

JP/JS 14 (1C & 1D) Response/Clarification by JMRC on Pre-Bid Queries of Bidders

S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
1	Chapter - 2 (Radio & CDRS System) Part - 1 (Radio System)	3. SCOPE OF THE WORKS 3.1.1.1	(Page 5 of 98)	3.1.1.1 JMRTS has presently a TETRA based system operating in the 380 – 400 MHz frequency band having central control equipment/ MSO(of Cassidian make) installed & commissioned in the TER of OCC, Mansarovar Depot. Presently five (05) numbers of TETRA base stations are installed at selected locations viz. Mansarovar Depot, Vivek Vihar, Ram Nagar, Sindhi Camp & Chandpole (U/G) stations to relay communications between all radios in the Radio system. The radio network of Phase-1B stations i.e. Choti Chaupar (U/G) & Badi Chaupar (U/G) is extended from existing Base Station of Phase- 1A through BDA. Radio system details of exiting Phase-1A & 1B is provided at Annexure/Radio below and details of various Radio sites and Lines/ sections which are covered by this Radio Network is tabulated as under:	1. Kindly specify the existing BTS antenna tower height for the existing outdoor BTS locations so that we can do the coverage analysis as per the tender requirement. 2. Please provide the geo-coordinates of the existing and new outdoor BTS locations. This is also required for coverage analysis.	1. Existing Tower height at BTS location is of 30 meters. 2. It is advised that Bidders may visit the Site and conduct survey, with prior permission.
2	Chapter - 2 (Radio & CDRS System) Part - 1 (Radio System)	3. SCOPE OF THE WORKS 3.1.1.3 & 6.16 System Expansion 6.16.2	(Page 6 of 98) (Page 83 of 98)	3.1.1.3 - The contractor shall supply IP based TETRA accredited system. The system shall have a centralized architecture or a distributed architecture. However, system response time as laid down vide clause No. 6.4.3 of this chapter have to be complied by the contractor's equipment for the ultimate no. of base stations (minimum 64) which can be supported by the central or distributed radio system equipment being supplied. In case a distributed architecture is proposed and provided, the radio contractor shall be fully responsible for arranging at his own cost any extra network equipment (Routers, Switches etc) required to build his architecture, other than Ethernet channels (maximum 2 nos.) provided by the fibre optic contractor from each of the station to OCC for new stations of Phase-1C & 1D. 6.16.2 - Central equipment for OCC shall be modularly expandable without causing the installed hardware (except adding cards/modules/racks) and software to be replaced within the service life of the Radio system. With the ultimate expansion capacity of the Central equipment, the Radio System should be able to support minimum 64 remote Base Station sites in-line with the existing radio central system of Phase-1A. The contractors shall list equipment wise expansion capacity built in the system and possible in future. This list of expansion capacity built in, should include the capacity for additional radios available at every Base station site, capacity for additional dispatchers available at Central Infrastructure, central infrastructure equipment available for supporting remote base station sites, maximum voice logging channels available at the Central Infrastructure, maximum simultaneous voice calls possible between Mobiles to Dispatchers, available central audio switch size, maximum EPABX ports available, maximum ports available for remote site linking, etc. The same information shall also be provide for maximum expansion possible in future by addition of cards, modules and racks.	Since JMRTS is currently having a 5 sites TETRA network (for PH - 1A & 1B) and the PH -1C & 1D would require only 2 additional sites with a total of 7 sites for the entire TETRA network, hence a requirement of the proposed system to support minimum 64 sites will not be practical for this small corridor. Therefore, we would like to request to kindly amend the clause to minimum 20 Base Stations, which will be sufficient for the existing as well as the future expansion requirements. This will also make the MSO cost effective for JMRTS. Kindly confirm.	No change in Bid conditions.
3	Chapter - 2 (Radio & CDRS System) Part - 1 (Radio System)	5.14 - NETWORK MANAGEMENT SYSTEM	(Page 45 of 98)	JP/JS14(1C&1D)Contractor shall upgrade/replace the existing NMS (Network Management System), AKDC, RCW, CDRS, DWS other MMI'swith RAID5 configuration so that following requirements are continue to meet for the extended section under Phase-1C & 1D as well according clause 3.2.1 above.	Items like AKDC & DWS are the proprietary items of the existing Cassidian Radio system configuration & design. Other OEMs will use its own configuration and architectural equipment to meet all the tender specifications and functionalities and may not use the same items & abbreviations. Kindly confirm.	Clause is self explanatory.
4	Chapter - 2 (Radio & CDRS System) Part - 1 (Radio System)	3.2 Scope of Supplies 3.2.1 Sub Point - 7	(Page 7 of 98)	7) L3 switch for Radio Network Management Upgradation/Replacement with 10 year service life. Ugradation/Replacement with 15 year service life	Kindly advise the requirement of upgrade / replacement of the existing L3 Switches for Radio Network Management. As per TETRA system design L3 Switch is not applicable. It is also not mentioned in the tender BoM.	Bidder to refer Addendum-2
5	CHAPTER 7 CLOCK SYSTEM	1.2.2	Page 3	The Master Clock system already commissioned at OCC shall provide synchronization signal to all sub master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, Telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations. JP/JS14 (1C & 1D) contractor shall configure master clock at OCC and integrate sub-master clocks to the master clock at OCC for provision of synchronization to sub-master clocks and to any new systems at OCC. JP/JS14 (1C&D)MCLK Contractor shall provide any item necessary for integrating with pre-installed Master clock system at OCC.	We understand that the Master Clock system at the OCC has already been installed and has been operational for a considerable period. Kindly clarify whether any OEM support, modification, upgrade, replacement, or integration-related requirement associated with the pre-installed Master Clock system shall be carried out without any additional cost to the Employer, or whether such costs shall be considered separately.	Clause is self explanatory.



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6	CHAPTER 7 CLOCK SYSTEM	3.3.1	Page 3	The Master Clock system already installed at OCC shall provide synchronization signal to all sub-master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations.	Clause 3.3.1 states that the existing Master Clock at OCC shall provide synchronization and Date/Time to the new systems at OCC/stations, whereas Clause 5.2 (4) states that the Sub-Master Clock shall provide timing signals to these systems.	Clause is self explanatory.
7	CHAPTER 7 CLOCK SYSTEM	5.2	Page 6	(4) Sub-master clock shall supply timing signals to the voice and video recording equipment, the train control & signalling system, PIDS, PAS, Radio, Telephone system, CCTV System, power supply, computer, (SCADA), other SCADA systems, the AFC central computer and other necessary equipment.	Kindly clarify whether the new systems at stations shall be synchronized directly from the existing Master Clock at OCC or through the respective Sub-Master Clock.	Clause is self explanatory.
8	CHAPTER 7 CLOCK SYSTEM	5.3	Page 6	Alarm and status monitoring of the Master Clock system shall be connected to the NMS of PAS/PIDS in OCC.	Clause 5.3 states that the alarm and status monitoring of the Master Clock system shall be connected to the NMS of PAS/PIDS at OCC. Kindly clarify whether this requirement includes integration and monitoring of both the existing Master Clock system and the new Master Clock system on the same NMS workstation at OCC. The MCLK Contractor shall be responsible for integrating the new Master Clock system with the existing NMS at OCC. Please clarify.	Clause is self explanatory, No change in Bid conditions.
9	CHAPTER 7 CLOCK SYSTEM	5.5	Page 6	The Sub-Master Clock system shall provide appropriate clock output interfaces for master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare Collection, Train Control and Signalling etc.). Suitable interfaces (such as RS422 or RS232 or LAN connections) for clock output interfaces shall be supported.	Clause 5.5 seems typo error. The clause must be: The Master Clock system shall provide appropriate clock output interfaces for Sub-master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare Collection, Train Control and Signalling etc.). Suitable interfaces (such as RS422 or RS232 or LAN connections) for clock output interfaces shall be supported.	No change in Bid conditions.
10	CHAPTER 7 CLOCK SYSTEM	6.3.1.8 (2)	Page 8	(2) One single faced, outdoor type, digital clock each at head end of each platform suitably positioned for the use of the train driver. Where ever CCTV monitors or Driver Mirror for monitoring of train doors are installed, these clocks shall be aesthetically co-located with the CCTV monitors/Mirror. These clocks shall be visible from the driver's cab in emergency lighting conditions and in bright sun light. The character height of the display shall not be less than 170 mm.	The clause specifies provision of one outdoor digital clock at the head end of each platform. We request to consider provision of an additional outdoor digital clock at the tail end of each platform as well, to ensure clear visibility of the time reference to the train crew & passengers irrespective of the train berthing position and to facilitate operational activities during train arrival, departure and emergency conditions.	No change in Bid conditions.
11	CHAPTER 7 CLOCK SYSTEM	6.3.1.8 (3)	Page 8	(3) One 60 centimetre diameter double faced suspended analogue clock at each entrance gate to the passenger areas to be visible in all lighting conditions;	Clause 5.2(3) specifies provision of double-faced suspended analogue clocks at each entrance gate to the passenger areas (1 No. per station). However, no clock provision is specified for the concourse level and station platforms (middle). Kindly clarify and consider provision of suitably located clocks at the concourse and middle platform levels to ensure convenient visibility of the time to passengers and station staff throughout the paid/unpaid areas.	No change in Bid conditions.



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12	ITB	C2.6	Pg 12 of 74	JMRC project is covered under Project Import 98.01 of Custom Tariff Act according to which only concessional custom duty is payable. The bidder should avail this benefit. As regards registration under Project Import, after the award of the contract, JMRC at the written request of a contractor shall facilitate the contractor for getting them registered for availing Project Import benefits. The responsibility to avail the concessional benefits under Project Import shall solely rest with the contractor.	1.Exact concessional rate:-Kindly confirm the exact applicable concessional custom duty rate (%) as per the relevant CBIC notification, so that customs duty component can be catered accurately in the quoted price." 2.Scope of eligible items under Project Import:-Kindly confirm whether ALL imported equipment/spares/tools/jigs & fixtures under this tender (CCTV, Radio, CDRS, PIDS/PAS/MCK, FOTS, Telephone and UPS System) are eligible for Project Import 98.01 concessional rate, or only specific categories/HSN codes. A list of eligible HSN codes, if available, would help to quote price accurately." 3.Registration timeline and responsibility:- Kindly clarify: (a) The expected timeline for JMRC to complete this facilitation after LOA since import activities/procurement may need to commence early in the project schedule. (b) Whether any imports made before registration requiring the Contractor to pay full/standard BCD for that interim period. (c) In case the concessional duty benefit under Project Import is delayed, reduced, or denied by customs authorities for reasons not attributable to the Contractor (e.g., delay in facilitation, change in government policy), will it be compensated as the differential duty through the Price Variation, or does the Contractor bear this risk entirely. 4.In case any item is quoted partly in Foreign Currency(FC) and partly in Indian Rupees(INR) or completely in Foreign Currency, kindly clarify whether the payment against such item shall be made in Indian Rupees(INR) after conversion of the foreign currency component. 5.In case the payment is to be made in INR, kindly confirm the applicable exchange rate and date/reference applicable for conversion of the foreign-currency component into INR. 6. It is unclear whether customs duty is reimbursed at actuals or included in the price, and how it is treated in L1 evaluation. Confirm: (a) customs duty is payable extra at actuals on production of Bills of Entry, and is EXCLUDED from evaluation; (b) the process and timeline for JMRC's Project Import registration; (c) whether duty on items supplied in INR but imported by an Indian supplier is covered.	Clause is self explanatory. Kindly refer Bidding Documents.
13	NIB	1.1.2 (E-Bidding Processing Fee); ITB C18.1		NIB says the e-bidding fee is by DD/BC in favour of 'MD, RISL', but the same cell says bid fee is payable ONLY by RTGS/NEFT/IMPS. Mode and submission procedure are unclear.	Confirm instrument for the INR 2,500 e-bidding fee, whether a physical DD must be sent to JMRC/RISL, and the date by which it must be received.	Bidder to refer Addendum-2
14	NIB / ITB	1.1.2 Bid Security; ITB C17, C18.1.3		Bid Security validity is 27.06.2027, whereas Bid validity is 180 days from 02.11.2026 (about 01.05.2027). Original BG/DD/FDR must reach Jaipur by 02.11.2026 15:00, 3 hours before online close.	Confirm the 27.06.2027 date is intended.	No change in Bid conditions.
15	BOQ / SCC	BOQ Appendix-15 (Man-day rates); SCC 28(c); SCC 27 (Sub-clause 11.6)		Maximum foreign man-day rates are fixed in EURO (Column A) but the bidder's proposed rates and the BOQ foreign-currency columns are in USD.	Confirm the currency for Appendix-15 and for foreign-currency pricing/payment, the exchange rate used to compare EURO caps with USD rates, and whether any cap applies to the share of price quoted in foreign currency. Will this appendix rates will be considered for bid-evaluation. Clarify	Please refer ITB Clause C16.1.



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16	BOQ / PS / ER Radio	BOQ 'Section 1AB' items (Radio items 1, 3(b), 4, 5(b), 6, 17; Telephone 8; PAS/PIDS 1, 3; CCTV 9; UPS 7; FOTS)		Upgrading live Phase-1A/1B systems (11 stations, depot, OCC) carries commercial risk: the existing OEMs' cooperation, licences, warranties, and liability for failures during integration are not addressed in SCC.	Confirm: (a) existing OEM(s) are obliged to provide interfaces, APIs, licences and technical support to the new contractor; (b) who bears the cost if the existing OEM charges; (c) liability for pre-existing defects found during upgrade; (d) allowed possession windows/hours and maximum outage on the live line.	Interface responsibility for existing system is under the scope of the Bidder.
17	BOQ				In BOQ when we select foreign currency then all sheets follow the same foreign currency as selected in BOQ1. But if we want to quote some products into two different foreign currency then this option is not available.	Bidder to refer ITB Clause C16.1.
18	SCC	Clauses 37 & 38 (Sub-clauses 11.2.1 and 11.2.4)		Mobilisation advance quantum, interest rate, and BG format are not stated in NIB/SCC/COF; SCC only says recovery starts when 20% of the original contract value is paid and interest runs 'as per GCC 11.2.1'.	State advance % (suggest 10%), interest rate, recovery rate after 20%, and BG release. Confirm advance can be taken in INR and foreign currency in the same ratio as the price.	Bidder to refer GCC clause 11.2.1.
19	SCC / PS	SCC 24 (11.3), SCC 36 (7.8); PS Appendix B KD3		SCC 24 says provisional payment against material at site is not applicable; SCC 36 says goods paid but not taken over stay in contractor's custody/risk. PS KD3 requires delivery of equipment at the Contractor's premises in Jaipur and Employer's inspection.	Confirm milestone payment applies at KD3 (delivery at contractor's Jaipur premises after inspection), against what documents/BG, and that no site-delivery is required for payment.	Clause is self explanatory.
20	SCC	Clause 7 (Sub-clause 4.5, Sub-contractors) vs NIB 1.1.3.2 A		Sub-contracting is capped at 50% (excl. design) with vendor eligibility of 'similar work in Metro rail environment'. NIB accepts a wider range of experience (Railways, airports, PSUs, Defence, Police) for bidders. It is unclear whether OEM/vendor supply of equipment and cables counts as sub-contracting.	Confirm bought-out supply from OEMs/vendors is not counted against the 50% cap, and align the sub-contractor/vendor eligibility with the bidder's own experience definition.	Clause is self explanatory.
21	SCC	Clause 28 (Variations) - Pricing mechanism after last ROD; BOQ Preamble 6		BOQ Preamble says no price variation is admissible, while SCC 28 provides CPI/PPI/IEEMA escalation after last ROD for extra works. The bidder is told to submit the index with the tender.	Confirm the indices to be submitted (country-wise CPI/PPI), whether IEEMA formula is a fixed form, and that this escalation applies only to ordered extra works.	Clause is self explanatory.
22	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.1.1.2; Ch.1 3.2(1)-(2)	PDF 81–82; 17–18	Phase 1C consists of extension of E-W corridor from Badi Chaupar to Transport Nagar of 3.85 Km total with 1 no. Underground Station (Galta Gate) & 01 no. Elevated Station (Transport Nagar); and Phase 1D consists of extension from Mansarovar to Ajmer Road Chauraha of 1.352 km with 01 no. of Elevated Station (Ajmer Road Chauraha). Tentative requirement/location of Radio Base stations for these three (03) new stations under Phase-1C & 1D is tabulated below: S.No. Stations under Phase -1C & 1D No. of BTS Sites (nos.) Elevated Underground Elevated Underground 1 (i) Transport Nagar (ii) Ajmer Road Chauraha (i) Galta Gate 01 (Transport Nagar) 01 (Galta Gate) Total 2	Please confirm the bidding baseline of two new BTS sites (Transport Nagar and Galta Gate), with Ajmer Road Chauraha covered from Mansarovar Depot. Please provide pre-bid RF survey access and the available survey/design data. In view of the lump-sum provisions, it is requested that a defined allowance or separate payable schedule be introduced for additional BTS, BDA, RF/passive equipment and tower modifications established by the approved survey beyond the stated bidding baseline; please identify the applicable contractual mechanism.	No change in Bid conditions. Bidder is advised to visit the Site for survey, with prior permission.
23	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.1.1.3; 6.1.8–6.1.9; 6.16.1–6.16.2; 6.16.5	PDF 82; 129; 159–160	The contractor shall supply IP based TETRA accredited system. The system shall have a centralized architecture or a distributed architecture. However, system response time as laid down vide clause No. 6.4.3 of this chapter have to be complied by the contractor's equipment for the ultimate no. of base stations (minimum 64) which can be supported by the central or distributed radio system equipment being supplied. In case a distributed architecture is proposed and provided, the radio contractor shall be fully responsible for arranging at his own cost any extra network equipment (Routers, Switches etc) required to build his architecture, other than Ethernet channels (maximum 2 nos.) provided by the fibre optic contractor from each of the station to OCC for new stations of Phase-1C & 1D.	With reference to the minimum ultimate capacity of 64 BTS sites and the mandatory 25% spare BTS and dispatcher capacity with licences, please confirm the day-one equipped/licensed capacity, the baseline quantities and rounding rule for the 25% allowance, and the bid-stage evidence required for ultimate expansion to 64 sites. Please confirm that licences for the remaining future BTS additions may be procured when those sites are added, subject to 6.16.1.	Clause is self explanatory.



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24	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.1.1.1; 3.1.1.4; Annexure A/Radio B–F	PDF 81–82; 171–173	Interfaces of existing BTSs available in Phase-1A & 1B for communication shall be up-graded from E1 to Ethernet (IP based) under this contract.	For the five existing TB3 BTS sites identified in the PS, please provide the current site-wise hardware/software revisions, E1 termination details, IP-upgrade compatibility, licences, port configuration, FOTS drawings and approved as-built topology. Please confirm how the existing spare TB3 is to be treated during IP migration.	Bidder is advised to visit the site for survey, with prior permission.
25	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.1.1.3; 3.1.1.5–3.1.1.6; 6.10.1.2	PDF 82; 142	For Phase-1C & 1D new IP based BTSs equipped with required number of Ethernet links/interfaces shall be supplied under this contract.	Taking account of the maximum two station-to-OCC Ethernet channels and dual-port/redundant BTS connectivity, please confirm the FOTS handoff interface type, speed, committed bandwidth, VLAN/IP scheme, QoS, latency/jitter and route diversity at each new and existing site, together with the demarcation for optics, patch leads, switches and routers.	Clause is self explanatory.
26	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.1.1.7; Ch.1 3.2(2)	PDF 82; 17–18	The Contractor should give details in his bid, how he proposes to implement and interface with existing system and Radio equipment's at OCC/stations, to meet the above-mentioned requirements.	Please provide the bid-stage deliverable schedule for the proposed migration and integration with existing OCC/station radio equipment, specifying required architecture drawings, interface compliance matrices, migration methodology and survey records. Please distinguish bid-stage submissions from detailed design submissions after award.	Clause is self explanatory.
27	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.2.1–3.2.2; Annexure A/Radio B–G	PDF 82–85; 171–174	Upgradation/ Replacement of existing Central Infrastructure at OCC and existing BTS at Stations of Phase-1A&1B (including, but not limited to, the radio system specified at table below) and supply of new BTS system at stations of Phase-1C & 1D including testing & commissioning of complete radio system.	Against the Annexure A baseline (DXT3c, TB3, TCS, DWS, AKDC, RCW, AVLS, CDRS and NMS), please provide a current asset register with site, make/model, revisions, licences, database backups and interfaces. Please identify any equipment specifically mandated for replacement rather than upgrade, and confirm whether AVLS and all existing server/client functionality must be retained or replaced under this contract.	Bidder is advised to visit the Site for survey, with prior permission. Upgradation/Replacement of existing AVLS and its server/client is not part of this Contract.
28	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.2.1; 5.9; Annexure A/Radio B	PDF 83; 114; 171	Existing may be used and functionality in existing system to be ensured	Annexure A lists 305 existing handheld terminals, 3.2.1 permits reuse, and 5.9 requires necessary hardware/software/licence upgrades. Please confirm the current fleet count, models, revisions, accessories and encryption capabilities, and the acceptance tests for reuse. For units found non-upgradable or unserviceable during the joint survey, please define replacement responsibility, quantity baseline and commercial treatment.	Clause is self explanatory.
29	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	3.2.1; 6.4.1.6	PDF 83–84; 132	The Radio contractor may utilize the existing passive equipments infra like Radio Tower, Antenna, Cables, LCX cables, Splitters etc of the existing Radio system during upgradation /replacement work in existing OCC & Stations of Phase-1A&1B. However, to meet the overall functionality and performance of the radio system requirements, the Radio system contractor shall provide any required passive equipment within the cost of this contract.	Please provide the approved as-built and condition/test records for existing towers, antennas, feeders, LCX, splitters, BDAs and RF distribution equipment, with pre-bid survey access. Please identify any items prohibited from reuse and confirm the joint condition-assessment and approval procedure for retained equipment.	Bidder is advised to visit the site for survey, with prior permission.
30	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.3.1–4.3.2	PDF 86–87	The Radio system including Radio Management system shall have an overall availability of better than 99.95%.	We note the prescribed reliability-block-diagram methodology, exclusion of degraded/reconfigured modes and inclusion of any single BTS failure. Please confirm the integrated-system availability assessment boundary, treatment of retained equipment and external FOTS/power/interface failures, and the operational demonstration period and acceptance procedure for better than 99.95% availability.	Clause is self explanatory.
31	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.3.3; Section 7; Ch.11 Appendices A, J, Q	PDF 87; 161–163; 458–610; 648–652; 663 onward	The Radio system interface to the following systems shall be reliable - (1) Telephone system (2) FOTS System (3) Train-borne PA System (4) Station PA System (5) Train Control and Signalling System (6) Rolling Stock system	Using the PS interface responsibility matrices and existing Appendix J/Q documents as the baseline, please confirm the current approved revisions and Phase-1C/1D changes for Telephone, FOTS, Station/Train PA, ATS/ATC and Rolling Stock interfaces. Please provide the outstanding equipment-specific interface details, endpoint/contact schedule and responsibility for gateways, licences and joint testing.	Interface responsibility lies with the Bidder with other designated system contractors. Further, Bidder is advised to visit the Site for survey, with prior permission.
32	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.4.1–4.4.2; 4.3.1	PDF 86–87	The Mean Time to Restore (MTTR) of the Radio system to full normal operation following a failure shall be less than four hours excluding the time of travel.	Please confirm the MTTR measurement start/end events and scope for radio equipment, and whether automatic failover may count as restoration only when all normal specified functions and performance are restored. Please define the separately applicable deadline for repair and re-establishment of redundancy after failover.	Clause is self explanatory.



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33	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.6; 4.9.2	PDF 87–89	The Radio system supplier shall have previously demonstrated working radio interoperability tests between their radio equipment and the equipment of another radio vendor. The radio system supplier must submit documentation that has demonstrated interoperability. This test certification must be issued by only Accredited Test Houses of TETRA. The Inter-Operability Profile (IOP) certificates have to be submitted for the Switching Infrastructure Equipment. Copy of IOP Certificates issued for compliance to each of the following TETRA summary features for the Switching Infrastructure Equipment, to be necessarily submitted as part of the Bid. i. Core System ii. Short Data Service (minimum SDS-TL). iii. Individual Address Dynamic Group Number Assignment iv. Packet Data v. Air Interface Encryption (minimum Class 3) vi. Authentication. vii. End to End Encryption. In case of non-compliance or non-availability for any of the above important summary features, the Bid shall be considered as Technically non-compliant.	Where an accredited TETRA IOP certificate uses an earlier product/platform name, please confirm whether it may be accepted for the offered model only with an OEM traceability statement, hardware/software equivalence evidence and accredited test-house confirmation covering every feature required by 4.6. Please specify any supplementary certificates or tests required.	Clause is self explanatory.
34	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.7; Ch.1 11.4.1.1	PDF 88; 62	The radio system supplier shall submit as part of their proposal, all Application Programming Interface (API) documentation that show the functions that will be used in the interface design between the radio and non-radio system, as in the case of train management system. This is a mandatory requirement and no other document such as flow charts will be permitted as acceptable. During execution of the Contract, JP/JS14(1C&1D) shall also be required to provide the actual API's for future use of JMRC, at no additional price.	Please confirm the required bid-stage API document scope for all proposed radio/non-radio interfaces and the permitted method of submitting proprietary documents. Please confirm the execution deliverables, usage rights, SDK/runtime tools and perpetual licences required for JMRC future use at no additional price, including any third-party interface licence obligations.	Clause is self explanatory.
35	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.8.1	PDF 88	The radio system supplier shall submit as part of their proposal, Type examination certificate from only Accredited Test Houses of TETRA. The Type examination certification should be provided for Central/Switching Equipment, Base Stations, Mobiles and Portables and should indicate the ETSI Standards that have been approved to in the Certificate. Certification form issued by any other Body will not be considered and the OEM shall be treated as technically non-compliant.	Please confirm whether accredited TETRA Type Examination certificates identifying product-family variants are acceptable for the exact offered hardware/software versions, subject to an OEM model/version mapping and evidence covering central/switching equipment, BTS, mobiles and portables and all required ETSI standards. Please specify any required accredited test-house endorsement.	Clause is self explanatory.
36	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.9.1	PDF 88–89	The contractor shall establish that their proposed TETRA system is established and proven. For this the contractor shall, as part of their proposal, submit an Installation & Commissioning Certificate proving that from the same manufacturer of Radio system as being proposed, at least one similar multisite(>=3 Base Stations) TETRA system (along with Central or distributed Infrastructure) has been commissioned for any Rail or Metro Rail Customer anywhere in the World in last 5 years. The commissioned system should have necessary included Remote Base Stations, Central Switch (or distributed architecture) and Dispatchers. The system must have given a trouble free satisfactory service for at least one year after commissioning. The certificate to this effect, shall be issued by a Competent Authority within the Customer's Organisation and submitted by him on his Official Company Stationery. Address for Correspondence, telephone, fax and email contact details must be provided for future communication. Certification from any other Individual/Organisation will not be entertained. In case of failure to do so, the OEM shall not be considered technically compliant.	Please confirm whether a qualifying Rail/Metro reference commissioned under a predecessor OEM brand may be accepted for a successor platform, with documentary evidence of corporate/product continuity and an official customer certificate demonstrating at least three BTS, central/distributed infrastructure, dispatchers, commissioning within the last five years and at least one year satisfactory service. Please issue an amendment if this acceptance is intended.	Clause is self explanatory, No change in Bid conditions.
37	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.9.2; 4.6; 4.8.1	PDF 87–89	The Radio System supplier/OEM shall be a TETRA Accredited manufacturer of TETRA Switching Infrastructure equipment (the base station can be integrated as an OEM partnerships) and shall have Inter-Operability Certificates issued by TETRA Accredited Test House. Copy of current and valid IOP certificate to be submitted. The Certification shall cover all features as listed above in Clause 4.6, as a minimum.	We note that 4.9.2 permits base stations integrated through OEM partnerships. Please confirm the required certificate mapping for such a solution: switching-infrastructure IOP evidence under 4.6, BTS Type Examination evidence under 4.8.1, and interoperability evidence for the offered switch/BTS combination. Please confirm the prime supplier responsibility and whether any additional integrated-solution tests are required.	Clause is self explanatory.



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38	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.1.1; 6.3.1–6.3.2; 6.3.7; 3.3.2	PDF 90; 131; 85	The Radio system shall be a digital trunked radio system operating in the 380 – 400 MHz frequency band conforming to the TETRA standards as defined by ETSI.	We note that five existing frequency pairs must be reused and their values are presently to be released at design stage. Please provide these frequencies, site-wise assignments, DMO channels and current WPC/SACFA licence/clearance details before bid submission. Please clarify which frequency/resource charges are excluded under 6.3.2 and the cost responsibility for amendments and additional clearances under 3.3.2.	Bidder to refer Addendum-2
39	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.2.3–5.2.4; 6.4.1.1–6.4.1.8	PDF 91; 132	The Design requirements required to be submitted are given in Chapter 1 and Clause 6 of this Chapter. Contractor shall however submit to the Employer's Representative for review, the coverage calculations and coverage plots (both up-link & down-link) to confirm that the required RF coverage stated above can be achieved using the Contractor's proposed leaky coaxial cable and the antenna locations.	We note the 3 microvolt minimum signal criteria and prescribed 98%/95% coverage conditions in 6.4.1. Please confirm the voltage reference/measurement impedance and equivalent RSSI threshold, and whether the additional margin written as 3 dbm in 6.4.1.4 means 3 dB. Please provide the accepted BER/audio-quality threshold, calibration, sampling and route methodology for uplink/downlink acceptance, including indoor and moving-train tests.	Clause is self explanatory.
40	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.3.2(2); 6.9; Ch.11 Appendix H	PDF 92; 141–142; 644–645	2) Radio Access Unit (RAU) - The RAU shall provide all individual and group call, limited call setup and receipt through the use of a multi-function feature phone facility connected directly to the radio Control system through a fixed TETRA radio(minimum 3 W RF Output). The RAU shall also provide a back-up to the RCW (only for voice communications). As an alternative a desktop Fixed Radio with display+ a Goose Neck Desktop Mic with PTT can also be provided connected to the Fixed Radio. The complete RAU shall have display unit for the user, to display the Radio ID of the Calling party, alias of calling party, signal strength, etc.	We note the permitted desktop fixed-radio alternative with display and goose-neck PTT microphone. Please confirm whether it may be used at all scheduled RAU locations, subject to all specified functions and independent RCW backup. Please confirm the measurement point for the minimum 3 W output and the final approved RAU/RCP location schedule, including terminal-station extra RAUs under 6.9.7.	Clause is self explanatory.
41	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.4.1.6.1	PDF 95	DMO voice calls shall be possible both ways between the train-borne mobile and another train-borne mobile, train-borne mobile and hand-portable and between hand-portables located within a radius of 1 Km in above ground areas and practically feasible range in tunnels.	Please define the test terrain, line-of-sight/non-line-of-sight assumptions, antenna heights, equipment configuration and minimum audio/BER quality criterion for the specified 1 km above-ground DMO tests between train radios and handhelds, and the acceptance routes/criteria for practically feasible tunnel DMO range.	Clause is self explanatory.
42	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.8.1.1–5.8.1.4; 5.8.4; 6.11; Annexure A/Radio B; Ch.11 Appendices J, Q	PDF 105–106; 114; 149–156; 171; 648–652; 663 onward	After upgradation/replacement work as per Clause 3.2.1 above in Phase-1A & 1B stations / Depot/OCC of JMRC, all existing train radio communication and functionalities shall be available in Phase-1A, 1B including Phase-1C&1D radio system without degradation and affecting revenue operation.	Against the Annexure A baseline of 48 train/mobile radios and existing on-board interface documents in Appendices J/Q, please provide the current cab-wise model/revision register, mechanical mounting drawings, connector pinouts, cable/antenna details, approved configuration and any post-baseline modifications. Please confirm the existing versus new train quantities and the access/approval process for retrofit testing without disruption to revenue service. We note that 5.8.1.3 prohibits changes to existing on-board ATC/ATS and rolling-stock interface/physical arrangements; please provide the controlled baseline needed to comply with this restriction.	Clause is self explanatory. Further, Bidder is advised to visit the Site for survey, with prior permission.
43	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.9.2.5; 6.2.3	PDF 115; 131	Designated Handportable radios shall have the capability of initiating or receiving telephone calls from designated telephones directly without the radio MMI Controller intervention. A minimum total of 30 simultaneous Telephone Interconnect calls shall be possible in the system from 30 Portables.	For the mandatory 30 simultaneous telephone interconnect calls, please provide the designated-portable allocation and Telephone/PABX interconnect capacity/interface. Please confirm the required network-wide test distribution and traffic assumptions against the BTS carrier configuration and the gateway/channel licences to be included in the bid.	Clause is self explanatory.
44	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.9.2.6; Section 7; Ch.11 Appendix A	PDF 115; 161–163; 458–610	1) designated handportable radios shall access the PAS to make public address announcement in the station; and 2) the Radio system shall support the selection of the following PA zones by the handportable radio as a minimum: • up platform; • down platform; • concourse; and • all zones.	Please provide the designated-handheld allocation for Radio-to-PAS announcements at existing and new stations, together with the current Radio/PAS protocol, zone-addressing data and any extension-specific changes to the baseline interface responsibilities. Please confirm the required authorisation and joint acceptance tests for up-platform, down-platform, concourse and all-zone selection.	Clause is self explanatory.
45	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.6.11.1; 6.4.2.1–6.4.2.2	PDF 98; 133	The Radio system shall support handoff across all the RF coverage zones of base stations in the Radio system such that all calls in progress regardless of the call types and call modes shall be maintained with minimum interruption to an ongoing call, so that the call does not drop at all. (Type 2 Handoff minimum)	We note the Type 2 handoff requirement and maximum 500 ms handover limit under 6.4.2.2. Please provide the acceptance routes, trigger settings, call types, load conditions, sampling and pass/fail methodology, including the tunnel/LCX-to-elevated transition and migration between retained and new BTS equipment.	Clause is self explanatory.



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46	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.6.2.1; 6.4.3.1–6.4.3.6	PDF 96; 133	The average channel access time, defined as the elapsed time from the push- to-talk (PTT) operation to the time when the originator receives the transmit prompt tone shall not be greater than 300ms at 5% BER subject to the availability of a voice channel.	Please confirm the sampling, traffic loading, BER conditions and timing instrumentation for the average 300 ms channel-access requirement, and the relationship between transmit-prompt channel access under 5.6.2.1 and communication-link setup under 6.4.3. Please define acceptance for same-site, inter-site, group, OCC and RCP calls and the evidence for ultimate-capacity performance.	Clause is self explanatory.
47	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.6.15.2.6; 6.2.3; 6.10.4.5	PDF 100; 131; 144	The system shall support Dedicated Data Channels This shall be achieved by dedicating specific traffic channels to only handle data. Each Base Site shall be able to accommodate up to four of these dedicated Packet Data Channels (PDCHs).	Please confirm whether four PDCHs per site must be available/licensed from day one and how many are to be permanently reserved at initial commissioning. Please define the required voice/data traffic assumptions and whether dedicated PDCHs share the minimum BTS traffic channels or require additional carriers, including treatment of the OCC BTS configuration.	Clause is self explanatory.
48	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.12.7.1–5.12.7.6; Ch.11 Appendix Q	PDF 119–120; 663 onward	The Contractor shall interface the radio system with ATS system for initialisation of TID in the radio system.	Please confirm the approved current revision and continued applicability of the Appendix Q Signalling Radio Interface Specification and ATS Radio Interface Test Procedure to the proposed replacement system and Phase-1C/1D extension. Please provide changed endpoint/network details, message dictionaries, track/route databases and responsibility for any ATS modifications/gateways. Please confirm joint testing includes TID initialisation, train tracking and graphical calling under 5.12.7.4.	Clause is self explanatory,. Further, Interface responsibility lies with the Contractor for the other designated system contractors.
49	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.13.1–5.13.5; Ch.2 Part-2 4.4.2, 5.3	PDF 120; 165; 167	The radio system shall log all call activities, both incoming and outgoing calls, and all Status/Messages including Free Text Messages for audit trails indicating action, result, timing.	We note at least four weeks call-log retention and export to Excel/Access or similar under 5.13. Please confirm the sizing assumptions (users, call/message volume and archive duration), required backup/restore and archive retrieval, and the metadata linkage between call/message logs and separate CDRS voice recordings. Please state whether retention beyond the prescribed four-week minimum is required.	Clause is self explanatory.
50	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.7; 3.2.1; Annexure A/Radio B; Ch.11 Appendix H	PDF 101; 83; 171; 644–645	JP/JS14(1C&1D) Contractor shall upgrade/replace all existing RCW with all necessary hardware, Software & licenses so that following requirements are continue to meet for the extended section under Phase-1C & 1D as well including Phase-1A & 1B in-line with Clause 3.2.1 above:	Annexure A identifies two RCW servers and six clients. Please reconcile these with the Appendix H controller-position schedule and the bidding-form BOQ, and confirm the final location-wise count of RCW servers/clients, additional RAUs and dispatcher licences, including the mandatory 25% spare dispatcher capacity under 6.16.5.	Clause is self explanatory, Quantity under the BoQ shall prevail.
51	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.14; 3.2.1; Ch.2 Part-2 5.5	PDF 121; 83–84; 167	Upgrade/replace existing NMS, AKDC, RCW, CDRS, DWS and other MMIs with RAID5, covering the extended sections in accordance with 3.2.1.	We note the required upgrade/replacement of NMS, AKDC, RCW, CDRS, DWS and other MMIs with RAID5. Please confirm whether RAID5 applies to each server and client/workstation or may be implemented at redundant shared/server storage, and provide the current storage/database sizes, growth assumptions and backup/restore requirements. Please identify which other MMIs are included.	Clause is self explanatory.
52	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	4.9.1–4.9.2; 4.6; 4.8.1; 4.7	PDF 87–89	A customer-certified qualifying multisite Rail/Metro TETRA reference from the proposed radio-system manufacturer is required; 4.9.2 permits partnered BTS.	It is requested that 4.9.1 be amended to expressly permit a switching-infrastructure/BTS solution with separately manufactured dispatcher and on-board TRCP/TRIU equipment. The switching-infrastructure OEM shall continue to demonstrate the specified qualifying multisite Rail/Metro TETRA reference with central/distributed infrastructure and dispatchers. Please permit separate qualifying Rail/Metro experience for the offered dispatcher and on-board OEMs, supported by customer certificates and documented interoperability/API evidence for the offered combination, with single-point contractor responsibility and full compliance with 4.6, 4.7 and 4.8.1. Please specify the integrated-solution evidence and tests required.	Clause is self explanatory, No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
53	PS – Ch.2 Radio & CDRS; related Ch.1/11 where cited	5.1.2; 5.6.15.2.2–5.6.15.2.3; 6.16.4	PDF 90; 99; 159	Specified alternatives include TEDS software upgrades and broadband services by adding WiMAX/LTE base stations on the proposed infrastructure. Bid substantiation is required by 5.6.15.2.3.	To strengthen the specified future broadband upgrade path, it is requested that the tender expressly require the proposed dispatcher/RCW platform to support a documented migration to 3GPP Mission Critical Services (MCPTT, MCData and MCVideo) over 4G/5G, while retaining the supplied dispatcher platform where technically feasible. Please define the required 3GPP release, services, interfaces, interoperability evidence and migration acceptance criteria. Each bidder should identify retained/replaced central/core/application hardware, additional broadband core/access/IWF components, licences and upgrade costs. Please confirm whether day-one MCX compliance or future upgrade capability is required and issue the corresponding amendment.	Clause is self explanatory, No change in Bid conditions.
54	TETRA Radio System	Clause 4.9.1 – Installation Certificate	(Page 88 of Particular Specifications)	"The contractor shall establish that their proposed TETRA system is established and proven. For this the contractor shall, as part of their proposal, submit an Installation & Commissioning Certificate proving that from the same manufacturer of Radio system as being proposed, at least one similar multisite(>=3 Base Stations) TETRA system (along with Central or distributed Infrastructure) has been commissioned for any Rail or Metro Rail Customer anywhere in the World in last 5 years. The commissioned system should have necessary included Remote Base Stations, Central Switch (or distributed architecture) and Dispatchers. The system must have given a trouble free satisfactory service for at least one year after commissioning. ..."	Kindly clarify whether the TETRA Base Stations/Central Core Infrastructure and Dispatcher/On-board TRCP/TRIU proposed under the tender are necessarily required to be from the same OEM. It is submitted that there are proven Metro Rail deployments in India where the TETRA Base Stations/Central Core Infrastructure, Dispatcher and On-board TRCP/TRIU are from different OEMs and are successfully integrated and operating satisfactorily. Accordingly, it is requested that the requirement of "same manufacturer of Radio system as being proposed" may kindly be removed and the experience credentials of the respective OEMs, having Rail or Metro Rail Customer anywhere in the World in last 5 years, for TETRA BTS Infrastructure and Dispatcher, On-board equipments be accepted separately. This will ensure wider participation by credible bidders having relevant Railways / Metro Railways experience. Kindly confirm. We request you to please amend the requirement as suggested in the query.	Clause is self explanatory, No change in Bid conditions.
55	TETRA Radio System	Reference: Clauses 5.1.2, 5.6.15.2.2/2.3 & 6.16.4 – Future Broadband Upgradation		The JP/JS14(1C&1D) system shall be up-gradable to support higher data rates as per TETRA2 TEDS service by only software upgrades or upgradable to broadband services by adding broadband base station based on Wimax or LTE technology on the proposed infrastructure. Contractor to detail how this shall be achieved. The system shall also be up-gradable to support higher data rates as per TETRA2 TEDS service by only software upgrades or by broadband services by adding broadband base station based on Wimax or LTE technology on the proposed infrastructure.	The specification requires the proposed TETRA Radio System to be upgradeable/migratable to broadband services based on LTE technology. In order to ensure future migration to mission-critical broadband over 4G/5G without replacement of the Central Core/Application Servers and Dispatcher platform, kindly confirm that the proposed Central Core/Application Servers and Dispatcher/RCW platform shall be compliant/upgradeable to 3GPP Mission Critical Services (MCX), including MCPTT, MCData and MCVideo, through software/licence upgrade and suitable 3GPP-compliant broadband access/network interfaces. This will ensure an open-standard and future-ready migration path from the present TETRA system to 4G/5G Mission Critical Broadband while protecting JMRC's investment in Central Core and Dispatcher infrastructure. Kindly confirm. We request you to please include ETSI 3gpp MCX standard compliant Central Control Room dispatcher RCW to support any future upgrade path to LTE 4G/5g.	Clause is self explanatory, No change in Bid conditions.



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56	Volume-1, Notice Inviting Bid (NIB)	Clause 1.1.3.2 (A)(ii)	Page 14 of 22	ii. The term 'Telecommunication System' mentioned above is comprised of at least any two of the following in a single work experience: - (a) FOTS (b) Radio System (TETRA) (c) CCTV System including VMS (d) IP-PBX based Telephone System (e) PIDS-PAS (f) UPS System (Min. 30KVA)"	It is requested to delete the restriction of "in a single work experience". Alternatively, please explicitly allow credentials from multiple separate Purchase Orders (POs) or independent work contracts to be aggregated collectively to meet the sub-system qualification criteria.	No change in Bid conditions.
57	Volume-1, Form of Bid (FOB)	Appendix-15 (Financial Data)	Page 23 of 49	"Total value of Work done as per audited financial statements"	Please clarify whether the 'Total value of Work done' refers to the overall gross annual turnover of the bidding entity from all civil, engineering, and service contracts, or if it is restricted purely to works done in Telecommunication Systems.	Bidder to refer Addendum-2
58	Volume-1, Notice Inviting Bid (NIB)	Clause 1.1.3.3 (Bid Capacity Criteria)	Page 17 of 22	Form of Bid-Appendix 15 data is used to derive Factor 'A' (Maximum value of works executed in any one year during the last five financial years) for computing Available Bid Capacity via formula: Available Bid Capacity = 2*A*N – B	Please explicitly confirm that for evaluating Factor 'A', the maximum value of the overall gross annual engineering/infrastructure turnover of the firm shall be utilized, completely matching the values in Appendix-15.	Bidder to refer Addendum-2
59	Volume-1, Form of Bid (FOB)	Appendix-16 (Financial Data - Commitment for On-going Works)	Page 24 of 49	"Name and brief particulars of contract (Clearly indicate the Part of the work assigned to the applicant (s))" Used as Factor "B" in Bid Capacity formula.	Please explicitly clarify that Factor 'B' (Value of existing commitments for ongoing works) shall aggregate only ongoing Telecommunication/S&T works, and shall NOT include ongoing contracts from unrelated sectors like general civil infrastructure or massive power grids.	Bidder to refer Addendum-2
60	Volume-1, Form of Bid (FOB)	Sr. No. 3, Appendix-27 (Undertaking for Land Border Country)	Page 35 of 49	"belong to the Country appearing on MEA website (https://www.mea.gov.in/Lines-of-Credit-for-Development-Projects.htm#...)"	It is requested to provide the active, correct official URL link for the MEA Lines-of-Credit list, as the current link published in the document is corrupted and broken (returning a 404 error).	Bidder to refer Addendum-2
61	Volume-1, Instructions to Bidders (ITB)	Clause regarding Power of Attorney (PoA)		Format for Power of Attorney for Authorized Signatory.	Please clarify whether the Power of Attorney (PoA) must be executed on a Non-Judicial Stamp Paper (duly notarized) or if it is acceptable on the company's official corporate letterhead. Please also state the required denomination/value of the stamp paper.	POA shall be on Non-Judicial Stamp Paper (duly notarized) of Rs. 500/-.
62	Volume-1, Form of Bid (FOB)	Missing Templates for JV / Consortium		No specific legal format provided for Power of Attorney in the case of a Joint Venture (JV) or Consortium entry.	It is requested to explicitly provide standard JMRC-approved templates for: 1. Power of Attorney by JV/Consortium Members in favor of the designated Lead Member. 2. Power of Attorney in favor of the operational Authorized Signatory.	FOB Appendix-30 shall be used for Power of Attorney by Joint Venture (JV)/Consortium members in favour of the designated lead member and also for operational Authorized Signatory.
63	Chapter-5: PAS	3.2.1.1	271	Any one of the following solution(s) can be adopted for the PAS & PIDS sub-system(s). (a) Stand-alone integrated system for Phase-1C & 1D: the bidder shall provide integrated hardware (servers etc.), NMS & MMIs etc. (both at OCC & Station level) for all locations/sections of Phase-1C & 1D, providing all functionalities including control, management and other common functionalities. The system shall be integrated/interfaced with the existing Phase-1B system(s) such that the Phase-1B MMIs at OCC also function for Phase-1C & 1D applications. Or (b) Augmentation of the existing Phase-1B system, including control, management & other common functionalities, such that the upgraded system also seamlessly functions for Phase 1C & 1D. The existing NMSs & MMIs of Phase-1B shall be suitably augmented/upgraded to function for Phase-1C & 1D without any degradation.	Existing PAS/PIDS 1B System have different Products/ Software have Specifications at Station level and Integration /Augmentation of Phase 1B and 1C & 1D will be possible at central level to achieve required functionalities including control, management ,etc. excluding the hardware dependencies.	Clause is self explanatory.
64	Chapter-5: PAS	5.1.7	276	The PAS equipment's internal clock shall be synchronized to the Master clock already installed at OCC over Ethernet.	So clause shall be amended accordingly.	No change in Bid conditions.
65	Chapter-5: PAS	5.6.6	280	Live audio messages (emergency, fire & evacuation etc.) initiated from OCC, Stations/Depots shall be recorded at the respective PA/PIDS servers so that the record of actual announcements can be analyzed at a later date. The record is to be kept for 4 weeks.	Clause 4.5.1 is asking for 7 days recording.Please clarify	Clause is self explanatory, the said 4 weeks recording is required for emergency, fire & evacuation etc.
66	Chapter-5: PAS	5.8.1	280	All the PAS zones at each station shall be provided independently with automatic gain control for each loudspeaker feeder line to compensate for changing noise levels.	Noise Sensor is required in Noisy area as per Tender clause. Will it be required at staff area or not? Please clarify.	Clause is self explanatory.



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67	Chapter-5: PAS	6.3.5.1	289	All microphones for the PAS shall have the following features; (1) Unidirectional; (2) Gooseneck.	This microphone specifications are not applicable for Noise Sensor Microphones	Bidder to refer Addendum-2
68	Chapter-5: PAS	6.3.11.8	292	The loudspeakers and loudspeaker cables shall be manufactured from fire resistant, low smoke, zero/low halogen materials and shall be of the fire survival type to ensure circuit integrity for at least 3 hours during fire.	As per EN standard for loudspeaker will be fire survival type and don't defined any integrity test duration. Please clarify.	Bidder to refer Addendum-2
69	Chapter-6: PIDS	3.2.1.1	300	(a) Stand-alone integrated system for Phase-1C & 1D: the bidder shall provide integrated hardware (servers etc.), NMS & MMIs etc. (both at OCC & Station level) for all locations/sections of Phase-1C & 1D, integrated/interfaced with the existing Phase-1B system(s) such that Phase-1B MMIs at OCC also function for Phase-1C & 1D. Or (b) Augmentation of the existing Phase-1B system, including control, management & other common functionalities, such that the upgraded system also seamlessly functions for Phase 1C & 1D; existing NMSs & MMIs of Phase-1B shall be suitably augmented/upgraded to function for Phase-1C & 1D without any degradation.	Existing PAS/PIDS 1B System have different type of Products/ Software architecture have Specifications at Station level and Integration /Augmentation of Phase 1B and 1C & 1D will be possible at central level to achieve required functionalities including control, management ,etc. excluding the hardware dependencies.	Clause is self explanatory.
70	Chapter-6: PIDS	6.3.3.2 (1)	331	The PIDS displays consisting of Industrial Grade True color LED type panels shall meet the following minimum specifications: (h) Optimal viewing angle: 1400 or better; (j) Operating temperature (ambient): up to 550C;	Should be corrected as - (h) Optimal viewing angle: 140° or better; (j) Operating temperature (ambient): up to 55°C;	Bidder to refer Addendum-2
71	Chapter-6: PIDS	6.3.3.2 - Item 5	332	LEDs used in platform display boards shall be of high performance quality from reputed manufacturers viz. Nichia, OSRAM, Everlight or equivalent. The maximum junction temperature of a LED shall not be less than 1000 C.	Should be corrected as - The maximum junction temperature of a LED shall not be less than 100°C.	Bidder to refer Addendum-2
72	Chapter-6: PIDS	6.3.3.2 - Item 21 (c)	333	The displays shall support various media formats pertaining to graphics (BMP, GIF, JPEG, PNG, WMF etc.), Animation (SWF, FLC, FLI, Animated GIF etc.), Sound (WAV, MP3, MIDI, CD Audio etc.), Video (SD/HD, MP4, MPEG 1/2/4, AVI, QT3, WMV etc.), Fonts (OpenType, TrueType, Devanagari etc.), Language (Hindi, English).	Please note that many of the specify media formats are currently obsolete and not supported by equipments.Please ammend the clause accordingly.	Bidder to refer Addendum-2
73	Chapter-6: PIDS	6.3.3.3 - (1)	334	(b) Viewing angle: 1700 (horizontal & vertical) minimum; (c) Brightness: 1200 cd/m2 or better; (f) Aspect ratio: 21:9; (g) Operating temperature (ambient): up to 550C; (k) Refresh rate: 90 Hz or better;	Product Specifiication will be given in view of availblty and maintainance requirement of the system.Specific requirement shall be avoided.Should be corrected as - (b) Viewing angle: 170° (horizontal & vertical) minimum; (c) Brightness: 1200 cd/m2 or better;(Max) (f) Aspect ratio: 16:9; (g) Operating temperature (ambient): up to 55°C; (k) Refresh rate: 60 Hz or better;	Bidder to refer Addendum-2
74	Chapter-6: PIDS	6.3.3.3 - (7)	335	The display panel shall have a set of 5 W in-built stereophonic speakers or suitable audio ports such that one set of 5 W external stereophonic speakers (Left & Right) can be connected on either side of the display board.	Contradictory with clause 6.3.3.3 (18(9)) where the speaker wattage of 12W was given.Please clarify.	Bidder to refer Addendum-2
75	Chapter-6: PIDS	6.3.3.3 - (9)	335	The viewing distance for the concourse display boards shall be at least 45 meters for both Hindi and English characters when displaying in the biggest font size characters.	Idealy viewing distance for the concourse display boards will be maximum 35 meters. Please ammend the clause accordingly.	No change in Bid conditions.
76	Chapter-6: PIDS	6.3.3.3 - (10)	335	The panels shall operate satisfactorily even in environmental external temperature up to 550 Celsius.	Should be corrected as - temperature to 55°C	Bidder to refer Addendum-2
77	Chapter-6: PIDS	6.3.3.3 - (15(d))	336	The displays shall support various media formats pertaining to graphics (BMP, GIF, JPEG, PNG, WMF etc.), Animation (SWF, FLC, FLI, Animated GIF etc.), Sound (WAV, MP3, MIDI, CD Audio etc.), Video (SD/HD, MPEG 1/2/4, AVI, QT3, WMV etc.), Fonts (OpenType, TrueType, Devanagari etc.), Language (Hindi, English).	Please note that many of the specify media formats are currently obsolete and not supported by equipments.Please amend the clause accordingly.	Bidder to refer Addendum-2
78	Chapter-6: PIDS	6.3.3.3 - (15(k))	337	For weather information/AQI data, the PIDS contractor shall install a protected server (with firewall etc.) at OCC to get the data and distribute the data on PIDS.	Shall be included separatly in tender BOQ.	No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
79	Chapter-6: PIDS	6.3.3.3 - (18)	338	(1) Viewable picture size 40" minimum; - (2) Viewing angle 120° (horizontal & vertical) minimum; (3) Brightness 500 cd/m2 or better; (4) Contrast 1000:1 or better; (5) Resolution 1366 x 768 or better; (6) Unaffected by severe problem of burn-in when static picture or text continues for long. (9) Each LCD panel shall have an inbuilt 12 W output loudspeaker for colour video clips with audio. - (11) LCD panels shall operate satisfactorily even in environmental external temperature up to 500C. -	Contradictory with above clause 6.3.3.3 (1)	Bidder to refer Addendum-2
80	Chapter-6: PIDS	6.3.4.6	339	Indoor display boards shall be suitable for operating in an indoor environment with or without air-conditioning. Indoor housing shall be designed to IP54 compliant.	Contradictory with above clause 6.3.3.3 (1)	Bidder to refer Addendum-2
81	Chapter-6: PIDS	6.3.3.2 (1)(h), (j); 5 (Junction temp.)	331	Viewing angle '1400'; operating temperature 'up to 550 C'; LED junction temperature 'not less than 1000 C'.	These look like typing errors (missing degree symbols). Please confirm: viewing angle 140° (horizontal) and specify the vertical angle; operating ambient temperature up to 55 °C; LED maximum junction temperature not less than 100°C. Viewing angle ≥140° H / ≥120° V; operating temp. 0 °C to +55 °C.	Bidder to refer Addendum-2
82	Chapter-6: PIDS	6.3.3.2 (1)(n), (19)	331	Interface: HDMI & two Ethernet. Display boards shall have IP input from the main server system.	Please clarify the purpose of the HDMI input when the system is IP-based. Is it for local maintenance or test input only? Please also confirm the purpose of the two Ethernet ports: (a) one per side controller; (b) redundant / dual-homed network links; or (c) loop-through / daisy chain.	No change in Bid conditions.
83	Chapter-6: PIDS	6.3.3.2 (10); 6.3.4.5	332	Transparent display cover for the LED display area. All display board faces to have shatterproof, anti-reflective glazing with scratch-resistant coating.	Anti-reflective sheet suitable for this application is not readily available in toughened glass or polycarbonate in the required sizes (55" LCD and approx. 2 m LED boards); it is available in acrylic. Glass is also heavy and, if broken, produces sharp fragments in a public area. Please confirm that an AR-coated acrylic sheet with scratch-resistant hard coat meets the 'shatterproof, anti-reflective glazing' requirement.	No change in Bid conditions.
84	Chapter-6: PIDS	6.3.3.3 (1)(a), (e), (f)	331	Viewable size 55" (min.); resolution 1920 x 1080 or better; aspect ratio 21:9.	1920 x 1080 is a 16:9 resolution and does not match the 21:9 aspect ratio. A 55" 21:9 industrial high-brightness panel is not a standard commercial product. Please confirm that a 55" 16:9 Full HD panel is acceptable.	Bidder to refer Addendum-2
85	Chapter-6: PIDS	6.3.3.3 (1) Vs 6.3.3.3 (18)	331	Item 1: 55", 1200 nits, 170°, 4000:1, 55 °C, 5 W stereo speakers. Item 18: 40", 500 nits, 120°, 1000:1, 1366 x 768, 12 W speaker, 50 °C.	Item 18 gives a second, lower LCD specification that conflicts with item 1. Please confirm that item 18 is a leftover from an earlier phase and should be deleted, and that only item 1 applies.	Bidder to refer Addendum-2
86	Chapter-6: PIDS	6.3.3.3 (2)	335	Screen shall be 'burn free' when static picture or text continues for long periods.	No LCD panel can be ensured fully free of image retention. Please confirm whether compliance can be shown through panel anti-image-retention features plus software measures.	No change in Bid conditions.
87	Chapter-6: PIDS	6.3.3.2 (14)	332	The contractor may propose an architecturally bending sunshade / sunshield.	Please confirm whether a sunshade for boards at elevated platforms is mandatory and part of the bid price, or optional.	No change in Bid conditions.
88	CHAPTER-7 MCS	1.2.2	3	The Master Clock system already commissioned at OCC shall provide synchronization signal to all sub-master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, Telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations. JP/JS14 (1C & 1D) contractor shall configure master clock at OCC and integrate sub-master clocks to the master clock at OCC for provision of synchronization to sub-master clocks and to any new systems at OCC. JP/JS14 (1C&D)MCLK Contractor shall provide any item necessary for integrating with pre-installed Master clock system at OCC.	We understand that the Master Clock system at the OCC has already been installed and has been operational for a considerable period. Kindly clarify whether any OEM support, modification, upgrade, replacement, or integration-related requirement associated with the pre-installed Master Clock system shall be carried out without any additional cost to the Employer, or whether such costs shall be considered separately.	Clause is self explanatory.
89	CHAPTER-7 MCS	3.3.1	4	The Master Clock system already installed at OCC shall provide synchronization signal to all sub-master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations.	Clause 3.3.1 states that the existing Master Clock at OCC shall provide synchronization and Date/Time to the new systems at OCC/stations, whereas Clause 5.2 (4) states that the Sub-Master Clock shall provide timing signals to these systems. Kindly clarify whether the new systems at stations shall be synchronized directly from the existing Master Clock at OCC or through the respective Sub-Master Clock.	Clause is self explanatory.
90	CHAPTER-7 MCS	5.2	6	(4) Sub-master clock shall supply timing signals to the voice and video recording equipment, the train control & signalling system, PIDS, PAS, Radio, Telephone system, CCTV System, power supply, computer, (SCADA), other SCADA systems, the AFC central computer and other necessary equipment.		Clause is self explanatory.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
91	CHAPTER-7 MCS	5.3	6	Alarm and status monitoring of the Master Clock system shall be connected to the NMS of PAS/PIDS in OCC.	Clause 5.3 states that the alarm and status monitoring of the Master Clock system shall be connected to the NMS of PAS/PIDS at OCC. Kindly clarify whether this requirement includes integration and monitoring of both the existing Master Clock system and the new Master Clock system on the same NMS workstation at OCC. The MCLK Contractor shall be responsible for integrating the new Master Clock system with the existing NMS at OCC. Please clarify.	Clause is self explanatory, No change in Bid conditions.
92	CHAPTER-7 MCS	5.5	6	The Sub-Master Clock system shall provide appropriate clock output interfaces for master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare Collection, Train Control and Signalling etc.). Suitable interfaces (such as RS422 or RS232 or LAN connections) for clock output interfaces shall be supported	Clause 5.5 seems typo error. The clause must be: The Master Clock system shall provide appropriate clock output interfaces for Sub-master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare Collection, Train Control and Signalling etc.). Suitable interfaces (such as RS422 or RS232 or LAN connections) for clock output interfaces shall be supported.	No change in Bid conditions.
93	CHAPTER-7 MCS	6.3.1.8 (2)	8	(2) One single faced, outdoor type, digital clock each at head end of each platform suitably positioned for the use of the train driver. Where ever CCTV monitors or Driver Mirror for monitoring of train doors are installed, these clocks shall be aesthetically co-located with the CCTV monitors/Mirror. These clocks shall be visible from the driver's cab in emergency lighting conditions and in bright sun light. The character height of the display shall not be less than 170 mm.	The clause specifies provision of one outdoor digital clock at the head end of each platform. We request to consider provision of an additional outdoor digital clock at the tail end of each platform as well, to ensure clear visibility of the time reference to the train crew & passengers irrespective of the train berthing position and to facilitate operational activities during train arrival, departure and emergency conditions.	No change in Bid conditions.
94	CHAPTER-7 MCS	6.3.1.8 (3)	8	(3) One 60 centimetre diameter double faced suspended analogue clock at each entrance gate to the passenger areas to be visible in all lighting conditions;	Clause 5.2(3) specifies provision of double-faced suspended analogue clocks at each entrance gate to the passenger areas (1 No. per station). However, no clock provision is specified for the concourse level and station platforms (middle). Kindly clarify and consider provision of suitably located clocks at the concourse and middle platform levels to ensure convenient visibility of the time to passengers and station staff throughout the paid/unpaid areas.	No change in Bid conditions.
95	CHAPTER-7 MCS	1.2.1	3	The Master Clock System to be provided under JP/JS14 (1C & 1D) Contract shall consist of the following major components: (1) Sub-master clocks at each of the stations in redundant configuration.	In Tender BOQ Submaster clock qty is mentioned as only 3, whereas clause requiremnt is for redundant submaster clock. Please clarify.	Bidder to refer Addendum-2
96	Chapter-9: PS Telephone System	3.2.2 (h)	Page 10 of 55	SIP-based IP Telephone Instruments (10 lines & 20 lines), as specified in the Particular Specifications:	To achieve the complete functionality of an IP-based Telephone System and ensure end-to-end interoperability and compliance with applicable IETF and ITU standards, the Telephone System should be specified as SIP/IP-based end-to-end, rather than limiting the requirement to only SIP-based IP Telephone Instruments. Accordingly, it is requested that the tender specification be amended to require the complete Telephone System, including Call Server/IP-PBX, Gateways, IP Telephones and associated system components, to be based on open SIP/IP standards, ensuring seamless interoperability, scalability, vendor neutrality and compliance with relevant IETF/ITU standards.	Bidder to refer Addendum-2



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries																				
97	Chapter-9: PS Telephone System	3.2.2 (j)	Page 10 of 55	All user licenses required for Analog, Digital, SIP-based IP Telephone Instruments and SIP-based IP Video Telephone Instruments, as specified in the Particular Specifications	To achieve the complete functionality and interoperability of IP Video Telephone Instruments, the instrument should be specified as SIP/IP-based rather than only SIP-based. The IP Video Telephone Instruments should support relevant SIP/IP protocols and applicable IETF and ITU-T standards to ensure reliable voice and video communication, interoperability with the IP-based Telephone System, and seamless integration with other standards-compliant network elements. Accordingly, it is requested that the specification be amended from “SIP-based IP Video Telephone Instruments” to “SIP/IP-based IP Video Telephone Instruments compliant with applicable IETF and ITU-T standards.”	Bidder to refer Addendum-2																				
98	Chapter-9: PS Telephone System	4.2.3	Page 12 of 55	The Telephone system equipment supplied under the contract shall comply with the reliability figures given below: <table><thead><tr><th>Equipment</th><th>MTBF (Hours)</th></tr></thead><tbody><tr><td>Switching module</td><td>> 150,000</td></tr><tr><td>Processor module</td><td>> 200,000</td></tr><tr><td>Memory module</td><td>> 200,000</td></tr><tr><td>Line and trunk interface module</td><td>> 100,000</td></tr><tr><td>Multifunction direct line console</td><td>>20,000</td></tr><tr><td>Network management system</td><td>>50,000</td></tr><tr><td>Help Point</td><td>>1,00,000</td></tr><tr><td>Emergency Phone</td><td>>1,00,000</td></tr><tr><td>SIP VOIP Phones</td><td>>1,00,000</td></tr></tbody></table> Table 4-1 MTBF Figures	Equipment	MTBF (Hours)	Switching module	> 150,000	Processor module	> 200,000	Memory module	> 200,000	Line and trunk interface module	> 100,000	Multifunction direct line console	>20,000	Network management system	>50,000	Help Point	>1,00,000	Emergency Phone	>1,00,000	SIP VOIP Phones	>1,00,000	To achieve the overall performance, functionality and interoperability requirements of VoIP Phones, the equipment should be specified as SIP/IP-based rather than merely SIP-based. The VoIP Phones should support the relevant SIP/IP protocols and applicable IETF and ITU-T standards to ensure seamless communication, interoperability with the IP-based Telephone System, and compliance with recognized international standards Accordingly, it is requested that the specification be amended from “SIP-based VoIP Phones” to “SIP/IP-based VoIP Phones compliant with applicable IETF and ITU-T standards.”	Bidder to refer Addendum-2
Equipment	MTBF (Hours)																									
Switching module	> 150,000																									
Processor module	> 200,000																									
Memory module	> 200,000																									
Line and trunk interface module	> 100,000																									
Multifunction direct line console	>20,000																									
Network management system	>50,000																									
Help Point	>1,00,000																									
Emergency Phone	>1,00,000																									
SIP VOIP Phones	>1,00,000																									
99	Chapter-9: PS Telephone System	5.1.1.1	Page 14 of 55	There are two existing Main Nodes at OCC for the Telephone Systems of Phase-1A and Phase-1B, which are interconnected for call routing between the Phase-1A and Phase-1B stations. As part of the Works under this contract, the Contractor shall upgrade and consolidate the existing OCC Main Nodes into a single IP-based Appliance Call Server in redundant (1+1) configuration together with Gateway Architecture . The upgraded OCC Central Telephone System shall provide a unified platform for the Telephone Systems of Phase-1A, Phase-1B, Phase-1C & 1D, ensuring complete feature transparency, operational continuity, seamless migration and interoperability across all phases. The Contractor shall provide all necessary hardware, software, media gateways, interface modules, E1/PRI/SIP trunk interface modules, licenses and accessories required for successful implementation and integration. The integration proposal shall be included in the Design Documents.	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the system should support E1/PRI/SIP/IP Trunk-based connectivity instead of being limited to E1/PRI/SIP Trunk connectivity. The Telephone System should support relevant IP-based trunking protocols and applicable IETF and ITU-T standards, enabling seamless interconnection with IP networks, legacy E1/PRI networks and SIP-based communication systems. Accordingly, it is requested that the specification be amended from “E1/PRI/SIP Trunk” to “E1/PRI/SIP/IP Trunk”, with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																				
100	Chapter-9: PS Telephone System	5.1.1.2 (9)	Page 15 of 55	All existing licenses of the OCC Central Telephone System maybe reused and shall remain valid after completion of the upgradation. The Contractor shall also provide and configure all additional user, feature, interface, Digital Subscriber, SIP User, SIP Trunk and application licenses required for successful migration, integration and operation of the upgraded Telephone System.	To achieve the overall functionality, interoperability and performance requirements of the Central Telephone System, the system should support SIP/IP-based users and SIP/IP-based trunks, rather than being limited to only SIP users and SIP trunks. The Central Telephone System should support relevant IP-based communication protocols and comply with applicable IETF and ITU-T standards, ensuring seamless interoperability between IP users, IP-based trunk connections and other standards-compliant telecommunication systems. Accordingly, it is requested that the specification be amended from “SIP User & SIP Trunk” to “SIP/IP User & SIP/IP Trunk”, with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																				

S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Saught	JMRC's Response on Pre-Bid Queries																														
101	Chapter-9: PS Telephone System	5.1.1.4	Page 17 of 55	5.1.1.4 Requirements of IP-PBX Telephone System (Phase-1C & 1D including OCC) are given in Table 5-2 below. <table><tr><th>Item No.</th><th>Description of Item</th><th>Under Ground stations</th><th>Elevated Station each</th><th>Additional Platform</th><th>OCC</th></tr><tr><td>1.</td><td>Equipped Ports</td><td>120</td><td>60</td><td>-</td><td>300</td></tr><tr><td>2.</td><td>Wired Ports including the License therein</td><td>120 user (80 analog +40 SIP IP)</td><td>60 user (30 analog +30 SIP IP)</td><td>-</td><td>512 user with additional 60 digital user license and 20 SIP user</td></tr><tr><td>3.</td><td>E1 Ports</td><td>02 No E1 link</td><td>02 No E1 link</td><td>-</td><td>As Required</td></tr><tr><td>4.</td><td>SIP trunk</td><td>20</td><td>20</td><td>-</td><td>30</td></tr></table>	Item No.	Description of Item	Under Ground stations	Elevated Station each	Additional Platform	OCC	1.	Equipped Ports	120	60	-	300	2.	Wired Ports including the License therein	120 user (80 analog +40 SIP IP)	60 user (30 analog +30 SIP IP)	-	512 user with additional 60 digital user license and 20 SIP user	3.	E1 Ports	02 No E1 link	02 No E1 link	-	As Required	4.	SIP trunk	20	20	-	30	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the following changes are necessary to ensure compatibility with applicable IETF and ITU-T standards and to provide a fully integrated IP-based communication solution: 2. Wired Ports including the License therein The user capacity and associated licenses should be specified as follows: Underground Stations: 120 users 80 Analog users 40 SIP/IP users Elevated Stations: 60 users 30 Analog users 30 SIP/IP users OCC: 512 users, with an additional 60 Digital User Licenses and 20 SIP/IP User Licenses The inclusion of SIP/IP users is required to ensure support for IP-based endpoints and interoperability with th IP-based Telephone System. 4. Trunk Connectivity The requirement should not be restricted to SIP Trunk only. It should be specified as SIP/IP Trunk to support IP based trunk connectivity and interoperability with IP networks. Accordingly, it is requested that the specification be amended from “SIP Trunk” to “SIP/IP Trunk”, with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2
Item No.	Description of Item	Under Ground stations	Elevated Station each	Additional Platform	OCC																															
1.	Equipped Ports	120	60	-	300																															
2.	Wired Ports including the License therein	120 user (80 analog +40 SIP IP)	60 user (30 analog +30 SIP IP)	-	512 user with additional 60 digital user license and 20 SIP user																															
3.	E1 Ports	02 No E1 link	02 No E1 link	-	As Required																															
4.	SIP trunk	20	20	-	30																															
102	Chapter-9: PS Telephone System	5.1.1.4	Page 18 of 55	<table><tr><td>6.</td><td>SIP Based Direct line Telephone (20 Lines)</td><td>01</td><td>01</td><td>0</td><td>3</td></tr><tr><td>7.</td><td>SIP Based Direct line Telephone (10 Lines)</td><td>16</td><td>12</td><td>1</td><td>0</td></tr><tr><td>8.</td><td>SIP Video Phone</td><td>01</td><td>01</td><td>0</td><td>02</td></tr></table>	6.	SIP Based Direct line Telephone (20 Lines)	01	01	0	3	7.	SIP Based Direct line Telephone (10 Lines)	16	12	1	0	8.	SIP Video Phone	01	01	0	02	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the following changes are necessary to ensure compatibility with applicable IETF and ITU-T standards: 6. SIP-Based Direct Line Telephone – 20 Lines The specification should be amended to require SIP/IP-Based Direct Line Telephones – 20 Lines, supporting IP based connectivity and interoperability with the Central Telephone System. 7. SIP-Based Direct Line Telephone – 10 Lines The specification should be amended to require SIP/IP-Based Direct Line Telephones – 10 Lines, supporting IP based connectivity and interoperability with the Central Telephone System. 8. SIP-Based Video Phone The specification should be amended to require SIP/IP-Based Video Phones, supporting IP-based voice and video communication and interoperability with the IP-based Telephone System.	Bidder to refer Addendum-2												
6.	SIP Based Direct line Telephone (20 Lines)	01	01	0	3																															
7.	SIP Based Direct line Telephone (10 Lines)	16	12	1	0																															
8.	SIP Video Phone	01	01	0	02																															
103	Chapter-9: PS Telephone System	5.1.1.11.1	Page 24 of 55	The IP-PBX switch shall be equipped with modules to support a minimum the following interfaces: (1) Digital trunks at E1 level; (2) SIP trunk	Instead of “SIP Trunk”, the specification should be amended to “SIP/IP Trunk” to ensure IP-based trunk connectivity, interoperability with the IP-based Telephone System, and compliance with applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																														
104	Chapter-9: PS Telephone System	5.1.1.13.2 (4)	Page 26 of 55	A minimum of 4 programmable function keys for assignment of features or additional extension circuits and a minimum of 20/10 memories/phone book for speed dialing for 20/10 lines SIP IP Phone respectively.	To achieve the required functionality, interoperability and performance of Direct Line Telephones, the IP Phones should be SIP/IP-based and compliant with applicable IETF and ITU-T standards, ensuring seamless integration with the IP-based Telephone System and reliable IP-based communication.	Bidder to refer Addendum-2																														
105	Chapter-9: PS Telephone System	5.2.3.2	Page 31 of 55	The offered IP Phones shall be a standard SIP endpoint based on open IETF SIP standards and shall be interoperable with any third-party SIP-compliant IPPBX. It shall not be a proprietary extensions or OEM-locked phone	To achieve the required functionality, interoperability and performance of Direct Line Telephones, the IP Phones should be SIP/IP-based and compliant with applicable IETF and ITU-T standards, ensuring seamless integration with the IP-based Telephone System and reliable IP-based communication.	Bidder to refer Addendum-2																														



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
106	Chapter-9: PS Telephone System	5.2.5.3	Page 34 of 55	The Help point should have built-in camera. Upon initiation of a Help Point call, the call shall land on the designated Video Phone. The designated controller at the Station/OCC shall be able to communicate with and view the image of the person seeking assistance. The video communication shall be one-way from the Help Point to the Video Phone.	To achieve this functionality, the Help Point & Video Phone should be part of one location as OCC and any other one location. As this functionality can be achieved in Centralized architecture where the IP PBX system does not have at station level, so request you to amend the clause or allow us to have Video Phones & all Help Point Phones to be registered at OCC	No change in Bid conditions.
107	Chapter-9: PS Telephone System	5.2.5.8	Page 34 of 55	In the event, if Station Controller (SC) fail to respond within 30sec, the call shall be forwarded to DLT set (Video Phone) of the Chief Controller (CC) in OCC. If the CC also fails to respond within 30 sec., the call shall further be forwarded to DLT set (Video Phone) of Security Controller at OCC.		No change in Bid conditions.
108	Chapter-9: PS Telephone System	6.3.3	Page 36 of 55	The IP-PBX shall support SIP interfaces and PRI (E1) digital interfaces conforming to ITU-T Recommendations G.703 and G.704 for interconnection with the existing Telephone Systems of Phase-1A & 1B, PSTN and other interfacing systems.	The IP-PBX shall support SIP/IP interfaces instead of being limited to only SIP interfaces, in order to achieve the overall functionality, interoperability and performance requirements of the IP-PBX system and ensure seamless integration with IP-based users, trunks and other network elements in compliance with applicable IETF and ITU-T standards.	Bidder to refer Addendum-2
109	Chapter-9: PS Telephone System	6.6.5 T	Page 42 of 55	The IP-PBX shall support Analog Telephone Instruments, SIP-based IP Phones and SIP-based Video Phones, as specified in this Particular Specification	Please amend the clause as follows: "The IP-PBX shall support Analog Telephone Instruments, SIP/IP-based IP Phones, and SIP/IP-based Video Phones, as specified in this Particular Specification."	Bidder to refer Addendum-2
110	Chapter-9: PS Telephone System	1.1.3	401	upgradation of the existing OCC Central Telephone Systems and the existing OCC Network Management Systems (NMS) of Phase-1A and Phase-1B	Since the existing Central Telephone System and NMS are proprietary systems, please clarify whether "upgradation" shall mean complete replacement with a new IP-based/open-standard SIP-compliant setup for the Central Telephone System and NMS?	Clause is self explanatory.
111	Chapter-9: PS Telephone System	1.1.3	401	The OCC Direct Line Console (DLC) requirement may be met either by upgradation of the existing DLCs of Phase-1A & 1B to accommodate Phase-1C & 1D or by supply of new DLCs of adequate capacity for the combined requirements of Phase-1A, Phase-1B, Phase-1C & 1D, including OCC.	Since the existing DLCs are proprietary, please consider the requirement as a new DLC setup compatible with the proposed open-standard SIP-based system, rather than upgradation of the existing proprietary DLCs?	Clause is self explanatory.
112	Chapter-9: PS Telephone System	1.1.4	401	Telephone Network for Phase-1A & 1B is formed by EPABXs installed for each phases (1A&1B) at OCC (which acts as the Main Node) and at each station. These nodes are interconnected in a ring through E1 links running over the FOTS Network backbone.	Please clarify the make/model and protocol capabilities of the existing EPABXs. Since the existing EPABXs are proprietary and may not support open-standard SIP, please clarify the proposed integration methodology with the new IP-based/open-SIP Telephone System?	Clause is self explanatory. Further, Bidder is advised to visit the Site for survey, with prior permission.
113	Chapter-9: PS Telephone System	1.1.4	401	These nodes are interconnected in a ring through E1 links	The Technical Specifications require an open-standard SIP-based Telephone System. Accordingly, please clarify whether the new Central Telephone System and Phase-1C & 1D Telephone Systems shall be interconnected using SIP over the available IP network, with adequate bandwidth provisioned based on the required number of simultaneous channels, instead of E1 connectivity?	Clause is self explanatory. Please refer Clause No. 5.1.1.4 (Figure-5.1 & 5.2).
114	Chapter-9: PS Telephone System	1.1.4(2)	401	the Existing OCC Central Telephone System shall be upgraded by replacing the existing Central EPABX of Phase-1A & 1B with a redundant IP-based Appliance Call Server (1+1) together with Gateway Architecture, Direct Line Consoles (DLCs), associated hardware, software, interface modules, licenses and accessories required for successful operation of the Telephone System	Since the existing OCC Central Telephone System is proprietary and may not support open-standard SIP, please clarify whether the requirement shall be treated as complete new IP-based Central Telephone System , comprising redundant Call Servers (1+1), Gateway Architecture, DLCs, licenses and associated accessories, rather than an upgradation of the existing system?	Clause is self explanatory. Please refer Clause No. 5.1.1.4 (Figure-5.1 & 5.2).
115	Chapter-9: PS Telephone System	1.1.4(2)	401	The Existing OCC Direct Line Consoles (DLCs) shall be upgraded or replaced, and the existing OCC Network Management System (NMS) of Phase-1A & 1B shall also be replaced by common NMS (1+1) as specified in these Particular Specifications.	Since the existing DLCs and NMS are proprietary systems and may not be compatible with the proposed open standard SIP-based architecture, please clarify whether complete replacement with new SIP-compatible DLCs and common NMS (1+1) shall be permitted?	Clause is self explanatory. Please refer Clause No. 5.1.1.4 (Figure-5.1 & 5.2).
116	Chapter-9: PS Telephone System	1.1.4(5)	402	overall supervision, configuration, fault management, alarm management and performance monitoring of the Telephone Network, Network Management System (NMS) is provided at OCC for Phase-1A and Phase-1B separately. Both existing OCC Network Management System (NMS) shall be upgraded by replacing with a common NMS (1+1) under this Contract and shall support centralized monitoring and management of the upgraded OCC Central Telephone System, OCC Direct Line Consoles (DLCs) and the Telephone Systems of Phase-1A, Phase-1B, Phase-1C & 1D from a single centralized platform.	Since centralized monitoring, configuration, fault management, alarm management and performance monitoring across Phase-1A, 1B, 1C & 1D require common protocol compatibility, please clarify whether a old centralized NMS (1+1) supporting the complete proposed open-standard SIP-based architecture shall be provided?	Clause is self explanatory. Please refer Clause No. 5.1.1.4 (Figure-5.1 & 5.2).



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
117	Chapter-9: PS Telephone System	1.2.1.2	403	The Telephone Systems of Phase-1C & 1D shall be integrated with the upgraded OCC Central Telephone System using open standard SIP-based protocols. Integration of the upgraded OCC Central Telephone System with the existing Telephone Systems of Phase-1A & 1B stations shall be achieved through the existing E1 interfaces or other existing interfaces, as applicable, without affecting the functionality, reliability or performance of the existing Telephone System.	The specification requires integration using open-standard SIP-based protocols. Please clarify whether the complete new Central Telephone System and Phase-1C & 1D Telephone Systems shall be based on open-standard SIP, ensuring feature transparency, interoperability and centralized management. Please also clarify the intended interface/gateway methodology for integration with the existing Phase-1A & 1B systems?	Clause is self explanatory. Please refer Clause No. 5.1.1.4 (Figure-5.1 & 5.2).
118	Chapter-9: PS Telephone System	3.2.1	406	The Telephone System shall be implemented by replacing the Existing OCC Central Telephone System and the Existing OCC Network Management System (NMS) of Phase-1A & 1B, and by providing new IP based Telephone Systems for Phase-1C & 1D stations.	The specification states that the existing OCC Central Telephone System and NMS shall be replaced. Please confirm that the scope includes complete replacement of the existing OCC Central Telephone System and NMS , including all required Call Servers, Gateways, DLCs, licenses, interfaces and associated accessories?	Clause is self explanatory.
119	Chapter-9: PS Telephone System	5.1.1.4	414	Table 5-2 IP-PBX Telephone System Requirement	Please clarify whether the IP-PBX Telephone System requirement specified in Table 5-2 is applicable to both existing Phase-1A & Phase-1B systems in addition to Phase-1C & Phase-1D , or only to the new Phase-1C & Phase-1D Telephone Systems? then provide details of 1A & 1B?	Clause is self explanatory.
120	Chapter-2 (Radio & CDRS System)	3.2.1	164	Upgradation/ Replacement of existing CDRS at OCC of Phase-1A&1B such that the upgraded/replaced system also seamlessly functions for the Phase1C & 1D including existing interface services of Phase-1A & 1B. The existing NMSs & MMIs provided for Phase-1A/1B shall also be suitably upgraded/replaced to function for the Phase-1C & 1D also without any degradation.	Please provide the make, model and technical details/protocols of the existing CDRS system installed at OCC for Phase-1A & 1B. Alternatively, please confirm whether a new IP-based, multichannel CDRS compatible with the proposed IP/SIP-based Telephone System shall be acceptable?	Clause is self explanatory. Further, Bidder is advised to visit the Site for survey, with prior permission.
121	Chapter-2 (Radio & CDRS System)	3.2.2(3)	165	CDRS has to work in 1 + 1 mode (2 units in parallel) with RAID5 storage in-line	Please clarify whether the existing CDRS is already configured in 1+1 redundant mode with RAID-5 storage. If not, please confirm whether a new 1+1 redundant CDRS system with RAID-5 storage shall be provided both phase?	Clause is self explanatory.
122	Chapter-2 (Radio & CDRS System)	5.15	168	Control administration and management function shall be provided through the front panel of the CDRS or a Workstation (to be supplied) connected to the CDRS and the following functions, as a minimum, shall be provided:	Please clarify whether the requirement permits two separate CDRS workstations/panels , one for each CDRS unit in the 1+1 configuration, or whether a single centralized workstation shall be provided for administration and management of both CDRS units.	Clause is self explanatory.
123	PS Chapter-4 (UPS System)	2.2.1	7 of 43	Inverter output isolation transformer Equipment cabinets, racks & cubicles;	Isolation transformer is considered at input of the UPS Systems. Hence, Isolation transformer at output side of UPS Systems is not required. Please remove it from scope.	No change in Bid conditions.
124	PS Chapter-4 (UPS System)	2.2.1	7 of 43	For Upgradation of existing NMS of JMRTS Phase-1B to include UPS & DC Power system alarm & monitoring of Phase-1C&1D or provision of new Remote monitoring equipment and accessories including voltage free contacts for Alarms (it should be able to monitor real time alarms of UPS and DC Power (SMPS) systems with web based graphical user interface & line diagram display. Any alarm in any of the UPS / SMPS / Isolation Transformer / SCVS / Battery system etc. shall pop-up the line diagram of the UPS with audio & visual alarm indications);	Please share the list of existing equipment to be on monitoring.	Clause is self explanatory. Further, Bidder is advised to visit the Site for survey, with prior permission.
125	PS Chapter-4 (UPS System)	3.1.2	9 of 43	The complete UPS system, except cellblocks, shall have a minimum service life of 15 years operating continuously.	Please include the performance certificate requirement to establish service life of 15 years operating continuously from metro project under operations.	No change in Bid conditions.
126	PS Chapter-4 (UPS System)	3.1.3	9 of 43	Equipment shall be designed and manufactured in modular manner to facilitate the fault diagnosis and replacement of each modular part. Each module shall be capable of being interchanged with other modules of the same type without affecting the rest of modules in place.	We understand that requirement is for modular UPS System. Please confirm.	Clause is self explanatory.
127	PS Chapter-4 (UPS System)	4.2.4 (8)	14 of 43	Overload capacity of each UPS better than 150% > 60 seconds 125% > 10 minutes 110 % for 60 minutes	Please correct the clause as under: Overload capacity of each UPS equal to / better than 150% for 60 seconds 125% for 10 minutes 110 % for 60 minutes	Please refer Addendum-2
128	PS Chapter-4 (UPS System)	4.3.3	18 of 43	The Contractor shall provide the complete diagnostic software tools for monitoring and configuration in CD/DVD/any other laptop compatible electronic device in uneditable form and the same shall also be installed in Laptop provided for PAS/PIDS system.	Diagnostic software tools are proprietary in nature and being handled by experts. Hence, the same shall be removed from specifications.	No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
129	PS Chapter-4 (UPS System)	4.5.8 (e)	21 of 43	Battery sizing calculations shall be done as per the recommendations of IEEE-485 (2010) or latest, considering the following factors/margin: i. Design margin of 10%. ii. Temperature correction factor at assume an ambient temperature of 25°C. iii. Ageing de-rating factor of 25% shall be taken into account.	Please share the output power factor is to be considered for battery sizing.	Clause is self explanatory.
130	PS Chapter-4 (UPS System)	4.10.2		f) Rated short-circuit making capacity (Icm): 105 kA at 0.25 power factor (min), g) Rated ultimate short-circuit breaking capacity (Icu): 50 kA (min), m) All MCCBs should have front adjustable electronic/ microprocessor based releases with adjustment in the range of 40 – 100% for nominal overloads and 2 – 10 times of rated current for short circuit faults	Rated short circuit making & breaking capacity shall be as per requirement, not as per defined capacity in specification. MCCB shall be thermal mechanical type. Please consider.	No change in Bid conditions.
131	PS Chapter-11 (Appendices)	Appendix-A4	569-570	INTERFACE BETWEEN UPS (S&T) SYSTEM AND OTHER SYSTEM(S) (SIGNALLING, TELECOM, AFC) CONTRACTORS FOR POWER SUPPLY REQUIREMENTS	MCB Shown in figure is 32Ax2 & 3x6A is not sufficient for PAS/PIDS and Clock system to avoid single point of failure, MCB quantity will increase during interface and same needs to be provided as per requirement.	No change in Bid conditions.
132	PS Chapter-11 (Appendices)	Appendix-M - 4.1.1 (5-a)	655	(i) Operating temperature Range -40 ° C to + 85 ° C (ii) Storage temperature Range -40 ° C to + 100 ° C	Normally many reputed OEM not provides operating & storage temperature as specified, SPD temperature should be as per the temperature specified for hardware for which is to be used.	Bidder to refer Addendum-2
133	PS Chapter-11 (Appendices)	Appendix-P-(1) (6-Display)	660	b-i)- 1 display port/HDMI (Out) b-iii)- 1 x Analog 2.0 audio line out (3.5 mm jack) c) Integrated Soundbar Speaker (Min 3.5 Watts)	Normally many reputed OEM not provides this specifications and same shall be complied through KVM	No change in Bid conditions.
134	PS Chapter-11 (Appendices)	Appendix-P- (2)	661	KVM Operating temperature 60° C	Normally many OEM not provides 60° C perating temperature and PAS/PIDS KVM to be installed in controlled indoor environment i.e TER & SCR, so temperature should be as per indoor requiremnt.	Bidder to refer Addendum-2
135	PS Chapter-11 (Appendices)	Appendix-Q	781-785	APPENDIX Q: EXISTING PHASE-1A & 1B INTERFACE DOCUMENTS	The Signalling interface document provided is not sufficiently clear or legible to review.	Bidder to refer Addendum-2
136	6.2.4 Industrial Grade Layer-2 Switches for Field	32. Switch Operating System certification	PS-202	The Switch Operating System should be IPv6 certified/complied and common criteria EAL3/EAL4 and NDcPP or equivalent certified/complied. The contractor shall submit details of the equivalent certification/ compliance to the Engineer for review and approval.	We request JMRC to amend the restrictive certification requirements of Common Criteria EAL3/EAL4/ NDcPP or MTCTE certificate for Class-1 local supplier to increase competition in the bidding process, as the domestic manufacturer manufacture their equipments as per the prevalent guidelines of DPIIT, DoT and complies to Indian regulatory framework.	Bidder to refer Addendum-2
137	6.2.5 Layer 3 Switch (Aggregate Switch)	16.Certification and other compliances	PS-205	1) Should have regulatory compliance of MTCTE, TTP,ITSAR, UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval.	We request JMRC to delete "ITSAR" from the regulatory compliance list, as mandatory ITSAR guidelines are yet to be notified for Switches.	Bidder to refer Addendum-2
138	6.2.5 Layer 3 Switch (Aggregate Switch)	16.Certification and other compliances	PS-205	3) The Switch Operating System should be IPv6 certified/complied and common criteria EAL4 and NDcPP or equivalent certified/complied. The contractor shall submit details of the equivalent certification /compliance to the Engineer for review and approval.	Request to amend the restrictive certification requirements Common Criteria EAL3/EAL4/ NDcPP or MTCTE for Class-1 local supplier to increase competition in the bidding process, as the domestic manufacturer manufacture their equipments as per the prevalent guidelines of DPIIT, DoT and complies to Indian regulatory framework.	Bidder to refer Addendum-2



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139	4.5 TECHNICAL SPECIFICATIONS IP-MPLS Router	1.4.1 Security	PS-366	Security forms an integral part of a network design to protect both the end-customers and the network infrastructure. The solution that vendor proposes must have the necessary provisions to implement the necessary security measures. The Router/Router Series/Router OS/Router family must be EAL3+ certified from Day-1.	Domestic OEMs manufacture their IP/MPLS routers in India as per the prevailing guidelines of DPIIT and DoT under the Make in India initiative of the Government of India, which conforms to the applicable regulatory and security standards, as mandated by NCCS vide letter No. NCCS/HQ/COMSEC/2021-22/III/I Dated 16/04/2024. Hence, it is requested to consider ITSAR-PRO-TEM certificate valid for all purpose for the IP/MPLS router, including supply of equipments instead of insisting for any foreign standard/certification. Request to amend the clause to "EAL3+ certified" or valid MTCTE/ITSAR PRO-TEM certificate. It is requested to revise the clause as- "The Router/Router Series/Router OS/Router family must possess a valid MTCTE (Mandatory Testing and Certification of Telecom Equipment) certificate issued by the Telecommunication Engineering Centre (TEC), India, covering all specified Essential Requirements (ER) including ITSAR PRO-TEM certificate from Day-1."	Bidder to refer Addendum-2
140	4.5 TECHNICAL SPECIFICATIONS IP-MPLS Router	1.6 Certificates and environment standards	PS-367	Router or family must comply with NEBS Level 3 specifications and CE2.0 or higher compliant/certified.	Under the Public Procurement (Preference to Make in India) Order, tenderer must allow equivalent global or national test parameters to prevent the exclusion of qualified domestic Class-1 Local Suppliers. Strictly mandating NEBS Level 3 (a proprietary American telecom standard) and specific third-party global certifications like MEF CE 2.0, excludes domestic OEMs. We understand that the NEBS Level 3 specifications and CE2.0 or higher are proprietary foreign certifications for which Indian Equivalents should be provided in the Bid to for domestic OEMs to offer their products. Request to amend the clause and allow TEC QM-333, MTCTE / TEC Generic Requirements (TEC-GR) As equivalent to NEBS Level 3 specifications and CE2.0.	Bidder to refer Addendum-2
141	4.5.2 TECHNICAL SPECIFICATIONS IP-MPLS Router-P-MPLS node/Router (Core) for OCC	2.6.1 Certificates and environment standards	PS-371	Router or family must comply with NEBS Level 3 specifications and the router/family must be CE2.0/3.0 certified.	Under the Public Procurement (Preference to Make in India) Order, tender guidelines must allow equivalent global or national test parameters to prevent the exclusion of qualified domestic Class-1 Local Suppliers. Strictly mandating NEBS Level 3 (a proprietary American telecom standard) and specific third-party global certifications like MEF CE 2.0, excludes domestic OEMs. We understand that the NEBS Level 3 specifications and CE2.0 or higher are proprietary foreign certifications for which Indian Equivalents should be provided in the Bid to for domestic OEMs to offer their products. Request to amend the clause and allow TEC QM-333, MTCTE / TEC Generic Requirements (TEC-GR) As equivalent to NEBS Level 3 specifications and CE2.0.	Bidder to refer Addendum-2
142	4.5 TECHNICAL SPECIFICATIONS IP-MPLS Router	1.1.5 General Specifications & Architecture	PS-364	The router must support following type of interfaces –1GE, 10GE, FXO, FXS, E&M and E1 interfaces. All traffic interfaces must come with universal slot option in the router. All the interface line-cards must be capable to be configured on all given line card slots.	We request JMRC to allow IP-MPLS routers with modular cards distributed in redundant separate interface cards with on-line insertion & removal facility. The module level redundancy of interfaces shall keep the other services working in case of a failure of an interface card. Universal slot should be made as an optional feature, which shall enable the participation of more qualified OEMs, while ensuring access to high-quality Telecom solutions at competitive pricing.	No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
143	4.5.2 TECHNICAL SPECIFICATIONS IP-MPLS RouterP-MPLS node/Router (Core) for OCC	2.1.8 General Specifications & Architecture	PS-368	Router must support On-line insertion and removal of same. All line-card slots must be universal. All the line-cards must be capable to be configured on all given line-card slots without any restriction	We request JMRC to allow IP-MPLS routers with modular cards distributed in redundant separate interface cards with on-line insertion & removal facility. The module level redundancy of interfaces shall keep the other services working in case of a failure of an interface card. Universal slot should be made as an optional feature, which shall enable the participation of more qualified OEMs, while ensuring access to high-quality Telecom solutions at competitive pricing.	No change in Bid conditions.
144	4.5.2 TECHNICAL SPECIFICATIONS IP-MPLS RouterP-MPLS node/Router (Core) for OCC	2.6.3 Certificates and environment standards	PS-371	Safety: IEC/EN 60825-1, IEC/EN 60825-2	Request to amend the clause to Safety: IEC/EN 60825-1, IEC/EN 60825-2 or QM-333 for Class-1 Local Supplier.	No change in Bid conditions.
145	4.5.2 TECHNICAL SPECIFICATIONS IP-MPLS RouterP-MPLS node/Router (Core) for OCC	2.6.4 Certificates and environment standards	PS-371	Storage: EN300 019-2-1 class 1.2	Request to amend the clause to Storage: EN300 019-2-1 class 1.2 or QM-333 for Class-1 Local Supplier.	Bidder to refer Addendum-2
146	4.5.2 TECHNICAL SPECIFICATIONS IP-MPLS RouterP-MPLS node/Router (Core) for OCC	2.6.5 Certificates and environment standards	PS-371	Transport: EN300 019-2-2 class 2.3	Request to amend the clause to Transport: EN300 019-2-2 class 2.3 or QM-333 for Class-1 Local Supplier.	Bidder to refer Addendum-2
147	4.5.2 TECHNICAL SPECIFICATIONS IP-MPLS RouterP-MPLS node/Router (Core) for OCC	2.6.6 Certificates and environment standards	PS-371	In service: EN300 019-2-3 class 3.2	Request to amend the clause to In service: EN300 019-2-3 class 3.2 or QM-333 for Class-1 Local Supplier.	Bidder to refer Addendum-2
148	4.5.2 TECHNICAL SPECIFICATIONS IP-MPLS RouterP-MPLS node/Router (Core) for OCC	2.6.9 Certificates and environment standards	PS-371	IEEE1613, IEC61850-3 compliant	Request to amend the clause to In service: EN300 019-2-3 class 3.2 or EMC/EMI IEC 61000-4-4 (Electrical Fast Transient/Burst) for Class-1 Local Supplier.	Bidder to refer Addendum-2
149	4.5 TECHNICAL SPECIFICATIONS IP-MPLS Router	1.6.3 Certificates and environment standards	PS-367	Safety: IEC/EN 60825-1, IEC/EN 60825-2	Request to amend the clause to Safety: IEC/EN 60825-1, IEC/EN 60825-2 or QM-333 for Class-1 Local Supplier.	No change in Bid conditions.
150	4.5 TECHNICAL SPECIFICATIONS IP-MPLS Router	1.6.4 Certificates and environment standards	PS-367	Storage: EN300 019-2-1 class 1.2	Request to amend the clause to Storage: EN300 019-2-1 class 1.2 or QM-333 for Class-1 Local Supplier.	Bidder to refer Addendum-2
151	4.5 TECHNICAL SPECIFICATIONS IP-MPLS Router	1.6.5 Certificates and environment standards	PS-367	Transport: EN300 019-2-2 class 2.3	Request to amend the clause to Transport: EN300 019-2-2 class 2.3 or QM-333 for Class-1 Local Supplier.	Bidder to refer Addendum-2
152	4.5 TECHNICAL SPECIFICATIONS IP-MPLS Router	1.6.6 Certificates and environment standards	PS-367	In service: EN300 019-2-3 class 3.2	Request to amend the clause to In service: EN300 019-2-3 class 3.2 or QM-333 for Class-1 Local Supplier.	Bidder to refer Addendum-2



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
153	Additional Clause			Make in India Clause	Further, as per the latest DPIIT and Nodal Ministry's (DOT) guidelines; IP-MPLS routers are notified as Class I products, listed in Table-A of DoT Gazette Notification Dated 21/10/2024, and there is sufficient local capacity and competition for the Telecom services and works, listed in Table-A of the aforesaid Gazette Notification. Since, IP-MPLS routers, asked in the Tender, fall under this category, with HSN Code 85176290. Therefore, these routers need to be mandatorily sourced from Class-I OEMs. Hence, we request JMRC to suitably incorporate the Make in India guidelines in this Tender.	No change in Bid conditions.
154	PS	3. Key dates for Contract	160 of 209	KD - 7 Completion of Contract - 2 years beyond Revenue Operation of last Section	As per the payment terms specified in the tender, the payment for MS Work is proposed to be released after completion of the respective milestone, with the final milestone extending up to two years. Although provision for interim payment of 50% is available upon completion of 50% of the work, the balance payment would remain withheld for a prolonged period despite the Contractor continuously incurring costs towards manpower, resources, operations and service delivery. Such a payment structure may result in a significant working capital and cash-flow burden and may also increase the financing cost for the Contractor.	Clause is self explanatory, No change in Bid conditions.
155	SCC	26. Sub Clause 11.4.1	11 of 19	Application for Interim Payment Certificates Contractor may apply for part completion of any milestone, if the milestone activity has been at least 50% completed, along with supporting details justifying the percentage completion being requested. The milestone which has already been at least 50% completed, further part payment of the same milestones may be requested for completed portion of the milestone along with supporting details justifying the percentage completion being requested. The part payment shall be released maximum upto 80% of the milestone value.	Considering the long-term nature of the MS Work, we request the Authority to kindly consider releasing payments on a quarterly basis against the satisfactorily completed and certified work/services during each quarter. Quarterly payment would provide sufficient time to the Authority to review and certify the work while ensuring a fair and sustainable payment mechanism. Such periodic payment terms are also generally followed in long-term service and maintenance contracts by reputed authorities. We therefore request the Authority to suitably amend the payment terms and permit quarterly payment against the work satisfactorily completed and certified during the respective quarter, instead of withholding the payment until completion of the two-year milestone.	Clause is self explanatory, No change in Bid conditions.
156	COF	Appendix 1 – Terms and Procedures of Payment, (A) General Requirements, A., 6	4 of 83	The sum of the amounts apportioned to section MS shall not be less than 10% of fix lump sum bid price refer to clause 7 below.		Clause is self explanatory, No change in Bid conditions.
157	SCC	22. SCC- Sub Clause 11.1.3	10 of 19	Adjust in Contract - Price Price quoted by the tenderer shall be fixed throughout the Tenderers performance of the contract Since the contract is fixed lump-sum price based contract, no adjustment for changes in cost on any account is allowed.	Considering the long duration of the contract, we request the introduction of a suitable price escalation formula to account for variations in the cost of materials, labour, and other inputs during the contract period.	No change in Bid conditions.
158	GCC	Advances 11.2, Mobilization Advances 11.2.1	46 of 77	#VALUE!	Since the tender already provides for a mobilization advance, we request the Authority to kindly consider making the mobilization advance interest-free , as the Contractor is required to incur substantial upfront expenditure towards manpower, resources, equipment, logistics and other project mobilization activities. Providing the advance on an interest-free basis would reduce the initial financing burden on the Contractor and facilitate timely and efficient project mobilization, ultimately supporting uninterrupted execution of the project.	No change in Bid conditions.
159	PS.pdf	3.2 Scope of Supplies, 3.2.1	6-8 of 98	3.2.1 - Upgradation/ Replacement of existing Central Infrastructure at OCC.....Servers, Dispatcher/RCW, RAU/RCP, Train Radio etc available/provided for Phase-1A&1B at Central Locations OCC and stations shall also function for Phase-1C & 1D applications as well.	Upgrade/replacement of existing Phase-1A and Phase-1B Radio System Kindly confirm, subsystem-wise, the assets that must be retained, upgraded, replaced or removed, and whether complete replacement is permitted where retention or upgrade is technically unviable, subject to meeting all specified functional and performance requirements.	Clause is self explanatory.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
160	PS.pdf	3.1 General Requirements	17 of 77	3.1 - The scope of the works includes but not limited to design, design coordination with other Contractors.....DLP warranty (Defect Liability Period) for the entire CCTV, Radio System, CDRSystem, PIDS/PAS/MCK system, FOTS, Telephone system andUninterrupted Power Supply System (UPS).	Integration and upgrade of existing telecom systems Kindly provide the station-wise and central-site asset register covering OEM, model, part number, quantity, installation location, hardware revision, software/firmware version, license status, configuration, operational condition and available spare capacity of all existing systems to be retained or integrated.	Kindly refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
161	PS.pdf	3.3 Scope of Services, 3.3.2	17-18 of 77	3.3.2 - The scope of services to be performed by the Contractor shall include, but not be limited to, the following:.....(15) Assistance to Engineer.	Retention and integration of existing equipment Kindly share identified list of all existing hardware and software that have reached, or are expected to reach during the contract period, End-of-Sale, End-of-Support or End-of-Life, together with the current AMC/OEM-support arrangements.	Kindly refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
162	PS.pdf	3.1 General Requirements	17 of 77	3.1 - The scope of the works includes but not limited to design, design coordination with other Contractors.....DLP warranty (Defect Liability Period) for the entire CCTV, Radio System, CDRSystem, PIDS/PAS/MCK system, FOTS, Telephone system andUninterrupted Power Supply System (UPS).	Please confirm that the contractor will not be responsible for latent defects, pre-existing deficiencies, capacity limitations or failures of retained existing equipment, except to the extent directly caused by the contractor's work.	No change in Bid conditions.
163	PS.pdf	Radio System, Clauses 3.1.1.2 and 3.2.1	5 of 98 and 6-7 of 98	3.1.1.2 - Phase 1C consists of extension of E-W corridor from Badi Chaupar to Transport Nagar.....Frequency and coverage planning for whole JMRTSradio network shall be contractorresponsibility but without performance degradation to existing system. 3.2.1 - Upgradation/ Replacement of existing Central Infrastructure at OCC and existing BTS at Stations of Phase-1A&1B.....The system provided for Phase-1C & 1D corridors shall be integrated/interfaced with the upgraded/replaced system(s) of Phase-1A & 1B such that the MMIs, CAD Servers, Dispatcher/RCW, RAU/RCP, Train Radio etc available/provided for Phase-1A&1B at Central Locations OCC and stations shall also function for Phase-1C & 1D applications as well.	Existing Radio/TETRA system and proposed extension Kindly provide existing Radio/TETRA architecture, RF design, frequency plan, BTS and antenna configuration, LCX layout, coverage plots, talk-group plan, radio identity plan, VPN configuration, network database, licenses and approved as-built drawings.	Bidder is advised to visit the site for survey, with prior permission.
164	PS.pdf	Radio System, Clause 3.1.1.2	5-6 of 98	3.1.1.2 - Phase 1C consists of extension of E-W corridor from Badi Chaupar to Transport Nagar.....Frequency and coverage planning for whole JMRTSradio network shall be contractorresponsibility but without performance degradation to existing sy	Indicated BTS locations Please confirm whether the indicated BTS quantities and locations are mandatory or may be optimized through detailed RF survey and design, subject to satisfying the specified coverage, capacity, redundancy and availability requirements.	Clause is self explanatory.
165	PS.pdf	Radio System, Clause 6.2.3	55 of 98	6.2.3 - Radio system shall as a minimum be equipped with 7 traffic channels and 1 control channel at every BTS. For the BTS serving the OCC, there shall be 4 Base Radios i.e. 4*8 timeslots.	Seven traffic channels and one control channel per BTS Please confirm whether seven traffic channels plus one control channel constitute a mandatory minimum at every BTS, irrespective of the traffic analysis, or whether BTS capacity may be established through an approved traffic and availability assessment.	Clause is self explanatory.
166	PS.pdf	General Query	General Query	Radio System, frequency and regulatory approval requirements Frequency availability and statutory approvals	Kindly provide the allocated frequency pairs, present utilization and applicable license conditions, and clarify the respective responsibilities of JMRC and the contractor for WPC, SACFA and other frequency-related approvals, including relief where approval depends on information or action by JMRC.	Complete interface/liasioning responsility lies with the Contractor for the such approvals.
167	PS.pdf	Radio System, Clauses 5.7, 5.8.1.3 and 5.12.7	25 of 98	5.7 Radio Control Workstation (RCW) [Dispatcher] Functionality JP/JS14(1C&1D)Contractor shall upgrade/replace all existing RCW with all necessary hardware, Software & licenses so that following requirements are continue to meet for the extended section under Phase-1C & 1D as well including Phase-1A & 1B in-line with Clause 3.2.1 above: 5.8.1.3 - For the existing Rolling Stock, Contractor shall have to coordinate for the physical dimensions.....placement, mounting, routing, connectors, protocols, etc is permitted. 5.12.7 - Train Radio Logging/ Initialisation (Complete Clause)	ATS and rolling-stock integration Kindly provide the approved ATS-Radio and Rolling Stock-Radio ICDs, protocols, message structures, Train ID/Rake ID/Radio ID mapping logic, connector details, cable schedules, mounting arrangements, software/database requirements and interface test procedures.	Kindly refer Bidding Documents. Further, Interface responsility lies with the Bidder with other designated system contractors.
168	PS.pdf	General Query	General Query	Radio System, existing rolling-stock integration Modification or replacement of train-radio equipment	Kindly provide the train-set-wise quantity and configuration of train radios and associated equipment requiring retention, upgrade or replacement, and confirm when representative trains will be made available for survey, prototype installation, testing and fleet retrofit.	Bidder is advised to visit the site for survey, with prior permission.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
169	PS.pdf	General Query	General Query	Telephone System, existing-system integration Existing telephone-system extension/upgrade	Kindly provide the complete existing telephone-system architecture, including Alcatel OXE hardware and software details where applicable, licenses, numbering plan, DLC configuration, PRI/SIP trunks, interfaces, capacity utilization, database backup and station-wise equipment inventory.	Kindly refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
170	PS.pdf	General Query	General Query	Telephone System, migration and integration requirements Integration with existing operational telephone system	Kindly confirm the assets to be retained, upgraded or replaced and provide the required migration, number-retention, interoperability, rollback and final acceptance requirements.	Kindly refer Bidding Documents.
171	PS.pdf	General Query	General Query	CCTV System, existing-system integration Integration with existing CCTV/VMS platform	Kindly provide existing CCTV/VMS architecture, OEM and software versions, server and storage specifications, camera inventory, license status, network topology, cybersecurity requirements, database/configuration backup and available system capacity.	Bidder is advised to visit the site for survey, with prior permission.
172	PS.pdf	CCTV System, Clause 5.1.12	8 of 50	5.1.12 - Installation of Facial Recognition (FR) camera at station of Phase-1C&1D. JP/JS14(1C&1D) contractor shall submit in detailed design, the integration methodology with CCTV VMS to Engineer for approval.	Integration with existing Facial Recognition server Kindly provide the Facial Recognition system OEM, product and software version, API/SDK, supported protocols, license availability, cybersecurity restrictions, interface ownership, test environment and acceptance criteria for integration.	No change in Bid conditions. Further, Facial Recognition Integration shall be finalized during design stage.
173	PS.pdf	General Query	General Query	CCTV recording and storage requirements Recording retention with spare capacity	Kindly confirm the mandatory resolution, frame rate, codec, bitrate or image-quality basis, recording mode, retention period, RAID/redundancy arrangement, usable-capacity definition and treatment of the specified spare capacity for CCTV storage sizing and acceptance.	Kindly refer Bidding Documents.
174	PS.pdf	General Query	General Query	PAS/PIDS and ATS interface requirements Integration with existing PAS/PIDS and ATS	Kindly provide the existing PAS/PIDS architecture, OEM, software version, server and display inventory, license status, audio zoning, ATS interface protocol, message dictionary, approved ICD, database/configuration backup and interface test cases.	Bidder to refer Addendum-2
175	PS.pdf	General Query	General Query	FOTS System and existing backbone integration Utilization and extension of the existing transmission network	Kindly provide the existing FOTS/SDH/IP network topology, node and switch details, software versions, protection scheme, VLAN and IP plan, port availability, bandwidth utilization, network-management interfaces, time-synchronization arrangement and approved as-built drawings.	Bidder is advised to visit the site for survey, with prior permission.
176	PS.pdf	FOTS System, Clause 4.2.1	9 of 45	4.2.1 - The optical fibre cable backbone network shall be formed by two outdoor single mode optical fibre cables laid from Mansarovar station.....Phase-1A & 1B for Fibre cable cores availability as per his proposed network design for FOTS.	Kindly provide route-wise and station-wise fiber cable details, core-allocation schedule, tested spare-core availability, ownership, termination details, attenuation records and permitted use of existing fibers.	Bidder is advised to visit the site for survey, with prior permission.
177	PS.pdf	General Query	General Query	Master Clock System Integration with existing clock and synchronization system	Kindly provide the existing Master Clock architecture, OEM and software version, master/slave hierarchy, NTP/PTP interfaces, clock inventory, synchronization sources, redundancy philosophy, license status and available expansion capacity.	Bidder is advised to visit the site for survey, with prior permission.
178	PS.pdf	General Query	General Query	UPS System UPS sizing for Telecom and associated loads	Kindly provide the approved equipment-wise connected and demand-load schedules for Telecom and all other loads required to be supported, required autonomy, battery technology, redundancy philosophy, input supply characteristics, short-circuit levels and future/spare-capacity basis.	Kindly refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
179	SCC.pdf	Additional Clause: Interface Requirement	16	Contractor interface obligations	Kindly provide a consolidated Interface Responsibility Matrix defining design, supply, installation, power, cabling, protocol development, software modification, testing, approvals and rectification responsibilities among Telecom, Signaling/ATS, Rolling Stock, AFC, Civil, E&M, Track, OCC and existing-system maintainers.	Kindly refer Bidding Documents (Chapter-11, Appendix-A, Interface Responsibilities)
180	GS.pdf	Sections 15, 16 and 17: Site Establishment, Liaison with Others and The	-	Site access, other contractors and interface management (Complete Clauses)	Kindly confirm the facilities and provisions to be made available by JMRC or other contractors at each site, including rooms, rack space, floor loading, HVAC, earthing, normal and UPS power, cable trays, conduits, sleeves, shafts, penetrations, embedded inserts, supports, lighting and fire protection.	Kindly refer Bidding Documents (Chapter-11, Appendix-A, Interface Responsibilities)



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
181	TelecomGADPart 1.pdf, TelecomGADPart 2.pdf, TelecomGADPart 3.pdf	Station and architectural drawings	-	Layouts include tentative provisions and requirements for coordination with system and civil contractors (Complete Refer clauses)	Kindly provide the latest coordinated and approved editable CAD/BIM drawings for OCC, Depot, Ajmer Road Chauraha, Galta Gate and Transport Nagar, including TER/SER layouts, equipment-room sections, cable routes, tray layouts, shafts, openings, rack locations and power/HVAC provisions, and identify any drawings that remain provisional.	Clause is self explanatory.
182	TelecomGADPart 2.pdf, TelecomGADPart 3.pdf	General notes concerning tentative cutouts and coordination	-	Cutouts/shafts and certain civil provisions are tentative and require system-contractor review(Complete Refer clauses)	Please confirm the contractual responsibility and cost allocation for finalizing and executing additional or modified openings, sleeves, supports, equipment foundations and cable routes resulting from the approved telecom design.	Clause is self explanatory. Kindly refer Bidding Documents (Chapter-11, Appendix-A, Interface Responsibilities)
183	PS.pdf, GS.pdf	General Query	General Query	Existing-system migration and Testing & Commissioning requirements Work on operational systems and integrated commissioning	Kindly provide permissible shutdown windows, possession/access restrictions, notice periods, service-continuity requirements and prohibited outage periods for migration and cutover of each existing telecom subsystem.	Work on existing systems need to be carried-out in consultation with O&M without any disruption to revenue services.
184	PS.pdf, GS.pdf	General Query	General Query	Existing-system migration requirements Continued operation during upgrade/replacement	Please confirm whether temporary systems, parallel operation, temporary licenses, additional circuits, standby equipment or phased migration are required to maintain operations, and identify the party responsible for associated facilities and approvals.	Work on existing systems need to be carried-out in consultation with O&M without any disruption to revenue services.
185	PS.pdf, GS.pdf	General Query	General Query	Testing and Commissioning FAT, SAT and integrated testing	Kindly define the system-wise FAT, SAT, reliability/availability, integration and trial-operation acceptance boundaries, required test duration, pass/fail criteria, witness/approval authority, and whether testing must include retained Phase-1A and Phase-1B assets in addition to the new Phase-1C and Phase-1D scope.	Kindly refer Bidding Documents.
186	PS.pdf, GS.pdf	General Query	General Query	Interface and integrated-testing requirements Dependence on third-party and existing systems	Please confirm the process and contractual relief where an integration or acceptance test cannot be completed due to unavailability, delay, defect or incompatibility of an existing system, third-party contractor, test environment, operational possession or customer-furnished information.	No change in Bid conditions.
187	PS.pdf	General Query	General Query	Software and license requirements Software required for operation, maintenance, configuration and integration	Kindly confirm, subsystem-wise, the required license type, quantity, term, user/device basis, redundancy and future-capacity requirements, and whether all licenses necessary for operation, administration, configuration, APIs, virtualization, cybersecurity, backup and disaster recovery are to be perpetual.	No change in Bid conditions. Further, all licenses are to be perpetual.
188	PS.pdf	General Query	General Query	Central servers, NMS, CDRS and dispatcher systems Central-system deployment	Please confirm whether virtualized deployment is permitted and, if so, provide the available virtualization platform, version, resource allocation, network/security requirements, backup arrangement, responsibility boundary and acceptance requirements.	No change in Bid conditions.
189	BOQ_1062877.xls	BOQ Preamble, Notes 10–12 and Summary Note 2	BOQ Preamble and Summary of BOQ	BOQ is minimum and additional items or quantity enhancement necessary to complete the scope are to be borne by the contractor	Kindly confirm that additions or quantity changes resulting from Employer-directed changes, revised customer requirements, revised drawings, unavailable existing capacity, undisclosed site conditions or changes to third-party interfaces after the base date will be treated as Variations and not as contractor-funded completion of the minimum BOQ.	No change in Bid conditions. Contractor has to meet the Bid condition.
190	COF.pdf	Appendix-1, Clause 14	5	Minimum BOQ is a baseline, additional items or enhancements required to complete the contract are part of the lump-sum scope	Kindly define the contractual baseline for distinguishing contractor-design development from a change in Employer's Requirements, and confirm the valuation mechanism for work arising from post-bid changes in scope, quantity, interface, site condition or customer-furnished information.	No change in Bid conditions.
191	COF.pdf	Appendix-1, Clauses 2–18	4–6	Apportionment across Sections, Cost Centres and Milestones	Kindly provide the final section-wise and cost-center-wise scope allocation and confirm how milestone values and payment dates will be adjusted where achievement depends on customer approvals, access, civil readiness, third-party interfaces or operational possessions.	Clause is self explanatory.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
192	SCC.pdf	Sub-Clause 4.5: Sub-contractors	5-6	Subcontracting excluding design is limited to 50%, with prescribed experience requirements and Notice of No Objection	Kindly clarify whether OEM supply, OEM engineering, software licensing, specialist testing and authorized service-provider activities are included when calculating the 50% subcontracting limit, and specify the value basis for such calculation.	Clause is self explanatory.
193	SCC.pdf	Sub-Clause 15.1/15.5: Professional Indemnity	15	Professional Indemnity Insurance requirement	Kindly specify the required indemnity limit, policy period, territorial/jurisdictional extent, retroactive date, extended reporting period and whether one project-specific policy or an annual corporate policy is acceptable.	Clause is self explanatory (SCC Clause-29)
194	ITB.pdf	Clause C24: Pre-Bid Meeting and bidding programme	23	Pre-bid clarification process	Kindly confirm the final dates for site surveys, release of clarification responses/addenda, bid submission and validity, and confirm that sufficient bid-preparation time will be allowed where material technical or commercial information is issued after the pre-bid meeting.	Please refer NIB clause 1.1.2 (Key Details)
195	GS.pdf	Sections 1.12, 15 and 17	As listed in the document contents	Survey, site access and existing conditions (Refer complete mentioned clauses)	Kindly confirm bidder access before bid submission to OCC, Depot, existing Phase-1A/1B stations, the three project stations, equipment rooms, telecom shafts and representative trains, together with permission to inspect, photograph, measure and verify existing equipment and routes.	Bidder is advised to Contact Office of Bid Inviting Authority for request of site visit/survey.
196	PS.pdf, GS.pdf, SCC.pdf	General Query	General Query	Interface, submission and programme requirements Contractor depends on customer and third-party information/approvals	Kindly provide a schedule identifying each customer-furnished document, database, drawing, license, interface input, facility, access and approval, together with its planned availability date and responsible organization.	Interface responsibility lies with the Bidder with other designated system contractorss/authorities/third party. Further, Bidder is advise to visit the site for survey, with prior permission.
197	PS.pdf, GS.pdf	General Query	General Query	Cybersecurity, remote access and software management requirements Networked telecom systems and central applications	Kindly provide the applicable JMRC cybersecurity architecture and policies, including network zoning, firewall responsibility, permitted protocols, antivirus/EDR, patching, vulnerability assessment, remote access, account management, log retention, backup, disaster recovery and cybersecurity acceptance requirements.	Kindly refer Bidding Documents.
198	GS.pdf, COF.pdf	GS Section 13: Spare Parts, Special Tools and Test Equipment, COF Appendix-14	GS: As listed in contents, COF: Printed	Spares for ten years of system operation	Kindly confirm whether the ten-year spare requirement is a recommended priced list or a mandatory supply, identify the required calculation basis and quantities, and clarify the applicable price-validity, obsolescence-replacement and compatibility obligations.	Clause is self explanatory. (SCC Clause-30)
199	Vol 1/Chapter-6	6.2.1.10(11)	17	Parameters / DetailsQuad HD Cameras (4 MP or better) Focal length 9mm – 40mm	To enable wider participation from multiple OEMs, we request that the specified focal length requirement be revised from 9 mm - 40 mm to either 9 mm (±2 mm) to 40 mm (±2 mm), 10.5 mm (±2 mm) to 47mm (±2 mm), based on the required coverage. In metro deployments, camera with the proposed focal length range are widely used to achieve the required field of view and coverage, rather than relying on a single fixed specification. Therefore, we request that the specification be made more flexible to accommodate suitable camera solutions from multiple OEMs while meeting the required coverage and performance.	Bidder to refer Addendum-2
200	Vol 1/Chapter-6	6.2.1.10	17	4K UHD Cameras 4K UHD Cameras (Fixed Box) ; 8 MP	Please change to Bullet/Box We as Bosch offer Bullet cameras and Bullet IP Camera integrates the camera and lens in a single purpose-built housing while offering equivalent or superior optical, imaging and environmental performance to a Fixed Box Camera with a separate lens. Therefore, Bullet Cameras meeting all specified camera, lens, resolution, optical and environmental requirements should also be permitted, ensuring flexibility and wider participation from reputed OEMs.	Bidder to refer Addendum-2



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
201	NIB	1.1.3.2	Page 14 of 22	The term "Telecommunication System" mentioned above is comprised of at least any two of the following in a single work experience: - (a) FOTS (b) Radio System (TETRA) (c) CCTV System including VMS (d) IP-PBX based Telephone System (e) PIDS-PAS (f) UPS System (Min. 30KVA)	Request you to kindly amend the clause as under: The term "Telecommunication System" mentioned above is comprised of at least any two of the following in a single work experience: - (a) FOTS (b) Radio System (TETRA) (c) CCTV System including VMS (d) IP-PBX based Telephone System (e) PIDS-PAS (f) UPS System (~~Min. 30KVA~~) This will allow more bidders to participate.	No change in Bid conditions.
202	PS Chapter-4 (UPS System)	2.2.1	Page 7 of 43	Inverter output isolation transformer Equipment cabinets, racks & cubicles;	Isolation transformer is considered at input of the UPS Systems. Hence, Isolation transformer at output side of UPS Systems is not required. Please remove it from scope.	No change in Bid conditions.
203	PS Chapter-4 (UPS System)	2.2.1	Page 7 of 43	For Upgradation of existing NMS of JMRTS Phase-1B to include UPS & DC Power system alarm & monitoring of Phase-1C&1D or provision of new Remote monitoring equipment and accessories including voltage free contacts for Alarms (it should be able to monitor real time alarms of UPS and DC Power (SMPS) systems with web based graphical user interface & line diagram display. Any alarm in any of the UPS / SMPS / Isolation Transformer / SCVS / Battery system etc. shall pop-up the line diagram of the UPS with audio & visual alarm indications);	Please share the list of existing equipment to be on monitoring.	Kindly refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
204	PS Chapter-4 (UPS System)	4.3.3	Page 18 of 43	The Contractor shall provide the complete diagnostic software tools for monitoring and configuration in CD/DVD/any other laptop compatible electronic device in uneditable form and the same shall also be installed in Laptop provided for PAS/PIDS system.	Diagnostic software tools are proprietary in nature. Hence, the same shall be removed from specifications.	No change in Bid conditions.
205	PS Chapter-4 (UPS System)	4.5.8 (e)	Page 21 of 43	Battery sizing calculations shall be done as per the recommendations of IEEE-485 (2010) or latest, considering the following factors/margin: i. Design margin of 10%. ii. Temperature correction factor at assume an ambient temperature of 25°C. iii. Ageing de-rating factor of 25% shall be taken into account.	Please share the output power factor is to be considered for battery sizing.	Clause is self explanatory.
206	Chapter-9: PS Telephone System	1.1.3	Page 4 of 55	Upgradation of the existing OCC Central Telephone Systems and the existing OCC Network Management Systems (NMS) of Phase-1A and Phase-1B	Since the existing Central Telephone System and NMS are proprietary systems, please clarify whether "upgradation" shall mean complete replacement with a new IP-based/open-standard SIP-compliant setup for the Central Telephone System and NMS?	Clause is self explanatory.
207	Chapter-9: PS Telephone System	1.1.3	Page 4 of 55	The OCC Direct Line Console (DLC) requirement may be met either by upgradation of the existing DLCs of Phase-1A & 1B to accommodate Phase-1C & 1D or by supply of new DLCs of adequate capacity for the combined requirements of Phase-1A, Phase-1B, Phase-1C & 1D, including OCC.	Since the existing DLCs are proprietary, please consider the requirement as a new DLC setup compatible with the proposed open-standard SIP-based system, rather than upgradation of the existing proprietary DLCs	Clause is self explanatory.
208	Chapter-9: PS Telephone System	1.1.4	Page 4 of 55	Telephone Network for Phase-1A & 1B is formed by EPABXs installed for each phases (1A&1B) at OCC (which acts as the Main Node) and at each station. These nodes are interconnected in a ring through E1 links running over the FOTS Network backbone.	Please clarify the make/model and protocol capabilities of the existing EPABXs. Since the existing EPABXs are proprietary and may not support open-standard SIP, please clarify the proposed integration methodology with the new IP-based/open-SIP Telephone System.	Clause is self explanatory. Further, Bidder is advised to visit the Site for survey, with prior permission.
209	Chapter-9: PS Telephone System	1.1.4 (2)	Page 4 of 55	the Existing OCC Central Telephone System shall be upgraded by replacing the existing Central EPABX of Phase-1A & 1B with a redundant IP-based Appliance Call Server (1+1) together with Gateway Architecture, Direct Line Consoles (DLCs), associated hardware, software, interface modules, licenses and accessories required for successful operation of the Telephone System	Since the existing OCC Central Telephone System is proprietary and may not support open-standard SIP, please clarify whether the requirement shall be treated as a complete new IP-based Central Telephone System , comprising redundant Call Servers (1+1), Gateway Architecture, DLCs, licenses and associated accessories, rather than an upgradation of the existing system?	Clause is self explanatory.
210	Chapter-9: PS Telephone System	1.1.4 (2)	Page 4 of 55	The Existing OCC Direct Line Consoles (DLCs) shall be upgraded or replaced, and the existing OCC Network Management System (NMS) of Phase-1A & 1B shall also be replaced by common NMS (1+1) as specified in these Particular Specifications.	Since the existing DLCs and NMS are proprietary systems and may not be compatible with the proposed open-standard SIP-based architecture, please clarify whether complete replacement with new SIP-compatible DLCs and common NMS (1+1) shall be permitted?	Clause is self explanatory.
211	Chapter-9: PS Telephone System	5.1.1.4	Page 17 of 55	Table 5-2 IP-PBX Telephone System Requirement	Please clarify whether the IP-PBX Telephone System requirement specified in Table 5-2 is applicable to both existing Phase-1A & Phase-1B systems in addition to Phase-1C & Phase-1D , or only to the new Phase-1C & Phase-1D Telephone Systems? then provide details of 1A & 1B?	Clause is self explanatory.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
212	Chapter-9: PS Telephone System	5.2.5.3	Page 34 of 55	The Help point should have built-in camera. Upon initiation of a Help Point call, the call shall land on the designated Video Phone. The designated controller at the Station/OCC shall be able to communicate with and view the image of the person seeking assistance. The video communication shall be one-way from the Help Point to the Video Phone.	To achieve this functionality, the Help Point & Video Phone should be part of one location as OCC and any other one location. As this functionality can be achieved in Centralized architecture where the IP PBX system does not have at station level, so request you to amend the clause or allow us to have Video Phones & all Help Point Phones to be registered at OCC	No change in Bid conditions.
213	Chapter-9: PS Telephone System	5.2.5.8	Page 34 of 55	In the event, if Station Controller (SC) fail to respond within 30sec, the call shall be forwarded to DLT set (Video Phone) of the Chief Controller (CC) in OCC. If the CC also fails to respond within 30 sec., the call shall further be forwarded to DLT set (Video Phone) of Security Controller at OCC.		No change in Bid conditions.
214	Chapter-9: PS Telephone System	6.3.3	Page 36 of 55	The IP-PBX shall support SIP interfaces and PRI (E1) digital interfaces conforming to ITU-T Recommendations G.703 and G.704 for interconnection with the existing Telephone Systems of Phase-1A & 1B, PSTN and other interfacing systems.	The IP-PBX shall support SIP/IP interfaces instead of being limited to only SIP interfaces, in order to achieve the overall functionality, interoperability and performance requirements of the IP-PBX system and ensure seamless integration with IP-based users, trunks and other network elements in compliance with applicable IETF and ITU-T standards.	Bidder to refer Addendum-2
215	Chapter-9: PS Telephone System	6.6.5 T	Page 42 of 55	The IP-PBX shall support Analog Telephone Instruments, SIP-based IP Phones and SIP-based Video Phones, as specified in this Particular Specification	Please amend the clause as follows: "The IP-PBX shall support Analog Telephone Instruments, SIP/IP-based IP Phones, and SIP/IP-based Video Phones, as specified in this Particular Specification."	Bidder to refer Addendum-2
216	Notice Inviting Bid (NIB)	1.1.2	Pg No. 4 of 22	Bid Security (Refundable): Amount of Bid Security: INR 1.08 Crores (In favour of Jaipur Metro Rail Corporation Limited, payable at Jaipur , Rajasthan) Validity of Bid Security in case of BG/FDR/TDR: 27.06.2027 Bid Security (in original) as per clause C18 of ITB and RTPPR Rule 42 and its latest amendments, if any Shall be accepted only upto 02.11.2026 (latest by 15:00 hrs) in the office of the OSD(O&S), Jaipur Metro Rail Corporation Limited at the Address mentioned herein after. In case of RTGS/NEFT/IMPS/deposit transactions, bidders shall upload the scanned copies of transaction of payment of Bid security including e- receipt (clearly indicating UTR No. and Bid reference i.e. CONTRACT NCB No.: JP/JS14(1C&1D) must be entered in remarks at the time of online transaction of payment, failing which payment may not be considered) to be uploaded in online bid submission. The detail of bank account of JMRC is mentioned below this table.	Under Rule 170(i) of the General Financial Rules (GFR 2017/2023) and IRDAI guidelines, insurance surety bonds are legally accepted on par with bank guarantees across central government departments, PSUs, and the Government e-Marketplace (GeM) along with other options mentioned in NIB. Further same is followed in JMRC recently published NIB No: JMRC/O&S/S&T/NIB/2025-26/15 dated 10.03.2026 so our humble request is to adopt this option to SI for JP/JS14 (1C&1D) tender along with options already metioned.	Bidder to refer Addendum-2
217	Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.1 (SOW)	Page No. 5 of 98	JMRTS has presently a TETRA based system operating in the 380 – 400 MHz frequency band having central control equipment/ MSO(of Cassidian make) installed & commissioned in the TER of OCC, Mansarovar Depot. Presently five (05) numbers of TETRA base stations are installed at selected locations viz. Mansarovar Depot, Vivek Vihar, Ram Nagar, Sindhi Camp & Chandpole (U/G) stations to relay communications between all radios in the Radio system. The radio network of Phase-1B stations i.e. Choti Chaupar (U/G) & Badi Chaupar (U/G) is extended from existing Base Station of Phase-1A through BDA. Radio system details of exiting Phase-1A & 1B is provided at Annexure/Radio below and details of various Radio sites and Lines/ sections which are covered by this Radio Network is tabulated as under:	Kindly share the drawings of all existing 11x stations Post survey along with Geo Coordinantes.(Prefer IDD & DD)	Bidder is advised to visit the site for survey, with prior permission.
218	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.1 (SOW)	Page No. 5 of 98	JMRTS has presently a TETRA based system operating in the 380 – 400 MHz frequency band having central control equipment/ MSO(of Cassidian make) installed & commissioned in the TER of OCC, Mansarovar Depot. Presently five (05) numbers of TETRA base stations are installed at selected locations viz. Mansarovar Depot, Vivek Vihar, Ram Nagar, Sindhi Camp & Chandpole (U/G) stations to relay communications between all radios in the Radio system. The radio network of Phase-1B stations i.e. Choti Chaupar (U/G) & Badi Chaupar (U/G) is extended from existing Base Station of Phase-1A through BDA. Radio system details of exiting Phase-1A & 1B is provided at Annexure/Radio below and details of various Radio sites and Lines sections which are covered by this Radio Network is tabulated as under:	Kindly provide the details of antenna installation heights of all existing stations post survey.(Required IDD).	Bidder is advised to visit the site for survey, with prior permission.
219	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.1 (SOW)	Page No. 5 of 98	Antenna Installation Heights of existing stations	Kindly specify if there is any restriction on tower height for Radio antenna installation as per Local Governments Norms post survey.	Kindly refer Bidding Documents.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
220	BOQ_1062877	Sr. No. 2	Sheet No. 6 Doc. No. BOQ_Rad	Radio Tower for Out door Radio BTS site with Antenna Structure	BOQ indicates only 1 Radio tower (assumed to be at Transport Nagar), based on coverage study if additional tower is be required at Galta Gate location, then kindly clarify the scope of Radio tower at Galta Gate.	Kindly refer Bidding Documents.
221	PS – Ch.2 Radio & CDRS System-- Scope of Supplies	Clause No. 3.2.1 (SOS)	Page No. 7 of 98	Upgradation/ Replacement of existing Central Infrastructure at OCC and existing BTS at Stations of Phase-1A&1B (including, but not limited to, the radio system specified at table below) and supply of new BTS system at stations of Phase-1C & 1D including testing & commissioning of complete radio system.	As per table in clause 3.2.1 Upgradation/Replacement is required at OCC & Existing stations. Kindly confirm the station name where is OCC is implemented.	Kindly refer Bidding Documents.
222	PS – Ch.2 Radio & CDRS System- Scope of Supplies	Clause No. 3.2.1 (SOS)	Page No. 7 of 98	Existing Handportable count	Kindly specify the count of existing handportable radios.(Share Exsiting approved BOQ)	Kindly refer Bidding Documents.
223	PS – Ch.2 Radio & CDRS System- Scope of Supplies	Clause No. 3.2.1 (SOS)	Page No. 7 of 98	Existing Dispatcher Workstation count	Kindly specify the count of existing Dispatcher Workstation.(Share Exsiting approved BOQ)	Kindly refer Bidding Documents.
224	PS – Ch.2 Radio & CDRS System- Scope of Supplies	Clause No. 3.2.1 (SOS)	Page No. 7 of 98	Existing Train Radio Units (TRCP & TRIU) count	Kindly specify the count of existing Train Radio Units (TRCP & TRIU).(Share Exsiting approved BOQ)	Kindly refer Bidding Documents.
225	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.2 (SOW)	Page 5 of 98	Phase 1C consists of extension of E-W corridor from Badi Chaupar to Transport Nagar of 3.85 Km total with 1 no. Underground Station (Galta Gate) & 01 no. Elevated Station (Transport Nagar); and Phase 1D consists of extension from Mansarovar to Ajmer Road Chauraha of 1.352 km with 01 no. of Elevated Station (Ajmer Road Chauraha). Tentative requirement/locationsof Radio Base stations for these three (03) new stations under Phase-1C & 1D is tabulated below: S.No. Stations under Phase -1C & 1D No. of BTS Sites (nos.) Elevated Underground Elevated Underground 1 (i) Transport Nagar (ii) Ajmer Road Chauraha (i) Galta Gate 01 (Transport Nagar) 01 (Galta Gate) Total 2	Please confirm the bidding baseline of two new BTS sites (Transport Nagar and Galta Gate), with Ajmer Road Chauraha covered from Mansarovar Depot. Please provide pre-bid RF survey access and the available survey/design data. In view of the lump-sum provisions, it is requested that a defined allowance or separate payable schedule be introduced for additional BTS, BDA, RF/passive equipment and tower modifications established by the approved survey beyond the stated bidding baseline; please identify the applicable contractual mechanism.	No change in Bid conditions. Bidder is advised to visit the Site for survey, with prior permission.
226	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.3; 6.1.8–6.1.9; 6.16.1–6.16.2; 6.16.5	Page No. 82; 129; 159–160	The contractor shall supply IP based TETRA accredited system. The system shall have a centralized architecture or a distributed architecture. However, system response time as laid down vide clause No. 6.4.3 of this chapter have to be complied by the contractor's equipment for the ultimate no. of base stations (minimum 64) which can be supported by the central or distributed radio system equipment being supplied. In case a distributed architecture is proposed and provided, the radio contractor shall be fully responsible for arranging at his own cost any extra network equipment (Routers, Switches etc) required to build his architecture, other than Ethernet channels (maximum 2 nos.) provided by the fibre optic contractor from each of the station to OCC for new stations of Phase-1C & 1D.	With reference to the minimum ultimate capacity of 64 BTS sites and the mandatory 25% spare BTS and dispatcher capacity with licences, please confirm the day-one equipped/licensed capacity, the baseline quantities and rounding rule for the 25% allowance, and the bid-stage evidence required for ultimate expansion to 64 sites. Please confirm that licences for the remaining future BTS additions may be procured when those sites are added, subject to 6.16.1.	Clause is self explanatory.
227	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.1; 3.1.1.4; Annexure A/Radio B–F	Page No. 81–82; 171–173	Interfaces of existing BTSs available in Phase-1A & 1B for communication shall be up-graded from E1 to Ethernet (IP based) under this contract.	For the five existing TB3 BTS sites identified in the PS, please provide the current site-wise hardware/software revisions, E1 termination details, IP-upgrade compatibility, licences, port configuration, FOTS drawings and approved as-built topology. Please confirm how the existing spare TB3 is to be treated during IP migration.	Bidder is advised to visit the site for survey, with prior permission.
228	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.3; 3.1.1.5–3.1.1.6; 6.10.1.2	Page No. 82; 142	For Phase-1C & 1D new IP based BTSs equipped with required number of Ethernet links/interfaces shall be supplied under this contract.	Taking account of the maximum two station-to-OCC Ethernet channels and dual-port/redundant BTS connectivity, please confirm the FOTS handoff interface type, speed, committed bandwidth, VLAN/IP scheme, QoS, latency/jitter and route diversity at each new and existing site, together with the demarcation for optics, patch leads, switches and routers.	Clause is self explanatory.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
229	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.1.1.7; Ch.1 3.2(2)	Page No. 82; 17–18	The Contractor should give details in his bid, how he proposes to implement and interface with existing system and Radio equipment's at OCC/stations, to meet the above-mentioned requirements.	Please provide the bid-stage deliverable schedule for the proposed migration and integration with existing OCC/station radio equipment, specifying required architecture drawings, interface compliance matrices, migration methodology and survey records. Please distinguish bid-stage submissions from detailed design submissions after award.	Clause is self explanatory.
230	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.2.1–3.2.2; Annexure A/Radio B–G	Page No. 82–85; 171–174	Upgradation/ Replacement of existing Central Infrastructure at OCC and existing BTS at Stations of Phase-1A&1B (including, but not limited to, the radio system specified at table below) and supply of new BTS system at stations of Phase-1C & 1D including testing & commissioning of complete radio system.	Against the Annexure A baseline (DXT3c, TB3, TCS, DWS, AKDC, RCW, AVLS, CDRS and NMS), please provide a current asset register with site, make/model, revisions, licences, database backups and interfaces. Please identify any equipment specifically mandated for replacement rather than upgrade, and confirm whether AVLS and all existing server/client functionality must be retained or replaced under this contract.	Bidder is advised to visit the Site for survey, with prior permission. Upgradation/Replacement of existing AVLS and its server/client is not part of this Contract.
231	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.2.1; 5.9; Annexure A/Radio B	Page No. 83; 114; 171	Existing may be used and functionality in existing system to be ensured	Annexure A lists 305 existing handheld terminals, 3.2.1 permits reuse, and 5.9 requires necessary hardware/software/licence upgrades. Please confirm the current fleet count, models, revisions, accessories and encryption capabilities, and the acceptance tests for reuse. For units found non-upgradable or unserviceable during the joint survey, please define replacement responsibility, quantity baseline and commercial treatment.	Clause is self explanatory.
232	PS – Ch.2 Radio & CDRS System-- Scope of Works	3.2.1; 6.4.1.6	Page No. 83–84; 132	The Radio contractor may utilize the existing passive equipments infra like Radio Tower, Antenna, Cables, LCX cables, Splitters etc of the existing Radio system during upgradation /replacement work in existing OCC & Stations of Phase-1A&1B. However, to meet the overall functionality and performance of the radio system requirements, the Radio system contractor shall provide any required passive equipment within the cost of this contract.	Please provide the approved as-built and condition/test records for existing towers, antennas, feeders, LCX, splitters, BDAs and RF distribution equipment, with pre-bid survey access. Please identify any items prohibited from reuse and confirm the joint condition-assessment and approval procedure for retained equipment.	Bidder is advised to visit the site for survey, with prior permission.
233	PS – Ch.2 Radio & CDRS System	4.3.1–4.3.2	Page No. 86–87	The Radio system including Radio Management system shall have an overall availability of better than 99.95%.	We note the prescribed reliability-block-diagram methodology, exclusion of degraded/reconfigured modes and inclusion of any single BTS failure. Please confirm the integrated-system availability assessment boundary, treatment of retained equipment and external FOTS/power/interface failures, and the operational demonstration period and acceptance procedure for better than 99.95% availability.	Clause is self explanatory.
234	PS – Ch.2 Radio & CDRS System	4.3.3; Section 7; Ch.11 Appendices A, J, Q	Page No. 87; 161–163; 458–610; 648–652; 663	The Radio system interface to the following systems shall be reliable - (1) Telephone system (2) FOTS System (3) Train-borne PA System (4) Station PA System (5) Train Control and Signalling System (6) Rolling Stock system	Using the PS interface responsibility matrices and existing Appendix J/Q documents as the baseline, please confirm the current approved revisions and Phase-1C/1D changes for Telephone, FOTS, Station/Train PA, ATS/ATC and Rolling Stock interfaces. Please provide the outstanding equipment-specific interface details, endpoint/contact schedule and responsibility for gateways, licences and joint testing.	Interface responsibility lies with the Bidder with other designated system contractors. Further, Bidder is advised to visit the Site for survey, with prior permission.
235	PS – Ch.2 Radio & CDRS System	4.4.1–4.4.2; 4.3.1	Page No. 86–87	The Mean Time to Restore (MTTR) of the Radio system to full normal operation following a failure shall be less than four hours excluding the time of travel.	Please confirm the MTTR measurement start/end events and scope for radio equipment, and whether automatic failover may count as restoration only when all normal specified functions and performance are restored. Please define the separately applicable deadline for repair and re-establishment of redundancy after failover.	Clause is self explanatory.



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236	PS – Ch.2 Radio & CDRS System	4.6; 4.9.2	page No. 87–89	The Radio system supplier shall have previously demonstrated working radio interoperability tests between their radio equipment and the equipment of another radio vendor. The radio system supplier must submit documentation that has demonstrated interoperability. This test certification must be issued by only Accredited Test Houses of TETRA. The Inter-Operability Profile (IOP) certificates have to be submitted for the Switching Infrastructure Equipment. Copy of IOP Certificates issued for compliance to each of the following TETRA summary features for the Switching Infrastructure Equipment, to be necessarily submitted as part of the Bid. i. Core System ii. Short Data Service (minimum SDS-TL). iii. Individual Address Dynamic Group Number Assignment iv. Packet Data v. Air Interface Encryption (minimum Class 3) vi. Authentication. vii. End to End Encryption. In case of non-compliance or non-availability for any of the above important summary features, the Bid shall be considered as Technically non-compliant.	Where an accredited TETRA IOP certificate uses an earlier product/platform name, please confirm whether it may be accepted for the offered model only with an OEM traceability statement, hardware/software equivalence evidence and accredited test-house confirmation covering every feature required by 4.6. Please specify any supplementary certificates or tests required.	Clause is self explanatory.
237	PS – Ch.2 Radio & CDRS System	4.7; Ch.1 11.4.1.1	Page No. 88; 62	The radio system supplier shall submit as part of their proposal, all Application Programming Interface (API) documentation that show the functions that will be used in the interface design between the radio and non-radio system, as in the case of train management system. This is a mandatory requirement and no other document such as flow charts will be permitted as acceptable. During execution of the Contract, JP/JS14(1C&1D) shall also be required to provide the actual API's for future use of JMRC, at no additional price.	Please confirm the required bid-stage API document scope for all proposed radio/non-radio interfaces and the permitted method of submitting proprietary documents. Please confirm the execution deliverables, usage rights, SDK/runtime tools and perpetual licences required for JMRC future use at no additional price, including any third-party interface licence obligations.	Clause is self explanatory.
238	PS – Ch.2 Radio & CDRS System	4.8.1	88	The radio system supplier shall submit as part of their proposal, Type examination certificate from only Accredited Test Houses of TETRA. The Type examination certification should be provided for Central/Switching Equipment, Base Stations, Mobiles and Portables and should indicate the ETSI Standards that have been approved to in the Certificate. Certification form issued by any other Body will not be considered and the OEM shall be treated as technically non-compliant.	Please confirm whether accredited TETRA Type Examination certificates identifying product-family variants are acceptable for the exact offered hardware/software versions, subject to an OEM model/version mapping and evidence covering central/switching equipment, BTS, mobiles and portables and all required ETSI standards. Please specify any required accredited test-house endorsement.	Clause is self explanatory.
239	PS – Ch.2 Radio & CDRS System	4.9.1	88–89	The contractor shall establish that their proposed TETRA system is established and proven. For this the contractor shall, as part of their proposal, submit an Installation & Commissioning Certificate proving that from the same manufacturer of Radio system as being proposed, at least one similar multisite (>=3 Base Stations) TETRA system (along with Central or distributed Infrastructure) has been commissioned for any Rail or Metro Rail Customer anywhere in the World in last 5 years. The commissioned system should have necessary included Remote Base Stations, Central Switch (or distributed architecture) and Dispatchers. The system must have given a trouble free satisfactory service for at least one year after commissioning. The certificate to this effect, shall be issued by a Competent Authority within the Customer's Organisation and submitted by him on his Official Company Stationery. Address for Correspondence, telephone, fax and email contact details must be provided for future communication. Certification from any other Individual/Organisation will not be entertained. In case of failure to do so, the OEM shall not be considered technically compliant.	Please confirm whether a qualifying Rail/Metro reference commissioned under a predecessor OEM brand may be accepted for a successor platform, with documentary evidence of corporate/product continuity and an official customer certificate demonstrating at least three BTS, central/distributed infrastructure, dispatchers, commissioning within the last five years and at least one year satisfactory service. Please issue an amendment if this acceptance is intended.	Clause is self explanatory, No change in Bid conditions.
240	PS – Ch.2 Radio & CDRS System	4.9.2; 4.6; 4.8.1	87–89	The Radio System supplier/OEM shall be a TETRA Accredited manufacturer of TETRA Switching Infrastructure equipment (the base station can be integrated as an OEM partnerships) and shall have Inter-Operability Certificates issued by TETRA Accredited Test House. Copy of current and valid IOP certificate to be submitted. The Certification shall cover all features as listed above in Clause 4.6, as a minimum.	We note that 4.9.2 permits base stations integrated through OEM partnerships. Please confirm the required certificate mapping for such a solution: switching-infrastructure IOP evidence under 4.6, BTS Type Examination evidence under 4.8.1, and interoperability evidence for the offered switch/BTS combination. Please confirm the prime supplier responsibility and whether any additional integrated-solution tests are required.	Clause is self explanatory.
241	PS – Ch.2 Radio & CDRS System	5.1.1; 6.3.1–6.3.2; 6.3.7; 3.3.2	Page No. 90; 131; 85	The Radio system shall be a digital trunked radio system operating in the 380 – 400 MHz frequency band conforming to the TETRA standards as defined by ETSI.	We note that five existing frequency pairs must be reused and their values are presently to be released at design stage. Please provide these frequencies, site-wise assignments, DMO channels and current WPC/SACFA licence/clearance details before bid submission. Please clarify which frequency/resource charges are excluded under 6.3.2 and the cost responsibility for amendments and additional clearances under 3.3.2.	Bidder to refer Addendum-2



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242	PS – Ch.2 Radio & CDRS System	5.2.3–5.2.4; 6.4.1.1–6.4.1.8	91; 132	The Design requirements required to be submitted are given in Chapter 1 and Clause 6 of this Chapter. Contractor shall however submit to the Employer's Representative for review, the coverage calculations and coverage plots (both up-link & down-link) to confirm that the required RF coverage stated above can be achieved using the Contractor's proposed leaky coaxial cable and the antenna locations.	We note the 3 microvolt minimum signal criteria and prescribed 98%/95% coverage conditions in 6.4.1. Please confirm the voltage reference/measurement impedance and equivalent RSSI threshold, and whether the additional margin written as 3 dbm in 6.4.1.4 means 3 dB. Please provide the accepted BER/audio-quality threshold, calibration, sampling and route methodology for uplink/downlink acceptance, including indoor and moving-train tests.	Clause is self explanatory.
243	PS – Ch.2 Radio & CDRS System	5.3.2(2); 6.9; Ch.11 Appendix H	Page No. 92; 141–142; 644–645	2) Radio Access Unit (RAU) - The RAU shall provide all individual and group call, limited call setup and receipt through the use of a multi-function feature phone facility connected directly to the radio Control system through a fixed TETRA radio(minimum 3 W RF Output). The RAU shall also provide a back-up to the RCW (only for voice communications).As an alternative a desktop Fixed Radio with display+ a Goose Neck Desktop Mic with PTT can also be provided connected to the Fixed Radio. The complete RAU shall have display unit for the user, to display the Radio ID of the Calling party, alias of calling party, signal strength, etc.	We note the permitted desktop fixed-radio alternative with display and goose-neck PTT microphone. Please confirm whether it may be used at all scheduled RAU locations, subject to all specified functions and independent RCW backup. Please confirm the measurement point for the minimum 3 W output and the final approved RAU/RCP location schedule, including terminal-station extra RAUs under 6.9.7.	Clause is self explanatory.
244	PS – Ch.2 Radio & CDRS System	5.4.1.6.1	95	DMO voice calls shall be possible both ways between the train-borne mobile and another train-borne mobile, train-borne mobile and hand-portable and between hand-portables located within a radius of 1 Km in above ground areas and practically feasible range in tunnels.	Please define the test terrain, line-of-sight/non-line-of-sight assumptions, antenna heights, equipment configuration and minimum audio/BER quality criterion for the specified 1 km above-ground DMO tests between train radios and handhelds, and the acceptance routes/criteria for practically feasible tunnel DMO range.	Clause is self explanatory.
245	PS – Ch.2 Radio & CDRS System	5.8.1.1–5.8.1.4; 5.8.4; 6.11; Annexure A/Radio B; Ch.11 Appendices J, Q	Page No. 105–106; 114; 149–156; 171; 648–652; 663 onward	After upgradation/replacement work as per Clause 3.2.1 above in Phase-1A & 1B stations / Depot/OCC of JMRC, all existing train radio communication and functionalities shall be available in Phase-1A, 1B including Phase-1C&1D radio system without degradation and affecting revenue operation.	Against the Annexure A baseline of 48 train/mobile radios and existing on-board interface documents in Appendices J/Q, please provide the current cab-wise model/revision register, mechanical mounting drawings, connector pinouts, cable/antenna details, approved configuration and any post-baseline modifications. Please confirm the existing versus new train quantities and the access/approval process for retrofit testing without disruption to revenue service. We note that 5.8.1.3 prohibits changes to existing on-board ATC/ATS and rolling-stock interface/physical arrangements; please provide the controlled baseline needed to comply with this restriction.	Clause is self explanatory. Further, Bidder is advised to visit the Site for survey, with prior permission.
246	PS – Ch.2 Radio & CDRS System	5.9.2.5; 6.2.3	115; 131	Designated Handportable radios shall have the capability of initiating or receiving telephone calls from designated telephones directly without the radio MMI Controller intervention. A minimum total of 30 simultaneous Telephone Interconnect calls shall be possible in the system from 30 Portables.	For the mandatory 30 simultaneous telephone interconnect calls, please provide the designated-portable allocation and Telephone/PABX interconnect capacity/interface. Please confirm the required network-wide test distribution and traffic assumptions against the BTS carrier configuration and the gateway/channel licences to be included in the bid.	Clause is self explanatory.
247	PS – Ch.2 Radio & CDRS System	5.9.2.6; Section 7; Ch.11 Appendix A	Page No. 115; 161–163; 458–610	1) designated handportable radios shall access the PAS to make public address announcement in the station; and 2) the Radio system shall support the selection of the following PA zones by the handportable radio as a minimum: • up platform; • down platform; • concourse; and • all zones.	Please provide the designated-handheld allocation for Radio-to-PAS announcements at existing and new stations, together with the current Radio/PAS protocol, zone-addressing data and any extension-specific changes to the baseline interface responsibilities. Please confirm the required authorisation and joint acceptance tests for up-platform, down-platform, concourse and all-zone selection.	Clause is self explanatory.
248	PS – Ch.2 Radio & CDRS System	5.6.11.1; 6.4.2.1–6.4.2.2	Page No. 98; 133	The Radio system shall support handoff across all the RF coverage zones of base stations in the Radio system such that all calls in progress regardless of the call types and call modes shall be maintained with minimum interruption to an ongoing call, so that the call does not drop at all. (Type 2 Handoff minimum)	We note the Type 2 handoff requirement and maximum 500 ms handover limit under 6.4.2.2. Please provide the acceptance routes, trigger settings, call types, load conditions, sampling and pass/fail methodology, including the tunnel/LCX-to-elevated transition and migration between retained and new BTS equipment.	Clause is self explanatory.
249	PS – Ch.2 Radio & CDRS System	5.6.2.1; 6.4.3.1–6.4.3.6	96; 133	The average channel access time, defined as the elapsed time from the push- to-talk (PTT) operation to the time when the originator receives the transmit prompt tone shall not be greater than 300ms at 5% BER subject to the availability of a voice channel.	Please confirm the sampling, traffic loading, BER conditions and timing instrumentation for the average 300 ms channel-access requirement, and the relationship between transmit-prompt channel access under 5.6.2.1 and communication-link setup under 6.4.3. Please define acceptance for same-site, inter-site, group, OCC and RCP calls and the evidence for ultimate-capacity performance.	Clause is self explanatory.



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250	PS – Ch.2 Radio & CDRS System	5.6.15.2.6; 6.2.3; 6.10.4.5	100; 131; 144	The system shall support Dedicated Data Channels This shall be achieved by dedicating specific traffic channels to only handle data. Each Base Site shall be able to accommodate up to four of these dedicated Packet Data Channels (PDCBs).	Please confirm whether four PDCBs per site must be available/licensed from day one and how many are to be permanently reserved at initial commissioning. Please define the required voice/data traffic assumptions and whether dedicated PDCBs share the minimum BTS traffic channels or require additional carriers, including treatment of the OCC BTS configuration.	Clause is self explanatory.
251	PS – Ch.2 Radio & CDRS System	5.12.7.1–5.12.7.6; Ch.11 Appendix Q	119–120; 663	The Contractor shall interface the radio system with ATS system for initialisation of TID in the radio system.	Please confirm the approved current revision and continued applicability of the Appendix Q Signalling Radio Interface Specification and ATS Radio Interface Test Procedure to the proposed replacement system and Phase-1C/1D extension. Please provide changed endpoint/network details, message dictionaries, track/route databases and responsibility for any ATS modifications/gateways. Please confirm joint testing includes TID initialisation, train tracking and graphical calling under 5.12.7.4.	Clause is self explanatory. Further, Interface responsibility lies with the Contractor for the other designated system contractors.
252	PS – Ch.2 Radio & CDRS System	5.13.1–5.13.5; Ch.2 Part-2 4.4.2, 5.3	120; 165; 167	The radio system shall log all call activities, both incoming and outgoing calls, and all Status/Messages including Free Text Messages for audit trails indicating action, result, timing.	We note at least four weeks call-log retention and export to Excel/Access or similar under 5.13. Please confirm the sizing assumptions (users, call/message volume and archive duration), required backup/restore and archive retrieval, and the metadata linkage between call/message logs and separate CDRS voice recordings. Please state whether retention beyond the prescribed four-week minimum is required.	Clause is self explanatory.
253	PS – Ch.2 Radio & CDRS System	5.7; 3.2.1; Annexure A/Radio B; Ch.11 Appendix H	101; 83; 171; 644–645	JP/JS14(1C&1D) Contractor shall upgrade/replace all existing RCW with all necessary hardware, Software & licenses so that following requirements are continue to meet for the extended section under Phase-1C & 1D as well including Phase-1A & 1B in-line with Clause 3.2.1 above:	Annexure A identifies two RCW servers and six clients. Please reconcile these with the Appendix H controller-position schedule and the bidding-form BOQ, and confirm the final location-wise count of RCW servers/clients, additional RAUs and dispatcher licences, including the mandatory 25% spare dispatcher capacity under 6.16.5.	Clause is self explanatory, Quantity under the BoQ shall prevail.
254	PS – Ch.2 Radio & CDRS System	5.14; 3.2.1; Ch.2 Part-2 5.5	121; 83–84; 167	Upgrade/replace existing NMS, AKDC, RCW, CDRS, DWS and other MMIs with RAID5, covering the extended sections in accordance with 3.2.1.	We note the required upgrade/replacement of NMS, AKDC, RCW, CDRS, DWS and other MMIs with RAID5. Please confirm whether RAID5 applies to each server and client/workstation or may be implemented at redundant shared/server storage, and provide the current storage/database sizes, growth assumptions and backup/restore requirements. Please identify which other MMIs are included.	Clause is self explanatory.
255	PS – Ch.2 Radio & CDRS System	4.9.1–4.9.2; 4.6; 4.8.1; 4.7	87–89	A customer-certified qualifying multisite Rail/Metro TETRA reference from the proposed radio-system manufacturer is required; 4.9.2 permits partnered BTS.	It is requested that 4.9.1 be amended to expressly permit a switching-infrastructure/BTS solution with separately manufactured dispatcher and on-board TRCP/TRIU equipment. The switching-infrastructure OEM shall continue to demonstrate the specified qualifying multisite Rail/Metro TETRA reference with central/distributed infrastructure and dispatchers. Please permit separate qualifying Rail/Metro experience for the offered dispatcher and on-board OEMs, supported by customer certificates and documented interoperability/API evidence for the offered combination, with single-point contractor responsibility and full compliance with 4.6, 4.7 and 4.8.1. Please specify the integrated-solution evidence and tests required.	Clause is self explanatory, No change in Bid conditions.
256	PS – Ch.2 Radio & CDRS System; related Ch.1/11 where cited	5.1.2; 5.6.15.2.2–5.6.15.2.3; 6.16.4	90; 99; 159	Specified alternatives include TEDS software upgrades and broadband services by adding WiMAX/LTE base stations on the proposed infrastructure. Bid substantiation is required by 5.6.15.2.3.	To strengthen the specified future broadband upgrade path, it is requested that the tender expressly require the proposed dispatcher/RCW platform to support a documented migration to 3GPP Mission Critical Services (MCPTT, MCData and MCVideo) over 4G/5G, while retaining the supplied dispatcher platform where technically feasible. Please define the required 3GPP release, services, interfaces, interoperability evidence and migration acceptance criteria. Each bidder should identify retained/replaced central/core/application hardware, additional broadband core/access/IWF components, licences and upgrade costs. Please confirm whether day-one MCX compliance or future upgrade capability is required and issue the corresponding amendment.	Clause is self explanatory, No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
257	PS – Ch.2 Radio & CDRS System	Clause 4.9.1 – Installation Certificate	88	"The contractor shall establish that their proposed TETRA system is established and proven. For this the contractor shall, as part of their proposal, submit an Installation & Commissioning Certificate proving that from the same manufacturer of Radio system as being proposed, at least one similar multisite(>=3 Base Stations) TETRA system (along with Central or distributed Infrastructure) has been commissioned for any Rail or Metro Rail Customer anywhere in the World in last 5 years. The commissioned system should have necessary included Remote Base Stations, Central Switch (or distributed architecture) and Dispatchers. The system must have given a trouble free satisfactory service for at least one year after commissioning. ..."	Kindly clarify whether the TETRA Base Stations/Central Core Infrastructure and Dispatcher/On-board TRCP/TRIU proposed under the tender are necessarily required to be from the same OEM. It is submitted that there are proven Metro Rail deployments in India where the TETRA Base Stations/Central Core Infrastructure, Dispatcher and On-board TRCP/TRIU are from different OEMs and are successfully integrated and operating satisfactorily. Accordingly, it is requested that the requirement of "same manufacturer of Radio system as being proposed" may kindly be removed and the experience credentials of the respective OEMs, having Rail or Metro Rail Customer anywhere in the World in last 5 years, for TETRA BTS Infrastructure and Dispatcher, On-board equipments be accepted separately. This will ensure wider participation by credible bidders having relevant Railways / Metro Railways experience. Kindly confirm & request you to please amend the requirement as suggested in the query.	Clause is self explanatory, No change in Bid conditions.
258	PS – Ch.2 Radio & CDRS System	5.6.15.2.2/2.3 & 6.16.4 Future Broadband Upgradation	Page 83 of 98 23 of 98	The JP/JS14(1C&1D) system shall be up-gradable to support higher data rates as per TETRA2 TEDS service by only software upgrades or upgradable to broadband services by adding broadband base station based on Wimax or LTE technology on the proposed infrastructure. Contractor to detail how this shall be achieved. The system shall also be up-gradable to support higher data rates as per TETRA2 TEDS service by only software upgrades or by broadband services by adding broadband base station based on Wimax or LTE technology on the proposed infrastructure.	The specification requires the proposed TETRA Radio System to be upgradeable/migratable to broadband services based on LTE technology. In order to ensure future migration to mission-critical broadband over 4G/5G without replacement of the Central Core/Application Servers and Dispatcher platform, kindly confirm that the proposed Central Core/Application Servers and Dispatcher/RCW platform shall be compliant/upgradeable to 3GPP Mission Critical Services (MCX), including MCPTT, MCData and MCVideo, through software/licence upgrade and suitable 3GPP-compliant broadband access/network interfaces. This will ensure an open-standard and future-ready migration path from the present TETRA system to 4G/5G Mission Critical Broadband while protecting JMRC's investment in Central Core and Dispatcher infrastructure. Kindly confirm & request you to please include ETSI 3gpp MCX standard compliant Central Control Room dispatcher RCW to support any future upgrade path to LTE 4G/5g.	Clause is self explanatory, No change in Bid conditions.
259	PS Chapter 2 Radio & CDRS System	3. SCOPE OF THE WORKS 3.1.1.1	Page 5 of 98	3.1.1.1 JMRTS has presently a TETRA based system operating in the 380 – 400 MHz frequency band having central control equipment/ MSO(of Cassidian make) installed & commissioned in the TER of OCC, Mansarovar Depot. Presently five (05) numbers of TETRA base stations are installed at selected locations viz. Mansarovar Depot, Vivek Vihar, Ram Nagar, Sindhi Camp & Chandpole (U/G) stations to relay communications between all radios in the Radio system. The radio network of Phase-1B stations i.e. Choti Chaupar (U/G) & Badi Chaupar (U/G) is extended from existing Base Station of Phase- 1A through BDA. Radio system details of exiting Phase-1A & 1B is provided at Annexure/Radio below and details of various Radio sites and Lines/ sections which are covered by this Radio Network is tabulated as under:	1. Kindly specify the existing BTS antenna tower height for the existing outdoor BTS locations so that we can do the coverage analysis as per the tender requirement. 2. Please provide the geo-coordinates of the existing and new outdoor BTS locations. This is also required for coverage analysis.	1. Existing Tower height at BTS location is of 30 meters. 2. Bidder is advised to visit the Site for survey, with prior permission.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
260	PS Chapter 2 Radio & CDRS System	3. SCOPE OF THE WORKS 3.1.1.3 & 6.16 System Expansion 6.16.2	Page 6 of 98 & Page 83 of 98	3.1.1.3 The contractor shall supply IP based TETRA accredited system. The system shall have a centralized architecture or a distributed architecture. However, system response time as laid down vide clause No. 6.4.3 of this chapter have to be complied by the contractor's equipment for the ultimate no. of base stations (minimum 64) which can be supported by the central or distributed radio system equipment being supplied. In case a distributed architecture is proposed and provided, the radio contractor shall be fully responsible for arranging at his own cost any extra network equipment (Routers, Switches etc) required to build his architecture, other than Ethernet channels (maximum 2 nos.) provided by the fibre optic contractor from each of the station to OCC for new stations of Phase-1C & 1D. 6.16.2 Central equipment for OCC shall be modularly expandable without causing the installed hardware (except adding cards/modules/racks) and software to be replaced within the service life of the Radio system. With the ultimate expansion capacity of the Central equipment, the Radio System should be able to support minimum 64 remote Base Station sites in-line with the existing radio central system of Phase-1A. The contractors shall list equipment wise expansion capacity built in the system and possible in future. This list of expansion capacity built in, should include the capacity for additional radios available at every Base station site, capacity for additional dispatchers available at Central Infrastructure, central infrastructure equipment available for supporting remote base station sites, maximum voice logging channels available at the Central	Since JMRTS is currently having a 5 sites TETRA network (for PH - 1A & 1B) and the PH -1C & 1D would require only 2 additional sites with a total of 7 sites for the entire TETRA network, hence a requirement of the proposed system to support minimum 64 sites will not be practical for this small corridor. Therefore, we would like to request to kindly amend the clause to minimum 20 Base Stations, which will be sufficient for the existing as well as the future expansion requirements. This will also make the MSO cost effective for JMRTS. Kindly confirm.	No change in Bid conditions.
261	PS Chapter 2 Radio & CDRS System	5.14 NETWORK MANAGEMENT SYSTEM	Page 45 of 98	JP/JS14(1C&1D) Contractor shall upgrade/replace the existing NMS (Network Management System), AKDC, RCW, CDRS, DWS other MMI's with RAID5 configuration so that following requirements are continue to meet for the extended section under Phase-1C & 1D as well according clause 3.2.1 above.	Items like AKDC & DWS are the proprietary items of the existing Cassidian Radio system configuration & design. Other OEMs will use its own configuration and architectural equipment to meet all the tender specifications and functionalities and may not use the same items & abbreviations. Kindly confirm.	Clause is self explanatory.
262	PS Chapter 2 Radio & CDRS System	3.2 Scope of Supplies 3.2.1 (7)	Page 7 of 98	7 L3 switch for Radio Network Management Upgradation/Replacement with 10 year service life. gradation/Replacement with 15 year service life	Kindly advise the requirement of upgrade / replacement of the existing L3 Switches for Radio Network Management. As per TETRA system design L3 Switch is not applicable. It is also not mentioned in the tender BoM.	Bidder to refer Addendum-2
263	PS Chapter-3 CCTV System	Tender CCTV BOQ NVR Sr No. (8)		General	As per the tender BOQ NVR quantity is 6 nos. but as per the PS clause no.5.4.1 NVR/NAS/SAN shall provide local recording at the station itself and mirrored recording (at adjacent station) for 03 stations. Please do clarify that in the existing station (i.e. adjacent station) do existing NVR has sufficient storage space to cater recording of newly proposed camera. Also please do share the current storage capacity of existing NVR/NAS/ SAN.	Primary/Secondary recordings of new station shall be catered within these 03 stations only.
264	PS Chapter-3 CCTV System	6.2.1.7.1 Varifocal Lenses:	Page 13 of 50	Quad HD Cameras (4 MP or better) and 4K UHD Cameras Zoom Control : Remote (i-CS or equivalent) control	Request for Amendment – Zoom Control The tender specification presently requires the camera to support remote zoom control through i-CS or equivalent control. In this regard, we respectfully submit that manual varifocal zoom provides the required flexibility to adjust the camera's focal length and field of view during installation and commissioning. For fixed surveillance applications where remote lens adjustment is not essential, manual varifocal zoom offers a technically suitable and practical solution while maintaining the required surveillance coverage. Accordingly, to promote technology neutrality and wider OEM participation, we request that the existing specification be suitably amended as follows: Existing Specification: "Zoom Control: Remote (i-CS or equivalent) control." Requested Amendment: "Zoom Control: Manual Varifocal Zoom control." The proposed amendment will provide the required focal length and field-of-view adjustment capability while avoiding dependence on a specific remote lens control technology.	No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
265	PS Chapter-3 CCTV System	6.2.1.12 High Speed, Quad HD IP PTZ Dome Camera, & Corner Lift Camera	Page 22 of 50	Sector blanking: 360° Pan rotation to be divided in 24 individually configurable Privacy Masks/Zones as required by operator.	Request for Amendment – Sector Blanking and Privacy Masks The tender specification presently requires 360° pan rotation to be divided into 24 individually configurable privacy masks/zones as required by the operator. In this regard, we respectfully submit that supporting 20 individually configurable privacy masks/zones provides sufficient flexibility for defining restricted viewing areas across the complete 360° pan range. The number of privacy masks required is application-dependent and may vary based on site layout and surveillance requirements. Reducing the specified quantity from 24 to 20 will not affect the camera's 360° pan coverage or the fundamental privacy protection functionality. Accordingly, to provide flexibility in camera configuration while maintaining the required privacy protection functionality, we request that the existing specification be suitably amended as follows: Existing Specification: "Sector blanking: 360° Pan rotation to be divided in 24 individually configurable Privacy Masks/Zones as required by operator." Requested Amendment: "Sector blanking: 360° Pan rotation to be divided in 20 individually configurable Privacy Masks/Zones as required by operator." The proposed amendment will retain 360° sector blanking and individually configurable privacy protection while allowing technically suitable	No change in Bid conditions.
266	PS Chapter-3 CCTV System	6.2.1.12 High Speed, Quad HD IP PTZ Dome Camera, & Corner Lift Camera	Page 22 of 50	Motorized Varifocal Lens : Fixed 2.4 mm or better	Request for Amendment – Lens Type and Focal Length The tender specification presently requires a motorized varifocal lens with a fixed 2.4 mm focal length or better. In this regard, we respectfully submit that a 2.7–12 mm motorized varifocal lens provides greater flexibility in adjusting the field of view according to the surveillance area and installation requirements. The varifocal range enables suitable coverage adjustment during installation and operation, while maintaining motorized lens control. This provides greater flexibility compared to a fixed focal length requirement. Accordingly, to provide flexibility in lens selection and wider OEM participation, we request that the existing specification be suitably amended as follows: Existing Specification: "Motorized Varifocal Lens: Fixed 2.4 mm or better." Requested Amendment: "Motorized Varifocal Lens: 2.7–12 mm or better." The proposed amendment will provide adjustable focal length and field-of-view capability through a motorized varifocal lens while meeting the surveillance coverage requirements of the application.	No change in Bid conditions.
267	PS Chapter-3 CCTV System	6.2.1.10 (20) Fixed Box (4K UHD or better)	Page 17 of 50	For the Fixed Box Camera (4K UHD), need to confirm whether the requirement is for a camera with a separate housing or a camera with inbuilt housing.	Please confirm the same	Bidder to refer Addendum-2



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
268	PS Chapter-3 CCTV System	Sr. No: 6.2.15.4.1 (iv) 8MP (4K Ultra HD) Colour Camera for Facial Recognition	Page 45 of 50	Minimum Illumination: 0.004 lux (at F1.4) or better	Request for Amendment – Minimum Illumination The tender specification presently requires a minimum illumination of 0.004 lux at F1.4 or better. In this regard, we respectfully submit that minimum illumination specifications are influenced by multiple factors, including sensor size, lens aperture, gain control, image signal processing, shutter settings, and other low-light enhancement technologies. A color sensitivity of 0.08 lux provides adequate image capture for typical surveillance applications, particularly when supported by appropriate image processing and illumination conditions. Therefore, specifying an exact lux value at a particular aperture may unnecessarily restrict technically suitable camera solutions. Accordingly, to promote technology neutrality and wider OEM participation while maintaining adequate low-light surveillance performance, we request that the existing specification be suitably amended as follows: Existing Specification: "Minimum Illumination: 0.004 lux (at F1.4) or better." Requested Amendment: "Minimum Illumination: Color: 0.08 lux." The proposed amendment will allow suitable low-light camera solutions while providing flexibility in sensor, lens, and image-processing technologies used to achieve effective surveillance performance.	Bidder to refer Addendum-2
269	PS Chapter-3 CCTV System	6.2.15.4.1(xxvii.)	Page 46 of 50	Certification: UL, CE, FCC, ROHS, EN and STQC	Request for Amendment – Compliance and Certification The tender specification presently requires the camera to comply with UL, CE, FCC, RoHS, EN, and STQC standards/certifications. In this regard, we respectfully submit that the EN requirement may be removed where the applicable product safety, electromagnetic compatibility, environmental, and regulatory requirements are already addressed through the specified UL, CE, FCC, RoHS, and STQC certifications. Making an additional EN requirement mandatory may unnecessarily restrict technically suitable solutions that comply with recognized international and Indian certification requirements. Accordingly, to promote technology neutrality, wider OEM participation, and avoid duplication of compliance requirements, we request that the existing specification be suitably amended as follows: Existing Specification: "UL, CE, FCC, ROHS, EN and STQC." Requested Amendment: "UL, CE, FCC, ROHS and STQC." The proposed amendment will retain the key safety, regulatory, electromagnetic compatibility, environmental, and Indian certification requirements while removing an additional certification requirement that may unnecessarily limit technically compliant solutions.	Bidder to refer Addendum-2



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
270	PS Chapter-3 CCTV System	6.2.15.4.1(xli) 8MP (4K Ultra HD) Colour Camera for Facial Recognition	Page 47 of 50	Smart Search Technology: Helps to quickly locate a person of interest to improve incident response time and enhance forensic investigations.	Request for Amendment – Smart Search Technology The tender specification presently requires “Smart Search Technology” to quickly locate a person of interest for improving incident response time and enhancing forensic investigations. In this regard, we respectfully submit that Smart Search is primarily a VMS-level functionality rather than a mandatory camera-edge feature. Such functionality typically involves searching and analyzing recorded video using metadata, attributes, object classification, timestamps, appearance characteristics, and other indexed information across one or multiple cameras. Requiring this functionality at the camera edge may unnecessarily restrict the selection of technically suitable cameras, whereas the same functionality can be effectively provided through the centralized VMS platform. Accordingly, to maintain a flexible and open system architecture, we request that the existing specification be suitably amended as follows: Existing Specification: “Smart Search Technology: Helps to quickly locate a person of interest to improve incident response time and enhance forensic investigations.” Requested Amendment: “Smart Search Technology: Shall be supported through the VMS platform and is not mandatory as a camera-edge feature.” The proposed amendment will ensure that Smart Search and forensic investigation capabilities are available through the centralized VMS while	Bidder to refer Addendum-2
271	PS Chapter-3 CCTV System	6.2.15.4.3 Lens for FR Cameras	Page 47 of 50 (7)	Lens mount : C/CS-mount	Request for Amendment – Lens Mount / Integral Lens for Face Recognition The tender specification presently requires the camera to support a C/CS-mount lens for face recognition applications. In this regard, we respectfully submit that an integral lens configuration can provide a suitable and application-optimized optical solution for face recognition. An integral lens is factory-matched with the camera sensor and image processing, ensuring reliable optical performance while simplifying installation and eliminating the need for separate lens selection and mounting. Allowing an integral lens configuration will also provide greater flexibility in camera selection without affecting the required face recognition functionality. Accordingly, to promote technology neutrality and wider OEM participation, we request that the existing specification be suitably amended as follows: Existing Specification: “C/CS-mount.” Requested Amendment: “C/CS-mount or integral lens.” The proposed amendment will allow both C/CS-mount and integral lens configurations for face recognition applications, enabling technically suitable camera solutions while maintaining the required imaging and recognition performance.	Bidder to refer Addendum-2
272	PS Chapter-4 (UPS System)	UPS System 2.2.1	Page 7 of 43	Inverter output isolation transformer Equipment cabinets, racks & cubicles;	Isolation transformer is considered at input of the UPS Systems. Hence, Isolation transformer at output side of UPS Systems is not required. Please remove it from scope.	No change in Bid conditions.
273	PS Chapter-4 (UPS System)	2.2.1	Page 7 of 43	For Upgradation of existing NMS of JMRTS Phase-1B to include UPS & DC Power system alarm & monitoring of Phase-1C&1D or provision of new Remote monitoring equipment and accessories including voltage free contacts for Alarms (it should be able to monitor real time alarms of UPS and DC Power (SMPS) systems with web based graphical user interface & line diagram display. Any alarm in any of the UPS / SMPS / Isolation Transformer / SCVS / Battery system etc. shall pop-up the line diagram of the UPS with audio & visual alarm indications);	Please share the list of existing equipment to be on monitoring.	Kindly refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
274	PS Chapter-4 (UPS System)	3.1.3	Page 9 of 43	Equipment shall be designed and manufactured in modular manner to facilitate the fault diagnosis and replacement of each modular part. Each module shall be capable of being interchanged with other modules of the same type without affecting the rest of modules in place.	We understand that requirement is for modular UPS System. Please confirm.	Clause is self explanatory, No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries																				
275	PS Chapter-4 (UPS System)	4.2.4 (8)	Page 14 of 43	Overload capacity of each UPS better than 150% > 60 seconds 125% > 10 minutes 110 % for 60 minutes	Please correct the clause as under: Overload capacity of each UPS equal to / better than 150% for 60 seconds 125% for 10 minutes 110 % for 60 minutes	Bidder to refer Addendum-2																				
276	PS Chapter-4 (UPS System)	4.3.3	Page 18 of 43	The Contractor shall provide the complete diagnostic software tools for monitoring and configuration in CD/DVD/any other laptop compatible electronic device in uneditable form and the same shall also be installed in Laptop provided for PAS/PIDS system.	Diagnostic software tools are proprietary in nature and being handled by experts. Hence, the same shall be removed from specifications.	No change in Bid conditions.																				
277	PS Chapter-4 (UPS System)	4.5.8 (e)	Page 21 of 43	Battery sizing calculations shall be done as per the recommendations of IEEE-485 (2010) or latest, considering the following factors/margin: i. Design margin of 10%. ii. Temperature correction factor at assume an ambient temperature of 25°C. iii. Ageing de-rating factor of 25% shall be taken into account.	Please share the output power factor is to be considered for battery sizing.	Clause is self explanatory, No change in Bid conditions.																				
278	PS Chapter-4 (UPS System)	4.10.2	Page 26 of 43	f) Rated short-circuit making capacity (Icm): 105 kA at 0.25 power factor (min), g) Rated ultimate short-circuit breaking capacity (Icu): 50 kA (min), m) All MCCBs should have front adjustable electronic/ microprocessor based releases with adjustment in the range of 40 – 100% for nominal overloads and 2 – 10 times of rated current for short circuit faults.	Rated short circuit making & breaking capacity shall be as per requirement, not as per defined capacity in specification. MCCB shall be thermal mechanical type. Please consider.	No change in Bid conditions.																				
279	Chapter-9: PS Telephone System	3.2.2 (h)	Page 10 of 55	SIP-based IP Telephone Instruments (10 lines & 20 lines), as specified in the Particular Specifications	To achieve the complete functionality of an IP-based Telephone System and ensure end-to-end interoperability and compliance with applicable IETF and ITU standards, the Telephone System should be specified as SIP/IP-based end-to-end, rather than limiting the requirement to only SIP-based IP Telephone Instruments. Accordingly, it is requested that the tender specification be amended to require the complete Telephone System, including Call Server/IP-PBX, Gateways, IP Telephones and associated system components, to be based on open SIP/IP standards, ensuring seamless interoperability, scalability, vendor neutrality and compliance with relevant IETF/ITU standards.	Bidder to refer Addendum-2																				
280	Chapter-9: PS Telephone System	3.2.2 (j)	Page 10 of 55	All user licenses required for Analog, Digital, SIP-based IP Telephone Instruments and SIP-based IP Video Telephone Instruments, as specified in the Particular Specifications	As stated above in bidder query,it is requested that the specification be amended from "SIP-based VoIP Phones" to "SIP/IP-based VoIP Phones compliant with applicable IETF and ITU-T standards."	Bidder to refer Addendum-2																				
281	Chapter-9: PS Telephone System	4.2.3	Page 12 of 55	The Telephone system equipment supplied under the contract shall comply with the reliability figures given below: <table><thead><tr><th>Equipment</th><th>MTBF (Hours)</th></tr></thead><tbody><tr><td>Switching module</td><td>> 150,000</td></tr><tr><td>Processor module</td><td>> 200,000</td></tr><tr><td>Memory module</td><td>> 200,000</td></tr><tr><td>Line and trunk interface module</td><td>>100,000</td></tr><tr><td>Multifunction direct line console</td><td>>20,000</td></tr><tr><td>Network management system</td><td>>50,000</td></tr><tr><td>Help Point</td><td>>1,00,000</td></tr><tr><td>Emergency Phone</td><td>>1,00,000</td></tr><tr><td>SIP VOIP Phones</td><td>>1,00,000</td></tr></tbody></table> Table 4-1 MTBF Figures	Equipment	MTBF (Hours)	Switching module	> 150,000	Processor module	> 200,000	Memory module	> 200,000	Line and trunk interface module	>100,000	Multifunction direct line console	>20,000	Network management system	>50,000	Help Point	>1,00,000	Emergency Phone	>1,00,000	SIP VOIP Phones	>1,00,000	To achieve the overall performance, functionality and interoperability requirements of VoIP Phones, the equipment should be specified as SIP/IP-based rather than merely SIP-based. The VoIP Phones should support the relevant SIP/IP protocols and applicable IETF and ITU-T standards to ensure seamless communication, interoperability with the IP-based Telephone System, and compliance with recognized international standards. Accordingly, it is requested that the specification be amended from "SIP-based VoIP Phones" to "SIP/IP-based VoIP Phones compliant with applicable IETF and ITU-T standards."	Bidder to refer Addendum-2
Equipment	MTBF (Hours)																									
Switching module	> 150,000																									
Processor module	> 200,000																									
Memory module	> 200,000																									
Line and trunk interface module	>100,000																									
Multifunction direct line console	>20,000																									
Network management system	>50,000																									
Help Point	>1,00,000																									
Emergency Phone	>1,00,000																									
SIP VOIP Phones	>1,00,000																									
282	Chapter-9: PS Telephone System	5.1.1.1	Page 14 of 55	There are two existing Main Nodes at OCC for the Telephone Systems of Phase-1A and Phase-1B, which are interconnected for call routing between the Phase-1A and Phase-1B stations. As part of the Works under this contract, the Contractor shall upgrade and consolidate the existing OCC Main Nodes into a single IP-based Appliance Call Server in redundant (1+1) configuration together with Gateway Architecture . The upgraded OCC Central Telephone System shall provide a unified platform for the Telephone Systems of Phase-1A, Phase-1B, Phase-1C & 1D, ensuring complete feature transparency, operational continuity, seamless migration and interoperability across all phases. The Contractor shall provide all necessary hardware, software, media gateways, interface modules, E1/PRI/SIP trunk interface modules, licenses and accessories required for successful implementation and integration. The integration proposal shall be included in the Design Documents.	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the system should support E1/PRI/SIP/IP Trunk-based connectivity instead of being limited to E1/PRI/SIP Trunk connectivity. The Telephone System should support relevant IP-based trunking protocols and applicable IETF and ITU-T standards, enabling seamless interconnection with IP networks, legacy E1/PRI networks and SIP-based communication systems. Accordingly, it is requested that the specification be amended from "E1/PRI/SIP Trunk" to "E1/PRI/SIP/IP Trunk", with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																				



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Saught	JMRC's Response on Pre-Bid Queries																														
283	Chapter-9: PS Telephone System	5.1.1.2 (9)	Page 15 of 55	All existing licenses of the OCC Central Telephone System maybe reused and shall remain valid after completion of the upgradation. The Contractor shall also provide and configure all additional user, feature,interface, Digital Subscriber, SIP User, SIP Trunk and application licenses required for successful migration, integration and operation of the upgraded Telephone System.	To achieve the overall functionality, interoperability and performance requirements of the Central Telephone System, the system should support SIP/IP-based users and SIP/IP-based trunks, rather than being limited to only SIP users and SIP trunks. The Central Telephone System should support relevant IP-based communication protocols and comply with applicable IETF and ITU-T standards, ensuring seamless interoperability between IP users, IP-based trunk connections and other standards-compliant telecommunication systems. Accordingly, it is requested that the specification be amended from “SIP User & SIP Trunk” to “SIP/IP User & SIP/IP Trunk”, with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																														
284	Chapter-9: PS Telephone System	5.1.1.4	Page 17 of 55	5.1.1.4 Requirements of IP-PBX Telephone System (Phase-1C & 1D including OCC) are given in Table 5-2 below. <table><tr><th>Item No.</th><th>Description of Item</th><th>Under Ground stations</th><th>Elevated Station each</th><th>Additional Platform</th><th>OCC</th></tr><tr><td>1.</td><td>Equipped Ports</td><td>120</td><td>60</td><td>-</td><td>300</td></tr><tr><td>2.</td><td>Wired Ports including the License therein</td><td>120 user (80 analog +40 SIP IP)</td><td>60 user (30 analog +30 SIP IP)</td><td>-</td><td>512 user with additional 60 digital user license and 20 SIP user</td></tr><tr><td>3.</td><td>E1 Ports</td><td>02 No E1 link</td><td>02 No E1 link</td><td>-</td><td>As Required</td></tr><tr><td>4.</td><td>SIP trunk</td><td>20</td><td>20</td><td>-</td><td>30</td></tr></table>	Item No.	Description of Item	Under Ground stations	Elevated Station each	Additional Platform	OCC	1.	Equipped Ports	120	60	-	300	2.	Wired Ports including the License therein	120 user (80 analog +40 SIP IP)	60 user (30 analog +30 SIP IP)	-	512 user with additional 60 digital user license and 20 SIP user	3.	E1 Ports	02 No E1 link	02 No E1 link	-	As Required	4.	SIP trunk	20	20	-	30	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the following changes are necessary to ensure compatibility with applicable IETF and ITU-T standards and to provide a fully integrated IP-based communication solution: 2. Wired Ports including the License therein The user capacity and associated licenses should be specified as follows: Underground Stations: 120 users 80 Analog users 40 SIP/IP users Elevated Stations: 60 users 30 Analog users 30 SIP/IP users OCC: 512 users, with an additional 60 Digital User Licenses and 20 SIP/IP User Licenses The inclusion of SIP/IP users is required to ensure support for IP-based endpoints and interoperability with the IP-based Telephone System. 4. Trunk Connectivity The requirement should not be restricted to SIP Trunk only. It should be specified as SIP/IP Trunk to support IP-based trunk connectivity and interoperability with IP networks	Bidder to refer Addendum-2
Item No.	Description of Item	Under Ground stations	Elevated Station each	Additional Platform	OCC																															
1.	Equipped Ports	120	60	-	300																															
2.	Wired Ports including the License therein	120 user (80 analog +40 SIP IP)	60 user (30 analog +30 SIP IP)	-	512 user with additional 60 digital user license and 20 SIP user																															
3.	E1 Ports	02 No E1 link	02 No E1 link	-	As Required																															
4.	SIP trunk	20	20	-	30																															

S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries				
285	Chapter-9: PS Telephone System	5.1.1.4	Page 18 of 55		To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the following changes are necessary to ensure compatibility with applicable IETF and ITU-T standards:	Bidder to refer Addendum-2				
				6.	SIP Based Direct line Telephone (20 Lines)		01	01	0	3
				7.	SIP Based Direct line Telephone (10 Lines)		16	12	1	0
				8.	SIP Video Phone		01	01	0	02
286	Chapter-9: PS Telephone System	5.1.1.11.1	Page 24 of 55	The IP-PBX switch shall be equipped with modules to support a minimum the following interfaces: (1) Digital trunks at E1 level; (2) SIP trunk	Instead of “SIP Trunk”, the specification should be amended to “SIP/IP Trunk” to ensure IP-based trunk connectivity, interoperability with the IP-based Telephone System, and compliance with applicable IETF and ITU-T standards.	Bidder to refer Addendum-2				
287	Chapter-9: PS Telephone System	5.1.1.13.2 (4)	Page 26 of 55	A minimum of 4 programmable function keys for assignment of features or additional extension circuits and a minimum of 20/10 memories/phone book for speed dialing for 20/10 lines SIP IP Phone respectively.	To achieve the required functionality, interoperability and performance of Direct Line Telephones, the IP Phones should be SIP/IP-based and compliant with applicable IETF and ITU-T standards, ensuring seamless integration with the IP-based Telephone System and reliable IP-based communication.	Bidder to refer Addendum-2				
288	Chapter-9: PS Telephone System	5.2.3.2	Page 31 of 55	The offered IP Phones shall be a standard SIP endpoint based on open IETF SIP standards and shall be interoperable with any third-party SIP-compliant IPPBX. It shall not be a proprietary extensions or OEM-locked phone	To achieve the required functionality, interoperability and performance of Direct Line Telephones, the IP Phones should be SIP/IP-based and compliant with applicable IETF and ITU-T standards, ensuring seamless integration with the IP-based Telephone System and reliable IP-based communication.	Bidder to refer Addendum-2				
289	Chapter-9: PS Telephone System	5.2.5.3	Page 34 of 55	The Help point should have built-in camera. Upon initiation of a Help Point call, the call shall land on the designated Video Phone. The designated controller at the Station/OCC shall be able to communicate with and view the image of the person seeking assistance. The video communication shall be one-way from the Help Point to the Video Phone.	To achieve this functionality, the Help Point & Video Phone should be part of one location as OCC and any other one location. As this functionality can be achieved in Centralized architecture where the IP PBX system does not have at station level, so request you to amend the clause or allow us to have Video Phones & all Help Point Phones to be registered at OCC	No change in Bid conditions.				
290	Chapter-9: PS Telephone System	5.2.5.8	Page 34 of 55	In the event, if Station Controller (SC) fail to respond within 30sec, the call shall be forwarded to DLT set (Video Phone) of the Chief Controller (CC) in OCC. If the CC also fails to respond within 30 sec., the call shall further be forwarded to DLT set (Video Phone) of Security Controller at OCC.		No change in Bid conditions.				
291	Chapter-9: PS Telephone System	6.3.3	Page 36 of 55	The IP-PBX shall support SIP interfaces and PRI (E1) digital interfaces conforming to ITU-T Recommendations G.703 and G.704 for interconnection with the existing Telephone Systems of Phase-1A & 1B, PSTN and other interfacing systems.	The IP-PBX shall support SIP/IP interfaces instead of being limited to only SIP interfaces, in order to achieve the overall functionality, interoperability and performance requirements of the IP-PBX system and ensure seamless integration with IP-based users, trunks and other network elements in compliance with applicable IETF and ITU-T standards.	Bidder to refer Addendum-2				



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
292	Chapter-9: PS Telephone System	6.6.5 T	Page 42 of 55	The IP-PBX shall support Analog Telephone Instruments, SIP-based IP Phones and SIP-based Video Phones, as specified in this Particular Specification	Please amend the clause as follows: "The IP-PBX shall support Analog Telephone Instruments, SIP/IP-based IP Phones, and SIP/IP-based Video Phones, as specified in this Particular Specification."	Bidder to refer Addendum-2
293	PS Chapter-7: Clock System	1.2.2	Page 3 of 10	The Master Clock system already commissioned at OCC shall provide synchronization signal to all sub master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, Telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations. JP/JS14 (1C & 1D) contractor shall configure master clock at OCC and integrate sub-master clocks to the master clock at OCC for provision of synchronization to sub-master clocks and to any new systems at OCC. JP/JS14 (1C&D)MCLK Contractor shall provide any item necessary for integrating with pre-installed Master clock system at OCC.	We understand that the Master Clock system at the OCC has already been installed and has been operational for a considerable period. Kindly clarify whether any OEM support, modification, upgrade, replacement, or integration-related requirement associated with the pre-installed Master Clock system shall be carried out without any additional cost to the Employer, or whether such costs shall be considered separately.	Clause is self explanatory.
294	PS Chapter-7: Clock System	3.3.1	Page 4 of 10	The Master Clock system already installed at OCC shall provide synchronization signal to all sub-master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations.	Clause 3.3.1 states that the existing Master Clock at OCC shall provide synchronization and Date/Time to the new systems at OCC/stations, whereas Clause 5.2 (4) states that the Sub-Master Clock shall provide timing signals to these systems.	Clause is self explanatory.
295	PS Chapter-7: Clock System	5.2	Page 6 of 10	(4) Sub-master clock shall supply timing signals to the voice and video recording equipment, the train control & signalling system, PIDS, PAS, Radio, Telephone system, CCTV System, power supply, computer,(SCADA), other SCADA systems, the AFC central computer and other necessary equipment.	Kindly clarify whether the new systems at stations shall be synchronized directly from the existing Master Clock at OCC or through the respective Sub-Master Clock.	Clause is self explanatory.
296	PS Chapter-7: Clock System	5.3	Page 6 of 10	Alarm and status monitoring of the Master Clock system shall be connected to the NMS of PAS/PIDS in OCC.	Clause 5.3 states that the alarm and status monitoring of the Master Clock system shall be connected to the NMS of PAS/PIDS at OCC. Kindly clarify whether this requirement includes integration and monitoring of both the existing Master Clock system and the new Master Clock system on the same NMS workstation at OCC. The MCLK Contractor shall be responsible for integrating the new Master Clock system with the existing NMS at OCC. Please clarify.	Clause is self explanatory.
297	PS Chapter-7: Clock System	5.5	Page 6 of 10	The Sub-Master Clock system shall provide appropriate clock output interfaces for master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare Collection, Train Control and Signalling etc.). Suitable interfaces (such as RS422 or RS232 or LAN connections) for clock output interfaces shall be supported.	Clause 5.5 seems typo error. The clause must be: The Master Clock system shall provide appropriate clock output interfaces for Sub-master clock and timing and reference distribution. The type and quantities of the clock output interfaces shall be determined by the interfaces requirements of the subsystems (PAS, PIDS, Radio, CCTV, CDRS, Telephone System etc) and relevant interfacing project contractors (Traction, Fare Collection, Train Control and Signalling etc.). Suitable interfaces (such as RS422 or RS232 or LAN connections) for clock output interfaces shall be supported.	Clause is self explanatory, No change in Bid conditions.
298	PS Chapter-7: Clock System	6.3.1.8 (2)	Page 8 of 10	(2) One single faced, outdoor type, digital clock each at head end of each platform suitably positioned for the use of the train driver. Where ever CCTV monitors or Driver Mirror for monitoring of train doors are installed, these clocks shall be aesthetically co-located with the CCTV monitors/Mirror. These clocks shall be visible from the driver's cab in emergency lighting conditions and in bright sun light. The character height of the display shall not be less than 170 mm.	The clause specifies provision of one outdoor digital clock at the head end of each platform. We request to consider provision of an additional outdoor digital clock at the tail end of each platform as well, to ensure clear visibility of the time reference to the train crew & passengers irrespective of the train berthing position and to facilitate operational activities during train arrival, departure and emergency conditions.	No change in Bid conditions.
299	PS Chapter-7: Clock System	6.3.1.8 (3)	Page 8 of 10	(3) One 60 centimetre diameter double faced suspended analogue clock at each entrance gate to the passenger areas to be visible in all lighting conditions;	Clause 5.2(3) specifies provision of double-faced suspended analogue clocks at each entrance gate to the passenger areas (1 No. per station). However, no clock provision is specified for the concourse level and station platforms (middle). Kindly clarify and consider provision of suitably located clocks at the concourse and middle platform levels to ensure convenient visibility of the time to passengers and station staff throughout the paid/unpaid areas.	No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Saught	JMRC's Response on Pre-Bid Queries																				
300	COF (Contract Forms)	Appendix-2	Page No. 44	Price Adjustment: Not Used	We request to provide a suitable price adjustment/escalation mechanism for materials, cables, labour, fuel, and other major inputs, considering the current market volatility and continuous upward fluctuations in prices. Further, for cable-related items, the price adjustment may be linked to the applicable IEEMA Price Variation Clause (PVC) indices.	No change in Bid conditions.																				
301	BoQ_1062877	BoQ1			Kindly clarify how many currencies the bidder is permitted to quote in and specify the applicable bidding currency requirements.	Bidder to refer ITB Clause C16.1.																				
302	Chapter-9: PS Telephone System	3.2.2 (h)	Page 10 of 55	SIP-based IP Telephone Instruments (10 lines & 20 lines), as specified in the Particular Specifications	To achieve the complete functionality of an IP-based Telephone System and ensure end-to-end interoperability and compliance with applicable IETF and ITU standards, the Telephone System should be specified as SIP/IP-based end-to-end, rather than limiting the requirement to only SIP-based IP Telephone Instruments. Accordingly, it is requested that the tender specification be amended to require the complete Telephone System, including Call Server/IP-PBX, Gateways, IP Telephones and associated system components, to be based on open SIP/IP standards, ensuring seamless interoperability, scalability, vendor neutrality and compliance with relevant IETF/ITU standards.	Bidder to refer Addendum-2																				
303	Chapter-9: PS Telephone System	3.2.2 (j)	Page 10 of 55	All user licenses required for Analog, Digital, SIP-based IP Telephone Instruments and SIP-based IP Video Telephone Instruments, as specified in the Particular Specifications	To achieve the complete functionality and interoperability of IP Video Telephone Instruments, the instruments should be specified as SIP/IP-based rather than only SIP-based. The IP Video Telephone Instruments should support relevant SIP/IP protocols and applicable IETF and ITU-T standards to ensure reliable voice and video communication, interoperability with the IP-based Telephone System, and seamless integration with other standards-compliant network elements. Accordingly, it is requested that the specification be amended from “SIP-based IP Video Telephone Instruments” to “SIP/IP-based IP Video Telephone Instruments compliant with applicable IETF and ITU-T standards.”	Bidder to refer Addendum-2																				
304	Chapter-9: PS Telephone System	4.2.3	Page 12 of 55	The Telephone system equipment supplied under the contract shall comply with the reliability figures given below: <table><thead><tr><th>Equipment</th><th>MTBF (Hours)</th></tr></thead><tbody><tr><td>Switching module</td><td>> 150,000</td></tr><tr><td>Processor module</td><td>> 200,000</td></tr><tr><td>Memory module</td><td>> 200,000</td></tr><tr><td>Line and trunk interface module</td><td>>100,000</td></tr><tr><td>Multifunction direct line console</td><td>>20,000</td></tr><tr><td>Network management system</td><td>>50,000</td></tr><tr><td>Help Point</td><td>>1,00,000</td></tr><tr><td>Emergency Phone</td><td>>1,00,000</td></tr><tr><td>SIP VOIP Phones</td><td>>1,00,000</td></tr></tbody></table> Table - 4-1 MTBF Figures	Equipment	MTBF (Hours)	Switching module	> 150,000	Processor module	> 200,000	Memory module	> 200,000	Line and trunk interface module	>100,000	Multifunction direct line console	>20,000	Network management system	>50,000	Help Point	>1,00,000	Emergency Phone	>1,00,000	SIP VOIP Phones	>1,00,000	To achieve the overall performance, functionality and interoperability requirements of VoIP Phones, the equipment should be specified as SIP/IP-based rather than merely SIP-based. The VoIP Phones should support the relevant SIP/IP protocols and applicable IETF and ITU-T standards to ensure seamless communication, interoperability with the IP-based Telephone System, and compliance with recognized international standards. Accordingly, it is requested that the specification be amended from “SIP-based VoIP Phones” to “SIP/IP-based VoIP Phones compliant with applicable IETF and ITU-T standards.”	Bidder to refer Addendum-2
Equipment	MTBF (Hours)																									
Switching module	> 150,000																									
Processor module	> 200,000																									
Memory module	> 200,000																									
Line and trunk interface module	>100,000																									
Multifunction direct line console	>20,000																									
Network management system	>50,000																									
Help Point	>1,00,000																									
Emergency Phone	>1,00,000																									
SIP VOIP Phones	>1,00,000																									
305	Chapter-9: PS Telephone System	5.1.1.1	Page 14 of 55	There are two existing Main Nodes at OCC for the Telephone Systems of Phase-1A and Phase-1B, which are interconnected for call routing between the Phase-1A and Phase-1B stations. As part of the Works under this contract, the Contractor shall upgrade and consolidate the existing OCC Main Nodes into a single IP-based Appliance Call Server in redundant (1+1) configuration together with Gateway Architecture . The upgraded OCC Central Telephone System shall provide a unified platform for the Telephone Systems of Phase-1A, Phase-1B, Phase-1C & 1D, ensuring complete feature transparency, operational continuity, seamless migration and interoperability across all phases. The Contractor shall provide all necessary hardware, software, media gateways, interface modules, E1/PRI/SIP trunk interface modules, licenses and accessories required for successful implementation and integration. The integration proposal shall be included in the Design Documents.	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the system should support E1/PRI/SIP/IP Trunk-based connectivity instead of being limited to E1/PRI/SIP Trunk connectivity. The Telephone System should support relevant IP-based trunking protocols and applicable IETF and ITU-T standards, enabling seamless interconnection with IP networks, legacy E1/PRI networks and SIP-based communication systems. Accordingly, it is requested that the specification be amended from “E1/PRI/SIP Trunk” to “E1/PRI/SIP/IP Trunk”, with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																				



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Saught	JMRC's Response on Pre-Bid Queries																														
306	Chapter-9: PS Telephone System	5.1.1.2 (9)	Page 15 of 55	All existing licenses of the OCC Central Telephone System maybe reused and shall remain valid after completion of the upgradation. The Contractor shall also provide and configure all additional user, feature, interface, Digital Subscriber, SIP User, SIP Trunk and application licenses required for successful migration, integration and operation of the upgraded Telephone System.	To achieve the overall functionality, interoperability and performance requirements of the Central Telephone System, the system should support SIP/IP-based users and SIP/IP-based trunks, rather than being limited to only SIP users and SIP trunks. The Central Telephone System should support relevant IP-based communication protocols and comply with applicable IETF and ITU-T standards, ensuring seamless interoperability between IP users, IP-based trunk connections and other standards-compliant telecommunication systems. Accordingly, it is requested that the specification be amended from “SIP User & SIP Trunk” to “SIP/IP User & SIP/IP Trunk”, with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																														
307	Chapter-9: PS Telephone System	5.1.1.4	Page 17 of 55	5.1.1.4 Requirements of IP-PBX Telephone System (Phase-1C & 1D including OCC) are given in Table 5-2 below. <table><tr><th>Item No.</th><th>Description of Item</th><th>Under Ground stations</th><th>Elevated Station each</th><th>Additional Platform</th><th>OCC</th></tr><tr><td>1.</td><td>Equipped Ports</td><td>120</td><td>60</td><td>-</td><td>300</td></tr><tr><td>2.</td><td>Wired Ports including the License therein</td><td>120 user (80 analog +40 SIP IP)</td><td>60 user (30 analog +30 SIP IP)</td><td>-</td><td>512 user with additional 60 digital user license and 20 SIP user</td></tr><tr><td>3.</td><td>E1 Ports</td><td>02 No E1 link</td><td>02 No E1 link</td><td>-</td><td>As Required</td></tr><tr><td>4.</td><td>SIP trunk</td><td>20</td><td>20</td><td>-</td><td>30</td></tr></table>	Item No.	Description of Item	Under Ground stations	Elevated Station each	Additional Platform	OCC	1.	Equipped Ports	120	60	-	300	2.	Wired Ports including the License therein	120 user (80 analog +40 SIP IP)	60 user (30 analog +30 SIP IP)	-	512 user with additional 60 digital user license and 20 SIP user	3.	E1 Ports	02 No E1 link	02 No E1 link	-	As Required	4.	SIP trunk	20	20	-	30	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the following changes are necessary to ensure compatibility with applicable IETF and ITU-T standards and to provide a fully integrated IP-based communication solution: 2. Wired Ports including the License therein The user capacity and associated licenses should be specied as follows: Underground Stations: 120 users 80 Analog users 40 SIP/IP users Elevated Stations: 60 users 30 Analog users 30 SIP/IP users OCC: 512 users, with an additional 60 Digital User Licenses and 20 SIP/IP User Licenses The inclusion of SIP/IP users is required to ensure support for IP-based endpoints and interoperability with the IP-based Telephone System. 4. Trunk Connectivity The requirement should not be restricted to SIP Trunk only. It should be specified as SIP/IP Trunk to support IP-based trunk connectivity and interoperability with IP networks. Accordingly, it is requested that the specification be amended from “SIP Trunk” to “SIP/IP Trunk”, with compliance to applicable IETF and ITU-T standards.	Bidder to refer Addendum-2
Item No.	Description of Item	Under Ground stations	Elevated Station each	Additional Platform	OCC																															
1.	Equipped Ports	120	60	-	300																															
2.	Wired Ports including the License therein	120 user (80 analog +40 SIP IP)	60 user (30 analog +30 SIP IP)	-	512 user with additional 60 digital user license and 20 SIP user																															
3.	E1 Ports	02 No E1 link	02 No E1 link	-	As Required																															
4.	SIP trunk	20	20	-	30																															

S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries																		
308	Chapter-9: PS Telephone System	5.1.1.4	Page 18 of 55	<table><tr><td>6.</td><td>SIP Based Direct line Telephone (20 Lines)</td><td>01</td><td>01</td><td>0</td><td>3</td></tr><tr><td>7.</td><td>SIP Based Direct line Telephone (10 Lines)</td><td>16</td><td>12</td><td>1</td><td>0</td></tr><tr><td>8.</td><td>SIP Video Phone</td><td>01</td><td>01</td><td>0</td><td>02</td></tr></table>	6.	SIP Based Direct line Telephone (20 Lines)	01	01	0	3	7.	SIP Based Direct line Telephone (10 Lines)	16	12	1	0	8.	SIP Video Phone	01	01	0	02	To achieve the overall functionality, interoperability and performance requirements of the IP-based Telephone System, the following changes are necessary to ensure compatibility with applicable IETF and ITU-T standards: 6. SIP-Based Direct Line Telephone – 20 Lines The specification should be amended to require SIP/IP-Based Direct Line Telephones – 20 Lines, supporting IP-based connectivity and interoperability with the Central Telephone System. 7. SIP-Based Direct Line Telephone – 10 Lines The specification should be amended to require SIP/IP-Based Direct Line Telephones – 10 Lines, supporting IP-based connectivity and interoperability with the Central Telephone System. 8. SIP-Based Video Phone The specification should be amended to require SIP/IP-Based Video Phones, supporting IP-based voice and video communication and interoperability with the IP-based Telephone System. These requirements will ensure that the proposed Telephone System and associated endpoints support open, standards-based IP communication and comply with the applicable IETF and ITU-T standards.	Bidder to refer Addendum-2
6.	SIP Based Direct line Telephone (20 Lines)	01	01	0	3																			
7.	SIP Based Direct line Telephone (10 Lines)	16	12	1	0																			
8.	SIP Video Phone	01	01	0	02																			
309	Chapter-9: PS Telephone System	5.1.1.11.1	Page 24 of 55	The IP-PBX switch shall be equipped with modules to support a minimum the following interfaces: (1) Digital trunks at E1 level; (2) SIP trunk	Instead of “SIP Trunk”, the specification should be amended to “SIP/IP Trunk” to ensure IP-based trunk connectivity, interoperability with the IP-based Telephone System, and compliance with applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																		
310	Chapter-9: PS Telephone System	5.1.1.13.2 (4)	Page 26 of 55	A minimum of 4 programmable function keys for assignment of features or additional extension circuits and a minimum of 20/10 memories/phone book for speed dialing for 20/10 lines SIP IP Phone respectively.	To achieve the required functionality, interoperability and performance of Direct Line Telephones, the IP Phones should be SIP/IP-based and compliant with applicable IETF and ITU-T standards, ensuring seamless integration with the IP-based Telephone System and reliable IP-based communication.	Bidder to refer Addendum-2																		
311	Chapter-9: PS Telephone System	5.2.3.2	Page 31 of 55	The offered IP Phones shall be a standard SIP endpoint based on open IETF SIP standards and shall be interoperable with any third-party SIP-compliant IPPBX. It shall not be a proprietary extensions or OEM-locked phone	To achieve the required functionality, interoperability and performance of Direct Line Telephones, the IP Phones should be SIP/IP-based and compliant with applicable IETF and ITU-T standards, ensuring seamless integration with the IP-based Telephone System and reliable IP-based communication.	Bidder to refer Addendum-2																		
312	Chapter-9: PS Telephone System	5.2.5.3	Page 34 of 55	The Help point should have built-in camera. Upon initiation of a Help Point call, the call shall land on the designated Video Phone. The designated controller at the Station/OCC shall be able to communicate with and view the image of the person seeking assistance. The video communication shall be one-way from the Help Point to the Video Phone.	To achieve this functionality, the Help Point & Video Phone should be part of one location as OCC and any other one location. As this functionality can be achieved in Centralized architecture where the IP PBX system does not have at station level, so request you to amend the clause or allow us to have Video Phones & all Help Point Phones to be registered at OCC	No change in Bid conditions.																		
313	Chapter-9: PS Telephone System	5.2.5.8	Page 34 of 55	In the event, if Station Controller (SC) fail to respond within 30sec, the call shall be forwarded to DLT set (Video Phone) of the Chief Controller (CC) in OCC. If the CC also fails to respond within 30 sec., the call shall further be forwarded to DLT set (Video Phone) of Security Controller at OCC.		No change in Bid conditions.																		
314	Chapter-9: PS Telephone System	6.3.3	Page 36 of 55	The IP-PBX shall support SIP interfaces and PRI (E1) digital interfaces conforming to ITU-T Recommendations G.703 and G.704 for interconnection with the existing Telephone Systems of Phase-1A & 1B, PSTN and other interfacing systems.	The IP-PBX shall support SIP/IP interfaces instead of being limited to only SIP interfaces, in order to achieve the overall functionality, interoperability and performance requirements of the IP-PBX system and ensure seamless integration with IP-based users, trunks and other network elements in compliance with applicable IETF and ITU-T standards.	Bidder to refer Addendum-2																		



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
315	Chapter-9: PS Telephone System	6.6.5 T	Page 42 of 55	The IP-PBX shall support Analog Telephone Instruments, SIP-based IP Phones and SIP-based Video Phones, as specified in this Particular Specification	Please amend the clause as follows: "The IP-PBX shall support Analog Telephone Instruments, SIP/IP-based IP Phones, and SIP/IP-based Video Phones, as specified in this Particular Specification."	Bidder to refer Addendum-2
316	PS Chapter 2	3.1.1 - Radio Base Stations	Page 81	The requirement and locations of radio base stations are tentative.	Please confirm final BTS count/locations, coverage boundaries, minimum signal/quality thresholds, traffic capacity and bid/acceptance criteria.	Bidder to refer Bidding Documents.
317	PS Chapter 2	3.1.1.3 - Ajmer Road Chauraha	Page 82	Additional hardware/software required to extend coverage from the Mansarovar depot BTS is included.	Please provide the existing BTS model/configuration, capacity, licenses, antenna/feeder details, measured coverage and outage constraints, and confirm extension acceptance criteria.	Kindly refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
318	PS Chapter 2	Existing Phase-1A/1B Radio scope table	Page 82-83	Existing hand-portable radios may be reused and infrastructure may be upgraded or replaced.	Please confirm reusable asset quantities, models, firmware, condition and ownership, and define interoperability, performance and functional acceptance tests.	Bidder is advised to visit the site for survey, with prior permission.
319	PS Chapter 3	3.2.1 - Existing CCTV	Page 178	Phase-1B CCTV control, management and common functionality must be upgraded/replaced and extended.	Please provide the CCTV inventory, VMS/NMS/analytics versions, streams, recording architecture, licenses, storage use, health, topology, retention and OEM support status.	Bidder is advised to visit the site for survey, with prior permission.
320	PS Chapter 3	CCTV WAN integration	Page 182	Phase-1C/1D CCTV WAN must integrate with Phase-1B; dark fibre and equipment depend on approved design.	Please confirm allocated fibre pairs/endpoints, existing WAN equipment/capacity, topology, IP plan, bandwidth/latency, redundancy, cybersecurity and responsibility for equipment/licenses at each end.	Bidder is advised to visit the site for survey, with prior permission.
321	PS Chapter 5	Existing PAS integration option	Page 271	The system may integrate with or augment Phase-1B so OCC MMIs serve Phase-1C/1D.	Please confirm the mandated target-state option, existing PAS make/version/licenses/capacity, retained equipment, architecture, MMI quantities and seamless-operation acceptance criteria.	Bidder is advised to visit the site for survey, with prior permission.
322	PS Chapter 6	Existing PIDS integration option	Page 300	The system may integrate with or augment Phase-1B so OCC MMIs serve Phase-1C/1D.	Please confirm the mandated target-state option, existing PIDS make/version/licenses/capacity, retained equipment, architecture, display inventory and seamless-operation acceptance criteria.	Bidder is advised to visit the site for survey, with prior permission.
323	PS Chapter 8	Existing Layer-3/SDH interconnection	Page 35	Existing Phase-1A/1B Layer-3 switches/SDH must be configured, updated and tested without additional cost.	Please provide inventory, software/firmware, configurations, ports/capacity, licenses, OEM support, access process and outage windows, and confirm responsibility if replacement or new licenses are required.	Bidder is advised to visit the site for survey, with prior permission.
324	PS Chapter 9	PS Chapter 9, Page 412 - Telephone migration	Page 412	Existing applications, databases, numbering, routing, profiles and features must remain functional; licenses may be reused.	Please provide existing IP-PBX inventory/licenses, subscribers/trunks, numbering/routing, integrations, features, export capability and support status, and confirm migration, outage, rollback and acceptance criteria.	Bidder is advised to visit the site for survey, with prior permission.
325	PS Chapter 9, Telephone System	Telephone System	Page 412	SIP-based IP Telephone Instruments (10 lines & 20 lines), as specified in the Particular Specifications	Request to kindly amend the requirement as complete Telephone System, including Call Server/IP-PBX, Gateways, IP Telephones and associated system components, to be based on open SIP/IP standards, ensuring seamless interoperability, scalability, vendor neutrality and compliance with relevant IETF/ITU standards for wider OEM participation.	Bidder to refer Addendum-2
326		Ch-2 Cl. 3.2.1 & Table (pp.6-7), Cl. 3.1.1.1, 3.1.1.3; Ch-1 Cl. 3.3.2(2) (p.18)		Cl. 3.2.1: "Upgradation/ Replacement of existing Central Infrastructure at OCC and existing BTS at Stations of Phase-1A&1B ... and supply of new BTS system at stations of Phase-1C & 1D". Table: "Upgradation/Replacement with 15-year service life". Ch-1 Cl. 3.3.2(2): "Enhancement, upgradation, expansion and configuration in Hardware or software ... of the existing JMRC Phase-1B Centralised system".	Please confirm that bidders may either upgrade or completely replace the existing core, base stations, dispatch, NMS and authentication systems with the proposed TETRA OEM's infrastructure (central or distributed, as permitted by Cl. 3.1.1.3), and that retaining the incumbent OEM's equipment is not mandatory. If retention is intended, please list the elements to be retained.	Clause is self explanatory. (PS Chapter-2, Clause 3.2.1)
327		Ch-2 Table 3.2.1 (p.7), Cl. 5.9 (p.38),		Table 3.2.1 (Handportable): "Existing may be used and functionality in existing system to be ensured". Cl. 5.9: "Contractor shall upgrade all existing Handportable with all necessary hardware, Software & licenses".	Please clarify whether handhelds are to be re-programmed only (Table 3.2.1) or upgraded (Cl. 5.9), and confirm that terminals found incompatible will be treated as a variation.	Clause is self explanatory. (PS Chapter-2, Clause 5.9)



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
328		Ch-2 Cl. 5.8.4 (p.38)		Cl. 5.8.4: "After upgradation/replacement work ... all existing train radio communication and functionalities shall be available ... without degradation and affecting revenue operation."	Replacing the live core, five BTS and about 350 terminals, with design consent only at D0+20 weeks, leaves about 22 weeks to PAT. Please confirm the permitted non-traffic windows and maximum radio outage per night and per site;	Work may be executed during Non-revenue hours/ Revenue hours, without affecting the operations services, in phased manner, with due liaisoning with O&M.
329		Ch-2 Cl. 5.8.1.3 (pp.29-30), 6.11 (pp.73-79); Ch-11 App. J (pp.194-198), App. A13, App. Q Annexure-1		Cl. 5.8.1.3: "The Radio supplier shall follow the same design and provide exactly the same cables, connectors, antenna, mounting arrangement, etc so that the Rolling Stock Contractor does not have any new Interface issue ... No change to the existing On-Board System Interface design ... is permitted." App. J: "The various cables, connectors- details ... are given on subsequent pages."	Appendix J shows only typical block diagrams and the TRIU-TRCP cable pin-out; the interfaces to TIMS, ATC (RS-422), PA/AVAS and 110 V DC are not detailed. Please provide the existing TRIU/TRCP/RCH installation drawings and pin-level interface documents (DID), and confirm that replacement units of a different make or form factor are acceptable provided the Rolling Stock and ATC-side interfaces and cabling remain unchanged. Please also confirm the number of cabs to be retrofitted (BOQ: 20 on-board radio upgrades; Annexure A: 48 train/mobile radios)	Bidder is advised to visit the Site for survey please, with prior permission. Bidder to refer Addendum-1 (for Annexure- A)
330					As per the NIB, the cost of the Bid Document is ₹50,000/- (inclusive of GST) In this regard, it is requested to kindly consider BSNL, being a Central Government PSU/Government of India Enterprise, is eligible for exemption from Payment of Bid Document Cost/Fee of ₹50,000/-	No change in Bid conditions.
331					OEM Tie-up Kindly clarify whether the bidder is required to submit OEM authorization for each subsystem/equipment at the bid stage itself, or whether OEM authorization/undertaking can be submitted at the time of supply/implementation.	Bidder to refer Bidding Documents.
332					FOTS/MPLS Interface The specification requires integration of the telecom systems with the MPLS backbone. Kindly clarify the exact scope and responsibility of the FOTS/MPLS contractor vis-à-vis the telecom system contractor, particularly for provision/configuration of MPLS routers, ports, bandwidth and optical interfaces.	Bidder to refer Bidding Documents.
333					Existing JMRC System Integration Since the scope includes upgradation/integration with existing Phase-1A/1B systems, kindly provide the existing system architecture, OEM details, equipment make/model, software versions, available interfaces/API/protocols and configuration details necessary for assessing compatibility and pricing. The specification requires bidders to review existing systems before bidding.	Bidder to refer Bidding documents. Further, Bidder is advised to visit the site for survey, with prior permission.
334					Site Survey Kindly confirm whether a joint site survey will be arranged by JMRC before submission of bids so that bidders can accurately assess existing infrastructure, cable routes, equipment rooms, power availability and interfaces.	Bidder is advised to visit the Site for survey, with prior permission.
335					BSNL as Telecom Service Provider Kindly clarify whether BSNL's existing telecom infrastructure, including optical fibre network, IP/MPLS network, transmission network and telecom O&M infrastructure, may be considered/utilised wherever technically compliant with the tender requirements.	No, Bidder has to provide a dedicated IP-MPLS Network for JMRC, as per bid conditions.
336					MTCTE / ITSAR / TTP Compliance For telecom/network equipment, the specification refers to MTCTE, TTP, ITSAR or equivalent compliances. Kindly clarify the applicability of each certification to individual equipment and whether valid equivalent certifications accepted by DoT/TEC may be submitted.	Bidder to refer Bidding Documents.

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337					STQC Certification – CCTV The specification requires STQC certification/approval for CCTV cameras and VMS. Kindly clarify whether STQC certification is required at bid submission stage for all offered models, or whether it may be submitted before supply/commissioning where certification is under process.	No change in Bid conditions.
338					Scope of Civil Works Various civil provisions such as cable routes, cut-outs, foundations, trays, conduits and equipment mounting are dependent upon inputs from the telecom contractor. Kindly clarify which civil works are included in the telecom contractor's price and which will be executed by the Civil/DDC/other contractor.	Bidder to refer Bidding Documents (Chapter-11, Appendix-A, Interface Responsibilities)
339					Payment for Additional/Enhanced Requirements The specification states that additional items/enhancements required to complete the contract shall be provided without extra cost. Kindly clarify the mechanism for handling requirements arising due to changes in existing systems, site conditions or Employer's requirements after award of contract.	No change in Bid conditions.
340	Industrial Grade Layer-2 Switches for Field	6.2.4.5	No of ports	24x100/1000Mbps Ethernet ports with auto MDI/MDI-X. (These ports should support PoE/PoE++) While all the ports should support PoE & PoE+ functionality, at least one port should support PoE++(60watt) functionality. For PoE++ functionality an external adapter can be provided as an alternative. However, the external adapter should be of the same make (OEM) as the switch.	Most of the Switches OEM's do not have External PoE Power Adaptor. Requesting you to use the same from any 3rd Party OEM	Bidder to refer Addendum-2
341	Industrial Grade Layer-2 Switches for Field	6.2.4.12	Operating Voltage	The switch should have redundant AC power supplies/ solution with operating range of -180 – 240 V AC. Any Power adaptor if required shall be of same OEM make. The contractor shall submit details of the Power adaptor to the Engineer for review and approval.	Most of the Switches OEM's do not have External PoE Power Adaptor. Requesting you to use the same from any 3rd Party OEM	Bidder to refer Addendum-2
342	Industrial Grade Layer-2 Switches for Field	6.2.4.29	PoE support	Switch should be able to supply a minimum PoE power of 390W (total). Each port should be capable of feeding PoE-15.4 W, PoE+-30 W, PoE++ - 60 W as per requirement. However, for PoE++ functionality an external adapter can be provided as an alternative. The external adaptor shall be of the same make (OEM) as the switch.	Most of the Switches OEM's do not have External PoE Power Adaptor. Requesting you to use the same from any 3rd Party OEM	Bidder to refer Addendum-2
343	Industrial Grade Layer-2 Switches for Field	6.2.4.32	Switch Operating System certification	The Switch Operating System should be IPv6 certified/complied and common criteria EAL3/EAL4 and NDcPP or equivalent certified/complied. The contractor shall submit details of the equivalent certification/ compliance to the Engineer for review and approval.	Most of the Industrial Grade Switches OEM's do not have EAL3/EAL4 as these are not Indian Standards. Kindly allow MTCTE (Indian Standard) or IEC 62443-2-1 for fair and wider participation of OEM.	Bidder to refer Addendum-2
344	Industrial Grade Layer-2 Switches for Field	6.2.4.30	Regulatory compliances	Should have regulatory compliance of UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval.	Requesting you to change the specs as below for wider participation. " Should have regulatory compliance of UL/ FCC/CE or equivalent. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval.	No change in Bid conditions.
345	Industrial Grade Layer-2 Switches for Field	6.2.4.35	Switch Management	Switch should be manageable using CLI, console, telnet/SSH/HTTP, FTP, TFTP and secure FTP.	Most of the switches OEM switch have either one or two file transfer protocol i.e FTP, TFTP or Secure FTP as function of these protocols is same. Requesting you to change the as below: " Switch should be manageable using CLI, console, telnet/SSH/HTTP, FTP, TFTP/Secure FTP.	Bidder to refer Addendum-2
346	Industrial Grade Layer-2 Switches for Field:	6.2.4.12	Operating Voltage	The switch should be operated on AC power supply / solution with the operating range of -180 – 240 V AC. Any Power adaptor if required shall be of same OEM make. The contractor shall submit details of the Power adaptor to the Engineer for review and approval.	Most of the industrial Grade switches OEM's have Switches operate on DC power Supply, as these switches installed in Field. Requesting you to change the requirement as below for fair and wider participation of OEM: "The switch should be operated on AC/DC power supply / solution with the operating range of -180 – 240 V AC or 48 VDC. Any Power adaptor if required shall be of same OEM make or from 3rd Party suggested by Switch OEM. The contractor shall submit details of the Power adaptor to the Engineer for review and approval."	Bidder to refer Addendum-2
347	Industrial Grade Layer-2 Switches for Field:	6.2.4.32	Switch Operating System certification	The Switch Operating System should be IPv6 certified/complied and common criteria EAL3, EAL4 and NDcPP or equivalent certified/complied. The contractor shall submit details of the equivalent certification/ compliance to the Engineer for review and approval.	Most of the Industrial Grade Switches OEM's do not have EAL3/EAL4 as these are not Indian Standards. Kindly allow MTCTE (Indian Standard) or IEC 62443-2-1 for fair and wider participation of OEM.	Bidder to refer Addendum-2



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
348	Layer-3 Gigabit Aggregation switch Specifications (OCC)	6.2.5.1.16	Certification and other compliances	1) Should have regulatory compliance of MTCTE, TTP, ITSAR, UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval.	ITSAR is not used in Switching as it is meant for Wireless. Requesting you to remove the same from specs for wider participation of OEM's.	Bidder to refer Addendum-2
349	Layer-3 Gigabit Aggregation switch Specifications (OCC)	6.2.5.1.16	Certification and other compliances	3) The Switch Operating System should be IPv6 certified/complied and common criteria EAL4 and NDcPP or equivalent certified/complied. The contractor shall submit details of the equivalent certification /compliance to the Engineer for review and approval.	Most of the Industrial Grade Switches OEM's doent have EAL3/EAL4 as these are not Indian Satndards. Kindly allow MTCTE (Indian Standard) or IEC 62443-2-1 for fair and wider partciaipation of OEM.	Bidder to refer Addendum-2
350	Layer-3 Gigabit Aggregation switch Specifications (OCC)	6.2.5.1.17	Environment Conditions	iii) Routers shall have high RFI/EMI immunity and shall have IEEE/UL/EN and FCC or equivalent regulatory compliance.	Customer requirement is Switch only. Kindly change the word Router as Swicth	Bidder to refer Addendum-2
351	Layer-3 Gigabit Aggregation switch Specifications (OCC)	6.2.5.1.17	Environment Conditions	iv) Shall be capable to withstand shock and vibrations as per IEC or equivalent standards.	EMI and shock vibrations required for industrial switching only. Kindly remove this Specs.	No change in Bid conditions.
352	Layer-3 Gigabit Aggregation switch Specifications (OCC& BCC / Stations & Depots etc.)	6.2.5.1.6	Forwarding rates (Min.)	122 Mpps wire-speed performance	As per Switch port calculation, Swicthng performance should be 95.24 Mpps. Kindly change the same for wider participation of OEM in this Bid.	No change in Bid conditions.
353	Layer-3 Gigabit Aggregation switch Specifications (OCC& BCC / Stations & Depots etc.)	6.2.5.1.16	Certification and other compliances	1) Should have regulatory compliance of MTCTE, TTP, ITSAR, UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval.	ITSAR is not used in Switching as it is meant for Wireless. Requesting you to remove the same from specs for wider participation of OEM's.	Bidder to refer Addendum-2
354	Layer-3 Gigabit Aggregation switch Specifications (OCC& BCC / Stations & Depots etc.)	6.2.5.1.16	Certification and other compliances	3) The Switch Operating System should be IPv6 certified/complied and common criteria EAL4 and NDcPP or equivalent certified/complied. The contractor shall submit details of the equivalent certification /compliance to the Engineer for review and approval.	Most of the Industrial Grade Switches OEM's doent have EAL3/EAL4 as these are not Indian Satndards. Kindly allow MTCTE (Indian Standard) or IEC 62443-2-1 for fair and wider partciaipation of OEM.	Bidder to refer Addendum-2
355	Layer-3 Gigabit Aggregation switch Specifications (OCC& BCC / Stations & Depots etc.)	6.2.5.1.17	Environment Conditions	iii) Routers shall have high RFI/EMI immunity and shall have IEEE/UL/EN and FCC or equivalent regulatory compliance.	Customer requirement is Switch only. Kindly change the word Router as Swicth	Bidder to refer Addendum-2
356	Layer-3 Gigabit Aggregation switch Specifications (OCC& BCC / Stations & Depots etc.)	6.2.5.1.17	Environment Conditions	iv) Shall be capable to withstand shock and vibrations as per IEC or equivalent standards.	EMI and shock vibrations required for industrial switching only. Kindly remove this Specs.	No change in Bid conditions.



S. No	Chapter / Document Name	Clause No.	Pg. No.	Original Bid Clause	Bidder's Query/Clarification Sought	JMRC's Response on Pre-Bid Queries
357				Bid Document Clause 1.1.3.2. Minimum Eligibility Criteria-Subclause-A Work experience: (ii) The term "Telecommunication System" mentioned above is comprised of at least any two of the following in a single work experience: - (a) FOTS (b) Radio System (TETRA) (c) CCTV System including VMS (d) IP-PBX based Telephone System (e) PIDS-PAS (f) UPS System (Min. 30KVA)	1. FOTS (Fiber Optic Transmission System): Kindly clarify whether experience involving OFC laying, jointing/ splicing, termination, TDM/SDH multiplexer, MAPLE and associated transmission equipment, executed for providing station-to-station /station-to-control connectivity over OFC, shall be considered as FOTS experience, where this works was executed as an integral part of a Railway S&T contract. 2. UPS System – Minimum 30 KVA: (i) Kindly clarify whether experience of installation and ommissioning of an IPS (Integrated Power Supply) system having a capacity of 30 KVA or more shall be considered as fulfilling the tender requirement of "UPS System (Minimum 30 KVA)", as the UPS forms an integral part of the IPS system. (ii) Further, where multiple UPS/IPS systems have been installed under a single contract, kindly clarify whether the aggregate capacity of such UPS/IPS systems being 30 KVA or more shall be considered for fulfilling the above experience requirement.	Clause is self explanatory, No change in Bid conditions.
358	Particular Specification Chapter 3	3.2 - Scope of Supply for Closed Circuit Television System	178	Upgradation/replacement of the existing system provided for Phase-1B, including control, management & other common functionalities, such that the upgraded/replaced system also seamlessly functions for the Phase-1C & 1D in addition to Phase-1B. The existing Servers, NMSs & MMIs provided for Phase-1B shall also be suitably upgraded/replaced to function for the Phase-1C & 1D without any degradation.	Need the details of Existing VMS Infrastructure to check the upgradation possibilities for Software and Server	Bidder is advised to visit the Site for survey, with prior permission.
359	Particular Specification Chapter 3	6.2.1.7 - Varifocal Lenses	187	Quad HD Cameras Focal Length: 9mm – 40mm	Kindly change this clause as Quad HD Cameras Focal Length: 10mm – 45mm (±2 mm) for wider OEM participation. <u>Justification:</u> In metro deployments, cameras with proposed focal length range are widely adopted to achieve the required field of view. Therefore, we request that the specification be suitably relaxed/flexibilized to allow equivalent camera solutions from multiple OEMs, provided that the proposed solution meets the required coverage, image quality, and overall performance requirements.	Please refer Addendum-2
360	Particular Specification Chapter 3	6.2.1.10 Specifications for Fixed Box and Bullet IP Colour Cameras (Quad HD & 4K UHD)	190	Fixed Box (4K UHD or better)	Kindly change this clause as Fixed Box/ Bullet Veri-Focal Cameras with 4K UHD Resolution. <u>Justification:</u> Major STQC-approved OEMs offer Bullet-type IP cameras with an integrated lens within an enclosure and are designed to deliver the required image quality, optical performance, resolution, and environmental protection, and can provide performance comparable to or better than conventional Fixed Box Cameras used with a separate lens. Therefore, we request that the specification be suitably amended to permit Bullet-type IP Cameras, provided they comply with the prescribed requirements for all the mentioned parameters	Bidder to refer Addendum-2





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CONTRACT NCB No. JP/JS14 (1C&1D): Design, Manufacture, Supply, Installation, Testing and Commissioning of Telecommunication System for 3 Stations of JMRTS Phase-1C&1D Project.

ADDENDUM NO. A2 **(SUMMARY SHEET)**

S. No	Original Page No	Tender Document	Clause/Item No	Addendum/Corrigendum	Replaced/Added page No in Addendum A2
1.	4	NIB	1.1.2 Bid Security	Insurance surety bonds included as mode of Bid Security	Replaced with 4R
2.	5	NIB	1.1.2 E-Bidding Processing Fee	Submission mode and address updated for DD/BC for E-Bidding Processing Fee.	Replaced with 5R
3.	20&21	ITB	C18.1.3 (5)	Insurance surety bonds included as mode of Bid Security	Replaced with 20R & 21R
4.	6&7	FOB	Appendix-1(iv)	LD clause added.	Replaced with 6R & 7R
5.	23	FOB	Appendix-15	Type of Work for Financial Data updated	Replaced with 23R
6.	24	FOB	Appendix-16	Type of Work for Financial Data updated	Replaced with 24R
7.	41	FOB	Appendix-27	Link for MEA website corrected	Replaced with 41R
8.	18	PS (Chapter 1-General)	3.3.2(16)	New clause added for Responsibility of Dismantling existing equipment.	Replaced with 18R
9.	7	PS (Chapter 2-Radio with CDRS)	3.2.1 (table S. No 7)	L3 switch service life updated	Replaced with 7R
10.	55	PS (Chapter 2-Radio with CDRS)	6.3.2	Clause regarding Fees associated with DoT modified	Replaced with 55R
11.	89	PS (Chapter 2-Radio with CDRS)	Sub Clause of 3.3 (CDRS)	Clause numbering corrected.	Replaced with 89R
12.	95	PS (Chapter 2-Radio with CDRS)	B of Annexure A / Radio	Network elements in existing Radio system of Phase-1A & 1B updated	Replaced with 95R
13.	13	PS (Chapter 3- CCTV)	6.2.1.7.1(1)& (7)	Focal length & Lens mount modified	Replaced with 13R





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14.	16	PS (Chapter 3- CCTV)	6.2.1.10	Camera Type updated from Fixed Box to Fixed Box/Bullet.	Replaced with 16R
15.	26	PS (Chapter 3- CCTV)	6.2.4 table S. No (5) & (12)	Power Adapter requirement updated	Replaced with 26R
16.	28	PS (Chapter 3- CCTV)	6.2.4 table S. No (29),(32) &(35)	Specifications/Functional Requirements updated for PoE support, Switch Operating System Certification & Switch Management	Replaced with 28R
17.	31	PS (Chapter 3- CCTV)	6.2.5.1 table S.No16-(1)& (3)	Specifications/Functional Requirements updated for Certification and other compliances	Replaced with 31R
18.	32	PS (Chapter 3- CCTV)	6.2.5 table S. No 17-(iii)	Specifications/Functional Requirements updated for Environment Conditions	Replaced with 32R
19.	32&33	PS (Chapter 3- CCTV)	6.2.8.1	Work Station & MMI for Viewing, Monitoring Specifications updated	Replaced with 32R & 33R
20.	35	PS (Chapter 3- CCTV)	6.2.11	KVM Extender specification updated	Replaced with 35R
21.	45	PS (Chapter 3- CCTV)	6.2.15.4.1 table S. No (iv)	Specifications for Minimum Illumination updated	Replaced with 45R
22.	46	PS (Chapter 3- CCTV)	6.2.15.4.1 table S. No (xxvii)	Certification updated	Replaced with 46R
23.	47	PS (Chapter 3- CCTV)	6.2.15.4.1 table S. No (xli) & 6.2.15.4.3 table S. No (7)	Specifications for Smart Search Technology updated and Specifications for Lens mount for FR Cameras updated	Replaced with 47R
24.	14	PS (Chapter 4 -UPS)	4.2.4 table S. No (8)	Requirement of Overload capacity of each UPS updated	Replaced with 14R
25.	22	PS (Chapter 5 -PAS)	6.3.5.1	Clause modified for Microphones	Replaced with 22R
26.	25	PS (Chapter 5 -PAS)	6.3.11.8	loudspeakers and the loudspeaker cables circuit integrity during fire updated.	Replaced with 25R





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27.	35	PS (Chapter 5 -PIDS)	6.3.3.2(1)-(h), (j)	Optimal Viewing angle and Operating Temperature (Ambient) of PIDS updated	Replaced with 35R
28.	36	PS (Chapter 5 -PIDS)	6.3.3.2(5)	The maximum junction temperature of a PIDS updated	Replaced with 36R
29.	37	PS (Chapter 5 -PIDS)	6.3.3.2(21)(c)	media formats pertaining to graphics of PIDS updated	Replaced with 37R
30.	38-39	PS (Chapter 5 -PIDS)	6.3.3.3(1)-(b) (f)(g)(k)	Viewing Angle, Aspect Ratio , Operating Temperature (Ambient) , Refresh Rate, of concourse PIDS updated	Replaced with 38R & 39R
31.	39	PS (Chapter 5 -PIDS)	6.3.3.3(10)	environmental external temperature of PIDS updated	Replaced with 39R
32.	40	PS (Chapter 5 -PIDS)	6.3.3.3(15)-(d)	formats pertaining to graphics of PIDS at Concourse level updated	Replaced with 40R
33.	42	PS (Chapter 5 -PIDS)	6.3.3.3(18)	Clause deleted for repeated specifications	Replaced with 42R & 43R
34.	43	PS (Chapter 5 -PIDS)	6.3.4.6	Indoor PIDS housing IP rating updated	Replaced with 43R
35.	3	PS (Chapter 7 - MCLK)	1.2.1 (1)	Redundant configuration of sub master deleted	Replaced with 3R
36.	14	PS (Chapter 8 - FOTS)	4.5.1IP-MPLS node (Router) for station table (1.4.1)	IP-MPLS station Router Security requirement updated	Replaced with 14R
37.	15	PS (Chapter 8 - FOTS)	4.5.1IP-MPLS node (Router) for station table) (1.6.1, 1.6.4, 1.6.5, 1.6.6,1.6.7)	IP-MPLS station Router Certificates and environment standards updated	Replaced with 15R
38.	19	PS (Chapter 8 - FOTS)	4.5.2(IP-MPLS node/Router (Core) for OCC) (2.6.1, 2.6.4, 2.6.5, 2.6.6,2.6.9	IP-MPLS Core at OCC Router Certificates and environment standards updated	Replaced with 19R





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39.	10	PS (Chapter 8-Telephone)	3.2.2(h),(i),(j)	IP based Telephone system Network requirements updated	Replaced with 10R
40.	12	PS (Chapter 8-Telephone)	4.2.3(table)	Telephone system equipment type updated	Replaced with 12R
41.	14	PS (Chapter 8-Telephone)	5.1.1.2(4)	Clause updated	Replaced with 14R
42.	15	PS (Chapter 8-Telephone)	5.1.1.2(9)	Clause updated	Replaced with 15R
43.	17&18	PS (Chapter 8-Telephone)	5.1.1.4	Requirements of IP-PBX Telephone System table 5-2 updated	Replaced with 17R & 18R
44.	20	PS (Chapter 8-Telephone)	5.1.1.4	Para added regarding Telephone system design requirement.	Replaced with 20R
45.	20	PS (Chapter 8-Telephone)	5.1.1.5,5.1.1.6, 5.1.1.7,5.1.1.8	Clause No corrected	Replaced with 20R
46.	24	PS (Chapter 8-Telephone)	5.1.1.11	line interfaces requirement updated	Replaced with 24R
47.	26	PS (Chapter 8-Telephone)	5.1.1.13.2(4)	VoIP phones requirement updated	Replaced with 26R
48.	31	PS (Chapter 8-Telephone)	5.2.3.1,5.2.3.2	Direct Line Telephones requirement updated	Replaced with 31R
49.	33	PS (Chapter 8-Telephone)	Figure:5.2.4.2	Figure corrected	Replaced with 33R
50.	36	PS (Chapter 8-Telephone)	6.3.3	IP-PBX Switch Specifications requirement updated	Replaced with 36R
51.	42	PS (Chapter 8-Telephone)	6.6.5	Clause Numbering corrected	Replaced with 42R
52.	2	PS Chapter 11 - (Appendices)	Index	Appendix-R added in Index	Replaced with 2R
53.	201	PS Chapter 11 - (Appendices)	4.1.1-(5)(a)	Requirement for effective transient and surge protection specification updated	Replaced with 201R





JAIPUR METRO

JAIPUR METRO RAIL CORPORATION LIMITED

Directorate of Operations & Systems,
4th Floor Admin Building, Mansarovar Depot, Jaipur-302020
CIN: U60221RJ2010SGC030630
Tel: No. 0141-2822101



Website: <http://transport.rajasthan.gov.in/jmrc>; email: dos@jaipurmetrorail.in

S. No	Original Page No	Tender Document	Clause/Item No	Addendum/Corrigendum	Replaced/Added page No in Addendum A2
54.	207	PS Chapter 11 - (Appendices)	Appendix-P(2)	KVM extender Specifications updated	Replaced with 207R
55.	781 – 846 (PDF)	PS Chapter 11 - (Appendices)	Appendix-Q	Legible ATC-PA&PIS INTERFACE SPECIFICATION and Signalling-PIDS/PAS and Master clock Interface Document replaced the illegible documents.	Replaced 781 - 846 (PDF)
56.	New Pages	PS Chapter 11 - (Appendices)	Appendix-R	General Overview of Telecom Systems (CCTV, PIDS /PAS/ Master Clock and UPS) in Existing Phase-1BofJMRC added.	New Pages added in PDF.
57.	Preamble	BOQ	S. No. 3 & 8	S. No. 3 & 8 Deleted, as discount is not applicable.	Preamble page updated in BOQ
58.	Appendix-15	BOQ	Man-day Rates	Option to fill Foreign Currency (FC) for "Rate proposed by the bidder in FC" in Man-day rates updated.	BOQ Updated



(Om Prakash)
OSD (O&S)

1.1.2. Key details:

Estimated cost of work	INR 54.14 Crores (inclusive of GST@18%)
Bid Security (Refundable)	Amount of Bid Security: INR 1.08 Crores (In favour of Jaipur Metro Rail Corporation Limited, payable at Jaipur , Rajasthan) Validity of Bid Security in case of BG/FDR/TDR/<u>Insurance surety bonds</u>: 07.07.2027. Bid Security (in original) as per clause C18 of ITB and RTPPR Rule 42 and its latest amendments, if any Shall be accepted only upto 12.11.2026 (latest by 11:30 hrs) in the office of the OSD(O&S), Jaipur Metro Rail Corporation Limited at the Address mentioned herein after. In case of RTGS/NEFT/IMPS/deposit transactions, bidders shall upload the scanned copies of transaction of payment of Bid security including e- receipt (clearly indicating UTR No. and Bid reference i.e. CONTRACT NCB No.: JP/JS14(1C&1D) must be entered in remarks at the time of online transaction of payment, failing which payment may not be considered) to be uploaded in online bid submission. The detail of bank account of JMRC is mentioned below this table. Note: Bidders to note that the payment of Bid security shall be made from the account of bidder only. However, in case of JV/ Consortium, the Bid security can either be paid from JV/Consortium account or one of the constituent members of JV/Consortium. If Bid security has been made from other than the account mentioned above, same shall not be accepted and all such bids shall be considered ineligible and summarily rejected. For further details, clause C18 of ITB may be referred.
Completion period of the Work	18 (Eighteen) months

Bid documents on sale	From 28.09.2026 (from 10:00 hrs) to 11.11.2026 (up to 11:30 hrs) on e-bidding website https://eproc.rajasthan.gov.in and interested bidders will have to submit their offer in electronic formats both for technical and financial proposal on this website with their digital signatures. The complete bid document can also be seen on Corporation's website transport.rajasthan.gov.in/jmrc and state procurement portal i.e., https://ppp.rajasthan.gov.in. For further information in this regard bidders are advised to contact on +91-141-2822781/ 2822786/2822101
Cost of Bid documents (Non-Refundable) And E-Bidding Processing Fee. (Non-Refundable)	Cost of Bid Document: INR 50,000 /-(inclusive of 18% GST) Non-Refundable as per JMRC Bank details provided below. E-Bidding Processing Fee: INR 2500/- (Demand Draft (DD)/Bankers Cheque (BC) in favour of "Managing Director, RISL" payable at Jaipur) <u>Physical Demand Draft (DD)/Bankers Cheque (BC) to be submitted at "OSD(O&S), Directorate of Operations & Systems, Jaipur Metro Rail Corporation Limited, Room No. 404, 4th Floor, Admin Building, Mansarovar Metro Depot, Mansarovar, Jaipur, Rajasthan - 302020"</u> "For Further details GoR FD Circular No. F.8(10) FD/SPFC/Misc. /2022 Dated 27.01.2023 in this regard." (Payment of bid document cost/ bid fee is to be made only by RTGS, NEFT & IMPS. No other mode of payment will be accepted. The details of bank account of JMRC are mentioned below. The bidders will be required to upload scanned copies of transaction of payment of Bid fee/Bid document cost including e-receipt (clearly indicating UTR No. and Bid reference i.e. Contract NCB No. JP/JS14(1C&1D) must be entered in remarks at the time of online transaction of payment, failing which payment may not be considered) and scanned copies of E-Bid processing fee at the time of online bid submission, failing which bids shall not be considered and rejected). (Copy of GST registration no. to be provided along with Bid document cost/bid fee and E-Bidding processing Fee) by 12.11.2026 upto 11:30 hrs.
Last date of Seeking Clarifications	(Latest by 16:00 hrs on 07.10.2026) Bidders to note that seeking clarification on the Bid shall be done by sending it either on registered official email id of JMRC i.e. jmrc.snt.ph1c1d@jaipurmetrorail.in or on e-Bidding portal only. Seeking clarification by fax or post will not be considered. Queries/clarifications from bidders after due date and time shall not be acknowledged.

bids, all such bids shall be considered ineligible and summarily rejected.

C18.1.2 Deleted.

C18.1.3 BID Security:

- (1) In case of open competitive bidding, two-stage bidding, rate contract, electronic reverse auction, bid security shall be 2% or as specified by the State Government of the estimated value of subject matter of Procurement put to bid. In case of Small-Scale Industries of Rajasthan it shall be 0.5% of the quantity offered for supply and in case of sick industries, other than Small Scale Industries, whose cases are pending with Board of Industrial and Financial Reconstruction; it shall be 1% of the value of bid. Concessional bid security may be taken from registered bidders as specified by the State Government. Everybidder, if not exempted, participating in the procurement process shall be required to furnish the bid security as specified in the notice inviting bids.
- (2) In lieu of bid security, a bid securing declaration in the form provided in annexure 6B of ITB shall be submitted with the sealed bid by the following category of Bidders.
 - (i) Departments/Boards of the State Government or Central Government;
 - (ii) Government Companies as defined in clause (45) of section 2 of the Companies Act, 2013;
 - (iii) Company owned or controlled, directly or indirectly, by the Central Government, or by any State Government or Governments, or partly by the Central Government and partly by one or more State Governments which is subject to audit by the Auditor appointed by the Comptroller and Auditor-General of India under sub-section (5) or (7) of section 139 of the Companies Act, 2013;
 - (iv) Autonomous bodies, Registered Societies, Cooperative Societies which are owned or controlled or managed by the State Government or Central Government; or
- (3) Bid security instrument or cash receipt of bid security or a bid securing declaration shall necessarily accompany the sealed bid.
- (4) Bid security of a bidder lying with the procuring entity in respect of the bids awaiting decision shall not be adjusted towards bid security for the fresh bids. The bid security originally deposited may, however, be taken into consideration in case bids are re-invited.
- (5) The instrument type for payment of bid security for bids having NIB value greater than Rs.10.00 crores can be done by Demand Draft, Banker's Cheque, Fixed Deposit Receipt (FDR), Bank Guarantee, **Insurance Surety Bonds**, RTGS, NEFT & IMPS deposit.
 - a) In case of RTGS/NEFT & IMPS deposit transactions, bidders will be

required to upload the scanned copies of transaction of payment of bid security at the time of online bid submission. No copies of transaction of payment are required to be sent to the office of JMRC. The detail of Bank account of JMRC to facilitate the payment is mentioned at C18.1.4 below.

Note: Bidders to note that the payment of bid security shall be made from the account of bidder only. However, in case of JV/ Consortium, the bid security can either be paid from JV/Consortium account or one of the constituent members of JV/Consortium.

If bid security has been made form other than the account mentioned above, same shall not be accepted and all such bids shall be considered ineligible and summarily rejected.

- b) In case of submission of bid security in one of the following forms, "Original" is to be submitted in the office of JMRC within due date and time of submission as mentioned in clause 1.1.2 of NIB.
- (i) Irrevocable bank guarantee issued by a Scheduled Commercial bank based in India or from a branch in India of a scheduled foreign bank in the form given in **Annexure-6** to Instruction to Bidders (ITB) **or Insurance Surity Bonds as per IRDAI guidelines in favour of "Jaipur Metro Rail Corporation Ltd."**.
 - (ii) Demand Draft/ PayOrder/ BankDraft in favour of **"Jaipur Metro Rail Corporation Ltd."** Payable at Jaipur from a Scheduled Commercial bank based in India,
 - (iii) Fixed Deposit Receipt (FDR) of a Scheduled Commercial bank / Post office based in India duly pledged in favour of **"Jaipur Metro Rail Corporation Ltd."**

The Bid Security shall remain valid up to the date specified under the Clause 1.1.2 (key details) of NIB.

In case of JV/Consortium, the bid security shall be either in the name of JV/Consortium or in the name of any of the constituent substantial members. In case the Bank Guarantee/FDR is submitted in the name of any of the constituent substantial members, then the bidder shall also submit an undertaking as per **Annexure-6A of ITB**. The Bid Security shall remain valid up to the date specified under Clause 1.1.2 (key details) of NIB. The bid security shall be submitted in a sealed envelope clearly marked on top **"Bid Security for Contract NCB No. JP/JS14 (Phase 1C&1D)"**.

C18.1.4 To facilitate payment of Bid Fee and Bid Security through RTGS, NEFT & IMPS deposit, the details of bank account of JMRC is mentioned below:

Name of Bank	Bank's Address	Account Name & No.	Account Type	IFSCcode
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FORM OF BID–APPENDIX-1

[REQUIREMENTS UNDER GENERAL CONDITIONS OF CONTRACT]

S. No.	DESCRIPTION	REF. TO CLAUSE NO.	REQUIREMENT
i	Amount of Performance Security	Clause 4.2 of the GCC	10% of the Contract Price in types and proportions of currencies in which the contract price is payable. In the event of variations during the execution of the contract which result in payments to the Contractor over and above the contract price, the Performance Security shall be adjusted in accordance with clause 4.2 of GCC.
ii	Latest ‘date for commencement’ of the Works	Clause 8.1 of the GCC	Date given in LOA or Employer’s Notice to Proceed
iii	‘Time for completion’ of the work from the date of commencement of the work	Clause 8.2 of the GCC	18 months
iv	Liquidated Damages	Clause 8.5 of the GCC	(i) The maximum limit of Liquidated Damages shall be 10% of the total Contract Value. (ii) Liquidated damages shall be levied as given in Appendix-4 of Contract Forms for not achieving the respective key date. <u>(iii) 0.01% of the fixed lumpsum price per week* of delay for the key dates.</u>
v	Defects Liability Period’ for the whole of the Works	Clause 10 of the GCC	02 (Two) years after the date of issue of Taking-Over Certificate for the Whole of the Works.
vi	Amount of advance payment	Clause 11.2 of the GCC	As per clause 11.2 of GCC.
vii	Amount of Professional Indemnity Insurance (PII)	Clause 15.1 And 15.5 of the	As per SCC clause 29.

		GCC	
viii	Insurance cover for Contractor’s All Risk and other requirements as specified in the GCC	Clause 15 of the GCC	100% of the Total Contract Price.
ix	Amount of Third-Party Insurance	Clause 15.3 of the GCC	The amount of Third-Party Insurance for any one incident or all incidents put together, shall be as under: 10% (ten percent) of the Total contract value.
x	Contract Key Dates	Clause 8.5 of the GCC	Refer Employer’s Requirement
xi	Period in which all insurances have to Be affected	Clause 15.5 Of the GCC	Within 4 weeks from the “date of commencement”
xii	(a) Contractor’s Name and Address	GCC clause18.1	(Bidder to Complete)
	(b) Employer’s Name and Address	GCC clause18.2	Jaipur Metro Rail Corporation Ltd., 4 th Floor, Admin Building, Mansarovar Metro Depot, Mansarovar, Jaipur-302020
Date		Signature of authorized signatory of Bidder	
Place.....			

Note:

*** For the purpose of calculation of a week for LD, a period of 4 or more days will be counted as a full week and period less than 4 days will be counted as half week.**

FORM OF BID–APPENDIX-15
[As per clause E4.2]

FINANCIAL DATA

(WORK DONE DURING THE LATEST LAST FIVE FINANCIAL YEARS)

NAME OF THE BIDDER (CONSTITUENT
MEMBER IN CASE OF JV/CONSORTIUM):

(All amounts in Rupees
in Crores)

S. No.	DESCRIPTION	Financial Data for Last 5 Audited Financial Years				
		Year 2021-22	Year 2022-23	Year 2023-24	Year 2024-25	Year 2025-26
1	2	3	4	5	6	7
	Total value of Telecommunication Work done as per audited financial statements					

NOTE:

1. Separate Performa shall be used for each member in case of JV/Consortium.
2. Attach attested copies of the Audited Financial Statements of the last five financial years as Annexure.
3. All such documents reflect the financial data of the bidder or member in case of JV/Consortium, and not that of sister or parent company.
4. Historic financial statements must be complete, including all notes to the financial statements.
5. Foreign applicants, in whose country calendar year is also the financial year, may submit all relevant data for the last 5 years i.e. 2021, 2022, 2023, 2024 & 2025.
6. The financial data in above prescribed format shall be certified by Chartered Accountant / Company Auditor in original under his signature, stamp & membership number, Firm Registration Number and UDIN.
7. The above financial data will be updated to last day of the month previous to the month of bid submission price level assuming 5% inflation for Indian Rupees every year and 2% for foreign currency portions per year. The exchange rate of foreign currency shall be applicable 28 days before the submission date of bid.
8. The Years mentioned in the table are indicative only. Financial Data (updated as per Note 7 above) for latest last 5 (Five) audited financial years shall be considered for evaluation. In case audited balance sheet of the last financial year is not made available by the bidder, he has to submit an affidavit certifying that ‘the balance sheet has actually not been audited so far’. In such a case the financial data of previous ‘4’ audited financial years will be taken into consideration for evaluation. If audited balance sheet of any year other than the last year is not submitted, the bid will be Considered as non-responsive.

**Signature of authorized signatory on
behalf of Bidder**

FORM OF BID--APPENDIX 16
[As per clause E4.2]

FINANCIAL DATA

(Commitment for On-going **Telecommunication** Works / Works in hand)

Applicant's legal name..... Date.....

JV/Consortium Member's legal name.....Page..... of.....pages
 (All amounts in Rupees in Crores)

Name and brief particulars of contract (Clearly indicate the Part of the work assigned to the applicant (s))	Name of client with telephone number and fax number	Contract Value in Rupees Equivalent (Give only the value of work Assigned to the applicant (s))	Value of balance work yet to be Done in Rupee equivalent as on the last Day of the previous month of bid submission	Date of Completion as per Contract Agreement	Expected Completion Date	Delay if any, with reason	Value of work to be done during next Years with effect from the first day of the month of bid submission
TOTAL							

Signature of authorized signatory on behalf of Bidder

Note:

The above Annexure shall be certified by Chartered Accountant in original under his signature, stamp and membership number, Firm Registration Number and UDIN.

**FORM OF BID-Appendix-27
(Ref : NIB Clause 1.1.3.1 x)**

UNDERTAKING (Land Border Country Registration Requirement)

(To be executed on a non-judicial stamp paper)

Name of Bidder _____ NIB Number _____ I/We have read the Rule 13 of RTPP Rules and Government of Rajasthan Notification No. F.2(1)FD/G&T-SPFC/2017 dated 01.01.2021, 15.01.2021 and 30.03.2021 regarding Provisions for Procurement from a Bidder which shares a land border with India, I/we certify that, bidder M/s _____ (**Name of Bidder**) is

1. not from such a country which is not eligible as per the list published on MEA website (MEA notification no..... dated or the latest at the time of bidding.
or
2. if from such a country has been registered with the Competent Authority i.e. as specified in Rule 13 of RTPP Rules and Government of Rajasthan Notification No. F.2(1)FD/G&T- SPFC/2017 dated 01.01.2021, 15.01.2021 and 30.03.2021. (**Evidence of valid registration by the Competent Authority shall be attached**).
3. belong to the Country appearing on MEA website (<https://www.mea.gov.in/Lines-of-Credit-for-Development-Projects.htm#:~:text=Out%20of%20the%20total%20LOCs,million%20to%20Myanmar%20and%20US%24>)

(<https://www.mea.gov.in/Lines-of-Credit-for-Development-Projects.htm#:~:text=Out%20of%20the%20total%20LOCs,million%20to%20Myanmar%20and%20US%24>)

Name: ***[insert complete name of person signing the bid]***

In the capacity of ***[insert legal capacity of person signing the bid]***

Signed: ***[insert signature of person whose name and capacity are shown above]***

Duly authorized to sign the Bid for and on behalf of ***[insert complete name of the bidder]***

Date: ***[insert date of signing]***

operating system, licenses, databases, configurations, numbering plan, network architecture, FOTS transmission network, interfaces, field connectivity and all integrated systems before submission of the Bid. All requirement regarding interfacing of existing system for upgradation/ replacement work and integration of Phase-1C & 1D shall be included in the bid under the scope of this contract. No additional cost shall be paid to the contractor.

3.3 Scope of Services

3.3.1 The detailed requirements of the services to be provided by the Contractor shall be as given in the GS and PS.

3.3.2 The scope of services to be performed by the Contractor shall include, but not be limited to, the following:

- (1) Design, manufacture, delivery, system assurance, installation, testing and commissioning of the CCTV, Radio, CDRS, PIDS/PAS/MCK, FOTS, Telephone and UPS System, System presentations, reviews and audit support as specified in the Specification
- (2) Enhancement, upgradation, expansion and configuration in Hardware and/or software (licenses etc.) with all accessories of the existing JMRC Phase-1B Centralised system of the CCTV, Radio, CDRS, PIDS/PAS/MCK, FOTS, Telephone and UPS System.
- (3) Project management of the implementation of the System
- (4) Quality and safety management
- (5) Overall site supervision and management
- (6) Decommissioning, removal and disposal of Temporary Works
- (7) Operation and maintenance support services
- (8) Preparation and submission of documentation
- (9) Training for Employer's Training Instructors, operations staff, maintenance staff and engineering staff
- (10) Recommendation and provision of spares, tools and test equipment
- (11) Interface management
- (12) Manpower resources
- (13) Main Earth extension from Earthing strip in TER to Rack or equipment.
- (14) Prototypes, mock-ups, emulation and simulation as required
- (15) Assistance to Engineer.
- (16) **Dismantling of existing equipment required during the upgradation/replacement work and handing over to the Employer after successful commissioning of New/Upgraded System.**



S.No.	Existing Radio System installed in Phase-1A & 1B	Scope of Work in Phase 1C & 1D Radio Subsystem including, but not limited to,
1	Radio Central Infra & NMS at OCC	Upgradation/Replacement with 15 year service life for Radio system central infra except servers/workstation. Service life of servers/workstations shall not be less than 10 years.
2	TB3 Base station at OCC	Upgradation/Replacement with 15 year service life.
3	TB3 Base station at Existing stations	Upgradation/Replacement with 15 year service life.
4	Handportable Radio units	Existing may be used and functionality in existing system to be ensured
5	AKDC (Authentication Key Distribution Compact)	Upgradation/Replacement with 15 year service life. However, Service life of servers/workstations shall not be less than 10 years
6	Dispatcher Workstation	Upgradation/Replacement with 10 year service life.
7	L3 switch for Radio Network Management	Upgradation/Replacement with 10 year service life. ~~Upgradation/Replacement with 15 year service life~~
8	Train Radio Units (TRCP & TRIU)	Upgradation/Replacement with 15 year service life
9	RAU (Radio Access Unit) & RCP (Radio Control Panel)	Upgradation/Replacement with 15 year service life
10	RCW (Radio Control Workstation) Server	Upgradation/Replacement with 10 year service life.
11	RCW (Radio Control Workstation) Client	Upgradation/Replacement with 10 year service life.
12	CDRS(Central Digital Recording System) Server	Upgradation/Replacement with 15 year service life. However, Service life of servers/workstations shall not be less than 10 years
13	CDRS(Central Digital Recording System) Client	Upgradation/Replacement with 15 year service life. However, Service life of servers/workstations shall not be less than 10 years.
14	Antenna Structure for outdoor radio base station with antenna tower	Existing may be used however if Upgradation required in antenna system service life shall be 15 years.

Note: The service life shall be counted from the commencement date of DLP for the items supplied, replaced/upgraded under this contract.

The Radio contractor may utilize the existing passive equipments infra like Radio Tower, Antenna, Cables, LCX cables, Splitters etc of the existing Radio



- 3) Emergency traffic shall be the communications during emergency operations.

6.2.3 Radio system shall as a minimum be equipped with 7 traffic channels and 1 control channel at every BTS. For the BTS serving the OCC, there shall be 4 Base Radios i.e. 4*8 timeslots.

6.2.4 Channels shall be assigned dynamically on demand to meet the system-wide criteria for mobile radio communication.

6.3 Frequency Planning

6.3.1 The system shall operate within the frequency band 380-400 MHz. The minimum channel separation shall be 25 kHz and the duplex frequency separation shall be 10 MHz. The radio system shall be designed for DMO channels as well.

6.3.2 A total of five (05) frequency pairs have been allocated for use by the Metro. The same have to be reutilized by the Contractor for the whole system i.e. Phase-1A, 1B, 1C & 1D. In case more frequencies or amendments of current license are required by the Contractor, than the same have to be liaison by the Contractor at his cost (except the ~~cost of resources i.e. Equipment/~~ **Frequency fees associated with DoT (i.e. SACFA and WPC)**) and without time implications to the Employer. The existing frequencies are in the band 380-400 MHz and shall be provided to the JP/JS14(1C & 1D) Contractor at the start of the Design Phase.

6.3.3 Radio Frequency planning during the Contract execution stage shall be carried out for the entire network, covering both Underground / Elevated and at grade levels.

6.3.4 The Contractor shall perform radio frequency planning ensuring efficient use of the available frequency pairs. The frequency plan including detailed calculations shall be submitted to the Employer's representative for review, as part of the Design stage.

6.3.5 The system design shall have suitable safeguards to ensure that the operation of a radio set from any other system is either debarred, or its operation does not affect the operation of this Radio System of JMRTS in any way.

6.3.6 The Contractor shall enclose detailed calculations as part of the Design stage, to establish that there will be no interference from other radio communication links operating in this area in the same band of frequencies.

6.3.7 The use of radio frequency spectrum in India is regulated by the Wireless Planning and Co-ordination (WPC) Wing of the Ministry of Communications, Government of India. The employer shall be authorised the use of the frequency band 380-400 MHz for mobile train radio communication. However, a separate clearance for the use of specific frequencies is to be obtained. Based on the frequency plan proposed by the Contractor, approval from WPC shall be obtained by the Contractor. The Contractor, if so required by the WPC, shall incorporate specific changes in the frequency plan, after mutual discussions.



3. CDRS has to work in 1 + 1 mode (2 units in parallel) with RAID5 storage in-line with clause 3.2.1 of Part-2 Chapter-2 above.

3.3. Scope of Services

~~3.2.1~~ **3.3.1** The requirements on the scope of services are given in Chapter-1 of this PS.

~~3.2.2~~ **3.3.2** JP/JS14(1C&1D) Contractor to upgrade/replace CDRS at OCC Mansarovar for recording over Corridor of 1C & 1D including Phase-1A & 1B as per solution provided at Clause 3.2.1 above.

~~3.2.3~~ **3.3.3** In addition, the contractor shall interface and co-ordinate with relevant contractors for Telephone System, PAS System and Rolling Stock.

~~3.2.4~~ **3.3.4** The radio system contractor shall submit a detailed design for the implementation of upgraded/replaced CDRS system for required integration of Radio, Telephone, PAS & Clock system for complete Phase-1A, 1B, 1C & 1D.

4. Performance Requirements.

4.1. General

4.1.1. The technical system performance requirements for the CDRS System are specified in this Particular Specification.

4.1.2. Fault tolerant design with protections against failure shall be provided in order to achieve the system availability.

4.2. Reliability

4.2.1. The inability to perform any required function, the occurrence of unexpected action or the degradation of performance below the specifications shall be considered as a failure.

4.2.2. As per the design requirements CDRS has to work in 1 + 1 mode (2 units in parallel). Contractor shall provide MTBF values for the CDRS and submit calculations for the availability of the designed system.

4.3. Maintainability Requirements

4.3.1. The mean Time to Restore (MTTR) of the CDRS system shall be less than four hours (travel time excluding).

4.3.2. The service life of the upgraded/replaced CDRS shall not be less than 15 years. Service life of all type of cables shall not be less than 25 years. The service life shall be counted from the commencement date of Defect liability period.

4.4. SYSTEM SAFETY REQUIREMENTS

4.4.1. The recording of voice communication should be done automatically at OCC so that record of actual recorded information can be analyzed at a later date. Play back of any recorded/stored message from the recording media/ device shall also be possible.

4.4.2. Dual internal storage facility, preferably with RAID5 which shall store all recordings and associated logs automatically for a duration of minimum 4 weeks.



B. Network Composition:

- **Network Elements:**

Elements	Total
DXT3c	1
TB3	5+1 Spare
TCS	2
DWS	1
AKDC	1
RCW	2 Server + 6 Client
AVLS	1 Server + 1 Client
CDRS	2 Server + 1 Client
NMS Workstation	1
Handheld Terminals	305
Train Radios/ Mobile Radios	<u>20</u> 48
<u>Fixed Radios</u>	<u>28</u>

C. RADIO NETWORK TOPOLOGY OF PHASE-1A:



6.2 EQUIPMENT DESIGN

6.2.1 CCTV Cameras

- 6.2.1.1 All CCTV cameras shall be of colour, CMOS, IP based 4K/Quad HD/Full HD type with low light capability to produce clear and detailed picture quality as well as under high lighting contrast condition. CCTV cameras shall have Wide Dynamic Range (WDR) for excellent image quality in different lighting conditions.
- 6.2.1.2 Fixed box type IP colour cameras with varifocal lens shall generally be used in, Concourse, Platforms, ticketing area(s), AFC gates etc. 4K IR illuminated IP camera shall be used for Station Entry, Parking, Platform end track side, SPC, Ramp etc where proper lighting conditions are not available. Bullet Cameras shall generally be used in unpaid Concourse area or area where wide view coverage is required.
- 6.2.1.3 JP/JS14(1C&1D) contractor shall design the distribution of all cameras at each location to comply with the coverage requirements and submit to the Employer's Representative for review. CCTV camera coverage plots shall also be submitted with the detailed design for review.
- 6.2.1.4 Dedicated FR Cameras shall be installed to cover AFC Entry & Exit gates of Stations.
- 6.2.1.5 All the indoor cameras shall be suitable for continuous operation in a non AC environment from 0°C to 50°C and relative humidity up to 80% non-condensing including in the dusty environment of at grade stations.
- 6.2.1.6 Unless specified otherwise elsewhere in the PS, Cameras & other equipment (like field switches), meant for outdoor installations, shall be suitable to work from 0°C to +50° C with RH up to 80% non-condensing.

6.2.1.7 Varifocal Lenses:

- 6.2.1.7.1 Vari-focal Lenses shall be compatible with high resolution fixed box type cameras to provide best resolution/picture quality. Vari-focal lenses shall have the following specifications as minimum:

S.No.	Parameters / Details	Quad HD Cameras (4 MP or better)	4K UHD Cameras
1.	Focal length	9mm—40mm 12mm – 45mm	4.4mm – 8.5mm
2.	Iris range	F1.5 to close	F1.5 to close
3.	Format	1/2.8" or better, Full HD/Quad HD, IR corrected.	1/1.8" or better, 8MP, IR corrected.
4.	Angle view wide	33° x 20° or better	44° to 109° or better
5.	Angle view Tele	6.6° x 3.8° or better	24° to 58° or better
6.	Iris Control	Automatic Control (DC Iris / P-Iris)	
7.	Lens mount	C/CS-mount or integrated lens	
8.	Focus Control	- Auto focus - Remote (i-CS or equivalent) control	
9.	Zoom Control	- Remote (i-CS or equivalent) control	
10.	Operating Temperature	0°C to +50° C	
11.	Storage Temperature	0° C to +60° C	
12.	Operating Humidity with camera and housing	Up to 90% RH, non-condensing	
13.	Approval (Safety & EMC Immunity,	CE or equivalent.	



6.2.1.10 Specifications for Fixed Box and Bullet IP Colour Cameras (Quad HD & 4K UHD)

S.N o.	Parameter	Fixed Box IP Colour Camera		Bullet IP Colour Camera (Quad HD or better)
		Fixed Box (Quad HD or better)	Fixed Box/Bullet (4K UHD or better)	
1	Image Sensor	1/2.8" or bigger, CMOS progressive scan image sensor, P-Iris sensor / Auto-Iris sensor	1/2" or bigger, CMOS progressive scan image sensor, P-Iris sensor / Auto-Iris sensor Image Sensor between 1/2" - 1/2.3" can also be considered provided the reduction in the sensor size is compensated with corresponding increase in Lux and other parameters such that there is no degradation in the 4K image quality. The bidder will have to submit authentic / verifiable details / proof for the same, failing which the bid may be considered as non-compliant.	1/2.9" or bigger, CMOS progressive scan image sensor, P-Iris sensor / Auto-Iris sensor
2	Pixel Resolution	Quad HD (2560*1440) or better (with 16:9 Aspect ratio)	8.0 Mega Pixel Ultra HD (3840x2160) or Higher (with 16:9 Aspect Ratio)	Quad HD (2560*1440) or better (with 16:9 Aspect ratio)
3	Data Rate	- with latest compression technology - Configurable between 64 Kbps (min.) to 6 Mbps(max) (Max. data rate of 6 Mbps per stream shall support Quad HD without any degradation)	- with latest compression technology - Configurable between 64 Kbps (min.) to 8 Mbps (max.) (Max. data rate of 8 Mbps per stream shall support 4K UHD without any degradation)	- with latest compression technology - Configurable between 64 Kbps (min.) to 6 Mbps(max) (Max. data rate of 6 Mbps per stream shall support Quad HD without any degradation)
4	Compression method	H.264 / H.265 or better	H.264 / H.265 or better	H.264 / H.265 or better
5	Video Streaming	Min. Three (3) video streams with H.264 / H.265 or better compression with: i) 25/30 FPS ii) Intelligent streaming iii) The streams shall be configurable as unicast or multicast, and all of them shall be configurable/ dynamically adaptable from SD to Quad HD iv) At any given time, following streams shall be available: a) 1st stream :- Quad HD b) 2nd stream :- Full HD c) 3rd stream :- SD	Min. Three (3) video streams with H.264 / H.265 or better compression with: i) 25/30 FPS ii) Intelligent streaming iii) The streams shall be configurable as unicast or multicast, and all of them shall be configurable/ dynamically adaptable from SD to 4K iv) At any given time, following streams shall be available: a) 1st stream :- Ultra HD (4k) b) 2nd stream :- Full HD c) 3rd stream :- SD	Min. Three (3) video streams with H.264 / H.265 or better compression with: i) 25/30 FPS ii) Intelligent streaming iii) The streams shall be configurable as unicast or multicast, and all of them shall be configurable/ dynamically adaptable from SD to Quad HD iv) At any given time, following streams shall be available: a) 1st stream :- Quad HD b) 2nd stream :- Full HD c) 3rd stream :- SD
6	Sensitivity @ 30 IRE F1.4 -F1.6 (if AGC is off) a) Colour Mode b) Monochrome mode	0.10 Lux 0.05 Lux	0.10 Lux 0.05 Lux	0.10 Lux 0.05 Lux
7	Shutter Speed	1 to 1/10000 sec or better	1 to 1/10000 sec or better	1 to 1/10000 sec or better
8	Wide Dynamic Range (WDR)	≥ 100 dB	≥ 100 dB	≥ 100 dB



6.2.4 Industrial Grade Layer-2 Switches for Field:

S.No.	Features Specifications	Specifications / Functional Requirements - Layer-2 Access Switches	
		L2- 24 Port PoE Access Switch (Industrial grade/Temp. Hardened)	L2- 08 Port PoE Access Switch (Industrial grade/Temp. Hardened)
1	Locations	All Stations, Depots & other locations	Point Zone& other locations (as required)
2	Qty. at each location	As per requirement	As per requirement
3	Redundancy	Redundant Power Supply	-
4	Configuration	24 Port Layer-2 PoE switch	8 port Layer-2 switch
5	No. of Ports	No. of Ports Minimum: 1) 2x1Gbps SFP with auto-negotiation ports for up linking with the Distribution Switch (with 2x1000 Base-LX SFP modules for Single Mode OFC) 2) 24x100/1000Mbps Ethernet ports with auto MDI/MDI-X. (These ports should support PoE/ PoE+/PoE++) While all the ports should support PoE & PoE+ functionality, at least one port should support PoE++(60 watt) functionality. For PoE++ functionality an external adapter can be provided as an alternative. However, the external adapter should be of the same make (OEM) <u>OEM/OEM certified</u>, as the switch.	No. of Ports Minimum: 1) 2x1Gbps SFP with auto-negotiation ports for up linking with Distribution Switch (with 2x1000 Base-LX SFP modules for Single Mode OFC) 2) 08 x 100/1000 Mbps Ethernet ports with auto MDI/MDI-X. (These ports should support PoE/ PoE+)
6	Switching/Back plane Capacity (Min.)	26 Gbps Full Duplex (non-blocking)	10Gbps Full Duplex (non-blocking)
7	Forwarding rates (Min.)	39 Mbps wire-speed performance	14 Mbps wire-speed performance
8	MAC table size	4K	1K
9	VLAN capacity	1K	256
10	Multicast capacity	1K	256
11	Environment Conditions (Industry Grade / Temperature Hardening)	i) Operating temperature 0°C to +60°C, ii) Humidity up to 90% (non-condensing). iii) Switch shall preferably be without any moving parts (no fans) iv) All Switches shall have high RFI/EMI immunity and shall have IEEE/UL/EN and FCC approval v) Shall be capable to withstand shock and vibrations as per IEC or equivalent standards.	i) Operating temperature 0°C to +60°C, ii) Humidity up to 90% (non-condensing). iii) Switch shall be without any moving parts (no fans) iv) All Switches shall have high RFI/EMI immunity and shall have IEEE/UL/EN and FCC approval v) Shall be capable to withstand shock and vibrations as per IEC or equivalent standards.
12	Operating Voltage	The switch should have redundant AC power supplies/ solution with operating range of -180 – 240 V AC. Any Power adopter if required shall be of same <u>OEM/OEM certified</u> make. The contractor shall submit details of the Power adopter to the Engineer for review and approval.	The switch should be operated on AC power supply / solution with the operating range of - 180 – 240 V AC. Any Power adopter if required shall be of same <u>OEM/OEM certified</u> make. The contractor shall submit details of the Power adopter to the Engineer for review and approval.



S.No.	Features Specifications	Specifications / Functional Requirements - Layer-2 Access Switches	
		L2- 24 Port PoE Access Switch (Industrial grade/Temp. Hardened)	L2- 08 Port PoE Access Switch (Industrial grade/Temp. Hardened)
26	Port Authentication and RADIUS or TACACS+ Accounting.	Switch shall support IEEE 802.1X Port Authentication, MAC based Port Authentication and RADIUS or TACACS+ Accounting.	Switch shall support IEEE 802.1X Port Authentication, MAC based Port Authentication and RADIUS Accounting.
27	QoS and ACL for traffic filtering.	Shall support QoS, ACL for Layer 2 to Layer 4 traffic filtering.	Shall support QoS, ACL for Layer 2 to Layer 4 traffic filtering.
28	ACL	Shall support global ACL, VLAN ACL, Port ACL and IPv6 ACL.	Shall support global ACL, VLAN ACL, Port ACL and IPv6 ACL.
29	PoE support	Switch should be able to supply a minimum PoE power of 390W (total). Each port should be capable of feeding PoE-15.4 W ,PoE+-30 W , PoE++ - 60 W as per requirement. However, for PoE++ functionality an external adaptor can be provided as an alternative. The external adaptor shall be of the same make (OEM) <u>OEM/OEM certified</u> , as the switch.	Switch should be able to supply minimum total PoE power of 180 W. Each port should be capable of feeding PoE-15.4 W &PoE+-30 W as per requirement.
30	Regulatory compliances	Should have regulatory compliance of UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval.	Should have regulatory compliance of UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval.
31	RoHS and WEEE regulations.	Shall provide support for RoHS and WEEE regulations.	Shall provide support for RoHS and WEEE regulations.
32	Switch Operating System certification	The Switch Operating System should be IPv6 certified/complied and common criteria ~~EAL3/EAL4~~ and ~~NDcPP~~ <u>EAL4/EAL5/NDPP/NDcPP</u> or equivalent certified/ complied. The contractor shall submit details of the equivalent certification/ compliance to the Engineer for review and approval. <u>All supplied switches must hold a valid MTCTE/STQC certificate, to be submitted with the bid or prior to supply.</u>	The Switch Operating System should be IPv6 certified/complied and common criteria ~~EAL3, EAL4 and NDcPP~~ <u>EAL4/EAL5/NDPP/NDcPP</u> or equivalent certified/complied. The contractor shall submit details of the equivalent certification/ compliance to the Engineer for review and approval. <u>All supplied switches must hold a valid MTCTE/STQC certificate, to be submitted with the bid or prior to supply.</u>
33	OEM certification	OEM should be having valid ISO 9001 / ISO 14001 certification on the date of opening of bid.	OEM should be having valid ISO 9001 / ISO 14001 certification on the date of opening of bid.
34	Installation of the switch	Should be possible to install the switch in a 12U or 9U, 19" standard rack.	Should be possible to install the switch in a Junction Box or 3U, 19" standard rack.
35	Switch Management	Switch should be manageable using CLI, console, telnet/SSH/HTTP, FTP, ~~FTTP~~ and secure FTP.	Should be manageable using CLI, console, telnet/SSH/HTTP, FTP, ~~FTTP~~ and secure FTP.
36	Reputed OEMs of the switches	The switch shall meet all the above specifications and shall be from the reputed manufacturer – Cisco, Juniper, HP, Alcatel Lucent, Extreme, Hirschmann, Ruggedcom, AMG, NOKIA , Ciena or equivalent	The switch shall meet all the above specifications and shall be from the reputed manufacturer – Cisco, Juniper, HP, Alcatel Lucent, Extreme, Hirschmann, Ruggedcom, Moxa, AMG, Ciena or equivalent



S.No.	Features	Specifications / Functional Requirements (Layer-3 Gigabit Aggregation switch)	
		OCC	Stations etc
		It shall also support MAC based radius authentication through a radius server.	support MAC based radius authentication through a radius server.
14	Protection	1) It shall support STP, RSTP, MSTP, Link Aggregation (LACP) IEEE 802.3ad. 2) Shall support reliable network switching.	1) It shall support STP, RSTP, MSTP, Link Aggregation (LACP) IEEE 802.3ad. 2) Shall support reliable network switching
15	Manageability	1) It should be manageable using CLI, console, telnet/SSH/HTTP, FTP, TFTP and secure FTP 2) Should support Ethernet Link OAM as per IEEE 802.3ah/UDLD, IEEE 802.1ag/UDLD. 3) It should support SNMP v1, SNMP v2, SNMP v3 and RMON support.	1) It should be manageable using CLI, console, telnet/SSH/HTTP, FTP, TFTP and secure FTP 2) Should support Ethernet Link OAM as per IEEE 802.3ah/UDLD, IEEE 802.1ag/UDLD. 3) It should support SNMP v1, SNMP v2, SNMP v3 and RMON support.
16	Certification and other compliances	1) Should have regulatory compliance of MTCTE/<u>STQC</u>, TTP, ~~ITSAR~~, UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval. 2) Switch Shall comply to RoHS or equivalent and WEEE or equivalent regulations. The Contractor shall submit details of the equivalent regulation(s) to the Engineer for review and approval. 3) The Switch Operating System should be IPv6 certified/complied and common criteria ~~EAL4 and NDcPP~~ <u>EAL4/EAL5/NDPP/NDcPP</u> or equivalent certified /complied. The contractor shall submit details of the equivalent certification / compliance to the Engineer for review and approval. 4) OEM should be having valid ISO 9001 / ISO 14001 certification on the date of opening of bid.	1) Should have regulatory compliance of MTCTE/<u>STQC</u>, TTP, ~~ITSAR~~, UL or equivalent and FCC/CE. The contractor shall submit details of the equivalent regulatory compliance to the Engineer for review and approval. 2) Switch Shall comply to RoHS or equivalent and WEEE or equivalent regulations. The Contractor shall submit details of the equivalent regulation(s) to the Engineer for review and approval. 3) The Switch Operating System should be IPv6 certified/complied and common criteria ~~EAL4 and NDcPP~~ <u>EAL4/EAL5/NDPP/NDcPP</u> or equivalent certified /complied. The contractor shall submit details of the equivalent certification / compliance to the Engineer for review and approval. 4) OEM should be having valid ISO 9001 / ISO 14001 certification on the date of opening of bid.
17	Environment Conditions	i) Operating temperature 0°C to +45°C, ii) Humidity up to 90% (non-	i) Operating temperature 0°C to +45°C, ii) Humidity up to 90% (non-



S.No.	Features	Specifications / Functional Requirements (Layer-3 Gigabit Aggregation switch)	
		OCC	Stations etc
		condensing). iii) ~~Routers~~ Switches shall have high RFI/EMI immunity and shall have IEEE/UL/EN and FCC or equivalent regulatory compliance. iv) Shall be capable to withstand shock and vibrations as per IEC or equivalent standards.	condensing). iii) ~~Routers~~ Switches shall have high RFI/EMI immunity and shall have IEEE/UL/EN and FCC or equivalent regulatory compliance. iv) Shall be capable to withstand shock and vibrations as per IEC or equivalent standards.
18	Reputed OEMs of the switches	The switch shall meet all the above specifications and shall preferably be from the reputed manufacturers viz. Cisco, Juniper, HP, Alcatel Lucent, Extreme, Hirschmann, Ruggedcom, AMG, Nokia, Ciena or equivalent	The switch shall meet all the above specifications and shall preferably be from the reputed manufacturer – Cisco, Juniper, HP, Alcatel Lucent, Extreme, Hirschmann, Ruggedcom, AMG, Ciena or equivalent

6.2.5.2 The Layer-3 Switches at OCC should be configured with Redundant Supervisor/Switching Fabric/Management Modules/Power Supplies. All switch components should be Hot-Swappable without disrupting the Operations.

6.2.6 CCTV Monitors

6.2.6.1 Not Used

6.2.6.2 Not Used

6.2.6.3 Not Used.

6.2.7 Digital CCTV Keyboard:

6.2.7.1. The digital keyboard shall be fully functional, multipurpose keyboard used for system control and programming.

6.2.7.2 Keyboard shall include an integral variable speed pan/tilt/ zoom joystick and shall be able to select any camera and display it on any monitor of that location.

6.2.7.3 Keyboard shall control multiple PTZ cameras.

6.2.7.4 Keyboard shall be with user-friendly menu displayed on LCD/LED with dynamic menu and easy to read display.

6.2.7.5 Joystick (Keyboard) should support RS232/RS485/USB Type C connectivity and RJ 11 connections and should be supplied with required interface units.

6.2.7.6 The Key Board shall be UL or EN and FCC approved and shall be of one of the reputed makes of same make as cameras or the NVR.

6.2.7.7 Keyboard shall automatically number monitors, cameras, sequences and guard tours. Users shall view video on monitors in the same way as controlling a matrix.

6.2.8 Work Station & MMI or Viewing, Monitoring.

6.2.8.1 The PC Workstation Hardware shall be 19" Rack Mountable and shall meet the following specifications **given at Appendix-P of Chapter- 11 (Appendices) of this PS** as a minimum:

S.No	Parameters	Minimum Specification
1.	Processor	~~11th generation Intel Xeon W / Core i7 or better Processor, 8Core, 16Threads, 16MB Cache, Base speed 3.5GHz, up to 5.0GHz Turbo boost.~~



2.	RAM	~~1) Minimum installed RAM:~~ ~~32GBx2, DDR4, 3200MHz, Dual Channel RAM with Error Correcting Capability (ECC).~~ ~~2) Upgradable to 128GB RAM.~~ ~~3) At least 2 usable empty DIMM slots.~~
3.	Graphics Card (Dedicated)	Dual 4GB DDR5, NVIDIA Quadro P1000 or equivalent
4.	LAN	1Gbps Ports ~~2 nos.~~
5.	Storage	~~1) 2 nos. x 2TB M.2 PCIe NVMe Solid State Drives in RAID 1~~ ~~2) 2TB SSD/SATA 7200rpm Hard Drive~~
6.	Display	~~a) Viewing angle (H/V): 170 degree or better~~ ~~b) Connectivity:~~ ~~i) 1x Display Port / DVI (in)~~ ~~ii) 1x Display Port / HDMI (out)~~ ~~iii) 1x HDMI (in)~~ ~~iv) 1x Analog 2.0 audio line out (3.5mm jack).~~ ~~v) 1x VGA (in) (Optional)~~ ~~c) Integrated Soundbar (Min. 3.5 Watts)~~ ~~d) Response Time: 5ms or better~~ ~~e) Image Brightness (typical): 350cd/m² or better~~ ~~f) Display Position Adjustments: Tilt, Swivel, Pivot, Height Adjustment set.~~ ~~g) VESA Flat Panel Mount Interface.~~ ~~h) Operating Temperature: 0°C to +50°C~~ ~~i) Humidity: Up to 80% RH (non-condensing)~~ ~~j) Viewable Size: 32" and 85" as per requirement (when measured diagonally)~~ ~~k) Resolution: 4K UHD (3840x2160) or better~~ ~~l) Image Contrast Ratio: (Typical) 3000:1 or better~~ ~~m) Colour Support: 1.07 billion or better~~
7.	Keyboard & Mouse	Wired / Wireless Keyboard & Mouse
8.	Additional Ports	~~USB 3.x Gen. Ports 4 nos.~~ ~~HDMI Port 1 no.~~ ~~VGA Port 1 no. (with Adapter, if required)~~
9.	Operating System	Preloaded Genuine Windows 10 (64bit) professional or as required
10.	OS Recovery Media	Recovery DVD/media for Operating system
11.	Pre-Loaded Software	Licensed Anti-Virus, MS Office 2024 or latest, Adobe PDF. The licenses shall be registered in the name of JMRC.
12.	DVD	Dual Layer DVD-RW (Internal or External)
13.	Approvals	The Workstation shall be UL/EN approved for safety and CE/FCC approved for EMC & immunity and shall be from reputed makes. The Contractor shall submit a proposal indicating the make & model of the proposed Workstation to the Engineer for review & approval. The workstation shall be procured only after receipt of no objection from the Engineer.

6.2.9 Not Used



6.2.11 KVM Extender

Workstation for CCTV MMIs shall be kept in Telecom Equipment Room (TER) and the extension of Video, Key board, Mouse and CCTV joystick to the, Station Control Room (SCR) and Security Rooms in OCC/stations shall be done through KVM Extenders. The distance between TER and SCR/Security Rooms in some cases may be more than 100mts. The KVM extenders shall be selected keeping in view the distance and the screen resolution of MMI. The KVM extenders shall include, but not limited to the following specifications **given at Appendix-P of Chapter- 11 (Appendices) of this PS.**

S.No.	Parameters	Minimum Specification
1	Remote connection	Dual Port Redundant Connectivity ~~(i) For distance less than 100m:~~ Ethernet connectivity with port activity indicator ~~(ii) For distance more than 100m:~~ Fiber connectivity with port activity indicator
2	Display Resolution & Setup:	For CCTV System: ~~(i) 4KUHD@50/60Hz or better~~ ~~(ii) Single Monitor Setup: 1xKVM (Single Monitor)~~ ~~(iii) Dual Monitor Setup: 1xKVM (Dual Monitor)~~ or 1 x KVM (Single Monitor) + 1 x KVM (Single Monitor) /HDMI or Display Port Extender (Compliant to all Parameters indicate d in the Specs)
3	Indicator	Device status LED indicator with network activity
4	Operating temperature	0 to 50°C as minimum.
5	Humidity	Upto 80% non-condensing
6	Approvals	The Contractor shall submit a proposal indicating the make & model of the proposed KVM Extender to the Engineer for review & approval. The KVM Extender shall be procured only after receipt of no objection from the Engineer.

6.2.12 IR illuminator for IP Fixed Box camera.

The Infra-Red (IR) illuminator (inbuilt in camera or external) shall provide high quality 850nm or better IR illumination. The IR function can be controlled via the video output of the camera and or the camera's IR-cut filter can be synchronized via a contact closure in the housing.

S.No.	Functionality	Specification
1	LED type	IR LED or better
2	Wavelength	850nm
3	Power	PoE/PoE+ or PoE/PoE+ & AC 24V
4	IR distance	50 mtrs. (120 mtrs for PTZ cameras)
5	Angle	33° x 19° or better
7	Day and night switch	Auto (build in photocell)
8	Cable length	1.3 meter or as per requirement
9	Mounting Wall mounting	"U" bracket (Pan/Tilt)



- 6.2.15.3.2 The camera shall have built-in intelligence where it has the ability to classify a moving object as a “human” (by drawing a bounding box on the moving object).
- 6.2.15.3.3 The cameras shall have the ability to lower its bit rate based on non-activity of human. When there is a human present, the cameras shall stream at its pre-configured bit rate. When there is no human activity in a defined region, the cameras shall stream at a lowered bit rate.
- 6.2.15.3.4 The camera shall support latest video compression technology to lower the amount of bit rate consumed by the camera. The smart codec shall be able to differentiate foreground Object(s) against background, moving objects v/s non-moving and apply the compression on the region accordingly.
- 6.2.15.3.5 System deployed should meet the global standards for safety. For CCTV cameras, interoperability Standards such as ONVIF Profile S, G, T & M must be followed as a minimum.
- 6.2.15.3.6 If any additional accessories required for installation and commissioning of new Facial Recognition & Surveillance System Camera, other than mentioned in above Table shall be provided by the contractor. The supplied FRS camera need to be integrated with existing FR server (under implementation).

6.2.15.4 **Technical Specifications(TS)**

6.2.15.4.1 **8MP (4K Ultra HD) Colour Camera for Facial Recognition**

S. No.	Parameters	Specifications
i.	Image Sensor	1/1.8” progressive scan CMOS sensor or better
ii.	Sensor with Analytics	Single Sensor to provide high definition imaging with embedded analytics capabilities
iii.	Resolution	3840x2160 or better
iv.	Minimum Illumination	0.004 0.01 lux (at F1.4) or better
v.	Dynamic range	WDROFF: 70dB,WDRON: 120dB
vi.	Aspect Ratio	16:9
vii.	Compression	H.264, H.265, Motion JPEG1
viii.	WDR (120dB)	Captures details in scenes with both very bright and Very dark areas
ix.	Max. Image Rate	WDROFF: (50Hz/ 60Hz)-25fps/ 24fps, WDRON:(50Hz/60Hz)-16.7fps/17.1fps
x.	3D Noise reduction filter	Yes
xi.	White Balance	Automatic, Manual
xii.	Backlight compensation	Adjustable
xiii.	Audio Compression method	Opus,G.711PCM8kHz
xiv.	Edge Recording	Edge storage with built in slot compatible for SD/SDHC/SDXC memory card with class 10 speed for 2



		Days recording capacity is to be supplied.
xvii.	Electronic shutter control	Automatic, Manual(1/7.5to1/8000sec)
xviii.	Iris control	Automatic, Open, Closed
xix.	Flicker control	50Hz,60Hz
xx.	Network Connectivity	CAT 1G
xxi.	Network	1000-BASE-T/100-BASE-TXor1000-BASE-SX /1000-BASE-LXviaSFP
xxiii.	Connector	RJ-45
xxiv.	Protocols	IPv6, IPv4, HTTP, HTTPS, SOAP, DNS, NTP, RTSP,RTCP,RTP,TCP,UDP,IGMPv2,ICMP, DHCP,ARP,HSTS
xxv.	Streaming Protocols	RTP/UDP, RTP/UDP, multicast, RTP/RTSP/TCP, RTP/RTSP/HTTP/TCP,RTP/RTSP/HTTPS/TCP, HTTP
xxvi.	Device Management Protocol	SNMPv2c,SNMPv3
xxvii.	Security	Password protection, HTTPS encryption, digest authentication, WS authentication, user access log, 802.1x port based authentication, FIPS 140-2 L1, FIPS140-2L3, FIPS compliance enables the camera to be deployed at sites requiring FIPS-compliant cryptography.
xviii.	ONVIF compliance	Profile S, G, T & M
xxix.	Power Consumption	18W Max.
xxx.	RTC backup battery	3V manganese lithium or similar
xxxi.	Power source	POE: IEEE802.3 at Class4 POE Compliant.
		VAC:24V±10%,21 VA.
		VDC:12V±10%,18 W.
xxxii.	Low Light Performance	Enhanced low light performance helps to monitor areas without adequate lighting and can capture wide scenes. The reduced image noise and blur combined with embedded analytics enables Powerful after-hours, low light live monitoring.
xxiii.	Audio	Cameras must be capable of bi-directional communication.
xxiv.	Operating Temperature	0°Cto +60°C
xxxv.	Storage Temperature	-5°Cto +65°C
xxvi.	Relative Humidity	0to95%non-condensing
xxvii.	Certification	UL,CE,FCC,ROHS,EN and STQC <u>BIS/UL/ EN for Safety, BIS/FCC/ CE for EMC & Immunity and STQC.</u>
xviii.	Camera will be equipped with edge based Video Analytics including support for Appearance Search, Object Classification and Face recognition	
xxix.	Facial Recognition	Quickly identify a person of interest with more Accurate context to make more informed decisions on critical events.
xl.	Activity Detection	Atypical activity enabled detection for a typical activities such as people traveling at faster speeds or moving/standing at unusual locations.

xli.	Smart Technology:	Search	Helps to quickly locate a person of interest to improve incident response time and enhance forensic investigations <u>through Camera or VMS.</u>
xlii.	Supported events	Analytics	Object in Area
			Object Loitering
			Objects Crossing Beam
			Object Appears or Enters Area
			Object Not Present in Area
			Object Stops in Area
			Object Enters Area/ Leaves Area
			Temper detection
			Direction Violated
xliii.	Camera shall Support SLR-bayonet style of Lens mount. Camera shall be housed in an IK10 rated housing with IP68 environmental protection.		

6.2.15.4.2 **SDXC Card for 2 Days Recording**

S. No.	Specification
1	Optimized for 24x7 video surveillance cameras
2	Designed with ultra endurance for continuous operation
3	Weather-resistant, humidity resistant and withstands temperatures from-5°to 65°C
4	Supports card health monitor functionality
5	Advanced 96-layer 3D NAND Technology or better
6	SDA6.0 compliant micro-SD slots
7	Speed Class10 or better
8	Certifications: CE, FCC or BIS

6.2.15.4.3 **Lens for FR Cameras**

S.No.	Parameters / Details	Specification
1.	Focal length	4.4mm – 8.5mm
2.	Iris range	F1.5 to close
3.	Format	1/1.8" or better, 8MP, IR corrected.
4.	Angle view wide	44° to 109° or better
5.	Angle view Tele	24° to 58° or better
6.	Iris Control	Automatic Control (DC Iris / P-Iris)
7.	Lens mount	C/CS-mount <u>or integrated lens</u>
8.	Focus Control	- Auto focus - Remote (i-CS or equivalent)
9.	Zoom Control	- Remote (i-CS or equivalent) control



- 4.2.1 The UPS shall include rectifier, battery, charger, inverter, solid-state bypass switch, Servo Controlled Voltage Stabilizer in bypass path. Failure of a single component shall not cause failure of the total UPS. The UPS shall be of the self-contained floor mounted, bottom entry, metal-clad type with front access.
- 4.2.2 The UPS shall be designed such that on restoration of the 415 V AC 3 phase input supply source after its failure, the load shall be transferred on to this input source only after a delay and verification that there are no spikes and that the voltage has stabilized.
- 4.2.3 Two independent redundant 3-phase primary power input feeder cables will be made available inside the UPS Room to the JP/JS14(1C&1D) contractor by the E&M contractor.
- 4.2.4 The following data shall apply to UPS (of complete system unless specified otherwise):

(1)	Output capacity (KVA) of each UPS	60 KVA for interlocking stations/Base station with Radio Tower
(2)	Input voltage (Three phase) of input feeder [#]	415V AC +10%, - 20%
(3)	Input frequency of input feeder	50 Hz $\pm$ 5%
(4)	Input Power factor	>0.95
(5)	Output voltage	415V AC Three phase
(6)	Output frequency	50 Hz $\pm$ 1% (except in bypass)
(7)	Voltage Regulation: Static Dynamic (0-100-0% Load Step)	Better than $\pm$ 1% Better than $\pm$ 3%
(8)	Overload capacity of each UPS <u>equal to /</u> better than	150% $\geq$ <u>for</u> 60 seconds 125% $\geq$ <u>for</u> 10 minutes 110 % for 60 minutes
(9)	a. Total Current Harmonic Distortion of each UPS at input (THDi)	<3%
	b. Total Voltage Harmonic Distortion of each UPS	<3% for 100% linear load <5% for 100% non-linear load
(10)	Crest factor of each UPS	$\leq$ 3:1
(11)	Ambient Operating temperature	0°C to 50°C
(12)	Storage temperature	0° C to + 70°C
(13)	Relative humidity (non-condensing)	Up to 95% at 40° C
(14)	Efficiency (AC-AC) of complete system (including transformers)	Minimum 87% (From Half load to full load)

6.3.3.1 Each work station shall consist of all equipment necessary to provide the specified display and command functions for a PAS operator as detailed in associated clause 5.10.1 above.

6.3.4 PAS Control Panel

6.3.4.1 Each PAS control panel shall be equipped with “gooseneck” microphone with illuminated “Push-to-Talk button.

6.3.4.2 Each button for zone selection and external music source selection shall have a built-in LED for status indication including idle, engaged by others and selected by the operator of the pre-defined zones.

6.3.4.3 Not used.

6.3.4.4 The monitor/listen-in speaker with volume adjustment control on the PAS control panel shall be used for real time monitoring of any message being broadcast to the pre-defined zones.

6.3.4.5 A ready to proceed indication shall be provided when selected zone or zones are available. Zone busy indication shall be displayed on the control panel when broadcast is in progress over a zone or a group of zones.

6.3.4.6 The panel shall have sufficient buttons/space to accommodate the complete requirements.

6.3.5 Microphones

6.3.5.1 All microphones (except noise sensor) for the PAS shall have the following features;

- (1) Unidirectional;
- (2) Gooseneck;
- (3) Low sensitivity to feedback;
- (4) Noise suppressing;

6.3.5.2 The microphone shall have the following minimum performance:

- | | | |
|-----|---------------------|-------------------------|
| (1) | Frequency response | 340 Hz – 14 kHz (–3 dB) |
| (2) | Sensitivity | >–73 dB (0.22mV) |
| (3) | Distortion at 1 kHz | <1% and |
| (4) | Inherent noise | ≤ 25 dB SPL, A weighted |

6.3.6 Microphone Pre-Amplifier Unit

6.3.6.1 The microphone pre-amplifier unit shall have a nominal output level of 0 dBm compatible with the output from the DVA.

6.3.6.2 Suitable automatic level control technique shall be employed for microphone input processing to ensure that the level of instantly recorded voice is controlled within an acceptable range.

6.3.6.3 The microphone pre-amplifier unit shall have the following minimum performance:

- | | | | |
|-----|--------------------|---|--------------------------|
| (1) | Frequency response | : | 340 Hz – 14 kHz (–3 dB); |
| (2) | Output impedance | : | 600 ohm balanced; |

- 6.3.11.7 Loudspeakers shall have a minimum frequency response for 340 Hz to 14 KHz at -10dB and in-case of horn speaker 500 Hz – 4.5 KHz at -10dB.
- 6.3.11.8 The loudspeakers and the loudspeaker cables shall be manufactured from fire resistant, low smoke, zero/ low halogen materials and shall be of the fire survival type to ensure circuit integrity for at least ~~3~~ **1** hours during fire.
- 6.3.11.9 The bidder shall give complete specification of the offered loudspeakers including impedance, nominal power output, peak power handling capacity, sensitivity, polar diagram for various frequencies and SPL characteristics to the Engineer for review and approval.
- 6.3.11.10 The Contractor shall co-ordinate with Civil Works Project Contractors for the design of loudspeakers taking into account the effect of the station architectural design that will affect the choice, colour, layout and mounting of loudspeakers for esthetics of the architectural finish of the station.
- 6.3.12 PAS Management System**
- 6.3.12.1 The PAS management system shall be equipped with a proven operating system to support the specified management functions. PAS Management System shall have to be provided at OCC TER/CSS to manage all stations. This NMS should not be available for access in other than CSS/TER. The mass storage device shall be provided with a storage capacity for at least 4 weeks of alarm data, system configuration data, alarm history, event logging data and recording of all live announcement per clause 5.6.5 above. It shall be possible to copy and store such data and the live announcements on media like flash drive or any other secondary storage medium for future retrieval.
- 6.3.12.2 One Notebook laptop loaded with appropriate software with latest specifications as approved by the employer shall be supplied as given in BOQ for field maintenance. The notebook computer shall be powered by an internal rechargeable battery supporting more than 4 hours continuous operation without recharging. Appropriate software shall be pre-loaded onto the notebook computers to access full management facilities through the local maintenance port.
- 6.3.13 Power Supply System**
- 6.3.13.1 All equipment of the PAS shall work from 230 Volts $\pm$ 20% AC Single phase power supply and connected to a UPS.



- 6.3.3.1.3 The display board shall be blanked whenever no valid signal is received from the local PIDS control equipment and if the default display message is not activated. If the default display message is activated then the default message in the PIDS Boards memory or in the PIDS station server shall be displayed.

6.3.3.2 PLATFORM DISPLAY BOARDS (True Color LED Type)

1. The PIDS displays consisting of Industrial Grade True color LED type panels shall meet the following minimum specifications:
 - a) LED model: 3 in 1 SMD LED
 - b) Color: True Color
 - c) Pixel Pitch (mm): 2.5 or better
 - d) No of sides: 2
 - e) Display Dimension (mm x mm): 1920 X 480(min.)
 - f) Brightness (cd/m²): 3000 or better
 - g) Contrast ratio: 3000:1 or better
 - h) Optimal Viewing angle: ~~4400~~ **140°** or better
 - i) LED display life-span (hours): 50000 or better
 - j) Operating Temperature (Ambient): up to ~~550C~~ **55 °C**
 - k) IP Rating (Front & Rear): IP 65
 - l) Frame Rate: 30 FPS (min.)
 - m) Refresh Rate: 1920 Hz or better
 - n) Interface: HDMI & Two Ethernet
 - o) Service conditions: 24x7
2. The data shall be displayed simultaneously on the complete display board.
3. The display board shall be equipped with:
 - a) Highly reliable controller(s) with each controller controlling one side of display board(s). side of the display board(s).
 - b) Dual power supplies configured in hot standby mode, with each power supply configured for taking load for both sides of the display boards, in normal as well as degraded (failure) modes.
 - c) The contractor shall submit detail specification of controller and Power supply module for approval of Engineer.
4. The construction of the whole unit of different type of display boards should be modular, such that any module (i.e. PCB, connector, cable, power supply unit etc.) can be easily removed when defective and a fresh module is fixed to make the system functional again. Wiring between different modules should be done with the help of male/female type of connectors. There should not be any requirement of rewiring, re-soldering/ de-soldering or opening and reconnections of wiring etc. during the maintenance, unless there is damage to the wiring. Proper cable guides are to be provided inside the display board for drawing cables and wires neatly.



5. LEDs used in platform display boards shall be of high performance quality and from reputed manufacturers viz. Nichia, OSRAM, Everlight or equivalent. The maximum junction temperature of a LED shall not be less than ~~4000 °C~~ **100 °C** and epoxy used in the LED shall have UV inhibitors.
6. The contractor shall include details of the LEDs used including the make design document and submit the same for approval of the Engineer. Decision of the Engineer shall be final.
7. The brightness level of the LED panel shall be adjustable both Automatically and Manually so as to maintain the required viewing distance and viewing angle under all indoor and outdoor environment. The manual adjustment of the brightness level shall be possible from the PAS/PIDS MMI.
8. The visibility of each Display shall be at least 35 m for both Hindi and English characters when displaying in the biggest font size characters during brightest part of the day.
9. The display board shall display moving text/graphics smoothly at the programmable scrolling rate. No “break-up”, “line pulling” and “line jittering” shall occur to the displays on the display board.
10. The optical characteristics of the transparent display cover for the LED display area shall be selected such that the light transmission and display contrast are suitable for outdoor, indoor and semi-outdoor environment where it is applicable throughout the station areas.
11. Each display board shall be equipped with light sensors to adjust the brightness to a level comfortable for passengers according to the ambient light intensity in different environments. Each side of the display board shall display True Colors and shall use Ultra Bright LEDs
12. Every LED dices/clusters shall have the same level of brightness to achieve an even brightness across the whole display area of the display board. LEDs shall be used with equal fringe and uniform intensity to ensure that the information to be displayed is with excellent contrast so that no black patches are visible on the display screen.
13. The brightness of the LED to be installed at the station areas with direct sunlight or reflection of sunlight shall be high enough to achieve the specified viewing distance and viewing angle at all times.
14. The Contractor may propose an architecturally bending sunshade or sunshield to reduce the incident sunlight but this shall not reduce the viewing angle and viewing distance.



15. The LED and other processor modules for the display board shall be plug-in type to facilitate easy module replacement.
16. All LEDs 'ON' testing facility shall be provided on each display board.
17. The software of display panel should be designed in such a way that the panel shall work without any trouble such as software hang, flickering, unstable picture etc. in 24x7 working environment.
18. Software shall allow defining objects with their attributes (back ground color, the type, size and color of fonts etc.).
19. The PIDS display Boards shall have IP input from the main server system, for ease of configuration and uniformity as most of the communication sub-system(s) shall be IP based with IP inputs.
20. Suitable earthing arrangement shall be provided for earthing the body of the display Unit.
21. Templates for Platform PIDS shall be as detailed below:
 - a) The Platform Display Panel shall be a multifunctional display panel with comprehensive information contents in Templates.
 - b) The panel shall support multi partitioning without degradation of display quality and with independent addressing of individual partitions.
 - c) The displays shall support various media formats pertaining to graphics (BMP, GIF, JPEG, PNG, ~~WMF~~ etc.), Animation (~~SWF, FLC, FLI~~, Animated GIF etc.), Sound (WAV, MP3, MIDI, CD Audio etc.), Video (SD/HD, MP4, MPEG, 1/2/4, ~~AVI, QT3, WMV~~ etc) Fonts (OpenType, TrueType, Devanagari etc), Language (Hindi, English).
 - d) The overall design of the Platform PIDS shall match the station architecture / design. As such the aesthetics of the display and the arrangement shall be coordinated with architectural and signage aspects.
 - e) The PIDS software delivery shall include a field proven commercially available comprehensive software package for the Design, Creation and Editing, Storage and Scheduling of Digital Content.
 - f) Platform display boards shall show the estimated time of arrival of the next train by a countdown counter. Train information shall be displayed with the Hindi characters and English characters simultaneously (The display shall be coordinated with PA announcement for the expected train arrival announcement also). This display sequence format for the train information shall be continuously displayed unless a message with higher priority is assigned, including an emergency message.
 - g) Information of all non-stopping trains will be shown on platform display boards. The PIDS shall, however, co-ordinate with the PAS to ensure that appropriate audio announcements are made to alert passengers of these non-stopping trains.



- h) Stopping train not in passenger service shall be displayed as “TRAIN NOT IN SERVICE” in place of destination for all the train information display messages at all stations.
- i) Train terminating at any intermediate station shall be described as “TRAIN TERMINATES HERE” in place of destination for all the train information display messages at the intermediate terminal station.
- j) Sample template is attached at Figure 2C.1. The template shall contain display of Clock (Analog / Digital), Train departures, Train info (disruptions, non- stopping etc), Advertisements, videos etc.
- k) PIDS contractor shall submit multiple templates (min. 20 nos.) as per typical template detailed below, for approval of Employer’s representative.

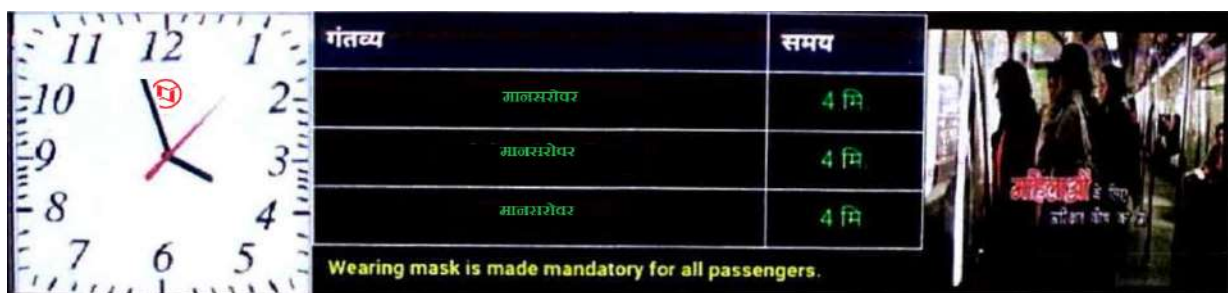


Figure 2C.1: Indicative Template for Platform Display Panel

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FONT SIZES AND NUMBER OF CHARACTERS

- i. The number of characters to be displayed per row for LED type display boards within the display area without scrolling for the platform display boards shall be the following as a minimum (for the Destination field):
 - 15 Hindi characters for the biggest font sizes;
 - 15 English characters for the biggest font sizes.
- ii. Destination station name having more than 15 characters, will be displayed in horizontal scrolling manner from right to left with stable display of estimated time of arrival.
- iii. The Contractor shall submit details of dimensions of characters, housing etc. to the Employer’s Representative for approval.

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Platform display boards shall predominantly display information on train arrivals for the corresponding platform. Relevant service and passenger information shall also be displayed, if required, on the destination station field.

6.3.3.3

CONCOURSE DISPLAY BOARDS (LED-backlit LCD panel display board)

- 1) The PIDS panel shall consist of industrial grade 55 inches LED-backlit LCD panel TFT active matrix full HD type display boards shall meet the following minimum specifications:
 - a) Viewable picture size : 55” minimum
 - b) Viewing Angle : 170° (horizontal & vertical) minimum

- c) Brightness : 1200 cd/m² or better
 - d) Contrast : 4000; 1 or better
 - e) Resolution : 1920 x 1080 or better with minimum 16.7 million colors
 - f) Aspect Ratio : ~~24:9~~ **16:9**
 - g) Operating Temperature (Ambient) : upto ~~550~~ **55 °C**
 - h) Interface : HDMI & Two Ethernet
 - i) IP Rating (Front & Rear) : IP 65 & IP 54
 - j) Frame Rate : 30 FPS (min.)
 - k) Refresh Rate : ~~90~~ **60** Hz or better
 - l) Screen-to-body ratio : 90% or better
 - m) Service conditions : 24x7
- 2) Screen shall be "Burn free" when static picture or text continues for long period and unaffected by sever problems.
 - 3) (a) The display panel shall be equipped with highly reliable controller and separate/common power supply for CPU and screen of the display board panel.
(b) The contractor shall submit detail specification of controller and Power supply module for approval of Engineer.
 - 4) The LED backlit LCD panel shall be provided with ultra thin antiglare coating or any standard method without affecting display readability, optimal viewability and optical bonding. Details of the same shall be submitted to the engineer for review and approval.
 - 5) Software shall allow defining objects with their attributes (back ground color, the type, size and color of fonts etc.).
 - 6) The panel shall be protected by 3 mm ultraviolet stabilized single polycarbonate optically correct antiglare overlay without affecting quality of picture.
 - 7) The display panel have a set of 5watt in-built stereophonic speakers or suitable audio ports such that one set of 5watt external stereophonic speakers (Left & Right) are able to be connected either side of the display board.
 - 8) The panels shall offer highly bright, crisp, high resolution images for easy viewing in all ambient lighting conditions at all stations / subways.
 - 9) The viewing distance for the concourse display boards shall be at least 45 meters for both Hindi and English characters when displaying in the biggest font size characters.
 - 10) The panels shall operate satisfactorily even in environmental external temperature up to ~~550~~ **55 degree** Celsius.



- 11) The Tenderer shall furnish full specifications of the offered LED-backlit LCD panel TFT active matrix full HD type display boards to the Engineer for review / approval.
- 12) The software of display panel should be designed in such a way that the panel shall work without any trouble such as software hang, flickering, unstable picture etc. in 24x7 working environment
- 13) The PIDS display Boards shall have IP input from the main server system, for ease of configuration and uniformity as most of the communication sub-system(s) shall be IP based with IP inputs.
- 14) Suitable earthing arrangement has to be provided for earthing the body of the display Unit. A brass bolt of 6 mm dia shall be provided at appropriate location for the earth connection.
- 15) Display Templates for Concourse PIDS shall be as detailed below:
 - a) The Concourse display panel shall be an Integrated Multifunction Display with comprehensive information contents in Templates.
 - b) The panel shall support multi partitioning without degradation of display quality and with independent addressing of individual partitions.
 - c) The panel shall be capable of displaying messages in different formats such as text, graphics, animated graphics, video clips, RSS feeds, flash and sound. There shall be no limitation on the display contents of each partition e.g. video text, graphics, animated graphics etc in any combination.
 - d) The displays shall support various media formats pertaining to graphics (BMP, GIF, JPEG, PNG, ~~WMF~~ etc.), Animation (~~SWF~~, ~~FLC~~, ~~FLI~~, Animated GIF etc.), Sound (WAV, MP3, MIDI, CD Audio etc.), Video (SD/HD, MPEG, 1/2/4, ~~AVI~~, ~~QT3~~, ~~WMV~~ etc) Fonts (OpenType, TruType, Devnagiri etc), Language (Hindi, English).
 - e) The overall design of the Concourse PIDS shall match the station architecture/design. As such the aesthetics of the display and the arrangement shall be coordinated with architectural and signage aspects.
 - f) The PIDS software delivery shall include a field proven commercially available comprehensive software package for the Design, Creation and Editing, Storage and Scheduling of Digital Content. A separate Content Development Workstation shall be provided to allow create, amend, ~~append~~ modify and download



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Figure 2C.2: Indicative Template for Concourse Display Panel

16. The LCD and other processor modules for the display board shall be the plug-in type to facilitate easy module replacement.
17. All LEDs 'ON' testing facility shall be provided on each display board.
18. LCD (TFT active matrix) type display Board shall meet the following minimum specifications:
 - (1) Viewable picture size 40" minimum
 - (2) Viewing Angle 1200 (horizontal & vertical) minimum
 - (3) Brightness 500cd/m² or better
 - (4) Contrast 1000 ; 1 or better
 - (5) Resolution 1366 x 768 or better
 - (6) Unaffected by severe problem of burn in when static picture or text continues for long
 - (7) Software will allow defining objects with their attributes (back ground colour, the type, size and colour of fonts etc).
 - (8) LCD to be protected by 3 mm polycarbonate optically correct overlay without affecting quality of picture
 - (9) Each LCD panel shall have an inbuilt 12 watts output loud speaker for colour video clips with audio.
 - (10) LCD flat panels shall offer highly bright, crisp, high resolution images for easy viewing in all ambient lighting conditions for the under ground stations / subways.
 - (11) LCD Panels shall operate satisfactorily even in environmental external temperature up to 500 Celsius.
 - (12) Video input for playing video streams / audio streams shall be plugged into the PIDS equipment in the station TER and/or Central

~~Servers at OCC. Hence video/audio input port shall be available in the PIDS equipment for feeding standard video/audio format.~~

6.3.4 Display Board Housing

- 6.3.4.1 The internal components of the display board shall be arranged in a compact manner to minimize the thickness of the housing.
- 6.3.4.2 The Contractor shall submit detailed design information of the display board housing and mounting brackets for review by the Employer's representative
- 6.3.4.3 The visual impact of display boards and the proposed housing and mounting designs shall take into account ergonomic considerations and overall harmonization with station architectural design. The Contractor shall co-ordinate with Architect & Civil Works Project Contractors to finalize the locations, visual impact, housing and mounting design and colour selection for the display boards.
- 6.3.4.4 All display board housings shall be lockable but easily accessible for maintenance.
- 6.3.4.5 All the display board equipment faces shall be provided with shatterproof, anti-reflective glazing and scratch resistant coating.
- 6.3.4.6 Indoor display boards shall be suitable for operating in an indoor environment with or without air-conditioning. Indoor housing shall be designed to ~~IP54~~ **IP65 (Front) & IP54 (Rear)** compliant.
- 6.3.4.7 In open areas (e.g. Platforms of Elevated station) where display boards will be exposed to rain or sunlight, the display boards shall be dust-proof and water-proof to IP65 standard.
- 6.3.4.8 There shall be no gap between the edge of the housing and the LED matrix so that no internal hardware or wiring is exposed to the public.
- 6.3.4.9 No sharp corner in the housing design shall be provided and if the housing has corners, the corners shall be at an external radius of 35mm in front and rear elevations.
- 6.3.4.10 The design of the ceiling or pillar or wall mounting brackets shall facilitate easy replacement of the whole display board.

6.3.5 PIDS Management System

- 6.3.5.1 The PIDS management system shall be a window (latest configuration) based or a proven COTS operating System-based environment using a mouse as the pointing



1. INTRODUCTION

1.1 General

1.1.1 This Chapter 7 specifies the particular technical and performance requirements of the Master Clock system of the Telecommunications System.

1.1.2 This Chapter shall be read in conjunction with other Chapters of the particular specification, General Specification (GS), General Conditions of Contract (GCC), Special Conditions of Contract (SCC), Instructions to Bidders (ITB) and other documents forming part of the contract.

1.1.3 The Phase 1C consists of extension of E-W corridor from Badi Chaupar to Transport Nagar of 3.85 Km total with 1 no. Underground Station (Galta Gate) & 1 no. Elevated Station (Transport Nagar) and Phase 1D consists of extension from Mansarovar to Ajmer Road (Chauraha) of 1.352 km with 1 no. of Elevated Station (Ajmer Road Chauraha).

1.2 Overview of Clock System

1.2.1 The Master Clock System to be provided under JP/JS14 (1C & 1D) Contract shall consist of the following major components:

- (1) Sub-master clocks at each of the stations in ~~redundant configuration~~.
- (2) Slave clocks, both digital and analogue at all stations
- (3) All power and signal cables, surge protection devices etc
- (4) Both primary and secondary fixtures for installation;

1.2.2 The Master Clock system already commissioned at OCC shall provide synchronization signal to all sub master clock units at stations and also provide synchronization signal and Date/Time to new systems (Radio system, Telephone system, PAS/PIDS, CCTV, Automatic Fare Collection system, SCADAs, TC&S etc) at OCC/stations. JP/JS14 (1C & 1D) contractor shall configure master clock at OCC and integrate sub-master clocks to the master clock at OCC for provision of synchronization to sub-master clocks and to any new systems at OCC. JP/JS14 (1C&D) MCLK Contractor shall provide any item necessary for integrating with pre-installed Master clock system at OCC.

2. NOT USED



1.3.5	IP Application Mapping. The list of IP match criteria must 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.
1.3.6	VLAN CoS preservation: the IEEE 802.1p priority bits.
1.3.7	VLAN CoS differentiation: appropriate service differentiation must be applied according to the 802.1p bits. This will require the mapping of the .1p bits to DSCP values and EXP-bits in the MPLS header when the service is offered over a (partially) MPLS-enabled network.
1.3.8	End-to-end delay budgets are strictly-enforced to support critical applications Scada, VOICE, Video etc.
1.4	Security
1.4.1	Security forms an integral part of a network design to protect both the end-customers and the network infrastructure. The solution that vendor proposes must have the necessary provisions to implement the necessary security measures. The Router/Router Series/Router OS/Router family must be EAL3+/ <u>EAL4/NDcPP or equivalent</u> certified from Day-1.
1.4.2	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. Must Support SNMPv1/v2/V3.
1.4.3	Black hole filtering: dropping of traffic destined for a specific prefix at wire speed. The router must support NAT & zone based statefull firewall functionality without any additional hardware requirement.
1.4.4	Ingress and egress packet filtering based on L2-L4 criteria at wire speed. The possibility to log the actions on individual filter rules must be supported.
1.4.5	Protection of local services (http, small udp/tcp servers, dhcp, telnet, ssh etc) based on L2-L4 criteria.
1.4.6	AAA support – Accounting, Authorization and Authentication of users and commands. Support of local authentication, TACACS+ and Radius.
1.4.7	Authentication of routing protocol updates: IS-IS, OSPF, BGP.
1.4.8	Router must support SSH & IPSEC without any additional hardware requirement
1.5	Performance
1.5.1	Router must support minimum non-blocking full duplex capacity of 88 Gbps. The Router must be supplied with all applicable feature and interface perpetual-licenses from day one. No interface must have year-based capping for usage
1.5.2	Router must support minimum 32K MAC address, 64K IPv4 & 32K IPv6 routes.



1.5.3	Router must support minimum 1K multicast groups, 1K multicast routes.
1.5.4	Router must support minimum 4K ingress Queues and 4K egress Queues each for the node
1.5.5	Router must support minimum 1K MPLS layer-3 VPN's.
1.5.6	Router must support minimum 1K MPLS VPLS.
1.5.7	Router must support minimum 1K MPLS Layer-2 PWs.
1.5.8	Router must support min 20 BFD sessions.
1.5.9	Router must support segment routing functionality.
1.6	Certificates and environment standards
1.6.1	Router or family must comply with NEBS Level 3 specifications / <u>Equivalent TEC QM 333 or latest specification</u> and CE2.0 or higher <u>MEF 3.0 or equivalent</u> compliant/certified.
1.6.2	Security: MTCTE, TTP, ITSAR
1.6.3	Safety: IEC/EN 60825-1, IEC/EN 60825-2.
1.6.4	Storage: EN300 019-2-1 class 1.2 <u>or TEC QM-333 equivalent standard.</u>
1.6.5	Transport: EN300 019-2-2 class 2.3 <u>or TEC QM-333 equivalent standard.</u>
1.6.6	In service: EN300 019-2-3 class 3.2 <u>or TEC QM-333 equivalent standard.</u>
1.6.7	Relative humidity: 5 to 85% (non-condensing). IEEE1613 Class 1, IEC61850-3 <u>or equivalent</u> compliant
1.6.8	Operating temperature: -40°C to 65°C.

4.5.2 IP-MPLS node/Router (Core) for OCC must have the following specifications as minimum:

2.1	General Specifications & Architecture
2.1.1	Router Chassis must be of modular and fit into a standard sized 19-inch rack mounting. Chassis must be compatible with ETSI-compliant cabinets.
2.1.2	Router must have redundant controller cards, power and fans for resilience.
2.1.3	Router must have redundant (internal or external) either AC or DC power supply: 230 VAC or -48 VDC whichever applicable with a variation over the range 180V to 240V for AC Power supply and variation over the range -40V to -60V for DC system. The router must not fail working in case of failure with one of power supply.
2.1.4	The Router must support minimum following type of interfaces – 1GE, 10GE, 25GE from day 1. The router must support multi-rate interfaces: 100/1000Mbps, 1/10GE and 10/25G.
2.1.5	The Router must provide a non-blocked Routing matrix. The Router must be supplied with all applicable feature and interface perpetual-licenses from day one. No interface must have year-based capping for usage

2.5.6	Router must support minimum 8K ingress and egress Queues.
2.5.7	Router must support minimum 2K MPLS layer-3 VPN's.
2.5.8	Router must support minimum 2K MPLS layer-2 VPLS.
2.5.9	Router must support minimum 2K MPLS Layer-2 PWs.
2.6	Certificates and environment standards
2.6.1	Router or family must comply with NEBS Level 3 specifications/ <u>Equivalent TEC QM 333 or latest specification</u> and the router/family must be CE2.0/3.0/ <u>MEF 3.0 or equivalent</u> certified
2.6.2	Security: MTCTE, TTP, ITSAR
2.6.3	Safety: IEC/EN 60825-1, IEC/EN 60825-2
2.6.4	Storage: EN300 019-2-1 class 1.2 <u>or TEC QM-333 equivalent standard</u>
2.6.5	Transport: EN300 019-2-2 class 2.3 <u>or TEC QM-333 equivalent standard</u>
2.6.6	In service: EN300 019-2-3 class 3.2 <u>or TEC QM-333 equivalent standard</u>
2.6.7	Relative humidity: 5 to 95% (non-condensing)
2.6.8	Operating temperature: -40°C to 65°C
2.6.9	IEEE1613, IEC61850-3 compliant <u>or equivalent</u>



- g) Licences for Digital Telephone Instruments at OCC, as specified in the Particular Specifications.
- h) SIP/IP -based IP Telephone Instruments (10 lines & 20 lines), as specified in the Particular Specifications.
- i) SIP/IP-based IP Video Telephone Instruments, as specified in the Particular Specifications.
- j) All user licenses required for Analog, Digital, SIP/IP -based IP Telephone Instruments and SIP/IP-based IP Video Telephone Instruments, as specified in the Particular Specifications.
- k) Emergency Telephone Instruments, as specified in the Particular Specifications.
- l) Help Point Telephone with in-built camera, as specified in the Particular Specifications.
- m) Subscriber and Trunk Interface Modules.
- n) PRI (E1) and SIP Trunk Interface, as specified in the Particular Specifications.
- o) Portable Laptop/Notebook suitable for system programming, configuration, testing, commissioning and maintenance.
- p) Spares, Special Tools & Test Equipment and Testing and Commissioning facilities.
- q) Cables, accessories, distribution frames, cabinets, enclosures, racks and earthing.
- r) Under-floor cable trays/risers inside OCC including TER, CSS, DCC, OCC Theatre and other Telecom rooms, wherever required.
- s) Any other hardware, software, interface modules, licenses, accessories and miscellaneous items required for successful upgradation, migration, integration, testing, commissioning and operation of the complete Telephone System.

3.3 Scope of Services

- 3.3.1 The contractor shall coordinate with civil works project contractors and provide comments or recommendations on subjects of station building materials, finishes and architectural layouts. He shall also coordinate with civil works project contractors to ensure the availability of proper duct / support facilities for telephone cables in the station and other areas like connectivity to tunnels. At OCC building, the contractor shall temporarily remove the false ceiling/false floor without causing any damage to the civil infrastructure with due permission from JMRC authority. After completion of installation, the contractor shall restore the false ceiling/floor to its earlier state.
- 3.3.2 The contractor shall provide necessary support, presentation, compliance and documents for obtaining necessary approvals from Indian authorities viz



4 PERFORMANCE REQUIREMENTS

4.1 General

4.1.1 In addition to the overall system performance requirements as identified in Chapter-1 of the Particular Specification, the specific performance requirements for the telephone system shall be as specified below.

4.1.2 The technical system performance requirements for the Telephone System are specified in Section 6, Chapter 9 of this Particular Specification.

4.2 Reliability

4.2.1 The inability to perform any required function, the occurrence of unexpected action or the degradation of performance below the specifications shall be considered as a failure.

4.2.2 MTBF shall be the average operating time accumulated by the total population of identical items between failures.

4.2.3 The Telephone system equipment supplied under the contract shall comply with the reliability figures given below:

Equipment	MTBF (Hours)
Switching module	> 150,000
Processor module	> 200,000
Memory module	> 200,000
Line and trunk interface module	>100,000
Multifunction direct line console	>20,000
Network management system	>50,000
Help Point	>1,00,000
Emergency Phone	>1,00,000
SIP/ <u>IP</u> VOIP Phones	>1,00,000

Table 4-1 MTBF Figures

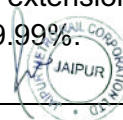
4.3 Availability

4.3.1 The contractor in meeting the required availability below shall substantiate his design by providing detailed calculations and evidence of statistical failure rates for the equipment for review by the Employer's representative

4.3.2 The availability of the IP based Telephone System shall be defined as the availability of the connections between extensions.

4.3.3 The availability of the connection between any extensions shall be better than 99.99%.

4.3.4 The availability of connection between extensions within direct line communication system shall be better than 99.99%.



5 FUNCTIONAL REQUIREMENTS

5.1 IP based Telephone system

5.1.1 IP-PBX network

5.1.1.1 Main Nodes

There are two existing Main Nodes at OCC for the Telephone Systems of Phase-1A and Phase-1B, which are interconnected for call routing between the Phase-1A and Phase-1B stations. As part of the Works under this contract, the Contractor shall upgrade and consolidate the existing OCC Main Nodes into a single IP-based Appliance Call Server in redundant (1+1) configuration together with Gateway Architecture . The upgraded OCC Central Telephone System shall provide a unified platform for the Telephone Systems of Phase-1A, Phase-1B, Phase-1C & 1D, ensuring complete feature transparency, operational continuity, seamless migration and interoperability across all phases. The Contractor shall provide all necessary hardware, software, media gateways, interface modules, E1/PRI/SIP/IP trunk interface modules, licenses and accessories required for successful implementation and integration. The integration proposal shall be included in the Design Documents.

5.1.1.2 Upgradation of existing Central Telephone System

- 1) The Bidder shall visit the site and thoroughly review the existing OCC Central Telephone System, including hardware, software, firmware, operating system, licenses, databases, configurations, numbering plan, network architecture, FOTS transmission network, interfaces, field connectivity and all integrated systems before submission of the Bid.
- 2) The upgraded OCC Central Telephone System shall be based on the latest commercially available OEM hardware platform and latest stable OEM software release available at the time of supply. All supplied hardware, software and firmware shall be OEM supported.
- 3) The upgraded OCC Central Telephone System shall have hardware configuration, processing capability and system capacity not less than the existing OCC Central Telephone System capabilities & capacity including Phase-1C & 1D Stations and shall additionally meet all functional, performance, redundancy, migration, integration and future expansion requirements specified under this Contract.
- 4) The Contractor shall provide all Gateway Architecture Cabinets, Gateway Interface Cards, Analog Subscriber Interface Cards, Digital Subscriber Interface Cards, PRI (E1) Interface Cards, SIP/IP Trunk Interface Modules, Digital Subscriber Licenses, SIP/IP User Licenses, additional Digital Phone Licenses, software licenses, associated hardware, software, accessories and all other items as specified in this PS.
- 5) The upgraded OCC Central Telephone System shall be fully compatible with the existing Telephone Systems of Phase-1A & 1B and the



Telephone Systems of the Phase-1C & 1D stations under this Contract, and shall support all functionalities specified in this Contract.

- 6) The existing approved operational network topology and connectivity between the OCC and all existing stations shall be retained to the maximum extent possible. Any modification required for implementation of the upgraded Central Telephone System shall not adversely affect the functionality, redundancy, reliability, availability or performance of the existing Telephone System and shall be carried out only after prior approval of the Employer.
- 7) Communication between the OCC and all connected stations over the existing FOTS Network and associated communication interfaces shall remain operational to the maximum extent possible during the upgradation. Any unavoidable interruption shall be carried out only during the approved maintenance window with prior approval of the Employer.
- 8) All existing running services, applications, databases, numbering plans, subscriber data, routing tables, user profiles, configurations and existing system features shall remain fully functional after completion of the upgradation without any loss of functionality or degradation in performance.
- 9) All existing licenses of the OCC Central Telephone System maybe re-used and shall remain valid after completion of the upgradation. The Contractor shall also provide and configure all additional user, feature, interface, Digital Subscriber, SIP/IP User, SIP/IP Trunk and application licenses required for successful migration, integration and operation of the upgraded Telephone System.
- 10) The upgraded OCC Central Telephone System, Direct Line Consoles (DLCs) and Network Management System (NMS) shall continue to operate seamlessly after completion of the upgradation. All existing and new interfaces with the Centralized Digital Recording System (CDRS), Radio System, Public Address System, Master Clock System and other interfacing systems shall remain fully functional without any degradation in functionality, performance or feature transparency.
- 11) All existing and newly provided Analog Telephones, Digital Telephones, IP Telephones, Direct Line Consoles (DLCs), Emergency Telephones, Help Point Telephones and all other connected end devices under this Contract shall function seamlessly after completion of the upgradation and integration work.
- 12) Existing field cabling and installed end devices shall be reused wherever found suitable. Any additional material required for successful completion of the work shall be provided by the Contractor under the scope of this contract.
- 13) The Contractor shall ensure complete migration of all existing databases, configurations, licenses, subscriber information, routing



while the first and the last station of each group shall be connected to the upgraded OCC Central Telephone System through redundant SIP Trunks.

- (3) For the existing Phase-1A & Phase-1B stations, the first and the last station of each group shall be connected to the upgraded OCC Central Telephone System through the existing redundant E1/PRI links.
- (4) Alternative routing through redundant SIP Trunks shall be provided for each group between 1C, 1D station and OCC.
- (5) The IP-based Appliance Call Server (1+1) employing Media Gateway Architecture shall be installed in the TER at OCC and the respective TERs of Phase-1C & 1D stations.
- (6) At the OCC, the Telephone System Contractor shall lay all necessary cables up to the FOTS rack and terminate the PRI (E1) links on the Distribution Frame (DDF)/Patch Panel for interconnection of the upgraded OCC Central Telephone System with the existing Telephone Systems of Phase-1A & Phase-1B.
- (7) For SIP Trunk connectivity between the Telephone Systems of the Phase-1C & Phase-1D stations and the upgraded OCC Central Telephone System, the Contractor shall provide, lay and terminate all necessary cables at the designated FOTS Ethernet switch ports/interfaces at Phase-1C & Phase-1D stations and the OCC
- (8) The IP-based Telephone System network, as a minimum, shall be provided as per the indicative network topology shown in Figure 5.1. However, any additional equipment, interfaces, hardware, software, licenses or services required to meet the requirements of this Contract shall also be provided by the Telephone System Contractor at no additional cost to the Employer.

5.1.1.4 Requirements of IP-PBX Telephone System (Phase-1C & 1D including OCC) are given in Table 5-2 below.

Item No.	Description of Item	Under Ground stations	Elevated Station each	Additional Platform	OCC
1.	Equipped Ports	120	60	-	300
2.	Wired Ports including the License therein	120 user (80 analog +40 SIP/ IP)	60 user (30 analog +30 SIP/ IP)	-	512 user with additional 60 digital user license and 20 SIP/ <u>IP</u> user
3.	E1 Ports	02 No E1 link	02 No E1 link	-	As Required
4.	SIP/ <u>IP</u> trunk	20	20	-	30



5.	Basic analog Telephones	30	20	0	0
6.	SIP/IP Based Direct line Telephone (20 Lines)	01	01	0	3
7.	SIP/IP Based Direct line Telephone (10 Lines)	16	12	1	0
8.	SIP/IP Video Phone	01	01	0	02
9.	Help point Speaker Phone with in-built camera	02	02	1	0
10.	Emergency Telephone	32	0	0	0
11.	Upgradation of existing DLC or new DLC	0	0	-	11
12.	CLIP	Yes Required	Yes Required	Yes Required	Yes Required
13.	Management PC + Printer (Common for IP-PBX & Direct Line System)	-	-	-	As required
14.	MDF including protection devices No. of pairs	100	100	-	0
15.	Ports for connectivity of CO Lines/ PRI lines / PRI Lines from PSTN (BSNL)	-	-	-	As required / As per existing ports
16.	Voice mail facility	Yes Required	Yes Required	Yes Required	Yes Required

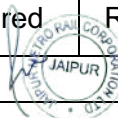


FIGURE 5-2

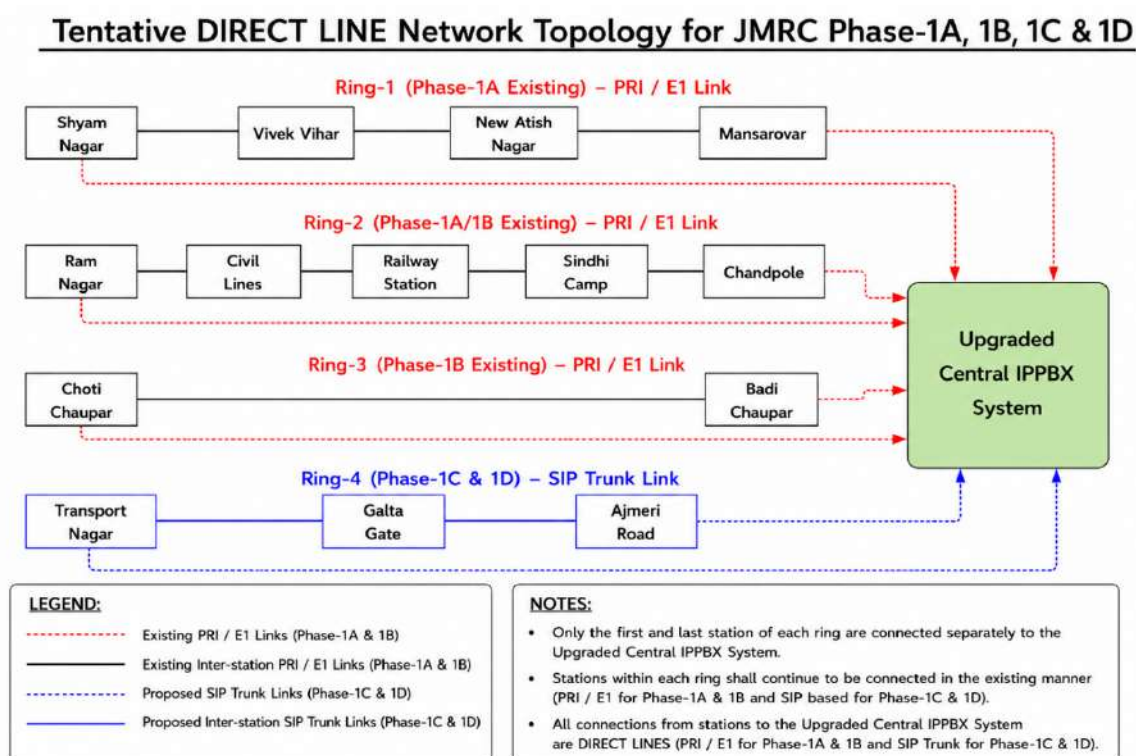


Figure 5.2: Tentative E1/SIP Connectivity for DIRECT LINE Network.

The SIP-based requirements specified in the PS shall remain unchanged. However, the Contractor may propose IP-based trunks and IP users in lieu of SIP-based trunks and SIP users, respectively. In such cases, the SIP trunk and SIP user licenses specified in the PS and BOQ shall also be supplied by the Contractor. The Contractor may also propose IP-based telephones and IP-based video phones, provided that the offered IP-PBX system supports SIP-trunks, SIP-based IP telephones and SIP-based video phones, respectively. Such interoperability shall be demonstrated during the project execution stage.

~~5.1.1.3~~ **5.1.1.5** The IP-PBX switch network shall be synchronized to the master clock signal from the Master Clock System. Telephone System Contractor shall coordinate, test and commission the Clock Interface with Master Clock contractor. At OCC, the telephone system contractor shall make use of existing master clock system's master clock signal available as NTP over Ethernet.

~~5.1.1.4~~ **5.1.1.6** The IP-PBX switch network shall have internal clock in free running mode in the event of the failure or absence of the master clock signal.

~~5.1.1.5~~ **5.1.1.7** The IP-PBX switch network shall synchronize automatically back to the master clock signal when master clock signal is recovered.

~~5.1.1.6~~ **5.1.1.8** The IP-PBX switch shall restart automatically and restore to the last running configuration when the power supply to the IP-PBX switch resumes normal after power failure.

5.1.1.9 **Numbering Plan of the IP-PBX Telephone System**

The number plan shall be in line with one finalized and implemented for Phase-1A & 1B telephone network. The current numbering scheme is based on 5 digit numbering scheme with features to distinguish stations and rooms. The numbering scheme for Phase-1A & 1B can be obtained by the contractor from

- (2) semi-restricted level which user cannot make PSTN (BSNL/ Private Operators) calls but can receive PSTN (BSNL/ Private Operators) calls through the attendant console telephone/DID;
- (3) local level which the telephone extension user can make or receive local PSTN (BSNL/ Private Operators) calls only and
- (4) unrestricted level which there shall be no restriction on the telephone extension for call connection.

5.1.1.10.3 The IP-PBX switch network shall be connected to the Radio system through inter-connection with existing Telephone exchange (Phase-1A & 1B) to provide switching and connection for user to make telephone call connection through the hand portable radios and call to hand portable radios through telephone extension.

5.1.1.11 LINE INTERFACES

5.1.1.11.1 The IP-PBX switch shall be equipped with modules to support a minimum the following interfaces:

- (1) Digital trunks at E1 level;
- (2) SIP/IP trunk

5.1.1.11.2 Digital trunks at E1 level from FOTS shall be used as tie lines for connectivity with existing EPABX system. Common channel signalling conforming to ITU-T Recommendations I.431 and I.441 shall be supported. The frame structure shall contain voice, data, synchronisation and signalling channels.

5.1.1.11.3 The IP-PBX shall provide analogue and digital subscriber line cards to support analogue and digital telephone sets.

- (1) The analogue subscriber line card shall provide, but not be limited to, the following:
 - over voltage protection to protect the line equipment from lightning and power line induction;
 - test and monitoring circuitry which connects test equipment to the two wire lines to test the line for continuity, short circuits, and impedance characteristics;
 - signal to light up the telephone message waiting indicator.
- (2) The digital subscriber line card (at OCC) shall support digital telephone sets and digital terminals for voice and data services. The digital subscriber line card shall provide, but not be limited to the following:
 - over voltage protection to protect the line equipment form lightning and power line induction;
 - test and monitoring circuitry which connects test equipment to the two wire lines to test the line for continuity, short circuits, and impedance characteristics;
 - signal to light up the telephone message waiting indicator; and



- (4) lamp for message waiting;
- (5) powered by the IP-PBX switch;
- (6) 12 push-button keypad;
- (7) 4 feature buttons for redial, hook flash, mute and hold.
- (8) Should support on-hook dialing.
- (9) Should have missed call indication
- (10) Should be line powered and CLI functionality should work without requirement of any external power source.
- (11) Should have adjustable handsfree volume.
- (12) CLIP
- (13) Desktop / Wall mounted type as per site requirement.

5.1.1.13.2 The VoIP phones shall be equipped with, but not be limited to, the following facilities:

- (1) Handset with 12 push-button keypad;
- (2) Adjustable volume control for speaker and ringer
- (3) Monochrome 4 line text display screen
- (4) A minimum of 4 programmable function keys for assignment of features or additional extension circuits and a minimum of 20/10 memories/phone book for speed dialing for 20/10 lines SIP/IP Phone respectively.
- (5) Hands-free operation through built-in speaker and microphone;
- (6) Display of call duration;
- (7) System clock display (synchronized);
- (8) On-hook dialing;
- (9) Visual display of details for incoming and outgoing calls;
- (10) CLIP support
- (11) Support for SIP
- (12) Two 10/100 BT PC port, POE Type Class 1/2
- (13) Supporting DHCP Client or static IP address allocation plan
- (14) Inbuilt Lost-packet compensation mechanism, Self-adaptive jitter cache and echo suppression for smooth voice function Voice compression standards G711, G722, G723.1, G729a
- (15) QoS support, TOS diffserv, 802.1p/q
- (16) RTCP and RTP support
- (17) XML support



- 5.2.2.8 The selection facilities shall provide selection status indication in the form of LCD or LED displays.
- 5.2.2.9 Dedicated push button and/or soft keys shall be assigned to each telephone line which can be connected to the direct line console.
- 5.2.2.10 At least 10 spare push buttons and/or soft keys shall be provided for assignment of additional functions or telephone lines.
- 5.2.2.11 The push buttons and/or soft keys of similar functions or nature shall be grouped together to facilitate the user to locate the required selection.
- 5.2.2.12 The direct line console shall also be provided with functions for operation as an ordinary telephone set. The direct line console shall be equipped with keypad for dialing to originate IP-PBX telephone call and support on-hook dialing.
- 5.2.2.13 The direct line console shall give different audio indication for normal and emergency calls.
- 5.2.2.14 Once the direct line extensions have been programmed on the direct line telephones it shall not be possible for unauthorized change of program from the direct line extensions (direct line telephones)

5.2.3 Direct Line Telephones

- 5.2.3.1 Direct line telephones shall be standard SIP/IP based Telephones connected to OCC direct line console through single push button selection. In each station 1 Nos. of such telephones, 20 line for SCR and 10 line for each of the other locations in the stations shall be provided. It shall be possible for the SCR to make normal and emergency direct line calls to the designated controllers in OCC. Different audio/visual indications shall be provided for incoming direct line calls on the direct line telephones for normal and emergency calls.
- 5.2.3.2 The offered IP Phones shall be a standard SIP/IP endpoint based on open IETF SIP standards and shall be interoperable with any third-party SIP-compliant IP-PBX. It shall not be a proprietary extensions or OEM-locked phone

5.2.4 Emergency Telephones at cross passages in Tunnels.

- 5.2.4.1 Normally when a train becomes disabled in a tunnel, the driver will be able to call for assistance by means of his train radio. However, to cater for the possibility of a train radio failure, trackside telephone from the direct line communication system shall be provided at regular intervals close to the cross passages in each tunnel separately and also at the start of the tunnel at the Platform ends. These shall be situated next to the Traction Power Supply Contractor's Blue Line Telephone System Boxes. The exact position shall be coordinated by the Telephone System Contractor as part of the Interface requirements
- 5.2.4.2 Passenger emergency evacuation design for cross passages between running tunnels which are constructed either by cut and cover or bored method shall be in accordance with the requirements of NFPA 130-200 or latest as follows:
 - (1) The distance between two Emergency phones should not exceed 250 meters.



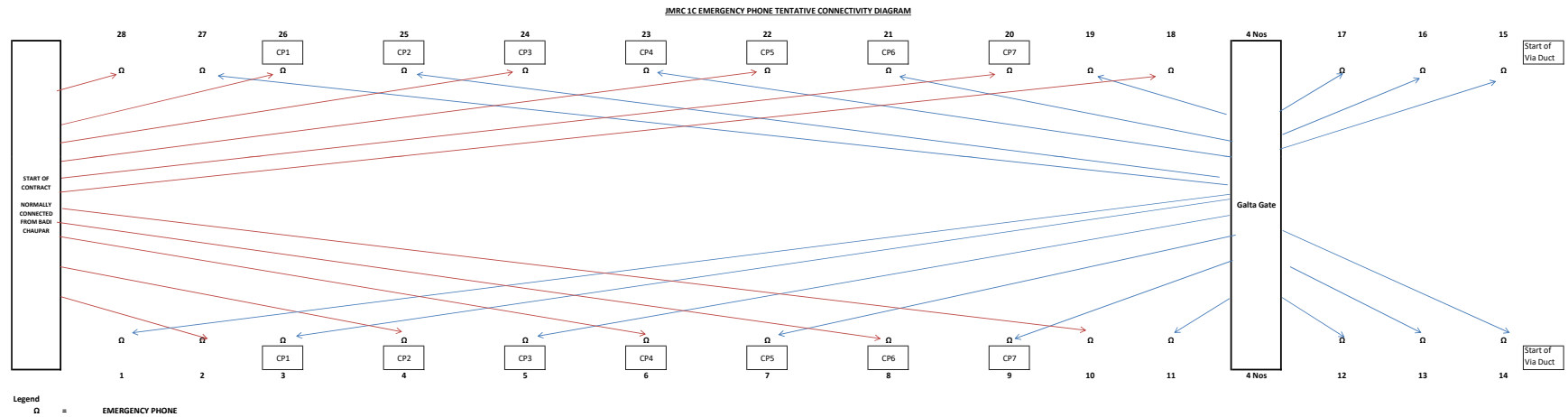


Figure: 5.2.4.2: Tentative location & plan of tunnel Emergency Phones.

possibility of a train radio failure, trackside telephones, separate for the UP and the Down tracks, from the direct line communication system shall be provided at regular intervals close to the cross passages in each tunnel and at the start of the tunnel.

- 6.2.3.2 Each telephone will be a self-contained unit consisting of a metal box containing a heavy duty telephone hand set and cord and calling facility. The unit will be adaptable to tunnel wall mounting. The telephone set and box shall work satisfactorily in tunnel environment. An outgoing call is generated on lifting the handset of emergency phone, the call is routed to Traction Power Controller's DLC and if it not answered in predefined period than the call shall be automatically routed to designated Traffic Controller's position in OCC.
- 6.2.3.3 Conspicuous audio and visual indications to alert the controllers shall be displayed on the lifting of a handset from any location. Identity of calling location shall also be displayed on the Controller MMI. Facility of conference call with other emergency telephones shall be possible through the Controller position
- 6.2.3.4 Loud audio and prominent visual indication shall be provided on the field telephone for attracting attention of staff/driver in the neighbourhood of the telephone box when called by the OCC. This shall be provided by a hooter and a flasher arrangement as part of the Emergency Telephone.
- 6.2.3.5 The Emergency Telephone shall be a proven make and model, which has been in use previously in an Underground Railway/ Metro for at least 2-3 years.
- 6.2.3.6 The Emergency Telephone shall work on the telephone cable and it is anticipated that the flasher & hooter shall also be able to work on the same cable. However, if the visibility and audibility of the arrangement (to be approved by the Employer) requires more power, then power cables shall be laid by the Contractor for the Emergency Telephones in the tunnel.
- 6.2.3.7 The cables for emergency phones through the tunnels shall be armoured type. Each emergency phone shall be fed through separate cables and alternate phones shall be fed from different node (i.e Badi Chaupar and Galta Gate) between two underground stations as far as possible. The arrangement shall be required to be finalized by Telephone System contractor with Employer as a part of detailed design.

6.3 IP-PBX Switch Specifications

- 6.3.1 The IP-PBX shall be a highly reliable, non-blocking, stored program controlled (SPC) system.
- 6.3.2 The IP-PBX shall be of modular, plug-in unit and keyed design.
- 6.3.3 The IP-PBX shall support SIP/IP interfaces and PRI (E1) digital interfaces conforming to ITU-T Recommendations G.703 and G.704 for interconnection with the existing Telephone Systems of Phase-1A & 1B, PSTN and other interfacing systems.
- 6.3.4 The IP-PBX shall support standard voice codecs including ITU-T G.711 (A-law/ μ -law), G.722 and G.729, or equivalent industry-standard codecs, and shall conform to the applicable ITU-T Recommendations.



The telephone network management system shall provide housekeeping functions for database backup, files deletion, download and upload.

6.5.6.1 **Call detail logs for all types of call from an extension shall be generated.**

6.6 Telephone Equipment

6.6.1 The telephones shall be of modular design and construction to allow easy replacement of keypad and PCBs.

6.6.2 All analogue telephones shall be of DTMF dialing in accordance with ITU-T Recommendations Q.23.

6.6.3 The transmission and reception including sending, receiving and side tone sensitivities shall comply with relevant ITU-T Recommendations P series.

6.6.4 At stations where direct line telephones are used to access the control consoles at OCC basic telephone instruments shall be provided with single selection push buttons for each direct line. More than one telephone instrument, wherever necessary, may be provided

6.6.5 The IP-PBX shall support Analog Telephone Instruments, SIP-based IP Phones and SIP-based Video Phones, as specified in this Particular Specification.

6.7 Power Supply System

6.7.1 The Telephone system equipment shall operate satisfactory at 240 AC (nominal). within variations of +10% to -20% voltages and ripple content 2%.

6.7.2 All equipment of telephone system (except printer, etc) shall be powered from 240 Volts AC to be provided by UPS contractor of JP/JS14 (1C & 1D). Necessary cabling from the equipment to the ACDB shall be done by the respective system contractor i.e. Telephone contractor.

6.7.3 Any OCC equipment that runs on AC power including printer and DLC shall be powered by 240 V AC from the ACDB in TER(OCC) provided by UPS Sub-System Contractor of JS/JP14 (1C & 1D).

6.8 Line Distribution

6.8.1 Cabling System

6.8.1.1 A cable network shall be provided at each facility to support operation of the telephone system.

6.8.1.2 The network shall include all cables, distribution, termination and installation facilities together with RJ11 and RJ45 socket outlets or equivalent.

6.8.1.3 Termination facilities shall be provided within TER at each site to serve as the interface connection point between the equipment and the cable installation.

6.8.1.4 The termination equipment shall be arranged with separate equipment side and line side facilities which shall include all necessary insulation displacement connectors (such as IDCs), fuses, circuit test and isolation facilities, patch fields, patch cords and audio/data connectors. These shall provide a highly



TELECOMMUNICATION SYSTEMS

This chapter covers the Appendices of Particular Specifications of JP/JS14(1C&1D) Contract.

1. **APPENDIX A: INTERFACE RESPONSIBILITIES**

The JP/JS14(1C&1D) Contractor's responsibilities for specification and provision of the requirements for Design and Works which interface with designated Project Contractors are given.

2. **APPENDIX B: KEY & ACCESS DATES**

The schedule of Key Dates to be met by the JP/JS14(1C&1D) Contractor and Access Dates to be used in planning the Works are laid out.

3 **APPENDIX C: SECTIONS**

Describes the names of stations and the OCC.

4. **APPENDIX D: CABLE SPECIFICATIONS**

The Cable Specifications to be followed for JP/JS14(1C&1D) Contract. These specifications will not be applicable on equipment specific cabling/wiring.

5. **APPENDIX E: CONTRACT SPARES**

The list of minimum Contract Spares to be supplied under JP/JS14(1C&1D) Contract

6. **APPENDIX F: BATTERY BACKUP SYSTEM 48V DC**

Functional and Design Specifications of 48V Battery Backup system are given.

7. **Appendix G: SPECIAL TOOLS & TEST EQUIPMENTS**

The list of minimum Special Tools and Test equipment to be supplied under JP/JS14(1C&1D) Contract.

8. **APPENDIX H: MMI PROVISION SCHEDULE**

Requirements of MMIs for all Telecommunication systems are given in Appendix H

9. **APPENDIX I: LOCAL AREA NETWORK (LAN) PLAN FOR TELECOM SYSTEMS.**

Scope of work for creation of LAN network for Telecommunication system contractors are given.

10 **APPENDIX J: EXISTING DETAILS OF ON-BOARD RADIO INSTALLATION.**

11. **APPENDIX M: EARTHING POLICY AND TRANSIENT PROTECTION**

Describes the policy for Earthing and Transient Protection for Telecommunication Systems.

12. **APPENDIX N: BASE FRAME, FALSE FLOOR AND UNDER FALSE FLOOR CABLE TRAYS WITH REQUIRED RISERS FOR WALL MOUNTED UNITS IN TER.**

Describes the scope of work for Design, Supply and Installation of Base Frame, False Floor & under False Floor Cable Trays with required risers for wall mounted units for all Telecom Systems in TER and SCR (only Under Floor Cable trays) of Phase 1C&1D Stations

13. **APPENDIX O: SPECIFICATIONS OF CONDUITS AND ACCESSORIES FOR TELECOMMUNICATION SYSTEMS.**

14. **APPENDIX P: SPECIFICATIONS FOR WORKSTATION (MMI) & LAPTOP (LOCAL CRAFT TERMINAL)**

15. **APPENDIX Q: EXISTING PHASE-1A & 1B INTERFACE DOCUMENTS**

16. **APPENDIX R: GENERAL OVERVIEW OF TELECOM SYSTEM (CCTV, PIDS/PAS, MCLK, UPS)**



- d) BS 61010-1:2003/A2:1995: Safety requirements for electrical equipment for measurement, control & laboratory use. Part 1: General requirements.
 - e) Underwriters Laboratory safety std 497A: Secondary protectors for Communication Circuits.
2. Peak transient of up-to 700 Volts on the DC Power Supply line for several microseconds.
 3. Average transient duration of 2 microseconds with a repetition frequency of 15kHz to 100 kHz.
 4. For short duration transient (<5ms) the variation approaches a sine-wave.
 5. For longer duration transients (<5ms) the variation approaches rectangular pulses with an initial rate of rise upto 5×10^4 Volts per second.

Suitable electronic devices (Hybrid Circuitry such as a combination of silicon avalanche diode – also called Transzorb, high impedances in combination of Gas discharge Tubes) having high surge handling capability, fast response time, low clamping voltage, etc., shall be incorporated in the communication equipment subsystems offered, to ensure that the latter withstands the conditions mentioned in 4.1.1 above without any damage or permanent degradation in performance throughout the system lifetime.

The selection criteria for such devices shall include, but not limited to, the following:

- a. Reverse standoff Voltage: At least twice the maximum operating voltage and allowing operation over the temperature range **as specified in IEC 61643-11 for power SPD and IEC 61643-21:2011 and 61643-21:2011 for data SPD.**
 - i. ~~Operating temperature range -40° to $+85^\circ$ C~~
 - ii. ~~Storage temperature range -40° to $+100^\circ$ C~~
- b. Pulse Power Rating: This shall have a value to handle the peak pulse power of the transients and ensure their decay in less than 10% of the rise time for the worst pulse likely to be encountered from all possible sources including lightning and transients from overhead traction power system.
- c. SPD should be capable enough to handle a surge current 10kA (of 8/20mA impulse per line) for Power & Telecom Network application.
- d. SPD should be of Auto Resetting type, once surge is diverted

4.1.2 Surge protection devices shall be provided on both the power and data cables as detailed in Table below as a minimum:

Sub-system	Surge Protection for equipment in Platform area and Depot area (Outdoor)			Surge Protection for equipment in room (indoor)		
	Equipment	Power Line	Data Line	Equipment	Power Cable	Data Line
FOTS				Cable Armour	Yes at one end	
				Data Network Equipment	no	*2
PAS	Speaker	N/A	No	PA amplifier output	N/A	Yes
	Call Station at PSB	N/A	*1	Mixer	No	No

S. No	Parameters	Minimum Specification
7.	Keyboard & Mouse	Wired / Wireless Keyboard & Mouse
8.	Additional Ports	USB 3.x Gen. Ports - 4 nos. HDMI Port on chipset - 1 no (minimum). VGA Port – 1 no. (with Adapter, if required)
9.	Operating System	Preloaded Genuine Windows 11 (64bit) professional or as required
10.	OS Recovery Media	Recovery DVD/media for Operating system
11.	Pre-Loaded Software	Anti-Virus, MS Office 2024 or latest, Adobe PDF
12.	DVD (Internal/External)	DVD-RW
13.	Approvals	The Workstation shall be UL/EN approved for safety and CE/FCC approved for EMC & immunity and shall be from reputed makes. The Contractor shall submit a proposal indicating the make & model of the proposed Workstation to the Engineer for review & approval. The workstation shall be procured only after receipt of no objection from the Engineer.

2) SPECIFICATIONS FOR KVM EXTENDER:

S. No	Parameters	Minimum Specification
1.	Remote connection	(i) for distance less than 150m: Ethernet connectivity with port activity indicator (ii) for distance more than 150m: Fiber connectivity with port activity indicator
2.	Network protocol	TCP/IP, LDAP, SNMP or as required.
3.	Display Resolution & Setup:	For CCTV System: (i) 4K UHD @ 50/60 Hz or better (ii) Single Monitor Setup: 1 x KVM (Single Monitor) (iii) Dual Monitor Setup: 1 x KVM (Dual Monitor) or 1 x KVM (Single Monitor) + 1 x KVM (Single Monitor) /HDMI or Display Port Extender (Compliant to all Parameters indicated in the Specs) For Other systems: (i) Full HD @ 50/60 Hz or better (ii) Single Monitor Setup: 1 x KVM (Single Monitor)
4.	Indicator	Device status LED indicator with network activity
5.	Operating temperature	0 to 45°C ~~60°C~~
6.	Humidity	Up to 80% non-condensing
7.	Approvals	The Contractor shall submit a proposal indicating the make & model of the proposed KVM Extender to the Engineer for



Annexure-2: PIDS/PAS - Signalling Interface

**ANNEXURE [A13] of
JPJS02-SE-0021- SIG RS DID**

ATC-PA&PIS INTERFACE SPECIFICATION

DISTRIBUTION	Confidentiality Category <i>Restricted</i> ☐	<i>Normal</i> ☒	Control Category <i>Controlled</i> ☐	<i>Not Controlled</i> ☒				
CONFIDENTIAL. All rights reserved. ALSTOM	Passing on and copying of this document, use and communication of its content are not permitted without prior written authorization.				JPJS02-SE-0022	Version A	Lang. en	N.Shts 36



DOCUMENT EVOLUTION

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A	G.Raghupathy	15-Oct-12	All	Official Version

BIBLIOGRAPHY

Applicable standards and documents:

Id.	Title	Ref.
[A1]	Contract agreement between JMRC and the consortium the Design, Manufacturing, Supply, Installation, Testing, and Commissioning of Signaling / Train control of Jaipur Metro Rail Project completed by the Supplementary Agreement signed on Jan. 24 th , 2012	none
[A2]	Signalling Project Quality Plan (PQP)	JPJS02-QM-0001
[A3]	ATC-Rolling Stock Detailed Interface Document	JPJS02-SE-0021
[A4]	ATS to ATC station identification	JPJS02-SE-0048

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1 INTRODUCTION

1.1 Aim of the document

The objective of this document is to describe the interface between the On-board ATC equipment supplied by the JPJS02 contractor and the Papis (Public Address and Passenger Information System) supplied by the RS08 contractor.

1.2 Domain of application

This document is applicable to the JMRC project.

1.3 Context

This document deals with the specification between the On-board ATC equipment, which provides automatic train control and protection, and PA/PIS which is the Public Address and Passenger Information System.

1.4 Abbreviations

ATO:	Automatic Train Operation
ATP:	Automatic Train Protection
CAB:	CABin
CKD:	Carte Controleur Dynamique (Dynamic controller board)
EB:	Emergency Braking
MMI:	Man Machine Interface
RMO:	Restricted Manual Operation
RS08:	Rolling Stock Contractor
RS:	Serial link designation (e.g. RS 485)
TDMS:	Train Data Management System
MSB:	Most Significant Bit
LSB:	Less Significant Bit
NRZ:	Non Return to Zero
PA/PIS:	Public Address and Passenger Information System
CPU:	Central Process Unit
JMRC :	Jaipur Metro Rail Corporation

1.5 Definitions

In the rest of the document "ATC" designation is used instead of "On-board ATC equipment"

2 ATC – PA/PIS COMMUNICATION ARCHITECTURE

2.1 Train-borne architecture overview

The PA/PIS is connected to the ATC on both front and rear cab.

Two serial lines are used :

- **SL1** between ATC and PA/PIS in cab 1;
- **SL2** between ATC and PA/PIS in cab 2.

The following diagram presents a synoptic of train-borne equipment interfaces between ATC and PA/PIS equipment:

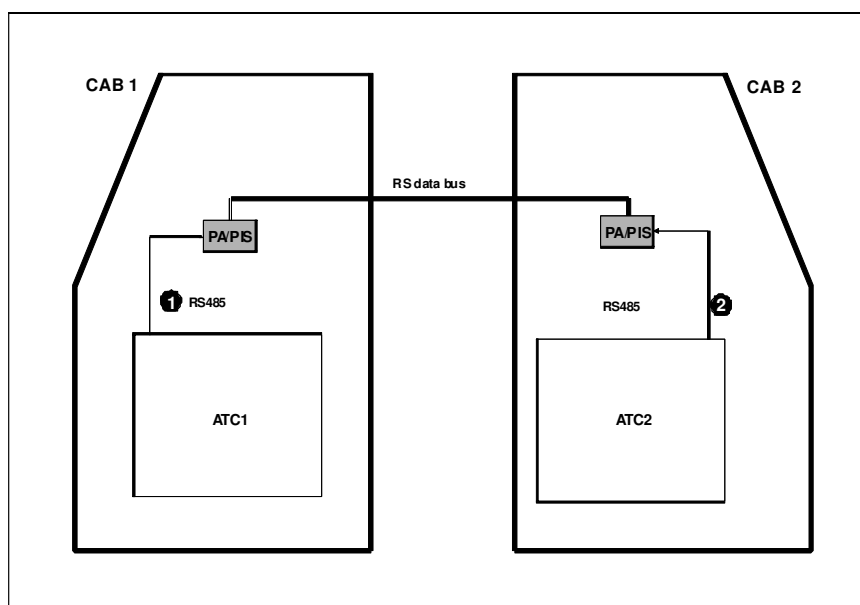


Figure 1: ATC/PA/PIS connection layout

The ATC and PA&PIS are physically connected to the RS485 network.

PA&PIS can only read the messages from the RS485 network.

2.2 Train configuration management

The train configuration management is carried out using serial link frame exchanges which transport the necessary information allowing both ATC and PA/PIS to determine which serial link to be used for operational exchanges.

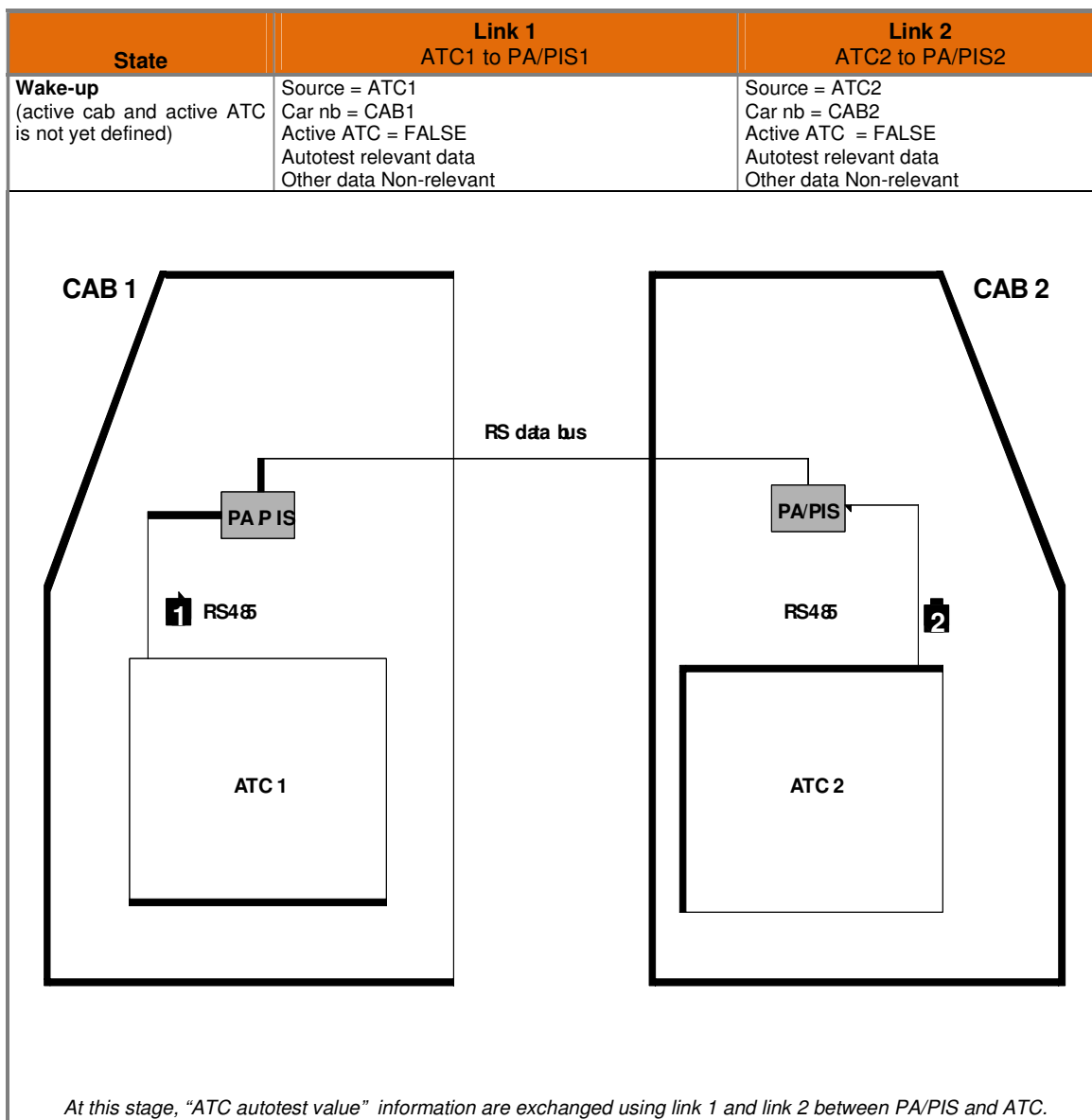
These data are :

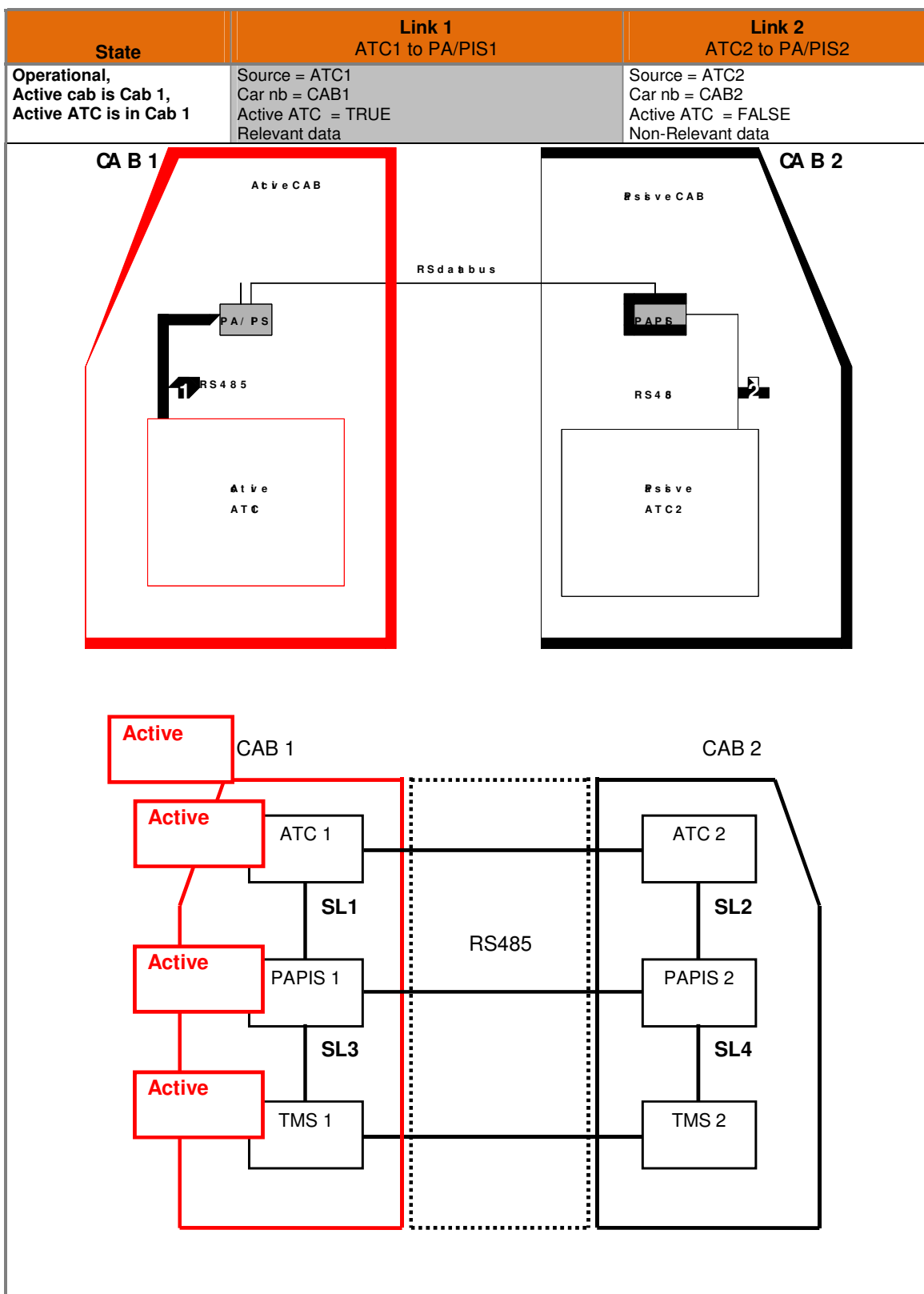
- ☐ from ATC to PA/PIS :
 - Car nb (ATC coding plug).
 - Active ATC.
- ☐ from PA/PIS to ATC : none.

This is reflected in the following sketch which shows the different information exchanged with the 2 serial links.

The grey link represents the "active operational link".

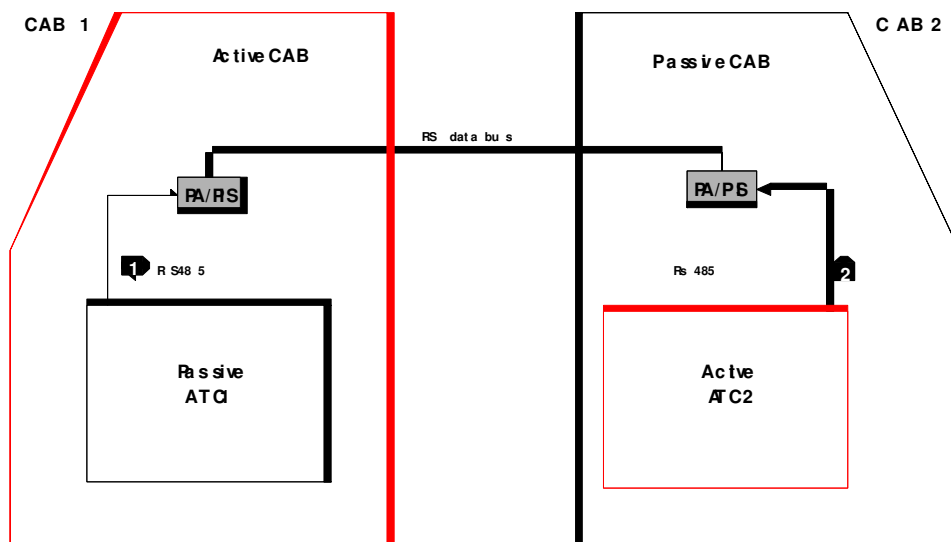
2.2.1 ATC-PAPIS - Active and Passive Operations:



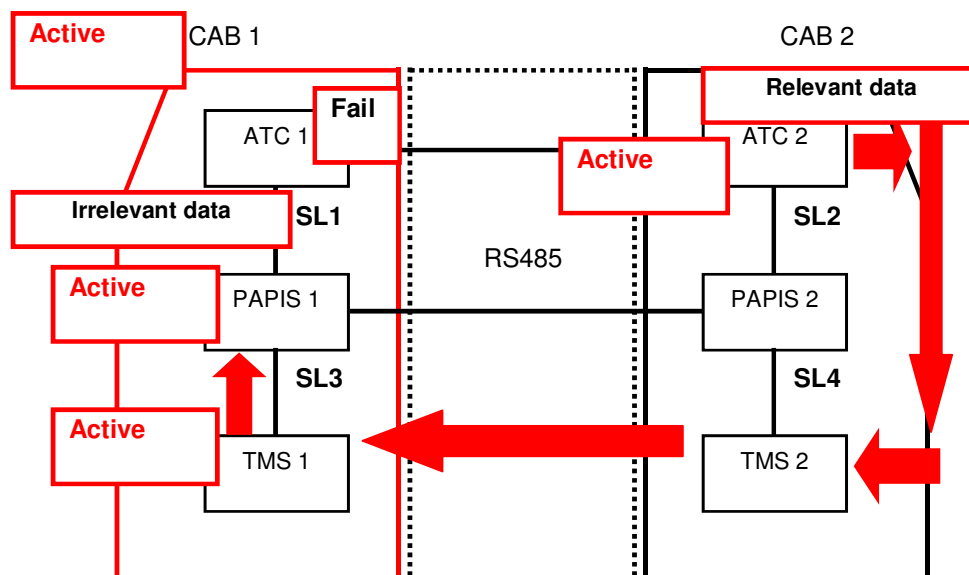


State	Link 1 ATC1 to PA/PIS1	Link 2 ATC2 to PA/PIS2
Operational, Active cab is Cab 1, Active ATC is in Cab 2	Source = ATC1 Car nb = CAB1 Active ATC = FALSE Non-Relevant data	Source = ATC2 Car nb = CAB2 Active ATC = TRUE Relevant data

The ATC2 sends the Relevant data to CAB2 - PAPIS system,

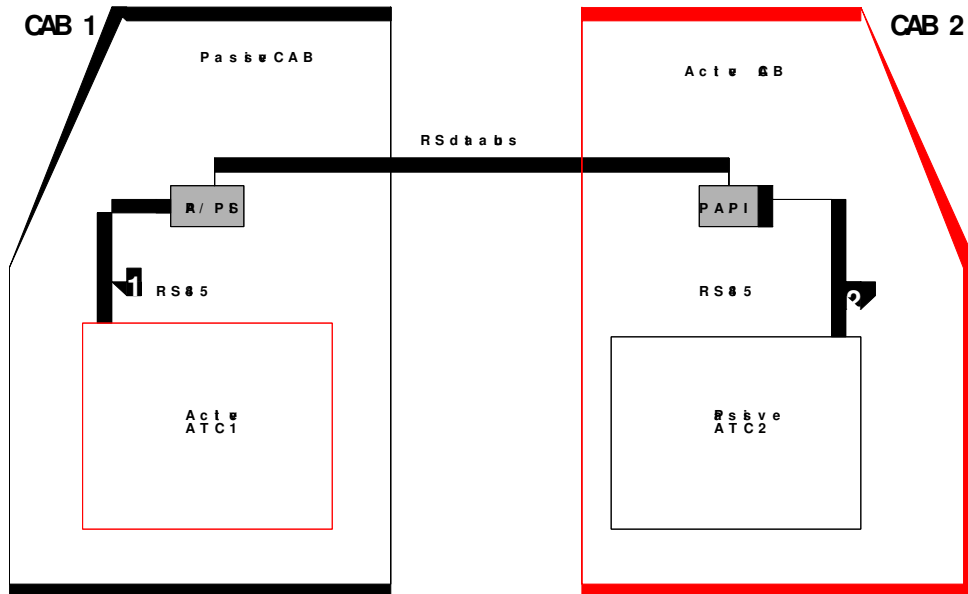


The PAPIS system gets the information as shown in the below data flow :

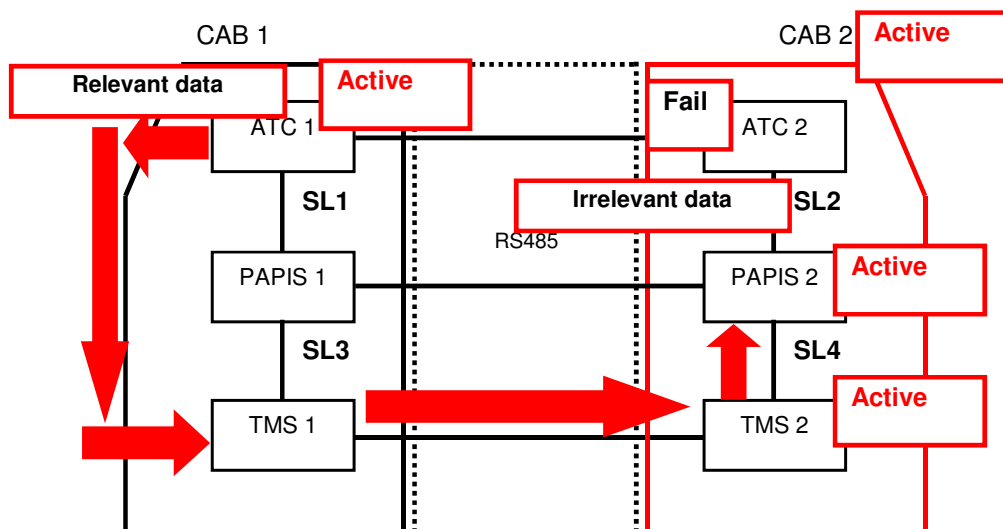


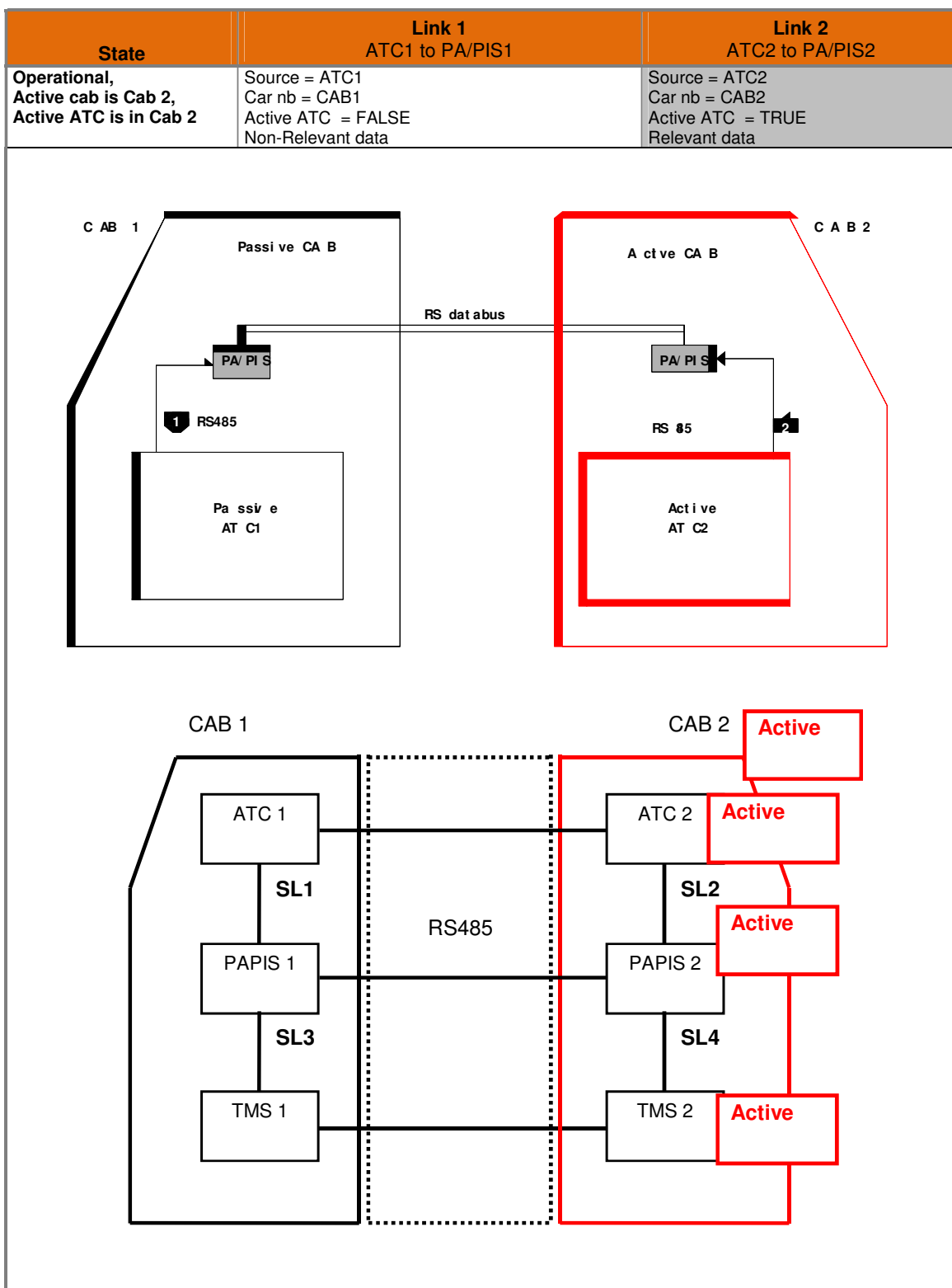
State	Link 1 ATC1 to PA/PIS1	Link 2 ATC2 to PA/PIS2
Operational, Active cab is Cab 2, Active ATC is in Cab 1	Source = ATC1 Car nb = CAB1 Active ATC = TRUE Relevant data	Source = ATC2 Car nb = CAB2 Active ATC = FALSE Non-Relevant data

The ATC 1 sends the Relevant data from CAB 1 to PAPIS system,



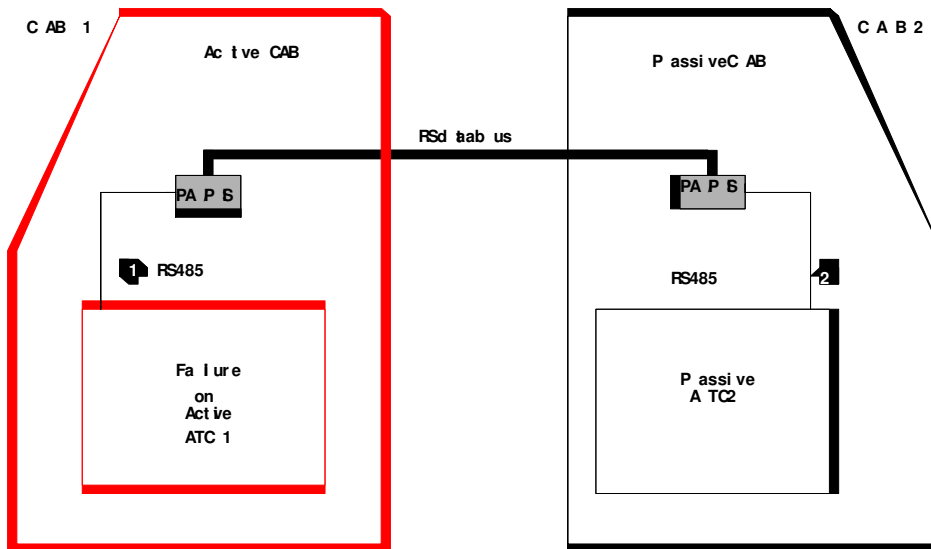
The PAPIS system gets the information as shown in the below data flow :



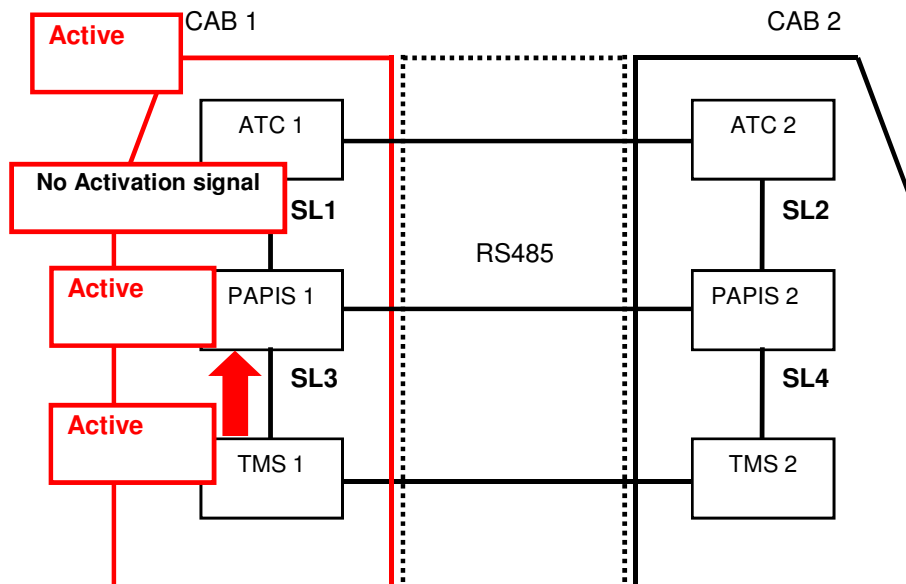


State	Link 1 ATC1 to PA/PIS1	Link 2 ATC2 to PA/PIS2
ATC Changeover : case 1 => Stage 1 : Operational, Active cab is Cab 1, Active ATC is in Cab 1 A failure occurs on ATC1	No data exchange	Source = ATC2 Car nb = CAB2 Active ATC = FALSE Non-relevant data

When ATC 1 Failure Changeover occurs, No Data Exchanged.

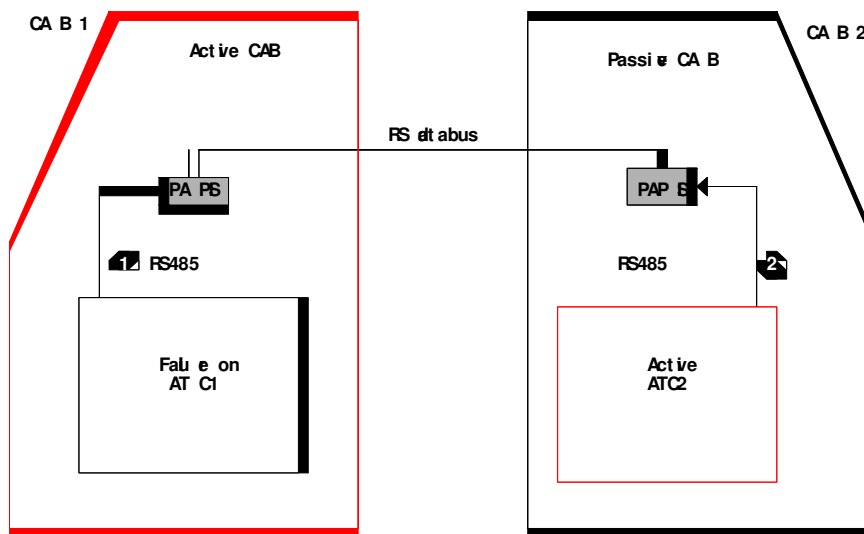


The PAPIS system receives data as per below data flow :

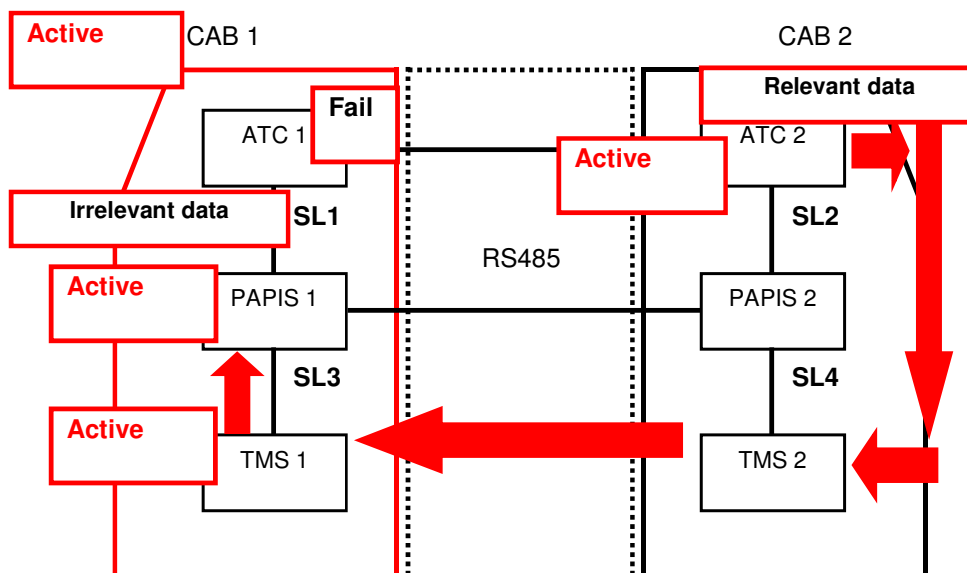


State	Link 1 ATC1 to PA/PIS1	Link 2 ATC2 to PA/PIS2
ATC Changeover : case 1 => Stage 2 : Operational, Active cab is Cab 1, After switching, Active ATC is now in Cab 2	No data exchange	Source = ATC2 Car nb = CAB2 Active ATC = TRUE Relevant data

When ATC 1 Changeover occurred, Now ATC 2 is Active.

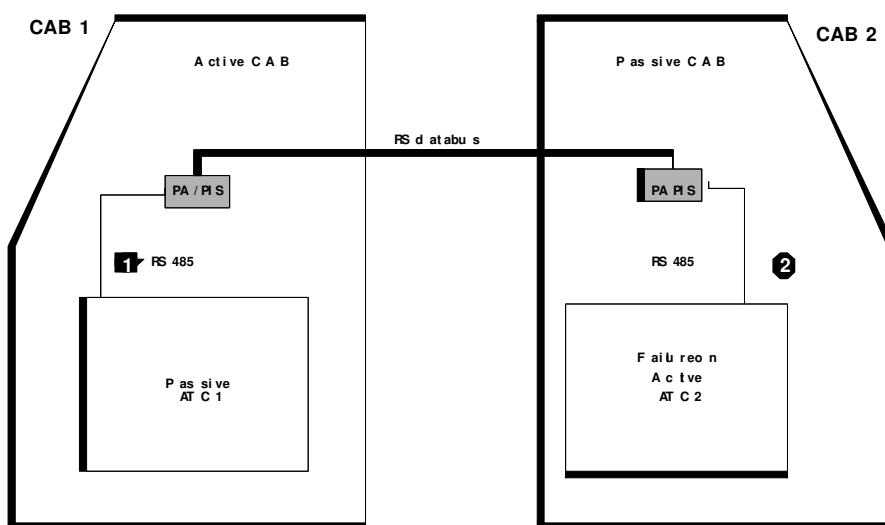


The PAPIS system receives data as per below data flow :

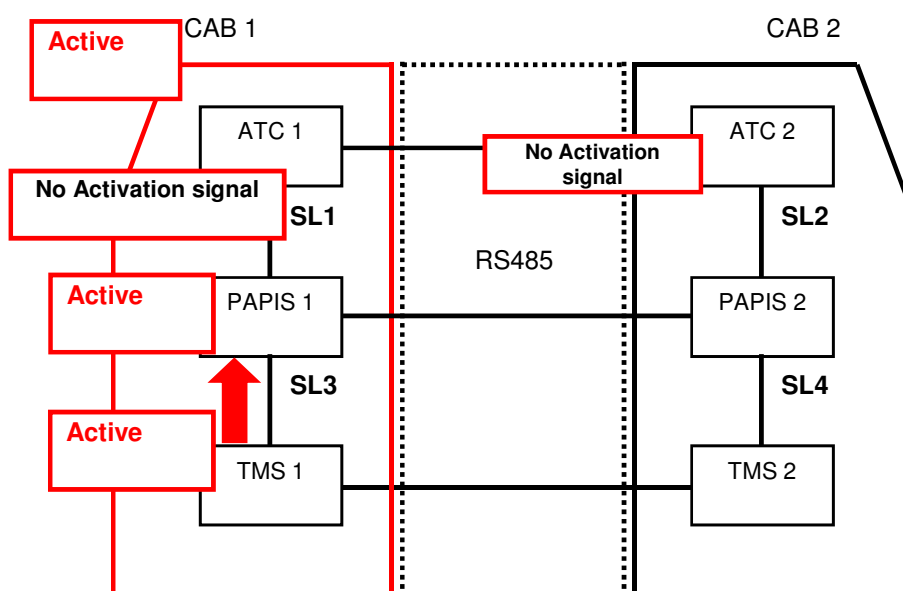


State	Link 1 ATC1 to PA/PIS1	Link 2 ATC2 to PA/PIS2
ATC Changeover : case 2 => Stage 1 : Operational, Active cab is Cab 1, Active ATC is in Cab 2 A failure occurs on ATC2	Source = ATC1 Car nb = CAB1 Active ATC = FALSE Non-relevant data	No data exchange

When ATC 2 Failure Changeover occurs, No Data Exchanged.



The PAPIS system receives data as per below data flow :



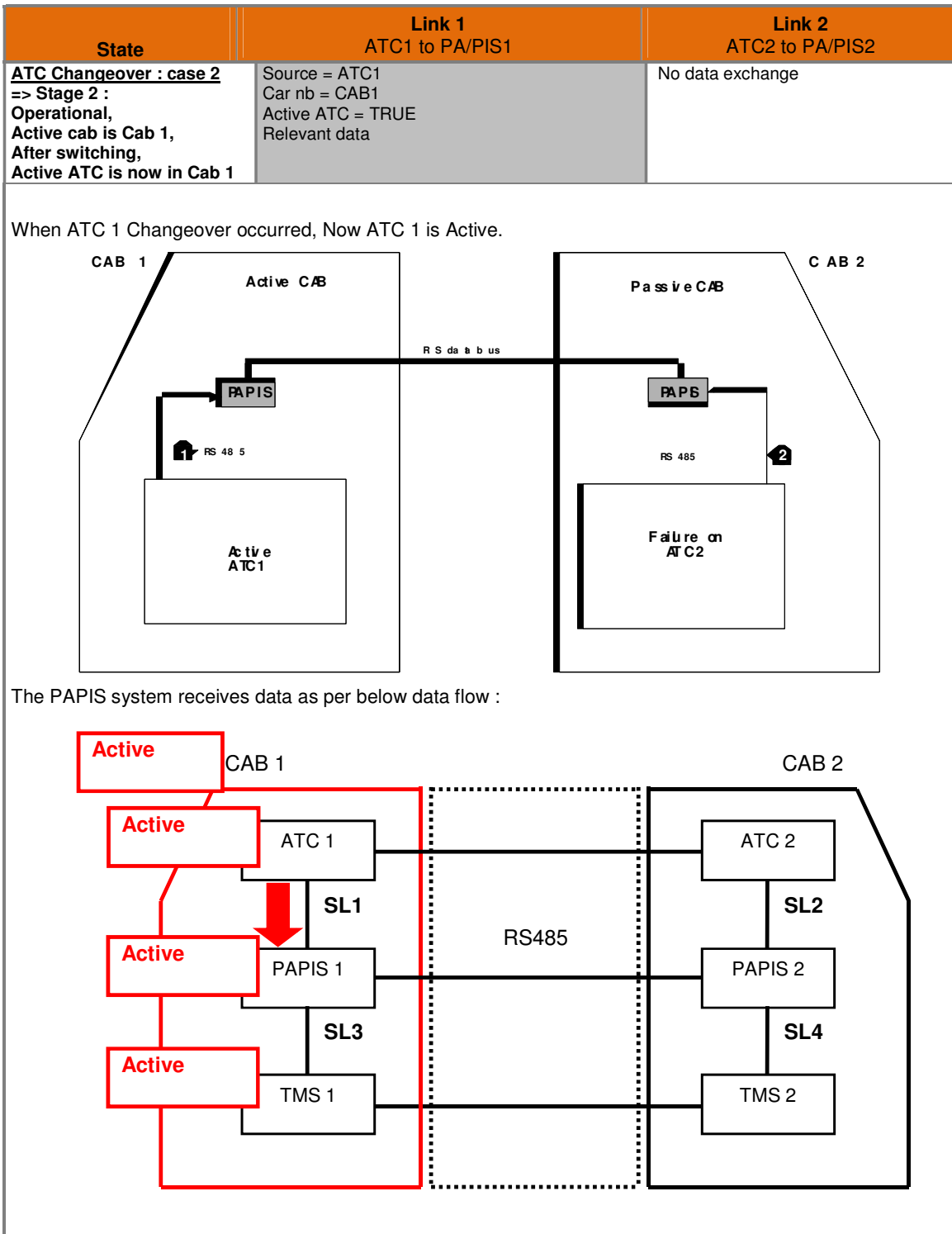


Figure 2 : ATC/PA/PIS connection layout

2.3 Changeover scenarios

ATC can be active either in the active cab or in the passive cab.
Relevant data are always sent by the active ATC.

The following paragraphs explain the influence of some events on the ATC changeover.
Only ATC can decide or not to change over.

2.3.1 Active cab change

This event has no influence on communication between ATC and PAPIS because the ATC communicates locally whatever the state of the cab.

The cab change must be transparent from the point of view of the data exchanged on the serial link. No silence on the serial link should be detected by ATC because this could be considered as a failure on serial link.

3 COMMUNICATION PROTOCOL

The Communication protocol is based upon the ISO 7 layers model:

Layer	Description	Document
1	Physical layer	In this document
2	Data link layer	In this document
3	Network layer	Not implemented
4	Transport Layer	Not implemented
5	Session layer	Not implemented
6	Presentation layer	Not implemented
7	Application layer	Not implemented

3.1 PHYSICAL LAYER

The physical interface between the PA/PIS and the ATC consists of a point to point RS485 serial link.

The electrical levels are compliant with the standard RS485.

The link is galvanically isolated through the use of DC/DC converters.

It operates with a floating potential and transmits a reference voltage signal.

PA/PIS and ATC must include its own protection with respect to the environment (clamping diodes, transil, RC filter).

The bias resistors (R_p : 1200 kOhm, 1/4 W) and the terminating resistors (R_t : 120 Ohm, 1/4 W) for line matching are installed as described on the following drawings.

The cable characteristics are twisted shielded pair (2 wires) cable, Single lines consists of 1 data pair and a signal ground line

Shielding must be connected to earth on each equipment side. On the PA/PIS side, this connection is done through a capacitor.

The PA/PIS is a DTE (Data Terminal Equipment)
The ATC is a DCE (Data Communication Equipment)

The following circuits described in the EIA RS485 standard are used:

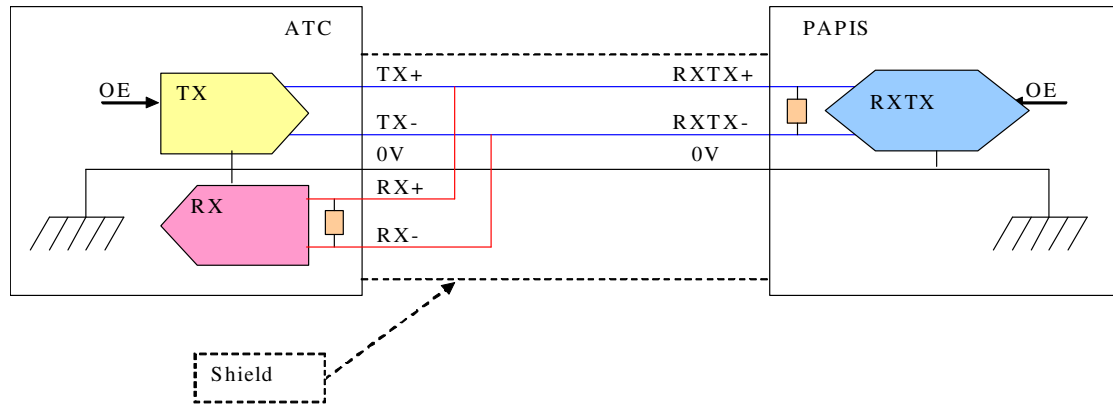


Figure 8-1 Link wiring diagram for RS485

3.2 DATA LINK LAYER

3.2.1 Frame format

The frame is built using a mechanism of transparent char (DLE), to identify the start control char (STX) and the end of frame char (ETX).

DLE	STX	D1	D2		DLE	DLE	...	Dn	DLE	ETX	BCC
-----	-----	----	----	-------	-----	-----	-----	----	-----	-----	-----

- The sequence *DLE+STX* indicates the message start.
- The sequence *DLE+ETX* indicates the message end.
- D1-Dn corresponds to the message useful data characters. Data is binary and not code converted with the exception of the character *DLE* which is doubled to avoid any confusion with the message end sequence *DLE+ETX*, this doubling (*DLE,DLE*) representing only one useful character (*DLE*).
- Doubling of DLE is only required when the value of DLE (10) appears in the data.
- *BCC (Block Control Check)* is the check character which enables the guarantee of data coherence. The *BCC* is calculated to represent the exclusive *OR* between all the useful data characters, character *ETX* and character *4A HEXA* if the number of useful data characters (*n*) is even, the transparent characters *DLE* being ignored.

3.2.2 Dimensional constraints

The message length is limited to 256 chars of data.

Each message must have 1 data char at least.

It is possible to define, for the reception, a minimal size and a maximal size for messages; this to detect rapidly a transmission error (corruption of the DLE char, ETX char,...) with $1 < \text{Size} < 256$.

3.2.3 Timings

3.2.3.1 Inter-character timings

The emitter must perform the proximity between the data to determine the transmission time.

The receiver can define a maximal time-out between two chars to detect rapidly an interruption of the reception.

3.2.3.2 Inter-frame time-out

It is possible to define a inter frames maximal time-out to perform a fast re-synchronisation, on a new frame, after a communication stop(because of an error...).

This inter frames time-out is defined between the reception of the last char and the DLE char of the beginning of the new frame. The exchange mechanism must provide a minimal delay between two frames bigger than the inter frame time-out.

3.2.4 Physical Char Coding

A frame is made up of a sequence of characters, each character being defined by :

- 1 start bit, b0,
- 8 data bits, b1 to b8, to define the code of the encoded character,
- 1 parity bit, b9 : the parity bit shall be equal to 0 when the quantity of binary elements in bits b1 to b8 is even (even parity),
- 1 stop bit, b10.

The eight data bits b1 to b8 are transmitted in increasing order of significance: LSB (Least Significant Bit) through MSB (Main Significant Bit).

It means LSB is first transmitting from the point of view of the transmitter and LSB is first received from the point of view of the receiver.

NRZ coding is used to transmit the data on the line.

3.2.5 Data link layer parameters

The protocol parameters of this layer are defined as follows:

Baud Rate/speed : 19.2 Kbps
inter char time-out : none (this means that this parameter is not controlled by the protocol)
inter frame time-out : none (protocol is used as a master / slave protocol)
min size of messages : 2 characters
max size of messages : 128 characters
Transmission Cycle : 500ms.

3.2.6 Frame Example

3.2.6.1 Odd Useful Length Frame

Example: the message to be transmitted composed of the following 3 bytes:

	1st byte	2nd byte	3rd byte
Binary	1001 1100	0001 0000	1111 0000
Hexadecimal value	9 C	1 0 (DLE)	F 0
Code	9 C	1 0 (DLE)	F 0

The following frame is obtained:

	Hexa Value	b1	b2	b3	b4	b5	b6	b7	b8	Characters entering in the BCC calculation
DLE	10	0	0	0	0	1	0	0	0	No
STX	02	0	1	0	0	0	0	0	0	No
	9C	0	0	1	1	1	0	0	1	Yes
DLE	10	0	0	0	0	1	0	0	0	No
DLE	10	0	0	0	0	1	0	0	0	Yes
	F0	0	0	0	0	1	1	1	1	Yes
DLE	10	0	0	0	0	1	0	0	0	No
ETX	03	1	1	0	0	0	0	0	0	Yes
BCC	7F	1	1	1	1	1	1	1	0	= (0x9C) XOR (DLE) XOR (0xF0) XOR (ETX)

3.2.6.2 Even Useful Length Frame

Example: the message to be transmitted composed of the following 4 bytes:

	1st byte	2nd byte	3rd byte	4th byte
Binary information	1001 1100	0001 0000	1111 0000	1010 0010
Hexadecimal value	9 C	1 0 (DLE)	F 0	A 2
Code	9 C	1 0 (DLE)	F 0	A 2

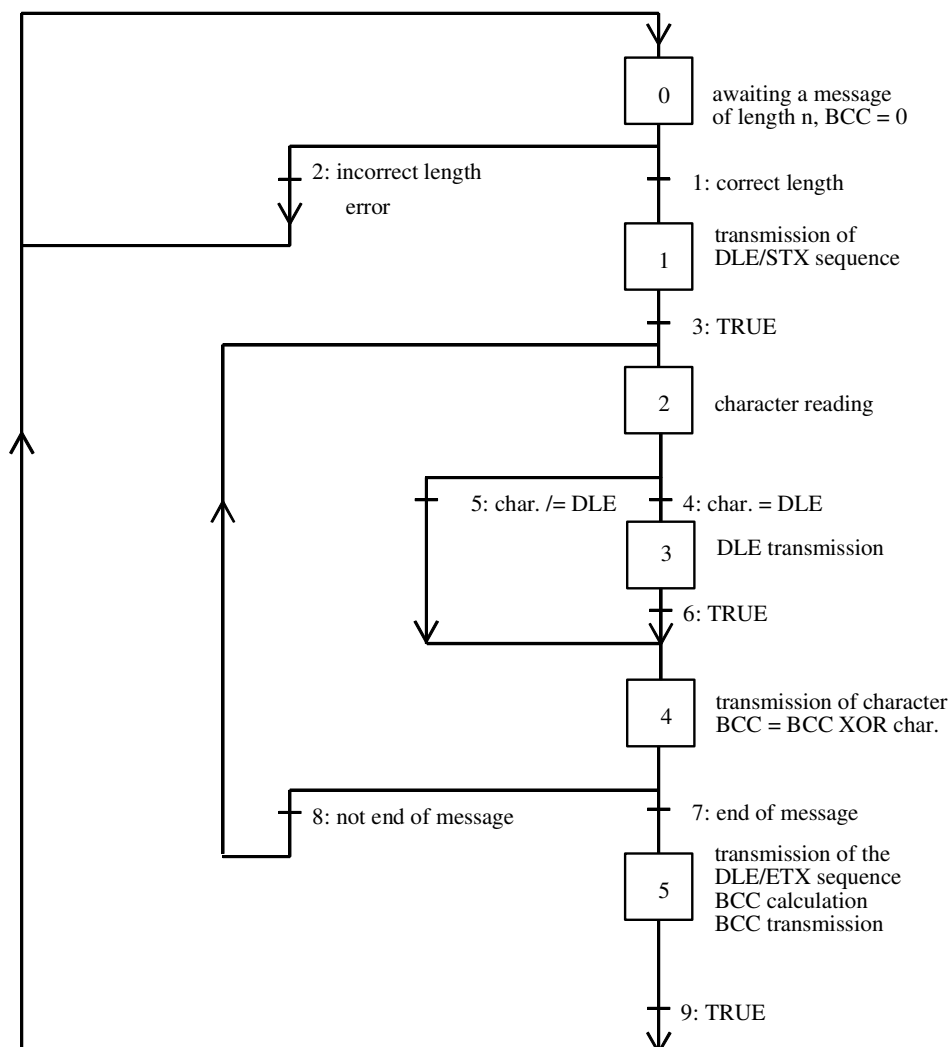
The following frame is obtained:

	Hexa Value	b1	b2	b3	b4	b5	b6	b7	b8	Characters entering in the BCC calculation
DLE	10	0	0	0	0	1	0	0	0	No
STX	02	0	1	0	0	0	0	0	0	No
	9C	0	0	1	1	1	0	0	1	Yes
DLE	10	0	0	0	0	1	0	0	0	No
DLE	10	0	0	0	0	1	0	0	0	Yes
	F0	0	0	0	0	1	1	1	1	Yes
	A2	0	1	0	0	0	1	0	1	Yes
DLE	10	0	0	0	0	1	0	0	0	No
ETX	03	1	1	0	0	0	0	0	0	Yes
	4A	0	1	0	1	0	0	1	0	Yes
BCC	97	1	1	1	0	1	0	0	1	=(0x9C)XOR (DLE) XOR (0xF0) XOR (0xA2) XOR (0x4A) XOR (ETX)

The character 0x4a is not part of the frame (see 3.2.1)

3.2.7 Example of Frame Encoding

The following diagram shows the mechanism for encoding a frame for transmission:



Description of status:

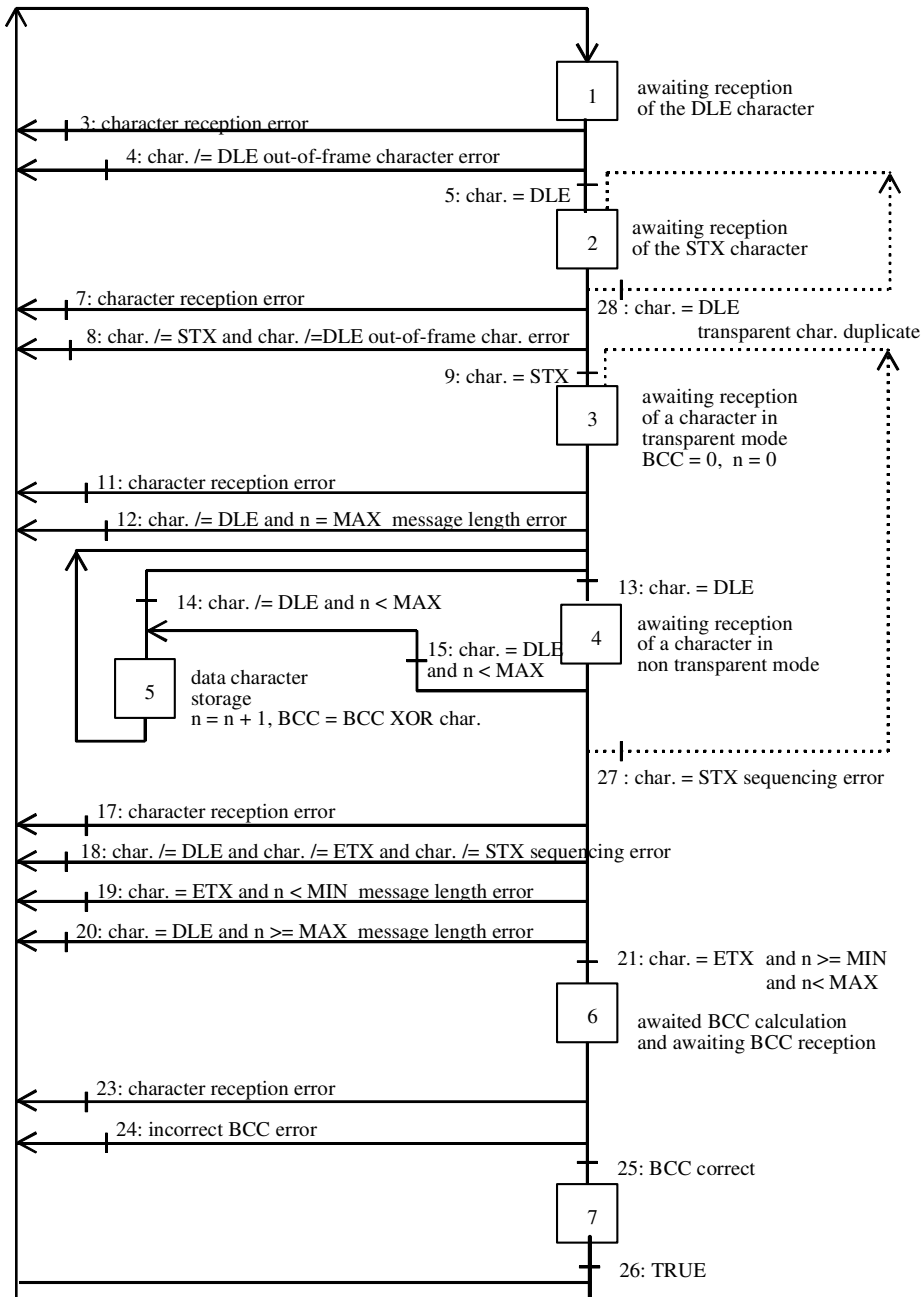
- status 0 : awaiting a request for frame encoding (message length = n) and BCC initialisation (BCC = 0).
- status 1 : transmission of the DLE/STX sequence
- status 2 : acquisition of a character of the message to be transmitted
- status 3 : processing of DLE character doubling
- status 4 : character transmission and calculation of the BCC (BCC = BCC XOR character)
- status 5 : transmission of the DLE/ETX sequence, BCC calculation (BCC = BCC XOR ETX then BCC = BCC XOR 0x4A if n even).

Description of transitions:

- transition 1 : message length correct ($1 \leq n \leq 256$)
- transition 2 : message length incorrect ($n < 1$ or $n > 256$)
- transition 3 : always true
- transition 4 : the character to be transmitted is DLE
- transition 5 : the character to be transmitted is not DLE
- transition 6 : always true
- transition 7 : number of characters transmitted equal to n
- transition 8 : number of characters transmitted different than n
- transition 9 : always true.

3.2.8 Example of Frame Decoding

The following diagram shows the mechanism for decoding a frame for reception:



Description of status :

- status 1 : awaiting the DLE character reception.
- status 2 : awaiting the STX character reception.
- status 3 : after the reception of a STX char, initialisation of the number of characters received ($n = 0$) and the BCC ($BCC = 0$) then awaiting reception of a character in transparent mode (awaiting any character). In case of a character reception error the counters are resetted (transitions 11, 12, 27).
- status 4 : awaiting reception of a character in non-transparent mode (awaiting DLE or ETX).
- status 5 : acquisition of a useful data character, incrementation of the number of characters received ($n = n+1$) and BCC calculation ($BCC = BCC \text{ XOR character received}$) then awaiting reception of a character in transparent mode (awaiting any character).
- status 6 : BCC calculation awaited ($BCC = BCC \text{ XOR ETX}$ then $BCC = BCC \text{ XOR } 0x4A$ if n even) then awaiting BCC reception.
- status 7 : message completely received (transitory status).

Description of transitions :

- transition 3 : error on character reception: the character has been corrupted (levels, parity,...).
- transition 4 : reception of a character different to DLE: out-of-frame character.
- transition 5 : DLE character reception
- transition 7 : error in character reception.
- transition 8 : reception of a character different to STX: out-of-frame character.
- transition 9 : STX character reception.
- transition 11 : error in character reception.
- transition 12 : reception of a character different to DLE and number of characters received equal to the maximum length of messages in reception mode: message length error.
- transition 13 : DLE character reception (passage in non transparent mode).
- transition 14 : reception of a character different to DLE (passage in transparent mode).
- transition 15 : DLE character reception.
- transition 17 : error in character reception.
- transition 18 : reception of a character different to DLE, to ETX and to STX in non transparent mode: sequencing error.
- transition 19 : reception of the ETX character when the number of characters received is less than the minimum length of messages in reception mode: message length error.
- transition 20 : reception of the DLE character when the number of characters received is equal to the maximum length of messages in reception mode: message length error.
- transition 21 : reception of the ETX character in non transparent mode.
- transition 23 : character reception error.
- transition 24 : reception of a character different to the BCC awaited.
- transition 25 : reception of the BCC awaited.
- transition 26 : always true.
- transition 27 : reception of the STX character in non-transparent mode, i.e. a start of frame during frame reception: sequencing error. The start of frame is considered valid and the decoding of a new frame is re-initialised.
- transition 28 : reception of the DLE character when awaiting the STX character: transparent character error. This character may be considered as the start of a new frame.

The transitions 27 and 28 are in favour of the re-synchronisation on a new frame when setting up a communication or after a communication error, without invoking time delay restrictions.

4 DATA TRANSFER

4.1 Messages Sent from ATC to PA&PIS

These messages are sent from the ATC Equipment to PA/PIS.

Information bytes description :

Identifier		Byte	Bits								Description	Comments	
			7	6	5	4	3	2	1	0			
		0								1	1	CPUx is Master	
		1	0	0	0	0	1	1	1	1	Standard Header for Periodic Response=1		
ATC State		2									X	State of this ATC	0 = this ATC cubicle is not in an active state. 1 = this ATC cubicle is in an active state.
		2									X	State of health of the local ATC	0 = the local ATC cubicle is not working. 1 = the local ATC cubicle is working.
									X	State of health of the remote ATC	0 = the remote ATC cubicle is not working. 1 = the remote ATC cubicle is working.		
NEXT STATION EVENT									X		Next station event	This bit is set to 1 as soon as the train has left the station. When this bit is set to 1, the data in the <i>Current station code</i> field is no more relevant. This bit is reset to 0 when the train enters the next station. When this bit is set to 0, the <i>skip station</i> and <i>keep door closed</i> event bits are not relevant.	
Approaching Station							X					Approaching station event	This bit is set to 1 when the train is approaching the (200mts) next station.
Reserved			X	X	X							Spare	Set to 0
Reserved		3 to 14											

Identifier		Byte	Bits								Description	Comments	
			7	6	5	4	3	2	1	0			
NEUTRAL ZONE		15								X	Neutral zone event	This bit is set to 0 if the train is out of the neutral zone area and is set to 1 when is located on the neutral zone area.	
SKIP STATION										X	Skip station event	This bit is set to 1 if the next station will be skipped. The Skip station flag is valid and CONSTANT while the Next Station Flag is equal to 1. The reason is that the Skip station order can only be received by the on-board ATC when the train is in the station.	
RESERVED								X					
RESERVED							X						
RESERVED						X							
RESERVED					X								
Reserved			X	X								Spare	Set to 0
SPEED		16									Velocity	1bit for 1km/h	
STATUS		17									X	Status	0 = The date is relative from 0 as ATC has not yet received data from ATC trackside after power-up 1 = The date is absolute
									1		1 = Station Valid (always true)		
								1			1 = ATO/ATP Software version Valid (always true)		
			X								Spares		
YEAR		18									Year of the ATC data to be logged	Binary value in range [00 .. 99 years] (20xx)	
MONTH		19									Month of the ATC data to be logged	Binary value in range [0 .. 11 months]	
DAY		20									Days of the ATC data to be logged	Binary value in range [0 .. 30 Days]	
HOUR		21									Hours of the ATC data to be logged	Binary value in range [0 .. 23 hours]	
MINUTE		22									Minutes of the ATC data to be logged	Binary value in range [0 .. 59 minutes]	

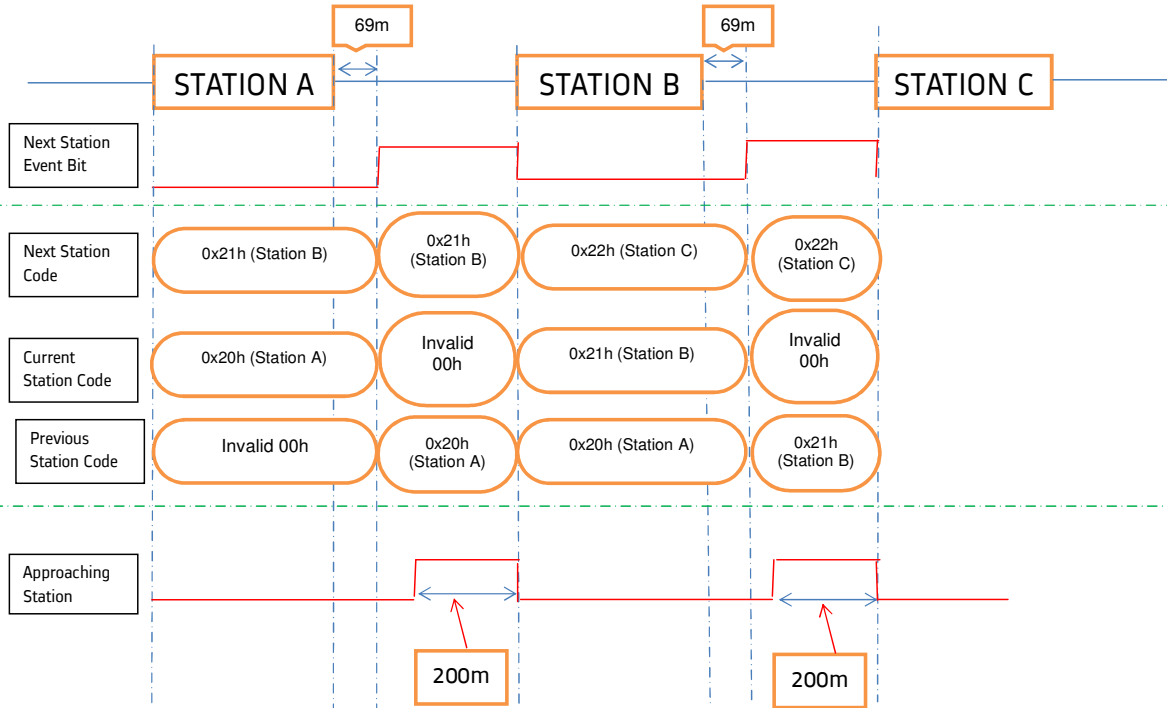
Identifier		Byte	Bits								Description	Comments
			7	6	5	4	3	2	1	0		
SECOND		23									Seconds of the ATC data to be logged	Binary value in range [0 .. 59 seconds]
ACAR		24	Not used = 0						B 9	B 8	ATC Car number	Identification of the ATC which sends this message.
		25	B 7							B 0		
TRAIN ID		26	1st BCD digit			2nd BCD digit			Train identification See 4.1.2		Four BCD digits	
		27	3rd BCD digit			4th BCD digit						
CREW ID		28	Not used = 0			1st BCD digit			Crew identification		Three BCD digits	
		29	2nd BCD digit			3rd BCD digit						
EBRO1		30								X	State of the vital output EBRO1 (Emergency Brake output)	0 = EB is applied. 1 = EB is not applied.
EBRO2										X	State of the vital output EBRO2 (Emergency Brake output)	0 = EB is applied. 1 = EB is not applied.
ZVR1								X			State of the vital output ZVR1 (Zero Velocity Relay output)	0 = the train is not stopped. 1 = the train is stopped
ZVR2							X				State of the vital output ZVR2 (Zero Velocity Relay output)	0 = the train is not stopped. 1 = the train is stopped
DER						X					State of the vital output DER (Door Enable Right side)	0 = current station door opening for right side not authorised 1 = current station door opening for right side authorised
DEL					X						State of the vital output (Door Enable Left side)	0 = current station door opening for left side not authorised 1 = current station door opening for left side authorised
ACTATC				X								State of the vital output ACTATC (ActiveATC)

Identifier	Byte	Bits								Description	Comments
		7	6	5	4	3	2	1	0		
Reserved		X								Reserved	Set to 0.
LACTCAB								X		State of the vital input LACTCAB (Local Active Cab)	0 = local cab is not active 1 = local cab is active
RACTCAB							X			State of the vital input RACTCAB (Remote Active Cab)	0 = remote cab is not active 1 = remote cab is active
ATP						X				State of the vital input ATP (ATP position of mode selector)	0 = ATP position is not selected 1 = ATP position is selected.
RMM					X					State of the vital input RM (RM position of mode selector)	0 = RM position is not selected 1 = RM position is selected.
REV				X						State of the vital input REVERSE (REVERSE position of mode selector)	0 = REVERSE position is not selected 1 = REVERSE position is selected.
DCL			X							State of the vital input DCL (Door Closed and Locked)	0 = Doors are not closed and locked 1 = Door are closed and locked
ROS		X								State of the ROS (Running On Sight) internal driving mode in ATC	0 = ROS non-active 1 = ROS active
EBRV		X								State of the non-vital input EBRV (Emergency Brake Valve Relay)	0 = The emergency brake is applied 1 = The emergency brake is not applied
ROC	32							X		State of the non-vital output ROC (Right Output door Control output)	0 = right door opening not controlled. 1 = right opening controlled.
LOC								X		State of the non-vital output LOC (Left Output door Control output)	0 = left door opening not controlled. 1 = left opening controlled.
SB	32					X				State of the non-vital output SB (Service brake output)	0 = full service brake not requested. 1 = full service brake requested
Reserved		X	X	X	X	X				Reserved	Set to 0

Identifier	Byte	Bits								Description	Comments
		7	6	5	4	3	2	1	0		
AUTO	33								X	State of the AUTO non-vital input (AUTO position of mode selector)	0 = AUTO position is not selected 1 = AUTO position is selected.
Reserved	33							X		Reserved	<i>Note : This data was previously CO = State of the CO sealed switch non-vital input (Cut-Out mode).</i>
EBRI							X			State of the EBRI non-vital input (Emergency brake relay input)	0 = EB is not applied by RS 1 = EB is applied by RS.
START ORDER PUSH-BUTTON						X				State of the <i>Start</i> push-button.	0 = not pressed 1 = pressed
TRAIN READY PUSH-BUTTON					X					State of the <i>Train ready</i> push-button on the ATC DMI.	0 = not pressed 1 = pressed
ROS ACK PUSH-BUTTON				X						State of the <i>ROS request</i> push-button on the ATC DMI.	0 = not pressed 1 = pressed
RESERVED			X								
RESERVED		X									
Wheel diameter	34									Wheel diameter measured by ATP in HEXA decimal code (Upper)	Set to Maximum value if computed value is not available(Value in mm)
Wheel diameter	35									Wheel diameter measured by ATP in HEXA decimal code (Lower)	Set to Maximum value if computed value is not available(Value in mm)
PWM effort	36									Indicate the percentage of the traction/braking effort	Percentage (0-100%) of the traction/braking effort. Quantum = 0.5% 0xFF = Train not in ATO
PWM type	37									Indicate the type of the ATO traction/braking control	0 = coasting 1 = braking 2 = traction 0xFF = Train not in ATO

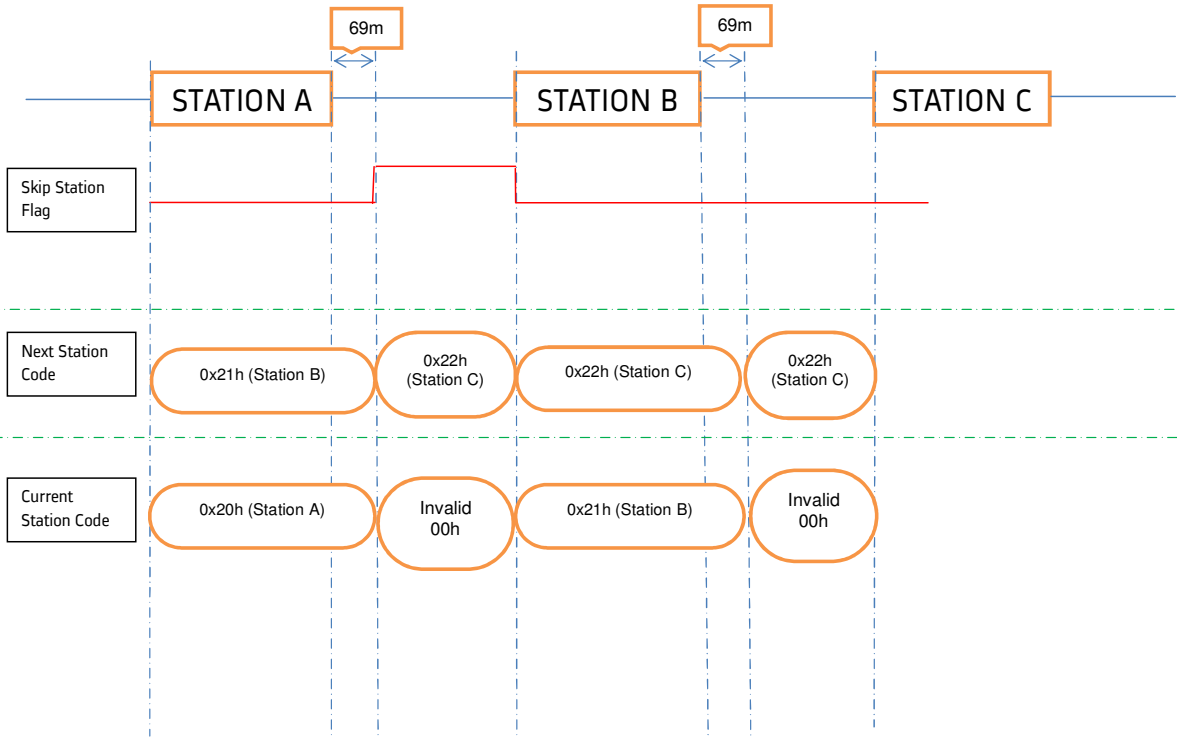
Identifier	Byte	Bits								Description	Comments
			7	6	5	4	3	2	1	0	
SW1	38									ATC-TDMS software release (BYTE1)	1 st and 2 nd BCD digit of the software ATC-TDMS version Example : version 12.34 gives SW1=0x12 and SW2=0x34
SW2	39									ATC-TDMS software release (BYTE2)	3 rd and 4 th BCD digit of the ATC TDMS software version.
PREVIOUS ID	40-41									Previous station ID	Codes detailed in section 4.1.1
CURRENT ID	42-43									Current station ID	Codes detailed in section 4.1.1
NEXT ID	44-45									Next station ID	Codes detailed in section 4.1.1
DESTINATION ID	46-47									Destination ID	Codes detailed in section 4.1.1
DEPARTURE ID	48-49									Departure ID	Codes detailed in section 4.1.1
Operation LINE ID	50-51									Operation LINE ID	0 = unknown 1 = Line 1 N-S Corridor 2 = Line 2 E-W Corridor
RUNNING DISTANCE	52-53									Running distance since last DER/DEL (train docked in station)	1 m per bit
Next Station Door Open Side	54								X	Next station door open LEFT Side	This Bit is "1", When the next station will be open the LEFT Side door.
									X	Next station door open RIGHT Side	This Bit is "1", When the next station will be open the RIGHT Side door.
SLID	55-59									Identification string	String
Spare	70-73										

Timing Chart for the below Messages



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Timing Chart for Skip Station (STATION B)



Details on the fields of the message ATC/PA&PIS

LOCATION OF THE TRAIN	The train enters the station, is braking or is docked in the station	The doors are closed and the train is leaving the station	The train is in the inter-station	The train is at less than 200 m to the next station	The train enters the station, is braking or is docked in the station
FIELDS					
Next Station Event	0	1	1	1	0
Approaching station	0	0	0	1	0
Skip station	Data not relevant	0=The station will not be skipped, 1=The station will be skipped,			Data not relevant
Keep door closed	Data not relevant	0=Doors will be opened at the next station, 1=Doors will be kept closed			Data not relevant
Previous station code (example)	VIVEK VIHAR Code	SHYAM NAGAR Code			SHYAM NAGAR Code
Current station code (example)	SHYAM NAGAR Code	Data not relevant			RAM NAGAR Code
Next station code (example)	RAM NAGAR Code	RAM NAGAR Code			CIVIL LINES Code

*** Note: these events are triggered by ATP software as follows:**

- "Entering station" event is triggered when STATION singularity is crossed by safety maximum location of the train.

- "Leaving station" event is triggered when maximum location is after the SSP (Station Stopping Point) SSP + DerrLocMax (maximum error that can exist on the safety maximum location).

4.1.1 List of the station ID

List of the station ID NEXT/CURRENT/PREVIOUS/DEPARTURE/DESTINATION STATION fields of the message.(these fields are coded on 8 bits). The station ID for line 2 E-W Corridor to keep an 8 bits structure.

The Destination Identification changes at each trip or turn back.

Line 2 (Stage 1) / Corridor-2 (East West):

The Station Names, Station Abbreviations and Station IDs :

STATION NAME	Abbreviations	Station IDs in HEX
Mansarovar	MSOR	0x18
New Atish Market	NAMT	0x19
Vivek Vihar	VKVR	0x1A
Shyam Nagar	SMNR	0x1B
Ram Nagar	RMNR	0x1C
Civil Lines	CLJP	0x1D
Metro Railway Station	MRSN	0x1E
Sindhi Camp	SICP	0x1F
Chandpole	CDPE	0x01

4.1.2 Coding rules for the Train Id field

The basic coding rules are as follows:

Train id is a 4 digit number.

The first two digits identify a destination with a *destination code*. The second two digits are a *service identifier* (or circulation number). This is allocated to train when it enters service and is maintained until it finishes its service.

A train out of service as well on the mainline as in the depot would be controlled and followed from its "Rake Id". Since Rake id is coded from 0000 to 0999, the destination codes "00" to "09" are for out of service trains. A train in service on the mainline only will be controlled and followed from its "Train Id". The range of "Train Id" Trains in service is 1000 to 8999.

The value of these identifiers follows the ranges indicated by the [A4] document.

4.2 Aperiodic request from PA&PIS to ATC

Not used

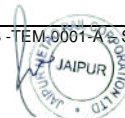
4.3 Aperiodic response from ATC to PA&PIS

Not used

JMRC CONTRACT JP/JS02-1B

Signalling - PIDS/PAS and Master clock Interface Document

05-Dec-2018	M Arun Kumar ATS Integrator	Shanmugan K ATS Leader	AGGARWAL Anurag Project Engg Manager	MISHRA Himanshu Project Manager	 Alstom Transport India Limited 66/2, 3rd Floor, Bagmane Embassy Prime Building, Bagmane Tech Park, C. V. Raman Nagar, Bengaluru – 560 075, India, Karnataka, India.			
DATE	WRITTEN	VERIFIED	VALIDATED	APPROVED				
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Description of the column 'For'

Observation:

DOCUMENT EVOLUTION

REVISIONS				
Version	Author	Date (dd-mm-yyyy)	Page / Paragraph	Modifications
A	Sudarshan N	08-AUG-12	All	First Issue
B	Mahesh Joshi	07-JAN-13	Para 3.2 Para 4.4.2 Figure 7 Para 4.6	Para 3.2 & 4.4.2 updated as per JS14 Comments dated October 24, 2012. Fig 7 & Para 4.6 updated for more clarity
C	Mahesh Joshi	25-02-2013	Para 2.4.4	Para 2.4.4 updated as per JS15 Comments dated February 18 th 2013
D	Aditya Vedula	17-10-2013	Para 2.9.4 Figure -6 Figure -9	DMRC comments dated 03/04/2013
E	M Arun Kumar	05-12-2018	Section 2.9.4 Table - 8	Updated for 1B Extension



BIBLIOGRAPHY

Applicable standards and documents:

Id.	Title	Ref.
[A1]	Signalling Project Quality Plan (PQP)	JPJS02-QM-0001
[A2]	Train Control & Signalling and Telecommunication System / Contract JP/JS02	-
[A3]		
[A4]		
[A5]		

Reference standards and documents:

Id.	Title	Ref.
[R1]	Signalling System Design Specification (SDS)	JPJS02-SE-0006
[R2]	Signalling System Engineering Management Plan (SEMP)	JPJS02-PM-0006
[R3]	Design Verification Table	JPJS02-PM-0020
[R4]	ATS to ATC Station Identification	JPJS02-SE-0048
[R5]		



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1 INTRODUCTION

1.1 Scope

The aim of this document is to describe the PIDS/PAS and Master Clock interface with the ATS Sub-system.

1.2 Field of application

This document applies to the project Train Control and Signalling System for Corridor-2 of JAIPUR Metro Rail Corporation Limited (JMRCCL).

The Works to be executed under the Contract include the design, manufacture, verification, delivery, installation and testing, commissioning and technical support for a complete, integrated Train Control and Signalling System, including all control centers, track-side, and train borne equipment, necessary to deliver the requirements of this Specification.

Corridor-2 of JMRCCL consists of approx. 12 kms from Mansarovar to Badi Chaupar, some on elevated and some at underground. There are 11 stations on Corridor-2 and one depot at Mansarovar. It will operate using Automatic Train Operation, Automatic Train Protection and Automatic Train Supervision. The Operational Control Centre will be located at Mansarovar Depot (OCC).

In particular, this document applies to the ATS sub-system PIDS/PAS and Master Clock Interface, the requirements, specifications and the operation of the same.

1.3 Abbreviations

• ASCV	Apparato di Stazione a Calcolatore Vitale
• ATC	Automatic Train Control
• ATP	Automatic Train Protection
• ATO	Automatic Train Operation
• ATS	Automatic Train Supervision
• CATS	Central Automatic Train Supervision
• CER	Central Equipment Room
• CBI	Computer Based Interlocking
• DATS	Depot Automatic Train Supervision
• DCC	Depot Control Centre
• DER	Depot Equipment Room
• ESP	Emergency Stop Plunger
• FOTS	Fibre Optic Transmission System
• HDLC	High Level Data Link Control
• I/O	Input/output
• LAN	Local Area Network
• LATS	Local Automatic Train Supervision
• HMI	Man Machine Interface
• MSS	Main Signalling Station
• NST	Non Stop Train
• NTP	Network Time Protocol



- OCC Operations Control Centre
- OLE Object Linking and Embedding
- OPC OLE for Process Control
- PIDS & PAS Passenger Information Display System & Public Address System
- PTI Positive Train Identification
- RIN Radio Identity Number
- RM Restricted Manual
- SCR Station Control Room
- SER Station Equipment Room
- SSS Secondary Signalling Station
- SUP ATS Sub-system Supervision
- TC Track Circuit
- TCP/IP Transmission Control Protocol / Internet Protocol
- TSR Temporary Speed Restriction
- TVM Tunnel Ventilation management
- WAN Wide Area Network
- LOM Line Operating Mode.
- CHW Constant Headway
- MCK Master Clock

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2 PIDS/PAS INTERFACE

This chapter presents the general specification and utilisation of PIDS and PAS concerning the arrival and departure of the trains at each station platform.

2.1 ATS Node with PIDS/PAS System

Each Depot or Central ATS is autonomous; its scope of control stops at the boundary of the depot or mainlines. CATS, DATS and LATS are linked to one or more Telecommunication systems as indicated in Figure 1&2. The connections between ATS and other telecom subsystems (PIDS PAS, TVM, and Master Clock) are redundant.

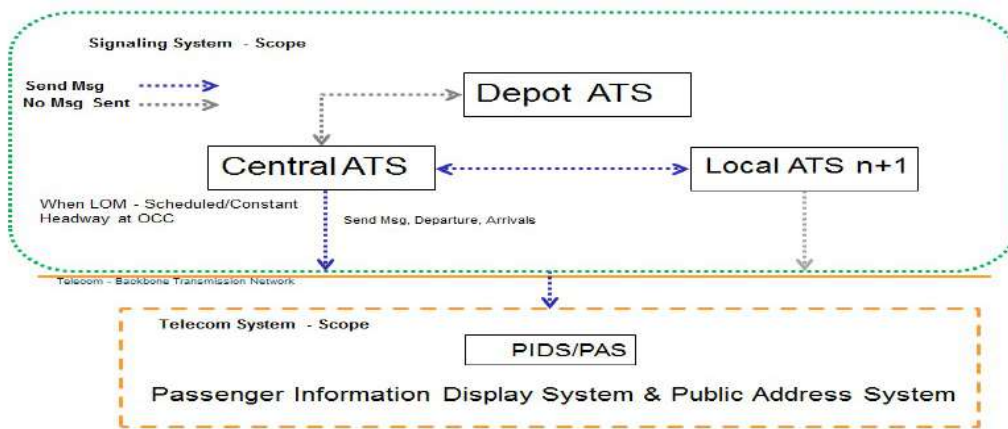


Figure 1: ATS network with PIDS/PAS System – Central Control

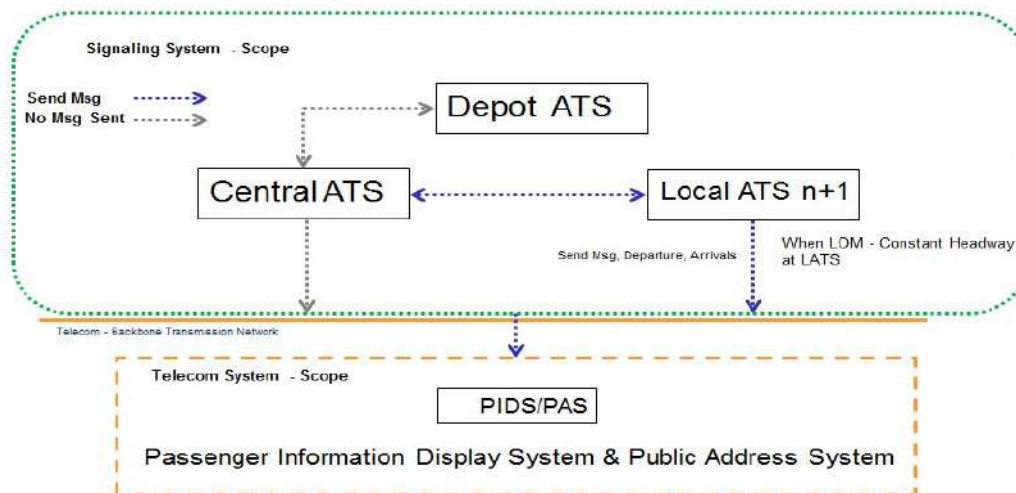


Figure 2: ATS network with PIDS/PAS System – Local Control

ATS will not send the arrival message while train is heading towards Station from the rear siding. Whereas ATS will only send the departure message for the station as the travel time from the siding to platform is less than 50sec.

2.2 TCP/IP Protocol utilisation

The interface between a Central/Local ATS and PIDS/PAS uses TCP/IP protocols for ETHERNET LAN data transmission.

The Figure 3: PIDS/PAS interface presents the utilisation of TCP/IP protocol by both subscribers: PIDS/PAS and ATS (Central or Local).

The interface between an application process and TCP consists of a set of call operating system services:

- ❑ Open and close connections: The centralised PIDS/PAS server opens a TCP connection when it triggers off communication session with the principal server of a Central ATS or one Local ATS. If one attempt fails, the PIDS/PAS server opens a TCP connection with the secondary ATS server (Central or Local).
- ❑ The ATS is considered as a server and the PIDS/PAS as a client during a session. The PIDS/PAS closes TCP connection at the end of session.
- ❑ Send data on established connection: The ATS (Central or Local) loads the sending buffer with message describing and locating a train. It requests after that the data contained in the sending buffer to be sent on the indicated and opened connection. The sending TCP packages the data from buffer into segments and calls IP module to transmit each segment to the destination TCP.
- ❑ Receive data on established connection: The receiving TCP places the data from a segment into receiving buffer and notifies the application. The PIDS/PAS requests the receiving buffer associated with the connection.
- ❑ Abort connection: The Central PIDS/PAS can request all pending send and receive operations to be aborted.

The connection can also close accidentally. In that case the two subscribers will be notified by the TCP/IP protocol.



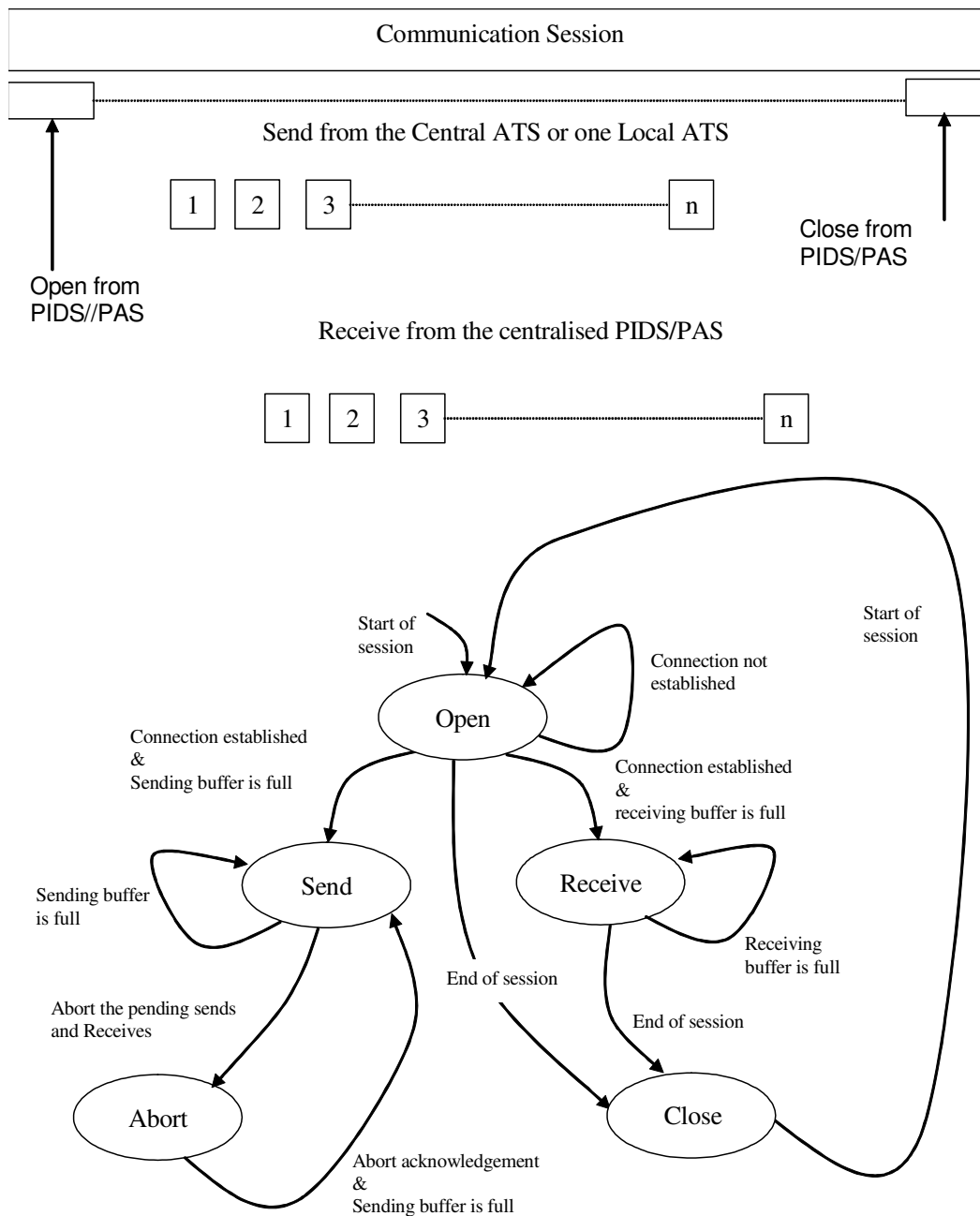


Figure 3: PIDS/PAS interface

2.3 Application layer

2.3.1 Non Stopping

If the train does not stop in a particular Platform, the indications on platform display boards for the corresponding station platform are - "NON STOPPING".

In the concourse of considered stations, the wall mounted display boards show no indication for the train without passengers.

This is generally the case for the first and last trips of a train service when the train is coming/going to the mail line from the Depot for/after the revenue service.

2.3.2 Train in siding

When a train is out of service at siding, the platform display boards for the corresponding siding indicate:

- "NOT IN SERVICE".

The last trip of its current service has brought the considered train in siding. The train is dissociated from service.

In the concourse of considered station, the wall mounted display boards show no indication on the train in siding.

2.3.3 Train in departure

A train is situated at departure platform of terminal station. The corresponding platform display boards show the "time of departure and the train destination".

Into the concourse of same terminal station, the wall mounted display boards indicate on one among three rows for the train departure the following indications:

- Time of departure from the station,
- Train destination,
- Platform number of departure.

All the rows of the wall mounted display boards can be without indications or there can be one or two indications depending upon the departure of the trains from that station.

The rows with departure indications have one or more different parameters (Time, Destination and Platform number). The displaying order between the three rows is guided by:

- Time parameter: a row "n" has a time value that is equal or smaller than the row "n+1" (n: 1 to 3).
- Platform parameter: when the time parameter are identical, the displaying order from row 1 to row 3 follows the growing order of platform numbers.

For a given train, the number of stations where the concourse PIDS display boards show the estimated departure time of this train is deducted of the number of trains situated between the considered train and a target station. 0 to 2 trains, the target station should supply the departure time for this train; 3 or more, the target station is not concerned by this train.

The first next train departure displayed on the wall mounted display boards is explicitly removed by the sending a new message from ATS on imminent departure of that train to avoid passengers rushing to the platform. One minute before the train leaving, the wall mounted display boards are brought up to date from a new message sent by the ATS indicating zero, one or more next departure of trains.

2.3.4 Train arrival in intermediate station

A train is expected at a platform of an intermediate station.

The Central or one Local ATS sends the "Arrival platform" message which includes estimated arrival time data, which load a time counter in PIDS system. From this counter, the PIDS carries out the "Time count down" based on its current internal system clock.

The platform display boards situated on arrival platform show the value of time counter. A new message coming from the ATS can update the estimated time data for the same next arrival, and reloads the time counter.

A train having arrived at the platform of an intermediate station, the arrival indications displayed are replaced by the departure indications. The ATS sends the "Departure platform" message. The display



board shows then the departure time and the destination of the stationary train on this platform. After the train leaving, the indications displayed are cleared or replaced by a new count down of arrival time for the next train arriving at this platform.

In the concourse of the same station, the wall mounted display boards will show following indications on one among three rows for this expected train:

- Time of departure from the station,
- Train destination,
- Platform number of departure.

One minute before the train leaving, the wall mounted display boards are updated from a new message sent by the ATS by removing information of this train and indicating zero, one or more next departure of trains.

2.3.5 Train arrival in terminal station

When a train is due arrive at a platform of terminal station, the corresponding platform display boards shows the following message:

- “Terminates here xx”.

“xx”: the value of time counter loaded with the estimated arrival time of this train.

The train having left the arrival platform, the platform display boards:

- Either is cleared following the explicit “PIDS clear display board” message sent by the ATS.
- Or show the value of time counter loaded with the estimated arrival time of the next train sent by the ATS.

In the concourse of the same station, the wall mounted display boards provide no indications concerning the train, which terminates its current trip.

2.4 List of messages

Each type of message comprises one or two parts, in first place an identification code on 8 bits, and in second place the data. The set of messages with their code and data is described in the following sections.

The Figure 4 presents the graph of message types and the table below provides the list of message types.

Message type	Code	Transmitter	Receiver	Overview
PIDS/PAS three next departures	01	ATS	PIDS/ PAS	During a session, the initialisation or a modification of the three next departures for displaying on wall mounted display boards in a given concourse.
PIDS/PAS departure platform	02	ATS	PIDS /PAS	During a session, initialisation or actualisation of platform display boards for next departure for a train stopped in a platform.
PIDS/PAS arrival platform	03	ATS	PIDS/ PAS	During a session, initialisation or actualisation of platform display boards for a next train arrival.
PIDS/PAS clear display board	04	ATS	PIDS/ PAS	Requires the clearing of display boards at specific platform of a station.
PIDS/PAS operational ATS session ¹	05	ATS	PIDS/ PAS	Indicates that the ATS servers are always in communication with the PIDS/PAS servers. The message is transmitted after a time-out of 1 second when during this period no message has been sent from the ATS servers.

¹ The “PIDS/PAS operational ATS session” message does not include data.



Table 1 – List of PIDS PAS messages

2.4.1 Graph of messages

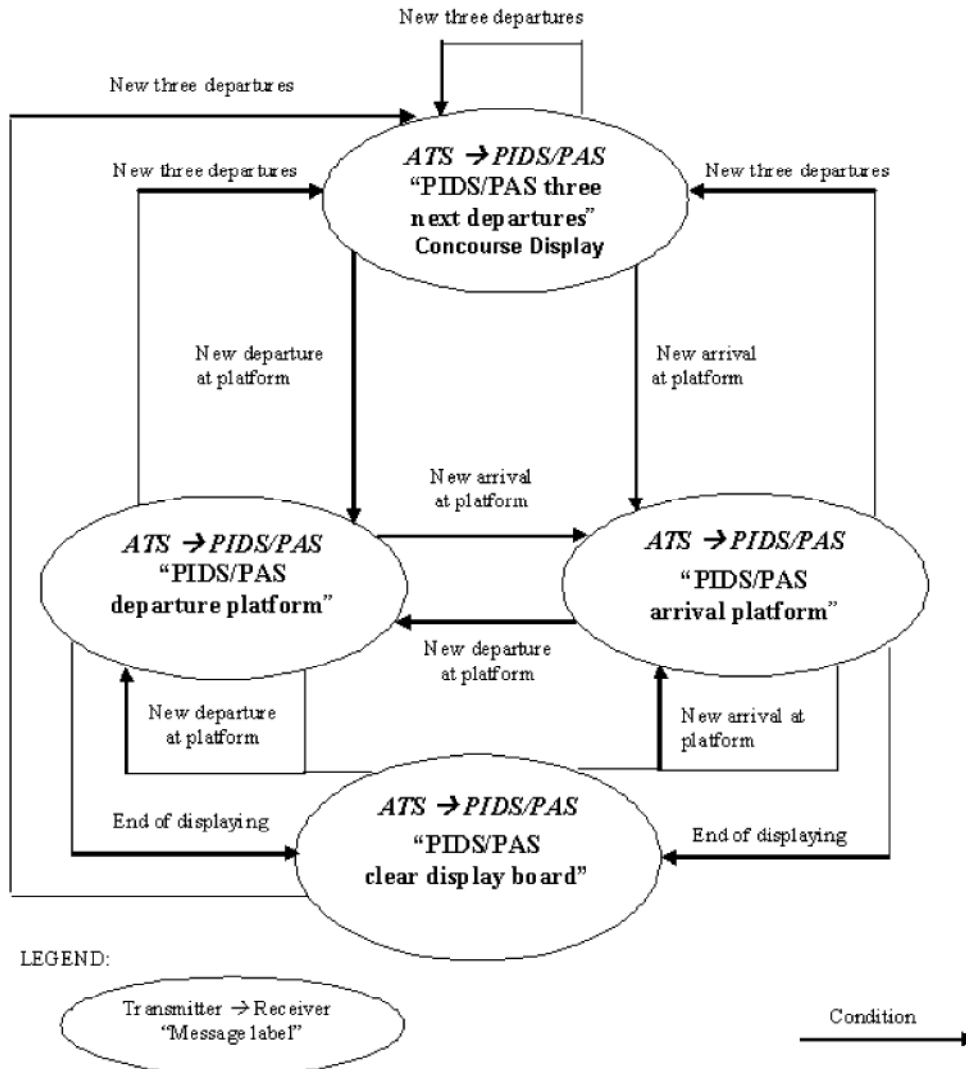


Figure 4: Graph of messages

2.4.2 PIDS/PAS three next departures (Code 01)

The message is transmitted by the ATS when the displaying must be initiated or actualised on a wall mounted display boards into a given concourse. The initialisation and actualisation correspond to one or more among the three departures. Each message provides the set of three next departures with their current parameter values and for only one wall mounted display boards located into concourse of each station.

One, two or all rows of the wall mounted display boards can be without indications, depending on the no of expected departures from that station at that time.

The rows with departure indications have one or more different parameters (Time, Destination and Platform number).

The displaying order between the three rows is guided by:

- Time parameter: a row “n” has a time value that is equal or smaller than the row “n+1” (n: 1 to 2).
- Platform parameter: when the time parameter are identical, the displaying order from row 1 to row 3 follows the ascending order of platform numbers.

Message Description:

Message completion:

MSB				LSB				
Byte	Bit 7	6	5	4	3	2	1	Bit 0
1	Station identification							
2	Spare	Spare	Spare	Spare	Spare	Spare	Departures	
3	hour							First next departure field, if it exists
4	minutes							
5	Seconds							
6	Destination number							Second next departure field, if it exists
7	Spare	Spare	Spare	Spare	Platform identification			
8	hour							
9	minutes							Third next departure field, if it exists
10	Seconds							
11	Destination number							
12	Spare	Spare	Spare	Spare	Platform identification			
13	hour							
14	minutes							
15	Seconds							
16	Destination number							
17	Spare	Spare	Spare	Spare	Platform identification			

Table 2 – Description of next three departures

- Station identification: intermediate or terminal station where three next departures must be displayed on the wall mounted display boards located into concourse of this station. The station Id designates a specific station into its line.
- Departures: indication of the number of next departures (0 to 3) described by the following fields of message. The appearance order of departure descriptions respects the increasing order of the time and platform number values of each description.

Number of departures	Bit 1	Bit 0	Remark
Zero next departure	0	0	Three rows must be cleared. The message does not contain other fields.
One next departure	0	1	Only first row is valued, the other rows must be cleared. The following fields of this message describe one next departure.
Two next departures	1	0	The first and second rows are valued, then that the last must be cleared. The following fields of this message describe two next departures.
Three next departures	1	1	Three rows are valued. The following fields of this message describe three next departures.

The next departure fields provide the departure time data corresponding to one, two or three departures:

- Hour: quantum = 1 hour
: field = [00 .. 23].



- Minute: quantum = 1 minute
: field = [00 .. 59].
- Second: quantum = 1 second
: field = [00 .. 59].

- Destination Id: the terminal station where a train trip will end
- Platform Id: the identification of the departure platform.

➤  Spare

➤

2.4.3 PIDS/PAS Departure Platform (Code 02)

The message is transmitted by the ATS, when the displaying must be initiated or updated on platform display boards with departure indications, which is Departure time and Destination for the next departure from a station platform (terminal or intermediate station). Each message addresses only one departure platform for the indication of next train departure or updating of time and/or destination parameters.

Message Description:

MSB						LSB		
Byte	Bit 7	6	5	4	3	2	1	bit 0
1	Station identification							
2	Spare	Spare	Consist Id		Platform identification			
3	hour							
4	minutes							
5	seconds							
6	Destination number							

Table 3 – Description of departure message

- Station identification: the identification of the terminal station where the next departure must be displayed on a platform display boards. The station Id designates a specific station into its line.
- Platform Id: the identification of the departure platform.
- Hour : quantum = 1 hour
: field = [00 .. 23].
- Minute : quantum = 1 minute
: field = [00 .. 59].
- Second : quantum = 1 second
: field = [00 .. 59].
- Destination Id: the terminal station where a train trip will end.
- Consist Id :

Bit 1	Bit 0	Consist Id
0	0	4-car train
0	1	6-car train
1	0	No used
1	1	Invalid

 Spare

2.4.4 PIDS/PAS Arrival Platform (Code 03)

The message is transmitted by the ATS, when the displaying must be initiated or updated on platform display boards with arrival indications, which is Arrival time countdown, Arrival status and Destination for the next train arriving on a station platform (terminal or intermediate station).

Each message addresses only one arrival platform for the indication of next train arrival status or updating the time and/or destination parameters.

ATS transmits the estimated time data of the next arrival to the PIDS system. The "Time count down" is realised by the PIDS from the estimated time data sent by the ATS and the current internal system clock. The display of the decremented time is updated automatically with the latched value of time counter. A new message sent by the ATS can update the estimated time of the same next arrival and reload the time counter.

The arrival message for a platform also indicates to the PIDS system, the arrival status of this train on that platform

- "NON STOPPING", if the arriving train runs across the station-platform without stopping.
- "NOT IN SERVICE", when the train is stabled in siding of the station-platform or when the arriving train is not associated to a service.
- "TERMINATES HERE xx" for the next train terminating its trip at terminal or intermediate station. Where "xx" is the number of minutes remaining before the arrival of the next train on the platform of a terminal station.

Message Description:

MSB							LSB	
Byte	Bit 7	6	5	4	3	2	1	bit 0
1	Station identification							
2	Spare	Spare	Consist ID		Platform identification			
3	Spare	Spare	Spare	Spare	Arrival situation			
4	hour							
5	minutes							
6	seconds							
7	Destination number							

Table 4 – Description of arrival message

- Station identification: the identification of a station where the next arrival must be displayed on a platform display boards. The station Id designates a specific station into its line.
- Consist Id: The arrival platform message contains the train length information on byte 2, bits 4 and 5. This will cause the train coaches information to be displayed.

Bit 5	Bit 4	Consist Id
0	0	4-car train
0	1	6-car train
1	0	No used
1	1	Invalid

Table 5 – Description of consist Id

- Platform Id: the identification of the arrival platform.
- Arrival situation:

Arrival situation	Bit 3	Bit 2	Bit 1	Bit 0	Remark
Non stopping	0	0	0	0	If a train runs across the station-platform without stopping. The message does not contain other fields.



Not in service	0	0	1	0	When a train rests in siding at the station-platform. The message does not contain other fields.
Terminated here xx	0	0	1	1	For the train terminating its trip at terminal station.
Next estimated arrival	0	1	0	0	The following fields of the message describe the next estimated arrival.

For the "Non stopping" and "Not in service" situations, the message only includes 3 bytes (1 to 3).
For the "Terminated here xx" and "Next estimated arrival", the message is complete with all 7 bytes.

- Hour : quantum = 1 hour
: field = [00 .. 23].
- Minute : quantum = 1 minute
: field = [00 .. 59].
- Second : quantum = 1 second
: field = [00 .. 59].
- Destination Id: the terminal station where a train trip will end.
- Consist Id :
-

Bit 1	Bit 0	Consist Id
0	0	4-car train
0	1	6-car train
1	0	No used
1	1	Invalid

 Spare

2.4.5 PIDS/PAS clear display board (Code 04)

The message is transmitted by the ATS when the displaying must be cleared on platform display boards located at the arrival or departure platform.

Message Description:

MSB				LSB			
Byte	Bit 7	6	5	4	3	2	1 bit 0
1	Station identification						
2					Platform identification		

- Station identification: the identification of a station.
- Platform Id: the identification of the arrival or departure platform.

 Spare

Table 6 – Description of PIDS/PAS clear display board

2.5 CATS and PIDS/PAS interface

When the control of a sector or whole line is at the central ATS, the CATS transmit the arrival/departure time data of that part of the line to PIDS. This information transmission is done when the line operating mode is either Scheduled (Timetable regulation) or Constant headway (Constant Headway regulation). In manual mode, without regulation of the trains, the CATS does not provide



indications to PIDS/PAS concerning the arrival and departure of the trains to the various stations of one line.

A TCP/IP port connects the dual server of each Central ATS to centralised PIDS/PAS.

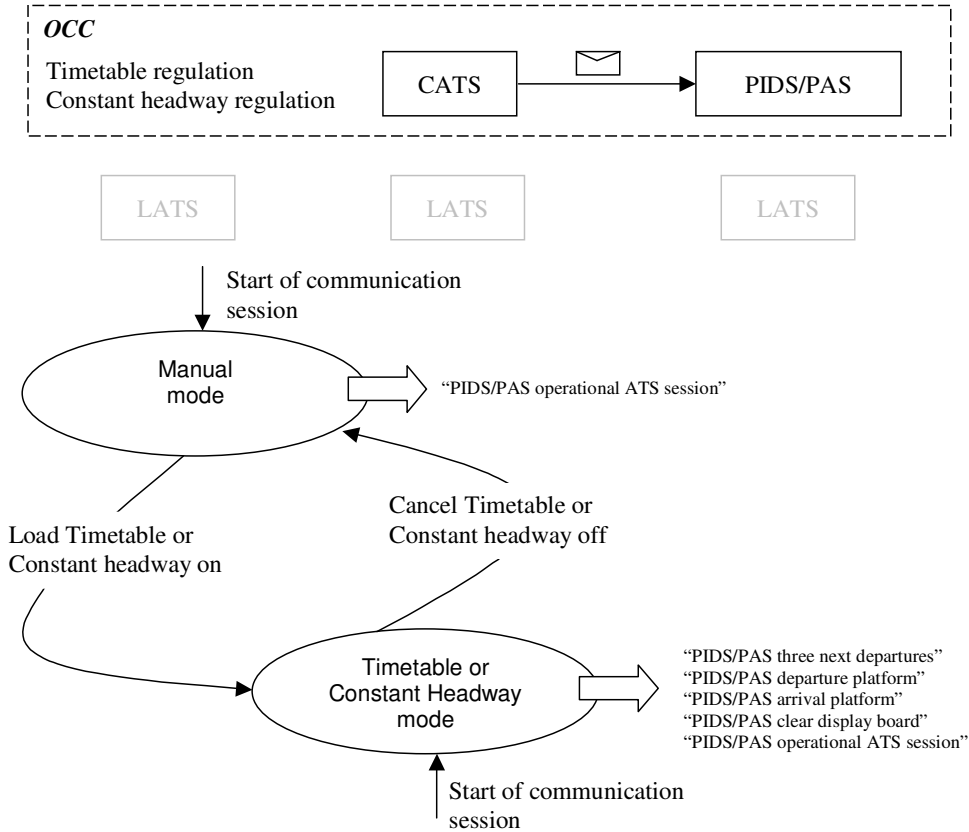


Figure 5: CATS & PIDS/PAS

2.6 LATS and PIDS/PAS interface

When the control of a specific sector is at the local ATS, that LATS transmit the arrival/departure time data of that part of the line to PIDS. This information transmission is done when the line operating mode in that LATS is Constant headway (Constant Headway regulation). In manual mode, without regulation of the trains, the LATS does not provide indications to PIDS/PAS concerning the arrival and departure of the trains.

A TCP/IP port connects the dual server of each Central ATS to centralised PIDS/PAS.

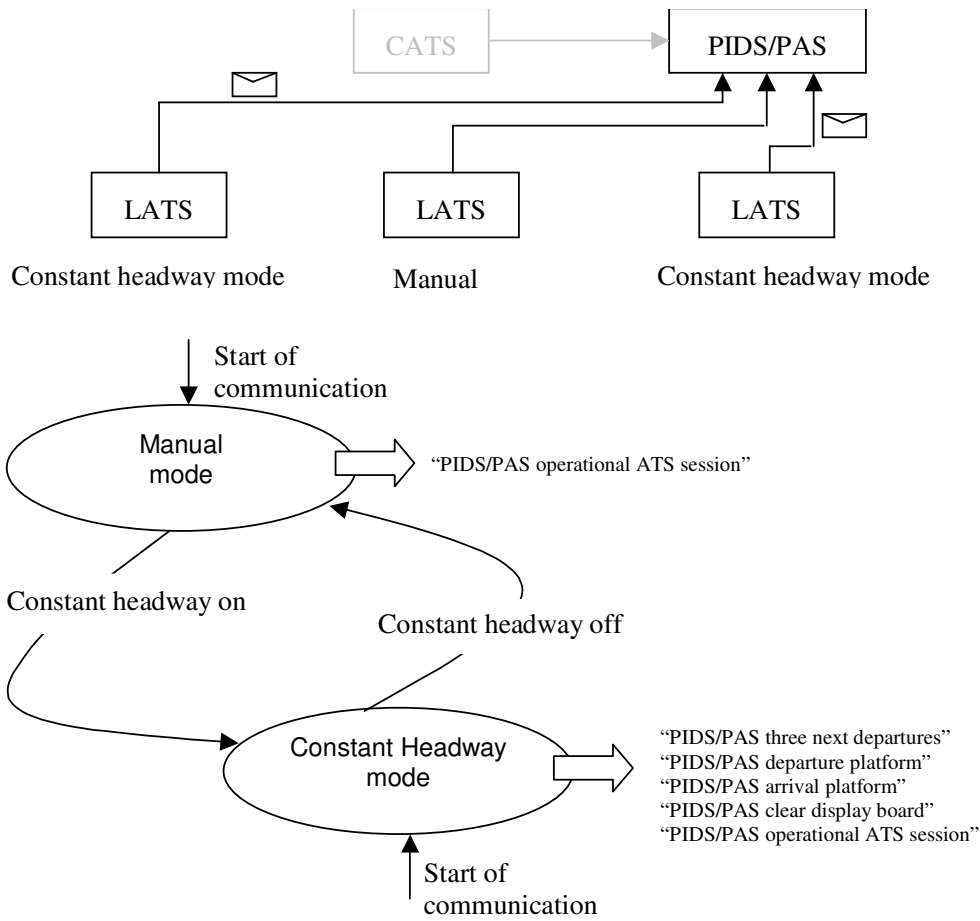


Figure 6: LATS & PIDS/PAS

Either the CATS or LATS controls a sector in mutual exclusion. Only one ATS (CATS or LATS) addresses central PIDS/PAS for the stations of a given sector. The central PIDS/PAS can receive messages from the CATS, CATS and one or more LATS, or all LATS, but never two ATS senders transmit messages concerning the same station, only one ATS control the stations of one sector.

2.7 Data flow to PIDS/PAS Server

The below mentioned figure 7 shows the data flow from Local server/Central Server to the PID/PAS Server

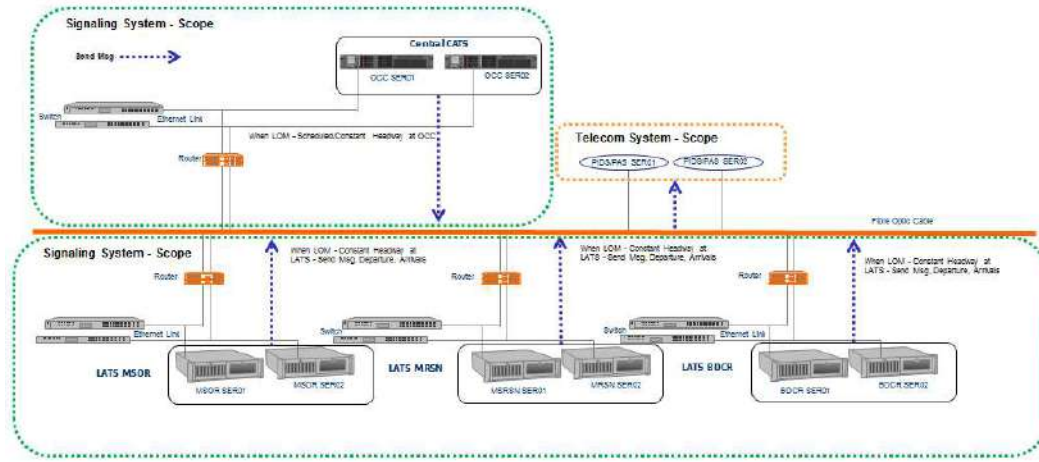


Figure 7: Data flow to PIDS/PAS Server

The PIDS PAS servers situated in the OCC is linked to ATS through the Redundant Layer 3 Ethernet Switch. The Redundant Layer 3 Ethernet Switch in ATS Cubicle at OCC is in the scope of ALSTOM. The Redundant Layer 3 Ethernet Switch in TER at OCC is not in the scope of ALSTOM.

2.8 Line operating and control modes

The changes of line operating mode cause the removal of display boards. The new mode initialisation includes the clearing display boards on all the platforms. Two messages will be used to clear the display boards:

- "PIDS/PAS clear display board" for the platforms.
- "PIDS/PAS three next departures" for the concourses.

The below table shows the principles of communication between ATS and PIDS/PAS in different operating and control modes.

Line operating and control modes	CATS	LATS
Scheduled	The CATS provides departure and arrival indications for the whole of the line. It sends the heart beat signal.	No indication
Constant headway	If the control mode is Central, CATS provides departure and arrival indications for the whole of the line. It sends the heart beat signal.	If the control mode is Local, one LATS provides departure and arrival indications for its ATS sector. It sends the heart beat signal.
Manual	No indication	No indication

Table 7 – Principles of communication between ATS and PIDS/PAS

2.9 Interface Scenario Description

Some “use cases” are described in this section to explain the PIDS data transmission based on different parameters like Line operating mode, train in service or not, first trip or other, intermediate or terminal station, arrival and/or departure platform. Three use cases are described in this section,

- ❑ Departure platform at one terminal station (*TS-Departure use case*).
- ❑ Arrival and departure platform at one intermediate station (*IS-Arrival & Departure use case*).
- ❑ Arrival platform at one terminal station (*TS-Arrival use case*).

The use cases show how the interface works at the platforms and concourses of the terminal and intermediate stations.

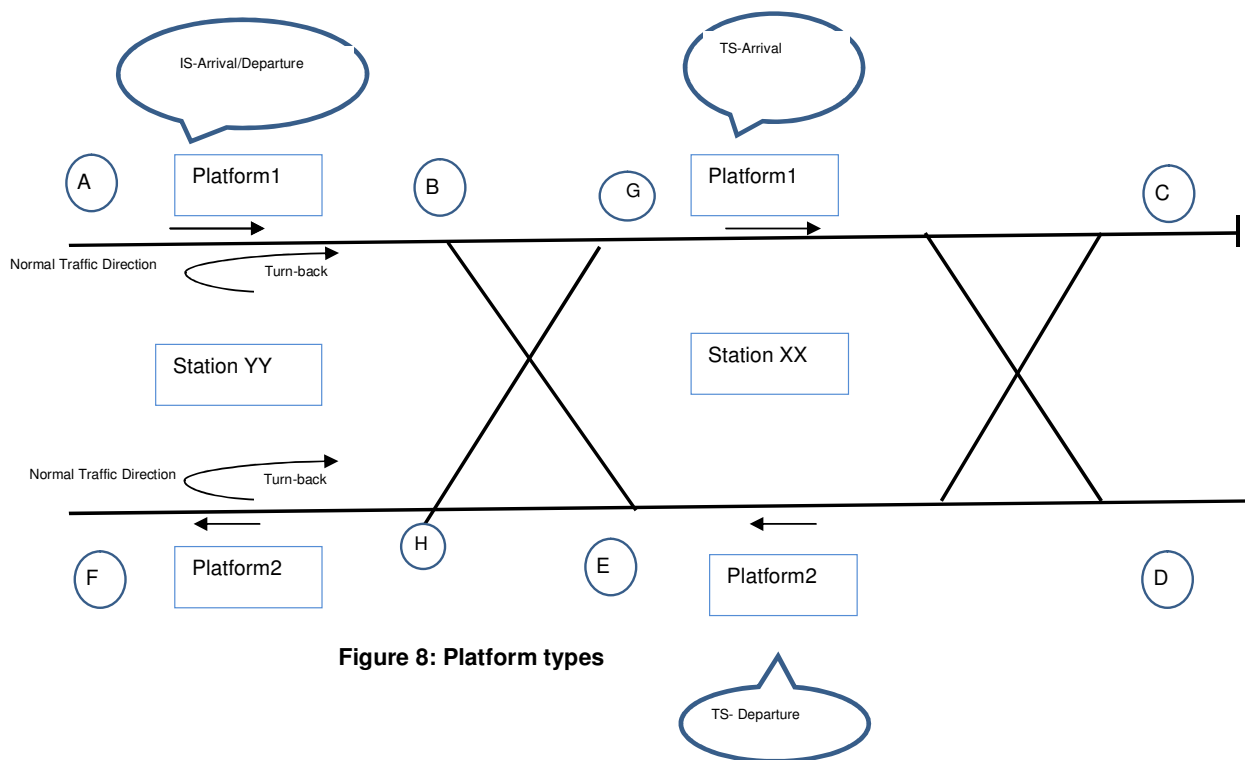


Figure 8: Platform types

2.9.1 TS-Departure use case

Three possible situations are considered for this use case of a terminal station. As an example, please refer Platform2 in StationXX of Figure 8: Platform types above. For each of these situations, scenarios are constituted as shown in table below.

Situation / Scenarios	Platform	Concourse
Situation 1: Train entering on departure platform		
SCENARIO 1: Train entering from station siding and is associated to a service (from point C or D in Fig.8)		

Situation / Scenarios	Platform	Concourse
Departure	THE DISPLAY BOARD SHOWS THE DEPARTURE INDICATIONS.	ONE MINUTE BEFORE THE DEPARTURE TIME OF THIS TRAIN, EVEN IF THE TRAIN IS NOT ENTERED ON THE PLATFORM, THE DISPLAY FOR THIS DEPARTURE IS REMOVED THROUGH A MESSAGE INDICATING ZERO OR MORE NEXT DEPARTURE INDICATIONS.
SCENARIO 2: Train entering from other line using front crossover and turning back on this platform. (through point B and E in Fig.8)		
Turn-back	THE DISPLAY BOARD INDICATES TRAIN TERMINATES HERE	ONE MINUTE BEFORE THE DEPARTURE TIME OF THIS TRAIN, EVEN IF THE TRAIN IS NOT ENTERED ON THE PLATFORM, THE DISPLAY FOR THIS DEPARTURE IS REMOVED THROUGH A MESSAGE INDICATING ZERO OR MORE NEXT DEPARTURE INDICATIONS.
SCENARIO 3: Entering train is not associated to a service		
Not in service	THE DISPLAY BOARD INDICATES THAT THE TRAIN IS NOT IN SERVICE.	NO DISPLAY FOR A TRAIN OUT OF SERVICE.
Situation 2: Train arrives and is stationary on departure platform		
SCENARIO 1: Train is associated to service and dwell countdown in progress		
Departure	THE DISPLAY BOARD SHOWS THE DEPARTURE INDICATIONS.	ONE MINUTE BEFORE THE DEPARTURE TIME OF THIS TRAIN, EVEN IF THE TRAIN IS NOT ENTERED ON THE PLATFORM, THE DISPLAY FOR THIS DEPARTURE IS REMOVED THROUGH A MESSAGE INDICATING ZERO OR MORE NEXT DEPARTURE INDICATIONS.
SCENARIO 2: Train is not associated to service		
Departure	THE DISPLAY BOARD INDICATES THAT THE TRAIN IS NOT IN SERVICE.	NO DISPLAY FOR A TRAIN OUT OF SERVICE.
Situation 3: Train leaving the departure platform		
SCENARIO 1: The train completed station dwell and is leaving departure platform		
Departure	THE SENT MESSAGE PROVIDES THE DEPARTURE/Arrival INDICATION FOR THE NEXT TRAIN.	THE DISPLAY BOARD SHOWS ZERO TO THREE DEPARTURE INDICATIONS BASED ON SCHEDULE.

2.9.2 TS-Arrival use case

Three possible situations are considered for this use case of a terminal station. As an example, please refer Platform1 in StationXX of Figure 8: Platform types above. For each of these situations, scenarios are constituted as shown in table below.

Situation / Scenarios	Platform	Concourse
Situation 1: Train entering on arrival platform		
SCENARIO 1: Train entering from line, turning back on this platform and going to other line using front crossover (through point G and H in fig.8)		
Turn-back	THE DISPLAY BOARD SHOWS THE ARRIVAL INDICATIONS WITH TRAIN TERMINATES	THE DISPLAY BOARD SHOWS THE DEPARTURE INDICATIONS.
SCENARIO 2: Train entering from line, going on to siding(towards point C or D in fig.8)		



Situation / Scenarios	Platform	Concourse
Arrival	THE DISPLAY BOARD INDICATES TRAIN TERMINATES HERE	NO DISPLAY FOR A TRAIN GOING TO SIDING.
SCENARIO 3: Entering train is not associated to a service		
Not in service	THE DISPLAY BOARD INDICATES THAT THE TRAIN IS NOT IN SERVICE.	NO DISPLAY FOR A TRAIN OUT OF SERVICE.
Situation 2: Train arrives and is stationary on arrival platform		
SCENARIO 1: Train entered from line, turning back on this platform and going to other line using front crossover (through point G and H in fig.8).		
Departure	THE DISPLAY BOARD SHOWS THE DEPARTURE INDICATIONS.	ONE MINUTE BEFORE THE DEPARTURE TIME OF THIS TRAIN, EVEN IF THE TRAIN IS NOT ENTERED ON THE PLATFORM, THE DISPLAY FOR THIS DEPARTURE IS REMOVED THROUGH A MESSAGE INDICATING ZERO OR MORE NEXT DEPARTURE INDICATIONS.
SCENARIO 2: Train entered from line, going on to siding (towards point C or D in fig.8)		
Termination	THE DISPLAY BOARD INDICATES TRAIN TERMINATES HERE	NO DISPLAY FOR A TRAIN GOING ON TO SIDING
SCENARIO 3: Train stopped is not associated to a service		
Not in service	THE DISPLAY BOARD INDICATES THAT THE TRAIN IS NOT IN SERVICE.	NO DISPLAY FOR A TRAIN OUT OF SERVICE.
Situation 3: Train leaving the arrival platform		
SCENARIO 1: The train completed station dwell and is leaving departure platform		
Arrival	THE SENT MESSAGE PROVIDES THE ARRIVAL INDICATIONS FOR THE NEXT TRAIN.	THE DISPLAY BOARD SHOWS ZERO TO THREE DEPARTURE INDICATIONS BASED ON SCHEDULE.

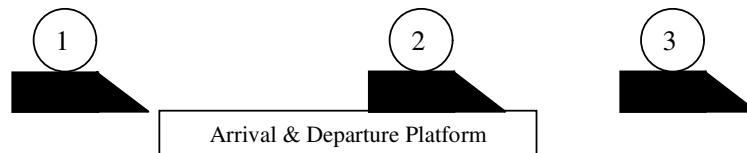
2.9.3 TS-Arrival & Departure use case

Three possible situations are considered for this use case of an intermediate station. As an example, please refer Platform1 in Station YY of Figure 8: Platform types above. For each of these situations, scenarios are constituted as shown in table below.

Train entering on arrival platform

Stationary train

Train leaving the departure platform



Situation / Scenarios	Platform	Concourse
Situation 1: Train entering on platform		
SCENARIO 1: Train entering is associated and is going on further (through point B and G in fig.8)		
Arrival	THE DISPLAY BOARD SHOWS THE ARRIVAL INDICATIONS.	THE DISPLAY BOARD SHOWS THE DEPARTURE INDICATIONS.
SCENARIO 2: A skip-stop is applied in this station		

Situation / Scenarios	Platform	Concourse
Skip stop	THE DISPLAY BOARD INDICATES THAT THE TRAIN DOES NOT STOP AT THIS PLATFORM.(NON STOPPING)	NO DISPLAY FOR A NON-STOPPING TRAIN.
SCENARIO 3: Train entering is not associated to a service		
Out of Service	THE DISPLAY BOARD INDICATES THAT TRAIN IS NOT IN SERVICE.(NOT IN SERVICE)	NO DISPLAY FOR A TRAIN OUT OF SERVICE.
Situation 2: Stationary train		
SCENARIO 1: Train stopped is associated and is going on further (through point B and G in fig.8)		
Departure	THE DISPLAY BOARD SHOWS THE DEPARTURE INDICATIONS.	ONE MINUTE BEFORE THE DEPARTURE TIME OF THIS TRAIN, EVEN IF THE TRAIN IS NOT ENTERED ON THE PLATFORM, THE DISPLAY FOR THIS DEPARTURE IS REMOVED THROUGH A MESSAGE INDICATING ZERO OR MORE NEXT DEPARTURE INDICATIONS.
SCENARIO 2: Train stopped is not associated to a service		
Out of Service	THE DISPLAY BOARD INDICATES THAT TRAIN IS NOT IN SERVICE.(NOT IN SERVICE)	NO DISPLAY FOR A TRAIN OUT OF SERVICE.
Situation 3: Train leaving the departure platform		
Scenario 1: Train departs from platform		
Arrival & Departure	THE SENT MESSAGE PROVIDES THE ARRIVAL INDICATIONS FOR THE NEXT TRAIN OR CLEAR DISPLAY BASED ON SCHEDULE	THE DISPLAY BOARD SHOWS THE DEPARTURE INDICATIONS FOR THE NEXT 0 TO THREE TRAINS BASED ON SCHEDULE..

Physical parameters

2.9.4 Station Identification

The platform identification is coded on eight bits.

The below table indicates the identifier for each station of the Main line for Corridor 2.

JPJS02 Existing Phase 1A

Station Name	Station ID
Mansarovar (MSOR) (Destination)	0x18
New Atish Market (NAMT)	0x19
Vivek Vihar (VKVR)	0x1A
Shyam Nagar (SMNR)	0x1B
Ram Nagar (RMNR)	0x1C
Civil Lines (CLJP)	0x1D
Railway Station (MRSN)	0x1E
Sindhi Camp (SICP)	0x1F
Chandpole (CDPE)	0x20



JPJS02 -1B Extension Phase 1B

Station Name	Station ID
Chotti Chaupar (CTCR)	0x21
Badi Chaupar (BDCR) (Destination)	0x22

Table 8 – Identifier for each station

2.9.5 Platform identification for Corridor 2

The platform identification is coded on four bits. The below table indicates the platform identifier for up and down directions.

The Direction Down is from Mansarovar (MSOR) to Badi Chaupar (BDCR) and the direction up is from Badi Chaupar (BDCR) to Mansarovar (MSOR).

Direction	Platform Id	Terminal origin	Terminal destination
Down	4	MANSAROVAR	BADI CHAUPAR
Up	1	BADI CHAUPAR	MANSAROVAR

Table 9 – Platform Identifier



3 MASTER CLOCK INTERFACE

The interface is required between the MASTER CLOCK and the ATS system to synchronize the time of ATS and the signalling system with the central MASTER CLOCK.

3.1 Description

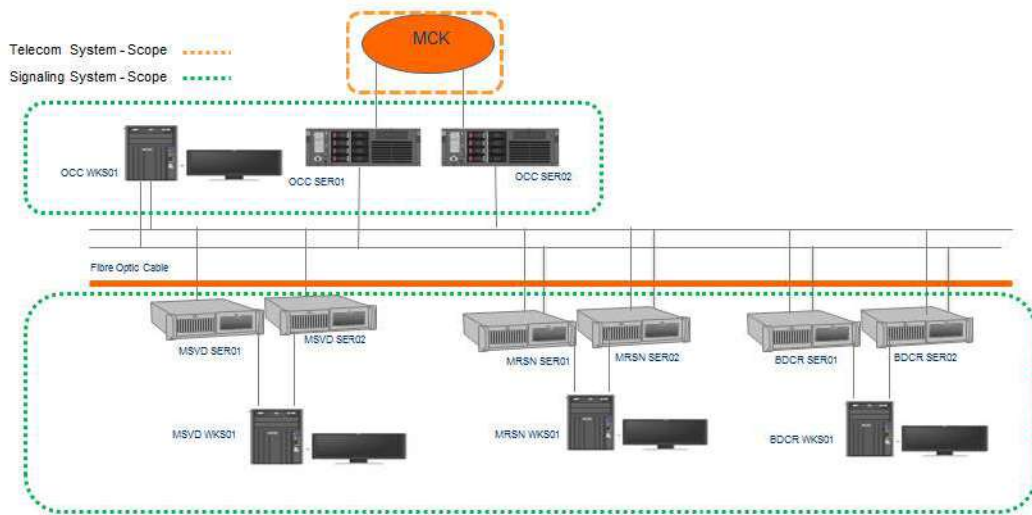


Figure 9: ATS node with Master Clock

The interface uses the Network Time Protocol (NTP) to help synchronize time across a network. NTP is an Internet time protocol that includes the discipline algorithms necessary for synchronizing clocks.

The time synchronization process involves the following steps:

- Input providers request and receive time samples from configured NTP time sources.
- These time samples are then passed to the Windows Time Service Manager, which collects all the samples and passes them to the clock discipline subcomponent.
- The clock discipline subcomponent applies the NTP algorithms which results in the selection of the best time sample.
- The clock discipline subcomponent adjusts the time of the system clock to the most accurate time by either adjusting the clock rate or directly changing the time.

3.2 Synchronisation scheme

The Master Clock System synchronises the clocks of the servers, workstations forming the physical architecture of the CATS, LATS or DATS. The Figure 10: Synchronisation Scheme presents the connections between various NTP servers and clients. The ATS FEP receives the time data from master-clock on WAN and then other ATS equipment receive time data from FEP on LAN/WAN. The configuration for these schemes includes providing the server name/IP address of NTP server in each of the ATS equipment.

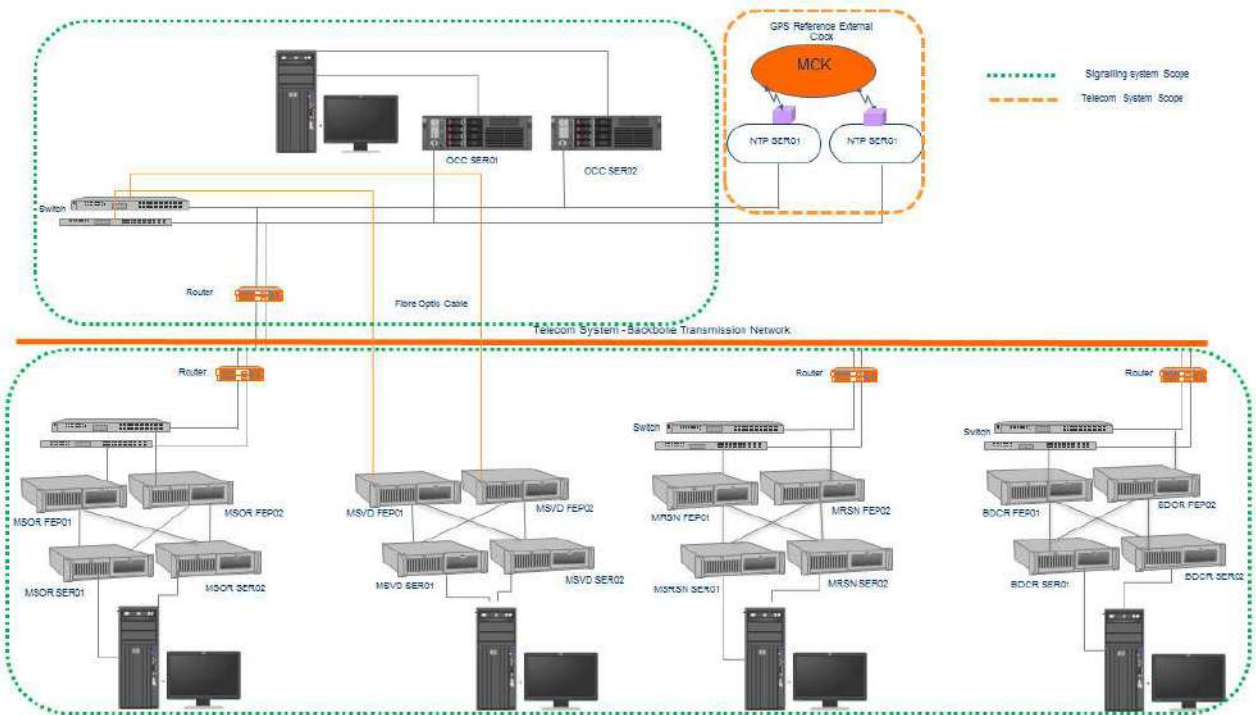


Figure 10: Synchronisation Scheme



In the Figure 10: Synchronisation Scheme shown for the Master Clock:-

- All the equipment except FEP i.e., Server, VDU and All WKS are in synchronisation with its own FEP (Which is the first priority), else with the adjacent FEPs (second priority).
- All the OCC equipment i.e., Central Server and All WKS are in synchronisation with the MSVD, MSOR and MRSN FEPs

The above diagram is a logical link diagram showing for time synchronisation.

The NTP servers situated in the OCC is linked to Central ATS through the Redundant Layer 3 Ethernet Switch. The Redundant Layer 3 Ethernet Switch in ATS Cubicle at OCC is in the scope of ALSTOM. The Redundant Layer 3 Ethernet Switch in TER at OCC is not in the scope of ALSTOM.

All time Sync process is done using win32Time (Windows application). The configuration in ATS involves providing the Time server ID/IP address in the Windows registry for both primary and secondary time servers. In case of any deviations in system time, the correction occurs in steps as per NTP. As ATS relies fully on NTP, the duration and limitations for synchronisation of NTP are applicable for this process.



APPENDIX-R**1. GENERAL OVERVIEW OF CCTV SYSTEM IN EXISTING PHASE-1B OF JMRC**

A. The CCTV system consist of the following principal sub-systems:

- Platform Surveillance - CCTV system for monitoring of entraining and detraining of passengers at all platforms of all stations of JMRTS phase 1-B. System monitored locally from concerned station and remotely from OCC.
- CCTV surveillance system for monitoring important locations in all stations both locally and remotely from OCC/security control.
- CCTV surveillance system for monitoring parking areas at stations. Night Vision (IR illuminated) cameras is used for this purpose.

The Station surveillance CCTV system both live and recorded videos are accessed simultaneously from the following locations:

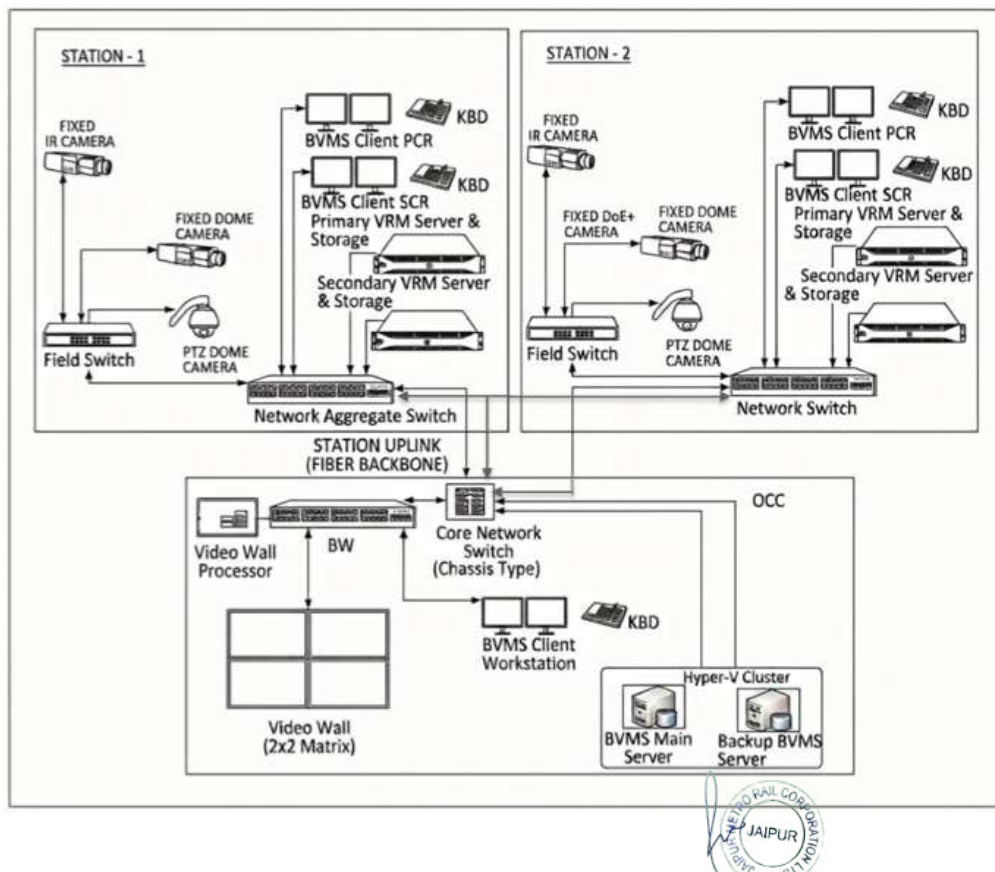
1 . At Stations

- a) Station Control Room
- b) Police Booth

2. At OCC

- a) OCC Controllers (Traffic controllers/Chief Controller) of the concerned OCC.
- b) Security Controller in Security Control Room

Video recording system provides primary recording locally at the stations itself and mirror recording at adjacent station for both stations of JMRTS phase 1-B.

B. PHASE - 1B SYSTEM DESIGN ARCHITECTURE

The CCTV system is based on the latest network video technologies, making use of sophisticated controlled systems through:

- 1 . Box Type(Fixed) camera
- 2 . Box Type(Fixed IR) camera
- 3 . PTZ camera
4. NVR
5. Management Server
6. Video Analytics
7. Keyboard with Joystick

CCTV is provided with IP cameras for covering the specified areas of the stations. These cameras are connected to access switches which are further connected to the respective stations for recording. The NVR is designed to record and store the CCTV images, storage of CCTV data for 7 days at 24X7 recording.

The video signal output of all the cameras in various locations are fed to NVR located at TER of respective stations and further the video signals are transferred to OCC through common FOTS Backbone.

The CCTV system of JMRC Phase-1B provided by M/s BOSCH, have following types of cameras:

- Fixed Box Camera
- Fixed Box Camera with I R illuminator
- PTZ cameras

C. FUNCTIONAL SPECIFICATIONS

1) CCTV CAMERAS

CCTV cameras is of colour CMOS, IP based Full HD type with low light capability to produce clear and detailed picture quality as well as under high lighting contrast conditions.

Three different types of cameras are provided based on the nature of the area being covered, as mentioned below:

a) BOX TYPE Fix CAMERA

IP HD cameras are 1080p 30 progressive scan CMOS cameras that use the digital imaging technology. The camera delivers the highest standards of performance and reliability in any security and surveillance scenario, day or night. Features such as multicasting, internet streaming and iSCSI recording are fully supported. Intelligent noise reduction reduces bandwidth and storage requirements by up to 50%.

b) Box Type Fix CAMERA (IR ILLUMINATOR)

IP HD cameras with IR illuminator are 1080p 30 progressive scan CMOS cameras that use the digital imaging technology. The camera delivers the highest standards of performance and reliability in any security and surveillance scenario, day or night. Features such as multicasting, internet streaming and iSCSI recording are fully



supported. Intelligent noise reduction reduces bandwidth and storage requirements by up to 50%.

c) PTZ CAMERA

The Bosch AUTODOME is an high-speed PTZ dome camera, in field- proven indoor/ outdoor pendant housing or indoor in-ceiling housing that delivers high-definition (HD) 1080p 25/30 (2MP) video and 20x optical zoom.

The camera provides complete network-based control of all dome functionality including pan/tilt/zoom operation, presets, tours and alarms as well as web based configuration of all dome settings.

- a) High-resolution, full HD PTZ camera with 1080p 25/30 (2MP) resolution and 20x zoom for capturing fine details.
- b) Fully configurable quad streaming with individually configurable HD streams, based on new Common Product Platform (CPP4)
- c) Easy and intuitive installation with multiple preconfigured user modes that allow users to select the camera configuration that is ideal for their applications.

2) NVR

Network video recorders are responsible for recording of all CCTV cameras provided in JMRTS Phase-1B CCTV network. The recorders are provided at all stations. Network Video recording system in JMRTS Phase-1B network provide local recording at the station itself and mirrored recording at adjacent station for all JMRTS Phase-1B stations.

NVR software manages recording of video and audio, with redundancy for high resilience. Key features of network video recorders are as follows:

- Record and playback MPEG-4 and H.264 video and audio streams
- Full frame rate recording with simultaneous playback
- Third party camera support, ONVIF conformant
- Supports internal disks, internal RAID array, SCSI RAID array, iSCSI and Fibre Channel SAN and NAS

3) MANAGEMENT SERVER

The CCTV Video Management System is a unique enterprise IP video security solution that provides seamless management of digital video and data across any IP network. It is designed to work with CCTV video security management system. It can integrate existing components into one easy-to-manage system, or use full-line capabilities and benefit from a complete security solution.

The CCTV Video Management System contains the following software components:

- Management Server software provides management, monitoring, and control of the entire system
- Video Recording Manager (VRM) service provides recording and playback management of video, audio, and data
- Configuration Client software provides the user interface for system configuration and management
- Operator Client software provides the user interface for system monitoring and operation



The architecture of the system is client server based. The Configuration Client and the Operator Client connect to the Management Server to obtain the configuration from it.

The system configuration is stored in a proprietary object oriented database on the Management Server. The configuration can be edited with the Configuration Client. Only one instance of the Configuration Client can be active at a time.

4) VIDEO ANALYTICS

Video content analytics is provided as per JMRTS phase 1-B contract specification. Video intelligent analysis is offered with the edge based IVA for IP Camera; it is integrated with VMS.

Video Content Analysis at Station

- Analytics proposed for the fixed cameras on the Platforms and Concourse.
- The Video content analysis proposed works on embedded platform directly on the camera at the Edge. The VCA alarms are integrated with BVMS for live monitoring. The operators see the alarm overlay on the live video as per the configuration.
- With the help of VCA functionality, cameras provided are able to detect intrusion outside SCR, and TER in case of loitering and can be programmed to alarm as required at night or day as necessary.
- The JMRTS phase 1-B requires VCA functions at each station which are fulfilled with the VCA functionality of proposed CCTV solution such as:
 - a) Detect Abandoned/Unattended Object
 - b) Track Protection at Station
 - c) Wrong way movement on escalators
 - d) Camera Tampering
 - e) Overcrowding/ Congestion Detection in Platform
 - f) Excessive Queuing

5) VIDEO Management System

VIDEO MANAGEMENT SOFTWARE (VMS)

The Management Server supports the concurrent connection of 100 Operator Clients. Video Recording Manager (VRM) provides a Network based Video Recorder solution, eliminating the need for dedicated NVRs and signalling the second generation of IP Network video recording.

The VRM provides load balancing and failover for the iSCSI storage and makes it easy to add additional SCSI storage later on. VRM introduces the concept of storage virtualization layer. This abstraction layer enables VRM to manage all of the individual disk arrays in the entire system as a single "virtual" common pool of storage which is intelligently allocated as needed.

D. HARDWARE & SOFTWARE SPECIFICATION

CCTV system has intelligent modules to have flexible integration options with the sub-systems



and external connected systems. These intelligent modules are designed to perform with latest software/Firmware versions to ensure and maintain high performance. Software specifications details are defined below as per design of individual modules:

Table-1: Hardware & Software Specifications

S. No.	Description	Make	Model	Software Version
1	Box Type Fix Camera	BOSCH	NBN-63023-B	As per BVMS 9.0
2	Box Type Fix Camera (IR Camera)	BOSCH	NBN-63023-B	As per BVMS 9.0
3	PTZ Camera	BOSCH	VG5-7230-EPC5	As per BVMS 9.0
4	NVR	DELL	Dell Poweredge R740XD	As per BVMS 9.0
5	Management Server	DELL	Dell Poweredge R740	As per BVMS 9.0
6	Video Analytics	Inbuilt in camera	-	-
7	Keyboard with Joystick	BOSCH	KBD-DIGITAL	As per BVMS 9.0



2. GENERAL OVERVIEW OF PAS-PIDS SYSTEM IN EXISTING PHASE-1B OF JMRC

A. GENERAL

The integrated PAS-PIDS system is designed to provide clear audio & visual information to the travelling public, along with automatic travel information and emergency evacuation messages.

The Integrated PAS & PIDS system consists of two type of hardware – Information Displays, and PA/PIDS Control System Hardware. The Central Equipment Room will consist of one PAS/PIDS control system server along with one backup PAS/PIDS control system server.

Each station will consist of a central equipment rack containing a PAS/PIDS server, a PAS/PIDS workstation within the SCR, and Passenger Information Displays across the Station. Each concourse will have 2 graphical LCD (TFT active matrix) type display board capable of displaying travel information as well as advertising, videos, images etc. Each platform will be provided with two double sided LCD (TFT active matrix type display boards capable of displaying travel information and text messages sent from the operator.

Central redundant servers allow the system to have a high availability to ensure continued operation during failure scenarios. The use of the local station server further allows the PAS & PIDS system to continue locally in the event failure scenarios.

The servers will coordinate the control messages from the workstations at the OCC and ensure the messages are delivered to the correct location across the network. Additionally, the servers will provide the interface to the signaling system and master clock. An internal scheduling service will allow automatic display messages to continue to operate even when the workstation that created them is turned off. Logging facilities ensure records of all actions performed by the workstations are recorded.

A redundant server architecture is used so that if one server or location fails, the system will continue to operate using the second server.

At the station level, the PIDS displays will communicate with the station server and workstation using the IP network.

PAS system will be able to provide facility to operator to generate/announce following type of messages:

- Fixed digital recording
- Pre-formatted with data to be added
- Instant recorded
- Live audio broadcast

The PAS system provides PAS coverage to the below mentioned areas of each station:

- Concourses and entry/exits
- UP platform
- Down platform



- Staff areas

The PIDS consists of the following equipment:

- Central Control System Servers
- PAS/PIDS Workstations
- Station Server
- Station Workstation
- LCD (TFT active matrix) type display boards

General architecture of the Integrated Passenger Audio & Visual Information System
- PAS/PIDS (PAMS) at OCC level is illustrated as below

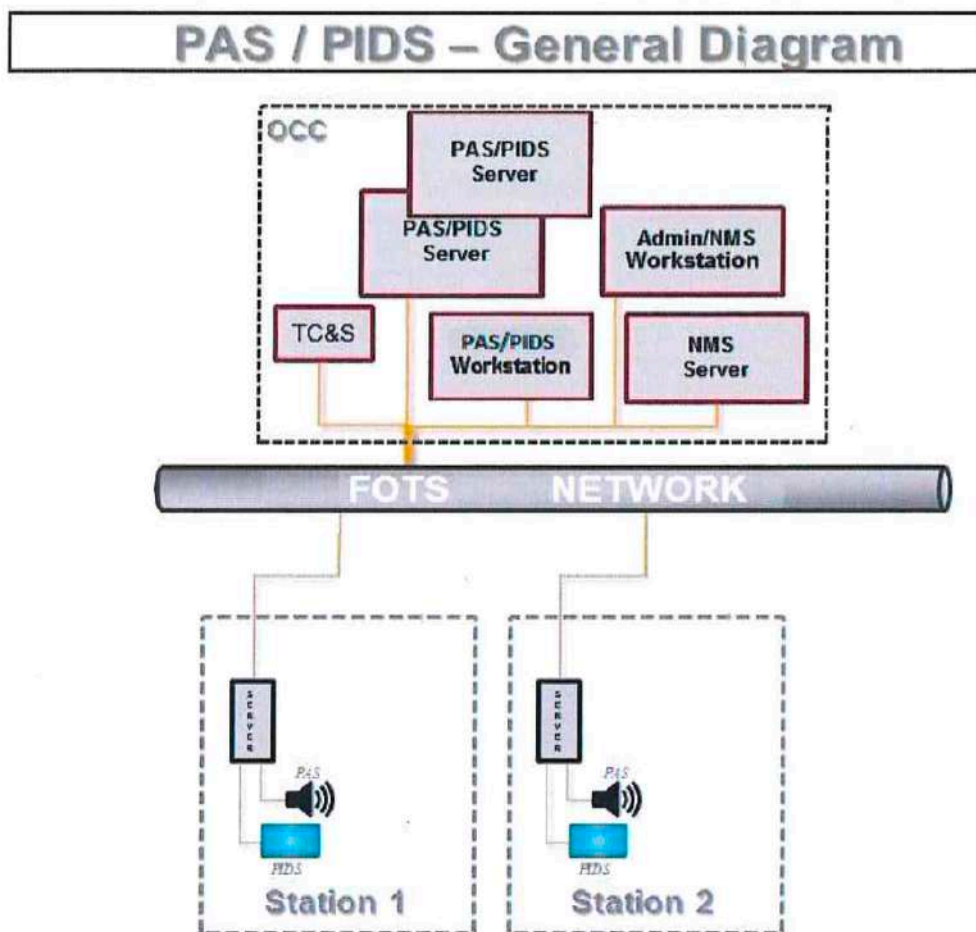


Figure 1 PAS & PIDS – General Architecture



B. PHASE - 1B INTEGRATED PASSENGER AUDIO & VISUAL INFORMATION SYSTEM DESIGN ARCHITECTURE AT OCC:

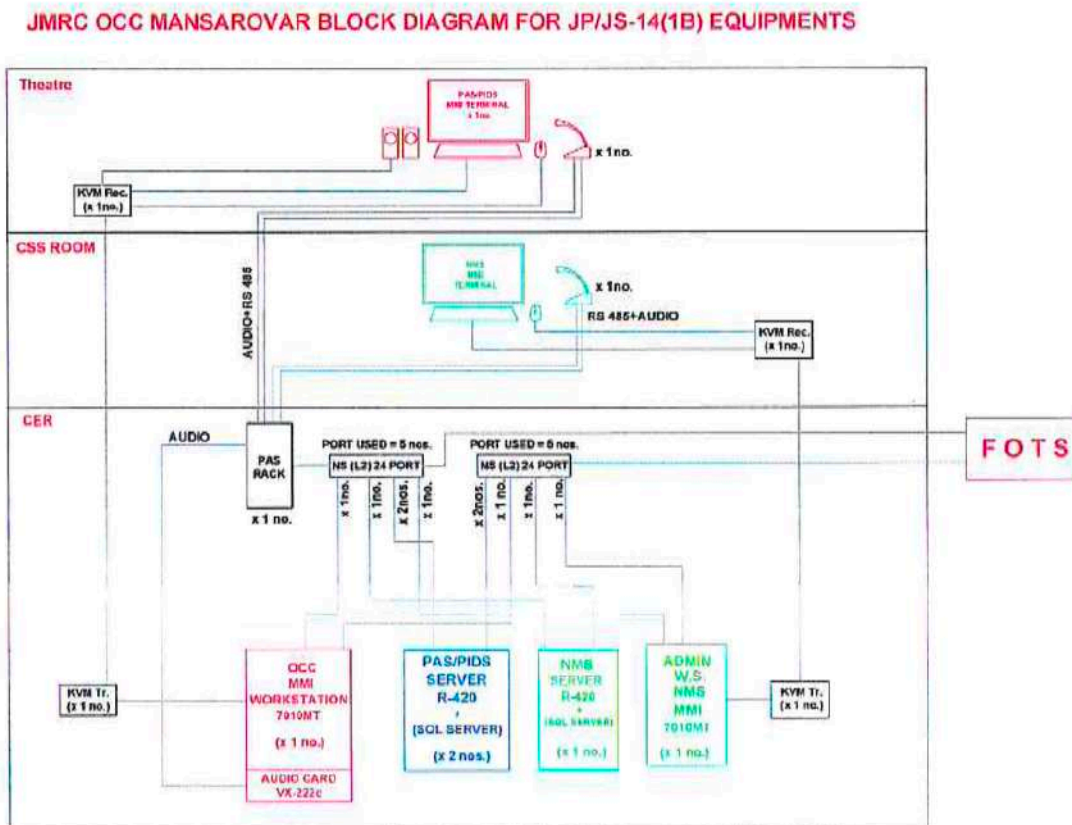


Figure 2 System Architecture at OCC

The Integrated System shall consist of the following sub-systems:

- A central system to manage the information for each line located at each OCC (with a backup)
- A local system installed in each station. In each station, the system is based on a SCR server to simultaneously control the visual and audio information inside the station.
- At the central position (at OCC), the OCC server gives to the operator the functions to manage the information in each station and to inform passengers in real time according to the Train movement information through TC&S system.
- A client application running on each workstation provides the user MMI for the operator (OCC or SCR control room).
- An administration/maintenance MMI in OCC (CSS Room) for alarm review & system management purposes.



C. INTEGRATED PASSENGER AUDIO & VISUAL INFORMATION SYSTEM DESIGN ARCHITECTURE AT STATION

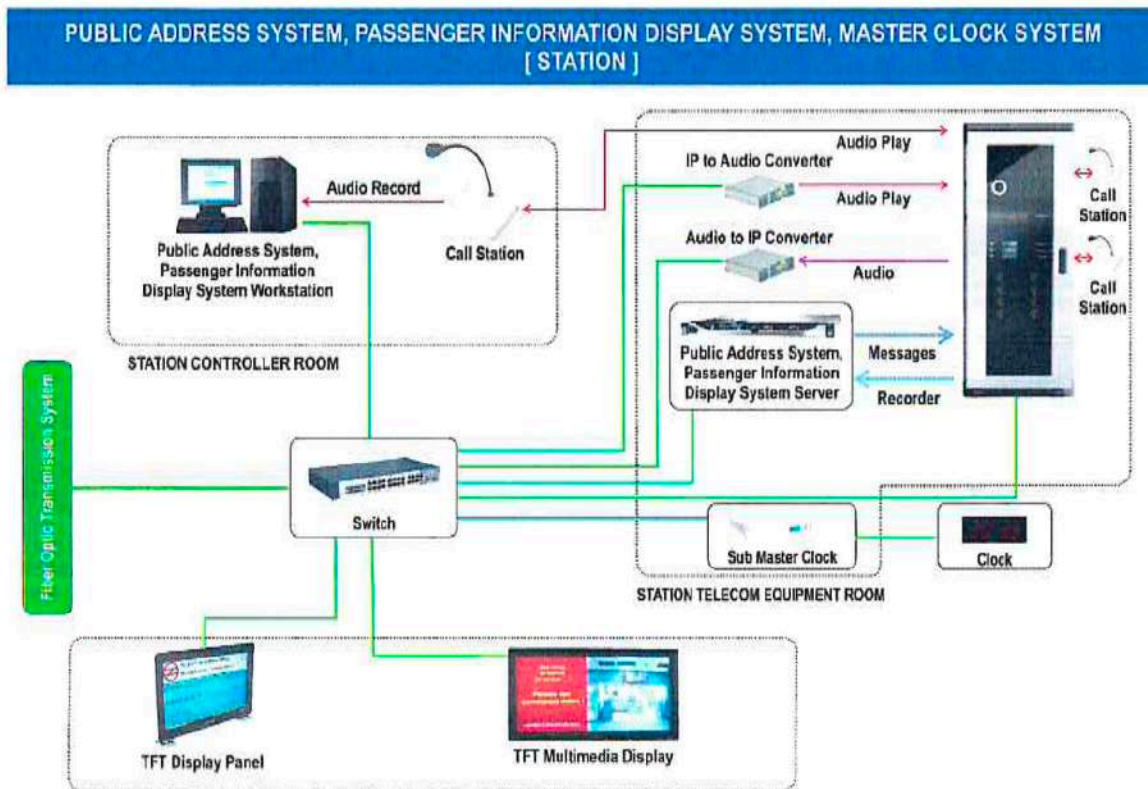


Figure 3 System Architecture at Station

D. OCC SERVER SOFTWARE

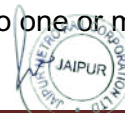
The OCC server is a central server containing the main database and used to dispatch the TC&S data and the OCC workstation requests.

The OCC server is running in hot standby with one main server and one redundant server at OCC. Both databases are synchronized in real-time.

The OCC Server is synchronized to the clock distribution system by using the NTP protocol over TCP/P.

The main features of the OCC Server are:

- Dispatch of automatic data from the TC&S system to the SCR Servers
- Dispatch command from each OCC Workstation
- Dispatch of fixed, pre-formatted or pre-recorded / instantly constructed audio/visual messages to one or multiple SCR servers
- Dispatch of live audio messages to one or multiple SCR servers
- Dispatch of scheduled audio and/or visual messages to one or multiple SCR servers



- Dispatch the central database updated from the OCC Workstation Administration to the SCR servers

The OCC architecture for the PIDS/PAS system is characterized by:

- The central server running in hot-standby (at OCC)
- A Workstation MMI at OCC
- An Administration Workstation MMI at OCC
- The link with the TC&S
- The link with the MCS
- The link with each SCR Server

The OCC Server is connected to the MCS server in order to collect the time reference via the NTP protocol.

a) OCC REDUNDANCY

The OCC Servers are in constant communication, one as main server and the other one as slave and their databases are synchronized in real-time.

The main server is the only one in charge of dispatching requests or data to the SCR servers and of distributing the data received from the SCR servers (equipment status and Scheduled List) to OCC Workstations.

In case of failure of the OCC Server, Redundant Server replaces will take the charge becomes the main server. When the failure is resolved, both databases need a new synchronization to enable the return to a hot-standby mode.

E. STATION SERVER SOFTWARE

a) GENERAL OVERVIEW

The OCC server, located at the central position, will be able to manage the system through the SCR server. In case of communication failure between the station and the central position, the PIDS/PAS system shall run locally with the SCR server.

The SCR server manages the communication to passengers by using the following equipment:

- TFT Display Panels
- Public Address (Audio Matrix)

The SCR server is synchronized to the clock distribution system via the TCP/IP network. The connection is done through NTP protocol.

The main features of the SCR server are:

- To dispatch any command received from the SCR Workstation and from the OCC server:



- Dispatch of fixed, pre-formatted or pre-recorded audio and/or visual messages to one or multiple audio zones and/or display screens.
- Dispatch of live audio messages to one or multiple audio zones. Dispatch of scheduled audio and/or visual messages to one or multiple audio zones and/or display screens.
- To dispatch the audio and/or visual messages triggered by the TC&S data, forwarded by the OCC server, to one or multiple audio zones and/or display screens.
- To record the audio signals providing by the PA system, during an announcement.
- To notify the SCR Workstation and the OCC server of the status of the PIDS/PAS system.
- To notify the SCR Workstation and the OCC server of the status (pending, in progress, done or cancelled) of the audio/visual messages contained in the Scheduled List.
- To transfer the alarms generated by the SCR system to the NMS servers.

b) LCD (TFT active matrix) display Boards

By using the SNMP protocol, the SCR server shall be able to:

- Receive the status of the TFT screens
- Receive alarms of the TFT screens

By using the HTTP protocol, the SCR server shall be able to:

- Display messages on the TFT screens
- Blank the TFT screens
- Display advertisements and images for TFT Multimedia screens

F. WORKSTATION SOFTWARE

GENERAL OVERVIEW

The main functions of the software are dispatch of fixed, pre-formatted, instantly created visual or/and audio messages to a station, group of stations, all stations, to one or more equipment (display boards/audio zones) at one station, or to any combination of equipment (display boards/audio zones) in any combination of stations.

Workstation software system is used to edit visual or/and audio message to be displayed/broadcast at the equipment of stations, in order to keep the passengers informed, in addition to automatic messages from the TC&S system. It combines PIDS and PAS functionalities.

It also provides facilities to monitor equipment. It shows the content of PAS/PIDS equipment (audio zones and display boards), with their status and message origin, for the current station selected.



G. HARDWARE AND SOFTWARE SPECIFICATION

- OCC Server: DELL PowerEdge R420
- PA MATRIX Rack & Control unit : ELASON
- Control Monitoring Panel: ELNO
- Amplifiers: ELASON
- Ceiling speaker: ITC T-105M
- Uni-directional Projection Loudspeaker (5W-7.5W-15W): ITC T-770A
- Announcement management Software : ELNO
- Administrator PAS/PIDS MMI: ELNO
- Network Management System : PAS/PIDS Alarm management Software : ELNO

H. INTERFACE WITH OTHER SYSTEMS

Sr. No.	System	Vendor	Interface
1.	FOTS	Fibcom SDH	Ethernet LAN over TCP/IP
2.	CDRS	VoiceGate	Analog Output
3.	Signalling	Alstom	Ethernet LAN over TCP/IP
4.	Telephone	Alcatel Lucent	Analog
5.	Radio	Cellcomm	Through Telephone system
5.	MCS system	Existing Ph-1B	NTP



3. GENERAL OVERVIEW OF MASTER CLOCK SYSTEM IN EXISTING PHASE-1B OF JMRC

The existing central Master Clock acts as NTP Time server. The Sub Master Clock at Stations will automatically query the NTP Time server (OCC/BCC) to synchronize its system clocks. The designated external systems connected to the network and supporting NTP will receive correct time from the NTP time server.

Master clock system will be of fault tolerant architecture and include self-monitoring fault diagnostics to enable continuous monitoring of all equipments to ensure that failures are immediately detected and indicated to the Network Management System (NMS).

The MCS consists of the following equipments in order to meet the technical requirements of the JP/JS14 (1B) Project:

- Sub Master Clock
- MCS NMS and MMI
- Analogue Clocks
- Digital Indoor Clocks
- Digital Outdoor Clocks

A. DESIGN METHODOLOGY

This design covers technical requirement of Master Clock System for JP/JS14 (1B) Project. The objective of Master Clock System is to provide exact and reliable time information in the form of analogue and digital clocks in Stations for time synchronization.

(i) SYSTEM DESIGN ARCHITECTURE

The MCS block diagram is shown in below figure:

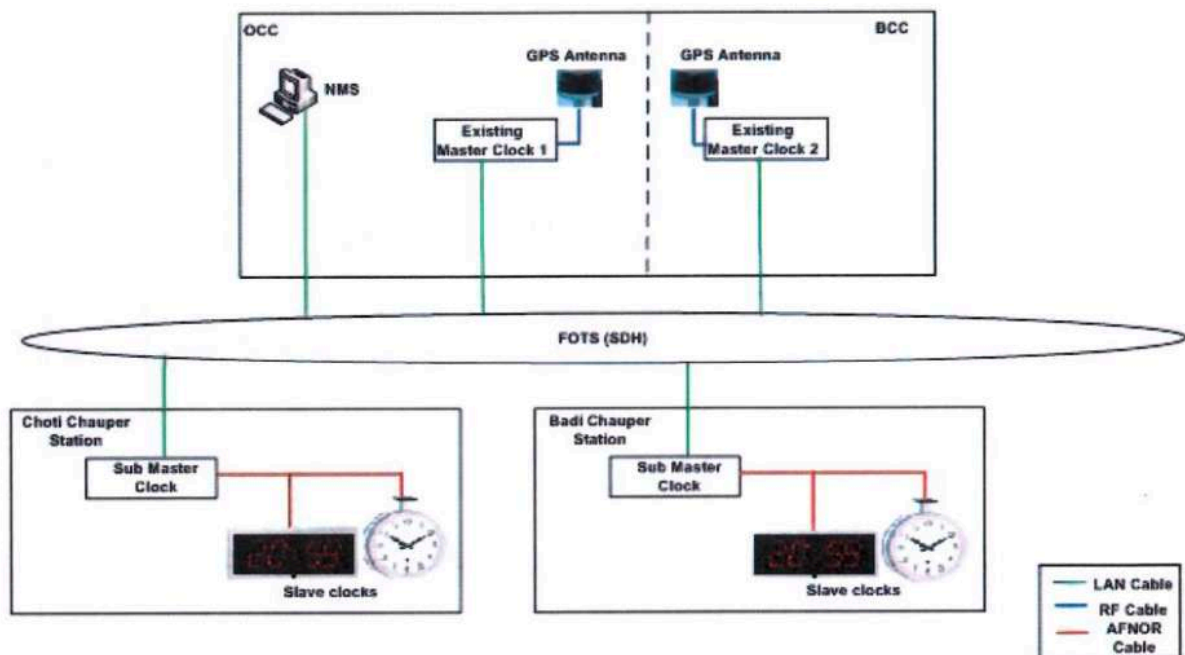


Figure 1 MCS – System Block Diagram

The existing master clock (OCC/BCC) will provide date and time information to sub master clocks at stations through NTP protocol and sub master clock at station will further distribute the date and time information to slave clocks on AFNOR protocol.

Existing Phase-1A Master clock system distribute the time and date signal to sub master clocks at Stations through FOTS (SDH) network. In absence of valid master clock signal, the sub-master clock will operate in free running mode with an internal clock supplying the time signals. On restoration of the time signal from Master Clock, the sub master clock will validate the time signal automatically without any manual intervention. After successful validation, the sub master Clock system will self-correct, if necessary.

The sub master clock provides clock sources to the slave clocks of Stations. In the absence of valid sub master clock signal, the slave clocks will operate in free running mode with a n internal clock supplying the time signals. All sub master clock and slave clocks (digital) will be provided with internal battery backup of at least 4 hours in case of power failure.

MCS NMS MMI is provided at OCC for supervision and maintenance of all clocks provided under Master Clock System.

(ii) SYSTEM BLOCK DIAGRAM - OCC/BCC ARCHITECTURE

One NMS server will be provided a t OCC and existing Master clock unit will interfaced with sub master clocks at stations for time synchronization through FOTS (SDH).

The System block diagram of MCS at OCC/BCC is shown in below figure:

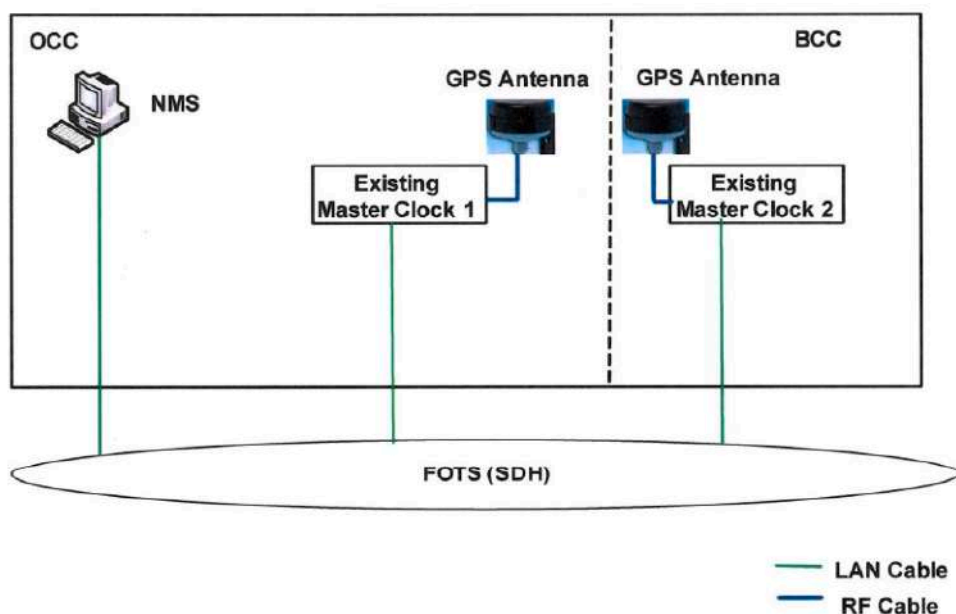


Figure 2 MCS – OCC/BCC System Block Diagram

(ii) SYSTEM BLOCK DIAGRAM - STATION ARCHITECTURE

One sub-master clock unit along-with slave clocks provided at each station for time synchronization through FOTS (SDH).

The System block diagram of MCS at station is shown in below figure:

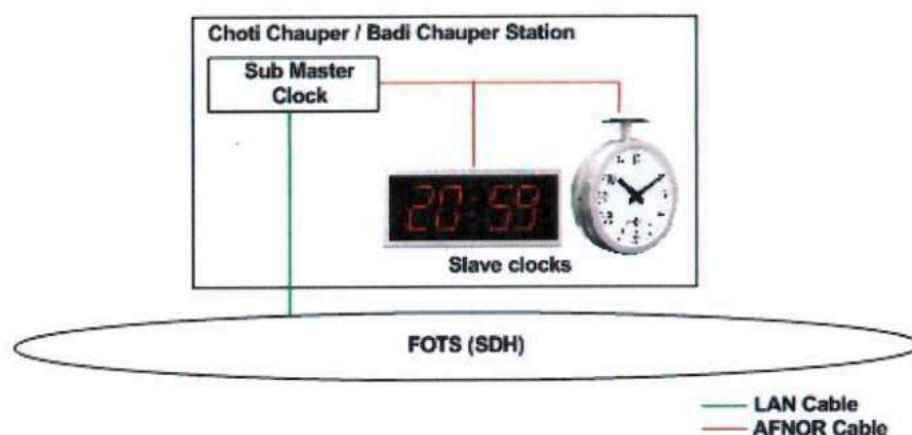


Figure 3 MCS – Station System Block Diagram

B. MASTER CLOCK SYSTEM EQUIPMENT SPECIFICATION**(i) HARDWARE SPECIFICATION**

The Master Clock System consists of the following main equipments:

S. No.	Equipment	Description
1.	Sub Master Clock	LEDI Network TS
2.	Outdoor Digital Clock	7300001400/02
3.	Indoor Digital Clock	7300001400/01

(iii) SOFTWARE SPECIFICATION

Master clock system has intelligent distributed modules to have flexible integration options with all the sub-systems and external connected systems and to provide reliable



timing signals. These intelligent modules are designed to perform with latest software/Firmware versions to ensure and maintain high performance.

Software specifications details are defined below as per design of individual modules:

S. No.	Description	Make	Model	Software Version*
1	Sub Master Clock	Gorgy Timing, France	LEDI Network TS	DIGI version : 2.00 release 16.210
2	Outdoor Digital Clock	Autometers Alliance Ltd,	7300001400/02	3.0
3	Indoor Digital Clock	Autometers Alliance Ltd,	7300001400/01	2.0
4	MCS NMS System	Gorgy Timing, France	CDG024 (supervision software)	v 2.13
5	Analogue Clock	Gorgy Timing, France	HANDI 620	1.1.2.1



4. GENERAL OVERVIEW OF UPS SYSTEM IN EXISTING PHASE-1B OF JMRC

A. SYSTEM OVERVIEW

UPS system with batteries is meant to provide uninterrupted power to connected load. The UPS System and the battery backup system for Signalling, Telecommunication & AFC system includes 2 numbers 3 - Phase input, 3-phase Output, UPS System in online redundant configuration (1+1) powered by Two separate Battery Banks (one for each UPS System) at each interlocking and secondary station.

A stand by spare cell charger (for 1 to 6 UPS cells) and a spare cell bank with 6 numbers cells is also provided at each station.

(i) SYSTEM DESCRIPTION

UPS System comprises the following items:

- Input Automatic Transfer Switch (ATS)
- Transient Voltage Surge Suppressor (TVSS)
- Isolation Transformer
- Input Distribution
- Redundant UPS Systems
- Servo Controlled Voltage Stabilizer (SCVS) as bypass source
- Output ACDB
- 48 V DC System
- Battery Bank
- Spare Cells
- Spare Cell Charger

Input Transformer Cubicle:

It contains the following:

- Automatic Transfer Switch (ATS)
- Transient Voltage Surge Suppressor (TVSS) /Surge and Transient Protection
- Isolation Transformer
- Metering and Switchgear

While ATS have functionality of selecting priority source, in the event of failure of priority source, it will automatically select the emergency source available. It could be a DG source or any other supply available. Once primary source is restored back, the ATS will automatically select the primary source and the power will be once again derived from primary source.



Isolation transformer provides galvanically isolated supply to UPS 1, UPS 2 SCVS and DC power system. This will ensure that separately derived source availability to user to have a dedicated grounding system for the UPS supplied loads.

TVSS will ensure surge suppression as per specifications and will ensure transient free power to all the equipment.

Distribution system provided at the output of the transformer will provide various feeders feeding to onward equipments.

UPS Systems:

UPS system consists of a rectifier and inverter with following features:

Rectifier

The UPS have solid state PWM converter with IGBT rectifiers. The rectifier has the following important features:

- a) Power Conversion
- b) Battery Charging
- c) Power Factor Improvement
- d) Current Harmonic Reduction
- e) Voltage Regulation
- f) Transient Recovery
- g) Automatic Synchronization
- h) Over-current Protection
- i) Over Temperature Protection
- j) Control Power Failure Protection
- k) Short Circuit Protection
- l) Current limiting function of battery charging to prevent the battery from being damaged.

The rectifier/charger unit is equipped with an over-voltage protection device.

Inverter

The inverter is a solid state device with proven Pulse Width Modulation technique utilizing Insulated Gate Bipolar Transistors and microprocessor controls, capable of accepting the output of the rectifier / charger or the battery system and provide a 3-phase alternating current output complying with the performance requirements.

The inverter utilise WM technology to achieve high efficiency and reliability, and to cope with non-linear loads. The inverter incorporates following essential features:



- a) Voltage Regulation
- b) Transient Recovery
- c) Automatic Synchronization
- d) Over-current Protection
- e) Over Temperature Protection
- f) Short Circuit Power Protection
- g) Frequency Control
- h) Inverter Output voltage Harmonic distortion
- i) Inverter Overload protection.

The inverter is capable to supply its rated load at 0.8 lagging power factor.

Voltage harmonic distortion: The inverter provide sine wave output having harmonic neutralisation and filtering to limit the total harmonic distortion on the output voltage to less than 1% of linear load and 5% of non-linear load.

Output ACDB: --

This is only a distribution board which ensures distribution of the power to the load as per the load requirement.

The output of the UPS system is terminated in Distribution Boards, as follows:

At Interlocking stations, Distribution Board will have one no. of 63A MCCB for S&TC, one no. of 63A MCCB for Telecommunication, one no. of 63A MCCB for AFC, one 63 A MCCB as spare. It's also have 16A MCCB for 48 V DC System including spare feeder.

At Secondary stations, Distribution Board will have one no. of 63A MCCB for S&TC, one no. of 63A MCCB for Telecommunication, one no. of 63A MCCB for AFC, one 63 A MCCB as spare. It's also have 16A MCCB for 48 V DC System including spare feeder.

48V DC System:

48 V redundant DC system is provided for equipments which runs on 48V DC. This system will take UPS power from ACDB and provide 48 V output.

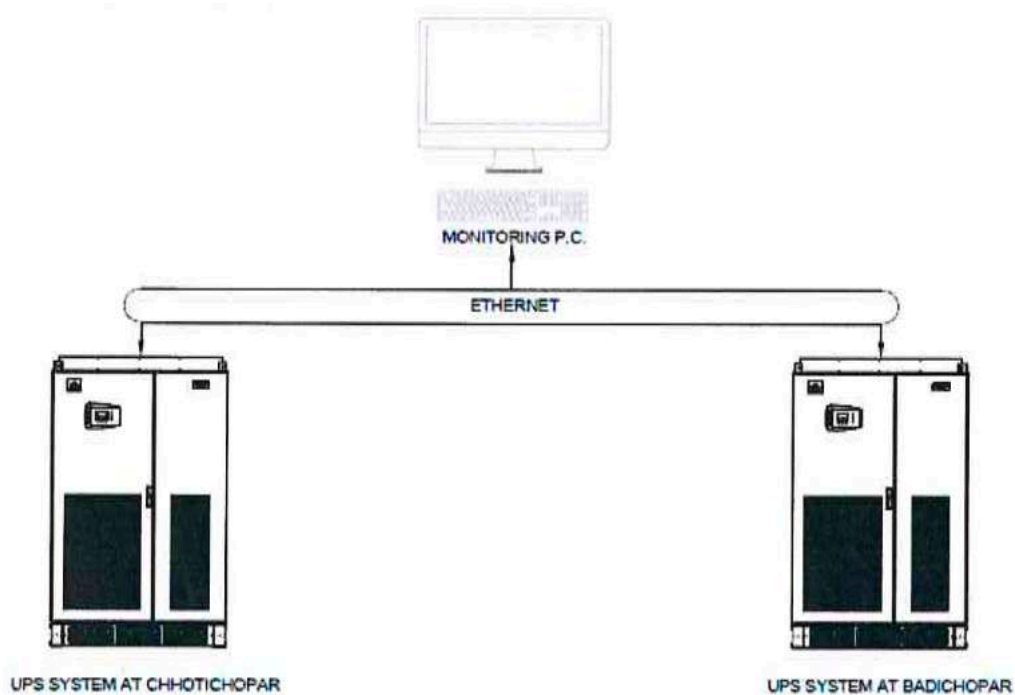
Battery Bank:

Battery Banks is energy storage system which store electrical energy in form of chemical energy.



VRLA battery of 300Ah having 192 cells is connected with each 30 KVA UPS system at secondary stations and 400Ah having 192 cells is connected with each 60 KVA UPS system at interlocking

(ii) MONITORING ARCHITECTURE



Contract JP/JS14(1C&1D): Design, Manufacture, Supply, Installation, Testing and Commissioning of Telecommunication System for 3 Stations of JMRTS Phase-1C & 1D Project.

S. No.	Preamble
1	The Bill of Quantities shall be read in conjunction with instructions to Bidders, General and Special Conditions of Contract, Notice inviting Bidders and Employer's Requirements (General specifications & Particular specifications).
2	Bidder shall note that prices shall be quoted against each item in the price schedule, the bidders are advised to quote the price inclusive of all Central/State/Local taxes (except GST and Custom duty which will be paid extra as applicable), duties, levies, cess on duties, freight, insurance and all other incidental charges required to fulfill the contract requirements including statutory deduction viz., TDS towards Income Tax/GST/Works Contract Tax /Labor Cess and any other Tax etc. and except Custom duty/ exemptions thereto, to the extent the same are applicable and available. after considering clause C2.4, C2.5 & C2.6 of ITB and SCC Clause 21.
3	~~The Bidder shall quote any unconditional discounts and the methodology for their application in view of the rights provided to the bidder in terms of percentage figure on total bid price so that the discounts can be evaluated by simple arithmetic calculation during financial evaluation of the bids, to arrive at the net total price of the bid. Deleted.~~
4	If the bidder fails to quote rates against any item, the tender may be treated as incomplete and non-responsive and shall be rejected.
5	Errors will be corrected by the employer for any arithmetic errors in computation or summation as per contract conditions.
6	No Price variation is admissible in this contract.
7	Bidder shall note that total price mentioned in Bid Total of Annexure-A of Appendix-1 of COF and BOQ total price must be equal. In case of discrepancies BOQ total price shall prevail.
8	~~Bidder shall note that total price mentioned in BOQ after discount and Annexure-A of Appendix-1 of COF must be equal. In case of any discrepancies BOQ total price shall prevail and Milestone shall be apportioned accordingly by considering the same discount as mentioned in BOQ. Deleted.~~
9	The rates and prices to be tendered in the Pricing Document are for completed and finished items of work and complete in all respect. It will be deemed to include cost of all plants, labour, supervision, materials, transport, all temporary works, erection, maintenance, contractor's profit and establishment/overheads, all general risks, insurance liabilities, compliance of labour laws and obligations set out or implied in the contracts.
10	Bidder shall note that the Appendix-1 of COF is only instructions for completing the pricing document, whereas Appendix 14 to 16 of COF is required to be prepared and submit along with the pricing document (Vol-4) by the bidder.
11	For the List of spares for 10 years of system operation from the last date of Taking over of whole works, the bidder shall submit unpriced list of spares for maintenance of supplied system in the format as per Appendix- 14 of COF in Technical Package and priced list for the same in the Financial Package. However, due to any reason, if the bidder is not able to submit unpriced list of spares for maintenance of supplied system in the format as per Appendix- 14 of COF in Technical Package and priced list for the same in the Financial Package, bidder shall submit a undertaking in the format as per Appendix-17 of COF in the Technical Package. The rates of these spares (Appendix-14 of COF) will not be considered for tender evaluation while assessing the L1 bidder.
12	Bidder shall note that the pricing for unconditional withdrawal of the deviations from Instructions to Bidder, GCC & SCC and the Employer's Requirements (General Specifications and Particular Specifications) noted in the Appendix 13 of FOB has been given in the financial bid Appendix-N. The Bidder shall indicate price adjustment against each deviation in Appendix N of Financial bid. This price is the price on which the bidder shall reduce from his tender price if deviation(s) is/are accepted by the Employer. If there is no deviation, the statement should be returned duly signed with an endorsement indicating ' No Deviations '. In case, Performa of deviations is not submitted or submitted as blank, it will be construed that the bidder has not proposed any deviations from bid documents. Bidder must confirm that all implicit and explicit deviations, comments and remarks mentioned elsewhere in our proposal shall be treated as NULL and VOID and stand withdrawn and the unpriced deviations will be treated as NULL and VOID.
13	Bidder shall note that the copy of all the documents of Financial Package must be submitted with the Technical Package and it should be true copy of the financial package with prices left blank. Bidder shall also note that any additional comments, remarks, deviations, terms and conditions in Financial Package will be treated as NULL and VOID and stand withdrawn.
14	Bidder shall note that all the pages of documents submitted/uploaded as part of bid documents must be signed by the authorised signatory of the bidder. For detailed information ITB clause A4.1 & C24.2 may be referred.
15	Please refer Appendix 1 of COF for Instructions to complete the Pricing Document (BOQ and Milestones)



APPENDIX-15

MANDAY RATES (Refer COF Appendix-1)

Name of the Work- Contract - JP/JS14(1C&1D): Design, Manufacture, Supply, Installation, Testing and Commissioning of Telecommunication System for 3 Stations of JMRTS Phase-1C & 1D Project.

Name of Bidder:	0
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Item No.	Job Title and Grade of Staff	Max. Daily Rate in Foreign Currency (A)	Max. Daily Rate in Local Currency (B)	Rate proposed by the bidder in FC	Rate proposed by the bidder in INR
		EURO	INR		INR
1	Rates for Works Carried Out Overseas- Expatriate Staff				
1.1	Project Manager	966.00	0.00		
1.2	Engineer	760.00	0.00		
1.3	Assistant Engineer	548.00	0.00		
2	Rates for Works Carried Out in Jaipur - Expatriate Staff				
2.1	Project Manager	1,164.00	0.00		
2.2	Engineer	920.00	0.00		
2.3	Assistant Engineer	684.00	0.00		
3	Rates for Works Carried Out in Jaipur - Local Jaipur Staff				
3.1	Manager	0.00	16,170.00		
3.2	Engineer	0.00	13,368.00		
3.3	Assistant Engineer	0.00	6,990.00		

1. These are maximum rates fixed (Column A & B) by the employer for the contract period.

2. This Document is to be prepared by the Bidder and submitted as part of the Bill of Quantities/ Pricing Document (Volume 4 of the bid documents) in Package 2 (i.e., Financial Package) on e-bidding website <https://eproc.rajasthan.gov.in>.

