



GOVERNMENT OF ANDHRA PRADESH
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RFP No. APBiL/ABP/2026/001, dated: 14/05/2026

Request for Proposal for
Development (Creation, Upgradation and Operations & Maintenance)
of
Middle mile network of BharatNet
on
Design Build Operate and Maintain (DBOM) Model
and
Operations & Maintenance of the APSFL Phase – I Network

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Disclaimer

The information contained in this Request for Proposal document ("RFP" or "Tender") including any information subsequently provided to the bidders, ("bidder/s") verbally or in documentary form by Andhra Pradesh BharatNet Infrastructure Limited (APBIL) or any of its employees or advisors, shall at all times be subject to the terms and conditions set out in this Tender document (as may be amended only by APBIL from time to time).

This RFP is not an agreement and is not an offer to any party. The purpose of this RFP is to provide the bidders or any other person with information to formulate their offers ("Bid"). This RFP includes statements, which reflect various assumptions and assessments arrived at by APBIL in relation to this scope. This Tender document does not purport to contain all the information each bidder may require. This Tender document may not be appropriate for all persons, and it is not possible for the CEO, APBIL and their employees or advisors to consider the objectives, technical expertise and particular needs of each bidder. The assumptions, assessments, statements and information contained herein are made considering the intended objectives of the project, and may not be complete, accurate or adequate. Each bidder must therefore conduct their own analysis of the information contained in this RFP and seek professional advice from appropriate sources.

Information provided in this Tender document to the bidder is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. APBIL accepts no responsibility for the accuracy or otherwise for any interpretation of opinion on law expressed herein.

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The issue of this tender document does not imply that APBIL is bound to select a bidder or to appoint the selected bidder (as defined hereinafter), for supporting implementation of the project. APBIL reserves the right to reject all or any of the bidders or Bids without assigning any reason whatsoever.

The bidder shall bear all the costs associated with or relate to the preparation and submission of Bid pertaining to this RFP including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations, which may be required by. All such costs and expenses will remain with the bidder and APBIL shall not be liable in any manner whatsoever for the same, regardless of the conduct or outcome of the selection process

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SECTION – I: DETAILED NOTICE INVITING TENDER (DNIT)

DETAILED NOTICE INVITING TENDER

Tender No: APBIL/ABP/2026/001, Dated 14/05/2026

1. On behalf of Digital Bharat Nidhi (erstwhile USOF), Department of Telecommunications, Government of India, the Chief Executive Officer (CEO), Andhra Pradesh BharatNet Infrastructure Limited (APBIL) invites online digitally sealed open tenders, on rupee payment basis, from the Bidders in the tendering process through Notice Inviting Tender No: APBIL/ABP/2026/001, Dated 14/05/2026, for “RFP for Development (Creation, Upgradation and Operations & Maintenance) of Middle mile network of BharatNet on Design Build Operate and Maintain (DBOM) Model and Operations & Maintenance of the APSFL Phase – I Network”. The selected PIA shall be responsible for
 - **Construction** of IP-MPLS technology with ring topology across the unconnected Gram Panchayats (GP) and Block/Mandal locations across the state of Andhra Pradesh.
 - **Upgradation** of existing infrastructure from linear to IP-MPLS technology with ring topology across the Gram Panchayat (GP) and Block/Mandal locations which were connected in the BharatNet Phase-I network.
 - **Operation and Maintenance** of existing and the newly deployed BharatNet network infrastructure along with APSFL Network infrastructure for a period of 10 years.
 - **Upgrade and integrate** the existing Data Center & Disaster Recovery Network Operations Center of BharatNet network including the infrastructure created for connecting all the government institutions/organisations etc., with the APSFL Phase-I Network Operation Center along with the infrastructure created to establish a unified, centrally managed operational framework. The integrated environment shall enable consolidated OSS and BSS operations, unified NMS visibility, SLA driven O&M and seamless provisioning and management of services like FTTH, IBB, ILL, P2P leased lines, MPLS VPN and future service expansions. The end-to-end **unified network architecture** shall be comprehensively planned, implemented, tested, demonstrated and commissioned to APBIL, ensuring that the complete infrastructure function as a single cohesive network to support future retail, enterprise business expansion throughout the contract period.
 - **On demand Village Connectivity** from nearby Gram Panchayats to develop infrastructure for service provisioning at village level.
 - The selected PIA shall conduct survey, evaluate and propose combined unified network design and submit HLD, LLD to APBIL. Post approval, the PIA shall integrate, test and commission the design post approval from IE.
 - All the DC, DR of BharatNet and APSFL NOC must function as a single unified network for all purpose of O&M, Upgradations and expansions and accordingly all the integrations must be planned, implemented, tested and demonstrated and commissioned to APBIL (BharatNet network means the combined network of BharatNet Phase-I, BharatNet Phase-II and newly created network under ABP).
 - The selected PIA must review the available existing Network architecture, HLD, LLD of BharatNet and APSFL network and submit a consolidated architecture diagram, HLD and LLD to APBIL/ APSFL for approval.
 - The PIA must submit the integration and implementation plan to APBIL/ APSFL.
 - The PIA must review the existing IP-schemas and come up with a combined IP-schema planning and submit the same to APBIL/ APSFL.

The details of information of both BharatNet and APSFL networks is tabulated as below:

TABLE A – BharatNet Infrastructure

Package No.	Name of State	No. of Blocks	No. of GPs					Total 24F OFC RKM (Laid) (Kms)		Estimated RKM to be laid (Kms)		Blocks
			GPs for upgradation (i)	GPs for creation (ii)	GPs already in Ring (iii)	GPs connected using Satellite (iv)	Total GPs (v)	Under Ground (I)	Overhead (II)	Under Ground (I)	Overhead (II)	To be created
Column 1	Column 2	Column 3	Column 4					Column 5		Column 6		Column 7
A	Andhra Pradesh	664	1,692	480	11,254	20	13,446	5,063	54,502	3,277	1,961	79

TABLE B – APSFL Phase-I Infrastructure

Package No.	Name of State	No. of PoPs (DHQ/ Zonal/ OLA/ Mandal PoP)	Total OFC RKM (Laid) (Kms)		
			24F OFC Overhead (I)	Last Mile connectivity 2F/ 6F/ 12F (II)	Under Ground (III)
Column 1	Column 2	Column 3	Column 4		
B	Andhra Pradesh	2,230	24,500	31,000	31

2. Accessibility of Tender/Bid Document: The Tender document for prospective bidders participating in the e-tender process shall be available for download from 12:00 hours on XX/05/2026 through the e-tender portal at www.apecprocurement.gov.in. The Tender document shall not be available for download on or after its submission/ closing date & time. For online bid submission etc., bidders have to mandatorily register (If not already registered). Kindly refer Section XIII of tender document for instructions on e-tendering.
3. The Bidder shall pay a sum of Rs 29,500/- (Rupees Twenty-Nine Thousand Five Hundred Only) i.e. Rs. 25,000 plus applicable GST @ 18%, through NEFT / RTGS / or any other online payment facility as applicable, towards cost of the Bidding Documents/ Tender Fee.

Note: -

- (i) The Tender Fee is non-refundable. The bidder shall pay the tender fee of Rs. 29,500/- (including GST) only.
- (ii) The Bidders shall also upload online payment receipt and / or transaction details for the payment of cost of Bidding Document in their Technical part of online bid.
- (iii) “The Public Procurement (Preference to Make in India) (PPP-MII) guidelines, issued vide No. P-45021/2/2017-PP (B.E.-II)-Part IV (Vol-II) dated 19.07.2024 and DoT Gazette Notification dated 21.10.2024, along with subsequent amendments, if any, shall be applicable to this tender.

Class-I & Class-II local and non-local bidders shall be eligible to participate in the tender. However, Preference shall be given to Class-I bidders as defined in the Public Procurement (Preference to Make in India) Order, 2017, as amended from time to time.

The bidder must source notified items mandatorily from Class-I local suppliers. The overall local content of bid shall be calculated as per Clause 2(e) of the DPIIT PPP-MII order, which states: "For contracts involving the supply of multiple items, the weighted average of all items shall be taken while calculating the local content."

- (iv) The bidder shall submit Form-1 (as per Annexure-VI) for overall local content of the total bid package, along with declaration specifying the local content of individual SOR items, failing which the bid is liable to be rejected. The declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the bidder is a company and by a practicing cost accountant or a chartered accountant for bidders other than companies.

At the time of bidding, the bidder is required to submit only a self-declaration regarding the local content of their products without disclosing the details mentioned in points (vi) to (xiii) of Form-I. These details must be maintained by the bidder in accordance with the conditions outlined in the DoT/DPIIT PPP-MII notification/order, as amended from time to time.

4. **Sale of hard copy of tender Document:** APBIL has decided to use process of e-tendering for inviting this tender, and so the hard copy of the tender document will not be available for sale.

5. **ELIGIBILITY CRITERIA:**

Please refer **Clause 2** of Section IV (Part-A) of tender document for Eligibility Criteria.

6. **Bid Security:**

- 6.1 The bidder shall furnish the EMD/ Bid Security, for an amount of **INR 10 Cr.** preferably through online payment mode as per the aforementioned APBIL Bank/Beneficiary details. However, Bid security may also be submitted in one of the following ways: -

- a) Demand Draft/Banker 's cheque drawn in favour of "The CEO, APBIL, Vijayawada" and payable at Vijayawada.
- b) Bank Guarantee from a Scheduled Bank in India (except from Co- operative banks), drawn in favour of "The CEO, APBIL, Vijayawada". It should be valid for 210 days from the tender opening date. Format for Bank Guarantee is given at Section-VIII.A.
- c) Insurance Surety Bond issued by an Insurance Company, approved by IRDAI, drawn in favour of "The CEO, APBIL, Vijayawada". It should be valid for 210 days from the tender opening date. Format for Bank Guarantee is given at Section-VIII.B.
- d) Bank Transaction details with UTR Number, towards the successful e-payment for Tender Fee & EMD, required to be mentioned in case of e-Payment Mode.
- e) Deleted

- 6.2 MSE (Micro & Small Enterprise) bidders are exempted from payment of Tender Fee/Bid Security provided they submit current and valid Udyam Registration Certificate (URC) issued from the Ministry of MSME. Udyam Registration Certificate (URC), submitted by MSE bidder in their online bid for claiming exemption from Tender Fee & Bid Security, must be current & valid on the date of opening of technical bid part. Micro and Small Enterprises (MSEs) registered under Udyam

Registration are eligible to avail the benefits under the policy. In case of bid by a Consortium, all the members of the Consortium should be MSE to avail the exemption from payment of Tender Fee/Bid Security.

6.3 Declaration/Updation of Udyam Registration on the AP e-Procurement Portal by MSE bidders is mandatory to avail benefits under the Public Procurement Policy for MSEs, 2012. Non-declaration shall render the bidder ineligible for such benefits. Medium Enterprises are not eligible for Tender Fee and EMD exemptions.

6.4 In case of Consortium, the Bid security shall be payable by the lead bidder only.

7. **Last Date & Time of Submission of Tender bid: 12/06/2026, by 15:00 Hrs.** In case the date of submission (opening) of bid is declared to be a holiday by Government of India, the date of submission (opening) of bid will get shifted automatically to next working day at the same scheduled time. Any change in bid opening date due to any other unavoidable reason will be intimated on e-Tendering portal.

8. Opening of Tender Bids: At **16:00** Hours on same day after bid closing time **i.e. 12/06/2026**. Place of opening of Tender bids: APBIL has adopted e-tendering process which offers a unique facility for Online Tender Opening Event (TOE). APBIL's Tender Opening Officers as well as authorized representatives of bidders can attend the Online Tender Opening Event (TOE) from the comfort of their offices. However, authorized representatives of bidders PIA, along with authorization form as per Section X, if desire so, can attend the TOE at APBIL Office, Address: 2nd Floor, INFOSIGHT building, NH-16 Service road, Tadepalle – 522501, Andhra Pradesh, where APBIL's Tender Opening Officers would be conducting online Tender Opening Event (TOE).

9. The bidder is required to submit his bid/offer documents for the tender enquiry online at the e-Tendering portal and offline documents as defined in Section IV Part A. Tender bids received after respective due date & time will not be accepted.

10. Incomplete, Ambiguous, Conditional, digitally unsealed tender bids will be rejected.

11. The CEO, APBIL reserves the right to accept or reject any or all tender bids without assigning any reason at any stage of the tender before awarding Letter of Intent/Award. He is not bound to accept the lowest bid in the tender.

12. The bidder shall furnish a declaration under his/her digital signature that no addition/deletion/ corrections have been made in the terms & conditions of downloaded tender enquiry document and bid is being submitted against tender enquiry document which is identical to the tender document appearing on E-tender Portal (www.apecurement.gov.in).

13. In case of any correction/addition/alteration/omission in the tender document by the bidder, the tender bid shall be treated as non-responsive and shall be rejected summarily. All documents submitted in the bid offer should be preferably in English. In case the certificate viz. experience, registration etc. is issued in a language other than English, the bidder shall attach an English translation of the same duly attested by the bidder & the translator, to be true copy in addition to the relevant certificate.

14. All computer-generated documents should be duly attested/signed by the authorized signatory of the bidder. However, PDF files with digital signatures on 1st page will be acceptable.
15. The Integrity Pact Program is applicable to this tender. The format of the Integrity Pact is provided in Section XIV of the tender document. To oversee the implementation of the Integrity Pact Program, Independent External Monitors (IEMs) have been appointed by APBIL.
16. The Date / time schedule for various activities is as mentioned below:

S. No.	Activity	Date
1	Issue of NIT and Accessibility of Tender document on AP e-Procurement Portal	14/05/2026
2	Pre-Bid meeting	26/05/2026
3	Last date & time of seeking clarifications (by email)	26/05/2026
4	Last Date & Time of submission of Bids(online)	12/06/2026
5	Opening of Tender Bids (Technical Part)	12/06/2026
6	Opening of Tender Bids (Financial Part) shall be informed separately through E-portal.	To be notified after technical bid opening.

17. The queries in respect of the Tender document, if any, can be submitted to abp-apbil@ap.gov.in, latest by 22/05/2026, 18:00 hrs. Any query received after this date will not be entertained.

SECTION –I A: TENDER INFORMATION

1. Type of tender: e-tender will be configured on AP e-Procurement Portal under this Tender Enquiry having following attributes:
 - (a) No. of Bid Submission Stages for tender: Single Stage
 - (b) No. of Envelopes for submission of Bids: Two Electronic Envelopes System
 - (c) E-reverse auction: NOT APPLICABLE

Note1: -The bidder shall submit Techno-commercial bid and financial bid simultaneously.

2. Bid Validity Period: **180 days** from the Tender opening date.
3. The tender offer shall contain two electronic envelopes viz. techno-commercial and financial envelope. The techno-commercial part/envelope will be opened first and then second electronic envelope consisting of financial bids will be opened for those bidders whose techno- commercial bids are found to be responsive.
 - a. **Techno-commercial envelope called 'Technical e-envelope'** shall contain scanned copies of the following, but not limited to, documents:-
 - (i) Bank Transaction details with UTR Number towards the successful e-payment for Tender Fee & EMD OR valid MSE (Micro or small Enterprise) certificate for claiming exemption, as the case may be.
 - (ii) DD/ Banker Cheque or Bank Guarantee or Insurance Surety Bond towards Tender Fee, EMD/Bid Security (if not submitted through e-payment mode) OR valid MSE (Micro or small Enterprise) certificate for claiming exemption, as the case may be.
 - (iii) Supporting Documents/clause by clause compliances as per detail in Annexure-III of the Tender document.
 - (iv) All required certificate(s)/ documents showing fulfilment of the eligibility criteria(s) stated in clause 2 of Section IV (Part-A) of the Tender document.
 - b. **Financial e- envelope** shall contain scanned copies of:
 - (i) Bid Form, duly filled and signed as per Section- VI
 - (ii) Price Schedule duly filled & signed both in PDF and Excel format as per Section-VII

A BoQ template (online template under financial bid at AP e-Procurement Portal for entering only the summary of financial quotes rates) shall also be prepared on AP e-Procurement Portal for each e-tender for bidder to enter its quoted values in financial bid part. This will only be a summary of price bid and is equivalent to "Read-out quoted rates" of any manual tendering process.

Note-2: In case there is any discrepancy between the information entered by bidder in the BoQ (template at AP e-Procurement Portal) and that as per the scanned copy of signed & stamped PDF document [price schedule (Section -VII)] uploaded by bidder on AP e-Procurement Portal, **then information as per the uploaded signed & stamped PDF document [Price schedule (Section-VII)] shall prevail over the information entered in the BoQ (template under financial bid at AP e-Procurement Portal).**

4. Instructions regarding offline submissions

1. Tender Fee & EMD is required to be submitted by the bidder **preferably through online payment mode** as per the Bank/Beneficiary Details provided in the Tender Enquiry document. In case of **MSE (Micro & Small Enterprise)** bidder, valid MSE Certificate /Udyam Registration certificate, broadly covering the tendered equipment/ services, for claiming exemption of Tender Fee / EMD shall be required to be submitted.

However, scanned copies of the following documents (which ever applicable) are to be **mandatorily uploaded** by the bidder in their online technical bid part (1st electronic Envelope i.e. Technical Envelope) on e-tender portal failing which the tender bid shall be archived unopened / rejected on e-tender portal at bid opening stage except in case the originals of these documents are already received on/before bid opening end date:

- (i) Bank Transaction details with UTR Number towards the successful e-payment for Tender Fee/EMD.
- (ii) DD/ Banker Cheque or Bank Guarantee or Insurance Surety Bond (if not submitted through e-payment mode).
- (iii) Valid MSE Certificate /Udyam Registration certificate, if claiming exemptions from Tender Fee/ EMD.

Moreover, **Originals** of Bank Instruments such as DD or EMBG or Insurance Surety Bond towards Tender Fee, EMD/Bid Security respectively **(if not submitted through e-payment mode)**, shall be submitted by bidder on any date before or **within 5 days** after bid submission end date to The CEO, APBIL, Vijayawada in a sealed envelope bearing the Tender number, Name of work, **failing which** the tender bid (if already opened on basis of scanned copies uploaded in 1st electronic Envelope i.e. Technical Envelope) **shall be rejected**.

2. During tender process, APBIL's tender inviting authority may require the bidder to produce **original copy** of any document such as **Power of Attorney, Integrity Pact, Bid Form, Consortium Agreement etc.** submitted as scanned copy in the technical bid part (1st electronic Envelope) on e-tender portal, **which the bidder will have to comply with**.

SECTION-II: GENERAL INSTRUCTIONS TO BIDDERS

1. DEFINITIONS

- (a) **"Advance Purchase Order (APO)/Advance work order (AWO)" or "Letter of Intent"** means the intention of APBIL to place the Purchase Order/ work order on the successful bidder.
- (b) **"Appointed Date"** means the date of signing of Agreement by the successful bidder after acceptance of APO and submission of Performance Security by the successful bidder.
- (c) **"Bid date"** means the date (the bid submission end date) up to which the bidder can submit online bids.
- (d) **"Bidder"** means the Company, who participates in this tender and submits its bid. In case of Consortium Bids, the Bidder will mean Lead bidder as well as Consortium Partner/s, if not otherwise specified.
- (e) **"Contract Price"** means the price payable to the Contractor under the purchase order/work order for the full and proper performance of its contractual obligations.
- (f) **"FAT"** means Final Acceptance Test or Acceptance Testing carried out by the Independent Engineer (IE)/ APBIL after successful completion of the PAT (Preliminary Acceptance Test) by PIA as per Acceptance Testing template duly approved by APBIL.
- (g) **"Fiber Maintenance Agency (FMA)"** means the Company executing the AMC works of the existing Network.
- (h) **"Firm Work Order"**: Firm work order means the individual work order under contract which will be issued to the contractor by The CEO, APBIL or his authorized representative on behalf of DBN after the survey report and BOQ approved by APBIL. However, the flexibility shall remain with respective The CEO, APBIL or his representative to further decide about the quantum of work in each firm order as per the local conditions. Accordingly, payment will be made for the works executed, goods supplied or/and services rendered based on the firm work order.
- (i) **"Independent Engineer"** means a Third-Party Agency appointed by APBIL for the Acceptance testing/ inspection of works, bill verification, dispute resolution etc as specified in Section -IV B.
- (j) **"Inspector"** means the designated official from APBIL.
- (k) **Deleted**
- (l) **"Project Implementation Agency (PIA)/ Contractor"** means the Company or Consortium of companies executing the works under the contract. The bidder will become PIA after acceptance of A.P.O.
- (m) **"Purchaser"** means APBIL on behalf of DBN, DoT.
- (n) **"Purchase Order/ work order"** means the order placed by APBIL on the PIA signed by APBIL on behalf of DBN, DoT including all attachments and appendices thereto and all documents incorporated by reference therein.
- (o) **"Successful Bidder(s)"** means the bidder(s) to whom work in this tender is awarded and the contract has been signed between the parties.

- (p) **"Supplier(s)"** means OEM, individual or firm who would supply the material to be procured by PIA to execute the project on turnkey basis under this contract.
- (q) **"Telecom Service Provider"** means any Telecom operator in India, who is licensed by the Department of Telecommunications (DOT), Government of India to provide telecom services to the general public or to the other DOT licensed Telecom operators. "Telecom Service Provider" also refers to any Telecom operator in other countries providing telecom services to general public of that country or to other telecom operators of the same country.
- (r) **Tender Inviting Authority- The CEO, Andhra Pradesh BharatNet Infrastructure Limited (APBIL), Vijayawada"** in the capacity of agent of DBN, DoT (Department of Telecommunications, Government of India) for the execution of this project, invites sealed tenders on behalf of DBN, DoT
- (s) **"Works"** means all the equipment, machinery, and/ or other materials and services which the PIA requires to deliver towards fulfilment of scope of work under this Tender
- (t) **"BharatNet Middle-mile network"** means the combined network of BharatNet Phase-I, BharatNet Phase-II and Amended BharatNet Program (ABP) (Network which is planned in this RFP for Upgradation of BharatNet Phase-I and creation of new GPs and Mandals) in the state of Andhra Pradesh, and the same will be termed and considered as BharatNet Network in the entire RFP document.
- (u) **"Unified Network"** means integration of combined network of BharatNet Phase-I, BharatNet Phase-II, ABP and APSFL Phase-I network.
- (v) **"Good Industry Practice"** means compliance with the latest applicable standards such as ISO 9001, TEC GRs, IEC 60794, ITU-T/IEEE guidelines, and OEM best practices.

2. ELIGIBLE BIDDER

Refer **clause 2** of **Section IV-A** for Eligibility Criteria.

3. COST OF BIDDING

- 3.1** The bidder shall bear all costs associated with the preparation and submission of the bid. APBIL will, in no case, be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

4. BID DOCUMENTS

- 4.1** The works required to be executed by agency, bidding procedures and contract terms and conditions are as prescribed in the Bid Documents. The Bid documents include:

- (a) Notice Inviting Tender
- (b) General Instructions to Bidders
- (c) General (Commercial) Conditions of Contract
- (d) Special Instructions to Bidders and Eligibility Conditions
- (e) Special (Commercial) Conditions of Contract, if any
- (f) Special (Technical) Conditions of Contract and Technical Specifications
- (g) Bid Form

- (h) Price Schedules
 - (i) Bid security /Performance Security Bond Forms
 - (j) Letter of authorization to attend bid opening
- 4.2 The Bidder is expected to examine all instructions, forms, terms and specifications in the Bid Documents and clarifications/ amendments/ addenda, if any. **Failure to furnish all information required as per the Bid Documents or submission of the bid not substantially responsive to the Bid Documents in every respect, will be at the bidder's risk and may result in rejection of the bid.**
- 5. **CLARIFICATION OF BID DOCUMENTS**
 - 5.1 Refer Clause No. 8 of Section IV-A.
 - 5.2 Any clarification issued by APBIL, through e-tendering portal, in response to query raised by prospective bidders shall form an integral part of bid documents and it may amount to an amendment of relevant clauses of the bid documents.
- 6. **AMENDMENT OF BID DOCUMENTS**
 - 6.1 At any time, prior to the date of submission of Bids, APBIL may on behalf of DBN, DoT, for any reason, whether at its own initiative or instruction of DBN, DoT or otherwise in response to a clarification requested by a prospective bidder, modify bid documents by amendments.
 - 6.2 The amendments shall be notified in writing through APBIL tender website/e-tendering portal to all prospective bidders and these amendments will be binding on them.
 - 6.3 In order to afford prospective bidders a reasonable time to take the amendment into account in preparing their bids, APBIL may, at its discretion, extend the deadline for the submission of bids suitably.
- 7. **DOCUMENTS TO BE SUBMITTED IN THE BID**
Refer Clause no. 4 of Section IV-A
- 8. **BID FORM**
 - 8.1 The bidder shall complete the bid form and appropriate Price Schedule furnished in the Bid Documents, indicating the goods & services to be supplied, brief description of the goods & services, quantity and prices as per Section VI and VII.
- 9. **BID PRICES**
 - 9.1 Bids would be evaluated on the basis of the lowest assessed Bid Price (the “Bid Price”) including GST. The Bid Price shall be as per Section-VII – Table 1E.
 - 9.2 The bidder shall give unit price against the Material/services it proposes to supply under the contract as per the price schedule given in Section VII. The offer shall be firm in Indian Rupees. No Foreign exchange will be made available by APBIL.
 - 9.3 Prices indicated in the Price Schedule shall be entered in the following manner:
 - (a) Deleted
 - (b) The contractor shall quote as per price schedule given in Section VII for all the items given in schedule of requirement.
 - 9.4 A bid submitted with an adjustable price quotation will be treated as non-responsive and rejected.

9.5 Deleted

9.6 The price approved by APBIL on behalf of DBN, DoT for execution of works will be exclusive of taxes as mentioned in clause 9.2 subject to other terms and condition as stipulated in clause 12 of Section III of Bid- document.

10. DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATION

10.1 The bidder shall furnish, as part of the bid documents establishing the bidder's eligibility, the following documents or whichever is required as per terms and conditions of Bid Documents.

- (a) Certificate of Incorporation.
- (b) Article or Memorandum of Association or partnership deed or proprietorship deed as the case may be.
- (c) Deleted
- (d) Approval from Reserve Bank of India/ SIA in case of foreign collaboration as per relevant guidelines of Govt. of India.
- (e) Latest and valid MSEs (MICRO & SMALL ENTERPRISES) Certificate from designated bodies under ministry of Micro, Small & Medium Enterprises, if applicable to bidder.
- (f) Type Approval Certificate given by Telecom Engineering Centre (TEC)/ TSEC issued by the Quality Assurance Circle of BSNL or proof of having applied for TAC/ TSEC (Copy of Form-B/ Form QF-103 be attached) (**if applicable**).
- (g) Undertaking duly signed by lead bidder and its consortium partner(s) stating that all of them shall be liable for due performance of the contract jointly and severally as per clause 12.4(d) (if applicable).
- (h) Power of Attorney as per clause 14.4 (a) and (d) and authorization for executing the power of Attorney as per clause 14.4 (b) or (c).
- (i) List of all Directors including their name(s), Director Identification Number(s) (DIN) and address (es) along with contact telephone numbers and mobile numbers of office and residence.
- (j) Certificates from all Directors of the bidder stating that none of their near relatives are working in APBIL in accordance with clause 34.
- (k) Additional documents to establish the eligibility and qualification of bidder as specified in Section-IV-A, IV-B and IV-C.

10.2 Deleted

10.3 In order to enable the Purchaser to assess the proven performance of the system offered, the bidder shall provide documentary evidence regarding the system being offered by it.

10.4 The offered product has to be type approved. For this purpose, the supplier/OEM shall submit a sample type for evaluation to IE/ Any other agency nominated by APBIL. The sample would be evaluated for its ability to meet the technical specifications, manufacturability, reliability, testability, ease of installation, maintainability etc. Necessary documents to substantiate these attributes will have to be submitted at the time of application for approval by the supplier for obtaining type approval. In case goods offered have already been type approved/ validated by the Purchaser, documentary evidence to this effect shall be submitted by the bidder. In case the

product is not type approved, the bidder can submit registered QF-103 (acceptance of registration by APBIL for TSEC application)/ Form-B (acceptance of registration by TEC for TAC application) at the time of bidding. However, the bidder has to get the TSEC/ TAC before supply of the product(s).

- 10.5 A signed undertaking from Authorized Signatory of the bidder certifying that all components/ parts/ assembly/ software used in the Desktops and Servers like Hard disk, Monitors, Memory etc. shall be original, new components/ parts/ assembly/ software and that no refurbished/ duplicate/ second hand components/ parts/ assembly/ software are being used or shall be used.
- 10.6 For supply of any software i.e. operating system or any applications software the bidder should submit a Certificate Of Authenticity (COA), issued by the respective OEM and duly signed by Authorized Signatory of the bidder stating that all Software supplied are authentic and legal copy is/are being supplied.

11. DOCUMENTS ESTABLISHING GOOD'S CONFORMITY TO BID DOCUMENTS

- 11.1 Pursuant to clause 7 above, the bidder shall furnish, as part of its bid, documents establishing the conformity of its bid to the Bid Documents of all goods and services which it proposes to supply under the contract.
- 11.2 The documentary evidence of the "goods and services" conformity to the Bid Documents, may be, in the form of literature, drawings, data etc. and the bidder shall furnish:
 - (a) A detailed description of goods with essential technical and performance characteristics.
 - (b) A list, giving full particulars including available sources of all spare parts, special tools, etc., necessary for the proper and continuous functioning of the goods for a period of ten years following commencement of use of the goods by the purchaser, and
 - (c) A clause-by-clause compliance on the purchaser's Technical Specifications and Commercial Conditions demonstrating substantial responsiveness to the Technical Specifications, Commercial Conditions and Special Conditions. A bid without clause- by-clause compliance of the Technical Specifications (Section IV-C), Commercial Conditions (Section III) and Special Conditions (Section IV) shall be considered as non-responsive.

12. BID SECURITY

- 12.1 The bidder shall furnish, as part of its bid, a bid security as per Clause 7 of Section-I.
- 12.2 The bid security form is required to protect APBIL against the risk of bidder's conduct.
- 12.3 A bid not secured in accordance with para 12.1 shall be rejected by APBIL being non-responsive at the bid opening stage.
- 12.4 The necessary action shall be taken in case of following
 - (a) If the bidder withdraws or amends its bid or impairs or derogates from the bid in any respect during the period of bid validity specified by the bidder in the Bid form or extended subsequently, or
 - (b) In the case of successful bidder, if the bidder fails:
 - i) to sign the contract in accordance with clause 28 or
 - ii) to furnish performance security within the specified time in accordance with clause 27.

- (c) In both the above cases, i.e. 12.4 (a) & (b), the bidder may also be suspended for a period of 3 years starting from the date of act as stated therein, from being eligible to submit the bids for Contract with APBIL.
- (d) The sole bidder or all the members of the consortium as the case may be, shall submit an irrevocable undertaking duly signed by it stating that the bidder shall be liable for due performance of the contract, failing which it shall be liable to be barred from having any business dealing with APBIL for a period of three years.

13. PERIOD OF VALIDITY OF BIDS

- 13.1 Bid shall remain valid for 180 days from the date of opening of bids prescribed by APBIL pursuant to clause 19.1. **A bid valid for a shorter period shall be rejected by APBIL being non- responsive, if bidder does not amend it on being pointed out by APBIL.**

In exceptional circumstances, APBIL may request the consent of the bidder for an extension to the period of bid validity. The request and the response thereto shall be made in writing. **A bidder accepting the request and granting extension will not be permitted to modify its bid. However, bidder may not agree to the above request without risk of forfeiting the EMD.**

14. FORMAT AND SIGNING OF BID

- 14.1 Deleted

- 14.2 The Bid shall be typed or printed, and all the pages numbered consecutively and shall be signed by the bidder or a person or persons duly authorized to bind the bidder to the contract. The letter of authorization shall be indicated by written power-of-attorney accompanying the bid. All pages of the original bid, except for un-amended printed literatures, shall be digitally signed by the person or persons signing the bid. In addition, the experience certificates have to be counter-signed by the bidder before uploading. The bids submitted shall be sealed properly, which are to be submitted as per the RFP.

- 14.3 The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the bidder in which case such corrections shall be signed by the person or persons signing the bid.

14.4 Power of Attorney

- (a) The power of Attorney should be submitted and executed on the non-judicial stamp paper of appropriate value as prevailing in the respective states(s) and the same be attested by a Notary public or registered before Sub-registrar of the state(s) concerned.
- (b) The power of Attorney be executed by a person who has been authorized by the Board of Directors of the bidder in this regard, on behalf of the Company/institution/ Body Corporate.
- (c) Deleted
- (d) In case, the bidder is a consortium, all the members of consortium shall execute a power of attorney in favour of the said authorized signatory.
- (e) Attestation of the specimen signatures of such authorized signatory who issues PoA for the bid by the Company's/ firm's bankers shall be furnished. Name, designation, Phone number, mobile number, email address and postal address of the authorized signatory shall be provided.

- (f) In case the Authorized signatory of Bidder is already holding a Power of Attorney to sign bids in all the tenders, then such PoA shall be accepted, subject to compliance of the clause 14.4.d above and verification of the original document as and when required by APBIL.

15. SEALING AND MARKING OF BIDS

- 15.1 Bids have to be submitted online only. In addition, some documents have to be submitted off-line in accordance with relevant instructions of this document (refer Section-XIII)
- (a) The envelope for offline submission shall be addressed to APBIL at the address mentioned in this document.
 - (b) The envelope shall bear (the project name), the tender number and the words 'DO NOT OPEN BEFORE' (due date & time).
 - (c) The envelope shall indicate the name and address of the bidders to enable the documents to be returned unopened in case it is declared 'late' or rejected.
 - (d) The responsibility for ensuring that the tenders are delivered in time would vest with the bidder.
 - (e) Offline documents delivered in person shall be delivered as per 2.4 of Section I-A. APBIL shall not be responsible if the bids are delivered elsewhere.
 - (f) Venue date and time of tender opening as mentioned in the Notice Inviting Tender (NIT) i.e. Section-I. If due to administrative reasons, the venue, date or time of Bid opening is changed, it will be displayed prominently on notice board and also on APBIL website.
- 15.2 If the envelope for offline submission are not sealed and marked as required at para 15.1 and Clause no. 2 of Section IV-A, the bid shall be rejected

16. SUBMISSION OF BIDS

- 16.1 Bids must be received by APBIL online as per instructions in relevant sections of this document not later than the specified date and time indicated in the **Detailed NIT (Section-I)**. The bidder is required to submit the bid online at the e-tender portal. Tender bids received after due time & date will not be accepted. Offline submission of bids would not be accepted and only the documents mentioned in relevant instructions of this document shall be submitted offline.
- 16.2 APBIL may, at its discretion, extend this deadline for the submission of bids by amending the Bid Documents in accordance with clause 6 above in which case all rights and obligations of APBIL and bidders previously subject to the deadline will thereafter be subjected to the deadline as extended.
- 16.3 The bidder shall submit its bid offer against a set of bid documents purchased by him for the entire package. Bid not submitted for the entire package will be rejected being non- responsive.

17. LATE BIDS

No bid shall be received by APBIL (online/offline) after the deadline for submission of bids prescribed by APBIL pursuant to **clause 16**.

18. MODIFICATIONS AND WITHDRAWAL OF BIDS

18.1 The bidder may modify, revise or withdraw its bid after submission prior to the deadline prescribed for submission of bid.

18.2 Subject to **clause 20**, no bid shall be modified subsequent to the deadline for submission of bids.

19. OPENING OF BIDS BY APBIL

19.1 APBIL shall open bids online in the presence of bidders or their authorized representatives who chose to attend, at the time specified in the Detailed NIT (**Section-I**). The bidder's representatives, who are present, shall sign in an attendance register. Authority letter to this effect shall be submitted by the bidders before they are allowed to participate in bid opening (A Format is given in **Section X**).

19.2 A maximum of two representatives of any bidder shall be authorized and permitted to attend the bid opening.

19.2.1 The bids will be opened in 2 stages i.e. the techno-commercial (Qualification) bid shall be opened on the date of tender opening given in NIT. The financial bid will not be opened on the Date of opening of techno commercial bids.

19.2.2 The financial bids of those bidders who are techno-commercially responsive will be considered for opening, subject to conditions as mentioned in **Section IV Part A**. The Date and Time of opening of financial bid will be intimated through e-portal.

19.3 The bidder's names, modifications, bid withdrawals and such other details as APBIL, at its discretion, may consider appropriate will be announced/ displayed on e-tender portal, at the time of opening

19.4 The date fixed for opening of bids, if subsequently declared as holiday by APBIL, the revised date of schedule will be notified. However, in absence of such notification, the bids will be opened on next working day, time and venue remaining unaltered.

20. CLARIFICATIONS OF BIDS SUBMITTED BY THE BIDDERS

20.1 To assist in the examination, evaluation and comparison of bids, APBIL may, at its discretion ask the bidder for the clarification of its bid. The request for the clarification and the response shall be in writing. However, no post bid clarification at the initiative of the bidder shall be entertained.

21. PRELIMINARY EVALUATION

21.1 APBIL on behalf of DBN, DoT shall evaluate the qualification bids submitted online as defined in **Section IV-A** and **Annexure-III** to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed and whether the bids are generally in order.

21.2 Arithmetical errors shall be rectified on the following basis. If there is a discrepancy between the unit price and total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected by APBIL. If there is a discrepancy between words and figures, the amount in words shall prevail. If the bidder

does not accept the correction of the errors, its bid shall be rejected. However, any discrepancy between the required and quoted quantities will not be considered as arithmetical errors and will be evaluated by loading of bids (if quantities quoted are lower than that put to tender).

- 21.3 Prior to the detailed evaluation pursuant to clause 22, APBIL will determine the substantial responsiveness of each bid to the Bid Document. For purposes of these clauses, a substantially responsive bid is one which conforms to all the terms and conditions of the Bid Documents without material deviations. APBIL's determination of bid's responsiveness shall be based on the contents of the bid itself without recourse to extrinsic evidence.
- 21.4 A bid determined as substantially non-responsive will be rejected by APBIL and shall not subsequent to the bid opening be made responsive by the bidder by correction of the non-conformity.
- 21.5 APBIL may waive any minor infirmity or non-conformity or irregularity in a bid which doesn't constitute a material deviation, provided such waiver doesn't prejudice or affect the relative ranking of any bidder.

22. EVALUATION AND COMPARISON OF SUBSTANTIALLY RESPONSIVE BIDS

- 22.1 APBIL shall evaluate in detail and compare the bids, previously determined to be substantially responsive pursuant to clause 21.
 - (a) The evaluation and comparison of responsive bids shall be done on total cost (i.e. Combined values of the both the packages exclusive of applicable taxes) basis on the prices of the Material/ services offered as indicated in the price schedule in the Section VII of the Bid document after arithmetic correction in the manner laid down herein above. Taxes claimed by vendor shall be supported by GST compliant Challans / Invoices at the time of claim for payment. It is clarified that GST will be reimbursed on actual basis subject to quoting in the bid as per prescribed rates except for the changes in GST rates during the original delivery schedule.

23. CONTACTING APBIL

- 23.1 Subject to **Clause 20**, no bidder shall try to influence APBIL on any matter relating to its bid, from the time of the bid opening till the time the contract is awarded.
- 23.2 Any effort by a bidder to modify its bid or influence APBIL in APBIL's bid evaluation, bid comparison or contract award decision shall result in the rejection of the bid.

24. PLACEMENT OF ORDER

- 24.1 APBIL shall consider placement of orders for commercial works execution only on those eligible bidders whose offers have been found technically, commercially and financially acceptable and whose services /goods have been type approved/ validated (wherever applicable) by APBIL. **APBIL reserves the right to counteroffer price(s) against price(s) quoted by any bidder.**
- 24.2 The ordering price of any bidder shall not exceed the lowest evaluated price.
- 24.3 APBIL reserves the right for the placement of order of entire tendered quantity separately for each package on the bidder with the lowest evaluated price.

25. APBIL'S RIGHT TO VARY QUANTITIES

- (a) APBIL on behalf of DBN, DoT will have the right to increase or decrease up to 25% of the overall

quantity of works specified in the schedule of requirements, without any change in the unit price or other terms and conditions at the time of issue of AWO, which shall be binding on bidders. However, the quantities can vary beyond 25% based on the exact requirement projected after the survey by PIA and payment shall be made only for the actual work executed.

- (b) Additional quantities up to **50%** of works contained in the running tender/ contract can be ordered during the contract execution stage or within a period of twelve months (earliest one) from date of commissioning of 90% of GPs (and 100% blocks) at the same rate or a rate negotiated (downwardly) with the existing contractors considering the reasonability of rates based on prevailing market conditions and the impact of reduction in taxes and material/services to be obtained within time period scheduled afresh.
- (c) In exceptional situation where the requirement is of an emergent nature and it is necessary to ensure continued works from the existing contractors, APBIL reserves the right to place repeat order up to 100% of the quantities of material/ services contained in the running tender/ contract during the contract execution stage or within a period of twelve months from the date of completion of project at the same rate or a rate negotiated (downwardly) with the existing contractors considering the reasonability of rates based on prevailing market conditions and the impact of reduction in duties and taxes etc.
- (d) APBIL will have full power to accord internal approval to procure any equipment/ material in any quantity by any means in the exigencies of services and interest of APBIL.
- (e) The Work Orders shall be issued for the quantities finalized through surveys, approved by APBIL. The Work Order quantities shall not be related to Advance Work Order quantities in any manner. The Quantity variation clauses- 25.(a) to 25.(d) of Section-II shall be applicable on the basis of total of quantities mentioned in all the Work Orders issued based on actual quantities as per survey.

26. APBIL'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

- 26.1 APBIL on behalf of DBN, DoT reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of contract without assigning any reason whatsoever and without thereby incurring any liability to the affected bidder or bidders on the grounds of APBIL's action. The bidder shall have no claim of any nature whatsoever on APBIL for period prior to signing of contract. The bidder will not be entitled to any sums in the event any work is carried out by the bidder after issue of APO in the event the contract is not signed.

27. ISSUE OF ADVANCE PURCHASE/ WORK ORDER

- 27.1 The issue of an Advance Purchase/ work Order shall constitute the intention of APBIL as an agent of DBN to enter into contract with the bidder. It is clarified that issue of Separate APO/WO does not mean that APBIL is bound to issue purchase/work order.
- 27.2 The bidder shall within 14 working days of issue of the advance purchase/work order, shall give its acceptance along with performance security (PBG or insurance security bond) in conformity with proforma enclosed in section IX (A) provided with the bid document. Non-submission of acceptance and PBG in the prescribed period will automatically result in withdrawal of APO or levy of penalty, along with other actions w.r.to. EMD/ business

banning etc. unless the period of acceptance is extended by APBIL subsequently. In case, the extension is given by APBIL, the period of extension may lead to commensurate reduction in delivery timelines. The extension by APBIL shall be in writing only.

28. SIGNING OF CONTRACT

- 28.1. After submission of acceptance of APO/ AWO along with performance security; separate Agreement for Package A and Package B, signed between the successful bidder and APBIL Corporate Office (on behalf of DBN, DoT for Package A and GoAP for Package B), shall constitute the award of contract to the successful bidder. Format of the Agreement is available at Annexure-XV.
- 28.2. After signing of agreement, Purchase Order(s)/ Work Order(s) shall be issued to the successful bidder (PIA) by the APBIL.

29. ANNULMENT OF AWARD

- 29.1 Failure of the successful bidder(L1) to comply with the requirement of clauses 27 & 28 shall constitute sufficient ground for the annulment of the award and the forfeiture of the bid security in which event APBIL may call L2 Bidder to match the price of L1. If L2 agree to match the price of L1, tenderer may award the contract. The same process may be followed for remaining qualified Bidders or call for new bids.

30. DELETED

31. REJECTION OF BIDS

- 31.1 While all the conditions specified in the Bid documents are critical and are to be complied, special attention of bidder is invited to the following clauses of the bid documents. Non-compliance of any one of which shall result in rejection of the bid.
- a) Clauses 12.1 of Section II: The bids will be rejected at opening stage if Bid security is not submitted as per Clauses 12.1.
 - b) Clause 2 & 10 of Section II: If the eligibility condition as per clause 2 of Section II is not met and/ or documents prescribed to establish the eligibility as per Clause 10 of section II are not enclosed, the bids will be rejected without further evaluation.
 - c) Clause 11.2 (c) of Section II: If clause-by-clause compliance and Nil deviation statements as prescribed are not given, the bid will be rejected at the stage of primary evaluation.
 - d) Section III General Commercial conditions, Section IV-A Special Instructions to Bidders, Section IV-B Special (Commercial) Conditions of Contract & Section IV-C Special (Technical) Conditions of Contract and Technical Specifications: Compliance if given using ambiguous words like "Noted", "Understood", "Noted & Understood" shall not be accepted as complied. Mere "Complied" will also be not sufficient, reference to the enclosed documents showing compliances must be given.
 - e) Section VII Price Schedule: Prices are not filled in as prescribed in price schedule.
- 31.2 Before outright rejection of the Bid by Bid-opening team for non-compliance of any of the provisions mentioned in clause 31.1 of Section II, the bidder company should be given opportunity to explain their position, however if the person representing the company is not satisfied with the decision of the Bid opening team, he/ they can submit the representation to

the Bid opening team immediately but in no case after closing of the tender process with full justification quoting specifically the violation of tender condition if any

- 31.3 Bid opening team will not return the bids submitted by the bidders on the date of tender opening even if it is liable for rejection and will preserve the bids in sealed cover as submitted by taking the signatures of representatives of the participating bidder/ companies present on the occasion
- 31.4 The in-charge of Bid opening team will mention the number of bids with the name of the company found unsuitable for further processing on the date of tender opening and number of representations received in Bid opening Minutes and if Bid opening team is satisfied with the argument of the bidder/ company mentioned in their representation and feel that there is prima- facie fact for consideration, the in-charge of the bid opening team will submit the case for review to competent authority as early as possible preferably on next working day and decision to this effect should be communicated to the bidder company within a week positively. Bids found liable for rejection and kept preserved on the date of tender opening will be returned to the bidders after issue of P.O. against the instant tender.

32. APBIL'S RIGHT TO DISQUALIFY

- 32.1 APBIL on behalf of DBN, DoT reserves the right to disqualify the bidder for a suitable period who had on previous occasion(s) failed to execute/complete the works in time. Further, the bidders whose work does not perform satisfactory in the field in accordance with the specifications may also be disqualified for a suitable period as decided by APBIL.

33. APBIL'S RIGHT TO BAN BUSINESS DEALINGS

- 33.1 APBIL reserves the right to ban business dealings with a bidder for a suitable period in case the bidder fails to honour its bid without sufficient grounds (also refer Appendix-I to Section II).

34. NON-RELATIONSHIP CERTIFICATE

- 34.1 The bidder should give a certificate that none of his/her near relative is working in APBIL or he may give list of near relatives employed in the APBIL. In case of proprietorship firm, certificate will be given by the proprietor. For partnership firm, certificate will be given by all the partners. In case of limited company, certificate will be given by all the Directors of the company excluding Government of India/ Financial institution nominees and independent non-Official part time Directors appointed by Govt. of India or the Governor of the state and full time Directors of PSUs, both state and central. In case of consortium all the partners/ directors of consortium shall give non-relationship certificate as above.
- 34.2 Due to any breach of these conditions by the company or firm or any other person the tender will be cancelled and bid security will be forfeited at any stage whenever it is noticed and APBIL will not pay any damage to the company or firm or the concerned person. The company or firm or the person will also be debarred for further participation in the concerned unit.
- 34.3 The near relatives for this purpose are defined as: -
 - a) Members of a Hindu undivided family.
 - b) They are husband and wife.

- c) The one is related to the other in the manner as father, mother, son(s) & Son's wife (daughter in law), Daughter(s) and daughter's husband (son in law), brother(s) and brother's wife, sister(s) and sister's husband (brother-in-law).

34.4 The format of the certificate to be given is "I..... s/o.....r/o hereby certify that none of my relative(s) as defined in the tender document is/ are employed in APBIL unit as per details given in tender document. In case at any stage, it is found that the information given by me is false/ incorrect, APBIL shall have the absolute right to take any action as deemed fit/without any prior intimation to me."

35. VERIFICATION OF DOCUMENTS AND CERTIFICATES

35.1 The bidder will verify the genuineness and correctness of all documents and certificates, including experience/ performance certificates, issued either by the bidder or any other firm/ associate before submitting them in the bid. **The onus of proving genuineness of the submitted documents would rest with the bidder.**

35.2 As per requirement of the tender's conditions, if any document/ paper/ certificate submitted by the participant bidder is found to be false/ fabricated/ tempered/ manipulated at any stage during bid evaluation or award of contract, then the bid security of the bidder would be forfeited, and the bidder would be disqualified from the tender. Action would also be taken for banning of business dealing with the defaulting firm. In case contract has already been awarded to the bidder, then PBG, would be the bidder will verify the genuineness and correctness of all documents and certificates, including experience/ performance certificates, issued either by the bidder or any other firm/ associate before submitting them in the bid. The onus of proving genuineness of the submitted documents would rest with the bidder.

Appendix-1 to Section II

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
1(a)	Submitting fake / forged	i) Rejection of tender bid of respective Vendor.
	a) Bank/Insurance surety bond Instruments with the bid to meet terms & condition of tender in respect of tender fee and/ or EMD;	ii) Banning of business up to 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL up to 3 years from date of issue of banning order.
	b) Certificate for claiming exemption in respect of tender fee and/ or EMD;	
	c) Bank Guarantee/ Insurance surety bond Instruments submitted towards performance security or any type of security.	iii) Termination/ Short Closure of APO/ PO/WO, if issued. This implies non-acceptance of further supplies / work & services except to make the already

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
	and detection of default at any stage from receipt of bids till award of APO/ issue of PO/WO.	received material work/ complete work in hand. iv) EMD, if submitted, shall also be forfeited, in case of default at para (c).
	Note 1: - Payment for already received supplies/ completed work shall be made as per terms & conditions of PO/ WO.	
1(b)	Submitting fake/ forged documents towards meeting eligibility criteria such as experience capability, supply proof, registration with Goods and Services Tax, Income Tax departments and any other supporting documents towards other terms & conditions with the bid to meet terms & condition of tender	
	a) If detection of default is prior to award of APO	i) Rejection of Bid & ii) Forfeiture of EMD. iii) Banning of business for up to three years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL for up to three years from the date of issue of banning order.
	b) If detection of default after issue of APO but before receipt of PG/ SD (DD, BG etc.)	i) Cancellation of APO, ii) Rejection of Bid & iii) Forfeiture of EMD, if submitted. iv) Banning of business for up to three years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL for up to three years from the date of issue of banning order.
	c) If detection of default after receipt of PG/ SD (DD, BG etc.)	i) Cancellation of APO ii) Rejection of Bid & iii) Forfeiture of PG/ SD.

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
		<p>However, on realization of PG/ SD amount, EMD, if not already released, shall be returned.</p> <p>iv) Banning of business for up to three years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL for up to three years from the date of issue of banning order.</p>
	d) If detection of default after signing of Agreement/ issue of PO/ WO	<p>i) Termination/ Short Closure of PO/WO and Cancellation of APO</p> <p>ii) Rejection of Bid &</p> <p>iii) Forfeiture of PG/ SD.</p> <p>However, on realization of PG/ SD amount, EMD, if not already released, shall be returned.</p> <p>iv) Banning of business for upto three years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL for upto three years from the date of issue of banning order.</p>
	Note 2: - However, settle bills for the material received in correct quantity and quality if pending items do not affect working or use of supplied items.	
	Note 3: - No further supplies are to be accepted except that required to make the already supplied items work.	
2	If vendor or his representative uses violent/ coercive means viz. Physical / Verbal means to threaten APBIL Executive / employees and/ or obstruct him from functioning in discharge of his duties & responsibilities for the following:	Banning of business for 3 years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL for 3 years from date of issue of banning order.

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
	a) Obstructing functioning of tender opening executives of APBIL in receipt/ opening of tender bids from prospective Bidders, suppliers/ Contractors.	
	b) Obstructing/ Threatening other respective bidders i.e. suppliers/ Contractors from entering the tender venue and/ or submitting their tender bid freely.	
3	Non-receipt of acceptance of APO/ AWO and SD/ PG by L-1 bidder within time period specified in APO/ AWO.	Forfeiture of EMD and banning of business, including a ban on participation in APBIL tenders, for a period of 1 year from date of issue of banning order.
4.1	Failure to supply and/ or Commission the equipment and /or execution of the work at all even in extended delivery schedules, if granted against PO/ WO.	i) Termination of PO/ WO. ii) Undertake purchase/ work at the risk & cost of defaulting vendor. iii) Recover the excess charges if incurred from the PG/ SD and outstanding bills of the defaulting Vendor.
4.2	Failure to supply and/ or Commission the equipment and /or execution of the Work in full even in extended delivery schedules, if granted against PO/ WO.	i) Short Closure of PO/ WO to the quantity already received by and/ or commissioned in APBIL and/ or in pipeline provided the same is usable and/or the Vendor promises to make it usable. ii) Undertake purchase/ work for balance quantity at the risk & cost of defaulting vendor. iii) Recover the excess charges if incurred from the PG/ SD and outstanding bills of the defaulting Vendor.
5.1	The equipment supplied does not perform satisfactory in the field in accordance with the specifications mentioned in the PO/ WO/Contract.	i) If the material is not at all acceptable, then return the non-acceptable material (or its part) & recover its cost, if paid, from the o/s bills/ PG/ SD.

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
		<p>OR</p> <p>ii) If the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee.</p> <p>Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD.</p>
5.2	Major quality problems (as established by a joint team / committee of User unit(s) and IE) / performance problems and non-rectification of defects (based on reports of field units and IE).	<p>i) If the material is not at all acceptable, then return the non-acceptable material (or its part) & recover its cost, if paid, from the o/s bills/ PG/ SD.</p> <p>OR</p> <p>ii) If the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee. Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD; and</p> <p>iii) Withdrawal of TSEC/ IA issued by IE.</p>
6	Submission of claims to APBIL against a contract	<p>i) Recovery of over payment from the outstanding dues of Vendor including EMD/ PG & SD etc. and by invoking 'Set off' clause 20 of Section III or by any other legal tenable manner.</p> <p>ii) Banning of Business for 3 years from date of issue of banning order or till the date of recovery of over payment in full, whichever is later.</p>
	(a) for amount already paid by APBIL.	
	(b) for Quantity in excess of that supplied by Vendor to APBIL.	
	(c) for unit rate and/ or amount higher than that approved by APBIL for that purchase.	

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
	Note 4: - The claims may be submitted with or without collusion of APBIL Executive/ employees.	
	Note 5: - This penalty will be imposed irrespective of the fact that payment is disbursed by APBIL or not.	
7	Network Security/ Safety/ Privacy: - If the vendor tampers with the hardware, software/ firmware or in any other way that:	i) Termination of PO/ WO. ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL for 3 years from date of issue of banning order. iii) Recovery of any loss incurred on this account from the Vendor from its PG/ SD/ O/s bills etc. iv) Legal action will be initiated by APBIL against the Vendor, if required.
	a) Adversely affects the normal working of APBIL equipment(s) and/ or any other TSP through APBIL.	
	b) Disrupts/Sabotages functioning of the APBIL network equipment such as NOC, DHQs, ZHQ, PoPs along with associated infrastructure etc., transmission equipment but not limited to these elements and/ or any other TSP through APBIL.	
	c) tampers with the billing related data/ invoicing/ account of the Customer/ User(s) of APBIL and/ or any other TSP(s).	
	d) hacks the account of APBIL Customer for unauthorized use i.e. to threaten others/ spread improper news etc.	
	e) undertakes any action that affects/ endangers the security of India.	
8	If the vendor is declared bankrupt or insolvent or its financial position has become unsound and in case of a limited company, if it is wound up or it is liquidated.	(i) Termination/ Short Closure of the PO/ WO. (ii) Settle bills for the quantity received in correct quantity and quality if pending items do not affect working or use of supplied items.

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
		<p>(iii) No further supplies are to be accepted except that required to make the already supplied items work.</p> <p>(iv) In case of turnkey projects, If the material is commissioned and is usable without any degradation of performance, then settle bills for the acceptable equipment/ material (or its part)</p> <p>(v) In case of turnkey projects, if the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or through a committee.</p> <p>(vi) Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD.</p>
9	In the event of the vendor, its proprietor, Director(s), partner(s) is / are convicted by a Court of Law following prosecution for offences involving moral turpitude in relation to the business dealings with APBIL.	<p>i) Termination/ Short Closure of the PO/ WO.</p> <p>ii) Settle bills for the material received in correct quantity and quality if pending items do not affect working or use of supplied items.</p> <p>iii) No further supplies are to be accepted except that required to make the already supplied items work.</p> <p>iv) In case of turnkey projects, If the material is commissioned and is usable without any degradation of performance, then settle bills for the acceptable equipment/ material (or its part).</p> <p>v) In case of turnkey projects, If the material is inducted in network & it is not possible to return it and/ or material is acceptable with degraded performance, the purchaser may determine the price for degraded equipment (Financial penalty = Price – price determined for degraded equipment) himself and/ or</p>

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
		through a committee. vi) Undertake recovery of financial penalty from outstanding dues of vendor including PG/ SD.
10	If the vendor does not return/ refuses to return APBIL's dues:	i) Take action to appoint Arbitrator to adjudicate the dispute.
	a) in spite of order of Arbitrator.	i) Termination of contract, if any. ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL from date of issue of banning order or till the date by which vendor clears the APBIL's dues, whichever is later. iii) Take legal recourse i.e. filing recovery suite in appropriate court.
	b) in spite of Court Orders.	i) Termination of contract, if any. ii) Banning of business for 3 years which implies barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL from date of issue of banning order or till the date by which vendor clears the APBIL's dues, whichever is later.
11	If the Central Bureau of Investigation/ Independent External Monitor (IEM) / Income Tax/Goods and Services Tax /Custom Departments recommend such a course	Take Action as per the directions of CBI or concerned department.
12	The following cases may also be considered for Banning of business:	i) Banning of business for 3 years which implies Barring further dealing with the vendor for procurement of Goods & Services including participation in future tenders invited by APBIL for 3 years from date of issue of banning order.
	a) If there is strong justification for believing that the proprietor, manager, MD, Director, partner, employee or representative of the	

Revised Appendix-1 to Section-II (General Instructions to Bidders)		
S. No.	Defaults of the bidder / vendor.	Action to be taken
A	B	C
	vendor/ supplier has been guilty of malpractices such as bribery, corruption, fraud, substitution of tenders, interpolation, misrepresentation with respect to the contract in question.	
	b) If the vendor/ supplier fails to execute a contract or fails to execute it satisfactorily beyond the provisions of Para 4.1 & 4.2 above.	
	c) If the vendor/ supplier fails to submit required documents/ information, where required.	
	d) Any other ground which in the opinion of APBIL is just and proper to order for banning of business dealing with a vendor/ supplier.	
	Note 6: The above penalties will be imposed provided it does not clash with the provision of other sections of this tender.	
	Note 7: -In case of clash between these guidelines & provision of other sections of this tender, the provision of other sections shall prevail over these guidelines.	
	Note 8: Banning of Business dealing order shall not have any effect on the existing/ ongoing works/ AMC / CAMC which will continue along with settlement of Bills.	

SECTION–III: GENERAL (COMMERCIAL) CONDITIONS OF CONTRACT

1. APPLICATION

- 1.1 The general condition shall apply in contracts made by APBIL for the execution of works.

2. STANDARDS

- 2.1 The works executed under this contract shall conform to the standards prescribed in the Technical Specifications mentioned in **Section IV-C**.

3. PATENT RIGHTS

- 3.1 The contractor shall indemnify APBIL against all third-party claims of infringement of patent, trademark or industrial design rights arising from use of the Service / goods or any part thereof in Indian Telecom Network.

4. PERFORMANCE SECURITY

- 4.1 All successful bidders [including MSEs (MICRO & SMALL ENTERPRISES) who are registered with Appropriate Authority under m/o MSME] shall furnish performance security to APBIL for an amount equal to 10% of the value of advance work order within 14 working days from the date of issue of Advance Purchase Order issued by APBIL on behalf of DBN, DoT. Selected bidder needs to submit separate PBG for Package A and Package B.
- 4.2 The proceeds of the performance security shall be payable to APBIL on behalf of DBN, DoT as compensation for any loss resulting from the contractor's failure to complete its obligations under the contract.
- 4.3 The performance security Bond shall be in the form of Bank Guarantee or insurance security bond issued by a nationalized/scheduled Bank or Insurance company approved by IRDA and in the form provided in 'Section IX-A' of this Bid Document. Validity of such BG shall be 1 year and 6 months. Validity shall be got extended by PIA as and when required to cover the periods of extension and be valid for six months beyond the date of such extensions.
- 4.4 The performance security Bond will be discharged by APBIL on behalf of DBN, DoT after completion of the contractor's performance obligations including any warranty obligations under the contract.
- 4.5 Performance Security for O&M
- For Package A:
- 4.5.1 The successful bidders shall submit the Performance security, in accordance with clause 4.1 to 4.4 above. This Performance Security shall initially be taken for the construction Phase.
- 4.5.2 PIA shall have option to continue the same Performance Security (submitted against AWO) for the O&M period also by extending its validity.
- 4.5.3 In case vendor requires release of main PBG, a Performance bank guarantee applicable for O&M Phase, shall have to be submitted at start of the O&M phase and shall be applicable as 10% of the O&M cost of 9 years and 6 months as per AWO. The PBG submitted after award of contract shall be released only after new PBG for the O&M period is submitted and accepted by Purchaser after due verification. Bank guarantee for O&M period is to remain valid till completion of O&M period plus six months.

For Package B:

4.5.4 The Performance Security for Package B shall be submitted upon issuance of the Award of Work (AWO) / Work Order (WO) and shall remain valid for a period of ten (10) years and six (6) months from the date of issuance of the WO and shall be extendable, as required by the Employer, the PIA shall be solely responsible for ensuring timely renewal and continuous validity of the PBG at all times during the contract period, and failure to renew the PBG before its expiry shall be treated as a material breach of the Contract.

5. INSPECTION AND TESTS

- 5.1 The Purchaser or its representative shall have the right to inspect and test the goods and/or works as per prescribed test schedules for their conformity to the specifications. Where the Purchaser decides to conduct such tests on the premises/installation sites of the supplier or its subcontractor(s), all reasonable facilities and assistance like Testing instruments and other test gadgets including access to drawings and production data shall be furnished to the inspectors at no charge to the purchaser.
- 5.2 Should any inspected or tested goods and/or works fail to conform to the specifications the purchaser may reject them, and the supplier shall either replace the rejected goods and/or works or make all alterations necessary to meet Specification requirements free of cost to the purchaser.
- 5.3 In case of goods, notwithstanding the pre-supply tests and inspections prescribed in clause 5.1 & 5.2 above, the equipment and accessories on receipt in the Purchaser's premises will also be tested during and after installation before "take over" and if any equipment or part thereof is found defective, the same shall be replaced free of all cost to the purchaser as laid down in clause 5.4 below.
- 5.4 If any equipment/good/work or any part thereof, before it is taken over under clause 5.5, is found defective or fails to fulfil the requirements of the contract, the inspector shall give the PIA notice setting forth details of such defects or failure and the PIA shall make the defective equipment/good/work good, or alter the same to make it comply with the requirements of the contract forthwith and in any case within a period not exceeding three months of the initial report. These replacements shall be made by the PIA free of all charges at site. Should it fail to do so within this time, the purchaser reserves the discretion to reject and replace at the cost of the PIA the whole or any portion of equipment/good/work as the case may be, which is defective or fails to fulfil the requirements of the contract. The cost of any such replacement made by the purchaser shall be deducted from the amount payable to the PIA.
- 5.5 When the performance tests called for have been successfully carried out, the inspector/ultimate consignee will forthwith issue a commissioning certificate. The inspector/ultimate consignee shall not delay the issue of any "commissioning certificate" contemplated by this clause on account of minor defects in the equipment which do not materially affect the commercial use thereof provided that the supplier shall undertake to make good the same in a time period not exceeding six months. "Commissioning certificate" shall be issued by the APBIL concerned unit within six weeks of successful completion of tests.
- 5.6 Nothing in clause 5 shall in any way release the PIA from any warranty or other obligations

under this contract.

6. DELIVERY/ MAKING OVER WORKS EXECUTED TO APBIL AND DOCUMENTS

- 6.1 Delivery of the goods/works and documents shall be made by the PIA in accordance with the terms specified by the purchaser in its schedule of requirements and special conditions of contracts, and the goods/works shall remain at the risk of the supplier until delivery has been completed.
- 6.2 All technical assistance for construction, commissioning and monitoring of the equipment and services shall be provided by the PIA at no extra cost during laboratory evaluation, FAT, inspection AT/ type approval, and field trial, if any.
- 6.3 The extension of delivery period against the purchase/work order, if any, should be granted subject to the condition that APBIL shall have the absolute right to revise the price(s) in compliance with clause-23 (Fall Clause) of Section-III and, also to levy LD/ penalty for the delayed work of execution.

7. TRAINING

- 7.1 The PIA shall provide training for supervisory staff of the purchaser or ultimate consignee or DBN, DOT free of cost where required for the purpose of Quality and Acceptance Testing.
- 7.2 The bidder shall provide training for the functioning of active elements like routers, SNOO elements, RFMS etc.
- 7.3 The training session frequency, duration and batch sizes shall be mutually decided so as to meet the actual requirement. It is anticipated that 1 man week training for every 200 GPs per year for first two years and 1 man week per 400 GP per year for subsequent years, should be sufficient. The training material, including the videos of around 100 hours, shall be shared by PIA to APBIL and/or DBN and/or ultimate consignee, for further online training sessions as per the requirement.
- 7.4 The PIA has to arrange the training material, venue and all other arrangements except conveyance and stay arrangement.

8. INCIDENTAL SERVICES

- 8.1 The PIA/supplier may be required to provide any or all of the following services:
 - (a) Performance or supervision of on-site assembly and/ or start-up of the supplied Goods.
 - (b) Furnishing of tools required for assembly and/ or maintenance of supplied Goods.
 - (c) Performance of supervision or maintenance and/ or repair of the supplied Goods, for a period of time agreed by the parties provided that this service shall not relieve the supplier of any warranty obligations under this contract.

9. SPARES

- 9.1 The PIA shall keep the required spares for meeting the SLA defined in Section IV-B. The PIA shall have an agreement with all the OEMs (new and existing) for supporting the supplied products and existing infrastructure for the lifetime of the contract (10 years). The OEM shall be bound to supply the spares to APBIL during the entire contract period as per the MAF on the same commercial terms and conditions.

In case any equipment is not repairable due to non-availability of the spares, PIA shall replace the supplied products with equal or upgraded/ higher version during lifetime of contract (10 years) at free of cost"

10. WARRANTY

- 10.1 All the equipment as per S. No. 18- 40 of the Price Schedule (Section-VII) shall be under warranty for one-year w.e.f. the date of commissioning. Date of commissioning for block & GP routers and associated hardware will be taken as the date on which 90% of the GPs of a block , including block router is visible in state NoC – (on achievement of payment mile stone 4 in table at para 12.1 (h) of Section IV-B) , The warranty shall start from 1st day on next calendar quarter (i.e. 1st Jan/ 1st Apr/ 1st Jul/ 1st Oct) from date of commissioning for rest of such equipment commissioned after the achievement of milestone as above, the warranty shall start from 1st day on next calendar quarter (i.e. 1st Jan / 1st Apr / 1st Jul / 1st Oct) from date of commissioning of all remaining routers and associated hardware of the block.

For other eqpt like RFTMS, UBR, digital microwave and electronics of SNOC, the warranty shall start from 1st day on next calendar quarter (i.e. 1st Jan / 1st Apr / 1st Jul / 1st Oct) from date of commissioning (date on which the equipment is commissioned after successful acceptance testing, for electronics of SNOC, this date will be date on which the SNOC is declared as commissioned).

- 10.2 The PIA/ supplier shall warrant that the stores to be supplied/works to be executed shall be new and free from all defects and faults in materials used, workmanship and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for materials/works of the type ordered and shall perform in full conformity with the specifications and drawings. The PIA/supplier shall be responsible for any defect that may develop under the conditions provided by the contract and under proper use, arising from faulty material, design or workmanship such as corrosion of the equipment, inadequate quantity of material to meet equipment requirements, inadequate contact protection, deficiencies in circuit design, unapproved less depth, inadequate protections, and/or otherwise and shall remedy such defects at its own cost when called upon to do so by the Purchaser who shall state in writing in what respect the stores are faulty. This warranty shall survive inspection or payment for/ and acceptance of goods/works but shall expire (except in respect of complaints notified prior to such date) after the period specified in Section-IV-C, after the stores have been taken over under clause 5.5 above.
- 10.3 If it becomes necessary for the PIA/ Supplier to replace or renew any defective portion(s) of the equipment/works under this clause, the provisions of the clause 10.1 above shall apply to the portion(s) of the equipment/works so replaced or renewed or until the end of the above-mentioned period as specified in Section-IV-C. If any defect is not remedied by the supplier within a reasonable time, the Purchaser may proceed to get the defects remedied from other supplier/contractor/PIA etc., at the supplier's risk and expenses, but without prejudice to any other rights which the purchaser may have against the PIA/supplier in respect of such defects.
- 10.4 Replacement under warranty clause shall be made by the PIA/ free of all charges at site including freight, insurance and other incidental charges.

11. Documents required for claiming payment

Payment terms are as per **Clause 12 of Package-A & Clause 8 of Package-B) of SECTION-IV-B: SPECIAL (COMMERCIAL) CONDITIONS OF CONTRACT (SCC)** of this tender document.

11.1 For claiming this payment, the following documents are to be submitted to the paying authority.

- a) Invoices in the name of APBIL/ DBN, DOT or any authority designated by them clearly indicating break up details of composite price i.e. Basic, Goods and Services Tax (GST), any other Duties and Taxes, etc.
- b) QA Inspection Certificate of the material used (as applicable).
- c) Proof of completion of work (AT certificate).
- d) E-waybill as prescribed in the GST law in case of movement of goods (if applicable).
- e) Proof of payment of GST, if applicable.
- f) Timely uploading of correct and necessary information on GSTN portal is mandatory as prescribed in GST compliances.

Note: -

- (1) If the PIA fails to furnish necessary supporting documents i.e. GST invoices in the name of APBIL/ of DBN, DOT / Customs-invoices etc. and also fails to upload the information on GSTN in respect of the Duties/taxes for which input tax credit is available to the purchaser i.e. APBIL/ DBN, DOT (as applicable to this tender), the amount pertaining to such Duties/Taxes will be deducted from the payment due to the PIA.
 - (2) Tax amount will be paid to the PIA only after PIA declares the details of the invoices in its return in GSTR-1 and GSTR-3B uploaded by the PIA and after submission of proofs of GST compliances.
 - (3) TDS/TCS under Income Tax Act 1961 & GST Acts shall be deducted by APBIL on behalf of DBN, DOT under DBN PAN/TAN/ GSTIN as a Tax deductor of APBIL/ DBN, DoT at the prescribed rate, if any (as the case may be).
 - (4) APBIL on behalf of DBN, DoT can adjust/ forfeit Bank Guarantee obtained from the PIA against any loss due to non-compliances towards Tax Laws on account of PIA's default.
 - (5) In case APBIL/ DBN, DOT has to pay GST on reverse charge basis, the PIA would not charge GST on its invoices. Further, the PIA undertakes to comply with the provisions of GST law as may be applicable.
 - (6) APBIL is the sole contracting authority and the sole payment authority for the PIA under this Contract. All invoices shall be addressed to the Chief Executive Officer, APBIL/ DBN, DoT. All payments to the PIA shall be made exclusively by APBIL/ DBN, DoT
- 11.2 No payment will be made for goods/ works/services rejected at the site on testing.
- 11.3 The PIA has to give the mandate for receiving payment costing Rs.5 lakhs and above electronically and the charges, if any, levied by bank has to be borne by the bidder/ PIA. The bidder company is required to give the following information for this purpose: -
- a) Beneficiary Bank Name:
 - b) Beneficiary branch Name:

- c) IFSC code of beneficiary Branch:
- d) Beneficiary account No.:
- e) Branch Serial No. (MICR No.):

11.4 GST Invoice:

- i. All the details of PIA (name, address, GSTIN/ unregistered supplier, place of supply, SAC/ HSN code etc.) and other mandatory details shall be mentioned on the invoice.
- ii. Invoice/Supplementary invoice/Debit Note/Credit Note/Receipt Voucher in the name of DBN, DoT need to be issued in compliant format and timely within the time prescribed under GST law.
- iii. In case of any deficient/incomplete/rejected supply, APBIL on behalf of DBN, DoT shall convey the same in reasonable time to enable the PIA to issue credit note and take tax adjustment.
- iv. It would be the responsibility of the PIA to declare correct information on invoice and GSTN portal viz. the amount, the place of supply, rate of tax etc.
- v. Registered location of both the parties i.e. DBN, DoT and PIA should be mentioned in the agreement with GSTIN No. Further, PIA should raise invoices at the registered premise of DBN, DoT and ensure that the place of supply as per GST law is same as registered premise of DBN, DoT or at the premises of its agent APBIL.
- vi. PIA to raise invoices as per the supply location as per GST law.
- vii. Invoice number should be mentioned on the e-way bill, if applicable.
- viii. PIA shall be responsible for timely issuance and delivery of invoice/ DN/ CN on or before the stipulated time period provided by the GST law.
 - (a) It is the responsibility of the supplier to ensure that outward supply return (GSTR- 1) would be filed correctly. If not, then cost would be borne by supplier.
 - (b) Reporting of correct outward supply by supplier in the outward return (GSTR-1) is the responsibility of the supplier. In case of mismatch because of supplier's fault, prompt amendments must be made by the supplier else supplier would be required to indemnify DBN, DoT for the loss of credit (if applicable for this tender) due to mismatch. The compliances to be adhered by supplier includes (but is not limited to) the following:
 - (i) Uploading appropriate invoice details on the GSTN portal within the stipulated time.
 - (ii) Issuing GST compliant invoice / CN/ DN in the name of DBN, DoT PO issued by APBIL on behalf of DBN should be referred by supplier for capturing information on the invoice.
 - (iii) Supplier needs to pay the entire self-assessed tax on timely basis.
 - (iv) Where invoice is not uploaded or incorrect upload of invoice detail on GSTN portal by supplier then credit on such invoice will be given provisionally subject to matching. So, acceptance of changes made by DBN, DoT on GSTN on account of non-upload or incorrect upload of invoice details on GSTN is to be submitted by supplier. Such changes w.r.t. the mismatch is required to be accepted by supplier within the time limit prescribed under the GST law. It should be noted that in case supplier does not accept such changes within the time limit prescribed under GST law, the loss of input tax credit (if any) would be recovered from the supplier. In case of mismatch because of Supplier's fault, prompt

amendments must be made by the supplier else supplier would be required to indemnify DBN, DOT for the losses of credit and interest paid due to mismatch.

- (v) Supplier to issue all necessary documentation and perform all necessary compliances to APBIL.
- (vi) A self-declaration along with evidence that the bidder is not blacklisted by GST authorities. In case supplier gets blacklisted during the tenure of this contract, then supplier must indemnify DBN/ due to default of supplier.
- (vii) Where the location agreed are more than one state, then separate invoice state wise shall have to be submitted.
- (viii) It shall be the responsibility of the supplier to mention place of supply of goods/services in the invoice issued in the name of DBN, DoT and submitted to designated authority of APBIL which is acting as a processing/ paying authority on behalf of DBN, DoT.
- (ix) PIA shall comply with GST Act 2017 with latest amendments.

12. PRICES

- 12.1 Prices charged by the PIA for the goods delivered and works/services performed under the contract shall not be higher than the prices quoted by the PIA in its Bid except for variation caused by change in taxes as specified in Clause-12.2 mentioned below.
- 12.2 For changes in taxes/ duties during the scheduled time period, the unit price shall be regulated as under:
 - (a) Prices will be fixed at the time of issue of purchase/work order as per taxes and statutory duties applicable at that time
 - (b) In case of reduction of taxes and other statutory duties during the scheduled time period, purchaser shall take the benefit of decrease in these taxes/ duties for the supplies made from the date of enactment of revised duties/taxes.
 - (c) In case of increase in duties/taxes during the scheduled time period, the purchaser shall revise the prices as per new duties/taxes for the supplies, to be made during the remaining delivery period as per terms and conditions of the purchase/work order.
- 12.3 Any increase in taxes and other statutory duties/ levies, after the expiry of the delivery date shall be to the supplier's account. However, benefit of any decrease in these taxes/duties shall be passed on to the Purchaser by the supplier. The total price is to be adjusted (by reducing the basic price) with increased duties and taxes as per price mentioned in PO.

13. CHANGES IN PURCHASE ORDERS

- 13.1 APBIL on behalf of DBN, DoT may, at any time, by a written order given to PIA, make changes within the general scope of the contract in any one or more of the following:
 - (a) drawings, designs or specifications, where works to be executed under the contract are to be specifically **completed as per requirements conveyed by APBIL.**
 - (b) the services to be provided by the PIA.
- 13.2 If any such change causes an increase or decrease in the cost of, or the time required for the execution of the contract an equitable adjustment shall be made in the contract price or delivery

schedule, or both, and the contract shall accordingly be amended. Any proposal by the supplier for adjustment under this clause must be made within thirty days from the date of the receipt of the change in order.

14. SUB-CONTRACTS FOR SERVICES

- 14.1 Sub- Contracting to any other agency can be done with prior approval of APBIL (being an agent of DBN, DoT), only up to 70% of the contract value for services {not exceeding 70% CAPEX excluding material cost}.

The procurement & supply of material, hiring of machines with or without labour shall not be covered under sub-contracting.

- 14.2 The no. of Subcontractors shall be limited to maximum 25.
- 14.3 The eligibility conditions for the Subcontractors shall be at least 50% of the proportionate technical eligibility mentioned in Eligibility Criteria (Sr. No.- 4) in Table-A under clause-2.1 of Section IV-A for the proposed subcontracted works other than material supplies. While according to approval, APBIL shall evaluate the Subcontractors eligibility based on its technical experience considered against already approved sub-contracts in the same or any package of this project. If such sub-contracted works are completed, the experience can be re- considered.
- 14.4 Even in such cases, the PIA shall ensure the quality of goods and services as envisaged in this document, with robust mechanism of monitoring and quality check, as the responsibility of contract lies with the PIA. Sub- Contracting, even if approved by APBIL shall not relieve the PIA from any liability or obligation under the contract.
- 14.5 After, the specific approval of Subcontracting of work to any Subcontractor is approved by APBIL, the PIA shall further keep APBIL updated, in writing, whenever, such approved subcontracts are awarded.

15. DELAYS IN THE CONTRACTOR'S PERFORMANCE

- 15.1 Performance of the services shall be made by the PIA in accordance with the time schedule specified in the purchase order/ work order.
- (a) In case the works are not completed in the stipulated period, as indicated in the Purchase Order/ work order, APBIL on behalf of DBN, DoT reserves the right either to short-close/ cancel the purchase order/ work order and/ or recover penalty.
 - (b) Before taking such action of short closure/ cancellation of purchase order/ work order, APBIL/ IE shall serve, four (04) written notices of default, to the PIA at an interval of ten (10) days after each notice.
 - (c) If the PIA does not remedy its failure within a period of 10 days after 4th notice, APBIL may take action as mentioned at para-(a) above.
 - (d) The cancellation/ short-closing of the order shall be at the risk and cost of the PIA and APBIL reserves the right to give work order for the balance works at the risk and cost of the defaulting PIA within one year from the date of short closure of the Purchase Order/ Work Order OR date of scheduled completion of the respective project phase (i.e. construction or O&M), whichever is later.
- 15.2 Delay by the PIA in the performance of its works obligations shall render the PIA liable to any or all of the following sanctions:

- (a) forfeiture of its performance security,
- (b) imposition of penalty, and/ or
- (c) Short- closure of the contract in part or full and/ or termination of the contract for default.

15.3 If at any time during the performance of the contract, the PIA encounters condition impeding timely performance of service (execution of work), the PIA shall:

- (a) Promptly notify to APBIL in writing the fact of the delay, effect on SLAs and its likely duration and its cause(s). As soon as practicable after receipt of the PIA's notice, APBIL shall evaluate the situation and may at its discretion extend the period for performance of the contract (by not more than 04 weeks or as per provisions of clause 16, Section-III) or grant relaxation in SLAs as per provision given below:
- (b) If the work is not completed as per the milestone, applicable penalties/ LD shall be levied. However, the PIA need not seek delivery period extension till the delay of 10 weeks from the milestone. PIA shall request for delivery period extension, Work Order wise, after delay of 10 weeks as per project milestones. However, APBIL reserves the right to short close any time beyond delivery period. The PIA has to submit their request for extension in time along with the undertaking as per clause 23 Section-III (Fall Clause) and a copy of QA/IE inspection certificate at least two weeks before the expiry of time period. The PIA shall also submit unconditional acceptance of the conditions for time period extension i.e. applicability of penalties, prices to be provisional and to be regulated as per clauses 12.3 & 23 of section-III and submission of additional BG, wherever applicable. The decision regarding extension shall be communicated within four weeks of the receipt of request and after receipt of the unconditional acceptance and the undertaking mentioned above.
- (c) In case extension is being granted beyond 04 weeks then the PIA shall submit additional BG while seeking extension. For piecemeal works the amount of additional BG shall be 3 % of the value of balance quantity of works to be done for which extension in time period has been sought. The additional BG shall be valid for six months beyond extension of scheduled period sought and shall be discharged after the works has been completed and made over to the ultimate consignee within the last extended scheduled period on submission of inspection certificate from QA/IE and APBIL designated officer's receipt without prejudice to the other remedies available to APBIL.

15.4 If the works are not completed in the extended time period, the purchase/work order shall be short-closed and both the Performance securities i.e. PBG and additional BG shall be forfeited. The decision of APBIL shall be final.

16. FORCE MAJEURE

16.1 If, at any time, during the continuance of this contract, the performance in whole or in part by either party of any obligation under this contract is prevented or delayed by reasons of any war or hostility, acts of the public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restrictions or act of God (hereinafter referred to as events) provided notice of happenings of any such eventuality is given by either party to the other within 10 days from the date of occurrence thereof, neither party shall by reason of such event be entitled to terminate this contract nor shall either party have any claim for damages against other in respect of such non-performance or delay in performance, and deliveries under the contract

shall be resumed as soon as practicable after such an event come to an end or cease to exist, and the decision of APBIL as to whether the deliveries have been so resumed or not shall be final and conclusive. Further that if the performance in whole or part of any obligation under this contract is prevented or delayed by reasons of any such event for a period exceeding 60 days, either party may, at its option, terminate the contract.

- 16.2 Provided, also that if the contract is terminated under this clause, APBIL shall be at liberty to take over from the Contractor at a price to be fixed by APBIL on behalf of DBN, DoT, which shall be final, all unused, undamaged and acceptable materials, bought out components and stores in course of manufacture which may be in possession of the Contractor at the time of such termination or such portion thereof as APBIL may deem fit, except such materials, bought out components and stores as the Contractor may with the concurrence of APBIL elect to retain.

17. TERMINATION FOR DEFAULT

- 17.1 APBIL on behalf of DBN, DoT may, without prejudice to any other remedy for breach of contract, by written notice of default, sent to the Contractor, terminate this contract in whole or in part
- (a) if the Contractor fails to deliver any or all of the goods & services within the time period(s) specified in the contract, or any extension thereof granted by APBIL pursuant to clause 15 above.
 - (b) if the Contractor fails to perform any other obligation(s) under the Contract; and
 - (c) if the Contractor, in either of the above circumstances, does not remedy its failure within a period of 15 days (or such longer period as APBIL may authorize in writing) after receipt of the default notice from APBIL.
 - (d) if the average monthly SLA achievement (for GP uptime in the package) is less than 90% for more than 20% of Blocks (SLA to be calculated as an average of all the GPs in a block) consecutively for 3 months for the network where PIA has started O&M phase of existing network (after hand over by APBIL) and newly constructed network. This condition shall be applicable after 1 year from the appointed date.
- 17.2 In the event APBIL on behalf of DBN, DoT terminates the contract in whole or in part, APBIL on behalf of DBN, DoT may procure, upon such terms and in such manner as it deems appropriate, works similar to those undelivered and the Contractor shall be liable to APBIL on behalf of DBN, DoT for any excess cost for such similar works. However, the Contractor shall continue the performance of the contract to the extent not terminated.
- 17.3 Deleted

18. TERMINATION (INSOLVENCY & CONVENIENCE)

- 18.1 **Termination for Insolvency:** APBIL on behalf of DBN, DoT may at any time terminate the Contract by giving written notice to the Contractor, without compensation to the Contractor, if the Contractor becomes bankrupt or otherwise insolvent as declared by the competent court provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to DBN, DoT/ APBIL.
- 18.2 **Termination for Convenience:** APBIL on behalf of DBN, DoT, may, by prior written notice sent to the contractor at least 03 months in advance, terminate the Contract, in whole or in part at any time for its convenience. The notice of termination shall specify that termination is for DBN,

DoT's/ APBIL's convenience, the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective.

19. Dispute Resolution

19.1 Dispute Resolution Committee (DRC)

19.1.1 Disputes arising under this Request for Proposal (RFP) shall be formally notified in writing (Dispute Notice) by either party ("**the Notifying Party**") to the other party ("**the Receiving Party**"). The parties are encouraged to resolve disputes amicably through direct negotiation and information sharing.

19.1.2 If the dispute remains unresolved after direct negotiation and communication, the parties shall establish a Dispute Resolution Committee (DRC). The DRC shall comprise the following members:

- a) APBIL – The CEO
- b) PIA (Project Implementing Agency) – Authorized Representative
- c) IE (Independent Engineer) - Authorized Representative

19.2 Dispute Adjudication Board (DAB) (list of issue)

If the dispute remains unresolved after negotiations and the intervention of the DRC, either party may refer the dispute to the Dispute Adjudication Board (DAB) within 15 days from the date of the dispute notice as provided in Clause 19.1 above.

The DAB shall consist of the following members:

- a) APBIL – CEO, APBIL
- b) PIA (Project Implementing Agency) – Authorized State Representative
- c) IE (Independent Engineer) - Authorized State Representative

19.3 The mechanism for resolution of disputes through conciliation under Outside Expert Committee (OEC):

If any difference or dispute (hereinafter referred as "Dispute") remains unresolved after negotiations and the intervention of the DAB also, the party aggrieved (hereinafter referred as "Claimant") shall refer the Dispute to conciliation under Outside Expert Committee (hereinafter referred as "OEC"). The OEC nominated by DBN/ APBIL shall be comprised of 3 members who shall be independent in terms of Section 12 read with Schedule 5 of the Arbitration and Conciliation Act, 1996 (hereinafter referred as "Act"). The proceedings shall be governed by Part III of the Act. The detailed procedure has been given in **Annexure A** below.

19.4 Settlement of commercial disputes between CPSEs inter se and CPSE(s) and Government Department(s)/ Organization(s):

In the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises (CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/Organizations (excluding disputes concerning Railways, Income Tax, Customs & Excise Departments), such disputes or differences shall be taken up by either party for resolution through AMRCD (Administrative Mechanism for Resolution of CPSE's Disputes) as mentioned in **DPE OM No. 05/0003/2019-FTS-**

10937 dated 14-12-2022 and the decision of AMRCD on the said dispute will be binding on both the Parties.

- 19.5 It is clarified that the parties have agreed that the Arbitration and Conciliation Act, 1996, shall be applicable only for the purpose of Conciliation".

In case of failure of the conciliation process between the parties and/ or refusal of either of the party to accept the outcome of the conciliation process, the aggrieved party shall be free to seek redressal of its dispute by approaching the Commercial Court. The Courts at Amaravathi shall have exclusive jurisdiction.

Annexure A - Conciliation through Outside Expert Committee (OEC):

- A. If any dispute, difference, question or disagreement arises between the parties hereto or their respective representatives or assignees, in connection with construction, meaning, operation, effect, interpretation of the third-party contract or breach thereof which parties are unable to settle mutually, the same may first be referred to conciliation through Outside Expert Committee ("OEC") as provided in the Conduct of Proceedings through OEC in Annexure B
- B. **The venue of the OEC meeting shall be as decided by DBN/ APBIL.**
- C. OEC members will be paid fees and provided facilities as per prevalent guidelines.
- D. Parties are free to terminate the conciliation proceedings at any stage as provided under the Arbitration and Conciliation Act, 1996.
- E. Subject to terms and conditions contained in the above paras, the provisions of the Part III of Arbitration and Conciliation Act, 1996 shall be applicable to the conciliation proceedings and the parties and the OEC members shall be bound by the same.

Annexure B - Conduct of Conciliation Proceedings by OEC

Proposal for OEC

1. The Claimant shall give notice for conciliation to the other parties. The notice shall be given to the concerned officer(s) named for the other parties in the third-party contract, clearly bringing out the points of dispute and the amount claimed with documents in support of the claim and the party concerned shall not raise any issue thereafter. It shall be ensured by parties that no parallel proceedings relating to dispute under the same contract are going on in any Court/ Forum /Tribunal. In case, if any dispute is pending relating to the same Contract, then both the parties shall either withdraw the proceedings from the Court/ Tribunal / forum or shall keep the case in abeyance.

Constitution of OEC

2. The OEC shall comprise of 3 members, appointed by DBN/ APBIL.
3. In case of vacancy created because of the resignation/recusal of any member, or if any OEC member is not available to attend further OEC Meetings, the vacancy shall be filled by the nomination by the DBN/ APBIL.
4. The OEC members shall give a declaration of independence and impartiality (as per Appendix) to both the parties before the commencement of the OEC proceedings.

Constitution of OEC

5. The claimant shall submit its statement of claims to OEC members, and to the other party(ies) (**hereinafter referred as “Respondents”**) prescribed in the appointment letter within 30 days of the issue of the appointment letter (as per Appendix, placed below clause 21).
6. The respondents shall file its reply and counter claim (if any) within 30 days of the receipt of the statement of claims.
7. Parties may file their rejoinder/additional documents if any in support of their claim/counter claim within next 15 days. No documents shall be allowed thereafter, except with the permission of OEC.
8. OEC will commence its meetings only after completion of the pleadings.
9. In case of 3 members OEC, 2 members will constitute a valid quorum, and the meeting can take place to proceed in the matter after seeking consent from the member who is not available. However, OEC Recommendations will be signed by all Members. Further, efforts must be made for unanimous recommendations. In exceptional circumstances such as death/serious illness of OEC member or if any OEC member has resigned/recused himself from the case during OEC proceedings and non-appointment of any other member in the place of vacancy so caused, then with the consent of all the parties, two OEC members shall give and sign the recommendations. At the conclusion of OEC proceedings, OEC members shall give its recommendations for resolution of disputes based on material before it with proper justification and reasons. Failure report **or recommendations without reasons** shall not be construed to be a recommendation by the OEC.
10. The parties shall be represented by their in-house employees/executives. No party shall be allowed to bring any advocate or outside consultant/advisor/ agent to contest on their behalf. Ex-officers of APBIL and/or DBN who have handled the matter in any capacity are not allowed to attend and present the case before OEC on behalf of Contractor.
11. Solicitation or any attempt to bring influence of any kind on either OEC Members or APBIL or DBN is completely prohibited in conciliation proceedings and DBN/ APBIL reserves the absolute right to close the conciliation proceedings at their joint discretion if they apprehend any kind of such attempt made by the Contractor or its representatives.
12. Parties agree to rely only upon documentary evidence in support of their claims and not to bring any oral evidence in the OEC proceedings.
13. OEC will give full opportunity of hearing to the parties before giving its recommendations.
14. OEC will conclude its proceedings in generally 4 meetings and give its recommendations within 60 days of its first meeting. OEC will give its recommendations to all the parties recommending possible terms of settlement. DBN/ APBIL may extend the time/ number of meetings, in exceptional cases, if OEC requests for the same with sufficient reasons.
15. Parties shall not claim any interest on claims/counterclaims from the date of notice invoking conciliation till execution of settlement agreement, if so, arrived at. In case, parties are unable to reach a settlement, no interest shall be claimed by either party for the period

from the date of notice invoking conciliation till the date of OEC recommendations and 30 days thereafter in any further proceeding.

Actions after OEC Recommendations

16. The recommendations of OEC are non-binding and the parties may decide to accept or not to accept the same. Parties are at liberty to accept the OEC recommendation with any modification they may deem fit.
17. Each party shall communicate its comments/response on the Recommendations given by the OEC along with its decisions whether the recommendations are acceptable or not, to the other parties within a period of 15 days from the electronic receipt of the recommendations of OEC. If recommendations are acceptable by all the parties, a settlement agreement under Section 73 of the Arbitration and Conciliation Act, 1996 will be signed within 15 days of last communication of the period ending 15 days within which the decision of the parties has to be communicated, and same shall be authenticated by all the OEC Members. The Agreement so signed and authenticated shall have the same effect as an award passed under Section 30 of the Arbitration and Conciliation Act, 1996.
18. The timelines mentioned in the above guidelines are with an objective to achieve expeditious conclusion of OEC proceedings. However, it does not mean that any action beyond the timelines will be invalid. However, the party concerned will make all efforts to complete the actions within the stipulated time.
19. The parties shall keep confidential all matters relating to the conciliation proceedings including minutes of OEC meeting and Recommendations of OEC. Parties shall not rely upon them as evidence in any arbitration / court proceeding whether or not such proceedings relate to the dispute that is the subject of the conciliation proceedings,
 - views expressed or suggestions made by the other party in respect of a possible settlement of the dispute.
 - admissions made by the other party in the course of the OEC proceedings.
 - proposals made by the OEC.
 - the fact that the other party had indicated his willingness to accept a proposal for settlement made by the OEC.
20. Confidentiality extends also to the settlement agreement, except where its disclosure is necessary for purposes of implementation and enforcement. This stipulation will not apply to disclosure made by APBIL or DBN to Govt. of India or its authorities, if required.
21. The OEC members shall be entitled to the Fee as applicable.

Appendix C - Declaration of independence and impartiality by OEC Member

To,

1.APBIL

2.DBN

3.Contractor

Subject: Declaration of independence and impartiality by Outside Expert Committee (OEC) Member in the dispute under Contract No. _____

I, the undersigned, hereby accept to act as Member of the Expert Committee and conciliate in the disputes under reference between the parties above named, I confirm that I am aware of the requirements of law particularly of the Arbitration and Conciliation Act, 1996, to act as a conciliator, I am able to act as conciliator and am available to act as Member of the Expert Committee, I hereby declare that I am independent of each of the parties and have no ownership interest in any part of the contract under reference or any financial interest in the said contract. I have no interest in the outcome of the dispute or its settlement.

I hereby affirm that I shall act with honesty, integrity, diligence, and will remain independent and impartial while discharging my duties as conciliator/OEC Member. I will disclose any interest or relationship with the parties or the subject matter which might compromise in any manner my ability or capacity to remain impartial and independent in the matter.

I further, being a member of the OEC, agree to abide by the terms and conditions of Clause and conduct the proceedings as per Clause of the Contract/Agreement No. _____

(Signature) Name:

Address:

Phone:

Email:

Date:

20. SET OFF

Any sum of money due and payable to the Contractor (including security deposit refundable to him) under this contract may be appropriated by APBIL or any other person(s) contracting through APBIL and set off the same against any claim of APBIL such other person or person(s) for payment of a sum of money arising out of this contract or under any other contract made by the Contractor with APBIL or such other person(s) contracting through APBIL.

21. INTIMATION OF STATUS OF WORK EXECUTED

The bidders, who are given Purchase/ Work Orders, must give the details of the works made against all the Purchase Orders every month on the first working day of the following month to BA Heads and concerned user branch of APBIL.

22. DETAILS OF THE PRODUCT/ SERVICES OFFERED

The bidder should furnish the name of its collaborator/Sub-contractor (if applicable), brand name, model number and type of the products offered in this tender. The technical literatures of the products should also be submitted. No change in either technology or product shall be permitted after opening of bids.

23. FALL CLAUSE

23.1 At any time during the contract (a) if it comes to the notice of APBIL regarding reduction of price for the same or similar works; and/ or (b) the prices received in a new tender for the same or similar works are less than the prices chargeable under the contract. The prices would be determined as follows:

23.2 The prices once fixed will remain valid during the scheduled time period except for the provisions in clause 12.1 of Section III.

23.3 APBIL, for the extended period, if any, will determine and intimate the new price, taking into account various related aspects such as quantity, geographical location etc., and the date of its effect for the balance works to the vendor. In case the vendor does not accept the new price to be made applicable during the extended period and the date of its effect, APBIL on behalf of DBN, DoT shall have the right to terminate the contract without accepting any further works. This termination of the contract shall be at the risk and responsibility of the Contractor and APBIL reserves the right to give work order for the balance works at the risk and cost of the defaulting vendor besides considering the forfeiture of its performance security.

23.4 The Contractor while applying for extension of time for works, if any, shall have to provide an undertaking as "We have not reduced the price, and/ or offered price the same or similar works to any person/organization including Department of central/state Government or any central/state PSU at a price lower than the price chargeable under the contract for scheduled time period."

23.5 In case undertaking as in Clause 23.4 is not applicable, the vendor will give the details of prices, quantity etc. to APBIL, while applying extension of delivery period.

24. COURT JURISDICTION

24.1 Any dispute arising out on account of terms & conditions of the tender/ bid document/ evaluation of bids/ issue of APO/AWO shall be subject to the jurisdiction of the competent court

at the place from where the NIT/ tender has been issued i.e. Amaravathi. The courts at Amaravathi will have exclusive jurisdiction under this NIT and the contract that may be entered into pursuant to this NIT.

24.2 This Contract/ PO/WO is subject to jurisdiction of Court at Amaravathi.

25. Audit and Security services

25.1 The PIA shall be required to provide comprehensive support to APBIL during the Third-Party Audit and Security Audit etc. The PIA shall be responsible in getting the required readiness built in the network during audit for security solutions.

25.2 APBIL reserves the right to inspect, monitor and assess the progress and performance of the project either itself or through another designated Contractor as it may deem fit, throughout the course of the Contract. APBIL may demand and upon such a demand being made, APBIL shall be provided any document, data material or any other information which it may require, to enable it to assess the progress of the project.

25.3 APBIL shall also have the right to conduct, either itself or through another Contractor as it may deem fit, an audit to monitor the performance of the Contractor of its obligations/ functions in accordance with the standards committed to or required by APBIL and the Contractor undertakes to cooperate with and provide to APBIL or any other Contractor appointed by DBN (DoT)/ APBIL, all documents and other details as may be required by them for this purpose.

26. Term and Extension of Contract

26.1 The term of this Contract shall be as per Clause-10 (Project Completion Schedule) of Section IV-B.

26.2 APBIL shall reserve the sole right to grant any extension to the term of each work order above against the request of PIA and shall notify in writing to the PIA within 15 days of the request, whether it shall grant the PIA an extension of the term. The decision to grant or refuse the extension shall be at APBIL's discretion. Accordingly, the Bank Guarantee of the same amount shall be extended up to extended period of the Contract, if required.

26.3 Where APBIL is of the view that no further extension of the term be granted to the PIA, APBIL shall notify the PIA of its decision at least 3 (three) months prior to the expiry of the Term. Upon receipt of such notice, the PIA shall continue to perform all its obligations hereunder, until such reasonable time beyond the Term of the Contract within which, APBIL shall either appoint an alternative Contractor or create its own infrastructure to operate such Services as are provided under this Contract. APBIL shall make payment for work executed for the extended period post contract expiry.

26.4 Deleted

27. Third Party Damage:

If the PIA damages other Private Service provider's cables /sewage line/ Government or public properties, such as electricity cable or roads etc., the damage charges/penalty will be paid by the PIA only as per the claim of such third party. APBIL/DBN, DoT will not be liable to pay any penalty, or any damage charges made by the PIA as per the indemnity clause below:

"PIA shall either pay to third parties all expenditure incurred for restoring services which are damaged by it while carrying out the work or the same amount will be deducted from his bills.

Such expenditure shall be intimated to the PIA either by Engineer in- charge or concerned third parties in writing. The amount deducted by APBIL from his bill shall be paid to concerned third parties by the designated authority of APBIL.”

28. UTILITIES

28.1 Existing utilities and roads

Notwithstanding anything to the contrary contained herein, the PIA shall ensure that the Government Instrumentalities owning the existing roads, right of way or utilities, on, under or above the Site (Route) of the New Network and/or the Existing Network are enabled by it to keep such utilities in continuous satisfactory use, if necessary, by providing suitable temporary or permanent diversions with the authority of the controlling body of that road, right of way or utility, and shall initiate and undertake at its own cost, legal proceedings for acquisition of any right of way necessary for such diversion.

28.2 Shifting of obstructing utilities

During the execution of the underground OFC construction work, if there is a requirement of shifting of any utility including electric lines, water pipes and telephone cables etc, the PIA shall, first, explore an alternative path and execute the construction after getting approval of The CEO APBIL. In case, no alternative path is feasible, the PIA shall explore the possibility of laying ADSS OFC for that section and shall lay the same after getting approval from The CEO APBIL. In case where the shifting of utility becomes unavoidable, the PIA shall, subject to Applicable Laws, provisions of Applicable Permits and with the assistance of APBIL, undertake shifting of any utility, including electric lines, water pipes and telephone cables, to an appropriate location or alignment within or outside the Site (Route) of the New Network and/or the Existing Network, if and only if such utility causes or shall cause a Material Adverse Effect on the development, operation or maintenance of the Project. The PIA shall submit to the CEO APBIL, the estimate of such shifting cost for approval of the same and shall carry out the shifting work after obtaining approval of cost estimate(s) and issue of Work Order for the same. The cost of such shifting shall be paid to the PIA, as per Work Order, and in the event of any delay in shifting thereof, the PIA shall be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay on the part of the entity owning such electric lines, water pipes or telephone cables, as the case may be. The PIA shall indemnify the Government Instrumentality for any damage to the utilities on account of the Development Works or the Upgradation Works.

29. Felling of trees

APBIL shall assist the PIA in obtaining the applicable permits for felling of trees to be identified by APBIL for this purpose if and only if such trees cause a material adverse effect on the development, operation or maintenance of the Project. In the event of any delay in felling thereof for reasons beyond the control of the PIA, it shall be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay in the felling of trees. For the avoidance of doubt, the costs and expense in respect of felling of trees shall be paid to the PIA as per Work Order and any revenues thereof shall be kept with DBN, DoT/ APBIL. The PIA shall submit, to The CEO APBIL, the estimate of cost of such works for approval of the same and shall carry out the work after obtaining approval of cost estimate(s) and issue of Work Order for the same.

30. Penalty for causing inconvenience to the Public.

The bidder shall not be allowed to dump the empty cable drums/waste materials in Govt/public place, which may cause inconvenience to Govt/ Public. If the bidder does not dispose off the empty cable drums/waste materials within 3 days of becoming empty, APBIL is at liberty to dispose off the drum in any manner deemed fit and the costs incurred by APBIL in disposing off such materials shall be borne by the Bidder. DBN, DoT/ APBIL may also levy a **penalty up to INR One Thousand for each such default.**

31. Penalty for cutting/damaging the other operator/ agencies cable.

- 31.1 In accordance with Indian telegraph act, if any person, wilfully or negligently damages telegraph line, he shall be liable to pay the expenses (if any), as may be incurred in making good such damage.
- 31.2 PIA shall settle all such claim raised by other operators/ agencies regarding cutting/ damaging their cables or other infrastructure without any cost to APBIL.

32. Indemnities

32.1 General indemnity

The PIA shall indemnify, defend, save and hold harmless DBN, DoT/ APBIL and its officers, servants, agents, Government Instrumentalities and APBIL owned and/or controlled entities/enterprises, (hereinafter referred as the "Authority Indemnified Persons") against any and all suits, proceedings, actions, demands and claims from third parties for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the PIA of any of its obligations under this contract or any related agreement or on account of any defect or deficiency in the provision of services by the PIA to DBN, DoT/ APBIL or to any User, or from any negligence of the PIA under contract or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this contract on the part of the Authority Indemnified Persons.

32.2 Indemnity by the PIA

- 32.2.1** Without limiting the generality of Clause-32.1 above, the PIA shall fully indemnify, hold harmless and defend the 'Authority Indemnified Persons' from and against any and all loss and/or damages arising out of or with respect to:
 - a. failure of the PIA to comply with Applicable Laws and Applicable Permits.
 - b. payment of Taxes required to be made by the PIA in respect of the income or other taxes of the PIA's contractors, suppliers and representatives.
 - c. non-payment of amounts due as a result of materials or services furnished to the PIA or any of its contractors which are payable by the PIA or any of its contractors.
 - d. its omissions or acts of fraud, gross negligence and wilful misconduct.
 - e. any personal bodily injury or death of any person caused by, arising out of or in connection with its performance of this Contract; or
 - f. loss of or physical damage to property of APBIL or any third party caused by, arising out of or in connection with the performance of this contract.

- g. Claims towards any default by PIA, in payment of statutory benefits to its employees/sub-contractors engaged to perform the contract.

32.2.2 Without limiting the generality of the provisions of this clause, the PIA shall fully indemnify, hold harmless and defend the 'Authority Indemnified Persons' from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the 'Authority Indemnified Persons' may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the PIA or by the PIA's Contractors in performing the PIA's obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the PIA shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Project, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the PIA shall promptly make every reasonable effort to secure for APBIL a license, at no cost to DBN, DoT/ APBIL authorizing continued use of the infringing work. If the PIA is unable to secure such license within a reasonable time, the PIA shall, at its own expense, and without impairing the Specifications and Standards, either replace the affected work, or part, or process thereof with non-infringing work or part or process or modify the same so that it becomes non-infringing.

32.3 Notice and contest of claims

In the event that Authority Indemnified Person receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this clause it shall notify the PIA within 15 (fifteen) days of receipt of the claim or demand and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the PIA wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the APBIL/DoT/DBN subject to the APBIL/DoT/DBN being secured against any costs involved, to its reasonable satisfaction.

32.4 Defence of Claims

32.4.1 The Authority Indemnified Persons shall have the right, but not the obligation, to contest, defend and litigate any claim, action, suit or proceeding by any third party alleged or asserted against such Party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder, and reasonable costs and expenses thereof shall be indemnified by the PIA. If the PIA acknowledges in writing its obligation to indemnify the Authority Indemnified Persons in respect of loss to the full extent provided by this clause, the PIA shall be entitled, at its option, to assume and control the defence of such claim, action, suit or proceeding, liabilities, payments and obligations at its expense and through the counsel of its choice; provided it gives prompt notice of its intention to do so to the Authority Indemnified Persons and reimburses the Authority Indemnified Persons for the reasonable cost and expenses incurred by the Authority Indemnified Persons prior to the assumption by the PIA of such defence. The PIA shall not be entitled to settle or compromise any claim, demand, action, suit or proceeding without the prior written consent of the

Authority Indemnified Persons, unless the PIA provides such security to the Authority Indemnified Persons as shall be reasonably required by the Authority Indemnified Persons to secure the loss to be indemnified hereunder to the extent so compromised or settled.

32.4.2 If the PIA has exercised its rights under Clause-32.3 above, the Authority Indemnified Persons shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the PIA (which consent shall not be unreasonably withheld or delayed).

32.4.3 If the PIA exercises its rights under Clause-32.3 above, the Authority Indemnified Persons shall nevertheless have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of the Authority Indemnified Persons, when and as incurred, unless:

- a. the employment of counsel by such party has been authorized in writing by the PIA.
- b. the Authority Indemnified Persons shall have reasonably concluded that there may be a conflict of interest between the PIA and the Authority Indemnified Persons in the conduct of the defence of such action.
- c. the PIA shall not, in fact, have employed independent counsel reasonably satisfactory to the Authority Indemnified Persons, to assume the defence of such action and shall have been so notified by the Authority Indemnified Persons; or
- d. the Authority Indemnified Persons shall have reasonably concluded and specifically notified the PIA either:
 - i. that there may be specific defences available to it which are different from or additional to those available to the PIA; or
 - ii. that such claim, action, suit or proceeding involves or could have a material adverse effect upon it beyond the scope of this Contract

Provided that if Sub-clauses (b), (c) or (d) of this Clause-32.4.3 shall be applicable, the counsel for the Authority Indemnified Persons shall have the right to direct the defence of such claim, demand, action, suit or proceeding on behalf of the Authority Indemnified Persons, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

32.5 No consequential claims

Notwithstanding anything to the contrary contained in this clause, the indemnities herein provided shall not include any claim or recovery in respect of any cost, expense, loss or damage of an indirect, incidental or consequential nature, including loss of profit, except as expressly provided in this Contract.

32.6 Limitation of Liability

Notwithstanding anything to the contrary in this Contract, the liability of the PIA towards the Authority Indemnified Persons for any damages or compensation of any nature whatsoever under this Contract, shall not exceed Total cost of Project awarded to PIA. For the avoidance of doubt, the limitation hereunder shall not apply to any or all liabilities in respect of third parties. The Parties agree that the PIA's liability will be uncapped in case of any liabilities arising due to:

- a. any amount payable as indemnity to DBN, DoT/ APBIL due to its acts or omissions or fraud, gross negligence and wilful misconduct.
- b. breach of any Applicable Laws or any Applicable Permits.
- c. any claims or loss on account of Intellectual Property rights violation by the PIA.
- d. any personal bodily injury or death of any person caused by, arising out of or in connection with its performance of this Contract; or
- e. any loss of or physical damage to property of APBIL, or any third party caused by, arising out of or in connection with the performance of this Contract.”

32.7 Survival on Termination

The provisions of this clause shall survive Termination under Clauses 17 and 18 of Section- III: GENERAL (COMMERCIAL) CONDITIONS OF CONTRACT under the RFP.

33. Easements, Permits, Licenses and Other Facilities

33.1 The PIA shall obtain at its own cost, all easements, permits and licenses, required to execute the contract including but not limited to following:

33.1.1 “Right of Way” easements and permits.

33.1.2 Railway, Highway, Forest and other Authorities crossing permits including bridge.

33.1.3 Canal/stream crossing permits.

33.1.4 ROW

PIA shall pay applicable charges against the demand note/ estimate raised by the concerned authorities. PIA shall submit the copies of the proof of payment along with the invoices for reimbursement.

33.2 **No extra charges will be paid to the bidders for pursuance of easements, permits, RoW etc.** from the different local authorities.

33.3 The bidder shall be fully responsible for handling and obtaining all necessary easements, permits and licenses, for moving all construction equipment, tools, supplied materials and men across Railways and Highway, across public or private road as well as premises of any public utility within the right of user and for bearing all costs that may be incurred in respect of the same.

33.4 The bidder is to confine his operation to the provided construction “Right of User” unless it has made other arrangement with the particular property owners and /or tenants such other arrangements shall be entirely at the responsibility of the bidder as to cost and arrangement as also breach and claim and shall be entitled with a copy to the Divisional Engineer.

33.5 The bidder will not be entitled to extra compensation for hardship and increase in cost by the cable trench being routed adjacent to or across other pipeline, Highway, Railways, telephones or posar poles and wires or guy wires, embankment, cliffs, streams or other obstacles which may physically or otherwise in any manner, restrict or limit the use of the construction “Right of User”. Some construction and such contingency shall be deemed to have been provided for in the rates.

- 33.6 At locations where the optical fiber cable trench is routed across or along railways or roads the bidder shall without extra cost provide and maintain such detours and road controls as are required by the railways or government or local agencies having jurisdiction.

34. Protection of Life and Property and Existing Facilities.

- 34.1 The bidder is fully responsible for taking all possible safety precaution during preparation for and actual performance of the works and for keeping the construction site in a reasonable safe condition. The bidder shall protect all life and property from damage or losses resulting from his construction operations and shall minimize the disturbance and inconvenience to the public.
- 34.2 If the excavation of trench alters the contours of the ground around road and highway crossing in such locations dangerous to traffic, the bidder shall at his own cost, take all necessary precautions to protect public and shall comply with all APBIL regulations as to placing of warning boards (minimum size 3' x 2'), traffic signals, barricades, flags etc., at such location. If the bidder does not put the warning signal as per above directions, then a penalty of Rs 1000/- per day shall be levied on the bidder, till the directions are complied by the bidder. The bidder shall take due precautions to avoid damages to other pipelines, water mains, sewers, telephones, telegraphs and power conduits, laid wires poles and guy wires, railways, highways, bridges or other underground or above ground structure and/or property crossing or adjacent to the cable trench being excavated.
- 34.3 Attention of the bidder is drawn to the rules regarding laying of cables at road crossing, along Railways Bridges, highways safety precautions while working in Public Street as per Engineering Instructions.
- 34.4 The bidder shall be solely responsible for location through approved non-destructive means and ensuring the safety of all existing underground pipeline, electrical cables, and or other structures.
- 34.5** The bidder shall be solely liable for all expense for and in respect of repairs and/or damages occasioned by injury of or damage to such underground and above structures or other properties and undertake to indemnify DBN, DoT/ APBIL from and against all actions, cause of actions, damages, claims and demands what-so-ever, either in law or in equity and all losses and damages and costs (inclusive between attorney and client), charges and expenses in connection therewith and/ or incidental thereto. The bidder shall take all responsibilities and risk in crossing other pipelines and cables and shall be responsible for protecting all such existing pipelines, poles, electric lines, sewers, cables or other facilities from damage by the bidder's operation in connection with the work. The bidder without cost of DBN, DoT/ APBIL shall promptly repair any damage incurred.
- 34.6 The current market value of any commodities lost as a result of any damage to the aforesaid existing facilities shall be paid by the bidder together with such additional sums necessary to liquidate the personal of property damages, resulting there from.

35. Labour Welfare Measures and Workman Compensation

35.1 Obtaining License before commencement of work:

The bidder shall obtain a valid labour license under the Contract Labour (R &A) Act 1970 and the Contract Labour (Regulation and Abolition) Central Rules 1971, before commencement of the work, and continue to have a valid license until the completion of work. The bidder shall

also abide by the provisions of the Child Labour (Prohibition and Regulation) Act 1986. Any failure to fulfil this requirement shall attract the penal provisions of the contract arising out of the resultant non-execution of work.

35.2 Bidders Labour Regulations:

The bidder shall ensure compliance of all statutory obligations, viz. payment of wages / salary to the workers engaged by him on regular and timely basis (by 7th every month) and any other amounts including any Statutory Dues, charges, taxes and levies payable as per the relevant statutes applicable and subsequent amendment thereof and same should be sole liability of Bidder and DBN, DoT/ APBIL will not be liable in any circumstances whatsoever. The Bidder shall comply with the provisions of Employees State Insurance Act 1948, Workmen's Compensation Act, the Employees Provident Fund (and Family Pension Fund) Act 1952, the Payment of Bonus Act 1963, the Industrial Disputes Act 1947, the Payment of Wages Act, Contract Labour (Regulation & Abolition) Act 1970 with Contract Labour (R&A) 1971 and / or any other rules, regulations and / or statutes that may be applicable from time to time or that may be introduced by the Central /State Government or Municipal / Local Self Government authorities, subsequent to the date of this agreement. Default on this account shall be deemed as sufficient ground for termination of the Agreement. In case of accident arising out of and in the course of this agreement. APBIL as Implementation Agency and DBN, DoT being owner/ Principal Employer will not be responsible for payment of any compensation or under any other law. It will be the sole responsibility of the bidder for payment towards loss or compensation whatsoever.

- 35.3 The person engaged by bidder shall be treated as bidder's own employees and they will claim no privileges from DBN, DoT/ APBIL. The bidder will be directly responsible for administration of his employee as regards their wages, uniforms, general discipline and courteous behaviour.

36. Insurance:

Insurance Without limiting any of his other obligations or liabilities, the bidder shall, at his own expense, take and keep comprehensive insurance including third party risk for the plant, machinery, men, materials etc. brought to the site and for all the work during the execution and Operation & Maintenance. The bidder shall also take out workmen's compensations insurance as required by law and undertake to indemnify and keep indemnified APBIL from and against all manner of claims and demands and losses and damages and cost (including between attorney and client) charges and expenses that may arise in regard the same or that DBN, DoT/ APBIL may suffer or incur with respect to end / or incidental to the same. The bidder shall have to furnish originals and/or attested copies as required by the department of the policies of insurance taken within 15 (fifteen) days of being called upon to do so together with all premium receipts and other papers related thereto which APBIL/ DBN, DoT/ APBIL may require.

37. Compliance with Laws and Regulation:

During the performance of the works the bidder shall at his own cost and initiative fully comply with all applicable laws of the land and with any and all applicable by-laws, rules, regulations and orders and any other provisions having the force of law made or promulgated or deemed to be made or promulgated by the Government, Governmental agency or municipal board, Government of other regulatory or Authorized body or persons and shall provide all certificates of compliance therewith as may be required by such applicable law, By-laws, Rules, Regulations, orders and/or provisions. The bidder shall assume full responsibility for the payment of all

contributions and pay roll taxes, as to its employees, servants or agents engaged in the performance of the work specified in the bidder documents. If the bidder shall require any assignee or sub-bidder to share any portion of the work to be performed hereunder may be assigned, sub-leased or sub-contracted to comply with the provisions of the clause and in this connection the bidder agrees as to undertake to save and hold DBN, DoT/ APBIL harmless and indemnified from and against any/all penalties, actions, suits, losses and damages, claims and demands and costs (inclusive between attorney and client) charges and expenses whatsoever arising out or occasioned, indirectly or directly, by failure of the bidder or any assignee or sub-bidder to make full and proper compliance with the said by-laws, Rules, Regulations, Laws and Order and provisions as aforesaid.

38. The PIA's Office:

The PIA's office shall be equipped with the following facilities within 7 days from the issue of Work Order:

- i. Land line /FTTH/ Mobile,
- ii. E-mail facility with PC

The PIA should have at-least one office in the districts of AP and one nodal person in each district with above facilities. It may have more than one office in a district as per the operational need.

SECTION-IV-A: SPECIAL INSTRUCTIONS TO BIDDERS AND SPECIAL CONDITIONS OF CONTRACT

1. Instructions

The special instructions to bidders and the special conditions of contract shall supplement the 'Instructions to Bidders' as contained in Section-II & "General (Commercial) Conditions of Contract" as contained in Section-III and wherever there is a conflict, the provisions herein (Section-IV-A, Section-IV-B & Section-IV-C) shall prevail over those in Section-II and Section-III.

2. ELIGIBILITY CONDITIONS

2.1 For determining the eligibility of Bidders for submission of Bids hereunder, the following shall apply:

- a. The Bidder may be a single entity or a group of entities (the "Consortium"), coming together to implement the Project. However, any Bidder applying individually or as a member of a Consortium, as the case may be, cannot be member of another Bidder. The term Bidder used herein and, in this RFP, would apply to both a single entity and a Consortium.
- b. The Bidder and each of the Consortium members should be registered under Companies Act 1956 or as amended, with at least 3 years of operations in India as on Bid Date. A Consortium shall be eligible for consideration subject to the conditions set out in Clause 2.1 and Clause 2.4.
- c. A Bidder shall not have a conflict of interest (the "**Conflict of Interest**") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, APBIL shall be entitled to blacklist the Bidder from participation in the tendering process for the work of State Government/ Ministry of Communications / Department of Telecom / any public sector undertaking engaged in Telecom / OFC business in India and any work under other Centrally Sponsored Schemes for a period of one year from the Bid Date and/or forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by APBIL and not by way of penalty for, inter alia, the time, cost and effort of APBIL, including consideration of such Bidder's proposal (the "Damages") without prejudice to any other right or remedy that may be available to APBIL under the Bidding Documents or otherwise. Without limiting the generality of the above, a Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:
 - i. A constituent of such Bidder is also a constituent of another Bidder; or
 - ii. Such Bidder has the same authorized representative for purposes of this Bid as any other Bidder; or
 - iii. Such Bidder, or any Associate thereof has participated as a consultant to APBIL in the preparation of any documents, design or technical specifications.

Explanation: In case a Bidder is a Consortium, then the term Bidder as used in the Clause 2.1, shall include each Member of such Consortium.
- d. The financial Eligibility parameters as mentioned in the Table-A (S. No. - 2 & 3) below would be consolidated parameters of the company.

- e. In case of Consortium, the number of bidders including Lead Bidder can be maximum three.
- f. An ISP/TSP license holder for Andhra Pradesh LSA shall be ineligible to participate.
- g. The bidder and consortium partners (if any) shall submit an undertaking in the form of affidavit, as per Annexure-VIII.

Table A: Pre-Qualification Eligibility Criteria

Following are the criteria for eligibility for submitting bid in the tender:

S. No.	Qualification Criteria	Supporting Documents
1.	The Bidder or each of the Consortium members should be registered under Indian Companies Act, 1956/ 2013 or Limited Liability Partnership Act, 2008 or as amended; with at least 3 years of operations in India as on Bid submission Date.	The Bidder or each of the Consortium members: a) Copy of Certification of Incorporation / Registration Certificate b) Copy of PAN card c) Copy of GST Registration
2.	Financial Capacity Net Worth: Minimum Net Worth required for a Bidder shall be as per column-1 of Table-B at the close of the preceding financial year or subsequent to that. Note: In case of Consortium, each member of the consortium should have positive Net Worth. All the consortium partners can meet the Net worth criteria cumulatively.	The Bidder or Lead Member: Audited financial statements for the last three financial years (2021-22, 2022-23 & 2023-24 or 2022-23, 2023-24 & 2024-25). Unaudited statement if certified by the Statutory Auditor for the year 2024-25 shall also be accepted. Certificate from the Statutory Auditor on net worth details for the financial year preceding the Bid Date (i.e. 2024-25).
3.	Financial Capacity: Average annual turnover: The Bidder should have minimum Available Average Annual Turnover for the last three Financial Years, as per column-2 of Table-B . Note: In case of consortium of two members, at least 50% of Available Average annual Turn Over requirement should be met by the Lead Member. In case of consortium of three members, at least 40% of Available Average annual Turn Over requirement should be met by the Lead Member. Remaining turnover to be met by remaining consortium partners, cumulatively.	Audited financial statements for the last three financial years (2021-22, 2022-23 & 2023-24 or 2022-23, 2023-24 & 2024-25) from the Statutory Auditor. Unaudited statement if certified by the Statutory Auditor for the year 2024-25 shall also be accepted.

S. No.	Qualification Criteria	Supporting Documents
	<p>However, the other members of the consortium should have minimum INR 100 Cr. average annual turnover during last 3 financial years.</p>	
4.	<p>Technical Capability:</p> <p>(i) The bidder should have Available Technical Capacity of having executed EPC OFC Network Construction project consisting of 24 or more core OFC in the last 7 years within India, for at least- 6,300 Kms (a minimum 60% of the requirement should be met through OFC construction of 24 or more core Underground cables).</p> <p>The EPC OFC Construction project execution shall consist of both Supply of all material and Construction of OFC Network.</p> <p>AND</p> <p>(ii) The bidder should have satisfactorily completed in the last 7 years within India, the O&M of any OFC network of 24 or more Core Under Ground OFC/ ADSS OFC for the number of 'Year Kms' (for the network for which O&M has been done for at least one year) at least equal to 1,07,000 Kms (a minimum 15% of the O&M requirement should be met through O&M of 24 or more core Underground cables)</p> <p>Year Kms: If O&M of "X" Kms of OFC has been done for "N" years ($N \geq 1$), then 'Year Kms' = "X multiplied by N".</p> <p>AND</p> <p>(iii) The bidder should have available capacity of having executed Installation, Commissioning of Telecom Equipment, satisfactorily in the last 7 years within India, of at least- 2,700 active nodes. The active nodes to be considered for this criterion can be Routers, Layer-3 Switches, BNGs, PTNs/ CPANs, DWDM, OLTs of 16 or more ports, enode-B, BTS and OTN.</p> <p>AND</p>	<p>Experience/ Work Completion Certificate in case of EPC project and Satisfactory O&M completion certificate in case of O&M works issued & signed by the PO issuing authority or an authority authorized by the PO issuing authority of the client entity or by Project Implementation Authority along with the Work order/ Purchase Order with the name of contact person, postal address, email id and telephone numbers.</p>

S. No.	Qualification Criteria	Supporting Documents
	<p>(iv) The bidder should have available capacity of having maintained Telecom Equipment satisfactorily in the last 7 years within India of at least 20,000 active nodes. The active nodes to be considered for this criterion can be Routers, Layer-3 Switches, BNGs, PTNs/ CPANs, DWDM, OLTs of 16 or more ports, enode-B, BTS and OTN.</p> <p>Note-1: The Sole bidder or members of the Consortium should meet the Technical Capability requirements either on their own or jointly for the works awarded directly by the TSPs, Category-A ISPs, Central Government, State Government, Municipal Corporations for Smart City Projects, BharatNet SPVs, Government Institutions, PSUs for their own network and not sub-contracted works. <u>However, it is clarified that the work experience issued by TSPs to the executing agencies for the DBN/DOT awarded projects shall be accepted.</u></p> <p>Note-2: Regarding the experience certificate issued to IP-1 Service Provider, the concerned TSP or ISP (Category-A only), has to certify that the TSP/ ISP (Category-A only) has taken fibres on lease from the said IP-1 out of the network constructed using 24 or more fibre Under Ground OFC or ADSS/ Aerial OFC, as the case may be, which should be constructed and owned by the concerned IP-1 Service Provider for at least one completed year. TSP/ ISP (Category-A only) shall also certify the Route KM of OFC with route wise details for which leasing has been done. The information may be submitted in the format mentioned in the footnote below.</p> <p>Note-3: However, for installation and commissioning of active nodes, the experience certificate issued by the OEMs for the works awarded by the TSPs to the OEMs shall also be considered.</p> <p>Note-4: Deleted</p> <p>Note-5: Deleted</p> <p>Note-6: The technical experience of ongoing projects/ partly completed projects shall also be considered if routes/ links are successfully</p>	

S. No.	Qualification Criteria	Supporting Documents
	<p>completed end-to-end in such partly completed project.</p> <p>Note-7: If any project has been executed in the consortium, the lead bidder and the consortium partners can use the same project experience for qualification individually, if not participating as the partner of same consortium. If they are participating as the consortium partners, then the experience shall be considered only once. However, other than consortium experience, the experience from any type of joint execution, like “teaming agreement, sub-contracting (including any EPC partnerships), backend partnership” shall not be considered.</p> <p>Note-8: The above experience conditions can be met either through single project or multiple projects executed during last 10 years as on date of submission of bid.</p> <p>Note-9: Deleted</p> <p>Note-10: Deleted</p>	
5.	<p>The Bidder or any of the Consortium members should not be blacklisted/ debarred with State Government or Ministry of Communication or APBIL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as per provision of OM No.F.1/20/2018-PPD by Department of Expenditure (DoE), MoF dated on 2nd Nov 2021 as on Bid submission date.</p>	<p>The Bidder or each of the Consortium members shall submit:</p> <p>An undertaking signed by CEO/ Country Head/ Authorized Signatory of the company to be provided on Non – judicial stamp paper of INR 100/- or such equivalent amount and duly attested by notary public.</p>
6.	<p>The Bidder or Lead Member should submit valid letter from the OEM against the proposed products confirming the following:</p> <p>OEM shall ensure that all equipment/ components/ sub- components being supplied by them shall be supported for entire contract period. If the same is de supported by the OEM for any reason whatsoever, the bidder shall replace it with an equivalent or better substitute without any additional cost to APBIL and without impacting the performance of the solution in any manner whatsoever. In case replacement with a product from an OEM other than the OEMs</p>	<p>The Bidder or the lead member of the Consortium should submit valid Manufacturer Authorization Form (MAF) from at least one (01) OEM or up to maximum four (04) OEMs for each passive component (all types of OF Cables, Duct, Joint Closures (SJC & BJC), FDMS & FTB) and up to maximum four (04) OEMs for each active component (Routers, RFMS, UPS & Racks). Copy of Technical Specification Evaluation Certificate (TSEC), from each OEM of Active and Passive components, shall be enclosed with the bid. TSEC issued against earlier tender(s) of</p>

S. No.	Qualification Criteria	Supporting Documents
	<p>proposed by bidder in their bid, prior approval of APBIL will be required.</p> <p>Note: The Bidder shall provide a valid OEM Manufacturer's Authorization Form (MAF) for the existing infrastructure to support the Operations & Maintenance (O&M) phase, including spares.</p>	<p>BSNL/BBNL/MTNL/State Government/Central Government/BharatNet Projects BSNL QA registered QF-103 or Form B issued by TEC for the quoted products shall also be acceptable for eligibility to submit the Bid only. {Bidders may refer the amended QA & testing clause for further details} In order to meet the delivery timelines, the successful bidder can procure and supply the material from one or more quoted OEMs in any combination.</p> <p>Note: The bidder shall submit a separate MAF for existing infrastructure.</p>
7.	<p>If a bidder has been declared as non-performer in any DBN project(s) such as BharatNet Project and 4G saturation project, on the bid submission date, such bidder shall stand not eligible to submit the bid for this tender.</p>	<p>A Self-declaration for not being declared as non-performer in any DBN project(s), as per the clause.</p>
8.	<p>An ISP/ TSP license holder for Andhra Pradesh LSA shall be ineligible to participate.</p>	<p>The bidder and consortium partners (if any) shall submit an undertaking in the form of an affidavit, as per <u>ANNEXURE - VIII</u></p>

Note:

1. Regarding Point No.-6 above (in the Table of Eligibility criteria), following shall be acceptable to meet the eligibility for submitting the bid only.
 - (i) Against the requirement of TSEC/ QF-103 of 48F loose tube OFC (SoR item#4), bidders may also submit copy of the TSEC of 48 or more Fibre Loose Tube type cable, solely for the purpose of meeting the eligibility criteria for submitting the bid only. However, the PIA/ OEM shall submit the valid TSEC as per the TEC GR/ Standard No.: TEC 85260:2024 with latest amendment, before supply of the OFC.
 - (ii) Against the requirement of TSEC/ QF-103 of 6F Aerial OF Drop Cable, bidders may also submit copy of TSEC of 4 or more Fiber Aerial Drop Cable to meet the eligibility for submitting the bid only.
 - (iii) Against the requirement of TSEC/ QF-103 of UPS (SoR item#21,22 and 23), bidders may also submit copy of previous TSEC of any UPS or any CCU or both to meet the eligibility for submitting the bid only. However, the PIA/ OEM shall submit the valid TSEC as per the Technical Specifications in this RFP, before supply of the UPS.
 - (iv) For the Armoured Optical Fibre Cable for underground application (24F loose tube), latest TEC Standard Number- TEC 85170:2024 shall be applicable. However, bidders may submit copy of TSEC against the earlier TEC GR/ Standard No.- TEC 85170:2011 to meet the eligibility for

submitting the bid only. Successful bidders shall obtain TSEC against the latest TEC Standard No. before supplies.

- (v) Against the requirement of TSEC/ QF-103 of 24F ADSS Cable, bidders may also submit copy of TSEC/ QF-103 of 24F or more Fiber ADSS Cable to meet the eligibility for submitting the bid only.
 - (vi) TSEC/ QF-103 or TAC/ Form-B obtained against the Tender No.- T-791 shall be acceptable for this tender also.
2. Regarding Note-2 above, bidder shall also submit an undertaking that it will obtain TSEC before commencement of supplies for the project.
 3. In case of any bidder is quoting the active equipment from multiple OEMs (as per point-6 of above table), in such case the bidder shall ensure that all quoted equipment should meet the Interoperability requirement for smooth network operations. There shall be no exclusion/ relaxation in SLA/ penalties on this account.
 4. In case the experience of IP-1 service provider is being submitted in the bid, then the concerned IP-1 shall submit the Route-wise details, along with certificate(s) obtained from the respective TSP/ISP-Category A, regarding Fibres leased by IP-1 service provider to them, in the below given format:

Route details (Start-End Solutions)	Route length (in RKM)	Cable size (in terms of number of fibers)	No. of fibers leased to TSP/ ISP-A in the route for at least one year	Details of TSP/ISP (Category-A only)	Period of lease	Certificate from TSP/ISP-A Placed at Page No. of bid

The IP-1 shall undertake that

- i) None of the routes mentioned above have any overlapping lengths
- ii) Only one certificate is submitted for claim of experience against one route even, where fibres may have been leased out to more than one TSPs/ISPs, in the same route.
- iii) If, at any stage, it comes to the notice of the purchaser or it is found on verification, that any of the routes, mentioned above, has been claimed more than once for experience claimed, the bid where such IP-1 involved either as sole bidder or as consortium partner, shall be declared nonresponsive.

Table B: Financial Qualification Criteria

Financial Capacity (Net worth) in INR Cr.	Financial Capacity (Average Annual Turnover) In INR Cr.
Column 1	Column 2
140	470

2.2 The Bidder shall enclose with its Qualification Bid, to be submitted as per the format at Annexure-V, complete with its Annexes, the following:

Certificate(s) from statutory auditors of the Bidder or its Associates specifying the Net Worth of the Bidder, as at the close of the preceding financial year, annual turnover of the Bidder for last 3 years as at the close of preceding financial year and also specifying that the methodology adopted for calculating such Net Worth conforms to the provisions of this Clause. For the purposes of this RFP, net worth (the “**Net Worth**”) shall mean the aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write-back of depreciation and amalgamation.

2.3 The sole bidder shall submit a Power of Attorney as per the format at Annexure-IX, authorizing the signatory of the Bidder to sign and submit the Bid.

2.4 In case the Bidder is a Consortium, it shall comply with the following additional requirements:

- i) Number of members in a consortium shall not exceed 3 (three).
- ii) subject to the provisions of sub-clause (i) above, the Bid should contain the information required for each member of the Consortium.
- iii) Members of the Consortium shall nominate one member as the lead member (the “Lead Member”). The nomination(s) shall be supported by a Power of Attorney, in the format at Annexure-IX., signed by all the other Members of the Consortium.
- iv) the Bid should include a brief description of the roles and responsibilities of individual members, particularly with reference to their obligations.
- v) An individual/sole Bidder cannot at the same time be member of a Consortium bidding for the tender. Further, a member of a particular Bidder Consortium cannot be member of any other Bidder Consortium.
- vi) The members of the Consortium shall have entered into a binding Joint Bidding Agreement, substantially in the form specified at Annexure-XII (the “**Joint Bidding Agreement**”), for the purpose of making the Bid and submitting a Bid in the event of being qualified. The Joint Bidding Agreement, to be submitted along with the Bid, shall, inter alia:
 - (a) clearly mention the name of Lead Member, other members and proposed roles and responsibilities, if any, of each member.
 - (b) include the commitment that each of the members, whose experience will be evaluated for the purposes of this RFP, shall discharge the obligations specified by the Bidder.
 - (c) include a statement to the effect that all members of the Consortium shall be liable jointly and severally for all obligations of the consortium in relation to the Project until the Appointed Date is achieved in accordance with the contract.
 - (d) include a provision that the Lead Member shall represent all the members of the Consortium and shall at all times be liable and responsible for discharging the functions and obligations of the Consortium; and that each member of the Consortium shall be bound by any decision, communication, notice, action or inaction

of the Lead Member on any matter related to the Contract Agreement and APBIL shall be entitled to rely upon any such action, decision or communication of the Lead Member. APBIL shall have the right to release payments solely to the Lead Member and shall not in any manner be responsible or liable for the inter se allocation of payments among members of the Consortium.

- (e) Except as provided under this RFP and the Bidding Documents, there shall not be any amendment to the Joint Bidding Agreement without the prior written consent of APBIL.

2.5 The following conditions shall be adhered to while submitting a Bid:

- i) Bidders should attach clearly marked and referenced continuation sheets in the event that the space provided in the prescribed forms in the Annexes is insufficient. Alternatively, Bidders may format the prescribed forms making due provision for incorporation of the requested information.
- ii) Information supplied by a Bidder (or other constituent Member if the Bidder is a Consortium) must apply to the Bidder, Member or Associate named in the Bid and not, unless specifically requested, to other associated companies or firms.
- iii) In responding to the qualification submissions, Bidders should demonstrate their capabilities in accordance with the provisions of this RFP.
- iv) In case the Bidder is a Consortium, each Member should satisfy the qualification requirements to the extent specified herein.

2.6 Notwithstanding anything to the contrary contained herein, in the event that the Bid Date falls within 3 (three) months of the closing of the latest financial year of a Bidder, it shall ignore such financial year for the purposes of its Bid and furnish all its information and certification with reference to the 3 (three) years preceding its latest financial year. For the avoidance of doubt, financial year shall, for the purposes of a Bid hereunder, mean the accounting year followed by the Bidder in the course of its normal business.

2.7 A Bidder shall be liable for disqualification and forfeiture of Bid Security if any legal, financial or technical adviser of APBIL in relation to the Project is engaged by the Bidder, its Members or any Associate thereof, as the case may be, in any manner for matters related to or incidental to such Project during the Bidding Process or subsequent to the (i) issue of the LOA or (ii) execution of the Contract Agreement. In the event any such adviser is engaged by the Selected Bidder, as the case may be, after issue of the LOA or execution of the Contract Agreement for matters related or incidental to the Project, then notwithstanding anything to the contrary contained herein or in the LOA or the Contract Agreement and without prejudice to any other right or remedy of APBIL, including the forfeiture and appropriation of the Bid Security or Performance Security, which APBIL may have thereunder or otherwise, the LOA or the Contract Agreement, as the case may be, shall be liable to be terminated without APBIL being liable in any manner whatsoever to the Selected Bidder or PIA for the same. For the avoidance of doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired or was terminated at least 30 (thirty) days prior to the Bid Date. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the Bid Date.

2.8 Any award of the contract pursuant to this RFP shall be subject to the terms of Bidding Documents.

2.9 Change in role of Consortium Members

- (i) By submitting the Bid, the Bidder acknowledges that it will be qualified on the basis of Financial Capacity and Technical Capability of the Consortium Members who shall discharge their obligation as specified in the Bid.
- (ii) By submitting the Bid, the Bidder shall also be deemed to have acknowledged and agreed that in the event of a change in the role of the Lead Member and Consortium Member whose Financial Capacity and Technical Capability was taken into consideration for the purposes of qualification under and in accordance with this RFP, the Bidder shall be deemed to have the knowledge of the same and shall inform APBIL forthwith along with all relevant particulars about the same and APBIL may, in its sole discretion, disqualify the Bidder or withdraw the LOA from the Selected Bidder, as the case may be. In the event such change in control occurs after signing of the Agreement but prior to sign off of the project, it would, notwithstanding anything to the contrary contained in the Agreement, be deemed to be a breach of the Agreement, and the same shall be liable to be terminated without the competent authority being liable in any manner whatsoever to the Bidder. In such an event, notwithstanding anything to the contrary contained in the Agreement, the competent authority shall be entitled to forfeit and appropriate the Bid Security and Performance Security, as the case may be, as damages, without prejudice to any other right or remedy that may be available to the competent authority under the Bidding Documents and / or the Agreement or otherwise.

2.10 Public Procurement (Preference to Make in India):

- (i) The Public Procurement (Preference to Make in India) (PPP-MII) guidelines, issued vide No. P-45021/2/2017-PP (B.E.-II)-Part IV (Vol-II) dated 19.07.2024 and DoT Gazette Notification dated 21.10.2024, along with subsequent amendments, if any, shall be applicable to this tender.

Class-I & Class-II local and non-local bidders shall be eligible to participate in the tender. However, Preference shall be given to Class-I bidders as defined in the Public Procurement (Preference to Make in India) Order, 2017, as amended from time to time.

The bidder must source notified items mandatorily from Class-I local suppliers. The overall local content of bid shall be calculated as per Clause 2(e) of the DPIIT PPP-MII order, which states: "For contracts involving the supply of multiple items, the weighted average of all items shall be taken while calculating the local content

- (ii) The bidder shall submit Form-1 (as per Annexure-VI) for overall local content of the total bid package, along with declaration specifying the local content of individual SOR items, failing which the bid is liable to be rejected. The declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the bidder is a company and by a practicing cost accountant or a chartered accountant for bidders other than companies.

At the time of bidding, the bidder is required to submit only a self-declaration regarding the local content of their products without disclosing the details mentioned in points (vi) to (xiii) of Form-I. These details must be maintained by the bidder in accordance with the conditions outlined in the DoT/DPIIT PPP-MII notification/order, as amended from time to time.

2.11 Conditions for Field Trial of the Class I/ Class II local suppliers for routers.

- (i) The offered Make-Model for Block Router and GP Routers can be from same OEM or different OEM. However, the same or its earlier version should have been supplied for minimum 30% of required quantities.
- (ii) In case of Class-I & Class-II local suppliers (as per prevalent DPIIT, GoI guidelines mentioned in Clause-2.10 of Section-IV-A), the offered Make-Model for Block Router and GP Routers or its earlier version should have been supplied for minimum 10% of required quantities.
- (iii) In case, a bidder quotes a router model (OEM-1) of a Class I/ II local supplier (as defined in the DPIIT guidelines mentioned in Para-2.10.(i) above), which does not meet the criteria as defined in para 2.11(ii) above, it must also quote another model (OEM-2) of some other OEM meeting the above required criteria.
- (iv) The PIA shall have to offer the router model (OEM-1) for field trial to APBIL within 60 days of the APO/AWO date. The Field trial is mandatory and must be successfully completed within 150 days of the APO/AWO date.
- (v) The Field trial shall consist of one ring in a block with Router category A and minimum 9 GP routers with mix of Category C and Category-D routers at GPs. The other ring shall be in different block with Category B router at the Block and minimum 9 GPs with mix of Category C and Category D routers at GP. Logical ring shall be created using multiple fibres on the same route, if a physical ring is not possible.
- (vi) In case, the Field trial for any category is not completed successfully within 150 days of the APO/AWO, the PIA must provide all the routers from OEM-2 for that category.
- (vii) No relaxation in this shall be given and any delay in achieving the milestone shall attract penalties as per the provision of the tender.
- (viii) The PIA shall submit the Field Trial test schedule; covering all the technical specifications as per the tender; to APBIL for approval.

2.12 The TSEC and field trial shall not absolve the PIA for offering the individual equipment for acceptance testing after installation.

2.13 Being a turn-key project, the responsibility of the PIA shall be to meet all the performance parameters, functional requirements and SLA benchmarks during the entire contract period. In case, the router or any other equipment does not meet these requirements during Acceptance Testing and/ or O&M period, the PIA shall be bound to replace such equipment with appropriate equipment meeting all the requirements specified in the tender for entire contract period on its own cost.

2.14 Any bidder from a country which shares land border with India will be eligible to bid if the bidder is registered with the competent authority as specified in Annexure-I of O.M. No. 7/10/2021-PPD (1) Dated 23.02.2023 from Department of Expenditure, Ministry of Finance. The bidders shall submit an undertaking in this regard as per format provided at **Annexure VII**, of this tender document.

2.15 The Mandatory Testing and Certification of Telecom Equipment (MTCTE) guidelines require that every telecom equipment must undergo mandatory testing and certification prior to sale, import or use in India.

The supplied products under this project shall meet the extant guidelines on MTCTE issued by TEC from time to time for various telecom equipment.

- 2.16** The instructions regarding supply of 'Trusted products' as mandated by DoT vide File no- 20-271/2010 AS-I (Vol-III) dated 10.3.2021, along with its amendments, issued from time to time, shall have to be complied for this tender. The bidder/ OEM shall not be in the notified list of designated sources, from whom no procurement can be done, as per above letter.

Routers and RFMS, to be supplied under this tender, should comply "Trusted Products" before delivery. In case, the make/ model is not approved as "Trusted Product", then, the bidder/ OEM shall obtain the approval for the tendered products from the designated office.

Alternatively, the bidders can provide all documents/ information to APBIL for application on trusted portal, in their technical bid. The format for submission of information (to be submitted with technical bid) is enclosed at **Annexure-XIV**.

- 2.17** In case of imported products, OEM should have a registered office and Service Support Centre in India to provide after sales service support in India.

The bidder is required to submit a certificate to this effect, as part of its bid.

3. Bid Security

- 3.1** The bidder shall furnish Bid Security of an amount of **INR 10 Cr.** along with Tender. Bid Security shall be in the form of Bank Guarantee (in the proforma given at Section-VIII A) from any Scheduled Bank other than Gramin Bank & Cooperative Banks OR in the form of Insurance Surety Bond (in the proforma given in Section-VIII B).

Bid Security in original shall be submitted offline within 5 days before bid submission end date, as per instructions regarding offline submissions mentioned in Section-I-A. Scanned copy of the same shall be mandatorily uploaded along with the other required documents in the technical bid part of Tender bid.

4. The documents comprising the Bid shall include:

4.1 Qualification Bid

- 4.1.1 Bid Form in the prescribed format (Section-VI).
- 4.1.2 Bid Security in the form of Bank Guarantee or in the format of Insurance Surety Bond (Section-VIII- (A) & (B)).
- 4.1.3 Power of Attorney for signing the Bid as per the format at Annexure-IX.
- 4.1.4 Integrity Pact as per the format at Section XIV
- 4.1.5 Online payment receipt towards the cost of the Bidding Documents.
- 4.1.6 Memorandum and Articles of Association, if the Bidder is a body corporate, and if a partnership then a copy of its partnership deed.
- 4.1.7 Bidder's duly audited balance sheet and profit and loss account for the preceding three years indicating turn over. Provisional statements, in case of preceding year certified by Chartered Accountant shall be accepted, if audited statements are not published.
- 4.1.8 Copies of the Work orders/ Agreements/ Contract issued by the customer and Satisfactory Service/ Performance Certificate from the Customer.
- 4.1.9 EPF/ESIC/Labour Department/GST Registration Certificates

- 4.1.10 Chartered Accountant (CA) Certificate on Net worth as on 31st Mar 2025 with CA's Registration Number and Seal.
- 4.1.11 Undertaking that the Bidder or any of the Consortium members is not blacklisted/debarred with Ministry of Communication or APBIL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as on Bid submission date (Section-XII)
- 4.1.12 Undertaking for clause-by-clause compliance and Nil deviation.
- 4.1.13 List of all Directors including their name(s), Director Identification Number(s) (DIN) and address (es) along with contact telephone numbers of office and residence.
- 4.1.14 Certificates from all Directors of the bidder stating that none of their near relatives are working in APBIL in accordance with clause 34 of Section-II.

4.2 Financial Bid

- 4.2.1** Financial Bid in the prescribed format – Section VII.

5. Evaluation Criteria and Number of Successful Bidders

5.1 DELETED

5.2 DELETED

- 5.3** APBIL shall determine whether each Qualification (Techno-commercial) Bid is responsive to the requirements of the tender. A Qualification (Techno-commercial) Bid shall be considered responsive if it is found to be complete as per the requirement of the tender, is unconditional and is accompanied by all the required documents.
- 5.4** The financial bids of only those bidders shall be opened which are found to be technically responsive.
- 5.5** For the purpose of ordering against this tender, APBIL intends to limit the number of technically and commercially responsive bidders to One (1) from the list of such bidders arranged in increasing order of their evaluated prices starting from the lowest. Among all technically & commercially qualified bids, the lowest evaluated price will be termed as L1 price and the bidder quoting L1 price as L1 bidder.
- 6.** APBIL reserves the right to blacklist a bidder for a suitable period in case he fails to honour his bid without sufficient ground.
- 7.** APBIL reserves the right to offer counteroffer price(s) against the price(s) quoted by any bidder.
- 8. Clarifications:** The bidders may seek clarifications prior to the last date and time of seeking clarifications through E-mail. The template for seeking clarifications through email is enclosed. The bidder may submit queries in the specified template in .xlsx format and send the email to abp-apbil@ap.gov.in. Queries received in any other format or sent to any other email id or received after the last date and time of seeking clarifications, as specified in Detailed Notice Inviting tender clause17, will not be addressed by APBIL. As this is an Electronic Tender, so queries received in physical form / hard copy / letter format etc. will not be considered by APBIL. The clarifications should be sought for commercial conditions and technical conditions separately. The clarifications sought without any mention of the clauses of the tender document/ clause no of GR(s) may not be considered.

Template of seeking clarifications from APBIL

S. No.	Section No.	Clause No.	Page No.	Brief Description of the Clause	Query Submitted By (Company Name)	Query / Clarification sought for

Hint for filling the template:

- i. S. No.Fill 1, 2, 3,in serial order for each query
 - ii. Section No.Fill Section No. in Roman e.g. I, II, III, IV, V, VI, VII, VIII, IX, X or XI
 - iii. Clause No.Fill exact clause No. e.g. II.1 (a), III.1.1, IV.B.1 (i) (a)
 - iv. Page No. Fill Page No. of the clause as printed on the tender document
 - v. Query Submitted by (Company Name) Name of the company seeking clarification
 - vi. Query / Clarification sought for Brief Query of the bidder.
 - vii. Only one query may be sought in one row. Please use separate rows for each query even if the queries are related to same clause.
9. Any clarification and amendment, if any, issued by APBIL in response to any query raised by prospective bidders or otherwise shall form an integral part of Bid Documents.
 10. The bidder must comply with all tender conditions. Clause by Clause compliance for the tender document shall be submitted by the bidder along with the No deviation certificate. Every page of the same shall be signed and written as complied against each clause. The copy of the clarifications/ corrigendum shall also be submitted by the bidder duly signed on every page along with compliance against each clause. Section wise NIL deviation statement with declaration "Fully complied without deviation" shall also be acceptable. Similarly, a NIL deviation to all clarifications & amendments issued, with statement "Fully complied without deviation" shall be submitted by the bidders).
 11. The Bid shall be liable to be rejected, if any of the above clauses are not complied by the bidder.
 12. This tender is governed with the integrity pact; Performa is attached as Section XIV.

SECTION-IV-B: SPECIAL (COMMERCIAL) CONDITIONS OF CONTRACT (SCC)

Package – A: BharatNet

1. Project Background

BharatNet is a project funded by Digital Bharat Nidhi (DBN), Department of Telecommunications (DoT), with an aim to provide high speed broadband connectivity to all inhabited Gram Panchayats (GPs), villages across India. The network infrastructure under this project shall be a national asset and accessible on a non-discriminatory basis to all eligible service providers to enable them to provide services in rural areas.

1.1. Phase I – Network Implementation

- a. The implementation was done under Central Public Sector Units (CPSU) led model by PGCIL.
- b. Under this implementation model, the network infrastructure was deployed from Block to Grama Panchayat Location by laying incremental underground OFC.
- c. The network architecture was based on linear topology where GPON based electronics infrastructure was deployed across Block and GP location for middle mile network connectivity.

1.2. Phase II – Network Implementation

- a. The project is presently being implemented under State-led model by APSFL.
- b. Under this implementation model, the connectivity is being done by laying end to end overhead 24F ADSS OFC from Block to GPs location in Ring topology.
- c. Deleted
- d. State led model: - The network architecture based on IP-MPLS (ring topology) based electronics infrastructure was deployed across Block and GP location for network mid-haul connectivity.
- e. Media – Aerial (24F ADSS) OFC has been used for 100% connectivity of the Phase II GPs.

2. Scope of the Work

To implement the middle-mile network for BharatNet program as per Table-A of Section- I consist of the following:

2.1. Construction: To build network infrastructure across remaining Gram Panchayat (GP) and Block locations.

2.2. Upgradation:

- i. To upgrade the existing network infrastructure from linear to ring topology across GPs and Block locations of Phase-I network.
- ii. To deploy IP-MPLS Network by replacing existing GPON network at GPs and Block locations of Phase-I network.

2.3. Operation and Maintenance: To operate and maintain the existing and the newly deployed network infrastructure for a period of 10 years as per the defined SLA.

2.4. Upgradation of State Main & DR NOCs: To upgrade State NOCs (Data Centre at Tirupati and Data Recovery at Visakhapatnam) including BSS and OSS applications,

- i. To connect the complete network of BharatNet Phase I, Phase II & ABP for monitoring, supervision and O&M to meet the SLAs.
- ii. Service Provisioning: To enable retail, enterprise and wholesale FTTH, ILL, P2P LL, MPLS VPN etc. services as per the requirement of APBIL across the Contract Period.

The scope of work for the Project Implementation Agency (PIA) shall cover as per the details in Section-V (Schedule of Requirement). It is to be noted that number of Gram Panchayats (GPs) as mentioned in Section-V is indicative, and PIA shall undertake the Scope of Work across all Gram Panchayats (GPs) identified post survey and approved by APBIL.

The PIA shall deploy and maintain a dedicated project management tool for the entire contract period, including both the Implementation and Maintenance phases. The PIA shall also be responsible for enabling automated report generation for invoicing purposes, automated Service Level Agreement (SLA) calculations, and real-time dashboards for monitoring, review, and governance of project progress, service delivery, and performance indicators throughout the contract duration.

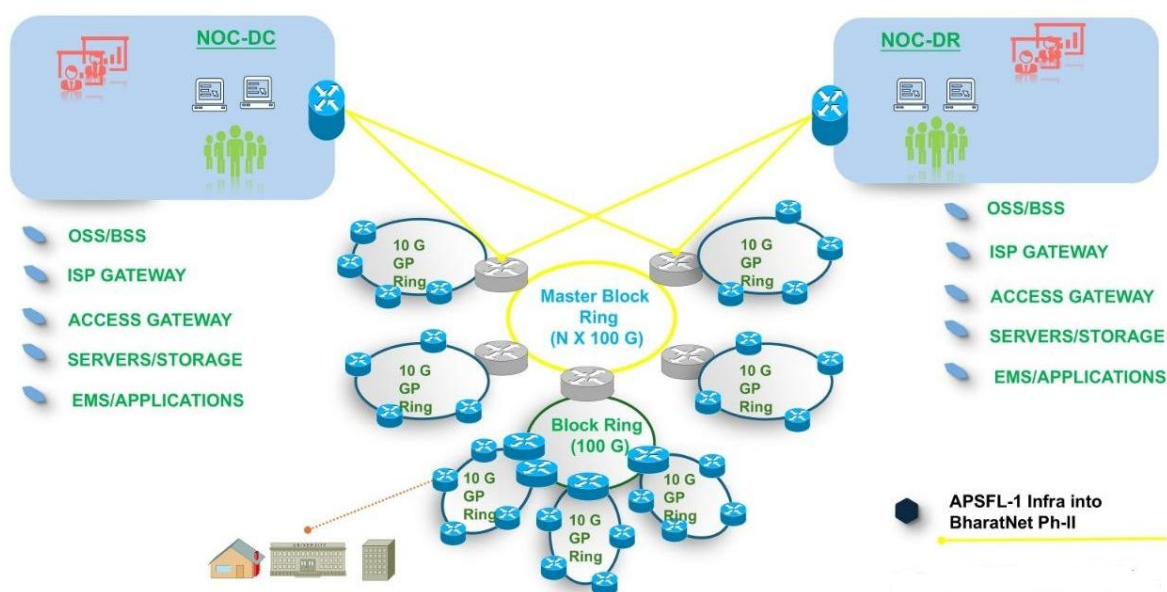
3. Detailed Scope of Work

3.1 Construction and Upgradation of the Network:

3.1.1 Ring architecture using IP-MPLS:

Project Implementation Agency (PIA) shall be responsible for survey, planning, design, supply, installation, end-to-end integration, and commissioning of newly deployed and upgradation of existing network infrastructure including Optical Fibre Cable (OFC) network (underground and aerial). Primarily, the PIA shall plan OFC construction through Underground/Overhead laying as per the previous OFC laying methodology in that area. However, wherever, the Underground is not possible, the next alternative shall be ADSS OFC laying preferably using existing electricity infrastructure. The same shall be approved by APBIL based on recommendation of IE with appropriate justification and constraints for underground laying. In case it is not feasible to lay the OFC (either underground or ADSS), the PIA shall represent the same to the IE. The IE after verifying with the field conditions shall submit the same to APBIL. APBIL will take a final decision for deployment of alternate technology to connect such GPs based on the recommendation of IE and/or its field unit report. However, post n/w integration, the FLM of such GPs shall also be the responsibility of the PIA including its integration with State- Network Operation Centre (S-NOC). **The PIA shall be responsible for connectivity across all Gram Panchayat (GP) in accordance with Section-V (Schedule of Requirement) and ensure upgradation of the existing network infrastructure into ring topology with IP-MPLS network.** The GPs already connected on Satellite media under BharatNet Phase-II project shall also be planned for connectivity on OFC network. The PIA shall deploy new network infrastructure in BharatNet middle mile scope or may leverage existing network of BharatNet, or existing TSP/ ISP/ IP- 1 license holders (as detailed in Para-3.6 below), for providing connectivity from Blocks to Gram Panchayat (GP) except for the provision as specified in clause No. 3.6 (a) iii.

A simple schematic of the proposed network architecture (illustrative) is as given below:



Based on the network infrastructure to be deployed under this project, all permissions shall be obtained by the PIA, as required under Applicable Laws, relevant Applicable Permits, license(s), authorisation(s) and permissions from Department of Telecom / Government of India/ State Governments.

3.2 Making Over the Network to PIA by APBIL:

3.2.1 Handover/ Takeover of the Existing BharatNet Phase-I & Phase-II Networks:

- a. The SIA of State Government shall hand over the Existing Network to APBIL, within a maximum time period as per below table from the agreement signed date on as is where is basis. The handover of the BharatNet Phase-II network shall be Block wise. At field level, the O&M agencies of SIA and APBIL's PIA shall co-ordinate with each other for physical takeover of the BharatNet Phase-II network.

The entire BharatNet Phase-I network shall be handed over to the PIA on as is where is basis immediately after award of AWO and signing of agreement.

Table X.1: Timelines to handover existing network

S. No.	Milestones	Timeline
1	Existing network handover completion of 20% or more GPs (Locations)	T*+1 month
2	Existing network handover completion of 40% or more GPs (Locations)	T + 2 months
3	Existing network handover completion of 60% or more GPs (Locations)	T + 3 months
4	Existing network handover completion of 80% or more GPs (Locations)	T + 4 months
5	Existing network handover completion of 100% GPs (Locations)	T + 5 months

*T is Appointed Date i.e. date of signing of Agreement between PIA and APBIL.

- b. The APBIL PIA shall be responsible for O&M of the taken over OFC network as well as FLM of taken over GPON equipment including logistics, replacement of faulty GPON/ SPV equipment, spares management till MPLS routers are commissioned in the Block/GP.

Note:

1. The Milestone wise % GPs to be taken over by the PIA as mentioned in Table X.1 above are not restrictive. If the PIA is willing to take over some or all GPs and/or associated OFC network, the PIA shall be allowed to take over the same (complete block) from the existing SIA of State Government.
2. However, after five (5) months from appointed date, the entire network shall be deemed to be made over to the PIA on as is where is basis.
3. In those blocks, where complete OFC network of the block is taken over by PIA and all the GPs are not up, on date of such taking over, the PIA has to make additional 5% GPs of the block as operational every month after 2 months from such taking over date, till all the GPs are made operational. A penalty of Rs. 5,000/- per month per GP shall be levied and deducted from the O&M invoice, for such shortfall of achieving 5% addition in operational GP count of the block, every month from 4th month of taking over date. The GPs becoming operational as per NoC report, will be counted for O&M payments from date of becoming operational.
4. In case, the GP of taken over block is made operational by PIA, by laying the OFC on the approved route (after survey) for completion of the ring, (even if the ring is not completed, due to non-repair of the existing OFC route for that GP), the GP will be counted as operational (will be counted in 5% addition for the month and O&M payments).
5. PIA will be able to claim 50% of the OFC construction work in such cases. Remaining payment of OFC construction shall be made only after the ring completion and as per the milestone defined in Clause-12.1.h of Section-IV-B.
6. In all such operational GP cases, the SLA will stand started immediately after GP becomes operational.
7. O&M Payment for Non-functional routes after handover: Payment shall be made only for the routes which are made operational by PIA.

3.2.2 Existing Infrastructure: Site of the Existing Network shall include an inventory of existing network infrastructure across Blocks, Gram Panchayats (GPs) and Villages along with laid OFC infrastructure. The indicative information is described in Table A.1 & Table A.2

Table A.1: Asset Summary

State	No of Blocks	Total GPs (Connected on OFC)	Total OFC laid (Kms)	OLT / MPLS Routers installed (Nos.)	ONT/MPLS routers installed (Nos.)	GPs connected through VSAT (Nos.)
Andhra Pradesh	668	12,946	59,565	674	12,946	20

Table A.2: Block / Gram Panchayat (GP) count

States	Total Blocks	GPs already created			GPs for Upgradation	GPs To be Connected	Total GPs to be connected in Ring Topology
		Phase I	Phase II	Satellite			
Andhra Pradesh	668	1,692	11,254	20	1,692	480	2,172

3.2.2.1 Summary of Existing Infrastructure - BharatNet Phase-I:

Particulars	BharatNet Phase-I
No. of Districts (Erstwhile)	2
No. of Mandals	80
No. of GPs	1,692
Passive Infrastructure	
24F Optical Fiber UG Cable	5,063
GPON OLT at Mandal/ Block (count)	82
GPON ONT at GP (count)	1,692

3.2.2.2 Summary of Existing Infrastructure - BharatNet Phase-II

Particulars	BharatNet Phase-II
No. of Districts (Erstwhile)	12
No. of Mandals	613
No. of GPs	11,254
24F Optical Fiber ADSS Cable with pole accessories	54,502
IP-MPLS Router at Master Mandal/ DC/ DR (count)	54
IP-MPLS Router at Mandal/ Block (count)	550
IP-MPLS Router at Master Mandal/ DC/ DR (OEM)	Huawei
IP-MPLS Router at Mandal/ Block (OEM)	Huawei
IP-MPLS Router at GP (count)	11,254
IP-MPLS Router at GP (OEM)	Huawei
Shelter Infrastructure	
Shelter at Master Mandals with associated infrastructure	43
Shelter at Mandals with associated infrastructure	542
Network Operations Center	
NOC (DC & DR)	2
OEM/ Vendor	
OEM - Power infra/ UPS /Smart rack	Delta
OEM for OSS	NMS Works
OEM for BSS	Green Lantern & Alepo
OEM for AAA	Alepo
OEM for DDI	Efficient IP

3.2.3 GP End Equipment:

- a. The Network shall be made over Block wise with the GPs whose optical power is -25 dBm or better at the GP end equipment. The same shall be ensured by the outgoing existing O&M agency. The details of the equipment will also be provided.
- b. The PIA shall be given access to NMS, GIS, so as to see the status and seek clarification, mention any observation in the handover – takeover (HOTO) memo.
- c. The PIA shall upkeep the equipment even after the Router at the GP/ new equipment is installed. The GP equipment may be used for providing/ continuing the FTTH connection at the GP/ School, if approved by APBIL. If the same is provided through BharatNet Udyami, the APBIL PIA shall make over the same to the BharatNet Udyami under similar HOTO memo with a copy to APBIL.

3.2.4 Block End Equipment:

- a. The OLT/MPLS Router along with make model, configuration, cards and Ring diagram shall be made over by BSNL/SIA to APBIL/PIA. The APBIL PIA shall be responsible for FLM of the same till the network is transferred to IPMPLS.
- b. After transfer of network to the new equipment, the PIA shall make over the old equipment to APBIL.

3.2.5 OFC Network:

- a. The OFC **network** corresponding to the GPs whose optical power is OK (-25 dBm or better) and made over to APBIL by the SIA of State Government shall be transferred to the APBIL PIA for O&M on as-is-where-is basis. The complete L-14 diagram mentioning the routes shall be signed by the O&M agencies of State Government, APBIL/ PIA and SIA. Details of temporary restoration etc. shall also be marked. APBIL /PIA, if required, can mention its observations in the HOTO memo.
- b. The responsibility of attending the faults in the damaged OFC routes is with the outgoing O&M agencies of State Government. The O&M agencies of State Government shall progressively make over such GPs whose optical power is made available as per specifications laid and ABP requirements to the APBIL PIA with details of the routes marked on the L-14 (already available with the APBIL PIA). The equipment of such GPs shall be made over by the outgoing O&M agencies of State Government.
- c. However, in cases, where, from the Date of first GP make over to the APBIL PIA, the outgoing O&M agencies of State Government fails to make over some GPs within 5 months, the APBIL PIA shall be bound to take over such GPs also. The APBIL PIA shall get the restoration charges as per the tender discovered rates.
- d. Any section which is temporarily restored shall be clearly mentioned in the HOTO memo. The APBIL PIA shall be paid for permanent restoration of the same at the tender discovered rate.
- e. APBIL PIA shall be responsible for First Line Maintenance (FLM) of the network elements both at Block and GP level, till the network is transferred to the MPLS router.

3.3 Upgradation of Existing BharatNet Infrastructure

As part of the upgradation, the following activities shall be performed:

- a) Upgrade existing BharatNet middle mile network to make it robust, redundant and carrier-grade.
 - The PIA shall replace the existing GPON equipment with IP-MPLS routers (Access/Aggregator)
 - The existing OFC network shall be upgraded from linear to ring topology
- b) PIA shall integrate the existing (Phase I & II) GPs and newly covered GPs (to be created) under BharatNet middle mile network

PIA shall conduct a detailed survey to cover all the GPs in a circle by forming GP rings and child rings. These rings may consist of existing (Phase I & II) GPs and newly covered GPs (to be created) under BharatNet middle mile network
- c) PIA shall integrate existing BharatNet infrastructure with NOC as required to be implemented under the project.

PIA shall integrate entire BharatNet infrastructure existing (Phase I & II) and newly created with the EMS and NMS to be deployed in State NOC. Further the NMS of State NOC shall be integrated with the NMS of centralized BharatNet NOC.

3.4 Site Survey and Planning

The PIA shall conduct an exhaustive video-based site and route survey based on an optimal/shortest path to connect Gram Panchayat (GP) and Block as defined under the scope of work for construction and upgradation of network. All the videos during Survey shall be taken using Mobile APP. The PIA shall take the videos as per the specifications in clause No. 3.7 of Section-IV-B, which shall be uploaded in the BharatNet GIS platform in the CNOC. PIA shall perform the following activities for site survey and planning:

- a) APBIL shall provide the GIS details for site and route data of the Existing Network to the PIA on as is where is basis.
- b) The PIA shall deploy a GIS based planning tool for desktop planning. The tool based on the Geo coordinates of the Block and the GPs shall provide the initial optimal path of the connectivity using road data. The PIA shall use such initial plan for physical site survey.
- c) PIA shall conduct an actual Geographic Information System (GIS)-based survey for the area under scope of work.
- d) The PIA shall record with videos, constraints about the changes in the desktop routes proposed based on physical survey. I.E. and APBIL may use such evidence for approval of the design and BoQ. The access of such GIS based planning tool shall be given to the IE and APBIL also.
- e) The PIA shall ensure that the GIS based file formats should be compatible with BharatNet GIS platform. Furthermore, sharing and integration of GIS data under this project with the afore-mentioned platform shall be the responsibility of the PIA and APBIL shall provide reasonable assistance in the same.
- f) During the survey, the PIA shall consider connectivity till Gram Panchayat (GP) based on the optimal path for fibre layout covering maximum population en-route.

- g) The PIA shall provide all the relevant drawings such as network diagram, L-14 (Single Line Diagram), As Build Diagram (ABD), related for the Development Works and/or the Upgradation Works for New Network and Existing Network to APBIL and its designated agency. The network diagram shall include both High- and Low-Level Design (HLD & LLD).
- h) The PIA shall create/update the relevant engineering drawings/design in case of future upgradation, ensure updation of GIS platform and other relevant systems as required by APBIL.
- i) All engineering drawings/design and documents shall be created, updated and maintained by the PIA on its system/tool or portal and shall be accessible to APBIL throughout the Contract Period. All these will eventually be handed over to APBIL and will become property of DBN, DoT.
- j) The GPs of BharatNet Phase-I and BharatNet Phase-II, that are merged with municipalities or urban areas and are currently active, shall continue to be utilized by APBIL and no further ring creation for these GPs are not required.

3.5 Network Design

- a) The PIA shall connect all Gram Panchayat (GP) into ring topology with IP-MPLS aggregation/access routers as per the technical specification in this document across the State/UT in accordance with Section-V (SOR) and as per the scope of work through OFC connectivity.
- b) The PIA shall design a redundant and robust OFC network infrastructure connecting all GPs, based on ring architecture/ topology. The number of GPs in a GP ring (as per figure in clause 3.1.1 above) shall normally be eight (8) and maximum up to ten (10).

In case, more than 10 (ten) GPs are necessitated to be connected in a ring as per survey, the same shall be implemented after justification and recommendation by the I.E. and approval by APBIL.

- c) The PIA can also plan child rings (as per figure in clause 3.1.1 above) in case the creation of GP ring from Block is not feasible due to distance from block or any other reason. The PIA shall conduct a detailed survey and prepare the report in consultation with IE for each case and submit it to APBIL for approval of such Child Rings.
- d) Depending on the non-feasibility of the ring architecture deployment, PIA may recommend to APBIL to deploy suitable network architecture (linear) other than ring architecture in a GP/ GPs. If ring architecture is not techno-commercially feasible, APBIL shall approve the same based on the recommendation of the PIA and IE on case-to-case basis.

e) Alternate Technology Implementation

- (i) Wherever, the U/G or ADSS OFC laying is not possible, the PIA shall submit a note to the IE detailing the constraints. The Independent Engineer (IE) shall examine the same and if the same is found to be correct, the IE shall recommend in speaking justification to APBIL. The CEO APBIL, based on the recommendation of the IE will approve the same to be implemented through Alternate Technology.
- (ii) However, the deployment on Alternate Technologies shall be permitted for not more than 2% GPs.

In case of exigencies, if the PIA justifies connectivity of GPs on Alternate Technology beyond the above-mentioned state wise limits, then with the recommendation of IE, PIA can submit such cases to APBIL. APBIL in consultation with DBN reserves the right to approve the use of Alternate Technology for connecting GPs beyond the mentioned limits.

- (iii) The PIA shall work out the possible Alternate Technology solutions in consultation with I.E. and submit the report, duly recommended by the I.E., to The CEO APBIL. APBIL shall approve such cases for implementation.
 - (iv) In case the alternate technology is decided as Unlicensed Band Radio (UBR) or Digital Microwave (DMW), the PIA shall supply, install & commission the same as per the technical specifications mentioned in Section – IV (C) at point no. 2.IX & 2.X with pre-defined rates mentioned in Section – VII.
 - (v) For other cases, a separate tender shall be floated by APBIL on behalf of DBN, DoT for implementation of alternate technology in such GPs. The PIA shall be bound to facilitate/ coordinate such implementation through agency selected by APBIL on behalf of DBN, DoT and integration of the same with State NOC. The PIA shall also allow installation of EMS and/or any equipment in State NOC for integration with State NOC/ Central NOC. No space and Infra charges shall be payable to the PIA for the same.
 - (vi) The FLM of such alternate technology equipment shall also be in the scope of the PIA. The PIA shall be paid @ Rs. 1,000 per month/ link for FLM for first 5 years and thereafter @ 1300 per month per link for next 5 years. In case of Hilly Circle (NE1), these rates shall be Rs. 1,500 per month/ link for FLM for first 5 years and thereafter @ 1800 per month per link for next 5 years. The Schedule of FLM shall be issued by APBIL in consultation with the PIA and the alternative technology implementing agency. Adequate spares, software updates and upgrades, L2/L3 support and Training as required to meet SLA shall be provided free of cost by the Alternate Technology provider. The AMC charges against the alternate technology equipment shall be paid by APBIL as these are to be purchased under separate tender floated by APBIL on behalf of DBN, DoT.
 - (vii) PIA has to attend the trouble tickets within 8 hours. Penalty for delay beyond 8 Hours and up to 24 hours shall be INR 100 per ticket. The penalty for delay in attending the tickets beyond 24 hours up to 48 hours shall be INR 200 per ticket. The penalty for delay in attending the tickets beyond 48 hours and up to 72 Hrs shall be INR 300 per ticket. Beyond 72 hrs, the penalty shall be INR 400 per 24 Hrs or part thereof. 10% spares will be provided to the PIA for FLM. For Hilly Areas, a further relaxation of 12 Hrs shall be given in above mentioned delays.
 - (viii) There will be one EMS (Element Management System) for each Alternate Technology proposed in this RFP i.e. Unlicensed Band Radio (UBR) or Digital Microwave (DMW). EMS shall be provided by APBIL at CNOC or any other central location.
- f) The PIA shall design a robust, fault-tolerant and high-performance carrier-grade network. Further, it shall ensure availability and reliability of the network as per KPIs. The network architecture must also be deployed to meet the following:
- (i) Redundancy across nodes and links (ports) to maintain higher uptime

- (ii) Optimal link utilisation
- (iii) Flexibility to allow easy insertion of new node/cards
- (iv) From Day-1, the network shall support and enable retail, enterprise, and wholesale services as per the capabilities of the router, such as but not limited to the following:

All type of data and voice services, wireless back-haul traffic for 2G, 3G,4G and 5G services, FTTx, layer2 VPN, layer3 VPN, point 2 Multipoint VPN and VPLS, IPTV and multicast VPN, Cable TV transmission services along with other bandwidth leasing services supported any to any, one to many, many to many kind of services. The network created should have capability to establish end to end integration as per requirement up to State-Wide Area Network (SWAN) and National Knowledge Network (NKN).

In this regard, APBIL shall facilitate in provisioning of all necessary details and access for a smooth integration.

3.6 OFC Implementation

- a. The project implementation shall follow underground OFC or Aerial OFC based on existing methodology adopted in that area. The implementation through aerial optical fibre cable shall only be resorted where implementation through underground OFC laying is not feasible either due to terrain or ROW approvals. All UG OFC shall be armoured. This includes:
 - (i) **Existing network upgradation:** GPs already connected through 24F loose tube type fibre for underground OFC to be upgraded with the OF cable of same count of fibres across all Gram Panchayats (GPs). The PIA shall also plan and lay 24F or 48F as per the requirement based on survey.
 - (ii) **New network construction:** 48F ~~Core ribbon~~ loose type/24F loose tube type underground fibre and 24F core ADSS fibre to be deployed to connect all Gram Panchayats (GPs).
 - (iii) In case of uncovered GPs (480), The bidder shall have an option to utilize the existing optical fibre cable of any TSP/ISP/IP-1 license holders for the construction of the uncovered GPs with the following conditions:
 - The leasing of OFC shall be for the complete ring covering from Block to GPs
 - PIA shall be liable to provide end to end SLA as mentioned in Section IV B clause no.11.
 - PIA shall construct the ring by taking entire OFC cable on lease as below:
 - a) 48F OFC along with the PLB HDPE duct on lease or
 - b) 24F ADSS OFC utilizing existing power infrastructure of State Discom or
 - c) 24F ADSS OFC not utilizing existing power infrastructure of State Discom
 - PIA shall be fully responsible of O&M of the entire leased OFC along with all the fibres for the entire contract period

- At end of the contract period, the ownership of complete ring consisting of the leased OFC (along with PLB HDPE duct in case of 48F UG cable) shall be passed on to DBN
- APBIL may extend the O&M agreement for such OFC for further 10 years on the same terms & conditions
- PIA and lesser of such OFC and duct shall enter into tripartite agreement with APBIL for the contract period with extension, if any, of O&M for the entire lifetime of the OFC
- Payment will be made as per the price schedule (Section-VII) as mentioned below and as per payment milestones defined in clause 12.1(i):

S. No.	Category	Capex + Opex for 10 years
1	48F OFC along with the PLB HDPE duct on lease	1.6 times of X2 (Item no. 1b of Price Schedule)
2	24F ADSS OFC on lease	1.6 times of X3 (Item no. 1c of Price Schedule)

NOTE:

In case of leasing of 24F ADSS OFC not utilizing existing power infrastructure of State Discom where the Lessor had erected its own poles, or utilizing existing power infrastructure of State Discom on lease basis, then APBIL shall pay ROW charges @ Rs. 200 per pole per Annum during the entire contract period in addition to lease payment as at S. No. 2 above.

- b. The PIA shall submit Block wise site survey reports to the Independent Engineer (IE) for certifying that the same is in line with the guidelines mentioned in this RFP. Based on such certification by IE, The CEO APBIL shall approve the same. Format of Survey report is attached at Annexure-X.
- c. Based on the approved site survey report and network design, the PIA shall be required to initiate OFC implementation and comply with specifications and standards, as per Section-IV-C.
 - (i) PIA shall also be responsible for supply, delivery, storage, warehousing and handling of optical fibre cable along with fittings and requisite items such as HDPE PLB duct, FDMS, joint enclosures, route markers, etc.
 - (ii) PIA shall perform all activities required for end-to-end implementation of underground and aerial OFC, within the stipulated time.
 - (iii) For the routes, where ADSS is approved as implementation design, the PIA may leverage existing power distribution poles for stringing, jointing, live line installation and commissioning of optical fibre cable from the nearest Block to Gram Panchayat (GP) using appropriate pole clamping and accessories.
 - (iv) PIA shall perform end-to-end testing of the OFC laid till Gram Panchayat (GP) in accordance with good industry practice, specifications and standards, and acceptance testing template for quality assurance.

- d. The Right of Way (RoW) for the project shall be granted as per the existing agreement with the State Government and facilitated by APBIL through introduction letters for creation and upgradation of new and existing network respectively during the construction period.
- e. During the Operation & Maintenance, the PIA shall also be facilitated RoW by APBIL, only for replacement and repair of existing fiber deployed to maintain the new and existing network.

3.7 Videography

- 3.7.1. Videography for all the works like trenching, fiber laying, splicing etc., shall be conducted by PIA. The Video Recording (with Date/ Time stamping and GPS coordinates) of the OFC laying and Ducting works by the PIA shall be done in following phases as under-
 - 3.7.1.1 Ducting - Video recording of Open Trenches is to be done using a Vertical Measuring Stick (Known as Measuring Staff in Civil Engineering Terms) at every 50 (Fifty) Mtr intervals. The depth reading in the Staff from top of the duct should be clearly recorded. In case of HDD (if the PIA is not using the machine recorded depth and produce the depth data), the depth of Entry & Exit pits should be Video recorded from top of the duct. The Couplers, Plugs and End Caps wherever required as per E.I. should also be captured in the video. Protection used as per E.I. in case of Low Depth should also be Video Recorded.
 - 3.7.1.2 OFC Blowing/ Pulling - The OFC blowing process should be Photographed (geo tagged with time stamp) clearly showing the drum and fiber meter reading details.
 - 3.7.1.3 Splicing- The splicing should be Photographed (geo tagged with time stamp) clearly showing that all 24F/48 F have been spliced and arranged in cassette.
 - 3.7.1.4 Manhole/ Cable Chamber- The Cable Chamber of MH base should be Photographed (geo tagged with time stamp) clearly showing the base plate of 50 mm thickness, RCC joint Chamber and Top Cover as per E.I. The cable loop also to be video recorded – showing start and end readings.
 - 3.7.1.5 Route Markers- Route Markers should be Photographed (geo tagged with time stamp).
- 3.7.2. All Videos/ Photographs (geo tagged with time stamp) shall be submitted /uploaded with a unique location related name in a folder with file descriptions clearly indicating each of the above activities like Ducting, Blowing, Splicing, MH/CC & RM.
- 3.7.3. The MP4 Video should have 3 windows running concurrently for following views-
 - (a) Window 1 – Physical work being carried out with Lat/ Long and Date/Time stamp
 - (b) Window 2 – Location of the activity on Google Map.
 - (c) Window 3 – KMZ/KML file with chainage, OFC route, Depth, Offset from road centre & Lat/ Long of Joint pits etc.
- 3.7.4. Each Video file should be of at least 2 minutes time duration capturing works being done for 40 Mtrs in case of Open Trenching and one shot in case of HDD. The size of each Video file should not be more than 30MB so that the same can be sent through mobile/mail etc.
- 3.7.5. The speed of movement of the camera while recording the Video should be maximum 20Mtr/Minute.
- 3.7.6. All Video recordings should be done in day light time without rain, fog, mist etc. Wherever, the video recording is not possible, photographs should be taken at every 10 meters with the

approval of APBIL.

- 3.7.7. The nomenclature of the files should be in the following format: -

XXXX_YYYY: 12345_67890: Work

XXXX is the Route Abbreviation as per the Work Order

YYYY is the Circle+District+Block Abbreviation as per the Work Order 12345 is the Chainage of start point of Video Recording

67890 is Chainage of end point of Video Recording

Work- OT Ducting- OTD, HDD, OFC Blowing- OFB, Splicing- OFC, MM/CC, RM etc.

- 3.7.8. Block end should be Chainage '0' and GP end should be taken as the last Chainage.
- 3.7.9. The Backend team of the PIA should merge all the files of a section of 40 meters in succession or HDD shot and send to the CEO, APBIL for review / verification of works and GIS NOC Delhi for linking the same with GIS.
- 3.7.10. The payments of the works as per payment schedule mentioned in the tender shall only be done if the videos /photographs (geo tagged with time stamp) of the same as per this SOP are submitted to both The CEO APBIL and GIS NOC Delhi.

Note: GPS enabled Camera/mobile phone, that can record Video with live tracking of LAT LONG (GPS Coordinates) and Date/ Time Stamping shall be used by the PIA. Video output resolution should not be less than 720dpi.

3.8 State- Network Operations Centre (S-NOC) Upgradation

- a. PIA shall be responsible for upgradation of an S-NOC for managing the existing (Phase-I to be upgraded & Phase-II) and new network (to be created) in Andhra Pradesh. The PIA shall be responsible for the deployment/upgradation of all requisite hardware, software, and manpower for monitoring, helpdesk, troubleshooting, etc.
- b. The scope shall also include design, site preparation, supply, installation, testing, commissioning, documentation, operations and maintenance of NOC along with workforce deployment, training, etc.
- c. The NOC shall be capable to perform key functions but not limited to i.e. fault management, performance management, configuration management and security management etc.
- d. The existing passive infrastructure should be upgraded as per the requirements of upgraded SNOCs.

The passive infrastructure deployed, if any, should be certified by TSEC/TEC TAC/BIS/ISI, whichever is applicable.
- e. PIA shall connect the NOC, or its relevant platform created under this project to BSNL's point of integration for NOC i.e. Business Exchange Gateway (BEG).
- f. PIA shall submit details such as APIs', protocols, version, attributes etc. to APBIL. Once, the information has been shared at detailed level, both PIA and APBIL shall complete integration of NOC within 90 days from agreement signed date.

- g. Further, the PIA shall perform end-to-end testing of the NOC in accordance with good industry practice, specifications and standards, and acceptance testing template for quality assurance.
- h. **State NOC Space and Infra Charges:** The rental and electricity charges for the S-NoC shall be payable by PIA as decided by the APBIL. The PIA shall raise the same for reimbursement in the quarterly invoices against OPEX.
- i. The State NOC upgraded under this project shall be integrated with BharatNet Delhi & Bangalore NOC.
- j. The S-NOC shall enable all the EMS to be integrated with Central NOC to fetch the required parameters directly.
- k. **Provisioning of OLTs or any other services in State NOC.** The PIA shall give rights and access of State NOC to Central NOC, or any other person/ agency authorized by Central NOC for provisioning of OLT or any other equipment/ services.
- l. **Data Communication Network (DCN) Charges-** The DCN links for connectivity of Block routers to State NOC and State NOC to Central NOC shall be provided by APBIL for which PIA shall not be charged. The charges of DCN links payable to APBIL shall be raised by APBIL directly to DBN.
- m. PIA shall also integrate the BSS platform to create a unified platform for service delivery provisioning

3.9 Electronics Installation

- a. The PIA shall supply and install network solution or electronics infrastructure for the successful creation/ upgradation of a robust, redundant and carrier-grade network to support and enable retail, enterprise, and wholesale services.
- b. It shall also be responsible for supply of new electronics infrastructure and its accessories to perform end to end implementation of the same across the network.
- c. Adequate power back-up infrastructure shall be provided by the PIA to ensure network availability as per defined KPIs.
- d. Further, the PIA shall perform end-to-end testing of the electronics infrastructure in accordance with good industry practice, specifications and standards, and acceptance testing template for quality assurance.
- e. PIA shall be responsible for integration of existing Phase-1 OLTs at Block Headquarter with Block router or any nearby available node created/to be created and ONTs at GPs shall be utilized for providing connections from the OLTs.
- f. PIA shall prepare and maintain asset records listing the assets at site locations required for the performing the O&M and the same shall be shared with APBIL every quarter.
- g. KPIs shall be monitored and reported by the PIA to APBIL on daily/ weekly/ fortnightly/ monthly /quarterly basis, as required.

- h. In case of any defect, deficiency or deterioration in the project, poses a hazard to safety or risk of damage to property, the PIA shall promptly take all reasonable measures for eliminating or minimizing such danger.
- i. **Provisioning Mini OLTs:** PIA shall need to supply and install Mini OLT at each GP. The PIA is required to make provision for housing the same in the rack (cabinet) being provided by it as per technical specifications. Normally, the size of the Mini OLT is 1 RU. The PIA shall allow the power to the OLT to be tapped from the Power System being procured at the GP location. The PIA shall carry the installation/testing/FLM of Mini OLT. The PIA will also facilitate testing by the BNUs, whenever required, to ensure desired connectivity/uptime to all the FTTH customers of the housed OLT. The PIA shall configure and integrate the Mini OLTs with the existing and newly deployed MPLS network for last mile connectivity.
- j. **Modification in the Ring Architecture to meet increased Bandwidth Requirement:** Initially each ring is be designed for 10Gbps with around 8-10 nodes. However, if there is a requirement subsequently to increase the capacity due to increased bandwidth requirement, additional ring shall be created splitting the nodes using spare fibres and spare ports at the Block router. If required, additional Block router may need to be installed at the Block for which separate payment shall be made as per the finalized itemized rates.
- k. PIA shall provision the bandwidth for the services mentioned in this document. The PIA shall also build up the dark fibre on end-to-end basis for provisioning the same for commercial use or providing village connectivity. PIA shall get INR 3500/- per joint to operate any OFC joint in the made over network for the first time only for a particular joint, for the purpose of attending a fault for providing the dark fibre. This cost shall include all the material supply and services i.e. localization of fault, digging of pit, supply of Splice Closure, Splicing, testing and back filling. However, if instructed by APBIL for construction of Joint Chamber as per E.I, additional payment @ INR 4000/- per Joint Chamber shall also be provided.

3.10 Last Mile Connectivity to the Villages

The PIA shall provide the Last Mile Connectivity to the Village on demand basis from the nearest GP for provisioning of FTTH connection in the villages by APBIL at the quoted/ finalized price as per Sr. No. 12 of the Price schedule. The rates to be quoted by bidder at Sr. No. 12 shall include both CAPEX and OPEX charges (for 32 quarters). Following guidelines/ technical specifications shall be followed by the PIA:

- (i) The PIA shall use 6F Overhead OFC as per TEC GR as mentioned in the table of TEC GRs in Annexure-A of section- IV-C. Last Mile connectivity shall be implemented with 6F Aerial Drop Cable. However, the TEC GR mentioned for 12F/ 24F is applicable for 6F cable also.
- (ii) The OFC shall be laid using existing Electricity poles with required accessories. TEC GR Standard No.: TEC 87060:2017 including its latest amendment, if any, may be referred.
- (iii) The payment, if any, to the electricity authority shall be done by APBIL/DBN.

- (iv) Wherever, such electricity poles are not available/used, the PIA is required to erect wooden/ G.I. poles at the required intervals so that the OFC withstands normal climatic disturbances. It is the PIA's responsibility to maintain & manage overhead Cable without diluting uptime/ SLA. The Pole must be stable enough to withstand against external environment.
- (v) The PIA is required to terminate such OFC at an appropriate location in the village in a minimum 16 pair FTB (TEC/GR/TX/FTB-02/02/APR-2010 with latest amendments if any and RFP requirements) and at the GP FDMS/FTB from where connectivity extended to villages either with a new mini-OLT or using splitters and the mini- OLT installed at the GP The PIA shall also be liable to maintain the above arrangement till the completion of the contract period.
- (vi) Payment of 40% of the quoted /finalized price shall be made after successful commissioning of first FTTH connection.
- (vii) Payment of 7.5% of the quoted/ finalized price shall be made every year, during next 8 years, after the completion of Financial Year in which the first FTTH connection is provided. This payment shall be made quarterly as 1.875% only, on achievement of quarterly SLA of 95% or better for such connectivity, However, the payment will be reduced as per table below, if 95% uptime in the quarter is not maintained. No payment will be made for the quarter, if the uptime for that village connectivity is below 65%. However, SLAs shall not be levied on the PIA for delays attributable to circumstances beyond the PIA's control, particularly those related to last mile connectivity in the respective village, subject to prior verification and explicit approval by APBIL.

S. No.	SLA	Quarterly Payment as percentage of the quoted/ finalized price
1	=>95%	1.875 %
2	=>90% and <95%	1.7%
3	=>85% and <90%	1.4%
4	>75% and <85%	1.0%
5	=>65% and <75%	0.5%
6	<65%	Nil

- (viii) The O&M payment to the PIA for the concerned Block shall not be released, till all such villages for which the work orders in the block have been issued are provided with connectivity within 30 days of the work order. A penalty of Rs 100/- per day of delay beyond 30 days shall be levied, unless the exemption is given by APBIL on case-to-case basis with proper justification for the reasons beyond the control of the PIA. Maximum penalty for delay in connectivity to the village shall be capped at 12% value of the O&M invoice for each quarter for that Block. Further, APBIL, on behalf of DBN, shall have the right to get the work done at the risk and cost of the PIA in case work is not completed in 100 days.
- (ix) Wherever the existing electricity poles are not available; the PIA shall erect a 7/8 Meter RCC pole. Payment of the quoted/ finalized price, as per Sr. No. 7 of the Price schedule, shall be made for such RCC Poles, including supply, installation and O&M for the entire

contract period, on uploading of the video as per specifications. The PIA shall have to replace such poles damaged for any reason whatsoever during the contract period without any additional cost to APBIL.

- (x) For the Acceptance Testing of such last mile implementation, only the quality of the OFC, its termination at both the ends and measurement of optical power shall be done. The construction practice shall not be part of acceptance testing as the PIA shall be responsible for O&M of the entire end to end construction during the entire contract period.
- (xi) If the implementation through OFC is not feasible, the PIA can plan the implementation using UBR at the quoted/ finalized price, as per Sr. No. 49 of the Price schedule. However, if required, the PIA can use the poles as specified in Sub-Clause (x) on cost basis along with other terms and conditions.
- (xii) The villages, where last mile connectivity is not feasible either using OFC or UBR, the same shall be descoped after recommendation of IE and approval of APBIL.
- (xiii) The entire quoted/ finalized price of Last Mile Connectivity to villages is split in the ratio of 68:32 against CAPEX: OPEX charges. Thus, 1% of the price shall be paid per quarter, as OPEX of that quarter and remaining 0.875% shall be paid against CAPEX out of total 1.875%, mentioned in sub-clause (viii). If APBIL orders the Last Mile Connectivity to a village, after two years or later, from the appointed date, the left-over balance of the CAPEX part shall be paid in the last quarter of the contract period. It may be noted that this payment will be made after deduction of penalties over the contract period, if any. Thus, total payment over the entire contract period i.e. till termination or closure shall be 68% (as CAPEX) + 1% multiplied by number of quarters of completed O&M, (minus penalties). Upon completion of eight (8) years of O&M, if APBIL requires continuation of O&M services for the connectivity, the PIA shall be entitled to O&M-only payments at the rate of 1% per completed quarter, being the same rate as paid for the last quarter of the 8th year, with no CAPEX component applicable, and subject to SLA compliance and penalty deductions.
- (xiv) In case of implementation of Last Mile Connectivity through OFC, the cable length shall be measured through OTDR for payment purpose. The point-to-point distance between GP and village shall also be calculated using GIS coordinates (Lat/Long) for verification. If, the OTDR measured length is more than the GIS length by 20% or more, IE/ APBIL shall do the due diligence before making the payment based on OTDR length. This measurement (based on OTDR) is only for Last Mile OFC. Payment for Construction, O&M etc. (under middle mile network) shall be made as per actual route length based on rodo meter (as per FootNote-1 under Price-sheets).

3.11 Earthing at G.P. location:

The PIA shall provide Chemical Earthing at the GP locations without any extra cost, as per specifications approved by APBIL, with following details:

(i) Item	:	Chemical earthing as per RDSO specifications RDSO/SPN/197
(ii) Earthing rod	:	<ul style="list-style-type: none"> o Length 3.0 Meter (Minimum) o Copper Coating 250 Microns (Minimum)

		<ul style="list-style-type: none"> ○ Dia 17 mm ○ Engraving UL mark/ Name of the Manufacturer/ Batch No.
(iii) Back Fill Material	:	<ul style="list-style-type: none"> ○ Resistivity 0.2 Ohm mtr. (max) ○ Packing in 10 Kg with Batch No. printed on Bag
(iv) Size of the Earth Pit	:	<ul style="list-style-type: none"> ○ Top -- 285 MM ○ Bottom -- 200 MM ○ Height --190 MM

3.12 Key Personnel

- (i) Before the Appointed Date, the PIA shall designate and notify the CEO, APBIL of the Key Personnel by name, including:
 - a. Project Director – the single point of contact for all contractual, commercial, coordination, and escalation matters.
 - b. NOC Lead/ Chief – the single point of contact for APBIL’s Technical Nodal Officers for network operations, SLA adherence, and all technical matters across the BharatNet and APSFL networks.
- (ii) The CEO, APBIL may convene review meetings with the Project Director at any time with reasonable prior notice.
- (iii) The PIA shall ensure the Project Director is made available for all such meetings without exception.
- (iv) If the CEO, APBIL finds the responsiveness, effectiveness, or performance of the Project Director or NOC Lead/ Chief unsatisfactory, APBIL may issue a written request for their replacement.
- (v) The PIA shall nominate and notify APBIL of a suitable replacement within 30 days from the date of such written notice.
- (vi) The PIA shall notify the CEO, APBIL in writing of any changes in the designated Key Personnel within 7 days of such change taking effect.
- (vii) Failure to provide such notification within the stipulated period shall constitute a minor breach and attract a financial penalty of INR 1,00,000 (Rupees One Lakh) per week or part thereof until notification is provide

4. Measurement

- (i) **Measurement Book.** The measurement books are to be maintained by the PIA. The entry shall be made in ink. No entry shall be erased. If a mistake is made, it should be corrected by crossing out the incorrect words or figures and inserting the corrections, the corrections thus made shall be initialled & dated by the bidder. The measurement books shall invariably be consulted at the time of making final payments to the bidder.
- (ii) Method of recording of nomenclature of items: Complete nomenclature of items, as given in the agreement need not be reproduced in the measurement book for recording the measurement but corresponding item code as provided, shall be used.
- (iii) The measurements of various items of work shall be taken and recorded in the measurements book. The measurements shall be taken and recorded by bidder which will be countersigned by the authority appointed by APBIL and/or IE. The PIA shall be directly

responsible for supervision of work and for accuracy of 100% of measurements. The IE will be responsible for conducting Acceptance Test (A/T) check of measurements at different locations on sample basis. The PIA shall re-do the work, wherever, the IE finds deviation from the entries in MB by the PIA or APBIL at any subsequent stage during contract period. During subsequent inspection by APBIL or any other agency, **in case the sample measured data does not match with the measurement book entry up to a lesser depth of 5cm, penalty (equal to amount of difference of payment , so reduced due to lesser depth) shall be levied in addition to the reduction of payment due to lesser depth as per the approved formulae on each such default instance on the payment due for the link** (waiver of penalty, if warranted, shall be decided by APBIL on case to case basis) . The spirit is to ensure correct recording in the measurement book by PIA. APBIL, on behalf of DBN, reserve the right to get the work done at the risk and cost of the PIA in case of lesser depth cases.

(iv) **Method of measurement:** The measurement of the work shall be done activity-wise as and when the item of work is ready for measurement. The methods of measurement of various items are enumerated as under:

- a. **Measurement of Depth of Trenches:** The cable route shall be divided into a number of segments each of maximum 200 Meters length bounded by identifiable landmarks at both the ends of the segments. If landmarks are not available, length of segment may be maintained at 200 Meters. The measurement of depth shall be recorded at each point of measurement (POM) in the measurement book in Meters in the multiples of 5 cms. For example, 97 cms will be recorded as 95 cms and 103 cms as 105 cms. The points of measurements shall be at a distance of 10 Meters starting from 0 (Zero) Meter. For example, if the length of segment is 75 Meters, the POMs shall be at 0 M, 10 M, 20 M, 30 M, 40 M, 50 M, 60 M, and 70 M. The last POM shall be at 75th M to be recorded against residual POM. Normally the workers tend to dig shallow trenches due to effort involved. As standard depth of the trench is important for future life and protection of cables, this tendency has to be discouraged.
- b. **Measurement of lengths and profiles of strata and protection:** The measurements of length of trenches are on running Meter basis, irrespective of type of soil encountered while digging. The type of protection utilized (item code – wise) to include RCC Half Round and Full Round Pipe, DWC HDPE Pipe, GI Pipe, MS Weld Mesh etc in a segment shall be recorded in the measurement book in the sheet provided for this purpose.
- c. **Measurement of length of cable:** The length of cables laid in trenches, through pipes and through ducts shall be measured by use of OTDR for the purpose of accuracy of the identification of cuts during O&M. **The payment for such laying/trenching as per price schedule shall be made as per the RODO Meter readings and not as per the OTDR readings.** The length should be cross verified with the marking of lengths on the cables. The lengths shall be recorded in sheet provided in the measurement book.
- d. **Measurement of other items.** The measurement/ numerical details of other items shall be recorded in the sheets provided for respective items viz.
 - Digging of joint pit/manholes and preparation of chambers along with details of its dimensions and location.
 - Fixing, Painting and sign writing of route/joint indicators.

- Termination of Cable in equipment room and no. of joints.
 - Record splice loss details for each joint.
- e. The PIA shall sign all the measurement recorded in the measurement book. This will be considered as an acceptance by the bidder, of measurements recorded in the MB. In case bidder fails to attend at the measurements or fails to countersign or to record the difference within a week, than in any such events the measurements taken by IE shall be final and binding on the bidder and the bidder shall have no right to dispute the same. In case of any difference of opinion in the measurement book between IE and the bidder, same shall be mutually discussed and agreed before making it final.
 - f. Measurement of the work of cable for calculation of laying /trenching will be taken equal to the length of the pipe/ duct (as measured in the RODO meter) through which the cable has been pulled and not the total length of the cable pulled through pipe/duct.
 - g. **Uploading of Depth Photographs:** The IE responsible for verification of MB shall take the photographs of the depth measurement being done at every 100 m in case of open trench work and at the entry / exit points in case of HDD method using BharatNet GIS App and upload the same on GIS platform.
 - h. Compilation of the Measurement Book needs to be on real time basis while the work is being carried out.
 - i. The details noted by the Contractor in the notebooks will be entered in the proper MB format in the computer on weekly basis and shared with APBIL. These shall be checked by IE progressively so that as soon as the work of the route is complete, the MB is also ready.
 - j. Depth AT and other tests/ observations to be done while the work is being executed. The PIA should ensure proper recording of all the details like drum Nos, duct roll numbers and length of shots etc.

5. RATES PAYABLE IN CASE OF LAYING AT LESS DEPTH

- (i) The nominal depth of OFC laying in plain area/ soft soil is 165 cm and that in the hilly area is 120 cm.
- (ii) The minimum depth allowed in plain area/soft soil will be 100 cm and that in the hilly area will be 30 cm.
- (iii) Depth below 100 cm in plain/soft soil and 30 cm in hilly area will be allowed under exceptional circumstances with the approval of the CEO APBIL.
- (iv) The payment, in case of less depth, shall be done as under:

In Plain Area

S. No.	Depth (with relaxation) ['d' in cm]	Protection as per EI	Cost of protection (Rs per mtr)	Payment without protection (%)
1	$d \geq 165$	No Protection	--	100%
2	$165 > d \geq 150$	No Protection	--	$(d/165) * 97\%$
3	$150 > d \geq 120$	No Protection	--	$(d/165) * 93\%$
4	$120 > d \geq 100$	DWC	65	$(d/165) * 85\%$

5	100 > d ≥ 60	GI*	550	(d/165) *76%
		CC*#	6000 per Cubic M	
6	60 > d ≥ 30	RCC#	8000 per Cubic M	(d/165) *76%

* Any one protection can be used

rates are in per Cu Mtr

In Hilly Area

S. No.	Depth (with relaxation)	Protection as per EI	Cost of protection (Rs per mtr)	Payment without protection (%)
1	d ≥ 120	No Protection	--	100%
2	120 > d ≥ 100	No Protection	--	(d/120) *97%
3	100 > d ≥ 80	No Protection	--	(d/120) *93%
4	80 > d ≥ 50	DWC	65	(d/120) *85%
5	50 > d ≥ 30	GI*	550	(d/120) *76%
		CC*#	6000 per Cubic M	
6	30 > d	RCC#	8000 per Cu M	(d/120) *76%

* Any one protection can be used

rates are in per Cu Mtr

- 'd' shall be rounded off to the nearest multiple of '5' (five).
- In case of depth between 100 Cm to 60 Cm in plain terrain and 50 cm to 30 cm in hilly terrain, the protection of G.I. pipe or CC (1:2:4) needs to be done for 25cm*25cm encasing the PLB.
- In case of depth 60 cm to 30 cm in plain and '< 30 cm' in hilly area protection of RCC (1:2:4) needs to be done for 25 cm*25 cm with 12 SWG G.I. mesh of 50 mm*100 mm size.
- The DWC, CC and RCC protection will be retained in EI the rest protection like RCC pipes will be removed from EI.

Note: - There will be no additional payment for any other items except material i.e. DWC/ GI pipe.

Illustration:

1. In case of less depth for plain area, given that the standard depth required is 165 cm and the rate approved is Rs. X/- per meter for the standard depth. For a depth (d) of 101 cm, the rate shall be worked out as below:

The depth (d) shall be rounded off to 100 cm. Then, the payment shall be calculated as under:

$$= \left(\frac{100}{165} \right) * \left(\frac{85}{100} \right) * X$$

2. In case of less depth for hilly area, given that the standard depth required is 120 cm and the rate approved is Rs. X/- per meter for the standard depth. For a depth (d) of 103 cm, the rate shall be worked out as below:

The depth (d) shall be rounded off to 105 cm. Then, the payment shall be calculated as under:

$$= \left(\frac{105}{120} \right) * \left(\frac{97}{100} \right) * X$$

6. Inspection and Acceptance Testing

During the Project, APBIL shall have the right to inspect, test and audit the network infrastructure and modalities across processes to construct, operate and maintain the network till Gram Panchayat (GP) during construction and operation period i.e. throughout the lifecycle of the project.

For determining that the Development Works and/or the Upgradation Works conform to the Agreement, the IE shall require the PIA to carry out or cause to be carried out tests, at such time and frequency and in such manner as may be specified by the IE from time to time in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template for quality assurance. These tests would include testing of all the installed electronics and passive infrastructure along with its ancillary items deployed under construction and upgradation of the network infrastructure as per the scope of work. This shall also include all network links along with testing of network traffic from the Block to Gram Panchayat (GP), and further to NOC implemented / leveraged for this project and BharatNet Delhi and Bangalore NOC.

The selected PIA shall deploy the equipment only after successful completion of Quality Assurance testing and receipt of approval from the Independent Engineer/APBIL representative appointed for the project, in accordance with the provisions of this RFP. All costs towards such Quality Assurance testing shall be borne by the selected PIA.

The PIA shall perform and facilitate the following with regards to testing activities:

a) Supply of products/ material or network infrastructure

- i. During the Contract Period, the PIA shall obtain from Original Equipment Manufacturers (OEM), the relevant certificates or documents with relevant test results, certifying that the product / material supplied for the Project conforms to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C (Special Technical Conditions). The records of relevant certificates shall be maintained by the PIA throughout the Contract Period.
- ii. Submit the same to APBIL and the IE within 7 days of receipt of such certificates or documents from OEMs.
- iii. In case the product / material supplied for the Project does not conform to the Specifications and Standards or is deficient in terms of relevant certificates / documents / test results, as inspected by APBIL or IE, then the costs to be incurred on any replacement of such product / material shall be borne solely by the PIA.

b) Deployment of products/ material or network infrastructure

- i. The acceptance testing (A/T) of the New Network and upgradation of Existing Network shall be carried out as per the Acceptance Testing Schedule issued by IE/ any other agency nominated by APBIL. As validated by the IE, such tests along with Acceptance Testing Template shall be designed in conformance with the provisions set forth under Section- IV- C: (Special Technical Conditions), Specifications and Standards and Good Industry Practice.

- ii. The PIA shall, no later than 30 (thirty) days prior to the likely completion of the construction, notify the IE and APBIL of its intent to subject the infrastructure to tests.
- iii. Further, no later than 10 (ten) days prior to the actual date of tests, the PIA shall furnish detailed inventory and particulars of all works and equipment forming part of the Project to the IE and APBIL.
- iv. In the event of the PIA and the IE failing to mutually agree on the dates for conducting the tests, the PIA shall fix the dates by not less than 10 (ten) working days' notice to the IE, and in the event the IE delays the tests hereunder, APBIL shall ensure that tests are completed in time either by the IE or any substitute thereof.
- v. The PIA shall progressively self-conduct and perform Preliminary Acceptance Testing (PAT) for network infrastructure being created as per the scope of work.
- vi. All tests shall be conducted in accordance with Acceptance Testing Template duly approved by APBIL at the cost and expense of the PIA. The IE shall undertake the tests only when all the Gram Panchayat (GP) offered for testing are visible in the NOC.
- vii. Once the PIA performs the PAT, it shall offer network infrastructure within a Block subject to minimum 10% Gram Panchayat (GP) completed and pinged from the Central NOC or visible in SNOC, for testing purposes to the IE for Final Acceptance Test (FAT). Inspection work for FAT within a Block shall be offered only after completion of PAT of the route and site location by the PIA.
- viii. The schedule for such testing shall be based on a project plan and the timelines for the same shall be agreed between IE and PIA. In case of any changes in the schedule or plan, PIA shall notify the IE, 10 (ten) working days prior to the scheduled date.
- ix. In pursuance of the provisions of this Agreement, the IE shall conduct visual and physical check of the infrastructure at Blocks and Gram Panchayat (GP) and central locations (i.e. NOC) to determine that all works, equipment and services forming part thereof conform to the provision of this Agreement and the detailed scope of work as defined in the Section-IV-B and Section-V (SoR).
- x. The IE shall perform tests of offered Gram Panchayat (GP) aggregated at Block level in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template. Sample sites and its routes to be checked shall be decided by the IE.
- xi. The PIA shall facilitate the IE in conducting the tests as per approved Acceptance Testing Template and/or as per directions of the IE. All reasonable facilities and assistance like testing instruments and other test devices including access to drawings and other details shall be furnished, by the PIA to the IE and APBIL.
- xii. The cost of all associated works regarding testing as per the scope of work such as digging pits at sample sites for connectivity across Gram Panchayat (GP), its restoration, and arrangement of testing instruments such as OTDR etc. shall be borne by the PIA.
- xiii. The IE may also decide to witness, or participate in, any of the tests to be undertaken by the PIA for its own quality assurance in accordance with Good Industry Practice, Specification and Standards, and in such an event, the PIA shall cooperate with, and provide the necessary assistance to, the IE for discharging its functions hereunder.

- xiv. Result of IE's inspection and audit shall only be valid for Gram Panchayat (GP) which were offered for testing under a Block. If PIA offers a Block for inspection more than once, IE and APBIL reserve the right to include or exclude the test of previously completed Gram Panchayat (GP) as well.
- xv. The overall result(s) of the FAT conducted by IE/ APBIL shall be indicated as "Satisfactory" or "Unsatisfactory" as judged at the time of inspection on merits of each case. The results of the test shall be jointly signed by the authorised personnel of the PIA and IE. In case of classifying the work as "Unsatisfactory", the PIA shall highlight the reason for non-compliance as per the Specifications and Standards set forth under Section-IV-C and Good Industry Practice along with design requirements under the scope of work. The results of the FAT conducted shall include submission of all relevant documents such as measurement book, Acceptance Testing Template report etc. Further, "Unsatisfactory" cases shall be communicated to the PIA by the IE/ APBIL for its rectification.
- xvi. During a FAT, if more than 10% discrepancies across site route or locations across Gram Panchayats (GPs) are observed within a Block which may be attributed due to negligence on the part of the PIA, under such circumstances, the FAT may be rejected. Further, the PIA shall get the work redone in a time bound manner and re-submit FAT report compliance, upon which IE/ APBIL shall have to recheck the offered Gram Panchayat (GP) and may also extend the sample size of site route or locations across Gram Panchayats (GPs) for discrepancies and record its observations. However, if the discrepancies are less than 10% within a Block, then IE/ APBIL shall provide a provisional acceptance and issue a Provisional Acceptance Certificate as per provision set forth in this Section.

However, the issuance of Provisional Acceptance Certificate shall be subjected to the visibility of Gram Panchayat (GP) in the Network Operations Centre (NOC). In such an event, the Provisional Acceptance Certificate shall have appended thereto a list of outstanding items signed jointly by the Independent Engineer and the PIA (the "Punch List"); provided that the Independent Engineer or APBIL shall not withhold the Provisional Acceptance Certificate for reason of any work remaining incomplete if the delay in completion thereof is attributable to APBIL.

c) Rectification of defects and deficiencies

- i. The PIA is obligated to rectify the outstanding item or Punch List in a time bound manner to receive a Final Acceptance Certificate on the same as per provision set forth in this (Section-IV-B.6.b.xvi). In this process, the PIA shall comply with the timelines of the construction milestone and shall be responsible for delays on the re-work on its scope.
- ii. In case any inspected or tested components/site route fail to conform to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C, the PIA shall either replace the rejected components or make all alterations necessary to meet specification/ requirements, without any additional cost to APBIL.
- iii. If any equipment or any part thereof is found to be defective or fails to fulfil the requirements as per provisions set forth in Section-IV-C, APBIL shall give notice to the PIA setting forth details of such defects or failure and the PIA shall at their own cost make the defective equipment good or alter the same to make it comply with the requirements

forthwith, within a period not exceeding one month of the initial report. These replacements shall be made by the PIA free of all charges at site and route locations.

- iv. Further, in the entire process the IE/ APBIL shall make a report of inspections (the "Inspection Report") performed as a part of FAT. The Inspection Report shall state defects or deficiencies, if any, with reasonable details and reference to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C. IE shall send a copy of the Inspection Report to APBIL and the PIA within 7 (seven) days of such inspection and upon receipt thereof, the PIA shall rectify and remedy the defects or deficiencies, if any, stated in the Inspection Report. Notwithstanding the foregoing, such inspection or submission of Inspection Report by the IE shall not relieve or absolve the PIA of its obligations and liabilities hereunder in any manner whatsoever.
 - v. Based on the Inspection Report or the defect and deficiencies observed in the Project, the IE/ APBIL shall verify whether remedial measures have brought the Development Works and/or the Upgradation Works into compliance with Specifications and Standards and design requirements as per provisions set forth in Section-IV-C.
 - vi. The procedure for closure of defect and deficiencies as reported shall be repeated until such Development Works and/or the Upgradation Works conform to the Specifications and Standards and design requirements as per provisions set forth in Section-IV-C. Further, it is agreed that the tests pursuant to this shall also be undertaken in addition to and independent of the tests carried out by the PIA for its own quality assurance in accordance with Applicable Laws, Applicable Permits and Good Industry Practice. It is also agreed that a copy of the results of such tests shall be sent by the PIA to the IE forthwith. The costs to be incurred on any test which is undertaken for determining the rectification of any defect or deficiency in the Development Works and/or the Upgradation Works shall be borne solely by the PIA.
 - vii. Upon successful completion of tests, the IE/ APBIL shall issue the Completion Certificate, as the case may be, in accordance with the provisions of this Section (IV-B.6.b.xvi).
 - viii. If the IE/ APBIL certifies to APBIL and the PIA that it is unable to issue the Completion Certificate or Provisional Acceptance Certificate, as the case may be, because of events or circumstances on account of which the tests could not be held or had to be suspended, the PIA shall be entitled to re-schedule the tests and hold the same as soon as reasonably practicable.
- d) In pursuance to clause- IV-B.6.c.vii above, the Completion Certificates/ A.T. Certificates will be issued 'site wise' in case of Acceptance testing of equipment and 'Ring wise' for Network commissioning.**

7. Operation and Maintenance (O&M)

PIA shall undertake the responsibility for Operations & Maintenance (O&M) of the Existing Network i.e., incremental OFC laid under BharatNet & First Level Maintenance of GPON/MPLS equipment (MPLS routers, Shelters, OLTs, ONTs, Solar Photo Voltaic Systems etc., at the GPs) and New Network. All expenditure required to perform O&M of the Existing Network and New Network shall be the responsibility of the PIA.

The O&M of the network shall be carried out as per the Key Performance Indicators (KPIs) provided. The PIA shall be required to commence O&M for newly connected individual Gram Panchayats (GPs) immediately after the date of commissioning and from the date of handover in case of existing BharatNet network.

- (a) The PIA shall be solely responsible for ensuring network uptime and performance along with providing comprehensive support during the entire Contract Period for the network created/upgraded till village level.
- (b) This shall also include the establishment of governance framework, and escalation procedures & matrix for network and customer support service on 365 x 24 x 7 basis.
- (c) As part of the maintenance, PIA shall be required to maintain the upkeep of the medium of connectivity, restoration of services, any other maintenance job required to meet the redundancy and KPIs.
- (d) PIA shall extend access of the Network Management System or other equivalent systems along with network performance reports on a mutually agreed basis to BharatNet Delhi and Bangalore NOC.
- (e) The services provided shall adhere and conform to applicable security policies and guidelines issued by DoT/ TRAI/ Gol.
- (f) PIA shall prepare and maintain asset records listing the assets at site locations required for performing the O&M and the same shall be shared with APBIL every quarter.
- (g) The PIA shall be responsible and bear costs for replenishment and upgrade of all active and passive infrastructure including all ancillaries required for smooth executions and operations & maintenance of project across the Contract Period.
- (h) KPIs shall be monitored (after 5 months from taking over) reported by the PIA to APBIL on daily / monthly / quarterly basis, as required. Based on the performance of the network in the prior quarter, the penalty shall be computed as per the Clause-11 of Section-IV-B and shall be payable by the PIA.
- (i) In case of any defect, deficiency or deterioration in the Project poses a hazard to safety or risk of damage to property, the PIA shall promptly take all reasonable measures for eliminating or minimizing such danger.
- (j) PIA may deploy a dedicated fault resolution team at the Block level or at any suitable place for effectively management of network.
- (k) The PIA shall insure all the equipment at GP for theft, damages due to fire, flood, earthquake, storm etc for the entire project duration.
- (l) **Periodic Maintenance**
 - (i) The periodic maintenance of the network shall be done based on the schedule
 - (ii) The corrective maintenance of the network shall also to be done for ensuring the network availability/ uptimes as per the KPIs.
- (m) The PIA shall work in close coordination with the APTRANSCO/ any other agency team for fault restoration, preventive activities, maintenance activities and any EB-related operational requirements to ensure uninterrupted service availability.

- (n) The PIA is responsible for maintaining the existing shelter infrastructure along with all associated peripheral components
- (o) PIA shall also be responsible for the maintenance of the existing HDD works executed for Road crossings, Railway crossing locations any other locations.
- (p) The PIA shall be responsible for ensuring continuation of AMCs with OEMs of the existing active network elements to support smooth maintenance throughout the contract period.
- (q) During maintenance of the network, PIA will ensure that all fibres are spliced at the cut location (and not only live fibres) during rectification process. APBIL/IE/any third party as appointed may audit the health / continuity of all fibres at any time and PIA will have to facilitate this exercise by performing LSPM and OTDR testing in presence of this team.

8. CAPACITY AUGMENTATION

- (a) The PIA shall replace/ upgrade the SFP based on the demand/ requirement during the contract period on payment basis.
- (b) The PIA shall provide the required spares and service support for the supplied equipment in the Project. In case of any solution/ equipment reaching End of Life (EoL) during contract period, the PIA shall be responsible for its replacement with equivalent / higher specifications.
- (c) In case of installation of products / material on account of capacity augmentation or replacement / repair the same shall be subject to Preliminary Acceptance testing conducted by the PIA.

9. NETWORK AND SERVICE PROVISIONING

- (a) The network shall enable retail, enterprise and wholesale services as per the requirement of APBIL.
- (b) PIA shall provide all necessary support and facilitation to APBIL and designated service provisioning agencies for provisioning and monitoring of services from NOC.
- (c) The PIA shall ensure service assurance and accounting for all provided services from the network.

10. PROJECT COMPLETION SCHEDULE

During Development Period, the PIA shall comply with the requirements set forth in this clause for each of the Project Milestones and the Scheduled Completion Date (the "Project Completion Schedule"). Within 15 (fifteen) days of the date of each Project Milestone, the PIA shall notify APBIL of such compliance along with necessary particulars thereof.

The PIA shall complete the Project as per following Project Milestones (the "Project Milestones") during the Development Period:

10.1 Project Milestone-I

- i. Project Milestone-I shall occur on the date falling on the 120th (one hundred and twentieth) day from the Appointed Date (the "Project Milestone-I").
- ii. Prior to the occurrence of Project Milestone-I, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in central NOC or in EMS not less than 10% (ten per cent) of the GPs targeted for upgradation and creations in the Package.

10.2 Project Milestone-II

- i. Project Milestone-II shall occur on the date falling on the 180th (one hundred and eightieth) day from the Appointed Date (the “Project Milestone-II”).
- ii. Prior to the occurrence of Project Milestone-II, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 30% (thirty per cent) of the GPs targeted for upgradation and creations in the Package.

10.3 Project Milestone-III

- i. Project Milestone-III shall occur on the date falling on the 240th (two hundred and fortieth) day from the Appointed Date (the “Project Milestone-III”).
- ii. Prior to the occurrence of Project Milestone-III, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 50% (fifty per cent) of the GPs targeted for upgradation and creations in the Package.

10.4 Project Milestone-IV

- i. Project Milestone-IV shall occur on the date falling on the 300th (three hundredth) day from the Appointed Date (the “Project Milestone-IV”).
- ii. Prior to the occurrence of Project Milestone-IV, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 75% (seventy-five per cent) of GPs targeted for upgradation and creations in the Package.

10.5 Project Milestone-V

- i. Project Milestone-V shall occur on the date falling on the 330th (Three hundred and thirtieth) day from the Appointed Date (the “Project Milestone-V”).
- ii. Prior to the occurrence of Project Milestone-V, the PIA shall have completed the Commissioning of individual Rings and GPs should be visible in EMS not less than 90% (ninety per cent) of the GPs targeted for upgradation and creations in the Package.

10.6 Scheduled Completion Date

- i. After all the Blocks are declared commissioned, after the Project Milestone-V (Commissioning of individual rings and not less than 90% GPs should be visible in S-NOC and C-NOC), the Schedule Completion Date shall be the 365th (Three hundred and sixty fifth) day from the Appointed Date.
- ii. Project Completion shall include complete integration of all equipment with EMS/ S-NOC & C-NOC along with updation of all the necessary documents (Licenses/ Manuals/ OEM agreements and support, Commissioning memo's & AT reports, operations/ maintenance & safety instructions etc.) and of all the assets in C-NOC after installation and commissioning of all the rings & S-NOC with minimum 95% of the total numbers of GPs in the project as envisaged in the tender.
- iii. Delay in project completion shall attract the penalty as per LD clause. However, as per field requirements, project can be extended or short closed for the left-over GPs.

10.7 Timelines for initial survey

The PIA shall conduct the initial survey as per survey milestones, mentioned in the table below:

Survey Milestone No.	Period for completion of initial survey	No. of GPs to be completed (percentage of total GPs)
I	T0 + 30days	10%
II	T0 + 60 days	30%
III	T0 + 90 days	70%
IV	T0 + 120 days	100%
T0: Appointed Date		

Any delay in above-mentioned timelines for initial survey shall attract a penalty of Rs. 100/- per shortfall GP per week or part thereof.

There shall not be any relaxation in the timelines for Project Milestones, as mentioned above in clause-10 of Section IV-B, on account of the survey timelines mentioned herein.

11. SERVICE LEVEL AGREEMENT HEREINAFTER REFERRED AS SLA AND PENALTIES

11.1 Construction Phase

- (i) All the Gram Panchayats (GPs) should be connected as per the scope of work defined and Project Completion Schedule. The Penalties applicable for not meeting the Milestones are as below:
- (ii) Should the PIA fail to achieve the defined Project Milestone within the period prescribed in Clause-10 above, APBIL, without prejudice to other remedies available to it shall be entitled to recover, as agreed, liquidated damages (LD) as follows:
 - a) at a sum equivalent to 0.5% of the value of incomplete GPs as per milestone for each week of delay or part thereof for a period up to 10 (TEN) weeks, and thereafter
 - b) at the rate of 0.7% of the value of the incomplete GPs as per milestone for each week of delay or part thereof for another 10 (TEN) weeks of delay. (LD is capped at 12% of CAPEX).
 - c) The Value of incomplete GP for the purpose of calculation of LD shall be taken as equal to the Total Project Cost (PO Value excluding O&M charges) divided by the number of GPs as per SOR.
 - d) **L.D. on subcontracted works:** If the achievement of a milestone is delayed due to any sub-contracted work, the applicable penalties/ LD shall be twice the penalties mentioned in clause-11 of Section IV B.
- (iii) Non-completion of the targets of any Project Milestone even at the occurrence of the next Project Milestone shall render the PIA liable to any or all of the following sanctions:
 - a) Forfeiture of its performance security,
 - b) Imposition of penalty, and/ or
 - c) Short- closure of the contract in part or full and/ or termination of the contract for default.

- (iv) For the Project Milestone-I only (clause-10.1 of section-IV-B), the project milestone period (120 days, as per RFP) shall be up to 120 days from the appointed date or up to 90 days from the date of FWO issued by APBIL, whichever is later.
- (v) There will be a relaxation in the penalty/ L.D. during construction phase only in terms of grace period according to the achievements up to a certain extent, as mentioned below:
 - (a) **For Project Milestone-I only:** If the PIA has completed 90% work against Project Milestone-I within the assigned timelines as per tender, there will be a grace period of 60 days for remaining work i.e. up to 10% of the 1st milestone. There will be no penalty during this grace period of 60 days for Project Milestone-I. In case, incomplete work is more than 10% of target, the grace period shall not be available, and the Liquidated Damages shall be applicable as per tender.
 - (b) There will be a further extended grace period of 30 days (beyond 60 days grace period) if only up to 5% work against 1st milestone is incomplete. In case, incomplete work is more than 5% of target, the extended grace period shall not be available, and the Liquidated Damages shall be applicable as per tender.
 - (c) Beyond the extended Grace period of 30 days, as per “(b)” above, Liquidated Damages shall be levied from the original target date of Project Milestone-I, as per clause- “(iv)” above.
 - (d) **For Project Milestone-II:** If the PIA has completed 90% work against the Project Milestone-II within the assigned timelines as per tender, there will be a grace period of 30 days for remaining work i.e. up to 10% of the targeted work. There will be no penalty during this grace period of 30 days for the Project Milestone-II.
 - (e) No grace period/ extended grace period shall be available beyond Project Milestone-II. Liquidated Damages shall be levied from the original target date of respective Project Milestones.

Note: Notwithstanding the milestone-wise grace periods defined above, the maximum cumulative grace period permissible across all project milestones shall not exceed 90 days in total for the entire project duration.

Once the cumulative grace period of 90 days is exhausted, any delay beyond the original milestone timelines shall attract Liquidated Damages as per the tender, irrespective of the work completion percentage at individual milestones.

11.2 Operation and Maintenance Phase

Following table depicts the penalty to be deducted, depending on network uptime. The penalties for Operation and Maintenance provided below shall be applicable as listed in the table below:

11.2.1 SLA Parameters

SLA for the O&M of the existing made over network (BharatNet incremental OFC and MPLS/GPON equipment (MPLS Routers, Shelters, OLTs, ONTs, SPVs), till the commissioning of IP-MPLS routers and new Rings:

SLA Parameters			
S. No.	Parameter	Permissible Range	Remarks
1	Block wise all GPs- UP Time	≥98%	Based on availability from NOC. Exclusions only due to Force Majeure clauses, OLT power down and Electric connection unavailability.
2	GP down due to OFC Cut	One event of a GP going down due to OFC Cut in a month shall be allowed for up to 40% GPs in a Block	

Note:

1. Successful bidder shall follow APBIL in house Trouble Ticket Module for capturing the fault status which will in turn be used for SLA calculation through the SLA module.
2. SLAs to be calculated Block wise and penalties to be imposed on monthly basis on O&M charges of the block network.
3. PIA shall ensure above SLAs else the corresponding penalties will be imposed.
4. GPs down time due to Block being down due to Power issues /media failure or equipment failure not attributable to PIA only to be excluded from SLA. Such exclusions shall include, but not be limited to, non-availability of power supply at GP/Block locations, upstream network or bandwidth failures beyond the PIA's scope, fiber/cable damages caused by third-party agencies such as during road works or other utility activities, force majeure events such as natural calamities, and site access restrictions due to administrative or law and order issues. Any such downtime shall be recorded as 'Non-PIA Attributable Downtime' and shall not be considered for SLA penalty calculations.
5. Wherever Electricity Connection is not available in the GP – Exclusion of down time after discharge of battery set shall be allowed in SLA provided the battery is in healthy condition and proper backup and charging system is functional. Wherever electric connection is available in GP but not in the building- The PIA can shift the equipment. If no suitable building is available, APBIL has to coordinate with State Authorities for getting Electricity connection. Till it is provided, down time during power unavailability to be excluded from SLA.
6. The shutdown taken for maintenance of fibre by PIA shall be excluded from SLA. However, such shutdown time in a month for a link cannot be more than 8 hours. Further, there should not be more than 1% of links taken for shutdown in a month.
7. If electric supply is not available and the battery is unable to take load such down period of Block / GP will be excluded from SLA.
8. No exclusion except above or force majeure cases.
9. The PIA and IE shall take the OTDR traces, jointly, on a fort-nightly basis, from the Block and/ or GP ends, for all the cases where SLA relaxations are sought by the PIA till RFMS deployment is not completed to achieve the automatic measurement.

Penalties

S. No	Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quarterly O&M Payment for the GP
1	Network Availability at GP	Availability of GP	≥98%	No Penalty
			≥ 95% < 98%	Proportionate Penalty
			≥ 90% < 95%	Twice the Proportionate Penalty
			< 90%	3% additional penalty on account of each 1% reduction in uptime

Note 1: * At 98% availability, the penalty is zero and from 98% to 95% availability, penalty will be proportionate to SLA availability. For example, for availability of 97.56 %, it will be rounded off to single digit after decimal i.e. 97.6 and penalty will be $98-97.6=0.4\%$.

Note 2: SLA will be calculated Block wise (i.e. all the GPs under AMC connected to the Block) month wise.

Note 3: One event of a GP going down due to OFC Cut in a month shall be allowed for up to 40% GPs in a Block. A penalty shall be levied @ INR 200 per event beyond this and an incentive of Rs. 200 per GP shall be given to the PIA for count of GPs beyond 80% GPs in a block without a fibre cut in a month in the Block.

Note 4: There will be a performance-based relaxation in the penalties mentioned in the Table above for the period of one year from the appointed date. The relaxation will be as below:

S. No.	Period	Average block wise GPs availability/ Up Time	Rebate on Penalty
1	Up to 6 Months	>=85%	No Penalty
		<85%	Rebate of 60% of the applicable penalty up to 75% uptime and 40% rebate in case of below 75% uptime
2	6 to 12 months	>=90%	No Penalty
		<90%	Rebate of 40% of the applicable penalty up to 80% uptime and 20% rebate in case of uptime below 80%.
There shall be no relaxation beyond one year from appointed date and the penalty shall be applicable as mentioned in the Table of Penalties.			

11.2.2 SLAs for Network Availability for S-NOC:

Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quart. Payable O&M payment of the State NoC network
Network Availability	All network equipment (Servicing affecting) installed and commissioned at S-NOC including but not limited to, core routers, switches,	≥99.9%	No Penalty
		≥ 99.5% < 99.9%	Proportionate Penalty
		≥ 99% < 99.5%	Twice the Proportionate Penalty

Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quart. Payable O&M payment of the State NoC network
at NOC	Firewall, IPS, EMS, NMS etc.	≥ 95% < 99%	Thrice the Proportionate Penalty
		<95%	Five times the Proportionate Penalty

11.2.3 SLAs for Network Availability at Block level for Ring topology:

Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quart. Payable O&M payment of the of Block Level
Network Availability at Block level**	Availability of Block router (aggregation)- in ref to power infra and router hardware/software outage	≥99.5%	No Penalty
		≥ 97.5% to <99.5%	Proportionate Penalty
		≥ 95.0% < 97.5%	Twice the Proportionate Penalty
		<95.0%	1% additional penalty on account of each 0.25% reduction in uptime

Note: The selected PIA shall mandatorily maintain a minimum 80% monthly uptime for the Block Router / Block-level Infrastructure, failing which no service charges shall be payable for the concerned month, and such failure shall be treated as non-compliance with the prescribed service level requirements.

11.2.4 SLAs for Network Availability at GP on Ring:

Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quart. Payable O&M payment for GP Level
Network Availability at GP	Availability of GP router (access)	≥98%	No Penalty
		≥ 95% to <98%	Proportionate Penalty
		≥ 90% < 95%	Twice the Proportionate Penalty
		<90%	3% additional penalty on account of each 1% reduction in uptime

** The definition for equipment availability is common for all network equipment i.e. availability in Block, (Aggregation) and Gram Panchayat (Access) level Network equipment availability for a Quarter is defined as total time (in minutes) in a Quarter - total down time (in minutes) in a Quarter excluding planned network downtime during that Quarter. The network is considered available when all the services in full capacity are available. However, the downtime of GP router due to downtime of Block router shall be excluded from the downtime of GP router for SLA/Penalty purpose.

- Network Availability (%) = (Total minutes during the Quarter – Planned downtime during the Quarter – Unplanned downtime minutes during the Quarter) *100 / (Total minutes during the Quarter- Planned downtime during the Quarter)

- Planned downtime: details related to the planned downtime shall be agreed with APBIL and shall be communicated well in advance. The downtime of the Block and GPs commissioned during the implementation phase shall be calculated on pro-rata basis.
- Measurement Tool: Reports from NMS (OSS) duly approved by APBIL or its appointed agency. PIA shall submit Quarterly reports on the performance and adherence to the SLAs while the penalties shall be charged on quarterly basis.

Penalty Calculation Illustration:

Suppose up to 98% availability, the penalty is zero and from 98% to 95%, the penalty is proportionate, 95 to 90%, the penalty is twice the proportionate and below 90%, it is thrice the proportionate. Then, the maximum penalty in slab 98%-95% shall be 3%, slab 95%- 90% shall be 3%+10%=13%. Illustrations of penalty calculation under different availability

- If the availability is 97.56 %, it will be rounded off to single digit after decimal i.e.97.6 and penalty will be $98-97.6=0.4\%$.
- If the availability is 92.43 %, it will be rounded off to single digit after decimal i.e.92.4 and penalty will be $3\% + 2*(95-92.4)\% = 8.2\%$.
- If the availability is 82.67 %, it will be rounded off to single digit after decimal i.e.82.7 and penalty will be $3\% + 10\% + 3*(90-82.7)\% = 34.9\%$.
- If the availability is less than or equals to 61 %, the penalty will be $3\% + 10\% + 3*(90-61)\% = 100\%$.
- The penalty shall never be more than 100%

11.2.5 SLA Exclusion for upgraded/ newly created Network:

- Electricity and manual switching off the equipment.
- To address these issues, the following steps are to be taken by the PIA-
- To separate out the power connection from other utilities (like fan, bulb etc) in such a way that the BharatNet equipment is not switched off whenever someone switches off other utilities during, night, weekend, holiday etc.
- Wherever, the daily average availability of electricity is less than 8 Hrs, it is presumed that the Battery may not get fully charged and be able to run the equipment continuously. Such sites may be captured at the survey stage itself and 1 Kw Solar Panel may be provisioned for such sites. However, the same needs to be approved by CEO, APBIL.
- Above arrangement shall leave little chance for asking SLA exclusion due to Electricity issues.
- PIA shall ensure availability of alternative power arrangements, where electricity is not available beyond 12 hours in a GP.
- PIA shall submit valid evidence/ documentation proof to APBIL for SLA exclusions.

11.2.6 Service provisioning by PIA from S-NOC

As per services mentioned in the sub-clause no. "3.5. (f).iv" of Section-IV-B

S. No	Measurement Criteria	Definition	Target	Penalty
	Service	Provisioning and	Up to 48 hours	No Penalty

S. No	Measurement Criteria	Definition	Target	Penalty
1	Provisioning	monitoring of services from S-NOC	> 48 hours	INR 10,000 per day

11.2.7 MTTR and No. of OFC cut/Block /month

S. No	Measurement Criteria	Definition	Target	Penalty
1	Mean Time to Repair (MTTR) for Fibre		Up to 8 hours	No Penalty
			> 8 hours up to 24 hours	INR 500 per additional hour
			More than 24 hours	INR 1,000 per additional hour
2	No. of OFC cut/Block /month	One cut if the OFC Route KM in the block is ≤ 50 ;	N cuts if the OFC Route KM is $> 50(N-1)$ and $\leq 50N$	NIL
		Two cuts if the OFC Route KM in the block is > 50 and ≤ 100 ;		
		N cuts if the OFC Route KM is $> 50(N-1)$ and $\leq 50N$	Above N cuts/fault/month or part thereof	INR 1,000/- per cut/fault

Mean Time To Repair (MTTR) shall be monitored on the time taken between logging of complaint against the network and its closure.

Measurement Tool: Reports from Ticketing Tool approved by APBIL or its appointed agency. PIA shall submit Monthly reports on the performance and adherence to the SLA while the penalties shall be charged on Quarterly basis.

11.2.8 DEPLOYMENT OF FRT

(a) Minimum Resources to be deployed in a FRT Team:

- (1) Technician for splicing & measurements.
- (2) Manpower for surveillance, liaison, and patrolling (one man for about 70-80 kms beat). However, the bidder has to deploy extra manpower for as and when needed during any work or other agencies work in the section.
- (3) Un-skilled manpower for trenching etc.
- (4) OTDR for measurement at 1310, 1550 and 1625nm.
- (5) 1 km length dummy fiber spool
- (6) Fusion splicing machines (ribbon and single fibre) with cleavers.
- (7) Optical laser source power meter
- (8) Cable fault locator / Electronic locator system for armoured/unarmoured OFC.
- (9) Vehicle for transportation of men, machines, and stores.

(10) Communication Gadgets: as required.

(11) Tool/ Tackles kit.

(b) Deployment of FRT:

- (i) The FRT team needs to be deployed based on RKM to be maintained. One (01) FRT team with the composition mentioned above need to be deployed for every 250 RKM of UG cable and for 500 RKM of ADSS cable of the network under O&M.
- (ii) The tracking of FRT team and associated manpower as mentioned above shall be done through manpower tracking application of the FRT Team Leader provided by the PIA/ APBIL.
- (iii) 5% of monthly O&M payment shall be deducted in case the average availability (on monthly basis) of FRT, is less than 80% of the required number of FRTs. The deduction will be 10% if the availability of FRTs is below 60% in any month.

Illustration: Suppose the network to be maintained is around 1,000 RKM, then the number of FRT teams to be deployed shall be four (4). The FRT teams should be available for 80% on an average i.e. out of 120 FRT team-days, 96 FRT team-days shall be trackable for that month.

If the average availability in a month is below 80% (below 96 FRT team-days), then 5% of O&M charges for the month will be deducted in addition to the SLA deductions. Further, if the average availability in a month is below 60% (below 72 FRT team-days), then 10% of O&M charges for the month will be deducted in addition to the SLA deductions.

- (iv) To monitor the availability of FRTs for penalty calculation as mentioned above, PIA shall deploy its own mobile based GIS application to monitor the movement of FRTs for operation and maintenance, APBIL may allow the integration of the same with APBIL's GIS App for penalty calculation, eliminating the need for FRTs to update their attendance in two separate applications.

In case of any issue impacting project progress and SLAs, as defined in the RFP, due to the reasons beyond control of the PIA; the PIA shall report the same in the online message board which shall be provided by APBIL. APBIL & IE shall respond to the issues raised by PIA on the message board itself.

12. PAYMENT OF BID PROJECT COST

12.1 Upon receiving request from PIA, APBIL on behalf of DBN, DoT shall make an advance payment (the "Advance Payment"), up to 10% (ten percent) of the capex value of the bid Project Cost, for mobilisation expenses and for acquisition of equipment.

- a) Mobilization Advance will be non-interest bearing for the specified term.
- b) The PIA shall submit an additional Bank Guarantee of 110% of the Mobilization Advance valid up to 60 days after the Construction Completion Date.
- c) Initial Mobilization advance up to 10% of the capex value shall be adjusted in 6 (six) equal instalments. The first instalment shall be adjusted in the 7th month (from the month of disbursement of the advance) from the due payments, second instalment in the 8th month, 3rd instalment in the 9th month and so on. However, on completion of the last milestone (for capex, in 12th month), 100% advance pending will be adjusted in the invoices to be paid. In case of delayed adjustment of mobilization advance due to non-completion of Project

completion Milestones (including grace period), penal interest shall be charged for the delayed period @ SBI MCLR rate per Annum. In case of non- completion of work, penal interest shall be charged for the entire period starting from the date of disbursal of such advance till the date of adjustment/ deposit with APBIL. For Mobilization Advance taken with GST, the amount of GST shall be returned/ adjusted in full by the PIA within 128 months from date of disbursal of advance, or the milestones due within 128 months; whichever is earlier.

- d) In case of non-adjustment of advance, in the prescribed period, the PIA will deposit the payable amount in next 30 days with interest, otherwise APBIL on behalf of DBN, DoT reserves the right to invoke the PBG for recovery of principal and interest.
- e) The PIA can request for mobilization advance after signing of the agreement between APBIL (on behalf of DBN, DoT) and PIA.
- f) Bid Project Cost shall be due and payable to the PIA in instalments during the Development Period
- g) Upon receiving the invoices after completion of works as under from the PIA, duly certified by the Independent Engineer, APBIL shall disburse, within 45 (forty-five) days of the receipt of each such invoice, instalments as mentioned below:
- h) For GPs planned in a Ring:

S. No.	Milestone	% of Payment	% of Cumulative Payments
1a	Commissioning of electronic equipment (router) at Block (visible in SNoC or validated through C- NOC by IP ping)	75% of Block equipment cost	-
1b	Commissioning of electronic equipment (router) at GP* (visible in SNoC or validated through C- NOC by IP ping)	75% of GP equipment cost	
2	Commissioning of at least 90% electronic equipment (router) of a ring (at least 90% GPs in a ring) (visible in SNoC or validated through C-NOC by IP ping)	5% of equipment cost (Block and GP)	-
3	Commissioning of individual rings as specified in SI No. 2 (visible in SNoC or validated through C-NOC using eMS) **	80% of OFC construction cost***	80%
4	90% GPs of respective Block visible in SNOC	10% of equipment and OFC construction cost	90%
5	At least 90% GPs of 90% Blocks are completed (visible in SNoC)	5% of OFC construction cost	95% of OFC construction cost + equipment cost as per Note-iv below
6	Completion of project with or without short closure	5% of OFC construction cost #	100% of OFC construction cost + equipment cost

S. No.	Milestone	% of Payment	% of Cumulative Payments
			as per Note-iv below

* GP shall be considered commissioned only when corresponding block has already been commissioned.

** PIA can claim, payment of 80% of milestone 3 above for OFC construction as per actual completed portion (node to node) for the ring in a block in case the ring is not completed due to reasons beyond the control of PIA like issues from State Government (including RoW), provided all the GPs are up & in working condition and number of such GPs (working but not in ring) is less than 20% of the total required GPs against the payment milestone.

*** including the claimed amount of OFC construction, if any, as per clause 3.2.1 of section IV B

Except for equipment mentioned in note iv below.

Note:

- i. PIA shall raise an invoice in the name of the DBN/CCA on behalf of APBIL on monthly basis for the completed work.
 - ii. Payment of the above-mentioned milestones shall be done in the sequential order
 - iii. The payment against milestone 2 and 3 for the GPs planned in spur shall be released by considering such GPs as part of the ring.
 - iv. The 10% payment of all the electronic items namely- Router at GP, Router at Block, digital microwave, UBR, all the equipment at State NOC, RFTS, the Racks, UPS/Power Plant, Battery, as specified at Sl. No. 3 to 11 of Price Schedule and items at Sl. No. 16 to 21 in the table of pre-defined rates, shall be made on completion of warranty of one year for these equipment
- i) Payment for construction and maintenance of the uncovered GPs using existing optical fibre cable of any TSP/ISP/IP-1 license holders on lease (as per clause 3.6.(a).iii of section-IV-B):**
- (i) 20% of the due amount for the leased cable (As per Table in clause 3.6. (a).iii of section-IV-B) shall be paid after commissioning of all the GPs in the ring connected through the leased OFC.
 - (ii) Remaining amount shall be paid in the quarterly instalment of 1.5% of total amount (As per Table in clause 3.6. (a).iii of section-IV-B),
 - (iii) The minimum commitment period for such quarterly payment from APBIL shall be up to 7 years.
 - (iv) The maximum period for which the 1.5% quarterly payment to be done, shall not exceed 10 years. After 10 years period, the assets of 24/48 F OFC, as the case may be, shall be transferred to DBN at nominal price of Rs. 1.00 per Km.
 - (v) Balance 20% of due payment (As per Table in clause 3.6. (a).iii of section-IV-B) shall be made on successful handover of such OFC along with duct to DBN.

- (vi) The PIA shall transparently maintain all the fibres (live and dark) of such leased OFC on end-to-end basis for entire duration of the contract. The SLA and penalty for live fibres as well as fibres leased out by APBIL shall be same as for GP as defined in Clause 11.2.4 and 11.2.7. If any unused dark fibre is not available for >95% during a quarter, the proportionate payment (of 1.5% quarterly payment) shall only be paid for these fibres, which are available.
- (vii) All the SLA penalties as defined in clause 11.2.4 in respect of ring created on leased OFC will be applicable to quarterly amount (1.5% quarterly payment).

j) Payment for S-NOC upgradation shall be due and payable to the PIA in instalments during the Development Period, as below:

S. No.	Milestones	Proposed payment schedule
1	Physical Infra Readiness & Delivery of S-NOC material Readiness of civil, electrical infrastructure Delivery of hardware, software applications and licenses	30% of S-NOC cost
2	Installation and commissioning (AT completion) of S-NOC along with at least integration of 10% GPs (include integration of BharatNet Phase-I, Phase-II and ABP along with APSFL Phase-I network)	30% of S-NOC cost
3	Integration with BharatNet NOC (C-NOC) at New Delhi & Bengaluru	15% of S-NOC cost
4	Completion of Project	15% of S-NOC cost
5	After the completion of 1 year Warranty	10% of S-NOC cost

12.2 MIS Reports

Bidders are required to provide below mentioned MIS reports but not limited to:

S. No.	Type of report	Periodicity
1.	HoTo Field Survey Report	Daily
2.	Availability of Devices live vs faulty	Daily
3.	Daily Fibre cut brief details with location, affected sites, MTTR, etc.	
4.	Total No. of complaints raised	
5.	Ageing Report of issues/Complaints/Incidents	
6.	Summary of issues / complaints logged at the Help Desk	
7.	Summary of resolved unresolved and escalated issues / complaints	

S. No.	Type of report	Periodicity
8.	Summary of resolved unresolved and escalated issues / complaints to vendors/other Bidder/Service Provider.	
9.	Receive Signal Strength at LM including connectivity media (indicating an alert if the signal strength is below the defined threshold)	
10.	Bandwidth Utilization (max, min and average)	Weekly
11.	Issues/Complaints Analysis report for Network, call trend, call history, etc. Summary of systems rebooted.	
12.	Summary of issues / complaints logged with the OEMs.	
13.	Summary of changes undertaken in the Project including major changes like configuration changes, Parts Replacement, patch upgrades, database reorganization, storage reorganization, etc. and minor changes like log truncation, volume expansion user creation, user password reset etc.	
14.	Inventory and spare materials reports	
15.	Software upgrade/enhancement reports per network element	Monthly
16.	Network Availability Report. SLA compliances with all categories mentioned in RFP	
17.	Configuration change reports	
18.	Attendance report of field manpower	
19.	SLA compliance reports	Quarterly
20.	Preventive maintenance reports	
21.	Scheduled maintenance reports	
22.	Change Management Reports	
23.	Service Availability, Downtime, Usage/Utilization, Fault & rectification, Performance statistics-, Log of Network	

S. No.	Type of report	Periodicity
	parameters along with Service down time and % uptime achieved	
24.	Summary of fault/complain reported and pending at different bucketization including at APBIL end along with brief data details	Daily/Weekly-Monthly Summary
25.	Any other reports- As and when required by Tenderer	

Note:

1. The selected bidder shall submit all above reports as mentioned on a regular basis over e-mail and as per the prescribed formats provided by the APBIL. Frequency and report types are indicative at may change as per the requirement. In addition of above APBIL may ask to provide customized report as per customer requirement. Delay in the billing process due to non-adherence of above compliances/report submission will be sole responsibility of the Bidder.
2. Quarterly review meeting with APBIL internal stakeholders and selected bidders core team on performance review which includes network availability, spare, resources/manpower availability and payment criteria will be part of this and selected bidder appointed SPOC has to join and if ask with their stakeholders including OEM

13. O&M Payments

- 13.1 All O&M Expenses in the form of quarterly payments shall be due and payable by DBN, DoT on behalf of APBIL, as per the yearly O&M Cost as under , Similarly for fiber on lease , the O&M payment is already clubbed in the quarterly payments , thus any O&M Expenses in excess of such O&M (in case of PIA constructed fiber) or quarterly (for fiber on lease) payments shall be borne solely by the PIA. For avoidance of doubt, it is clarified that the quarterly payments for such fiber on lease and PIA constructed fiber will be treated separately being on different routes, thus the quantity under the scope of PIA shall be as per actual only and no overlapping, of fiber on lease and fiber construction by PIA, will be allowed on any route.
- 13.2 O&M payment will be paid GP wise after completion of every quarter, based on the SLAs (averaged over a block, counting only GPs under AMC) during the O&M phase.
- 13.3 Any section which is in damaged condition or temporarily restored shall be clearly mentioned in the HOTO memo. For permanent restoration of such damaged sections/ temporary restored sections, the PIA shall be paid at tender discovered rates. In case, such permanent restoration work is required to be taken up beyond 15% of the total taken over OFC RKM, the PIA shall be paid at 90% of the present tender approved rates. The replacement of damaged sections can be any section from Block to GP.
- 13.4 **Deleted**
- 13.5 **Deleted**

- 13.6 Further, with regards to the payment of O&M Payments to the PIA, APBIL shall pay 75% (seventy-five per cent) of the invoice amount within 45 (forty-five) days of receiving a demand from the PIA along with invoice and necessary particulars. Remaining 25% (twenty-five per cent), payment shall be made to the PIA by APBIL after due audit / verification, within 90 days of receiving a demand from the PIA along with invoice and necessary particulars.
- 13.7 The PIA shall be responsible for maintenance, including FLM of the made over GPON network, comprehensive O&M of OFC network, MPLS network, associated infrastructure, replacement of any OFC damages up to 200 meters length for underground and up to 500 meters length for Aerial damaged in a single stretch, within AMC cost /charges including material & services. However, if the OFC route damages are unavoidable and are of more than 200 m in UG/ 400 m in Aerial and have been intimated to the IE or APBIL before crossing 200 m in UG/ 400 m in Aerial, the PIA shall get the separate work order from APBIL for replacement of damaged section. The PIA shall be paid, for such replacement of damaged sections after getting firm work order for the same from APBIL, the cost of the material in full and 50% of the Cost of Services. PIA may coordinate for raising demands from agencies requiring shifting of cables, if applicable, before taking approval for such replacement of damaged sections. In such case, the PIA will also be required to restore the GP using OH OFC on temporary basis within 12 Hrs, else, SLA penalty will be applicable.
- 13.8 The PIA shall identify and notify the sections of made over OFC network which have become lossy and need replacement during the contract period to the IE/APBIL for replacement. After getting approval from APBIL, the PIA shall submit the estimate along with BOQ for such replacement. After getting the firm work order, the PIA shall replace such section at the approved rates finalized based on quoted rates as per PO. In such cases also, the PIA will also be required to restore the GP using OH OFC on temporary basis within 12 Hrs, else, SLA penalty will be applicable.

14. Note

- (1) In case any associated component is required not covered in the BoM, PIA shall provide the same to complete the work without any extra cost.
- (2) The PIA shall be required to follow the Technical Specification & Testing Parameters as mentioned in **Annexure A, Annexure-B, Engineering Instructions (EI) (Annexure C) and Annexure D.**
- (3) Any deviation from the standard EI, shall be liable for penalty as per clause 6 & 11.
- (4) In case there are any changes in the standard engineering instructions, PIA may be asked to execute the work as per the latest engineering instructions.
- (5) During the process of execution, the PIA shall be responsible for resolving all the disputes arising out of damages caused to the public utilities and infrastructure of private operators/ public including payment of compensation, if any.
- (6) **13.2 to 13.8 is not applicable for fiber on lease routes, once the first lease in payment of 20% becomes due and claimed by PIA –as per 12.1 (i) above)**

15. QUALITY ASSURANCE AND TESTING

15.1 Indigenous Equipment

- 15.1.1 The supply of Equipment manufactured indigenously shall be accepted only after Quality

Assurance tests are carried out by the IE/ any other agency nominated by APBIL, as mentioned in Para-15.1.2 below. For other items which do not have TEC GR, QA shall be done based on a test schedule submitted by the Successful Bidder and approved by APBIL. However, for branded IT items such as computers, laptops, servers and computer peripherals that are supplied by ISO certified companies, APBIL, at its discretion, may accept the testing and quality certificate of such companies in lieu of QA requirements and copy of the same shall be submitted to the CEO APBIL at the time of supply of these Equipment and to the Inspection Circle for verification while offering for acceptance testing. The relaxation of QA requirement, if necessary, shall be given by APBIL on a case-to-case basis.

15.1.2 In case of supply of Indigenous equipment, for Routers to be installed at Blocks & GPs and RFMS, the Bulk QA testing shall be carried out, as under:

- i. If the actual supply experience is up to 5 times the maximum supply experience, required for eligibility criteria, as per the certificate provided in accordance with clause-2.11.(i) of Section-IV-A (as per clause- 2.11.(ii), in case of Class-I & Class-II local suppliers), the Bulk QA testing shall be done on 20% of the quantity to be supplied. Similarly, if the actual supply experience is between 5 to 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 10% of the quantity to be supplied and if the actual supply experience is more than 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 5% of the quantity to be supplied. {see illustration-1, below}
- ii. In case of failure of any component during the Bulk QA testing-
 - a. Complete lot shall be deemed as rejected. The same lot shall be offered again for Bulk QA testing by the concerned OEM.
 - b. The quantity offered shall be equal to that of the rejected lot. For such re-offered lot (post rejection), Bulk QA testing shall be done on the 100% offered quantity.
 - c. For all the further offered lots (post rejected lot), Bulk QA testing shall be done on the 10% more quantity than the prescribed quantity as in sub-clause-(i) above (i.e. 20%, 10% or 5%, as the case may be).
 - d. As mentioned at para- (a) & (b) above, for all the re-offered lot (post rejection), Bulk QA testing shall be done on 100% offered quantity.
 - e. After each rejected lot, Bulk QA testing shall be done on 10% more quantity than the previous successfully tested lot, as mentioned at para- (c) above.

{see illustration-2 below}

- iii. The PIA/ respective OEM shall make the suitable arrangements in India for such Bulk QA testing of such imported items.

15.2 Imported Equipment:

15.2.1 The supply of imported equipment (except Block & GP Routers and RFMS) shall be accepted only if it is accompanied with Factory Test Reports (FTR)/ certifications of various performance parameters required as per relevant TEC GR & Technical Specifications mentioned in this tender together with environmental test as per BSNL QA document QM333/ any other agency nominated by APBIL with bulk testing certificate from QA, BSNL. Any imported equipment not accompanied by the Factory Test Reports/ certifications of various services, features, facilities and performance parameters as per relevant TEC GR & Technical Specifications in RFP together with environmental testing certificate as per QA document QM-333 shall not be

accepted. For the IT equipment such as Routers (except Block & GP Routers and RFMS), servers etc. supplied by ISO certified companies, the PIA shall seek for any specific relaxation, if necessary, along with reasons, on QM333 requirements from QA Circle IE/ any other agency nominated by APBIL before supplies are made which will be considered by QA Circle IE/ any other agency nominated by APBIL and decision of the same will be binding. The Factory Test Reports and certification with relaxed parameters are to be submitted along with the supplies.

15.2.2 In case of supply of imported items, in addition to FTR as mentioned, the bulk testing shall also be required. For Routers to be installed at Blocks & GPs and RFMS, the Bulk QA testing shall be carried out, as under:

- (i) If the actual supply experience is up to 5 times the maximum supply experience, required for eligibility criteria, as per the certificate provided in accordance with clause-2.11.(i) of Section-IV-A, the Bulk QA testing shall be done on 20% of the quantity to be supplied. Similarly, If the actual supply experience is between 5 to 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 10% of the quantity to be supplied and if the actual supply experience is more than 7 times the maximum supply experience, required for eligibility criteria, Bulk QA testing shall be done on 5% of the quantity to be supplied. {see illustration-1, below}
- (ii) In case of failure of any component during the Bulk QA testing-
 - a) Complete lot shall be deemed as rejected. The same lot shall be offered again for Bulk QA testing by the concerned OEM.
 - b) The offered quantity shall be equal to that of the rejected lot. For such re- offered lot (post rejection), Bulk QA testing shall be done on the 100% offered quantity.
 - c) For all the further offered lots (post rejected lot), Bulk QA testing shall be done on the 10% more quantity than the prescribed quantity as in sub- clause-(i) above (i.e. 20%, 10% or 5%, as the case may be).
 - d) As mentioned at para- (a) & (b) above, for all the re-offered lot (post rejection), Bulk QA testing shall be done on 100% offered quantity.
 - e) After each rejected lot, Bulk QA testing shall be done on 10% more quantity than the previous successfully tested lot, as mentioned at para- (c) above.

{see illustration-2 below}

The PIA/ respective OEM shall make the suitable arrangements in India for such Bulk QA testing of such imported items.

Illustration-1: *If the requirement is 2,500 routers against which the bid has been submitted by a bidder. Thus, the required experience is of 750 (30%) routers as per clause 2.11.(i) of Section-IV-A (or 10% as per clause- 2.11.(ii), in case of Class-I & Class-II local suppliers). For any OEM, having actual supply experience up to 3,750 routers, as per the experience certificate(s); the Bulk QA testing shall be done on 20% of the quantity to be supplied i.e. 500 routers. Similarly, for an OEM with actual supply experience of 3,750 to 5,250; the Bulk QA testing shall be done on 250 routers and for an OEM with actual supply experience of more than 5,250, the Bulk QA testing shall be done on 125 routers.*

Illustration-2: *An OEM qualify (as per actual experience and required supply) for 20% Bulk QA testing and equipment is to be offered in 10 lots. If the 3rd lot is rejected, the same lot shall be re-offered, and 100% quantity shall be tested for Bulk QA. For 4th lot onwards, Bulk QA testing shall be carried out on*

30% of offered quantity. Further, if 7th lot is rejected, 100% quantity of re-offered 7th lot shall be tested. For 8th lot onwards, Bulk QA testing shall be carried out on 40% of offered quantity and so on.

- 15.3 The supply of equipment/stores/services shall strictly adhere to the package discipline as described in the Purchase/Work Order. A particular item mentioned in SoR would deem to have been received in full only if all the parts/ components, installation material etc. are supplied as a package during Scheduled Delivery Period.
- 15.4 All equipment supplied shall be new products only and no refurbished equipment shall be supplied in any case.
- 15.5 In case of any Quality issue, the PIA shall be required to replace the defective/inferior material, in full, by good material duly passed by QA.
- 15.6 A quality manual describing the QA system shall be submitted along with the bid, which should include the details about the component quality assurance and quality system practices, including data on critical components.
- 15.7 The PIA shall obtain approval from The CEO, APBIL for all the passive items to be supplied under the contract (MAF and TSEC/ QF-103 for passive items are not required to be submitted along with bid). The bidder shall submit a request enclosed with valid MAF (in the format as per tender) and copy of TSEC to The CEO, APBIL CO, Vijayawada for approval of an OEM.
- 15.8 Deleted-
- 15.9 TSEC of imported items shall be done as per the ~~QA circle's~~ IE/ any other agency nominated by APBIL prevailing guidelines on QA for imported items.
- 15.10 The PIA shall have valid Type Approval Certificate (TAC) from Telecom Engineering Centre (TEC), New Delhi or Technical Specification Evaluation Certificate (TSEC) from Quality Assurance Circle, BSNL, Bengaluru, against the respective technical specifications of this RFP, before commencement of the supply. The requirement of TSEC for various items to be used for execution of the project are mentioned in the Table below:

S. No.	Material name	TSEC (Required/ Not Required)
1	24F loose tube type armoured optical fiber cable	Required
2	48F ribbon type armoured optical fiber cable	Required
3	PLB HDPE telecom duct (40/33mm)	Required
4	24F Metal Free Aerial Optical Fibre Cable (24F ADSS)	Required
5	Joint Enclosure (48F and above)	Required
6	SJC/BJC (24F)	Required
7	Fibre Distribution Management System Type I at Block location	Required
8	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Required
9	Rack at Block locations	Required
10	Rack at GP locations	Required
11	IP-MPLS Router at Block location	Required
12	IP-MPLS Router at GP location with accessories	Required
13	Remote Fibre Monitoring System (RFMS) including necessary hardware and software with accessories	Required
14	Power System with backup provisions at GP locations with provision of MPPT Card including solar panels	Required
15	Power System with backup provisions at GP locations with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels	Required

S. No.	Material name	TSEC (Required/ Not Required)
16	Lithium-Ion Battery of 2400 VAH to be used	Required
17	Installation Accessories and fixtures of Self-Supporting Metal free Optical Fibre Cable	Required
18	Poles for ADSS Fiber Laying	Not Required
19	Route/Joint indicators	Not Required
20	SFP 100G (with 40km / 80km) pluggable	Not Required
21	SFP 10G (with 10km/40km/80km) pluggable	Not Required
22	SFP 1G with 10km pluggable	Not Required
23	SFP 10G with 10Km pluggable	Not Required
24	SFP 1G with 10 km pluggable	Not Required
25	Civil works including site preparation and partitioning works , false flooring, false ceiling, etc.	Not Required
26	Electrical works including light fixtures, cabling, panels + earthing etc.	Not Required
27	Silent DG set with AMF panel	Not Required
28	Air conditioning for NOC, UPS, BMS, Meeting, electrical rooms, etc.	Not Required
29	40 kVA online UPS (with SNMP)	Not Required
30	Access Control System (RFID + Biometric, smart cards)	Not Required
31	Racks (Integrated Air conditioning and climate monitoring system covering entire Racks/suite/Isle/Data Centre only)	Not Required
32	IP camera with intelligent monitoring system including software & internal storage	Not Required
33	70" LED TV	Not Required
34	Structured cabling (OFC and Cat6)	Not Required
35	Workstation furniture and fixtures including chairs	Not Required
36	Fire Detection System	Not Required
37	NOC Router	Not Required
38	Core Switch	Not Required
39	Access Switch	Not Required
40	Aggregation Switch	Not Required
41	Primary SAN storage for application & DB	Not Required
42	SAN Switch	Not Required
43	Secondary Storage (As per requirement, to be assessed by PIA)	Not Required
44	Blade Chassis/Rack servers (including AAA) (As per requirement, to be assessed by PIA)	Not Required
45	Workstation computers (i5 2.5 GHz processor, 8 GB DDR4, 1 TB HDD with 19.5 Full HD Monitor Key Board & Mouse with all other accessories as per requirement; 1xDVI output, 2xHDMI Output, 1xVGA Output)	Not Required
46	IP phones	Not Required
47	IP PBX	Not Required
48	Video wall display, Controller, Video wall Management Software & Accessories	Not Required
49	Backup and archival solution	Not Required
50	NMS/OSS Solution	Not Required
51	Helpdesk solution	Not Required
52	End point protection software	Not Required
53	Centralized Access Control system software	Not Required

S. No.	Material name	TSEC (Required/ Not Required)
54	Firewall (1+1)	Not Required
55	NIPS (1+1)	Not Required
56	Mini OLT at GP Location	Required
57	Online UPS at Block Location	Required

NOTE: If any item is not covered in the table above, the TSEC applicability shall be decided by APBIL, as per prevalent guidelines of the ~~BSNL QA circle~~ IE/ any other agency nominated by APBIL.

16. RIGHT OF WAY

- 16.1 The Right of Way for the Project shall be granted as per the existing agreement with the State Government and facilitated by APBIL through introduction letters for creation and upgradation of New Network and Existing Network respectively during the Development Period.
- 16.2 Based on network survey and design, or any other activities it may deem necessary, the PIA is permitted to apply and obtain the Right of Way for the Project from the State Government and other agencies from the Appointed Date.
- 16.3 The PIA shall, at its own expense, apply for and obtain the Right of Way for the Project which shall include making and filing applications, paying associated costs related to RoW approval, liaising with Government Instrumentalities and agencies etc. for which PIA may engage suitable consultants. The PIA shall pay the ROW charges to be paid to the ROW agencies, if the same is upto Rs 50,000/-. The PIA shall claim the reimbursement of the same from APBIL. If the amount is more than Rs 50,000, PIA shall have the option either to pay to the ROW agency and seek reimbursement from APBIL along with normal bills or ask APBIL to pay directly to the ROW agency. The similar arrangement shall be applicable during the whole contract period for O&M also.
- 16.4 The PIA shall not be required to pay Right of Way access charges for the Project during the Contract Period to the State Government (s) or its agencies. Further, any other costs associated with the Right of Way which are beyond the scope of the agreement between the State Government and DoT/ DBN/ APBIL shall be reimbursed by APBIL, subject to submission of valid proof of payment by the PIA. This includes applicable charges for Right of Way from Government Instrumentalities regulating forest land, railway lines, defence areas, highways, oil and gas pipelines or any other agencies or departments.
- 16.5 Further, it is being expressly agreed and understood that DoT/ DBN/ APBIL or the State Government shall have no liability whatsoever in respect of survey carried out or work undertaken by the PIA on or about the Site (Route) of the New Network and Existing Network pursuant hereto in the event of Termination or otherwise.
- 16.6 The CEO, APBIL shall relax the penalties on delay due to ROW permissions with proper justification. No penalty shall be levied due to delay in RoW due to any reason whatsoever if the same is not solely attributable to the PIA.
- 16.7 Reinstatement charges based on the standard SOR rates of the District/ State authorities, if any, shall be payable by APBIL either to the respective authority or shall be reimbursed to the PIA, if paid by the PIA after the same is approved by APBIL. However, the delay on account of delayed payment/ non-payment of such reinstatement charges shall be on account of the PIA and no LD waiver for such delay shall be granted.

- 16.8 It is expressly agreed that the license granted hereunder with respect to Right of Way for the Project shall terminate automatically and forthwith, without the need for any action to be taken by APBIL to terminate the license, upon the Termination of this Agreement for any reason whatsoever.
- 16.9 It is hereby clarified that the provisions of this Clause shall apply mutatis mutandis for any additional Right of Way that may be required for the Project in accordance with the provisions of this Agreement, and upon procurement thereof, such Right of Way shall form part of the Project, as the case may be.

Note :- Installation of poles shall be at public land only.

17. MONITORING OF THE PROJECT

17.1 Project progress reports

During the Development Period, the PIA shall, no later than 7 (seven) days after the close of the mutually agreed upon time period, furnish to APBIL and the Independent Engineer report(s) on the progress of the Development Works and the Upgradation Works, in the agreed format, and shall promptly give such other relevant information as may be required by the Independent Engineer/APBIL. The PIA shall also develop a graphical user interface for reporting of data and for providing information on the Development Works, Upgradation Works and the operation and maintenance of the Project Assets to APBIL and the Independent Engineer

17.2 Inspection during Development Phase

During the Development Period, the Independent Engineer shall have the right to inspect and audit the network infrastructure and make a report of such inspection (the "Inspection Report"). The Inspection Report shall state defects or deficiencies, if any, with reasonable details and reference to the Specifications and Standards. Independent Engineer shall send a copy of the Inspection Report to APBIL and the PIA and upon receipt thereof, the PIA shall rectify and remedy the defects or deficiencies, if any, stated in the Inspection Report. Notwithstanding the foregoing, such inspection or submission of Inspection Report by the Independent Engineer shall not relieve or absolve the PIA of its obligations and liabilities hereunder in any manner whatsoever.

17.3 Inspection during O&M Phase

The IE shall perform Six Monthly (twice in a year) inspection/ audit of the network and its elements during the O&M Phase for each KPI and constructed OFC. The O&M Phase shall be concurrent with the Development Phase for the network under O&M. The schedule of the same shall be jointly finalized by PIA/ IE and shall be approved by the CEO APBIL, the schedule should be prepared and agreed in such a manner that the same is spread over across the whole year. The Inspection Report shall state defects or deficiencies, if any, with reasonable details and reference to the Specifications and Standards. Independent Engineer shall send a copy of the Inspection Report to APBIL and the PIA and upon receipt thereof, the PIA shall rectify and remedy the defects or deficiencies, if any, stated in the Inspection Report within 30 days. Notwithstanding the foregoing, such inspection or submission of Inspection Report by the Independent Engineer shall not relieve or absolve the PIA of its obligations and liabilities hereunder in any manner whatsoever. The IE shall assess liabilities of the PIA and include the same in the report, The IE shall submit the report in parts on a mutually agreed periodicity so that the PIA is able to rectify/remedy the defects/deficiencies on a continuous basis. The PIA

shall intimate the rectification of the defects/deficiencies done to the IE. The IE shall re-inspect the same and shall mention the same in the Annual report.

17.4 Tests

- 17.4.1. For determining the conformity of Development Works and/or the Upgradation Works and/or the O&M works to the Agreement and Specifications and Standards, the Independent Engineer shall require the PIA to carry out or cause to be carried out tests, at such time and frequency as may be specified by the Independent Engineer from time to time in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template for quality assurance. On or before the Appointed Date, APBIL and PIA will mutually agree on the tests that will be undertaken for the acceptance of the network created. The Independent Engineer shall participate in at least 10% (ten per cent) of the number of such tests as would normally be undertaken in accordance with Good Industry Practice, Specifications and Standards, and Acceptance Testing Template. The PIA shall facilitate the Independent Engineer in conducting the tests as per approved Acceptance Testing Template and/or as per directions of the Independent Engineer. The Independent Engineer shall prepare the test report and shall submit same to APBIL. Provided however, that the Independent Engineer may, instead of carrying out the tests specified hereunder, at its option decide to witness, or participate in, any of the tests to be undertaken by the PIA for its own quality assurance in accordance with Good Industry Practice, Specification and Standards, and in such an event, the PIA shall cooperate with, and provide the necessary assistance to, the Independent Engineer for discharging its functions hereunder.
- 17.4.2. In the event that results of any tests conducted, establish any defects or deficiencies in the Development Works and/or the Upgradation Works and/or the O&M works, the PIA shall carry out remedial measures within 30 days and furnish a report to the Independent Engineer in this regard. The Independent Engineer shall verify that such remedial measures have brought the Development Works and/or the Upgradation Works and/or O&M works into compliance with Specifications and Standards, and the procedure under Clause 17.4.1 shall be repeated until such Development Works and/or the Upgradation Works and/or O&M works conform to the Specifications. For avoidance of doubt, the tests pursuant to this Clause 17.4.1 shall be undertaken in addition to and independent of the tests carried out by the PIA for its own quality assurance in accordance with Applicable Laws, Applicable Permits and Good Industry Practice. A copy of the results of such test shall be sent by the PIA to the Independent Engineer forthwith. The costs to be incurred on any test which is undertaken for determining the rectification of any defect or deficiency in the Development Works and/or the Upgradation Works and/or O&M works shall be borne solely by the PIA.

17.5 Delays during development

If the PIA does not achieve any of the Project Milestones or the Independent Engineer shall have reasonably determined, based on the progress reports submitted by the PIA, that the rate of progress of Development Works and/or Upgradation Works is such that Construction Completion Date or the relevant Project Milestone under the Project Completion Schedule respectively, is not likely to be achieved by the Scheduled Completion Date, it shall notify the PIA to this effect, and the PIA shall, within 15 (fifteen) days of such notice, by a communication inform the Independent Engineer in reasonable detail about the steps it proposes to take to

expedite progress and the period within which it shall achieve Construction Completion Date the relevant Project Milestone under the Project Completion Schedule, as the case may be.

18. INDEPENDENT ENGINEER

18.1 Appointment of Independent Engineer

APBIL ~~on behalf of DBN, DoT~~ shall appoint an agency substantially the independent consultant through a separate RFP (the “**Independent Engineer**”). The appointment shall be made no later than 60 (sixty) days from the date of the PO and shall be for the Construction and O&M Period. On expiry or termination of the aforesaid appointment, APBIL shall appoint an Independent Engineer for a further term of 3 (three) years and such procedure shall be repeated after expiry of each appointment.

18.2 Authorized signatories

APBIL shall require the Independent Engineer to designate and notify to APBIL and the PIA up to 2 (two) persons employed in its firm to sign for and on behalf of the Independent Engineer, and any communication or document required to be signed by the Independent Engineer shall be valid and effective only if signed by any of the designated persons; provided that the Independent Engineer may, by notice in writing, substitute any of the designated persons by any of its employees.

18.3 Dispute resolution

If either Party disputes any advice, instruction, decision, direction or award of the Independent Engineer, or, as the case may be, the assertion or failure to assert jurisdiction, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure as in term of clause 19 of Section III.

18.4 Interim arrangement

In the event that APBIL does not appoint an Independent Engineer, or the Independent Engineer so appointed has relinquished its functions or defaulted in discharge thereof, APBIL shall have full powers, in the interim, to designate and authorize any person to discharge the functions of the Independent Engineer, save and except that such person shall not exercise any functions relating to review, comment, approval or inspection for and in respect of the Independent Engineer, and such functions shall be discharged as and when an Independent Engineer is appointed. Provided, however, that nothing contained in this Clause 18.4 shall in any manner restrict the rights of APBIL to enforce compliance of the provisions of this RFP.

18.5 Roles and functions of the Independent Engineer

18.5.1 Overview of the roles of Independent Engineer:

- a. Validate the high and low-level network design proposed by the PIA and recommend for approval to APBIL.
- b. Inspect the Project and report any lapses, defects or deficiencies in project implementation to APBIL and PIA.
- c. Perform acceptance testing of the network infrastructure and validate its conformance with Specification and Standards.
- d. In the event of any dispute, mediate and assist APBIL and PIA in arriving at an amicable settlement.

- e. Review and validate penalties in case of PIA default during construction and O&M phase including non-compliance network performance/ SLAs and QoS parameters.
- f. During handover period, validate transfer of relevant records, and reports pertaining to the Project to APBIL.
- g. Validate associated tasks required to perform with Environment, Health and Safety (EHS) compliances.

Moreover, phase-wise detailed scope of work for independent engineer is mentioned in the following sub- sections.

18.5.2 During Conditions Precedent/ Pre-Planning Phase:

Validation of fulfilment of APBIL's and PIA's obligations during Condition Precedent (to be executed after signing of Contract Agreement). This includes the following but not limited to:

- a. Review existing network handover to the PIA with respect to PIA timeline for handover.
- b. Review and validate completeness of project execution and Operation & Maintenance (O&M) manual along with asset lifecycle management manuals, as required.
- c. Review if PIA submit approval request to APBIL on the use of linear architecture on case-to-case

18.5.3 Planning and Design Phase:

- a. Perform technical scrutiny of survey reports on GIS map.
- b. Review and validate network design, upgradation proposal of existing network, initial project plan.
- c. Review and validate the route length and Bill of Quantity (BOQ) required for optical fibre cable, IP-MPLS equipment, power equipment and other accessories requirement.
- d. Review and validate the adequacy of space and power requirements for passive and active network elements for GP, Block and State Network Operations Centre (S-NOC).

18.5.4 Implementation Phase

- a. Perform Material inspection for BOQ Quality and raise deviations/ discrepancies if any.
- b. Validate network infrastructure deployed items such as electronics, electrical, fibre etc. as per specifications and standards and design requirements.
- c. Perform audit for installation and commissioning of active equipment on site location to ensure best practices are being followed.
- d. Perform acceptance tests across Gram Panchayat (GP) and route based on agreed test schedules with stakeholders.
- e. Inspect and validate the integration of PIA's S-NOC (covering BharatNet existing network for upgradation and new network for creation) with BharatNet Delhi and Bangalore NOC.
- f. Validate network infrastructure and issue provisional and final completion certificate to the PIA.
- g. Validate closure of open punch points with PIA, in coordination with APBIL.
- h. Review and assess applicable penalty for not achieving Project milestone

- i. Validate completeness of inventory / asset database records during the Construction Period
- j. The Independent Engineer shall perform all other duties and functions specified in the RFP.

18.5.5 Operations and Maintenance Phase

Validation of fulfilment of PIA's obligations during operation period. This includes obligations such as disbursement of O&M Payments and validation of network performance SLAs in conformance with project and regulatory guidelines. This includes but not limited to the following:

- a. Review and assess applicable penalties for non-compliance to SLAs and QoS parameters.
- b. Validate compliance over O&M obligations to support Authority on disbursement of quarterly payment as per the provision of the Contract Agreement (MSA).
- c. Verify and validate completeness of inventory / asset database records during the operations period.
- d. Validate and assess penalty for default on obligation of serving non-discriminatory access to BharatNet services.
- e. Validate in case of PIA default during O&M phase.
- f. Assess, validate and approve requirements for change request extending scope of work.
- g. Six Monthly Inspection and Audit of the Network and compliance of rectification of defects/ deficiencies by the PIA.
- h. The Independent Engineer shall perform all other duties and functions specified in the RFP.

18.5.6 Handback Phase

Validation of fulfilment of APBIL's and PIA's obligations in the event of termination and transfer or handover of Project.

- a. Validate the inventory and Project's assets being managed and handed over by the PIA to APBIL.
- b. Validate transfer of relevant records, and reports pertaining to the Project to APBIL.
- c. The Independent Engineer shall perform all other duties and functions specified in the RFP.

19. Exit Management Plan

- 19.1 This Clause sets out the provisions that will apply when the contract has expired or when the contract is terminated.
- 19.2 Exit Management Plan- The PIA shall ensure continuing provision of the services throughout the transfer process or until the cessation of the services.
 - 19.2.1 Plans for the communication with such of the PIA's staff, Bidders, customers and any related third party as are necessary to avoid any material detrimental impact on APBIL's operations as a result of undertaking the transfer.
 - 19.2.2 Plans for provision of contingent support to APBIL and replacement Bidder for a reasonable period after transfer.
- 19.3 The PIA shall draft the Exit Management Plan annually to ensure that it is kept relevant and up to date.

- 19.4 Each Exit Management Plan shall be presented by the PIA to and approved by APBIL or its nominated agencies.
- 19.5 Payments during the Exit Management period shall be made in accordance with the Terms of Payment Schedule.
- 19.6 Exit Management plan shall be furnished in writing to APBIL or its nominated agencies within 90 days from the date of issue of Purchase Order. However, if PIA is not able to provide a Exit Management Plan within 90 days from the date of issue of Purchase Order, PIA is bound to follow exit management plan finalized by APBIL specified in next section.
- 19.7 Making Over the Network by PIA to APBIL or any agency appointed by APBIL

19.7.1 Handing over the Networks

On termination of the contract, the PIA shall get 3 months' time period to make over the network to APBIL or its appointed agency.

Table: Timelines to handover the network

Sr.	Milestones	Timeline
1	Network handover completion of 25% GPs and Blocks (Locations)	T*+4 weeks
2	Network handover completion of 50% GPs and Blocks (Locations)	T + 6 weeks
3	Network handover completion of 75% GPs and Blocks (Locations)	T + 9 weeks
4	Network handover completion of 100% GPs and Blocks (Locations)	T + 3 months

*T is the date of the notice issued by APBIL.

19.7.2 Existing Infrastructure:

Site of the Existing Network shall include an inventory of existing network infrastructure across Blocks, Gram Panchayats (GPs) and Villages along with laid OFC infrastructure. The indicative information is described in Table A.1 & Table A.2

Table A.1: Asset Summary – Package

State	No of Blocks	Total GPs (Connected on OFC)	Total OFC laid (Kms)	Block Routers installed (Nos.)	GP Routers installed (Nos.)

Table A.2: Block / Gram Panchayat (GP) count under Package

State	No of Blocks	GPs already created		GPs for Upgradation	GPs To be Connected	Total GPs to be connected in Ring Topology
		Phase 1	Phase 2			

19.7.3 GP End Equipment:

- The Network shall be made over Block wise with the GPs. The details of the equipment i.e. Routers, SFPs, UPS/SMPS cards, Rack, Battery, Mini OLT, Solar Panel, Earthing, FDMS etc will be provided.

- b. The status of the equipment as per NMS shall be noted and made over.
 - c. The physical status of equipment and battery OCV with replacement date shall be mentioned in the HOTO memo.
- 19.7.4 Block End Equipment:
 - a. The Routers along with configuration, cards and Ring diagram shall be made over by the PIA.
 - b. The details of the equipment i.e. Routers, SFPs, UPS/ SMPS cards, Rack, Battery, FDMS etc will be provided.
 - c. The status of the equipment as per NMS shall be noted and made over.
 - d. The physical status of equipment and battery OCV with replacement date shall be mentioned the HOTO memo.
- 19.7.5 OFC Network
 - a. The complete ABD/L-14 diagram mentioning the routes shall be signed by the PIA, IE and APBIL or its appointed agency.
 - b. Any section which is temporarily restored shall be clearly mentioned in the HOTO memo.
- 19.7.6 S-NOC:

The complete inventory and Status of Active Infrastructure, EMS, Passive Infrastructure along with the OEMs details, Licenses, MAFs, agreements with OEMs, Spares etc shall be made over.
- 19.7.7 All the network diagrams of Active infrastructure, passwords, keys shall be made over.
- 19.7.8 The Source code of the applications for which there is no support shall be arranged by the PIA and handed over to APBIL.
- 19.8 Transfer of Assets:**
 - 19.8.1 The PIA shall hand over all documents, manuals, SOPs to APBIL without any cost to APBIL.
 - 19.8.2 The PIA shall handover the relevant documentation/ information about existing infrastructure handed over to him (of BharatNet phase I and II) specified in the handover/ takeover section of this RFP
 - 19.8.3 In case of contract being terminated by APBIL, APBIL reserves the right to ask PIA to continue running the project operations for a period of 3 months after termination orders are issued. The other liquidated damages and SLA would be applicable during this period.
 - 19.8.4 Upon service of a notice following provisions shall apply:
 - a. Payment to the outgoing PIA shall be made to the tune of last set of completed services /deliverables, subject to SLA requirements.
 - b. The outgoing PIA will pass on to APBIL and/or its nominated agency, the subsisting rights of any products on terms not less favourable to APBIL/ its nominated agency, than that enjoyed by the outgoing PIA.

19.9 Cooperation and Provision of Information

During the exit management period:

- 19.9.1 The PIA will allow APBIL access to information reasonably required to define the then current mode of operation associated with the provision of the services to enable APBIL to assess the existing services being delivered.
- 19.9.2 Promptly on reasonable request by APBIL, the PIA shall provide access to, and copies of all information held or controlled by them which they have prepared or maintained in accordance with this contract relating to any material aspect of the services. APBIL shall be entitled to copy of all such information. Such information shall include details pertaining to the services rendered and other performance data. The PIA shall permit APBIL or its nominated agencies to have reasonable access to its employees and facilities as reasonably required to understand the methods of delivery of the services employed by the PIA and to assist appropriate knowledge transfer.
- 19.9.3 There should be a proper handing over/taking over of outgoing and incoming PIA. The fibre parameters should be at least as good as or better condition (optical power is in the range -8 dBm to -25 dBm at GP location) than these were at the time of taking over the sections by outgoing maintenance team.
- 19.9.4 On completion of the contract, the OTDR measurement shall be carried out on all spare fibres to ascertain the condition of cable, which should be same or better than the condition of the cable taken over by the contract at the beginning of the contract period. In case there is an increase in the number of fibre events at the time of handling over vis-à-vis the number of events at the time of taking over, the cost of rectification will be deducted from the final bill of the outgoing team, the security amount held may also be forfeited. Besides this, OFC route drawings handed over to the PIA at the time of award of work shall be updated fully and submitted to APBIL, both in Hard and Soft copy as given by APBIL incorporating the various changes occurred during the contract period.
- 19.9.5 PIA is liable to provide the details of the equipment i.e., Router, UPS, Battery (with replacement Date), Solar Panel, Rack, Enclosure, Earthing, etc at the GP end
- 19.9.6 PIA is liable to handover the Block equipment along with make model, configuration, cards and Ring/PON diagram
- 19.9.7 The PIA shall return or destroy any data or copies thereof that were provided or generated during the access period. APBIL may request written confirmation of such actions.

19.10 Confidential Information, Security and Data

The PIA will promptly on the commencement of the exit management period supply to APBIL the following:

- 19.10.1 Information relating to the current services rendered and purchased and performance data relating to the performance of Sub-PIAs in relation to the services;
- 19.10.2 Documentation relating to Project's Intellectual Property Rights.
- 19.10.3 Documentation relating to sub-PIAs (if any);
- 19.10.4 All current and updated data as is reasonably required for purposes of APBIL or its nominated agencies transitioning the services to its replacement Bidder in a readily available format nominated by the APBIL.

19.10.5 All other information (including but not limited to documents, records and contracts) relating to the services reasonably necessary to enable APBIL or its nominated agencies, or its replacement Bidder to carry out due diligence in order to transition the provision of the services to APBIL or its nominated agencies, or its replacement Bidder (as the case may be).

19.10.6 Before the expiry of the exit management period, PIA shall deliver to the APBIL all new or up-dated materials from the categories set out in Schedule above and shall not retain any copies thereof, except that the PIA shall be permitted to retain one copy of such materials for archival purposes only.

19.11 Transfer of Certain Contracts

On request by APBIL the PIA shall effect such assignments, transfers, licenses and sub-licenses as APBIL may require the same in the name of APBIL or its nominated agency in relation to any equipment lease, maintenance or service provision contract between PIA and third party licensor, vendors, and which are related to the services and reasonably necessary for the carrying out of replacement services by APBIL or its replacement Bidder.

19.12 Rights of Access to Premises

19.12.1 At any time during the exit management period, where Assets are located at the PIA's premises, the PIA will be obliged to give reasonable rights of access to (or, in the case of Assets located on a third party's premises, procure reasonable rights of access to) APBIL and/or any replacement Bidder in order to make an inventory of the Assets.

19.12.2 PIA shall also give APBIL or any of its nominated agency or any replacement Bidder right of reasonable access to the PIA's premises and shall procure APBIL or any of its nominated agency and any replacement Bidder rights of access to relevant third party premises during the exit management period and for such period of time following termination or expiry of the Contract as is reasonably necessary to migrate the services to APBIL, or a replacement Bidder.

19.13.1 General Obligations of the PIA

19.13.2 The PIA shall provide all such information as may reasonably be necessary to effect as seamless a handover as practicable in the circumstances to APBIL or its replacement Bidder and which the PIA has in its possession or control at any time during the exit management period.

19.13.3 For the purposes of this schedule, anything in the possession or control of any PIA, associated entity is deemed to be in the possession or control of the PIA.

19.13.4 The PIA shall commit adequate resources to comply with its obligations under this clause.

Package – B: APSFL PHASE-I NETWORK

1. Project Background

APSFL was incorporated under the Companies Act 2013 in October 2015 to undertake the implementation, operation, and maintenance of the AP Fiber Grid and related business activities. It is a fully owned Government of Andhra Pradesh entity under the Infrastructure & Investment (I&I) Department, with its corporate office at 2nd floor, INFOSIGHT building, NH-16 Service road, Tadepalle, Andhra Pradesh.

APSFL's objective is to provide affordable, high-quality digital and broadband services to households, government departments and enterprises, promoting digital inclusiveness and deepening Internet penetration across rural and urban areas of the State.

To achieve this, APSFL has established a scalable broadband infrastructure capable of delivering 15–50 Mbps for households and 100 Mbps to 1 Gbps for institutions and enterprises, supporting the vision of Digital Andhra Pradesh.

The AP Fiber Grid consists of a high-speed optical fiber network covering all 26 districts, with a 24-core OFC network deployed along approximately 24,500 km of electrical poles and terminating at electrical substations functioning as Points of Presence (PoPs). The Network Operations Centre (NOC) located at Andhra University Campus, Visakhapatnam, manages and monitors the entire network.

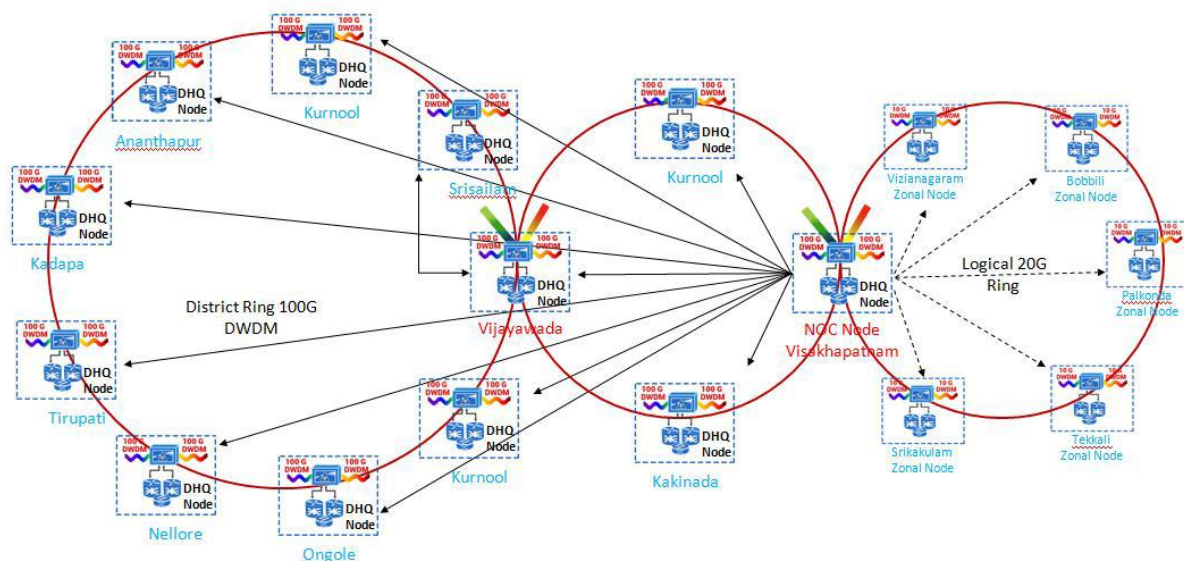
APSFL's network follows a Next Generation Network (NGN) architecture designed to support FTTH access requirements, enabling seamless transport and integration of broadband, voice and video services across the State.

1.1 Network overview

APSFL network has been divided physically into different areas from the aggregation viewpoint:

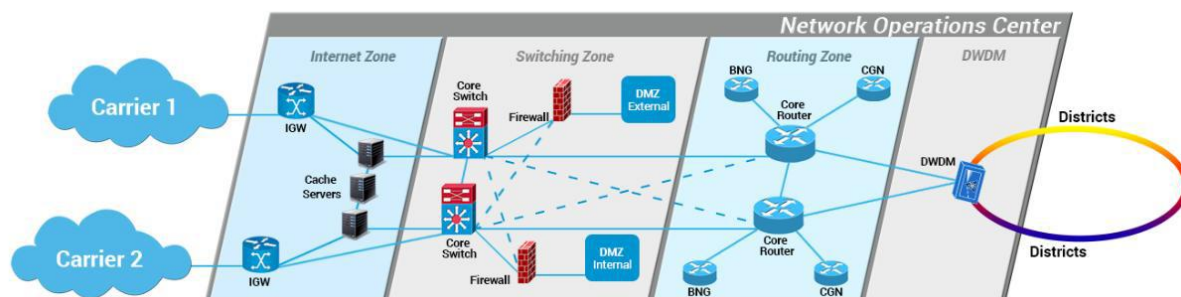
- i. NOC – Data Centre, IPTV Head End, IMS Switch, Internet Gateways, Media Gateway, Caching Servers, BNG, CGNAT, AAA, BSS, OSS, DDI, IPDR, LI, Core Switch etc.
- ii. District Head Quarter (DHQ)- IP-MPLS District Nodes & District DWDM Nodes
- iii. Zonal Hub (ZHQ) – Zonal IP-MPLS Node & Zonal DWDM Nodes
- iv. Mandal – Mandal IP MPLS Node & GPON OLT
- v. Sub-station Location – GPON OLT

Following diagrams depict the hierarchy of the various rings and components in the APSFL Network.



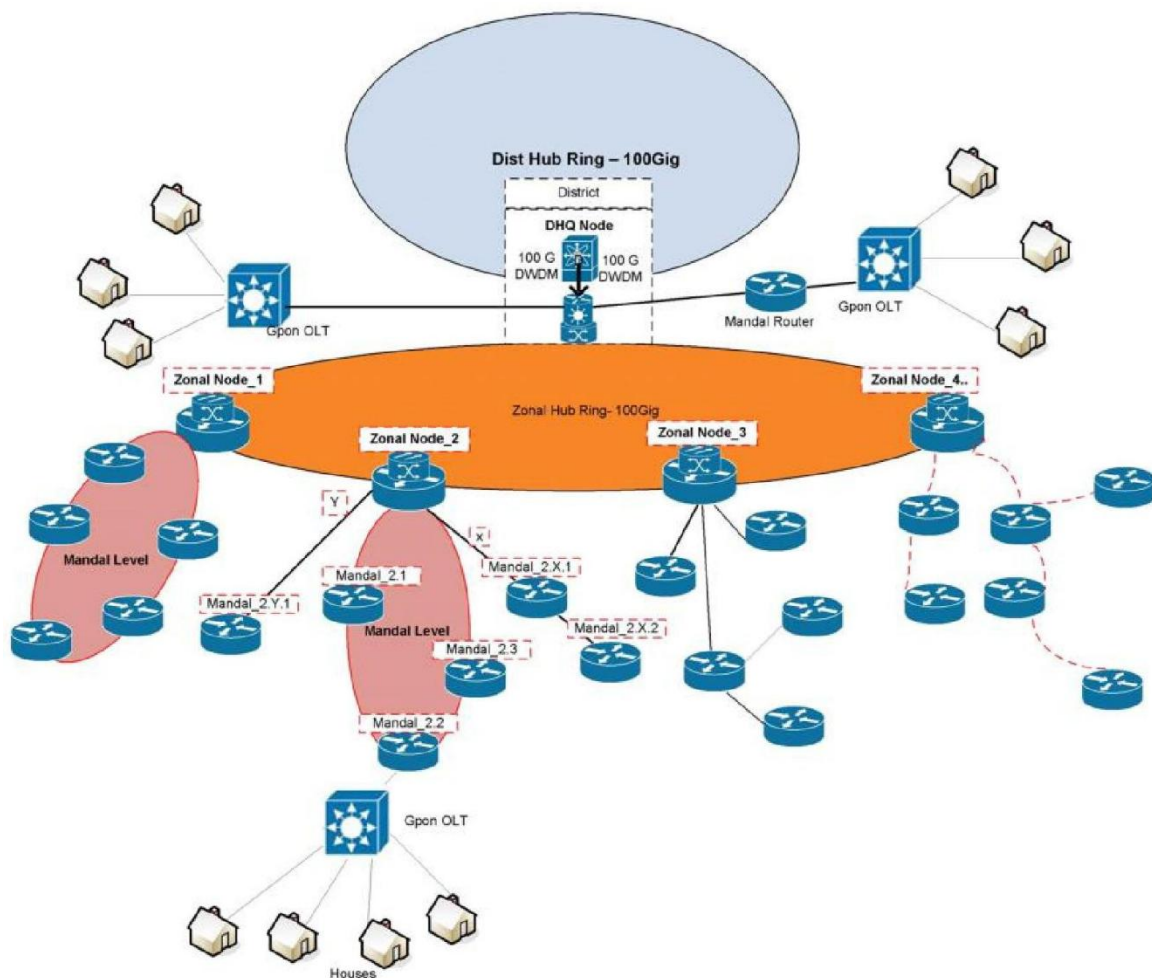
All District Head Quarters (DHQ) are connected to the NOC using the DWDM Nodes. The DWDM at the NOC allows 100G dedicated bandwidth at each district. The NOC DWDM is also provisioned as the District DWDM (DHQ) for Vizianagaram, Srikakulam and Visakhapatnam districts.

Network Operations Centre is the crucial component in the overall network architecture. This is catering to various functional requirements for end-to-end service enablement and monitoring. Below diagram depicts a logical design of NOC for AP Fiber Grid project. The BNG, Core Router, Caching Servers, Internet Gateway and CGNAT routers are placed in the NOC. The NOC Core Router also acts as DHQ for its respective district. High availability and redundancy are provided by the placement of two Core Switches, BNGs, Caching servers, CGNATs and Internet Routers.

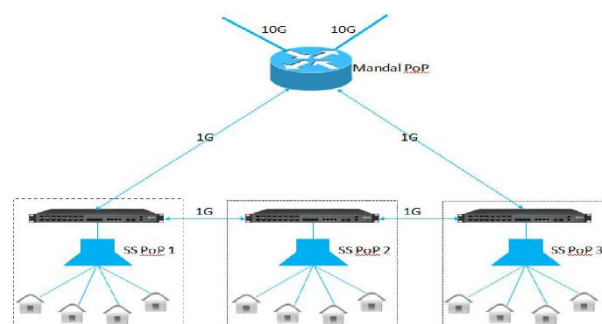


District Head Quarters (DHQ) acts as the Core Node for all the subrings within that district. It consists of one Core Router and a DWDM node. The Network comprised of erstwhile 11 districts in the form of ring architecture for reliability and traffic routing. Every Point to Points links from DHQ to NOC associated at Visakhapatnam is 100G and between the DHQs is 20G.

Zonal node (AGG – Aggregation node) functions as the second layer of aggregation within the overall NGN framework. The Zonal Node comprehends a Zonal Router and a Zonal DWDM which is connected to respective DHQ IP/MPLS nodes.

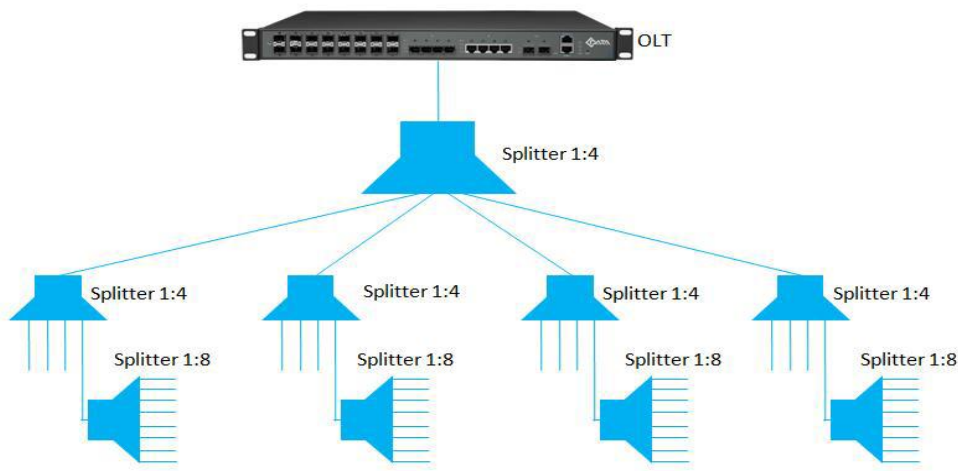


Mandal (Pre-AGG) Node functions as a pre-aggregation node within the overall NGN architecture. The Mandal ring is connected to the Zonal Hub. The number of Mandal rings connected to the hub is five in number. Each Mandal ring constitutes of 11 Nodes. Mandal is the FTTx services insertion point. Each Mandal Node uplink capacity is about 10G.



Substation OLT (Access) Node functions as the Access Edge Node. The last mile subscribers are connected to the access node through Gigabit Passive Optical Network (GPON) interface using the Customer Premise Equipment (CPEs) located at the customer premises. These substation OLTs are

connected to the Mandal Nodes to bring the customers on to the network. Each OLT is provided with 1G of bandwidth and can serve up to 1000 subscribers.



IPTV Head End

APSFL's IPTV Head End is based on Mediakind and WISI IPTV Platform. IPTV service delivery in APSFL network is done using IP Multicast. For the seamless delivery of the IPTV service, a dedicated pipe is used to carry all the IPTV channels till the edge router, thus reducing all the latencies and zap times. The content is always available at the Edge Routers located at the Mandals.

Telecom Switch

APSFL's Telecom Switch is based on ZTE / Huawei IMS Platform. In APSFL Network, IMS core is deployed in the NOC, and the end users are registered with the IMS Core using the SIP registration facilities available in the ONT through GPON network. The outgoing and incoming traffic to/from other PLMN/PSTN is handled through ZTE Media Gateway which uses the Point of Interconnect with the other operators to handle the calls.

Servers & Storage

1. AAA Servers
2. NMS & EMS Servers
3. Middleware Servers
4. Cache Servers
5. SAN Storage
6. DDI
7. IPDR
8. Lawful Interception
9. Load balancers
10. VOD Servers
11. Database Servers

OSS/BSS

The following functionalities outline the OSS and BSS system implemented in APSFL Network. These functionalities are considered by keeping in mind the advanced design of the AP Fiber grid and

functionalities of the consumers as well as service providers as envisioned in the AP Fiber grid project. These functionalities include features required for system SLAs and operational SLAs.

Components of OSS / BSS

S. No.	Components	Operations
1.	CRM	<ul style="list-style-type: none"> • Customer Management • Order Management (Capture, Validation, Submission, Order Orchestration, Fulfilment and Closure) • Integration with MRAS • Trouble tickets – Case Management
2.	Billing	<ul style="list-style-type: none"> • Data Mediation • Invoicing • Partner Management • Payments • Payment Gateway
3.	Service Assistance	<ul style="list-style-type: none"> • Provisioning • Network Inventory • Activation and Service • IP Number Management
4.	Web-Self care	<ul style="list-style-type: none"> • Web Self Care
5.	MIS, Reporting and Analytics System	<ul style="list-style-type: none"> • Operational Reports, Analytics, Reconciliation, Auditing
6.	Contact Centre	<ul style="list-style-type: none"> • Contact Centre Operations

OSS/BSS Applications and Software

OSS/BSS Software consists of applications with broad functional capabilities proposed to be supplied and integrated under this project are as given below:

1. CRM (Customer Management, Order Entry)
2. Billing (Order Management, Rating)
3. Payment Gateway
4. Service Assurance
5. Web Self Care
6. MIS, Reporting and Analytics System (MRAS)
7. Database management and archives
8. Contact Centre

All proposed applications modules shall operate from the same Database cluster.

2. Scope of the Work

APBIL seeks to onboard a qualified Project Implementation Agency (PIA) for the operations & maintenance of deployed APSFL Phase-I Network in full compliance with the defined SLA parameters for a period of 10 years.

The scope of work of the PIA is summarized as below:

a. **Operation and Maintenance:**

- i. To operate and maintain the existing APSFL Phase-I network infrastructure (Passive, Active and NOC) along with the infrastructure deployed for connectivity to enterprise institutions as per the defined SLAs.
- ii. The PIA shall coordinate with concerned stakeholders like, but not limited to, Local Authorities, IE/ TPA, APBIL/ APSFL, etc. to ensure uninterrupted site access, timely RoW approvals, and submission of all statutory documentation. Robust stakeholder management practices must be adopted to minimize delays and ensure compliance.
- iii. The PIA shall update all project-related information in the Mobile App, GIS platform, and Project Monitoring Tool with a Dashboard and reports in real time. Data must be accurate, geo-tagged, and aligned with APBIL reporting standards.
- iv. The PIA shall undertake aerial OFC installation (if applicable) adhering to approved engineering standards and safety protocols. All installed sections must be tested, integrated, and certified for operational readiness.
- v. The PIA shall install and commission incremental OLTs (if applicable) during the maintenance phase as directed by APBIL. All installations must follow prescribed technical configurations and certification procedures.
- vi. The PIA shall maintain a centralized/ District-wise warehouse (as specified by APBIL post the award of tender) with systematic inventory control, tracking, and reconciliation processes. Stock levels must be monitored to ensure material availability and eliminate operational downtime.
- vii. The PIA shall submit all field data, test reports, and certificates in formats mandated by APBIL. All documentation must be complete, timely, and audit-ready.
- viii. The PIA shall perform routine and corrective maintenance of OSS/BSS/EMS systems to ensure continuous network performance. Change management processes must be followed for all system updates and configuration changes.
- ix. All the field rectification team vehicles should be equipped with latest GPS technology which helps in the real time automatic vehicle location and tracking through maps or specialised software for both the APBIL and PIA team.
- x. The PIA shall procure incremental OFC and accessories, where required, in line with approved specifications and quality standards. Materials must be inspected, certified, and recorded before deployment in the field. Prior information has to be submitted to the concerned authorities before deployment.
- xi. The PIA shall maintain and support the network connectivity established from the OPGW tapping points till the fiber path and associated infrastructure created for APSFL

operations. The PIA shall work in close coordination with the APTRANSCO/ any other agency team for fault restoration, preventive activities and any EB-related operational requirements to ensure uninterrupted service availability.

- xii. "The PIA shall be responsible for supporting all future OPGW-based connectivity requirements as defined by APBIL. This includes undertaking the necessary activities to establish and operationalize connectivity from designated OPGW tapping points to the required APSFL network elements. The PIA shall coordinate with APTRANSCO and other relevant agencies to provision, extend and enable OPGW-derived paths at any new locations specified by APBIL, ensuring seamless integration with the existing network architecture."

- b. **Network Monitoring and Service Provisioning:** To provide comprehensive network monitoring and service provisioning to enable retail, enterprise and wholesale services as per the requirement of APBIL across the Contract Period.

The scope of work for the Project Implementation Agency (PIA) shall cover across Andhra Pradesh as per the details provided in Clause 5 of this section. It is to be noted that number of Point of Presence (PoPs), equipment and other details listed is indicative, and PIA shall undertake the identified scope of work across all PoPs post survey and approved by APBIL. Arriving at accurate bid values is the responsibility of the bidder by taking into consideration of existing infrastructure/ BoM including connectivity, site conditions etc.

The PIA shall also be responsible for the Operations and Maintenance, Integration, testing, commissioning of any additional enhancements, upgrades or augmentations undertaken by APBIL/ APSFL during the contract period. All such enhancements shall, by default and without the need for any further amendment, be deemed to fall within the existing scope of the PIA's O&M obligations to ensure uninterrupted service delivery and full adherence to all applicable Service Level Agreement (SLA) parameters.

Notwithstanding anything to the contrary, all such enhancements shall be serviced and maintained strictly under the existing contractually agreed O&M cost structure, and no additional financial consideration shall be payable by APBIL.

While introducing any new product, new service the authority shall arrange the required CAPEX and material. The PIA shall integrate, test and commission the new product/ services to the existing network along with the governance team of authority at no additional cost to APBIL.

3. HANDING OVER THE EXISTING NETWORK TO SELECTED PIA BY APSFL

3.1 Handover/ Takeover (HOTO) of the existing APSFL Phase-I network

APSFL shall hand over its existing network to selected PIA by its own/ through its existing O&M agencies, within a maximum time period as per below table (Table B) from the agreement signed date, in "as-is-where-is basis condition".

3.2 Table B transition Schedule

S. No.	Milestones	Timeline
1	Existing network handover completion of 20% of the network**	T*+1 month
2	Existing network handover completion of 40% of the network**	T + 2 months
3	Existing network handover completion of 60% of the network**	T + 3 months
4	Existing network handover completion of 80% of the network**	T + 4 months
5	Existing network handover completion of 100% of the network**	T + 5 months

*T is appointed date i.e. date of signing of agreement between selected PIA and APBIL.

**Network includes passive infrastructure and active infrastructure.

Note:

- **Existing APSFL Phase-I network:** The existing APSFL network shall be handed over to the selected PIA in “as-is-where-is basis condition” by APSFL, in accordance with the timelines specified in Table B.
- APSFL will short close any existing O&M tenders after the successful handover to the existing network.

3.3 NOC/DHQ/Zonal/OLA/Mandal/ Sub-Station/ PoP equipment

All the infrastructure deployed under APSFL Phase-I network along with other associated infrastructure including make, model, configuration, cards and diagram shall be hand over by APSFL/ existing PIA to the selected PIA. The selected PIA shall be responsible for maintenance of the same.

3.4 OFC network

The OFC network corresponding to the PoPs shall be handed over to the new PIA on “as-is-where-is basis condition” by APSFL. The selected PIA, if required, can mention its observations in the HOTO memo (HOTO memo format shall be shared with the successful bidder).

4. Operation and Maintenance (O&M)

PIA shall undertake the responsibility for Operations & Maintenance (O&M) of the existing APSFL Phase-I network. All expenditure required to perform O&M of the existing network shall be the responsibility of the selected PIA after HOTO.

The O&M of the network shall be carried out as per the Key Performance Indicators (KPIs) provided. The PIA shall be required to commence O&M for newly connected PoPs if any as instructed by APBIL immediately after the date of commissioning and from the date of handover in case of existing APSFL Phase-I network.

- a. The PIA shall be solely responsible for ensuring network uptime and performance along with providing comprehensive support during the entire contract period for the network created/ upgraded till village level.
- b. This shall also include the establishment of governance framework, and escalation procedures & matrix for network and customer support service on 365 x 24 x 7 basis.
- c. As part of the maintenance, PIA shall be required to maintain the upkeep of the medium of connectivity, restoration of services, any other maintenance job required to meet the redundancy and KPIs.
- d. All services and future enhancements shall comply with the applicable security policies and guidelines issued by DoT, TRAI, the Government of India, and other relevant regulatory authorities. The PIA shall ensure continuous adherence to these standards throughout the project lifecycle.
- e. PIA shall prepare and maintain asset records in a Inventory Management Tool listing the assets at site locations required for performing the O&M and the same shall be shared with APBIL every quarter.
- f. PIA has to ensure availability of the infrastructure (both physical and IT) including OFC, OFC accessories, routers, power, cooling, CCTV, Access Control, Racks, Firewall, storage, etc and other peripheral equipment installed and available in NOC.
- g. The PIA shall keep the required spares for meeting the SLA defined in the RFP.
- h. The PIA shall be responsible and bear costs for replenishment and upgrade of all active and passive infrastructure including all ancillaries required for smooth executions and operations & maintenance of project across the contract period.
- i. KPIs shall be monitored (after 5 months from taking over) and reported by the PIA to APBIL on daily / monthly / quarterly basis, as required. Based on the performance of the network in the prior quarter, the penalty shall be computed as per the clause 7 mentioned in this RFP and shall be payable by the PIA.
- j. In case of any defect, deficiency or deterioration in the project poses a hazard to safety or risk of damage to property, the PIA shall promptly take all reasonable measures for eliminating or minimising such danger.
- k. PIA may deploy a dedicated fault resolution team at the Mandal level or at any suitable place for effectively management of network.
- l. The PIA shall insure all the equipment at NOC, DHQ, Zonal, OLA, Mandal/ Sub-station and PoPs for theft, damages due to fire, flood, earthquake, storm etc for the entire project duration.
- m. Periodic Maintenance
 - The periodic maintenance of the network shall be done based on the schedule agreed with APBIL.
 - The corrective maintenance of the network shall also to be done for ensuring the network availability/ uptimes as per the KPIs.

- n. For APSFL Phase-I network, the cost of electronic equipment which are not covered under warranty, shall be assessed by the PIA.
- o. The PIA shall also be responsible for the Operations and Maintenance of any additional enhancements, upgrades or augmentations undertaken by APBIL/ APSFL during the contract period. All such enhancements shall, by default and without the need for any further amendment, be deemed to fall within the existing scope of the PIA's O&M obligations to ensure uninterrupted service delivery and full adherence to all applicable Service Level Agreement (SLA) parameters.
- p. Notwithstanding anything to the contrary, all such enhancements shall be serviced and maintained strictly under the existing contractually agreed O&M cost structure, and no additional financial consideration shall be payable by APBIL.
- q. During the period of the Operations & Maintenance (O&M), in the event of any hardware failure or malfunction, the PIA shall be responsible for restoring the equipment to full functionality. The PIA must strictly adhere to OEM guidelines, applicable SLAs, established ticketing procedures, O&M management software protocols, security patching requirements, and trusted-source policies. All rectification activities shall comply with prevailing industry standards and best practices.
- r. PIA shall be responsible for providing all necessary reports as per APBIL requirements, as well as any future audit requirements mandated by regulatory bodies, throughout the contract period.
- s. The PIA shall review the existing network architecture and configurations. Based on the assessment, the PIA shall develop detailed SOPs for network operations, maintenance, and incident handling. All SOPs shall align with industry best practices and be submitted for approval.
- t. The PIA shall strictly comply with the existing/ industrial IT Security Policy and all associated standards, guidelines, and controls. The PIA shall ensure that all personnel, systems, and processes engaged in the project adhere to the prescribed security requirements. Any deviation, breach, or risk identified shall be reported immediately, along with corrective actions to ensure continued compliance.
- u. The PIA shall be responsible for providing, configuring, and maintaining all required applications, including mobile apps, system tools, and related software components. The PIA shall ensure continuous availability, timely updates, and adherence to all security and compliance requirements. The PIA shall support enhancements, integrations, and future technology needs as they arise during the project lifecycle. All such activities shall be performed in accordance with agreed SLAs and the established change-management process.
- v. PIA shall ensure to collect Power bills of both the infrastructures and coordinate with the concerned authorities for timely payments and also do the necessary liaisoning with the respective discoms wherever necessary.
- w. PIA shall submit the information of healthy fiber spares details to APBIL as and when required during the contract period.
- x. PIA shall ensure that theft cases by default would be considered as "Selected PIA responsibility". However, certain cases, based on circumstances & certain locations, Authority may agree to qualify as "beyond the control of PIA". Damages due to any accident / mishap shall be considered as "beyond the control of PIA". However, PIA shall ensure there is adequate insurance provided for all the project assets/ equipment.

- y. Selected PIA is responsible for taking “Line clearance” from respective Discoms wherever required for restoration/ implementation activities.
- z. The selected PIA (Project Implementation Agency) shall be responsible for the operation and maintenance (O&M) of the entire network infrastructure throughout the contract period. While the Annual Maintenance Contract (AMC) support for the network infrastructure will be facilitated by APBIL/APSFL, it shall be the responsibility of the PIA to proactively coordinate, engage, and ensure timely provisioning of AMC services in alignment with APBIL/APSFL.

The scope of work for the Operations Phase can be categorized into following categories as described below.

4.1 Network Audit

Bidder shall do a complete network audit. A detailed network infrastructure report shall be prepared and submitted to APBIL within 60 days of signing of contract. The Network infrastructure report should primarily consist of following

- 1. Geotagged network route map with details of joints, splices etc
- 2. NOC & PoP equipment asset report with geotagging
- 3. Health status report for OFC & PoP equipment
- 4. Complete ASSET must be captured in an inventory tool and submitted to the competent authority. This tool shall be utilized throughout the O&M services to update the ASSETS on regular intervals.

4.2 Infrastructure Services

Following services shall be provided by the selected PIA under the basic infrastructure services:

- 1. Ensure availability of the infrastructure (both physical and IT) including OFC, OFC accessories, Power, Cooling, CCTV, Access Control, Racks, Firewall, Storage and other peripheral equipment installed.
- 2. ~~Providing Operational and maintenance for respective OEMs and vendors, as finalised by APBIL, repair and replacement of defective components (physical and IT infrastructure)~~

The bidder shall provide Operations and Maintenance (O&M) services through the respective OEMs and authorized vendors approved by APBIL. This includes repair and replacement of defective components for both physical and IT infrastructure..

- 3. The selected PIA shall carry out maintenance of the OFC cabling or maintenance work requiring civil work. The selected PIA shall ensure the distance between two enclosures is not less than 250 meters and the maximum 3 numbers of joint enclosures shall be installed per kilometre.
- 4. Any component (Physical & IT installed at the time of handover) that is reported to be faulty / non-functional on a given date should be either fully repaired or replaced by APSFL or existing PIA.
- 5. Proactive monitoring of the entire infrastructure installed.
- 6. The selected PIA shall maintain records of the maintenance of the infrastructure and shall maintain a log that may be inspected by APBIL at any time.

7. The selected PIA shall provide photographs with geo-tag along with OFC repair/restoration report.
8. The selected PIA has to maintain a minimum of 2% of the non-redundant equipment as spare and 2% of the available 24F ADSS OFC per district.

4.3 Network Monitoring Services

The activities shall include:

1. The selected PIA shall provide services for the management of NOC environment to maintain performance at optimum levels on a 24 x 7 basis.
2. The selected PIA shall monitor and administer the network from the NOC.
3. The selected PIA shall carry out maintenance of the OFC cabling or maintenance work requiring civil work.
4. The selected PIA should provide dashboard for review of current status of the project by management of APBIL.
5. GPS tracking and MIS report generation should be integrated into the dashboard.

4.4 Backend Services

The selected bidder is required to maintain and support all the Backend Services implemented at the NOC. The backend services include:

1. OSS/BSS management
2. IPTV management
3. HSI management
4. IP Telephony management
5. Implementation of policies and standards etc.

Other services such as maintenance of caching/peering services, VoD etc.

4.5 Change Management

1. Tracking the changes in field infrastructure, NOC hard/soft configurations, changes to applications, changes to policies, applying of upgrades/updates/patches, etc.
2. Pre-approval for any change request shall be jointly signed off before executing the change.
3. Bidder has to submit plan for changes to be made - draw up a task list, decide on responsibilities, coordinate with all the affected parties, establish and maintain communication between parties to identify and mitigate risks, manage the schedule, execute the change, ensure and manage the port change tests and documentation.
4. The selected PIA shall provide photographs with geo-tag along with repair/restoration report.

4.6 Installation and Configuration support of Application Infrastructure

The selected PIA shall provide installation and configuration support for the application infrastructure in the NOCs. The activities shall include:

1. The selected PIA shall be responsible for the maintenance/commissioning of the storage, network & security components and related basic infrastructure at the NOC.
2. The selected PIA shall carry out the planning and layout design for the placement of additional equipment if any in the NOC. The plan and layout design should be developed in a manner to optimally and efficiently use the resources and facilities already provisioned at the NOC.
3. The plan and design documents thus developed shall be submitted to APBIL for approval and the acceptance would be obtained prior to the commencement of installation/maintenance.

All the additional devices that will be installed in the NOC as part of the physical infrastructure should be SNMP enabled and shall be centrally and remotely monitored and managed on a 24x7x365 basis.

The physical infrastructure management and maintenance services shall include:

1. Proactive and reactive maintenance, repair and replacement of defective OFC and related accessories.
2. The selected bidder shall have to stock and provide adequate onsite and offsite spare parts and spare component to ensure that the uptime commitment as per SLA is met.
3. A component that is reported to be down on a given date should be either fully repaired or replaced by a temporary substitute (or equivalent configuration) within the time frame indicated in the Service Level Agreement (SLA). In case the selected bidder fails to meet the above standards of maintenance, there will be a penalty as specified in the SLA.
4. The selected bidder shall also maintain records of all maintenance of the system and shall maintain a log that may be inspected by the APBIL at any time.

4.7 Application Related Services

Application related services shall complete the entire spectrum of services to be provided by the selected PIA. As part of these services, the selected PIA shall provide support for bug fixes, enhancements, operational support, and assistance at NOC. Any additional new application support or change request shall be charged extra as per mutually agreed terms & conditions. These services have been classified under the following three categories depending upon the extent of application support that may be required:

1. Application Monitoring
2. Application Management

Application Monitoring

The application hosted at the NOC will require management in the functionalities.

1. Monitor the applications on a day-to-day basis to ensure that the application functions reliably.
2. Monitor applications to ensure that the application does not suspend, hang etc.
3. Monitor components, including but not limited to, Application servers, Web Servers, Middleware and other application servers on an on-going basis to ensure smooth functioning of the applications.

4. Develop expertise in the application to have the ability to troubleshoot problems, monitor erratic behaviour through the application logs. Further, the selected PIA shall coordinate with application vendor for resolution of application related issues.
5. Coordinate with the application vendor to manage patch upgrades as and when required with minimal downtime. Ensure configuration management and backups of the patch to rollback in case of problems.

Application Management

The Bidder has to ensure availability of OSS/BSS team to maintain as per list mentioned below to maintain application and features as per mutually agreed.

List of OSS/BSS team:

1. Project Manager - 1
2. Test Engineer - 1
3. Database Administrator – 1
4. Software Developers – 4

Bidder also should maintain software team for O&M of applications such as EMS, NMS.

4.8 MIS Reports

The selected PIA shall submit the reports on a regular basis in a mutually decided format. The selected PIA has to provide ticket management system. The following is only an indicative list of MIS reports that may be submitted to the State:

1. Daily reports
 1. Summary of issues/complaints logged at the Help Desk
 2. Summary of resolved unresolved and escalated issues/complaints
 3. Summary of resolved unresolved and escalated issues/complaints to vendors.
 4. Log of backup and restoration undertaken.
2. Weekly Reports
 1. Issues / Complaints Analysis report
 2. Summary of issues/complaints logged with the OEMs.
 3. Inventory of spare parts.
 4. Summary of changes undertaken in the network for all major and minor changes.
3. Monthly reports
 1. Component wise physical as well as infrastructure availability and resource utilization
 2. Consolidated SLA / (non)-conformance report.
 3. Summary of component-wise uptime report.
 4. Summary of changes in the network.
 5. Log of preventive / scheduled maintenance undertaken
 6. Log of break-fix maintenance undertaken
4. Quarterly Reports

1. Consolidated component-wise infrastructure availability and resource utilization.
5. Bidder has to generate and ensure submission of regulatory reports as per the requirements of government agencies.
6. Any other reports as required by APBIL management from time to time within scope of project.

4.9 Preventive Maintenance Services

The selected PIA shall provide preventive maintenance plan for all the equipment for which maintenance services are to be provided by OEM & the selected PIA. Selected PIA has to submit the reports based on mutually agreed plan to APBIL along with SLA reports for payment clearance.

The preventive maintenance shall at least include -

1. Cleaning and removal of dust and dirt from the interior and exterior of the equipment.
2. Conduct inspection (check for loose contacts in the cable and connections etc.), testing, satisfactory execution of diagnostics and necessary repairing of equipment.
3. Selected PIA shall intimate and take approval from APBIL before carrying out preventive maintenance activity.
4. Maintenance of circuit breakers, distribution boxes, etc. shall be carried out quarterly basis.
5. Measurement of earthing's resistance shall be documented in a register on monthly basis.
6. Preventive maintenance of doors, floor spring, partitions shall be carried out quarterly and evidence shall be documented

4.10 Corrective Maintenance Services

The details of the work to be undertaken by selected PIA are as follows:

1. Troubleshooting of problems related to the OFC/equipment/network/services and rectification of the same.
2. Repairing of defective parts/components.
3. Replacement of parts/components beyond repair with parts/components of same or better specifications ensuring compatibility.
4. The Optical fiber cable installed for maintenance or incremental should not have more than 3 splice joints per two kilometres.
5. Providing suitable standby for parts/components with same or better specifications till the time the original part/component is repaired or replaced so that daily business is not affected.
6. The Maintenance support for equipment shall include all passive components including, screws, clamp, fasteners, ties anchors, supports, ground strips, wires, fiber connecting kits, gears, spares, power-cables, Network cables etc.
7. Maintenance support services pertaining to Cabling and OFC shall include:
 - i. Splicing, repairing & testing of OFC.
 - ii. Re-fixing/shifting of cables/OFC whenever switches and racks are shifted or otherwise.

- iii. Removing and laying of UTP cable and I/Os with casing, etc in case renovation activity is undertaken in any building covered under the project.
- iv. Documentation of problems, isolation, cause and rectification procedures for building a knowledge base for the known problems.

4.11 Restoration/ Relocation of APSFL network and enterprise connectivity

APSFL network:

- i. The selected PIA must survey and submit (TPA/ IE certified) damaged portion of Passive and Active elements in APSFL network.
- ii. The report shall contain the quantities of material required for restoration of the damaged portion and the cost for the same shall be considered as per the discovered price in the tender (no installation/ laying/ commissioning cost shall be paid).
- iii. Post approval, PIA shall carry the restoration/ relocation works and submit the invoices.
- iv. The restoration/ relocation activity is one time activity; post it has to be the part of Operation and Maintenance phase.

Enterprise connectivity:

- i. The selected PIA must survey and submit (TPA/ IE certified) damaged portion of Passive and Active elements in Enterprise connectivity.
- ii. The report shall contain the quantities of material required for restoration of the damaged portion and the cost for the same shall be considered as per the discovered price in the tender (no installation/ laying/ commissioning cost shall be paid).
- iii. Post approval, PIA shall carry the restoration/ relocation works and submit the invoices.
- iv. The restoration/ relocation activity is one time activity; post it has to be the part of Operation and Maintenance phase.

4.12 Establishing new APSFL PoP or Enterprise connectivity

APSFL network:

- i. The selected PIA must carry out the feasibility check and submit (TPA/ IE certified) for establishing a new PoP in APSFL network.
- ii. The report shall contain the quantities of material required for restoration of the damaged portion and the cost for the same shall be considered as per the discovered price in the tender (no installation/ laying/ commissioning cost shall be paid).
- iii. Post approval, PIA shall carry the establishment of new PoP and submit the invoices
- iv. The establishment activity is one time activity; post it has to be the part of Operation and Maintenance phase.

Enterprise connectivity:

- i. The selected PIA must carry out the feasibility check and submit (TPA/ IE certified) for establishing a new connection.

- ii. The report shall contain the quantities of material required for restoration of the damaged portion and the cost for the same shall be considered as per the discovered price in the tender (no installation/ laying/ commissioning cost shall be paid).
- iii. Post approval, PIA shall carry the connecting new enterprise institutions submit the invoices.
- iv. The establishment activity is one time activity; post it has to be the part of Operation and Maintenance phase.

4.13 Last Mile Enterprise Connectivity

APSFL's broader vision is to digitally empower the State by building a statewide fiber-based network accessible to both citizens and Government entities. The network is designed to support e-governance, remote service delivery, and seamless inter-departmental communication. APSFL aims to create digital infrastructure as a national asset, enabling secure and high-quality connectivity to Government organizations across rural and remote areas

- i. The selected PIA shall carry out the operation & maintenance of last-mile enterprise optical fiber connectivity for approximately 31,000 connections covering over 31,000 kilometres of fiber (12F/6F/2F) connections across the State of Andhra Pradesh. These connections were provided across various Health Department offices and institutions, as well as other Government establishments including departments, schools, Gram Panchayats, hospitals, SD-WAN links and similar entities.
- ii. The selected PIA shall also carry out the commissioning works (wherever required) and enable the delivery of APBIL services, including high-speed broadband, dedicated leased lines, dark fiber leasing, telecom services, and other value-added services.
- iii. The selected PIA shall be responsible for the complete upkeep and management of the last-mile connectivity infrastructure, including both passive and active components, deployed from the existing Points of Presence (PoPs) and any new PoPs that are to be connected on APBIL/ APSFL requirement.
- iv. The selected PIA shall also be responsible for providing temporary connectivity for Government-led events, as per the instructions received from APBIL/ APSFL. Such temporary connections shall be provided without fail, with the PIA ensuring timely deployment, uninterrupted service, and full operational readiness for the duration of the event.
- v. The selected Bidder shall be fully responsible for end-to-end execution of last mile fiber connectivity works including survey, design, planning, procurement, supply of materials, aerial OFC deployment, termination infrastructure, splicing, testing, commissioning, integration with APSFL NOC, documentation, and comprehensive maintenance for a period of ten (10) years.
- vi. The Bidder shall provide all materials, equipment, accessories, consumables, manpower, safety gear, tools and testing instruments required for successful completion of the work. No additional items shall be payable unless specifically approved in writing by APBIL.
- vii. All assets created under this section shall be the property of APSFL on behalf of the Government of Andhra Pradesh

4.13.1 Commissioning Phase

- i. The scope of work shall comprise survey, supply of fiber including all the accessories, live line installation and commissioning of 12F, 6F and 2F optical fiber cable (considering the

no. of connections to be extended via this route) on the existing power distribution poles. The fiber has to be terminated at the Customer Premise Equipment (CPE) location within the offices. The CPE will be provided by APBIL/ APSFL while installation & commissioning of the CPE shall be responsibility of the selected bidder.

- ii. The Bidder shall supply suitable Optical Fiber Drop Cables of 12F, 6F and 2F optical fiber cable configurations as required for last mile connectivity.
- iii. The cable shall be suitable for aerial installation and shall be UV resistant, weatherproof and compliant with relevant industry standards. The cable shall be capable of withstanding environmental conditions prevalent in rural and urban Andhra Pradesh including heat, humidity, wind load and rain.
- iv. All fiber cables supplied shall be new, unused and from approved manufacturers meeting technical specifications prescribed in the RFP.

Activities in chronological order	Description
Field/Route Survey	<ul style="list-style-type: none"> • After allocation of the offices by APBIL, the service provider has to carry out the route /field survey and submit the feasibility report and route map of fiber for approval/clearance from APBIL to commence the work. • The vendor shall deploy 12F, 6F and 2F optical fiber cable optical fiber based on the distance and no. of connections factoring future requirements within that location. • The Bidder shall conduct a detailed field survey for each Government Institution identified by APBIL. The survey shall determine the optimal route from the nearest APSFL PoP /BharatNet GP to the target Government Institution. • The survey shall include capturing of GPS coordinates (latitude and longitude) along the proposed OFC route, identification of existing electrical poles, requirement of new poles (if any), identification of joint locations, power availability at customer premises, and assessment of route feasibility. • The Bidder shall prepare detailed survey reports in prescribed format including KMZ/KML files, GIS route maps, route length calculations, joint indicators, pole mapping and risk assessment. The survey data shall be integrated with the proposed As-Built drawing. • The final connectivity plan must be approved by APBIL prior to commencement of execution. APBIL reserves the right to modify the route plan considering scalability, redundancy or policy requirements.
Fiber Implementation	<ul style="list-style-type: none"> • Supply, delivery to site, unloading, storing, and handling of 12F, 6F and 2F optical fiber cable Optical Fiber cable along with fittings and associated items including but not limited to splitters, termination boxes, patch chords, pole accessories, etc. necessary to provide FTTH. The network shall be in line with international standards.

Activities in chronological order	Description
	<ul style="list-style-type: none"> • Live line installation and commissioning 12F, 6F and 2F optical fiber cable optical fiber cable on the existing power distribution poles from the nearest AP Aerial Fiber PoP to Government Offices/Institutions/Private Enterprises. A fiber loop of 2 to 3 meters shall be available every 200 meter.

4.13.2 Maintenance Phase

Maintenance of the commissioned last-mile network shall be carried out by the selected PIA in accordance with the defined Service Level Agreements (SLAs) for the entire duration of the contract. For newly created or newly deployed connections, SLA-based maintenance shall commence from the respective date of commissioning.

4.13.3 Periodical Maintenance

- The selected PIA shall carry out periodic maintenance of last mile connectivity commissioned and shall submit a report on the same every three months. This report shall include details of all preventive maintenance activities undertaken by the bidder to ensure 99% uptime of commissioned connections.
- The default ownership of all enterprise services' disruption tickets shall be with the selected bidder (PIA). The selected PIA should ensure resolution as per SLA for issues falling within its scope. If issues reported are out of scope, the selected PIA shall promptly report that same to APBIL call centre and get the ticket reassigned to concerned party immediately. The agency shall also ensure necessary coordination with other stakeholders in order to ensure an expeditious resolution.

4.13.4 Rapid Response Teams

- Considering urgent connectivity requirements from State and Central Government departments, the Bidder shall establish dedicated Rapid Response Teams at State and regional levels.
- These teams shall be equipped with pre-stocked materials, tools and manpower to execute urgent connectivity or restoration works within short timelines as directed by APBIL.
- The Rapid Response Teams shall operate on a 24x7 basis and coordinate directly with APBIL/ APSFL NOC and district authorities.

4.13.5 Compliance and Safety

- The Bidder shall strictly adhere to Environmental, Health and Safety (EHS) standards. The Bidder shall not dump cable drums or waste materials in public places. All work sites shall be restored to original condition.
- Any penalties imposed by authorities due to negligence of the Bidder shall be borne by the Bidder.

4.13.6 Supply and Installation of ONT/ any other equipment

- The Optical Network Terminal (ONT)/ any other equipment required for providing connectivity at Government Institutions shall be supplied by APBIL/APSFL based on the requirement of the respective Government Institution.
- The selected Bidder shall collect the required ONTs from the designated warehouse/location of APBIL/APSFL as communicated from time to time. The Bidder shall be responsible for safe transportation, handling, storage (if required), installation, configuration, integration, testing and successful commissioning of the ONT at the Government Institution premises.

The Bidder shall ensure:

- Proper mounting of ONT/ any other equipment inside rack or wall as applicable
- Power connectivity with proper MCB protection
- Fiber termination and patching
- LAN connectivity to switch/router
- Configuration as per APSFL NOC provisioning guidelines
- Labelling and documentation

The Bidder shall coordinate with APSFL NOC for provisioning and activation of services.

Any damage, loss or mishandling of ONT after collection from APBIL/APSFL and until successful commissioning shall be the responsibility of the Bidder. The Bidder shall maintain proper inventory records and submit acknowledgment of installation against each ONT collected.

Successful commissioning shall be considered complete only after:

- Integration with APSFL NOC
- Service activation
- Acceptance confirmation by APBIL/APSFL

4.13.7 Penalties and Payment Schedule

Commissioning phase SLAs

The selected PIA shall connect the offices/establishments as per the requirement of APBIL/ APSFL.

The Penalty for delay in delivery schedule (calculated on monthly basis):

Connections per month	Penalty
>95% of connections in a month completed within 3 days of allocation	No Penalty
<=95% ->85% of connections in a month completed within 3 days of allocation	INR 500 per connection for the difference

Connections per month	Penalty
<=85% – >75% of connections in a month completed within 3 days of allocation	INR 750 per connection for the difference
< 75% of connections in a month completed within 3 days of allocation	INR 1,000 per connection for the difference

Maintenance Phase SLAs

These SLAs shall be effective immediately after commissioning of a CPE, and will be calculated per District on a monthly basis as per SLA parameters given below:

Specification of Severity Levels and Penalties for tickets raised during business hours (0900 hrs to 2100 hrs)

For the purpose of these calculations a connection failure shall be defined as a CPE being unable to connect to the internet due to last mile fiber cut.

1. In case of route failure due to cable cut/damage when the services are disrupted /not available for a period up to 3 business hours, the fault(s) shall be treated as Severity Level 1. In such cases, if fault is restored within 3 hours there shall be no penalty.
2. In case the fault restoration time extends beyond 3 business hours up to 6 business hours, the fault shall be treated a Severity Level 2.
3. In case the fault restoration time extends beyond 6 and upto 8 business hours, the fault shall be treated as Severity Level 3.
4. In case the fault restoration time extends beyond 8 and upto 24 business hours, the fault shall be treated as Severity Level 4.
5. In case the fault restoration time extends beyond 24 business hours, the fault shall be treated as Severity Level 5.
6. In case there is/are additional fault(s) on the route which are yet to be repaired, the already existing severity level shall be maintained, and the severity shall be further raised depending upon the total restoration time of all faults leading to a CPE failure since downtime of the service is concurrent
7. Partial restoration of fault resulting in deteriorated functioning of the system shall not be treated as a repaired fault under any circumstances and the down time till the proper restoration of fault shall be counted in full.
8. The penalty for each of these Levels shall be applicable as tabulated below:

Security Level	TT (Turnaround Time) Resolution Time	Penalty
Level 1	Up to 3 business hours	Nil
Level 2	3 to 6 business hours	INR 500 per TT (Turnaround Time)
Level 3	6 to 8 business hours	INR 1,000 per TT

Security Level	TT (Turnaround Time) Resolution Time	Penalty
Level 4	8 to 24 business hours	INR 2,000 per TT
Level 5	Beyond 24 hours	INR 5,000 per TT If there are more than 5 such TTs in any given month due to a lapse on the agency's part APBIL reserves the right to cancel the awarded contract to that agency.

9. A TT will be considered closed only after confirmation from the customer.
10. It will be the agency's responsibility to reassign a trouble ticket to APBIL/APSFL (NOC/POP engineer) upon incidence of the ticket on its name. So long as a ticket remains on the agency's name the duration of that open trouble ticket will be counted towards SLA penalty calculation for the agency.
11. In addition to the severity levels mentioned above, following penalties will also be applicable towards notional lapses in the agency's preventive maintenance schedule:

Description	Penalty
Up to 3 disruptions per connection per month	No Penalty
4 – 10 disruptions per connection per month	INR 250 per disruption
11 – 20 disruptions per connection per month	INR 500 per disruption
>21 disruptions per connection per month	INR 100 per disruption

Only disruptions due to last mile fiber cut will be counted towards penalty calculation

Note: Planned Outages shall not be treated as part of downtime for SLA penalty calculations. The agency shall give 1-week prior notice in case of any such planned outages. The time for such outages shall be normally during non-peak hours unless otherwise decided mutually.

4.13.8 Payment Schedule

CAPEX Payment (if any)

- The selected PIA may raise invoice upon successful completion of Government Institution connectivity.
- Connectivity shall be considered complete (commissioning) only after:
 - Link is active and visible in APSFL NOC
 - Successful Acceptance Testing
 - Submission of ABD and GIS updates

- Commissioning certificate
- Customer signed Service Delivery Form
- **70% CAPEX payment** shall be released after certification and approval by APBIL. Remaining 30% CAPEX payment shall be released after Defect liability period of 3 months from date of commissioning.

OPEX Payment

- O&M payments for the last mile are as per the Payment Terms of APSFL Phase-I network duly consideration of the applicable SLAs and penalties mentioned in the RFP.

Payment Terms

- The successful bidder shall be entitled to raise invoices (along with all supporting documents), as per below stated milestones. APBIL shall release payments against all valid invoices, subject however to satisfactory acceptance of the deliverables as per the scope of work.
- The selected Bidder shall submit invoices for CAPEX and OPEX separately. All invoices shall be subject to verification and certification by APBIL before release of payment.
- Payment shall be released within 45 days from the date of submission of complete and approved invoice along with required supporting documents.
- The Bidder shall submit invoices with detailed break-up of quantities executed service delivery forms duly signed by the concerned Government Institution, Acceptance Test Certificate (ATC), As-Built Drawings (ABD), and applicable statutory tax details.
- Rates quoted by the Bidder shall remain firm and fixed for the entire contract period, and no escalation shall be permitted under any circumstances.
- APBIL reserves the right to issue additional or modified scope of work as required. Work executed beyond the defined scope shall be undertaken only upon written approval and mutually agreed rates

Note:

- a. All payments shall be released after certification of delivery, installation and acceptance tests per the Deliverables.
- b. All payments shall be made in Indian rupees only (INR).
- c. Payment shall be released against the invoices raised by PIA on providing all relevant documents timely, including acceptance testing report duly signed and approved by APBIL / APBIL authorized agency / or its nominated representative and are complete in all respect and subsequent approval.
- d. Payment shall be subject to deductions of any amount for which the supplier is liable under the RFP conditions. Further, all payments shall be made subject to deduction of applicable taxes and other Government levies like TDS (Tax Deduction at Source) and etc., as per the current Income-Tax Act.
- e. All payments shall be released only after deducting all SLA Penalties as applicable.

Payments shall be processed subject to submission of

- Original Tax invoice
- Signed delivery challan (if applicable)
- Acceptance report from the govt. institute representative & Technology operations team of APSFL (jointly signed report)

- Bank Guarantee (if applicable)

4.14 Contact Support Service

The operation support service will serve as a single point of contact for all incidents and service requests at the NOC. The service will provide a Point of Contacts (POC) and escalation/closure of incidents.

The activities shall include:

- a. Deployment of adequate personnel (30) on shift basis for 24*7 monitoring and reporting incidents/ issues/ problems with the Network infrastructure defined in the scope of RFP. The call center must be integrated with APSFL network. The call center and the ticketing tool which is to be delivered by PIA must take care of the following activities:
 - a. Residential customers
 - b. Enterprise customers
 - c. LCO/ MSO operators
 - d. Grievance cell
- b. PIA shall use existing ticketing system for call logging in line with the severity levels as per the SLAs. The Help desk shall log user calls related to network infrastructure and assign an incident/ ticket number. Severity shall be assigned to each call as per the SLAs.
- c. Escalate the calls, to the appropriate levels, if necessary, as per the escalation matrix agreed between the PIA and APBIL. The escalation matrix shall be developed by the PIA in discussion with the APBIL/APSFL.
- d. PIA shall coordinate for the closure of calls/Tickets.
- e. PIA shall submit all the reports/ logs on timely basis.
- f. PIA shall provide a dashboard to APBIL/ APSFL.

The Call Centre will receive the inbound and make outbound calls. Call centre will directly receive calls and process them. The Call Centre will make outbound calls for recovery and other purposes enumerated below. The scope of functions and coverage of APSFL's services by the Call Centre is discussed below.

The successful bidder shall also ensure to undertake the following but not limited to:

Key Programs:

- i. Call Centre should offer services broadly in the following three categories to all stakeholders of APBIL/APSFL
 - a) Effective query response services (Technical and General queries)
 - b) Basic APSFL services and transactions
 - c) Service requests and complaints
- ii. Collect feedback from stake holders as and when needed and mandated by department
- iii. Maintenance of database and software for real time display of all the services provided by the Call Centre

- iv. IVR Implementation as per extant regulations & standards
- v. Automated call centre system for capturing and storing the CDRs using systems like CRM and other software.
- vi. Automated timely reports without manual intervention for decision making.
- vii. Call quality audits shall be implemented with necessary reports to concerned stake holder with adherence to extant regulatory guidelines.
- viii. Abundant calls shall be monitored and maintained as per extant regulations & standards
- ix. Automated complaint monitoring with Turn Around Time (TAT) shall be incorporated in call centre system for monitoring and adherence as per guidelines.
- x. Call Average Handling Time and Voice of Customer shall be monitored and corrective measures to ensure industry standards shall be taken accordingly.
- xi. Response time to subscriber shall be maintained as per TRAI guidelines.
- xii. Attrition shall be maintained and monitored.
- xiii. Activation leads shall be monitored and ensure conversions
- xiv. Quality of manpower at call centre as per guidelines prescribed by APBIL/APSFL
- xv. Upselling the subscriber for higher plans based on the usage pattern and Age on Network (AON)
- xvi. Separate priority queues shall be maintained based on the IVR for priority customers such as Enterprise Customers and APSFL Business Partners/Operators etc.

4.14.1 Key Stakeholders

- i. End Customers – Household and Enterprise customers
- ii. Multi Systems Operators (MSOs)
- iii. Local Cable Operators (LCOs)
- iv. APBIL/APSFL Department personnel
- v. State Government / its department/agencies
- vi. Service Providers/Distributors such as ISPs, VAS / OTT Service Providers etc.

4.14.2 Channels

- i. Incoming voice, Outgoing Voice, Email, Chat on APSFL Portal, Social Media and other channels as required by the authority in future

4.14.3 Nature of Calls

- i. Support for all stake holders from Technical and Commercial / Business point of view
- ii. Addressing technical and general queries regarding services provided by APBIL/APSFL
- iii. Seeking feedback from all stake holders from time to time.
- iv. Handling Complaints / Requests/ Suggestions from Stakeholders / Customers.
- v. Outgoing calls to follow-up on the closure of the trouble tickets and new connection requests with respective stakeholders.

- vi. Payment follow-up shall be done through call center

4.14.4 Service Window

- i. The Call Centre will operate in two or three shifts (of 8 hours each) from 7 am to 00:00 am or for 24 hours, as decided by APBIL/APSFL on all seven days in a week.

4.14.5 Language to be supported

Telugu, English & Hindi

4.14.6 Capacity Served

- i. Approximately 5000 calls (on average) per day on total existing subscriber base of 4 Lakhs.
- ii. Scalability as per increase in subscriber base of APSFL. APSFL aims to reach 1 Crore subscriber base by March 2030.

4.14.7 Knowledge Base

- i. Creation of knowledge base on frequently asked questions to assist in resolving basic issues.
- ii. Should maintain call recording for a period of three to six months for analysis
Hardware/Software/Technologies to be implemented.
- iii. Hardware/Software/Technologies to be implemented

APBIL/APSFL shall provide toll free number for call center and access to customer's required information through APSFL CRM/BSS.

- i. The Bidder needs to provide Computer Telephony Interface (CTI) to integrate APSFL Systems (prevalent & future) with Call Centre & IVR applications using the industry standard interfaces for automatic pop-up of customer profile/ 360-degree view on every inbound call alert on Call Centre application.
- ii. The vendors selected will be required to design the IVR tree structure in consultation and with the approval of APSFL. APSFL may suggest changes and customization in IVR tree structure from time to time, which the vendor will be required to execute within the time as mutually discussed by both parties. All necessary script messages for IVR to be approved by APSFL. The integration of the PBX/IP PBX system with the IVR system shall be the responsibility of the Bidder. IVRS is to be operational 24 hours 365/366 days.
- iii. Call Manager System (CMS)
- iv. Dialler & Call logger (Inbound & Outbound)
- v. Procuring of necessary Primary Rate Interface (PRI) lines/SIP Trunks for inbound calls, in the name of APSFL will be the responsibility of the Bidder. Bidder has to ensure the Uptime of these Primary Rate Interface lines with the Telecom Service Provider (TSP). Payment and Maintenance of the Primary Rate Interface lines/SIP Trunks shall be the responsibility of the bidder. However, reimbursement of the cost incurred for procuring PRI lines and for the periodic bills of said PRI lines/SIP Trunks will be done by A[BIL on submission of Invoice along with the necessary documents
- vi. Software provided by bidder should have intelligent call routing capabilities supporting multi location contact center operations. Modules should be capable of Intelligent inbound routing based on multi-site, skills, time, service levels or business rule based.

- vii. Software provided by bidder should have Instant Call back feature – Module should be capable of making an outbound call when customer places request for call back through APBIL/APSFL website, Mobile App, SMS or by giving a missed call
- viii. Software provided by bidder should have capability to make bulk personalized outbound calls for informing the customers about new package or collecting customer feedback at regular intervals etc
- ix. Reporting Systems
- x. All technologies/software implemented shall be standard products and should allow for smooth integration with Business Support System (BSS) and Customer Relationship Management (CRM) system of APBIL/APSFL.

4.14.8 Call Centre Infrastructure

- i. The bidder shall operate the Call Centre using the existing APSFL Call Centre infrastructure, and utilize the facilities already provisioned by APSFL at the designated location in Andhra Pradesh.
- ii. The bidder must manage and run operations using the current APSFL setup, ensuring uninterrupted functioning through proper use of APSFL's existing power backup, UPS systems, network facilities, IT security, servers, and communication equipment.

4.14.9 People

- i. The bidder shall deploy and manage all required manpower, ensuring every seat is always manned and equipped with necessary skills, including escalation-desk resources, using their HR systems only with APBIL/APSFL's approval.
- ii. APSFL retains full supervisory rights, including deputing staff, conducting audits, reviewing recordings, barging live calls, and monitoring MIS for performance oversight.

4.14.10 Call Center Agents

- i. Should deploy enough resources to maintain the SLAs designed as per extant regulations & standards and start with a minimum of 30-seater facility operational during the service window mentioned above
- ii. Bidder should deploy adequate number of Call Center Representatives in each shift which should be sufficient to handle call flow from APBIL/APSFL's customers.
- iii. Necessary standby resources shall be planned in addition to minimum resources.
- iv. Should increase the resources if the call volumes go up and to meet the SLAs.

4.14.11 Call center Manpower

The minimum manpower to be deployed as per the following

Designation	Minimum Qualification	Required Experience	Team Size (Agent's)
Agent	Intermediate	Fresher/any experience	22
Team Leader (TL)	Graduation	18 months as executive /6 months experience as TL	3

Designation	Minimum Qualification	Required Experience	Team Size (Agent's)
Assistant Manager (AM)	Graduation	2 years as TL/6 months as AM and having total experience of 4/5 years in relevant field	1
Manager	Graduation	2 years as AM /6 months as manager and having total experience of 6/7 years in relevant field	1
Trainer	Graduation	12 months as executive /6 months experience as Trainer	1
Quality Assurance (QA)	Graduation	12 months as executive /6 months experience as a QA	2

- i. If the behaviour of any resource of the Bidder is not up to the satisfaction of the APBIL/APSFL or any such staff misbehaves with any customer/s of the APBIL/APSFL during the performance of given assignment, the Bidder will immediately, on the advice of the APBIL/APSFL remove such resource without expressing any objection to the APBIL/APSFL in any manner

4.14.12 Training

The Bidder, in consultation with the APBIL/APSFL shall provide training to all the resources on the systems and procedures laid down by the APBIL/APSFL as appearing in this document but not limited to the provisions herein.

The training will cover the following:

- i. The bidder shall provide comprehensive training covering APBIL/APSFL call-centre processes, products and services, behavioural expectations, information security, systems and procedures, with initial detailed induction, continuous updates for new products/campaigns, a mutually decided training plan, a trainer-training program conducted jointly with APSFL, and a fully equipped training room with required accessories and 25 systems.
- ii. The bidder shall make available adequate faculty for all call-centre process trainings, while APBIL/APSFL will support initial training for up to two months by providing its trainers and necessary documentation

4.14.13 Quality Management

The Bidder will deploy exclusive quality management team which will continuously audit the calls and procedures of operations and management of the Call Centre. This team will also suggest systems to improve the ratings against SLA parameters. The Bidder will present information about its internal audit and quality assurance practices in all areas of operations, including human resources in periodical review meetings.

APBIL/APSFL's authorised resources will inspect the procedures, reviews of Call Centre Representatives, etc., based on "Quality Score" discussed in this document.

- i. APBIL/APSFL's will conduct any mystery calling / Barging in process, onsite & offsite, to ensure service quality management.
- ii. APBIL/APSFL's will review the performance of the Call Centre services on the basis of MIS and call recordings as received

4.14.14 Management Information System - Report Requirement

Bidder shall install necessary software and will be available for the Bidder to use the same for real time monitoring and generating reports on operation of Call Centre. The Bidder must have a system of recording all the calls for a period of 3 months. Bidder should provide the recordings as and when called for by APBIL/APSFL. The bidder shall provide access to APBIL/APSFL personnel for real time monitoring of operations and voice recordings.

Few sample reports are as below. These are only indicative.

- i. Calls offered
- ii. Calls answered
- iii. Service level %
- iv. Short calls
- v. Abounded %
- vi. AHT
- vii. Repeat %
- viii. Call quality monthly report
- ix. Customer satisfaction report
- x. Number of incoming calls handled
- xi. Call recordings.

5. APSFL – Phase 1 - ASSET SUMMARY

The summary of APSFL Phase-I infrastructure to be covered under O&M is as follows:

5.1 Annexure - Master List of Assets (Passive infrastructure)

S. No	Category	Description	UoM	Indicative Quantity
1.	Optical Fiber Cable & Installation	24F Optical Fiber ADSS Cable as per specification - wind speed 100 Km/hour	Kms	22,500
2.		24F Optical Fiber ADSS Cable as per specification - wind speed 150 Km/hour	Kms	2,000
3.		Joint Enclosure & Splicing	Nos.	12,000
4.		Universal Pole Accessories	Nos.	3,75,000
5.	District Level PoP (DHQ)	Fiber Distribution Management System	Nos.	12
6.		Civil, electrical and furnishing works required for in PoP (New PoPs or Relocation of existing PoP)	Sq ft	12,000
7.		3 Phase Electricity Wiring per PoP	Connection	12
8.		Earthing measures at each PoP as per standard practices	Connection	12
9.	Zonal Hub Level PoPs (ZHQ)	Fiber Distribution Management System	Nos.	49
10.		3 Phase Electricity Wiring per PoP	Connection	49
11.		Earthing measures at each PoP as per standard practices	Connection	49
12.	Mandal Level PoPs	Fiber Distribution Management System	Nos.	605
13.		3 Phase Electricity Wiring per PoP	Connection	605
14.		Earthing measures at each PoP as per standard practices	Connection	605
15.	Sub-Station Level PoPs	Fiber Distribution Management System	Nos.	1,784
16.		3 Phase Electricity Wiring per PoP	Connection	1,784
17.		Earthing measures at each PoP as per standard practices	Connection	1,784

Note: All the above quantities are indicative and not limited to the values specified. The PIA shall factor in such variations while preparing the bid, as the scope of work is not limited to the quantities specified herein.

5.2 Annexure - Master List of Assets (Active infrastructure)

Sl. No.	Location of the Asset	Make/OEM	Description/model number	Device Type	Total Quantity
1.	NoC – Hardware	CISCO	NCS2006 DWDM (15454_M6) ROADM	DWDM	3
2.	NoC – Hardware	CISCO	ASA 5585-X	Fire Wall	4
3.	NoC – Hardware	CISCO	ASR 9010	Router	2
4.	NoC – Hardware	CISCO	ASR 9910	BNG - Router	2
5.	NoC – Hardware	CISCO	ASR1002-HX	IGW -Router	2
6.	NoC – Hardware	CISCO	ASR-920-12CZ-A	Router (Mandal)	1
7.	NoC – Hardware	CISCO	ASR9K 9006	OLD BNG - Router	2
8.	NoC – Hardware	CISCO	C9200L-24T-4X-E	TOR Switches	16
9.	NoC – Hardware	CISCO	Firepower 9300	CGNAT - Router	2
10.	NoC – Hardware	CISCO	NCS - 55A2	Router	2
11.	NoC – Hardware	CISCO	NCS - 57C3	Router	3
12.	NoC – Hardware	CISCO	NexusC9508	Core Switch	2
13.	NoC – Hardware	CISCO	WS-C2960X-24TD-L	MGMT Switches	2
14.	NoC – Hardware	CISCO	WS-C2960X-24TS-L	MGMT Switches	2
15.	NoC – Hardware	CISCO	ASR1002-X	IGW -Router	4
16.	NoC – Hardware	CISCO	ASR 903	Router	1
17.	NoC – Hardware	Dell PowerEdge	DELL EMC R740-2, DELL EMC R440-2, DELL POWER EDGE R630-10	Server	14
18.	NoC – Hardware	Cisco	CISCO HX 240C M5	Server	3
19.	NoC – Hardware	Cisco	PRIME 1 - CISCO - UCS 220C	Server	2
20.	NoC – Hardware	Tyrone	TYRONE AD400TR-28R-2	Server	2

Sl. No.	Location of the Asset	Make/OEM	Description/model number	Device Type	Total Quantity
21.	NoC – Hardware	HP Synergy blade server	Synergy 12000 frame Synergy 480 Gen10	Server	1
22.	NoC – Hardware	Huawei servers	Huawei RH2288 V2-2, Huawei H12H-05 e9000 ocean store-1	Server	3
23.	NoC – Hardware	Dell	Dell DNS efficient IP servers	Server	8
24.	NoC – Hardware	Mediakind - SD Encoder	Mediakind Controller	Equipment	10
25.	NoC – Hardware	Mediakind -HD Encoder	Mediakind Controller	Equipment	4
26.	NoC – Hardware	Cisco - Catalyst Switch	WS-C2960X-24TS-L	Equipment	2
27.	NoC – Hardware	Quintek	Active Splitters - RF splitters	Equipment	36
28.	NoC – Hardware	JAMS - Dish Antenna	12 feet mesh	Equipment	8
29.	NoC – Hardware	HP - Aruba Switch	HP-2530-48G	Equipment	1
30.	NoC – Hardware	WISI - WISI IRD	GT01W	Equipment	2
31.	NoC – Hardware	WISI - WISI MUX	GT01W	Equipment	2
32.	NoC – Hardware	Optilink IRD	80D00xx	Equipment	1
33.	NoC – Hardware	Cisco - Data Switch	C9300L-24P-4X	Equipment	3
34.	NoC – Hardware	Cisco - Chassis/Server	UCS b200 M4	Server	1
35.	NoC – Hardware	Radware - Load Balancer	Alteon 5208 (VX)	Equipment	2
36.	NoC – Hardware	Cisco - Cisco MDF Switch	MDS 9148s	Equipment	2
37.	NoC – Hardware	Cisco - Fabric Interconnect	UCS 6248UP	Equipment	1
38.	NoC – Hardware	Corpus	Middleware and DRM	Application	1
39.	NoC – Hardware	RedHat Enterprise Linux OS	Version 7.9 (Mapio)	Application	1
40.	NoC – Hardware	NetAPP SAN Storage	E5660 & EF560	Equipment	1
41.	NoC – Software	CISCO - EPNM	EPNM	Software	2
42.	NoC – Software	CISCO - ISE	ISE	Software	1

Sl. No.	Location of the Asset	Make/OEM	Description/model number	Device Type	Total Quantity
43.	NoC – Software	CISCO - PRIME	PRIME	Software	1
44.	NoC – Software	PT - Agora	PT	Software	1
45.	NoC – Software	DASAN - INOS	DASAN	Software	1
46.	NoC – Software	PT - AAA	PT	Software	1
47.	NoC – Software	DELL	DNS efficient IP servers	Application	1
48.	NoC – Software	OPEN Source - DHCP	HP	Application	1
49.	NoC – Software	Opensource - Sys log	Free version - opensource	Application	1
50.	NoC – Software	Speed Test - Application	Free version - opensource	Application	1
51.	NoC – Software	Zimbra – Mail server	Free version - opensource	Application	1
52.	NoC – Software	Green Lantern	Application - - BSS (Business support System)	Application	1
53.	NoC – Software	OS (Operating system)	Open source	Software	1
54.	NoC – Software	ESRI	ARC GIS	Software	1
55.	NoC – IMS	Fujitsu	Fujitsu Eternus Dx100 s3(ZTE IMS Disk array)	Storage	1
56.	NoC – IMS	ZTE	ZTE MGW	Server	1
57.	NoC – IMS	ZTE - Emerson	AC to DC converter	Equipment	1
58.	NoC – IMS	Huawei - IMS	E9000; 3058253; 3054675;	Server & Application	5
59.	NoC – IMS	Huawei - IMS	E9000; 3058253; 3054675;	Server & Application	5
60.	NoC – IMS	Dell	PowerEdge R740	Server	1
61.	NoC – IMS	Dell	PowerEdge R740	Server	1
62.	NoC – IMS	Huawei - NMS	E9000; 3058253; 3054675;	Server	1
63.	NoC – IMS	Huawei - NMS	E9000; 3058253; 3054675;	Server	1
64.	NoC – IMS	Vertiv - AC to DC Convertor	NETSURE 701 IC4	Equipment	1

Sl. No.	Location of the Asset	Make/OEM	Description/model number	Device Type	Total Quantity
65.	NoC – IMS	Vertiv - AC to DC Convertor	NETSURE 701 IC4	Equipment	1
66.	NoC – IMS	PertSol (IPDR & LI)	Application	Application	1
67.	NoC – IMS	ZTE	ZTE IMS software	Application	1
68.	NoC – IMS	Huawei - NMS	E9000; 3058253; 3054675;	Application	1
69.	NoC – IMS	Huawei - NMS	E9000; 3058253; 3054675;	Application	1
70.	NoC – IMS	Huawei - SMS Gateway	E9000; 3058253; 3054675;	Server & Application	1
71.	NoC – IMS	ZTE	ZTE IMS software	Application	1
72.	NoC – Infrastructure	Emerson - 10 Ton PAC	PEX 135EC	Equipment	6
73.	NoC – Infrastructure	Vertiv - 10 Ton PAC	PDX, PX033D	Equipment	5
74.	NoC – Infrastructure	Carrier 2.2 Ton	Emperia-X	Equipment	9
75.	NoC – Infrastructure	Carrier 1.5 Ton	Emperia-X	Equipment	3
76.	NoC – Infrastructure	Mitsubishi 2 Ton AC	MS-GK24VA	Equipment	4
77.	NoC – Infrastructure	Vertiv - 2 Ton AC	SRC07ET	Equipment	6
78.	NoC – Infrastructure	Emerson - 80 KVA UPS	HIPULSE EX SERIES	Equipment	3
79.	NoC – Infrastructure	Vertiv - 80 KVA UPS	Liebert EXS 80Kva	Equipment	4
80.	NoC – Infrastructure	L&T Omega - Air Circuit Breaker	UW1-08N	Equipment	1
81.	NoC – Infrastructure	Ravel - Fire Alarm	RE-120GR	Equipment	2
82.	NoC – Infrastructure	NOVAC - Fire Suppression	NOVAC 1230	Equipment	2
83.	NoC – Infrastructure	Ultrasonic	Rodent Repellent	Equipment	1
84.	NoC – Infrastructure	Maser	Rodent Repellent	Equipment	1
85.	NoC – Infrastructure	C Systems - Water Leakage	URRS-24T	Equipment	1
86.	NoC – Infrastructure	Vertex - Water Leakage	Vertex 22(2A) VFS	Equipment	1

Sl. No.	Location of the Asset	Make/OEM	Description/model number	Device Type	Total Quantity
87.	NoC – Infrastructure	SYMATRIX - Power Panel	1) 250KVAR APFC Control Panel 2) 1250Amps Main Panel & LT Panel 3) 400Amps UPS Sub Panel Source-A&B 4) Synchronization Panel for DG 5) UPS Output Parallel Panel	Equipment	1
88.	NoC – Infrastructure	TCC Energy Solutions - Transformer	11000/433V ONAN Type	Equipment	1
89.	NoC – Infrastructure	LG	Videowall for monitoring	Equipment	1
90.	NoC – Infrastructure	VALRACK	Legrand	Equipment	12
91.	Field – Hardware	CISCO	NCS2006 DWDM (15454_M6) ROADM	DWDM	65
92.	Field – Hardware	CISCO	NCS2006 DWDM (15454_M6) OLA	DWDM	31
93.	Field – Hardware	CISCO	ASR920-2Port	Router	484
94.	Field – Hardware	CISCO	ASR920-4Port	Router	728
95.	Field – Hardware	CISCO	ASR 903	Router	47
96.	Field – Hardware	CISCO	ASR 9010	Router	10
97.	Field – Hardware	CISCO	NCS - 55A2	Router	58
98.	Field – Hardware	CISCO	NCS - 57C3	Router	10
99.	Field – Hardware	DASAN	48-Port - Chassis OLT	OLT	50
100.	Field – Hardware	DASAN	32-Port - Chassis OLT	OLT	50
101.	Field – Hardware	DASAN	16-Port	OLT	100
102.	Field – Hardware	DASAN	4-Port	OLT	470
103.	Field – Hardware	DASAN	8-Port	OLT	4,133
104.	Field – Hardware	DASAN	8-Port	OLT	50
105.	Field – Hardware	PT	16-Port	OLT	20
106.	Field – Hardware	PT	32-Port	OLT	53

Sl. No.	Location of the Asset	Make/OEM	Description/model number	Device Type	Total Quantity
107.	Field – Hardware	PT	48-Port	OLT	5
108.	Field – Hardware	PT	8-Port	OLT	2,477
109.	Field – Infrastructure	ABKR, 1 KVA	UPS 1 KVA	Equipment	11
110.	Field – Infrastructure	Alpha, 1KVA	UPS1 KVA	Equipment	7
111.	Field – Infrastructure	Alpha, 3KVA	UPS 3 KVA	Equipment	7
112.	Field – Infrastructure	Emerson Vertiv	UPS 1 KVA	Equipment	1,394
113.	Field – Infrastructure	Emerson Vertiv	UPS 10 KVA	Equipment	2
114.	Field – Infrastructure	Emerson Vertiv	UPS 3 KVA	Equipment	32
115.	Field – Infrastructure	Emerson Vertiv	UPS 6 KVA	Equipment	7
116.	Field – Infrastructure	Fuji Electric	UPS 1 KVA	Equipment	1,375
117.	Field – Infrastructure	Fuji Electric	UPS 3 KVA	Equipment	45
118.	Field – Infrastructure	Fuji Electric	UPS 5 KVA	Equipment	19
119.	Field – Infrastructure	Fuji Electric	UPS6 KVA	Equipment	5
120.	Field – Infrastructure	NUMARIC	UPS1 KVA	Equipment	39
121.	Field – Infrastructure	NUMARIC	UPS10 KVA	Equipment	1
122.	Field – Infrastructure	NUMARIC	UPS3 KVA	Equipment	1
123.	Field – Infrastructure	Online UPS	UPS1 KVA	Equipment	11
124.	Field – Infrastructure	PROSTRAM	Batteries for 1KVA UPS	Equipment	1,020
125.	Field – Infrastructure	Switching AVO	UPS1 KVA	Equipment	1
126.	Field – Infrastructure	TESLA	UPS1 KVA	Equipment	4
127.	Field – Infrastructure	TESLA	UPS 30 KVA	Equipment	1
128.	Field – Infrastructure	Various OEMS of batteries	Updated	Equipment	11,188
129.	Field – Infrastructure	VALRACK	Network Rack	Equipment	2,468
130.	Field – Infrastructure	GODREJ Air Conditioner	1.5 Ton	Equipment	1

Sl. No.	Location of the Asset	Make/OEM	Description/model number	Device Type	Total Quantity
131.	Field – Infrastructure	LG Air Conditioner	1.5 Ton	Equipment	4
132.	Field – Infrastructure	LG Air Conditioner	2 Ton	Equipment	24
133.	Field – Infrastructure	LLOYD Air Conditioner	1.5 Ton	Equipment	3
134.	Field – Infrastructure	LLOYD Air Conditioner	2 Ton	Equipment	1
135.	Field – Infrastructure	Blue star Air Conditioner	2 Ton	Equipment	1
136.	Field – Infrastructure	Mitsubishi Air Conditioner	2 Ton	Equipment	10
137.	Field – Infrastructure	O General Air Conditioner	2 Ton	Equipment	2
138.	Field – Infrastructure	Samsung Air Conditioner	2 Ton	Equipment	1

Note:

- 1) Field – Hardware includes Infrastructure commissioned in District Head Quarters/Zonal/Mandal/Sub-stations.
- 2) The repeated line items in the above table indicates that the equipment is installed in one or more locations.
- 3) All the above quantities are indicative and may vary based on actual field requirements. The PIA shall factor in such variations while preparing the bid, as the scope of work is not limited to the quantities specified herein. The actual quantities may vary (either increase or decrease) from the estimated quantities specified in the BOQ, and the Bidder shall not have any claim on this account
- 4) APBIL reserves the right to descope, modify, increase, decrease, or omit any item or part thereof from the BOQ during the execution of the project, without assigning any reason. In the event the discovered rates are found to be higher than prevailing market rates or commercially unreasonable, APBIL reserves the right to reduce quantities, renegotiate rates, or remove such items from the scope. No compensation or claim shall be entertained from the Bidder on account of such changes.
- 5) In the current operational status of the network, all SFP modules installed in the respective routers and switches are functional. Any faulty or unusable SFP modules and their quantities will have to be identified by the PIA during the assessment phase. The bidder's scope also includes the replacement of non-functional modules during the tenure of the contract period. This applies to PON ports, and all other consumables at the sub-station level as well.

6. Key Personnel

The successful implementation, completion, and operation & maintenance of the services outlined in this RFP require a team of highly skilled and experienced personnel. This section details the necessary manpower resources, including required expertise and qualifications, to ensure project success and sustained network performance.

A. Mandatory requirement:

S. No.	Manpower Requirements	UoM	Qty	No. of Teams/ Personnel	Remarks
	Manpower for NOC (24*7)				
1.	Project Director	Nos		1	General shift
2.	Network Solution architect	Nos		1	General shift
3.	Digital headend and IPTV expert	Nos	1	3	1 Expert per shift for 3 Shifts
4.	Network Engineers - DWDM	Nos		3	1 Expert per shift for 3 Shifts for maintenance, monitoring and DHQ support
5.	Network Engineers - IPMPLS	Nos		6	2 Experts per shift for 3 Shifts for maintenance, monitoring and DHQ support. Each engineer will support 6 DHQs
6.	Network Engineers - GPON	Nos		6	2 Experts per shift for 3 Shifts for maintenance, monitoring and DHQ support. Each engineer will support 6 DHQs
7.	Data Base Administrator	Nos		1	General shift
8.	System Administrator	Nos		1	General shift
9.	Power & Infra – Shift engineers	Nos		3	1 per each shift
10.	GIS experts	Nos		2	1 Sr. SME and 1 Engineer: General shift
11.	BSS expert	Nos		2	1 Sr. SME and 1 Engineer: General shift

S. No.	Manpower Requirements	UoM	Qty	No. of Teams/ Personnel	Remarks
12.	OSS expert	Nos		2	1 Sr. SME and 1 Engineer: General shift
13.	Cyber Security expert	Nos		2	1 Sr. SME and 1 Engineer: General shift
14.	Regulatory expert	Nos		1	General shift
15.	MIS	Nos		2	1 Senior MIS expert and 1 Junior expert (to be deployed at APBIL/ APSFL HO): General shift

B. Illustrative requirement:

S. No.	Manpower Requirements	UoM	Qty	No. of Teams/ Personnel	Remarks
1.	Manpower for DHQ	Nos	13	39	1 N/W engineer per shift in DHQ (3 shifts)
2.	Manpower for all other Point of presences	Nos	2,438	163	1 N/W engineer per shift in SS PoP (General Shift) will be responsible to maintain 15 PoPs
Fiber Manpower					
3.	Fiber Restoration Teams including vehicle	Kms	24,000	93 (Teams)	Each Team comprising of Splicer, Assistant Splicer with spicing equipment, OTDR etc and one helper. A vehicle with driver along GPS tracking per team to maintain approx. 300 Kms of fibre as per SLA.
4.	District Network Managers	Nos	26	26	One network manager per district for both passive, active, infra and utility etc.,
Manpower for NOC (24*7)					
5.	Telecom Expert	Nos		6	2 Experts per shift for 3 Shifts
6.	HSI Expert	Nos		6	2 Experts per shift for 3 Shifts

S. No	Manpower Requirements	UoM	Qty	No. of Teams/ Personnel	Remarks
7.	UPS & Power Engineering	Nos		3	1 Experts per shift for 3 Shifts
8.	Project Managers/Leads	Nos		5	PM (General Shift)

Note:

1. The above-mentioned manpower is minimum requirement as per the APBIL/ APSFL. However, PIA has to ascertain the requirement from time to time to scaleup the manpower deployment.
2. The selected PIA must ensure to deploy, qualified electrical technicians, Security personnel, housekeeping 24*7 at APSFL NOC.
3. PIA shall ensure to deploy of support staff equipped with Laptops, Printers etc., to carry out their regular office activities.
4. The selected PIA must deploy one senior Subject Matter Expert for each technology vertical or critical area.
5. Bidder must deploy dedicated resource for this project. All proposed manpower must not be deployed other than this project.
6. CVs of the proposed team shall be submitted to APBIL. APBIL deserve the right to interview and also reject any personnel during the onboarding or during the course of the project.
7. All the critical resource team (PD, SMEs and Managers etc.,) must be deployed within 30 days from the date of sign of agreement.
8. Rest of the entire team members must be deployed in 90 days.
9. Project Director, Network architect and MIS team to be deployed at APBIL/ APSFL headquarters.
10. Moreover, adequate qualified manpower in the Network Operations Center (NOC) and field on a 24*7 shift basis to provide continuous support, proactively monitor network performance, and swiftly address any issues to maintain high network availability and uptime, ensuring full compliance with the Service Level Agreement (SLA).

7. Key Performance Indicators

The proposed solution shall populate the Network performance monitoring dashboard containing the network KPIs at administrative hierarchy to maintain the entire infrastructure created under both APSFL and BharatNet networks on Daily-Monthly-Quarterly-Yearly basis for network troubleshooting as per SLA commitment as well as for Service performance visualization to APBIL. The proposed KPIs are indicative and may vary as per the requirement of the Authority.

Sl. No.	Sr. No.	Parameter	KPI Name	UoM	Target/Threshold	Frequency
1	1	Service UP/DOWN	Service Availability (%)	%	Core $\geq 99.95\%$; Agg $\geq 99.9\%$; Access $\geq 99.5\%$ (monthly)	Hourly \rightarrow Daily \rightarrow Monthly
	2		Downtime (Minutes) per Service	minutes	Aligned to SLA (e.g., ≤ 22 min/month for 99.95%)	Daily/Monthly
	3		Mean Time Between Failures (MTBF)	hours	Higher is better (track trend QoQ)	Monthly/Quarterly
2	4	No. of Fiber cuts	Fiber Cut Count	#	Trend down QoQ	Weekly/Monthly
	5		Fiber Cut Rate (per 1,000 km / month)	cuts/1000 km/month	Metro ≤ 0.5 ; Long-haul ≤ 0.2	Monthly
	6		Third-Party Damage Ratio (%)	%	Reduce YOY	Monthly/Quarterly
3	7	MTTR	Mean Time To Repair (Hours)	hours	Core $< 2h$; Agg $< 4h$; Access $< 8-12h$	Weekly/Monthly
	8		On-Time Restoration (%)	%	$\geq 90-95\%$	Weekly/Monthly
	9		Travel vs Repair Split	%	Reduce travel share	Monthly
4	10	Lossy Fiber	Span Optical Loss (dB)	dB	SMF $\sim 0.2-0.35$ dB/km;	Continuous/Hourly

Sl. No.	Sr. No.	Parameter	KPI Name	UoM	Target/Threshold	Frequency
					connector 0.2–0.5; splice 0.05–0.1	
	11		High-Loss Events (# & Duration)	#, minutes	Threshold: design + 1 dB for >15 min	Daily/Monthly
	12		Corrected/Uncorrected FEC Ratio	ratio	Low uncorrected FEC desired	Hourly/Daily
5	13	Repetitive fiber cuts	Repeat Cut Density (per 10 km, 90 days)	cuts/10 km	Reduce to <1 per 10 km per quarter	Quarterly (rolling 90d)
	14		Time Between Cuts (Days)	days	Increase over time	Monthly/Quarterly
	15		Chronic Segment List	list	Action all items	Monthly
6	16	Ageing for Service restoration	Open Outage Ageing (Buckets)	#	>90% within SLA buckets	Daily/Weekly
	17		Average Age of Open Tickets (Hours)	hours	Trend down	Daily/Weekly
	18		Backlog Burn-Down	index/graph	Sustained decline expected	Weekly/Monthly
7	19	Quality of fiber splicing	Average Splice Loss (dB/splice)	dB	≤ 0.05–0.1 dB per splice	Per job / Monthly
	20		Splice Rework Rate (%)	%	< 2–5%	Monthly/Quarterly
	21		Post-Repair Margin Improvement (dB)	dB	>= design margin restored	Per incident / Monthly
8	22	Classified performance measures	SLA Compliance by Class (%)	%	>= 99% (premium), >= 97% (standard)	Monthly

Sl. No.	Sr. No.	Parameter	KPI Name	UoM	Target/Thresh old	Frequency
	23		Policy Class Utilization (%)	%	Keep p95 ≤ 70–80% (core)	Hourly/Daily
	24		Class-Specific Violations (#)	#	Trend down	Daily/Monthly
9	25	Real-time & troubleshooting	Mean Time to Detect (MTTD) (Minutes)	minutes	< 5–10 min	Daily/Weekly
	26		Mean Time to Acknowledge (MTTA) (Minutes)	minutes	< 5 min	Daily/Weekly
	27		Correlation Effectiveness (%)	%	≥ 85%	Monthly
	28		Alarm Noise Ratio	ratio	Trend down	Weekly/Monthly
	29		Data Freshness (Seconds)	seconds	< 60–120 sec	Hourly/Daily
10	30	Throughput & Utilization	Peak & p95 Throughput (Gbps)	Gbps	Track; keep headroom	Daily/Monthly
	31		Utilization (%)	%	Core p95 ≤ 70–80%; Access ≤ 60–70%	5-min/Hourly/Daily
	32		Congestion Minutes	minutes	Minimize; alert at >85%	Daily/Monthly
	33		Headroom (Gbps)	Gbps	> 20% of capacity	Monthly
11	34	Latency/Jitter/Loss	One-Way Latency (ms)	ms	Metro < 5–10 ms; Regional < 20–30 ms	5-min/Hourly/Daily
	35		Jitter (ms)	ms	< 5 ms (real-time class)	5-min/Hourly/Daily
	36		Packet Loss (%)	%	Premium < 0.1%; Best-effort < 0.5%	5-min/Hourly/Daily
	37		SLA Violations (Count & Duration)	#, minutes	Zero or declining trend	Daily/Monthly

Functional requirements:

Key functional requirements to enable continuous network and service performance measurement across the both networks (BharatNet and APSFL Phase-I) are as follows.

1. The entire network designing solution should have an architecture supporting ease of deployment, zero touch maintenance and seamless monitoring.
2. The entire network designing solution should support following multiservice monitoring like Education service, Anganwadi service, tele health service, government applications.
3. The entire network designing solution should support synthetic network test at both ends of a monitored path enabling testing of the path in either or both of two directions: source to target or target to source. It should provide standard network metrics: packet loss, latency, jitter, and optionally throughput—an improved form of the bandwidth metric—along with Path Visualization and path MTU.
4. The entire network designing solution should be able to monitor the individual ISP Links for all hosted applications. Solution should have the ability to automatically detect Internet outages in ISP networks to help identify the problem area of outages.
5. The entire network designing solution should support monitoring of Internet-based connectivity and Service from user / office to APBILs to NOC connectivity, the more thorough and capable path monitoring means faster trouble domain isolation, faster triage, and better escalation processes.
6. The entire network designing solution should be able to clearly visualize the Hop-by-Hop visibility of the Underlay Network at a granular level Sub-Second) for Identifying clear problematic sections on the Glass pane view.
7. The entire network designing solution should be able to perform Service Activation testing in an Automated way and provide easy downloadable reports for link handovers.
8. The proposed solution should have the Observability glass-pane which could ingest and demonstrate both network and Application SLA's on a Single glass-pane as per the requirement.
9. The service originating from end devices like routers at government offices or ONT at residence, the performance and quality measurement in terms of peak speed, total data consumption, server reachability should be monitored continuously in real-time and a dashboard for the same has to be created.
10. Latency measurement of each service from end device at customer premise should be done in real time and actions should be taken to rectify is issues seen.

8. O&M Payments

- 8.1 O&M payment will be paid after completion of every quarter, based on the SLAs during the O&M phase.
- 8.2 APBIL shall pay 75% (seventy-five per cent) of the invoice amount within forty-five days of receiving the invoice from the PIA along with necessary particulars. Remaining 25% (twenty-five per cent), payment shall be made to the PIA by APBIL after due audit / verification, within 90 days of receiving the invoice from the PIA along with supporting documents.
- 8.3 All change requests that were performed every month to be captured and major milestones or tasks or outages/ incidents occurred shall be submitted to APBIL along with Root cause analysis wherever relevant.
- 8.4 PIA shall ensure to submit all Project related credentials (including super user) to be submitted in a sealed cover to CEO APBIL every month.

Note:

1. The IE/ TPA shall scrutinize the bill against the works entrusted and accord necessary certificates stating that the work has been executed satisfactorily in accordance with terms and condition of the contract. The IE/ TPA shall verify the work done by the selected PIA with reference to measurement recorded in the measurement sheet.
2. The selected PIA must maintain the incremental OFC, NOC and PoP equipment installed during the period of maintenance (which otherwise is not covered under AMC of OEM or supplier). The O&M charges for the incremental equipment assigned by APBIL/APSFL not mentioned in the bill of material shall not exceed 10% per annum of the procurement cost exclusive of GST. The payment for the same shall be done by APBIL for the quantity/length of the material installed on the date of submission of invoice as per the terms of contract.
3. PIA should submit the Quarterly invoices along with OTDR reports of the entire network, restoration activities logs,
4. The selected PIA shall ensure to submit a copy of entire source code which is developed for this project to be submitted in a sealed cover to CEO APBIL/MD APSFL every month.

9. Deliverables

Below mentioned are the major deliverables of the PIA.

S. No.	Major Deliverables	Timeline
1.	Kick-off meeting and submission of Inception report to APBIL/ APSFL	T + 1 week
2.	Deployment of critical resource team (PD, Network solution architect, SMEs and Managers etc.,)	T + 4 weeks
3.	Deployment of ASSET management tool.	T + 4 weeks
4.	Deployment of Project Monitoring and Management tool.	T + 4 weeks
5.	Deployment of Ticketing tool.	T + 4 weeks

S. No.	Major Deliverables	Timeline
6.	Deployment of Workforce Management along with FRS with geo-fencing.	T + 4 weeks
7.	Selected PIA must review existing network architecture and submit HLD along with network architecture diagram and integration plans of unified network.	T + 8 weeks
8.	Selected PIA must submit the Integration and implementation plan for a unified network architecture.	T + 8 weeks
9.	Selected PIA must review existing IP-schemas and propose a combined IP-Schema planning for the unified network architecture.	T + 8 weeks
10.	Deployment of FRT vehicles along with latest GPS technology along with Mobile or web portal.	T + 12 weeks
11.	Selected PIA must review existing network architecture and submit LLD of unified network to APBIL/ APSFL.	T + 12 weeks
12.	Selected PIA must ensure loading of entire Inventory of unified network comprising of Active, Passive and submission to APBIL/ APSFL.	T + 12 weeks
13.	Selected PIA shall undertake the Integration and implementation of OSS and BSS of the unified network architecture.	T + 12 weeks
14.	Submission of O&M manual, SOPs for Operations and Maintenance for the unified network	T + 12 weeks
15.	Submit all Project related credentials (including super user) to be submitted in a sealed cover to CEO APBIL/MD APSFL every month.	Every month
16.	Submit a copy of entire source code which is developed for this project to be submitted in a sealed cover to CEO APBIL/MD APSFL every month.	Every month
17.	All change requests that were performed every month to be captured and major milestones or tasks or outages/ incidents occurred shall be submitted to CEO APBIL/MD APSFL along with Root cause analysis wherever relevant	Every month
18.	Selected PIA shall submit field data, test reports and prescribed certificates formats mandated by APBIL/APSFL. All documentation must be complete, timely, and audit-ready.	As and when required

S. No.	Major Deliverables	Timeline
19.	Submit the quarterly fiber-cut restoration activities performed along with the OTDR traces, Uptime, Downtime reports of the NOC and the Active infrastructure related activities across all the POP locations during invoice submission.	Quarterly
20.	Any other artefact linked with the project delivery.	As per RFP
21.	Submit all the regulatory reports to APBIL/ APSFL.	As and when required
22.	Submit of spare fiber health status to APBIL/ APSFL.	As and when required

Note: PIA shall indemnify APBI/ APSFL against any damage/ accidents/ incidents to the field personnel, tools, vehicles.

10. Network and service provisioning

10.1 The Selected PIA has to perform the following activities but not limited to.

- a. All the DC, DR of BharatNet and APSFL NOC must function as a single unified network for all purpose of O&M, Upgradations and expansions and accordingly all the integrations must be planned, implemented, tested and demonstrated and commissioned to APBIL (BharatNet network means the combined network of BharatNet Phase-I, BharatNet Phase-II and newly created network under ABP).
- b. The selected PIA must review the available existing Network architecture, HLD, LLD of BharatNet and APSFL network and submit a consolidated architecture diagram, HLD and LLD to APBIL/ APSFL for approval. This activity should be completed within 12 weeks from the date of signing of the agreement.
- c. The PIA must submit the integration and implementation plan to APBIL/ APSFL within 12 weeks of the date of signing of the agreement.
- d. The PIA must review the existing IP-schemas and come up with a combined IP-schema planning and submit the same to APBIL/ APSFL for approval within 12 weeks from the date of signing of the agreement.
- e. The PIA shall submit O&M manual, O&M SOPs and submit the same to APBIL/ APSFL for approval within 16 weeks from the date of signing of the agreement.
- f. PIA must ensure that the inventory data of both BharatNet and APSFL network of entire active and passive to be loaded in the tool and to be submitted within 12 weeks from the date of signing of the agreement.
- g. The network shall enable retail, enterprise, and wholesale services as per the requirement of APBIL/APSFL.
- h. The BSS, i.e. deployed by PIA, must migrate the data of existing BSS of APSFL. After migration, the PIA BSS shall be the main BSS for further provisioning, regulatory and all other activities.
- i. The OSS which is supplied by PIA must integrate all components of BharatNet, and APSFL networks.
- j. All common NOC components/ tools (DDI, Syslog, AAA etc.,) must be integrated with BharatNet, and APSFL networks.
- k. The PIA must also perform DC-DR activities for BharatNet and APSFL NOC like failover testing, syslog, backup, test server, etc.,
- l. The selected PIA shall integrate the existing APSFL Phase-I network technology with BharatNet OSS/ BSS for service delivery as per the requirement of APSFL.
- m. PIA shall provide all necessary support and facilitation to APBIL/APSFL and designated service provisioning agencies for provisioning and monitoring of services from NOC.
- n. The PIA shall ensure service assurance and accounting for all provided services from the network.

- o. PIA shall ensure all the services provisioned or to be provisioned to be tested, validated with prior approval from competent authority as part of the network configuration for service rollout.

10.2 Physical Security Services at NOC

The objective of this service is to provide a physically secure environment through the presence of physical security guards. Manpower would be as per Manpower requirements table as specified in the tender document. This service includes:

- 10.2.1 Monitoring bonafide personnel enter the datacentre.
- 10.2.2 Frisk bags of personnel entering the datacentre to ensure that it does not contain any item/ device which can be used to breach information security at the datacentre.
- 10.2.3 Security personnel shall be well versed with ISO 27001 requirements of physical security.
- 10.2.4 Primary checking by the help of various accessories/equipment is the selected PIA's responsibility.
- 10.2.5 Secure placement of original manuals, CDs, Backups, Media etc management.
- 10.2.6 Visitor Management software shall be made available by bidder, the security personnel at reception shall be responsible to capture the visitor information, checks & maintain the records of approval for the visitors to enter the premises.

10.3 Asset Management Services

- 10.3.1 The selected PIA shall provide asset management software along with mobile application capable of generating asset reports, RMAs etc.
- 10.3.2 The asset shall be classified as assets with redundant configurations and non-redundant configurations.
- 10.3.3 The selected PIA shall be responsible to maintain a database of all the equipment/ software proposed under this RFP and any incremental equipment, software and fiber Installed during Operation and Maintenance under APBIL/ APSFL.
- 10.3.4 The details of all assets like OFC, hardware, software, peripherals, manuals, media and other related peripherals, etc., shall be maintained by recording information like make, model, configuration details, serial numbers, licensing agreements, type of warranty, place of installation etc in IT asset register.
- 10.3.5 Record installation and removal of any equipment from the network and inform APBIL/APSFL even if it is temporary.
- 10.3.6 Perform software license management, notify to APBIL/APSFL on licensing contract renewal and assist them in getting the license renewed.
- 10.3.7 The selected PIA shall prepare & maintain the physical asset register for the entire IT & Non-IT equipment, software and separate material movement register at NOC. The selected PIA must take the Quarterly Signup for the asset register from APBIL/ APSFL.

10.4 Electricity, Diesel & Consumables Management

The Bidder shall be responsible for

- A) Collection of Electricity bills from all the sites and submission to APBIL. The responsibility of clearing the electricity bills shall lie with APBIL.

- B) Diesel & Consumables Management for the entire project period. This consumable cost shall be reimbursed to PIA on the monthly basis by APBIL on basis of actual consumption/procurement and on submission of invoice before 5th of subsequent month.

10.4.1 Diesel Management:

1. The bidder shall ensure the adequate availability of diesel in the DG sets for providing at least eight hours of power backup in case of power failure. PIA must maintain a register for monitoring and the diesel consumption for the DG set.
2. APBIL/APSFL shall verify the diesel consumption from the log maintained at sites and MIS generated.
3. The PIA will submit the bill (original bills of petrol/diesel pump) for every purchase and vendor payment receipt along with their debit note.
4. The Diesel consumable cost shall be reimbursed to PIA on the monthly basis by APBIL on basis of actual consumption/procurement and on submission of invoice before 5th of subsequent month.

10.4.2 Electricity Management:

1. The PIA will collect the electricity bills and submit on monthly basis to APBIL.
2. The responsibility of clearing and payment of the electricity bills shall lie with APBIL.

10.5 House Keeping services a NOC & DHQ sites

Maintaining cleanliness and hygiene in and around sites and the same must be recorded in a register.

10.5.1 Cleaning services at Office area

Job includes cleaning & wiping of all the tables & chair, cupboards, computers, telephones, coffee machine, crockery & Silverware, cleaning & refilling of water bottles, individual dustbins etc. and cleaning & wiping of windowpanes, glasses of cubical on daily basis. The job also includes cleaning & wiping of windowpanes, with wet paper & cloth thoroughly both from inside & outside on daily basis. A daily log of cleaning activity must be maintained.

10.5.2 Cleaning services at other locations

Cleaning of the server, Telecom room, Electrical room, Battery room with the industrial vacuum cleaner below the false flooring on weekly basis (preferably during non - working hours).

11.Service Level Agreements

11.1 SLA & Penalties during Operations and maintenance

1. SLA calculations for the route shall be defined as the section of fiber as unique identifiable route.
2. In case of route failure due to cable cut/damage when the services are disrupted /not available, for a period up to 4 Hours*, the fault(s) shall be treated as Severity Level 1 and there shall be no penalty for fault rectification within the time.
3. In case the fault restoration time extends beyond 4 hours up to 10 hours, the fault shall be treated as Severity Level 2.

4. In case the fault restoration time extends beyond 10 hours up to 24 hours, the fault shall be treated as Severity Level 3.
5. In case the fault restoration time extends beyond 24 hours, the fault shall be treated as Severity Level 4.
6. The penalty for each of these Levels shall be as tabulated below. In case there is/are additional fault(s) on the route will be treated as new fault after restoration of existing fault.
7. Partial / temporary restoration of fault shall be treated as a repaired fault under emergency circumstances and the down time till the proper restoration of fault shall not be counted.
8. The penalties to be imposed for the restoration of different severity levels of faults are defined below:

S. No	Measurement Criteria	Definition	Target	Penalty
1	Mean Time to Repair (MTTR) for Fiber		Up to 4 hours	Nil
			≥ 4 hrs to 10 hrs	INR 2,500 per route fault. (If one fault downs many nodes it is treated as one fault only)
			≥ 10 hrs to 24 hrs	Additional INR 500 per Hour subject to maximum of INR 5,000 per route fault
			More than 24 hrs	Additional INR 1,000 per day or part thereof subject to maximum of INR 15,000 per route fault. Any other concurrent fault on the same route to be treated as separate fault.
2	No. of OFC cut/Block /month	One cut if the OFC Route KM in the block is ≤50;	N cuts if the OFC Route KM is >50(N-1) and ≤50N	NIL
		Two cuts if the OFC Route KM in the block is >50 and ≤100;		
		N cuts if the OFC Route KM is >50(N-1) and ≤50N	Above N cuts/fault/month or part thereof	INR 1,000/- per cut/fault

*Note: Alternate MTTR for inaccessible areas as defined in SLA exclusions will be applicable.

9. Link Margin Values degradation from the current values at the time of takeover by the selected PIA for DWDM links on monthly basis.

KPI Value	Penalty
≤ 2 db	Nil
> 2 db ≤ 3 db	INR 2,000 per db
> 3 db ≤ 4 db	INR 5,000 per db
> 4 db	INR 10,000 per db

10. Percentage of non-compliance to approved uptime for NOC including but not limited to IPTV Headend

Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quart. Payable O&M payment of the State NoC network
Network Availability at NOC	All network equipment (Servicing affecting) installed and commissioned at S-NOC including but not limited to, core routers, switches, Firewall, IPS, EMS, NMS, IPTV Headend etc.	≥99.9%	No Penalty
		≥ 99.5% < 99.9%	Proportionate Penalty
		≥ 99% < 99.5%	Twice the Proportionate Penalty
		≥ 95% < 99%	Thrice the Proportionate Penalty
		<95%	Five times the Proportionate Penalty

11. Percentage of compliance to approved network uptime for each DHQ/ Zonal/ Mandal/PoP for reasons other than Primary Power and route failure.

Measurement Criteria	Definition	Quarterly Target	Penalty as %age of Quart. Payable O&M payment of the of Block Level
Network Availability at DHQ/ Zonal/ Mandal/PoP level**	Availability of DHQ/Zonal/ Mandal/PoP router/ OLT - in ref to power infra and router/OLT hardware/software outage	≥99.5%	No Penalty
		≥ 97.5% to < 99.5%	Proportionate Penalty
		≥ 95.0% < 97.5%	Twice the Proportionate Penalty
		<95.0%	1% additional penalty on account of each 0.25% reduction in uptime

Note:

1. Bidder has to provide the requisite licenses of a monitoring tool for automatic monitoring of all SLAs.
2. All the operational SLAs are measured on monthly basis. The penalties will be levied monthly and will be deducted from the payment due to the selected PIA.

11.2 Planned Network Outage

‘Planned Network Outage’ refers to unavailability of network services due to infrastructure maintenance activities such as configuration changes, up gradation or changes to any supporting infrastructure. Details related to such planned outage shall be agreed with the APBIL/ APSFL this shut down time will not come under penalty clause.

11.3 SLA Exclusions

1. Normal log time is considered for penalty calculation is from 7 AM to 5 PM. If the fault is reported after 5 PM or the location far away to reach for maintenance activity the call shall be treated as reported next day 7 AM.
2. On holidays and festival days the penalty structure shall be limited to 50% except NOC and DHQs
3. Natural calamities such as cyclones, earthquakes, Fire, Riots etc., will not be considered for calculation of SLA.
4. Poles shifting / Trees cutting by Electricity Department and Power outages during routine maintenance shut down will not be considered for calculation of SLA, However PIA is obligated to monitor these activities in the field and take precautionary measures.
5. The severity level 1, for restoration of fiber in Forests, AOB areas, fields/farmlands, long span highways and other inaccessible terrain will be considered as 0-6 hours on case-to-case basis.

11.4 Service provisioning by PIA from NOC

S. No	Measurement Criteria	Definition	Target	Penalty
1	Service Provisioning	Provisioning and monitoring of services from S-NOC	Up to 48 hours	No Penalty
			> 48 hours	INR 10,000 per day

11.5 Deployment of FRT

(a) Minimum Resources to be deployed in a FRT Team:

- (1) Technician for splicing & measurements.
- (2) Manpower for surveillance, liaison, and patrolling (one man for about 70-80 kms beat). However, the bidder has to deploy extra manpower for as and when needed during any work or other agencies work in the section.
- (3) Skilled/ Un-skilled manpower for fibre laying/rectification/trenching etc.
- (4) OTDR for measurement at 1310, 1550 and 1625nm.
- (5) 1 km length dummy fiber spool
- (6) Fusion splicing machines (ribbon and single fibre) with cleavers.
- (7) Optical laser source power meter
- (8) Cable fault locator / Electronic locator system for armoured/unarmoured OFC.
- (9) Vehicle for transportation of men, machines, and stores.
- (10) Communication Gadgets: as required.
- (11) Tool/ Tackles kit.

(b) **Deployment of FRT:**

- (i) The FRT team needs to be deployed based on RKM to be maintained. One (01) FRT team with the composition mentioned above need to be deployed for every 250 RKM of UG cable and for 500 RKM of ADSS cable of the network under O&M.

- (ii) The tracking of FRT team and associated manpower as mentioned above shall be done through manpower tracking application of the FRT Team Leader provided by the PIA/ APBIL.
- (iii) 5% of monthly O&M payment shall be deducted in case the average availability (on monthly basis) of FRT, is less than 80% of the required number of FRTs. The deduction will be 10% if the availability of FRTs is below 60% in any month.

Illustration: Suppose the network to be maintained is around 1000 RKM, then the number of FRT teams to be deployed shall be four (4). The FRT teams should be available for 80% on an average i.e. out of 120 FRT team-days, 96 FRT team-days shall be trackable for that month.

If the average availability in a month is below 80% (below 96 FRT team-days), then 5% of O&M charges for the month will be deducted in addition to the SLA deductions. Further, if the average availability in a month is below 60% (below 72 FRT team-days), then 10% of O&M charges for the month will be deducted in addition to the SLA deductions.

- (iv) To monitor the availability of FRTs for penalty calculation as mentioned above, PIA shall provide mobile based GIS application to the APBIL.
- (v) In case PIA deploys its own mobile based GIS application to monitor the movement of FRTs for operation and maintenance, APBIL may allow the integration of the same with APBIL's GIS App for penalty calculation, eliminating the need for FRTs to update their attendance in two separate applications.

In case of any issue impacting project progress and SLAs, as defined in the RFP, due to the reasons beyond control of the PIA; the PIA shall report the same in the online message board which shall be provided by APBIL. APBIL & IE shall respond to the issues raised by PIA on the message board itself.

12.Responsibility of Independent Engineer (IE)/ Third Party Auditor (TPA)

Below mentioned are the responsibilities of the Independent Engineer / Third Party Auditor for foreseeing and validating the PIA's scope of work, including but not limited to the following

- i. The verification, validation and certification of all works executed under this contract shall be carried out by an IE/TPA appointed by APBIL.
- ii. All quality checks, site inspections, material validation, and testing certifications required under this project shall be undertaken by the IE/TPA. The selected bidder shall extend full cooperation, provide access to sites, records, tools, test equipment, and personnel as required by the IE/TPA.
- iii. Certification of monthly completed work, quality of installation, quantity of materials consumed, OTDR test results, end-to-end testing, OFC laying, splicing, equipment installation and any other technical verification shall be performed by the IE/TPA and such certification shall be binding for processing payments.
- iv. The IE/TPA shall be responsible for reviewing and validating all deliverables submitted by the selected bidder, including but not limited to site reports, test reports, as-built documentation, route maps, inventory data and compliance records.
- v. The selected bidder must ensure adherence to APBIL/ APSFL standards, guidelines and technical procedures, which will be verified and reported by the IE/TPA. Any deviation, deficiency, or non-compliance identified by the TPA/IE shall be rectified by the bidder at no additional cost.

- vi. The IE/TPA may conduct inspections, random revalidation tests, field audits, and performance checks at any time during the project. The bidder shall provide required support, documentation, and manpower to facilitate such audits.
- vii. The IE/TPA shall validate material consumption and reconcile it with completed work. Any discrepancies or variations reported by the TPA/IE must be addressed and resolved by the bidder promptly.
- viii. The IE/TPA will review and certify CAPEX-related activities (where applicable) including verification of technical necessity, adherence to specifications, quality of execution, and completion.
- ix. All data, documents, reports, and compliance submissions generated by the bidder shall be subject to verification, approval and certification by the IE/TPA, and only post this verification will they be considered valid by APBIL/ APSFL.
- x. The IE/TPA will support APBIL/ APSFL in monitoring the performance of the selected bidder against SLAs and KPIs. The bidder shall comply with all audit observations and implement corrective actions as mandated.
- xi. The bidder shall maintain transparency and ensure secure handling of all information and network data shared for verification, as per the protocols followed by the IE/TPA and APBIL/ APSFL.

13. Inspection

IE/APBIL shall retain the right to inspect, test, and audit the network infrastructure, as well as the operation and maintenance activities, throughout the duration of the project.

- 1. IE/APBIL shall have the authority to review and assess the quality of work executed by the Project Implementation Agency (PIA).
- 2. IE/APBIL shall verify the quantity and installation of materials, including equipment, PON components, OTDR testing, end-to-end testing, OFC laying, splicing, and related activities (wherever applicable).
- 3. IE/APBIL shall carry out verification of all deliverables submitted by the PIA.
- 4. The PIA shall be responsible for preparing and uploading all relevant data, reports, and certificates on the designated project management tool and/or forwarding the same to the concerned IE/APBIL officers in accordance with predefined procedures.
- 5. The PIA shall strictly comply with all standards, guidelines, and procedures prescribed by IE/APBIL.
- 6. The PIA shall ensure the availability of verification and validation personnel in line with the maintenance schedule and coordinate at the site level with IE/APBIL to facilitate smooth execution of verification activities.

14. Capacity Augmentation

(a) The PIA shall replace/ upgrade the SFP based on the demand/ requirement during the contract period on payment basis.

(b) The PIA shall provide the required spares and service support for the supplied equipment in the Project. In case of any solution/ equipment reaching End of Life (EoL) during contract period, the PIA shall be responsible for its replacement with equivalent / higher specifications.

(c) In case of installation of products / material on account of capacity augmentation or replacement / repair the same shall be subject to Preliminary Acceptance testing conducted by the PIA.

Note: The Capacity augmentation is subject to approval of APBIL.

15. Monitoring of the Project

1. The IE/APBIL shall carry out inspections/audits during the Operation & Maintenance (O&M) phase for each KPI.
2. The inspection schedule shall be jointly prepared by the PIA and IE/any other appointed representative and approved by the CEO, APBIL, ensuring inspections are evenly spread throughout the year.
3. After each inspection, the IE/APBIL shall prepare an Inspection Report clearly listing any defects or deficiencies, with reference to applicable standards and specifications.
4. The IE shall share the Inspection Report with both APBIL and the PIA.
5. The PIA must rectify all reported defects/deficiencies within 30 days of receiving the Inspection Report.
6. The inspection or submission of the report does not reduce or waive the PIA's responsibilities or liabilities under the contract.
7. The IE/APBIL shall assess PIA liabilities, if any, and include them in the report.
8. The IE may submit inspection reports in parts at agreed intervals to enable continuous rectification by the PIA.
9. The PIA shall inform the IE once rectification is completed.
10. The IE shall re-inspect the rectified works and record the outcome in the Annual Report.

16. Exit Management Plan

1. This Clause sets out the provisions, which will apply when the contract has expired or when the contract is terminated.
2. In the case of termination during the project implementation or maintenance phase, the Parties shall agree at that time whether, and if so during what period, the provisions of this clause shall apply.
3. The Parties shall ensure that their respective associated entities carry out their respective obligations set out in this clause.
4. Transfer of Assets: The PIA shall provide a list of all the assets under maintenance of the PIA. The list should be current with up-to-date modifications/changes. All the ABDs/GIS details should be updated to account for any changes in the routes like additional joints/joint chambers, route indicators, and cable route diversions/modifications. As also the relevant entries to be made in project management tools as specified.
5. In case of the contract being terminated by APBIL, APBIL reserves the right to ask PIA to continue running the project operations for a period of 6 months after termination orders are issued. The other liquidated damages and SLA would be applicable during this period.
6. Upon service of a notice under this Article the following provisions shall apply:

a. Payment to the outgoing PIA shall be made to the tune of the last set of completed services/deliverables, subject to SLA requirements.

b. The outgoing PMA will pass on to APSFL and/or its nominated agency, the subsisting rights in any products on terms not less favourable to APBIL/ its nominated agency, than that enjoyed by the outgoing PIA.

17. End of Contract

After the end of the contract, PIA has to hand over the entire network infrastructure to APBIL in compliance with the following clauses:

Network Condition Report (NCR)

- PIA to submit NCR 12 months before O&M expiry.
- NCR shall include:
 - Complete asset inventory.
 - Equipment health status and performance indicators.
 - SLA compliance history.
 - Outstanding maintenance tasks.
 - Recommended capital replenishment items.

Joint Inspection & Rectification

- Joint inspection by APBIL + IE/TPA within 60 days of NCR submission.
- Inspection to cover compliance with SLAs and technical specs.
- Deficiencies shall be rectified by PIA at its own cost.
- Rectification must be completed before handback.
- Unresolved deficiencies may lead to penalties or guarantee invocation.

Transition Assistance (90 Days)

- PIA to provide transition support for 90 days post-handback.
- Includes knowledge transfer, technical help, operational support, troubleshooting.
- No additional cost to APBIL.

Documentation, GIS Data & IP Transfer

- Transfer of GIS data, network documents, SOPs, O&M logs, asbuilt drawings.
- Transfer of all software licences required for operations.
- All documents in editable/open formats.
- All material becomes IP of APBIL/APSFL.
- Includes passwords, admin credentials, config files, encryption keys.

Final Performance Audit

- Conducted within 90 days before handback.
- Covers asset condition, SLA compliance, safety, environmental norms.
- Compliance Certificate issued only after rectifications.

Data Integrity & Backup

- PIA to hand over raw + processed O&M data.
- Performance reports, logs for last 24 months.
- NMS/EMS DB backup and config backups.

- Proprietary formats must include viewer/editor tools.

Cyber-Security Handover

- Provide list of system users, admin passwords, access rights.
- Provide encryption keys and certificates.
- Ensure no backdoor accounts or active remote access.
- Submit Cyber-Security Clearance Report.
- Support VAPT testing.

Removal of PIA-Owned Components

- Removal allowed only with APBIL approval.
- Must not damage project assets.
- Must be completed within 30 days of hand back.
- Damage repaired at PIA cost.

Final Inventory Reconciliation

- Joint reconciliation by APBIL + PIA + IE/TPA.
- Missing items must be replaced by PIA or recovered via guarantees.
- Final asset register approved only after reconciliation.

Continuity of Operations

- No service disruption allowed during transition.
- PIA remains responsible for SLAs until acceptance.
- Transition-related outages attract penalties.

Knowledge Transfer & Staff Availability

- PIA to deploy key personnel during final 90 days.
- Provide training, SOPs, troubleshooting guidance.
- No key staff withdrawal in last 6 months without approval.

Final Handback Acceptance

- Handback complete only after APBIL issues Acceptance Certificate.
- Certificate issued after all rectifications, document transfer, audit completion.
- PIA obligations continue until acceptance.

SECTION- IV-C: SPECIAL TECHNICAL CONDITIONS

- 1.** Relevant TEC GRs for Technical specifications of material to be supplied are mentioned in **Annexure- A.**
- 2.** Detailed Technical Specifications of following Network components are mentioned in **Annexure-B**
 - I.** Network
 - II.** Routers
 - III.** EMS of Routers
 - IV.** State- NOC
 - V.** RFMS
 - VI.** Rack at Block and GP
 - VII.** Deleted
 - VIII.** UPS at GP
 - IX.** Unlicensed Band Radio (UBR)
 - X.** Digital Microwave
 - XI.** 8.0/ 7.0-meter long RCC pole working load of 115 Kgs
 - XII.** Armoured Ribbon Optical Fibre Cable for Underground Duct Application
 - XIII.** Mini OLT at GP
 - XIV.** Deleted
 - XV.** Shelter Enclosures with Air Conditioners
 - XVI.** Voltage Stabilizers
 - XVII.** 24U racks for FDMS at blocks
- 3.** Engineering Instructions for Under Ground Optical Fiber Cable Laying Works is attached as **Annexure-C.**
- 4.** Technical Specification for GIS Mapping of OFC Routes is attached as **Annexure-D.**

5. Annexure A: Technical Specifications as per TEC GR

TEC – GR Standards:

S. No.	Type of Material	Technical Specifications
1	Armored Optical Fiber Cable for underground application. 24F & 48F loose tube	TEC GR Standard No.: TEC 85170:2024 with latest amendments. Although in this TEC/ GR only optical fiber of G.652 D is mentioned but vendor shall have liberty to use G.657A1 also as per ITU-T recommendation.
2	Aerial OF Cable (ADSS Cable): 48/24F ADSS on power lines	TEC GR Standard No.: TEC 85190:2022 (Type- A-I & A-II) with latest amendments if any; OFC will be of type- A-1 Semi dry (without ice loading)
3	12F/24F Aerial Drop Optical Fiber Cable with Installation Accessories (For Last mile applications)	TEC GR Standard No.: TEC 85200:2022 with latest amendments if any (2005 for LMC).
4	Deleted	Deleted
5	Splitters (1:2, 1:4, 1:8, 1:16)	TEC GR Standard No.: TEC 72010:2023 with latest amendments (Type to be used as per site requirement)
6	SPV Power supply	TEC GR Standard No.: TEC/GR 66080:2016, with latest amendments if any
7	Battery	TEC GR Standard No.: TEC 67030:2016 with latest amendments if any a. Lithium-Ion Battery of 2400 VAH to be used.
8	Patch Cord	TEC GR Standard No.: TEC 87070:2009, with latest amendments if any. (Patch cords shall be supplied with source approval from CACT, against the relevant GR)
9	Splice Closure for Optical Fiber Cables	TEC GR Standard No.: TEC 87080:2010 with all amendments if any. Size to be used as per OFC used at site
10	Fiber Termination Box	TEC GR Standard No.: TEC 87030:2010, with latest amendments if any. Fiber Termination Box Size to be used as per OFC used at site
11	PLB HDPE Duct	TEC GR Standard No.: TEC 72030:2019 with latest Amendments if any
12	Installation Accessories and fixtures of Self-Supporting Metal free Optical Fiber Cable	TEC GR Standard No.: TEC 87060:2017, with latest amendments if any
13	FDMS (Indoor)	TEC GR Standard No.: TEC 87010:2007, with Amendment Dated 02.05.2012 and with latest amendments if any. Fiber termination in GP can be accommodated in a rack used for router and other equipment. 01 No. 48 fiber rack mount shelf to be used for fiber termination as per GR 87010:2017.

S. No.	Type of Material	Technical Specifications
14	FDMS (Outdoor)	TEC GR Standard No.: TEC 87050:2012, with latest amendments if any The No. of trays in case of 48 Fibre ribbon OFC will be 4. No. of sleeves will be 25% extra than the required joints i.e. 20 Nos.
15	Tension/Suspension Pole Assembly Set	TEC GR Standard No.: TEC 87060:2017, with latest amendments if any
16	MPLS Router	TEC/GR 48050:2022 with latest amendments if any or
17	Data Storage Infrastructure	TEC GR Standard No.: TEC 49100:2015, with latest amendments if any
18	Ethernet electrical to optical media converter	TEC GR Standard No.: TEC 48080:2014, with latest amendments if any
19	Firewall System / NIPS	TEC GR Standard No.: TEC 49090:2023, with latest amendments if any or NDPP certified TEC GR Standard No. for NIPS:49140:2018, with latest amendments if any or NDCPP certified
20	Lan Switch	TEC GR Standard No.: TEC 48060:2023, with latest amendments if any or NDPP certified
21	Layer 4-7 Load Balancer Switch	TEC GR Standard No.: TEC 48090:2015 with latest amendments if any
22	Network Management System	TEC GR Standard No.: TEC 48100: 2015 with latest amendments, if any
23	UPS	TEC GR Standard No.: TEC 66140:2019 with latest amendments, if any
24	Radio Modem in ISM band for UBR	TEC GR Standard No.: TEC 38050:2023, with latest amendment, if any
25	EMS for UBR	TEC GR Standard No.: TEC 52006:2016, with latest amendments, if any
26	Fiber Distribution Frames for UBR	TEC GR Standard No.: TEC 87000:2010, with latest amendments, if any
27	Packet Microwave Radio Equipment (15, 18 and 23 GHz) for DMW (Digital Micro Wave)	TEC GR Standard No.: TEC 36090:2022) with latest amendments if any
28	Millimeter Wave (E-Band) Microwave Equipment for DMW	TEC GR Standard No.: TEC 36060:2022
29	EMS for DMW	EMS-TEC-SD-IT-EMT-001/01/Mar-16
30	Electronic Locator System	TEC GR Standard No.: 73070:2014
31	Lithium Ion Battery for Telecom Applications	TEC GR Standard No.: TEC 67030:2024
32	Remote Fiber Monitoring System (RFMS)	TEC 88150:2015 with latest amendment.

S. No.	Type of Material	Technical Specifications
33	Mini OLT at GP	TEC GR No. TEC/GR/FA/PON-002/02/NOV-18 with all amendments.

Note:

- The technical and functional specifications mentioned in this RFP are mandatory and also supersedes GR for the clauses where there is any change.
- The supply of 48F Armoured ribbon type OFC will be as per GR under preparation.
- All the deliverables for the S-NOC items, mentioned in the tender, shall be as per the relevant TEC GR/ Standard, if not defined otherwise in the RFP/ Amendments. The items which are not mentioned in the tender shall be optional.
- The specifications which are explicitly mentioned in the RFP/ Clarifications/ Amendments shall be mandatory. Remaining compliances, as per relevant TEC GR, shall be optional
- TSEC for Rack (at Block & GP) shall be obtained as per Technical Specifications mentioned in the RFP
- The relevant TEC GR/ Standard is likely to be released before award of contract under the tender. In case the said TEC GR/ Standard is delayed, the data of Table (regarding physical characteristics) will be provided to the successful bidders.

Annexure B: Technical specifications of Network and its Components

I. Network

1 General Requirements

- The network should support successful fibre connectivity to rural areas of the country, connecting to all GPs and Villages and accessible on a non-discriminatory basis to all service providers to enable them to provide services in rural areas.
- The network should be built to provide the following:
 - Higher Network Uptime
 - Complete Centralized Visibility of Network
 - Segregation of Traffic and QOS in line with Industry standards
 - BetterNetworkManagement(Provisioning,Activation,Fault, Performance etc.)
- The network should have the capability and facility for seamless integration with all other components required to build a digital backhaul.
- Network must support next generation architecture to support future technologies like 5G etc.
- Devices must support the dynamic redundancy protocol for better convergence.
- Network Convergence methods like Fast reroute and bidirectional failure detection must be deployed to achieve faster convergence.
- Network must support segregation of traffic using Virtual Routing and Forwarding (VRF).

- h. QoS enables a network to provide improved service to selected network traffic. The Network must support IPMPLS QoS features.
- i. All Gram Panchayat (GP) nodes should have the capabilities to program the queues into logical queues to offer multiple services to the end customers.
- j. The mapping of QoS should be done on the basis of COS, IP precedence, TOS, IP address, VLAN etc.
- k. All nodes in network must support Hierarchical Quality of Service for granular QoS.
- l. Network should have multicast capabilities and should support at all layers.
- m. High QoS, Uptime, Security, L3, L2 and Multicast Services from edge where the nodes are connected should be ensured as it will be connecting to MSOs, SP and Telcos.
- n. Packet clock, 1588 should be supported for connecting Telco.
- o. IP/MPLS NNI with telcos and other Service providers for traffic exchange at all nodes should be supported.
- p. Interoperability between OEM for non-vendor locking should be supported at all nodes. Proposed technology partner / OEM for active infra to provide an undertaking to take responsibility of ensuring interoperability with other vendors.
- q. All nodes in network must support protocol for management information sharing so that devices can discover and reach to each other.
- r. Any changes in topology should be automatically learnt by all the devices in network.
- s. No manual intervention should be required in case of any physical link failure.
- t. Scalable dynamic protocol should be supported for transferring of customer network information across all service edge devices.
- u. The network must provide detailed Change monitor or baseline deviations applications, source and destinations. The change monitor dashboard must compare changes in applications, source and destinations in terms of percentage increase/decrease for last 15 mins/ 30 mins/ one hour/ one day against historical time period of 24 hours/ 7 days/ one month etc.
- v. OEM must provide performance, throughput and features evidence. APBIL reserves the right for asking the bidder to do a PoC that validates all technical compliance as submitted in the tender document.
- w. The network must support end to end SLA guarantee with features to automate the path based on latency and Jitter.
- x. The network must support Zero Touch Provisioning capability & Automated node provisioning.
- y. Network Should have integrated capability to monitor link and services.
- z. All hardware and software supplied, installed and configured under this project shall support IPv4, IPv6, and Dual-Stack functionality from day-1 of commissioning.

2 QoS Architecture

- a. Low latency Queuing should be deployed to ensure CIR guarantee to all Critical Traffic
- b. Minimum 4 Class-of-Service Model should be supported:
- c. Matching of traffic should be based on ACL, IPP, DSCP & MPLS EXP
- d. Marking of traffic Should be based on MPLS EXP
- e. Should also support weighted random early detection in the network to avoid congestion

3 Traffic Engineering Capabilities

- a. Standard based protocols to automatically map packets onto the appropriate traffic flows should be supported.
- b. Should Support transport of traffic flows across a network using IP/MPLS forwarding.
- c. Should support the determination of routes for traffic flows across a network based on the resources the traffic flow requires and the resources available in the network.
- d. Should Employ ", segment routing" in which the path for a traffic flow is the shortest path that meets the resource requirements (constraints) of the traffic flow.
- e. Should support QoS on Traffic engineering paths or LSPs.
- f. Should support Recovery of link or node failures that change the topology of the backbone by adapting to a new set of constraints.
- g. Providing bandwidth guarantee for critical real-time applications in the control plane
- h. Optimized utilization of redundant
- i. Handling of unanticipated load in the network
- j. Fast reroute to provide fast convergence for critical real-time application traffic

4 Network - MPLS VPN

All Service edge nodes in network should support:

- Layer 2 MPLS VPN
- Layer 3 MPLS VPN: Layer 3 MPLS VPN can be broadly classified in to Hub and Spoke VPN, MESH VPN, Extranet VPN, Multicast VPN
- Above specifications are minimum. Any additional feature or futuristic upgradation shall be allowed

II. Technical Specifications for Routers

Technical specifications for Master Mandal Routers	
S. No.	Specifications
1	Proposed router should support the following environmental condition: Temperature: 0 to 40 operating temperature and environment Relative humidity: 5 to 85% non-condensing
2	The proposed router should be of modular design with: - redundant controller cards - power supplies in 1+1 or N+1 redundancy and failure of controller card should not impact per slot throughput.
3	The proposed router should support software upgrade without interruption to the services
4	The proposed router should support AC power with voltage range: AC: 180 V AC to 260 V AC
5	The power supply of proposed router should have protection against under-voltage and reverse polarity conditions.
6	The proposed router should support at least 8 X 100G and should be configured and populated with 20X10G with 10km, 10 X 1G 10km and 6x100G 40Km On Day 1. Router should be configured with At least 2 Free slots for future expansion.
7	Proposed router should support switching capacity of at least 10 Tbps full duplex
8	All ports in the proposed router s total forwarding performance should be 2500 MPPS or more
9	The proposed router should support synchronization using IEEE 1588v2 and Sync E and must be configured with the required licenses from Day 1
10	The proposed router should support, LDP FRR, Remote Loop Free alternate mechanisms and micro loop avoidance mechanisms to have a better resiliency
11	The Proposed Router should have BNG features with support for 256K IPv4 and IPv6 dual-stack subscribers with required cards and license from day1. Broadband user session should not be dropped, in case of BNG node failure. Geo-Redundancy or similar redundancy Feature need to be supported.
12	<p>The Proposed router should have CG-NAT features supporting at least 20 million translations with all required cards and licenses should be configured from day1 with at least following features:</p> <ul style="list-style-type: none"> - Nat 64 (IPv6-to-IPv4) & Nat46 (IPv4-to-IPv6) - Auto/Manual NAT, static NAT, dynamic NAT, dynamic pat - Detailed logging of CG-NAT translations for log analysis - The throughput should be sufficient enough to serve 256K subscribers with at least 20Mbps bandwidth each

Technical specifications for Master Mandal Routers	
S. No.	Specifications
13	The proposed router must be configured to support 256K MPLS Labels from day1.
14	Shall support Frame sizes from 64 bytes to 1518; Proposed router should support jumbo frames of 9000 or above bytes on all ports; The proposed router should support 256k queues per line card
15	The proposed router should support the following: a. 20,00,000 MAC Addresses b. 2,000,000 IPv4 unicast routes c. 1,000,000 IPv6 routes d. 16,000 multicast routes e. 5 labels in label stack
16	The proposed router should support the following features: a. Routing Protocols: Static, RIP, OSPF, ISIS and BGP. VRRP should also be supported b. MPLS: MPLS LDP, IP FRR, BGP Labelled Unicast, BGP PIC (Edge and Core) c. VPNs: 6PE/6VPE, L3 VPN, EoMPLS, VPLS / EVPN/H-VPLS. Min. 4000 MPLS VPN instances, 32K L2VPN tunnels/VPLS instances should be supported d. Multicast: uRPF, PIM-SM, PIM-SSM, M-VPN
17	The router should support BFD in hardware with min detection interval of less than 4 ms. Protection against link / node failure in rings should be <50ms using TE-FRR/MPLS-FRR. Must provide OEM undertaking with open test report.
18	The router should also support Q-in-Q or Stacked VLANs
19	The proposed router should support ITU-T G.8032 based Ethernet Ring Protection
20	The proposed router should support 802.1ag (Ethernet OAM) and Y.1731 or equivalent based performance management
21	Proposed router should be at least CE 2.0 Certified. If case of certification in progress, OEM should give an undertaking to submit the Certificate within 6 months from the award of the contract failing which 5% of the overall cost of the project will be kept on hold for the System Integrator.
22	Proposed router should support QoS mechanism for end-to-end bandwidth and at least 4 level HQS
23	The Proposed router should support multilevel priority scheduling/Strict priority queuing with COS for voice and video applications.
24	Proposed router should support Quality of service for marking/policing traffic, hierarchical QoS, Prioritizing and assuring bandwidth Guarantees. Classification should be done based on DSCP, IP TOS (Type of Service), MPLS EXP and 802.1p.

Technical specifications for Master Mandal Routers	
S. No.	Specifications
25	Proposed router should support at least eight no of hardware queues that are required per port for flow treatment of traffic, Policy Based QOS, WRED, WFQ, HQOS. All The router cards which are supplied should support at least 4 Level HQOS
26	Should support Plug and Play for the ease of management
27	The software shall have all the features to administer, manage, maintain and troubleshoot the network through the CLI and HTTP/HTTPS Web Access or GUI
28	The system Command line interface (CLI) shall have commands for fault management, configuration management, performance management, security management and administration/EMS
29	Remote software and configuration download, backup of configuration without interruption of functioning of the system via management system shall preferably be possible including means of identification of software module versions/EMS
30	<p>The proposed routers shall support the following:</p> <p>Network Time Protocol (NTP)</p> <p>TELNET</p> <p>SSH</p> <p>FTP/ SFTP</p> <p>TFTP</p> <p>Syslog</p> <p>RADIUS for AAA</p>
31	The proposed router shall provide SNMP based Traps and Alarms to the configured EMS/NMS.SNMP v1, v2 and v3 should be supported
32	The router should support Internet Group Management Protocol (IGMP) v1, v2 and v3
33	<p>The Router should support the following programmability features:</p> <ul style="list-style-type: none"> • The Router should support NETCONF/RESTCONF interface for device configuration • The router should support Openconfig or IETF • The solution should support the network configuration protocol (NETCONF) that provides mechanism to install, manipulate and delete the configuration of the network devices • The solution should support an architecture for network management using NETCONF
34	The Router should support Zero touch provisioning and auto configuration through an orchestration solution.

Technical specifications for Master Mandal Routers	
S. No.	Specifications
35	The Router should send the status and monitoring attributes to EMS/ NMS
36	The proposed router shall provide appropriate service measurement parameters using Y.1731 or equivalent.
37	The system shall have the standard rack mountable capacity of 19" / 21" (ETSI compliant),
38	Should have to support Out of band management through Console / external modem for remote management.
39	Shall support standard model driven telemetry mechanism through JSON / GPB / XML /NETCONF for router management and monitoring
40	The routers shall provide hardware accelerated IETF NetFlow or equivalent feature. This feature shall be available for all interfaces provisioned on the router with hardware acceleration.

Technical specifications for Mandal/ Block and GP routers			
S. No.	Parameters	Mandal/ Block Router	GP Router
1.	Category of Router	<p>The router/Operating System should be compliant to TEC- GR 48050:2022 dated on March 2022 or its latest amendment as per non-Chassis based Aggregation router Category XV or Chassis based Category VI. The OEM shall need to submit a copy of valid TSEC/ TAC or proof of having applied for TSEC/ TAC (BSNL registered QF-103 or TEC Form- B) at the time of technical bid submission and the final certificate before commencement of shipment</p> <p>Router should be provided with 1+1 or N +1 power supply and Fan redundancy. Power</p>	<p>The router/Operating System should be compliant to TEC- GR 48050:2022 dated on March 2022 or its latest amendment as per non-Chassis based Aggregation router Category XV. The OEM shall need to submit a copy of valid TSEC/ TAC or proof of having applied for TSEC/ TAC (BSNL registered QF- 103 or TEC Form-B) at the time of technical bid submission and the final certificate before commencement of shipment.</p> <p>Router should be provided with 1+1 or N +1 power supply and Fan redundancy. Power supplies and Fans should be hot swappable for high availability,</p>

Technical specifications for Mandal/ Block and GP routers			
S. No.	Parameters	Mandal/ Block Router	GP Router
		supplies and Fans should be hot swappable for high availability, to ensure that there is no outage till both (main and standby) power supplies/ fans fail.	to ensure that there is no outage till both (main and standby) power supplies/ fans fail.
2.	Quantity of each Type of Interface i.e. 100G, 10G, 1G etc	<p>The router can be Chassis based for Type A with Control plane & Data plane redundancy but shall be of non-chassis based 1RU form-factor for Type B.</p> <p>Routers shall be as per requirement of chassis and non-chassis router defined in GR 48050:2022 Block Routers shall be of two configuration:</p> <ol style="list-style-type: none"> 1. Type A <ul style="list-style-type: none"> Router should support switching capacity of minimum 800 Gbps. The router should be enabled on day 1 with the following configuration: <ol style="list-style-type: none"> a. 4 port of 100G (with 40km pluggable) b. 12 port of 10 G (with 40km pluggable) c. 4 port of 1G/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP) 2. Type B <ul style="list-style-type: none"> Router should support switching capacity of minimum 300 Gbps. 	<p>The router shall be of non-chassis based 1RU form- factor, GP Routers shall be of two configuration:</p> <ol style="list-style-type: none"> 1. Type C- <ul style="list-style-type: none"> Router should support switching capacity of minimum 80 Gbps. The router should be enabled on day 1 with the following configuration: <ol style="list-style-type: none"> a. 4 ports of 10G (with 40km pluggable) b. 4 port 1/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP) c. 4port1G(with10km pluggable) 2. Type D <ul style="list-style-type: none"> Router should support switching capacity of minimum 40 Gbps. The router should be enabled on day 1 with the following configuration: <ol style="list-style-type: none"> a. 2 port of 10G (with 40km pluggable) b. 2 port of 1G/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP)

Technical specifications for Mandal/ Block and GP routers			
S. No.	Parameters	Mandal/ Block Router	GP Router
		<p>The router should be enabled on day 1 with the following configuration:</p> <ul style="list-style-type: none"> a. 2 port of 100G (with 40km pluggable) b. 8 port of 10G (with 40km pluggable) c. 4 port of 1G/10G (All ports should be usable for both 1G as well as 10G as per plugged SFP) <p>Note: Pluggables will be as per BoQ</p>	<p>c. 4 port 1G (with 10km pluggable)</p> <p>Note: Pluggables will be as per Fiber planning</p>
3.	Wavelength, Distance criteria etc of each type of optical interface	The router should support all 100G ports for 100m, 10km, 40km & 80KM pluggable, and 10G ports for 100m, 10km, 40km & 80KM pluggable.	The Router should support 10G with 10km,40km,80km pluggable and 1GE optical port for 100m, 10km pluggable support.
4.	Requirement of optional Security features	Router shall have support for DHCP snooping feature. All security requirements mandated with flag "Y" in the feature mapping table of the GR for category XV	Router shall have support for DHCP snooping feature. All security requirements mandated with flag "Y" in the feature mapping table of the GR at page-137 for category XV
5.	Requirement of EMS	Single EMS of adequate capacity is to be supplied for all routers in the State. EMS will be as per Section 3.22 of TEC- GR 48050:2022 dated March 2022 or its latest version.	Single EMS of adequate capacity is to be supplied for all routers in the State. EMS will be as per Section 3.22 of TEC- GR 48050:2022 dated March 2022 or its latest version.
6.	Requirement of EMS network as per clause 3.33.1		
7.	Requirement of EMS network redundancy and network elements	Single EMS of adequate capacity is to be supplied for all routers in the State. EMS will be as per Section 3.22 of TEC- GR 48050:2022 dated March 2022 or its latest version.	Single EMS of adequate capacity is to be supplied for all routers in the State. EMS will be as per Section 3.22 of TEC- GR 48050:2022 dated March 2022 or its latest version.
8.	Category and Type of Server Required for the EMS		

Technical specifications for Mandal/ Block and GP routers			
S. No.	Parameters	Mandal/ Block Router	GP Router
9.	Type of Storage Required for the EMS		
10.	Requirement of Optional EMS features		
11.	Scalability requirements for the SLA Management system like no. of business customers, maximum leads per customer etc may be provided		
12.	North Bound interface required towards NMS		
13.	Requirement of Optional Features		
14.	Clock support	Router should support NTP, Sync E, IEEE 1588v2 PTP (including G8265, G8273, G8275 profiles as applicable) and NTP. It should have internal Stratum 3E clock with holdover time of at least 4 hours.	Router should support NTP, SyncE, IEEE 1588v2 PTP ((including G8265, G8273, G8275 profiles as applicable) and NTP. It should have internal Stratum 3E clock with holdover time of at least 4 hours.
15.	Ipv4 / Ipv6 Routes to be supported shall be specified for the aggregation and Core Routers among the options given	The router should have capability of minimum 2 lakh Ipv4 / 1 lakh Ipv6 routes.	The router should have capability of minimum 20k Ipv4 / Ipv6 routes.
16.	Documentation requirements as per clause 10.1	<p>The contractor shall provide following documents:</p> <ul style="list-style-type: none"> a. System description documents b. Installation, Operation and Maintenance documents c. Training document d. Repair manual <p>All technical documents shall be in English language both in CD- ROM and in hard copy.</p>	<p>The contractor shall provide following documents:</p> <ul style="list-style-type: none"> a. System description documents b. Installation, Operation and Maintenance documents c. Training document d. Repair manual <p>All technical documents shall be in English language both in CD- ROM and in hard copy.</p> <p>All necessary interfaces, connectors, connecting cables</p>
17.	Additional Installation Requirements as per clause 10.2		
18.	Maintenance Requirements as per clause 10.3		

Technical specifications for Mandal/ Block and GP routers			
S. No.	Parameters	Mandal/ Block Router	GP Router
		<p>All necessary interfaces, connectors, connecting cables and accessories required for satisfactory installation and convenient operations shall be supplied. Type of connectors, adapters to be used shall be in conformity with the interfaces defined in this GR.</p> <p>All installation materials, consumables, and spare parts to be supplied.</p> <p>All literature and instructions required for installation of the equipment, testing and bringing it to service shall be made available in English language.</p> <p>For the installations to be carried out by the supplier, the time frames shall be furnished by the supplier including the important milestones of the installation process well before commencing the installations.</p> <p>Special tools required for wiring shall be provided along with the equipment.</p> <p>All the software updates shall be provided on continuous basis for a minimum period of 7 years or up to validity of the contract, whichever is later from the date of induction of system in the telecom network. These updates shall include new features and services and other maintenance updates.</p> <p>In the event of a bug found in the software, the manufacturer shall provide patches and</p>	<p>and accessories required for satisfactory installation and convenient operations shall be supplied. Type of connectors, adapters to be used shall be in conformity with the interfaces defined in this GR.</p> <p>All installation materials, consumables, and spare parts to be supplied.</p> <p>All literature and instructions required for installation of the equipment, testing and bringing it to service shall be made available in English language.</p> <p>For the installations to be carried out by the supplier, the time frames shall be furnished by the supplier including the important milestones of the installation process well before commencing the installations.</p> <p>Special tools required for wiring shall be provided along with the equipment.</p> <p>All the software updates shall be provided on continuous basis for a minimum period of 7 years or up to validity of the contract, whichever is later from the date of induction of system in the telecom network. These updates shall include new features and services and other maintenance updates.</p> <p>In the event of a bug found in the software, the manufacturer shall provide patches and firmware replacement if involved, free of cost.</p> <p>Compatibility</p>

Technical specifications for Mandal/ Block and GP routers			
S. No.	Parameters	Mandal/ Block Router	GP Router
		firmware replacement if involved, free of cost. Compatibility of the existing hardware shall be maintained with future software/firmware.	of the existing hardware shall be maintained with future software/firmware.
19.	Environmental Conditions- The routers shall be installed in the buildings without air conditioning where adequate ventilation may or may not be available. Therefore, the routers shall meet the Temperature and Humidity Requirements as per Category B of QM-333 standard.		

III. Technical Specifications for EMS of Routers

Server Hardware Specification

S. No	Server Hardware Specifications
1	The Server proposed shall conform to TEC Standard No.: TEC 48140:2018 or latest amendment if any (old document No.- TEC/GR/IT/SRV- 001/02/MAR-18).
2	All the servers shall be DC/AC powered for Data centers.
3	The processor loading at rated capacity of the network elements shall not exceed 70% of the total processor capacity
4	Server shall be 64-bit RISC / EPIC / CISC architecture processors with minimum 8 cores in each server.
5	The server should be provided with a minimum of 2 numbers of hot plug 600GB10K RPM SAS hard disk drives
6	No of equipped cores shall be as per sizing given by the software (Application) OEM.
7	Server shall have dual redundant power supplies.
8	All servers shall be rack mounted using rack mounting kits to be supplied by the server vendor (OEM).
9	The EMS must support and work in HA mode.

Storage System Specifications

S. No	Storage Hardware Specifications
1	The Storage system proposed shall conform to Entry-level storage category of TEC Specification/GR No. TEC/GR/IT/DSI-001/04/DEC- 2015 or latest.
2	All Storages shall be DC/AC powered.
3	The Storage system shall be provided in RAID 5 configuration.
4	The bidder can propose the Storage as per the solution requirement, either built-in within the Server or proposed as external Storage System to meet the solution requirement.

IV. State- NOC

1 General:

Proposed S-NOC shall be the 'heart' of the network that assists in enhancing efficiencies of operations and management of all active and passive network elements. It shall provide a holistic view of all network operations allowing monitoring, control, and automation of various functionalities at an individual system level.

2 Responsibilities of the S-NOC:

As part of BharatNet Phase-II implementation, state has already established S-NOCs with state of art facilities at Tirupati (DC) & Visakhapatnam (DR). Bidders are advised to conduct a detailed assessment of the existing NOCs and factor in any required upgrades to meet the RFP requirements while submitting their bids.

- PIA needs to survey the site; design the layout of the site including all the standard furnishings etc. to make the S-NOC operations.
- The complete BoQ of the work to be done at S-NOC needs to be submitted along with the design and approval to be taken from APBIL before start of the work.
- S-NOC shall be manned with qualified manpower for S-NOC operations. S-NOC shall be managed 24x7x365 and accordingly manpower to be planned.
- S-NOC shall act as centralized management of full-network resource and service inventory to improve utilization of in-service resources.
- The IT infrastructure at S-NOC will be in full redundancy architecture and will be provisioned with the required storage, computing, networking, security, backup, monitoring, management and help desk components.
- The S-NOC will house the OSS solution to monitor the complete IP network (all the active devices, any other SNMP enabled devices in the network, IT systems in the S- NOC) and optical network.
- The S-NOC will house the BSS solution to enable retail, enterprise and wholesale FTTH, ILL, P2P LL, MPLS VPN etc. services as per the requirement of APBIL across the Contract Period.
- S-NOC shall always be able to generate inventory report of active elements like port status, port utilization status etc. for future perspective through Network Management System (NMS).
- S-NOC shall have a centralized monitoring console displaying network topology map. It shall provide key correlation analysis for network fault processing to improve network fault processing efficiency, provide performance & trend analysis of network equipment and impact range of network fault, network usage, availability and performance for server nodes etc.
- All the EMS like routers & RFMS of the existing network as well as to be deployed under ABP, UBR, DMW and any other alternate technology EMS will be integrated to S-NOC NMS
- The NMS and all EMS of S-NOC will be integrated with Central BharatNet main NOC and DR NOC (C-NOC). The integration of S-NOC with C-NOC will be based on open standards. The prospective bidders should plan the deployment accordingly.

3 Functional requirements of S-NOC:

Sr. No.	Category	Functional Specification
1.	General	<ul style="list-style-type: none"> a. S-NOC to provide key correlation analysis for network fault processing to improve network fault processing efficiency b. Provide the function of automatic service design and resource distribution c. Provide performance & trend development analysis of network equipment and impact range of network fault and supply end-to-end service quality management & control, which control network & service quality continuously and enhance customer satisfaction d. Provide Field Operation Assistance (FOA) for field engineers e. S-NOC would also maintain necessary reports like details of no. of nodes per logical links on any particular fiber route through NMS. f. Minimum 10 licenses for helpdesk solution to monitor the state network for performance and resolution of all alarms related to network to be deployed. g. Logs and other items like trouble ticket details related to invoicing and payment shall be retained for 1 year or date of h. invoice settlement whichever is later
2.	Key Function and Operation	<ul style="list-style-type: none"> a. NOC should have following key functions: <ul style="list-style-type: none"> I. Centralized Operation II. Fault management III. Network performance/ SLA management IV. Planning and Engineering V. Service management VI. Spare Management VII. RFMS management for fault management b. NOC should have following field operations activity: <ul style="list-style-type: none"> I. Connectivity II. IT and Security III. Provisioning on field
3.	Core Function	<ul style="list-style-type: none"> a. Core infrastructure supports for NOC: <ul style="list-style-type: none"> I. Next-gen firewall along with NIPS II. Core switches for traffic aggregation III. Integration with existing OSS/ NMS for equipment monitoring and reporting IV. BSS for provisioning of services V. Network inventory management system VI. Remote Fiber Monitoring Software (RFMS) system

Sr. No.	Category	Functional Specification
		VII. Helpdesk (or Incident management system)
4.	Availability	<ul style="list-style-type: none"> a. 2 NOC core routers operating in high availability mode b. Minimum 2 core switches with high switching capacity which will be connected on mesh mode to have high availability c. All the servers like (NMS, Webserver etc.) & Firewall devices will be connected to core switches
5.	Servers	<ul style="list-style-type: none"> a. All servers like Helpdesk, EMS, OSS, BSS, AAA, Backup etc. with necessary hardware and software
6.	Firewall Support	<ul style="list-style-type: none"> a. The Firewall must support application identification natively, without requiring any license/ subscription/ blade. There should not be any need to buy any license for application visibility and the firewall must operate at Layer 7 natively. b. NOC must support Firewall, Application visibility and control, IPS, from day one and support for URL Filtering. c. NOC should support language like English, Hindi and regional languages for URL and IP database to fulfil web security needs d. All the servers will be kept behind firewalls e. NOC must have always on access to the firewall. The firewall should have dedicated inbuilt hardware resources for firewall access and management at all times and must be available irrespective of load. f. The NIPS and NGFW shall not be implemented in same security layer. Antivirus, Anti malware, Anti bot will have to be available at edge device. g. Performance Parameter: Next-Gen Firewall throughput must be 60 Gbps. The device must have capability of handling adequate Concurrent Sessions (TCP). IPSEC VPN throughput of 40 Gbps and SSL inspection throughput of 20 Gbps. It should be able to support http, https traffic. h. Interface Requirement: 4 X 10 G SFP, scalable to 6 x 10 G SFP i. All required transceivers as per solution design should be populated from day one j. Proposed solution must be dedicated purpose-built firewall device which enables the convergence of high performing networking and security across the security platform. k. The proposed solution must be quoted in high-availability mode with 2 appliances and active/active & active/passive modes must be supported on both IPV4 & IPV6.

Sr. No.	Category	Functional Specification
7.	User Licenses	There shall not be any limit on user creations for accessing all the applications. However, licenses for concurrent sessions for accessing all the applications shall be at least 40
8.	Video Wall	<p>a. The Video Wall should have configuration of 4(C) x3(R) of 70" Diagonal with Laser/RGB Laser Light Source having minimum resolution of Full HD (1920 X 1080 Resolution per cube), minimum onscreen brightness of 500 cd/m2, Dual redundant (1+1) redundancy and hot swappable power supply, video wall controller along with wall management software should be able to control all the cubes from a single logical area and should have minimum 12 HDMI/ DVI inputs.</p> <p>Note: The existing video walls can be utilized, subject to meeting the requirements of ABP.</p>
9.	Non-IT infrastructure	<p>To provide non-IT infrastructure including but not limited to tables and chairs for helpdesk support staff in NOC</p> <p>a. To provide fixtures, cable trays and racks for the server/telecom room. All structured LAN cabling for entire NOC along with necessary accessories I/O, faceplate, backbox, cable trays, jack panels.</p> <p>b. Physical structure, ergonomically designed desk to ensure 24x7 desking solution with sufficient knee space and foot space.</p> <p>c. The console top / working surface should be made of MDF with high pressure laminate finish. The laminate shall be fire retardant, insulated, waterproof, scratch resistant and high hardness.</p> <p>d. Consoles must be of modular design, facilitating future equipment retrofits and full re-configurations without requiring any major modification to the structure or exterior elements</p> <p>e. The workstation shall be able to house computer equipment, Ethernet Points, Power Distribution Unit. The CPUs shall be mounted/ kept on slide out CPU trays (mounted on heavy duty slides) for ease in maintenance, all of these equipment's should be concealed from direct human view while ensuring that adequate leg space is available for the operator.</p> <p>f. Ergonomic chair with arm rest and castor wheels designed for 24/7 usage</p> <p>g. Backrest support should be tilt adjustable</p> <p>h. Warranty/guarantee for tables/ workstations and chairs should be for entire contract period (10 years)</p> <p>i. Air conditioning, earthing, fire and safety facilities to be provided by PIA as per actual requirement</p>
10.	UPS	<p>a. NOC should be with proper building management system, civil and electrical Infra with 40 KVA UPS (1+1), 40 kVA/ 40kW 3 phase 415V, 50Hz input/ output online UPS (with SNMP) in 1+1 configuration with Li-ion battery for 60 minutes backup.</p>

Sr. No.	Category	Functional Specification
		<p>Certification: ISO9001:2015.</p> <p>Note: The existing UPSs can be utilized, subject to meeting the requirements of ABP</p>
11.	DG	<p>a. Silent DG of 100 KVA, engine should be full authority electronic with common rail fuel system 50 degree C ambient capability. Emissions useful life of after treatment systems not less than 8000 hours. Silencer should be hospital grade & oil change interval of 750 hours/1 year. Controller should have built in AMF functionality with RS 485 interface CAN compatible.</p> <p>Note: The existing DGs can be utilized, subject to meeting the requirements of ABP.</p>
12.	Data Centers at S-NoC(s)	<p>a. Access Control: The Data Centre in the S-NOC should be fitted with suitable high security access control system.</p> <p>b. IP Camera: minimum 2 Nos, one on the front and one rear side with software & internal storage (data storage capacity should be sufficient for minimum 30 days)</p> <p>c. Electrical: Raw power point will be given by user, raw DB, UPS input/output DB and associated wiring has to be done by bidder.</p> <p>d. Monitoring: intelligent monitoring system with an ethernet 10BaseT network connection</p> <p>e. Cooling: Air conditioning as per actual requirements. Separate cost saving air-conditioning solutions like PAC, in-row cooling, Smart row, smart suite, smart isle etc shall be deployed for Data Centre Racks housing servers/storage/networking equipment etc to optimize OPEX. Comfort Air conditioning solution shall be provided for other areas.</p> <p>Note: The existing Data Centers can be upgraded as per the requirements of ABP.</p>
13	Integration of BharatNet NOC	<p>The selected PIA shall be responsible for integrating the existing BharatNet NOC infrastructure with the Central BBNL NOC, in alignment with the revised requirements stipulated in this RFP. The scope of work includes seamless integration of newly introduced network elements in this RFP into the existing monitoring and management framework, ensuring end-to-end visibility at the Central BBNL NOC.</p> <p>The integration shall be carried out through standardized APIs and interfaces and shall include, but not be limited to, the following functional areas:</p> <ol style="list-style-type: none"> 1. Inventory tool management 2. Fault management 3. Configuration management

Sr. No.	Category	Functional Specification
		<ol style="list-style-type: none"> 4. Trouble Ticket Management system 5. Performance management 6. Service/ connections inventory 7. SLA monitoring, measurement and reporting <p>The PIA shall ensure that all newly added network elements are fully discovered, provisioned, monitored, and managed within the existing BharatNet NOC framework and that all relevant data, alarms, performance metrics, and service parameters are synchronized with the Central BBNL NOC. The integration shall maintain operational continuity, data integrity, and compliance with BharatNet and BBNL NOC standards, processes, and architecture.</p>

IV.1 SNoC Bill of Material

Functional Requirements of items mentioned in the S-NOC BoM, but minimum requirements not mentioned in the above-mentioned Table are given below-

S. No.	Category	Functional Specification
1.	NOC Router	<ol style="list-style-type: none"> a. The router shall be CE 2.0 certified or TEC-GR: TEC/GR/IT/TCP- 006/01/AUG-16 compiled. b. The router shall support a redundant and scalable architecture, including CPUs, modular power supplies, and performance components. c. All interface modules and power supplies shall be hot-swappable and provided with 1+1 route processor, 1+1 or 1+N switch fabric and power supply redundancy. d. It shall also support minimum nonblocking capacity of 1.6 Tbps full duplex and handle minimum 256K IPv4 and 128K IPv6 routes. e. It shall have minimum ports 2*100 G, 4*40G and 12*10G and may be extended in future as per requirement. f. The router shall support multicast, routing and protocols required to run services as mentioned in clause no. 3.5 (f) of Section – IV B in RFP g. The router shall support traffic classification, congestion management, traffic conditioning, hierarchical QoS policies and various other security features to prevent network attacks and vulnerabilities h. The router shall support access control lists to filter traffic based on parameters, per-user authentication, authorization and accounting. i. Operate within a temperature range of 0 to 40 degrees Celsius and humidity levels of 10% to 90% non-condensing. j. The router shall provide wire-rate throughput on all interfaces, with sufficient optical distance to eliminate the need for additional equipment. k. The routers shall be supplied with necessary power cords, data cables,

S. No.	Category	Functional Specification
		connectors, CD's, manuals, bracket accessories, wire managers and other appropriate accessories.
2	Core Switch	<ul style="list-style-type: none"> a. The switch shall support non-blocking Layer 2 switching and Layer 3 routing, providing 1:1/N+1 redundancy for power supplies, fan trays and fan. b. The switch shall support 24 x 10/40/100 G fiber interfaces, console port, and management interface for Out-of-Band Management. c. The switch shall support multicast, routing and protocols required to run services as mentioned in clause no. 3.5 (f) of Section – IV B in RFP d. It should support sufficient IPv4 and IPv6 routes and hardware-based load balancing, as per requirement, if not provided by any other mechanism. e. The switch shall support classification and marking, methods for identifying traffic types, and real-time traffic differential treatment and support hierarchical QoS policies. f. The switch shall support port-based authentication from Layer 2 to Layer 4, control plane protection, stringent security policies, AAA and various other security features to prevent network attacks and vulnerabilities, provided these are not addressed by any other mechanism in S-NOC. g. The switch shall support remote login using Telnet and SSH V.2.
3	Aggregator or Switch	<ul style="list-style-type: none"> a. Access switch shall support non-blocking Layer 2 switching and Layer 3 routing to ensure seamless data flow across the network. b. It shall support 1:1/N+1 redundancy and reliability for critical features such as components power supplies and fans to eliminate single points of failure. c. It shall support high-speed connectivity equipped with 48 x 10/ 25G Fiber and 4 x 40/ 100G ports, enabling high-speed data transmission and scalability. d. It shall support scalable routing and capable of handling sufficient IPv4 and IPv6 routes, as per requirement. e. It shall support load balancing ensuring optimal traffic distribution and performance. f. It shall provide robust security with port-based authentication, control plane protection, and support for external AAA databases. Includes comprehensive management features like SNMP v2/v3, centralized syslog, and packet capture capabilities. g. The switch shall support multicast, routing and protocols required to run services as mentioned in clause no. 3.5 (f) of Section – IV B in RFP
4	SAN storage for application & DB	<ul style="list-style-type: none"> a. Existing San storage can be utilized by upgrading up to 500 TB based on the application utilization and backup solution. b. SAN storage shall have provision of enterprise all-flash storage arrays for high-performance application. c. It shall ensure 99.9999% availability with SAN solutions configured for optimal and consistent performance.

S. No.	Category	Functional Specification
		<p>d. It shall implement regular backups to disk-based systems and transfer to object storage for long-term retention and it should have scalable object storage.</p> <p>e. It shall use enterprise SSD disks with dual parity RAID-6 for application and DB storage.</p> <p>f. It shall include multiple hot spares, active-active architecture, and fault-tolerant design without single points of failure.</p> <p>g. It shall provide a minimum of 8 point-in-time copies or snapshots with at least 20% of storage capacity allocated for snapshots.</p> <p>h. It shall offer centralized management software for monitoring, performance analysis, and support for various operating systems and databases.</p>
5	San Switch	<p>a. The SAN switch shall comply with TEC GR No. TEC/GR/IT/DSI- 001/04/DEC 2015 section 3.13 or latest amendment and have a director- class, non-blocking architecture.</p> <p>b. Its shall be scalable to 48 ports in a single domain, with 16 Gbps full duplex ports, ensuring high throughput and low latency.</p> <p>c. It shall have two fibre channel switches in a high availability mode, with no oversubscription at 16 Gbps, ensuring reliability and performance.</p> <p>d. It shall operate at 16 Gbps and auto-negotiate to 8 Gbps/4 Gbps. All components shall be hot-swappable and field-replaceable, allowing non-disruptive maintenance.</p> <p>e. It shall have no single point of failure and include dual-redundant control processors, redundant hot-swappable power and cooling subsystems.</p>
6	Blade Chassis/ Rack servers (including AAA)	<p>a. The PIA shall optimize server and processor hardware requirements, ensure redundancy and allow application combinations as needed.</p> <p>b. It shall have 64-bit latest CPU architecture, 2.5 GHz, 512 GB RAM extendable up to 1 TB.</p> <p>c. It shall ensure high availability and scalability, supporting multiple partitions and dynamic resource allocation with security isolation between partitions.</p> <p>d. It shall support 10/20/40 Gigabit Ethernet and have at least four 8/16 Gbps fibre channel adapters with redundancy, segregating public/private traffic.</p> <p>e. It shall support proactive failure detection, dynamic partition migration, dual redundant power supplies, ECC cache, and pre-failure alerts, with a 20% resource headroom.</p>

S. No.	Category	Functional Specification
		<p>f. It shall have Independent OS images in each partition, supporting virtual IP, dynamic processor allocation, online upgrades, clustering, patch management, and volume/file system management.</p> <p>g. Applications shall failover to high availability servers in separate partitions, with dynamic CPU resource allocation and maintaining performance without degradation, supporting minimum 2 x 1 TB internal SSD.</p> <p>h. The AAA server/ appliance shall provide authentication and security policy enforcement for network users and infrastructure, supporting redundant servers and remote databases for large-scale environments.</p> <p>i. The AAA server/ appliance shall offer web-based interface for simplified configuration, dynamic quotas for access restrictions, and flexible administration of security policies across network devices.</p>
7	Backup and archival solution	<p>a. Backup software shall operate on Windows, Linux, and UNIX platforms, supporting backup and restore across all type of operating systems.</p> <p>b. It shall support OS, database, and virtualization software backup.</p> <p>c. It shall be capable of backing up data from one platform and restoring it to another.</p> <p>d. It shall support multiple backup frequencies (daily, weekly, monthly) and utilizes 256-bit advanced encryption for secure data backups without additional licensing costs.</p> <p>e. It shall provide command-line support across supported platforms and features wizard-driven configuration for simplified setup and modifications.</p> <p>f. It shall offer firewall support, role-based access control, and cross- platform domain architecture for secure user management in multi- tenant environments.</p> <p>g. It shall Include deduplication, data multiplexing, hardware snapshot backups, and support for virtual platforms and databases, ensuring comprehensive backup capabilities.</p> <p>h. It shall Integrate with third-party Virtual Tape Libraries (VTLs) with deduplication capabilities and provides extensive web-based/GUI reporting for detailed backup management.</p> <p>i. It shall support scalable deployment with multiple worker/storage/media servers and allows direct data movement from clients to backup storage for efficient operations.</p>

S. No.	Category	Functional Specification
8	NMS/ OSS Solution	<ul style="list-style-type: none"> a. The OSS shall be telco-grade solution with proven scalability robust integration (SNMP and open-source APIs), and high availability on various OS. b. It shall support comprehensive eTOM coverage including next generation OSS providing Service assurance and Service fulfilment, spanning, Inventory, Discovery, Service provisioning, Service activation, Fault, Incident, Task, Device, SLA, Performance, Problem and Change management. c. Is shall provide unified GUI for network management, featuring end-to-end circuit diagrams, topology views, alarm management with root cause analysis, severity levels, and automatic ticketing. d. It shall support advanced CMDB functionality for managing active/passive inventory, custom attributes, workflow-based discrepancy resolution, and integration via standard NBIs. e. It shall provide auto-discovery of network inventory, circuits, and protection mechanisms with detailed GUI visualization and reporting capabilities. f. It shall support for auto-diagnosis, predictive analytics, service outage management, and detailed RCA with actionable alarms and SMS/email notifications. g. It shall support customizable network topology views including IP networks, device icons, and geo-location maps with interactive drill-down capabilities. h. It shall provide network diagram builder with Visio-like interface, primary/backup connection definitions, and automatic failover notifications. i. It shall provide real-time monitoring of device health, performance metrics, interface bandwidth, VLANs, and circuit levels with configurable KPIs and data aggregation. j. It shall support for Threshold Crossing Alerts (TCA), rule-based alarms, customized reports, and real-time data export in Excel format. k. It shall support End-to-end incident management with multi-channel creation, automatic timestamp recording, SLA mapping, dynamic workflows, and comprehensive audit trail. l. It shall support self-service capabilities for incident tracking, knowledge article access, customer surveys, role-based access control, and integration with field service GPS tracking.

S. No.	Category	Functional Specification
10	NIPS (1+1)	<ul style="list-style-type: none"> a. The NIPS appliance shall be dedicated firmware, independent from firewall or UTM functions, which means NIPS shall be purpose-built dedicated appliance. b. It shall support up to 60 Gbps inspection throughput. c. It shall handle up to 20 Gbps of TLS traffic inspection, supporting 10,000 new SSL connections per second and 1,00,000 concurrent SSL connections with a provision to extend up to 20% in future. d. It shall have Internal fail-over capabilities on interfaces up to 20 G to maintain network continuity during hardware failure. e. It shall defend against IPv4, IPv6, MPLS, and tunnelled traffic, including protocol/application anomalies and P2P attacks. f. It shall offer 15,000+ built-in IPS signatures, supports signature imports and allows flexible signature to enable/ disable and IP exemptions. g. It shall provide comprehensive protection with exploit detection, vulnerability scanning integration, layer 2 fallback, and IP reputation blocking.
10	End point security solution	<ul style="list-style-type: none"> a. End point protection software shall be single agent software for NGAV, EDR, Threat Hunting, Application Control, Vulnerability Protection, Firewall, and Device Control, operable without additional updates. b. Supports IPv4 and IPv6. c. Comprehensive protection against viruses, Trojans, worms, spyware, adware, and other malicious tools. d. Full malware scan with configurable exclusions and performance controls. e. Utilizes behaviour monitoring and machine learning to detect fileless attacks and unknown threats with an in-house anti-malware engine. f. Safeguards documents from ransomware, including backup capabilities. g. Automated cleanup of malware remnants and infected system elements. h. Blocks Command and Control (C&C) traffic, malicious websites, and protects against vulnerabilities with virtual patching and CVE-based rules.
11	Help desk Solution	<ul style="list-style-type: none"> a. The help desk solution shall be converged communication system supporting analog and IP devices on a server-gateway architecture, scalable up to 25 stations. b. It shall be SIP-based voice network with full redundancy (1:1) and support for IPv6 for futureproofing. c. It shall support ACD features include skill-based routing, customizable queuing, real-time statistics, and agent chat. d. It shall support IVR capabilities encompass voice support, HTTP/XML integration, outbound campaigns, and IVR application performance reporting.

S. No.	Category	Functional Specification
		<p>e. It shall support email integration with Exchange for queuing, routing, and agent automation, real-time supervisor reporting.</p> <p>f. It shall provide IP Phones with monochrome display, speakerphone, headset support, SNMP/DHCP/DNS protocols, and QoS.</p> <p>g. It shall provide video conferencing system with H.265/H.264 support, 1080p resolution, dual monitor HDMI/DVI outputs, and cloud platform compatibility.</p>

Note:

1. The PIA has to maintain the network for the entire contract period as per the KPIs & SLA parameters defined in the tender. The specifications / functional requirements/ dimensions mentioned in the tender for S-NOC are minimum requirement.
2. The PIA shall have to plan and deploy the hardware/ software in S-NOC to meet the SLA and O&M requirements. The PIA shall also deploy suitable security features to protect the NOC and the network from any security breaches.
3. The PIA shall provide MRTG graphs for all commercial/enterprise connections/services
4. The PIA shall provide unified network dashboard.
5. The PIA shall provide Enterprise dashboard and reports to all enterprise customers (Both BharatNet and APSFL)
6. The PIA shall provide Syslog, support auto backup facility, support as per regulatory norms.
7. All the hardware and software must be compatible to IPV4 and IPV6.
8. The equipment must support VLAN as per service.
9. The equipment must support, deliver Triple-Play and enterprise service and any latest service delivery.
10. PIA must design, implement, test and demonstrate segment routing.

IV.2 Indicative Bill of Material (BoM)

#	Item	UoM	Total Qty
NOC NON – IT			
1	Civil works including site preparation and partitioning , false flooring, false ceiling, etc.	Lot.	1
2	Electrical works including light fixtures, cabling, panels + earthing etc.	Lot.	1
3	Silent DG set with AMF panel and required foundation and civil structure	No.	1
4	Air conditioning for NOC, UPS, BMS, Meeting, electrical rooms, etc.	Lot.	1
5	40 kVA online UPS (with SNMP) with 60 minutes battery backup and battery enclosure (in 1+1 configuration)	Set	1
6	Access Control System (RFID + Biometric, smart cards) to manage NOC	Lot.	1

#	Item	UoM	Total Qty
NOC NON – IT			
7	Racks (Integrated Air conditioning and climate monitoring system covering entire Racks/suite/Isle/Data Centre only)	Set	1
8	IP camera with intelligent monitoring system including software & internal storage	No.	2
9	70" LED TV	No.	2
10	Structured cabling (OFC and Cat6)	Lot.	1
11	Workstation furniture and fixtures including chairs	Set	15
12	Fire Detection System	Lot.	1
NOC – IT components			
1	NOC Router	No.	2
2	Core Switch	No.	2
3	Access Switch	No.	4
4	Aggregation Switch	No.	2
5	SAN storage for application & DB	Set	1
6	SAN Switch	No.	2
7	Secondary Storage (As per requirement, to be assessed by PIA)	Set	1
8	Blade Chassis/Rack servers (including AAA) (As per requirement, to be assessed by PIA)	Set	1
9	Workstation computers (i5 2.5 GHz processor, 8 GB DDR4, 1 TB HDD with 19.5 Full HD Monitor Key Board & Mouse with all other accessories as per requirement; 1xDVI output, 2xHDMI Output, 1xVGA Output) – Existing infrastructure can be utilized, if required OS licenses to be procured.	No.	10
10	IP phones	No.	10
11	IP PBX	No.	1
12	Video wall display, Controller, Video wall Management Software & Accessories	Set	1
13	Backup and archival solution	Lot.	1
14	NMS/OSS Solution	Lot.	1
15	Helpdesk solution	Lot.	1
16	End point protection software	Lot.	1
17	Centralized Access Control system software for AAA server	Lot.	1
18	Firewall (1+1)	Lot.	1
19	NIPS (1+1)	Lot.	1
20	Remote Fiber Monitoring Software (RFMS) system	No.	1
21	Network color laser printer	No.	1

Note: The existing active and passive infrastructure at S-NOCs created under BharatNet Phase-II, can be utilized/upgraded/replaced to meet the requirements of ABP.

Reports: Around 40 no. of reports are required to be developed by the successful bidder in consultation with the APBIL at the time of the implementation of the S-NOC. These reports shall encompass the planning, operational and MIS parameters. Further, around 10 new reports and 10 customizations of existing reports, every year shall be done free of cost by the successful bidder during the warranty/AMC period to meet any changes in the requirement. Any unused quantum of new reports shall be rolled over to the balance AMC period.

The solution shall support the ability to send SMS/ WhatsApp/e-mail alerts regarding faults as per the defined escalation matrix. SMPP port and WhatsApp business account shall be provided by APBIL on chargeable basis, cost of which shall be reimbursed in the quarterly O&M invoices.

The S-NOC shall be deemed to be commissioned after the following:

- I. Installation and commissioning of all the hardware and software sought in the S-NOC after successful Acceptance Testing
- II. Providing the sought manpower support and the processes
- III. Visibility of at least 100 GP Routers and 5 Block Routers in the S-NOC confirming streamlining of the processes.

V. Technical Specifications of Remote Fibre Management System (RFMS):

Note: The equipment- RFMS and RFTS mentioned anywhere in the RFP may be referred interchangeably.

- a. EMS Server (1+1) and RTU's (Remote Test Units).
- b. The remote test unit should have 48 ports within 2U with 10W power consumption. Connectors to be LC or SC type. Connectors should be in the front panel of RTU preferably. RTU should have Dual DC power input capability/provisioning. Each Nodes, about 50% ports shall be having live or active fiber monitoring facility at 24 Ports (out of 48 Ports) and 24 Ports for dark fiber monitoring. All types of telecom traffic to be considered in case of Live Fiber monitoring.
- c. The OTDR module is required of 1650 nm (used for dark and live monitoring both) and dynamic range should be 40 dB or higher. Pulse width selectable between 6ns and 20µs and better. Event dead zone: = <1 Meter. Attenuation dead zone: 4 Meters; Optical distance accuracy: $\pm(0.75 + 0.0025\% \times \text{distance} + \text{sampling resolution})$.
- d. The system should have high availability feature with automatic switchover from active server to backup server in case of failure.
- e. System should be able to create users and manage passwords from centralized tool. It must allow to create user login, password, email and phone from the organizations directory using Lightweight Directory Access Protocol.
- f. The Administrator will be placed at NOC and manage the system. The solution should support upto 50 numbers of concurrent users having view/edit rights It should be possible for the system administrator of fiber monitoring system to see all the connected users with their IP address in a single window. All the user's activity should be stored in the database and can be displayed with the audit log function. EMS should be able to integrate with other third-party NMS via Rest API or SNMP.
- g. It should be possible that the fiber is still being monitored after a fault is detected. Users are automatically notified if the fault severity or the fault location changes. The user must be notified in case of second fiber cable cut or degradation happens along the cable route before the first cut or degradation is repaired when second cut or degradation is at a shorter distance than the first cut distance. All the changes of event above configured thresholds should be available in alarm history.
- h. The RFTS system will be able to provide alarm, alert notification, and automatic generation of customized reports to provide timely and valuable information on the fiber network health, availability, and provide historical trends of these performance indicators. This capability would be extended to Operation In-charge of each RTU location via web browser (Google chrome etc.) on mobile/tablet/laptop or any device which supports web browser (Google chrome etc.). The RFTS system must have a mobile application operating on android and iOS for remote P2P tests.
- i. Software upgrades from the Server and client should be done remotely. Software upgrades on Remote Test Units shall be done from the server which will contact every RTU automatically for up-gradation. This can be done in bulk and at a specific time.

- j. For each monitored fiber, it should be possible to obtain fiber performance versus time. This graph should show the evolution of the fiber optic budget. The graph can be displayed for the last hour, day, week, month or year. By viewing the evolution of the fiber budget, user should immediately know whether this alarm is caused by a long term or short-term effect.
- k. The system shall have a provision to tag .KMZ/.KML files to be associated to the relevant routes/ports to derive the co-ordinates of the fault or Google map link which can open in google map app which can be installed on PC/Tablet/Mobile phone.
- l. BBNL's GIS server for the entire fiber network is in-service. The RFTS system shall be linked with GIS system. All faults should be displayed on the screen of GIS. RFTS system should be able to take the GIS coordinate provided by third party GIS and incorporate in the email alert and SMS alert. The RFTS EMS vendor shall help the GIS vendor to get the RFTS EMS system integrated with the GIS system via REST API or SNMP.
- m. Integrated cable Management System for Inside and outside plant. Optical Inventory Module for logical and Physical network for port-to-port connectivity, Route search and service provisioning.
- n. The RFMS consist of EMS 1 Set and RTU as per BoM with all accessories as below
 - 1. eMS -1 Set consists of :-
 - 1.1 eMS H/W (Server/storage/firewall) with 1+0 at DC and 1+0 at DR
 - 1.2 eMS S/W (Application/ License)
 - 2. RTU -1 set Consists of :-
 - 2.1. RTU with 48 port,1650nm wavelength,=>40dB. 1 no
 - 2.2. Optical WDM Coupler, 24 nos
 - 2.3. Stop Pass Filter, 24 nos
- o. The offered solution/Make-Model should have been successfully in operation for minimum 40% of required quantities for the State, for at least one year in the TSPs' network anywhere or in BharatNet in India. A certificate from the end user should be enclosed with the Bid.
- p. APBIL may use RFMS deployed by PIA to monitor north bound OFC connectivity, used for backhaul/ management for BharatNet connectivity.

VI. Technical Specifications of Rack at Block and GP

All the equipment at GP shall be AC operated while at the Block, all equipment shall be DC operated.

1. Outdoor/Indoor enclosure for DC Power Plant/AC UPS and Other Network Equipment

Bidder has to provision single multifunction enclosure at each GP and Block for both network and power supply including battery with partitions for power, battery bank and network devices, etc. Separate enclosure for different devices shall not be allowed.

2. Technical Requirement:

All enclosure panels are single walled boltable from inside with earthing to be done on all flat parts,

3. Enclosure Frame Material:

Zinc magnesium coating with 25mm system punching in the roof and base frame plus vertical sections with two mounting levels, rolled out of a single sheet

4. Enclosure Flat Parts Material:

Enclosure flat parts material: Galvanized sheet steel 1.5mm / 2 mm thick of 120 GSM / Front single door with 4-point locking system and rear panel bolttable from inside in single walled construction with door stay, Side panels left and right in single walled construction bolttable from inside, Rain canopy of 75mm height with projection all around, with 300 mm base plinth of 3mm thick, The enclosure flat parts to be gasketed with Outdoor Polyurethane foam gasket, the fasteners will be of SS 304 grade suitable for outdoor application.

5. Dimension:

As per site requirement with provision for minimum 20% additional space for future expansion.

6. Cooling:

The housing should be equipped with DC/AC operated cooling Axial Fans, self-starting, double ball-bearing, temperature-controlled operation via controller. Noise level maximum 65dB. The cooling fans should be on a fan tray for ease of access and easy fault identification and diagnosis. N+1 Configuration fans. Standby fan operates automatically when inside temperature exceeds 60°C OR any of the fans fails. The enclosure should also have provision to mount Outlet filters: Material: ABS/PU, For ventilation by convection size and capacity as per heat load requirement.

7. Quality Certification:

The Rack should conform to DIN 41491, DIN 41494, and IEC 297. All products/OEM should be certified according to ISO 9001, 14001, ISO45001 and IS 13252: PART 1 (2010) & IEC, 60950-1 Protection category: IP55: IS/IEC 60529: 2001. Certificate from NABL accredited lab shall be attached

8. Surface Finishing:

Powder coated with UV Resistant pure polyester RAL 7035 Matt super durable with painting thickness of 80 to 120 microns minimum.

9. Access Control and Monitoring System:

Electromagnetic spring-loaded metal lock with 9-digit electronic keypad reader for front door with IP/SNMP/Web browser-based control and monitoring to central NOC along with temperature, humidity, water logging, fan fail, water leakage from top, fire detection, door

open/unauthorized access monitoring to manage the SLA, Enclosure, Fan and Filter, locking and Monitoring system should be from the same OEM.

There should be an EMS for monitoring major parameters including Input & Output Voltages, Inside & Outside Temperature, Humidity, Alarms, % battery backup time left. It should also be possible to control/switch on/off Non-Critical Loads/ Extra fans. The monitor & Control should be possible from State NOC as well as Central NOC. Last 24 hrs (at least) Alarm & Access events must be stored with Date & Time stamp.

The Rack OEMs may outsource the works related to GI sheet fabrication (cutting, bending, welding) including powder coating of enclosure. Remaining processes like fixing of sensors,

locking system, PU gasketing, camera & all other monitoring accessories and EMS shall be done by the Rack OEM itself. All testing facilities for the rack shall be available with the factory of rack OEM only.

- 10. Temperature based fan operation** – The fans will be in 5+1 configuration and 3 fans will operate when inside temperature is above 25°C, 2 more fans will start operating automatically when inside temperature exceeds 35°C. Standby fan operates automatically when inside temperature exceeds 60°C OR any of the fans fails.
- 11. Hidden camera** – A hidden tamper proof camera will capture a snapshot every time the door is opened and continues to take snapshots at every 5 minutes for one hour and thereafter every 15 minutes until the door is closed and sends the snapshot to NOC, where it is stored for at least 15 days backup.
- 12. Access control system rights and protection** – The password for access control system can be remotely reset by a Super User at NOC. In case of unauthorized access of cabinet or wrong password is entered, a notification will be sent to the NOC and after three failed attempts, the password will be disabled.
- 13. EMS for Rack Operations** – The status of all the racks and all the alarms shall be available in the EMS to be supplied. The EMS shall be integrated both with State NOC and Central NOC.
- 14.** Power supply to the Rack shall be without external ON/ OFF switch, to avoid any accidental power cut. Further, in case of requirement of smart meter, there shall be provision in the rack to install the same inside the rack only.
- 15. Installation instructions for Outdoor Rack at GP:**

Wherever the PIA anticipates access issues, the rack may be planned to be installed outside the building (within the premises). In case of outdoor installation of rack at GP, the PIA shall install the rack on a RCC plinth of minimum 2 feet height to be casted with 2 pipes - one for power and the other for OFC. The cabinet should be grouted with suitable fasteners. No additional payment shall be made for such outdoor installations.

Note:- TSEC for Rack (at Block & GP) shall be obtained as per Technical Specifications mentioned in the RFP.

VII. Deleted

VIII. Technical Specifications of UPS at GP

Minimum Technical specifications for Uninterrupted Power Supply (UPS) System at GP

The Hybrid Uninterrupted Power Supply (HUPS) System at GP shall comply to TEC GR No 66160:2024 with ratings of various modules/ additional functional requirements as mentioned below. The additional functional requirements mentioned below will supersede the specifications in the TEC GR, in case of conflict.

S. No	Particulars	Requirement
1	Inverter	0.5 KVA
2	Rectifier	1+1 with capacity of 25 Amp each
3	Solar Charge Controller	This unit should be pluggable in modular chassis-based design, to connect solar panels as per requirement.

S. No	Particulars	Requirement
4	Solar Panel	2 Nos of solar panels with minimum 500W each as per TEC GR: 66080:2016 and latest amendments if any.
5	DSCA Unit	DSCA Unit shall integrate with the rack for extending all the monitoring parameters to the S-NOC/ C-NOC using SNMP /RS485 protocols.
6	Battery Specifications	<ul style="list-style-type: none"> a) Capacity: 2400 VAH b) Battery Type: Lithium Ion as per TEC GR No.67030:2024 c) BMS Technology: Active BMS d) Battery Theft Prevention: Digital Interlock to Prevent Battery Misuse e) BMS Interlock based on Hybrid UPS & Battery: RS485/CAN bus f) Digital Interlock to Prevent Battery Misuse <ul style="list-style-type: none"> I. Through the implementation of digital interlocking mechanisms, secure communication pathways can be established between the battery and the DSCA via an RS-485 enabled communication module / CAN protocol, or any other protocol II. The battery, equipped with an intelligent Battery Management System (BMS), will be programmed to initiate power supply exclusively upon receiving a specific signal, which the Hybrid UPS will be configured to emit. III. Consequently, ensuring that the battery discharges power solely for the operation of the Hybrid UPS. IV. iv.Should there be any attempt to connect any alternative load, the battery shall be designed not to provide power.
7	Rack	The System should be installed in the rack
8	Other requirements	<ul style="list-style-type: none"> a. The HUPS shall have provision to integrate 12V, 60W Solar Panels already deployed in BharatNet Phase I and Phase II in combination of 1X n no of Solar Panels (n=1 to 4 depending upon internal DC voltage e.g. if internal DC voltage is 48V, then n=4) at the locations where 1 KW solar panel and MPPT based Solar Charge Controller are not provisioned. The PIA shall quote for separate 1 KW MPPT Solar CCU module to connect such taken over solar panels by the PIA in the existing network, with the HUPS. b. The equipment on load (i.e. Router, OLT etc) should not get reset on switching of the input supply from Grid/Solar/Battery or switching from rectifier 1 to rectifier 2.

Technical Specifications of UPS at Block Level

Minimum Technical specifications for Uninterrupted Power Supply (UPS) System at Block Level

The Hybrid Uninterrupted Power Supply (HUPS) System at GP shall comply to TEC GR No 66160:2024 with ratings of various modules/ additional functional requirements as mentioned below. The additional functional requirements mentioned below will supersede the specifications in the TEC GR, in case of conflict.

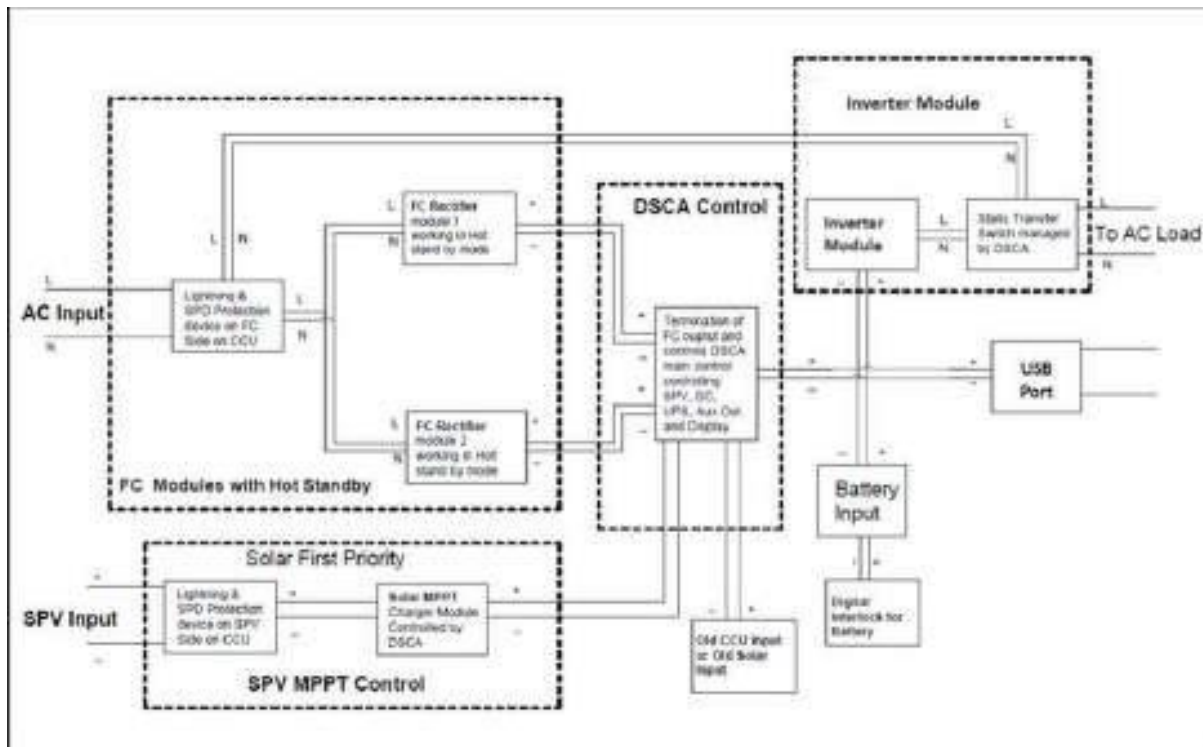
S. No	Particulars	Requirement
1	Inverter	2 KVA
2	Rectifier	1+1 with capacity of 100 Amp each
3	Solar Charge Controller	This unit should be pluggable in modular chassis-based design, to connect solar panels as per requirement.
4	Solar Panel	2 Nos of solar panels with minimum 2KW each as per TEC GR: 66080:2016 and latest amendments if any.
5	DSCA Unit	DSCA Unit shall integrate with the rack for extending all the monitoring parameters to the S-NOC/ C-NOC using SNMP /RS485 protocols.
6	Battery Specifications	<ul style="list-style-type: none">a) Capacity: 9600 VAHb) Battery Type: Lithium Ion as per TEC GR No.67030:2024c) BMS Technology: Active BMSd) Battery Theft Prevention: Digital Interlock to Prevent Battery Misusee) BMS Interlock based on Hybrid UPS & Battery: RS485/CAN busf) Digital Interlock to Prevent Battery Misuse<ul style="list-style-type: none">I. Through the implementation of digital interlocking mechanisms, secure communication pathways can be established between the battery and the DSCA via an RS-485 enabled communication module / CAN protocol, or any other protocolII. The battery, equipped with an intelligent Battery Management System (BMS), will be programmed to initiate power supply exclusively upon receiving a specific signal, which the Hybrid UPS will be configured to emit.III. Consequently, ensuring that the battery discharges power solely for the operation of the Hybrid UPS.IV. iv.Should there be any attempt to connect any alternative load, the battery shall be designed not to provide power.
7	Rack	The System should be installed in the rack

S. No	Particulars	Requirement
8	Other requirements	a. The equipment on load (i.e. Router, OLT etc) should not get reset on switching of the input supply from Grid/Solar/Battery or switching from rectifier 1 to rectifier

Please Note:

QF-103, already obtained against the earlier Technical Specifications shall be acceptable to meet the eligibility for submitting the bid only. Successful bidders shall obtain TSEC against the latest Technical Specification, as above, before supplies.

Indicative Figure for UPS solution



IX. Unlicensed Band Radio (UBR)

1. The Bidder shall supply, install and commission microwave links in 5.X GHz unlicensed band. The transmission equipment shall conform to latest TEC specifications/ GR: TEC/GR/R/ISM-MOD-001/04. MAR 2016 (except for those specific requirements stated in this section or those that have been outdated due to technology advances and the functional requirement has been met or exceeded) complete with Antenna, feeder and installation material. 23/25/27/29/32dbi antennae shall be used in the engineering of the links. The provision of BITE is not essential, provided other provisions like LED to broadly indicate the health of the system for split radio and LCT for full outdoor unit (FO), Ethernet port for IP connectivity to external EMS or NMS of APBIL and connectivity to local terminal [LCT/laptop] are all available.
2. The Antenna System of UBR should be Dual polarized (Horizontal & Vertical) and shall support Frequency range- 5150 to 5875 MHZ. The failure of either horizontal or vertical polarization shall not lead to failure of the system as a whole. The entire antenna supplied shall be dual polarized for the hop concerned.

3. The UBR system shall be of Full Outdoor architecture (FO). The necessary cables/accessories required for extending the bandwidth from the system to the user equipment like BBU shall be provided as part of the installation material. MCB addition, if required, at any site shall be done as part of I&C.
4. The system configuration, commissioning and monitoring shall be possible to be done using a local terminal [laptop] connected externally through standard Ethernet interface. One such terminal shall be supplied with every 200 hops. There shall be appropriate LCT with Browser-based user interface with GUI which shall indicate PMON/RMON to assess the performance of the system with last 7 days historical data.
5. The Project Implementation Agency (PIA) shall be responsible for integration of Digital Microwave nodes via their EMS with the network monitoring platform using standard interfaces such as SNMP v1/v2/v3. All the required support shall be extended during warranty and AMC for such integrations.
6. One electrical GE ports [10/100/1000 Base-T[X] type with auto negotiation] or 1 GE optical ports (1310nm, all with auto-negotiation, 5 Km range SFPs) shall be provided for FO. Applicable modulation schemes of QPSK to up to 1024 QAM with AMR shall be equipped with for achieving spectral efficiency in 5.X GHz bands.
7. The UBR shall provide the throughput as below:
 - 7.1 The throughput for a hop distance of 6-10km shall be minimum 500 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25% reduced throughput (375Mbps) without packet loss.
 - 7.2 The throughput for a hop distance of 10-14 km shall be minimum 400 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25% reduced throughput (300 Mbps) without packet loss.
 - 7.3 The throughput for a hop distance of 14-18 km shall be minimum 200 Mbps (uplink and downlink) without packet loss for 90% of such sites and remaining 10% sites can be accepted with 25%reduced throughput (150 Mbps) without packet loss.
8. All network elements handling IP shall support IPv6 addressing and routing with backward compatibility for IPv4. All equipment (Hardware, firmware, software) / services / features should be available on both IPv4 and IPv6 simultaneously (dual stack). All the network elements located within the LSA including the IPMPLS networking elements shall use only private IP address.
9. Ethernet latency shall be < 30 Milliseconds. However, bidder shall specify the exact value for various configurations, frame size and packet sizes
10. The MW radio shall be housed in a weatherproof casing (IP 65 compliant) designed for all weather operation and shall be preferably directly integrated with the antenna. It should be leaking proof during monsoon/snow fall.
11. There shall be dedicated auto-tests in all the network elements and equipment required for installation, troubleshooting, Maintenance, etc.
12. All network elements shall have the ability to upgrade software or hardware in the live system without any interruption or degradation of services. Any planned outage for major upgrade is

permissible in maintenance window only, but the traffic shall be protected through stand-by systems wherever feasible.

13. It shall be possible to expand the capacity of Microwave link by adding hardware & software to a live system without any interruption or degradation of services. Further, in general, all hardware and software expansions shall be possible without any downtime. However, In case of any major upgrades which require downtime, they shall be done in the maintenance window with the approval of in- Charge of operations.
14. The UBR microwave system availability shall be at least 99.9% measured over a period of one year and accordingly each network element forming part of the system shall have much improved fault tolerance and higher reliability.
15. The software version of equipment to be supplied shall be the latest and same for all configurations and for all the sites including validation site. The hardware version to be supplied shall be the latest version and the same for all configurations and for all sites including the validation site.
16. The Bidder shall furnish, as part of the techno-commercial Bid, solution document detailing the Microwave network Equipment architecture along with dimensioning rules/tools for each of the components
17. The Frequency Support and EIRP norms shall be as per MOC (Wireless Planning and Coordination Wing) Notification 2018. Equipment type approval (ETA) shall be submitted with the technical bid.
18. There shall be Selectable channel bandwidth of 20, 40, 80,160 MHz without any SW licenses or restrictions.
19. The Radio shall support Automatic Transmit Power Control (ATPC).
20. The radio modem shall support Ethernet Features like:
 - i. Q-in-Q
 - ii. Access, Trunk, Transparent, and management VLAN
 - iii. 4 Level Priority quality of service (QoS) as per IEEE 802.11d WMM
 - iv. 9000 bytes Jumbo Frame
 - v. Both IPv4 & IPv6 IP addressing
21. The radio modem shall support Layer 2 Bridge.
22. Interference Mitigation Methods:
 - 22.1 Automatic Dynamic Channel Selection: The link should automatically select the best channel available in case the interference level in the present channel exceeds a threshold. This switch shouldn't cause any disturbance to traffic.
 - 22.2 Dynamic Data Rate Selection: DDRS switches to the subsequent possible modulation in case of site-specific interference. Radio should support asymmetric TDD (Uplink and Downlink ratios) which should also be Dynamic or Fixed based on application needs.
23. The radio link shall have 256-bit AES encryption or higher.

24. Radio must support GPS based synchronization to avoid interference from multiple mast located in same area.
25. It should be possible to run bulk upgrades in field. Schedule upgrades should also be possible. New firmware download in radio shouldn't affect user traffic.
26. The Radio shall have inbuilt spectrum analyzer to check the result of both ends.
27. The microwave Antenna shall have a snow resistant Radom for extended temperature variants.
28. Radios should come with support for a link planning tool without any extra cost to the purchaser
29. Link planning tool should support creating of reports including link budget and path profiles based on Google Earth data.
30. In case, any item/ service/ functionality are required for successful interworking, the supplier will have to supply the same at no additional cost. The inter-working and interoperability with all the existing network elements is the sole responsibility of the Successful Bidder.
31. The Purchaser reserves the right to specify the details of redeployment. Redeployment of such items has to be done by the supplier as per the price finalized through this tender.
32. The successful bidder shall undertake to do the necessary customization as and when required by APBIL besides providing details of the APIs data structures so as to ensure smooth integration without any cost to DBN, DoT/APBIL.
33. A soft copy of the documentation shall be supplied in each of the network elements.
34. Radio shall have DC surge immunity as per IEC 61000-4-5, Level 2.
35. Radio shall support modulation of 1024QAM or better and throughput capability of 1 Gbps or Higher.
36. Radio should support detailed Ethernet interface monitored from NMS
 - 36.1 Ethernet Tx/Rx (Data rate) counters that can be
37. 37.Radio should support detailed Wireless interface monitored from NMS counters that can be
 - 37.1 Wireless Tx/Rx (Data rate)
 - 37.2 Wireless Tx/Rx usage
 - 37.3 Wireless drop packet
38. EMS System:

The successful bidder shall have to supply EMS for each of the Network elements supplied in the State. The EMS to be supplied shall conform to TEC standard EMS-TEC- SD-IT-EMT-001/01/MAR-16 or latest. It is the responsibility of successful bidder to integrate EMS with NMS by providing standard open interfaces so as to collate the O&M reports/data/logs.

 - 38.1 The supplied Microwave equipment shall extend all internal and external alarms to the EMS.
 - 38.2 If all the traffic and statistical reports as required by the Purchaser are not available, then necessary post processing software for off-line generation of traffic reports is also to be provided to each Circle along with necessary hardware including printer. However, sometimes, the data need to be changed due to modifications to be carried out at site, supplier has to ensure that necessary modification of the system, office and network data shall be possible to

be modified at site together with re-configuration, if required. Necessary tools and commands have to be provided by the supplier for the same.

38.3 All server-based applications shall have latest servers equipped with processors having processing speed of 2.2 GHz or higher. The servers shall be of minimum 16 cores scalable to 48 cores within same chassis with minimum 256GB DDR4 RAM and minimum 48MB L3 cache memory. Scalability shall be in all the related components within the chassis and can be implemented easily without shutting it down. Partitioning of the servers is allowed for multiple applications. All the servers and storage shall be powered by DC (nominal - 48V) for the four zonal centers. The bidder shall provide full details regarding power, space, and heat dissipation for each node/platform.

38.4 The processor loading at rated capacity of the network elements shall not exceed 70% of the total processor capacity. Dimensioning of all nodes shall be done with a maximum loading of 70% for memory, signalling, CPU usage etc. Similarly, all critical storages are to be dimensioned to be occupied not more than 70% at the rated load of the Network Element.

38.5 The bidder has to necessarily supply DC powered storage & servers at all EMS locations.

38.6 All power supply units shall be in redundant mode. The Bidder shall define the redundancy provided in the system as part of the bid document. The interfaces shall be distributed at least in a minimum of two cards/modules. The definition of redundancy shall include the following and details of compliance shall be submitted as part of the Bid for every network element.

38.7 It is the responsibility of the successful bidder to integrate the above EMS supplied for the UBR Microwave link with the NMS of APBIL.

39. **4 Ports managed PoE switch with one Uplink:**

39.1 The 4 Ports managed PoE switch will be deployed.

39.2 The PoE Switch shall be able to supply sufficient power to the UBR so as to achieve the throughput requirement.

39.3 The L2 LAN switch shall have full IPv4 and IPv6 support.

39.4 L2 Switch being procured through this tender shall be Dual Stack configurable and Non-Blocking Architecture.

39.5 The no. of 10/100/1000Base-T PoE interfaces or ports on LAN switches shall be as per SoR ordering.

39.6 **The backplane Switching capacity of LAN switch shall be 10 Gbps or better and non-blocking.**

39.6.1 IEEE 802.3ad LACP- Link Aggregation.

39.6.2 IEEE 802.1AB LLDP.

39.6.3 IEEE 802.1p prioritization, DiffServ/COS.

39.6.4 Broadcast and Multicast Suppression.

39.6.5 ACLs/filters.

39.6.6 Support for Rate limiting/Queue Shaping.

39.6.7 Dynamic VLAN Assignment.

- 39.6.8 Configuration backup and restoration
- 39.6.9 Port Mirroring
- 39.6.10 Forwarding rate 8.93 Mpps 64 bytes
- 39.6.11 Memory Buffer: 4 MB RAM: 1 GB Flash: 128 MB
- 39.6.12 Jumbo frame 9.600 bytes
- 39.6.13 MAC address 8.000 (automatic updates, two-way learning)
- 39.6.14 Network Management L2+
- 39.6.15 Port aggregation "LACP, Static aggregation
- 39.6.16 PoE IEEE 802.3af/at, Supports PoE management (programable PoE, power limit, priority...)
- 39.6.17 Power Consumption "Max 30W per port IEEE 802.3af/at Stand by <6W.
- 39.6.18 Feeding voltage DC48 - 57V

39.7 **Management Features:**

- 39.7.1 Console Management Port on the front panel.
- 39.7.2 Zero Touch Provisioning
- 39.7.3 SMMP v1, v2 and v3 Support.
- 39.7.4 SSHv2 Support
- 39.7.5 Telnet Support, TFTP, FTP, SCP and SFTP client.
- 39.7.6 Port Mirroring.
- 39.7.7 Industry Standard CLI with built in Scripting tool/Event Scheduler.

39.8 **Quality of Service:**

- 39.8.1 IEEE 802.1p Priority.
- 39.8.2 Diff. Serv Marking /TOS/Classification/remarking.
- 39.8.3 Shaping and Policing.

39.9 **Security Feature**

- 39.9.1 802.1x: Port security, Single and Multiple Authentications, MAB
- 39.9.2 RADIUS / TACACS+ Authentication support
- 39.9.3 MAC limiting per Interface/Port
- 39.9.4 SSH Remote Login
- 39.9.5 HTTPs
- 39.9.6 SNMPv3
- 39.9.7 MAC lockdown, MAC notification

40. Installation and Commissioning spares & consumables

- 40.1.1 All installation material and installation consumables shall be provided to enable the proper installation of Microwave equipment supplied. Any other materials and consumables, which

are technology dependent and required for installation, but not quoted shall also be supplied free of cost.

- 40.1.2 Item-wise details of installation materials required for installation has to be furnished along-with its unit. The said details can be provided in the priced BoM.
- 40.1.3 Complete details of each and every item of installation materials, maintenance spares and maintenance consumables shall be provided.
- 40.1.4 Further, the successful bidders shall be bound to supply the additional Hardware/ Software for expansions of the network within a period of 3 years as per the traffic and operational requirements of the purchaser on the finalized itemized price after applying the applicable duties & taxes. The period of three years shall be counted from the date of carrying live traffic.

41. Installation Material

Per Hop Installation material for MW will include -

- i. Grounding cable including lugs.
- ii. Fixers (Nut Bolt) for mounting ODU.
- iii. 2*Weather proofing and 4*Adhesive Tape and any additional item required.
- iv. 4*Patch cord LC/LC _ 5 meters for GE (o) if applicable.
- v. Cable Ties per terminal / station as per requirement Minimum 100.
- vi. FO Power cable _ Minimum 4*10 meters with connector and lug or as per site requirement if applicable.
- vii. RJ45 Cable CAT6
- viii. MCB [2 per hop]
- ix. laptop [One laptop for every 200 hops shall be supplied
 - CPU: Quad core, 4MB cache at least 2.8 GHz clock speed or higher.
 - RAM: 8(1*8) GB DDR4.
 - HDD: 1 TB SSD
 - Monitor: Minimum 14 Inch TFT screen
 - Others: 10/100/1000 Mbps LAN port, One HDMI, Wi-Fi 802.11b/g/n/ac, Bluetooth, 3xUSB- 3 ports Licensed Windows 11 Business OS along with Antivirus
 - Software with continuous update on database till the completion of AMC.
 - Office 2021 Business edition or higher version.
 - Bidder to provide required any other interface cables/ Installation materials for their FO.

Note: Corrigendum issued against BSNL Tender No. MM/NWP-GSM/UBR /T-779/2023 Dated 19.09.2023, shall be applicable

X. Digital Microwave (DMW)

- 1. The PIA shall supply, install and commission 15 GHz/E Band Microwave links with Installation Material including cables, BITE etc. wherever, it is decided by APBIL on behalf of DBN, DoT.

2. Microwave General

- 2.1 This section outlines the detailed technical requirements of Microwave links transport to connect access network. The parameters mentioned in the tender along with clarifications shall be taken while designing the solutions. If any other parameter is also necessary, the same may be suggested during the clarifications round based on the global/Indian experience of the bidder and got confirmed from APBIL.
- 2.2 All the necessary hardware and the related software licenses including databases in all the network elements shall be dimensioned and equipped accordingly except for those network elements for which higher capacity, if any, has been specified elsewhere in this document.
- 2.3 The Microwave system shall be required for connecting last mile as well as in the back-haul. The Bidder shall quote for such microwave links in 15GHZ band / E- band. The transmission equipment proposed shall conform to latest TEC specifications/ GR: TEC GR No TEC/TX/GR/HMR-001/01.MAR-12 (except for those specific requirements stated in this DTR or those that have been outdated due to technology advances and the functional requirement has been met or exceeded) complete with Antenna, feeder and installation material. 0.6 m / 1.2 m / antennae shall be used in the engineering of the links. The provision of BITE is not essential provided other provisions like LED to broadly indicate the health of the system for split radio and LCT for full outdoor unit (FO), Ethernet port for IP connectivity to external OSS or NMS of APBIL and connectivity to local terminal [LCT/laptop] are all available.
- 2.4 The microwave system shall be in 2+0 XPIC (Single carrier with minimum ~350 Mbps to 500 Mbps approx.) configuration which is expandable to 4+0 XPIC (two carriers with minimum ~700Mbps to 950 Mbps approx.) by addition of required second carrier activation license, along with hardware & software if any. In XPIC functionality, the failure of either horizontal or vertical polarization shall not lead to failure of the system as a whole. These expansions for additional carrier for ODU to make the system 4+0 XPIC from 2+0 XPIC feature shall be supplied as per SOR ordering. All FOs shall support dual carriers & XPIC as well as support carrier aggregation by default. The entire antenna supplied shall be dual polarized for the hop concerned.
- 2.5 The MW system shall be of Full Outdoor architecture (FO). The necessary cables/accessories required for extending the bandwidth from the system to the user equipment like BBU shall be provided as part of the installation material. MCB addition, if required, at any site shall be done as part of I&C.
- 2.6 All FOs can support two modems i.e., one FO shall be sufficient to cater one XPIC radio link. Hub ODUs, as per SoR ordering, shall support convergence of up to 2 radio links along with support for protection schemes. These hops, which would be deployed as hub-hops, shall be typically with capacity enhancement features like 4+0 configuration with XPIC as per SoR ordering in order to cater for the capacity aggregation from the hops in downstream. However, with the provision of LAN switch it shall be possible to converge the traffic of 6 or more radio links through the microwave link of hub site.
- 2.7 It shall be possible to define QoS [including Committed Information Rate [CIR] and Excess Information Rate [EIR]] in the system and it shall also be possible to configure the same as per need through the O&M terminal/EMS. These features will be required to be deployed for effective usage of bandwidth, among other uses.

- 2.8 The system configuration, commissioning and monitoring shall be possible to be done using a local terminal [laptop] connected externally through standard Ethernet interface. One such terminal shall be supplied with every 60 hops. The requirement of laptop against this clause shall be captured within the quote of Microwave and captured under the detailed priced BoM. There shall be appropriate LCT with Browser-based user interface with GUI which shall indicate PMON/RMON to assess the performance of the system with last 7 days historical data
- 2.9 APBIL is in the process of commissioning a nationwide network monitoring platform and it shall be possible to integrate these Digital Microwave nodes through their EMS to the upcoming platform through standard interfaces including CORBA/xml/SNMP v.1/v.2/v.3. All the required support shall be extended during warranty and AMC for such integrations.
- 2.10 There shall be the necessary L2 switch in-built in the terminal capable of combining electrical FE signals from other co-located access equipment such as GSM, UMTS & LTE base stations so that the combined output available at optical GE that can be interfaced to the transport network of APBIL. The equipment shall have L2 switching functionality having 1 Gbps to 2 Gbps backplane switching capacity. However, the bidder may provide external L2 switch solution and the rate for the same may be quoted separately.
- 2.11 One electrical GE ports [10/100/1000 Base-T[X] type with auto negotiation], 2 GE optical ports (1310nm and 5 Km range SFPs) shall be provided for FO Applicable modulation schemes of QPSK to 2048 for 2K QAM system and QPSK to 4096QAM for 4K QAM with AMR shall be equipped with for achieving spectral efficiency in 7 MHz and 28 MHz channelling plans in 15 GHz.
- 2.12 It shall be the responsibility of the bidder to supply an Optical Distribution Frame for Optical GE links having a minimum of 8 terminations capacity at radio site and terminate the optical interfaces coming from the Access equipment of that site.
- 2.13 All network elements handling IP shall support IPv6 addressing and routing with backward compatibility for IPv4. All equipment (Hardware, firmware, software) / services / features should be available on both IPv4 and IPv6 simultaneously (dual stack). All the network elements located within the LSA including the IPMPLS networking elements shall use only private IP address. Wherever multiple GE interfaces are sought, the IEEE Link Aggregation Control Protocol shall be supported to ensure load sharing and redundancy across the interfaces.
- 2.14 Any requirements stated in the various TEC GRs w.r.t. ATM, LSL, HSL, FTAM, X25 protocol/interfaces etc. if not relevant now for the application due to technological obsolescence, need not be complied with but suitable latest physical/logical interface in TCP/IP etc. shall be provided to meet the requirements of the application.
- 2.15 The equipment shall provide L2 services using MPLS Experimental bit.
- 2.16 The equipment shall support for Ethernet network, LAG (Link Aggregation) protection (including FE/GE ports and radio links). Further, equipment shall support Ethernet-OAM. The offered Equipment shall meet all the specifications of ETH-OAM as per IEEE 802.1ag, IEEE 802.3ah and IEEE y.1731. Monitoring of Error frame events (FER), error frame second events and error frame period events shall be supported by the Ethernet-OAM as per IEEE 802.3ah & IEEE y.1731. Complete Ethernet link performance monitoring shall be possible as per IEEE 802.3ah & IEEE y.1731.

- 2.17 The MW equipment shall support both the E-Line and E-LAN Ethernet service types. The Maximum frame length of Ethernet frame shall be specified. It shall be possible to configure MAC learning parameters. Ethernet latency shall be < 50 Milliseconds or better. However, bidder shall specify the exact value for various configurations, frame size and packet sizes
- 2.18 The MW radio shall be housed in a weatherproof casing (IP 65 compliant) designed for all weather operation and shall be preferably directly integrated with the antenna. It should be leak proof during monsoon/snow fall.
- 2.19 The MW system shall be provided with traffic protection schemes for Ethernet services as per relevant ITU-T/ITU-R recommendations. The offered equipment shall support sub 50 ms ring protection with ERPS (Ethernet Ring Protection switching) (ITUT-G.8032 / Y.1344).
- 2.20 The microwave system in E-band also shall be supplied in full outdoor mode [1+0] as per SoR ordering.
- 2.21 Synchronization shall be compliant through IEEE 1588 v.2 standard. The provision of 1588 v2 shall be without any limitations and shall support all network topologies.
- 2.22 There shall be dedicated auto-tests in all the network elements and equipment required for installation, troubleshooting, Maintenance, etc.
- 2.23 The Network elements to be provided under this Tender shall have an availability of 99.99%.
- 2.24 All network elements shall have the ability to upgrade software or hardware in the live system without any interruption or degradation of services. Any planned outage for major upgrade is permissible in maintenance window only, but the traffic shall be protected through stand-by systems wherever feasible.
- 2.25 It shall be possible to expand the capacity of Microwave link by adding hardware & software to a live system without any interruption or degradation of services. Further, in general, all hardware and software expansions shall be possible without any downtime. However, in case of any major upgrades which require downtime, they shall be done in the maintenance window with the approval of APBIL.
- 2.26 The supplier shall also ensure the interworking of offered Microwave Equipment with the various network elements of other technology in other licensed service areas of the APBIL Mobile network
- 2.27 The system availability shall be at least 99.99% measured over a period of one year and accordingly each network element forming part of the system shall have much improved fault tolerance and higher reliability as called for elsewhere in the DTR.
- 2.28 The software version of equipment to be supplied shall be the latest and same for all configurations and for all the sites including validation site. The hardware version to be supplied shall be the latest version and the same for all configurations and for all sites including the validation site.
- 2.29 The Bidder shall furnish, as part of the techno-commercial Bid, solution document detailing the Microwave network Equipment architecture along with dimensioning rules/tools for each of the components

3. EMS System

- 3.1 The supplied Microwave equipment shall extend all internal and external alarms to the EMS.
- 3.2 If all the traffic and statistical reports as required by the Purchaser are not available, then necessary post processing software for off-line generation of traffic reports is also to be provided to each Circle along with necessary hardware including printer. However, sometimes, the data need to be changed due to modifications to be carried out at site, supplier has to ensure that necessary modification of the system, office and network data shall be possible to be modified at site together with re-configuration, if required. Necessary tools and commands have to be provided by the supplier for the same.
- 3.3 All server-based applications shall have latest servers equipped with processors having processing speed of 2.2 GHz or higher. The servers shall be of minimum 16 cores scalable to 48 cores within same chassis with minimum 256GB DDR4 RAM and minimum 48MB L3 cache memory. Scalability shall be in all the related components within the chassis and can be implemented easily without shutting it down. Partitioning of the servers is allowed for multiple applications. All the servers and storage shall be powered by DC (nominal -48V) for the four zonal centers. The bidder shall provide full details regarding power, space, and heat dissipation for each node/platform.
- 3.4 The processor loading at rated capacity of the network elements shall not exceed 70% of the total processor capacity. Dimensioning of all nodes shall be done with a maximum loading of 70% for memory, signalling, CPU usage etc. Similarly, all critical storages are to be dimensioned to be occupied not more than 70% at the rated load of the Network Element.
- 3.5 The bidder has to necessarily supply DC powered storage & servers at all EMS locations.
- 3.6 All power supply units shall be in redundant mode. The Bidder shall define the redundancy provided in the system as part of the bid document. The interfaces shall be distributed at least in a minimum of two cards/modules. The definition of redundancy shall include the following and details of compliance shall be submitted as part of the Bid for every network element.

4. General

- 4.1 In case, any item/ service/ functionality are required for successful interworking, the supplier will have to supply the same at no additional cost. The inter-working and interoperability with all the existing network elements is the sole responsibility of the Successful Bidder.
- 4.2 The Purchaser reserves the right to specify the details of redeployment. Redeployment of such items has to be done by the supplier as per the price finalized through this tender.
- 4.3 The successful bidder shall undertake to do the necessary customization as and when required by APBIL besides providing details of the APIs data structures so as to ensure smooth integration without any cost to APBIL.
- 4.4 A soft copy of the documentation shall be supplied in each of the network elements.

5. Installation and Commissioning including spares & consumables

- 5.1 All installation material and installation consumables shall be provided to enable the proper installation of Microwave equipment supplied. Any other materials and consumables, which are technology dependent and required for installation, but not quoted shall also be supplied free of cost.

- 5.2 Item-wise details of installation materials required for installation has to be furnished along-with its unit. The said details can be provided in the priced BoM.
- 5.3 Complete details of each and every item of installation materials, maintenance spares and maintenance consumables shall be provided.
- 5.4 Further, the successful bidders shall be bound to supply the additional Hardware/ Software for expansions of the network within a period of 3 years as per the traffic and operational requirements of the purchaser on the finalized itemized price after applying the applicable duties & taxes. The period of three years shall be counted from the date of carrying live traffic.

Installation Per Hop Installation material for MW will include –

- i. Grounding cable including lugs.
- ii. Fixers (Nut Bolt) for mounting ODU.
- iii. 2*Weather proofing and 4*Adhesive Tape and any additional item required.
- iv. 4*Patch cord LC/LC _ 5 meters for GE (o).
- v. Cable Ties per terminal / station as per requirement Minimum 100.
- vi. FO Power cable _ Minimum 60 meters with connector and lug or as per site requirement.
- vii. RJ45 Cable _ 60 meters. CAT6
- viii. MCB [2 per hop]
- ix. laptop [One laptop for every 60 hops shall be supplied- Minimum configuration]
 - CPU: Quad core, at least 2.8 GHz clock speed or higher.
 - RAM: 8(1*8) GB DDR4.
 - HDD: 1 TB SSD
 - Monitor: Minimum 14 Inch TFT screen
 - Others: 10/100/1000 Mbps LAN port, One HDMI, Wi-Fi 802.11b/g/n/ac, Bluetooth, 3xUSB- 3 ports Licensed Windows 11 Business OS along with Antivirus
 - Software with continuous update on database till the completion of AMC.
 - Office 2021 Business edition or higher version.
 - Bidder to provide required any other interface cables/ Installation materials for their FO.

XI. Technical Specifications of 8.0/ 7.0-meter long RCC pole working load of 115 Kgs

The specification covers manufacture, curing, testing and supply of 8.0/7.0 meter long RCC poles, are generally as per drawing enclosed with the specification and are intended to be used. The materials manufactured shall conform strictly to the requirement of relevant INDIANSTANDARDS and latest addition of IS using the best quality of materials and workmanship. The Cement used in the manufacture of RCC Poles shall be of good quality and confirming to the relevant ISS either ordinary or rapid hardening Portland cement conforming to IS: 269. Aggregate used for the manufacture of RCC Poles shall confirm to IS: 383. Reinforcing bars and wires used in the manufacture of RCC Poles shall be as below: -

- i) Mild steel and medium tensile steel bars and hard drawn steel wire confirming to IS-432/1960
- ii) The steel of Tor-50 grades conforming to latest edition of IS: 1786
- iii) Quality of MS Rounds used for stirrups shall comply with the requirements of IS:226

The reinforcing bars used shall be of required length as per drawing and no joint shall be allowed. All joints and stirrups shall be welded properly. If no welded, the lap length shall not be less than 40 times the diameter of the bars. The cover of concrete over the reinforcement shall be 30mm under normal working conditions and shall not be under any circumstances less than 20mm.

The sand shall be of the quality fit for use in RCC works i.e., river sand and sieved and free from alkaline/acidic materials. The ratio of cement concrete shall be 1:2:3 and shall comply with the requirements of IS:456.

The standards adopted for various materials manufacture shall be as follows:

- i) The RCC poles shall conform to the requirement of IS:785/1964
- ii) The quality of concrete shall be to the requirements of IS:456/1964
- iii) The testing of proto-type poles shall be as per requirements of IS:2905/1966

The RCC Poles shall be manufactured as per the drawing mentioned below.

The poles shall take working load 115 Kgs for 8.0/7.0 meters, long RCC pole acting at 0.6 M from top with factor of safety of 2.5 respectively and

The tests for transverse strength, torsion strength, measurement of cover and uprightness shall be carried out in the presence of a representative of APBIL/IE.

1.0% of the total number of poles ordered and selected at random shall be tested as per the BIS standard referred above. The PIA or the manufacturer of poles shall offer a lot of upto 500 poles to APBIL QA team for testing. The QA team will draw a sample of 1% of the offered lot and carry out the tests as per test standards referred above. The tests for which the test facilities are available at the manufacturer premises may be carried out and tests for which test facility is not available in the manufacturer premises, sample may be sent to external lab. After testing the offered lot may be cleared by APBIL QA based on test results as per norms of QA.

No payments will be made for the poles, which fail or tested to destruction.

Earthing shall be provided for the poles. By having a continuous separate length of SWG GI wire embedded in concrete during manufacture and the ends of wire left projecting from the narrower end of the poles and 150mm below the ground level. The arrangements for termination of the earth wire to the bolt and nut shall be as indicated in the concerned drawing. The G.I. Wire used for embedding shall comply with requirement of IS: 2141/1968.

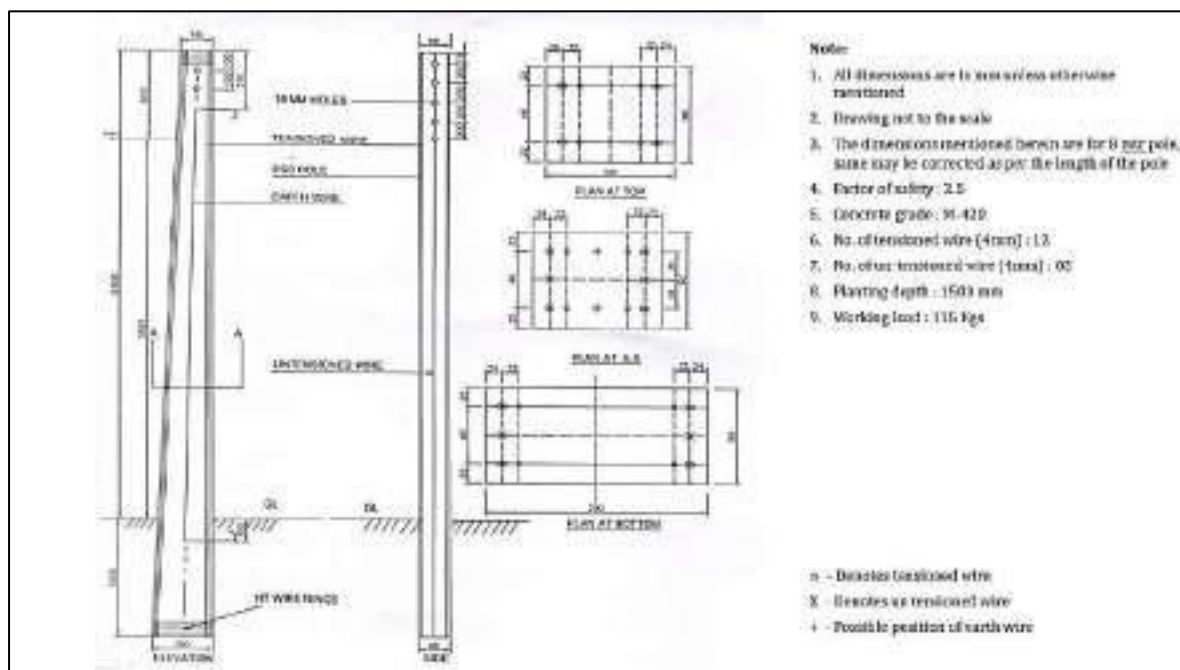
The poles shall be clearly and indelibly marked with the following particulars, during manufacture but before testing at a position so as to be easily seen after erection in position.

- a. Month and year of manufacture
- b. Maker's Sl. No. and marking
- c. Purchase order No. and date
- d. A line to indicate the depth of planting

e. BHARATNET engraved (letters – OWNER)

Provisions for holes for fixing the cross arms and other fixtures shall confirm to drawing and/or the industry construction practice. The universal pole clamp and ADSS accessories are to be used for slinging of ADSS OFC as per E.I

Drawings:



XII. Deleted

XIII. Technical Specifications of Mini OLT at GP

A	Technical Specifications
1.	General
1.1	The GPON OLT shall comply with the latest & relevant ITU-T recommendations and generic requirements of the TEC GR No. TEC/GR/FA/PON-002/02/NOV-18 with all amendments. In case of any conflict in interpretation of this GR, a specification of this tender supersedes GR. Some of the technical requirements are given below:
1.2	GPON equipment should be MTCTE certified before delivery.
1.3	GPON equipment should comply "Trusted Source". The OLTs shall be approved from trusted source, before delivery. In case, the make/ model is not approved from trusted source then, the bidder shall provide all documents/ information to APBIL for application on trusted portal in their technical bid.
1.4	The GPON OLT shall provide aggregation & switching functionality between the core network and PON interfaces. It shall offer PON interfaces towards ONTs& service node interfaces (SNI) towards core network. OLT shall interface the core network at various Ethernet interfaces as required. The SNI at OLT is envisaged to provide various Gigabit Ethernet and 10G Ethernet interfaces.
1.5	Transport of voice services shall be supported as Voice over Packet between ONT and OLT. The voice traffic shall be terminated at OLT across IP over Ethernet interfaces (with

	SIP signalling & ITU-T Rec.G.711 framing), thus creating a simple evolution path to an all IP network with soft-switches, as needed.
2.	PON Requirements
2.1	The maximum differential logical reach shall be 20 KM as per GPON standards G984.x
2.2	High splitter ratio support to access 64 terminals from single PON.
2.3	The upstream & downstream shall be 1.244Gbps and 2.448Gbps respectively per OLT GPON Port with link/optical budget.
2.4	Mini-OLT shall have minimum 4 PON ports or above.
2.5	Mini-OLT shall have SNI interface 3x 1G (Optical) and 1 RJ45 port.
3.	Layer 2 Requirements
3.1	MAC
3.1.1	MAC learning shall be supported at OLT level
3.1.2	It shall be possible to enable / disable MAC address learning function and configure the MAC learning aging time.
3.1.3	Support for MAC address limiting: It shall be possible to set maximum number of MAC addresses from the ONT UNI through OLT. When the MAC address limit is reached, subsequent MAC addresses from that specific ONT UNI will not be learned.
3.1.4	OLT should have 4096 port-IDs per GPON MAC (Downstream and Upstream) & 1024 Alloc -IDs per GPON MAC (Upstream)
3.1.5	The OLT shall have a function to store the corresponding relationship of userid, VLAN tag value and port id number.
3.2	VLAN
3.2.1	Port id based VLAN shall be supported at OLT.
3.2.2	Should have port based QinQ and selective QnQ (vlan stack)
3.2.3	Should have port based/mac based/ ip subnet based vlan
3.2.4	OLT shall support the following VLAN operations, VLAN insertion in ingress process, and VLAN removal in ingress process and VLAN stacking per 802.1ad
3.2.5	The OLT should be able to configure up to 3966 (1-3966) VLAN
3.2.6	VLAN forwarding / Filtering database should be based on IVL (Independent VLAN learning)
3.2.7	Classification based on Classification based on 802.1p bit and VLAN id
3.3	LOOP PROTECTION
3.3.1	STP/RSTP/MSTP
3.3.2	Remote loop detecting
3.4	PORT
3.4.1	Bidirectional bandwidth control
3.4.2	Static link aggregation and LACP (Link Aggregation Control Protocol)
3.4.3	Port mirroring and traffic mirroring
3.4.4	Rate limiting
3.4.5	Ethernet user interface at SNI of OLT: For P2P application, the SNI interface of the OLT may be GbE as per below:
3.4.5.1	1000Base SX (50 μ multi-mode) Interface.
3.4.5.2	1000 Base LX (10 μ single mode @1310 nm) Interface.

3.4.5.3	1000 Base ZX (10 μ single mode @ 1550 nm) Interface.
3.5	FILTERING
3.5.1	Filtering by destination MAC address.
3.5.1	Filtering by source MAC address.
3.5.1	Filtering of 802.1x packets (Optional).
3.5.1	Support of Ethernet port authentication (Optional)
3.6	Dynamic Bandwidth allocation (DBA)
I.	Maximum Bandwidth limiting.
II.	Minimum guaranteed bandwidth
III.	Two Or more level (Preferred four) classes of classification.
IV.	Piggy-back DBRu report mode 0.
V.	Idle GEM DBA.
VI.	Concurrent support of idle GEM and Piggy-back DBRu mode 0 support.
VII.	T-CONT Type 1 to Type 4
4.	Security Requirements
I.	Anti-DOS attack feature
II.	SSHv2 Secure shell
III.	SNMP v3 encrypted management
IV.	Hierarchical management of user and option to add several privilege levels like administrator, operator, guest etc
V.	User based MAC and ARP traffic examination
VI.	Dynamic ARP table-based binding
VII.	ACL and SNMP ACL feature
VIII.	Port based broadcast/multicast suppression
IX.	DHCP Option 82
X.	TACACS/RADIUS functionality should be present
XI.	Login banner and post declaration option
XII.	Should have Advanced Encryption Standard (AES) for downstream traffic
XIII.	MAC ADDRESS LIMITATION PER PORT
XIV.	System software up gradation at regular intervals
XV.	Traffic Protection –Anti-Spoofing
XVI.	Shall support secure network protocols such as SFTP/HTTPS/SCP etc.
XVII.	Shall support MAC security function
XVIII.	Shall support SNMPv3 and 128-bit AES algorithm for Encryption
XIX.	Anti-Malware Software automated or real-time scanning feature must be enabled
5.	Service Requirements
5.1	QoS
I.	Rate limit to packet sending/receiving speed of port or self-defined flow and provide general flow monitor and two-speed tri-colour monitor of self-defined flow.
II.	Priority remark to port or self-defined flow and provide 802.1 P, DSCP priority and remark
III.	Should have CAR (Committed Access rate), traffic shaping and flow statistics packet mirror and redirection of interface and self-defined flow.
IV.	Should have super queue scheduler based on port and self-defined flow. Each port/flow supports 8 priority queues and scheduler of SP, WRR and SP + WRR.

V.	Congestion avoid mechanism, including Tail-Drop and WRED
5.2	(A) IPV4
I.	ARP Proxy
II.	DHCP relay and DHCP server
III.	Static Routing
IV.	RIP v1/v2
V.	OSPFv2
	(B) IPV6 : The equipment shall be IPV6 compliant with all the features as mentioned in clause 5.2.(A) above
5.3	Multicast
I.	IGMP v1/v2/v3
II.	IGMP Snooping
III.	IGMP filter
IV.	IGMP fast leave
V.	IGMP filter
VI.	MLDv2 snooping
5.4	VOIP
I.	OLT shall transparently support SIP/H.248 signalling and all required codecs
II.	Static and dynamic IP allocation should be supported.
6.	MAINTENANCE REQUIREMENTS
6.1	Network Maintenance
I.	Port real-time utilization and transmit/receive statistic
II.	Ping/traceroute
III.	IGPON OMCI and OLT management software
6.2	Device Maintenance
I.	CLI, console port, telnet , SSH and web access
II.	NTP/SNTP
III.	Network Management
7.	RELIABILITY REQUIREMENTS
I.	The OLT shall have local status monitoring, System Event & Alarm Logging with Severity Critical/Major/Minor, Local Alarm storage and Syslog logging.
II.	OLT shall support LED status indication
III.	Power - Indicates power ON status
IV.	Indicate Alarm status.
V.	Alarms: The alarms & consequent actions shall be possible to monitor via EMS & LCT of the equipment as per ITU-T G 984 series Recs.
8.	INTEROPERABILITY REQUIREMENTS
I.	OLT shall also interoperable with all existing ONTs being used in BSNL BharatNet Phase- I/ BharatNet Phase -II and any future ONTs to be used, by loading of suitable patches without any additional cost. It will be preferred if the loading of Patches is done through EMS/ NMS without visiting site.
II.	All bidders shall complete inter-operability test with the successful bidders and MTCTE approved supplier of ONTs. All successful bidders shall provide quoted OLT to APBIL, for interoperability testing (IOT) with existing equipment in BharatNet network.
9.	PHYSICAL REQUIREMENTS
9.1	9.1. Mechanical standards:
I.	OLT should be 19" rack 1 U mountable pizza box fully compliant with ITU GPON standards.

II.	The equipment shall be fully solid state and adopt state of the art technology.
III.	The equipment shall be compact & composite in construction & lightweight.
IV.	The bidder shall mention the actual dimension & weight of the offered equipment's.
V.	The adapters to be provided for terminating in adapters/ connectors on OLT side shall be SC-PC. The connectors/ adapters at ONT side shall be SC-APC.
VI.	OLT should have Dual redundant & Hot standby AC power supply and power consumption should be less than 50W.
VII.	Switch fabric in OLT shall be able to handle full wired speed throughputs.
VIII.	Dual fan as Hot standby shall be provided
9.2	Environmental requirements: The OLT supplied shall comply with environmental standard QM-333, B2" category.
9.3	Power supply: Powering requirement for OLT shall be as per below:
1.	For AC operation, the normal power supply is 160 to 270 V AC, 50 \pm 5 Hz. The OLT shall be designed to have protection of power transient, power surge and power blowouts.
2.	The equipment shall be adequately protected in case of voltage variation beyond the range as specified above and also against input inverse polarity.
3.	The derived DC voltages in the equipment shall have protection against over voltage, short circuit and overload.
10.	INTERFACES SUPPORTED
I.	Southbound Interface towards the OLTs is SNMP v2c/v3.
II.	Web service based Northbound Interface for integration with OSS Applications.
11.	CERTIFICATIONS
I.	TEC-GR Compliant
II.	TSEC compliant
B.	EMS REQUIREMENTS
	EMS (Element Management System) provides an easy to use and effective centralized management solution for GPON network elements namely OLTs and ONTs.
2.	GENERAL
1.	Every successful bidder will also provide EMS to manage order quantity with 25% buffer to add OLT and ONT in the network without any additional cost, in hardware/ software. Solution should comply with ITU-T or any other better interface between the EMS and the Network elements. Furthermore, suitable network interface and software in the EMS should be supplied, so as to have a common/ centralized network management system of different vendors.
2.	The Bidder will also provide SNMPv2C/ SNMPv3 or any other better interface as the South Bound Interface between the EMS and the Network elements.
3.	Furthermore, REST API/TMF-814/CORBA shall be supplied as the North bound interface along with suitable network interface and software in the EMS, so as to have a common/ centralized network management system of different vendors.

4.	The EMS shall support full management capability over the Northbound Interface including Inventory, Fault Performance, Provisioning, Protection, Accounting, Security, Configuration management features which enable end to end management and monitoring of network from the NMS.
5.	The supplier shall provide basic provisioning system software to enable provisioning of circuits/ bandwidth at any OLT from the EMS itself. The provisioning software shall be customized as per the APBIL requirements.
6.	The vendor who is selected to supply the equipment will provide, without any additional cost, the software upgrades, patches for a period of seven years from the date of completion of supplies for their equipment. They will also provide/ make necessary changes without any additional cost, in hardware/ software to ensure compliance to ITU-T or any other better interface between the EMS and the Network elements
7.	The Bidder will also provide/ make necessary changes without any additional cost, in hardware/software to ensure compliance to Q3 interface of ITU-T or SNMPv2C/ SNMPv3 or any other better interface as the South Bound Interface between the EMS and the Network elements. Furthermore, TMF-814/ CORBA shall be supplied as the North bound interface along with suitable network interface and software in the EMS, so as to have a common/ centralized network management system of different vendors. Bidder has to have open interface architecture so that if required it can be integrated in future and vendor shall render full support at that stage to facilitate such integration. The protocol used to communicate between ONT and SPV should be based on Q3 interface of ITU-T or SNMPv2/v3 or any other protocol.
8.	EMS shall have the provision/ alarms showing the status of battery health.
3.	SALIENT FEATURES REQUIRED
1.	Auto Discovery and Sync of OLTs and ONTs.
2.	Detailed Chassis & Tree View for configuration and reporting.
3.	Fault Management (Current/History Alarms, Tabular Graphical Reports).
4.	Performance Management (Current/History performance data, Tabular Graphical Reports).
5.	Configuration Management.
6.	Security Management.
7.	Accounting Management.
8.	Advanced features for remote software upgrade on OLTs and ONTs.
9.	“One Stop App” for reporting and user-friendly graphs.
10.	Automatic E-Mail delivery upon alarms of operator's interest.
11.	Role and geographical Based Access Control (RBAC).
12.	Logging of important user operations and events in the network.
13.	High Availability and Disaster Recovery.
14.	EMS shall provide status of battery health.

4.	TECHNICAL SPECIFICATIONS
1.	EMS running on 4 CPU, 14 cores per CPU, 128 GB RAM
2.	Should handle all OLT and ONTs
3.	Performance and fault history for 30 days.
4.	Management data and history data needs to be maintained for a period of 6 months
5.	Independent handling of user requests towards different OLTs.
6.	EMS GUI access through standard web Browser like IE, Firefox, Google Chrome.
7.	EMS should support up to 100 concurrent GUI users.

XIV. Deleted

XV. Technical Specifications of Shelter Enclosures along with Air Conditioners

S. No.	Item	Description
1	Internal dimensions of shelter	Insulated Telecom Shelter Size (L*B*H) a) 7m *3m *3m – 8 Units b) 5m *3m *3m – 71 Units
2	Core	60 mm thick polyurethane Foam having density of 40±2 KGs/Cu. Mt.
3	Thermal conductivity	Thermal conductivity: < 0.023 W/M Deg K at 10deg Mean temp.
4	Corrugated roofing sheet (secondary Roofing Sheet)	0.5 mm thick corrugated Pre-Painted Profile sheet for free flow of Water
5	Modular walls & Ceiling panel composite	Wall & Ceiling PUF Panel- 0.5 mm inner & 0.5 mm outer pre coated skins with PUF of 59 mm
6	Integral projected roof	0.5 mm corrugated Pre-Painted Profile sheet roof shall be cambered and projected min. 100 mm on all four sides to give rain protection.
7	Base frame with ISMB (GI)	Bolted designed steel channel frame to withstand 800 kg/Sq.mt floor load
8	Floor external skin	0.5 mm corrugated Pre-Painted Profile sheet to withstand floor load of 800 Kgs / Sq Mt uniformly
9	Floor insulation	61.5 mm thick PUF
10	Floor internal	18 mm thick plywood, PUF-61.5 mm. Antistatic flooring – 2 mm

S. No.	Item	Description
11	Door	Insulated Metallic door with clear opening 1100 mm X 2000 mm fitted with rubber environmental gasket / pilferage protection techniques to be used while construction of door
12	Door locks standard	Single point concealed lock – key (with 3 nos. key) and door handle with provision for rain water protection along with addition L drop for safety
13	Door hinges	Stainless steel pickproof Hinges 4 Nos.
14	Door rain guard	Projected rain guard shall be provided above the door for smooth operations
15	Cut-outs	Guidable cable & AC cut-outs to suit the requirement duly sealed for water tightness
16	3 steps ladder	Adjustable GI ladder to be hooked on to the shelter at the door entrance.
17	Cable duct	100mm. PVC cable duct on all points of racks and 40mm. PVC duct for all electrical points
18	Door stopper	Solid hook mounted in the ISMB for holding the door.
19	Door sensor	Required
20	Civil foundation with ISMB.	Standard ISMB – 150 mm as per shelter required
21	Smoke detector	1 nos.
22	LED wall mounted lights	6 nos.
23	Wind speed tolerance	150 Km/h
24	Fire extinguisher clean agent	1 nos. - 5 Kg; ISI marked
25	Shelter electrical	Power distribution box with MCB along with switch and sockets are required with cabling for internal lightening of shelter / additional MCB to be incorporated in ACDB where industrial grade air conditioner to be install at site
26	Warranty	1 Year
27	Comprehensive Warranty	9 years

Note: PIA has to ensure proper earthing as per industrial standards.

Technical Specifications of Air Conditioner

The following are the technical specifications of Air Conditioner for Shelter enclosure

S. No.	Item	Description
1	Air conditioner	Min star Rating- 5 Star; 2 Ton AC AC outdoor units to be mounted on frame (Detailed specs included below)

The air conditioning is required for critical application i.e. for maintaining the temperature for critical sub-station control and protection equipment. To provide redundancy for such critical applications, each kiosk shall be installed with environment control system comprising of two units of air conditioners working in conjunction through a micro-processor-based controller for desired operation. The system shall be designed for 24 Hours, 365 Days of the year to maintain the inside kiosk temperature for proper operation of the critical equipment. One of the air-conditioner shall be running at a time and on failure of the same or as described hereunder, the other unit shall start automatically. To ensure longer life of the system, the redundant units shall also be running in cyclic operation through the controller. However, during running of one air-conditioner unit, if inside temperature of the shelter reaches to a predefined (i.e. 35o C), the other unit shall start running to maintain the temperature to specified value (i.e. 23+2o C) and gives alarm for such situation. After achieving this temperature, the other unit shall again shut off.

The following are the technical specifications of Air Conditioner:

S. No.	Parameter	Unit	Particulars
Twin circuit Air Conditioning system			
1	Total Tonnage of Complete Unit	TR	3 (2*2TR)
2	Tonnage of each unit	TR	2TR
3	Applicable Standards		Meets IS:8148
Compressor			
4	Scroll Compressor Offered	Yes/No	Yes (Hermetically Sealed)
5	Number of Compressors in Complete Unit	Nos.	Two
6	MTBF		25,000 working hrs
7	Life of Compressor		10 years for machine
8	Continuous running time		Always on (7 days, 24 hours and 365 days)

S. No.	Parameter	Unit	Particulars
Controller			
9	Controller type		Microprocessor
10	Machine type		Twin machine
11	Grade		Industry / commercial grade AC
12	Communication		Remote Monitoring
Installation			
13	Wall mounted	Yes/No	Yes
14	Outside mountable	Yes/No	Yes
15	Whether bottom support is required	Yes/No	Yes-Please check installation details
Electrical Data			
16	Supply with Variation	Volt, Hz	230V±15%, 50Hz, 1PH / 3PH

Note:

1. The air conditioning system shall be provided in the kiosks to be used for housing panels having control and protection IEDs for performing sub-station automation and protection functions. These kiosks shall be placed in the switchyard area generally unmanned.
2. The PIA shall deploy Shelter Air-Conditioning (AC) units incorporating the latest and advanced technology. The AC systems shall be rugged, industrial-grade, and optimally suited for telecom shelters and prevailing operating conditions. The PIA shall assess the shelter-specific heat load and ensure deployment of AC units with adequate and sufficient cooling capacity. The responsibility for proposing and implementing the best-fit solution shall rest with the PIA, subject to technical vetting and approval by APBIL.

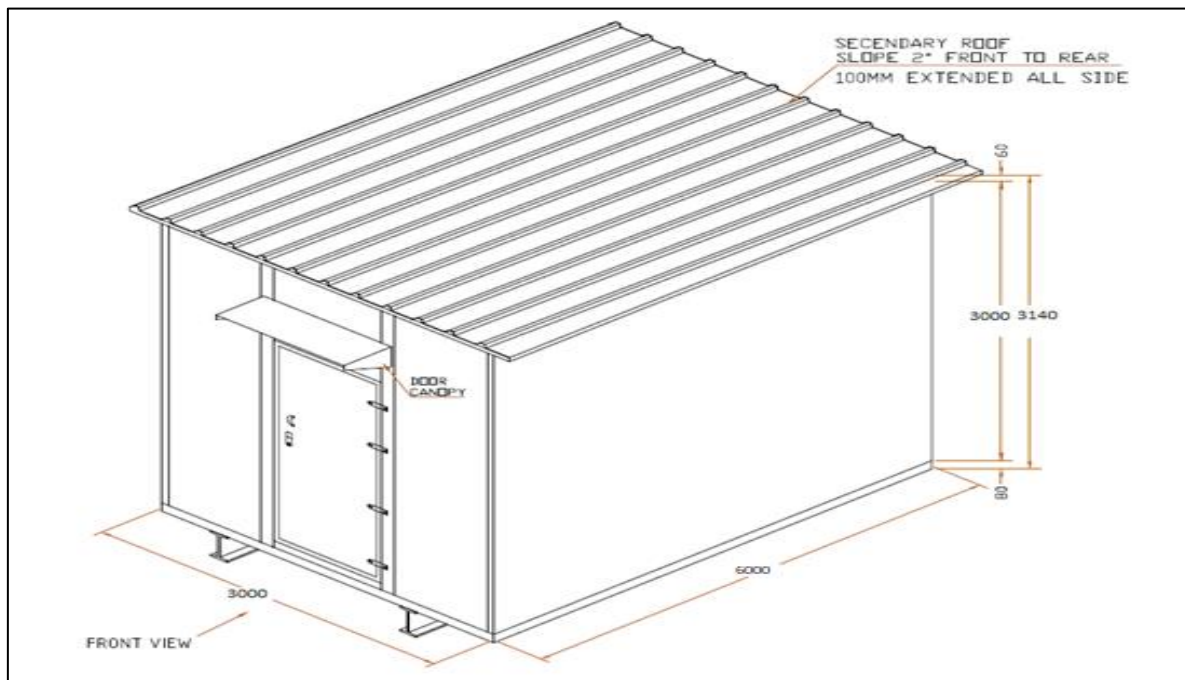
Functional Specifications of Shelter Enclosures

Shelter/ Container Enclosure will be implemented by the Bidder as a turnkey solution as per the specification mentioned above. Approximate size of each Shelter/ Container Enclosure would be as provided above. Apart from the technical specifications mentioned above, the functional specification for Shelter Enclosure is as follows:

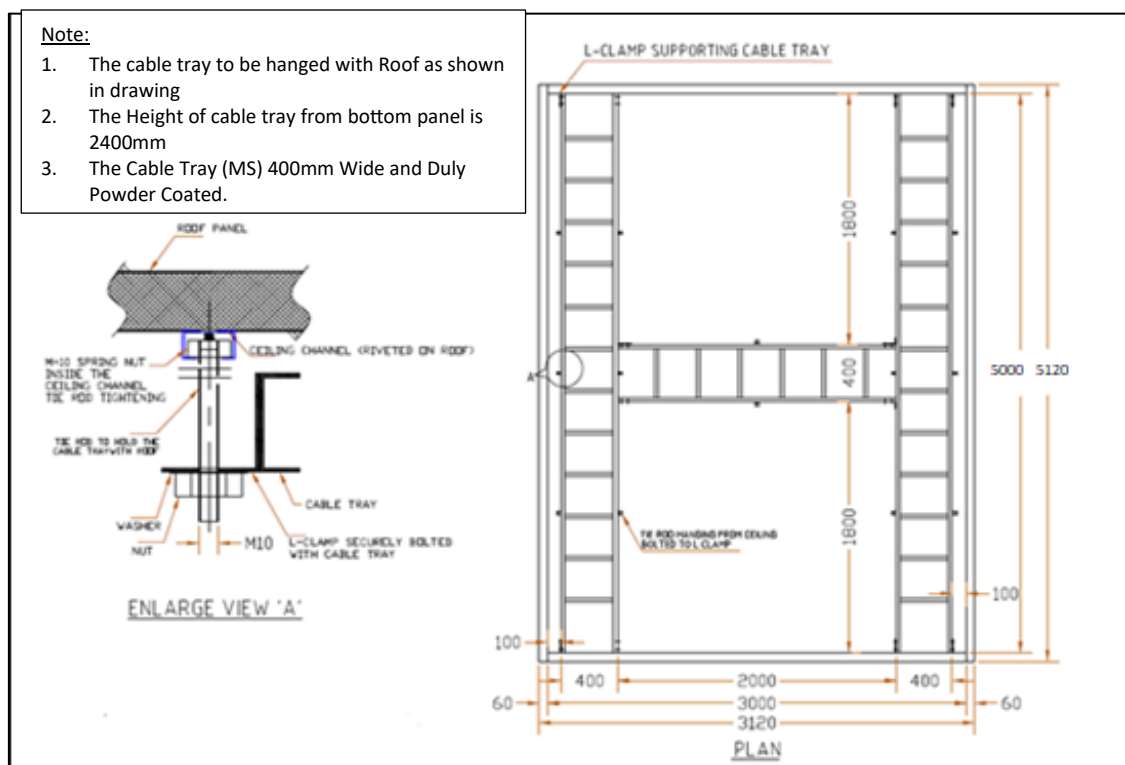
S. No.	Parameters
1	a. The Shelter/ Container enclosure should withstand extreme temperatures at external surface without creating any damage to internal equipment. Shelter/ Container enclosure must be self-supporting, fireproof room comprising modular wall, floor and ceiling elements and shall withstand wind speed of 150 Kms per Hour. Design calculation wind speed test report to be submitted along with technical bid.

S. No.	Parameters
	<ul style="list-style-type: none"> b. Its modular design should be fully adapted to on- site area and height dimensions. The Shelter/ Container enclosure should have opening for door systems, cable duct, lighting system, air conditioning ducts and other components. c. The enclosure will have color combination and logo as given by the user (both for internal and external). d. The enclosure is to be made of corrosion resistant material, electrostatic protection coating material and smoke detectors are to be installed in each Shelter/ Container enclosure. It has to be installed on a concrete plinth. e. Bidder needs to plan concrete plinth basis on the site survey and conditions.
2	<ul style="list-style-type: none"> a. Door and access control – The door system should have dimension as mentioned in technical specification and to be fire resistant door. It is to be fitted around with hollow rubber seal and expanding high temperature seal to prevent the penetration of heat, fire extinguishing water and acrid gases. Additionally the door system must comply with the following:- <ul style="list-style-type: none"> i. The door is to be fitted with a locking system which should include high security bolt work and locking bolt. The door lock should have at least three keys and keys should not be removable from the lock in unlocked state ii. It should support features like door opening and closing monitored through Network Operating Center (NOC) – DC/DR iii. Emergency exit door cut out should be provided on the main door (350mm x 350mm)
3	<ul style="list-style-type: none"> a. Ducting and structured cabling - The Shelter/ Container Enclosure should come equipped with separate ducts for power supply distribution and communication cables. Cable inlet to the Shelter/ Container Enclosure has to be fire proof, pressurised water and gas tight system. b. The duct should be designed in such a way that it should be possible to do retro fitment in future. The duct should be positioned in accordance with the racks for structured snarl free wiring. The size of the power cable duct and communication cable duct should be such that it must be possible to accommodate wiring needs for computer, network and UPS equipment.

Layered View of the System



Isometric View (Illustrative)



Cable Tray Layout (Illustrative)

Implementation Strategy

Supplier would be responsible for procurement and carrying out the installation and maintenance of Shelter Enclosures. The activities are to be performed as per the laid down standards, guidelines and procedures.

Supplier will be responsible for the following (but not limited to):

- a. To carry out the site area survey in the sub-station POPs
- b. Coordination with various agencies like Local Administration, APBIL/APSFL/DISCOMs etc. for Mandals Site Access, for end-to-end implementation and submission of documentations
- c. Installation of Shelter enclosures.
- d. Comprehensive maintenance
- e. Any other field implementation related work.

Survey and Planning Phase

- a. Survey of Mandal premises to finalize the exact location for placing the shelter Enclosure
- b. Identifying the requirements for constructing the plinth/platform for deploying the shelter enclosure over it.

Implementation Phase

- a. Supply of all material
- b. Responsible for payment of any Octroi / taxes involved in material movement to Supplier warehouse/work site.
- c. Site level coordination with Mandal Sub-stations for accessing the premises and connecting to installed equipment
- d. Carrying out the PoP installation work as per agreed standards and guidelines.
- e. Supplier will be responsible for taking photographs of the work carried out.
- f. Providing required support to APBIL/agency nominated by APBIL for conducting acceptance test.

Operations and Maintenance Phase

- a. Comprehensive maintenance of all shelter enclosures for a period of ten (10) years from the start of the Operations & Maintenance (O&M) phase, including supply of required spares. A minimum warranty period of one (1) year shall apply to newly deployed shelters. The scope shall additionally cover maintenance of all existing Mandal and Master Mandal shelter enclosures across the State.
- b. Adherence to guidelines and procedures laid down by APBIL
- c. Procurement and supply of all replacement material required for maintenance work.

XVI. Technical Specifications of Voltage Stabilizers

15 KV Technical Specifications

S. No.	Description
1	Micro controller-based confirming to IS:9815 IP 20 Servo Controlled 3 phase. voltage stabilizer with Input Voltage Range: 340-480 V, Output Voltage: 415V $\pm 1\%$ (230V Phase) Rated supply frequency: 47 - 53 Hz Ambient Temperature : 45° C Continuous Duty cycle with low voltage/High Voltage/Overload/Short

S. No.	Description
	Circuit/single phase prevention protections,3 Nos sensing Transformers, Correction rate :30 V/sec, Input on, Input Low, Input High, Output On, Output Cutoff, Auto / Manual Selector switch, Increase / Decrease Selector switch, Volts adj. Potentiometer, Voltmeter to read input and Output Voltage with Selector switch, Ammeter to read the Output current 3 phase SCVS, Input MCCB, Bypass, Output Contactor, Type Air Cooled etc., complete with all labour charges and with connections.
2	20mm dia, 2.1mm thick PVC conduit pipe
3	Horizontal SPN Distribution board with IP-43 protection (Metal Board) suitable for 1 No 63-A FP isolator as incomer
4	ISI marked, 4 core PVC insulated and sheathed FRLS/FRLS-H round copper cable for voltage up to 1100V as per IS 694/1990.
5	SITC of minimum 15KA surge protection device in the existing stabilizer
6	SITC configuration of High Voltage, Low Voltage, Over Current, High Frequency microprocessor relay with display in the stabilizer (in built)
7	SITC configuration of spike/impulse relay in the existing servo stabilizer (in built)

30 KV Technical Specifications

S. No.	Description
1	Micro controller-based confirming to IS:9815 IP 20 Servo Controlled 3 phase. voltage stabilizer with Input Voltage Range: 340-480 V, Output Voltage: 415V \pm 1% (230V Phase) Rated supply frequency: 47 - 53 Hz Ambient Temperature: 45° C Continuous Duty cycle with low voltage/High Voltage/Overload/Short Circuit/single phase prevention protections,3 Nos sensing Transformers, Correction rate :30 V/sec, Input on, Input Low, Input High, Output On, Output Cutoff, Auto / Manual Selector switch, Increase / Decrease Selector switch, Volts adj. Potentiometer, Voltmeter to read input and Output Voltage with Selector switch, Ammeter to read the Output current 3 phase SCVS, Input

S. No.	Description
	MCCB, Bypass, Output Contactor, Type Air Cooled etc., complete with all labour charges and with connections.
2	20mm dia, 2.1mm thick PVC conduit pipe
3	Horizontal SPN Distribution board with IP-43 protection (Metal Board) suitable for 1 No 63-A FP isolator as incomer
4	ISI marked, 4 core 16 sqmm PVC insulated and sheathed FRLS/FRLS-H round copper cable for voltage up to 1100V as per IS 694/1990.
5	SITC of minimum 30KA surge protection device in the existing stabilizer (to be In-built)
6	SITC configuration of High Voltage, Low Voltage, Over Current, High Frequency microprocessor relay with display in the stabilizer (To be in-built)
7	SITC configuration of spike/impulse relay in the existing servo stabilizer (To be in-built) (in built)

XVII. Technical Specifications of 24U Racks for FDMS at Block locations

S. No.	Description
1	Supply, Assembly and Installation of UL listed Server & Network Racks
2	The unit shall have 24U height with minimum 800 depth & 750 Width with Rigid Frame and Electro-Phoretic dip coated and then powder coated to Color RAL7035
3	Rack should include following
a	Single Perforated Front Door with profile which shall have better air flow or curved profile. Open Perforated area of Front Door.
b	Split Perforated Rear Door for better clearance at rear side
c	Removable side panel split for easy removal with lock. Side Panel should be of pass-through type in front and rear side, with preinstalled wire brush. This shall allow to pass the cables & Patch Chords to side enclosure directly without mixing the air between.
d	Castor Wheels and adjustable leveling feet from underneath or above.
e	Roof includes two large cable access slots for high density cabling and brush strips for air containment. Roof to have spring loaded pints for easy roof removal and installation with cable in place.

S. No.	Description
f	Rack should be supplied with accessories mounting channels
g	19" Rack Mounting Rail with option of adjustment, U position numbered in front and rear.
h	Baying Kit to join enclosures
i	Hardware Kit with M6 x 16 Phillips slot screws and cage nuts.
j	Vertical Manager - 02, pre-installed in front side of rack, 01 in left and 01 in right. The vertical cable manager should have smooth plastic cable guides at 1 U increment to allow patch cords to enter and exit in an organized manner.
k	Static Load Capacity of minimum 1300 kgs and rolling load of not less than 1000 kgs confirming to UL 2416 Standards. (Copy of UL Listing certificate essential as documentary evidence)
4	ATS: 16A ATS need to supplied with min 8 nos C13 sockets for each rack

Annexure C: ENGINEERING INSTRUCTIONS (E.I.)

Annexure C (1) - Engineering Instructions for Under Ground Optical Fiber Cable Laying Works

Scope

The Engineering Instructions spelt out in this document deal with the methods to be adopted for underground Optical Fiber Cable laying in PLB HDPE ducts and termination of OF Cables at Gram Panchayats (GPs) for BharatNet Projects. The methods of underground OFC laying included in this EI are

1. Open trenching method
2. Horizontal drilling method (HDD)

Under this RFP unified rates have been taken irrespective of the method used for OFC laying, therefore PIA has to take appropriate decision to adopt any of the above method depending upon the feasibility, time frame, meeting SLA over the contract period and O&M. The PIA has to follow the guidelines for open trenching method or HDD method adopted by him as under.

OF CABLE LAYING APPROACH

On the basis of the survey reports done by CONTRACTOR and further approved by APBIL, routes for OF cable laying shall be finalized. Road Cutting Permission shall be obtained from road and rail authorities for laying the Optical Fiber Cable along the finalized roads and at rail / road crossing along the route. Generally, O.F. Cable may preferably be laid straight as far as possible along the road near the boundaries, away from the burrow pits. When the O.F. Cable is laid along the National Highways, Cable should run along the road land boundary or at a minimum distance of 15 meters from the center line of the road where the road land is wider as the OFC carries high-capacity traffic and is planned for about 25 to 30 years of life. It is essential that the cable is laid after obtaining due permission from all the concerned authorities to avoid any damage (which may result in disruption of services / revenue loss) and shifting in near future due to their planned road widening works. For obtaining RoW APBIL will facilitate the CONTRACTOR.

In special cases where it may be necessary to avoid burrow pits or low-lying areas, the Cable may be laid underneath the shoulders at a distance of 0.6 meter from the outer edge of the road embankment provided the same is located at least 4.5 meters away from center line of road.

1. GENERAL

Soil Classification

- (a) Soil shall be classified under two broad categories Rocky and non-rocky. The soil is categorized as rocky if the cable trench cannot be dug without blasting and / or chiseling. All other types of soils shall be categorized as Non-Rocky including Murrum & soil mixed with stone or soft rock.

Rocky soil.

- (a) The terrain which consists of hard rocks or boulders where blasting/ chiselling is required for trenching such as quartzite, granite, basalt in hilly areas and RCC (reinforcement to be cut through but not separated) and the like.

Non Rocky soils

- (a) This will include all types of soil- soft soil/hard soil/Murrum i.e. any strata, such as sand, gravel, loam, clay, mud, black cotton murrum, shingle, river or nullah bed boulders, soling of roads, paths etc. (All such soils shall be sub-classified as kachcha soil) and hard core, macadam surface of any description (water bound, grouted tarmac etc.), CC roads and pavements, bituminous roads, bridges, culverts (All such soils shall be classified as Pucca soils)
- (b) The Optical Fiber Cable shall be laid through PLB HDPE Ducts buried at a nominal depth of 165cm. The steps involved in OF Cable laying are as under
- (c) Excavation of trench up to a nominal depth of 165 cm in non-Rocky soil, according to construction specifications along National/State Highways/other roads and in built up /rural areas. Under exceptional conditions/ genuine circumstances due to site constraints/ soil conditions, relaxation can be granted by the competent authority for excavation of trench to a depth lesser than 165cm. Such relaxation shall be given as per the laid down norms/ procedures being set by APBIL and with the approval of the competent authority. The payment in such cases shall be made on pro-rata basis as per the laid down rates mentioned in clause 5 of section IV B of tender document and norms adopted by the concerned APBIL.
- (d) Laying of PLB HDPE Ducts/coils coupled by sockets in excavated trenches, on bridges and culverts, as per construction specification and sealing of PLB HDPE Ducts pipe ends at every manhole/ joint chamber by end-plugs of appropriate size.
- (e) Providing additional protection by R.C.C. Pipes/GI pipes and/or concreting/chambering, wherever required according to construction specification mentioned in section IV B of tender document.
- (f) Fixing of GI pipes/troughs with clamps on culverts/bridges and/or chambering or concreting of G.I. Pipes/troughs, wherever necessary. Normally, RCC/DWC pipes shall be used, and use of GI pipes shall be avoided. However, in case it is felt that GI pipe is unavoidable in certain circumstances this should be done with the prior approval of competent authority within the concerned APBIL. This shall be recorded appropriately.

- (g) Laying Protection Pipes on Bridges and Culverts. In case trenching and pipe laying is not possible on the culverts, the pipes shall be laid on the surface of the culverts/bridges after due permission from the competent authority within the concerned APBIL as per construction specification and CC may be done over the pipe for protection.

Back filling and Dressing of the Trench according to construction specifications.

- (a) Making manhole/joint chamber of size (1.0 m length x 1.0 m width x 1.65 m Depth) at every Cable pulling location for housing the OF Cable loop & Pulling Optical Fiber Cable using proper tools and accessories. Sealing of both ends of the PLB HDPE pipe in manhole/joint chamber by hard rubber bush of suitable size to avoid entry of rodents into the PLB HDPE Ducts, putting split PLB HDPE Ducts and split RCC pipes with proper fixtures over cable in the manhole to protect the bare cable.
- (b) Digging of pit of size 2-meter x 2 meter x 1.8 meter (depth) for fixing of Jointing chambered-cast RCC cover or stone of suitable size on jointing chamber to protect the Joint and backfilling of jointing chamber with excavated soil.
- (c) Digging of pits 500 cm to 1000 cm towards jungle side at every jointing chamber along the route to a depth of 75cm fixing of route Indicator/joint indicator, concreting and backfilling of pits. Painting of route indicators with Blue colour and joint Indicator by Grey colour and sign writing denoting route/joint indicator number and marked as “BBNL/APBIL” as per construction specifications. Alternatively electronic markers shall be used for joint indicators by fixing/tying them to joint closure.

2. Specifications of Materials to be used

PLB HDPE Duct

- (a) Optical Fiber Cables should be pulled through Permanently Lubricated HDPE Duct of 40mm/33 mm size conforming to the specifications as per. TEC/GR 72030:2019 with latest Amendments. The Ducts shall be blue in colour and have the identification markings as per TEC GR wherein APBIL logo shall be marked as APBIL's name.

PLB HDPE Duct Accessories

Push fit Coupler

Push Fit couplers shall be used for coupling PLB HDPE ducts/coils. The specifications of the couplers shall be as per GR no TEC/GR 72030:2019 with latest amendments.

PP Rope

Should confirm to GR No. TEC/GR 72030:2019 with latest Amendments. However, this is optional, and PIA may use the same on need basis. The PP rope can be ordered along with the PLB duct as required. In this case PP ropes drawn through the HDPE/PLB pipes/coils and safely tied to the end caps at either ends with hooks to facilitate pulling of the OF cables at a later stage. The rope used is 3 strands Polypropylene Para Pro rope having yellow colour and size of 6 mm diameter. It should have a minimum breaking strength of 550 kgs. The length of each coil of rope should be 5 meter more than the standard length of duct(or as ordered) and it should conform to (i) BS 4928 Part-II of 1974 (ii) IS 5175 of 1982. It should be of special grade and should have ISI certificate mark. It should be manufactured out of industrial quality Polypropylene.

End Cap

End Cap shall be used for sealing the ends of the empty ducts, prior to installation of the OF Cable and shall be fitted immediately after laying the duct to prevent the entry of any dirt, water, moisture, insects/rodents etc. It should confirm to GR No. TEC/GR 72030:2019 with latest amendments. The ends of the PLB HDPE ducts/coils laid in the manholes should be closed with End Caps. The End Caps used should be suitable for closing 40mm/33mm PLB HDPE ducts/coils. A suitable arrangement should be provided in the End Cap to tie PP Rope. (See figure-1 for details)

Cable sealing Plug

This shall be used to seal the end of the ducts perfectly, after the OF cable is pulled in the duct. For pulling the cable through the ducts, it is necessary to provide manholes at that location and also at bends and corners wherever required. The ends of the PLB HDPE ducts/coils are closed with Cable sealing Plugs. The End Plugs used should be suitable for closing 40mm/33mm PLB HDPE ducts/coils. The Cable sealing plug shall confirm to GR No TEC/GR 72030:2019 with latest amendments. (Wherever blowing technique is used for laying OF Cable, at the discretion of the PIA concerned, the hand holes/manholes required for accessing the cable during cable laying can be at longer distances depending upon requirement.)

Material for Providing Additional Protection

RCC Full Round Pipes: Reinforced cement concrete pipes (spun type) coupled with RCC collars sealed with cement mortar used to provide additional protection to PLB HDPE Ducts/coils at lesser depths should be of full round, NP-2 class and size 100 mm (internal diameter), conforming to IS standard 458-1988 with latest amendments. The pipes should have a nominal length of 2 meters.

The RCC collars should be properly sealed using cement mortar 1:3 (1:53 grade cement of reputed brand, 3: fine sand without Impurities). If case of long spans, every third joint will be embedded in a concrete block of size 60 cm (L) x 40cm (W) x 25 cm (H) of 1:2:4 cement concrete mix (1: cement, 2: coarse sand, 4: stone aggregate of 20 mm nominal size) so that the alignment of RCC pipes remain firm and intact. Also, both ends of RCC pipes spans will be sealed by providing concrete block of size 40 cm (L) x 40 cm (W) x 25 cm (H) of 1:2:4 cement concrete mix to avoid entry of rodents.

RCC Split Pipes: The split Reinforced cement concrete pipes (spun type) with in-built collars are used to provide additional protection to PLB HDPE Ducts/coils should be of 100mm internal dia.(Spotted), Class--NP-3, Thickness: 25mm, Length: 2 Meters with inbuilt collaret one end, conforming to ISI Specification IS: 458, 1988 with latest amendment

G.I. Pipes: G.I. pipes should be of medium duty class having inner diameter of 50mm and should conform to specifications as per IS 554/1985 (revised up to date) IS 1989 (Part- I), 1900 Sockets (revised up to date) & IS 1239 (Part-II) 1992 (revised up to date).

DWC Pipes: Use of normal duty DWC (Double walled corrugated) HDPE pipe confirming to TEC GR no.GR/ with latest amendments shall be preferably utilized as first choice for protection of Optical Fiber Cable instead of GI pipes. The DWC pipes used shall be of size 75/ 61mm as per table 2 of the said TEC GR.

M.S. Weld Mesh: The PLB HDPE Ducts can also be protected by embedding it in concrete of size of 25 cm x25 cm reinforced with MS weld mesh. The MS weld mesh used should be of 50 mm x 100mm size, 12 SWG, 120 cm in width in rolls of 50m each. One meter of MS weldMesh caters to approx. 3 meters of concreting (See figure '2' for details). The strength of RCC/CC is dependent on proper curing;

therefore, it is imperative that water content of CC/RCC mix does not drain out into the surrounding soil. In order to ensure this, the RCC/CC work should be carried out by covering all the sides by yellow PVC sheets of weight not less than 1 kg per 8 sqm to avoid seepage of water into the soil.

Joint Chamber: The Joint chamber shall be provided at every joint location to keep the OF cable joint well protected and also to house extra length of cable which may be required in the event of faults at a later date. The Joint chamber shall be of pre-cast RCC type as per construction specification. Brick chamber can also be made with prior permission of APBIL.

Rubber Bush: To prevent entry of rodents into PLB HDPE DUCTS, the ends of PLB HDPE DUCTS are sealed at every manhole and joint using rodent resistant hard rubber bush (cap) after optical Fiber cable is pulled. The rubber bush should be manufactured from hard rubber with grooves and holes to fit into 40 mm PLB HDPE DUCTS pipe, so that it should be able to prevent the entry of insects, rodents, mud, and rainwater into the PLB HDPE DUCTS pipe. It should conform to TEC GR with latest amendments. (See Figure-3)

Route/Joint Indicator: The Route/Joint indicators are co-located with each manhole/joint chamber. In addition Route indicators are also to be placed where route changes direction like road crossings etc. Either RCC/Pre-cast or Stone based route indicators can be used. The detailed specification and design of the same shall be as per construction specification. Generally, Stone Route indicators shall be used for the BharatNet Project. Alternatively electronic markers shall be used for joint indicators by fixing/tying them to joint closure.

EXCAVATION OF TRENCHES

Trenching

Location and Alignment of the Trench: In built up areas, the trench will normally follow the foot- path of the road except where it may have to come to the edge of the carriage way cutting across road with specific permissions from the concerned authorities maintaining the road (such permissions shall be obtained by the department as per MOU signed with respective State Govt.). Outside the built up limits the trench will normally follow the boundary of the roadside land. However, where the roadside land is full of burrow pits or afforestation or when the cable has to cross culverts/ bridges or streams, the trench may come closer to the road edge or in some cases, over the embankment or shoulder of the Road (permissions for such deviations for cutting the embankment as well as shoulder of the road shall be obtained). The alignment of the trench will be decided by a responsible official of the APBIL.

Once the alignment is marked, no deviation from the alignment is permissible except with the approval of APBIL. While marking the alignment only the center line will be marked and the CONTRACTOR shall set out all other work to ensure that, the excavated trench is as straight as possible. The CONTRACTOR shall provide all necessary assistance and labour, at his own cost for marking the alignment. CONTRACTOR shall remove all bushes, undergrowth, stumps, rocks and other obstacles to facilitate marking the centre line without any extra charges. It is to be ensured that minimum amount of bushes and shrubs shall be removed to clear the way, and the CONTRACTOR shall give all, consideration to the preservation of the trees.

The line-up of the trench must be such that PLB pipe(s) shall be laid in a straight line, both laterally as well as vertically except at locations where it has to necessarily take a bend because of change in the alignment or gradient of the trench, subject to the restrictions mentioned elsewhere.

Line-Up: The line-up of the trench must be such that PLB HDPE Ducts shall be laid in a straight line except at locations where it has to necessarily take a bend because of change in the alignment or gradient of the trench, subject to the restrictions mentioned elsewhere.

Method of Excavation

In built up areas, the PIA shall resort to use of manual labour / HDD only to ensure no damage is caused to any underground or surface installations belonging to other public utility services and/or parties.

However, along the Highways and cross country there shall be no objection to the PIA resorting to mechanical means of excavation, provided that no underground installations existing the path of excavation, if any, are damaged.

There shall be no objection to resort to horizontal boring to bore a hole of required size and to push through G.I. Pipe (50 mm ID) through horizontal bore at road crossing or rail crossing or small hillocks etc.

All excavation operations shall include excavation and 'getting out'. 'Getting out' shall include throwing the excavated materials at a distance of at least one meter or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified.

In Rocky strata excavation shall be carried out by use of electromechanical means like breakers/ jack hammers or by blasting wherever permissible with express permission from the competent authority. If blasting operations are prohibited or not practicable, excavation in hard rock shall be done by chiseling / jack hammers.

Trenching shall as far as possible be kept ahead of the laying of pipes. PIA shall exercise due care that the soil from trenching intended to be loose for back filling is not mixed with loose debris. While trenching, the PIA should not cause damage to any underground installations belonging to other agencies and any damage caused should be made good at his own cost and expense.

Necessary barricades, night lamps, warning board and required watchman shall be provided by the PIA to prevent any accident to pedestrians or vehicles. While carrying out the blasting operations, the PIA shall ensure adequate safety by cautioning the vehicular and other traffic. The PIA shall employ sufficient manpower for this with caution boards, flags, sign writings etc.

The PIA should provide sufficient width at the trench at all such places, where it is likely to cave in due to soil conditions without any extra payment. A minimum free clearance of 15 cm should be maintained above or below any existing underground installation. No extra payment will be made towards this. In order to prevent damage to PLB HDPE DUCTS over a period of time, due to the growth of trees, roots, bushes, etc., the PIA shall cut them when encountered in the path of alignment of trench without any additional charges.

In large burrow pits, excavation may be required to be carried out for more than 165 cm in-depth to keep gradient of bed less than 15 degrees with horizontal. If not possible as stated above, alignment of trench shall be changed to avoid burrow pit completely.

Depth and Size of the Trench

The depth of the trench from top of the surface shall not be less than 165 cm unless otherwise relaxation is granted by APBIL under genuine circumstances.

In rocky terrain, less depth shall be allowed only in exceptional circumstances with additional protection where it is not possible to achieve the normal depth due to harsh terrain/ adverse site conditions encountered. This shall be done only with the approval of the APBIL. This shall be properly documented. In all cases, the slope of the trench shall not be less than 15 degrees with the horizontal surface. The width of the trench shall normally be 45 cm at the top & 30 cm at the bottom.

In case, additional pipes (HDPE/GI/RCC Pipes) are to be laid in some stretches, the same shall be accommodated in this normal size trench.

When trenches are excavated in slopes, uneven ground and inclined portion, the lower edge shall be treated as top surface of land and depth of trench will be measured accordingly. In certain locations, such as uneven ground, hilly areas and all other Places, due to any reason whatsoever it can be ordered to excavate beyond standard depth of 165 cm to keep the bed of the trench as smooth as possible. Near the culverts, both ends of the culverts shall be excavated more than 165 cm to keep the gradient less than 15 degree with horizontal. For additional depth in excess of 165 cm, no additional payment shall be applicable.

If excavation is not possible to the minimum depth of 165 cm, as detailed above, full facts shall be brought to the notice of the APBIL in writing giving details of location and reason for not being able to excavate that particular portion to the minimum depth.

Approval shall be granted by the APBIL in writing under genuine circumstances. The decision of the APBIL shall be final and binding on the PIA . All the relaxations granted as specified above shall be dealt with as per the laid down norms and procedure of APBIL.

Dewatering: The PIA shall be responsible for all necessary arrangements to remove or pump out water from trench. The PIA should survey the soil conditions encountered in the section and make his own assessment about dewatering arrangement that may be necessary. No extra payment shall be admissible for this.

Wetting: Wherever the soil is hard due to dry weather conditions, if watering is to be done for wetting the soil to make it loose, the same shall be done by the PIA. No extra payment shall be admissible for this.

Blasting: For excavation in hard rock, where blasting operations are considered necessary, the PIA shall obtain approval of the APBIL in writing for resorting to blasting operation. The PIA shall obtain license from the APBIL for undertaking blasting work as well as for obtaining and storing the explosive as per the Explosive Act, 1884 as amended up to date and the explosive Rules, 1983. The PIA shall purchase the explosives fuses, detonators, etc. only from a licensed dealer. Transportation and storage of explosive at site shall conform to the aforesaid Explosive Act and Explosive Rules. The PIA shall be responsible for the safe custody and proper accounting of the explosive materials. Fuses and detonators shall be stored separately and away from the explosives. APBIL or his authorized representatives shall have right to check the PIA's store and account of explosives. The PIA shall provide necessary facilities for this.

The PIA shall be responsible for any damage arising out of accident to workmen, public or property due to storage, transportation and use of explosive during blasting operation. Blasting operations shall be carried out under the supervision of a responsible authorized agent of the PIA (referred subsequently as agent only), during specified hours as approved in writing by the APBIL. The agent shall be conversant with the rules of blasting. All procedures and safety precautions for the use of

explosives drilling and loading of explosives before and after shot firing and disposal of explosives shall be taken by the PIA as detailed in IS: 4081 safety code for blasting and related drilling operation.

Trenching Near Culverts/ Bridges: The PLB HDPE Ducts shall be laid in the bed of culvert at the depth not less than 165 cm protected by RCC pipes as decided by APBIL. Both ends of culverts shall be excavated more than 165 cm in depth to keep the gradient of not less than 15 degrees with horizontal. The bed of trench should be as smooth as possible.

While carrying out the work on bridges and culverts, adequate arrangement for cautioning the traffic by way of caution boards during daytime and danger lights at night shall be provided. In case of small bridges and culverts, where there is a likelihood of their subsequent expansion and remodelling, the cable should be laid with some curve on both sides of the culvert or the bridge to make some extra length available for readjustment of the cable at the time of reconstruction of culvert or the bridge.

Laying OF PLB HDPE Ducts

After the trench is excavated to the specified depth, the bottom of the trench has to be cleared of all stones or pieces of rock and levelled up properly. A layer of soft soil/or sand (in case the excavated material contains sharp pieces of rock/stones) of not less than 5 cm is required for levelling the trench to ensure that the cable when laid will follow a straight alignment. Adequate care shall be exercised while laying so that the OF cables are not put to undue tension/pressure after being laid as this may adversely affect the optical characteristics of cables with passage of time.

The PIA shall ensure that trenching and pipe laying activities are continuous, without leaving patches or portions incomplete in between. In case intermediate patches are left, measurement of the completed portions will be taken only after work in such left-over patches are also completed in all respects.

Preparatory to aligning the pipe for jointing, each length of the PLB HDPE Ducts shall be thoroughly cleaned to remove all sand, dust or any other debris that may clog, disturb or damage the optical Fiber cable when it is pulled at a later stage. The ends of each pipe and inside of each Socket shall be thoroughly cleaned of any dirt or other foreign materials.

After the trench is cleaned the PLB HDPE Ducts/Coil shall be laid in the cleaned trench, jointed with Sockets. Drawing up of PP rope is optional as per TEC GR. In case of use of PP Rope, at every manhole or approximately at every 200m or at bends or turns the PP rope will be tied to the HDPE end caps used for sealing the PLB HDPE Ducts, to avoid entry of rodents/mud etc.

At the end of each day work, the open ends of the pipes sections shall be tightly closed with end caps to prevent the entry of dirt/mud, water or any foreign matter into PLB HDPE Ducts until the work is resumed. In built up area falling within Municipal/Corporation limits, the PLB HDPE Ducts shall be laid with protection using RCC Pipes/ Concreting reinforced with weld mesh (only in exceptional cases).

For lesser depths requiring additional protection in built up areas, towns and cities falling within the municipal limits, suitable protection shall be provided to PLB HDPE pipes/coils using RCC/DWC full round/split pipes or GI pipes or cement concreting reinforced with MS weld mesh or a combination of any of these as per the site requirement. This shall be done only with the prior instructions/approval of the APBIL. The specifications for providing each of these protections are given later in this document.

Moreover, in cross country routes, if depth is less than 1.2 meters, protection by using DWC Pipe shall be provided. APBIL shall decide about such stretches and type of protection to be provided in view of

the site requirements. Normally 63 / 100 mm DWC Pipes shall be used for protecting PLB HDPE Ducts but if more than one PLB pipe is to be laid and protected, DWC Pipe of suitable size to accommodate the required number of PLB Pipes shall be used.

The PLB HDPE Ducts shall be laid in RCC Full Round spun Pipes/GI Pipes as required at Road crossings. The RCC pipes/GI pipes shall extend at least 3 meters on either side of the road at Road crossings. At Road crossings, extra GI/PLB HDPE Ducts may be laid as per the direction of the APBIL. On Rail bridges and crossings, the PLB HDPE Ducts shall be encased in suitable cast iron as prescribed by the Railway Authorities.

Wherever RCC pipes are used for protection, the gaps between the RCC collars and the RCC pipes shall be sealed using cement mortar 1:3 (1:53 grade cement of reputed brand, 3: fine sand without impurities) to bar entry of rodents. Every third collar of RCC pipes (normally of 2 meters length) and also both ends of RCC Pipes will be embedded in a concrete block of size 40 cm (L)x 40 cm(W) x 25 cm (H) of 1:2:4 cement concrete mix (1:53 grade cement of reputed brand, 2: coarse sand, 3: stone aggregate of nominal size of 20 mm) so that the alignment of RCC pipes remain firm and intact and to avoid entry of rodents.

Wherever GI pipes are used, special care should be taken to ensure that G.I. Pipes are coupled properly with the sockets so as to avoid damage to PLB pipe and eventually the OF Cable in the event of pressure coming on the joint and G.I. Pipe joint giving its way. Rubber bushes shall be used at either ends of the GI pipes to protect PLB pipe. Both the ends of G.I. Pipe will be embedded in a concrete block of size 40 cm (L) x 40 cm ((W) x 25 cm (H) of 1:2:4 cement concrete mix (1:53 grade cement of reputed brand, 2: coarse sand, 3: stone aggregate of nominal size of 20 mm) so that the alignment of G.I. Pipes remain firm and intact and to avoid entry of rodents.

In case of protection by concreting at site, the nominal dimension of concreting shall be 250 mm x250 mm section. Cement Concrete Mixture used shall be of 1:2:4 composition i.e. 1:53 grade Cement of a reputed company, 2: Coarse Sand, 4: Graded Coarse Stone aggregate of 20 mm nominal size, reinforced with MS weld mesh. As the RCC is cast at site, it is imperative to ensure that special care is taken to see that proper curing arrangements are made with adequate supply of water. The PIA shall invariably use mechanical mixer at site for providing RCC protection, to ensure consistency of the mix.

For carrying out concreting work in trenches, yellow PVC sheets of width not less than 1.0 M and of weight not less than 1 kg. Per 8 sq. meters shall be spread and nailed on sides of the trench to form trapezoidal section for concreting in the cleaned trench, to avoid seepage of water into the soil.

A bed of cement concrete mixture of appropriate width and 75 mm thickness shall be laid on the PVC sheet, before laying PLB HDPE ducts. The PLB HDPE Ducts shall then be laid above this bed of concrete. After laying the PLB HDPE Ducts, MS weld mesh is wrapped around, and tied and concrete mix is poured to form the cross-sectional dimensions as instructed by the APBIL.

The strength of RCC is dependent on proper curing therefore, it is imperative that water content of RCC mix does not drain out into the surrounding soil. Portions where cement concreting has been carried out shall be cured with sufficient amount of water for reasonable time to harden the surface. After curing, refilling of the balance depth of the trench has to be carried out with excavated soil.

The PLB HDPE Ducts/ RCC/ GI Pipes shall be laid only in trenches accepted by APBIL or his representative. The PIA shall exercise due care to ensure that the PLB HDPE Ducts are not subjected to any damage or strain.

Water present in the trench at the time of laying the PLB HDPE Ducts shall be pumped out by the PIA before laying the pipes in the trench to ensure that no mud or water gets into the pipes, thus choking it.

In case of nallahs, which are dry for nine months in a year, the PLB HDPE Ducts shall be laid inside the RCC Pipes laid at a minimum depth of 165 cm, as instructed by the APBIL. The mechanical protection shall extend at least 5 meters beyond the bed of nallah on either side.

Notwithstanding anything contained in clauses referred above, the APBIL may order, based on special site requirements, that the PLB HDPE Ducts may be encased in reinforced cement concrete, as detailed, *ibid*. While laying the pipes, a gap of 2 M is kept at convenient locations approx. 200 m apart and at the bends and turns, which will be used as manholes during OF cable pulling. Ends of the PLB HDPE Ducts at the manholes shall be sealed using end caps after tying the PP rope to the end caps to avoid choking of the pipes. In a similar manner, manholes shall be kept while approaching bridges, road crossings etc., as instructed by the APBIL. The location of the manholes will be decided by the APBIL.

Laying Protection Pipes on Bridges and Culverts:

In case trenching and pipe laying is not possible on the culverts, the pipes shall be laid on the surface of the culverts/bridges after due permission from the APBIL. Of late the bridge construction authorities are providing channel ducts on the footpaths on the bridges for various services. The RCC/ DWC/ G.I. Pipes can be laid in these ducts for pulling cables. However, for laying cables on existing bridges, where duct arrangement does not exist, one of the following methods may be adopted.

In case of the Bridges/ Culverts, where there are no ducts and where the cushion on the top of the Arch is 50 cm to 100 cm or more, G.I. Pipe (Carrying PLB HDPE pipe and cable) may be buried on the top of the Arch adjoining the parapet wall, by digging close to the wheel guards. Every precaution shall be taken to see that no damage occurs to the arch of the culvert. After burying the GI pipe, the excavated surface on the arch shall be restored.

Where the thickness of the Arch is less than 50 cm, the pipe must be buried under the wheel guard masonry and the wheel guard rebuilt.

If neither of the two methods is possible, the G.I. Pipes/GI Troughs must be clamped on the parapet wall with the clamps. If necessary, the pipes may be taken through the parapet wall at the ends where the wall diverges away from the road.

Methods cited in above clauses should be carried out under close supervision of Road authorities.

The surface to be concreted should be thoroughly cleaned and levelled before concreting. At both ends of the Bridges/Culverts, where the GI Pipes /GI Troughs slope down and get buried, the concreting should be extended sufficiently to ensure that no portion of the GI Pipes/GI Troughs is exposed as approved by the APBIL to protect the pipe/trough from any possible externally caused damage.

Where whitewash/colour wash is existing on the Bridges/ Culverts, the same should also be carried out on the concreted portion to ensure uniformity.

Back Filling and Dressing of the Trench

Provided that the PLB HDPE pipes have been properly laid in the trench at the specified depth, the back filling operation shall follow as early as practicable. The earth used for filling shall be free from all roots, Grass, shrubs, vegetation, trees, saplings and any other kind of garbage or pebbles. The back filling operation shall be performed in such a manner so as to provide firm support under and above the pipes and to avoid bend or deformation of the PLB HDPE pipes when the pipes get loaded with the back filled earth.

At locations where the back filled materials contains stones/sharp objects which may cause injury to the PLB HDPE pipes and where the excavated or rock fragments are intended to refill the trench in whole or in part, the trench should be initially filled, with a layer of ordinary soil or loose earth (free from any stones/pebbles) not less than 10 cm thick over the pipes.

Back filling on public, roads, railway crossings, footpaths in city areas shall be performed immediately after laying the HDPE pipes. Back filling at such locations shall be thoroughly rammed, so as to ensure original condition so that it is safe for the road traffic. All excess soil/ material left on road/ footpath/railway crossing shall be removed by PIA. However, along the highways and in countryside, the excess dug up material left over after refilling should be kept in a heap above over the trench.

In city limits, at any given time not more than 50 Meters length of trench should be kept open and, in all places, where excavation has been done, no part of the trench should be kept open over night to avoid occurrence of any mishap or accident in darkness.

Restoration of Road Surface

Road restoration work to be made with bituminous macadam for semi grouting 50 mm thick and premix carpet surfacing 25 mm thick over the grouted surface (total up to 75 mm thick) including supply of asphalt etc. to evenly match the road, including consolidation and rolling as per standard specification of DSR 1997

Road restoration work with cement concrete 1:4:8 mix for thickness varying from 150 mm to 225 mm, including supply of concrete to be made to evenly match the road.

CABLE PULLING AND JOINING/SPLICING

CABLE PULLING

Manholes/Joint chambers marked during PLB HDPE Ducts pipe laying of approx. size of 1.0 m length x 1.0 m width x 1.65 m depth shall be excavated for pulling the cables. There may be situations where addition manholes/joint chambers are required to be excavated, for some reasons, to facilitate smooth pulling of cable. Excavation of addition manholes will be carried out, without any extra cost. De-watering of the manhole, if required, will be carried out without any extra costs. Dewatering/ De-gasification of the Ducts, if required, will be carried out without any extra costs.

The Optical Fiber cables are available in drums in lengths of approx. 2 km. The cables shall be blown / manually pulled (in exceptional cases) through already laid PLB HDPE DUCTS. This work is to be carried out under the strict supervision of site in-charge. It shall be ensured that during the blowing / pulling of Cable the tension is minimum and there is no damage to the Cable/Optical Fibers.

After pulling of the drum is completed, both ends of the PLB HDPE DUCTS pipe in each Manhole should be sealed by hard rodent resistant rubber bush, to avoid entry of rodents/mud into PLBHDPE Ducts.

The Manholes are prepared by providing 40 mm split PLB HDPE DUCTS pipe of 2.5 to 3m length and closing the split PLB HDPE Ducts by providing necessary clamps/ adhesive tape as per the directions

of APBIL. Afterwards, the split/cut PLB HDPE DUCTS pipe are covered with 100 mm split RCC pipe of 2m length and sealing the ends of RCC pipe with lean cement solution for protecting bare cable in the manhole. After fixing of RCC Split Pipes necessary back filling/reinstatement and dressing of manholes should be carried out as referred under trenching. The location of the pulling manhole should be recorded for preparation of documentation.

Jointing/ Splicing

Optical Fiber Cable Joints will be at varying distances depending upon the fiber to be laid for connecting Panchayats. The 48 fibers are to be spliced at every Joint & at both ends (Terminations) in the equipment room as directed by the APBIL. The infrastructure required for cable splicing i.e. Splicing machine OTDR. Optical talk set Tool kit etc. will be arranged by the PIA and also any additional accessories. e. g. Engine etc. required at site for splicing will also be arranged by the PIA.

The Optical Fiber Cable thus jointed end-to-end will be tested by the APBIL/TPA/IE officer of Acceptance Testing unit of the concerned APBIL for splice losses and transmission parameters as specified by APBIL and prevalent at that time. The through Optical Fiber should meet all the technical parameters, specified and no relaxation will be granted.

Construction of Jointing Chamber:

The joint chambers are provided at every joint to keep the O.F.C. joint well protected and also to keep extra length of cable, which may be, required to attend the faults at a later date. Jointing chambers are to be prepared at the Fiber Point of Interconnect (FPIO) or normally at distance of every 2 km. Actual location of jointing chamber depends on length of cable drum and appropriateness of location for carrying out jointing work.

In case of restoration of existing made-over network and during O&M phase, the Manholes shall be provisioned only in case a long section is being replaced. Construction of manholes for attending single cuts and small section replacement is not mandatory.

The jointing chambers are constructed by way of fixing pre-cast RCC chambers/Brick Chambers and covers as per the instructions from APBIL.

Precast RCC chamber

For fixing precast RCC chamber, first a pit of size 2 m x 2 m x 1.8 m depth shall be required to be dug. Pre cast RCC chamber shall consist of three parts (i) round base plate of 140 cm diameter and 5 cm thickness in two halves (ii) full round RCC joint chamber with diameter of 120 cm and height of 50 cm and thickness of 5 cm (iii) round top cover will be in two halves with diameter of 140 cm and thickness of 5 cm having one handle for each half in centre and word "APBIL OFC" engraved on it.(See figure '4'). After, fixing the pre-cast RCC joint chamber, the joint chamber is filled with clean sand before closing. Back filling of joint chamber pit with excavated soil shall be carried out in the end.

Brick Chamber

For constructing brick chamber, first a pit of size 2m x2 mx1.8 m depth is shall be required to be dug, then, base of the chamber shall be made using concrete mix of 1:5:10 (1 cement, 5 coarse sand, 10 graded stone aggregate of 40mm nominal size) of size of 1.7m x 1.7 m and 0.15 m

using cement mortar mix of 1:5 (1: cement, 5: fine sand). The chamber should have internal dimensions of 1 m x 1 m and 1 m height. The bricks to be used for this purpose should be size

9"x4.5"x3", best quality available and should have smooth rectangular shape with sharp corners and shall be uniform in colour and emit clear ringing sound when struck.

The joint chamber should be so constructed that PLB pipe ends remain protruding minimum 5 cm inside the chamber on completion of plastering. The PLB pipes should be embedded in wall in such a way that, the bottom brick should support the pipe, and upper brick should be provided in a manner that PLB HDPE pipe remains free from the weight of the construction. The joint chamber should be plastered on all internal surfaces and top edges with cement mortar of 1:3 (1: cement, 3: coarse sand), 12 mm thick finished with a floating coat of complete cement as per standard. Pre- cast RCC slab with two handles to facilitate easy lifting, of size 0.7 m x 1.4 m and of thickness of 5 cm having one handle for each half in centre and word "OFC" engraved on it are to be used to cover the joint chamber. Two numbers of such slabs are required for one joint chamber. This pre-cast slab should be made of cement concrete mix of 1:2:4 (1: cement, 2: coarse sand, 4: stone aggregate 6 mm nominal size) reinforced with steel wire fabric 75 x 25 mm mesh of weight not less than 7.75 Kg per sq. Meter. The joint chamber is filled with clean sand before closing. Back filling of joint chamber pit with excavated soil shall be carried out in the end.

Fixing of Route Indicators / Joint Indicators

Pits shall be dug 500 cm to 1000 cm towards jungle side at every Manhole and Jointing chamber for fixing of Route/Joint Indicator. In addition, Route Indicators are also required to be placed where O.F. Cable changes directions like road crossing etc. Alternatively electronic markers shall be used for joint indicators by fixing/tying them to joint closure.

The pits for fixing the indicator shall be dug for a size of 60 cm x 60 cm and 75 cm (depth).

The indicator shall be secured in upright position by ramming with stone and murrum up to a depth of 60 cm and concreting in the ratio of 1:2:4 (1: cement, 2: coarse sand, 4 stone aggregate 20 mm nominal size) for the remaining portion of 15 cm. Necessary curing shall be carried out for the concreted structure with sufficient amount of water for reasonable time to harden the structure.

RCC/ Precast Route Indicators

The route /joint indicator made of pre-cast RCC should have the following dimensions Base - 250 mm x 150 mm Top - 200 mm x 75 mm Height - 1250 mm (See figure '5')

Stone based Route Indicators

The route /joint indicators made of Sand/ limestone Should have the following dimension. The word 'BBNL/APBIL OFC' should be engraved on the Route/Joint indicators.

Stone to be used (Sand/ limestone)

Indicator Top surface to be rounded

Base 155 mm x 100 mm

Upper 500 mm length to be Tapered width wise as shown in the drawing and homogeneously finished.

Height 650mm (Straight) + 400 mm (Tapered)

The route indicators should be engraved with word 'OFC' of size 80mm length & 50 mm width.

Length 3.5 Ft., top 4"x4" dressed 1Ft. from top & tapered.

(See figure '6' for details of Stone Route Indicators)

The Route indicators shall painted Blue and placed at 500 to 1000 cm away from the centre of the trench towards jungle side. The Joint indicators are placed at OFC joints and placed 500 to 1000 cm away from wall of the joint chamber facing jungle side and are painted Grey. The engraved word “BBNL/APBIL OFC” should be painted in white, on route as well as joint indicators. Numbering of route indicators/joint indicators should also be done in white paint. The numbering scheme for route indicators will be Joint No./Route Indicator No. for that joint. For example, 2/6 marking on a route indicator means 6th route indicator after 2nd joint. Additional joints on account of faults at a later date should be given number of preceding joint with suffix A, B, C, and D. For example, sign writing 2A on a joint indicator means, additional joint between joint No. 2 and 3. The numbering of existing route/joint indicator should not be disturbed on account of additional joints. Enamel paints of reputed brand should be used for painting and sign writing of route as well joint indicators.

The route and joint indicator shall be painted with primer before painting with oil paint. The material used should bear ISI mark. The size of each written letter should be at least 3.5 cm. The colours of painting and sign writing is as under:

- For Joint Indicator: Grey colour
- For Route Indicator: Blue colour
- For APBIL OFC & Nos: White Colour

Documentation

The documentation, consisting of the following shall be prepared for each Block and the Panchayats connected to the Block. 4 sets of documentation shall be provided both in electronic format on CD as well as Hard binded copy.

Route Index Diagrams General: This diagram shall consist of Cable Route Details on Geographical Map drawn to scale with prominent landmarks and alignment of cable with reference to road. This shall be prepared on A-3 sheets of 80 GSM.

Route Index Diagrams Profile These diagrams will contain

Make and size of the cable.

Offset of cable from centre of the road at every 10 meters Depth profile of Cable at every 10 meter.

Details of protection with type of protection depicted on it.

Location of culvert and bridges with their lengths and scheme of laying of PLB HDPE Ductspipe thereon.

Important landmarks to facilitated locating the cable in future; Location of Joints and pulling manholes.

These diagrams shall be prepared on A-4 sheets of 80 GSM. On one sheet profile of maximum 400 meters shall be given to ensure clarity.

Joint Location Diagram This diagram will show

Geographical location of all the joints.

Depth of Joint Chamber covers from ground level Type of chamber (Brick/Pre-cast)

Length of O.F. Cable kept inside the joint chamber from either direction. This shall be prepared on A-4 sheets of 80 GSM.

All the diagrams (1), (2) & (3) shall bear the signatures of the PIA, the APBIL as a proof of accuracy of the details. The diagrams shall be bound in A-4 size book with cover.

The cover sheets shall be of 110 GSM and laminated. The front cover shall have the following details.

Name of the State/District/Block Name of the Panchayats connected Name of the APBIL with logo

Name of the PIA

Date of commencement of work Date of completion of work

For each Block 1 sets of above-mentioned document shall be submitted to APBIL.

SAFETY PRECAUTIONS

Safety Precautions when excavating or working in excavations close to electric cables

The Officer in charge (APBIL) of the work should get full information from electricity undertaking regarding any electric cables, which are known or suspected to exist near the proposed excavation and unless this is done, excavation should not be carried out in the section concerned. The electricity undertaking should be asked to send a representative and work should be preceded with close consultation with them.

Only wooden handled hand tools should be used until the electric cables have been completely exposed. Power Cables, not laid in conduits, are usually protected from above by a cover slab of concrete, brick or stone. They may or may not be protected on the sides. It is safer, therefore, always to drive the point of the pickaxe downwards then uncovering a cable, so that there is less chance of missing such warning slabs. No workman should be permitted to work alone where there are electric cables involved. At least one more man should be working nearby so that help can be given quickly in case of an accident. If disconnection of power could be arranged in that section it will be better. No electric cables shall be moved or altered without the consent of the Electric Authority, and they should be contacted to do the needful. If an electric cable is damaged even slightly, it should be reported to the Electric Authority and any warning bricks disturbed during excavation should be replaced while back filling the trench. Before driving a spike into the ground, the presence of other underground properties should be checked. Information on plans regarding the location of power cables need not to be assumed as wholly accurate. Full precautions should be taken in the vicinity until the power cable is uncovered. All electric cables should be regarded as being live and consequently dangerous. Any power is generally dangerous, even low voltage proving fatal in several cases.

Electric shock-Action and treatment :

Free the victim from the contact as quickly as possible. He should be jerked away from the live conductors by dry timber, dry rope or dry clothing. Care should be taken not to touch with bare hands as his body may be energized while in contact. Artificial respiration should begin immediately to restore breathing even if life appears to be extinct. Every moment of delay is serious, so, in the meanwhile, a doctor should be called for.

Safety Precautions while working in public street and along railway lines :

Where a road or footpath is to be opened up in the course of work, special care should be taken to see that proper protection is provided to prevent any accidents from occurring. Excavation work should be done in such a manner that it will not unduly cause inconvenience to pedestrians or occupants of buildings or obstruct road traffic. Suitable bridges over open trenches should be so

planned that these are required for the minimum possible time. Where bridges are constructed to accommodate vehicular traffic and is done near or on railway property, it should be with the full consent and knowledge of the competent railway authorities.

Danger from falling material

Care should be taken to see that apparatus, tools or other excavating implements or excavated materials are not left in a dangerous or insecure position so as to fall or be knocked into the trench thereby injuring any workman who may be working inside the trench.

Care when working in Excavations

Jumping into a trench is dangerous. If it is deep, workmen should be encouraged to lower themselves. Workers should work at safe distance so as to avoid striking each other accidentally with tools. If the walls of the trench contain glass bits, corroded wire or sharp objects they should be removed carefully. If an obstruction is encountered, it should be carefully uncovered and protected if necessary. If an obstruction is encountered, it should be carefully uncovered and protected if necessary. Care must be taken to see that excavated material is not left in such a position that it is likely to cause any accident or obstruction to a roadway or waterway. If possible, the excavated material should be put between the workmen and the traffic without encroaching too much on the road.

Danger of cave in

When working in deep trenches in loose soil, timbering up/shoring the sides will prevent soil subsidence. The excavated material should be kept at sufficient distance from the edge of the trencher pit. Vehicles or heavy equipment must not be permitted to approach too close to the excavation.

When making tunnelled opening, it should be ensured that the soil is compact enough to prevent cave in even under adverse conditions of traffic. Extra care should be taken while excavating near the foundations of buildings or retaining walls. In such cases, excavation should be done gradually and as far as possible in the presence of the owners of the property.

Protection of Excavations

Excavations in populated areas, which are not likely to be filled up on the same day should be protected by barriers or other effective means of preventing accidents and the location of all such openings must in any event be indicated by red flags or other suitable warning signs. During the hours from dusk to dawn, adequate number of red warning lamps should be displayed. Supervisory officers should ensure that all excavations are adequately protected in this manner as serious risk and responsibility is involved. Notwithstanding adoption of the above-mentioned precautions, works involving excavations should be so arranged as to keep the extent of opened ground and the time to open it to a minimum.

Precautions while working on roads

The period between half an hour after sunset and half an hour before sunrise, and any period of fog or abnormal darkness may also be considered as night for the purpose of these instructions, for the purpose of providing the warning signs.

Excavation liable to cause danger to vehicles or the public must at all times be protected with fencing of rope tied to strong uprights or bamboo poles at suitable height or by some other effective means. Any such temporary erection which is likely to cause obstructions, and which is not readily visible

should be marked by posts carrying red flags or boards with a red background by day and by continuously lighted lamps at night.

The flags and the lamps should be placed in conspicuous positions so as to indicate the pedestrians and drivers of vehicles the full expanse i.e. both width and length of the obstruction. The distance between lamps or between flags should not generally exceed 1.25 m along the width and 6m along length of the obstruction in non-congested areas, but 4 meters along the length in congested areas.

If the excavation is extensive, sufficient notice to give adequate warning of the danger, should be displayed conspicuously not less than 1.25 m above the ground and close to the excavation. Where any excavation is not clearly visible for a distance of 25m to traffic approaching from any direction or any part of the carriage way of the road in which the excavation exists, a warning notice should be placed on the kerb or edge of all such roads from which the excavation or as near the distance as is practicable but not less than 10 m from the junction of an entering or intersecting road in which the excavation exists. All warnings, in these should have a red background and should be clearly visible and legible. All warning lamps should exhibit a red light, but white lights may be used in addition to facilitate working at night. Wherever required a passage for pedestrians with footbridge should be provided. At excavations, cable drums, tools and all materials likely to offer obstructions should be properly folded round and protected. This applies to jointer's tents as well. Leads, hoses etc stretched and across the carriageway should be guarded adequately for their own protection and also that of the public.

Traffic Control

The police authorities are normally responsible for the control of traffic and may require the setting up of traffic controls to reduce the inconvenience occasioned by establishment of a single line of traffic due to restriction in road width or any other form of obstruction caused by the work. As far as possible, such arrangements should be settled in advance. If there are any specific regulations imposed by the local authorities, these should be followed.

Work along Railway Lines

Normally all works at Railway crossing is to be done under supervision of the railway authorities concerned, but it is to be borne in mind that use of white, red or green flags by the Departmental staff is positively forbidden to be used when working along a railway line as this practice may cause an accident through engine drivers mistaking them for railway signals. When working along double line of railway, the men should be warned to keep a sharp look on both the "UP" and "Down" lines to avoid the possibility of any accident when trains pass or happens to cross one another near the work spot.

Procedure and Safety Precautions for use of explosives during blasting for trenching

In areas where the cable trench cannot be done manually on account of boulders and rocks, it is necessary to blast the rocks by using suitable explosives. The quality of explosive to be used depends on the nature of the rocks and the kind of boulders. A few types of explosive fuses and detonators normally used for making trenches for cable works are detailed below:

Gun powder Nitrate Mixture Gelatine

Safety fuse Electric Detonator

Ordinary Detonator

Procedure

A detailed survey of the route is to be done to assess the length of the section where trenching is to be done with the help of blasting. A route diagram of the rocky section may be prepared indicating the length of the route where the explosives are to be used. For the purpose of obtaining license, a longer length of route should be given in the application as in many cases, after digging, rocks appear which was not initially anticipated.

Next a license will have to be obtained for use and storing of explosive in that section. If the area falls under a police commissioner, the authority for granting such license is the police commissioner of the concerned area. When the route does not fall in the jurisdiction of a police commissioner, the authority for issuing license is the District Magistrate.

The concerned APBIL authority should be applied in prescribed form with a route map. The concerned authority will make an enquiry and issue license for using/storing explosives for cables trenching work. Such license will be valid for 15 days only. The license should be got renewed if the blasting operation needs to be extended. Once the license is granted, it is the responsibility of the holders of the license for the proper use of explosives, its transportation and storing.

Method of using

The safest explosive is the Gelatin and electric detonator. Gelatin is in the form of a stick. Electric detonator is a type of fuse used for firing the explosive electrically. Holes are made at suitable intervals on rocky terrain or boulders either by air compressor or by manual chipping. The depth

First the electric detonator is to be inserted into the Gelatin, and the Gelatin is to be inserted into the holes keeping the + ve and - ve wirings of electric detonators outside the holes. Again, refill the holes with sand. These +ve and -ve insulated wires of detonator are then extended and finally connected to an EXPLoder kept at a distance of not less than 100 m.

Now the explosive is ready for blasting. But, before connecting wires to exploder for blasting, all necessary precautions for stopping the traffic, use of red flags, exchange of caution signals, etc. should be completed and only then Exploder should be connected and operated.

Operation of exploder (IDL schaffler type 350 type exploder)

The type 350 blasting machine consists of a bearing block with blasting machine system and the explosion proof light- alloy injection moulded housing. The exploder is held with the left hand. The twist handle is applied to the drive pin, clapped with the right hand turned in the clockwise direction in continuous measurements at the highest speed from the initial position until it reached to a stop. At this stage an indication lamp will glow. When the indication lamp glows, "press button switch" should be pressed. This will extend the electric current to detonator and Gelatin will be detonated. The rock will be blasted out of the trench. Number of holes can be blasted in a single stroke by connecting all such detonators in series connection and finally to the exploder. After blasting, again mazdoors are engaged on the work to clear the debris. If the result of the first blasting is not satisfactory; it should be repeated again on the same place.

Warning

There may be two reasons for unsatisfactory results of the blasting Misfire of Gelatin due to leakage of current from detonator.

Over loading because of overburdens.

Never pull the broken wire pieces from the holes in such cases. Attempt should not be made to re-blast the misfired Gelatin. The safest way is to make a fresh hole by its side and put fresh Gelatin in that hole and blast it.

Precautions

The abstract of Explosives Rules 1983 which are relevant to our work is given below:

Restriction of delivery and dispatch of explosives

No person shall deliver or dispatch any explosives to anyone other than a person who is the holder of a license to possess the explosives or the agent of a holder of such a license duly authorized by him in writing on his behalf?

OR

Is entitled under these rules to possess the explosives without a license.

The explosives so delivered or dispatched shall in no case exceed the quantity, which the person to whom they are delivered or dispatched is authorized to possess with or without a license under these rules.

No person shall receive explosives from any person other than the holder of a license granted under these rules. No person shall receive from or transfer explosives to any person for a temporary storage or safe custody in a licensed premise unless prior approval is obtained from the Chief Controller.

A person holding license for possession of explosives granted under these rules shall store the explosives only in premises specified in the license.

Protection from Lightning During Storing

Every magazine shall have attached there to one or more efficient lightning conductors designed and erected in accordance with the specification laid down in Indian Standard Specifications No.2309 as amended from time to time. The connections to various parts of earth resistance of the lightning conductor terminal on the building to the earth shall be tested at least once in every year by a qualified electrical engineer or any other competent person holding a certificate of competency in this behalf from the State Electricity Department. A certificate showing the results of such tests and the date of the last test shall be hung up in conspicuous place in the building.

Precautions during thunderstorm

When a thunder- storm appears to be imminent in the vicinity of a magazine or store house every person engaged in or around such magazine and store house shall be withdrawn to a safe distance from such magazine or store house and the magazine and store house shall be kept closed and locked until the thunderstorm has ceased or the threat of it has passed.

Maintenance of records

Every person holding a license granted under these rules for possession, sale or use of explosives shall maintain records in the prescribed form and shall produce such record on demand to an Inspection Officer.

Explosives not to be kept in damaged boxes

The licensee of every magazine or store house shall ensure that, the explosives are always kept in their original outer package. In case, the outer package gets damaged so that the explosive contained therein cannot be stored or transported, such explosives shall be repacked only after the same are examined by controller of explosives.

Storage of explosives in excess of the licensed quantity

The quantity of any kind of explosives kept in any licensed magazine or store house shall not exceed the quantity entered in the license against such kind of explosives. No explosives in excess of the licensed quantity shall be stored in the magazine or store house unless a permit in this behalf is obtained from the licensing authority by a letter or telegram.

Precautions to be observed at Site

The electric power at the blasting site shall be discontinued as far as practicable before charging the explosives. No work other than that associated with the charging operations shall be carried out within 10 meters of the holes unless otherwise specified to the contrary by the licensing authority.

When charging is completed, any surplus explosive detonators and fuses shall be removed from the vicinity of the hole and stored at a distance which should prevent accidental detonation in the event of a charge detonating prematurely in any hole. The holes which have been charged with explosive shall not be left unattended till the blasting is completed. Care shall be taken to ensure that fuse or wires connected to the detonation are not damaged during the placing of stemming materials and tamping.

Suitable warning procedure to be maintained

The licensee or a person appointed by the licensee to be in charge of the use of explosives at the site shall lay down a clear warning procedure consisting of warning signs and suitable signals and all persons employed in the area shall be made fully conversant with such signs and signals.

Precautions to be observed while firing

The end of the safety fuse (if used in place of a detonator should be freshly cut before being lighted. The exploders shall be regularly tested and maintained in a fit condition for use in firing. An exploder shall not be used for firing a circuit above its rated capacity. The electric circuits shall be tested for continuity before firing. All persons other than the shot-firer and his assistant, if any, shall be withdrawn from the site before testing the continuity.

For the purpose of jointing, the ends of all wires and cables should have the insulation removed for a maximum length of 5 cm. and should, then be made clear and bright for a minimum length of 2.5 cm. and the ends to be joined should be twisted together so as to have a positive metal contact.

Then these should be taped with insulation to avoid leakage when in contact with earth. In case of blasting with dynamite or any other high explosive, the position of all the bore holes to be drilled shall be marked in circles with white paint. These shall be inspected by the PIA's agent. Bore holes shall be of a size that the cartridge can easily pass down. After the drilling operation, the agent shall inspect the holes to ensure that drilling has been done only at the marked locations and no extra hole has been drilled. The agent shall then prepare the necessary charge separately for each bore hole. The bore holes shall be thoroughly cleaned before a cartridge is inserted. Only cylindrical wooden tamping rods shall be used for tamping. Metal rods or rods having pointed end shall never be used for tamping.

One cartridge shall be placed in the bore hole and gently pressed but not rammed down. Other cartridges shall then be added as may be required to make up the necessary charge for the bore hole. The topmost cartridge shall be connected to the detonator which shall in turn be connected to the safety fuses of required length. All fuses shall be cut to the length required before being inserted into the holes. Joints in fuses shall be avoided.

Where joints are unavoidable, a semi-circular niche shall be cut in one piece inserted into the niche. The two pieces shall then be wrapped together with string. All joints exposed to dampness shall be wrapped with rubber tape.

The maximum of eight bore holes shall be loaded and fired at one occasion. The charges shall be fired successively and not simultaneously. Immediately before firing, warning shall be given, and the agent shall see that all persons have retired to a place of safety. The fuses of the charged holes shall be ignited in the presence of the agent, who shall see that all the fuses are properly ignited.

Careful count shall be kept by the agent and other of each blast as it explodes. In case all the charged bore holes have exploded, the agent shall inspect the site soon after the blast but in case of misfire the agent shall inspect the site after half an hour and mark red crosses (X) over the holes which have not exploded. During this interval of half an hour, nobody shall approach the misfired holes. No driller shall work near such bore until either of the following operations has been done by the agent for the misfired boreholes.

The PIA'S agent shall very carefully (when the tamping is a damp clay) extract the tamping with a wooden scraper and withdraw the primer detonator.

The holes shall be cleaned for 30 cm of tamping and its direction ascertained by placing a stick in the hole. Another hole shall then be drilled 15 cm away and parallel to it. This hole shall be charged and fired. The misfired holes shall also explode along with the new one.

Before leaving the site of work, the agent of one shift shall inform the agent relieving him for the next shift, of any case of misfire and each such location shall be jointly inspected and the action to be taken in the matter shall be explained to the relieving agent. The APBIL shall also be informed by the agent of all cases of misfire, their cause and steps taken in that connection.

General Precautions

For the safety of persons red flags shall be prominently displayed around the area where blasting operations are to be carried out. All the workers at site, except those who actually ignite the fuse, shall withdraw to a safe distance of at least 200 metres from the blasting site. Audio warning by blowing whistle shall be given before igniting the fuse.

Blasting work shall be done under careful supervision and trained personnel shall be employed. Blasting shall not be done within 200 meters of an existing structure, unless specifically permitted by the APBIL in writing.

Precautions against misfire

The safety fuse shall be cut in an oblique direction with a knife. All saw dust shall be cleared form inside of the detonator. This can be done by blowing down the detonator and tapping the open end. No tools shall be inserted into the detonator for this purpose. If there is water present or if the borehole is damp, the junction of the fuse and detonator shall be made watertight by means of tough grease or any other suitable material. The detonator shall be inserted into the cartridge so that about

one-third of the copper tube is left exposed outside the explosive. The safety fuse just above the detonator shall be securely tied in position in the cartridge. Waster proof fuse only shall be used in the damp borehole or when water is present in the borehole. If a misfire has been found to be due to defective fuse, detonator or dynamite, the entire consignment from which the fuse, detonator or dynamite was taken shall be got inspected by the APBIL or his authorized representative before resuming the blasting or returning the consignment.

Precaution against stray currents

Where electrically operated equipment is used in locations having conductive ground or continuous metal objects, tests shall be made for stray current to ensure that electrical firing can proceed safely.

Horizontal Directional Drilling (HDD)

HDD Overview :Horizontal directional drilling is an excellent alternative to traditional utility installation methods. Unlike manual labour, trenching or excavation, the HDD process is highly suitable in urban areas or places where aboveground obstructions exist that are expensive, inconvenient or impossible to disturb for product installation. HDD machines install utilities under obstacles such as roads, rivers, creeks, buildings and highways — with little or no impact to the aboveground surface.

Drill Rig : Horizontal directional drilling machines are available in many sizes. Regardless of a machine's size, it has three main functions — rotation, forward thrust/pullback and fluid flow.

HDD Process: Horizontal directional drilling machines will bore under or around obstacles. Once the drill path is planned, an underground pilot bore is performed utilizing a series of drill rods connected to a drill head. After the pilot bore is completed, a back reamer is attached to the drill string that enlarges the drill path to accommodate the product that will subsequently be pulled into place. Vermeer NAVIGATOR horizontal directional drilling machines can install product under roads, buildings, railroad tracks, streets, rivers, creeks and in congested underground areas.

Steering: Steering refers to control of the direction of a drill path. The shape of a drill bit on the drill head allows an operator to change the drill path direction during a bore. When an operator points the drill bit downward to the 6 o'clock position and pushes the drill head forward, the drill head goes deeper. When the drill faces the 12 o'clock position, the drill head will rise. Pushed to the 9 o'clock position, the head goes left. Pushed to the 3 o'clock position, the head goes right. If no change in drill path is needed, the drill head and rod are rotated while thrusting.

Locating: Prior to starting a bore, the drill head is equipped with a transmitter that sends signals to an aboveground receiver during the bore. The drill head's location must be tracked during a bore in order to provide steering position information to the HDD operator.

ALLIED ACTIVITIES

Storing/Warehousing of Materials: PIA will be responsible for storing and warehousing of all the material and accessories, but not limited to, supplied by him at his own cost. No storing/warehouse shall be provided by APBIL.

Transportation of Materials: The PIA shall be responsible for transporting the materials, to be supplied by the APBIL or otherwise to execute the work under the contract, to site at his/ their own cost. The costs of transportation are subsumed in the standard quoted Rates and therefore no separate charges are payable on this account.

Disposal of Empty Cable Drums: The PIA shall be responsible to dispose of the empty cable drums after laying of the cables. The cost of various sizes of empty cable drums recoverable from the PIA will be fixed taking into account the prevailing market rates.

It shall be obligatory on part of the PIA to dispose of the empty cable drums at his/their level and the amount fixed for various empty cable drums shall be recovered from the bill for the work for which the drum (s) was/were issued or from any other amount due to the PIA or the Security Deposit.

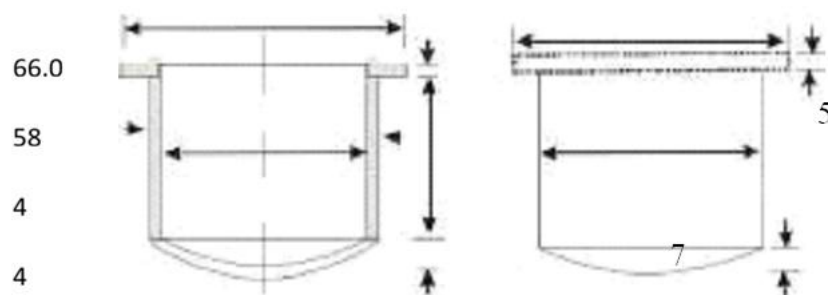
The PIA shall not be allowed to dump the empty cable drums in Govt. /Public place which may cause inconvenience to the APBIL / public. If the PIA does not dispose of the empty cable drums within 3 days of becoming it empty, the APBIL shall be at liberty to dispose-off the drums in any manner deemed fit and also recover the amount fixed in this contract from the bill/security deposit/ any other amount due to the PIA.

Supply of Materials: There are some materials (Accessories) other than as mentioned in BoQ required to be supplied by the PIA for execution of work under this contract like Bricks, Cement, Wire Mesh and Steel for protection, etc., besides using other consumables which do/don't become the part of the asset. The PIA shall ensure that the materials supplied are of best quality and workmanship and shall be strictly in an accordance with the specifications.

Social auditing: While carrying out the execution work of cable/Eqpt. ,videography may be carried out on sample basis for duration of 15 to 30 minutes per Gram Panchayat which may also involve the local people of the Gram Panchayats and villages including the Gram Panchayat Pradhan (If possible) and same may be submitted in a form of CD along with the documentation sets for information.

Note: All the materials as above have to be TSEC/Type approved by -IE/TEC/ any other agency nominated by APBIL against mentioned TEC GR or as per the approval procedure of ~~BSNL~~ APBIL for which TEC GR not there.

Figure 1: HDPE END CAPS



Section A.B

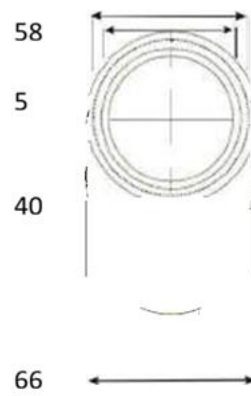


Figure 2

M.S. WELDMESH

DETAILS OF 100 MM X 50 MM, 12 SWG MILD STEEL WELD MESH HAVING WIDTH OF

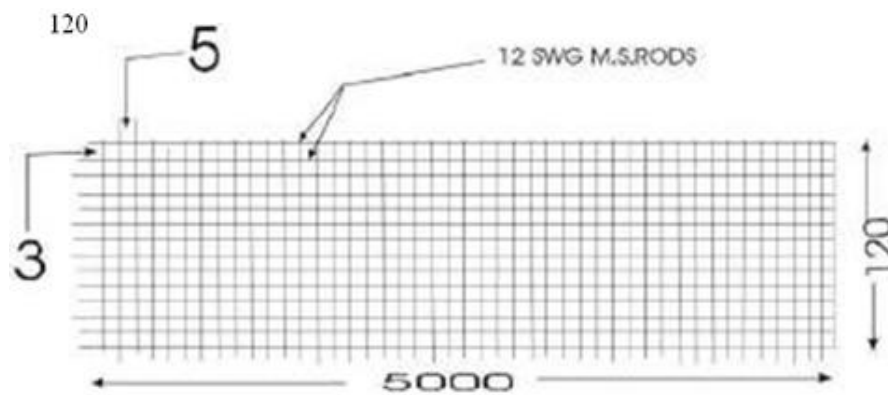
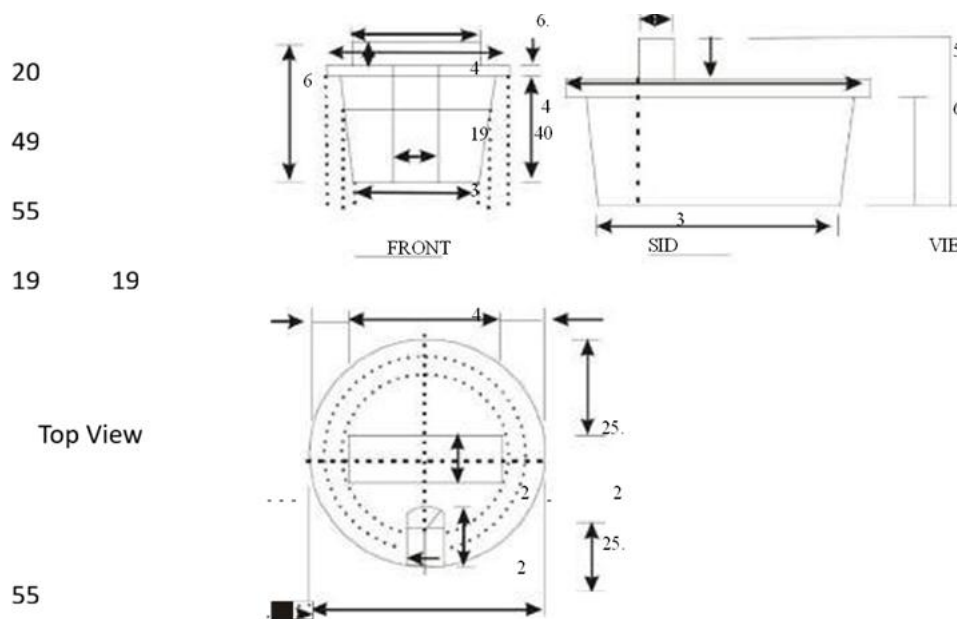


Figure 3

Rubber Cork



NOTE:

1. ALL DIMENSIONS ARE IN MM.

2. DIMENSIONS ARE ONLY FOR GUIDENCE. TAPPER SHOULD BE SUCH THAT IT SHOULD TIGHTLY FIX. INTO TYPE A & TYPE B HOPE 50 mm OO PIPES.

Figure 5

RCC Route Indicator

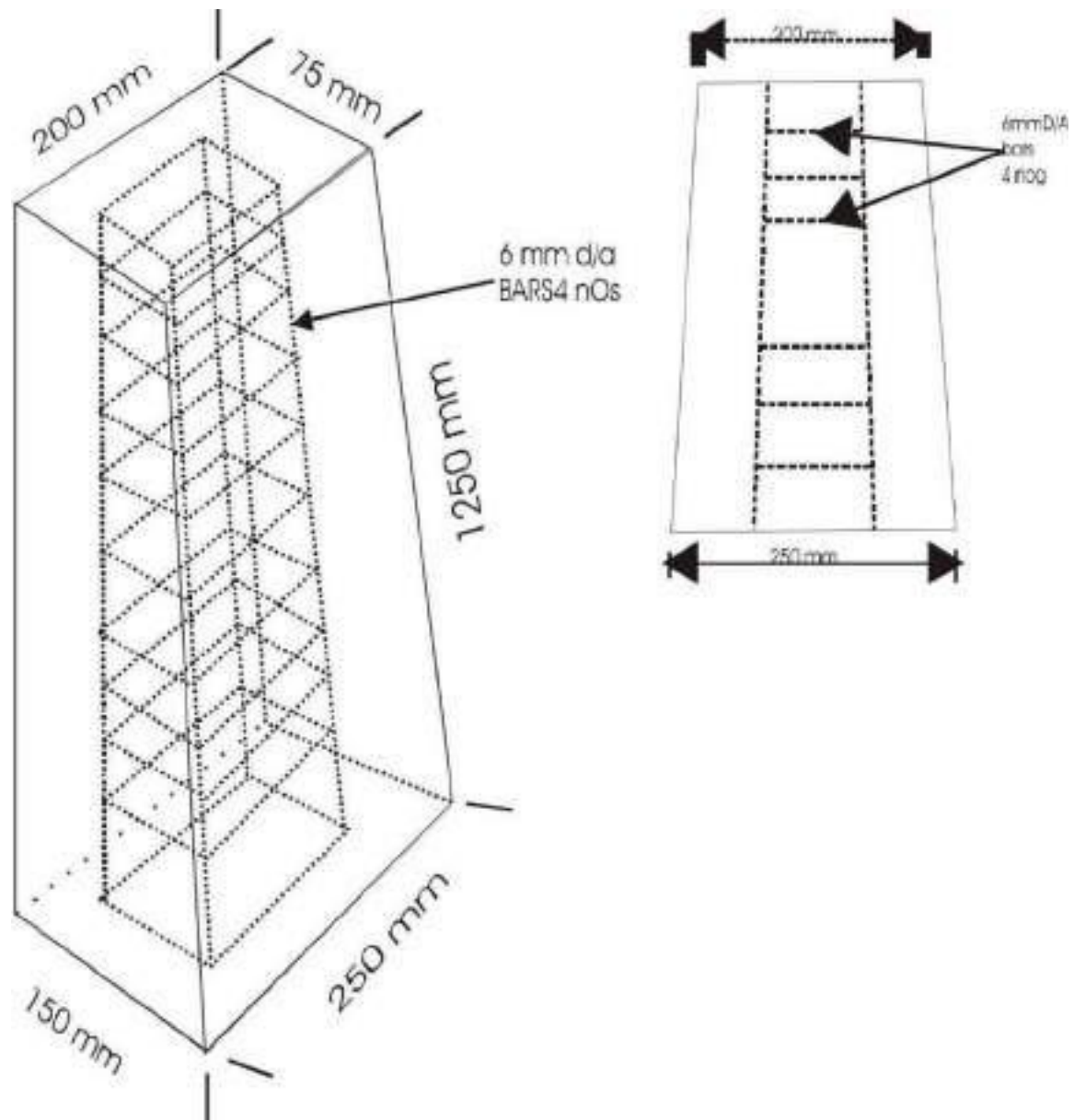
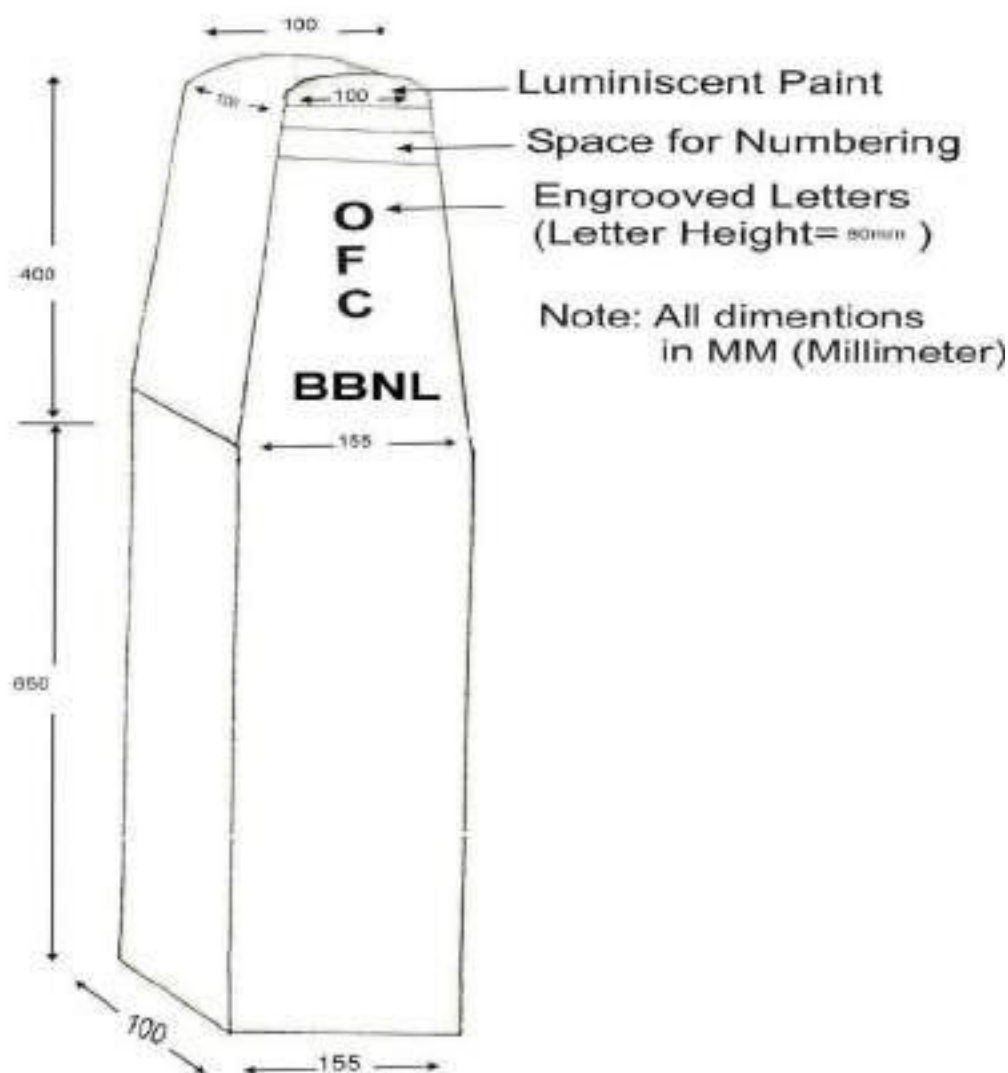


Figure 6

1. Stone OFC Route Indicator



Annexure B (1) - Penalty for Deviation from Standard Engineering Instructions Underground Laying

Normally depth of the trench should be 1.65 m in normal & mix soil and 1.2m in hard soil. Deviations due to field conditions will be required to have necessary protections in case of less depth. The cases and solutions are as following.

- Minimum depth of burial in general shall be 1.65m
- In rocky/ hilly area (including Murrum & soil mixed with stone or soft rock) depth of burial shall be 1.2m at the minimum.
- In case of utility where depth is 100 to 120 cm then DWC protection is to be used in normal/mix soil case.
- In some areas where the depth is 60cm, in those cases reinforced concrete casing of 4"(Four inch) round or GI pipe should be provided.

- For hard strata/rock soil layer for 50 to 80 cm cases DWC with wire mess and PCC or GI pipe is to be used. However, for depth relaxation photograph (with GPS) proof and justification is required.
- Above ground installation of ducts shall be limited to culvert and bridge crossings only. At such locations, ducts shall be installed inside GI pipe or HDPE DWC pipes with metal sheet protection (GI sheet wrapping) of appropriate size (4" to 6") suitable for number of ducts to be installed.
- Trenching depth under no circumstances shall be less than 30cms. Trenching work in soft/hard rock patches are to be achieved using rock breakers or any other method deemed fit.
- The relaxation by the competent authority prescribed below shall be obtained giving reasons for not achieving standard depth.

Note:

- In case of rocky/hilly soil, full payment is to be made for depth equal to or more than 1.2 m. The details of payment to be made in less depth cases are mentioned at clause 5 of section IV B of tender document.
- **Duct:** Extra 2% of trench length to account for actual PLB length in trenches. The payment shall be made with above factor included.
- In compliance to para 11, joint chambers are to be provided at every joint to keep the O.F.C. joint well protected and also to keep extra length of cable, which may be, required to attend the faults at a later date. Separate payment shall be made for construction of Joint Chambers. Extra OFC length shall normally be kept @ 20 meter per joint. However, to avoid wastage of OFC, extra length beyond 20 meters and up to 100 meters may be allowed.
- The payment of OFC shall be made as per the end-to-end OTDR length.

Annexure C (2) - Installation Practice of Self-Supporting Metal Free Aerial Optical Fibre Cable

INSTALLATION PRACTICE OF

SELF SUPPORTING METAL FREE AERIAL OPTICAL FIBRE CABLE

1. Introduction

This engineering Instruction (EI) deals with the guidelines and the installation practice for installing of self-supporting metal free aerial optical fibre cable.

2. General guidelines

2.1 General Instruction for Installation of ADSS:

- a) The methods described in this Engineering Instruction for installation of All Dielectric Self-Supporting (ADSS) fiber optic cable are intended to be used as guidelines by design engineers and outside plant construction personnel. This guide is generic enough, and yet contains sufficient specific information, to be applicable for most installations of ADSS cable, however, local conditions, existing engineering and customer procedures and requirements must be considered.
- b) ADSS Cables should meet National Electric Safety Code (NESC) loading requirements for heavy, medium, and light loading conditions in their sag/tension tables. Special tables can be generated based on specific customer installation requirements, which may include minimum separation and clearance, sag requirements, and loading conditions.
- c) It is assumed that the personnel using the information presented in this document have prior experience in the planning, engineering or placement of ADSS fiber Optic Cable.
- d) The ADSS Cable should meet the P1222 IEEE Standard for All- Dielectric Self- Supporting Fiber Optic Cable (ADSS).

2.2 Precautions during Installation of ADSS:

- a) The following are some suggested precautions which should be observed when working with fiber optic cables. Before starting any aerial fiber optic cable installation, all personnel must be thoroughly familiar with Occupational Safety and Health Act (OSHA) regulations. Each individual company's safety precautions for ADSS fiber optic cable installations should be reviewed before work begins and practiced during the entire installation process.
- b) Before cable installation begins, the cable reels should be carefully inspected for any imperfections such as nails and broken flanges which might cause damage to the cable as it is payed out. Precautions should be taken to protect stored reels from possible damage by vandals or other sources when left unattended.
- c) Fiber optic cable is a high-capacity transmission medium which can have its transmission characteristics degraded when subjected to excessive pulling force, sharp bends, and crushing forces. These losses may not be immediately revealed after installation. For these reasons extra care must be taken during the entire installation process.
- d) Whenever cable from the reel is placed on pavement or other surfaces, it should be protected with barricades or cones to prevent possible vehicular or pedestrian traffic damage.
- e) Fiber optic cables are susceptible to performance degradation due to tight bending. The minimum bend radius of each cable is specified relative to the cable's diameter. During installation a cable is not exposed to a bend radius smaller than 20 times the cable diameter and that after

installation a cable should not be exposed to a bend radius smaller than 10 times the cable diameter.

- f) Whenever cable from the reel is placed on pavement or other surfaces, it should be protected with barricades or cones to prevent possible vehicular or pedestrian traffic damage. A “figure-eight” configuration should be used when the cable is removed from the reel and piled on the ground. This prevents kinking and twisting of the cable which could cause damage. Fiber optic cable should not be coiled in a continuous direction except for lengths of 30 meters (100 ft) or less. The preferred sized for the “figure-eight” is about 4.5 meters (15 ft) in length with each loop 1.5 meters (5 ft) to 2.4 meters (8 ft) in diameter.

Note: An alternative to the manual figure-eight is the “figure-eight” machine. This equipment will “figure-eight” cable much faster than manual methods saving time and manpower. Using a “figure-eight” machine the remaining cable on the reel is wound on the machine’s drum. Once the inside cable end is accessible, the machine is reversed, and the cable is pulled from the machine through the duct. The machine’s drum and rollers are designed to keep the cable at a bend radius that exceeds the minimum bend radius of the cable.

- g) Never, during the pull-in process, should the fiber optic cable experience sags, bends or twists that produce in the cable a bend whose radius is smaller than that specified as the minimum bend radius for the cable being installed.
- h) Do not cut the Cable under any circumstances without prior approval of the engineer responsible for the project. Splice locations are determined in the initial system design by the project engineer. Introducing new splices can potentially degrade the transmission characteristics of the system.
- i) Temporary or permanent guys should be installed at any location where the self- supporting cable is tensioned to avoid placing an unbalanced load on the support poles. Wire mesh grips are intended for pulling the cable into place and are not intended for tensioning the cable in place. Do not use split wire mesh grips to tension or to hold cable under tension.

2.3 Accessories and tools for Installation of ADSS:

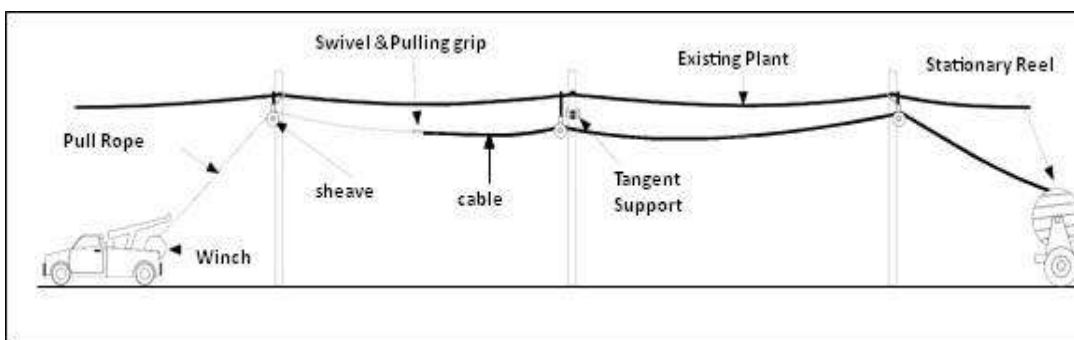
- a) The type and construction of the reel support determine the method and tools for handling. Reel construction requires that they be mounted on an axle or be supported by the reel flange. The equipment used must be rated for the maximum load and be able to lift the reel. When the reel stand is not self-loading, a crane, forklift or some other method of lifting must be available to lift the reel onto its stand.
- b) The reel support design employed must incorporate an adjustable brake to supply the necessary hold-back tension needed to properly tension the cable. The cable may be pulled directly from the reel support when employing slack stringing methods that apply minimal tension to the reel of cable.
- c) Capstan and reel type pulling machines with approved adjustable tensioners may be used to install the ADSS fiber optic cable.
- d) The pulling and braking system employed should operate smoothly to prevent any jerking or bouncing of the cable during placement. The system should be controllable and able to maintain a constant and even tension on the cable during the installation process. Pullers and tensioner should be equipped with tension indicator and limiting devices. Tensioner wheels should be

controlled so that a constant hold-back tension is maintained at all pulling speeds. A braking system to maintain cable tension when pulling is stopped is required.

- e) Sheave diameters larger than those specified in Paragraph 2.5 are suggested, especially at the payoff reel position and the take-up or winch location. A larger diameter than the minimum diameter required offers the advantage of reducing the load applied to the cable.
- f) The depth and flare of grooves in wheels used during the placing process are not critical, but there are some recommended guidelines that should be followed. The sheave grooves should have depth of 25% greater than the cable diameter with a flare angle of 15 to 20 degrees from vertical. This will facilitate the passage of grips, swivels, etc. and contain the cable within the groove. The material and finish of the grooves should be such that it does not mar the surface of the cable.
- g) Traveler, sheave, or quadrant blocks used should be in good working order and properly lubricated. The cable release should work smoothly with minimal pressure. These should be lined so that they do not cause any abrasion of the cable jacket. A plastic lining of neoprene or urethane are acceptable.
- h) Tangent supports made of metal with a protective pad can be used as a replacement for stringing blocks. These supports are mounted directly on the pole and open from the top. The protective pads can be removed and the top closed and secured for stringing.
- i) At places where uplift may occur, it is recommended that uplift rollers or hold down blocks be used.
- j) Wire mesh grips or pulling eyes can be used to pull the cable into place through the travelers, sheaves, or quadrant blocks. The mesh grip or pulling eye must be used in conjunction with a swivel link which will minimize cable twisting that can be introduced by the pull rope. The load rating of the swivel link shall not exceed the maximum pulling tension rating of the cable.

2.4 ADSS Installation Methods:

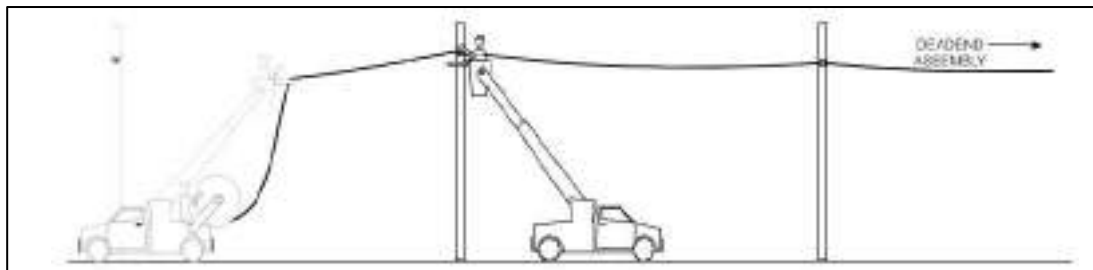
There are two primary methods used for placing ADSS cable. Both these methods are very similar to those methods used to place most aerial cables. The first method is called the stationary reel, or the "Pull-back Method," and the second is called the moving reel, or the "Drive-out Method."



The Pull-back Method: The Pull-back Method is illustrated in Figure A below.

Figure A: The Pull-back Method of Installation of ADSS

- (a) Holes are drilled in all poles along the cable run and line pole hardware is attached to the poles at the engineered height. At dead-end and tangent locations, down guys are placed at the correct position according to local engineering practices.
- (b) Travelers, sheaves, or quadrant block are placed just above or just below the location of the installed pole line hardware at each pole location. The diameter of these supports must meet the minimum bend radius specs for the cable in any location where the cable will be bent more than 20 degrees. The cable warranty is void if these limits are not observed.
- (c) Please note that if tension is let off the cable during a pull, the natural sag of the cable will usually produce angles larger than 20 degrees at each support point. Thus, extreme caution must be used if pulling through small diameter supports.
- (d) The pulling line is then pulled through each traveler, sheave, or quadrant block. After the pulling line is in place, it is attached to the ADSS cable with a break-away swivel and a factory installed pulling eye. A wire mesh grip may be used when a pulling eye has not been installed.
- (e) The ADSS cable is then pulled in through the entire section using the puller and the tensioner. Care must be taken to avoid over tensioning the cable and to avoid sagging of the cable that may introduce bends that are smaller than the minimum bending radius of the cable. Several pulling stages may be required to place the cable through the entire system.
- (f) When the entire cable has been pulled into place, starting at an end location, each dead-end-to-dead-end cable length can be sagged and tensioned and support hardware applied according to



the installation requirements.

The Drive-back Method: The Pull-back Method is illustrated in Figure B below.

Figure B: The Pull-back Method of Installation of ADSS

- a) The Drive-out method of cable placement is primarily used during the construction of new lines where there is a clear right-of-way and with no obstructions to vehicles.
- b) The reel of cable is placed on a reel trailer or a truck equipped with a reel carrier. The cable should play off the top of the reel for reel trailers and the bottom of the reel for trucks equipped with a reel carrier. The reel trailer or reel equipped truck should have a braking device, set on minimum. The brake is used to prevent overrun of the reel when stopping at the support poles.
- c) Holes will have to be drilled at the poles to mount the support hardware. At dead-end and tensioning locations, down-guys of the correct loading factor are to be placed according to local engineering practices.
- d) Travelers, sheaves, or quadrant blocks are placed above or below the pole mounting hardware at each pole location.

- e) With the cable dead ended at the starting location and minimum tension applied to the reel brake, the reel of cable is transported along the construction route while the cable is played out.
- f) As the reel passes a pole location, the trailer or truck must be stopped while the cable is placed into the traveler, sheave, or quadrant block attached to the pole.
- g) The reel then travels on to the next pole where the process is repeated over again. This continues until the cable is completely deployed or a dead-end is reached.
- h) With the cable deployed, each span must be sagged and tensioned with supporting hardware installed. Each span is started at the dead-end and slack worked back towards the opposite end. An alternative method is to sag and tension each span and install permanent hardware as the cable is being deployed.

2.5 Route Survey:

The route should be inspected before the actual installation of optical fibre cables. Survey of the aerial route should be carried out pole by pole.

2.6 Over Head Alignment:

The existing route alignment wherever available should be used. On new routes, alignment should be erected. The span length must not exceed above 90 metres.

2.7 Line Diagram:

2.7.1.1.1A line diagram should be prepared to mark the poles & the actual distance between the poles in a splice section (Normally 15 poles per km are recommended).

2.7.1.1.2Additional poles should be erected if required to keep the span length within the specified limits.

2.7.1.1.3Care should be taken that the alignment is easily accessible from the road. It is necessary to keep a clear head way (Ground clearance) of 12 to 15 feet in a section.

2.7.1.1.4A complete line diagram should be prepared i.e. from station A to station B.

2.7.1.1.5The number of road crossings, canals or nallahs, electric lines should be clearly marked in the route diagram.

2.8 Hilly Regions:

- (a) Line erection rules must be strictly followed. Additional poles may be erected for better support to optical fibre cable & to avoid sharp curves & bends.
- (b) Span lengths should be reduced to avoid sags in case of steep slopes.

3. Installation of ADSS on New poles

3.1 Tension Poles

Tension poles are dead end or termination poles. The tension poles shall have dead end fittings. The dead-end fittings offer a continuous run of the aerial optical fibre cable. These fittings relieve the optical fibre cable of its compressive, bending & clamping stresses. The performed dead end fittings are suitably gritted for excellent tensile holding strength.

3.1.1) Selection of Tension Poles

Selection of tension poles depends upon the actual site location of the route. Every fifth pole should be a tension pole in straight alignment. Splicing location poles should be tension poles or wherever alignment takes a sharp turn (more than 15 degrees) should also be a tension pole.

3.2 Suspension Poles

The suspension pole assembly is designed to offer cushion to aerial optical fibre cable against the dynamic stress of Aeolian vibration at the suspension point. They also reduce static stresses at the Support point.

3.3 Selection Poles

Selection of suspension poles also depends upon actual site location of route. All the intermediate poles between two tension poles will be suspension poles.

3.4 Selection of Splice location

The splice box of the aerial optical cable should be buried underground. Therefore, it is necessary to fix & determine the splicing location as per the designated cable drum length.

3.5 Aerial optical Fibre Cable Specifications

1	Maximum span length	:	90 Metres
2	Maximum ice loading	:	1Kg per meter
3	Operational wind velocity	:	75Kms per hour
4	Maximum sag allowed (without excess load)	:	2% of span length
5	Maximum sag allowed (with excess load)	:	3% of span length
6	Temperature range operation & storage installation	:	-30 to +70 degree C -15 to +50 degree C
7	Minimum bend radius	:	2D (D-Dia of cable)
8	Tensile force During installation Permanent with ice & wind load (where w is the mass of 1 km length of cable, in kg)	:	9.81 x 1.3 x w 9.81 x 3 x w

3.6 Type of Accessories and Fixtures

3.6.1 Wedge Solution Introduction

This Technical Specification contains the requirements for Installation Accessories & Fixtures to be used for erection of the Self-Supporting Metal Free Aerial / ADSS Optical Fiber Cables on the existing overhead alignments or Power line alignments up to 100 m of span length.

Technical Requirements of Installation Accessories

Types of Installation Accessories

The Wedge types of Installation Accessories are as mentioned below:

- i. Tension (Dead End) Assembly

- ii. Universal Pole Bracket
- iii. Suspension Clamp Assembly
- iv. Adjustable Cable Storage Bracket
- v. Stainless Steel Strap with Buckle
- vi. Down Lead Clamps

Anchoring (Dead End) Assembly

Anchoring assemblies shall be used to firmly hold ADSS cable to a concrete, wood or steel pole and transmit the mechanical tension,

- i. at the end of a run
- ii. at Tensioning Points
- iii. at a major change in direction of over 20 degrees

Each Anchoring Assembly includes

- i. Two numbers of wedge type tension Clamps (Dead End Clamp)
- ii. One number Pole bracket or wall bracket (Universal Pole Bracket)

Anchoring assemblies shall be supplied in sets to ensure compatibility of the materials

Universal Pole Bracket

Universal Pole Bracket shall be used for Tensioning (Dead End) Assembly.

Suspension clamp Assembly

Suspension Clamp Assembly shall be used for holding the ADSS cable at an intermediate point of support such as a pole. It can accommodate small angles of deviation up to 20 deg.

Each suspension assembly shall consist of

- i. One number Suspension Clamp (Body with Flange).
- ii. One number of elastomer liner allowing ADSS to slide in case of unexpected dissymmetric load on one span.

The Body and Flange shall be designed to hold the ADSS cable through a liner kept in a clamp. Suspension Assemblies shall be supplied in sets to ensure compatibility of the materials.

Adjustable Cable storage Bracket

Adjustable Cable Storage Bracket is used to store the excess cables which is being maintained in the middle of the line and to use at the time of joints.

Stainless Steel Strap and Buckles

- i. The Stainless-steel strap shall consist of stainless-steel strap of size 20mm ± 0.2 x 0.7mm ± 0.05 mm and shall have tensile strength of 7.5KN min., elongation 30% Min, finish 2B.
- ii. Tensile strength of strap shall be minimum 7.5KN which shall be tested on a loop with Buckle. Number of loops for mounting the bracket on pole shall be allocated as per

load requirement for Tension (Dead-end) and Suspension clamp specified in this specification.

- iii. Min two loops of 0.75 meter each with one Buckle shall be considered for attaching the brackets to the poles.
- iv. The SS Strap shall be engraved with the name of the Manufacturer, month and year of manufacturing and length at a distance of approx. 250mm for traceability.
- v. SS Strap shall be supplied in 50-meter roll in plastic dispenser casing with indication of remaining length.
- vi. The SS Buckle to suit above Strap shall be used to tension & fix it. It shall have a slot width of not less than 20.5 mm x 1.5 mm
- vii. Buckles shall be supplied in plastic bags containing 100 pcs per bag.

Down Lead Clamps

Down Lead Clamps shall be used to properly fix the cable on the pole to avoid the movement of the cable under wind condition which may lead to damage of the cable. The Down Lead Clamps shall have provision to fix it on the pole by stainless Steel straps.

Raw materials for Installation Accessories

Raw material for Dead End Clamp

The clamp body shall consist of an aluminium alloy, flexible rope sling attachment loop ("bail") of stainless steel and self- adjusting plastic wedges which shall Tension/hold the cable. The following key criterion shall be followed for the design of the same:

- i. There shall be no losable part in the process of clamping arrangement
- ii. Locking mechanism shall be wedge type self-locking. Wedges shall be made of UV resistant thermoplastic with glass Fiber (Polybutylene Terephthalate (PBT) / Polyamide (PA 06)
- iii. The loop bail / rope shall be flexible, made of stainless-steel material of (AISI 304 / 301), fitted with plastic u- saddle. It shall be possible to open the bail loop in order to be put through a ring bracket or a cross-arm hole. The distance between the end of U-Saddle and the cable fitment area shall be of min 400 mm, or more to ensure the min bending radius of cable while installation

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- iii. The loop bail / rope shall be flexible, made of stainless-steel material of (AISI 304 / 301), fitted with plastic u- saddle. It shall be possible to open the bail loop in order to be put through a ring bracket or a cross-arm hole. The distance between the end of U- Saddle and the cable fitment area shall be of min 400 mm, or more to ensure the min bending radius of cable while installation

Raw material for Universal Pole Bracket

Universal Pole Bracket for Anchoring Assembly shall be made out of a single piece aluminium alloy made of gravity die casting and further heat treated to required strength. Extruded aluminium brackets are not allowed due to sharp corners. The brackets shall be suitable for attachment to a pole by one bolt or two stainless Steel straps.

Raw material for Suspension Clamp

- i. The body shall be made of plastic to avoid damage to the ADSS cable during pulling without liner at the time of installation. The flange shall be fitted with a non-permanent locking device to prevent any cable escape from the clamp body at the line installation, before fitting the liner. The body and Liner shall be made of weather and UV resistant Thermo plastic – Polyamide / PBT and Elastomer respectively.
- ii. The Flange made of plastic shall be a part of body to lock the liner. Built- in bracket support shall be suitable for fixing to pole by means of a single SS Strap and SS Buckles or by a M14 hot dip galvanized steel bolt (as per IS: 1367 Part-13) in case of multiple runs over cross arms.

Raw material for Adjustable Cable Storage Bracket

Bracket and Cap made of Aluminium Alloy and other items which includes bolt, nut, washers etc., shall be of hot dip galvanized steel. Rod shall be of aluminium / Galvanized Steel (rod/ pipe) to avoid rust and corrosion.

Raw material for Stainless Steel Strap and Buckles

- i. The stainless-steel material of the Strap shall be of high mechanical strength, corrosion and wear resistant as per ASTM SS 202.
- ii. The Buckle shall be made from ASTM SS 304 of thickness not less than 0.8 mm.

Raw material for Down Lead Clamps:

Down Lead Clamps shall be made of weather and UV resistant Thermo plastic – Polyamide/PBT.

Testing of the accessories

Design aspect of all Accessories shall be verified as per the description. The Type Test (for product qualification) and Acceptance Test (for batch acceptance by purchaser) shall be conducted at supplier premises or any NABL or COFRAC accredited Laboratory.

Tests for Dead End Clamp

The following table details the Type tests and Acceptance Test for Dead End Clamp:

S. No.	Test	Type Test	Acceptance Test
1	Visual	X	X
2	Dimensional	X	X
3	Raw material verification	X	X
4	Tensile Test	X	X
5	Galloping Test	X	
6	Climatic Ageing Test	X	
7	Corrosion Test	X	

- i. Raw material data Sheet and test certificate to be verified
- ii. For factory acceptance test duration of the test is 10 Minutes.

Tensile Test

A minimum load value $T (N) = 50\% - 60\%$ of Tensile Strength or Maximum Allowable Tension (MAT) of the cable, sustained for minimum one hour shall not damage the outer jacket of the cable such as piercing or creep. There shall be no displacement between the dead-end fitting and cable. The change in attenuation of each fiber at the end of the test shall be ≤ 0.1 dB

Test Method: IEC 60794-1-2-E1

Galloping Test

The Dead-End Clamp under Galloping Vibration with High Amplitude and low frequency shall not rupture and damage the cable outer sheath as piercing or creep.

Method: IEEE std. 1222 – 2004

Climatic Ageing Test

The Climatic ageing test shall be conducted as per test method standard NF EN 50483-6 with the following specifications:

Test Condition:

Temperature: 70°C

Clamps radially arranged, placed opposite the light source with their fitting bolt horizontal.

Requirements:

After the climatic ageing, Tensile test as per 3.1 (a) shall be repeated after 24 hours but not later than 72 hours with load values not less than 20% specified in the clause. The marking for

identification of pieces shall be visible when examined with normal or rectified vision, without enlargement.

Test Method: NF EN 50483-6

Corrosion Test

The Corrosion test shall be conducted as per standard NF EN 50483-6 with the following specifications:

Test Parameter:

Gaseous atmosphere as per para 8.4.2. (test method 1)

Clamps placed in its service position

Requirements:

After the corrosion Test, Tensile test as per 3.1 (a) shall be repeated after 24 hours but not later than 72 hours with load values not less than 20% specified in the clause. There shall be no trace of rust visible on the surface of clamps.

Tests for Adjustable Cable Storage Bracket

The following table details the type tests and Acceptance Test for Adjustable Cable Storage Bracket.

S. No.	Test	Type Test	Acceptance Test
1	Visual	X	X
2	Dimensional	X	X
3	Raw material verification ⁽¹⁾	X	X

Raw material data sheet and test certificate to be verified.

Tests for Stainless Steel Strap and Buckle

Type tests on SS Straps and Buckles shall consist of Chemical Analysis Test Report of Composition. In addition, the SS Strap shall be tested for Tensile Strength and Ultimate Elongation.

S. No.	Test	Type Test	Acceptance Test
1	Visual	X	X
2	Dimensional	X	X
3	Raw material verification ⁽¹⁾	X	X

4	Tensile Test	X	X
5	Chemical Properties	X	

Raw material data sheet and test certificate to be verified.

Mechanical Strength Test:

One loop of SS strap with a length of 0.75 meter and strapped with a buckle shall withstand a minimum load of 7.5 KN, in order to ensure that universal pole bracket can hold the Tension / dead-end clamp.

Tests for Down Lead Clamp

The following table details the type tests and Acceptance Test for Down Lead Clamp.

S. No.	Test	Type Test	Acceptance Test
1	Visual	X	X
2	Dimensional	X	X
3	Raw material verification ⁽¹⁾	X	X

Raw material data sheet and test certificate to be verified.

Marking

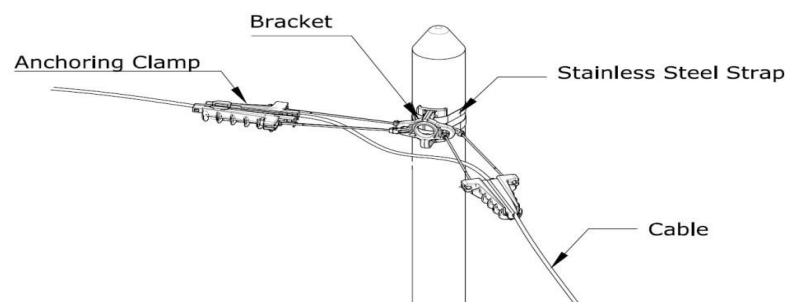
Following Mandatory marking shall be available on each installation Accessories including SS Strap:

- i. Manufacturer`s name or logo or trade name
- ii. Month and year of manufacturing
- iii. Product Reference

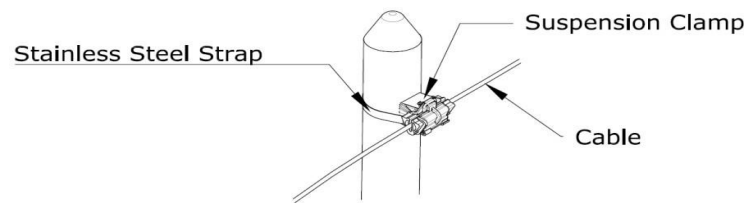
Installation Procedure for Accessories

Please refer the Schematics given below:

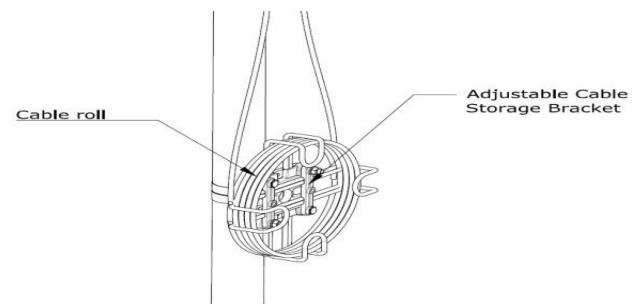
Tensioning (Dead End) Assembly



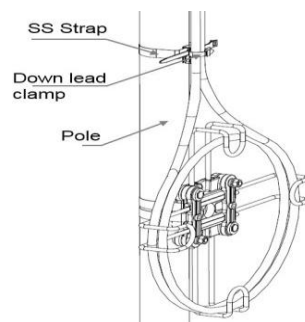
Suspension Clamp Assembly



Adjustable Cable Storage Bracket

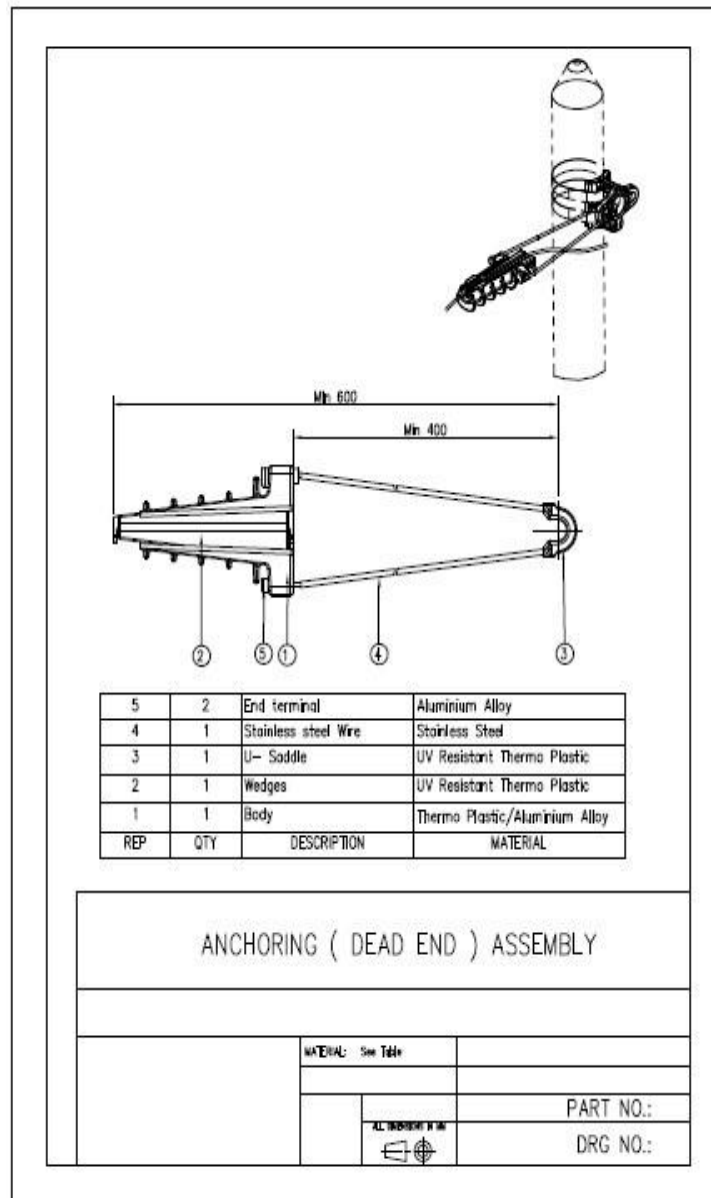


Down Lead Clamp



Typical Drawings of Accessories

Dead End Clamp

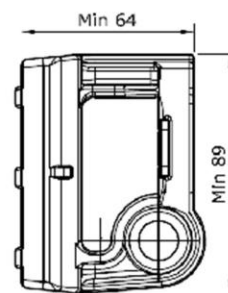
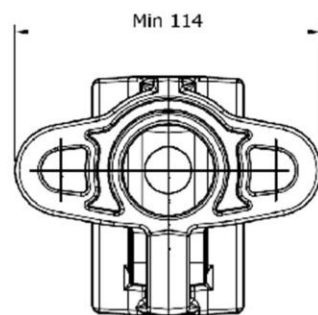
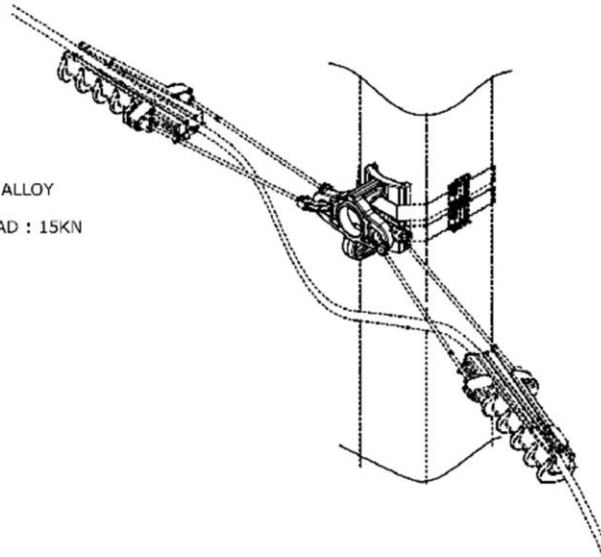


Universal Pole Bracket

NOTE:-

MATERIAL : ALUMINIUM ALLOY

MINIMUM BREAKING LOAD : 15KN



UNIVERSAL POLE BRACKET

MATERIAL: REFER NOTE

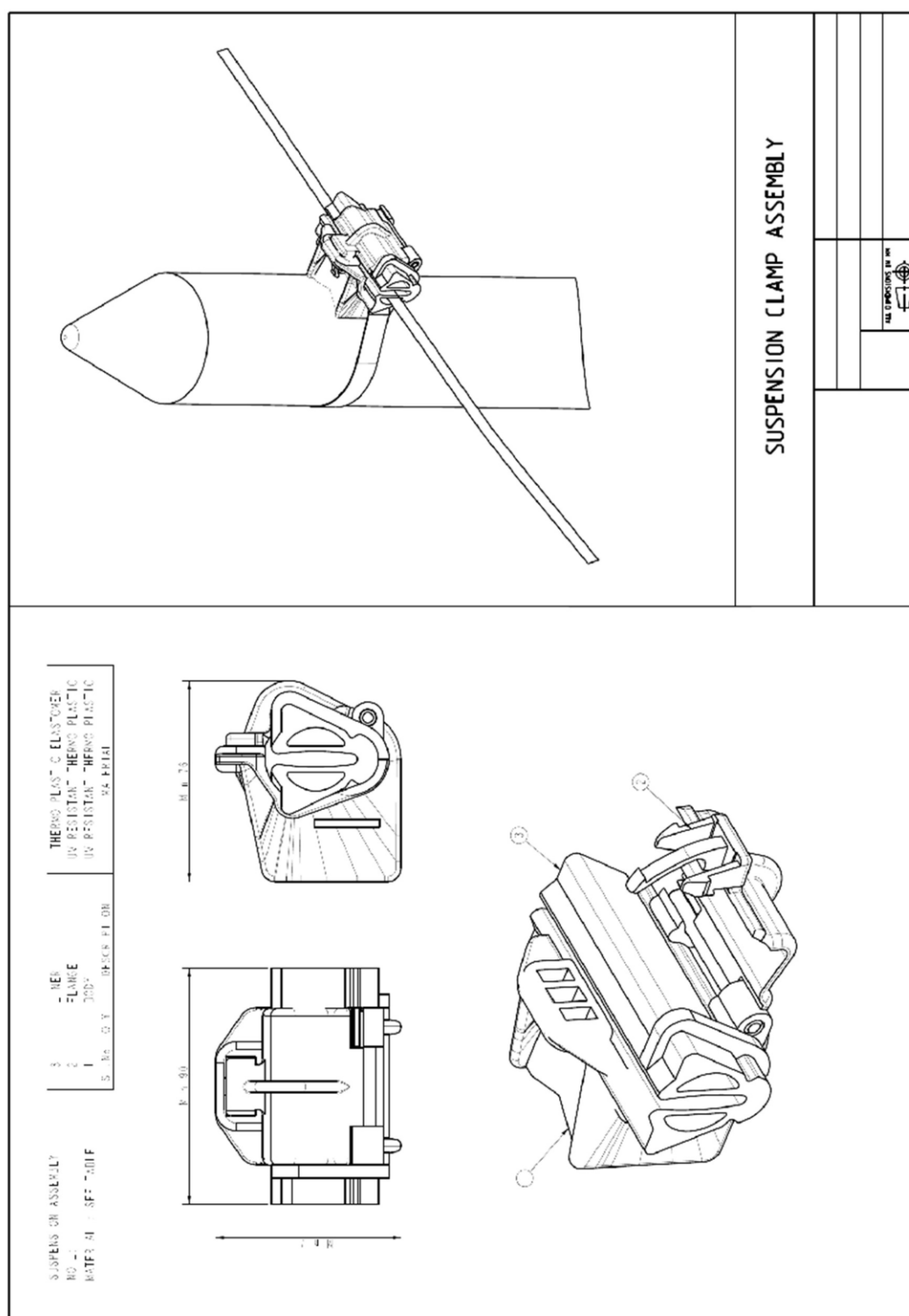
ALL DIMENSIONS IN MM



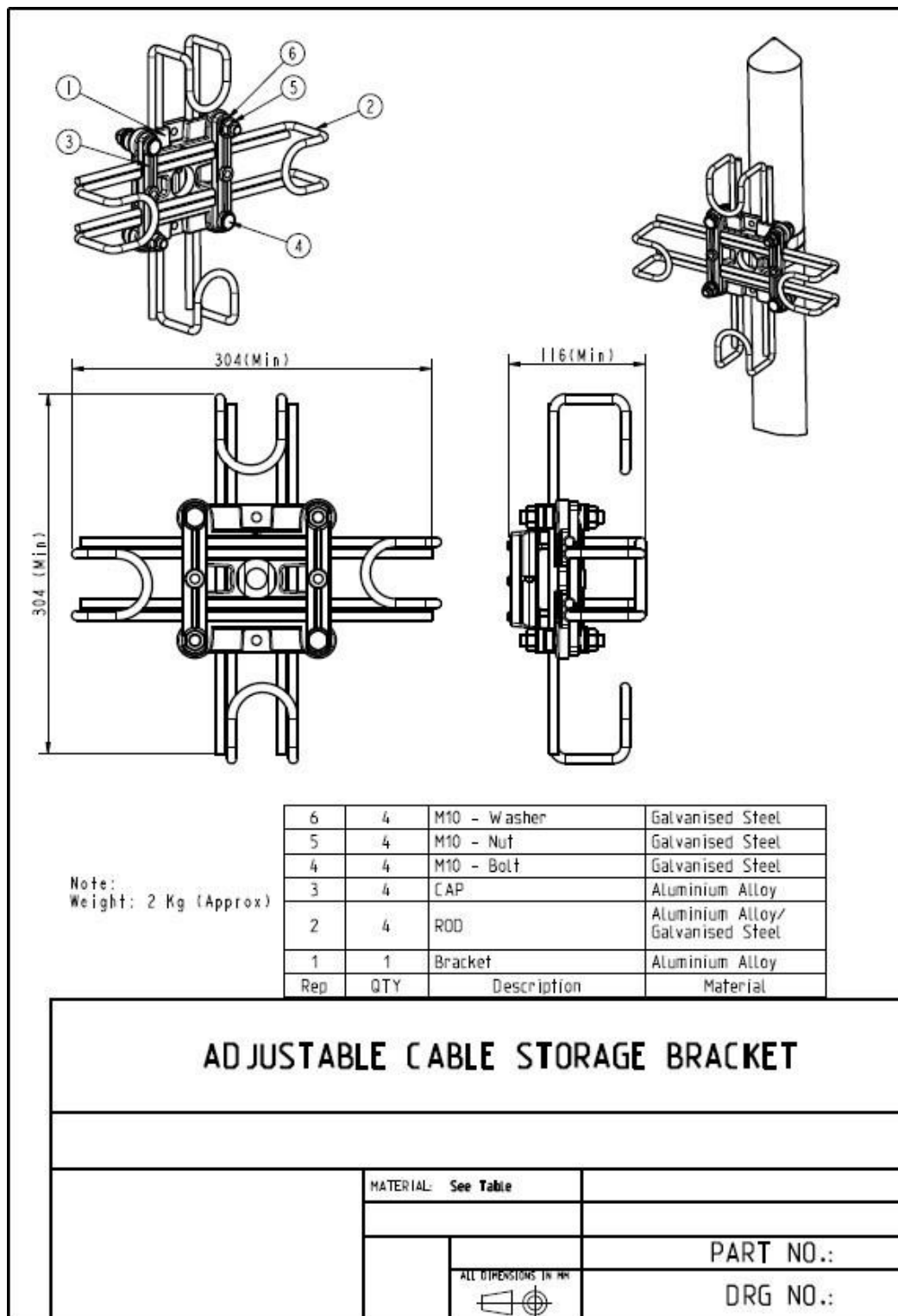
PART NO

DRG NO.

Suspension Clamp Assembly



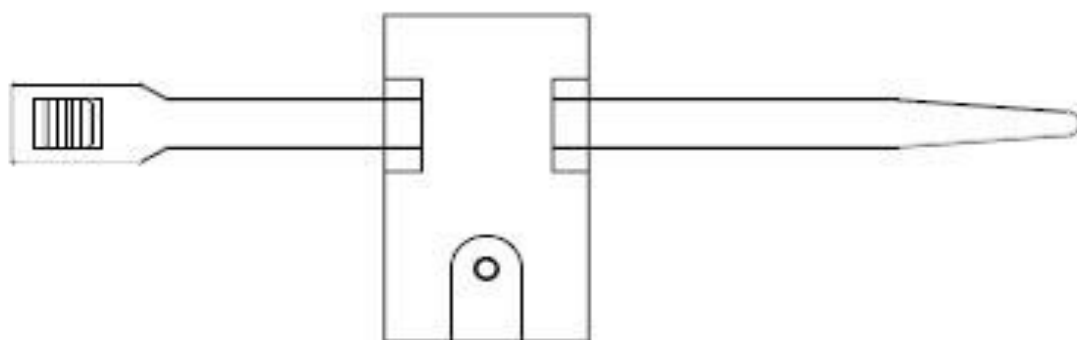
Adjustable Cable Storage Bracket



SS Strap and Buckles

<p>STRAP: - IF 207</p> <div style="text-align: center; margin-top: 20px;"> </div> <p>NOTE :- THICKNESS = 0.7 ±0.05 TENSILE STRENGTH = 7.5KN Minimum ELONGATION = 30% MIN; FINISH = 2B MATERIAL = SS 302 RAW MATERIAL (COMPOSITION) TOLERANCE = AS PER ASTM "A 480"</p>	<p>STANDARD CASING: -</p> <div style="text-align: center; margin-top: 20px;"> </div> <p>BUCKLES: - CF 20</p> <div style="text-align: center; margin-top: 20px;"> </div> <p>NOTE :- MATERIAL = SS 304 RAW MATERIAL TOLERANCE = AS PER ASTM "A 480" QUANTITY PER STANDARD BOX = 100 NOS.</p>				
<p>BUCKLES CF 20</p>					
<p>STAINLESS STEEL STRAP (20 x 0.7) IF 207</p>					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"> MATERIAL: SS 302 </td> <td style="width: 50%; text-align: center;"> FINISH: 2B </td> </tr> <tr> <td style="width: 50%; text-align: center;"> QUANTITY: 100 NOS </td> <td style="width: 50%; text-align: center;"> DRAWING: 100 </td> </tr> </table>		MATERIAL: SS 302	FINISH: 2B	QUANTITY: 100 NOS	DRAWING: 100
MATERIAL: SS 302	FINISH: 2B				
QUANTITY: 100 NOS	DRAWING: 100				


Down Lead Cable



Material: UV Protected Thermo Plastic

DOWNLEAD CLAMP

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	MATERIAL: Refer Note		
	ALL DIMENSIONS IN IN		PART NO.:
			DRG NO.:

Guaranteed Technical Particulars**Anchoring (Dead End) Assembly**

S. No.	Details	Specific Requirements	Confirmation (Vendor to specify)
1	Type of Clamp	Tension (Dead-end)	
2	Name and address of the Manufacturer		
3	Type of design	Wedge Type	
4	Cable Diameter Range of Clamp	As per cable design requirement	
5	Installation mode	Ready- to-use (Without disassembling). No specific tools required for cable installation. No loose parts allowed.	
6	Mounting	Provision to mount on Bracket and cross arm holes	
7	Type & Grade of the Material		
a	Clamp Body	UV Resistant Thermoplastic / Aluminium	
b	Wedge	UV Resistant Thermoplastic	
8	Minimum Breaking Load (in KN)	As per cable design requirement	
9	Marking	To be furnished by the vendor	
10	Dimension & Weight	Drawing to be submitted in the Tender	

Suspension Clamp Assembly

S. No.	Details	Specific Requirements	Confirmation (Vendor to specify)
1	Type of Clamp	Suspension Clamp	
2	Name and address of the Manufacturer		
3	Type of design	Mounting clamp with Insert arrangement. Multiple orientation allowability.	
4	Cable Diameter Range	8 – 20mm	
5	Mounting	Using Stainless Steel Strap or Bolts	
6	Type & Grade of the Material		
7	Clamp Body	UV Resistant Thermoplastic	
8	Insert	Elastomer	
9	Minimum Breaking Load (in KN)	As per cable design requirement	
10	Marking	To be furnished by the vendor	
11	Dimension & Weight	Drawing to be submitted in the Tender	

Universal Pole Bracket (for Anchoring Assembly Mounting)

S. No.	Details	Specific Requirements	Confirmation (Vendor to specify)
A	Universal Pole Bracket		
1	Name and address of the Manufacturer		
2	Type of design	6-Line Servicing	

S. No.	Details	Specific Requirements	Confirmation (Vendor to specify)
3	Type and grade of metallic / non-metallic materials	Heat treated Aluminum alloy for bracket	
4	Manufacturing process	Gravity die casting	
5	Min. Ultimate tensile strength	Min 15 KN	
6	Marking	To be furnished by the vendor	
7	Dimension & Weight	Drawing to be submitted in the Tender	

Adjustable Cable Storage Bracket

S. No.	Details	Specific Requirements	Confirmation (Vendor to specify)
1	Name and address of the Manufacturer		
2	Type of design	Pole mounting – Adjustable type for Coil	
3	Cable Loop Diameter Range	min 400 to 660mm	
4	Mounting	Using Stainless Steel Strap or Bolts	
5	Type & Grade of the Material		
a	Bracket	Aluminum alloy	
b	Sliding Pipes or Rod	Aluminum or Hot dip Galvanized Steel	
6	Minimum Breaking Load (in KN)	As per cable design requirement	
7	Marking	To be furnished by the vendor	
8	Dimension & Weight	Drawing to be submitted in the Tender	

Stainless Steel Strap and Buckle

S. No.	Details	Specific Requirements	Confirmation (Vendor to specify)
A	Steel Strap		
1	Name and address of the Manufacturer		
2	Material composition	SS 202	
3	Tensile strength (kN)	Min 7.5	
4	Width of Strap	As per Drawing	
5	Thickness of Strap	As Per Drawing	
6	Length indication marking	Marking required at every 250mm	
7	General Marking engraved in the strap	Manufacturer name and date of marking	
8	Provision for easy and safe usage	To be provided in a thermoplastic dispenser casing with bobbin.	
9	Dimension & Weight	Drawing to be submitted in the Tender	
B	Buckle		
1	Material composition	SS 304	
2	Tensile strength (kN)	Min 7.5	
3	Dimension & Weight	Drawing to be submitted in the Tender	
4	Packing requirement	Supplied as a box of 100 nos each	

Down Lead Clamps

S. No.	Details	Specific Requirements	Confirmation (Vendor to specify)
1	Name and address of the Manufacturer		
2	Type & Grade of the Material	Pole Mounting & UV Resistant Thermoplastic	
3	Cable Diameter Range	As per cable design requirement	
4	Dimension & Weight	Drawing to be submitted in the Tender	

3.6.2 Installation of Aerial Optical Fiber Cable

The following steps need to be followed for Installation of Aerial Optical Fiber Cable Installation.

- 1 Install the accessories and fixtures as per the requirement of the individual poles it tension and suspension fittings.
- 2 Install the demountable pulley on all the poles in the section before pulling the cable.
- 3 Keep the cable drum over the jack near the 1st pole at the beginning of the section. Uncoiled the cable from the drum and placed on the ground in the shape of 8 to avoid any twist in cable.
- 4 Attach anti-twist device and the shackle hook along with the rope to the front and of the cable on pulling eye or on the cable grip. Carry the attached rope over the demountable pulleys for pulling the cable.
- 5 The cable should be pulled till the cable reaches the last pole of the section.
- 6 Wherever in the pulling section, through pulling is difficult; half section or one fourth, action pulling method may be adopted by using figure of a techniques
- 7 The feeding and pulling of the cable should be synchronized by using communication link. Care is required to be taken so that the cable is not accumulated at any one point during pulling operation and sharp bends are avoided
- 8 Once the cable reaches the other end actual tensioning of the cable and fixing the installation of the accessories and fixtures shall be taken up with the help of cable pulling winch. The pulling tension must be monitored during tensioning.
- 9 Install the tension fittings and accessories at the 1st pole.
- 10 Fix a flat twin open type cable grip on the cable after tension pole for tensioning the cable in the preceding tension section.
- 11 The cable shall be tensioned to a tension of 1-3 to 1-6 times of the cable weight. The Sag shall be Monitored and kept between 0.25 to 0.5% of the span length.

- 12 The cable should be lifted between two poles by using cable pole fork during tensioning and fixing of the cable.
- 13 During the fixing operation the cable shall remain under required tension for minimizing the sag in the splice section.
- 14 Now install tension fitting and accessories at all tensioned pole at the end of the tension section.
- 15 Install the suspension fitting and accessories on the intermediate poles in the tensioned section.
- 16 Similarly, installation should be carried out in each tension pole in the entire section and the tension and suspension fittings are installed.
- 17 At the Through tension poles the cable shall be kept loose and shall be supported by cable jumper clamp.
- 18 At the end pole where the cable reel is kept; the cable to be taken through DWC pipe (fixed to the pole) to the splice location in case of underground splicing.
- 19 Extra care for the aerial O.F. Cable may be taken at the bends and at entry and at the exit of the pipe. About 10 meters of cable shall be kept at the splice location for coiling (spare cable) and jointing requirement.
- 20 Test the installed OF Cable via laser source & Visual Fault Locator Coil the OF Cable and keep it safe in the splice location for splicing.

Precautions

- 1 Provide display boards.
- 2 Provide sufficient number of road sign and traffic cones.
- 3 Avoid sharp bending of the OF cable during installation.
- 4 The OF cable should not be given extra tension than the permissible tension limits.
- 5 While crossing the overhead electric installations, safety measures should be taken. Also provide guard wire.
- 6 To avoid man-made damages, safety measures should be taken for each pole.

Safety precautions during ADSS OFC Installations

Following safety precautions are to be taken during installation of ADSS OFC:

- 1 Aerial ADSS OFC installation requires skill and know-how thus only skilled and trained personnel shall be deployed for aerial installation.
- 2 Use of safety harness while using bucket trucks and aerial lifts or climbing poles/buildings is a must.
- 3 Protective gloves (leather/rubber) must be used while climbing/descending a pole or near exposed electrical wires.
- 4 Wearing of safety glasses while handling/preparing the OFC for splicing/terminations is necessary to avoid injury to eyes.
- 5 The condition of existing poles should be checked before attempting to climb. Climbing on heavily corroded or badly degraded / deteriorated wooden poles should be avoided.

- 6 Area where cable is being pulled/installed using equipment /hardware under tension should be clear of persons except in situations that demand presence of installation person to observe correct alignment. Even in such cases, the person should stay clear from hardware under tension.
- 7 Equipment and tools should not be thrown to ground. They should be lowered to ground using a hand line.
- 8 While climbing / descending a pole/ladder, hands should be free and all tools and tackles/accessories shall be handled only after fully climbing of the pole.
- 9 Existing enclosures/suspended equipment/cables etc. should not be used as work platform or for climbing as they might have become loose or deteriorated since their installation and can get damaged and cause injury.

Procedures to be followed for Installation of ADSS Aerial Optical Fiber Cable

Scope

This document is intended to provide guidelines for selection of appropriate methodology for aerial installation of ADSS optical Fiber Cable on Existing Electrical Poles of 33/11 KV Lines and LT lines as per the route map and network design.

Installation Techniques

The techniques used in installation of Aerial ADSS Optical Fiber Cables are described here. With the proper installation hardware and skilled resource, any of these methods can be used to install ADSS cable. Many a times, it will become necessary to use a combination of these methods to achieve full installation.

Selection of the specific technique (i.e. Moving Drum method, Stationary Drum method or Manual Installation method), or a combination thereof, shall largely depend on the actual site conditions. The PIA shall select the most appropriate installation technique suitable to the site conditions.

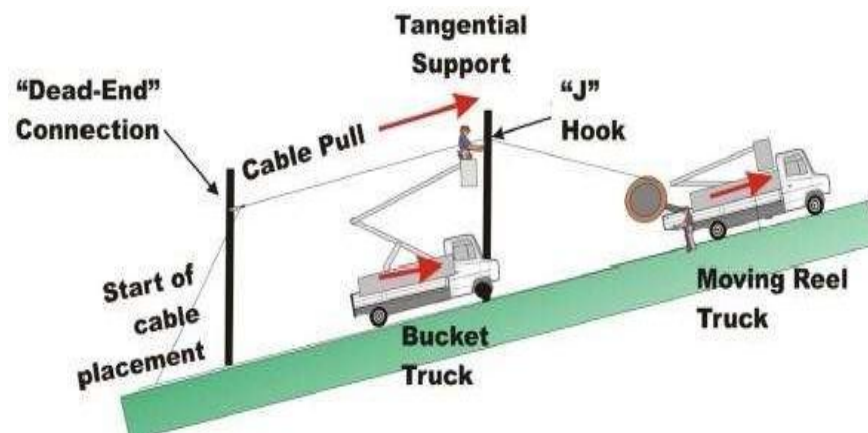
Moving Drum method

In this method the cable is pulled directly from the cable drum mounted on a moving vehicle as it drives along the pole line. The cable drum must be mounted on a proper support to allow easy cable pay off. At the dead-end point, the cable is terminated using Termination Assembly sets and tensioned using turnbuckles to maintain cable sag within permissible value

To start installation, park the vehicle with the cable drum approximately 15 - 20 meters away from the pole facing away from it down the pole line. The cable must pay off from top of the drum towards the rear of the vehicle.

Install the termination supports and temporary hooks on the poles at the starting point and subsequent poles. Pull off the necessary amount of slack, lift the dead-end to the top of the pole and mount on the termination assembly.

Once the cable is fixed at both ends with at the terminating assemblies, carry out tensioning. After the cable section is properly tensioned and secured at both ends lift the cable out of the hooks at each of the intermediate pole and support it with the suspension set assemblies



Stationary Drum Method

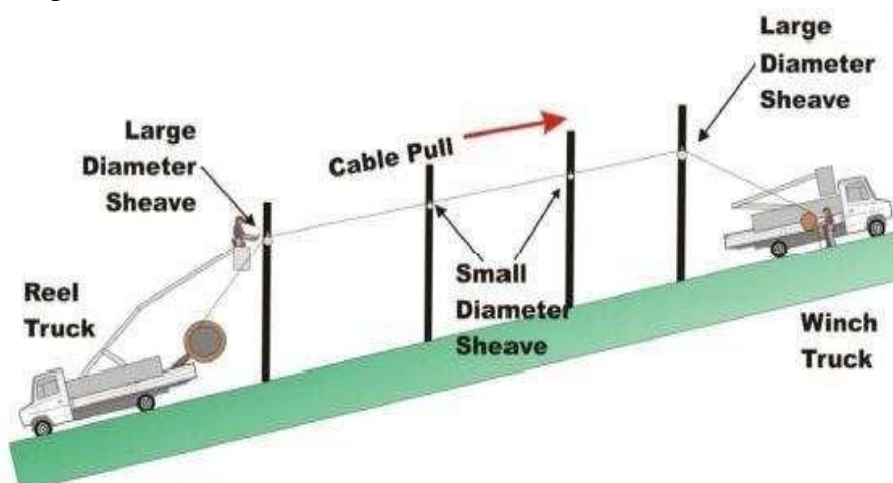
In this method of aerial cable installation, the cable is pulled along the cable route through temporary support hardware. Stationary drum installation method requires installation of temporary support hardware such as pulley blocks.

A rope wound on the tension limiting winch is passed through the pulleys and connected to the cable on the drum installed on a stand which allows free rotation of the drum. The pulling load should normally not exceed 60% of the maximum permissible cable tension recommended by cable supplier.

The cable drum and winch locations must have vehicular access. The cable drum should always be placed on levelled ground so that its flanges are vertical thus avoiding rubbing of cable against flanges. The orientation should be such that the cable pay-off is directly in the direction of pull. Always pay-out the cable from top of the drum and not from bottom.

The drum should have provision to allow controlled pay-out of cable. Cable pay-out needs to be controlled to prevent free running or jerking.

Once the cable is completely pulled end to end, it is then ready for installation of permanent supporting system of terminating and suspension set assemblies at required locations and tensioning for sag control.

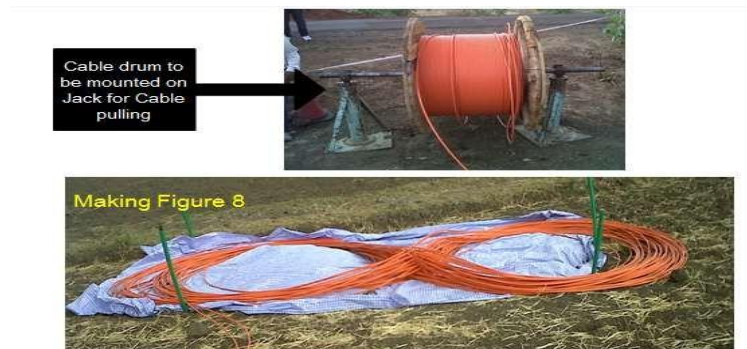


Manual Installation method

Manual installation method technique is similar to stationary drum method, except that in this case the cable is uncoiled from the drum and placed on the ground in the shape of 8.

The pulling operation is same as in stationary drum method. The hardware requirement and pulling equipment also remains same.

For pulling in both directions, two loops of shape of 8 can be made and each can be pulled in separate directions. Loops of size 4 to 5m x 1.5m should be sufficient in most cases.



Installation of Accessories

Pole Clamp

Prior to fixing any temporary supports / stringing blocks or permanent cable suspension / termination assemblies, it is necessary to fix pole clamps. Appropriate type of pole clamps will be required depending on the shape of the pole. The two halves shall be opened and fixed at the specified height using tightening bolts.

Terminating (or Dead End) Assembly

Termination assemblies are required at dead ends locations where:

- i. Cable needs to be terminated at the end facility
- ii. loops are to be kept for future maintenance activities
- iii. For double sided termination assembly 2 sets would be required.

Suspension Assembly

ADSS optical Fiber cable shall be supported on all intermediate poles between two terminating poles using the pole clamp and a suspension assembly set.

To fix a suspension assembly, following accessories are required:

- i. Protective Wedge on the cable,
- ii. Suspension Wedge
- iii. Clevis Thimble
- iv. Spiral Vibration Damper

Installation of Cable Loop/ storage/ Joint closure

Cable loops are to be provided for future maintenance purposes at regular spacing. A fixture is required to be installed. Excess cable is then wound & kept on support. The fixture provides a means to ensure Proper bend radius is maintained. Separate clamp is required for installation of Joint Closures.

Supporting Jumper Cable Clamp

Jumper cable hanging between a pair of Termination Assemblies installed at locations where there is sharp change in direction need to be supported with a special twisted link. To support jumper cable, use already installed clamp.

Cable Tensioning

After the required Length of cable has been placed, the cable shall be properly tensioned before it is permanently secured into suspension assemblies.

The temporary dead end should be installed 4 to 5 m from the pole so that after complete tension is applied, appropriate permanent termination assembly set can be installed while the cable is in tension. The chain hoist will also need to be tied to the pole directly using a sling and on to pole clamp.

Once the cable sanction is under the required tension and the sag is within limits (i.e. less than 1% of span), the “free” end of the cable used for tensioning is fitted with termination assembly set and terminated. Once the load is transferred on to permanent termination end, the temporary arrangement shall be removed.

Machinery/ Equipment/ Tools

- 1 Ropes and Light weight ladder for installation of termination / suspension assemblies, clamps etc.
- 2 Temporary supports, dynamometer, chain hoists, temporary dead ends steel cables, etc. required during cable laying and / or cable pulling and cable preparation kits, etc. as applicable will have to be arranged by the PIA.
- 3 Van with portable splicing machines and OTDR, power meter, cable preparation kits, etc. for splicing and testing of installed ADSS Optical Fiber Cable.
- 4 Other tools and tackles shall include wrenches, spanners, screwdrivers, hammer, ropes etc.
- 5 All safety equipment such as safety belts, insulating and cotton gloves and hard hats, fluorescent vests etc. as required.

3.7 ENTRY OF THE O.F. CABLE IN THE BUILDING:

Normal methods for leading in and precautions recommended for leading-in of the optical fibre cable should be followed. A conduit pipe should be laid for leading-in the

O.F. cable inside the building; the cable may also be taken directly from the nearby O/H pole to inside of the building for termination.

- 3.7.1.1.1 Before the installation the O.F. cable should be tested.
- 3.7.1.1.2 As per requirement install the additional new poles.
- 3.7.1.1.3 Each pole should be checked for its strength. Provide extra stays if more strength is required.
- 3.7.1.1.4 The Aerial O.F. Cable is recommended to be installed on the outermost hole of bracket towards road on the existing bracket/new bracket on the poles.
- 3.7.1.1.5 Replace weak and other poles for clear ground clearance and strength as per the field conditions.
- 3.7.1.1.6 Provide ground clearance of 12 feet in non-obstructing areas.
- 3.7.1.1.7 Raise the height to minimum 16 feet at all the road crossings.
- 3.7.1.1.8 Maintain the alignment as straight as possible.
- 3.7.1.1.9 Construct splice chambers.

3.8 SPLICE LOCATIONS:

The joint closure shall be mounted on the pole using an adjustable storage bracket to accommodate cable loops while maintaining the minimum specified bend radius. Adequate slack length shall be provided to facilitate future operation and maintenance. The joint closure shall be fixed to the pole using a separate clamp, independent of the ADSS cable suspension or tension hardware, ensuring that no mechanical load is transferred to the cable. All installations shall be carried out strictly in accordance with approved engineering instructions, applicable standards, and OEM guidelines, and compliance with this requirement shall be the sole responsibility of the Bidder. Any deviation shall be treated as a breach of contract and corrected by the Bidder at no additional cost to the Employer.

3.9 CALCULATION OF SECTION LENGTH:

Aerial O.F. cable is supplied as per TEC GR in a length of 2 Kms + 10%.

To arrive at the section length and allocating a particular reel of the cable to a particular section following consideration are required.

Strength Length:

- Actual section length measured.
- Allowance for sag 2% for each span length.
- Cable at each through tension pole (4 meters).
- Extra spare cable for coiling at the splice location (10 meters).

3.10 INSTALLATION MATERIAL REQUIRED DURING INSTALLATION

1	Demountable pulleys	:	1 each for each pole in the installation section
2	Jack for cable drum	:	1 set
3	Ladders	:	For each pole

4	Tools	:	Screw drivers C&T pliers Spanner set & hammer etc.
5	Manila rope 12 mm dia	:	250 meters
6	Cable pulling winch machine with tension monitoring device	:	1
7	Anti twist device	:	1
8	Cable pole fork	:	10
9	Flat twin open type cable grip	:	2

3.11 INSTALLATION OF AERIAL OPTICAL FIBRE CABLE

The following steps are recommended:

- a) Install the accessories and fixtures as per the requirement of the individual poles it tension and suspension fittings.
- b) Install the demountable pulley on all the poles in the section before pulling the cable.
- c) Keep the cable drum over the jack near the 1st pole at the beginning of the section.
- d) Attach anti twist device and the shackle hook along with the rope to the front and of the cable on pulling eye or on the cable grip. Carry the attached rope over the demountable pulleys for pulling the cable.
- e) Depute one person at each pole to monitor and in case it is required to guide the cable over the demountable pulley during pulling operation.
- f) The cable should be pulled till the cable reaches the last pole of the section.
- g) Wherever in the pulling section, through pulling is difficult; half section or one fourth, action pulling method may be adopted by using figure of a techniques.
- h) The feeding and pulling of the cable should be synchronized by using communication link. Care is required to be taken so that the cable is not accumulated at any one point during pulling operation and sharp bends are avoided.
- i) Once the cable reaches the other end actual tensioning of the cable and fixing the installation of the accessories and fixtures shall be taken up with the help of cable pulling winch. The pulling tension must be monitored during tensioning.
- j) Install the tension fittings and accessories at the 1st pole.
- k) Fix a flat twin open type cable grip on the cable after tension pole for tensioning the cable in the preceding tension section.
- l) The cable shall be tensioned to a tension of 1-3 to 1-6 times of the cable weight. The sag shall be monitored and kept between 0.25 to 0.5% of the span length.
- m) The cable should be lifted between two poles by using cable pole fork during tensioning and fixing of the cable.
- n) During the fixing operation the cable shall remain under required tension for minimizing the sag in the splice section.
- o) Now install tension fitting and accessories at all tensioned pole at the end of the tension section.

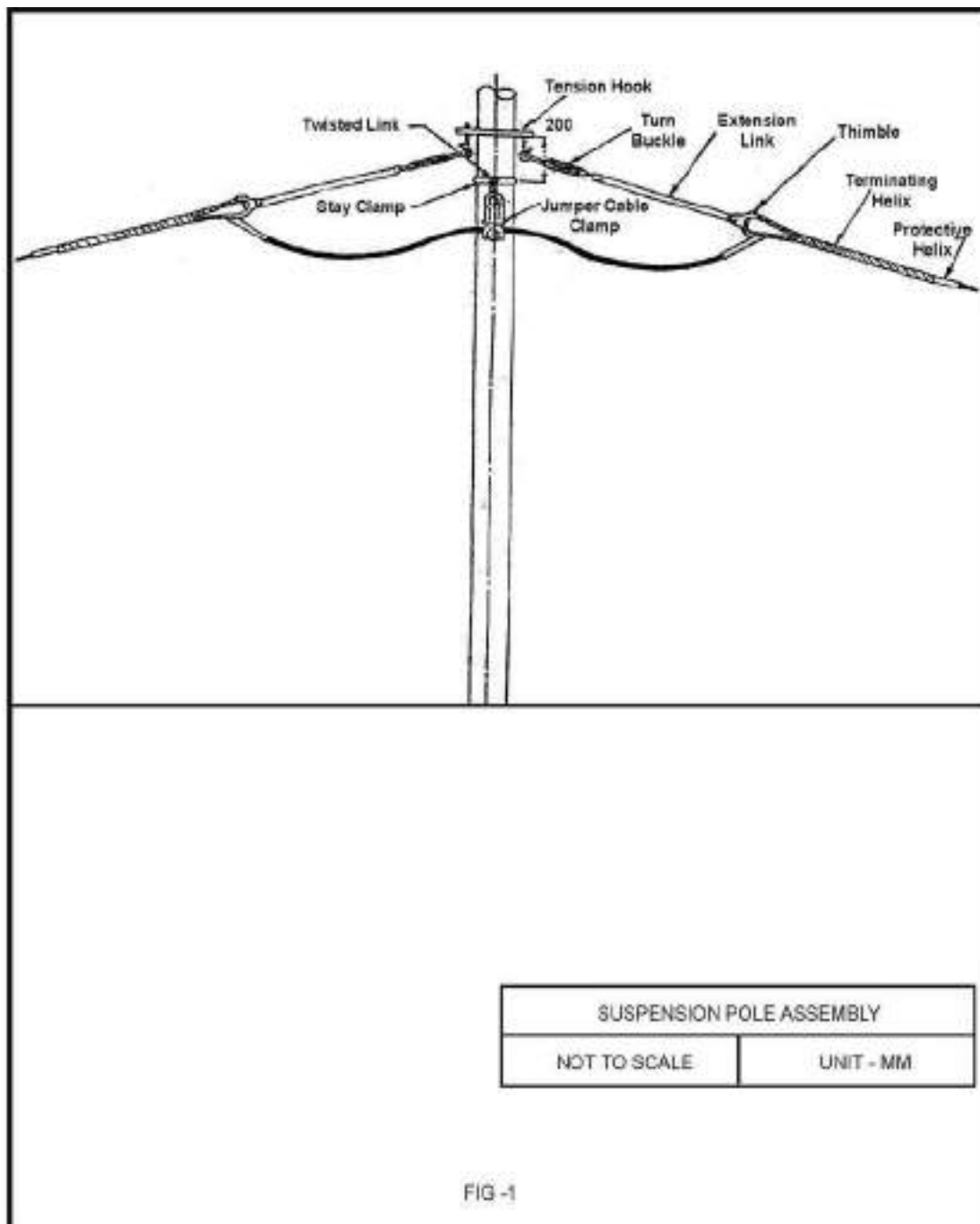
- p) Install the suspension fitting and accessories on the intermediate poles in the tensioned section.
- q) Similarly, installation should be carried out in each tension pole in the entire section and the tension and suspension fittings are installed.
- r) At the Through tension poles the cable shall be kept loose and shall be supported by cable jumper clamp.
- s) At the end pole where the cable reel is kept; the cable to be taken through GI pipe (fixed to the pole) to the splice location.
- t) Extra care for the aerial O.F. cable may be taken at the bends and at entry and at the exit of the pipe. About 10 meters of cable shall be kept at the splice location for coiling (spare cable) and jointing requirement.
- u) Test the installed OF cable.
- v) Coil the OF cable and keep it safe in the splice location for splicing.

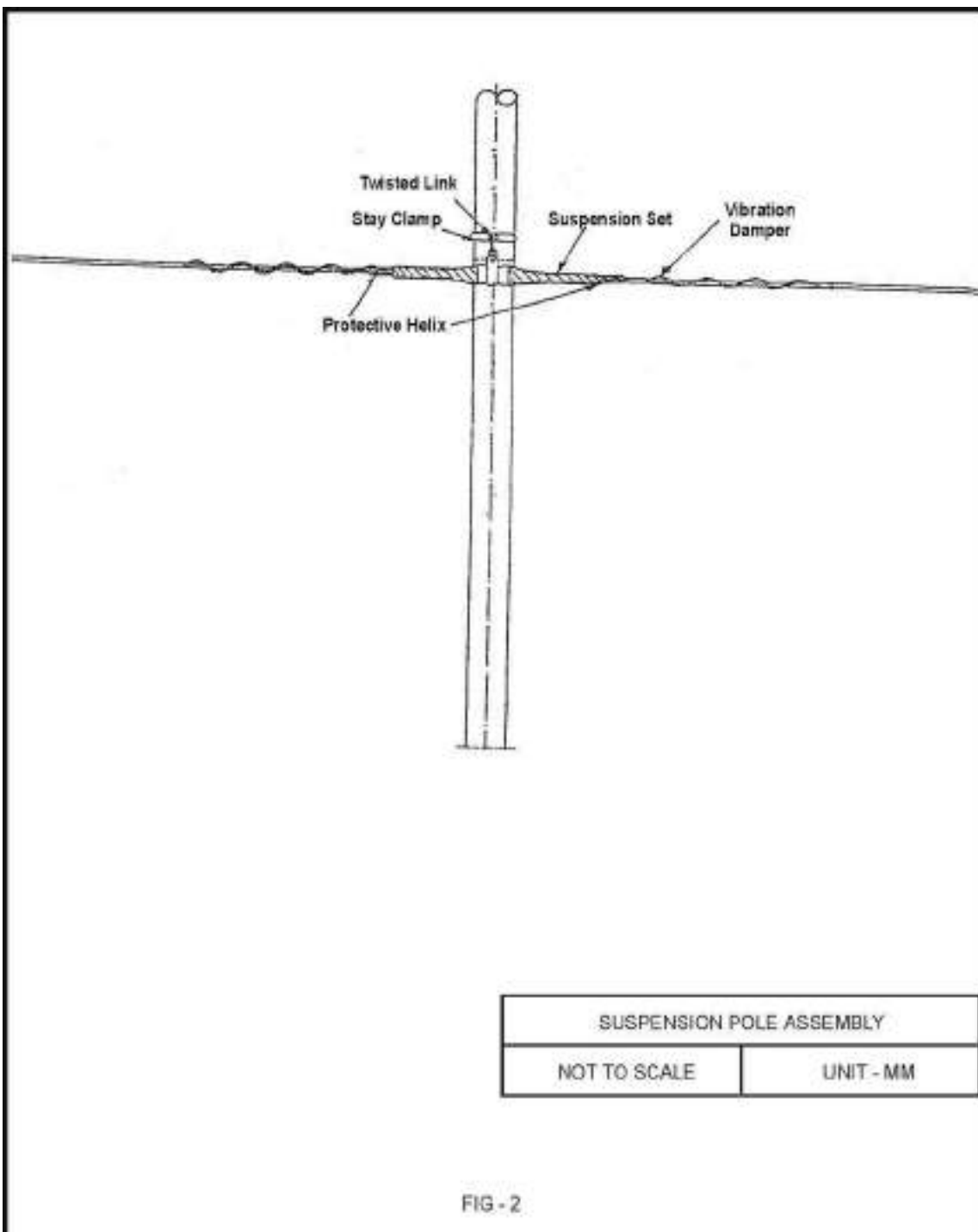
3.12 PRECAUTIONS

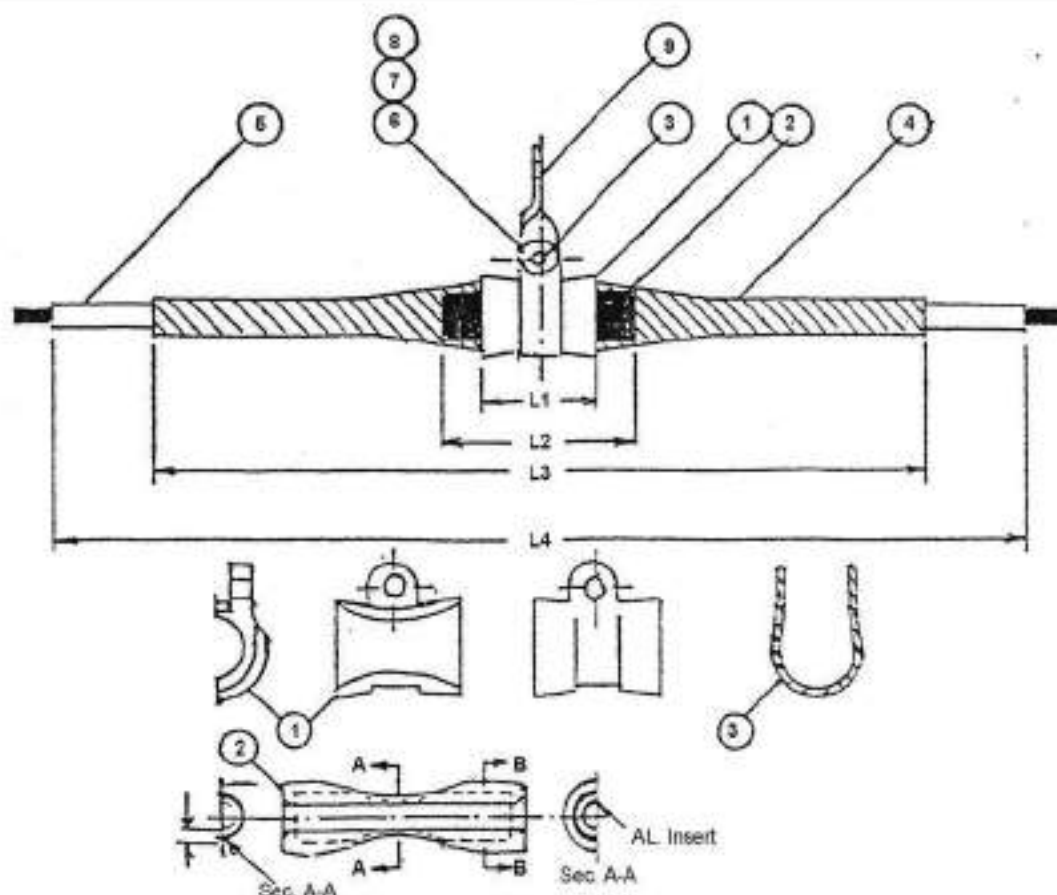
- a) Provide display boards.
- b) Provide sufficient number of road sign and traffic cones.
- c) Avoid sharp bending of the OF cable during installation.
- d) The OF cable should not be given extra tension than the permissible tension limits.
- e) While crossing the overhead electric installations, safety measures should be taken. Also provide guard wire.
- f) To avoid man-made damages, safety measures should be taken for each pole.

3.13 REFERENCE

TEC GR on Planning Guidelines and the Installation Practices for the installation of self-supporting metal free aerial optical fiber cable.







(FOR EXAMPLE)

DIMENSIONS - CABLE SIZE - 14.4 MM DIA

CABLE DIA	L1	L2	L3	L4	COLOR CODE	DIA AGS/ROD
14.4	115	200	800	1400	BROWN	4.25 ± 0.1

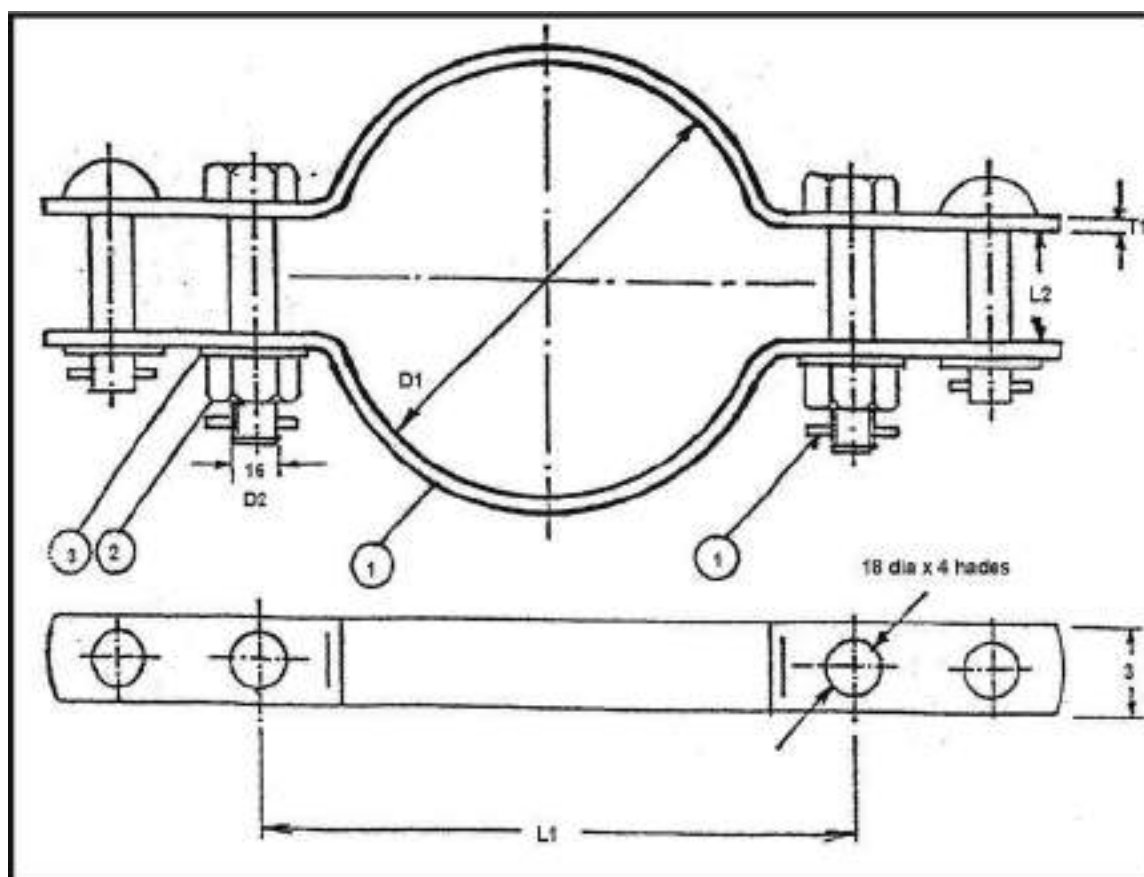
NOTE - DIMENSIONS FOR DIFFERENT CABLE SIZES TO BE DECIDED AFTER TYPE TEST APPROVAL
INSERT DIMENSIONS IN MM

INNER DIA.	AT - A - A	AT - B - B
	22	22
OUTER DIA.	33	60

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 CLAMP	ALUMINIUM ALLOY GDC	IS : 617	1 SET
2 INSERTS SUSPEN. CLIPPER	POLYCHLOROPRENE COMPOUNDED	1 PAIR	1 PAIR
3 STRAP	ALUMINIUM ALLOY	IS : 617	1
4 AGS HELIX	ALUMINIUM ALLOY 6061		1 SET
5 PROTECTIVE HELIX	ALUMINIUM ALLOY 6061		1 SET
6 RIVET M 16	MILD STEEL GALVANISED	IS : 2062	1
7 FLAT WASHER	MILD STEEL GALVANISED	IS : 2016	1
8 SPLIT PIN	STAINLESS STEEL	IS : 2549	1
9 TWISTED EYE	MILD STEEL GALVANISED	IS : 2062	1

ARMOUF GRIP SUSPENSION SET
NOT TO SCALE UNIT - MM

FIG - 3



POLE MOUNTED STAY CLAMP (RAIL)

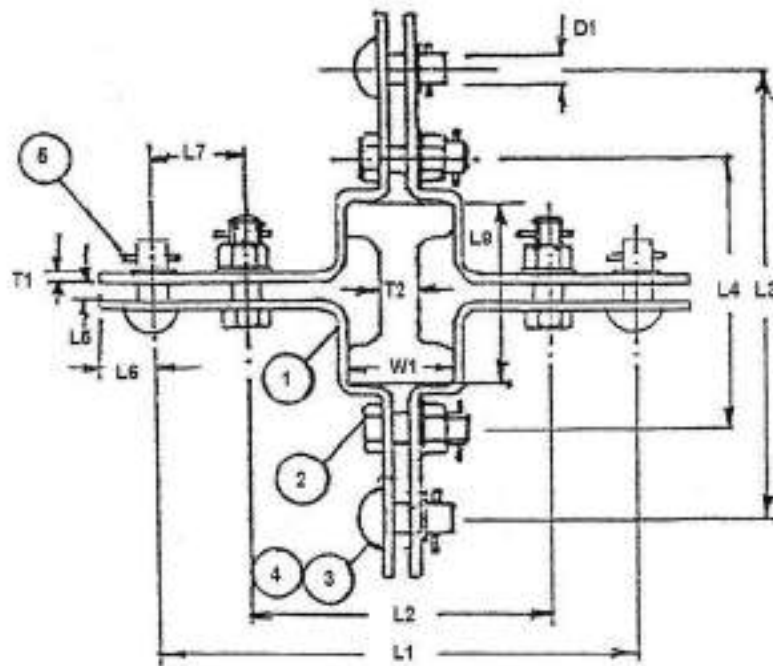
L1	L2	L3	L4	L5	L6	L7	L8	T1	T2	D1	W1
270	170	251	151	20	32	50	120	5	20	16	60

NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR UNLESS UNTILL SPECIFIED)
HOT DIP Galvanised as per is : 2629

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 CLAMP	MILD STEEL GALVANISED	IS : 2062	1 SET
2 BOLT & NUT M 16	MILD STEEL GALVANISED	IS : 1363	2
3 RIVET 16	MILD STEEL GALVANISED	IS : 2016	2
4 WASHER	MILD STEEL GALVANISED	IS : 2016	4
5 SPILT PIN	STAINLESS STEEL	IS : 545	4

POLE COLLAR CLAMP	
NOT TO SCALE	UNIT - MM

FIG - 4



DIMENSIONS IN MM :
POLE MOUNTED STAY CLAMP TUBULAR

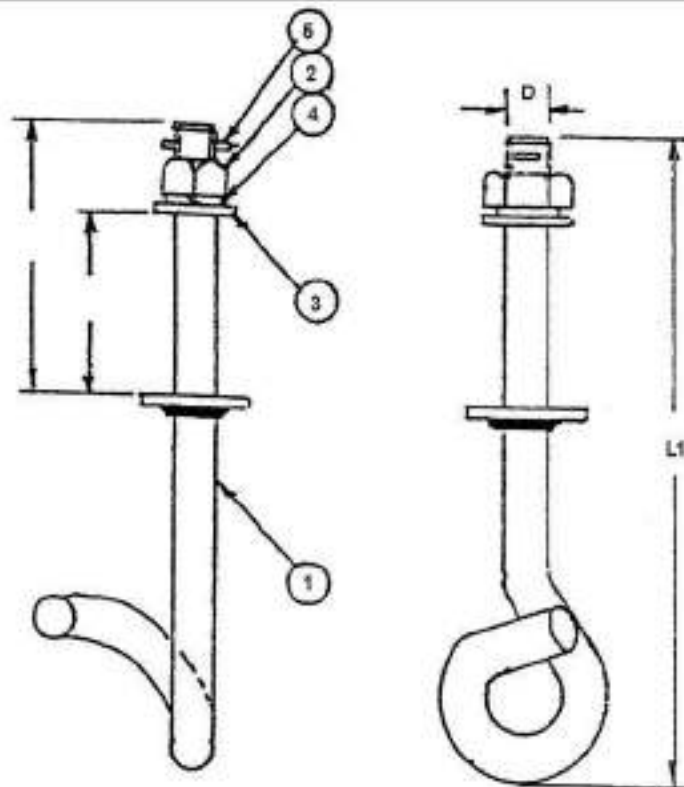
L1	L2	D1	D2	T1	W
210	20	150	16	5	30

NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR UNLESS UNTILL SPECIFIED)
HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 CLAMP	MILD STEEL GALVANISED	IS : 2052	1 SET
2 BOLT & NUT M 16	MILD STEEL GALVANISED	IS : 1363	4
3 RIVET 16	MILD STEEL GALVANISED	IS : 2016	4
4 WASHER	MILD STEEL GALVANISED	IS : 2016	8
5 SPILT PIN	STAINLESS STEEL	IS : 548	8 SET

POLE COLLAR CLAMP (R)	
NOT TO SCALE	UNIT - MM

FIG - 5



DIMENSIONS IN MM :

L1	L2	L3	D
177	75	50	12

NOTE :- TOLERANCE SHALL BE AS PER IS : 2102

(DETAIL AS PER GR. UNLESS UNTILL SPECIFIED)

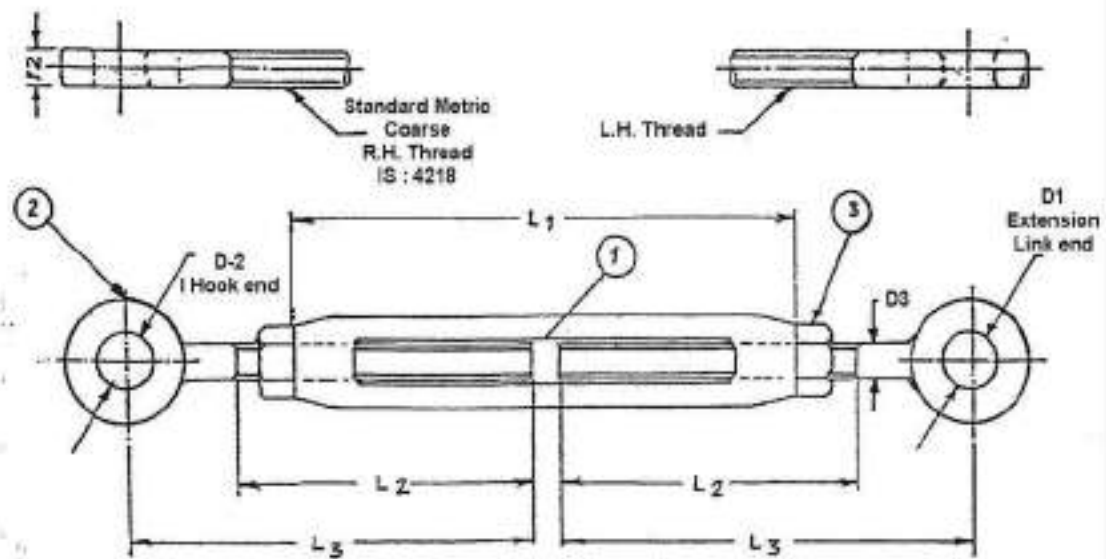
TO BE USED HERE C-BRACKET IS AVAILABLE ON POLE FOR FITMENT OF TENSION HOOK

HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 BODY	ALLOY STEEL GALVANISED	IS : 2004	1
2 NUT	MILD STEEL GALVANISED	IS : 1363	1
3 PLAIN WASHER	MILD STEEL GALVANISED	IS : 2016	1
4 SPRING WASHER	SPRING STEEL GALVANISED	IS : 3083	1
5 SPLIT PIN	STAINLESS STEEL	IS : 548	1

TENSION HOOK	
NOT TO SCALE	UNIT - MM

FIG - 6



DIMENSIONS IN MM :

L1	L2	L3	D1	D2	D3
170	100	140	18	18	12

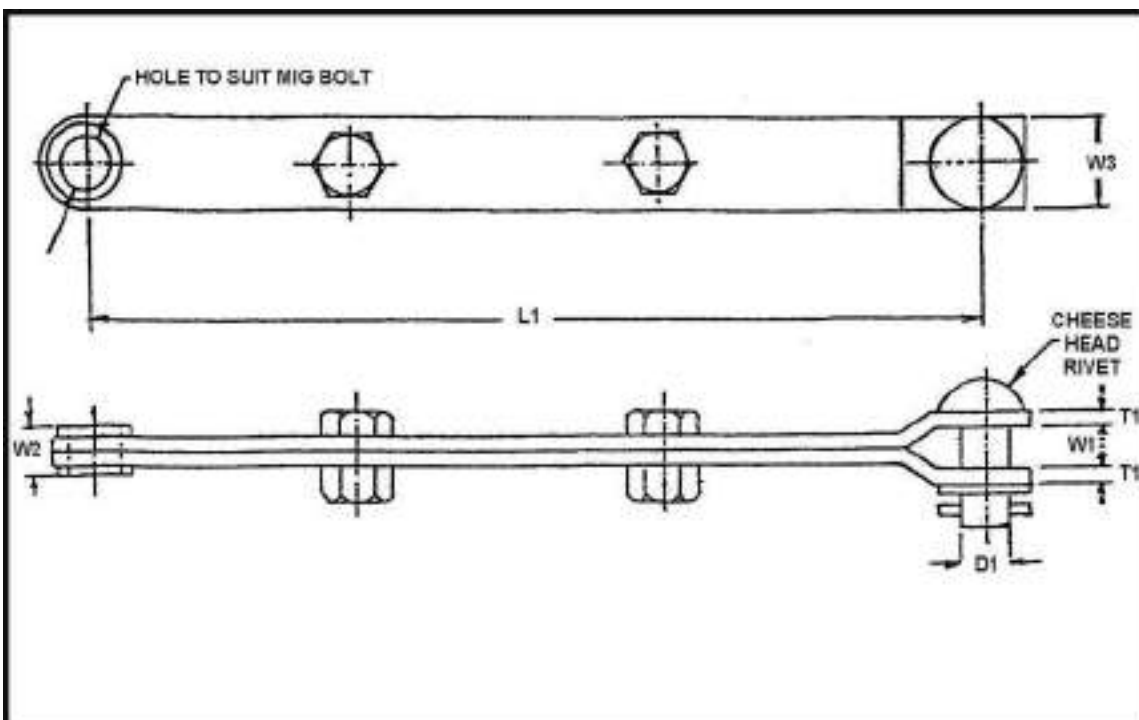
NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

MIN. LENGTH : 290 MM
MAX. LENGTH : 400 MM
RANGE OF ADJ. : 110 MM
HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 BODY	MILD STEEL FORGED GLAV.	IS : 2064	1
2 NUT BOLT	MILD STEEL FORGED GLAV.	IS : 2062	2
3 NUT	MILD STEEL	IS : 1363	2

TURN BUCKLE	
NOT TO SCALE	UNIT - MM

FIG - 7



DIMENSIONS IN MM :

L1	T1	W1	W2	W3	D1
465	5	14	16	30	16

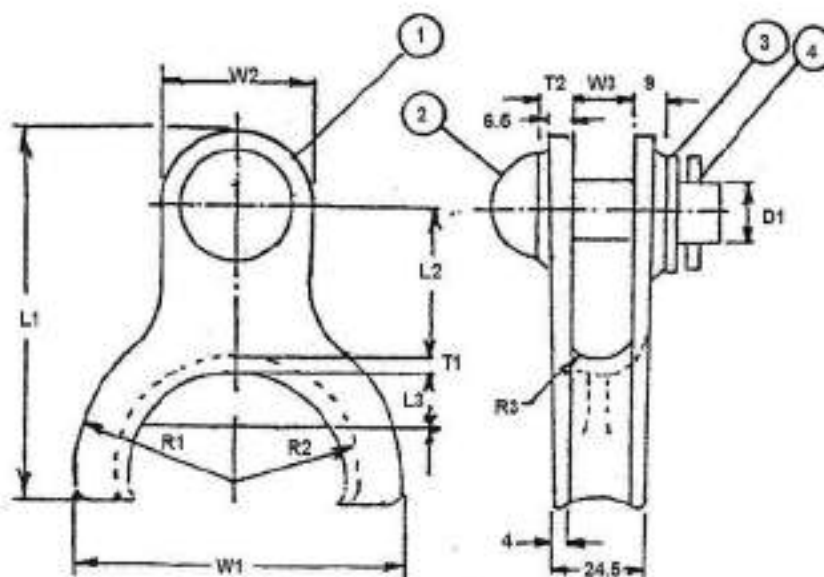
NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 STRAP	MILD STEEL GALVANISED	IS : 2057	1
2 RIVET & WASHER	MILD STEEL GALVANISED	IS : 2016	1
3 SPLIT PIN	STAINLESS STEEL	IS : 549	1
4 BOLT & NUT M 16	MILD STEEL GALVANISED	IS : 1363	1

EXTENSION LINK	
NOT TO SCALE	UNIT - MM

FIG - 8



DIMENSIONS IN MM :

L1	L2	L3	T1	T2	R1	R2	R3	W1	W2	W3	D1
102	42	15	4	9	23	15	8	92	40	18	16

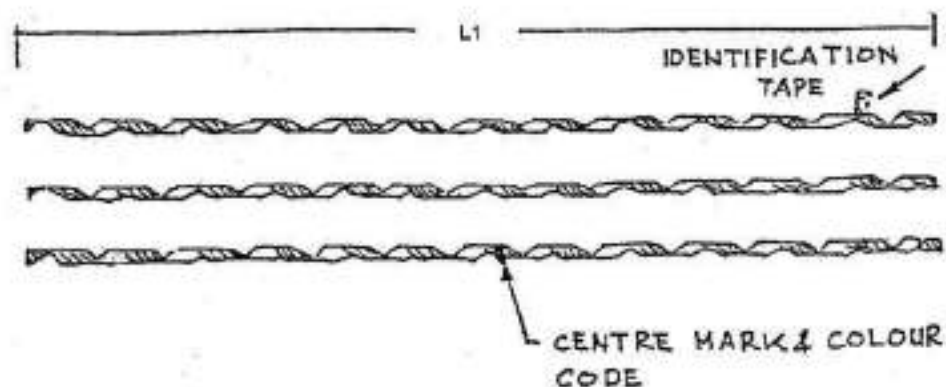
NOTE :- TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

FEROUS PARTS ARE HOR DIP GALVANISED
AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec	Qty.
1 CLAMP	ALUMINIUM ALLOY GDC.	IS : 617	1
2 RIVET M16 x 45	GALV. STEEL	IS : 2016	1
3 WASHER	GALV. STEEL	IS : 2016	1
4 SPLIT PIN	STAINLESS STEEL	IS : 549	1

CLEVS THIMBLE	
NOT TO SCALE	UNIT - MM

FIG - 9



FOR EXAMLE
DIMENSIONS (FOR CABLE SIZE, D - 144 MM)

- I. DIA OF EACH WIRE - 3.2 ± 0.1
- II. NO. OF SETS - 3
- III. NO. OF WIRE PER SET - 5
- IV. LENGTH OF HELIX - 1400

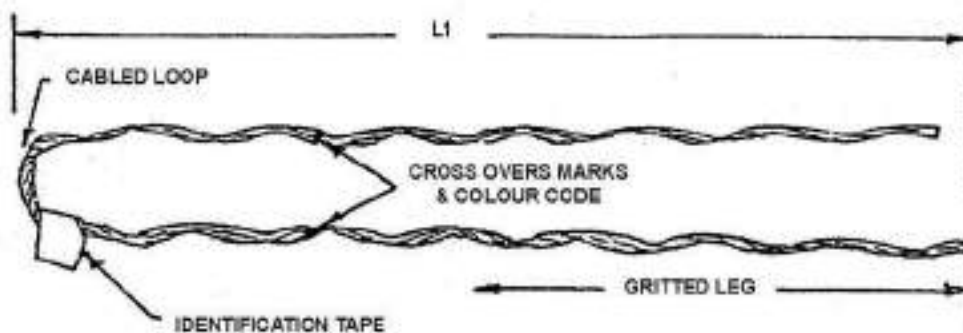
DIMENTION DETAILS FOR OTHER CABLE SIZE SHALL BE INDICATED BY THE
MANUFACTURER INCLUDING THE PITCH OF HELIX

NOTE : ENDS OF RODS SHALL BE DEBURRED TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

DESCRIPTION	METERIAL	REF. Spec	Qty.
1 PROTECTIVE HELIX	ALUMINIUM ALLOY 6061		

PROTECTIVE HELIX (S)	
NOT TO SCALE	UNIT - MM

FIG - 10



DIMENSIONS
FOR EXAMPLE

L1	T1
1000	2.2±0.1

D IS DIA OF EACH WIRE ROD
NO. OF WIRES USED 5

NOTE : TOLERANCE SHALL BE PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

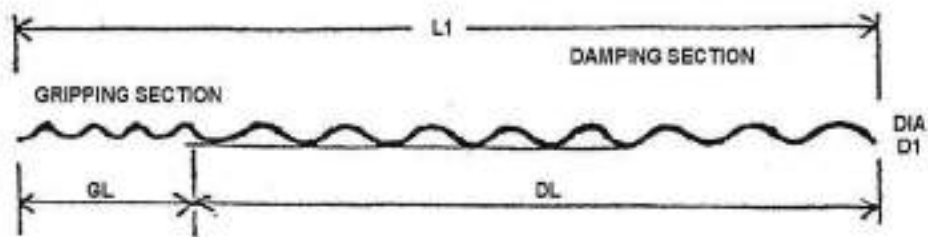
DIMENSION DETAIL FOR DIFFERE CABLE SIZES TO BE DECIDED AP TYPE TEST APPROVAL
FOR EXAMPLE CABLE SIZE

ENDS OF RODS SHALL BE DEBUR LENGTH OF TERMINATING HELIX 1000 MM,
TER MINATING HELIX TO BE USED WITH THIMBLE C DIA - 14.4 MM

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 DEADEND GRIP	ALUMINISED STEEL		

TERMINATING HELIX	
NOT TO SCALE	UNIT - MM

FIG - 12



DIMENSIONS IN MM

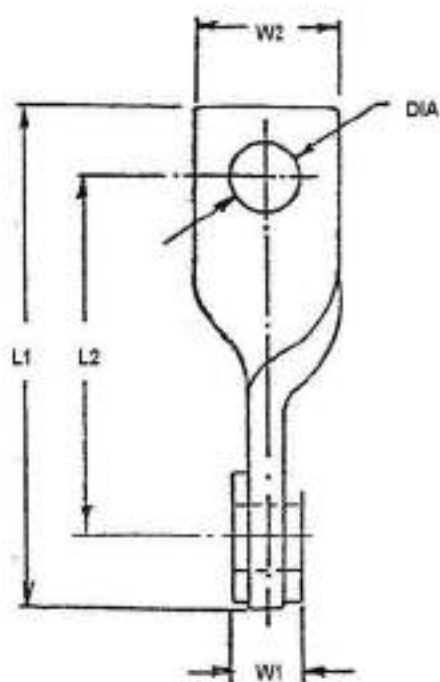
L1	GL	DL	D1
1346	446	900	12 \pm 1

NOTE : TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 SPIRAL VIBRATION DAMPER	POLYVINYL COPOUNDED		

SPIRAL VIBRATION DAMPER	
NOT TO SCALE	UNIT - MM

FIG - 13



DIMENSIONS IN MM

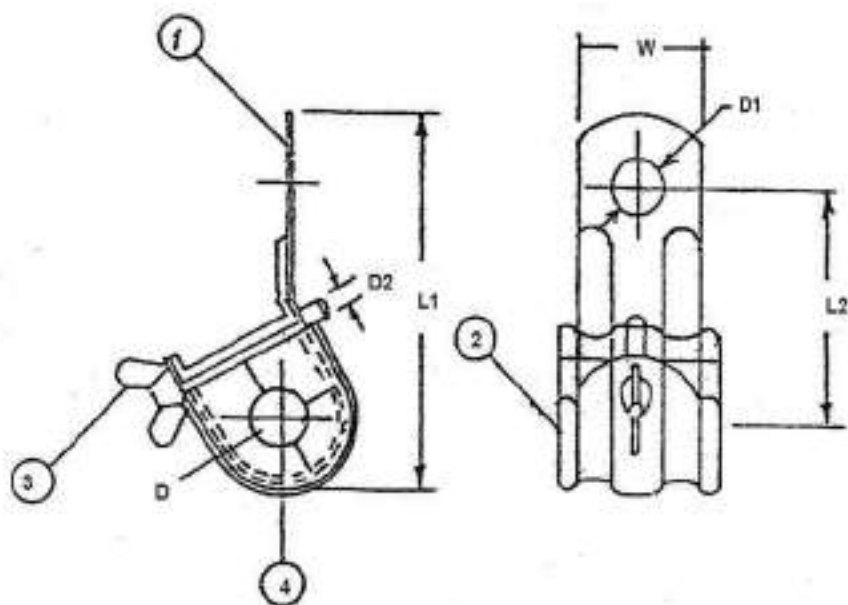
L1	L2	W1	W2	DIA
138	100	27	38	18

NOTE : TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR. UNLESS UNTILL SPECIFIED)
HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 LINK	MILD STEEL	IS : 2062	1

TWISTED EYE LINK	
NOT TO SCALE	UNIT - MM

FIG - 14



DIMENSIONS IN MM

L1	L2	D1	D2	W
105	65	17.5	5-6	35

DIMENSIONS IN MM OF INSERT PAD

L	INNER DIA	OUTER DIA
40	15	30

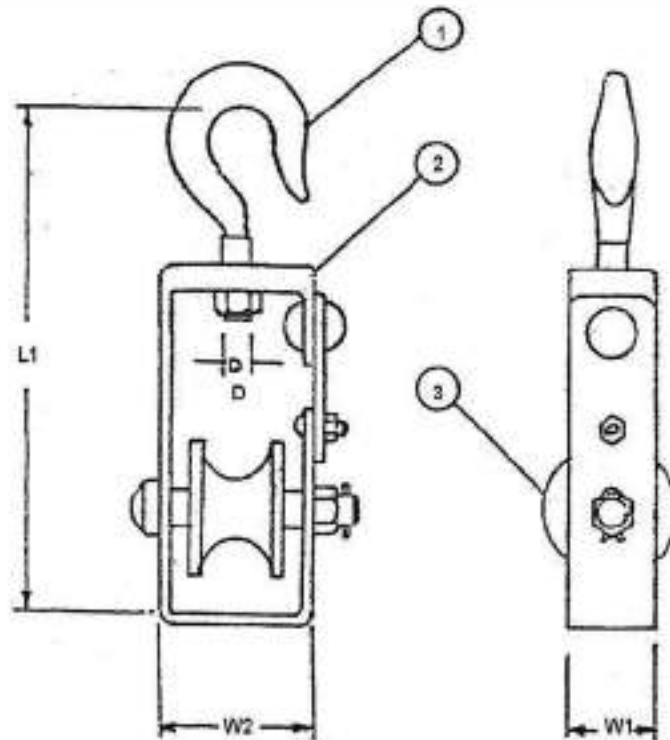
NOTE : TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)

INSERT IN TOW HALVES D TO SUIT CABLE DIA FERROUS PARTS ARE HOT DIP GALVASIED AS PER IS : 2629

DESCRIPTION	MATERIAL	REF. Spec	Qty.
1 STRAP	MILD STEEL GALV	IS : 2062	1
2 INSERT	POLYCHLOROPRENE COMPOUND		1
3 WING BOLT	MILD STEEL GALV	IS 2062	1

JUMPER CABLE CLAMP	
NOT TO SCALE	UNIT - MM

FIG - 15



DIMENSIONS IN MM

L1	W1	W2	D
280	50	92	12

NOTE : TOLERANCE SHALL BE AS PER IS : 2102
(DETAIL AS PER GR, UNLESS UNTILL SPECIFIED)
FEFFOUS PARTS ARE HOT DIP GALVANISED AS PER IS : 2629

DESCRIPTION	METERIAL	REF. Spec	Qty.
1 HOOK	GALVANISED STEEL		
2 BODY	GALVANISED STEEL		1 SET
3 SPOOL	ALUMINIUM COATED NEOPRENE		

DEMOUNTABLE PULLEY	
NOT TO SCALE	UNIT - MM

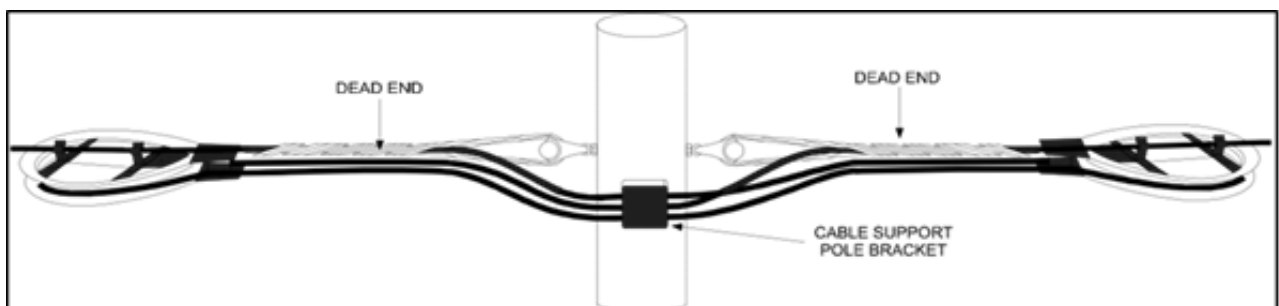
FIG - 16

4 Post based, ADSS on LT/HT Electrical Poles

4.1) Overview

- (a) The location of the tensioner and puller relative to the structure must be selected so that the pole is not overloaded. Where possible, a pulling slope of 75° to 80° is considered good practice. This ratio will minimize the load on the cable, traveler, sheave, or quadrant block, and pole. It may be necessary to place temporary guys to prevent overloading support poles. The reel must be placed in-line with the first two poles of the run to prevent twisting of the cable or any damage to the cable caused by rubbing the sides of the traveler, sheave, or quadrant block groove.
- (b) Anchors and pole hardware must be rated above the expected environmental load of the cable, plus a safety factor. In installations where aeolian vibration could be an issue, the safety factor should be increased. At locations where the cable is tensioned to achieve proper sag, the pole may require a temporary down-guy and anchor to prevent overloading the pole.
- (c) Travelers, sheaves, or quadrant blocks are normally attached directly to the support pole. The pole attachment, used to support the traveler, sheave, or quadrant block must be consistent with the working load and rating of the traveler, sheave, or quadrant block.
- (d) The pulling grip shall be rated above the maximum pulling tension anticipated. Use the manufacturer's instructions for the proper application. When properly installed, no special preparation of the cable end, or aramid yarns, are required. A matching clevis type swivel should be used to help prevent twisting of the cable during pull-in. The swivel should be of the type that has a break-away tension less than or equal to the cable's rated maximum pulling tension to prevent over tensioning the cable.
- (e) Aeolian vibration is a resonant vibration caused by low velocity wind blowing across a cylindrical cable that is under tension. This vibration can cause severe degradation of the cable support hardware. Vibration dampers can be very effective in controlling aeolian vibrations when used on ADSS cable. Both resonant and interference type vibration control systems will work when properly applied.
- (f) Splice locations require additional cable be provided to accommodate lowering the cable to the ground with enough slack to allow splicing inside a splicing van or trailer.

Figure: C – Cable Slack Storage



- (g) All slack cable storage locations require the installation of slack cable storage brackets. The strand cable storage bracket insures a proper bending radius for the stored fiber optic cable and

provides for horizontal storage and tiering for storage of multiple cables and loops. Figure 3 below illustrates slack cable storage.

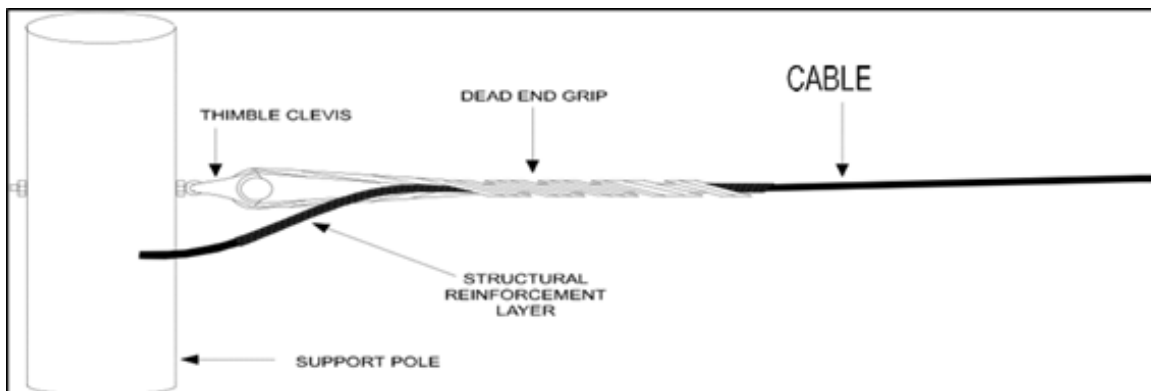
4.2) ADSS Cable Support Hardware:

There are two general types of ADSS cable support hardware: dead ends and tangent assemblies.

4.2.1) Dead-end assemblies:

- (a) Deadend assemblies are used at the point of cable termination, or where the cable angle is greater than 20°. See Figure 4 below for illustration of a Deadend Assembly.
- (b) The Structural Reinforcement Layer (SRL) is a subset of armor rod that is the first layer applied to the ADSS cable. They are spiraled in a precise twist lay to match the diameter and load of a specific cable. They are normally grouped together in a sub-set of four to five rods, with grit applied to the inside for slip resistance.
- (c) The Deadend Grip itself is a set of armor rods that have been formed in a double spiral with a loop at one end. Its precise twist is designed to perfectly match the diameter of the SRL as it lay over the cable. The length of the deadend grip is dependent upon the maximum load. It too has grit applied to the inside for slip resistance.

Figure: C – Cable Slack Storage

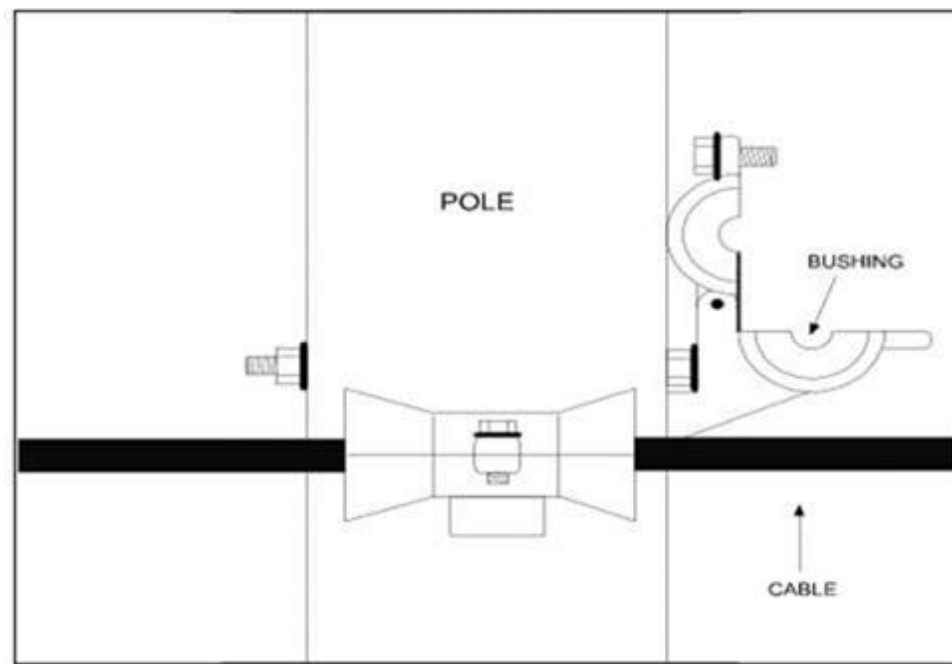


- (d) The Thimble Clevis is made of cast aluminium or steel and is used to maintain the seat diameter of the dead end loop.
- (e) The dead end hardware is assembled in the following manner:
 - (i) The SRL rod is assembled on the cable first. The end with the color band is assembled towards the end of the span. Wind on one set of rods at a time. The rods should be placed close together so that there is enough room for them all.
 - (ii) The tips of the SRL rods should align at the end. Do not force the rods or use tools to install them. Forcing the rods or using tools may damage the cable jacket.
 - (iii) Align the colour band on the dead end with the color band on the SRL and wind one leg of the dead end on approximately two feet.
 - (iv) Insert the thimble clevis into the loop.

- (v) Align the color band on the second dead end leg with the colour band on the first dead end. Wind the second dead end leg over the SRL for approximately two feet. Continue winding the dead-end legs over the SRL until both legs are snapped in place.
- (vi) Connect the thimble clevis to the hardware (or to the extension link and then the hardware) mounted on the pole

4.2.2) Tangent Assemblies:

Tangent hardware is normally installed after the span has been tensioned. Figure D below illustrates a front and side view of a Tangent Support. To install the cable, open the hinged top and insert the bottom pad. Then place the cable on the pad, place the top pad over the cable, close the top and tighten the bolt to hold the cable in place.



4.2.3) ADSS Sagging and Tensioning:

- a) Upon completion of placing the entire run of cable, sagging and tensioning can now be started. Sagging and tensioning the run is worked progressively from one end of the run towards the opposite end. Normally the slack is worked back in the direction of the reel in order to recover as much cable as possible. Sagging and tensioning should be conducted according to the cable manufacturer's recommendations for the cable just installed.
- b) The cable run is broken down into subsections for sagging and tensioning purposes. The last structure at each end of a section being sagged and tensioned is a dead-end assembly. Remove all excess slack cable out of the section of the run being prepared for sagging and tensioning. To remove the slack, reverse the tensioner and pull the cable back towards the reel, being careful not to exceed the minimum bending radius for the cable under tension.
- c) Once the slack is out of the cable, install a temporary dead end on the cable approximately 2 dead end assembly lengths away from the support pole. This dead end will be used as a tensioning grip to achieve proper span sag and tension, prior to installing the permanent dead-end assembly.

- d) Attach the tensioning device: a chain hoist or power winch and a dynamometer between the pole and the temporary dead end. Begin to apply tension to the span.
- e) The cable is normally tensioned from dead end to dead end along the span back to the reel. Once the spans are properly sagged and dead ends attached, the suspension or tangent hardware is installed and attached to the poles by working back to the dead end one span at a time.
- f) With a span's permanent deadend installed and the hardware attached to the poles, the pulling device can now have its tension released and the temporary deadends removed from the cable. When the next permanent deadend is installed on the adjacent span, make sure that the loop formed between the two deadends maintains the minimum bend radius for the cable. Repeat this operation until all spans are sagged and tensioned.

5 Conclusion

As All Dielectric Self-supporting Aerial Cable (ADSS) are made of brittle material, so it can't put too much strain and fiber diameter is very small, so its tensile strength is very weak. In choosing the cable hardware, the principle is not only to meet all the features and characteristics of the cable should be inclusive, but shall take into account the payment of grip strength with uniform, non-metallic sheath degradation, wear, vibration breeze, dancing, exceed the allowable bending stress and reverse parameters. Therefore, the general provisions are "Hardware's squeeze should not exceed with more than two cables design limits, hardware should not be designed for a range of diameters."

Abbreviations:

1.	ADSS – All Dielectric Self-Supporting optical fibre cable
2.	MASS – Metal Free Aerial self-supporting cable
3.	OFC – Optical Fibre Cable
4.	OPPC – Optical Phase Conductor
5.	KV – Kilo Volt
6.	LT – Low Tension
7.	HT – High Tension
8.	FTTH – Fibre To The Home
9.	dB – decibel
10.	Km – Kilometre
11.	TEC GR – Telecommunication Engineering Centre (Department of Telecom, Govt of India) Generic Requirements.
12.	IEEE – Institution of Electrical and Electronics Engineers
13.	IEC – International Electro technical Commission
14.	Aeolian vibration : Wind induced (Aeolian) vibrations of conductors and overhead shield wires (OHSW) on transmission and distribution lines can produce damage that will negatively impact the reliability or serviceability of these lines.
15.	C- Bracket
16.	D-Dia of cable
17.	degree C: Degree Centigrade
18.	EI: Engineering Instruction
19.	OF cable: Optical Fibre Cable
20.	SVD: SPIRAL VIBRATION DAMPER
21.	TEC GR: Generic Requirements issued by the Telecommunication Engineering Centre New Delhi.

Annexure-D: Technical Specification for GIS Mapping of OFC Routes and Project Management Tool

1. General requirements

1.1 State NOC (S-NOC) Integration with Central NOC (C-NOC)

- PIA shall ensure integration of S-NOC with C-NOC including NMS and all EMSs, such as IP-MPLS routers, RFMS, mini-OLT, alternate technology, etc.
- PIA shall ensure seamless integration of S-NOC applications such as Fault management, Performance management and Trouble ticket management etc. with C-NOC.
- PIA shall establish mechanisms for real-time data synchronization between S-NOC and C-NOC applications. The integration shall be based on open APIs and event-based data shall be pushed by S-NOC to C-NOC on near real time basis.

1.2 Geographical Information System (GIS)

- PIA shall perform GIS based desktop planning, preliminary design, detailed video graphic survey, GIS data collection during execution for creation of digital As Built Drawing (ABD) on GIS.
- PIA shall collect and maintain the inventory of both physical and logical resources of OSP (outside plant - fibre, chamber, splice-closure, coupler etc.), ISP (Inside Plant: room, rack equipment's and their connectivity) and power infra.
- PIA shall maintain and store all details of deployed network infrastructure till the readiness of C-NOC. After readiness of C-NOC, PIA shall upload all GIS data.
- PIA shall upload all required GIS details such as data files, videos, photos, etc. on C-NOC GIS application.
- PIA shall provide all required information related to network to C-NOC for fibre inventory management.

Note: The specific functional criteria listed in clause no. 2 below for the GIS mapping of OFC routes.

1.3 Asset management

- PIA shall maintain a detailed inventory of all BharatNet network assets, including but not limited to routers, switches, OFC, RFMS and other infrastructure components. This inventory will be validated by the Independent Engineer (IE) and then approved by the APBIL.
- PIA shall manage the entire asset lifecycle of BharatNet infrastructure. PIA in consultation with APBIL shall assign unique identifiers or tags to network assets and infrastructure elements in the field, such as routers, switches, fibre cables, splice points, junction boxes, and termination points etc.

1.4 Project Monitoring

- PIA shall provide necessary inputs regarding the progress and status of the project implementation in the Project Monitoring tool to be deployed by APBIL. This input is crucial for creating and overseeing project schedules, milestones tracking, and monitoring of timelines within the project. The detailed requirements are given in clause no. 3 below.

1.5 Network Provisioning and Utilization

- The network shall enable retail, enterprise and wholesale services as per the requirement of APBIL.
- PIA shall provide all necessary support and facilitation to APBIL and designated service provisioning agencies for provisioning and monitoring of services from S-NOC.
- PIA shall be responsible for coordinating and assisting APBIL in provisioning and configuring network resources for effective network operations, service provisioning, assurance and utilization through retail or wholesale enterprise services such as FTTH, leased circuits, dark fibre and bandwidth leasing etc.

2. Functional requirements for GIS Mapping of OFC Routes

- Accuracy: sub meter level accuracy (20cm).
- Format: .shp format with mapping on Geography Coordinate System (GCS) projection system with WGS 84 datum.
- Codification and layer structure will be provided by APBIL. The PIA shall be responsible to create separate layers for all network elements as per the requirement. However, the indicative structure of the shape files for Block, GP, route markers and OFC layers are as given below:

Block Layer (indicative)			
S. No.	Field	Type	Description
1	Name	String	Block Name
2	Asset Type	String	Block
3	Blk_Name	String	Block Name
4	Blk_Code	String	Block Code
5	Dt_Name	String	District Name
6	Dt_Code	String	District Code
7	St_Name	String	State Name
8	St_Code	String	State Code
9	Lat	Double	Latitude
10	Long	Double	Longitude
11	Cable_Len	Double	Cable Length
12	Remarks	String	if any
13	Obs	String	Observation
14	Status	String	Editing Status/It should be blank
15	Block_ip	String	IP address of BLOCK
16	geo_photo	String	Photo with geo-location
17	Vendor	String	Name of vendor
18	Phase	String	1/2/3
19	Model	String	DBOM
20	Technology	String	IP-MPLS

GP Layer (indicative)

S. No.	Field	Type	Description
1	Name	String	GP Name
2	Asset Type	String	GP
3	Asset_Code	String	GP Code
4	LGD_Code	String	LGD Code for Location
5	Location	String	Location Name of GP
6	Loc_Type	String	School, College, GP, PANCHAYAT BHAWAN etc.
7	GP_Code	String	GP Code
8	NMSBLOCK_CD	String	NMS BLOCK Code
9	NMSGP_C D	String	NMS GP Code
10	Blk_Name	String	Block Name
11	Blk_Code	String	Block Code
12	Dt_Name	String	District Name
13	Dt_Code	String	District Code
14	St_Name	String	State Name
15	St_Code	String	State Code
16	Lat	Double	Latitude
17	Long	Double	Longitude
18	Cable_Len	Double	Cable Length
19	Remarks	String	Remarks from APBIL
20	Obs	String	Observations
21	Status	String	Editing Status/It should be blank
22	Block_ip	String	IP address of Block
23	GP_mac_id	String	Mac Id of GP
24	Otdr_len	Double	Length in meters
25	Conn_str	String	PIC-PON- GP ID
26	GP_sr_no	String	Device serial no.
27	Backhaul	String	OFC or R F / Sat
28	geo_photo	String	Photo with geo-location
29	Phase	String	1/2/3
30	Route_code	String	New/Old

OFC Layer (indicative)			
S. No.	Field	Type	Description
1	Name	String	OFC Route name
2	Asset Type	String	Leased/Incremental
3	Asset_Code	String	Segment Code
4	Blk_Code	String	Block Code
5	Dt_Code	String	District Code
6	St_Code	String	State Code
7	CS	String	Cable Section

OFC Layer (indicative)			
S. No.	Field	Type	Description
8	Seg_Length	Double	Route length
9	Start_Node	String	Starting Asset
10	S_Cable_Len	Double	Starting Cable Length
11	End_Node	String	Ending Asset
12	E_cable_Len	Double	Ending Cable Length
13	num_fibre	String	24/48
14	Status	String	Editing Status/ It should be blank
15	Remarks	String	Remarks from APBIL
16	Obs	String	Observations
17	Traverse	String	FIBRE POSITION e.g. 'U' For Underground, 'O' for Overhead
18	fibre_pos	String	Left/ Right of the road
19	Direction	String	Towards GP or Block
20	Phase	String	1/2/3
21	Route_code	String	New/Old

Route Marker (indicative)			
S. No.	Field	Type	Description
1	Name	String	Route marker NAME
2	Type	String	Asset Type
3	Blk_Name	String	Block Name
4	Blk_Code	String	Block Code
5	Dt_Name	String	District Name
6	Dt_Code	String	District Code
7	St_Name	String	State Name
8	St_Code	String	State Code
9	Lat	Double	Latitude
10	Long	Double	Longitude
11	rd_Offset	Double	Offset from centre of the Road
12	CS	String	Cable Section
13	Remarks	String	Remarks from APBIL
14	Obs	String	Observations
15	cable_len	String	if any
16	Status	String	Editing Status/ It should be blank
17	geo_photo	String	Photo with geo-location
18	fibre_pos	String	Left/ Right of the road
19	Phase	String	1/2/3
20	Route_code	String	New/Old

Note: For other required layers similar structure may be envisaged.

2.1) GIS data collection

- PIA shall conduct survey of the Block and associated routes from Block to Gram Panchayats (GPs) to evaluate the existing and new fiber cable needs for network implementation.
- PIA shall collect coordinates of landmarks such as culverts, bridges / nallah, water bodies, crossroads, railway crossing, flyovers and public places like temples/mosques, bus-stop, PHC, post office, school/college, shops, police stations, banks, tourist spots, hospitals, etc. to be captured along with the route marker, cable joints, etc. along with the cable routes. One additional reading in the middle of the two manholes / RI should be recorded in the already laid network. Recordings are necessarily to be made at every fibre turn, bend along the route, road/railway crossing, culverts, diversion etc. Sufficient recordings at short intervals on the curvature of the route shall be captured to map it on GIS properly.
- PIA shall collect photos of various assets such as Blocks, GPs, manholes, joint chambers, FDMS, route markers etc. with geo tagged images.
- PIA shall collect information about terminated and spare fibres, loops, cable types/sizes and optical test results for each fibre, utilizing previously recorded data from APBIL. This includes port-by-port fibre configurations, termination details, and OTDR readings for Blocks and Gram Panchayats (GPs) PIA shall collect cement/electronic route marker (lat- long) details for route marker identification.
- PIA shall collect information about road length, width and type (RCC etc.). variation in width of road in meters taking offset from the center of the road.
- PIA shall gather details about authorities such as railway, National Highways (NH) and forest departments within the limits of the OFC path required for RoW permissions.
- The point feature like poles, sewerage manholes, other utility chambers, transformers, bore well etc. shall be captured as a point.
- The record of Block, GP and any utility shall be maintained within a 50-meter corridor with an accuracy of 20 cm (25 meters on each side of the road's center line or within the road's right-of-way, whichever is greater)
- To and fro direction towards village, town, city etc. shall be recorded for all roads.
- The geo coordinates of all road KM stones shall be recorded and shown using symbol provided.

Note: All the asset locations on ground are to be geo-tagged in five photographs (one close-up and four from different directions covering road part and also landmarks, if visible) and videography (zoom & wide angle) to be taken so as to identify the exact point later on. There will be a practical situation where the route markers will be found missing, in such situation a play card with the notional assets no. available RID/ABD to be placed on the identified point.

2.2) Mobile app for data collection from field

PIA shall use APBIL mobile application & video recording solution for the BharatNet Project to accurately document project activities such as trenching, fibre laying, splicing and equipment deployment. The key requirements are given below.

- PIA shall record videos of depth, offset, chainage marking, etc. of overhead or underground alignment type of execution (HDD, OT, Aerial etc.)

- The video should support to record and identify depth, offset, ofc accessories details and landmarks of routes.
- PIA shall ensure that the accuracy of videos and GIS coordinates is within the range of 20 cm. (a sample check of the survey shall be performed on the ground by IE to check the submeter level accuracy (≤ 20 centimeters). APBIL may use CORS system deployed by Survey of India for measuring the accuracy during sample check. The survey data shall be rejected if the accuracy of the sample data is not in accordance with the desired accuracy).
- The PIA should use suitable devices such as GNSS / DGPS (which can be pole- mounted or handheld as necessary), or any other appropriate technology and mobile applications for conducting surveys to capture GIS coordinates, videos, and photos of completed work.
- The BharatNet mobile app can be used as needed for capturing GIS coordinates, videos, and photos of executed work. The GNSS/ DGPS or any other device used by the PIA must be compatible with the BharatNet mobile app. If the PIA opts for its own application than PIA shall upload videos in mp4 format and GIS coordinates in shape file format on APBIL provided GIS application. If the PIA uses the APBIL mobile app, videos and GIS coordinates will be uploaded automatically.
- If PIA used own mobile app, in such case all videos and photos shall be geo tagged, and geo location shall be mentioned in file name. The geographical information shall also be available in header file.

3.13.1 Video specifications:

- Format: MP4 format, minimum 720p & and above resolution, and 30 fps/60fps frame rate with HEVC codec for video compression.
- Content: Each video segment shall clearly capture start and end points of activities, depth readings for trenching/drilling, manhole/cable chamber installation, details of OFC blowing/pulling, splicing activities, route markers, and active equipment deployment procedures.
- Continuous recording: Videos shall be recorded continuously without cuts or edits, and file sizes should be optimized for efficient data exchange.
- Visual evidence: Use calibrated vertical measuring tools to display depth in the video frame at every 10 meters for Open Trenching.
- Verbal commentary: Provide running commentary describing activities, depth measurements, and location references.
- Date and time stamp: Automatically embed date and time stamps in recordings.
- File naming: File names should clearly indicate the type of work, block, and route.
- The following details (indicative) shall be captured in videos:
 - Chainage (CH) details
 - Methodology type
 - Depth and Offset details.
 - Lat long of each pit, RI, splice chamber landmarks etc.

- Crossing of roads
- 3 reference points of RI, Block and GP
- Major crossing
- Forest area, etc.

Note:

1. Requirements for mobile device/ handset for GIS mobile app

- The PIA shall have dedicated mobile for BharatNet program to capture implementation videos.
- Mobile device shall support minimum android version 13.0 & iOS version 15 for operating the GIS mobile application.
- Mobile device shall support minimum camera capacity of 48 MP or higher and have at least 256 GB storage with augmented cloud storage capabilities as well.
- The camera should provide stable footage with minimal shaking or distortion.
- The video recording needs to be captured in sufficient day light and significant speed of maximum 40mtr/minute and minimum of 20mtr/minute.
- The video recorded and uploaded by PIA to APBIL shall also be stored by the PIA for future reference, extending for a duration of one year or until invoicing, whichever is higher.
- Mobile device shall support all the required features to fulfill the video recording requirements as given in clause 2.3.3.

2.3) GIS data upload and validation

- APBIL shall provide online tool and measurement book format for uploading the captured data and information.
- PIA shall upload geotagged images and videos of designated locations in specified formats given in clause 2.4 below. The mobile app of BharatNet shall be used to upload photos and videos to be taken from the sites.
- To upload Block-wise data on GIS application (web and mobile), APBIL will provide base maps to facilitate the upload and optimization of captured data and information, including fibre infrastructure and termination details etc.
- Validation of uploaded data shall be done in two stages:
 - **First stage:** The PIA shall upload and verify the Block wise data/ videos/ photos in the GIS application (web/ mobile)
 - **Second stage:** Second level validation shall be done by IE of respective Block.
- If the data correction is required at any stage, the same shall be sent to the PIA for necessary correction.
- PIA shall be responsible to modify/ correct the data and submit for revalidation by the IE/ APBIL.

2.4) Digital As-Built Drawing (ABD):

- As-Built Drawing (ABD) shall be created digitally on GIS platform.

- PIA shall record details of other operators and utilities such as underground optical fiber cables, utility pipes, transmission cables, and other similar infrastructure, in the digital ABD wherever possible.
- The geo coordinates of all property boundaries within the fibre route corridor shall be recorded and shown in digital ABD.
- PIA shall capture physical OFC asset details and locations in respect of locations/ asset visited for capturing GIS data during scope of work as mentioned in this tender.
- Existing data as per documentations/ details made available to PIA w.r.t. to old OFC laid.
- ABD shall be prepared from Block to GPs during implementation. The ABD for each block shall be prepared separately. ABD may have the following details:

Particulars	Parameters to be captured (indicative)
Cable details	<ul style="list-style-type: none"> • Make and Size of the cable
Joint details	<ul style="list-style-type: none"> • Location of Joint Chamber (Lat/ Long details in decimal degree format up to six-digit precision) • Depth of Joint Chamber Cover from ground level • Details of cable stack at each joint chamber • 3 reference points of joint locations
Route marker	<ul style="list-style-type: none"> • Location of Route Marker Cement / Electronic (Lat/ Long details in decimal degree format up to six-digit precision) • Route Marker Identification details • 3 reference point of each route marker
OFC Alignment Details	<ul style="list-style-type: none"> • Offset of cable from centre of the road at every 10 meters (Details to be captured from HDD Graph / digital measurement book) • Details of crossings (road / rail / nala etc.) should be provided. • Depth profile of cable at every 10 Meter (Details to be captured from HDD Graph / Measurement Book) • Details of protection with type of protection (Details to be captured from APBIL provided input) • Locations of culvert and bridges with their lengths and scheme of laying of HDPE / PLB pipe thereon
Landmark Details	<ul style="list-style-type: none"> • Important landmarks to facilitate locating the cable position in future to include important buildings such hospital, religious places, petrol pumps, educational institutes, government offices, commercial complex, major residential complex / building etc.
Road feature details	<ul style="list-style-type: none"> ○ Electric Pole / Transformer ○ Telephone Pole ○ Utility Manhole ○ KM Milestone ○ Street Pole / Lamp Post ○ Median ○ Divider

Particulars	Parameters to be captured (indicative)
	<ul style="list-style-type: none"> ○ Large Tree

- Readings shall be recorded without any exception at interval of 10 meters including every bend on the road, road/railway crossings, culverts, diversion etc. Each section shall record maximum 200 to 250 meter of the route length.
- All the property boundaries within the corridor shall be recorded and shown in drawing. Three point's references need to be shown for every joint chamber/pull through chamber/manholes.
- Collection of data shall also include custodianship of equipment in each Gram Panchayat.
- All the diagrams shall be verified by the PIA (project manager level person) as a proof of accuracy of the details. The ABD may have the following details.
 - Name of the Project Organization
 - Name of the OFC Link with ID
 - Name of the PIA
 - Name of Survey PIA Rep as part of acceptance test
 - Name of APBIL Rep (IE) as part of acceptance test
 - Date of commencement of work.
 - Date of completion of work
- RoW: Railway authority, National highway, Forest authority and any other authority limit along with OFC path shall be captured in ABD (details will be provided in APBIL ancillary input data).
- The PIA shall also be provided option to upload ABD in GIS format (.shp etc.) in the GIS platform through online tool to be provided by APBIL. In such cases, PIA shall prepare ABD in GIS format (shape format) of OFC connectivity from Block location to respective Gram Panchayats (GPs), routes data shall be in soft copy.

3. Functional requirements for PM tool

The project monitoring tool shall enable real-time tracking of project progress, (timelines and milestones) including the status of network infrastructure deployment, equipment installation, and connectivity establishment of Amended BharatNet program.

- PIA shall provide the input for managing project documents, drawings, specifications, permits, contracts, and other relevant documentation etc.
- PIA shall provide all required information for the application dashboard in standard/defined format such as measurement book, acceptance test proofs etc. The details shall be, but not restricted to, as under: -
 - Block/GP wise Cable Length.
 - Block /GP wise Duct length.
 - Block /GP wise Trench Length.

- Total as build OSP network elements count/details of FDMS/ Handhole/ Manhole/ Site/ Splice Closure etc.
- Total Planned OSP network elements count/details of FDMS/ Handhole/ Manhole/ Router/ Site/Splice Closure etc.
- Total ISP network Elements count/details of Router/ Switch/OLT /Repeater /Equipment's etc.
- PIA shall be responsible to update the project progress in the project monitoring tool, enabling the system to automatically create milestone-based proforma invoices.

3.14 Digital measurement book

- Digital measurement book module of BharatNet C-NOC shall automatically calculate and update the work completed data including route length in RKM, depth etc. based on the videos uploaded during the execution of the work.
- PIA shall be responsible to provide/ update the measurement book information in the PM tool MB module via mobile application to record work details in the C-NOC MB module if required. The recorded, reading in the MB cannot be deleted. The MB data shall be validated by the (approved/ rejected) by the IE. PIA shall maintain and store all details of measurement book till the completion of C-NOC application. After completion of C-NOC, PIA shall upload all required data in PM tool APBIL.
- PIA shall also get an option for manual entry of records in digital measurement book of PM tool in case of any issue faced in automated process.

3.15 Inspection and audit module

PIA shall have access of PM tool inspection and audit module, this module shall be utilized by IE to validate the high- and low-level network design, inspect the project and identify any lapses/defect etc. The PIA shall provide comments on the observations and describe the necessary actions required, including specific timelines for completion.

SECTION-V: Schedule of Requirement (SOR)

TABLE: V. (1): SoR for IP-MPLS ring in Andhra Pradesh State

S. No.	Item Description	Unit	Total Quantity (AP)
1	Package Summary		
1.1	No. of Blocks	Nos	668
1.2	No. of GPs	Nos	13,446
1.2a	No. of GPs for creation	Nos	480
1.2b	No. of GPs for upgradation	Nos	1,692
1.3	No. of Villages for last mile connectivity	Nos	3,942
2	Existing Network		
2.1	Total GPs (Connected on OFC)	Nos	12,946
2.2	Total GPs (Connected on Satellite)	Nos	20
2.3	Existing leased RKM from BSNL	RKM	0
2.4	Total incremental 24F RKM	RKM	59,565 (5,063 U/G + 54,502 ADSS)
2.5	Total incremental 48F RKM	RKM	0
2.6	OLT/Block routers installed	Nos	686(82 OLTs + 604 Routers)
2.7	ONT/GP Routers installed	Nos	12,946 (1692 ONTs + 11,254 Routers)
3	Passive Infrastructure		
3.1	Fibre Distribution Management System Type I at Block location	Nos	79
3.2	Fibre Termination Box/FDMS Type-IIIA & IIIB – 48F at GP locations	Nos	2,172 (1,692 BharatNet Phase 1 upgradation + 480 ABP New GPs)
3.3	Fibre Distribution Management System Outdoor at Splicing/Joining locations	Nos	3,810
4	Underground Fibre Services		
4.1	Supply of 24F OFC, duct and accessories including all the services, as described at serial No.-1 in the Table: V. (2)	RKM	3,282
4.2	Supply of 48F OFC, duct and accessories including all the services, as described at serial No.-2 in the Table: V. (2)	RKM	322
5	Aerial Fibre Services		
5.1	Supply of 24F ADSS OFC and accessories including all the services (using existing power poles OR including supply of Poles), as described at serial No.-3 in the Table: V. (2)	RKM	2,157
5.2	Supply of Joint Enclosures and pole accessories	Nos	2,157
5.3	Supply, installation including services of RCC Poles – 7/8 meter	Nos	9,803
6	Passive Infrastructure (Rack)		
6.1	Rack at Block locations(as per Section (IV C), Annexure-B, VI)	Nos	79
6.2	Rack at GP locations (as per Section (IV C),	Nos	

S. No.	Item Description	Unit	Total Quantity (AP)
	Annexure-B, VI)		
7	Active Infrastructure (Router at Block Location)		2172
7.1	IP-MPLS Router at Block location Supply of router at Block locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)	Nos	79
7.2	SFP 100G (with 40km) pluggable (Client Port type 2)	Nos	158
7.3	SFP 10G (with 40km) pluggable (Network Port type 3)	Nos	1,106
7.4	SFP 10G (with 80km) pluggable (Network Port type 4)	Nos	316
7.5	EMS for Block routers (including H/W, S/W & licenses)		79
7.6	EMS additional license including H/W and S/W upgradation		79
8	Active Infrastructure (Router GP Location)		2,172
8.1	IP-MPLS Router at GP location, Supply of router at GP locations with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, II & III)		4,344
8.2	SFP 10G with 10Km pluggable (Network Port type 2)		13,032
8.3	SFP 1G with 10km pluggable (Client Port)		2,172
8.4	EMS for GP routers (including H/W, S/W & licenses)		2,172
8.5	EMS additional licenses including H/W and S/W upgradation		2,172
8.6	SFP 1G with 40km pluggable (Network Port type 1)	Nos	4,344
8.7	SFP 10G with 40km pluggable (Network Port type 3)	Nos	2192
9	Active Infrastructure (RFMS)		
9.1	Remote Fibre Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning (as per Section (IV C), Annexure-B, V)	Nos	79
9.2	EMS for RFMS (including H/W, S/W & licenses)	No. of RTUs	79
9.3	EMS additional license including H/W and S/W upgradation	No. of RTUs	79
10	State NOC		
10.1	State NOC as per details and specification given at Section (IV C), Annexure-B, IV)	Nos	1
11	Passive Infrastructure (Power)		
11.1	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	500
11.2	Power System with backup provisions at GP locations with accessories including installation, integration, testing and commissioning with provision of slot for MPPT Card BUT excluding MPPT Card & solar panels	Nos	1692

S. No.	Item Description	Unit	Total Quantity (AP)
	(as per Section (IV C), Annexure-B, VIII)		
11.3	Online UPS (2KVA) with 4 Hrs backup provisions at Block locations with accessories including installation, integration, testing and commissioning with provision of MPPT Card including solar panels (as per Section (IV C), Annexure-B, VIII)	Nos	79
12	Supply & laying of 6F Aerial drop OFC including accessories like FDMS etc. & services for extending the last mile OF connectivity to 3942 villages, as described at serial No.-4 in the Table: V. (2) connectivity to 3942 villages, as described at serial No.-4 in the Table: V. (2)	Km	7884
13	Deleted	Nos	
14	Deleted	Nos	
15	Deleted	Nos	
16	Mini OLTs at GP Locations		
16.1	Supply, Installation and Commissioning of GPON 4-Port Optical Line Termination Equipment (OLT). (as per Section (IV C), Annexure-B, XIII)	Nos	13,426
16.2	Supply, Installation & Commissioning of EMS (1+1) and integration with NMS (per EMS) (at Main and DR Site) (as per Section (IV C), Annexure-B, XIII)	Nos	1
17	6F Aerial Dropping cable for Village connectivity	RKM	7,884

TABLE: V. (2) - Detailed description of the line items, referred in the SOR

S. No.	SOR S. No.	Item Description
1	1	Physical survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works.
2	2,3,4,5,6,7,8,9,10,11,13,14,15	Supply of 24F, 48F armoured optical fibre cable (OFC), Self-supporting Metal Free Aerial Optical Fibre Cable (24F ADSS), Joint Enclosure and pole accessories, duct (40/33 mm) along with accessories and joint chambers, RCC Poles, RCC route/ joint indicators, SJC, BJC, FTB/ FDMS, patch cords, 24U racks or any other accessories required as per TEC-GR including transportation, freight, insurance and warehousing etc.
3	16	<p>a. Excavation of trench for PLB pipe laying, backfilling, reinstatement, and compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route. This shall include fixing of joint chamber, manhole, splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions.</p> <p>b. Commissioning, Acceptance Testing and makeover of the routes, commissioning of armoured optical fibre connectivity from the Block PoP to GP room and termination at GP router and end to end testing of dark and lit fibre per GP (for Underground laying) (as per the Engineering Instruction given at Section (IV C), Annexure-C)</p> <p>c. Capturing the Latitude-Longitude of OFC route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OFC routes, videography and photos as defined in scope of work section of this RFP</p>
4	17	<p>a. Slinging / Laying and commissioning of 24F optical fibre connectivity from Block PoP to GP room and termination at GP Router. The cost shall include laying, fittings, splicing, splitting, splice closure, Pole clamping installation, termination at FTB/FDMS & all the relevant accessories etc. and end to end testing of dark and lit fibre per GP (For Aerial laying) of Optical Fibre Cable. Supply of As Built Diagram (ABD) of constructed OFC Route and Acceptance Testing, commissioning and makeover of the routes. The work also includes road / bridge crossing, providing protection as per EI</p>

S. No.	SOR S. No.	Item Description
		<p>wherever required and obtaining Right-of-Way (RoW) permissions. (As per the Engineering Instruction at Section (IV C), Annexure-C)</p> <p>b. Installation by utilizing the existing power infrastructure of State DISCOMs to the maximum possible extent, and on new poles wherever required.</p> <p>c. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP</p>
5	12	Supply of 6F Aerial Drop OFC and Accessories including all the services as per clause 3.10 Last mile connectivity of Section IV-B

Note:

Note 1	:	RKM is the Route Kilometres. The RKM shall be measured through GIS system. However, RKM shall be measured by Rodo Meter till the implementation of GIS system.
Note 2	:	Normally, the length of Duct used is almost 6% higher than the RKM and OFC Kms is higher by around 10%. The bidders, while quoting the rates must account for the same.
Note 3	:	<p>In Case of any other type of SFP required (SFP 10G with 40 Km pluggable shall be Rs F as per the bidder's quote and SFP 100G with 40 Km pluggable shall be Rs G as per the bidder's quote), the rates shall be paid to the bidder as mentioned below:</p> <ul style="list-style-type: none"> ○ SFP 10G with 80 km pluggable shall be 2 TIMES of F, ○ SFP 10G with 10 km pluggable shall be 0.25 TIMES of F, ○ SFP 1G with 10km pluggable shall be 0.13 TIMES of F, ○ Similarly, SFP 100G with 80 km pluggable shall be 1.2 TIMES of G
Note 4	:	In Case of Block Router (Item#19 of Price Schedule), the bidder has to supply the type A router in place of type B as per requirement for which the rates shall be 1.2 times the price quoted for Block Router type B at Serial No. #19 of the Price Schedule. The quantity of the type A router will be around 10% of the total quantity. Every block will have only one type of router, either type A or Type B.
Note 5	:	In Case of GP Router (Item#18 of Price Schedule), the bidder has to supply the type C router in place of type D as per requirement for which the rates shall be 1.2 times the price quoted for GP Router type D at Serial No.#18 of the Price Schedule. The quantity of the type C router will be around 10% of the total quantity. Every GP will have only one type of router, either type C or Type D.

Note 6	:	APBIL may or may not procure the EMS for active equipment at items at Sl. No. 34 & 36 of the Price Sheets (SOR items at Sr. Nos. 7.5,7.6, 8.4,8.5 9.1,9.2,9.3). However, quoted rates of these items shall be part of bid price for bid evaluation. APBIL shall decide to procure or not to procure EMS from the PIA finalised under the subject tender, based on the decision taken by APBIL and also to facilitate the integration of the EMS with the S-NOC of for enabling the O&M by the PIA. APBIL may procure any number of additional licenses in multiple of 100 licenses.
Note 7	:	Any other item required for completion of the project as per scope of work including but not limited to patch cords, connectors, installation material, adapters, attenuators, software, hardware etc. shall be supplied by the PIA without any additional cost to APBIL.
Note 8	:	Regarding ADSS OFC implementation (as per items# 5,17 of Price Schedules), the PIA may use GI poles also as per BIS standard No. BIS-2713 in place of RCC poles within the order price only. APBIL shall not pay any extra amount for the GI Poles.
Note 9	:	Regarding ADSS OFC implementation (as per item# 5,17 of Price Schedules), if the PIA needs to install some additional poles, such requirement shall be submitted to the Independent Engineer. APBIL shall consider such requirement on the case-to-case basis, based on recommendations of IE and the cost of such additional poles shall be paid (regarding cost of Pole to be used in Last Mile Connectivity).
Note 10	:	Deleted
Note 11	:	Since the OFC, to be used, is armoured; in order to trace the faults, suitable Cable Locator with each FRT is to be provided by the PIA
Note 12	:	A Bidder / Lead Bidder shall quote the amount for last mile connectivity as mentioned in serial no. 12 of price schedule. The total amount shall be equally divided @ 10% per year for entire Contract Period (10 years). For evaluation purpose, the NPV shall be calculated at a discount rate of 10%.
Note 13	:	The items at S. No. 49, 50 and 51 of price schedule are optional and shall not be part of evaluation. Further, APBIL reserves the right to place the purchase order at a negotiated price that can be upto average price of all technical valid bids for the items or the bid of the successful bidder, whichever is lower.

SECTION-VI - BID FORM

To Date:
From
.....
.....
.....

Ref: Your Tender Dated:

Having examined the above-mentioned tender enquiry document including amendment/ clarification/ addenda Nos dated the receipt of which is hereby duly acknowledged, we, the undersigned, offer to supply and deliver in conformity with the said drawings, conditions of contract and specifications for the sum shown in the schedule of prices attached herewith and made part of this Bid.

1. We undertake, if our Bid is accepted, to complete delivery of all the items and perform all the services specified in the contract in accordance with the delivery schedule specified in the General Commercial Conditions, read with modification, if any, in (Section - IV – “Special Conditions of Contract”).
2. If our Bid is accepted, we will provide you with a performance guarantee of a nationalized/Scheduled Bank (except co-operative banks), in accordance with clause-4 of Section-III of this tender document, for the due performance of the contract
3. We agree to abide by this Bid for a period of **180 days** from the date fixed for Bid opening or for subsequently extended period, if any, agreed to by us. This bid shall remain binding upon us up to the aforesaid period and may be accepted at any time before the expiration of that period.
4. Until a formal Purchase Order of Contract is prepared and executed, this Bid together with your written acceptance thereof in your notification of award shall constitute a binding contract between us.
5. Bid submitted by us is properly sealed and prepared so as to prevent any subsequent alteration and replacement.
6. We understand that you are not bound to accept the lowest or any bid, you may receive.
7. This bid is being submitted through a legally bound consortium for using the technical experience and turnover of each consortium member to be used to meet the eligibility conditions for the TENDER

Note: Para-7 may be strike-off, if the bid is being submitted by a sole bidder.

We understand that the Bid document so submitted is the true copy of APBIL tender documents available on APBIL website/ e-tendering portal. Any deviation will result in the rejection of the bid.

Dated this day of 20...

Name and Signature In the capacity of

Duly authorized to sign the bid for and on behalf of bidder

Witness Address.....

Signature

SECTION-VII: PRICE BID FORMAT

Table 1A: PRICE BID FORMAT OF ANDHRA PRADESH BharatNet Infrastructure (CAPEX)

S. No.	Item Description	Unit of Measurement	Estimated Quantity	Unit Price (excl. tax)	Total Cost (excl. tax)
	Passive Infrastructure				
1	Survey and GIS Services before execution of works	Kms	5,237		
2	Supply of PLB HDPE Telecom Duct (40/33mm) along with required accessories	Kms	3,473		
3	Supply of UG 24F Loose tube type OFC	Kms	3,282		
4	Supply of UG 48F Loose tube type OFC	Kms	322		
5	Supply of Aerial 24F ADSS type OFC	Kms	2,157		
6	Supply of Joint Enclosure and pole accessories	Kms	2,157		
7	Supply and installation of RCC Poles swaged of the length 7/8 meters	Nos	9,803		
8	Supply and installation of 48F Fibre Distribution Management System Type1 at Block location	Nos	79		
9	Supply and installation of Fibre Termination Box/FDMS Type-IIIB – 48F at GP locations	Nos	2,172		
10	Supply of Fibre Distribution Management System outdoor at Splicing / Jointing locations	Nos	3,810		
11	Supply of RCC Route Indicators / Joint Indicators (every 200m)	Nos	20,195		
12	Supply & laying of 6F Aerial drop OFC including accessories like FDMS etc. &	Kms	7,884		

S. No.	Item Description	Unit of Measurement	Estimated Quantity	Unit Price (excl. tax)	Total Cost (excl. tax)
	services for extending the last mile OF connectivity to 3942 villages, as described as per TEC GR as described at Serial No. 5 at Table: VII (2)				
13	Supply of Patch Cord 5 mtr length SCAPC	Nos	54,024		
14	Supply of Joint Chamber	Nos	1,737		
15	Supply and installation of 24 U Racks for FDMS at Mandal location	Nos	79		
16	Trenching, Laying and commissioning of UG Cable services as described at Serial No. 3 at Table: VII (2)	Kms	3,277		
17	Installation and commissioning of Aerial Fibre Services as described at Serial No. 4 at Table: VII (2)	Kms	1,961		
	Active Infrastructure – Supply				
18	Supply of IPMPLS Router at GP location	Nos	2,172		
19	Supply of IPMPLS Router at Mandal/block location	Nos	71		
20	Supply of IPMPLS Router at Master Mandal/block location	Nos	8		
21	Supply of smart rack at GP location with UPS solution	Nos	2,172		
22	Supply of smart rack at Mandal/ block location with UPS solution	Nos	71		
23	Supply of smart rack at Master Mandal/ Block location with UPS solution	Nos	8		
24	SFP 1G with 10 km pluggable (Client Port)	Nos	13,032		
25	SFP 1G with 40 km pluggable (Network Port Type 1)	Nos	4,344		

S. No.	Item Description	Unit of Measurement	Estimated Quantity	Unit Price (excl. tax)	Total Cost (excl. tax)
26	SFP 10G with 10 km pluggable (Network Port Type 2)	Nos	4,344		
27	SFP 10G with 40 km pluggable (Network Port Type 3)	Nos	2,172		
28	SFP 100G with 40 km pluggable (Client Port type - 2)	Nos	158		
29	SFP 10G with 40 km pluggable (Network Port Type 3)	Nos	1,106		
30	SFP 10G with 80 km pluggable (Network Port Type 4)	Nos	316		
31	SFP 100G with 10 km pluggable	Nos	100		
32	SFP 100G with 80 km pluggable	Nos	100		
33	1G SR Copper SFP	Nos	4,502		
34	Remote Fiber Monitoring System (RFMS) system including necessary hardware and software with accessories including installation, integration, testing and commissioning	Nos	544		
35	Supply, installation and Commissioning of GPON 4 port OLT (Mini OLT)	Nos	13,426		
36	Network Operation Center: EMS with the necessary software & hardware, NMS interface, GIS interface, fault management to be work as hot stand-by for IPMPLS, RFMS, smart rack (UPS & racks) and integration with OSS	Nos	2		
	Active Infrastructure – Service				
37	Installation, integration, testing and commissioning of Master Mandal/ Block Hub (router, smart rack, RFMS etc) with	Nos	8		

S. No.	Item Description	Unit of Measurement	Estimated Quantity	Unit Price (excl. tax)	Total Cost (excl. tax)
	accessories, including earthing and integration with OFC network				
38	Installation, integration, testing and commissioning of Mandal Hub (router, smart rack, RFMS, etc) with accessories, including earthing and integration with OFC network	Nos	71		
39	Installation, integration, testing and commissioning of GP Hub (router, smart rack, etc) with accessories, including earthing and integration with OFC network	Nos	2,172		
40	Network Operation Center: Installation and commissioning of NOC (DC & DR) EMS with the necessary software & hardware, NMS interface, GIS interface, fault management to be work as hot stand-by for IPMPLS, RFMS, smart rack (UPS & racks) and integration with OSS and integrating with existing state NOC and with BSNL NOC	Nos	2		
41	Integration of GPON with BharatNet OSS for Service Delivery	Nos	1		
Shelter Enclosure at Mandal/ Block locations with power infrastructure – Supply					
42	Shelter enclosure with all accessories for Master Mandal/ block location - (length, height, and width) of 7m x 3m x 3m, and thickness of 60 mm	Nos	8		
43	Shelter enclosure with all accessories for Mandal/ block location - (length, height, and width) of 5m x 3m x 3m, and thickness of 60 mm	Nos	71		

S. No.	Item Description	Unit of Measurement	Estimated Quantity	Unit Price (excl. tax)	Total Cost (excl. tax)
44	Air Conditioner for shelter enclosure (2T *2) at Mandal shelter enclosure locations including existing BharatNet Phase-II network	Nos	612		
45	Voltage stabilizers (30 KVA) for shelter at Master Mandal locations including existing BharatNet Phase-II network including	Nos	18		
46	Voltage stabilizers (15 KVA) for shelter at Mandal locations including existing BharatNet Phase-II network including	Nos	612		
	Shelter Enclosure at Mandal/ Block locations with power infrastructure – Service				
47	Installation & commissioning of shelter enclosure with all accessories for Master Mandal/ Mandal/ block location along with upgradation of existing power infrastructure, air-conditioners, voltage stabilizer	Nos	79		
	Power Infrastructure at GP/Mandal location				
48	Establishment of separate Power Infrastructure at all GP locations (ABP)	Nos	2,172		
49	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be supplied in pair to be installed at both ends of a link)	Nos	1		
50	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end (equipment to be	Nos	1		

S. No.	Item Description	Unit of Measurement	Estimated Quantity	Unit Price (excl. tax)	Total Cost (excl. tax)
	supplied in pair to be installed at both ends of a link				
51	MARR type mast (15 Mtr height) for UBR/DMW	Nos	1		
Total (Z1)					

Table 1B: PRICE BID FORMAT FOR BharatNet Infrastructure (OPEX)

S. No.	Item description	Total Amount in INR (excluding taxes)
1	O&M services cost for 1 st Year	
2	O&M services cost for 2 nd Year	
3	O&M services cost for 3 rd Year	
4	O&M services cost for 4 th Year	
5	O&M services cost for 5 th Year	
6	O&M services cost for 6 th Year	
7	O&M services cost for 7 th Year	
8	O&M services cost for 8 th Year	
9	O&M services cost for 9 th Year	
10	O&M services cost for 10 th Year	
Total O&M Expense for 10 years (Z2) - NPV of cost quoted for each year discounted at 8%		

Table 1C: PRICE BID FORMAT FOR O&M OF APSFL Phase-I Project

The bidder should quote the price in the below table for each year taking a reference to the details of assets to be covered under the O&M as per the Section IV-B, Package – B, Clause 5. Annexure 5.1 & 5.2 respectively.

S. No.	Item description	Total Amount in INR (excluding taxes)
1	O&M services cost for 1 st Year	
2	O&M services cost for 2 nd Year	
3	O&M services cost for 3 rd Year	
4	O&M services cost for 4 th Year	
5	O&M services cost for 5 th Year	
6	O&M services cost for 6 th Year	
7	O&M services cost for 7 th Year	
8	O&M services cost for 8 th Year	
9	O&M services cost for 9 th Year	
10	O&M services cost for 10 th Year	
Total O&M Expense for 10 years (Z3) - NPV of cost quoted for each year discounted at 8%		

Any equipment/ cards/ parts which are to be replaced can be procured with necessary approvals and recommendation by Independent Engineer subject to Competent Authority's approval.

Table 1D: PRICE BID FORMAT FOR O&M OF APSFL Last Mile Enterprise connectivity

S. No.	Item description	Total Amount in INR (excluding taxes)
1	O&M services cost for 1 st Year	
2	O&M services cost for 2 nd Year	
3	O&M services cost for 3 rd Year	
4	O&M services cost for 4 th Year	
5	O&M services cost for 5 th Year	
6	O&M services cost for 6 th Year	
7	O&M services cost for 7 th Year	
8	O&M services cost for 8 th Year	
9	O&M services cost for 9 th Year	
10	O&M services cost for 10 th Year	
Total O&M Expense for 10 years (Z4) - NPV of cost quoted for each year discounted at 8%		

Table 1E: Evaluation**Total Quote for the tender:**

S. No.	Particulars	Table reference	Amount (in INR Cr. excl. of taxes)
1	ABP Project new components (CAPEX) – Z1	Table 1A	
2	ABP OPEX 10 years – Z2	Table 1B	
3	APSFL OPEX 10 years – Z3	Table 1C	
4	APSFL Last Mile connectivity – Z4	Table 1D	
	Total (Z = Z1 + Z2 + Z3 + Z4)		
	Amount in words:		

Detailed description of the line items, referred in the Price schedule

TABLE: VII. (2)

Detailed description of the line items, referred in the Price Schedules

S. No.	SOR S. No.	Item Description
1	1	Physical survey of block to GP route, capturing the Latitude-Longitude of OF cable route, electronics infrastructure and power infrastructure, preparation of GIS survey report before execution of works.
2	2,3,4,5,6, 7,8,9,10,11, 13,14,15	Supply of 24F, 48F armoured optical fibre cable (OFC), Self-supporting Metal Free Aerial Optical Fibre Cable (24F ADSS), Joint Enclosure and pole accessories, duct (40/33 mm) along with accessories and joint chambers, RCC Poles, RCC route/ joint indicators, SJC, BJC, FTB/ FDMS, patch cords, 24U racks or any other accessories required as per TEC-GR including transportation, freight, insurance and warehousing etc.
3	16	<p>d. Excavation of trench for PLB pipe laying, backfilling, reinstatement, and compaction after laying of PLB pipe, laying / blowing of optical Fibre Cable inside laid PLB pipe, splicing and jointing of Optical Fibre Cable including supply of As Built Diagram (ABD) of constructed OFC Route. This shall include fixing of joint chamber, manhole, splice closure, Fixing, painting and sign writing of Route /Joint Indicators, termination at FTB/FDMS and all the relevant accessories etc. The work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions.</p> <p>e. Commissioning, Acceptance Testing and makeover of the routes, commissioning of armoured optical fibre connectivity from the Block PoP to GP room and termination at GP router and end to end testing of dark and lit fibre per GP (for Underground laying) (as per the Engineering Instruction given at Section (IV C), Annexure-C)</p> <p>f. Capturing the Latitude-Longitude of OFC route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OFC routes, videography and photos as defined in scope of work section of this RFP</p>
4	17	d. Sliding / Laying and commissioning of 24F optical fibre connectivity from Block PoP to GP room and termination at GP Router. The cost shall include laying, fittings, splicing, splitting, splice closure, Pole clamping installation, termination at FTB/FDMS & all the relevant accessories etc. and end to end testing of dark and lit fibre per GP (For Aerial laying) of Optical Fibre Cable. Supply of As Built Diagram (ABD) of constructed OFC Route and Acceptance Testing, commissioning and makeover of the routes. The

S. No.	SOR S. No.	Item Description
		<p>work also includes road / bridge crossing, providing protection as per EI wherever required and obtaining Right-of-Way (RoW) permissions. (As per the Engineering Instruction at Section (IV C), Annexure-C)</p> <p>e. Installation by utilizing the existing power infrastructure of State DISCOMs to the maximum possible extent, and on new poles wherever required.</p> <p>f. Capturing the Latitude-Longitude of OF route & joint location after execution of works from Block to GP and capturing coordinates of electronics infrastructure & power infrastructure along with integration of GIS data with As Built Diagram of OF routes, videography and photos as defined in scope of work section of this RFP</p>
5	12	Supply of 6F Aerial Drop OFC and Accessories including all the services as per clause 3.10 Last mile connectivity of Section IV-B

Note:

Note 1	:	RKM is the Route Kilometres. The RKM shall be measured through GIS system. However, RKM shall be measured by Rodo Meter till the implementation of GIS system.
Note 2	:	Normally, the length of Duct used is almost 6% higher than the RKM and OFC Kms is higher by around 10%. The bidders, while quoting the rates must account for the same.
Note 3	:	<p>In Case of any other type of SFP required (SFP 10G with 40 Km pluggable shall be Rs F as per the bidder's quote and SFP 100G with 40 Km pluggable shall be Rs G as per the bidder's quote), the rates shall be paid to the bidder as mentioned below:</p> <ul style="list-style-type: none"> ○ SFP 10G with 80 km pluggable shall be 2 TIMES of F, ○ SFP 10G with 10 km pluggable shall be 0.25 TIMES of F, ○ SFP 1G with 10km pluggable shall be 0.13 TIMES of F, ○ Similarly, SFP 100G with 80 km pluggable shall be 1.2 TIMES of G
Note 4	:	In Case of Block Router (Item#19 of Price Schedule), the bidder has to supply the type A router in place of type B as per requirement for which the rates shall be 1.2 times the price quoted for Block Router type B at Serial No. #19 of the Price Schedule. The quantity of the type A router will be around 10% of the total quantity. Every block will have only one type of router, either type A or Type B.
Note 5	:	In Case of GP Router (Item#18 of Price Schedule), the bidder has to supply the type C router in place of type D as per requirement for which the rates shall be 1.2 times the price quoted for GP Router type D at Serial No.#18 of the Price Schedule. The quantity of the type C router will be around 10% of the total quantity. Every GP will have only one type of router, either type C or Type D.

Note 6	:	APBIL may or may not procure the EMS for active equipment at items at Sl. No. 34 & 36 of the Price Sheets (SOR items at Sr. Nos. 7.5,7.6, 8.4,8.5 9.1,9.2,9.3). However, quoted rates of these items shall be part of bid price for bid evaluation. APBIL shall decide to procure or not to procure EMS from the PIA finalised under the subject tender, based on the decision taken by APBIL and also to facilitate the integration of the EMS with the S-NOC of for enabling the O&M by the PIA. APBIL may procure any number of additional licenses in multiple of 100 licenses.
Note 7	:	Any other item required for completion of the project as per scope of work including but not limited to patch cords, connectors, installation material, adapters, attenuators, software, hardware etc. shall be supplied by the PIA without any additional cost to APBIL.
Note 8	:	Regarding ADSS OFC implementation (as per items# 5,17 of Price Schedules), the PIA may use GI poles also as per BIS standard No. BIS-2713 in place of RCC poles within the order price only. APBIL shall not pay any extra amount for the GI Poles.
Note 9	:	Regarding ADSS OFC implementation (as per item# 5,17 of Price Schedules), if the PIA needs to install some additional poles, such requirement shall be submitted to the Independent Engineer. APBIL shall consider such requirement on the case-to-case basis, based on recommendations of IE and the cost of such additional poles shall be paid (regarding cost of Pole to be used in Last Mile Connectivity).
Note 10	:	Deleted
Note 11	:	Since the OFC, to be used, is armoured; in order to trace the faults, suitable Cable Locator with each FRT is to be provided by the PIA
Note 12	:	A Bidder / Lead Bidder shall quote the amount for last mile connectivity as mentioned in serial no. 12 of price schedule. The total amount shall be equally divided @ 10% per year for entire Contract Period (10 years). For evaluation purpose, the NPV shall be calculated at a discount rate of 10%.
Note 13	:	The items at S. No. 49, 50 and 51 of price schedule are optional and shall not be part of evaluation. Further, APBIL reserves the right to place the purchase order at a negotiated price that can be upto average price of all technical valid bids for the items or the bid of the successful bidder, whichever is lower.

TABLE-1 - Pre-defined rates

The Successful bidder shall also be bound to provide following services for attending the faults of the made over existing network only after receiving the work order for the same by APBIL at the pre-defined rates as mentioned against each item. The quantities shall be as per site requirement. The bidder is supposed to absorb the gain/loss on account of the predefined rates in the quoted price of other line items. These charges shall be applicable only as one time activity.

S. No	Description	Unit	Unit cost in Rs. (Excl. GST)
1	Deleted	Per No.	-
2	Solar Cable (3x 2.5 Sq.mm copper)	Per Site	1,000
3	SPV Mounting Structure	Per Site	2,000
4	Earthing including supply of material, installation and cabling till Enclosure//CCU as per the defined specifications in the scope	Per Site	2,200
5	Power Point Extension at the GP site	Per no	1,200
6	Complete Shifting of Equipment (including dismantling, transportation and supply of installation material not covered at SI No 2,3,4 above)	Per Site	3,950
7	Supply, installation of Joint Closure, testing and splicing 24 F for Dark Fiber Provisioning and/or attending OFC fault for the first time in a joint as per TEC GR/ E.I.	Per No	3,500
8	Deleted	-	-
9	Supply of 24F FTB/FDMS as per TEC GR and termination of all the fibers	Per No	3,000
10	Supply, installation and splicing/ jointing 1:4 Splitter as per TEC GR	Per No	751
11	Deleted	-	-
12	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services without mast on either end	Per Unit	56,362
13	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services with appropriate MARR type mast (15 Mtr height) at one end to facilitate connectivity	Per Unit	1,26,362

S. No	Description	Unit	Unit cost in Rs. (Excl. GST)
14	Unlicensed Band Radio (UBR) 5.X with 27dbi Antenna, mounting fixture including all installation material and services with appropriate MARR type mast (15 Mtr height) at both ends to facilitate connectivity	Per Unit	1,96,362
15	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services without mast on either end	Per Unit	2,57,580
16	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services with appropriate MARR type mast (15 Mtr height) at one end to facilitate connectivity	Per Unit	3,27,580
17	Digital Microwave -15GHz 2+0 XPIC 2KQAM with 0.6m Antenna, mounting fixture including all installation material and services with appropriate MARR type mast (15 Mtr height) at both ends to facilitate connectivity	Per Unit	3,97,580

Note: Brief Specifications, of MARR type mast are as under-

The mast to be used for UBR and Point to Point M/W shall be made of HT Steel angles of E350 grade and MS angles of E250(A) grade confirming to IS:2062/Equivalent ASTM. All steel used shall be hot-dip galvanized conforming to IS:4759. The mast shall be designed for operational wind speed of 140Kmph. Design standard shall be as per IS 800-2007. The mast to be installed with appropriate plinth and 15 Mtr height above ground level to ensure sustained LOS.

TABLE-2: Deleted

SECTION-VIII.A - BID SECURITY/ EMD Guarantee

(To be typed on Rs.100/- non-judicial stamp paper)

Sub: Bid Security/EMD guarantee.

1. Whereas M/s.....R/o.....
..... (Hereafter referred to as Bidder) has approached us for giving Bank Guarantee of Rs/- (hereafter known as the "B.G. Amount") valid up to/...../ 20.... (hereafter known as the "Validity date") in favour of The CEO APBIL, Vijayawada (Hereafter referred to as APBIL) for participation in the tender of work of vide tender no.
Now at the request of the Bidder, We Bank.....Branch having
.....(Address) and Regd. Office address as.....
..... (Hereinafter called 'the Bank') agrees to give this guarantee as herein after contained:
2. We the Bank do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from APBIL stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by APBIL by reason of breach by the said bidder(s) of any of terms or conditions contained in the said Agreement or by reason of the bidder (s) failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee where the decision of APBIL in these counts shall be final and binding on the bank. However, our liability under this guarantee shall be restricted to an amount not exceeding the "B. G. Amount".
3. We undertake to pay to APBIL any money so demanded notwithstanding any dispute or disputes raised by the bidder(s) in any suit or proceeding before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The Payment so made by us under this bond shall be valid discharge of our liability for payment there under and the bidder(s) shall have no claim against us for making such payment.
4. We the Bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of APBIL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till APBIL Certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said bidder(s) and accordingly discharge this guarantee. Unless a demand or claim under this guarantee is made on us in writing or before the expiry of Validity date from the date hereof, we shall be discharged from all liability under this guarantee thereafter.
5. We the Bank further agree with APBIL that APBIL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said bidder(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by APBIL against the said bidder(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Bidder(s) or for any forbearance, act or omission on the part

of APBIL or any indulgence by APBIL to the said bidder(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. Notwithstanding anything herein contained;
 - a) The liability of the Bank under this guarantee is restricted to the "B. G. Amount" and it will remain in force up to its Validity date specified above.
 - b) The guarantee shall stand completely discharged and all rights of APBIL under this Guarantee shall be extinguished if no claim or demand is made on us in writing on or before its validity date.
7. In case APBIL demands for any money under this bank guarantee, the same shall be paid through banker's Cheque in favour of "The CEO APBIL" payable at Vijayawada.
8. The Bank guarantees that the below mentioned officer who have signed it on behalf of the Bank have authority to give this guarantee under its delegated power.

Place:

Date:

(Signature of the Bank Officer)

Rubber stamp of the Bank

Authorized Power of Attorney Number.....

Name of the Bank officer.....

Designation.....

Complete Postal address of Bank

Telephone.....

Fax Number.....

SECTION-VIII.B - BID SECURITY IN FORM OF INSURANCE SURETY BOND

(To be submitted on non-judicial stamp paper of appropriate value)

Insurance Surety Bond for Bid Security

1. Whereas M/s R/o (Hereafter referred to as Principal) has approached us for giving a Surety of Rs./-..... (hereafter known as the "Surety Amount") valid up to/...../ 20..... (hereafter known as the "Validity date") in favour of(e.g. The CEO APBIL, Vijayawada) (Hereafter referred to as APBIL) for participation in the tender of work of.....vide tender no.
2. Now at the request of the Principal, We.....Insurance Company Limited, registered under the Insurance Act,1938, with its Corporate office,and.....Registered/Head Office.....(the "Surety") to transact the business of Surety Insurance under the powers conferred under Section 14 (2) (i) of IRDA Act, 1999 & IRDA Guidelines issued vide IRDAI/NL/GDL/SIC/01/01/2022 3rd January, 2022, agreed to give this Surety Bond by way of performance guarantee as hereinafter contained:
3. We, the Surety, do hereby undertake to pay the amounts due and payable under this Surety without any demur, merely on a demand from the APBIL stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the APBIL by reason of breach by the said Principal of any of terms or conditions contained in the said tender Agreement or by reason of the Principal's failure to honour its bid submitted to perform the said works. Any such demand made on the Surety shall be conclusive as regards the amount due and payable by the Surety under this Surety where the decision of the APBIL in these counts shall be final and binding on the Surety. However, our liability under this Surety shall be restricted to an amount not exceeding the "Surety Amount".
4. We, the Surety, undertake to pay to the APBIL any money so demanded notwithstanding any dispute or disputes raised by the Principal in any suit or proceeding before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The Payment so made by us under this bond shall be valid discharge of our liability for payment there under and the Principal shall have no claim against us for making such payment.
5. We the Surety, further agree that the Surety herein contained shall remain in full force and effect during the period that would be taken for the performance of the said tender agreement and that it shall continue to be enforceable till all the dues of the APBIL under or by virtue of the said tender Agreement have been fully paid and its claims satisfied or discharged or till APBIL Certifies that the terms and conditions of the said tender Agreement have been fully and properly carried out by the said Principal and accordingly discharge this Surety. Unless a demand or claim under this Surety is made on us in writing or before the expiry of Validity date from the date hereof, we shall be discharged from all liability under this Surety thereafter.
6. We the Surety further agree with the APBIL that the APBIL shall have the fullest liberty, without our consent and without affecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said tender Agreement or to extend time of performance by the said Principal from time to time or to postpone for any time or from time to time, any of the powers exercisable by the APBIL against the said Principal and to forbear or enforce any of the terms and conditions relating to the said tender agreement and we shall not be relieved from our liability by

reason of any such variation, or extension being granted to the said Principal or for any forbearance, act or omission on the part of the APBIL or any indulgence by the APBIL to the said Principal or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

7. Notwithstanding anything herein contained:

- a) The liability of the Surety under this Surety bond is restricted to the "Surety Amount" and it will remain in force up to its Validity date specified above.
- b) The Surety shall stand completely discharged and all rights of the APBIL under this Surety shall be extinguished if no claim or demand is made on us in writing on or before its validity date.

8. In case APBIL demands for any money under this Surety Bond, the same shall be paid through Banker's Cheque in favour of "The CEO APBIL, Vijayawada" payable at Vijayawada or by any other mode such as NEFT/RTGS, etc., as indicated by APBIL in its demand letter.

9. The Surety declares that the below mentioned officer who have signed it on behalf of the Surety, have authority to give this Surety under its delegated power.

Place:

Date:

(Signature of the Insurance Company Officer)

Rubber stamp of the Insurance Company

Authorized Power of Attorney Number.....

Name of the Bank officer.....

Designation.....

Official Email id:

Complete Postal address of Insurance Company

Telephone.....

Fax Number.....

Name, Address, Contact number and official Email ID of the Controlling Office of the Surety Issuing Branch or any web portal link, from whom / where the Surety Bond can be got confirmed by APBIL.

.....
.....
.....

SECTION-IX-A.1 - PERFORMANCE SECURITY GUARANTEE BOND

Format for Power of Attorney, available at Annexure-IX of the RFP may be read as "ANNEXURE-IX. A" and the same shall be applicable for the bidders, submitting its bid as a SOLE BIDDER.

Wherever in the RFP, reference is given to Annexure-IX, may be read as Annexure-IX.A.

1. In consideration of the CEO, Andhra Pradesh BharatNet Infrastructure Limited (hereinafter called 'APBIL') having agreed to exempt (hereinafter called 'the said contractor(s)') from the demand under _____ the _____ terms and conditions of an agreement/Advance Purchase Order No....., dated.....made between.....and..... for the supply of(hereinafter called "the said agreement "), of security deposit for the due fulfilment by the said contractor (s) of the terms and conditions contained in the said Agreement, on production of the bank guarantee forwe, (name of the bank).....(hereinafter refer to as "the bank") at the request of (contractor (s)) do hereby undertake to pay to APBIL an amount not exceeding against any loss or damage caused to or suffered or would be caused to or suffered by APBIL by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.
2. We (name of the bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demure, merely on a demand from APBIL by reason of breach by the said contractor(s)' of any of the terms or conditions contained in the said Agreement or by reason of the contractors(s)' failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee where the decision of APBIL in these counts shall be final and binding on the bank. However, our liability under this guarantee shall be restricted to an amount not exceeding.
3. We undertake to pay to APBIL any money so demanded notwithstanding any dispute or disputes raised by the contractor(s)/supplier(s) in any suit or proceeding pending before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be valid discharge of our liability for payment there under and the contractor(s)/supplier(s) shall have no claim against us for making such payment.
4. We (name of the bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of APBIL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till (office/ Department) APBIL certifies that the terms and conditions of the said Agreement have been fully or properly carried out by the said contractor(s) and accordingly discharges this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the expiry of Validity date (as specified in P.O) from the date hereof, we shall be discharged from all liabilities under this guarantee thereafter.
5. We (name of the bank) further agree with APBIL that APBIL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said

contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by APBIL against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act or omission on the part of APBIL or any indulgence by APBIL to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s)/ supplier(s).
7. We (name of the bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of APBIL in writing.

Place:

Date:

(Signature of the Bank officer)

Rubber stamp of the Bank

Authorized Power of Attorney Number.....

Name of the Bank officer.....

Designation.....

Complete Postal address of Bank.....

Telephone.....

Fax Number.....

Power of Attorney for Lead Member of Consortium[§]

(To be executed on Stamp paper of appropriate value)

Whereas On behalf of Digital Bharat Nidhi (DBN), Department of Telecommunication, Government of India, The CEO APBIL, Vijayawada invites online sealed tenders, on rupee payment basis, in two bid (Technical & Financial) system, for Development (Creation, Upgradation and Operations & Maintenance) of Middle mile network of BharatNet on Design Build Operate and Maintain (DBOM) Model and Operations & Maintenance of the APSFL Phase – I Network.

Whereas, and (collectively the “Consortium”) being members of the consortium are interested in bidding for the project in accordance with the terms and conditions of the request for proposal (RFP) and other connected documents in respect of the project, and

Whereas, it is necessary for the members of the consortium to designate one of them as the lead member with all necessary power and authority to do for and on behalf of the consortium, all acts, deeds and things as may be necessary in connection with the consortium’s bid for the project and its execution.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS

I, having our registered office at, (hereinafter collectively referred to as the “Principal”) do hereby irrevocably designate, nominate, constitute, appoint and authorise M/S having its registered office at, being one of the Members of the Consortium, as the Lead Member and true and lawful attorney of the Consortium (hereinafter referred to as the “Attorney”). I hereby irrevocably authorise the Attorney (with power to sub-delegate) to conduct all business for and on behalf of the Consortium during the bidding process and, in the event the Consortium is awarded the contract, during the execution of the Project and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the qualification of the Consortium and submission of its bid for the Project, including but not limited to signing and submission of all applications, bids and other documents and writings, accept the Letter of Award, participate in bidders’ and other conferences, respond to queries, submit information/ documents, sign and execute contracts and undertakings consequent to acceptance of the bid of the Consortium and generally to represent the Consortium in all its dealings with the Authority, and/ or any other Government Agency or any person, in all matters in connection with or relating to or arising out of the Consortium’s bid for the Project and/ or upon award thereof till the Master Service Agreement is entered into with the Authority.

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said attorney pursuant to and in exercise of the powers conferred by this power of attorney and that all acts, deeds and things done by our said attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/ consortium.

§ To be submitted in original by the Bidders within 7 days of Bid Date

IN WITNESS WHEREOF WE THE PRINCIPAL ABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF 2....

For:			
Signature			
Name & Title			
For:			
Signature			
Name & Title			
For:			
Signature			
Name & Title			
Witnesses:			
1.			
2.			
(Executants)			
(To be executed by all the Members of the Consortium)			

Notes:

1. The mode of execution of the power of attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
2. Also, wherever required, the bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this power of attorney for the delegation of power hereunder on behalf of the bidder.
3. For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian embassy and notarised in the jurisdiction where the power of attorney is being issued. However, the power of attorney provided by bidders from countries that have signed the Hague legislation convention 1961 are not required to be legalised by the Indian embassy if it carries a conforming apostille certificate.

SECTION-IX-A.2 - Performance Guarantee Surety Bond

(To be submitted on non-judicial stamp paper of appropriate value)

To

The CEO

APBIL

Infosight Building, 2nd floor,
NH-16 Service Road,
Tadepalle, Guntur, AP-522501

Surety Bond No
Surety Bond Issue dt
Surety Bond Amt
Bond Valid up to
Bond Claim Period

Dear Sir / Madam,

- Whereas (e.g. The CEO, APBIL, Vijayawada, R/o Address, Vijayawada -XXXXXX) (hereafter referred to as APBIL) has issued an APO/AWO no.Dated.....awarding the work of ...(the "Agreement") to M/s.....,R/o..... (hereafter referred to as "Principal") and APBIL has asked Principal to submit a performance guarantee in favour of..... (e.g. The CEO APBIL Vijayawada) of INR (hereafter referred to as "Bond Amount") valid up to dd.mm.yyyy (hereafter referred to as "Validity Date") Now at the request of the Principal, WeInsurance Company Limited, registered under the Insurance Act,1938, with its Corporate office, and Registered/Head Office (the "Surety")to transact the business of Surety Insurance under the powers conferred under Section 14 (2) (i) of IRDA Act, 1999 & IRDA Guidelines issued vide IRDAI/NL/GDL/SIC/01/01/2022 3rd January, 2022, agreed to give this Surety Bond by way of performance guarantee as hereinafter contained:
- The Surety do hereby undertake and assure to the APBIL that, if in opinion of APBIL the Principal in any way fails to observe or perform the terms and conditions of the Agreement or commits any breach of its obligations there-under, the Surety shall on demand and without any objection or demur pay to the APBIL such sum or sums up to an aggregate sum of the Bond Amount or such lesser amount as APBIL may demand without requiring APBIL to have recourse to any legal remedy that may be available to it to compel the Surety to pay the same.
- Any such demand from the APBIL shall be conclusive as regards the liability of Principal to pay to APBIL or as regards the amount payable by the Surety under this Surety Bond. The Surety shall not be entitled to withhold payment on the ground that the Principal had disputed its liability to pay or has disputed the quantum of the amount or that any arbitration proceeding or legal proceeding is pending between Principal and APBIL regarding the claim.
- The liability of the Surety under this Surety Bond is restricted to the Bond Amount and this Surety Bond shall come into force from the date of its issue and shall remain in full force and effect up to its Validity date.
- The Surety further agrees that the APBIL shall have the fullest liberty without the consent of the Surety and without affecting in any way the liability of the Surety under this Surety Bond to vary any of the terms and conditions of the Agreement or to extend the time for the performance contained in the Agreement from any of the powers exercisable by APBIL against the Principal and to forbear from enforcing any of the terms and conditions relating to the Agreement and the

Surety shall not be relieved from its liability by reason of such failure or extension being granted to Principal or through any forbearance, act or omission on the part of APBIL or any indulgence by APBIL to Principal or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of relieving or discharging the Surety.

6. In case APBIL demands for any money under this Surety Bond, the same shall be paid through banker's Cheque in favour of "The CEO APBIL Vijayawada" payable at Vijayawada or by any other mode such as NEFT/RTGS, etc., as indicated by APBIL in its demand letter.
7. The Surety guarantees that the below mentioned officers who have signed it on behalf of the Surety have authority to give this Surety Bond under its delegated power.

Notwithstanding anything contained herein above:

1. Our Liability under this Surety Bond shall not exceed INR (Rupees:Only).
2. This Surety Bond shall be valid up to.....(Validity date)
3. Further a claim period of 3(three)months from the Validity date of the Surety Bond is available to make a demand under this Surety Bond. We are liable to pay the Bond Amount or any part thereof under this Surety Bond only and only if you serve upon us a written claim or demand on or before (Date of claim period if any).
4. At the end of expiry of the Validity Date (including claim period), unless an action to enforce the claim under this Surety Bond is initiated before the Court or Tribunal on or before 12 months after the expiry of the Validity Date (including claim period), all your rights under this Surety Bond shall stand extinguished and we shall be relieved and discharged from all our liabilities and obligations under this Surety Bond irrespective of return of original Surety Bond

Place

Date.....

(Signature of the Surety)

Rubber stamp of the Surety

Authorized Power of Attorney Number.....

Name of the Surety officer.....

Designation.....

Complete Postal address of Surety.....

Telephone.....

Fax Number.....

Email ID (only official Email ID)

Name, Address, Contact number and official Email ID of the Controlling Office of the Surety Issuing Branch or any web portal link, from whom/ where the Surety Bond can be got confirmed by APBIL.

.....
.....
.....

SECTION-IX-B - MOBILIZATION ADVANCE SECURITY GUARANTEE BOND

FORMAT OF "MOBILIZATION ADVANCE BANK GUARANTEE"

Sub: Advance Bank Guarantee no.for value..... [Insert ABG value here] in respect.....of.....PurchaseOrder No..... ("PO").....Datedfor value [Insert total PO value]

In consideration of APBIL, (hereinafter called "APBIL") agreeing to make advance payment of [Insert ABG value in figures and words] ("Advance Payment") to [Insert the name of the Contractor with address, contact person's telephone/mobile number and email address], having its registered office at {Insert the full address } "hereinafter called 'the said contractor'" which has been unequivocally accepted by the contractor and the contractor having agreed to provide an irrevocable Advance Bank Guarantee ["Advance Bank Guarantee"] in accordance with the terms and conditions of the said PO, we, {Insert the Issuing Bank name and address}{"the Bank"} hereby unconditionally agree and undertake to hold at your disposal, [Insert ABG value] and agree with you as follows:

1. Under the terms of the said PO, APBIL has agreed to pay to the contractor an advance payment of [insert the ABG value in figures and words].....being% of the basic value/total value of the said PO, against furnishing of an Irrevocable Advance Bank Guarantee of equivalent amount by the selected bidder/Supplier.
2. The Bank at the request of the contractor has agreed to give this unconditional and irrevocable Advance Bank Guarantee and agree and undertake not to revoke the same.
3. The Bank, hereby guarantee that the Supplier will duly comply and faithfully perform all their obligations and responsibilities under the said PO, failing which we, the Guarantor, do hereby unconditionally undertake to pay to the Purchaser ON MERE DEMAND AND WITHOUT ANY DEMUR AND WITHOUT RECOURSE TO THE SUPPLIER such amount or amounts as the Guarantor may be called upon to pay not exceeding in the aggregate a sum of [insert ABG value in figures and words].....
4. The Advance Bank Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Supplier but shall in all respects and for all purposes be binding and operative until payment of all monies due to APBIL under the Advance Bank Guarantee are paid.
5. The decision of APBIL that any sum has become payable shall be final and binding on the Bank.
6. The Advance Bank Guarantee shall be governed by the laws of India.
7. We (Bank Name), shall on simple demand from the Purchaser pay immediately to the Purchaser, the said amount of (Insert ABG value in figures and words) without any demur and without requiring the Purchaser to invoke any legal remedy that may be available to them, to compel the Guarantor to pay the Advance Payment amount, even if the Supplier considers such demand of the Purchaser is unjustified.
8. Any notice by way of request, demand or otherwise hereunder may be sent by courier, fax or by post to the Bank on or before the expiry date of the Advance Bank Guarantee. APBIL may lodge request/demand in writing at our branch[Insert specific branch name and full address with

telephone/fax numbers] at on or before the expiry of the Advance Bank Guarantee as stated under clause no.9.

9. We (Bank Name) undertake to pay to APBIL any money so demanded notwithstanding any dispute or disputes raised by the contractor(s)/supplier(s) in any suit or proceeding pending before any court or tribunal relating thereto our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be valid discharge of our liability for payment there under and the contractor(s)/supplier(s) shall have no claim against us for making such payment.
10. Our liability under the Advance Bank Guarantee is restricted to a sum of [Insert ABG value in figures and words)and the Advance Bank Guarantee shall remain in force until(date) or such extended period as may be required by APBIL & Contractor and unless a claim under the Advance Bank Guarantee is lodged with us within three months from the date of expiry of the Advance Bank Guarantee at our branch i.e. on or before ...(date) or such extended period as the case may be, all your rights under the Advance Bank Guarantee shall be forfeited and we shall be relieved and discharged from all liabilities under the Advance Bank Guarantee.
11. We (name of the bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of APBIL under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till (office/ Department)
12. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s)/ supplier(s).
13. We (name of the bank) lastly undertake not to revoke this guarantee during its currency except with the previous consent of APBIL inwriting.

Place

Date(Signature of the Bank Officer)

Rubberstamp of the bank: Authorized Power of Attorney Number: Name of the Bank officer:
Designation:

Complete Postal address of Bank:

SECTION-X - LETTER OF AUTHORISATION FOR ATTENDING BID OPENING

(To be typed preferably on letterhead of the company)

Place:

Date:

To,

The CEO,

APBIL

Infosight Building, 2nd floor, NH-16 Service Road,

Tadepalle, Guntur, AP-522501

Subject: Authorization for attending bid opening on.....(date) in the Tender of
.....

I/ We Mr. /Ms..... have submitted our bid for the tender
no..... in respect of (Item of work) which is due to open on (date).

Following persons are hereby authorized to attend the bid opening for the tender mentioned above
on behalf of(Bidder) in order of preference given below.

Order of Preference

Name

Specimen Signature

I.

II.

Alternate Representative

Signatures of bidder/ Officer authorized to sign the bid Documents on behalf of the bidder.

Note:

1. Maximum of two representatives will be permitted to attend bid opening. In cases where it is restricted to one, first preference will be allowed. Alternate representative will be permitted when regular representatives are not able to attend.
2. Permission for entry to the hall where bids are opened, may be refused in case authorization as prescribed above is not received.

Section XI - AUTHORIZATION CERTIFICATE FROM OEM

The Bidder should submit valid letter (MAF) with undertaking from their OEM(s) whose product is being quoted by the bidder, as per format given below:

Manufacturer Authorization Form

To,

The Chief Executive Officer,

Andhra Pradesh BharatNet Infrastructure Limited,
Infosight Building, 2nd floor, NH-16 Service Road,
Tadepalle, Guntur, AP-522501

Subject: Manufacturer Authorizations Letter for Tender Enquiry No.

Sir,

We, <OEM Name> having our registered office at <OEM address>, hereinafter referred to as OEM are an established manufacturer of the following items quoted by <Bidder Name> having their registered office at <Bidder address>, hereinafter referred to as Bidder:

<name of items>.....

We <OEM Name> authorize <Bidder's name> to quote our above-mentioned item(s) for above mentioned tender.

We confirm that we have understood the delivery & installation timelines defined in the tender. We confirm that we have worked out all necessary logistics and pricing agreement with <bidder>, and there won't be any delay in delivery, installation and support from our side. Our full support as per pre-purchased support contract is extended/ applicable in all respects for supply, warranty and maintenance of our products. We also ensure to provide the required spares and service support as pre-purchased for the supplied equipment for a period of 10 years (includes 1 year of implementation) from date of supply of the equipment as per tender terms. In case, the PMA (APBIL on behalf DBN/ DoT) requires extending the period of contract with PIA beyond 10 years, we, as OEM, also undertake to provide support for this extended period also, in case, the supplied product is supported anywhere globally.

In case of any difficulties in logging complaint at bidder end, user shall have option to log complaint at our call support centre.

In case PIA is unable to fulfil the obligations given under this tender, OEM shall be responsible to complete its obligations towards project with any other PIA appointed by the purchaser.

In case it is required to change authorized agent of OEM, the OEM shall ensure that the alternate Authorized Agent in this case shall abide by all the terms & conditions laid down under the tender/ Contract with the bidder for the quoted OEM products.

In case of PIA exits from the Project for any reason, including but not limited to default, insolvency, termination of its Agreement with the purchaser, or other circumstances resulting in the inability of PIA to fulfill its obligations under the Agreement, OEM shall be obligated to continue providing the services to purchaser in accordance with the terms and conditions outlined in the agreement, between OEM and the bidder including commercials.

We also agree that in case of any default by us in meeting out the obligations as mentioned above, purchaser may debar us for a period upto 3 years.

If any product is declared end of sale, we shall proactively ensure that a suitable equivalent or higher roll over product is offered through the PIA to APBIL for due approval, contract and order executions thereafter.

We understand that any false information/ commitment provided here may result in <OEM's Name> getting blacklisted/debarred from doing business with APBIL.

We <OEM Name>, hereby provide this undertaking with regard to the Agreement executed between <Name of bidder> and <OEM Name> during the submission of the Bid for <Project Name>

Thanking You

For <OEM/ Manufacturer name>

< (Authorized Signatory of OEM)>

Name:

Designation:

Contact Details:

Seal of the Company:

NOTE:

1. The letter should be submitted on the letter head of the manufacturer / OEM and should be counter-signed by the authorized signatory of the bidder.
2. Any deviation would lead to summarily rejection of bid.

Section XII FORMAT OF UNDERTAKING for Non-Blacklisting of the Bidder

(to be provided on Non – judicial stamp paper of INR 100/- or such equivalent amount and duly attested by notary public)

Place:

Date:

To,

The Chief Executive Officer,

Andhra Pradesh BharatNet Infrastructure Limited (APBIL)

Infosight Building, 2nd floor, NH-16 Service Road, Tadepalle, Guntur, AP-522501

Email address: abp-apbil@ap.gov.in

Ref: Tender No. APBIL/XXXXXX/XXXXX/X/2026 issued on xx.xx.2026.

Subject: Declaration Letter for Non-Blacklisting of the Bidder.

Sir/Madam,

We, the undersigned, hereby declare that we are not blacklisted/ debarred with State Governments or Ministry of Communication or APBIL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as per provision of OM No.F.1/20/2018-PPD by Department of Expenditure (DoE), MoF dated on 2nd Nov 2021, as on Bid submission date.

For and on behalf of Signature:

(Authorized Signatory)

Name of the person:

Designation:

Name of the Respondent:

Address of the Respondent:

Company seal:

Section XIII - Special Instructions to bidders for e-Tendering

(1) Invitation to Bid

Andhra Pradesh BharatNet Infrastructure Limited (APBIL), a fully owned entity of the Govt. of Andhra Pradesh (AP), having office at Infosight Building, 2nd floor, NH-16 Service Road, Tadepalle, Guntur, AP-522501, Andhra Pradesh, India, invites responses ("Proposals"/ "Bids") to this Request for Proposal ("RFP") for the Selection of Project Implementation Agency (PIA) for Development (Creation, Upgradation and Operations & Maintenance) of Middle mile network of BharatNet on Design Build Operate and Maintain (DBOM) Model and Operations & Maintenance of the APSFL Phase – I Network in Andhra Pradesh.

The selected agency has to support APBIL in smooth execution of the project across the state of AP. The agency shall be responsible for

- a) Upgradation of BharatNet Phase-I network in Vishakhapatnam and Chittoor districts along with integration to Phase-II Network.
- b) To build network infrastructure across newly created Gram Panchayat (GP) in Andhra Pradesh.
- c) Operation and maintenance for APSFL Phase-I, BharatNet Phase-I (existing and to be) & Phase-II network including Network Operations Center (NOC) operations.
- d) Extending connectivity to villages in Andhra Pradesh on-demand basis.

Interested bidders are advised to study this RFP carefully before submitting the proposals in response to the RFP. Submission of a proposal in response to this RFP shall be deemed to have been done after careful study and examination of this document with full understanding of its terms, conditions, and implications.

Interested bidders may download the RFP from www.apecurement.gov.in. Any subsequent corrigenda/clarifications shall also be made available on the same portal. Bid proposals must be received not later than time and date mentioned in the key events and dates. Bid proposals received, in part or full, after the deadline WILL NOT be considered in this procurement process.

(2) Procedure for Bid Submission

The Bidder shall submit their response through bid submission process on e-Procurement platform at www.apecurement.gov.in.

The bidders shall submit their Pre-Qualification Bid and Commercial bid online in e-Procurement portal. The bidders shall upload the scanned copies of all the relevant certificates, documents etc., in support of their Pre-Qualification, and other certificates/documents with clear readability, in the e-Procurement website. The bidder should sign on all the statements, documents, certificates uploaded in the e-Procurement website, owning responsibility for their correctness/authenticity.

(3) Registration with e-Procurement platform

For registration and online bid submission bidders may contact HELP DESK on www.apecurement.gov.in or <https://tender.apecurement.gov.in>.

(4) Digital Certificate Authentication

The bidder shall authenticate the bid with the agency's Digital Certificate for submitting the bid electronically on e-Procurement platform and the bids that are not authenticated by digital certificate of the bidder, will not be accepted on the e-Procurement platform.

For obtaining Digital Signature Certificate, you may please contact: Andhra Pradesh Technology Services Limited, Vijayawada www.aps.gov.in/

(OR)

You may please contact any Registration Authorities of Certifying Authorities in India. The list of CAs is available in the link provided below.

<https://tender.apeprocurement.gov.in/DigitalCertificate/signature.html>

(5) Deactivation of Bidders

Vide Ref GO Ms. No.174 – I&CAD dated 1-9-2008, if any successful bidder fails to submit the original BG towards Performance Security within stipulated time or if any variation is noticed in the uploaded documents, the successful bidder will be suspended from participating in the RFPs on e-Procurement platform for a period of 3 years. The e-Procurement system would deactivate the user ID of such defaulting bidder based on the trigger/recommendation by the RFP Inviting Authority in the system. Besides this, APBIL shall invoke all processes of law including criminal prosecution of such defaulting bidder as an act of extreme deterrence to avoid delays in the RFP process for execution of the development schemes taken up by the government. Other conditions as per RFP document are applicable.

(6) Payment of Transaction Fee

It is mandatory for all the participant bidders from 1st January 2006 to electronically pay a prescribed non-refundable Transaction fee to M/s. APTS, the service provider through "Payment Gateway Service on E-Procurement platform". The Electronic Payment Gateway accepts all Master and Visa Credit Cards issued by any bank and Direct Debit facility/Net banking to facilitate the transaction. This is complying as per G.O.Ms. 13 dated 07.05.2006.

(7) Corpus Fund

As per GO MS No.4, user departments shall collect 0.04% of ECV (Estimated Commercial Value) with a cap of Rs.10,000/- (Rupees ten thousand only) for all works with ECV up to Rs.50 Crores, and Rs.25,000/- (Rupees twenty five thousand only) for works with ECV above Rs.50 Crores, from successful bidders on e-Procurement platform before entering into agreement/issue of purchase orders, towards e-procurement fund in favour of Managing Director, APTS. There shall not be any charge towards e-Procurement fund in case of works, goods and services with ECV less than and up to Rs.10 lakhs.

(8) RFP Document

The bidder is requested to download the RFP document and read all the terms and conditions mentioned in the RFP Document and seek clarification, if any from the RFP inviting authority. Any offline bid submission clause in the RFP document could be neglected.

The bidder has to keep track of any changes by viewing the Addendum/ Corrigenda issued by the RFP inviting authority from time-to-time in the e-Procurement platform. The Department calling for RFPs shall not be responsible for any claims/issues arising out of this.

(9) Bid Submission Acknowledgement

The bidder shall complete all the processes and steps required for Bid submission. The system will generate an acknowledgement with a unique bid submission number after completing all the prescribed steps and processes by the bidder. Users may also note that the bids for which an acknowledgement is not generated by the e-procurement system are treated as invalid or not saved in the system. Such invalid bids are not made available to the RFP Inviting Authority for processing the bids. The Government of AP is not responsible for incomplete bid submission by users.

- i. The bidders may contact the Helpdesk support of e-procurement portal (at www.apecurement.gov.in) for any further information / clarifications on e-procurement, and for all technical support required for bid submission.
- ii. The bidders need to register on the electronic procurement marketplace of Government of Andhra Pradesh i.e. <http://www.apecurement.gov.in>. On registration in the e-procurement marketplace they will be provided with a user ID and password using which they can submit bids online.
- iii. While registering on the e-procurement marketplace, the bidders need to scan and upload the required documents as per the RFP requirements on to their profile. The e-procurement marketplace provides an online self-service registration facility to all such bidders who are already registered with respective participating departments for supply of specified goods and services.
- iv. In addition to the direct payment through any of the e-payment options in the e-procurement portal, the bidder may opt for Demand Draft (DD) towards the bid processing fee and EMD in the form of Bank Guarantee (BG). The bidder shall invariably upload the scanned copies of DD/BG in e-Procurement system, and this will be the primary requirement to consider the bid as responsive. The Authority shall carry out the Technical bid evaluation solely based on the uploaded certificates/documents, DD towards EMD in the e-procurement system and open the price bids of the eligible and responsive bidders.

(10) Hard Copies

- a. In addition to the direct payment through any of the e-payment options in the e-procurement portal, the bidder may opt for Demand Draft (DD) towards the bid processing fee and EMD in the form of Bank Guarantee (BG). The bidder shall submit hard copy of the
 - i. Demand Draft (DD) towards the bid processing fee
 - ii. Bank Guarantee (BG) towards EMD
- b. APBIL shall carry out the technical evaluation solely based on the uploaded certificates/documents, DD towards bid processing fee and BG towards EMD in the e-Procurement system and open the price bids of the responsive and pre-qualification qualified bidders only.

On receipt of documents, APBIL shall ensure genuineness of the BG towards EMD, and all other certificates/documents uploaded by the bidder in e-Procurement system in support of the qualification criteria before concluding the agreement.

Section XIV - INTEGRITY PACT

(To be typed on letterhead of the company)

FORMAT OF INTEGRITY PACT

(To be submitted on Plain Paper)

INTEGRITY PACT

Between

Andhra Pradesh BharatNet Infrastructure Limited (APBIL) / hereinafter
referred to as "The Principal"

and

..... hereinafter referred to as "The
Bidder/Contractor"

Preamble

The Principal intends to award, under laid down organizational procedures, contract/s for The Principal values full compliance with all relevant laws, rules and regulations, and economic use of resources, and of fairness and transparency in its relations with its Bidder(s) and/ or Contractor(s).

In order to achieve these goals, the Principal will appoint an Independent External Monitors (IEMs) who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

- (1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles: -
 - (a) No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which he/she is not legally entitled to.
 - (b) The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - (c) The Principal will exclude from the process all known prejudiced persons.

- (2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/Contractor(s)

- (1) The Bidder(s)/Contractor(s) commit themselves to take all measures necessary to prevent corruption. The Bidder(s)/Contractor(s) commit themselves to observe the following principles during his participation in the tender process and during the contract execution.
- (a) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or immaterial benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
 - (b) The Bidder(s)/Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non- submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
 - (c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant Anti- corruption Laws of India; further the Bidder(s)/Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically and commit any offence under Indian Penal code (IPC)/Prevention of Corruption (PC) Act.
 - (d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the Agents/representatives in India, if any. Similarly, the Bidders/Contractors(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any.
 - (e) The Bidder(s)/Contractor(s) will, when presenting their bid, disclose any and all payments made, is committed to or intends to make to agents, brokers or any other in connection with the award of the contract.
 - (f) Bidder(s)/Contractor(s) who have signed the Integrity Pact shall not approach the Courts while representing the matter to Independent External Monitors (IEMs) and shall wait for their decision in the matter.
 - (g) To disclose and transgression with any other company that may impinge on the anti-corruption principle.
- (2) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/Contractor(s), before contract award or during execution has committed a transgression through a violation of Section 2, above or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/Contractor(s) from the

tender process or take action as per the defined procedure in APBIL Procurement Manual, which is in force on the date of Publication of tender.

Section 4 – Compensation for Damages

- (a) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit / Bid Security.
- (b) If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor the amount equivalent to liquidated damages (LD) of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee (PBG) in addition to any other penalties/ recoveries as per terms and conditions of the tender.

Section 5 – Previous transgression

- (a) The Bidder declares that no previous transgression occurred in the last 3 years with any other Company in any country conforming to the Anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- (b) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the defined procedure.

Section 6 – Equal treatment of all Bidders/Contractors/Subcontractors

- (i) The principal will enter into agreements with identical conditions as this one with all Bidders/Contractors.
- (ii) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors, a commitment in conformity with this Integrity Pact.
- (iii) The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 – Criminal charges against violating Bidder(s)/Contractor(s)/Subcontractor(s)

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to Chief Vigilance Officer.

Section 8 – External Independent Monitor/Monitors

1. Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
2. The monitor is not subject to instructions by the representatives of the parties and performs his/her functions neutrally and independently. The Monitor would have access in all contract documents, whenever required. It will be obligatory for him/her to treat the information and documents of the Bidders/Contractors as confidential. He/she reports to the CEO, APBIL.

3. The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/Contractor(s)/Subcontractor(s) with confidentiality.

Notwithstanding anything contained in this Section, the Bidder(s)/Contractor(s) shall have no obligation whatsoever to provide any internal costing mechanisms or any internal financial or commercial data pursuant to any audit or review conducted by or on behalf of the Principal. Further, the Bidder(s)/Contractor(s) shall not be required to provide any data relating to its other customers, or any personnel or employee related data.

4. The Monitor is under contractual obligation to treat the information and documents of the Bidders/Contractor(s) /Sub-contractor(s) with confidentiality. The Monitor has also signed declarations on “Non-Disclosures of Confidential Information” and of “Absence of Conflict of Interest”. In case of any conflict of interest arising at a later date, the Independent External Monitor (IEM) shall inform CEO, APBIL and recuse himself/herself from that case.
5. The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
6. As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
7. The Monitor will submit a written report to the Chairperson of the Board of the Principal within 4 to 6 weeks from the date of reference or intimation to him by the ‘Principal’ and, should the occasion arise, submit proposals for correcting problematic situations.
8. If the Monitor has reported to CEO, APBIL, a substantiated suspicion of an offence under relevant Anti-Corruption Laws of India, and APBIL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Corporate Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
9. The word ‘Monitor’ would include both singular and plural.

Section 9 – Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by CEO, APBIL.

Section 10 – Other provisions

- (1) This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. Vijayawada. The arbitration clause provided in the tender document / contract shall not be applicable for any issue /dispute arising under Integrity Pact.
- (2) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- (3) If the Contractor is a partnership, this agreement must be, signed by all partners.
- (4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- (5) Issues like Warranty/Guarantee etc. shall be outside the purview of IEMs. For the Principal For the Bidder/Contractor

Place.....

Witness 1 :

Date

Witness 2 :

Annexure-I - Bidder's / Supplier Profile

Bidder's / Supplier Profile

Bidder/ Supplier Particulars for <NIT NUMBER> dated <DD/MM/YYYY>

S. No.	Area of the details to be provided		Responding Firm's/Company details to be provided
1.	Name of the Bidder/ Supplier		
2.	Address of the Bidder/ Supplier		
3.	Telephone number of the Firm/company		
4.	Bidder/ Supplier's RFP number and date		
5.	Name of the contact person to whom all references shall be made regarding this RFP		
6.	Designation of the person to whom all references shall be made regarding this RFP		
7.	Address of the person to whom all references shall be made regarding this RFP		
8.	E-mail address of the Firm/company		
9.	Fax number of the Firm/company		
10.	Website address of the Firm/company		
11.	Details of Registration	<ol style="list-style-type: none"> 1. Registration Number of the Firm/company 2. Name of the place where the firm/company was registered 3. Date when the company was registered 4. Product /Service for which registered 5. Validity Period, if applicable 	
12.	Goods and Service Tax Registration No. (GST No.)		
13.	PAN No.		
14.	Average Annual Turnover for the last three (3) audited financial Years (2021-22, 2022-23 & 2023-24 or 2022-23, 2023-24 & 2024-25)		
15.	Details of ownership of the firm (Name and Address of the Board of Directors, Partners etc.)		
16.	Name of the authorized signatory who is authorized to quote in the RFP and enter into the Contract (Power of Attorney to be submitted)		
17.	Name of the Bankers along with the branch (as appearing in MICR cheque) & Account number		
18.	Status of Firm/company like Pvt. Ltd. etc.		

S. No.	Area of the details to be provided		Responding Firm's/Company details to be provided
19	Locations and addresses of the offices.	<ol style="list-style-type: none"> 1. The corporate address 2. The official address of the service delivery centre 	
20	Name and contact details of the Project Manager	<ol style="list-style-type: none"> 1. Name of the Project Manager assigned for 2. Contact details viz; telephone number, official address of the Project Manager assigned. 	

Witness:

Signature

Name

Address

Date:

Bidder/ Supplier:

Signature

Name

Designation

Company Seal

Date

Annexure-II - Declaration Proforma-2

UNDERTAKING & DECLARATION

For understanding the terms & condition of Tender & Specifications of work

a) Certified that:

1. I/ We have read, understood, and agreed with all the terms and conditions, specifications included in the tender documents & offer to execute the work at the rates quoted by us in the tender form.
2. if I/ We fail to enter into the agreement & commence the work in time, the EMD/ SD deposited by us will stand forfeited to APBIL.
3. no addition/ deletion/ corrections have been made in the terms & conditions of downloaded tender enquiry document and bid is being submitted against tender enquiry document which is identical to the tender document appearing on E-tender Portal (<https://www.apecurement.gov.in>).

b) The tenderer hereby covenants and declares that:

1. All the information, documents, photocopies of the documents/ certificates enclosed along with the tender offer are correct.
2. If anything is found false and/or incorrect and/or reveals any suppression of fact at any time, APBIL reserves the right to debar our tender offer/ cancel the LOA/ Purchase/ work order if issued and forfeit the EMD/ SD/ Bill amount pending with APBIL. In addition, APBIL may debar the contractor from participation in its future tenders.

c) In addition to above, it is certified that I/ We have also understood the following from perspective of network design:

1. That the existing made over GPs working on satellite (as mentioned in SoR item sr. no. 2.2) are covered under new GP creation (as mentioned in SoR item sr. no. 1.2a).
2. That the existing BSNL fibre taken on lease under BharatNet Phase- I from Block to FPOs shall no more be part of BharatNet network once the network is upgraded to ring architecture in that Block.
3. That the planning of OFC in ring architecture shall be based on optimal feasible path.
4. That, there will be an option to utilize the existing optical fibre cable of any TSP/ISP/IP-1 license holders for the construction of the uncovered GPs (as mentioned in SoR item sr. no.1.2a) as per Section IV-B (Package - A), clause no. 3.6.
5. That the conditions of field trial for the Class I/ Class II local suppliers of routers shall be applicable as per section IVA, clause no. 2.11.
6. That the S-NOC shall be upgraded at the existing DC and DR established under BharatNet Phase – II as per section IV B, clause no. 3.8.

Date:

Signature of Authorized signatory

Place:

Name of bidder Along with date & Seal

Annexure-III - Check list of documents to be submitted by the bidder in excel format

S. No	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comments
Offline Bid Documents					
1	Section I	3	Demand Draft/ Bankers cheque in favour of the CEO, APBIL , drawn on any nationalized / scheduled bank and payable at Vijayawada, submitted towards tender fee/ cost of the tender documents.		
2	Section II	10	A proof regarding registration of MSE (Micro & Small Enterprises) with Appropriate Authority, if claiming exemption in tender fee or Bid Security		
3	Section II	12	Original copy of the Bid Security (as per Section-VIII A or B)		
Techno Commercial Bid Documents					
1	Section I	3	Scanned copy of "Demand Draft/ Bankers cheque in favour of The CEO, APBIL , drawn on any nationalized/ scheduled bank and payable at Vijayawada, towards tender fee/cost of the tender documents"		
2	Section II	10	Scanned copy of proof regarding registration of MSE (Micro & Small Enterprises) with Appropriate Authority, if claiming exemption in tender fee or Bid Security		
3	Section II	12	Scanned copy of the Bid Security (as per Section-VIII A or B)		
4	Section I	12	Declaration that no addition/deletion/ corrections have been made in the downloaded tender document being submitted and it is identical to the tender document appearing on E-tender Portal (https://www.apecurement.gov.in) and all amendments /corrigendum/ clarifications issued by APBIL have been taken into account.		
5	Section II	10	Non-Relation Certificate duly signed by all Directors of Company (as per format in clause 34.4 Section II)		
6	Section II	8	Bid form duly filled & signed as per Section VI		

S. No	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comments
7	Section II	10.1	List of all Directors including their name(s), Director Identification Number(s) (DIN) and address (es) along with contact telephone numbers of office and residence.		
8	Section II	10.1	Undertaking duly signed by the bidder stating that it shall be liable for due performance of the contract as per clause 12.4(d) (if applicable)		
9	Section II	10.5	A signed undertaking from Authorized Signatory of the bidder certifying that all components/ parts/ assembly/ software used in the Desktops and Servers like Hard disk, Monitors, Memory etc. shall be original, new components/parts/ assembly/ software and that no refurbished/ duplicate/ second hand components/ parts/ assembly/ software are being used or shall be used		
10.	Section II	10.6	For supply of any software i.e. operating system or any applications software the bidder should submit a Certificate Of Authenticity (COA), issued by the respective OEM and duly signed by Authorized Signatory of the bidder stating that all Software supplied are authentic and legal copy is/are being supplied.		
11.	Section II	11.2	Clause-by-clause compliance in the format as per ANNEXURE- XVI. In case of deviations, a statement of the deviations and exception to the provision of the Technical Specifications and Commercial Conditions shall be given by the bidder		
12.	Section II	14	Scanned copy of notarized Power of Attorney for signing the bid document and authorization for executing the power of attorney as per clause 14.4 of Section II along with Attestation of the specimen		

S. No	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comments
			signatures of such authorized signatory of the bid by the Company's/ firm's bankers		
13.	Section XIV	-	Integrity Pact as per Section XIV		
14.	Section IV-Part-A	2.1 (Table A)	Certificate of Incorporation and Memorandum & Article of Association		
15.	Section IV-A	2.1 (Table A)	Self-attested Copy of PAN & GSTIN registration		
16.	Section IV-A	2.1 (Table A)	Completion Certificate issued & signed by the competent authority of the client entity along with the supporting documents such as Work order/ Purchase order OR Contract clearly highlighting the scope of work Bill of Material and value of the contract/ order.		
17.	Section IV-A	2.1 (Table A)	Undertaking from the bidder as per format given in Section XII that bidder is not blacklisted/ debarred with State Government/ Ministry of Communication or APBIL or debarring order issued by Department of Expenditure (DOE), Ministry of Finance (MOF) covering all central Ministries/ Departments as per provision of OM No.F.1/20/2018-PPD by Department of Expenditure (DoE), MoF dated on 2nd Nov 2021		
18.	Section IV-A	2.1 (Table A)	Audited/ Unaudited financial statements for net worth and average annual turnover as per eligibility criteria		
19.	Section IV-A	2.1 (Table A)	Certificate from the Statutory Auditor for net worth and average annual turnover for the financial year preceding the Bid Date (i.e. 2023-24 or 2024-25) as per eligibility criteria		
20.	Section IV-A	2.1 (Table A)	Copies of valid TSEC/ TAC or proof of having applied for TSEC/ TAC (BSNL registered QF-103 or TEC Form-B) for active & Passive components		

S. No	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comments
21.	Section IV-A	2.1 (Table A)	A Self-declaration for not being declared as non- performer in any DBN project(s), as per the Sr. No.-7 of Table A of eligibility criteria.		
22.	Section IV-A	2.1 (Table A)	Undertaking in the form of an affidavit, to be submitted by the bidder and consortium partners (if any), in the format given in Annexure-VIII, as per the Sr. No.-8 of Table A of eligibility criteria.		
23.	Section IV-A	2.4 (vi)	Joint bidding agreement as per Annexure XII, if Bidder is a consortium member		
24.	Section IV-A	2.10	Form-1, as per Annexure VI		
25.	Section IV-A	2.14	Land border sharing as per Annexure VII if bidder is from a country which shares land border with India		
26.	Section IV-A	2.17	In case of imported products, certificate from OEM that it has a registered office and Service Support Centre in India to provide after sales service support in India.		
27.	Section-V	-	Unpriced detailed BOM		
28.	Section-X	-	Letter of Authorization for attending bid opening		
29.	Section-XI	-	Manufacturer Authorization Form (MAF) as per Section XI		
30.	Annexure-I	-	Bidders /Supplier profile & questionnaire duly filled & signed as per format in Annexure-I		
31.	Annexure-II	-	Undertaking & declaration duly filled & signed (Certificate for having understood the terms & conditions of tender and specification of work)		
32.	Annexure-IV	-	Detailed summary of experience certificate (EPC work and O&M of OFC network) in excel format as per Annexure -IV		
33.	Annexure -V	-	Detailed summary of turnover/ net worth details in excel format as per Annexure -V		

Financial Bid Documents

S. No	Section	Clause No.	Particulars of documents to be submitted	Page No and Documents Name in Bid	Comments
1	Section VII		Scanned copy of signed & stamped Financial Bid as per format in Section-VII		
2	Section-IA		Price Bid in BoQ as per AP e-Procurement Portal		

Notes:

1. All the pages of bid documents should be numbered and arranged accordingly. The Bidder shall combine all the bid documents in the order, before uploading, as mentioned in the table above.
2. All other documents which are not mentioned in the table above but are required against any of the clause of RFP are necessarily to be submitted to make the bid compliant. These other documents shall be placed after the documents mentioned in the table above, while numbering and arranging the documents.
3. The bid documents (to be uploaded on the AP e-Procurement Portal) should be numbered in order of Check list in Annexure-III. An index in first folder with file names should be submitted for easy location

Annexure-IV - Summary of Experience Certificate in Excel Format

S. No.	EPC work (Supply, Laying, Installation, Testing and Commissioning) of OFC (UG/ ADSS of at least 24 F)	Under Ground (UG) / Aerial (ADSS)	Organization Name, Place and Address	PO No & Date	Completion certificate No, Date & Name, Designation, email, mobile No of Issuing Authority	Quantity/ RKM	Year (Period) of completion of work	Reference Page No in Bid documents (from - to)
1								
2								
3								

S. No.	O&M of OFC Network (UG/ ADSS of at least 24 F)	Under Ground (UG) / Aerial (ADSS)	Organization Name, Place and Address	PO No & Date	Completion certificate No, Date & Name, Designation, email, mobile No of Issuing Authority	Quantity / RKM	Year (Period) of completion of work	Reference Page No in Bid documents (from - to)
1								
2								
3								

S. No.	Telecom. Equipment Installation & Commissioning	Organization Name, Place and Address	PO No & Date	Completion certificate No, Date & Name, Designation, email, mobile No of Issuing Authority	Quantity (Nos.)	Year (Period) of completion of work	Reference Page No in Bid documents (from - to)

Note: Similar format is to be used by the bidder for providing details of supply and/or installation/commissioning of quoted make/model wherever required as per the requirement in this document.

Signature of the Bidder

With date and seal

Annexure-V - Summary of Turnover/ Networth of the Bidders

S. No.	Name of the Bidder/ Consortium member	Required Minimum Average Annual Turnover (Rs. Crore)	Turnover of bidder as per bid documents (Rs. Crore) (Select any three consecutive financial years)			Average Annual Turnover	Reference Page No in Bid documents (from - to)	Remarks
			2021-22 Or 2022-23	2022-23 Or 2023-24	2023-24 Or 2024-25			

Details of Net Worth of bidders as per bid documents (Eligibility, section-IV A):

S. No.	Name of the Bidder/ Consortium member	Required Minimum Networth (Rs. Crore)	Net worth of bidder as per bid documents (Rs. Crore) (Strike whichever is not applicable)	Reference Page No in Bid documents (from - to)	Remarks
			2023-24 or 2024-25		

Signature of the Bidder

With date and seal

Annexure-VI - Self-declaration regarding Local Content (LC) for Telecom Product

FORM-1

Format for Self-Certification regarding Local Content (LC) for Telecom Product, Services or Works to be submitted on non-judicial stamp paper of the value Rs. 100/-

Date:

I, S/o, D/o, W/o,Resident
of
....., do hereby solemnly affirm and declare as
under:

That I agree to abide by the terms and conditions of Department of Telecommunications, Government of India issued vide Notification No:.....dated.....

That the information furnished hereinafter is correct to the best of my knowledge and belief and I undertake to produce relevant records before the procuring entity or any other authority so nominated by the Department of Telecommunications, Government of India for the purpose of assessing the LC.

That the LC for all inputs which constitute the said Telecom Product/Services/Works has been verified by me and I am responsible for the correctness of the claims made therein.

That in the event of the LC of the Telecom Product/Services/Works mentioned herein is found to be incorrect and not meeting the prescribed LC norms, based on the assessment of an authority so nominated by the Department of Telecommunications, Government of India, **I and my Statutory auditor or cost auditor (if applicable) will be liable for actions as specified in Clause (9) of the DPIIT PPP-MII Order dated 19.07.2024 for all incorrect/false facts and figures.**

I agree to maintain detailed breakup / information (separately for each product) to substantiate my claim for LC in the Company's record for a period of 2 years and shall make this available for verification to any authority. I shall also maintain records of local content pertaining to items bought from other domestic manufacturers / traders.

[Please provide following information]

- i. Name and details of the local supplier (Registered Office, Manufacturing unit location, nature of legal entity)
- ii. Date on which this certificate is issued
- iii. Telecom Product/Services/Works for which the certificate is produced
- iv. Procuring agency to whom the certificate is furnished
- v. Percentage of LC claimed
- vi. Name and contact details of the unit of the manufacturer
- vii. Sale Price of the product
- viii. Ex-Factory Price of the product
- ix. Freight, insurance and handling
- x. Total Bill of Material
- xi. List and total cost value of inputs used for manufacture of the Telecom product/Services/Works

- xii. List and total cost of inputs which are locally sourced. Please attach LC certificates from local suppliers, if the input is not produced in-house.
- xiii. List and cost of inputs which are imported, directly or indirectly

I hereby certify that, having read all the provisions of the above order and principles / basis of calculations, the local content calculation does not include the following:

- a. Imported items sourced locally from resellers/distributors.
- b. The license fees / royalties paid/ technical charges paid out of India
- c. Procurement / supply of repackaged / refurbished/rebranded imported products

I hereby also certify to the best of my knowledge and belief that all the particulars furnished above are correct and complete. I agree to comply with the terms and conditions of the DPIIT PPP-MII order dated 19.07.2024 and DoT PPP-MII Notification dated.....

I understand that any incorrect declaration regarding the local content or failure to substantiate the claim of LC will result in penalties as specified in Clause (9) of the DPIIT PPP-MII Order dated 19.07.2024.

I further certify and take personal responsibility that I have applied my mind to the calculations and principles of LC as specified in this order and I shall, having declared the LC shall not seek recourse to change it on any ground. Any changes made by me on any grounds in a bid in LC after bid submission shall make my bid non-responsive and I shall hold myself liable for civil/criminal action arising out of any such change. I understand and agree that any such post bid change in LC content shall also be a valid ground for blacklisting of the firm from future contracts/bids.

Signature:

Name:

Designation:

Address:

Email Address:

Mobile No.:

Place:

Date:

ANNEXURE-VII - Certificate to be submitted by Bidders

Reference 1: APBIL Tender Enquiry No.

Reference 2: Department of Expenditure Office Memorandums (OMs) No. 7/10/2021- PPD (1) dated 23rd February 2023 and its subsequent Clarification, if any.

I, in capacity of authorized signatory of M/s.....having Regd. office at.....being a participant bidder in APBIL T.E cited at reference 1 above, hereby declare that I have read and understood the clause regarding Restrictions under Rule 144(xi) of the General Financial Rules (GFRs) 2017 on grounds of Defence of India and National Security issued vide OM cited at reference 2 above, on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries.

I, hereby, further certify that our Company is not from such a country which shares a land border with India and in light of conditions & restrictions imposed vide cited OMs, we fulfil all the requirements in this regard to become eligible to be considered in the subject Tender Enquiry by APBIL.

(Name of the authorized signatory)

Signature Designation in Company Seal / Stamp of Company
Counter signed by Company Secretary of the Company with seal / stamp

ANNEXURE-VIII - Affidavit for TSP / ISP Compliance

(To be submitted by the Sole bidder/ Lead Bidder and each Consortium Partner, separately on a non-judicial stamp paper of Rs. 100/-)

Affidavit for TSP / ISP Compliance

1. We,....., hereby declare and confirm that on the date of bid submission, we were complying to the tender eligibility conditions as mentioned in clause- 2.1(f) Section IV-A of the subject RFP dated XX.XX.2026.
2. Accordingly, we hereby declare the following:
 - i) That we are not holding any ISP/ TSP license, covering Andhra Pradesh State.
 - ii) We are not having more than 50% stake in our company of any other company who is holding ISP/TSP license covering Andhra Pradesh State.
 - iii) We are not having more than 50% stake in any other such company who is holding ISP/TSP license covering Andhra Pradesh State.
 - iv) We are not a subsidiary of a parent company who is holding ISP/ TSP license covering Andhra Pradesh State.

We,, also undertake and confirm that we shall obtain prior approval of APBIL, in case we or any of our associate / parent company (falling under any of the above categories) intends to obtain ISP/TSP License / provide ISP/TSP service, during the contract period under the referred tender, in Andhra Pradesh State, if awarded.

We,, also unconditionally undertake that in case of any of the above fact is found to be incorrect, our bid/agreement may be cancelled / terminated and, any further action by APBIL/DBN DOT as per tender terms & conditions of the RFP shall be acceptable to us, without any liability on APBIL/DBN.

We also understand that any suppression of information or breach of our undertaking herein would entitle APBIL to take any action in accordance with law, including but not limited to civil and criminal law.

For

(Signature, name, designation and address)

ANNEXURE-IX - Power of Attorney for signing of Bid[#]

(Refer Clause 2.3, Section IV-A)

(To be executed on Stamp paper of appropriate value)

Know all men by these presents, We (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr/Ms.....(name),son/daughter/ wife of..... and presently residing at..... , who is presently employed with us and holding the position of, as our true and lawful attorney (hereinafter referred to as the “Attorney”) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for the..... Project proposed or being developed by APBIL including but not limited to signing and submission of all applications, bids and other documents and writings, participate in Pre-Bids and other conferences and providing information/ responses to APBIL, representing us in all matters before APBIL, signing and execution of all contracts, undertakings consequent to acceptance of our bid, and generally dealing with APBIL in all matters in connection with or relating to or arising out of our bid for the said Project and/ or upon award thereof to us and/or till the entering into of the contract with APBIL.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE,.....THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS.....DAY OF.....2026.

For

(Signature, name, designation and address)

Witness:

Accepted

1

(Signature)

2

(Name, Title and Address of the Attorney)

[#]To be submitted in original by the Bidders before within 7 days of Bid Due Date

(Notarised)

Notes:

- The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
- Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.

ANNEXURE-X - Format of Survey Report

Table A: Format of Survey																
S. No	Block Name with LGD code	Total No of GP	Main Ring		Child Ring		Existing OFC (FPOI/BJC to GP) to be used in Ring (in Km)	Block to FPOI/BJC OFC length (to be replaced) in Km	OFC to be laid for Ring Formation (in Km)		Total OFC to be laid (in Km)		Count of SFP Required			Remarks
			Main Ring S. No.	Count of GP	Child Ring S. No.	Count of GP			24 F	48 F	24 F	48 F	10 Km	40 Km	80 Km	
1	2	3	4		5		6	7	8		9=7+8		10			11

Table B: Infra Structure in GP								
S. No.	Block Name with LGD Code	Name of GP	GP LGD Code	Availability of space Yes/ No	Commercial Electric Supply Availability Yes/No	Availability of Power Supply in Hrs.	OLT Available/Not available	Remarks

Note: APBIL reserves the right to change or modify the above formats. The final formats will be shared with the successful bidder.

Signature of the Bidder

With date and seal

ANNEXURE-XI - Proof of Delivery/ Service Completion Certificate

Invoice No:

Date:

Invoice Line-Item No.	APBIL's PO No.	PO line-item No.	Delivery No. (MIGO/ SES No.), if available	Item Description	Quantity	Unit of Measure
1						
2						
3						

I hereby certify that the material/ services provided by me are in accordance with the terms & conditions of the Purchase Order, referred above.

I request you to sign and stamp on the Proof of Delivery/ Service Completion Certificate for the material/ service provided.

Note: APBIL reserves the right to change or modify the above formats. The final formats will be shared with the successful bidder.

Sign & Stamp
Authorised Signatory
Company Name

To,
Consignee (Name & Address)
APBIL

Sign & Stamp
Authorised Signatory
APBIL

ANNEXURE-XII - Joint Bidding Agreement

(To be executed on Stamp paper of appropriate value)

THIS JOINT BIDDING AGREEMENT is entered into on this the day of.....2026.

AMONGST

1.Limited, a company incorporated under the Companies Act, 1956/2013 and having its registered office at _____ (hereinafter referred to as the "First Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

2.Limited, a company incorporated under the Companies Act, 1956/2013 and having its registered office at _____ (hereinafter referred to as the "Second Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

3.Limited, a company incorporated under the Companies Act, 1956/2013 and having its registered office at _____ (hereinafter referred to as the "Third Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)

WHEREAS,

- A. APBIL having its corporate office address at _____ represented by it's CEO (hereinafter referred to as the "APBIL" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) has invited applications (the Bids") by its Request for Proposal No. dated(the "RFP") for selection of Bidder for Development (Creation, Upgradation and Operations & Maintenance) of Middle mile network of BharatNet on Design Build Operate and Maintain (DBOM) Model and Operations & Maintenance of the APSFL Phase – I Network.
- B. The Parties are interested in jointly bidding for the package as members of a Consortium and in accordance with the terms and conditions of the RFP document and other Bidding Documents, and It is a necessary condition under the RFP document that the members of the Consortium shall enter into a Joint Bidding Agreement and furnish a copy thereof with the Bid.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and Interpretations

In this Agreement, the capitalised terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the RFP.

2. Consortium

2.1 The Parties do hereby irrevocably constitute a consortium (the “Consortium”) for the purposes of jointly participating in the Bidding Process for the package.

2.2 The Parties hereby undertake to participate in the Bidding Process only through this Consortium and not individually and/or through any other consortium constituted for this bid, either directly or indirectly or through any of their Associates.

3. Covenants

The Parties hereby undertake that in the event the Consortium is declared the selected Bidder and awarded, the Lead Member shall enter into a Contract Agreement with the APBIL and for performing all its obligations as the PIA in terms of the Contract Agreement.

4. Role of the Parties

The Parties hereby undertake to perform the roles and responsibilities as described below:

- (a) Party of the First Part shall be the Lead member of the Consortium and shall have the power of attorney from all Parties for conducting all business for and on behalf of the Consortium during the Bidding Process and until the expiry of the Defects Liability Period under and in accordance with the Contract Agreement;
- (b) Party of the Second Part shall be {the Technical Member of the Consortium;
- (c) Party of the Third Part shall be {the Technical Member of the Consortium;

5. Joint and Several Liability

5.1 The Parties do hereby undertake to be jointly and severally responsible for all obligations and liabilities relating to this RFP and in accordance with the terms of the RFP and the Contract Agreement.

5.2 The Parties do hereby undertake and declare that the Lead Member shall represent all the members of the Consortium and shall at all times be liable and responsible for discharging the functions and obligations of the Consortium; and that each member of the Consortium shall be bound by any decision, communication, notice, action or inaction of the Lead Member on any matter related to this Agreement and the APBIL shall be entitled to rely upon any such action, decision or communication of the Lead Member. The APBIL shall have the right to release payments solely to the Lead Member and shall not in any manner be responsible or liable for the inter se allocation of payments among members of the Consortium.

6. Representation of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

- (a) Such Party is duly organised, validly existing and in good standing under the laws of its incorporation and has all requisite power and authority to enter into this Agreement;
- (b) The execution, delivery and performance by such Party of this Agreement has been authorised by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/ power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute

this Agreement on behalf of the Consortium Member is annexed to this Agreement, and will not, to the best of its knowledge:

- i. require any consent or approval not already obtained;
 - ii. violate any Applicable Law presently in effect and having applicability to it;
 - iii. violate the memorandum and articles of association, by-laws or other applicable organisational documents thereof;
 - iv. violate any clearance, permit, concession, grant, license or other governmental authorisation, approval, judgement, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or
 - v. create or impose any liens, mortgages, pledges, claims, security interests, charges or encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;
- (c) this Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it; and
- (d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Associates is a party that presently affects, or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfilment of its obligations under this Agreement.

7. Termination

This Agreement shall be effective from the date hereof and shall continue in full force and effect until the expiry of the Defects Liability Period under the Contract Agreement, in case the bid is awarded to the Consortium. However, in case the Consortium is either not qualified for the bid or does not get selected for award of the bid, the Agreement will stand terminated in case the Bidder is not qualified or upon return of the Bid Security by the APBIL to the Bidder, as the case may be.

8. Miscellaneous

8.1 This Joint Bidding Agreement shall be governed by laws of India.

8.2 The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior written consent of the APBIL

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

Signed, Sealed and Delivered
for and Signed, Sealed and
Delivered for and on behalf of

Signed, Sealed and Delivered
for and Signed, Sealed and
Delivered for and on behalf of

Signed, Sealed and Delivered
for and Signed, Sealed and
Delivered for and on behalf of

Lead Member

Second Part

Third Part

Signed
Name
Designation
Date
Place

Signed
Name
Designation
Date
Place

Signed
Name
Designation
Date
Place

Notes:

- a) The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by the Applicable Law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.
- b) Each Joint Bidding Agreement should attach a copy of the extract of the charter documents and documents such as resolution / power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member.
- c) For a Joint Bidding Agreement executed and issued overseas, the document shall be legalised by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney has been executed.

ANNEXURE-XIII - List of Abbreviations

S. No.	Abbreviation	Definition
1	AP	Andhra Pradesh
2	AAA	Authentication, Authorization, and Accounting
3	ABD	As Build Diagram
4	ABG	Advance Bank Guarantee
5	ABS/PU	Acrylonitrile Butadiene Styrene / Polyurethane
6	AC	Alternating Current
7	ACL	Access Control List
8	ADSS	All-Dielectric Self-Supporting
9	AES	Advanced Encryption Standard
10	AIO	All in One
11	AMC	Annual Maintenance Contract
12	AMF	Auto Mains Failure
13	AMR	Adaptive Modulation and Coding
14	Annex	Annexure
15	ANSI	American National Standards Institute
16	API	Application Programming Interface
17	APO / A.P.O	Advance Purchase Order
18	ASTM	American Society for Testing and Materials
19	AT	Acceptance Testing
20	ATM	Asynchronous Transfer Mode
21	ATPC	Automatic Transmit Power Control
22	AWO	Advance Work Order
23	BA	Business Area
24	BBU	Baseband Unit
25	BEG	Business Exchange Gateway
26	BG	Bank Guarantee
27	BHQ	Block Head Quarter
28	BIFMA	Business and Institutional Furniture Manufacturers Association
29	BIS	Bureau of Indian Standards
30	BITE	Built-In Test Equipment
31	BJC	Branched Type Joint Closure
32	BMS	Building Management System
33	BNG	Broadband Network Gateway
34	BNU	BharatNet Udyami
35	BoM / BOM	Bill of Materials
36	BoQ / BOQ	Bill of Quantities
37	BSC	Base Station Controller
38	BSNL	Bharat Sanchar Nigam Limited
39	BTS	Base Transceiver Station
40	CA / C.A.	Chartered Accountant
41	CAC	Comfort Air Conditioning
42	CAMC	Comprehensive Annual Maintenance Contract

S. No.	Abbreviation	Definition
43	CAN	Controller Area Network
44	CAPEX	Capital Expenditure
45	CC	Cable Chamber
46	CCA	Controller of Certifying Authorities
47	CCU	Communications Control Unit
48	CD-ROM	Compact Disc Read-Only Memory
49	CEO	Chief Executive Officer
50	CGST	Central Goods and Services Tax
51	CIR	Committed Information Rate
52	CISC Architecture	Complex Instruction Set Computer Architecture
53	CLI	Command Line Interface
54	CN	Credit Note
55	COA	Certificate of Authenticity
56	COS	Class of Service
57	CPAN	Converged Packet Access Network
58	CPPP / CPP Portal	Central Public Procurement Portal
59	CPSU	Central Public Sector Undertakings
60	CPU	Central Processing Unit
61	CRM	Customer Relationship Management
62	CTD	Calcutta Telephones District
63	Cu M / Cu Mtr	Cubic Meter
64	DAB	Dispute Adjudication Board
65	DB	Distribution Board or Database (Based on context)
66	dB	Decibel
67	dBi	Decibels Relative to Isotropic
68	DBOM	Design Build Operate and Maintain
69	DC	Direct Current
70	DC	Data center (in reference to NOC)
71	DCN	Data Communication Network
72	DD	Demand Draft
73	DDR4	Double Data Rate Fourth Generation
74	DDRS	Dynamic Data Rate Selection
75	Degree C	Degree Centigrade
76	DG	Diesel Generator
77	DHCP	Dynamic Host Configuration Protocol
78	DiffServ	Differentiated Services
79	DIN	Director Identification Number
80	DMW	Digital Microwave
81	DN	Debit Note
82	DNH & DD	Dadra and Nagar Haveli and Daman and Diu
83	DNS	Domain Name System
84	DOE	Department of Expenditure
85	DoT / DOT	Department of Telecommunications, Government of India
86	DP	Delivery Period

S. No.	Abbreviation	Definition
87	DPIIT	Department for Promotion of Industry and Internal Trade
88	DR	Disaster Recovery
89	DRC	Dispute Resolution Committee
90	DSC	Digital Signature Certificates
91	DSCP	Differentiated Services Code Point
92	DSR	Delhi Schedule of Rates
93	dt	Date
94	DTR	Detailed Technical Requirements
95	DVI	Digital Visual Interface
96	DWC	Double Walled Corrugated
97	DWDM	Dense Wavelength-Division Multiplexing
98	DWF	Design Web Format (CAD drawing file format)
99	E.I.	Engineering Instructions
100	E/A	Engine Alternator
101	EHS	Environment, Health and Safety
102	EIR	Excess Information Rate
103	EIRP	Effective Isotropic Radiated Power
104	EMBG	Earnest Money Bank Guarantee
105	EMD	Earnest Money Deposit
106	EMS / eMS	Element Management System
107	EoL	End of Life
108	EPC	Engineering, Procurement and Construction
109	EPF	Employees' Provident Fund
110	EPIC Architecture	Explicitly Parallel Instruction Computing
111	Eqpt.	Equipment
112	ERPS	Ethernet Ring Protection Switching
113	ESIC	Employees' State Insurance Corporation
114	ETA	Equipment Type Approval
115	FAT	Final Acceptance Test
116	FDMS	Fiber Distribution Management System
117	FER	Frame Error Ratio
118	Fig.	Figure
119	ODU	Outdoor Unit
120	FLM	First Line Maintenance
121	FMA	Fiber Maintenance Agency
122	FO	Full Outdoor
123	FOA	Field Operation Assistance
124	FPOI / FPIO	Fiber Point of Interconnect
125	FRAC	Fair Rent Assessment Committee
126	FSC	Forest Stewardship Council
127	Ft.	Feet
128	FTAM	File Transfer, Access, and Management
129	FTB	Fiber Termination Box
130	FTP	File Transfer Protocol

S. No.	Abbreviation	Definition
131	FTTH	Fiber to the Home
132	FTTx	Fiber to the X
133	GALV.	Galvanized
134	Gbps	Gigabits per Second
135	GDC	Gravity Die Casting
136	GE ports	Gigabit Ethernet Ports
137	GE SFP	Gigabit Ethernet Small Form-factor Pluggable
138	GFR	General Financial Rules
139	GHz	Giga Hertz
140	GI / G.I	Galvanized Iron
141	GIS	Geographic Information System
142	GOI	Government of India
143	Govt.	Government
144	GP	Gram Panchayat
145	GPON	Gigabit Passive Optical Network
146	GPS	Global Positioning System
147	GR	Generic Requirement
148	GSM (with reference paper)	to Grams per Square Metre
149	GST	Goods and Services Tax
150	GSTIN	Goods and Services Tax Identification Number
151	GSTN	Goods and Service Tax Network
152	GSTR	Goods and Services Tax Return
153	GUI	Graphic User Interface
154	H/W	Hardware
155	HDD	Horizontal Directional Drilling
156	HDD (in reference to IT)	Hard Disk Drive
157	HDMI	High-Definition Multimedia Interface
158	HDPE	High Density Polyethylene
159	HLD	High-level Diagram
160	HOTO	Hand Over Take Over
161	HP	Himachal Pradesh
162	HQ	Headquarters
163	HSL	High-Speed Link
164	HSN	Harmonized System of Nomenclature
165	HT	High Tension
166	HT Steel	High Tensile Steel
167	HTTP / HTTPS	Hypertext Transfer Protocol / (Secure)
168	Hz	Hertz
169	I&C	Installation & Commissioning
170	I.e.	Id est
171	I/O	Input/Output
172	IA	Infrastructure Assessment
173	IE	Independent Engineer

S. No.	Abbreviation	Definition
174	IEC	International Electrotechnical Commission
175	IEEE	Institution of Electrical and Electronics Engineers
176	IEM	Independent External Monitor
177	IFSC	Indian Financial System Code
178	IGST	Integrated Goods and Services Tax
179	INR	Indian Rupees
180	IP-1	Infrastructure Provider Category 1
181	IPAM	IP Address Management
182	IPC	Indian Penal code
183	IP-MPLS	Internet Protocol Multi-Protocol Label Switching
184	IPP /IP prec	IP Precedence
185	IPS	Intrusion Prevention System
186	IPSEC	IP Security
187	IPTV	Internet Protocol Television
188	IPv4	Internet Protocol version 4
189	IPv6	Internet Protocol version 6
190	IRDA	Insurance Regulatory and Development Authority
191	ISI	Indian Standards Institute
192	ISO	International Organization for Standardization
193	ISP	Internet Service Provider
194	IT	Information Technology
195	ITU	International Telecommunication Union
196	ITU-R	ITU - Radiocommunication Sector
197	ITU-T	ITU - Telecommunication Standardization Sector
198	J&K	Jammu & Kashmir
199	JPG	Joint Photographic Experts Group (Image file format)
200	Kg	Kilogram
201	Kms	Kilometers
202	KMZ/KML	Keyhole Markup Language Zipped / Keyhole Markup Language
203	KPI	Key Performance Indicator
204	KQAM	Kilo Quadrature Amplitude Modulation
205	KVA	Kilo-Volt-Amperes
206	KW	Kilowatt
207	L1 / L-1	Selected Bidder
208	L2 / L-2	Qualified Bidder who has submitted the 2nd lowest Financial Bid
209	L3 / L-3	Qualified Bidder who has submitted the 3rd lowest Financial Bid
210	LACP	Link Aggregation Control Protocol
211	LAG	Link Aggregation
212	LAN	Local Area Network
213	LC	Local Content
214	LC Type Connector	Lucent Connector
215	LCD	Liquid Crystal Display
216	LCT	Local Craft Terminal
217	LD	Liquidated Damages

S. No.	Abbreviation	Definition
218	LED	Light Emitting Diode
219	LGD	Local Government Directory
220	LLD	Low-level Diagram
221	LLDP	Link Layer Discovery Protocol
222	LMC	Last Mile Connectivity
223	LOA	Letter of Award
224	LOS	Line of Sight
225	LSA	License Service Areas
226	LSL	Local Switching Layer
227	LSP	Label Switched Paths
228	LT	Low Tension
229	Ltd.	Limited
230	LTE	Long Term Evolution
231	M/W	Microwave
232	MAB	MAC Authentication Bypass
233	MAC	Media Access Control
234	MAF	Manufacturers Authorizations Form
235	MARR	Microwave Antenna Radio Relay
236	MASS	Metal Free Aerial Self Supporting Cable
237	MB	Measurement Book
238	Mbps	Megabits Per Second
239	MCB	Miniature Circuit Breaker
240	MCLR	Marginal Cost of Funds based Lending Rate
241	MD	Managing Director
242	MDC	Mini Data Center
243	MDF	Medium-Density Fiberboard
244	MH	Manholes
245	MHz / MHZ	Mega Hertz
246	MICR	Magnetic Ink Character Recognition
247	MIGO	Material Incoming Goods
248	MIS	Management Information System
249	mm	Millimetre
250	MOF	Ministry of Finance
251	MOU	Memorandum of Understanding
252	MP	Madhya Pradesh
253	MP4	MPEG-4 Advanced Video Coding
254	MPLS	Multi-Protocol Label Switching
255	MPLS EXP	Multi-Protocol Label Switching Experimental Bits
256	MPPT	Maximum Power Point Tracking
257	MS Pole	Mild Steel Pole
258	MS Weld Mesh	Mild Steel Weld Mesh
259	MSA	Master Service Agreement
260	MSC	Mobile Switching Center
261	MSE	Micro & Small Enterprise

S. No.	Abbreviation	Definition
262	MSME	Micro, Small, & Medium Enterprise
263	MSO	Multiple System Operator
264	MTCTE	Mandatory Testing and Certification of Telecom Equipment
265	MTTR	Mean Time to Repair
266	NABL	National Accreditation Board for Testing & Calibration Laboratories
267	NB / N.B.	Nota Bene (Important Point)
268	NDPP	Network Device Protection Profile
269	NE/FT	Network Engineer / Field Technician
270	NEFT	National Electronic Funds Transfer
271	NER / NE	North Eastern Region
272	NESC	National Electric Safety Code
273	NGFW	Next-Generation Firewall
274	NH	National Highway
275	NIC	National Informatics Centre
276	NIPS	Network intrusion prevention system
277	NIT	Notice Inviting Tender
278	NKN	National Knowledge Network
279	nm	Nanometre
280	NMS	Network Management Station
281	NNI	Network-to-Network Interface
282	Ns	Nanosecond
283	NSCS	National Security Council Secretariat
284	NTP	Network Time Protocol
285	NVR	Network Video Recorder
286	O&M	Operations and Maintenance
287	OAM	Operations, Administration, and Maintenance
288	OCV	Open Circuit Voltage
289	OEC	Outside Expert Committee
290	OEM	Original Equipment Manufacturer
291	OF / O.F.	Optical Fiber
292	OFB	OFC Blowing
293	OFC	Optical Fiber Cable
294	OH	Overhead
295	OLT	Optical Line Terminal
296	ONT	Optical Network Terminal
297	OPEX	Operating Expenses or Expenditure
298	OPGW	Optical Ground Wire
299	OPPC	Optical Phase Conductor
300	OS	Operating System
301	OSHA	Occupational Safety and Health Act
302	OSS	Operations Support Systems
303	OTD / OT Ducting	Open Trenching Ducting
304	OTDR	Optical Time Domain Reflectometer

S. No.	Abbreviation	Definition
305	OTN	Optical Transport Network
306	P2P tests	Peer-to-Peer
307	PAC	Precision Air Conditioning
308	PAN	Permanent Account Number
309	PAT	Preliminary Acceptance Testing
310	PBG	Performance Bank Guarantee
311	PBX	Private Branch Exchange
312	PC	Personal Computer
313	PC Act	Prevention of Corruption Act
314	PCC	Plain Cement Concrete
315	PDF	Portable Document Format
316	PG	Performance Guarantee
317	PGCIL	Power Grid Corporation of India Limited
318	PIA	Project Implementation Agency
319	PIC	Passive Integrated Circuit
320	PLB	Permanently Lubricated
321	PMA	Project Management Agency
322	PMI	Preference to Make in India
323	PMON	Performance Monitoring
324	PO / P.O.	Purchase Order
325	PO Value	Total Project Cost
326	PoA / POA	Power of Attorney
327	PoE	Power over Ethernet
328	POM	Point of Measurement
329	PON	Passive Optical Network
330	PoP	Point of Presence
331	PP Rope	Polypropylene Rope
332	PSU	Public Sector Undertaking
333	PTN	Packet Transport Network
334	PTP	Precision Time Protocol
335	Pvt.	Private
336	QA	Quality Assurance
337	QAM	Quadrature Amplitude Modulation
338	QoS	Quality of Service
339	QPSK	Quadrature Phase Shift Keying
340	R&A Act	Regulation and Abolition Act
341	RAID	Redundant Array of Independent Disks
342	RAM	Random Access Memory
343	RAR	Roshal Archive (Compressed file format)
344	RBI	Reserve Bank of India
345	RCC / R.C.C	Reinforced Cement Concrete
346	REST	Representational State Transfer
347	RFID	Radio-Frequency Identification
348	RFMS	Remote Fiber Monitoring System

S. No.	Abbreviation	Definition
349	RFP	Request for Proposal
350	RFTMS	Remote Fiber Testing & Monitoring System
351	RFTS	Remote Fiber Test System
352	RI	Route Indicator
353	RISC Architecture	Reduced Instruction Set Computer Architecture
354	RKM	Route Kilometre
355	RM	Route Markers
356	RMON	Remote Monitoring
357	ROHS	Restriction of Hazardous Substances
358	ROW	Right of Way
359	RPM	Rotation per minute
360	RTGS	Real-time gross settlement
361	RTU	Remote Test Units
362	RU	Rack Unit
363	S.No.	Serial Number
364	S/W	Software
365	SAC	Services Accounting Code
366	SAN	Storage Area Network
367	SAS	Serial-Attached SCSI (Small Computer System Interface)
368	SC Type Connector	Subscriber Connector
369	SCP	Secure Copy Protocol
370	SD	Security Deposit
371	SES	Service Entry Sheet
372	SFP	Small Form-factor Pluggable
373	SFTP	SSH File Transfer Protocol
374	SGST	State Goods and Services Tax
375	SHP	Shape file
376	SIA	Secretariat for Industrial Approval
377	SJC	Straight Through Joint Closure
378	SLA	Service Level Agreement
379	SMMP	May be referred as SNMP (Simple Network Management Protocol)
380	SMPP Port	Short Message Peer-to-Peer Protocol
381	SMPS	Switched-mode power supply
382	SMS	Short Message Service
383	SNMP	Simple Network Management Protocol
384	SNOC / State NoC	State Network Operations Center
385	SOP	Standard Operating Procedures
386	SOR / SoR	Schedule of Requirement
387	SP	Service Provider
388	SPV	Special Purpose Vehicle
389	SPV Mounting Structure	Solar Photovoltaic Mounting Structure
390	Sq.	Square
391	SRL	Structural Reinforcement Layer

S. No.	Abbreviation	Definition
392	SSD	Solid State Drive
393	SSH	Secure Shell
394	SSL	Secure Sockets Layer
395	SVD	Spiral Vibration Damper
396	SWAN	State-Wide Area Network
397	SWG	Standard Wire Gauge
398	Sync E	Synchronous Ethernet
399	T&L	Trenching & Laying
400	TAC	Type Approval Certificate
401	TAN	Tax Deduction and Collection Account Number
402	TCP	Transmission Control Protocol
403	TCS	Tax Collected at Source
404	TDD	Time Division Duplexing
405	TDS	Tax Deducted at Source
406	TE / T.E.	Tender Enquiry
407	TEC	Telecom Engineering Center
408	TFT Screen	Thin Film Transistor Screen
409	TFTP	Trivial File Transfer Protocol
410	TOE	Tender Opening Event
411	TOS	Type of Service
412	TPA	Third Party Auditor
413	TRAI	Telecom Regulatory Authority of India
414	TSEC	Technical Specification Evaluation Centre
415	TSP	Telecom Service Provider
416	Tx / Rx	Transmission / Reception
417	UBR	Unlicensed Band Radio
418	UG / U/G	Underground
419	UMTS	Universal Mobile Telecommunications System
420	UNMS	Unified Network Management System
421	UP(E) / UPE	Uttar Pradesh East
422	UP(W) /UPW	Uttar Pradesh West
423	UPS	Uninterruptible Power Supply
424	URC	Udyam Registration Certificate
425	URL	Uniform Resource Locator
426	USB	Universal Serial Bus
427	USOF	Universal Service Obligation Fund
428	UT	Union Territory
429	UTM	Unified Threat Management
430	UTR Number	Unique Transaction Reference Number
431	V	Volt
432	VGA	Video Graphics Array
433	VLAN	virtual local area network
434	VPLS	Virtual Private LAN Service
435	VPN	Virtual Private Network

S. No.	Abbreviation	Definition
436	VRF	Virtual Routing and Forwarding
437	W	Watt
438	w.r.t	with respect to
439	WDM	Wavelength division multiplexing
440	WGS	World Geodetic System
441	WO / W.O.	Work Order
442	WPC	Wireless Planning and Coordination Wing
443	XLS	Excel Spreadsheet
444	XPIC	Cross Polarization Interference Cancellation
445	μs	Microsecond
446	2G / 3G/ 4G/ 5G	Second / Third / Fourth / Fifth Generation of Wireless Network
447	DBN	Digital Bharat Nidhi
448	APBIL	Andhra Pradesh BharatNet Infrastructure Limited
449	APSFL	Andhra Pradesh State FibreNet Limited
450	GoAP	Government of Andhra Pradesh

ANNEXURE-XIV - Format for essential information for applying to NSCS

1	Project Name	:			
2	Type of Project	:	1. New Roll Out		
			2. Expansion		
			3. Upgrade		
3	Are your procurements from India registered vendor only for this project?	:	o Yes		
			o No		
4	Do you intend to procure from non- India registered vendor for this project?	:	o Yes		
			o No		
5	Remarks on the Project Criticality, if any,				
6	Details of Equipment:				
	Asset (one to be selected)	Equipment Name	Company Name/Vendor	Product Name	Model Name
	a) Support System b) Transport		Name of the Contact Person: Email Id: Mobile No:		

Signature of the Bidder

With date and seal

ANNEXURE-XV - FORMAT OF AGREEMENT[#]

Andhra Pradesh BharatNet Infrastructure Limited (APBIL)
(A Government of Andhra Pradesh Enterprise)

AGREEMENT

FOR

“PROJECT IMPLEMENTATION AGENCY (PIA) for Development (Creation, Upgradation and Operations & Maintenance) of Middle mile network of BharatNet on Design Build Operate and Maintain (DBOM) Model and Operations & Maintenance of the APSFL Phase – I Network”

Between

APBIL ON BEHALF OF DBN

&

M/s Company Name

Tender No.

Dated

Andhra Pradesh BharatNet Infrastructure Limited (APBIL)

Infosight Building, 2nd floor,
NH-16 Service Road, Tadepalle, Guntur, AP-522501
Email address: apbil@ap.gov.in

AGREEMENT

This AGREEMENT is made on this the day of XXX 20xx.

BETWEEN

APBIL (CIN No. XXXX), a Company incorporated and registered under provisions of the Companies Act of 1956 and is being governed by the Companies Act, 2013, having its Registered Office at Address: XXXX, acting through CEO who for the purpose of this Agreement is being represented by<Name>.....,<Designation>... ,

APBIL Corporate Office (hereinafter referred to as the "APBIL") which expression shall unless repugnant to the context or meaning thereof mean and be deemed to include its authorized agents, representatives and permitted assigns of the FIRST PARTY.

AND

(Name of the company), a company registered under companies ACT 2013, having its Registered Office at <office address> acting through <Name, Director> (herein after referred to as the "Project Implementation Agency" or "PIA" which expression shall unless repugnant to the context or meaning thereof mean and be deemed to include their successors and permitted assigns having its registered office at <office address> of the SECOND PARTY.

Each individually referred to as the "Party" and collectively as "Parties".

WHEREAS

- (a) The APBIL ON BEHALF OF DBN had invited bids vide their Tender Enquiry No.
Dated (hereinafter referred to as 'Tender') for selection of " Project Implementation Agency (PIA) for Amended BharatNet Program".
- (b) The "Bidder" means the Company, who participates in this tender and submits its bid. In case of Consortium Bids, the Bidder will mean Lead bidder as well as Consortium Partner/s, if not otherwise specified and, in case of a company, includes any successor entity pursuant to a reconstruction/reorganisation of the bidder as approved by any court, tribunal or statutory authority."
- (c) The "Project Implementation Agency (PIA)", as a bidder, had submitted its proposal (hereinafter referred to as the 'Bid') for the Goods and Services in accordance with its proposal as set out in its Bid and in accordance with the terms and conditions of the aforesaid Tender.
- (d) On the basis of acceptance by PIA, for the tender conditions & rates discovered after tender process, APBIL ON BEHALF OF DBN has agreed to engage the PIA for the works as are represented in the terms of the Tender Enquiry, Bid, negotiations and clarifications in relation to the implementation of the scope of work and referred in this Agreement and its Annexures
- (e) The APBIL ON BEHALF OF DBN has placed Advance Work Order (AWO) on the PIA vide No. AWO No. dated / / (Annexure-A) as its intention to engage the PIA for said works as cited in para (c) above. The indicative quantities and price-breakup are as per aforesaid AWO's ordering price sheet, enclosed at Annexure-.... of the aforesaid AWO. The exact quantities of various items of price sheet will be on basis of actual requirement in package and charges shall be regulated

accordingly at the Unit rates indicated in ordering price sheet of AWO and the Work Order shall be issued as per clause 27 and 28 of Section II of the RFP.

- (f) The parties hereby agree to sign the agreement to provide the said services on the term and conditions as contained herein and the said Tender and Clarification/amendment issued thereto vide No. Dated 2026.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

In consideration of the mutual covenants set out in this Agreement, the parties agree as follows:

6. The PIA hereby agrees and undertakes to execute Development (Creation, Upgradation and Operation & Maintenance) works of Amended BharatNet Program in the State of Andhra Pradesh as per terms & conditions of this agreement and the APBIL, in consideration of the PIA having agreed to execute the said Development (Creation, Upgradation and Operation & Maintenance) work, does hereby agree to make payment to PIA, in accordance with this Agreement.

7. This Agreement will remain valid for ten (10) years / 120 months, from the date of effect of this agreement, unless revoked earlier for any reason whatsoever. Date of effect of this Agreement shall be the date of signing of the agreement.

The PIA hereby agrees and undertakes unconditionally & unequivocally to fully comply with all terms and conditions stipulated in this Agreement without any deviation or reservation of any kind.

8. Unless otherwise mentioned in this agreement, all other terms and conditions of the Tender Enquiry Document No. ----- Dated2026 for "Engagement of Project Implementation Agency for Creation, Upgradation and O&M of **BharatNet Middle-Mile Network** on a DBOM Model and O&M of the **APSFL Network** " and clarifications & amendments/modifications dated to the tender document issued, AWO dated shall form part and parcel of this Agreement and mutatis mutandis be applicable to this agreement and shall be binding between the parties.

9. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the General Instructions to Bidders (Section-II of the aforesaid Tender Enquiry).

10. Waiver–

Neither the failure of either Party to insist on any occasion upon the Performance of the provisions of this Agreement nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right thereunder. Waiver by either Party of any default by the other Party in the observance or performance of any provision of this Agreement shall not operate or be construed as a waiver of any other or subsequent default or of other provisions of or obligations under this Agreement nor shall affect the validity or enforceability of this Agreement in any manner.

- 11. Severability of Terms–** If for any reason whatsoever, any provision of this Agreement is or becomes invalid, illegal, or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal, or unenforceable; the validity, legality or enforceability of the remaining provisions shall not be affected in any manner.

IN WITNESS whereof, the parties hereto have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, Sealed and Delivered for and Signed,
Sealed and Delivered for and on behalf of

Signed, Sealed and Delivered for and Signed,
Sealed and Delivered for and on behalf of

Company Name

Andhra Pradesh BharatNet Infrastructure Ltd.

Signed
Name
Designation
Date
Place

Signed
Name
Designation
Date
Place

In the Presence of

In the Presence of

Signed
Name
Designation
Date
Place

Signed
Name
Designation
Date
Place

The successful bidder shall sign separate agreements for Package A and Package B.

ANNEXURE-XVI - Format for Clause-By-Clause Compliance

(to be submitted in the firm's letter head with authorized signatory)

Subject – Clause by clause compliance for Tender Enquiry No._____

We, M/s....., the bidder for Tender Enquiry No._____ do hereby undertake and confirm that we have complied with all sections and clauses of the Tender Documents, including all clarifications, amendments, and addenda issued thereto up to date of bid submission.

Furthermore, we, M/s....., hereby confirm that there are no deviations in our technical and commercial bids with respect to the above-mentioned Tender. We are submitting our clause-by-clause compliance as below:

Sl. No.	Section No	Details	Remark for compliance (All clauses of this section are complied)
1	I	DNIT	All clauses of this section are complied and there is no deviation.
2	I-A	Tender Information	All clauses of this section are complied and there is no deviation.
3	II	General Instructions to Bidders	All clauses of this section are complied and there is no deviation.
4	III	General(Commercial) Conditions of Contract	All clauses of this section are complied and there is no deviation.
5	IV-A	Special Instructions to Bidders and Special Conditions of Contract	All clauses of this section are complied and there is no deviation.
6	IV-B	Special (Commercial) Conditions of Contract (SCC)	All clauses of this section are complied and there is no deviation.
7	IV-C	Special Technical Conditions [Including all the Annexures and Sub-sections under Section IV-C, regarding Technical Specifications/ conditions]	All Clauses of the Technical specifications and other specifications for tender items are complied and there is no deviation. Technical literatures of the offered items are also submitted with the bid.
8	V	Schedule of Requirement (SOR)	All clauses of this section are complied and there is no deviation.
9		All clarifications/ amendments/ Addenda, issued against the subject Tender Enquiry document	All clarifications/ amendments/ Addenda, issued against the subject tender, are complied and there is no deviation.

Note: In case of any deviations, a statement detailing the deviations and exceptions to the provisions of the Technical Specifications and Commercial Conditions shall be provided by the bidder.

Signature of Authorized Signatory
Designation in Company Seal / Stamp of Company

ANNEXURE-XVII – Unconnected Gram Panchayat List in Andhra Pradesh

Enclosed

ANNEXURE-XVIII – List of Gram Panchayats to be upgraded from Linear to Ring

Enclosed

ANNEXURE-XIX – List of Gram Panchayats connected under BharatNet Phase-II

Enclosed

ANNEXURE-XX – List of Point of Presence (PoPs) locations under APSFL Phase-I network

Enclosed

ANNEXURE-XXI – List of Mandals

Enclosed