

TECHNICAL SPECIFICATION

The detailed Specifications of the work Replacement of Datacom Equipments of PRS/UTS at Tier 2,3 & 4 and down locations over Hubballi Division are be carried out by the contractor are stipulated here under:- The work shall be carried out as per the approved practice by the Railways. The contractor shall be solely responsible for the proper execution of the work as per specifications.

1. Telecom works involves:-

The works to be executed can broadly be grouped as under:

- a. Replacement of datacom equipments and network connectivity of PRS/UTS.
- b. Supply and Installation of 8/4 WAN port, Layer Manageable switches, single Mode 1G SFP-BX, 12 Fiber FDMS, PVC conduit, PVC casing and capping/PVC pipe etc.,
- c. Laying of signaling/power/telecommunication cables, in pvc pipes /casing & capping, duct/dwc pipe etc.
- d. The materials to be supplied as per the applicable Railway Board circulars and RDSO specifications as on the date of tender opening
- e. Transportation of various telecom equipments from SSE/Stores/Telecom/UBL (or at any other nominated store which will be intimated from time to time) to the work site
- f. Submission of as made drawings as per extant practice of South Western Railway
- g. Provision of telecom equipment including supply, installation, networking, configuration and commissioning
- h. The material offered shall comply with the Minimum Local Content requirements stipulated in the Ministry of Communications, Department of Telecommunications (DoT) Notification dated 21.10.2024 issued under the Public Procurement (Preference to Make in India) for Telecom Products, Services or Works
- i. For the equipment after award of the contract and before supply of equipment "MoU with RDSO approved firm (if available) or in case not available, MoU with OEM who meets the RDSO specification" covering supply. installation, testing and commissioning of system shall be submitted including after sales support required during the warranty period.
- j. As per Railway Board letter No.2015/Tele/15(18)3 dated 10.02.2015 "on system improvement regarding elaborating the issues of compatibility, performance of the telecom equipments in the tender documents." The latest version amendment of the



specification applicable shall be as on the date of tender opening.

- k. As per Railway Board Letter No.2023/C&IS/PRS Modernization/01 of Dated: 04.06.2026, for supply of datacom equipments
- l. MTCTE and ITSAR certification for Telecom networking equipment of IR shall be submitted before supply of materials
- m. As per Railway Board letter No. 2025/Tele/15(13)/1(3489218) Dated 24.06.2025 [Copy enclosed]
 - i. Every person to which a notified standard applies, shall ensure that the details of such standard, including the Certificate of Conformity Assessment, is displayed in such manner as may be specified by the Appropriate Authority.
 - ii. No telecommunication equipment to which a standard applies, shall be sold or deployed in any telecommunication network, or otherwise be used in India, unless it has a valid Certificate of Conformity Assessment.
- n. Applicability of trusted telecom portal for inspection of Non-RDSO approved telecom items issued by HQ on 19.04.2024 and 12.08.2024 (copy enclosed)
- o. OEM quoting MII products for Router must have IPR for OS/Software registered in India. Ensure before supply of materials .

Technical Specification

| Sl. No | Explanation of Items |
|--------|---|
| 01 | Current RDSO specifications are mentioned here. However, while procuring only the LATEST RDSO SPECIFICATION will prevail and material to be inspected as per latest RDSO specifications. |
| 02 | Materials shall be procured from the RDSO approved vendor list, prior approval of Railways shall be obtained before placing the order with vendors under Development orders(if applicable). |
| 03 | Drawing number mentioned here are current and may be updated. Latest drawings are required to be followed while execution of work. |
| 04 | The quantities of each sub item are to be calculated/assessed and approval of Engineer to be taken before consolidated procurement of such items and for arranging inspection by RDSO/RITES, as indicated under Inspection Agency |
| 05 | The explanation mentioned for the schedule items is to clarify further on the technical details about the schedule item. The items available in the schedule of this NIT shall be executed as per the explanation & Technical specifications. |
| 06 | The works are to be done as per the instructions of the supervisor/officer in charge of the work and details mentioned in the schedule, all miscellaneous materials required for the work shall be supplied by the Contractor. |

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| 07 | S&T works shall be carried out under proper disconnection or line block as applicable. |
| 08 | All the work shall be done as per the technical specifications attached with the tender document as applicable. |
| 09 | All works are to be executed under the direct supervision of the Consignee or his authorized representative. |
| 10 | All materials required to execute the work are to be carried by the contractor from Consignee's Godown to work site at his own cost. |
| 11 | Released materials, if any are to be deposited to Consignee's Stores. |
| 12 | Clarification about the latest policies/practices for execution of work can be received from the office of Sr Divisional Signal and Telecommunication Engineer/Hubli Division, DRM Building, South Western Railway, Hubli |



CRIS

रेलवे सूचना प्रणाली केन्द्र

(रेल मंत्रालय भारत सरकार का संगठन)

CRIS

CENTRE FOR RAILWAY INFORMATION SYSTEMS

(An Organisation of the Ministry of Railways, Govt. of India)

No. CRIS/HR/NTWG/26/2023-CM

Dated :20.10.2023

✓ Executive Director /C&IS,
Railway Board,
Rail Bhawan,
New Delhi

Sub: Follow-up on decision taken during the meeting chaired by AM/M&BD on 16.08.2023

Ref : i) Railway Board letter no. 2023/C&IS/.PRS Modernization/01 dated 19.10.2023
ii) Minutes of meeting (MoM) held in chamber of AM(M&BD), Railway Board on 16.08.2023

The observation conveyed vide above referred letter (i) has been examined and comments are as under :

The existing architecture of UTN is IP-SDH based which uses hierarchical network topology (Tier 0/1/2/3/4) as against IP-MPLS network which is hub-and-spoke topology. No changes are proposed in the existing architecture and specifications for Routers to be deployed at Tier2/3/4 locations are based on "as-is" architecture. Keeping in view that Zonal Railways are also utilising Ethernet interface in the last mile of the WAN links, WAN port configuration of routers have been worked out with a mix of both Ethernet as well G.703 / E1 ports.

Since, minimum port requirements for both 08 WAN port and 04 WAN port routers are already specified in Item no. 8 of the specifications, the footnotes mentioned in the specifications have been removed for more clarity. The final set of Technical specifications for Tier 2/3/4 locations with these changes are enclosed herewith which may be circulated to Zonal Railways for expediting the replacement of routers and timely roll out of PRS Modernisation project.

राम बंसल

(Raman Bansal)

Chief Project Engineer/CN

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| | Tier-2 Router (08 WAN Ports) |
| Sr. No. | Item Description |
| | General Requirements |
| 1 | Router shall be designed for continuous operations. The bidder shall furnish the MTBF (Mean Time Between Failure) predicted and observed values along with calculations by the manufacturer. |
| 2 | In case of full system failure, Router shall maintain a trace area in the NVRAM / FLASH 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 | Router shall have suitable Visual Indicators for diagnostics and healthy / unhealthy status of Ports & modules. |
| 5 | The design of Router shall not allow plugging of a module in the wrong slot or upside down. |
| | Hardware Details |
| 6 | The proposed device should be mentioned as Router in the publically available OEM datasheet/document. |
| 7 | Router shall have minimum 02 Nos. 1G Base-T Ethernet LAN ports at wire-speed/Line rate complying to IEEE 802.3ab specification. The Gigabit ports shall have full duplex capabilities. The hardware of all these ports should be complete in all respect. |
| 8 | Router shall have minimum 8 WAN ports which shall be combination of both 100/1000 Base-T Ethernet Routed Ports and G.703 interface / E1 Ports. The hardware of all these ports should be complete in all respects. The combination of WAN ports shall be as follows: |
| (i) | Router shall have minimum 02 Nos. 100/1000 Base-T Ethernet Routed Ports at wire-speed / Line rate complying to IEEE 802.3ab specification. The Ethernet ports shall have full duplex capabilities. |
| (ii) | Router shall have minimum 04 Nos. WAN ports supporting G.703 interface / E1 Ports natively. These ports shall be operable up to speed of 02 Mbps. |
| (iii) | Router shall have minimum 02 Nos. WAN ports; which can be either be 100/1000 Base-T Ethernet Routed Ports supporting full duplex capabilities or G.703 interface / E1 Ports natively operable up to speed of 02 Mbps. |
| 9 | Router shall have aggregate packet forwarding rate greater than or equal to 400 kpps (killo packets per second) for a packet length of 64 Bytes/128 Bytes. The performance of the router shall not degrade for IPv4 and IPv6 individually as well as for dual stack operations (IPv4 & IPv6). |
| 10 | Router shall have aggregate throughput minimum 400/800 Kbps for a packet length of 64 Bytes/128 Bytes respectively. |
| 11 | Router shall have minimum 20K active IPv4 and 10K IPv6 routes. |
| 12 | The Router shall have enough CPU capacity and Memory so as to efficiently meet all the functionalities laid down in the specifications. The bidder should specify the offered CPU and memory model. |
| 13 | The router hardware shall be designed to run both IPv4 & IPv6 simultaneously (Dual Stack) from day one. |
| 14 | Router shall support 19" rack mountings. |
| 15 | Router shall support Upgrade of Software through Flash Memory. |
| 16 | Router shall support on-line software reconfiguration to implement changes without rebooting. |
| 17 | Router shall be capable of working with 200 – 240 Volts AC nominal at frequency 50 +/- 2 Hz. |
| 18 | Router shall support a console port with RS-232 or RJ-45 Interface for configuration and |

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| | diagnostic purposes. |
| | Software Details (required from day 1) |
| 19 | The router shall support following protocols: |
| | i. TCP/IP |
| | ii. ARP, ICMP, ICMPv6, DHCP, TFTP and DNS |
| | iii. Network address translation (NAT) and Port Address Translation (PAT) |
| | iv. Router shall support NTP (Network Time Protocol) or SNTP (Simple Network Time Protocol) for date & time synchronization from NTP Server. The router shall also be configured as NTP Server for serving the time. |
| | v. Support for both TCP and UDP at layer 4 |
| | vi. Sub networking |
| | vii. Classless Inter Domain Routing (CIDR) |
| | viii. Variable Length Subnet Masking (VLSM) |
| | ix. IEEE 802.1Q based VLAN tagging |
| | x. VRRP |
| 20 | The router shall support following WAN protocols: |
| | i. PPP |
| | ii. Multi-link PPP |
| | iii. HDLC |
| 21 | The router shall support static as well as dynamic routing with following IP routing protocols: |
| | i. OSPF Version 3 |
| | ii. BGP Version 4 |
| | iii. Multi-Protocol BGP Version 4 |
| 22 | The Router shall have following IP Routing features: |
| | i. Bidirectional Forwarding Detection (BFD) for Static and OSPF Routing. |
| | ii. Option to define a Router as Designated Router (DR) in OSPF Domain. |
| | iii. Option to define “Point to Point” and “Point to Multi-point” links in OSPF Domain. |
| | iv. Option to change the LSA and SPF timers as well as other timers / counters in OSPF. |
| | v. Router shall support tracking the reachability to remote destination which is not directly connected and thereby deciding the validity of static routes etc. |
| 23 | Router shall support following quality of service (QoS) features: |
| | i. Weighted Fair Queuing (WFQ)/Weighted Round Robin (WRR) or equivalent queuing mechanism |
| | ii. IP Precedence i.e. Priority based on TOS field of IPv4 and IPv6 |
| | iii. Differentiated Services (Diff Serve) i.e. Priority based on DS Field of the IPv4 and IPv6. |
| | iv. Weighted Random Early Detection for congestion avoidance. |
| 24 | The router shall have minimum eight hardware queues per port feature for assignment of bandwidth/priority to a group(s) of applications. |
| 25 | The router shall support forwarding of traffic in load-balancing mode on links with equal metric based on Per session or Per destination-based load balancing. |
| 26 | The router shall support following Security features: |
| | i. PAP and CHAP |
| | ii. Data Encryption as per DES, 3DES and AES Standards |
| | iii. Generic Routing Encapsulation |
| | iv. Hardware Accelerated IPsec based Point to Point secure tunnels for minimum 100 IPsec tunnels and minimum IPsec throughput of 200 kbps. |

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| | v. Access lists based on Network Address, Mask, Protocol Type and Socket Type |
| | vi. Access list violation Logging & Accounting |
| | vii. MD5 Route Authentication |
| | viii. Controlled SNMP Access through the use of SNMP with MD5 Authentication. |
| | ix. Multiple Privilege levels to provide different levels of access |
| | x. Remote Authentication Dial in User Service (RADIUS) |
| 27 | The Router shall support authentication, authorization and accounting through RADIUS / TACACS+. |
| 28 | Router shall support Network Management through: |
| | i. SNMP V-2 & V-3 |
| | ii. MIB I/II |
| | iii. Router shall support all standard MIBs based on OSPF, BGP etc. |
| | iv. Software Upgrade through FTP or TFTP |
| | v. TELNET Client and Server |
| | vi. SSH Version-2 |
| 29 | Router shall support following in the user level of access i.e. the user with minimum privileges: |
| | i. Ping |
| | ii. Telnet |
| | iii. Traceroute |
| | iv. Display of pre-configured description / label on each interface. |
| | v. Display of Input and Output error statistics on all interfaces. |
| | vi. Display of Input and Output data rate statistics on all interfaces. |
| | vii. Display of Dynamic ARP table. |
| 30 | Router shall support System & Event logging functions as well as forwarding of these logs onto a separate Server for log management. |
| 31 | The Hardware / Software of Router shall not pose any problem due to change in date and time caused by events such as changeover of millennium / century, leap year etc. in the normal functioning of the system. |
| 32 | Router shall have Debugging features to display and analyze various types of packets. |
| 33 | The router shall support NetFlow / SFlow / JFlow / NetStream. |
| | Regulatory Compliance |
| 34 | Router shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 or equivalent Indian Standard like IS-13252:2010 or better for Safety requirements of Information Technology Equipment. |
| 35 | Router shall conform to EN 55022/55032 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B or equivalent Indian Standard like IS 6873 (Part 7): 2012 or better for EMC (Electro Magnetic Compatibility) requirements. |
| 36 | Router shall be manufactured in accordance with the international quality standards ISO 9001:2008 or latest valid ISO or equivalent Indian standard like BIS for which the manufacturer should be duly accredited. |
| | Product Certification Required |
| 37 | Router / Router's Operating System should be tested and certified for EAL 2 / NDPP (Network Device Protection Profile)/NDcPP (Network Device collaborative 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. |

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| | Tier-3/4 Router (04 WAN Ports) |
| Sr. No. | Item Description |
| | General Requirements |
| 1 | Router shall be designed for continuous operations. The bidder shall furnish the MTBF (Mean Time Between Failure) predicted and observed values along with calculations by the manufacturer. |
| 2 | In case of full system failure, Router shall maintain a trace area in the NVRAM / FLASH 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 | Router shall have suitable Visual Indicators for diagnostics and healthy / unhealthy status of Ports & modules. |
| 5 | The design of Router shall not allow plugging of a module in the wrong slot or upside down. |
| | Hardware Details |
| 6 | The proposed device should be mentioned as Router in the publically available OEM datasheet/document. |
| 7 | Router shall have minimum 02 Nos. 1G Base-T Ethernet LAN ports at wire-speed/Line rate complying to IEEE 802.3ab specification. The Gigabit ports shall have full duplex capabilities. The hardware of all these ports should be complete in all respect. |
| 8 | Router shall have minimum 4 WAN ports which shall be combination of both 100/1000 Base-T Ethernet Routed Ports and G.703 interface / E1 Ports. The hardware of all these ports should be complete in all respects. The combination of WAN ports shall be as follows: |
| (i) | Router shall have minimum 02 Nos. 100/1000 Base-T Ethernet Routed Ports at wire-speed / Line rate complying to IEEE 802.3ab specification. The Ethernet ports shall have full duplex capabilities. |
| (ii) | Router shall have minimum 02 Nos. WAN ports supporting G.703 interface / E1 Ports natively. These ports shall be operable up to speed of 02 Mbps. |
| 9 | Router shall have aggregate packet forwarding rate greater than or equal to 200 kpps (killo packets per second) for a packet length of 64 Bytes/128 Bytes. The performance of the router shall not degrade for IPv4 and IPv6 individually as well as for dual stack operations (IPv4 & IPv6). |
| 10 | Router shall have aggregate throughput minimum 200/400 Kbps for a packet length of 64 Bytes/128 Bytes respectively. |
| 11 | Router shall have minimum 20K active IPv4 and 10K IPv6 routes. |
| 12 | The Router shall have enough CPU capacity and Memory so as to efficiently meet all the functionalities laid down in the specifications. The bidder should specify the offered CPU and memory model. |
| 13 | The router hardware shall be designed to run both IPv4 & IPv6 simultaneously (Dual Stack) from day one. |
| 14 | Router shall support 19" rack mountings. |
| 15 | Router shall support Upgrade of Software through Flash Memory. |
| 16 | Router shall support on-line software reconfiguration to implement changes without rebooting. |
| 17 | Router shall be capable of working with 200 - 240 Volts AC nominal at frequency 50 +/- 2 Hz. |
| 18 | Router shall support a console port with RS-232 or RJ-45 Interface for configuration and diagnostic purposes. |
| | Software Details (required from day 1) |

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| 19 | The router shall support following protocols: |
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| | iv. Router shall support NTP (Network Time Protocol) or SNTP (Simple Network Time Protocol) for date & time synchronization from NTP Server. The router shall also be configured as NTP Server for serving the time. |
| | v. Support for both TCP and UDP at layer 4 |
| | vi. Sub networking |
| | vii. Classless Inter Domain Routing (CIDR) |
| | viii. Variable Length Subnet Masking (VLSM) |
| | ix. IEEE 802.1Q based VLAN tagging |
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| | iv. Option to change the LSA and SPF timers as well as other timers / counters in OSPF. |
| | v. Router shall support tracking the reachability to remote destination which is not directly connected and thereby deciding the validity of static routes etc. |
| 23 | Router shall support following quality of service (QoS) features: |
| | i. Weighted Fair Queuing (WFQ)/Weighted Round Robin (WRR) or equivalent queuing mechanism |
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| | i. PAP and CHAP |
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| | iv. Hardware Accelerated IPSec based Point to Point secure tunnels for minimum 50 IPSec tunnels and minimum IPSec throughput of 100 kbps. |
| | v. Access lists based on Network Address, Mask, Protocol Type and Socket Type |
| | vi. Access list violation Logging & Accounting |

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| | vii. MD5 Route Authentication |
| | viii. Controlled SNMP Access through the use of SNMP with MD5 Authentication. |
| | ix. Multiple Privilege levels to provide different levels of access |
| | x. Remote Authentication Dial in User Service (RADIUS) |
| 27 | The Router shall support authentication, authorization and accounting though RADIUS / TACACS+. |
| 28 | Router shall support Network Management through: |
| | i. SNMP V-2 & V-3 |
| | ii. MIB I/II |
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| 32 | Router shall have Debugging features to display and analyze various types of packets. |
| 33 | The router shall support NetFlow / SFlow / JFlow / NetStream. |
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| 35 | Router shall conform to EN 55022/55032 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B or equivalent Indian Standard like IS 6873 (Part 7): 2012 or better for EMC (Electro Magnetic Compatibility) requirements. |
| 36 | Router shall be manufactured in accordance with the international quality standards ISO 9001:2008 or latest valid ISO or equivalent Indian standard like BIS for which the manufacturer should be duly accredited. |
| | Product Certification Required |
| 37 | Router / Router's Operating System should be tested and certified for EAL 2 / NDPP (Network Device Protection Profile)/NDcPP (Network Device collaborative 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. |