RailTel's Bid Specific Additional Terms & Conditions

Information to Bidder for the "Procurement of Routers, Switches, SFP Modules, TP, Racks, and Other Equipment for Customer Delivery and Projects in the Western Region"

Ref: GeM Bid No. GEM/2025/B/6092012   Dated: 29.04.2025

- The item/items in this bid should be quoted as per the technical specifications. *The details of the specifications along with consignee/site details are also available on website www.railtelindia.com*

-

TReDS feature available	Yes, on m1xchange portal (url: https://www.m1xchange.com

1. In the specification wherever support for a feature has been asked for, it will mean that the feature should be available without RailTel requiring any other hardware. Thus, all hardware required for enabling the support/feature shall be included in the offer. The technical specifications are mentioned in **Annexure-I**.

2. OEM or Authorized dealer/ distributor/ Partner/ Trader authorized by OEM specific to this bids should have a registered office in India to provide sales and 24x7 support in India. The certificate to this effect should be submitted.

3. In case of the bidder is Authorized dealer/ distributor/ Partner/ Trader authorized by OEM specific to this bid, a certificate from the OEM to this effect should be submitted as per the **Annexure-II** (MAF).

4. GSTIN ID of vendor should be provided from where goods will be supplied.

5. **Delivery Period, Consignee Address and inspection**

5.1 **Delivery Period:** The supplier is required to deliver the material within **120 days** from the date of issuance of the Purchase Order (PO) or GeM Contract, as per the terms and conditions specified in the PO. If material is not supplied within the approved delivery period then penalty of 0.5% of undelivered/uninstalled quantity per week to the maximum to the 10% of the contract value will be levied.

5.1.1 If the supplier fails to deliver the stores or any installment thereof within the period fixed for such delivery in the contract or as extended or at any time repudiates the contract before the expiry of such period the Purchaser may without prejudice to his other rights recover from the Contractor, as agreed, the LD a sum equivalent to 0.5 (half) per cent of the prices of any stores (including elements of taxes, duties, freight, etc.) which the Contractor has failed to deliver, within the period fixed for delivery in the contract or as extended for each week or part of a week, during which the delivery of such stores may be in arrears, where delivery thereof is accepted, after expiry of

the aforesaid period. The upper limit for recovery of liquidated damages will be 10% (Ten Percent) of Total contract value provided in the contract.

5.2 **Name of locations for Consignee Address: As per the Annexure-V.**

5.3 **Inspection:**
Post Receipt Inspection at consignee Site before acceptance of stores: Nominated RailTel Executive by CA.

Supplier should also submit data sheet, guarantee and fitment certificate along with the supply of materials.

6 **Estimated cost of tender & Earnest Money Deposit (EMD):**

6.1 **Estimated cost of tender:** Estimated cost of the Tender is **Rs. 2,36,56,599/-** (Incl. GST).

6.2 **Earnest Money Deposit (EMD): Rs. 4,73,200/-** with Payment online through RTGS/ internet banking in Beneficiary name RailTel Corporation of India Limited Account No. 11037321307, IFSC Code SBIN0001821, Bank Name: State Bank of India, Branch address: Churchgate Branch, Maharshi Karve Marg, Mumbai- 400020.

6.2.1 **The bidder seeking EMD exemption, must submit the valid supporting document for the relevant category as per the GeM General Terms and Conditions. However, in lieu of EMD, the bidder must submit Bid Security Declaration (BSD) as per 'Annexure-IX.**

6.2.2 **The Bid received without EMD/ documentary proof of exemption of EMD as per above clause will be summarily rejected.**

6.2.3 No exemption is, however, applicable to these units from payment of security deposit/ Performance Bank Guarantee.

6.2.4 Earnest Money of the unsuccessful bidder will be discharged/returned as promptly as possible. No interest shall be payable on the EMD.

6.3 RailTel is registered with m1xchange TReDS platform having buyer registration number "BUYER00001496". The URL for m1xchange platform is https://m1xchange.com. MSE suppliers/ vendors are required to register themselves on m1xchange platform for availing the facility of bill discounting on TReDS portal. The bidder is mandatorily required to submit its TReDS registration number (as provided by m1xchange portal) and GRN (Goods/ Service Receipt Note) Number (as provided by RailTel on delivery of Goods/ Service) while submitting the invoices if requires to avail TReDS facility.

6.4 MSE vendor will bear all costs relating to availing the facility of discounting on TReDS platform including but not limited to Registration charges, Transaction charges for

financing, Discounting charges, Interest on financing, or any other charges known by any name shall be borne by MSE vendor.

6.5 MSE vendor hereby agrees to indemnify, hold harmless and keep RailTel and affiliates, Directors, Officers, representative, agents and employees indemnified, from any and all damages, losses claims and liabilities (including legal costs) which may arise from Sellers submission, posting or display, participation, in any manner, on the TReDS platform or from the use of Services from the Buyer's breach of any of the terms and conditions of the Usage terms or of this agreement and any applicable Law on a full indemnity basis.

6.6 RailTel shall not be liable for any special, indirect, punitive, incidental or consequential damages or any damages whatsoever (including but not limited to damage for loss of profits or savings, business interruption, loss of information), whether in contract, tort, equity or otherwise or any other damages resulting from using TReDS platform for discounting their (MSE Vendor's) invoices.

7 This bid complies with "Public Procurement (preference to make in India) Policy Order, 2017 or latest issued by DIPP and Public Procurement Policy for Micro and Small Enterprises (MSEs) order,2012" or latest issued by MoSME." The bidders claiming the preference have to submit relevant documents prescribed under relevant order.

This bid complies with "Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1, 2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020 or latest regarding restrictions on procurement from a bidder of a country which shares a land border with India"

8 **Security Deposit/ Performance Bank Guarantee**:

The successful tenderer shall submit security deposit in the form of DD or irrevocable Bank Guarantee from any scheduled bank for due fulfillment of contract as per the details given below:

i. Security Deposit/Performance Bank Guarantee @ **5%** of total value of Purchase Order is required to be submitted within 30 days of issue of Purchase Order with validity of 3 months beyond warranty. Period, failing which a penal interest of 15% per annum shall be charged for the delay period i.e. beyond 30 (thirty) days from the date of issue of LOA/PO. PBG format specified in **Annexure-IV.**

ii. The security deposit/PBG shall be submitted to RCIL/WR, Mumbai.

iii. A separate advice of the BG will invariably be sent by the BG issuing bank to the RailTel's Bank through SFMS and only after this the BG will become acceptable to RailTel. It is therefore in own interest of bidder to obtain RailTel's bank IFSC code, its branch and address and advise these particulars to the BG

issuing bank and request them to send advice of BG through SFMS to the RailTel's Bank.

This PBG should be from a Scheduled commercial Bank (either Private or PSU) but not by any cooperative Bank or NBFC and the claim validity period shall be 1 year after PBG validity for lodging the claim.

The security deposit/Performance Bank Guarantee shall be released after successful completion of Contract obligations under the contract, duly adjusting any dues recoverable from the successful tenderer. Payment of Security Deposit in the form of Pay Order/Demand Draft should be made in favor of "RailTel Corporation of India Ltd" payable at Mumbai.

Note:
1. Any Performance security upto a value of Rs.5Lakhs is to be submitted through online transfer only
2. No interest shall be paid on the amount of Performance Security held by RailTel, at any stage.

9   Eligibility Criteria:

9.1   Technical Eligibility Criteria:

The bidder/ OEM (themselves or through reseller(s)) having valid authorization of OEM) should have executed project for supply and installation/ commissioning of same or similar category Products during preceding 03 (three) financial years (i.e. current year and three previous financial years) as on opening of bid, as per following criteria:

(i)   Single Order of at least 35% of estimated bid value; or

(ii)   Two Orders of at least 20% each of estimated bid value; or

(iii)   Three Orders of at least 15% each of estimated bid value.

Satisfactory performance certificate issued by respective Buyer Organization for the above Orders should be uploaded with bid. In case of bunch bids, the Category related to primary product having highest bid value should meet this criterion.

 # Definition of similar work: Supply/ Supply and installation of IT/ Telecom equipment with satisfactory working in Government/ PSUs/ Telecom Service providers/ Public Listed Company in India.

Note: In case a contract is started prior to 03 (three) years, ending on the date of opening of bid, but completed in last 03 (three) years, ending on the date of opening of bid, the completed work shall be considered for fulfilment of credentials.

Work experience certificate from private individual shall not be considered. However, in addition to work experience certificates issued by any Govt. Organization, PSU or any reputed TELCO, work experience certificate issued by Public listed company having average annual turnover of Rs.500 crore and above in last 3 financial years excluding the current financial year, listed on National Stock Exchange or Bombay Stock Exchange, incorporated/registered at least 5 years prior to the date of opening of tender, shall also be considered provided the work experience certificate has been issued by a person authorized by the Public listed company to issue such certificates. In case tenderer submits work experience certificate issued by public listed company, the tenderer shall also submit along with work experience certificate, the relevant copy of work order, bill of quantities, bill wise details of payment received duly certified by Chartered Accountant, TDS certificates for all payments received and copy of final/last bill paid by company in support of above work experience certificate.

9.2   **Financial Criteria for Bidder:**

The bidder should have minimum cumulative turnover from operation in the previous three financial years and the current financial year, **at least 150%** of the advertised value of the tender. The tenderers shall submit Certificates to this effect which may be an attested Certificate from the concerned department / client or Audited Balance Sheet duly certified by the Chartered Accountant/Certificate from Chartered Accountant duly supported by Audited Balance Sheet. The contact details of CA/Statutory Auditor along with UDIN No. shall be mandatorily mentioned on copy of certified Balance Sheet/Certificate.

Note: Client certificate from other than Govt. Organization should be duly supported by Form 16A/ 26AS generated through TRACES of Income Tax Department of India.

9.3   Bidder should have authorization specific to this tender from respective OEM as per **Annexure-II**. If OEM is directly participating in the Bid, self-declaration in this connection required to be submitted.

9.4   Bidder and OEM should Not be convicted (within three years preceding the last date of bid submission) or stand declared ineligible/ suspended/ blacklisted/ banned/ debarred by any other Ministry/ Department/ PSUs of the Government of India from participation in Tender Processes of all of its entities. An undertaking to this effect signed by the authorized signatory to be submitted by the Bidder.

10   Variation of Quantities at the Time of Award

i.   The purchaser reserves the right to increase or decrease the quantity to be ordered up to 30 percent at the time of placement of contract. The purchasers also reserve the right to increase the ordered quantity by up to 30% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly.

ii.   The provision of + (plus) 30% Option Clause shall be applicable as a Special Condition of Contract with a minimum purchase value of Rs. 1.5 Crores, for fixed quantity contracts, for procurements of materials of which the requirements are of continuing nature. However, such a threshold for inclusion of Option Clause may be decided by RailTel as deemed fit.

11   Warranty:

11.1   The materials are to be warranted for **3 years** from date of delivery to the consignee. The tenderer shall warrant that stores to be supplied shall be new and free from all defects and faults in material, workmanship and manufacturing and shall be of the highest grade and consistent with the established and generally accepted standards of materials of the type ordered and shall perform in full conformity with the specifications and drawings.

The supplier shall be responsible for any defects that may develop under the conditions provided by the contract and under proper use, arising from faulty materials, design or workmanship such as corrosion, inadequate quantity of material to meet item requirements, inadequate contact protection, deficiencies in design and/ or otherwise and shall remedy such defects at his own cost when called upon to do so by the Purchaser who shall state in writing in what respect the stores are faulty.

11.2   **SLA:**

After having been notified of the defects/service requirement during warranty period, Seller has to complete the required Service/Rectification within time limit of max. 7 days. If the Seller fails to complete service / rectification with in defined time limit, a penalty of 0.5% of Unit Price of the product shall be charged as penalty for each week of delay from the seller & upto max. of 100% of Unit Price of the product. Seller can deposit the penalty with the Buyer directly else the Buyer shall have a right to recover all such penalty amount from the Performance Security (PBG) or from the running bills.

12   Payment Conditions: -

(i)   100% payment against full supply.
(ii)   80% payment against part supply. In case bidder completes the supply order for one SOR, he can claim part payment of 80% against each SOR's completed supply of the said SORs. Balance payment shall be made after full supply.
(iii)   The following documents are to be submitted for payment:

- Original Tax Invoice. (With separate Tax amount, containing POS, RailTel GSTN and Supplier GSTN).
- Delivery Challan/E-way bill
- Original Consignee receipt with GRN No.
- Original Inspection Certificate
- Transit Insurance Certificate
- Warranty Certificate of OEM

- Copy of BG/Proof of BG Submission
- Certificate of receipt of Goods in good condition from RailTel

(iv) Any changes in the statutory taxes & duties during the contract period shall be on RailTel account with in the original DOC. Beyond DOC, changes in statutory taxes & duties shall be on RailTel's account only when the delay is an account of RailTel.

13 The tenderers shall submit a notarized affidavit on a non-judicial stamp paper stating that they are not liable to be disqualified and all their statement/documents submitted along with bid are true and factual. Standard format of the affidavit to be submitted by the bidder is enclosed as **Annexure-III**. **Non submission of a notarized affidavit by the bidder shall result in summarily rejection of his/their bid**. And it shall be mandatorily incumbent upon the tenderer to identify state and submit the supporting **documents duly self-attested** by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document. It will not be obligatory on the part of Tender Committee to scrutinize beyond the submitted document of tenderer as far as his qualification for the tender is concerned.

The RailTel (RCIL) reserves the right to verify all statements, information and documents submitted by the bidder in his tender offer, and the bidder shall, when so required by the RailTel (RCIL), make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification by the RailTel (RCIL) shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the railway thereunder.

In case of any wrong information submitted by tenderer, the contract shall be terminated. Performance Guarantee (PG) of contract forfeited and agency barred for doing business on RailTel (RCIL).

14   Online Submissions:

The bidder is required to upload and submit the following documents on line before due date & time of bid. The due date & time for closing of the bid as per GeM Bid and the bid will be opened as per GeM Bid.

(i)   EMD/Valid Documentary proof of exemption.
(ii)   Clause wise compliance along with all mentioned documents/ annexures for all clauses of GeM Bid and ATC (Information to bidder) documents.
(iii) Data Sheet of offered item/equipment.
(iv)   Financial (Certified copies of audited balance sheets/annual reports of last three preceding financial years) and Technical Eligibility Criteria documents.
(v)   Technical Compliance of all Specification of items as per ATC documents.
(vi)   Proof of document required against Eligibility criteria of Bidder / OEM vide para -9.
(vii) MAF/OEM Authorization as per **Annexure-II**.
(viii) Notarized affidavit on a non-judicial stamp paper as per **Annexure-III**.

(ix)   Duly notarized Power of Attorney in name of authorized signatory as per Clause No. 18.

(x)   NIL deviation declarations as per **Annexure- VI.**

(xi)   Declaration Regarding Minimum local content under preference to "MAKE IN INDIA" Policy as **Annexure-VII.**

(xii)   Land Border Sharing Declaration as **Annexure-VIII.**

(xiii)   **Bid Securing Declaration** as **Annexure-IX.**

15   Offline submission:

Original copy of documents shall be submitted by tenderer offline at RailTel Corporation of India Western Railway Microwave Complex, Senapati Bapat Marg Mahalaxmi (West) Mumbai - 400013 at any point of time whenever asked for verification. Incase original are not produced before provided due date, bid may be rejected.

16   Make in India

The provisions of the Public Procurement (Preference to Make in India) Order 2017 dated June 15, 2017 (or subsequent revisions, if any) by Department of Industrial Policy and Promotion, GoI shall apply to this tender to the extent feasible. Minimum Local Content for SOR items shall be 50% for purchase preference as per the Notification No. 18-10/2017-IP dated 29th August 2018 issued by Department of Telecommunications, Ministry of Communications or as per the latest notification. Bidder shall be required to give a self-certification in his bid that the item offered meets the local content and shall give details of the location(s) at which the local value addition is made. Bidder should submit Self Certification under preference to "MAKE IN INDIA" Policy as **Annexure-VII.**

In case of any false declaration, action shall be taken in line with the provisions of the PPP-MIII order.

In cases of procurement for a value excess of Rs. 10 crores, the 'Class-I local supplier/ Class-II local supplier' shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

17   Insurance

17.1   The Contractor shall take out and keep in force a policy or policies of insurance from the date, the delivery of material starts (including the transit portion) against all liabilities of the contractor or the Purchaser. The contractor shall take out and keep in force a Policy or policies of Insurance for all materials covered in schedule of requirement irrespective of whether used up in the portion of work already done or kept for the use in the balance portion of the work until such material are provisionally handed over to RailTel. The contractor should ensure the stores brought to site,

against risks as required under the Emergency Risk (Goods) Insurance Act in force from time to time up to contract value.

17.2   It may be noted that the beneficiary of the insurance policy should be RailTel or the policies should be pledged in favor of RailTel. The contractor shall keep the policy/policies current till the item/equipment are handed over to the purchaser.

18   Power of Attorney

Power of attorney in favor of the signatory duly authorizing the signatory shall be submitted online before the due date and time of submission of the e-Tender and Original copy is needed to be submitted by the successful bidder as per the clause-15 above.

19   The guidelines and directives issued by Department of Telecommunication, Govt. of India regarding procurement of Telecommunication equipment from trusted sources shall be applicable to this tender. The offered equipment shall be trusted Products". The vendor/OEM shall submit declaration for compliance.

20   Settlement of Disputes/ Arbitration

20.1   Any dispute or difference whatsoever arising between the parties out of or relating to the construction, meaning, scope, operation or effect of this contract or the validity or the breach thereof shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996 as amended and the award made in pursuance thereof shall be binding on the parties. The venue of such arbitration or proceedings thereof shall be at Mumbai.

20.2   All arbitration proceedings shall be conducted in English. Recourse against any arbitral award so rendered maybe entered into court having jurisdiction or application may be made to such court for the order of enforcement as the case may be.

20.3   The Arbitral Tribunal shall consist of the Sole Arbitrator appointed by CMD/RailTel Corporation of India Limited, if the value of claim is up to Rs. 10 lakhs. If the value of the claim or amount under dispute is more than Rs. 10 Lakhs, the matter shall be referred to the adjudication of arbitral council. Chairman Managing Director (CMD) of RailTel Corporation shall furnish a panel of three names to the contractor, out of which, contractor will recommend one name to be his nominee and then CMD/RailTel shall appoint one name as RailTel's nominee and these two arbitrators with mutual consent shall appoint a third arbitrator who shall act as the deciding arbitrator in terms of Arbitration and Conciliation Act. The award of the sole arbitrator or the Arbitral council, as the case may be, shall be final and binding on both the parties. Each of the parties agree that notwithstanding that the matter may be referred to Arbitrator as provided herein, the parties shall nevertheless pending the resolution of the Controversy or disagreement, continue to fulfil their obligation under this Agreement so far as they are reasonably able to do so.

Note: 1) The bidder is required to give acceptance of all the clauses of **GeM bid, ATC** and RailTel's Bid Specific **ATC** document. Any deviation/ non-acceptance may lead to rejection of the bid.

2) Information to Bidder viz. corrigendum /addendum/ amendments etc. for this bid shall be posted on www.railtelindia.com and GeM only.

3) This bid is governed by the Specific Additional Terms & Conditions and General Terms & Conditions laid down by the GeM against **GeM Bid No: GEM/2025/B/6092012**

4) After opening of the technical bid no correspondence/ submission of document made at the initiative of the bidder will be entertained. However, the purchaser can, if required, ask for clarifications in writing which need to be submitted before a target date. The clarifications submitted as required by the purchaser before the target date will be considered.

5) In case, if any contradiction between GeM Bid, Additional Terms & Conditions, RailTel's Bid Specific Additional Terms & Conditions and General Terms & Conditions, **RailTel's Bid Specific Additional Terms & Conditions will prevail.**

Technical Specification

1. **Equipment should be:**

   i.   The Electronics product (Except SOR item No. 2 & 5) should have service life for next 08 Years from date of delivery. The certificates/ Undertaking for the same will have to be submitted along with bid from respective OEM.
   The Electronic products covered under SOR item No. 2 & 5 should have service life for next 05 Years from date of delivery. The certificates/ Undertaking for the same will have to be submitted along with bid from respective OEM.

   ii. Equipped with necessary hardware/ software to comply all above required / support features.

   iii. Back-to-Back warranty with respective OEMs for both Hardware and Software. The certificates/ Undertaking for the same will have to be submitted along with bid from respective OEM.

   iv. OEM should have its Service Centre at min 02 locations in major cities in India. Service centre details to be shared along with address and contact no. and person.

   v.   UL, CE and FCC Certification is not required for PMA. However, Bidder have to produce certificate from OEM that their product is equivalent to UL, CE and FCC and meets all standard and specification of UL, CE and FCC.

S N	Description of Item	Unit	Quantity
1	Router Type II as per Technical specification	Nos	17
2	Router Type IV as per Technical specification	Nos	19
3	Router Type V as per Technical specification	Nos	5
4	Router type VII as per Technical specification	Nos	1
5	Router Type VIII as per Technical specification	Nos	22
6	Router Type XI as per Technical specification	Nos	3
7	Switch Type I as per Technical specification	Nos	1
8	Switch Type IV as per Technical specification	Nos	5
9	Switch Type V as per Technical specification	Nos	44
10	Switch Type VI as per Technical specification	Nos	33
11	Switch Type VII as per Technical specification	Nos	33
12	Switch Type X as per Technical specification	Nos	1
13	Telepresence Type I as per Technical specification	Nos	9
14	Wifi AP Outdoor with mounting accessories	Nos	20
15	SFP 1G 10 KM BIDI	Nos	28
16	SFP 1G 20 KM BIDI	Nos	4
17	SFP 1G 40 KM BIDI	Nos	34

S N	Description of Item	Unit	Quantity
18	SFP+ 10G 60 KM BIDI	Nos	2
19	SFP+ 10G 40 KM BIDI	Nos	138
20	SFP+ 10G 10 KM dual fiber	Nos	21
21	QSFP28 LR4	Nos	16
22	AC to DC Converter (-48V) 1000 Watts	Nos	11
23	AC to DC Converter 10A	Nos	1
24	Rack-19" 42U Telecom Rack with all accessory (Cable line Cash-n-capping, Cable Manager and DC Supply Distribution Panel in Rack)	Nos	8
25	Patchchord (LC-E2000) 10 meter	Nos	20
26	Strenghtened outdoor Cat-6 UTP cable drum 305 metre each	Nos	3

SOR item 1: Router Type II Technical Specifications

SN	Description	Compliance
1	The Router shall be designed for continuous operations. The bidder shall furnish the MTBF (Mean Time between Failures) and MTRR (Mean Time to Restore) and predicted and observed values along with calculations by manufacturer.	
2	In case of full system failure, Router shall maintain a trace area in the NVRAM, which would be used for analysis/ diagnosis of the problem.	
3	Router shall have built in power on diagnostics system to detect hardware failures.	
4	Should have DC power supply arrangement without any external adaptors with redundant power supply.	
5	Router shall have suitable Visual Indicators for diagnostics and healthy/ unhealthy status of ports & modules.	
6	Router shall have 8 Nos. of Gigabit SFP ports and 4 Nos. RJ45 1000 Base – TX / SFP Port with RJ-45 SFP and 4 Nos. of 10 Gigabit SFP+ ports complying to IEEE 802.3, IEEE 802.3u and 802.3ab standard, supporting half duplex mode, full duplex mode and auto negotiation on each port of 1G to optimize bandwidth.	
7	Router shall have minimum of 52 Gbps (full duplex) forwarding bandwidth at layer 2switching fabric.	
8	Router shall have a minimum of 16000 MAC address space.	
9	Bidder to propose Router having Operating and Storage Temperature as per environmental requirement. However, the Router should be capable of working at temperature 0 to 45 degree (minimum).	
10	It should be possible for the Router to be mounted on a 19-Inch rack. All accessories required for this mounting should be supplied.	

SN	Description	Compliance
11	Should support jumbo frame.	
12	**Shall have the following MPLS features:**	
	i. Shall support Static IPv4 and Ipv6 routing. It shall also support OSPFv2 and OSPFv3.	
	ii. Shall also support BGP and ISIS based routing.	
	iii. Shall also support MPLS with RSVP and LDP signaling. It shall support MPLSFRR and L3VRF with upto 128 VRF/L2VPN/VPLS	
	iv. Shall support a scale of 250 VLAN and shall support Ethernet OAM features like BFD, 802.3ah, 802.1ag and Y.1731	
	v. Shall support at least 10K MPLS labels.	
	vi. Shall support 16K for IPv4 routes and 4K for IPv6 routes.	
	vii. It shall support LSP ping and trace.	
	viii. It shall support 8 hardware queues per port and shall support ingress policing and egress shaping.	
	ix. Should support Segment routing, TI-LFA, R-LFA, MPLS-TE	
	x. Shall support MPLS based L3, L2 VPN & VPLS services.	
	xi. It shall also support SYNC Ethernet/ IEEE 1588V2 (PTP) and SNMPv3.	
	xii. Shall support remote telnet and SSH capabilities and it shall be possible to integrate with NMS system	
	xiii. Shall conform to UL 60950 or IEC 60950 Standards for safety requirements\ of IT Equipment.	
	xiv. Shall conform to EN55022 Class A/B or CISPR22 Class A/B or CE Class A/B for EMC for (Electro Magnetic Compatibility) or latest.	
13	Shall have the following features. All software's/hardware's/License required for this must be supplied along with the Router.	
	i. Link Aggregation Control (LCAP) as per IEEE 802.3ad	
	ii. Support for IEEE 802.1Q VLAN on all ports.	
	iii. Support for minimum 256 VLANs.	
	iv. Support for IEEE 802.1 D spanning tree protocol / 802.1 s MSTP	
	v. Support for IEEE 802.1 s MSTP.	
	vi. Support Dynamic Host Configuration Protocol (DHCP).	
	vii. Support Auto –MDIX (Media Dependent Interface Cross over)	
	viii. Support Inter VLAN IP routing for full layer -3 routing.	
	ix. Support for IPv6	
	x. Support Strict Priority Queuing	
	xi. Support Network Time Protocol (NTP)/ Simple Network Time Protocol (SNTP) based.	
	xii. RFC 1305/ 2030 for synchronization of date & time from the Central NTP Server.	
	xiii. Support RADIUS protocol for console access restriction and authentication as per RFC 2138.	

SN	Description	Compliance
xiv.	Support 4 group of embedded RMON (history, static's and alarms). or advanced level monitoring like Performance monitoring, Statistics, Alarm logging and event management, Telemetry and SNMP Polling of data	
xv.	Support multiple privilege level to provide different level of access on console port and telnet sessions	
xvi.	Support classification and scheduling as per IEEE 802.1P on all ports.	
xvii.	Support Port Spanning functionally for measurements using a networks analyzer.	
xviii.	Support all the standard MIBs (MIB-I&II).	
xix.	Support for console port Interface for configuration and diagnostics purposes.	
xx.	Support Port Spanning functionally for measurements using a networks analyzer.	
xxi.	ITU-T G.8032 Ethernet Ring Protection designed for loop protection and fast convergence times (sub 50 ms) in ring topologies	
xxii.	Should support multiple Ring up to 8 ring (Main and Sub Ring) protection failover within 50 ms (up to 10 Router in ring) or ITU-T G.8032 v2 (Confirmed roadmap within a year time is also acceptable for ITU-T G.8032 v2 with no additional cost to RailTel).	
xxiii.	Should support Optical Transceiver Digital Diagnostic Monitoring.	
xxiv.	Priority queues: Eight hardware-based queues per port for flexible QoS management	
xxv.	Traffic prioritization: Flow-based QoS with internal and external (a.k.a., remarking) prioritization	
xxvi.	Bandwidth management: Flow-based bandwidth management, ingress rate limiting; egress rate shaping per port.	
xxvii.	Queue management: Configurable scheduling algorithms — Strict Priority Queuing (SPQ), Weighted Round Robin(WRR) and Deficit Round Robin (DRR) or better. Rack Mountable clamps for standard 19 inch Rack for each item.	
xxviii.	The following Metro Ethernet features should support:	
1.	IEEE 802.1ad Provider Bridge.	
2.	Transparent LAN Services with Service VLAN (SVLAN) and Customer VLAN (CVLAN) concept.	
3.	CVLAN to SVLAN translation and mapping	
4.	IEEE 802.1ag Ethernet OAM: Connectivity Fault Management (Support 32 MEPs).	
5.	Ethernet OAM compliant with IEEE 802.3ah.	
6.	ITU-T G.8032 Ethernet Ring Protection designed for loop protection and fast convergence times (sub 50 ms) in ring topologies	
7.	Should support Optical Transceiver Digital Diagnostic Monitoring.	

SN	Description	Compliance
	8. L2 Protocol Tunneling.	
14	Router shall have support of following Standards:	
	i. IEEE 802.1D (STP) / 802.1 s MSTP	
	ii. IEEE 802.1p (CoS)	
	iii. IEEE 802.1Q (VLANs)	
	iv. IEEE 802.1ag (Connectivity Fault Management)	
	v. IEEE 802.1s (MSTP)	
	vi. IEEE 802.3z (Gigabit Ethernet)	
	vii. IEEE 802.3ab (1000Base-T)	
	viii. IEEE 802.3ac (VLAN Tagging)	
	ix. IEEE 802.3ad (Link Aggregation)	
	x. IEEE 802.3ae (10 Gigabit Ethernet)	
	xi. IEEE 802.3ah	
	xii. ITU-T G.8032/Y.1344 2010: Ethernet Ring	
15	Router shall have the following Certifications:	
	i. The model of the Routers series shall have MEF- (9 & 14)/ CE2.0 or IEEE standards or higher certification from authorized agencies.	
	ii. CE / FCC	
	iii. Shall conform to UL 60950 or IEC 60950 or EN 60950 Standards for safety requirements of IT Equipment.	
	iv. Shall Confirm relevant standards of EN/CE/FCC for EMC for (Electro Magnetic Compatibility).	
16	OEM should have a valid ISO 9001 & ISO 14001 certification on the date of opening of bid	
17	IPv6 feature should be ready from day 1.	
18	Router/ Router OS/Router Series should be tested and certified for EAL 2 / NDPP (Network Device Protection Profile) or above under Common Criteria Program for security related functions or under Indian Common Criteria Certification Scheme (IC3S) by STQC, DEIT, Govt. of India.	
19	**On Site OEM Warranty (Year) - 3 years**	

SOR item 2: Router Type IV Technical specification

SN	Description	Compliance
1	**Architecture:**	
1.1	Proposed Routers should support SDWAN ready	
1.2	The router should be a single box configuration for ease of management.	
1.3	It shall support hardware based VPN (3DES/ AES) Encryption, MD5, SHA, SHA-256	
1.4	The router shall support complete Firewall features.	

SN	Description	Compliance
1.5	Router shall support minimum 100K IPv4 and 50K Ipv6 routes.	
1.6	The Router shall have enough "High-performance multicore processors capacity and 4 GB DRAM and 4GB Flash Memory from Day1. So as to efficiently meet all the functionalities laid down in the specifications.	
1.7	It shall have integrated USB port.	
1.8	It shall be supplied with necessary power cards, data cables, connectors, bracket accessories, wire managers and other appropriate accessories. Routers shall be capable of working with 110 – 240 Volts AC nominal at frequency 50 +/- 2 Hz.	
2	**Performance:**	
2.1	It shall support high performance traffic forwarding with con-current features like firewall and encryption.	
2.2	Router shall support aggregate WAN throughput of 100 Mbps from Day-1 and IPSEC Throughput of 50 Mbps from Day-1	
2.3	It shall support variety of Ethernet Interfaces – 1 RJ45 GigE and 1 SFP GigE port & 4 port LAN 10/100/1000 Mbps port.	
2.4	It shall support other IP Services like GRE tunnelling, ACLs, IPSEC VPNs, Firewalling, NAT services.	
3	**High Availability:**	
3.1	It shall support non-stop forwarding for fast re-convergence of routing protocols.	
3.2	It shall support VRRP or equivalent	
4	**Protocol Support:**	
4.1	The router shall have routing protocols like IS-IS, RIP ver1 & RIP Ver.2, OSPF ver2, BGP4.	
4.2	It shall support multicast routing protocols IGMPv1/ v2/v3, PIM	
4.3	It shall support DHCP, Ipv6 QoS and Ipv6 Multicast, OSPFv3	
5	**Quality of Service (QoS) Features:**	
5.1	The router shall support the following:	
5.1.1	Classification and Marking: Policy based routing, IP Precedence, DSCP.	
5.1.2	Congestion Management: WRED, Priority queuing, Class based weighted fair queuing.	
5.1.3	Traffic Shaping and Policing for QoS	
6	**Security Features:**	
6.1	The router shall support GRE Tunneling & NAT Services.	
6.2	It shall support MD-5 route authentication	
6.3	It shall support AAA support using Radius.	
6.4	It shall support DoS prevention	
6.5	It shall support IP Access list to limit Telnet and SNMP access to router.	
6.6	It shall support multiple privilege level authentications for console and telnet access through Local database or through an external AAA Server.	

SN	Description	Compliance
6.7	It shall support IEEE 802.1x support for MAC address authentication.	
7	**Debug, Alarms & Diagnostics:**	
7.1	The router shall have display of input and output error statistics on all interfaces.	
7.2	It shall have display of dynamic ARP table.	
7.3	Trace-route and Ping shall be available.	
8	**It should support Network Time Protocol**	
9	**Management:**	
9.1	The router shall have support for CLI, Telnet and SNMPv3.	
9.2	It shall support Secure Shell for secure connectivity.	
9.3	It shall have to have dedicated console for Local management/ login through USB port/ RJ45 port/ serial	
9.4	Event and System logging: Event and system history logging functions shall be available. The Router shall generate system alarms on events. Facility to put selective logging of events onto a separate hardware where the analysis of log shall be available.	
10	**Certification Requirements:**	
	"Router/ Router OS should be tested and certified for EAL 2/ NDPP (Network Device Protection Profile) or above under Common Criteria Program for security related functions or under Indian Common Criteria Certification Scheme (IC3S) by STQC, DEIT, Govt. of India."	
11	**On Site OEM Warranty (Year) - 3 years**	

SOR item 3: Router Type V Technical specification

SN	Specifications	Requirements	PQC/ Optional	Compliance
1	Router should support 8 minimum 1G/ 10G SFP+ ports from day one (Including SFP of LR type 10G SFP+ Dual Fiber 1310).	8	PQC	
2	Router should have support for 100G Interfaces (**Including** XFP/ SFP/ QSFP).	4	PQC	
3	Total throughput (Full duplex).	Minimum 280 Gbps	PQC	
4	MAC Table Size	64K	PQC	
5	IPv4 RIB/ FIB	Minimum 1M/128K	PQC	
6	IPv6 RIB/ FIB	Minimum 512K/32K	PQC	
7	MPLS Labels	Minimum 32K	PQC	
8	Label Stack	Minimum 5	PQC	

SN	Specifications	Requirements	PQC/ Optional	Compliance
9	L2/ L3 VPN VRF	Minimum L2 1000, Minimum L3 256	PQC	
10	Packet Forwarding Rate (IMIX traffic) in Mpps	Minimum 300	PQC	
11	Support of number of queues per system	Minimum 4K	PQC	
12	Number of VLAN support	1000	PQC	
13	Operating Temperature	(0 to 40 degree C or better)	PQC	
14	Storage Temperature	(-10 to 60 degree C or better)	PQC	
15	Router can be of either modular/ fixed type and shall have modular Operating system where it shall support individual restart of critical processes without affecting other processes or rebooting the entire operating system.		PQC	
16	All 10G interfaces should support LR, ER and ZR		PQC	
17	Router shall have option checking configuration before committing and option of rolling back to at least five configurations.		PQC	
18	Router should have redundant DC (with the operating range of -40 to -72 VDC) power supplies		PQC	
19	Digital Optical Monitoring (DOM) should be supported, optics information retrievable including RX/ TX-power, threshold monitoring/ alarming, inventory.		PQC	
20	It shall support role based privileges for the system access and radius authentication for the System admin.		PQC	
21	The router should have a Console or Out-of-band Management.		PQC	
22	Alerts for environmental or other hardware based alarms should be visibly implemented on the chassis.		PQC	
23	All interfaces shall support services like L2VPN, L3VPN, VPLS and multicast VPN for both IPv4 and IPv6		PQC	

SN	Specifications	Requirements	PQC/ Optional	Compliance
24	The router should have mechanism to protect itself from DDoS attack.		PQC	
25	The router should be IPv6 ready from day one.		PQC	
26	The router should support filtering based on different parameters like: src ip, dst ip, src port, dst port, protocol etc		PQC	
27	The router should support Netflow, Jflow or equivalent		PQC	
28	The router should support IP SLA or RPM (or equivalent) for performance measurements, it should also support monitoring of IP SLA/ RPM (or equivalent) probes using SNMP polling (OEM has to provide SNMP MIB information)		PQC	
29	Shall support QoS, option of traffic shaping per Interface based.		PQC	
30	Shall support following class of service features:		PQC	
	a) Classification, policing, marking, shaping, filtering			
	b) Manage congestion using a weighted random early detection (WRED) algorithm			
	c) RFC 2474, Definition of the Differentiated Services Field in the IPv4 and IPv6 Headers			
	d) Single Rate Three Color Policer RFC 2697			
	e) Congestion Management through CBWFQ, Round- Robin or equivalent, WFQ or equivalent			
	f) RFC 2597, Assured Forwarding PHB Group			
	g) RFC 2598, An Expedited Forwarding PHB			
	h) Router should be able to classify based on 802.1 ad, 802.1 p, EXP and DSCP bits			
	i) The router shall support traffic interface mirroring in both ingress & egress directions for both IPv4 & IPv6			

SN	Specifications	Requirements	PQC/ Optional	Compliance
31	The router shall support provision for event based scripts that shall be capable of performing actions based on certain triggers		PQC	
32	The router shall support aggregated Ethernet and it shall be possible to bundle Upto 16 links.		PQC	
33	Shall support following MPLS features		PQC	
	a) LDP and RSVP signalling			
	b) RFC 5036, LDP Specification			
	c) RFC 3212 OR Constraint-Based LSP Setup using LDP			
	d) RFC 3215, LDP State Machine			
	e) RFC 3478, Graceful Restart Mechanism for LDP			
	f) RFC 2858, Multiprotocol Extensions for BGP-4			
	g) RFC 3063, MPLS Loop Prevention Mechanism			
	h) RFC 3031, Multiprotocol Label Switching Architecture			
	i) RFC 3032, MPLS Label Stack Encoding			
	j) The router should be able to do load-balancing over multiple equal cost MPLS LSP			
34	The Router shall support MPLS Fast Reroute both link protection and Node protection.		PQC	
35	MPLS Ping, MPLS Trace Route		PQC	
36	Fast Reroute Extensions to RSVP-TE for LSP Tunnels		PQC	
37	The router shall Support of Sync-E & PTP technology (License price to be quoted separately)		PQC	
38	Shall support MPLS based VPN services		PQC	
	a) L3VPN, L2VPN (Kompella BGP/ Martini LDP)			
	b) Internet draft, draft-ietf-l2vpn-vpls-bgp-08.txt, Virtual Private LAN Service (VPLS) Using BGP for Auto-discovery and Signaling			

SN	Specifications	Requirements	PQC/ Optional	Compliance
	c) RFC 4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling			
	d) Next Generation mVPN (P2MP) based on (Draft-ietf-13vpn-2547bis-mcast-01.txt) & mVPN (draft- rosen-vpn-mcast).			
39	The router shall support the following routing features		PQC	
	a) BGPv4, BGP confederations and route reflector			
	b) Dynamic Host Configuration Protocol (DHCP)			
	c) RFC 3101, The OSPF NSSA Option			
	d) RFC 2328, OSPF Version 2			
	e) RFC 3623, OSPF Graceful Restart			
	f) RFC 3630, Traffic Engineering (TE) Extensions to OSPF Version 2			
	g) RFC 1195, Use of OSI IS-IS for Routing in TCP/ IP and Dual Environments			
	h) RFC 2104, HMAC: Keyed-Hashing for Message Authentication			
	i) RFC 2973, IS-IS Mesh Groups			
	j) RFC 3358, Optional Checksums in IS-IS			
	k) RFC 3359, Reserved Type, Length and Value (TLV) Code points in IS-IS			
	l) RFC 3373, Three-Way Handshake for IS-IS Point- to-Point Adjacencies			
	m) RFC 5305, IS-IS Extensions for Traffic Engineering			
	n) RFC 3847, Restart Signalling for IS-IS			
	o) RFC 3590, Source Address Selection for Multicast Listener Discovery Protocol			
	p) IGMP v2 and v3 as described in RFC 2236 and RFC 3376 with IGMP Routing Policies to filter IGMP requests.			

SN	Specifications	Requirements	PQC/ Optional	Compliance
40	The router shall support Virtual Router Redundancy Protocol (VRRP) as per IETF RFC 3768		PQC	
41	Router shall support SNMP v2/v3 and NTP		PQC	
42	Shall support BFD for both single hop and multihop sessions		PQC	
43	Shall support the following OAM features and actions such as syslog/ link down should be configurable on OAM event trigger:		PQC	
	a) 802.3ah			
	b) 802.1ag			
	c) Y.1731			
44	Shall support Multi-chassis LAG or equivalent features			
45	IPv6 Features		PQC	
	a) IPv6 Ping			
	b) IPv6 trace route			
	c) OSPF v3			
	d) IS-IS			
	e) VRRPv3			
	f) IPv6 CoS (classification & rewrite, scheduling based on TC)			
	g) IPv6 ACL			
	h) 6PE and 6VPE			
46	Multicast Feature: It shall support following:		PQC	
	a) It shall support IGMP snooping v2/ v3			
	b) The router shall support PIM Sparse Mode, RFC 4601 (optional)			
	c) Rendezvous Point (RP) - ability to be configured as an RP			
	d) RFC 3569, Source Specific Multicast (SSM)			
	e) RFC 2365, Administratively Scoped IP Multicast			
	f) RFC 3446, Anycast Rendezvous Point (RP) Mechanism using Protocol Independent Multicast			

SN	Specifications	Requirements	PQC/ Optional	Compliance
	(PIM) and Multicast Source Discovery Protocol (MSDP).			
	g) RFC 3618, Multicast Source Discovery Protocol (MSDP).			
47	The proposed router should be NEBS level 3 compliant. NEBS Certification is not required for PMA. However OEM has to produce certificate from standard lab approved or authorized by Govt. of India that the supplied Products are equivalent to NEBS and meet all standard and specification of NEBS		PQC	
48	The device should comply to the following safety standards		PQC	
	a) EN 55022 Class A Emissions (Europe)			
	b) FCC Class A (USA) Radiated Emissions			
	c) UL 60950-1 Information Technology Equipment – Safety			
	d) EN 60825-1 Safety of Laser Products			
	e) EN-61000-4-11 Voltage Dips and Sags			
	f) ETS-300386 Electromagnetic Compatibility Requirements			
	g) The device will conform to the following EN/IEC standard:			
	i. 61000-4-2 – ESD			
	ii. 1000-4-3 Radiated Immunity			
	iii. 61000-4-4 – EFT			
	iv. 61000-4-5 - Surge			
	v. 61000-4-6 – Low Frequency common immunity			
49	The offered devices must support following functionalities to support 3rd party SDN (in future)			
	a) The router should support RFC 6020, YANG - A Data Modelling Language for the Network Configuration		PQC	
	b) Protocol (NETCONF)		PQC	

SN	Specifications	Requirements	PQC/ Optional	Compliance
	c) The solution should support the network configuration protocol (NETCONF) that provides mechanisms to install, manipulate, and delete the configuration of network devices, RFC 6241		PQC	
	d) The router should be able to act as Path computation client in the PCE architecture defined in RFC 4655.		PQC	
	e) The router should support PCECP as defined in RFC5440.		PQC	
	f) The router should support BGP link-state (BGP- LS), RFC 4655		PQC	
	g) The router should support SPRING		Optional	
50	Devices shall support following for Provisioning			
	a) Use NETCONF (RFC 6241, RFC 6242)		PQC	
	b) REST/ NETCONF/ gRPC based CRUD operations for configuration and management.		PQC	
51	The offered devices must support API/ NBIs for auto discovery of Services and Physical & Logical Topology		PQC	
52	TELEMETRY Function: It shall support following:			
	a) The router should support telemetry based on push model for monitoring network devices		PQC	
	b) The router should support various software models/ sensors for capturing different health parameters from the devices		PQC	
	c) The router should support sending telemetry data to multiple consumers simultaneously		PQC	
	d) The router shall support GPB/ GRPC/ KAFKA encoding for telemetry data		PQC	
	e) The software model/ sensors should be based on either yang, xml or open config		PQC	

SN	Specifications	Requirements	PQC/ Optional	Compliance
	f) The solution shall use either UDP or GRPC for transport of telemetry data		PQC	
	g) The system should support streaming granularity of atleast 10 sec		PQC	
	h) The router shall have the ability to interact with open standard based tools		PQC	
	i) The system should support REST API/ gRPC/ Netconf for communication with third party tools and applications		PQC	
	j) Enabling telemetry should not have any adverse impact on the performance of the device/ router		PQC	
	k) Some of the streaming models/ sensors the router should support are:		PQC	
	System			
	Chassis Environment		PQC	
	Line card utilization (memory, processor, QoS, Temp, Port utilization), errors counters		PQC	
	Controller Card sensors (memory, CPU, Temp etc)		PQC	
	Fabric statistics		Optional	
	ARP table state		Optional	
	Routing prefix information		Optional	
	Interface			
	Interface statistics (Physical and logical interfaces)		PQC	
	Interface optical diagnostic		Optional	
	Congestion and latency		Optional	
	Filter statistics		Optional	
	Protocol		Optional	
	BGP peer information		Optional	
	ISIS State, Interface, Adjacency statistics, LSDB		Optional	
	ISIS SPRING / Segment Routing Statistics		Optional	
	RSVP Interface Statistics		PQC	
	LSP statistics		PQC	

SN	Specifications	Requirements	PQC/ Optional	Compliance
	LSP Event Export, Experimental		PQC	
	IP SLA/RPM (or equivalent) reporting		PQC	
	Segment Routing statistics		PQC	
	DHCP statistics		Optional	
53	Router should support Dual Image/ Partition with USB flash drive booting option for OS recovery		PQC	
54	Router should support jumbo frame.		PQC	
55	Router should support port mirroring		PQC	
56	Router should support security features of Broadcast/ Mulitcast/ Unicast Storm control.		PQC	
57	Router should comply to following Temperature performance parameters:		PQC	
	i. Operating Temperature: -5 to 55 degree C or better			
	ii. Storage Temperature : -10 to 60 degree C or better			
58	Routers should support following Metro Ethernet Features:		PQC	
	i. ITU-T G.8032 Ethernet Ring Protection designed for loop protection or alternate mechanism to achieve ring protection in less than 50 ms			
	ii. Should support multiple Ring up to 8 ring (main and sub ring) protection failover within 50 ms or ITU-T G.8032 v2.			
59	The operating system of the Routers category/ series/family should be MEF 9/14 or CE (Carrier Ethernet) Certified.		PQC	
60	The Router shall be designed for continuous operations with dual fan system.		PQC	
61	Router should support CFM and LFM alarms.		PQC	
62	Shall support HQoS, option of traffic shaping per VLAN based.		PQC	
	i. Shall support at least 4K Queues.			
	ii. Per-VLAN policing.			
	iii. Per-VLAN rewrite			

SN	Specifications	Requirements	PQC/ Optional	Compliance
	iv. Per-VLAN two-rate tri-color marking.			
	v. Per-VLAN classification			
	vi. Per-VLAN filtering			
63	Support for P and PE router functionality for MPLS on the same router simultaneously and on all the interfaces.		PQC	
64	Router shall support E-Line or E-LAN MEF standards.		PQC	
65	Routers should be rack mountable to fit into a standard 19-inch rack		PQC	
66	OEM shall ensure that use of third-party optics shall not be explicitly blocked on the Router. Router must support all MSA complied Optics available in market.		PQC	
67	Segment Routing			
	i. Router should be able to support SR standards on IPv6 whenever it is firmed upto without any cost to RCIL.		PQC	
	ii. The router should support SR-MPLS data plane and protocols OSPF,IS-IS and BGP Segment routing extensions		PQC	
	iii. Controller instantiated SR Policy (PCEP, BGP) and SR policy based on demand next hop		Optional	
	iv. Router should have capability to calculate Bandwidth based path using centralized controller.		PQC	
	v. Shall support SR and MPLS (LDP) Interworking Mapping Server		PQC	
	vi. The router shall support dynamic point-to-point interface latency performance measurement. The measurement must be integrated in the IGP and BGP LS for SDN Controller Analysis.		Optional	
	vii. Label distribution protocol and segment routing should coexist and there should support option to prefer LDP over segment routing.		PQC	
68	EVPN Features			

SN	Specifications	Requirements	PQC/ Optional	Compliance
	i. Router should have support of Ethernet VPN (EVPN with single homing, multi homing		PQC	
	ii. Router should have support of following features on EVPN: EVPN-IRB, EVPN VPWS, EVPN VPWS Preferred Path over SR-TE Policy		Optional	
69	Router to support GRE tunnels (RFC 2784).		PQC	
70	**On Site OEM Warranty (Year) - 3 years**			

SOR item 4: Router Type VII Technical specification

SN	Description	Compliance
1	Router should support separate data and control plane capabilities.	
2	Router should have following interfaces :	
3	On-board 2x1G WAN SFP Port & 2 x 1G RJ45 LAN Port or more	
4	Router should have minimum 4 GB of DRAM and 4 GB Flash from Day1 OR Better	
5	The router should support following features IKEv1, IKEv2, VRF-aware IPsec, IPsec over IPV6, Hardware-accelerated DES, 3DES, AES 128, AES 192, and AES 256 from day1.	
6	Router should support minimum 100 tunnel	
7	Router can provide encrypted traffic performance of 350 Mbps.	
8	Router should have following protocol like static routes, RIPv1, RIPv2, OSPF, IS-IS, BGP, GRE, L2TP, L2TPv3, NAT, IPv4 and IPv6 Multicast, VRF lite, IGMPv3, 802.1x	
9	The Router should support Zone-Based Stateful Firewall, Application Aware Firewall and application inspection and control feature or an external appliance for the same functionality can be provided.	
10	Routers should support AAA using RADIUS and TACACS+	
11	Should have extensive support for IP SLA and best path selection for metrics like delay, latency, jitter, packet loss to assure business-critical IP applications from Day1.	
12	Router should support monitoring of network traffic with application level insight with deep packet visibility into web traffic, RTP-Based VoIP traffic.	
13	Router should capable to understand that system OS are authentic and unmodified, it should have cryptographically signed images to provide assurance that the firmware & BIOS are authentic.	

SN	Description	Compliance
14	Router should have traffic load balancing capability on dual WAN Links based on based on advanced criteria, such as reachability, delay, loss, jitter and bandwidth utilization.	
15	Router shall have capability to add on demand IPSec VPN tunnels dynamically established multipoint-to-multipoint IPSEC based spoke-to-spoke VPN tunnels matching traffic conditions	
16	Router shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.	
17	Router shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.	
18	Router/Router's Operating System should be tested and certified for EAL 3/NDPP or above under Common Criteria Certification	
19	Router should be IPv6 certified	
20	Router can support Encapsulations, Generic Routing Encapsulation (GRE), Ethernet, 802.1q VLAN, Point-to-Point Protocol (PPP), Multilink Pointto-Point Protocol (MLPPP).	
21	Router can support Traffic management, Quality of Service (QoS), Class-Based Weighted Fair Queuing (CBWFQ), Weighted Random Early Detection (WRED), Hierarchical QoS, Policy-Based Routing (PBR), Performance Routing (PfR),	
22	Router can support Cryptographic algorithms, Encryption: DES, 3DES, AES-128 or AES-256. Authentication: RSA (748/1024/2048 bit), ECDSA (256/384 bit); Integrity: MD5, SHA, SHA-256, SHA-384, SHA512.	
23	Router can support protocols IPv4, IPv6, static routes, Routing Information Protocol Versions 1 and 2 (RIP and RIPv2), Open Shortest Path First (OSPF), Border Gateway Protocol (BGP), BGP Router Reflector, Intermediate System-to-Intermediate System (IS-IS), Multicast Internet Group Management Protocol Version 3 (IGMPv3), Protocol Independent Multicast Sparse Mode (PIM SM), PIMSource-Specific Multicast (SSM), Resource Reservation Protocol (RSVP), Encapsulated Remote Switched Port Analyzer (ERSPAN), IP Service-Level Agreements (IPSLA), Call Home or equivalent, Embedded Event Manager (EEM) or equivalent, Internet Key Exchange (IKE), Access Control Lists (ACL), Ethernet Virtual Connections (EVC), Dynamic Host Configuration Protocol (DHCP), Frame Relay (FR) or equivalent , DNS, Locator ID Separation Protocol (LISP) or equivalent, Hot Standby Router Protocol (HSRP), RADIUS, Authentication, Authorization, and Accounting (AAA), Application Visibility and Control (AVC) or equivalent, IPv4-to-IPv6 Multicast, Multiprotocol Label Switching (MPLS), Layer 2 and Layer 3 VPN, IPsec, Layer 2 Tunneling Protocol Version 3 (L2TPv3), Bidirectional Forwarding Detection (BFD), IEEE 802.1ag, and IEEE 802.3ah.	
24	**On Site OEM Warranty (Year) - 3 years**	

SOR item 5: Router Type VIII Technical specification

SN	Description	Compliance
1	**Architecture:**	
1.1	Proposed Routers should support SDWAN ready	
1.2	The router should be a single box configuration for ease of management.	
1.3	It shall support hardware based VPN (3DES/AES) Encryption, MD5, SHA, SHA-256	
1.4	The router shall support complete Firewall features.	
1.5	Router shall support minimum 200K IPv4 and 50K Ipv6 routes.	
1.6	The Router shall have enough "High-performance multicore processors capacity and 4 GB DRAM and 4GB Flash Memory from Day1. So as to efficiently meet all the functionalities laid down in the specifications.	
1.7	It shall have integrated USB port.	
1.8	It shall be supplied with necessary power cards, data cables, connectors, bracket accessories, wire managers and other appropriate accessories. Routers shall be capable of working with 110 – 240 Volts AC nominal at frequency 50 +/- 2 Hz.	
2	**Performance:**	
2.1	It shall support high performance traffic forwarding with con-current features like firewall and encryption	
2.2	Router shall support aggregate WAN throughput of 200Mbps from Day-1 and IPSEC Throughput of 50 Mbps from Day-1.	
2.3	It shall support variety of Ethernet Interfaces – 2 SFP GigE ports & 4 port LAN 10/100/1000 Mbps port.	
2.4	It shall support other IP Services like GRE unnelling, ACLs, IPSEC VPNs, Firewalling, NAT services.	
3	**High Availability:**	
3.1	It shall support non-stop forwarding for fast re-convergence of routing protocols.	
3.2	It shall support VRRP or equivalent	
4	**Protocol Support:**	
4.1	The router shall have routing protocols like IS-IS, RIP ver1 & RIP Ver.2, OSPF ver2, BGP4.	
4.2	It shall support multicast routing protocols IGMPv1/ v2/v3, PIM	
4.3	It shall support DHCP, Ipv6 QoS and Ipv6 Multicast, OSPFv3	
5	**Quality of Service (QoS) Features:**	
5.1	The router shall support the following:	
5.1.1	Classification and Marking: Policy based routing, IP Precedence, DSCP.	
5.12	Congestion Management: WRED, Priority queuing, Class based weighted fair queuing.	
5.1.3	Traffic Shaping and Policing for QoS	

SN	Description	Compliance
6	**Security Features:**	
6.1	The router shall support GRE Tunneling & NAT Services.	
6.2	It shall support MD-5 route authentication	
6.3	It shall support AAA support using Radius.	
6.4	It shall support DoS prevention	
6.5	It shall support IP Access list to limit Telnet and SNMP access to router.	
6.6	It shall support multiple privilege level authentications for console and telnet access through Local database or through an external AAA Server.	
6.7	It shall support IEEE 802.1x support for MAC address authentication.	
7	**Debug, Alarms & Diagnostics:**	
7.1	The router shall have display of input and output error statistics on all interfaces.	
7.2	It shall have display of dynamic ARP table.	
7.3	Trace-route and Ping shall be available.	
8	**It should support Network Time Protocol**	
9	**Management:**	
9.1	The router shall have support for CLI, Telnet and SNMPv3.	
9.2	It shall support Secure Shell for secure connectivity.	
9.3	It shall have to have dedicated console for Local management/ login through USB port/ RJ45 port / Serial	
9.4	Event and System logging: Event and system history logging functions shall be available. The Router shall generate system alarms on events. Facility to put selective logging of events onto a separate hardware where the analysis of log shall be available.	
10	**Certification Requirements:**	
	"Router/ Router OS should be tested and certified for EAL 2/ NDPP (Network Device Protection Profile) or above under Common Criteria Program for security related functions or under Indian Common Criteria Certification Scheme (IC3S) by STQC, DEIT, Govt. of India."	
11	**On Site OEM Warranty (Year) - 3 years**	

SOR item 6: Router Type XI Technical specification

SN	Specification	Compliance
1.0	General Specifications & Architecture	
1.1	Chassis shall fit into a standard sized 19 inch rack mounting.	
1.2	Router should have redundant DC power feeds: -48VDC nominal.	
1.3	Router should be temperature hardened as it is placed at field locations	
1.4	The router shall provide a non-blocked switching matrix upto system capacity.	
1.5	Switching and packet routing (L2 and L3) shall be wire speed on all interfaces. Performance shall not be decreased at maximum traffic load.	

SN	Specification	Compliance
1.6	The router shall be equipped with 8x10G SFP+ and 4x40/100G (Uplink) QSFP28 Optical ports. All the optical interfaces shall be support LR,ER and ZR optics .	
1.4	The router should support Syn-E and PTP on network ports for LTE network	
1.8	The router should have external/ Internal Alarm Option for Chassis temperature and Chassis Power supply .	
1.9	Must have out-of-band Management port.	
1.10	Must have console port.	
1.11	Proposed Router series/ family of same type of OS shall have IP-MPLS interoperability with routers of other multiple OEMs. The product series/ family of same type of OS should should be tested at EANTC or any other renowned LAB for INTEROPERABIITY in Multi-OEM FOR IP/MPLS. The product series/ family should be deployed at least two major service provider, Govt, Railways. Customer letter/ Public case studies (Govt/PSU/ISP) with satisfactory performance of the offered make with IP/MPLS should be submitted along with offer.	
2.0		
2.1	Router should support unicast IPv4/IPv6 routing protocols (BGP, OSPF, IS-IS, OSPF v3, Segment Routing, SR-TE).	
2.2	Router shall support LDP, MPLS-TE with FRR and TI-LFA for sub 50 msec protection.	
2.3	Router must support Traffic Engineering for node and link protection.	
2.4	Router shall support aggregation of links. Minimum 8 links should be supported as part of single aggregation on a network side.	
2.5	Router shall support multi-chassis LAG for aggregation of links across two chassis.	
2.6	Router shall support performance monitoring for Layer-2 and layer-3 services (Y.1731/ Y.1564, CFM, TWAMP or equivalent).	
2.7	Router shall support IPV4 and IPV6, IGMP, MLD, and PIM-SM & SSM, ECMP, NGMVPN.	
2.8	Router shall support 6PE and 6VPE mode for IPV6 transport over IPV4.	
2.9	BGP Prefix independent control (EDGE / Core).	
2.10	Router shall support BFD with interval of 50ms or less .	
2.11	Router should support RFC 3107 of Carrying Label Information in BGP-4.	
2.12	Router should support Point to Point and Point to Multipoint LSP for Unicast and Multicast traffic.	
2.13	Router shall support layer3 and layer2 MPLS VPN , VPLS and EVPN.	
2.14	The router shall support Internet Group Management Protocol (IGMP) v1, v2 and v3.	
2.15	The router shall support Protocol Independent Multicast – PIM-SM and SSM.	
2.16	The switch/ router shall support Multicast troubleshooting tools like Mtrace and mfib ping or equivalent troubleshooting mechanism..	

SN	Specification	Compliance
2.17	IEEE 1588v2 Precision Timing Protocol (PTP) and Synchronous Ethernet support for network synchronization.	
3.0	Quality Of Service	
3.1	The switch/ router shall provide per-service, per-forwarding class queuing and shaping features.	
3.2	The router shall provide following QoS features: classification and hierarchical scheduling, WRR, strict priority (SP), profiled scheduling and multi-tier policing and shaping.	
3.3	Router shall support 3 level HQOS on all kind of Ethernet interface with minimum 8 Queue per port	
3.4	Similar QOS shall be supported for all type of interface including Bundled interfaces.	
3.5	IP Application Mapping. The list of IP match criteria should include Source IP address and mask, Destination IP address and mask, IP protocol, UDP source port, TCP source port, UDP destination port, TCP destination port.	
3.6	VLAN CoS preservation: the IEEE 802.1p priority bits.	
3.7	VLAN CoS differentiation: appropriate service differentiation must be applied according to the 802.1p bits. This will require the mapping of the 802.1p bits to DSCP values and EXP-bits in the MPLS header when the service is offered over a (partially) MPLS-enabled network.	
3.8	End-to-end delay budgets are a strictly-enforced to support critical applications SCADA, VOICE, Video.	
4.0	Security	
4.1	Security forms an integral part of a network design to protect both the end-customers and the network infrastructure. The solution that vendor proposes shall have the necessary provisions to implement the necessary security measures.	
4.2	Support Access Control List to filter traffic based on Source & Destination IP Subnet, Source & Destination Port, Protocol Type (IP, UDP, TCP, ICMP etc) and Port Range etc. Should Support SNMPv1/v2/V3.	
4.3	Black hole filtering: dropping of traffic destined for a specific prefix should be supported to avoid any attack in router	
4.4	Ingress and egress packet filtering based on L2-L4 criteria at wire speed. The possibility to log the deny actions on individual filter rules shall be supported.	
4.5	Protection of local services (http, small udp/tcp servers, dhcp, telnet, ssh) based on L2-L4 criteria.	
4.6	AAA support – Accounting, Authorization and Authentication of users and commands. Support of local authentication, TACACS+ and Radius.	
4.7	Authentication of routing protocol updates: IS-IS, OSPF, BGP.	
4.8	SSH support.	
5.0	Performance	
5.1	Router shall support non-blocking throughput capacity of 280 Gbps full duplex or higher.	

SN	Specification	Compliance
5.2	Router shall support 64k IPv4 routes/ 32k IPv6 routes and Multicast routes 1K.	
5.3	Router shall support 100 multicast groups.	
5.4	Minimum 32 MPLS layer-3 VPN's.	
5.5	Minimum 250 MPLS VPLS.	
5.6	Minimum 500 MPLS Layer-2 PWs.	
5.7	Router shall support min 64 BFD sessions.	
6.0	Certificates and environment standards	
6.1	Should comply to NEBS Level 3 specifications/ Equivalent TEC QM 333 or latest specification	
6.2	Safety: IEC/EN 60825-1 or IEC/EN 60825-2 or EN/IEC 60950-1	
6.3	Storage:EN300 019-2-1 class 1.2 / GR-63-CORE and GR-1089- CORE/ Equivalent TEC QM 333 or latest specification	
6.4	Transport:EN300 019-2-2 class 2.3 / GR-63-CORE and GR-1089- CORE/ Equivalent TEC QM 333 or latest specification	
6.5	In service:EN300 019-2-3 class 3.2 / GR-63-CORE and GR-1089- CORE	
6.6	Relative humidity: 5 to 85% (non-condensing).	
6.7	Operating temperature: 0°C to 40°C.	
7.0	MPLS Labels: Minimum 32K and Label Stack: 5	
8.0	The OEM shall ensure that the use of third-party optics shall not be explicitly blocked on the Router. Router must support all MSA complied optics available in market. Bidder is allowed to quote third party optics of renowned OEM and same should be fully compatible with offer equipment.	
9.0	The offered devices must support following functionalities to support 3rd party SDN (in future)	
9.1	The router should support RFC 6020, YANG - A Data Modeling Language for the Network Configuration	
9.2	Protocol (NETCONF)	
9.3	The solution should support the network configuration protocol (NETCONF)	
9.4	The router should be able to act as Path computation client in the PCE architecture defined in RFC 4655 or should support BGP-LS.	
9.5	The router should support PCECP as defined in RFC5440 should support BGP-LS.	
9.6	The router should support BGP link-state (BGP-LS), RFC 4655	
9.7	The router should support SPRING or Source Packet Routing in Networking or Segment routing	
9.8	The offered devices must support API/ NBIs for auto discovery of Services and Physical & Logical Topology	
10.0	TELEMETRY Function: It shall support following:	
10.1	The router should support telemetry based on push model	
10.2	The router should support various software models/ sensors for capturing different health parameters from the devices	

SN	Specification	Compliance
10.3	The router should support sending telemetry data to multiple consumers simultaneously	
10.4	The router shall support GPB/ GRPC/ KAFKA encoding for telemetry data (Optional)	
10.5	The software model/sensors should be based on either yang, xml or open config	
10.6	The solution shall use either UDP or GRPC for transport of telemetry data	
10.7	The system should support streaming granularity of atleast 10 sec	
10.8	The router shall have the ability to interact with open standard based tools	
10.9	The system should support REST API/ Yang and Netconf for communication with third party tools and applications	
10.10	Enabling telemetry should not have any adverse impact on the performance of the device/ router	
10.11	The OEM shall ensure that the use of third party optics shall not be explicitly blocked on the Router. Router must support all MSA complied optics available in market	
11.0	Segment Routing	
11.1	The router should support SR-MPLS dataplane and protocols OSPF, IS-IS and BGP Segment routing extensions	
11.2	Traffic Steering of SR policies and Segment TI-LFA SRLG Protection	
11.3	LSP ping, trace-route	
11.4	MPLS-LDP interworking with SR-ISIS/ SR-OSPF and LDP over RSVP. Roadmap for same may be acceptable however functionality should available before Final Acceptance (FAC).	
11.5	Router should have capability to calculate Bandwidth based path using centralized controller.	
11.6	Shall support SR and MPLS (LDP) Interworking Mapping Server. Roadmap for same may be acceptable however functionality should available before Final Acceptance (FAC).	
11.7	Label distribution protocol and segment routing should coexist and there should support option to prefer LDP over	
11.8	Router ASIC should be capable of supporting SR-MPLS in future. SRv6-MPLS natively.	
12	Telemetry tool for performance monitoring should be provided along with Routers and Tool should also be provided for generation of configuration to multiple routers based on predefined templates. These tools should not be any additional cost to RailTel however VMs for same will be provided by RailTel in case required.	
13	**On Site OEM Warranty (Year) - 3 years**	

SOR item 7: Switch Type I Technical specification

SN	Specification	Compliance
1	The LAN switch shall be standalone/ rack mountable with the following ports:	
2	**20 Nos. 10G SFP+ and 2 Nos. QSFP+ 40G ports.**	
3	The switch should support RJ-45 console port and industry standard CLI	
4	The switch should support Reset button to make switch reset to default.	
5	The switch should support RJ-45 management port	
6	Switch should have 02 power supply in 1+1 in redundant mode. It should support type (-48v DC supply) of power source supply on a Single Power Port.	
7	**General Specification:**	
8	The LAN Switch should support below specs Min **256MB RAM, 16MB flash, 1.5MB buffer.**	
9	The LAN switch shall be available with minimum Switching Fabric. 560 Gbps	
10	The LAN switch shall have minimum packet forwarding rate at 64-byte packet length 400 Mpps	
11	**The LAN switch shall support minimum 16K MAC address.**	
12	The LAN switch shall support 1024 static MAC address entries	
13	The LAN switch shall have 1K IGMP and 1K MLD snooping groups.	
14	Switch should support Dying Gasp or Syslog/SNMP-Trap for quick trouble shooting during power failures/ system shut down.	
15	**Layer-2 Features:**	
16	The LAN switch shall support IEEE 802.1Q VLAN up to 255 Active VLANs and 4094 VLAN ID.	
17	It shall support edge port in STP, RSTP, MSTP (16 instances), BPDU filtering.	
18	It shall support 802.1d, 802.1p, 802.1Q, 802.1s, 802.1w, 802.1x, 802.3x, 802.1ab.	
19	It shall support spanning-tree root guard and loop guard to prevent other edge switches becoming the root bridge.	
20	It shall support IGMP snooping v1, v2 and v3, IGMP Proxy, IGMP Qurier and MLD/MLD Qurier.	
21	It shall support Link Aggregation Protocol (LACP) as per IEEE 802.3ad and and 8 groups per device/8 ports per group.	
22	It shall Support for Detection of Unidirectional links and to disable them to avoid problems such as spanning tree loops and support Unidirectional Link Detection (UDLD) or any other industry equivalent protocol	
23	It shall have supports L2/L3/L4 QoS/ CoS solutions help ensure that critical network services such as VoIP, ERP, Intranet, and video conferencing are served with proper priority.	

SN	Specification	Compliance
24	It shall support unknown unicast and multicast port blocking to allow tight control by filtering packets that the switch has not already learned how to forward.	
25	It shall support unicast MAC filtering to prevent the forwarding of any type of packet with a matching MAC address.	
26	Switch shall support for Admission Control features to improve the network's ability to automatically identify, prevent, and respond to security threats and also to enable the switches to collaborate with third-party solutions for security-policy compliance and enforcement before a host is permitted to access the network.	
27	It shall be able to discover the neighboring device of the same OEM giving the details about the platform, IP Address, Link connected through etc, thus helping in troubleshooting connectivity problems. It shall support LLDP or LLDP-MED for network discovery	
28	There shall be support for Asynchronous data flows upstream and downstream from the end station or on the uplink using ingress policing and egress shaping	
29	It shall support Optical Transceiver Digital Diagnostic Monitoring and link layer monitoring through 802.3ah or UDLD/ IPSLA/ TWAMP	
30	It shall support configuration rollback to replace current configuration with any saved configuration file	
31	**Quality of Service (QoS) Features:**	
32	The LAN switch shall have per-port broadcast, multicast, and unicast storm control.	
33	There shall be 8 or better hardware-based queues per port for flexible QoS management	
34	There shall be Shaping and Scheduling supports of WRR/ WRED/ SRR	
35	The switch should support QOS based on Switch port, 802.1p priority queues, vLAN ID, MAC addresses, IPv4/ Ipv6 addresses, DSCP, ToS, Protocol type, TCP/UDP ports,Ipv6 traffic class	
36	It should support Time-Based QOS	
37	It shall support BPDU filtering feature, to shut down Spanning Tree Protocol Port Fast enabled interfaces when BPDUs are received to avoid accidental topology loops.	
38	**Network Security Features:**	
39	The LAN switch shall support IEEE 802.1x to allow dynamic, port-based security, providing user authentication, Dynamic VLAN assignment	
40	The LAN Switch shall support Compound Authentication and Change of authorization	
41	It shall support unicast MAC filtering to prevent the forwarding of any type of packet with a matching MAC address.	
42	It shall support unknown unicast and multicast port blocking to allow tight control by filtering packets that the switch has not already learned how to forward	

SN	Specification	Compliance
43	It shall support IGMP filtering to provide multicast authentication by filtering out no subscribers and limits the number of concurrent multicast streams available per port	
44	It shall support for SSHv2, SNMPv3 to provide network security by encrypting administrator traffic during Telnet, SSH and SNMP sessions.	
45	It shall support IMPB, DHCP snooping, IPSG and dynamic/static ARP inspection	
46	The switch shall be able to work on both Ipv4 and Ipv6 (dual stack) from day one	
47	It shall support Port Mirroring (minimum 4 mirror session) based on port basis/ VLAN basis to support intrusion prevention system deployment in different VLANs.	
48	It shall support RADIUS authentication to enable centralized control of the switch and restrict unauthorized users from altering the configuration.	
49	It shall support MAC address notification to allow administrators to be notified of users added to or removed from the network	
50	It shall support port security up to 1K MAC address to secure the access to an access or trunk port based on MAC address. After a specific timeframe, the aging feature should remove the MAC address from the switch to allow another device to connect to the same port.	
51	It shall support multilevel security on console access to prevent unauthorized users from altering the switch configuration.	
52	It shall support BPDU filtering feature, to shut down Spanning Tree Protocol Port Fast enabled interfaces when BPDUs are received to avoid accidental topology loops.	
53	It shall support Spanning-Tree Root Guard (STRG) to prevent edge devices not in the network administrator's control from becoming Spanning Tree Protocol root nodes.	
54	**Management:**	
55	It shall support Unidirectional Link Detection (UDLD) or similar mechanism to detect Unidirectional Link Fault.	
56	It shall have Layer 2 trace route to ease troubleshooting by identifying the physical path that a packet takes from source to destination	
57	It shall support Web based or Trivial File Transfer Protocol (TFTP) and File Transfer Protocol (FTP), SCP	
58	It shall support Simple Network Time Protocol/ Network Timing Protocol (SNTP/ NTP) to provide an accurate and consistent time stamp to all intranet switches	
59	It shall support RMON v1 and v2 standards and 4 RMON groups	
60	It shall support SNMPv1, SNMPv2c, and SNMPv3 and Telnet interface support to deliver comprehensive in-band management, and a CLI-based management console to provide detailed out-of-band management and Web Management for better manageability.	

SN	Specification	Compliance
61	It should support routing protocol static and RIP/ OSPF.	
62	Switch should support Surge Protection on power input	
63	Switch should support Surge Protection to ± 2 kV (line-earth) and ± 2 kW (line-line) on power input	
64	Loopback Detection (LBD)	
65	It should support 63 IP interface, 8 loopback interfaces and Intervlan routing	
66	It shall support default routing and static routing Support for 128 static Ipv4 routes and Support 64 static Ipv6 routes	
67	It shall support VRRP v2	
68	Should support authentication to allow an IP phone and a PC to authenticate on the same switch port while being placed on the appropriate voice and data VLANs or Should Support 802.1x based access control.	
69	It should support Port-based VLAN, MAC-based VLAN, VLAN Trunking, Voice VLAN and Surveillance VLAN, Private VLAN, GVRP, GARP/VTP, IP-Subnet Based VLAN and ISM VLAN (MVR)/IGMP filtering, Guest VLAN	
70	Should have the ability to disable per-VLAN MAC learning	
71	Should support MAC Authentication Bypass (MAB)	
72	Switch must support Zero Touch Deployment feature so that it can automatically obtain IP address and configuration file from remote server	
73	It should support flex link or Back up link.	
74	It should support Ethernet Ring Protection Switching ERPS v1 and v2 **for main ring and sub rings**: G.8032 ERPS Ring Protection Switching provides loop avoidance with redundancy in Layer-2 Ethernet networks using concept of RPL (Ring Protection Link). The switch completion time (transfer time) for a failure on a ring link shall be less than 50ms.	
75	It should support IEEE 802.1QinQ mechanism and VLAN translation	
76	It shall support built-in power-on diagnostics and system monitoring capabilities to detect hardware failures.	
77	Bandwidth management: Flow-based bandwidth management, ingress rate-limiting; egress rate shaping per port.	
78	It shall loopback detection and shut or disable a physical port and VLAN based on detection of loop on that interface	
79	To check support for Standard and Extended Access Lists	
80	It shall support access list based on Ipv4/v6 address Protocol type Ipv6 flow label VLAN-ID MAC-ID DSCP Ipv6 traffic class TCP/UDP Port and User-defined packet content	
81	Switch shall support Time based ACL	
82	The Switch should support minimum 1K Ingress Access Control Entries	
83	To check IGMP static join feature.	
84	To check Login and Access control List violations shall generate alarms to Network Management System and a log of the same shall be generated.	
85	It should support of ICMPv4, ICMPv6, Telnet v4, Telnet v6, SNMP v4 and SNMP v6	

SN	Specification	Compliance
86	Switch should support PVST or equivalent.	
87	Switch should support CPU monitoring, Memory monitoring and password recovery.	
88	It should support MAC flapping feature to block a duplicate MAC to learn from uplink and downlink interface	
89	It should support duplicate address inspection	
90	Support multiple privilege level to provide different level of access on console port and telnet sessions	
91	Switch should support traffic segmentation	
92	It should support DOS attack prevention and URPF	
93	Switch should support sflow or netfow	
94	Switch should support Ipv6 Neighbor Discovery (ND)	
95	It should support DHCP Client, DHCP Server and DHCP Relay with option 82	
96	It should support IEEE 802.1ag Ethernet OAM: Connectivity Fault Management (Support 32 MEPs)	
97	It should support Ethernet OAM compliant with IEEE 802.3ah/Y.1731	
98	It should support Radius and TACACS + Switch, Local Database	
99	It should support L2 Protocol Tunnelling for STP	
100	Should support port and vlan mirroring and jumbo frame 9K.	
101	Switch should support system log, traceroute, PING Size up to 9000 bytes or more.	
102	Switch should have dual image. Switch shouldn't go in monitor in any case mode if power off during firmware upgrade.	
103	Should support Optical Transceiver Digital Diagnostic Monitoring for All SFP ports of 1/10G.	
104	**Switch should support following SNMP traps or syslog**	
	i. Interface UP & Down	
	ii. Optical power SFP threshold alarms	
	iii. STP Topology Changes and New root bridge	
	iv. LLDP table changes	
	v. Threshold alarms for Temperature.	
	vi. Ethernet OAM SNMP alarms.	
105	Switch should comply to following Temperature performance parameters :	
	i. Operating Temperature – min 0 to 50 °C	
	ii. Storage Temperature - min -20 to 70 °C	
106	**Safety Requirement :-**	
107	Switch should have safety compliance of CE or FCC or equivalent	
108	**Electromagnetic Compatibility (EMC) Requirements:-**	
109	Switch should have EMC compliance of CE or equivalent	
110	Should be allowed Ipv6 ready from Day One.	

SN	Specification	Compliance
111	It shall have comprehensive debugging features required for software & hardware fault diagnosis.	
112	Switch should come with default accessories like Switch 3PIN Power cable, RJ-45 console cable, 2 mounting brackets for 19" rack mounting, Mounting kit, Quick Installation Guide.	
113	All 10G interfaces shall be of SFP+ type and shall support LR/ER/ZR. Use of third party optics should not be locked for all interfaces	
114	Switch should support Jumbo frame (9k)	
115	**On Site OEM Warranty (Year) – 3 years**	

SOR item 8: Switch Type IV Technical specification

SN	Description	Compliance
1	Should have 8 ports 10/100/1000 Mbps Base T	
2	Should have support for 2 ports SFP Based Gigabit ports.	
3	Should have at least 20 Gbps switching fabric.	
4	Should support at least 8K entries in the MAC table.	
5	Packet forwading rates 14 million PPS	
6	Should Support 255 minimum VLANs.	
7	Switch should support IEEE 802.3af & IEEE 802.3at on Ethernet ports & Min 120W PoE Power Budget	
8	Should have AC Power Supply 100 to 240 V AC with 50 to 60 Hz and equipped with 3 pin plug.	
9	Should support Dual Images.	
10	Should support port mirroring and jumbo frame.	
11	**Should support following for min. 64 Groups :**	
	i. IGMP Snooping,	
	ii. IGMP v1/v2/v3 awareness Snooping,	
	iii. IGMP Snooping Queried.	
12	Should support RSTP, spanning-tree root guard, Port Fast and BPDU Guard/ Filter or similar functionalities.	
13	**Switch should support :**	
	i. Surge protection of ± 2 kV (line-earth) and ± 1 kW (line-line) on power	
	ii. Surge protection of ± 4 kV on Ethernet ports and this will be applicable in case switch has copper ports.	
14	**Should support following security features viz.:**	
	i. Web Management (HTTPS),	
	ii. Broadcast/Multicast/Unicast Storm Control	
	iii. DoS Attack Prevention	

SN	Description	Compliance
15	**Switch should support following SNMP traps or Syslog**	
	i. Interface UP & Down	
	ii. Optical power SFP threshold alarms	
	iii. STP Topology Changes and New root bridge	
	iv. LLDP table changes	
	v. Threshold alarms for Temperature.	
16	**Switch should comply to following Temperature performance parameters :**	
	i. Operating Temperature - min 0 to 40 °C	
	ii. Storage Temperature - min -0 to 70 °C (-40 to 158 °F)	
17	It shall support MAC address notification to allow administrators to be notified of users added to or removed from the network.	
18	The switch shall be designed for continuous operations.	
19	IPv6/v4-L3 and IPv6-Multicast functionalities/features for Switches are desired but not mandatory.	
20	**Safety Requirement :-**	
	Switch should have safety compliance of UL.	
21	**Electromagnetic Compatibility (EMC) Requirements:-**	
	Switch should have EMC compliance of CE and FCC.	
22	The LAN switch shall support a console port or auxiliary/ Ethernet port for the purpose of local and remote configuration and diagnostics.	
23	IPv6 feature should be ready from day 1.	
24	**Qualitative Requirements:-**	
	i. The MTBF (Mean Time Between Failure) and MTTR (Mean Time To Repair) predicted and observed values shall be furnished along with calculations by the manufacturer.	
25	Use of third party optics should not be locked for all interfaces	
26	Switch should support Jumbo frame (9k)	
27	**On Site OEM Warranty (Year) - 3 years**	

SOR item 9: Switch Type V Technical specification

SN	Description	Compliance
1	Should have 24 ports SFP Based Gigabit ports.	
2	Should have support for 4 ports SFP+ Based 10G ports.	
3	Should have at least 120 Gbps switching fabric.	
4	Packet forwading rates 90 million PPS	
5	Should support at least 16K entries in the MAC table.	
6	Should Support 255 minimum VLANs.	

SN	Description	Compliance
7	**Switch should have 02 power supply in 1+1 in redundant mode as given below:** A. It should support both type (-48v DC & 240v AC supply) of power source supply. DC power supply should work as a redundant power supply to power-on the switch in case failure of AC power supply. **OR** B. Switch should have support AC Power Supply 100 to 240 V AC with 50 to 60 Hz in redundant mode	
8	Should support Dual Images.	
9	Should support Optical Transceiver Digital Diagnostic Monitoring for All SFP ports of 1G and 10G	
10	Should support port mirroring and jumbo frame.	
11	**Should support following for min. 64 Groups :**	
	i. IGMP Snooping	
	ii. IGMP v1/v2/v3 awareness Snooping	
	iii. IGMP Snooping Queried.	
12	Should support RSTP, MSTP, spanning-tree root guard, Port Fast and BPDU Guard/Filter or similar functionalities.	
13	**Should support following security features viz.:**	
	i. Web Management (HTTPS),	
	ii. Broadcast/Multicast/Unicast Storm Control,	
	iii. DoS Attack Prevention	
14	**Switch should support following SNMP traps or syslog**	
	i. Interface UP & Down	
	ii. Optical power SFP threshold ala1rms	
	iii. STP Topology Changes and New root bridge	
	iv. LLDP table changes	
	v. Threshold alarms for Temperature.	
	vi. Ethernet OAM SNMP alarms.	
15	**Switch should comply to following Temperature performance parameters :**	
	i. Operating Temperature - min 0 to 45 °C	
	ii. Storage Temperature - min -0 to 70 °C (-40 to 158 °F)	
16	It shall support MAC address notification to allow administrators to be notified of users added to or removed from the network.	
17	The switch shall be designed for continuous operations.	
18	IPv6/v4-L3 and IPv6-Multicast functionalities/features for Switches are desired but not mandatory.	
19	**Safety Requirement :-**	
	Switch should have safety compliance of UL.	

SN	Description	Compliance
20	**Electromagnetic Compatibility (EMC) Requirements:-**	
	Switch should have EMC compliance of CE and FCC.	
21	The LAN switch shall support a console port or auxiliary/Ethernet port for the purpose of local and remote configuration and diagnostics.	
22	The LAN switch shall support built in power diagnostics system to detect hardware failures.	
23	IPv6 feature should be ready from day 1.	
24	**Qualitative Requirements:-**	
	i. The MTBF (Mean Time Between Failure) and MTTR (Mean Time To Repair) predicted and observed values shall be furnished along with calculations by the manufacturer.	
25	**Switch should support following Metro Ethernet Features:**	
	i. Q in Q , Double VLAN (Q-in-Q) ,Port-based Q-in-Q and VLAN Translation	
	ii. IEEE 802.1ag Ethernet OAM: Connectivity Fault Management	
	iii. Ethernet OAM compliant with IEEE 802.3ah/Y.1731	
	iv. ITU-T G.8032 Ethernet Ring Protection designed for loop protection and fast convergence times (sub 50 ms) in ring topologies.	
	v. L2 Protocol Tunneling.	
	vi. Loopback Detection	
26	The operating system of the Switches category/ series/ family should be MEF-9/14 or CE (Carrier Ethernet) Certified/ compliant.	
27	Use of third party optics should not be locked for all interfaces	
28	Switch should support Jumbo frame (9k)	
29	**On Site OEM Warranty (Year) - 3 years**	

SOR item 10: Switch Type VI Technical specification

SN	Description	Compliance
1	Switch shall be Managed, Non-PoE	
2	Should have 24 Number of 1G Copper Ports	
3	Should have 4 No. of 1 G SFP Port (Uplink)	
4	Switch should have Redundant Power supply (from day one) (AC)	
5	Switching Capacity shall be Non Blocking 56 Gbps	
6	Switch Throughput shall be minimum 41.67 MPPS	
7	Switch should have the following Basic Layer-3 Protocol: Static route IPv4 & IPv6	
8	Switch should have the following Security Features: SSH v1/ v2, Port Security, Up to 64 MAC addresses per port	
9	Should support the following Management Protocol: CLI, GUI, Telnet, SNMP	

SN	Description	Compliance
10	Switch should have (RJ-45 Type) Console port	
11	Switch Should support Quality of Service (QoS) features viz:	
	CoS based on, Switch port , 802.1p priority , VLAN ID, MAC address, Ether Type	
12	Switch should comply to following performance parameters:	
	i. Operating Temperature - min 0 to 45 °C	
	ii. Minimum Operating Humidity (%RH) 05 - 90	
13	Switch should have EMI CERTIFICATE of FCC/IC /CE	
14	Switch should have SAFETY CERTIFICATE of UL	
15	The operating system of the Switches series/family shall have MEF-9 & 14 or CE (Carrier Ethernet) certified/ compliant.	
16	Switch should support ERPS protocol	
17	Switch should support DHCP Server.	
18	Use of third party optics should not be locked for all interfaces	
19	Switch should support Jumbo frame (9k)	
20	**On Site OEM Warranty (Year) - 3 years**	

SOR item 11: Switch Type VII Technical specification

SN	Description	Compliance
1	Should have 20 ports SFP Based Gigabit ports & 4 Port 1G combo (SFP & RJ-45)	
2	Should have support for 4 ports SFP+ Based 10G ports.	
3	Should have at least 120 Gbps switching fabric.	
4	Packet forwading rates 90 million PPS	
5	Should support at least 16Kentries in the MAC table.	
6	Should Support 255 minimum VLANs.	
7	Switch should have 02 power supply in 1+1 in redundant mode. It should support both type (-48v DC & 240v AC supply) of power source supply: i.AC Power Supply 100 to 240 V AC with 50 to 60 Hz ii.-48V DC supply	
8	Should support Dual Images.	
9	Should support Optical Transceiver Digital Diagnostic Monitoring for All SFP ports of 1G and 10G	
10	Should support port mirroring and jumbo frame.	
11	**Should support following for min. 64 Groups :** i. i.IGMP Snooping, ii. IGMP v1/v2/v3 awareness Snooping,	

SN	Description	Compliance
	iii. IGMP Snooping Queried.	
12	Should support RSTP, MSTP, spanning-tree root guard, Port Fast and BPDU Guard/Filter or similar functionalities.	
13	**Should support following security features viz.:**	
	i. Web Management (HTTPS),	
	ii. Broadcast/Multicast/Unicast Storm Control,	
	iii. DoS Attack Prevention	
14	**Switch should support following SNMP traps or syslog**	
	i. Interface UP & Down	
	ii. Optical power SFP threshold alarms	
	iii. STP Topology Changes and New root bridge	
	iv. LLDP table changes	
	v. Threshold alarms for Temperature.	
	vi. Ethernet OAM SNMP alarms.	
15	**Switch should comply to following Temperature performance parameters :**	
	i. Operating Temperature - min 0 to 50 °C	
	ii. Storage Temperature - min -0 to 70 °C (-40 to 158 °F)	
16	It shall support MAC address notification to allow administrators to be notified of users added to or removed from the network.	
17	The switch shall be designed for continuous operations.	
18	IPv6/v4-L3 and IPv6-Multicast functionalities/features for Switches are desired but not mandatory.	
19	**Safety Requirement :-**	
	Switch should have safety compliance of UL.	
20	**Electromagnetic Compatibility (EMC) Requirements:-**	
	Switch should have EMC compliance of CE and FCC.	
21	The LAN switch shall support a console port or auxiliary/Ethernet port for the purpose of local and remote configuration and diagnostics.	
22	The LAN switch shall support built in power diagnostics system to detect hardware failures.	
23	IPv6 feature should be ready from day 1.	
24	**Qualitative Requirements:-**	
	i. The MTBF (Mean Time Between Failure) and MTTR (Mean Time To Repair) predicted and observed values shall be furnished along with calculations by the manufacturer.	
25	**Switch should support following Metro Ethernet Features:**	
	i. Q in Q , Double VLAN (Q-in-Q) ,Port-based Q-in-Q and VLAN Translation	
	ii. IEEE 802.1ag Ethernet OAM: Connectivity Fault Management	
	iii. Ethernet OAM compliant with IEEE 802.3ah/Y.1731	

SN	Description	Compliance
	iv. ITU-T G.8032 Ethernet Ring Protection designed for loop protection and fast convergence times (sub 50 ms) in ring topologies.	
	v. L2 Protocol Tunneling.	
	vi. Loopback Detection	
26	The operating system of the Switches category/series/family should be MEF-9/14 or CE (Carrier Ethernet) Certified/compliant.	
27	Use of third party optics should not be locked for all interfaces	
28	**On Site OEM Warranty (Year) - 3 years**	
29	Should support ERPS protocol.	

SOR item 12: Switch Type X as per Technical specification

SN	Description	Compliance
1	Switch shall be Managed, Non-PoE	
2	Should have 24 Number of 1G Copper Ports	
3	Should have 4 No. of 1 G SFP Port (Uplink)	
4	Switch should have Redundant Power supply (from day one) (DC)	
5	Switching Capacity shall be Non Blocking 56 Gbps	
6	Switch Throughput shall be minimum 41.67 MPPS	
7	Switch should have the following Basic Layer-3 Protocol: Static route IPv4 & IPv6	
8	Switch should have the following Security Features: SSH v1/ v2, Port Security, Up to 64 MAC addresses per port	
9	Should support the following Management Protocol: CLI, GUI, Telnet, SNMP	
10	Switch should have (RJ-45 Type) Console port	
11	Switch Should support Quality of Service (QoS) features viz:	
	CoS based on, Switch port , 802.1p priority , VLAN ID, MAC address, Ether Type	
12	Switch should comply to following performance parameters:	
	i. Operating Temperature - min 0 to 45 °C	
	ii. Minimum Operating Humidity (%RH) 05 - 90	
13	Switch should have EMI CERTIFICATE of FCC/IC /CE	
14	Switch should have SAFETY CERTIFICATE of UL	
15	The operating system of the Switches series/family shall have MEF-9 & 14 or CE (Carrier Ethernet) certified /compliant.	
16	Switch should support ERPS protocol	
17	Switch should support DHCP Server.	
18	Use of third party optics should not be locked for all interfaces	
19	Switch should support Jumbo frame (9k)	
20	**On Site OEM Warranty (Year) - 3 years**	

13. Telepresence Type I as per Technical specification

SN	Category	Specification	RailTel Requirement	Compliance
1	General	Type of Endpoint	Point to Point / upgradable to 1+3	
2		Does it require mandatory registration with MCU/Gatekeeper	Supported	
3		Video Conferencing system resolution	Camera Should support 4K resolution & Codec should support 1080p60	
4		Minimum Bandwidth required for Specified video quality at End point/far-site-end	1 Mbps	
5	Camera	Type of Camera	PTZ	
6		Camera Positioning System	Supported	
7		Type of sensor	CMOS	
8		Camera Control (focus, brightness, white balance)	Automatic and Manual both	
9		Multiple Camera System	Single	
10		Optical Zoom	12x or more	
11		Digital Zoom	12X	
12		Field of View at Zoom	70	
13		Pan range Minimum to Maximum (+/- Degree)	(+/-)130	
14		Tilt Range (Degree)	90,-20	
15		Power Cord and Connector to be supplied for codec and camera	Yes	
16	Audio/ Video Specs	System delivers Full HD video and voice and Full HD Content for an over Full HD/ 1080P experience at specified bandwidth	Yes	
17		Video Coding Protocol	H.264 and H.265	
18		System has G 722, G 711, G729 or equivalent wideband audio coding support	Yes	
19		It is possible to see both the near and far site on one screen thus making most efficient use of single display area	Yes	
20		System is equipped with one or more omni directional microphones as required to cover large conference room Mic should have a pickup of at least 10ft	Yes	

SN	Category	Specification	RailTel Requirement	Compliance
21		Min. Number of Microphone Supplied (Port)	2	
22		Min. Number of camera support from the same OEM	1	
23	Network Parameters	Min. Number of Ethernet connection points for System supports for RJ-45, 10/100/1000 Mbps Base-T Ethernet connection	Yes	
24		Wi-Fi Connectivity	Yes, support Call over Wi-Fi also	
25		If Yes, Type of Wi-Fi connectivity	Wi-Fi 802.11 a/b/ g/n/a 2.4 GHz and 5 GHz for LAN	
26	Encryption	System supports AES Encryption video calls, system has encryption on and off facility	Yes	
27		Video Codec shall support 16:9 format	Yes	
28		Power Supply 230 + or - 10% volts, 50 Hz	Yes	
29		Shall come with easy to use infra-red hand held remote control/Touch panel with operating distance	Yes, touch panel	
30		All equipment are in compliance with the requirements of ITU-T (SIP Protocol and H.323) standard related to video conferencing, BFCP and H.239 for content sharing	Yes	
31	Peripherals	System to IPv6 ready from Day One	Yes	
32		System uses standard based protocols and the offered system is inter operable with existing H.323 AVC/SVC based equipment in a P2P call on VC endpoint. All H/w and s/w required to make it interoperable is included in scope of supply	Yes	
33		Min. Number of Input DVI Ports	0	
34		Min. Number of Input HDMI/ HDCI ports	3 (HDMI)	
35		Min. Number of Output HDMI ports	2	
36		Min. Number of Input USB ports	1	

SN	Category	Specification	RailTel Requirement	Compliance

37		System supplied complete with the following components
		   a) Codec
		   b) Camera
		   c) 2 Microphones with suitable connectivity of length 15 mtr
		   d) Touch panel
		   e) Necessary cables (including 15 Mtrs HDMI cable content sharing -1 nos)
			Yes	

38		Microphone type	Omnidirectional	
39		BIS Registry under CRS of MeitY	Yes	
40		UL/CE Certification	Yes	
41		Min Operating temperature (Deg C)	0	
42		Max Operating temperature (Deg C)	35 or more	
43		Min Operating/ non operating humidity (%RH)	10	
44		Max Operating/ non operating humidity (%RH)	90	
45		Free installation and commissioning	NA	
46		**On Site OEM warranty (Years)**	**3**	
47		Audio 3.5 mm stereo line in/out jacks for integration with External Audio System	Yes	
48		USB Support for integration with PC for sharing codec mics and camera	NA	
49		System has Automatic Noise Suppression, Echo cancellation	Yes	
50		Management access to Codec via Web, SSH/Telnet for min 2 users	Yes	
51		System Supports external cameras via HDMI input and Consumer Electronics Control (CEC) 2.0	Yes	
52		System supports FECC	Yes	
53		Should Support standard Packet loss recovery/ packet loss based down speeding	Yes	
54		The proposed solution should be interoperable with the existing video conferencing solution present in Railtel network:	Yes	

SN	Category	Specification	RailTel Requirement	Compliance
55	Integration of the device with the existing TPaaS infrastructure at Railtel	The Proposed VC endpoints should seamlessly integrated with existing Central VC system (MCU- Cisco Meeting server -2000 , Gatekeeper and Scheduler) and shall be able to access the devices 24/7 for operations, software updating, change request and reporting through monitoring Server, **In case existing infra not supporting the remote configuration and provisioning, Bidders should supply and install central infra (Scheduler/ Manager with adequate licenses), without any additional cost in both DC and DR .**	Yes	
56		The existing central management system should be able to remote configure and take backup of the configuration of the proposed VC endpoints.	Yes	
57		The existing central management system should be able to do provisioning and configuration of the proposed endpoints.	Yes	
58	Web Interface Support	The options mentioned here should be present in the web interface. These options should not require any restart and remote user should be able to change them during a live call	Yes	
59		i. It should support registration over SIP and H.323 on Cisco Video Communication Server version 8.1 or higher.	Yes	
60		ii. It must be inter-operable with Cisco meeting server version 3.1 and Content sharing over both SIP and H.323.	Yes	
61		iii. Audio: It should be possible to control the input and output volume, mute unmute control. The echo control automatic or be available for adjusting	Yes	

SN	Category	Specification	RailTel Requirement	Compliance
62		iv. Camera: Backlight, Brightness, Foucs, White balance, Zoom and adjustment, automatic snapshots to be shown on webpage.	Yes	
63		v. Conference: Auto answer, Call Protocols: H.323 and SIP settings, Default protocol, Call Rate, Do Not Disturb control, Content channel rate, video channel rate, phonebook	Yes	
64		vi. Network: DHCP, IPv4, IPv6, MTU, QoS, DNS, HTTP/ HTTPS, SNMP, NTP, Telnet/ SSH	Yes	
65		vii. Security: User control, Logging level (admin, user), Remote server settings, logs (audio, video, call diag.)	Yes	
66		viii. System Settings: Name, Language	Yes	
67		ix. Video IN/ OUT: Quality, Resolution, Multiple display mode, Remote operation, Layouts, Self view settings	Yes	
68		x. Active Call Monitoring: Call Information which must include: A/V Codecs used, transmit/ receive rate, A/V Channel Rate, A/V Packet loss, Jitter, Frame rate, encryption mode.	Yes	
69	Local Setting	Manual IP configuration on Codec using touch Panel	Yes, via touch panel	
70	Software upgrade	Bidder/OEM should provide software Upgrade/update during warranty period without any additional cost	Yes	
71	POC	POC required at Secunderabad to demonstrate features		

14. Wifi Router Technical specification

SN	Reference	Parameters	Technical specification	Compliance
1	CT2HW1	Hardware	Access Points proposed must include radios for both 2.4 GHz and 5 GHz.	
2	CT2HW2	Hardware	Must have a robust design for durability, without visible vents	
3	CT2HW3	Hardware	Must include dual band antennas to support both the 2.4GHz and 5GHz operations simultaneously.	
4	CT2HW4	Hardware	Proposed access point shall support MDO (Mobile Data offload)	
5	CT2HW5	Hardware	Mounting kit should be standard which shall be used for mounting access point	
6	CT2HW5	Hardware	Must support operating humidity of 10 to 90% (noncondensing)	
7		Hardware	The Quoted Access Points shall be MTCTE Certified as per the Notification of TEC, DOT and the Bidder shall Submit the TEC/ MTCTE Certificate of the OEM.	
8	CT2WS1	wireless Standard	Must support 2X2 multiple-input multiple-output (MIMO) with TWO spatial streams	
9	CT2WS2	wireless Standard	Must support simultaneous 802.11n on both the 2.4 GHz and 5 GHz radios. And must support 802.11ac Wave 2 on 5ghz .	
10	CT2WS3	wireless Standard	Must support data rates unto 800 Mbps on 5Ghz radio and 140mbps on 2.4Ghz radio.	
11	CT2WS4	wireless Standard	Must support 40 MHz and 80 MHz wide channels in 5 GHz.	
12	CT2WS5	wireless Standard	Antenna Gain of Access Points must be +2dBm or better Must Support following minimum transmit power for both2.4Ghz and 5Ghz radio.	
			(i) 2.4-Ghz band : +21dBm	
			(ii) 5.0-Ghz band: +24dBm	
13	CT2WS6	wireless Standard	AP should support VLAN trunking (802.1q) and VLAN based SSID for user traffic.	
14	CT2RF1	RF	The Wireless AP should have the technology to improve downlink performance.	
15	CT2RF2	RF	The AP shall be able to load-balance between 2.4Ghz and 5Ghz band.	

SN	Reference	Parameters	Technical specification	Compliance
16	CT2RF3	RF	Must have -90dB to -100dB or better Receiver Sensitivity.	
17	CT2RF4	RF	Must incorporate radio resource management for power, channel, coverage hole detection and performance optimization	
18	CT2RF6	RF	Should support configurable carrier sense threshold	
19	CT2M1	Mesh	The Wireless Backhaul shall operate in 5Ghz	
20	CT2M2	Mesh	Support Encrypted and authenticated connectivity between all backhaul components	
21	CT2M3	Mesh	Access point shall have wired uplink interfaces i.e. 1X10/100/1000 BASE-T Ethernet	
22	CT2R1	Roaming	Must support Proactive Key Caching and/ or other methods for Fast Secure Roaming.	
23	CT2S1	Security	Must support Management Frame Protection.	
24	CT2S2	Security	Should support locally-significant certificates on the APs using a Public Key Infrastructure (PKI) or preinstalled certs on AP for authentication	
25	CT2S3	Security	Provision of Wireless IPS to filter malicious traffic	
26	CT2E1	Encryption	Access Points must support a distributed encryption/ decryption model.	
27	CT2E2	Encryption	Access Points must support hardware or software based encryption	
28	CT2M1	Monitoring	Must support the ability to serve clients or monitor the RF environment.	
29	CT2M2	Monitoring	AP model proposed must be able to be both a client-serving AP and Parallely monitor-Intrusion Prevention services.	
30	CT2F1	Flexibility:	Should support mesh capabilities for temporary connectivity in areas with no Ethernet cabling.	
31	CT2F2	Flexibility:	Should support QoS for voice over wireless.	
32	CT2F3	Flexibility:	Must support Controller-based and standalone (autonomous) deployments	

SN	Reference	Parameters	Technical specification	Compliance
33	CT2F4	Flexibility:	Must support 16 WLANs per AP for SSID deployment flexibility.	
34	CT2O1	Operational:	Must support telnet or SSH or console login to APs directly for troubleshooting flexibility.	
35	CT2O2	Operational:	Must support automatic detection of dropped connection to controller,	
36	CT2O3	Operational:	Must support automatic failover to secondary controller, upon detecting lost connection to controller	
37	CT2O4	Operational:	Must support DHCP Option 82, defined in RFC 3046, including support for Sub-option 01 (Circuit-Id) and Sub-option 02 (Remote Id) fields.	
38	CT2O5	Operational:	With Controller APs (from a data-plane plane perspective) must support:	
			- Ethernet over GRE IPv6 tunnel	
			- Automatic detection of failed tunnel termination, with configurable connection retry and timeout.	
			- Automatic failover to secondary tunnel termination address.	
39	CT2O6	Operational:	Support for basic AP monitoring statistics for each radio: Bytes Sent, Bytes Received, Packets Sent, Packets Received,	
			Radio Channel Utilization, Noise.	
40	CT2O7	Operational:	Must support data-plane split tunneling in which ACLs may be configured to enable a range of destination net blocks and/ or IPs to bypass the data-plane tunnel and be bridged on the wired interface	
41	CT2O8	Operational:	AP should have capability to split tunnel for both IPv4 and IPv6 tunnel to segregate the management and data traffic.	
42	CT2O9	Operational:	AP should have capability to split tunnel for specific destination IP/Subnet (For implementing policy based Caching solutions) using local NAT and forward user traffic.	
43	CT2O10	Operational:	The AP shall support 200 concurrent Clients per AP	
44	CT2O11	Operational:	APs shall support SNMP v1 Or higher (V2/V3)	

SN	Reference	Parameters	Technical specification	Compliance
45	CT2P1	Power:	Must support Power over Ethernet/ PoE+/ UPoE/ Power Injector/ AC/ DC	
46	CT2Q1	Quality of Service:	shall have the support of 802.11e and WMM	
47	CT2Q2	Quality of Service:	Should be Wi-Fi Alliance certified and WPC Approved and ETA Certified	
48	CT2Q3	Quality of Service:	Must support QoS to prioritize video, voice and Data traffic	
49	CT2EES1	Environmental and Electrical Specifications	Must support QoS and Video Call Admission Control capabilities.	
50	CT2EES2	Environmental and Electrical Specifications	Access point shall support powering from POE/ PoE+/ UPoE/ Power Injector/ AC/ DC	
51	CT2EES3	Environmental and Electrical Specifications	Access point shall support pole, wall, and roof mounting options.	
52	CT2EES4	Environmental and Electrical Specifications	Geographic orientation flexibility – tilt angle for pole, wall, and roof mounting units	
53	CT2EES5	Environmental and Electrical Specifications	The equipment shall support up to 100 MPH sustained winds & 140 MPH wind gusts.	
54	CT2EES6	Environmental and Electrical Specifications	The Access point shall be IP67 certified.	
55	CT2EES7	Environmental and Electrical Specifications	The Access point shall be rated for operation over an ambient temperature range of 0C to +55 C	
56	CT2EES8	Environmental and Electrical Specifications	Should support Surge Protection on Ethernet Ports to meet the requirement at High Voltage Transmission Line running across the Railway Platform. If any OEM/ Bidder can't provide inbuilt surge protection in AP, external surge protection must be proposed. Surge protection of ± 2 kV on copper Ethernet ports.	
57	**On Site OEM Warranty (Year) - 3 years**			

15. SFP 1G 10 KM BIDI Technical specification

SN	Specification	Compliance
1	Should be compatible with OEM equipments like Cisco Juniper, Edgecore and D Link. IT should be MSA Complaint.	
2	Should support minimum 10 km optical distance on Single Fiber (ITU-G 652D) (Bi Directional on Single Mode Fiber).	
3	Should have LC type connector	
4	Should provide quantity in such a way that matching pair (BX U & D) can be achieved.	
5	Should have 1 Gigabit Ethernet throughput on single mode fiber.	
6	Important Parameters:	
	A. Link Budget (Max Tx Power- Receiver Sensitivity) 5 dB or better.	
	B. Transceiver supply voltage: 3.3 V (Nominal)	
	C. The case operating temperature -20 Degree Centigrade to +70 Degree Centigrade.	
	D. The storage Temp: -40 Degree Centigrade to +85 Degree Centigrade	
	E. Wavelength- 1270/1330 or 1550/1310 or 1490/1550	
7	Should support Digital Diagnostic Monitoring (MSA-SFF 8472 Compliant) feature with following operating parameters:	
	A. Transceiver temperature	
	B. Laser bias current	
	C. Launch Optical Power	
	D. Received optical power	
	E. Transceiver supply voltage:	
	F. It will provide alarm and warning flags to alert the user when particular operating parameters are outside of a factory set normal range.	
8	Complies with SFF-8431/ 8432 SFP+ MSA (Multi-Source Agreements Standards)	
9	Applications- 1 Gbps Ethernet	
10	Performance Certificate: The bidder will submit a satisfactory performance certificate from Telecom Service Provider/ ISP/ Govt/ PSU for the offered make of the SFP.	
11	Regulatory Compliance	
	A. EMI/EMC compatible with FCC/ EN/ IEC	
	B. Laser Safety compatible with FDA/ EN/ IEC	
	C. RoHS compliant	
12	SFP should support all OEM Vendors devices and open all optic ports	
13	**On Site OEM Warranty (Year) - 3 years**	

16. SFP_1G 20 KM BIDI Technical specification

SN	Description	Compliance
1	SFP module should comply with multi-source agreement (MSA), enabling compatibility with other vendor equipment.	
2	Should support 20 km optical distance on single fiber	
3	Should have LC type connector	
4	Should provide quantity in such a way that matching pair (BX U & D) can be achieved.	
5	Should have 01 Gigabit Ethernet capacity on single mode fiber.	

6	Should support Digital Diagnostic Monitoring feature with following operating parameters:
	  Transceiver temperature" 0 ~ 70 degC
	  Laser bias current
	  Transmitted optical power: 0 ~ -5dBm
	  Received optical power: -17dBm
	  Transceiver supply voltage: 3.3V
	  It also provides a sophisticated system of alarm and warning flags	

7	OEM should be having valid ISO 9000 Certificate	
8	Should have CE and FCC and UL regulatory Certificate	
9	Operating temperature of the SFP should be minimum 0 to 70°C (23 to 149 °F)	
10	Complies with SFF-8431 SFP+ MSA (Multi-Source Agreements Standards)	
11	Complies with 1310nm/1550nm DFB laser transmitter & CPRI Option 7, 8	
12	Should support 1G to 1.25Gb/s Multi-Rate & 2-wire interface for management and diagnostic monitor compliant with SFF-8472	
13	**On Site OEM Warranty (Year) - 3 years**	

17. SFP_1G 40 KM BIDI Technical specification

SN	Description	Compliance
1	Should be compatible with OEM equipments like Cisco Juniper, Edgecore and D Link. IT should be MSA Complaint.	
2	Should support minimum 40 km optical distance on Single Fiber (ITU-G 652D) (Bi Directional on Single Mode Fiber).	
3	Should have LC type connector.	
4	Should have 1 Gigabit Ethernet throughput on single mode fiber.	
5	Important Parameters	
	A. Link Budget (Max Tx Power- Receiver Sensitivity) 19 dB or better.	
	B. Transceiver supply voltage: 3.3 V (Nominal)	

SN	Description	Compliance
	C. The case operating temperature -20 Degree Centigrade to +70 Degree Centigrade.	
	D. The storage Temp: -40 Degree Centigrade to +85 Degree Centigrade	
	E. Wavelength- 1270/1330 or 1550/1310 or 1490/1550	
	F. Should provide quantity in such a way that matching pair (BX U & D) can be achieved.	
6	Should support Digital Diagnostic Monitoring (MSA-SFF 8472 Compliant) feature with following operating parameters	
	A. Transceiver temperature	
	B. Laser bias current	
	C. Launch Optical Power	
	D. Received optical power	
	E. Transceiver supply voltage	
	F. It will provide alarm and warning flags to alert the user when particular operating parameters are outside of a factory set normal range.	
7	Complies with SFF-8431/8432 SFP+ MSA (Multi-Source Agreements Standards)	
8	Applications- 1 Gbps Ethernet	
9	Performance Certificate: The bidder will submit a satisfactory performance certificate from Telecom Service Provider/ ISP/ Govt/ PSU for the offered make of the SFP.	
10	Regulatory Compliance	
	A. EMI/EMC compatible with FCC/ EN/ IEC	
	B. Laser Safety compatible with FDA/ EN/ IEC	
	C. RoHS compliant	
11	SFP should support all OEM Vendors devices and open all optic ports	
12	**On Site OEM Warranty (Year) - 3 years**	

18. SFP+ 10G 60KM BIDI Technical Specification

SN	Description	Compliance
1	Should be compatible with OEM equipments like Cisco Juniper, Edgecore and D Link. IT should be MSA Complaint.	
2	Should support minimum 60 km optical distance on Single Fiber (ITU-G 652D) (Bi Directional on Single Mode Fiber).	
3	Should have LC type connector.	
4	Should provide quantity in such a way that matching pair (BX U & D) can be achieved.	
5	Should have 10 Gigabit Ethernet throughput on single mode fiber.	
6	Important Parameters:	
	A. Link Budget (Max Tx Power- Receiver Sensitivity) 25 dB or better.	

SN	Description	Compliance
	B. Transceiver supply voltage: 3.3 V (Nominal)	
	C. The case operating temperature -0 Degree Centigrade to +70 Degree Centigrade.	
	D. The storage Temp: -40 Degree Centigrade to +85 Degree Centigrade	
	E. Wavelength- 1270/1330 or 1310/1550 or 1490/1550 (Nominal)	
7	Should support Digital Diagnostic Monitoring (MSA-SFF 8472 Compliant) feature with following operating parameters:	
	A. Transceiver temperature	
	B. Laser bias current	
	C. Launch Optical Power	
	D. Received optical power	
	E. Transceiver supply voltage:	
	F. It will provide alarm and warning flags to alert the user when particular operating parameters are outside of a factory set normal range.	
8	Complies with SFF-8431/8432 SFP+ MSA (Multi-Source Agreements Standards)	
9	Applications- 10 Gbps Ethernet	
10	Performance Certificate: The bidder will submit a satisfactory performance certificate from Telecom Service Provider/ISP/Govt/PSU for the offered make of the SFP.	
11	Regulatory Compliance	
	A. EMI/EMC compatible with FCC/EN/IEC	
	B. Laser Safety compatible with FDA/EN/IEC	
	C. RoHS compliant	
12	SFP should support all OEM Vendors devices and open all optic ports	
13	**On Site OEM Warranty (Year) - 3 years**	

19. SFP+ 10G 40 KM BIDI Technical specification

SN	Description	Compliance
1	SFP modules should comply with multi-source agreement (MSA), enabling compatibility with other vendors equipment.	
2	Should support 20-40 kms optical distance on single fiber	
3	Should have LC type connector	
4	Should have 10 Gigabit Ethernet capacities on single mode fiber.	
5	Should support DDMI feature. Option should be available for both SFP+ and XFP	
6	Should be having valid ISO 9000 & ISO 14000 certification on the date of opening of bid.	

7	Should have CE and FCC regulatory compliances.	
8	Operating Temperature of the SFP Should be mini 0 to 65 °C (23 to 149°F)	
9	Should provide quantity in such a way that matching pair (BX U & D) can be achieved.	
10	**On Site OEM Warranty (Year) - 3 years**	

20. SFP+ 10G 10Km Dual Fiber Technical specification

SN	Specification	Compliance
1	Should be compatible with OEM equipment's like Cisco Juniper, Edgecore and D Link. IT should be MSA Complaint.	
2	Should support minimum 10 km optical distance on Single mode Fiber (ITU-G652D) should have LC type connector.	
3	Should have 10 Gigabit Ethernet throughput on single mode fiber.	
4	Important Parameters:	
	A. Link Budget (Max Tx Power- Receiver Sensitivity) 5 dB or better.	
	B. Transceiver supply voltage: 3.3 V (Nominal)	
	C. The case operating temperature -20 Degree Centigrade to +70 Degree Centigrade.	
	D. The storage Temp: -40 Degree Centigrade to +85 Degree Centigrade	
	E. Wavelength- 1310nm (Nominal)	
5	Should support Digital Diagnostic Monitoring (MSA-SFF 8472 Compliant) feature with following operating parameters:	
	A. Transceiver temperature	
	B. Laser bias current	
	C. Launch Optical Power	
	D. Received optical power	
	E. Transceiver supply voltage	
	F. It will provide alarm and warning flags to alert the user when particular operating parameters are outside of a factory set normal range.	
6	Complies with SFF-8431/8432 SFP+ MSA (Multi-Source Agreements Standards)	
7	Applications- 10 Gbps Ethernet	
8	Performance Certificate: The bidder will submit a satisfactory performance certificate from Telecom Service Provider/ ISP/ Govt/ PSU for the offered make of the SFP.	
9	Regulatory Compliance	
	A.EMI/EMC compatible with FCC/EN/IEC	
	B.Laser Safety compatible with FDA/EN/IEC	
	C.RoHS compliant	
10	**On Site OEM Warranty (Year) - 3 years**	

21. QSPF-28 LR4 Technical specification

SN	Description	Compliance
1	Optics Should be compatible with OEM equipments like Cisco, Juniper, D-Link, Zyxel, Edge Core, Ciena	
2	Optics Should support upto 10 km optical distance on single mode fiber	
3	Connector type Dual LC	
4	Signaling rate, each channel 25.78125 GBd +/-100 ppm	
5	Standards compliance (Ethernet/OTN Standard, for e.g. 100GBASE-LR4) IEEE 802.3ba-2010	
6	Operating Temperature (range) 0° C to 70° C	
7	Transmitter output power, each lane (minimum, maximum) –4.3 dBm,4.5 dBm	
8	Cable type SMF	
9	Receiver input power, each lane (minimum, maximum)	
10	**Transmitter wavelengths (range):** 1294.53nm ~ 1296.59 nm 1299.02nm ~1301.09 nm 1303.54nm ~ 1305.63 nm 1308.09nm ~ 1310.19 nm	
11	**Should support below Digital Diagnostic Monitoring features:** Transceiver temperature Laser bias current (4-Channel) Transmitted optical power (4-Channel) Received optical power (4-Channel) Transceiver supply voltage Power consumption < 3.5W	
12	**On Site OEM Warranty (Year) – 3 years**	

22. AC to DC Convertor (-48V) 1000 Watts Technical Specification:

SN	Parameter	Specification:	Compliance
	INPUT CHARACTERISTICS		
1	Rated Voltage	230V AC	
2	Rated voltage Tolerance:	150-275V AC	
3	Rated Frequency Range:	45-65 Hz	
4	Rated Current:	6A (Approx)	
5	Power factor:	> 0.95 at 40%-100% load	
6	Harmonic distortion:	current THD<10% at >50% load , Voltage THD <10% at >50%load	
7	Efficiency	better than 90% at full load	
8	Soft start	Ramp up time 8sec to full load	

SN	Parameter	Specification:	Compliance
9	Protection	• Wide range of AC input 150-275V provides protection class-B from power disturbance and in combination with high interrupting capacity fast acting fuse/ MCB translate into better reliability. • HRC/MCB input fuse for input live. Isolated Input AC Supply with classB/C/D protection with with switch mode transformer copper winding • Separate Alarm section	
	OUTPUT CHARACTERISTICS		
1	Voltage	- 48V (Separate DC output section)	
2	Equalize	48V-56V	
3	Current	0-15A	
4	Wattage	900 (watt Approx.)	
5	Current limit	<10A	
6	Cooling	Fan/Natural	
7	Noise:	<2mV RMS phosphometric weighted,<10mV RMS (10KHz-100MHz)	
8	Protection	HRC output fuse for output live/Over volt / DC Reverse	
9	**On Site OEM Warranty (Year) - 3 years**		

23. AC to DC Convertor 10A Technical Specification:

SN	Parameter	Specification:	Compliance
	INPUT CHARACTERISTICS		
1	Rated Voltage	230V AC	
2	Rated voltage Tolerance:	150-275V AC	
3	Rated Frequency Range:	45-65 Hz	
	OUTPUT CHARACTERISTICS		
1	Voltage	- 48V (Separate DC output section)	
2	Equalize	48V-56V	
3	Current	0-10A	
4	Cooling	Fan/Natural	
5	**On Site OEM Warranty (Year) - 3 years**		

24. Server Rack- 42U Technical specification

Supply of heavy duty 42U Rack of size 2.2 mtr of size 600 mm width x 650 mm depth Rack should have the following:

S N	Description	Qty	Compliance
	ACCESSORIES INCLUDED IN EACH RACK ARE:		
1	Moducab Front Glass Door- 42U -600W - Cam Lock - Ventilation - Duscky Fine Tex - Assembly	1	
2	Moducab Honeycomb {Performax} Flat Pain Door - 42U - 600W - Cam Lock - Ventilation - Duscky Fine Tex - Assembly	1	
3	Double Fan For Mcab/ ProTek FS	1	
4	Mounting Hardware Packet {Containing 1 Nos Each of 3} - 20 Set	1	
5	Metal Cable Channel - 01U - Plastic Cable Loop's Mountable - Pastal Fine Tex- Assembly	2	
6	Metal Cable Channel - 100 mm Width - 1600 mm Height - Pastal Fine Tex - Assembly	2	
7	Power Distribution Unit - 06/13 Amp Multi-standard - 08 Socket - Single Pole/Screw Mountable/ 16Amp MCB/ Alternating current - 16 Amp 3 Pin Plug with Power Cable 2.5 sq. mm 3 meter Length - Black Fine Tex - Assembly	1	
8	3 Inch Castor Set ModuCab	1	
9	Earthing Strip - 150mm - Nickel Plating - Assembly	1	
10	**On Site OEM Warranty (Year) - 3 years**		

25. Patch Cords Technical specification

A) Patch Cords:

1. The patch cords shall be suitable for use on SDH and DWDM systems with the type of connectors specified in the BOQ.

2. All the patch cords shall be Single Mode (G657A), Simplex type, and of lengths as specified in the BOQ unless stated otherwise. The manufacturer shall provide a test certificate from Govt. approved or NABL-approved lab for conformity of G657A fiber used in the manufacturing of patch cords.

3. The connectors shall be securely connected to both ends of the patch cords without any play/looseness.

4. The fiber used for making the patch cord shall be Corning or equivalent.

5. **Ferrule with metallic flange:** Zirconia ceramic/Conical Zirconia ceramic (spring loaded anti- rotation keyed) Note: The type of ferrule used for each type of

connector is to be specified by the manufacturer.

6. **Fibre Reinforcement:** Secondary coated fibre shall be covered with Aramid yarn and shall be distributed equally over the entire periphery. The manufacturer shall indicate the Detex value and quantity of the Aramid yarn used in the patch cord and pigtails. The specification for Aramidyarn shall be as per GR No. TEC-GR-TX-ORM-001-05-DEC-17 (Section–XVII).

7. **Outer Jacket Sheath:** A circular sheath of suitable low smoke zero halogens (LSZH) grade of material and of yellow in color free from pinholes and scratches and other defects etc. shall be provided. The specification for Low smokes zero halogens (LSZH) shall be as per GR No. TEC- GR-TX-ORM-001-05-DEC-17 (Section–XX).

a) Outer sheath diameter: 2.00mm + 0.2 mm (LC-LC) & 2.90 mm + 0.15 mm (all other type ofpatch cords)
b) Thickness of sheath: 0.30mm to 0.35 mm (LC-LC) & 0.45 mm to 0.55 mm (all other type ofpatch cords)

8. The patch cords shall be suitable for use in the temperature range of -60° to $+85^{\circ}$C.

9. Maximum insertion loss for a patch cord should be <0.2 dB@1310nm and 1550nm wavelength.

10. All the patch cords with E2000 connectors shall be supplied with **Angle Polish** type

11. Return loss: ≥ 55db for PC/UPCFC/SC/LC and ≥ 65db for APC @@1310nm and 1550nmwavelength.

12. Durability: 500 times, Typical change: <0.05db (Max.)

13. Party should have a manufacturer certificate from the authorized laboratories/organizations

14. The internal/lab test reports in support of the above-mentioned technical parameters shall beprovided by the supplier unless stated otherwise.

15. All the patch cords should be as per **TEC-GR-TX-OFJ-001-05-NOV-09** with the latest amendment if any

B) Connectors:
1. Material for FC connector body shall be Nickel Plated Brass/ Zinc Alloy.
2. Materials for the LC connector body shall be PEI or PPS.
3. Material for SC connector body shall be Glass filled PBT.
4. Materials for all connector boots shall be polyester (Modified Thermo Polyester Ethelene).

5. Maximum insertion loss shall be < 0.3dB when connecting the patch cords through the adaptor.

6. FC-PC 0dB adaptors shall be square in shape such that they can be mounted on standard FODP.

C) Guarantee:

The material shall be guaranteed for a period of 12 months from the date of taking over, or 18 months from the date of delivery, which is earlier. If during the Guarantee period any defect shall be found in the design, engineering, materials, and workmanship of the material, the contractor shall promptly, in consultation and agreement with the employer replace at its own cost the faulty material.

The Contractor shall submit a Contract Performance Guarantee (CPG) in the amount equivalent to Ten percent (10%) of the Contract Price, with validity up to Ninety (90) days beyond the warranty period. If the manufacturer fails to submit the same then the security amount (equivalent to CPG) shall be kept on hold from the bills.

The Contract Performance Guarantee (CPG) shall be released only after the successful completion of the warranty period.

D) Quality Requirements:

1. The Optical Fiber Jumpers and Hybrid jumpers Adapters and Hybrid Adapters should be manufactured in accordance with International Quality Standards ISO 9001-2000 for whichthe manufacturer should be duly accredited. A quality manual shall be submitted by the manufacturer.

2. The Optical Fiber Jumper and, Hybrid jumpers, Adapters, and Hybrid Adapters shall conform to the requirements for the Environment test specified in IEC Document No. 60874-1 (1993- 02), IEC 60874-1 (1994-03) and IEC 60794-1. The requirements of the particular test have been specified in the relevant test.

E) Marking and Packing:

Identification and Marking:
1. Marking on the optical fiber jumpers shall be of durable quality and it shall withstand the rubbing (20 times) with dry tissue paper in both directions.

2. Marking on Jumpers shall include the following: a) Name of manufacturer c) Type of fiber d) LSZH material e) Manufacturer's identification mark f) Manufacturer's part number. g) Manufacturing date code (year/month etc.) h) Variant identification number(s)/ (Sr. No. of product) i) Any other additional marking required.

3. Marking on the adapters shall include the following: a. Manufacturer's name/ model no. b.Manufacturer's identification mark. c. Manufacturing date code (year/month etc.) Note: Additional information if required by the buyer may be provided on the packing or as a separate test report.

Packing:
1. Each Optical Fibre Jumper (Patch cord/Pigtail) shall be packed separately in transportable packing with the test report on the manufacturer's letterhead which shall include the following: (a) Insertion loss at 1310 nm and 1550 nm (b) Return loss at 1310 nm & 1550 nm. (c) Length of the patch cord/pigtail. (d) Precautions for handling and cleaning.

2. Each connector adapter shall be packed separately and supplied with the following details:
a) Insertion loss at 1310 nm and 1550 nm b) Each connector and Adapter shall be coveredwith dust cover. FC and SC connectors will be supplied with Dual dust covers (Ferrule cap and hanging type dust cover), while LC connectors shall be supplied with Ferrule dust cover. FC adapters shall have threaded-type dust covers and SC & LC adapters shall have compatible dust covers.

Note 1: The manufacturer supplying the parts of the optical connector and optical connector adapter shall also are required to have ISO 9001-2000 accreditation/ISO certified manufacturing facility. The complete quality plan of such vendors from whom the parts are being procured by the manufacturer seeking approval shall also be required to be submitted along with the drawings & dimensions of each part clearly marked with tolerances of individual parts. Manufacturer/ Vendor marking shall also be provided.

Note 2: The test certificate of the Ceramic Zerconia Sleeve used along with its drawing & dimensions and the test report shall also be required to be submitted which shall be mandatory. Ceramic Zerconia Sleeve shall be tested for the following parameters:

1. Material of Zirconia Sleeve: Min. 94% Zirconia ceramic.

2. Withdrawal Force: 0.2Kg to 0.6Kg for FC and SC sleeves; 0.1Kg to 0.250 Kg for LCsleeves.

3. Durability: Change in attenuation after 500 mating shall be less than 0.05 dB.

F) On Site OEM Warranty (Year) - 3 years

G) TEC certificate is required.

26. Strenghtened outdorr Cat-6 UTP cable drum 305 metre each (Technical specification)

1. Strenghtened outdorr Cat-6 UTP cable drum 305 metre each

2. **On Site OEM Warranty (Year) - 3 years**

<u>**Annexure-II**</u>

Principal Executive Director/WR
Dated: …………….
RailTel Corporation of India Ltd.
…………………………………
……………………………....
……………………………....

Subject: Manufacturer Authorization form (MAF) to M/s …………… for …………………….

Ref: GeM Bid No. GEM/2025/B/6092012   dated: 29.04.2025

Dear Sir,

We, M/s……………, are established and reputed manufacturer and service provider of ………………(Product details), having our registered office at ……………………………………………………………….
We hereby authorize M/s …………………….. (bidder name), Office ………………………………………………. to participate in bid and subsequently upon award of the bid to execute the supply and Installation & Commissioning of our range of products against your above said bid.
We further extend our warranty for …………… years for our range of products offered by M/s ……………….against the above-said bid.

Thanking you,
Best regards,

Authorised Signatory

FORMAT FOR AFFIDAVIT TO BE UPLOADED BY TENDERER ALONGWITH THE TENDER DOCUMENTS

(To be executed in presence of Public notary on non-judicial stamp paper of the value of Rs.100/-. The stamp paper has to be in the name of the tenderer) **

I………………………….. (Name and designation)** appointed as the attorney/authorized signatory of the tenderer (including its constituents), M/s._____ (hereinafter called the tenderer) for the purpose of the Tender documents for the work of _____ as per the tender No._____ of RailTel/WR, do hereby solemnly affirm and state on the behalf of the tenderer including its constituents as under:

(i)   I/We the tenderer (s) am/are signing this document after carefully reading the contents.

(ii)   I/we the tenderer(s) also accept all the conditions of the tender and have signed all the pages in confirmation thereof.

(iii)   I/We hereby declare that I/We have downloaded the tender documents from RailTel's website www.railtelindia.com or GeM Portal gem.gov.in. I/We have verified the content of the document from the website and there is no addition, no deletion or no alteration to the content of the tender document. In case of any discrepancy noticed at any stage i.e. evaluation of tenderers, execution of work or final payment of the contract, the master copy available with the railway Administration shall be final and binding upon me/us.

(iv)   I/We declare and certify that I/we have not made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.

(v)   I/We also understand that my/our offer will be evaluated based on the documents/credentials submitted along with the offer and same shall be binding upon me/us.

(vi)   I/We declare that the information and documents submitted alongwith the tender by me/us are correct and I/we are fully responsible for the correctness of the information and documents submitted by us.

(vii)   I/We undersigned that if the certificates regarding eligibility criteria submitted by us are found to be forged/false or incorrect at any time during process for evaluation of tenders, it shall lead to forfeiture of the tender EMD besides banning of business for five year on entire RailTel. Further, I/we (*insert name*

of the tenderer) ** _____ and all my/our constituents understand that my/our offer shall be summarily rejected.

(viii) I/we also understand that if the certificates submitted by us are found to be false/forged or incorrect at any time after the award of the contract, it will lead to termination of the contract, along with forfeiture of EMD/SD and Performance Guarantee besides any other action provided in the contract including banning of business for five year on entire RailTel.

**DEPONENT
SEAL AND SIGNATURE
OF THE TENDERER**

VERIFICATION
I/We above named tenderer do hereby solemnly affirm and verify that the contents of my/our above affidavit are true and correct. Nothing has been concealed and no part of it is false.

**DEPONENT
SEAL AND SIGNATURE
OF THE TENDERER**

Place:
Dated:

** The contents in Italics are only for guidance purpose. Details as appropriate are to be filled in suitably by tenderer. Attestation before Magistrate/Notary Public.

Annexure -IV

Guarantee Bond for Performance Guarantee
(On Stamp Paper of requisite value)
(To be used by approved Scheduled Banks)

1. In consideration of the RailTel Corporation of India Limited, Registered office at Plate-A, 6th Floor, Office Block, Tower-2, East Kidwai Nagar, New Delhi-110023 and Regional office at RailTel Corporation of India Ltd, Mahalaxmi Railway Microwave Compound, Senapati Bapat Marg, Mahalaxmi- Mumbai- 400 013 (hereinafter called "the RailTel") having agreed to exempt ……………………………………………………… **(Name and address of the Company/ Contractor both Registered and Regional office address)** (hereinafter called "the said Contractor(s)") from the demand, under the terms and conditions of an L.O.A No…………………………… Dated……………….. [L.O.A Date] made between ……………………………………. and RailTel Corporation of India Limited, for …….………………………………… [Name of Work/Supply of Materials] (hereinafter called "the said Agreement") of **Performance Guarantee** for the due fulfillment by the said contractor's) of the terms and conditions contained in the said Agreement, or production of a Bank Guarantee for Rs……………….. (Rs. ………….. Only). We, ……………………………………….. (indicate the name of the Bank and address) hereinafter referred to as "the Bank") at the request of. M/s…………………………….. Contractor(s) do hereby undertake to pay the **RailTel** an amount not exceeding Rs. ……………. Against any loss or damage caused to or suffered or would be caused to or suffered by the RailTel by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.

2. We, ……………………………………………………………. Bank (indicate the name of the Bank and address) do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on demand from the **RailTel** stating that the amount is claimed is due by way of loss or damage caused to or would be caused to or suffered by the **RailTel b**y reason of breach by the said Contractor(s) of any of terms or conditions contained in the said.

   Agreement or by reason of the Contractor(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. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ………………………

3. We, ……………………………………….. Bank (indicate the name of the Bank and address) undertake to pay to the **RailTel** any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) / Supplier(s) in any suit or proceedings 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 a valid discharge of our liability for payment thereunder and the Contractor(s) / Supplier(s) shall have no claim against us for making such payment.

4. We, …………………………………………. Bank (indicate the name of the Bank and address) 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 the RailTel under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till **RailTel** certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this Guarantee. Unless a demand or claim under the Guarantee is made on us in writing on or before the …………………………………….. We shall be discharged from all liability under this Guarantee thereafter.

5. We, ……………………………….(indicate the name of the Bank and address) further agree with the **RailTel** that the **RailTel** 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 Agreement or to extend time of to postpone for any time or from time to time any of the powers exercisable by the **RailTel** 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 to the said Contractor(s) or for any forbearance, act or omission on the part of **RailTel** or any indulgence by the **RailTel** 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 affect 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, ……………………………………… (indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the **RailTel** in writing.

8. Notwithstanding anything contained herein,
    1. Our liability under the Bank guarantee shall not exceed Rs. ……….. (In Rupees)
    2. This Bank Guarantee shall be valid up to ………………and
    3. We are liable to pay the guaranteed and or any part thereof under this Bank Guarantee only and only if you serve upon is a written claims or demand or before
       …………. (date of expiry of guarantee).

<div align="center">

Dated the day of 2025 for

…………………………………………

(Indicate the name of the Bank)

</div>

<u>Witness:</u>

1. Signature

   Name

2. Signature

   Name

Annexure - V

Consignee Details:

SN	Site name	Address & Contact	Contact No.	SOR item No.	Item to be delivered
1	MX	RailTel Corporation of India Ltd, Western Railway Microwave Complex, Senapati Bapat Marg, Mahalaxmi (West), Mumbai, 400013	Mr. Kheem Singh - 9974151518	SOR item No. 1 to 26	All qty

Note: All the locations/stations name given above are tentative and may change. Successful Bidder may ask the final location with complete address after finalizing the tender. RailTel has the right to change location within RailTel Western Region area & firm has to supply & commission at location given by RailTel.

Annexure-VI

PROFORMA FOR Nil Deviation Component Compliance
Undertaking Letter
(TO BE SIGNED BY BIDDER)

To,
Principal Executive Director/WR
RailTel Corporation of India Ltd.
Mahalaxmi, Mumbai-400013

Dear Sir,

Sub: NIL Deviation Compliance for **GeM Bid No. GEM/2025/B/6092012   dtd:29.04.2025**

Over and above all our earlier conformations and submissions as per your requirements of the bid, we confirm that,

We will ensure our unconditional compliance of all the terms and conditions as mentioned in the Tender document. In case of any deviation, the same should be attached as an Annexure (as per Format given below) to this form. In case of any deviation, RailTel reserves the right to reject the bid without giving any justification. Format of Annexure (Deviation Statement)

S. No.	Clause No. & Chapter No.	Existing Clause of Tender	Proposed Clause	Remarks, if any

All the proposed items to be supplied as per SOR for the technical specifications as mentioned in Annexure-I of Bid.

We hereby certify that the items/materials mentioned in our offer are complete.

We confirm that there is no requirement of any other hardware and software to fulfill requirements as per scope against the bid. If any additional hardware and software is required to meet in scope requirements, then it would be provided by us at no extra cost to RailTel.

Place:
Date: Seal and signature of the bidder

(This Form along with Annexure (if required) should be on the letterhead of the bidder duly signed by an authorized signatory)

DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)
(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)

To,

(Write Name & Address of Officer of RCIL inviting the Tender)

Dear Sir,

Sub: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).
Ref : 1) NIT/Tender Specification No: …………………………,
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by…………………………… *(specify the name of the organization here)* has a local content of _____ % and this meets the local content requirement for **'Class-I local supplier' / 'Class II local supplier'** ** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:
1. _____   2. _____
3. _____   4. _____

Thanking you,
Yours faithfully,

**(Signature, Date & Seal of
Authorized Signatory of the Bidder)**

** - *Strike out whichever is not applicable.*

Note:
1. Bidders to note that above format Duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per RCIL Guidelines shall be initiated against the bidder.

Annexure-VIII

Land Border Sharing Declaration

(To be submitted in the bidder's letter head)

In-line with Department of Expenditure's (DoE) Public Procurement Division Order vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020

GeM Bid No . ………………….

Job: …………………………..

"I/ we have read the clauses pertaining to Department of Expenditure's (DoE) Public Procurement Division Order (Public procurement no 1, 2 & 3 vide ref. F.No.6/18/2019-PPD dated 23.07.2020 & 24.7.2020) regarding restrictions on procurement from a bidder of a country which shares a land border with India. I/We hereby certify that I/ we the bidder < name of the bidder……> is / are

a) Not from such a country and eligible to be considered for this tender.

OR

b) From such country, has been registered with the competent authority and eligible to be considered for this tender. (Evidence of valid registration by the competent authority shall be attached)

For and behalf of _____ (Name of the bidder)

(Signature, date & seal of authorized representative of the bidder)"

Annexure – IX

Note: Bidders exempted from submission of bid security are required to submit this form.
Bid Securing Declaration
(on Company Letter-head)

Bidder's Name_____
[Address and Contact Details]

To,
Principal Executive Director/WR
RailTel Corporation of India Ltd.
Mahalaxmi, Mumbai-400013

Ref: GeM Bid No. GEM/2025/B/6092012   dated: 29.04.2025

Sir/ Madam

We, the undersigned, solemnly declare that:

We understand that according to the conditions of this Tender Document, the bid must be supported by a Bid Securing Declaration in lieu of Bid Security.

We unconditionally accept the conditions of this Bid Securing Declaration. We understand that we shall stand automatically suspended from being eligible for bidding in any tender in RailTel Corporation of India Ltd for 2 years from the date of opening of this bid if we breach our obligation(s) under the tender conditions if we:

1) Withdraw/ amend/ impair/ derogate, in any respect, from our bid, within the bid validity; or
2) Being notified within the bid validity of the acceptance of our bid by the Procuring Entity:
   a. Refused to or failed to produce the original documents for scrutiny or the required Performance Security within the stipulated time under the conditions of the Tender Document.
   b. Fail or refuse to sign the contract.

We know that this bid-Securing Declaration shall expire if the contract is not awarded to us, upon:

3) Receipt by us of your notification
   a. of cancellation of the entire tender process or rejection of all bids or
   b. of the name of the successful bidder or

4) Ninety days after the expiration of the bid validity or any extension to it.

(Signed by the Authorized Representative of Firm)

Name of Authorized Representative:
Name of Firm:
Date:

CHECKLIST FOR SUBMISSION OF OFFER

SN	Required documents	Remarks
1	Earnest Money Deposit (On line payment)/ Valid Documentary proof of exemption as per Clause-6 of ITB.	
2	Notarized affidavit on a non-judicial stamp paper **(Rs.100/-)** as per **Annexure-III**	
3	SOR Item Technical Specification compliance (**Annexure-I**)	
4	In case of the bidder is Authorized dealer/ distributor/ Partner/ Trader authorized by OEM specific to this bid, a certificate from the OEM to this effect should be submitted as per the **Annexure-II** (MAF). **/ Self declaration of OEM**	
5	Proforma for Nil Deviation Component Compliance Undertaking Letter **(Annexure-VI)**	
6	Declaration Regarding Minimum local content under preference to "MAKE IN INDIA" Policy as **Annexure-VII**	
7	Land Border Sharing Declaration as **Annexure-VIII**	
8	**Bid Securing Declaration -** Bidders exempted from submission of bid security as per **Annexure-IX**	
9	If the Firm is registered with MSME/NSIC, the Valid Certificate with same scope of work as per Tender	
10	Clause wise compliance along with all mentioned documents/ annexures for all clauses of GeM Bid and ATC (Information to bidder) documents.	
11	Technical Eligibility Criteria (as per Clause No.9.1) documents along with completion certificate	
12	Financial Eligibility Criteria (Turnover Certificate along with Certified copies of audited balance sheets/ annual reports of last three preceding financial years) (as per Clause No.9.2)	
13	Bidders Undertaking – Non Blacklisting (as per Clause No.9.3)	
14	Compliance for Delivery Period (as per Clause No. 5)	
15	Compliance for Warranty Period (as per Clause No. 11)	
16	Complete technical data and particulars of the equipment offered, as specified in the Tender	
17	GST Registration Details	
18	Duly notarized Power of Attorney in name of authorized signatory	
19	Upload Signed Copy of ITB, GeM Bid/ Corrigenda/ Addenda	

****