



NEPAL ELECTRICITY AUTHORITY
(Government of Nepal Undertaking)
Project Management Directorate
Project Management Department
Distribution System Control and Data Centre Project
Kharipati, Bhaktapur

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Letter Ref. No.077/78 /Ch:-122

Date:-10th November, 2020

To
All prospective bidders;

Subject:- Issuance of Clarification – III

Ref:- Design, Supply, Installation and Commissioning of Distribution Command and Control Centre (OCB:- PMD/EGMP/DCC -077/78 -01)

Dear Sirs/Madams;

In reference to the bid published on date 10th Aug 2020, We would like to inform all the prospective bidders with clarification -III according to the ITB clause 7.1 of the bidding document.

We also would like to request you to acknowledge the receipt in project office.

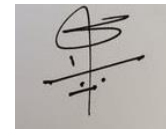
With Warm Regards

Rabindra Shrestha
(Project Manager)

Amendment to RFP to Clarify the Queries from Bidders

The amendments issued in this document shall be treated as a part of RFP from here and after and shall be read with the original RFP document and subsequently issued corrigendum documents.

Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended
1	Section-6.3/ Page160	<p>The contractor shall provide a videowall system based on modular LED technology. All the screen modules of the VPS system shall be suitable to form combined high-resolution projection images. The videowall system will be used to project displays of SCADA/DMS system independently of workstation console monitors. All the operations envisaged from workstation console (dispatcher) shall be possible from videowall also.</p> <p>The Contractor shall supply all necessary hardware and software, including modesty panel, multi- screen drivers, adapters and memory to seamlessly integrate the video projection system with the user interface requirements</p>	<p>The contractor shall provide a videowall system based on modular LED technology. All the screen modules of the VPS system shall be suitable to form combined high-resolution projection images. The videowall system will be used to project displays of SCADA/DMS system independently of workstation console monitors. All the operations envisaged from workstation console (dispatcher) shall be possible from videowall also.</p> <p>The Contractor shall supply all necessary hardware and software, including modesty panel, multi- screen drivers, adapters and memory to seamlessly integrate the video projection system with the user interface requirements described in the specification.</p> <p>The videowall systems shall have resolution of 11000 pixels x 4200 is required which may be either achieved by 4K-UHD or HD cubes and shall be complete with all projection modules, supporting structures and cabling.</p> <p>Design & installation of the video projection systems shall be coordinated with the Employer during project implementation. The requirement for each modular video display is as per the Annexure-1</p>



Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended
		<p>described in the specification. The videowall systems shall be 4K laser solution and shall be complete with all projection modules, supporting structures and cabling. Design & installation of the video projection systems shall be coordinated with the Employer during project implementation. The requirement for each modular video display is as per the Annexure-1</p>	
2	10. Annexures/ SWITCHBOARDS/ Page 341	<p>The enclosures shall be designed to take care of normal stress as well as abnormal electro-mechanical stress due to short circuit conditions. All covers and doors provided shall offer adequate safety to operating persons and provide ingress protection of IP 42 unless otherwise stated. Ventilating openings and vent outlets, if provided, shall be arranged such that same ingress protection of IP 42 is retained. Suitable pressure relief devices shall be provided to minimize danger to operator during internal fault conditions.</p>	<p>Degree of protection for Indoor enclosure , installation shall be IP - 21 and for outdoor installation - IP55 (Corrected clarification I and II)</p>



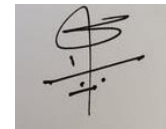
Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended
3	10. Annexures/ APFC PANEL: Minimum value provided. The qty. may vary during DDE./ Page 345	Design, fabrication, assembly, wiring, supplying, installation, testing and commissioning of front operated cubicle type compartmentalised front access free standing, dust and vermin proof (IP 20 ingress protection) switchboards suitable for use at 400 volts +/- 10%,	Degree of protection for Indoor enclosure , installation shall be IP - 21 and for outdoor installation - IP55 (Corrected clarification I and II)
4	10. Annexures/ SWITCHBOARDS/ Page 342	For operator safety IP2 X (touch proof) protection to be available even after opening the feeder compartment door. The compartmentalization to be achieved by using metal separators, use of PVC sheet / Hylem sheets shall not be allowed	Degree of protection for Indoor enclosure , installation shall be IP - 21 and for outdoor installation - IP55 (Corrected clarification I and II)
5	3. 1597390379_DCC Volume II (1) Clause No. 6.1.4 Servers/Processors Page No. 242	6.1.4 Servers/Processors Each server shall have dual AC power supply which shall be fed from two different UPS sources. The servers shall be fully operational even when only one of the AC power supply is available. There shall not be any interruptions in the operation of the server when there is a failover between the two AC power supplies of the server. The Servers shall have provision for expansion of the Processor, auxiliary memory	6.1.4 Servers/Processors Each server shall have dual AC power supply which shall be fed from two different UPS sources. The servers shall be fully operational even when only one of the AC power supply is available. There shall not be any interruptions in the operation of the server when there is a failover between the two AC power supplies of the server. "The Servers shall have provision for expansion of the auxiliary memory and Main memory (RAM) of the servers by 100% of the delivered capacity. This expandability shall be possible at site with addition of plug in modules only. "



Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended
		and Main memory (RAM) of the servers by 100% of the delivered capacity. This expandability shall be possible at site with addition of plug in modules only.	
6	Section 6.3–Technical Specification 2.1.7.3 Vol-II P 142/413	2.1.17.3 Calculated Data Processing Sys call in database should be able to calculate online.	2.1.17.3 Calculated Data Processing System call in database should be able to calculate online.
7	Chapter 10/Sub-Sector 2/ Clause no 10.2.7 Page 274	DG Set should be 625 KVA. DG should be suitable to supply power continuously to a constant or varying electrical load for unlimited hours in a data centre application. The DG should meet the uptime requirement of a Tier III data centre conforming to 2012 IBC Certification and capable to run for unlimited hours of operation. DG should can deliver Minimum 400 kWe @ 0.8 PF (lagging) Electrical power output at Alternator terminals continuously without any interruption 24 x 7 x 365 days @ 50 Deg. C. The DG rating proposed can either be Data	DG Set should be 625 KVA. DG should be suitable to supply power continuously to a constant or varying electrical load for unlimited hours in a data centre application. With 700 HP (at 1500 rpm). DG should be suitable to supply power continuously to a constant or varying electrical load for unlimited hours in a data centre application. The DG should meet the uptime requirement of a Tier III data centre conforming to 2012 IBC Certification and capable to run for unlimited hours of operation. Electrical power output at Alternator terminals continuously without any interruption 24 x 7 x 365 days @ 50 Deg. C. The DG rating proposed can either be Data Centre Continuous Rating conforming to 2012 IBC Certification and should meet uptime requirement of a Tier III data centre. The Proposed DG set capable to run for unlimited hours of operation at its full capacity for 12 hours. (Corrected clarification I and II)



Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended
		Centre Continuous Rating conforming to 2012 IBC Certification and should meet uptime requirement of a Tier III data centre. The Proposed DG set capable to run for unlimited hours of operation at its full capacity for 12 hours.	
8	Chapter 6.3 Technical Specification PASSIVE NETWORK SYSTEM 301-313	LIU should be able to accommodate Fiber, Copper and Multimedia Connectivity like Coaxial (BNC, F Type, RCA Connectors), HDMI, USB etc. Universal Optical fibre adapter frames shall provide the connecting interface between two optical fibre connectors.	LIU should be able to accommodate Fiber and Multimedia Connectivity like Coaxial (BNC, F Type, RCA Connectors), HDMI, USB etc. Universal Optical fibre adapter frames shall provide the connecting interface between two optical fibre connectors. (In Ultra High Density panel, Copper cable should be avoided)
9	Chapter 6.3 Technical Specification PASSIVE NETWORK SYSTEM 308	Port Angled unloaded Jack Panel	In the Data Centre with high standard BMS system, The cable with LSZH should be IEC 60332-1 complaint. Requirement for complaint against IEC 60332-1 for LSZH jacket stands deleted



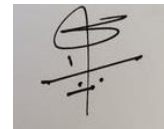
Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended
10	clause No. 3.2 page no 218 Building interior decoration requirement (DCC/SOC/NOC/office area)	The equipment container uses light steel keel filled with 50-inch thick thermal insulation rock wool, colour steel composite gypsum board veneer, 3000 mm high, and stainless-steel baseboard. Office rooms use latex paint walls and stainless steel baseboards. The colour steel plate is dustproof, easy to clean, does not generate glare, has a strong structure, and is durable and environment friendly. In addition, the colour steel plate must meet the fireproof requirements. Is the market with a good reputation in high-grade products; The colour steel plate surface layer is the galvanized steel plate; the steel plate back sticks the paper surface gypsum board.	The equipment container uses light steel keel filled with 50-mm thick thermal insulation rock wool, colour steel composite gypsum board veneer, 3000 mm high, and stainless-steel baseboard. Office rooms use latex paint walls and stainless-steel baseboards.
11	General Clause : Variation in quantity or Specification		Bidder is requested to refer quantities mentioned volume -III , that shall supersede quantities mentioned elsewhere.



Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended																																							
12	Vol II- Page No 93 Outage Management System	End to end integration with existing legacy systems, AMR, AMI Solution stack (Phase 1st : for KTM Valley 2 DCS is already under implementation and other AMI implementation that might take place during the duration of this project (Planned is for another 8 DCS of KTM Valley and 2 DCS each for other 6 provinces) and upcoming utility systems including Metering, Billing & Collection Systems (Both existing Distributed MBC System and Upcoming Centralized MBC System), ERP Solution, GIS System, DTMS, APFC, substation automation system(SAS), Transmission, Generation SCADA, Load Dispatch Center(LDC), other Smart initiatives by NEA etc. The integration is expected to be Industry Standards Based on IEC 61968-1 Bus (SOA Enabled on enterprise Bus) using CIM/XML, OPC, ICCP etc. which is, on-line, real time or offline where appropriate and shall operate in an automated	<p>The SCADA DMS and OMS systems must be integrated to other enterprise systems in the most secure manner to realize its full potential. The integration is expected to be as per leading Industry Standards Based on IEC 61968/equivalent or higher (SOA Enabled on enterprise Bus) using CIM/XML, OPC, ICCP etc. and shall operate in an automated fashion without manual intervention ,which is documented for future maintenance. SI shall make necessary provisions/software linkages in the proposed solution so that the IT system or any legacy SCADA/DMS system may be integrated seamlessly. The bidder is also required to provide end to end integration with the RTUs procured as part of this project. Below is a list of indicative system/devices not limited to, with which the SI is expected to establish integration/interface with during the course of this project.</p> <table border="1"> <thead> <tr> <th>System</th> <th>Legacy</th> <th>Upcoming</th> </tr> </thead> <tbody> <tr> <td>Automated Meter Reading</td> <td>Yes</td> <td></td> </tr> <tr> <td>AMI</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>AMI - KTM Valley 2 DCS</td> <td>Yes</td> <td></td> </tr> <tr> <td>AMI - Rest of KTM Valley</td> <td></td> <td>Yes</td> </tr> <tr> <td>Substation Automation</td> <td>Yes</td> <td></td> </tr> <tr> <td>Transmission SCADA - EMS</td> <td>Yes</td> <td></td> </tr> <tr> <td>National Load Dispatch Centre</td> <td>Yes</td> <td></td> </tr> <tr> <td>Customer Information System</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>Customer Care System (NO LIGHT)</td> <td></td> <td></td> </tr> <tr> <td>Enterprise Resource Planning</td> <td></td> <td>Yes</td> </tr> <tr> <td>GIS</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>VALORAGUA/WASP</td> <td>Yes</td> <td></td> </tr> </tbody> </table>	System	Legacy	Upcoming	Automated Meter Reading	Yes		AMI	Yes	Yes	AMI - KTM Valley 2 DCS	Yes		AMI - Rest of KTM Valley		Yes	Substation Automation	Yes		Transmission SCADA - EMS	Yes		National Load Dispatch Centre	Yes		Customer Information System	Yes	Yes	Customer Care System (NO LIGHT)			Enterprise Resource Planning		Yes	GIS	Yes	Yes	VALORAGUA/WASP	Yes	
System	Legacy	Upcoming																																								
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SI.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended		
		<p>fashion without manual intervention ,which is which is documented for future maintenance. SI shall make necessary provisions/software linkages in the proposed solution so that the IT system or any legacy SCADA/DMS system may be integrated seamlessly. Integration is also envisaged with the LDC and Master Control Centre of NEA. With respect to the integration with SAS, the bidder shall be able to fetch the data through the gateways procured under SAS project of NEA. The bidder is also required to provide end to end integration with the RTUs procured as part of this project.</p>	Distributed Energy Management Software		Yes
			Electric Vehicle Charging Management Software		Yes
			RMU	Yes	
			GO Switches	Yes	
			Customer Portal of NEA	Yes	
			Field equipment procured under this project		
13	Vol-II Page No: 102 (To be referred wherever applicable for System availability test in RFP)	System Availability Test (360 hours)	System availability is also termed as Stabilization period in the RFP and will be conducted for duration of 3 months post Successful commissioning of all the sites. Post successful completion of the requirements laid down under the System Availability test , the operational acceptance or Go-Live shall be considered/declared.		

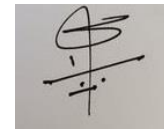


Sl.No	RFP Reference(s) (Section, Page)	Existing Clause	Shall be read as amended
	Vol-II- Page No -126 Minimum Indicative Manpower Requirement.	Note: For O&M, for each 5 stations a maintenance crew comprising of 1 Site Engineer and 1 Site Technician is required. There will be 6 teams for 30 Substations and switching stations. These will be in 3 shifts and 1 additional team as reliever for each team. So, a total of 48 persons minimum are required for O&M comprising of category 2a and 2b.	Minimum 48 Engineers and Technicians are required for O&M covering the entire scope of work and bidder shall propose the deployment in their human resource plan. Other resources as required shall be deployed by the bidder to meet the SLA prescribed in the bid document.

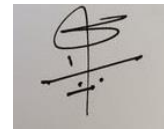
Revised Timelines for the Project

NOTE: These timelines shall be applicable to all the relevant clauses of the RFP wherever applicable and should be read and interpreted by the Bidder accordingly.

SL .NO	Project Phases	Timelines
1	Contract Finalization and Award of Work	T
2	Project Initiation Phase:	T+4 months
3	Design Blueprinting Phase of DC, DCC, NOC and SOC:	T+6 months



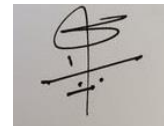
4	Design Blueprinting Phase of SCADA System:	T+7 months
5	DC, NOC, SOC, DCC Civil and Non IT Infrastructure I&C	T+12 months
6	SCADA DMS System IT and Field Infrastructure I&C	T+14 months
7	SCADA DMS System Design	T+14 months
8	SCADA DMS Roll Out	T+15 months
9	Go-Live Phase SCADA DMS	T+15 months onwards
10	Stabilisation Period	T+18
11	O&M (including FMS for SCADA DMS System)	T+18months onwards
12	O&M (including manpower for DC, DCC, NOC and SOC Civil Build and Non IT Infrastructure Setup)	T+17 months onwards



Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M	M1	M1	M1	M1	M1	M1	M1	M1	M1	M1	M1
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	8	To	
																							M5
1	Contract Finalization and Award of Work																						
2	Project Initiation Phase:																						
a	Project Kick Off																						
b	Presentation on Execution Approach & Methodology to Senior Management																						
c	Onsite Office Setup & Team Mobilization																						
d	Project Inception Report																						
e	Site Survey																						



Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	8	
		To																				
																						8
																						4
	Report for DC, NOC, DCC, SOC Civil and Non IT Infrastructure.																					
f	Site Survey report of Substation including network feasibility.																					
3	Design Blueprinting Phase of DC, DCC, NOC and SOC:																					
a	As-Is Study																					
b	Requirement gathering workshops																					
c	Gap Analysis																					
d	To-Be Process Design																					
e	Updation of Requirement Specifications																					
f	Technical Design Documents – Layouts, schematics for DC, DCC, NOC, SOC.																					
4	Design Blueprinting																					



Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M	M1	M1	M1	M1	M1	M1	M1	M1	M1	M1
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	8	
	Phase of SCADA System:																					
a	As-Is Study																					
b	Requirement gathering workshops																					
c	Gap Analysis																					
d	To-Be Process Design																					
e	Updation of Requirement Specifications																					
f	Technical Design Documents – HLD & LLD with layouts, schematics for DC, DCC, SS including communication network architecture																					
5	DC, NOC, SOC, DCC Civil and Non IT Infrastructure I&C:																					
a	Procurement equipment/material for civil build and Non IT																					



Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M1	M1	M1	M1	M1	M1	M1	M1	M1	M1	M1
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8		
																						To
																						M54
	Infrastructure																					
b	Supply equipment/material for civil build and Non IT Infrastructure																					
c	Install equipment/material for civil build and Non IT Infrastructure																					
d	Commission DC, NOC, SOC, DCC and Non IT Infrastructure and ready for occupancy																					
6	SCADA DMS System IT and Field Infrastructure I&C:																					
a	Procurement of SCADA DMS system equipment's (including hardware and software to be deployed at DC, DCC)																					



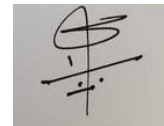
Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	8	
																						M5
																						4
b	Supply of SCADA DMS system equipment's (including hardware and software to be deployed at DC, DCC)																					
c	Installation of SCADA DMS system equipment's (including hardware and software to be deployed at DC, DCC)																					
d	Commissioning of SCADA DMS system equipment's (including hardware and software to be deployed at DC, DCC)																					
e	Procurement of SCADA DMS system field equipment and IED (including RTU, CMR, MFT)																					



Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M1	M1	M1	M1	M1	M1	M1	M1	M1	M1	M1
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	8	8
		To																				
	etc)																					
f	Supply of SCADA DMS system field equipment and IED (including RTU, CMR, MFT etc)																					
g	Installation of SCADA DMS system field equipment and IED (including RTU, CMR, MFT etc)																					
h	Commissioning of SCADA DMS system field equipment and IED (including RTU, CMR, MFT etc)																					
7	SCADA System Design Phase:																					
a	SCADA System Design and Development																					
b	Software Additional Customization and Configuration																					



Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
c	Solution Testing/Integration																						
d	User Acceptance Testing (UAT)																						
e	Incorporation of UAT changes																						
8	SCADA DMS Rollout Phase:																						
a	SCADA system roll out at all 35 Sub Stations including integration with AMI, No Light, Billing, GIS, ERP etc.																						
9	Go-Live Phase:																						
a	Stabilization Support																						
b	SCADA System Acceptance																						
c	SCADA System Go-Live – All Locations																						
10	O&M Phase:																						
a	O&M Services support for 3 years post Go-Live including facility																						



Sl. No	Activity Name	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	8	8	8
		To	To	To	To	To	To	To	To	To	To	To	To	To	To	To	To	To	To	To	To	To	To
	management and manpower services for:																						
b	Complete SCADA System																						
c	FRTU and IEDs Installed at Substations																						
d	DC, DCC, NOC and SOC Civil and Non IT Infrastructure																						
11	Training and Capacity Building																						
a	Continuous Training & handholding of Stakeholders.																						

Note:- *Please make a note that the queries raised by the bidders, if not mentioned in above table means that RFP condition remain unchanged.*

Note: All the relevant documents/declarations/certificates etc., which are required to be submitted along with the proposal shall be submitted in the required formats, wherever applicable as mentioned in the annexures.



Additional document (Annexure) to RFP:

The below attached annexure documents has been issued as per the request of the bidders in various queries related to pre bid and shall be treated as a part of RFP from here and after, the bidder shall submit all the relevant documents/declarations/certificates etc., wherever applicable, along with its proposal document.

1.1.1 Existing Status

NEA has also started the procedure of adopting modern digital technology into its system to enhance its operational efficiency, reduce energy theft and enable itself to serve its consumers in a better way.

The implementation of Smart Grid and Smart Metering system will increase efficiency and reduce losses. Smart Meter installation within Ratnapark and Maharajgunj distribution centers will be accomplished in FY 2020/21.

Contracts will be signed within FY 2020/21 for the supply and installation of smart meters for the remaining consumers within the valley.

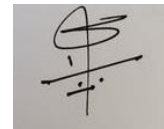
It is also taking steps for automation of its day to day business operations by implementation of advance software solutions, some of the key solutions that are under planning/implementation process include Utility Billing Solution, Enterprise Resource Planning (ERP) System, Geographical Mapping System (GIS Mapping), Preparation of Distribution System Master Plan, Smart Meter/Grid Tied Meter (Net Meter), Substation Automation System etc.

1.1.1.1 Geographical Information System

This project is funded by the Government of Nepal (GoN). NEA has planned to develop GIS (Geographical Information System) software to manage DCS asset inventories like substation, feeder, transformer, poles & meters along with its position on earth. It will help to identify the actual information about s/s, feeder, and poles, transformers, and consumers' capacity and also to balance the transformer's load as per connection to the consumer. It also helps to facilitate the consumer service faster & reliable against any fault in distribution system. Additional benefit of this smart distribution system will aid for outage management, no light management, optimal connection path for new consumer can be built. GIS based Data Survey work for certain 30 branches across the country will be conducted in F/Y 20/21.

1.1.1.2 Smart Metering/Smart Grid Project

Phase 1: This phase includes implementation of Automatic Meter Reading (AMR) System with implementing Advanced Metering Infrastructure in TOD meters like EDMI, Bluestar, Actarius, Wasion, Risesun. For this purpose, 10,000 Intelligent GPRS/GSM Modem has been procured. Out of the procured modems, 8198 modems have been installed in consumer sites. This phase work had been completed. The information like billing data, load profile, instantaneous data, event tampers can be retrieved via AMR/AMI system. The Integrated Branch Billing data can be retrieved through email and SMS. Server setup with all hardware and Network is completed.



Phase 2: This phase includes implementation of Smart Three phase energy meter to replace three phase whole current electromechanical meter. The programming of these smart meters can be executed remotely and supply can be controlled remotely in case of due payment. Out of 60,000 Three Phase Smart Meter, 30,000 meters have been delivered to NEA. Out of 30,000, around 9,000 old electro- mechanical meters are replaced with the new Smart Meter and about 8,000 meters are installed in new connections. Out of 9,000 smart meters installed, 469 consumers' demand was found increased and 200 defaulter's lines were disconnected. About 50 lakhs amount was collected from those consumers within a month. The billing of consumer reading is integrated with M-power Billing System. The system is two way allowing AMI system to read and write as per requirement. The mode of communication between meter and system is GPRS.

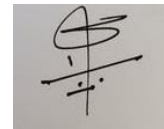
1.1.1.3 Smart Metering for 2 DCS in KTM Valley

NEA is implementing Smart metering in 2 DCS in Kathmandu valley. The total number of Smart meters under implementation are 98,000. As part of the AMI implementation NEA has procured Head End System (HES), Meter Data Management System (MDMS), Business Intelligence as well as Smart Meters, DCU, etc. The communication network is RF and the DCUs are connected using sim cards. Out of 98,000 Smart meters 5000 have been installed.

1.1.1.4 Other IT Applications

IT Department is responsible for providing the infrastructure for automation. It implements the governance for the use of network and operating systems, and it assists the operational units by providing them the functionality they need. Especially in NEA, under Planning, Monitoring and Information Technology Directorate, IT Department plays a vital role for core IT related activities within the organization with its rudimentary data center located in the IT Department Building at central office. Apart from the implementation of new IT Systems, the department provides continuous ICT support, maintenance and training to all NEA offices round the clock. Information Technology Audit has been conducted (assessment of internal controls within its information system environment to assure validity, reliability and security of information and information systems) after the assessment of the audit, the department has upgraded the necessary Computer Hardware (Server) requirements, network security equipment's and software requirements. Communication Backbone establishment (intranet connectivity) is being carried out throughout the nation. IT Department has started connecting all the NEA offices and has plan to connect all the offices within this Fiscal Year.

This Department is running the various software applications such as CAIS (Customized Account & Inventory System), Payroll, Pension, Asset Management, DCS-Activity's Information System, Consumption Analysis System, etc. Payroll information system has been upgraded in such a way that employee can view the salary and tax sheet. NEA vacancy application process was introduced from an Online Recruitment System. Applicants could easily submit the forms online from any location within any convenient time. Centralized E-attendance System has been introduced where all the attendance activities can be accessed centrally. Employee Self portal of the system will be introduced where the employee can view the attendance report. IT department has introduced NEA mobile app where consumers



can insert self meter reading. Further, Customer Relation Management System will be introduced where Consumer can post a complain through mobile app and NEA portal. Other features will also be added for the ease of the consumer. Personal Information System (PIS) and Darbandi Management System (DMS) will be upgraded from the old system. IT Department will centralize the Asset Management System and NEA Inventory System. NEA Video Conference System will be introduced where all the offices can be connected using NEA's Intranet/secure connection.

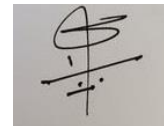
Other application software such as AMR (Automatic Meter Reading), GIS (Geographical Information System) & ERP (Enterprises Resource Planning) will be implemented by concerned Projects and finally governed by IT Department.

Many other key initiatives are taken by other different Directorates of NEA including IT and OT automation which are at various stages of implementation and roll out. Some of the key initiatives are as listed below:

- Substation Automation solution implementation is underway at Baneshwor 66kV Substation and Dhalkebar 220kV Substation by M/s ABB.
- Distribution Transformer Monitoring System pilot is being executed at Ratnapark DCS by M/s Analogics.
- EV Charging Station is installed and running at Ratnapark DCS.
- ERP RFP is under evaluation and will be implemented along with centralized revenue management system in the coming months.
- Power System Simulation for Engineering is implemented and functioning at systems planning division of NEA.
- Valoragua and Wein Automatic System Planning Package (WASP) – System planning division is currently using this freeware solution and planning to initiate the upgrade of needful.
- Existing Transmission SCADA solution upgradation is completed.
- Roll out and Implementation of Any Branch Payment System etc.
- SCADA DMS OMS is planned to be implemented in entire Kathmandu valley that will be integrated with the existing and the upcoming AMI implementations.
- NEA is also building a state of art data center which shall house all the IT Infrastructure of various applications as well as a Security Operation Center (SOC), Network Operation Center (NOC) and Distribution Command and Control Center (DCC).

1.1.2 Defect Liability Period:

- The one year period commencing immediately after the operational acceptance is called the Defect Liability Period. Operational Acceptance shall be given on successful completion of SAT. During this period, the Contractor shall replace or repair all defective parts and shall be responsible for maintaining an operational system to achieve the availability of 99.95% for subscriber to subscriber. The contractor's maintenance engineer shall report to the site for



restoration of the system within 6 hrs excluding travel time, in case of complete breakdown of the link. Within four (4) months from Contract Award Date, the Contractor shall submit a comprehensive maintenance strategy for the maintenance of the system during the Defect Liability Period. For this period which commences immediately after operational acceptance, the actual outage frequency and the availability achieved during the period shall be calculated periodically, jointly by the Contractor and the Employer.

- During the Defect Liability Period, the spare parts and tools and tackles supplied by the Contractor to Employer under the present procurement including items in both the “Mandatory” and “Recommended” lists, shall be issued as required by the Contractor.
- Only these supplied items and no additional items, with the exception of general purpose toolkits, shall be used by the Contractor for all its testing and preventive & restorative maintenance activities.
- If any additional spare parts are required or found to be required, these additional items shall be provided by the Contractor, within a reasonable time, up to the expiry of the Defect liability Period, at no additional cost to Employer. Further, in such case the list of “recommended” spare parts and tools & tackles shall be reviewed to identify further spares requirement, which shall have to be provided by the Contractor at no additional cost to Employer. Since the spare parts shall be “issued for use”, by the end of the Defect Liability Period, the Contractor shall replenish the spare parts stock to the original level plus any additional spares required, found to be required or additionally identified as above.
- All test equipment and tools & tackles issued to the Contractor shall be “issued for use” and shall be returned at the earliest in “as issued” condition.

1.2 Applicable Standards in RFP:

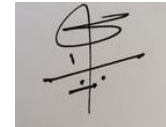
For LTE modem and PLCC communication IEC 60870-5-101 protocol shall be applicable

For Fibre communication IEC 60870-5-104

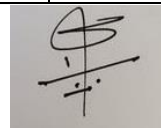


1.2.1 Technical Requirements Specifications - 48 Ports Managed Access Switch

SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
1.	Switch Architecture and Performance	Switch should have 48 Nos. 10/100/1000 Base-TX auto-sensing plus with minimum 2x10G SFP+ uplinks.		
2.	Switch Architecture and Performance	Switch should support link aggregation across multiple switches in a stack.		
3.	Switch Architecture and Performance	Switch should have non-blocking wire-speed architecture.		
4.	Switch Architecture and Performance	Switch should support IPv4 and IPv6 from day One		
5.	Switch Architecture and Performance	Switch should have non-blocking switching fabric of minimum 128 Gbps or more		
6.	Switch Architecture and Performance	Switch should have Forwarding rate of minimum 60 Mbps.		
7.	Layer 2 Features	IEEE 802.1Q VLAN tagging.		
8.	Layer 2 Features	802. 1Q VLAN on all ports with support for minimum 255 active VLANs and 1k VLAN ids		
9.	Layer 2 Features	Support for 8k/16 k MAC addresses		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
10.	Layer 2 Features	Spanning Tree Protocol as per IEEE 802.1d		
11.	Layer 2 Features	Multiple Spanning-Tree Protocol as per IEEE 802.1s		
12.	Layer 2 Features	Rapid Spanning-Tree Protocol as per IEEE 802.1w		
13.	Layer 2 Features	Self-learning of unicast & multicast MAC addresses and associated VLANs		
14.	Layer 2 Features	Jumbo frames up to 9000 bytes		
15.	Layer 2 Features	Link Aggregation Control Protocol (LACP) as per IEEE 802.3ad.		
16.	Layer 2 Features	Port mirroring functionality for measurements using a network analyser.		
17.	Layer 2 Features	Switch should support IGMP v1 / v2 / v3 as well as IGMP v1 / v2 / v3 snooping.		
18.	Quality of Service (QoS) Features	Switch should support classification and scheduling as per IEEE 802.1P on all ports.		
19.	Quality of Service (QoS) Features	Switch should support QoS configuration on per switch port basis.		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
20.	Quality of Service (QoS) Features	Switch should support classification and marking based on IP Type of Service (TOS) and DSCP.		
21.	Quality of Service (QoS) Features	Switch should provide traffic shaping and rate limiting features (for ingress traffic) for specified Host, network, Applications etc.		
22.	Quality of Service (QoS) Features	Strict priority queuing guarantees that the highest-priority packets are serviced ahead of all other traffic.		
23.	Security Features	Switch should support MAC address based filters/ access control lists (ACLs) on all switch ports.		
24.	Security Features	Switch should support Port as well as VLAN based Filters/ ACLs.		
25.	Security Features	Switch should support RADIUS and TACACS+ for access restriction and authentication.		
26.	Security Features	Secure Shell (SSH) Protocol, HTTP and DoS protection		
27.	Security Features	IP Route Filtering, ARP spoofing, DHCP snooping etc.		
28.	Security Features	Switch should support Should support DHCP snooping, DHCP		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
		Option 82, Dynamic ARP Inspection (DAI)		
29.	Security Features	Switch should support Should support a mechanism to shut down Spanning Tree Protocol Port Fast-enabled interfaces when BPDUs are received to avoid accidental topology loops.		
30.	Security Features	Switch should support Should support a mechanism to prevent edge devices not in the network administrator's control from becoming Spanning Tree Protocol root nodes.		
31.	Security Features	Switch should support static ARP, Proxy ARP, UDP forwarding and IP source guard.		
32.	Management, Easy-to-Use Deployment and Control Features	Switch should have a console port with RS-232 /RJ-45 Interface for configuration and diagnostic purposes.		
33.	Management, Easy-to-Use Deployment and Control Features	Switch should be SNMP manageable with support for SNMP Version 1, 2 and 3.		



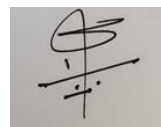
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
34.	Management, Easy-to-Use Deployment and Control Features	Switch should support all the standard MIBs (MIB-I & II).		
35.	Management, Easy-to-Use Deployment and Control Features	Switch should support TELNET and SSH Latest Version		
36.	Management, Easy-to-Use Deployment and Control Features	Switch should support remote monitoring service for history, statistics, alarm and events.		
37.	Management, Easy-to-Use Deployment and Control Features	Switch should support system and event logging functions as well as forwarding of these logs to multiple syslog servers.		
38.	Management, Easy-to-Use Deployment and Control Features	Switch should support on-line software reconfiguration to implement changes without rebooting. Any changes in the configuration of switches related to Layer-2 & 3 functions, VLAN, STP, Security, QoS should not require rebooting of the switch.		
39.	Management, Easy-to-Use Deployment and Control Features	Switch should Support for Automatic Quality of Service for easy configuration for critical applications		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
40.	Management, Easy-to-Use Deployment and Control Features	Support to detect unidirectional links caused by incorrect fiber-optic wiring or port faults and disable on fiber-optic interfaces		
41.	Management, Easy-to-Use Deployment and Control Features	Switch should have comprehensive debugging features required for software & hardware fault diagnosis.		
42.	Management, Easy-to-Use Deployment and Control Features	Should support DHCP Server feature to enable a convenient deployment option for the assignment of IP addresses in networks that do		
43.	Management, Easy-to-Use Deployment and Control Features	DHCP servers configured on servers and integrated with Directory Services.		
44.	Management, Easy-to-Use Deployment and Control Features	Switch should support Multiple privilege levels to provide different levels of access.		
45.	Management, Easy-to-Use Deployment and Control Features	Switch should support NTP (Network Time Protocol)		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
46.	Management, Easy-to-Use Deployment and Control Features	Switch should support FTP / TFTP		
47.	Standards	RoHS Compliant.		
48.	Standards	IEEE 802.1x support.		
49.	Standards	IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports.		
50.	Standards	IEEE 802.1D Spanning-Tree Protocol.		
51.	Standards	IEEE 802.1p class-of-service (CoS) prioritization.		
52.	Standards	IEEE 802.1Q VLAN.		
53.	Standards	IEEE 802.3u 10 BaseT / 100 Base Tx / 1000 Base Tx.		
54.	Compliance	Switch / Switch's Operating System should be tested and certified for EAL 2 /EAL3 / NDPP or above under Common Criteria Certification		

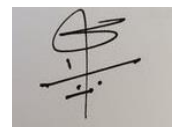


1.2.2 Serial Device Servers -

No. of Serial Ports	16
Serial Port Type	RS232/RS485/RS422 Software Selectable
No. of Ethernet Ports	2x 10/100/1000Mbps
Max. Baud Rate	230.4kbps
Serial Port Connector	RJ45
Power	230VAC
Operating Temperature	-100 to +600C
Mounting	Rackmount

1.2.3 PDS and DTS/ ICCP Server

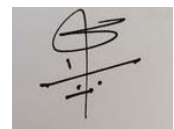
Sl. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations /Remarks
Make				
Model				
1.	Processor	Latest generation x86 Server with 1 x Intel Xeon Silver 4216 2.1G, 16C/32T, 9.6GT/s, 22M Cache, Turbo, HT or higher. Bidder to Submit documentary proofs for equivalence		
2.		Maximum cache available with the processor		
3.	Main Memory	Should have 128 GB RAM expandable to 256GB		
4.	RAS Features	Hot Pluggable Disk Drives		
5.		Redundant Power Supply at server / rack level		
6.		Redundant hot swappable fans at server level		
7.	Hard Disks	2*500 GB SSD Hot-plug Hard Drives		
8.		RAID		
9.		Integrated RAID offering Striping, Mirroring (RAID 0, 1)		
10.	Network Interface	Minimum 2Nos. 10 Gbps Ethernet ports		
		USB		



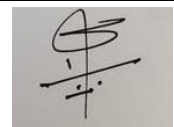
Sl. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations /Remarks
	Make			
	Model			
		Minimum 1 USB 2.0 ports or an option for connecting USB devices		
11.	Form Factor	Rack mountable / Blade (In case Bidder is offering Blade Server - Blade Chassis should be Provided by Bidder)		

1.2.4 Workstation Specifications

Component	Description	Complied (Yes/No)	Remarks
Make & Mode	To be Specified by the Bidder		
Form Factor	Desktop Tower		
Processor Make	Intel		
Number of Processors	1		
Processor Configuration	10th Generation Intel® Core™ i5-10500, 12 MB Cache, 6 Core, 3.1 GHz to 4.5 GHz - DDR4 2666		
Chipset	Latest generation Intel® W480 chipset		
Memory	Minimum 64GB , 4 Dimm Slots; Up to 128GB 2666MHz or 2933MHz		
HDD Controller	Intel® Rapid Storage Controller 12.0 supporting SATA 6Gb/s and host based RAID 0/1/5/10		
RAID Controller	RAID Controller which Support RAID 0, 1, 5, 10		
Hard Disk Drive	Minimum 1 x 2TB PCI M.2 SSD drive		
Graphic Card	NVIDIA Quadro® P1000		
Expansion Slots	2x M.2 2280 slots for PCIe NVMe™ SSDs, 1x M.2 2230 WLAN slot, 1x PCIe x16 Gen3 (full height), 1x PCI (full height), 1x PCIe x4 Gen3 (open ended, full height)		



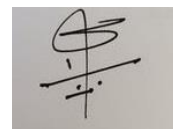
Component	Description	Complied (Yes/No)	Remarks
Workstation Security And Management software	Trusted Platform Module 2.0 and chassis Intrusion switch. Workstation Auto performance tuning software from same workstation OEM		
Networking Port	Dual Integrated Gigabit Ethernet controllers with Intel Remote		
I/O Ports (Integrated)	2x USB 2.0 Type A 1x USB 3.2 Type A Gen1 (5Gbps), with Power Share 1x USB 3.2 Type CTM Gen2 (10Gbps), with PowerShare		
	Rear Starting from top, going left to right 2x DisplayPort™ 2x PS2 (Legacy for keyboard and mouse) 1x Optional Port (VGA, HDMI 2.0, DP++ 1.2, Type CTM w/DP-Alt mode) 2x USB 2.0 Type A (with SmartPower) 1x RJ45 Network Connector 2x USB 3.2 Type A Gen2 (10Gbps) 2x USB 3.2 Type A Gen1 (5Gbps) 1x Audio Line out		
Keyboard and Mouse	Minimum 104 keys USB Keyboard and USB Optical Scroll		
	mouse - Same make as that of the workstation		
Monitor	Minimum Display Size Ultra Sharp 27 Monitor ; 1920 x 1200 at 60 Hz		
	VGA DVI-D (dual link) DisplayPort USB 2.0 upstream (Type B) 4 x USB 2.0 downstream (Type A)		
Audio	High Definition Integrated Audio with internal speaker		
Power Supply	460W 90% efficient PSU (80PLUS Gold Certified Certified) Energy Star compliant		
Operating System	Preloaded with Latest Operating System		
Operating System Certification	Windows 10 Professional. Ubuntu Linux and RHEL.		



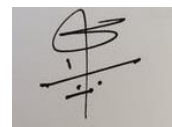
Component	Description	Complied (Yes/No)	Remarks
Workstation	FCC, UL, EPEAT Gold, ISO 9001-2015 certified.		
Certification	Bidder should the MAF from original OEM.		

1.2.5 Intelligent Cabling Specifications:

Description	Compliance	Remarks
OEM must be a member in the TIA and BICSI organization. OEM shall have RCDD certified manpower in SAARC region for design support and validation. Certificate is Mandatory		
OEM should have valid ISO 9001 and ISO 14001 certificate on Design, development and manufacture of SW and HW solutions for communication networks.		
The solution should be capable of tracking device history for networked end devices including the following forensics details:		
When device was first connected to the network; If and when it was removed from the network; If and when it was moved from one physical location to another		
The solution should be a complete Real Time Interconnect Solution and should provide alerts for:		
a. Patch cord connections or disconnections from the patch panel and switch		
b. Inter-changing of patch cords at the switch side and panel side.		
The solution should be based on a designated IIM Hardware which deliver physical connectivity information to the management software		
Device information - The software should provide information about the MAC id, IP and Host Name of the IP devices connected to the network.		
Complete link information - The solution should automatically provide complete linkage information (from switch port up to the end device) in graphical format, providing full end-to-end visibility and automatic updates of new locations when moves occur.		
Alerts on Connectivity changes– The solution should report any changes on patching information in real time through physical verification only and not through any other method.		



Description	Compliance	Remarks
Real time view of Communication Racks – The solution should provide information of the rack layout in graphical view and allow interaction with displayed information in real time (e.g. lighting an LED over a panel port remotely). This is extremely important for remote site management.		
Alerts – The solution should have in place the option to send alerts either through email, sms, pop-up messages at client end and pop-up messages to Dashboard.		
Database - The database should be using an open database to enable easy integration.		
Port status information - The solution should provide the capability of monitoring port availability status on network equipment including switches, patch panels and telecommunication outlets should be monitored in real time for the purpose of detecting unexpected or unauthorized activities.		
Integration to 3 rd party software- The solution should provide a comprehensive open-ended solution e.g. an SDK (software development Kit) and not just the capability to send SNMP traps to integrate the solution with any 3rd party software or in-house software like DCIM or NMS.		
Dashboard: The solution should provide an inbuilt customizable Dash Board to get information from the database and represent it for use in various formats. This is important so that all information from the database can be viewed without the need to interact directly with the total solution. This tool is essential for reporting all activities to higher management.		
Rack indication: The solution should provide a special tool to easily identify the racks in which the two ends of the patch cord are connected in case the two ends are in two different racks, again without the need of any special query to database or reading from any special device.		
Compliance: The solution should be complied with ISO IEC 18598 AIM and TIA TR421 and should comprise of following H/W to enable complete manageability.		
Intelligent Modular Copper Frames		
1. The Copper Frame should support both cross connect and interconnect topology.		
2. The Copper Frame should be a managed frame that supports up to 24 RJ-45 modular jacks.		
3. The Copper Frame should have a single LED above each port.		
Intelligent Fiber Trays		
1. The Fiber Tray should support three types of fiber patching options: LC-LC, LC-MPO, and MPO-MPO.		



Description	Compliance	Remarks
2. The Fiber Tray should be a high-end fiber optics-managed tray that supports up to 96 LC-LC fiber strands in 1 U (LC-LC and LC-MPO) along with a full management system.		
Scanning Hardware		
1. Each scanning hardware should supports minimum 24 numbers Copper or Fiber Panel ports (24 Ports)		
2. The scanning hardware should support up to four TCP/IP ports through an internal L2 switch, saving on ports in the main switch and enabling cascading of scanning hardware to provide unlimited network expansion.		
3. The Scanning hardware should support installation in zero-U configuration for rack space optimization. in case its needed the device can be installed also in 1U configuration.		

1.2.6 Network Management System:

The Contractor shall provide a Network Management System (NMS) for operational support to Termination equipment systems. This NMS shall provide the capability to monitor, reconfigure, and control elements of the Termination equipment systems from a centralized location. This NMS system shall assist Employer in the operations and maintenance of the Termination equipment system resources including system performance, the diagnosis of problems, the implementation of remedial actions and the allocation or reallocation of communications resources and addition/deletion of elements.

1.2.6.1 Applicable Standards

The NMS design concept, functional and informational architecture and physical architecture shall follow CCITT Recommendation M.3010.

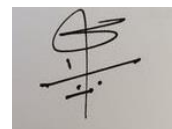
1.2.6.2 NMS Architecture

The NMS shall provide:

- Collection of Management data from all Network Elements (NEs)
- Processing of above management data by using processor(s) located at a centralized location.
- Communication channel support for NMS system.

The supplied NMS system shall be capable of handling all management functions for at least 200% of the final network elements. Further, the centralized NMS system shall also have provision for addition of at least two remote operator consoles. The NMS hardware shall be so designed that failure of a single processor shall not inhibit any of the functionality of the NMS System. The Contractor shall submit for Employer's approval the NMS architecture describing in detail the following subsystems/features:

- (a) Database used in NMS
- (b) Master Processor, server/workstation, LAN, Peripherals and hardware
- (c) Software and operating system
- (d) Local Consoles



- (e) Craft Terminals
- (f) Data communication between NEs, Local Consoles, Remote Consoles and NMS Processor(s)
- (g) Routers/Bridges
- (h) Expansion Capabilities

1.2.6.3 Management Functions

The NMS shall support following Management functions

a) Configuration Management

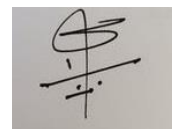
Configuration management is concerned with management, display and control of the network configuration. Minimum specific requirements that shall be satisfied include the following:

- (a) Provide tools to establish and maintain the backbone topology and configuration information and provide dynamic graphical maps depicting the configurations.
- (b) Gather descriptive information about the current configuration of the equipment, provide operator displays, and prepare reports.
- (c) Provide tools for planning, establishing, and changing the static equipment configuration. Provide for changes to the equipment configuration in response to equipment failures, planned upgrades, and operator requests to take equipment offline for testing.
- (d) Provide facility for automatic & manual device discovery of all Network Elements (NEs) such Broad Band Wireless Access Points.
- (e) Provide verification testing to support new equipment installation.
- (f) Have specification and settings of all the NE installed.

b) Fault Management

Fault management is concerned with detecting, diagnosing, bypassing, directing service restoration, and reporting on all the backbone network equipment, systems, and links. Minimum specific requirements that shall be satisfied include the following:

- (a) Display equipment status in a consistent fashion regardless of the source of the data on a graphical topological, map-type display. Status shall be displayed through the use of colours on links and nodes as well as through text.
- (b) Obtain status and detect faults through periodic polling, processing of unsolicited alarms and error events, and periodic testing for connectivity.
- (c) Maintain an alarm summary of unacknowledged alarm events on the management station display and maintain a log of all received alarms. The operator shall be able to acknowledge and clear alarms individually and as a group. The use of alarm correlation techniques is encouraged to minimize the proliferation of alarms caused by a single, common event. All alarms shall be configurable as critical alarms, major alarms and minor alarms with different colours.
- (d) Provide the capability to diagnose and isolate failures through analysis of error and event reports and through the use of both on-line and off-line diagnostic tests and display of monitored data.



- (e) The criteria for fail over shall be configurable as automatic fail over to redundant equipment wherever possible and through operator-initiated actions where automatic fail over is not possible. The status of fail over shall be reported to the NMS.
- (f) Track network equipment failure history.

c) Performance Management

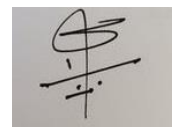
Performance management is concerned with evaluation of the use of network equipment and their capability to meet performance objectives. Minimum specific requirements that shall be satisfied include the following:

- (a) Provide support for an operator to initiate, collect, and terminate performance metrics under both normal and degraded conditions.
- (b) Monitor signal quality and history. Provide operator controls to monitor performance of specified events, measures, and resources. Specifically provide displays to permit the operator to:
 - Select/deselect network equipment, events, and threshold parameters to monitor.
 - Set monitoring start time and duration or end time.
 - Set monitoring sampling frequency.
 - Set/change threshold values on selected performance parameters.
 - Generate alarm events when thresholds are exceeded.
 - Set multiple thresholds on certain performance parameters. Alarm categories include as a minimum a warning and a failure.
 - Calculate selected statistical data to measure performance on selected equipment based on both current and historical performance data maintained in performance logs. Performance data provided is limited to what is available from the equipment Contractors.
 - Provide graphical displays of point to point and end to end current performance parameter values. Provide tabular displays of current, peak, and average values for performance parameters.
 - Generate reports on a daily, weekly, monthly, and yearly basis containing system statistics.

d) Security Management

The NMS shall be provided with security features to limit access to monitoring and control capabilities to only authorized personnel. One access level of System Administrator and at least two levels of operator access shall be provided - read (view) only and write (configure). The system administrator shall be able to create, define and modify operators with different access levels, network domains and perform all kind of maintenance and up gradation of the NMS system. With "read only" access level, network parameters should only be viewed. Access to database maintenance, command control and test functions shall be available with "write" access level. Means shall be provided to ensure only one authorized user has write capability for a selected domain of the network. It shall be possible to define multiple domains for purposes of monitoring and control.

Human error and conflict detection are also required. Such errors and access violations shall be reported to the offending user as error messages and warnings.



e) Communication Requirement and Integration

The Contractor shall provide all required interface cards / devices, LAN, routers/bridges, channel routing, cabling, wiring etc. and interfacing required for full NMS data transport. NMS channel shall be provided in the E-1 payload channel of the transmission equipment. The Contractor shall provide suitable interfaces in their supplied equipment for transport of NMS data. If, the requirement for NMS channel is less than E-1, suitable interface card in the multiplexer shall be provided by the Contractor.

The bidders shall describe in the proposal the NMS data transport proposed to be used by the bidder in detail including capacity requirements and various components/equipment proposed to be used.

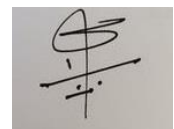
f) Each termination equipment (CPE, BTS, PTP) to be supplied shall include provision for connecting a portable personal computer **Craft Terminal** (PC)/ Laptop computer to be known as craft terminal to support local commissioning and maintenance activities. Through the use of this PC and local displays/controls, the operator shall be able to:

- (a) Change the configuration of the station & the connected NEs
- (b) Perform tests
- (c) Get detailed fault information

g) Versions

All firmware and software delivered under this specification shall be the latest field proven version available at the time of contract approval. Installed demonstration for acceptance shall be required.

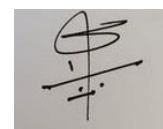
All firmware provided shall support its fully equipped intended functional requirements without additional rewrite or programming. All software shall be easily user expandable to accommodate the anticipated system growth, as defined in this specification. Software provided shall be compliant with national and international industry standards such as IEEE, ISO and OSF.



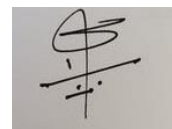
h) Network & Server Management Solution Requirement

The Network Management System software and hardware with all necessary accessories (supply and installation) as required for the Item no. 15 of Schedule 1: Plant & equipment including mandatory spare parts to be supplied from abroad and schedule 4: Installation & other services are to be provided by the successful bidder. The cost for such items shall be included in the cost of respective item in the BPS without extra payment.

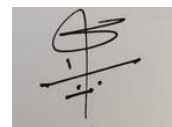
Technical Specification	Compliance (Yes / No)
The solution should be available as Commercial-Off-The-Shelf (COTS) software	
Both IPv4 and IPv6 supported for monitoring	
The solution should be a unified system which can monitor networks, servers, apps and any IT or Non-IT Communicable device	
The solution should provide views for any type of device including Networking devices, firewalls, servers, applications, IP Cameras, Wi-Fi, VSAT's, RF devices	
The solution should be completely multi-tenant where in every module and system being used can be assigned to a specific set of users or a group of users.	
The system should be capable to retrieve and show fault, performance, inventory and SLA data in a single dynamic view	
The system should have capability to add any additional information about the nodes via custom fields.	
System should have Node Tags for device grouping and resource/interface tagging for element grouping. Apart from Node Tags additionally system should have options to do device grouping based on default fields and customer fields	
No restriction in the number of level of grouping for the devices should be supported and provide the option to increase the grouping based on the need without affecting the existing grouping structure. System should also provide the option to create the grouping based on the service offered to customer and map all the devices involved in the specific service till the component / resource level	
The solution should be able to stop SLA calculation for every node in case of known downtimes. These should be a one-click alarm masking capability in the system	
Provides hierarchical multiple thresholds configuration option for each parameter being monitored	
Logically define any number of additional views without changing the actual deployment	
Any fault, performance, views, reports should be configurable till any node, component or parameter level. Granular level of control should be available across the system	
The system should be able to set minute level configuration to the element level. Polling interval, hierarchical thresholds, report dashboards should be configurable to every component in a single node or across nodes.	
Provides the option to export the views into PDF, Word, Excel, HTML etc. formats depends on the need.	
Role and grouping level based viewing and user management	
Able to allow each account to have specific type of toolbar according to the administrator's requirement and each account can only see/manage list of equipment's allowed in the specific group, device or	



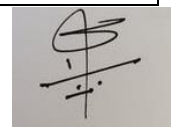
Technical Specification	Compliance (Yes / No)
even resource level	
Provides the option to have the portal account to the end customers with restricted views limits to their specific infrastructure. System should have the capability to be implement in DMZ and non-DMZ zone with adequate security.	
The System should have proper segregation of admin users and portal users via separate logins and authentications.	
User should be able to configure their own formula for the service availability, downtime, health etc....	
System should have option for CSV based discovery for bulk discovery and it should allow options to add customer fields to support customer specific data to upload during discovery	
The system should fetch topology via SNMP for ARP tables from routers , MAC tables from layer 2 switches, cisco Discovery Protocol, Link Layer Discovery Protocol, Foundry Discovery Protocol or SynOptics Network Management Protocol. The discovery should be automated and continuous.	
The system should have capability to manually add any additional topology in the network. Options to add via GUI or tabular should be available. The system should also allow downloading of topology connections.	
Discovery has to work intelligently by identifying the device in the network by the given IP range and categorize into network devices and servers with vendor and model details.	
Automatically learn devices that supports SNMP, HTTP, Ping, SMTP, POP3, WMI,JMX, SOAP, REST API,PDC, SSH and Telnet along with any required protocol to communicate to the devices.	
System should support global threshold and it should have option to define individual resource/interface statistics level threshold	
System should have build in algorithms to start the monitoring with zero threshold configurations	
System should have self learning algorithms to auto baseline and auto calculate thresholds of components or nodes.	
Configurable parameter like frequency, data duration, resolution duration, sigma based polarity value, reset points to should available to fine tuning the algorithm	
All thresholds should have set point , reset point, polarity , set point message and reset point message for ease of use. System should have anomalies detection and stop alarm flooding with these dynamic thresholds	
Detect & highlight faults (abnormal situations) occurring anywhere within the network	
Provides Filtering, De-duplication, Holding, Suppression and Correlation capability to let user focus on the critical event that affects the business and business processes	
Provides multi-level (preferably six-level) Severity definition, will handle events automatically and inform the designated person as per operational requirement	



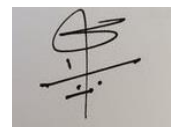
Technical Specification	Compliance (Yes / No)
<p>System should support separate Rule Engine based alarms apart from the generic threshold.</p> <p>a. Should have capability to configure Device Group based, Node Based, Resources/Interface based, Aggregation link based.</p> <p>b. On Selection of Nodes/Resources/Aggregation links it have flexibility to filter based on fields available in node information</p> <p>c. Rules should have option to apply configuration on top of performance value or based on configured threshold alarms</p> <p>d. Rules should have option configure the breach based on min, max and average values</p> <p>e. Should have option to configure rules n repeat counters</p> <p>f. Should have options to select custom alarm and clear alarm messages for individual configured rules</p> <p>g. Should have option to send severity levels like error, warning and information</p> <p>h. Notifications support based on configured rules</p>	
<p>Provides alarm suppression with hold time and aid in prevention of flooding</p>	
<p>Sends alert via E-mail, SMS, Execute Batch file, SNMP Trap, XML notification, Pop-up window and Audio alert</p>	
<p>Provide Alarms Suppression capabilities so that any duplicated events can be tracked to provide just a single event notification</p>	
<p>Monitors all traffic from all the interfaces of the network device. Provides traffic Utilization based on individual interface level, nodes level or based on the group by location, branch, departments etc.... as an Avg, Min and Max bandwidth, utilization, throughput or any custom monitoring parameters.</p>	
<p>Provision to change the polling interval to any frequency depending on the priority till the individual component / resource level like each interface might have the different polling interval in the same device based of the criticality and importance of service customer</p>	
<p>System should have capability to configure business , non-business hours or custom time polling. These configuration should be available for every device as well as every component in the device.</p>	
<p>Provision to disable and enable the polling of specific type of devices</p>	
<p>System should have capability to configure the maintenance period for any device. When device is in maintenance period there is no polling done and the SLA clock on the device is stopped.</p>	
<p>Provide a notification mechanism that allows administrator to define what notification channel to be used in different time of days, and able to trigger multiple notifications to alert multiple person and actions</p>	
<p>Provide escalation and acknowledgement function to provide the mechanism to ensure alternative personnel will be alerted when there is a critical situation and acknowledgement mechanism for generated alerts. The escalation should be available for any number of hierarchical sequence.</p>	
<p>Provide standard reports that display current status of nodes and interfaces. Reports could be viewed on daily graph (5 minute average), weekly graph (1 hour average minute average), monthly graph (1 hour average) and yearly graph (1 day average)</p>	
<p>Provide online and offline reports that allow the user to view the present usage of their devices. Reports generates should be exportable in the format of HTML, PDF, Excel and CSV</p>	



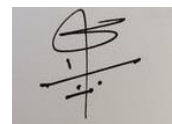
Technical Specification	Compliance (Yes / No)
Automatically generate daily reports that provide a summary of the network as well as custom Reports and that are automatically sent by email at a pre-defined schedule to any recipient or save into any specific folder or drive.	
Allows end-users to browse all reports using any web browser like Internet Explorer, Mozilla Firefox, Google Chrome etc. without the need to install any report specific software	
Provides the option to get the required report as an all hours, business and non business hours for detailed analysis. Also Provide report on single or multiple statistical split based on the operation need as option during the configuration	
Provide correlation report between all major network devices to determine if there is any degradation in these devices	
Significantly reduce the potential of generating unwanted, non-business critical, alert floods that are symptomatic of many systems management tools by alerting based on a problem identified for an end-to-end, business transaction. Identifies the root cause of any IT problem detected and filters out irrelevant information to let the user concentrate on solving the problem	
Supports instant diagnosis of the node status through Ping, Telnet and SNMPwalk	
Support Real-Time report generation for checking continuous reachability of target device	
System should have capability to create a user level repository of all the issued being faced. Users should have the rights to add data to this repository and system should be intelligent to automatically retrieve back information from here based if same issue re-occurs	
System should provide many different types of topology representation. To perform the following : 1. Display physical connections of the different devices being monitored in the system 2. Display flat maps of the entire network or networks in a single view 3. Display customer maps based on user configurations 4. Display maps based on geo locations	
Automatically learn IP Networks and their segments, LANs, hosts, switches, routers, firewalls etc. and to establish the connections and to correlate	
Provision to search specific device or resources in a view, map to specific background for each level of the network, upload and change icons of devices/background of the network layers	
Show the status of the connections based on the dependent connections and the utilization of the links by displaying connection with different width	
Navigate to node page and interface page on click of respective node or link	
On selections of any node highlight the next level of Hops connections for easy understanding and analysis, hop highlight count should be configurable from UI	
Filter topology view based on device group, node tag, vendor, model, IP address, host name etc.	
Tool should have option to display distance between devices in Topology Maps especially for branch gateway devices	
Have algorithmic auto arrangement capabilities. System should use standard algorithms like forceAtlas2base , repulsion or barner Hut to makes sure the map views are non cluttered and arranged to the best	



Technical Specification	Compliance (Yes / No)
non-overlapping method.	
SVG Map based world map view with drill down option is required. System should have capability to include any countries views with drill down for world > country > region > state > city..	
Change Country/Region/State/City color to Red/Orange/Green based on the device status, Red for all node down and orange for one or more node down and Green for all node up.	
Provides provision to draw & map user specific network diagram	
The tool should have Integrated Web based feature to build Network Diagram, No separate client window to configure network Diagram. The builder should be a Visio like system with all pre-loaded shapes and icons.	
System should support Drag & Drop based Network Diagram builder, Dynamically Upload Images, Customizable objects to support multiple vendors, capability to export maps in an XML format and upload to any other system.	
Any graph or network diagram configured should have functions to associate every component in the diagram to an existing node or resource. Additionally system should allow to associate any parameter being monitored to the specific element in the diagram. All network diagram's are user controlled and viewable to only specific configure users.	
Tool should be able to define Primary & back up line connection, so if primary line fails it should switch over to backup line & notify to administrator	
<p>Panel View</p> <p>a. Panel view should look similar to the actual device front panel</p> <p>b. System should automatically detect the device model display the right panel without any additional configuration</p> <p>c. Panel should show all the monitored interface with status</p> <p>d. Fan status with live fan icon and LED status for power</p>	
Download current running configuration file from the network devices	
Allows scheduling of automatic download of the configuration file from the network devices	
Alert user on any changes made to the current running configuration file of any monitored device	
Provide a web base and intuitive user interface that showcases the list of devices whose configuration file got changed with option to highlight the changes	
Maintain / store the configuration files of all the monitored devices for reference	
Support base-lining of specific version of the running configuration file of each device	
Support comparison of different versions of the configuration file of a device and comparison of the configuration files across devices	
Showcase the differences among the configuration files into useful categories like added/changed/removed through intuitive UI	
Support loading of a predefined configuration file on to a specific device	
Monitor QoS based on specific parameters and QoS parameters for various devices	



Technical Specification	Compliance (Yes / No)
Measure & monitor the following QoS parameters :Latency, Packet Loss,Probes,Packets,Delay,MOS,Jitter,RTT (Round-Trip-Time) and Detect quality deterioration by tracking QoS parameters	
The proposed monitoring solution should be able to monitor network traffic by capturing flow data from network devices, including Cisco Netflow v5 or v9, Juniper J-Flow, IPFIX, sFlow, NetStream data and also sampled Netflow data. System should have capability to alternatively capture flow data via packet capture.	
Should identify which users, applications, protocols, countries, AS numbers, top routers, and top interfaces are consuming the most bandwidth	
Solution must be able to store ALL flows without any rollups or loss for retention period - for security and audit purposes.	
Should highlight the IP addresses of the top bandwidth consumers on the network and find out unwanted bandwidth usage	
Should be able to associate traffic coming from different sources to application names	
Should be able to receive flows from non-SNMP-enabled devices, like VMware vSwitch	
Should monitor Class-Based Quality of Service (CBQoS) to find out if traffic prioritization policies are effective and if business-critical applications have network traffic priority. Should also support CBQoS Nested policies	
Should monitor Type of Service (ToS), Differentiated Services Codepoint (DSCP), and Per-Hop Behavior (PHB),BGP AS and NEXT HOP	
Should have options to specify data retention periods	
Should provide flow analysis with 1-minute granularity and The solution should be able to monitor up to 5 million flows per second, and should employ advanced optimization methods	
Should provide real time flow and traffic analysis with 5 second granularity	
Solution must alert when traffic to known malicious domains are encountered	
Solution must provide tool to investigate if a security incident caused a breach or just a scanning	
Tool must provide way to list all Internal hosts that are impacted by a security incident	
Should help in locating infected computers in case of virus outbreak	
Should help to recognize DOS attack	
Collect & display syslog's from network devices & servers and Group syslog's based on severity (Critical, Emergency, Major)	
System should support VM, Hypervisor and Cluster monitoring from different vendors like VMWare, Citrix, Nutanix, Linux etc.	
System licensing should be based only on Physical Hosts and not charge separately for individual guest VMs running on VM Hosts	
System show have capability to monitor industry standard web server like IIS / Tomcat / Web server statistics	
System show have capability to monitor HTTP service,HTTPS service,FTP server statistics, POP/SMTP services,ICMP services or any customer specific port based systems	



Technical Specification	Compliance (Yes / No)
Database Services – Monitor various critical Relational Database Management System (RDBMS) parameters such as database tables / table spaces, logs etc.	
Cover geographically distributed networks through multi-level scalable distributed deployment architecture	
Ability to add new pollers at no extra cost.	
Integration should provide the option in both north as well as south bound integration on each module level. Any fault details should be able to send to third party CRM, Customer Portal, UNMS or even EMS if needed using the Trap, XML and even direct database query integration	
Provide XML, Corba, REST API, SOAP based system to communicate with external software	
Provide 12+ open API's in the system which can be used by customers to create his own integration.	
The system should have a integrated service management tool from the same OEM. In future, it should be possible to use the service management features like Incident Logging, Viewing, Assignment, Escalation, Reporting, SLA Management etc. by just adding the required licenses for the service management tool.	

1.2.7 Weather Sensors

Weather sensors shall be installed along with RTU or FRTU at selected locations. All weather sensors shall be maintenance free and of Industry standard design. The design of sensors shall permit calibration on site. The sensing mechanism shall be rugged enough to avoid frequent recalibration. The sensor & support structure shall have built-in protection against lightning stroke/electrical surges.

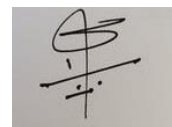
RS485 with MODBUS protocol may be used. The sensors shall be located in open and in the electrical environment such as outdoor substations. The equipment offered should be suitable for satisfactory operation in the above environment. The Bidder shall submit the details of EMI/EMC compatibility of the sensors and other equipment.

All weather sensors shall be IP 55 compatible. 24V to 48V DC /230 V single phase AC with power backup , with enclosure with mounting arrangement

a) Wind Speed Sensor

Wind Speed Sensors	
Sensor	Anemometer 3 cup assembly, very robust to withstand strong wind gust
Output	4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol
Starting Threshold	0.5 m/s or better
Range	0.9 - 60 m/s
Resolution	0.1 m/s
Accuracy	2 % or better
Mechanical	3 Cup assembly and housing (complete), should be very robust and capable to withstand strong wind gust and made up of suitable non-rusting material
Mounting Accessories	Made of suitable good quality material like steel or high strength fibre
Operating Temperature	0 degree Centigrade to + 60 degree Centigrade (-5 degree Centigrade to + 55 degree Centigrade for project area with snowfall history)

Note: The Wind Speed and Wind Direction sensors may be supplied in single enclosure or separately



b) . Wind Direction Sensor

Wind Direction Sensor	
Sensor	Wind Direction sensor
Output	4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol
Starting Threshold	0.5 m/s or better
Range	0 – 360 (Degrees)
Resolution	1 (Degree)
Accuracy	3 (Degrees) or better
Construction of Housing and vane	Housing (complete) should be very robust and capable to withstand strong wind gust and made up of suitable-non-rusting material having high mechanical Aluminium or other light UV resistant material strength. Wind vane and control head may be of
Operating Temperature	0 degree C to + 60 degree C (-5 degree C to + 55 degree C for project area with snowfall history)

Note: The Wind speed and Wind Direction sensors may be supplied in single enclosure or separately.

c) Air temperature Sensor

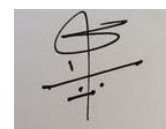
Air Temperature Sensor	
Sensor	Air Temperature Sensor
Output	4 to 20 mA at 0-500 ohm impedance or RS 485 with MODBUS protocol
Temperature Range	0 degree C to + 60 degree C (-5 degree C to +55 degree C for project area with snowfall history)
Resolution	0.1 degree C
Accuracy	< 0.5 degree C or better
Radiation Shield	Radiation Shield made of weather resistant material and suitable to sensor used.

d) Relative Humidity Sensor

Relative Humidity Sensor	
Sensor	Relative Humidity Sensor
Output	4 to 20 mA at 0-500-ohm impedance or RS 485 with MODBUS protocol
Range	0 to 100 %
Resolution	1%
Accuracy	3 % or better
Radiation Shield	Radiation Shield made of weather resistant material and suitable to sensor used.
Operating Temperature	Range 0 degree C to +60 degree C (-5 degree C to +55 degree C for project area with snowfall history)

e) Rainfall Sensor

Rainfall Sensor	
Sensor	Tipping Bucket Rain Gauge
Output	The output of rainfall sensor shall be in the form of potential free contact and its closure shall be accumulated (over a configurable time period) and reported at master station through RTU. Alternatively, RS 485 with MODBUS protocol may be used.



Capacity/Range	Unlimited
Resolution	0.2 mm per tip or better
Accuracy	4%
Collection Area	Minimum 200 sq.mm.
Operating Temperature Range	0 degree C to +60 degree C (-5 degree C to +55 degree C for project area with snowfall history)

f) Atmospheric Pressure Sensor

Atmospheric Pressure Sensor	
Sensor	Atmospheric Pressure sensor
Output	4 to 20 mA at 0-500-ohm impedance or RS 485 with MODBUS protocol
Range	600 mb to 1100 mb
Resolution	1 mb or better
Accuracy	2 % of range
Operating Temperature Range	0 degree C to +60 degree C (-5oC to +55oC for project area with snowfall history)

1.2.7.2 Weather Sensor Installation Requirement

The weather sensor shall be supplied along with necessary accessories (e.g. tripod, stand, clamps etc.) for installation/ fixing of sensors, signal/power cables etc. as part of weather sensors station. All the accessories shall be made of stainless steel or other suitable material having sufficient mechanical strength and corrosion resistance to withstand atmospheric temperature, pressure, wind speed and relative humidity up to the working range (Minimum to Maximum) of sensors for these parameters as defined. The Employer will prefer to install the sensors on roof top of control center/substation or other building. The mounting arrangement for all the sensors shall be designed suitably or installation on the roof top. The mounting arrangement of the Wind Velocity & Wind Direction sensors shall be of suitable height to avoid obstruction from the nearby structures.

1.2.8 Communication infrastructure :

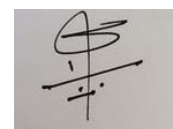
NEA intends to design, supply, establish, install, testing, commissioning, operate and maintain Communication infrastructure at its 18 substation and 12 switching station (Small substations). Bidder shall establish SDH ring at those substations (which are maximum 30km far from DCC location) using STM 4/16/32 MADM upto 5 MSP protected direction using (Common cards, Cross connect/control cards, optical base cards, power supply cards, power cabling, other hardware and accessories including sub racks, patch cord, DDF, SFP etc.) as in when required.

All equipment provided shall be designed to interface with existing equipment and shall be capable of supporting all present requirements and spare capacity requirement identified in this specification. The communication equipment shall be designed and provisioned for expansions and reconfigurations without impairing normal operation, including adding and removing circuits. The offered items shall be designed to operate in varying environments. Adequate measures shall be taken to provide protection against rodents, contaminants, pollutants, water & moisture, lightning & short circuit, vibration and electro-magnetic interference etc.

1.2.8.1 SDH Equipment

Functional Requirement

The primary function of the communication network is to provide a highly reliable voice and data



communication system for operation in support of the SCADA/RTUs/FRTUs. The communications support requirement for SCADA/RTUs/FRTUs system is for low & high-speed data, express voice circuits and administrative voice circuits as defined in appendices. The RTUs located at various locations will report to Control Centre using IEC 60870-5-104 Protocol. The proposed communication system shall provide connectivity of RTUs over TCP/IP protocol using Ethernet interface and few other RTUs over serial interface. The offered communication System shall support the communication requirements of RTUs and the SCADA/DMS system described in point to multi point and/or multipoint to multipoint configurations using Ethernet over SDH .There is a requirement for different types of equipment under this project which are described in this section. The BOQ is provided in the appendices. For the purpose of BOQ, the SDH Equipment is considered to be divided in three parts i.e. Optical interface/SFP, Tributary Cards (Electrical tributaries such as E1 & Ethernet10/100 Mbps) and Base Equipment (Consisting of Common Cards, Control Cards, Optical base card, Power supply cards, sub-rack, cabinet, other hardware and accessories required for installation of equipment i.e. everything besides optical interface/SFP and tributary cards).

The fibre optic network shall be based on the Synchronous Digital Hierarchy (SDH) having bit rate of STM-4/ STM-16. The network shall consist of overhead fibre optic links with a minimum bit rate of Synchronous Transport Module-1/4. The Contractor can propose a system based on higher bit rate systems, if required, so as to meet the link budget requirements or any other specification requirement.

A brief summary of the communication system requirements is as follows:

- (a) Data transport supporting Network Management channels
- (b) The connectivity envisaged between FRTUs and Control Centre over TCP-IP using Ethernet interface.

If bidder is offering equipment with multifunction cards such as cross-connect or control card with optical interface/SFP or tributary interface, such type of multifunction card shall be considered as Common control card and shall be the part of base equipment. In case optical interface/SFP is embedded with control card, the adequate number of optical interface/SFPs shall be offered to meet the redundancy requirements of the specifications.

Further, control card shall not be equipped with more than one optical interface/SFP and optical base card shall not be equipped with more than two optical interface/SFPs. The equipment shall be configurable either as Terminal Multiplexer (TM) as well as ADM with software settings only.

1.2.8.2 SDH ADM

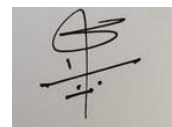
The aggregate interfaces shall be (at least) STM-4 towards at least two protected directions (Protected as specified in this specifications). At present the equipment shall be equipped with a one no., min. 4/8 port Ethernet interface card as tributaries. The equipment shall provide access to full STM-4 payload.

a) Redundancy and Protection

Two fibre rings shall be implemented wherever the network permits. On linear sections of the network, protected links using 4 fibres shall be implemented.

b) Service Channel

Service channels shall be provided as a function of the SDH equipment and shall be equipped with Service Channel Module that shall provide at a minimum: One voice channel (order wire) with analog interface (0.3 to 3.4 kHz) and one data channel. Both omnibus and selective calling facilities shall be provided. There shall be a facility to extend the line system order-wire to any other system or exchange lines on 2W/4W basis.



c) Supervision and Alarms

ISM (In Service Monitoring) circuitry shall be provided as a function of the SDH equipment. Local visual alarm indicators shall be provided on the equipment, as a rack summary alarm panel. Alarms shall be as per ITU-T Standards G.774, G.783 and G.784. Additionally, F2/Q2 interfaces for a local craftsperson terminal interface and remote equipment monitoring is required. The Equipment shall support collection of at least four (4) external alarms for monitoring and control of station associated devices by the TMN.

2.3.1.5 Synchronization

The equipment shall provide synchronization as per Table 2 -3. One 2 MHz synchronization output from each equipment shall be provided.

2.3.1.6 Electrical and Optical I/O Characteristics and General Parameters

Table provides the electrical and optical characteristics as well as other general parameters for SDH equipment.

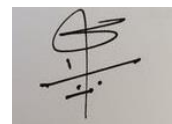
Electrical and Optical I/O Characteristics and General Parameters	
Optical Wavelength*	1310/1550nm
Optical Source**	Laser
Optical Source Lifespan	At least 5 X10 ⁵ hours
Optical Fibre Type	G.652 D
Optical Connectors	Type FC-PC
Transmission Quality	Per ITU-T G.821, G.823, G.826
Source Primary Power	-48 Vdc
Equipment Specifications	Per ITU-T G.783
Tributary, Electrical Interface	Per ITU-T G.703, 75 Ω
Ethernet Interface	10/100 Mbps
SDH Bit Rates	Per ITU-T G.703
Optical Interfaces	Per ITU-T G.957, G.958
Frame and Multiplexing Structure for SDH	Per ITU-T G.707
Synchronization	Per ITU-T G.813
Management Functions	Per ITU-T G.774, G.784
Protection Architectures	Per ITU-T G.841
Built In Testing and Alarms	Per ITU-T G.774, G.783, G.784

Note :

* Optical wavelength shall be selected considering the characteristics of the optical fibre and the link budget.

** Eye Safety for Laser Equipment: To avoid eye damage, when a receiver detects a line interruption, it is required that the optical power of the laser shall be reduced to safe limits on the transmitter in the opposite direction as per ITU-T G.958.

In case other than FC-PC connector is provided in the equipment, suitable patch cord with matching connector are to be provided to connect with



1.2.8.3 FODP

Optical Link Performance Requirements

The optical fibre link performance requirements are specified as follows:

1.2.8.3.a.1 Link Budget Calculations

The fibre optic link budget calculations shall be calculated based upon the following criteria:

(1) **Fibre attenuation:** The fibre attenuation shall be taken to be the guaranteed maximum fibre attenuation i.e. 0.21 dB/Km @1550nm and 0.35 dB/km @1310nm.

(2) **Splice loss:** Minimum 0.05 dB per splice. One splice shall be considered for every 3 kms.

(3) **Connector losses:** Losses due to connectors shall be considered to be minimum 1.0 dB per link.

(4) **Equipment Parameters:** The equipment parameters to be considered for link budget calculations shall be the guaranteed "End of Life (EOL)" parameters. In case, the End of Life parameters are not specified for the SDH equipment, an End of Life Margin of at least 2 dB shall be considered and a similar margin shall be considered for optical amplifiers.

(5) **Optical path Penalty:** An optical path penalty of at least 1 dB shall be considered to account for total degradations due to reflections, inter symbol interference, mode partition noise and laser chirp.

(6) **Maintenance Margin:** A maintenance margin of at least 2.5 dB/100Km shall be kept towards cabling, repair splicing, cable ageing and temperature variations etc.

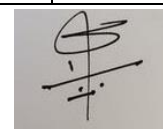
(7) **Other losses:** Other losses, if any required specifically for system to be supplied shall also be suitably considered.

(8) **Dispersion:** The fibre dispersion shall be taken to be the guaranteed maximum dispersion i.e. 18 ps/nm.Km @1550 nm & 3.5 ps/nm.km @ 1310 nm for DWDM fibres.

(9) **Bit Error Rate:** The link budget calculations shall be done for a BER of 10⁻¹⁰. The bidders shall determine the total link loss based on the above parameters and shall submit the system design (including link budget calculations) for each category of fibre optic link during detailed engineering. For finalizing the FOTS system design & BOQ, above methodology shall be adopted taking into account fibre attenuation, dispersion and splice loss determined during the detailed engineering. Accordingly, additions and deletions from the contract shall be carried out based on unit rates indicated in the contract.

1.2.9 Technical Requirements Specifications - 24 Port Managed Fibre Access Switch

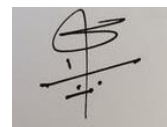
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
	Make			
	Model			
1	Switch Architecture and Performance	Switch should have 24 Nos. 10/100/1000 Base-TX auto-sensing plus with minimum 2x10G SFP+		



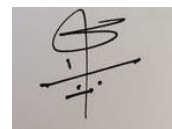
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
	Make			
	Model			
		uplinks.		
2	Switch Architecture and Performance	Switch should support link aggregation across multiple switches in a stack.		
3	Switch Architecture and Performance	Switch should have non-blocking wire-speed architecture.		
4	Switch Architecture and Performance	Switch should support IPv4 and IPv6 from day One		
5	Switch Architecture and Performance	Switch should have non-blocking switching fabric of minimum 128 Gbps or more		
6	Switch Architecture and Performance	Switch should have Forwarding rate of minimum 60 Mpps.		
7	Layer 2 Features	IEEE 802.1Q VLAN tagging.		
8	Layer 2 Features	802. 1Q VLAN on all ports with support for minimum 255 active VLANs and 1k VLAN ids		
9	Layer 2 Features	Support for 8k MAC addresses		
10	Layer 2 Features	Spanning Tree Protocol as per IEEE 802.1d		
11	Layer 2 Features	Multiple Spanning-Tree Protocol as per IEEE 802.1s		
12	Layer 2 Features	Rapid Spanning-Tree Protocol as per IEEE 802.1w		
13	Layer 2 Features	Self-learning of unicast & multicast MAC addresses and associated VLANs		
14	Layer 2 Features	Jumbo frames up to 9000 bytes		
15	Layer 2 Features	Link Aggregation Control Protocol (LACP) as per IEEE 802.3ad.		
16	Layer 2 Features	Port mirroring functionality for measurements using a network analyzer.		
17	Layer 2 Features	Switch should support IGMP v1 / v2 / v3 as well as IGMP v1 / v2 / v3 snooping.		
18	Quality of Service (QoS) Features	Switch should support classification and scheduling as per IEEE 802.1P on all ports.		
19	Quality of Service (QoS)	Switch should support QoS		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
	Features	configuration on per switch port basis.		
20.	Quality of Service (QoS) Features	Switch should support classification and marking based on IP Type of Service (TOS) and DSCP.		
21.	Quality of Service (QoS) Features	Switch should provide traffic shaping and rate limiting features (for egress as well as ingress traffic) for specified Host, network, Applications etc.		
22.	Quality of Service (QoS) Features	Strict priority queuing guarantees that the highest-priority packets are serviced ahead of all other traffic.		
23.	Security Features	Switch should support MAC address based filters/ access control lists (ACLs) on all switch ports.		
24.	Security Features	Switch should support Port as well as VLAN based Filters/ ACLs.		
25.	Security Features	Switch should support RADIUS and TACACS+ for access restriction and authentication.		
26.	Security Features	Secure Shell (SSH) Protocol, HTTP and DoS protection		
27.	Security Features	IP Route Filtering, ARP spoofing, DHCP snooping etc.		
28.	Security Features	Should support DHCP snooping, DHCP Option 82, Dynamic ARP Inspection (DAI)		
29.	Security Features	Should support a mechanism to shut down Spanning Tree Protocol Port Fast-enabled interfaces when BPDUs are received to avoid accidental topology loops.		
30.	Security Features	Should support a mechanism to prevent edge devices not in the network administrator's control from becoming Spanning Tree Protocol root nodes.		
31.	Security Features	Switch should support static ARP, Proxy ARP, UDP forwarding and IP source guard.		



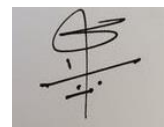
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
32.	Management, Easy-to-Use Deployment and Control Features	Switch should have a console port with RS-232 /RJ-45 Interface for configuration and diagnostic purposes.		
33.	Management, Easy-to-Use Deployment and Control Features	Switch should be SNMP manageable with support for SNMP Version 1, 2 and 3.		
34.	Management, Easy-to-Use Deployment and Control Features	Switch should support all the standard MIBs (MIB-I & II).		
35.	Management, Easy-to-Use Deployment and Control Features	Switch should support TELNET and SSH Latest Version		
36.	Management, Easy-to-Use Deployment and Control Features	Switch should support remote monitoring service like (history, statistics, alarm and events).		
37.	Management, Easy-to-Use Deployment and Control Features	Switch should support system and event logging functions as well as forwarding of these logs to multiple syslog servers.		
38.	Management, Easy-to-Use Deployment and Control Features	Switch should support on-line software reconfiguration to implement changes without rebooting. Any changes in the configuration of switches related to Layer-2 & 3 functions, VLAN, STP, Security, QoS should not require rebooting of the switch.		
39.	Management, Easy-to-Use Deployment and Control Features	Support to detect unidirectional links caused by incorrect fiber-optic wiring or port faults and disable on fiber-optic interfaces		
40.	Management, Easy-to-Use Deployment and Control Features	Switch should have comprehensive debugging features required for software & hardware fault diagnosis.		
41.	Management, Easy-to-Use Deployment and Control Features	Should support DHCP Server feature to enable a convenient deployment option for the assignment of IP addresses in networks that do		



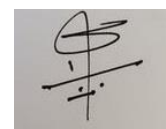
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
42.	Management, Easy-to-Use Deployment and Control Features	Switch should support Multiple privilege levels to provide different levels of access.		
43.	Management, Easy-to-Use Deployment and Control Features	Switch should support NTP (Network Time Protocol)		
44.	Management, Easy-to-Use Deployment and Control Features	Switch should support FTP / TFTP		
45.	Standards	RoHS Compliant.		
46.	Standards	IEEE 802.1x support.		
47.	Standards	IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports.		
48.	Standards	IEEE 802.1D Spanning-Tree Protocol.		
49.	Standards	IEEE 802.1p class-of-service (CoS) prioritization.		
50.	Standards	IEEE 802.1Q VLAN.		
51.	Standards	IEEE 802.3u 10 BaseT / 100 Base Tx / 1000 Base Tx.		
52.	Compliance	Switch / Switch's Operating System should be tested and certified for EAL 2 /EAL3 / NDPP or above under Common Criteria Certification		

1.2.10 Technical Requirements Specifications - 16 Port Managed Fiber Access Switch

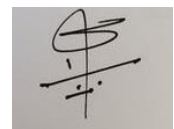
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
1.	Switch Architecture and Performance	Switch should have 16 Nos. 10/100/1000 Base-TX auto-sensing plus with minimum 2x1G SFP uplinks.	Yes	
2.	Switch Architecture and	Switch should support link		



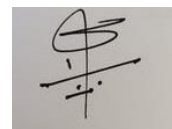
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
	Make			
	Model			
	Performance	aggregation across multiple switches in a stack.		
3.	Switch Architecture and Performance	Switch should have non-blocking wire-speed architecture.		
4.	Switch Architecture and Performance	Switch should support IPv4 and IPv6 from day One		
5.	Switch Architecture and Performance	Switch should have non-blocking switching fabric of minimum 128 Gbps or more		
6.	Switch Architecture and Performance	Switch should have Forwarding rate of minimum 26.50 Mpps.		
7.	Layer 2 Features	IEEE 802.1Q VLAN tagging.		
8.	Layer 2 Features	802. 1Q VLAN on all ports with support for minimum 255 active VLANs and 1k VLAN ids		
9.	Layer 2 Features	Support for 8k MAC addresses		
10.	Layer 2 Features	Spanning Tree Protocol as per IEEE 802.1d		
11.	Layer 2 Features	Multiple Spanning-Tree Protocol as per IEEE 802.1s		
12.	Layer 2 Features	Rapid Spanning-Tree Protocol as per IEEE 802.1w		
13.	Layer 2 Features	Self-learning of unicast & multicast MAC addresses and associated VLANs		
14.	Layer 2 Features	Jumbo frames up to 9000 bytes		
15.	Layer 2 Features	Link Aggregation Control Protocol (LACP) as per IEEE 802.3ad.		
16.	Layer 2 Features	Port mirroring functionality for measurements using a network analyzer.		
17.	Layer 2 Features	Switch should support IGMP v1 / v2 / v3 as well as IGMP v1 / v2 / v3 snooping.		
18.	Quality of Service (QoS) Features	Switch should support classification and scheduling as per IEEE 802.1P on all ports.		
19.	Quality of Service (QoS) Features	Switch should support QoS configuration on per switch port basis.		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
20.	Quality of Service (QoS) Features	Switch should support classification and marking based on IP Type of Service (TOS) and DSCP.		
21.	Quality of Service (QoS) Features	Switch should provide traffic shaping and rate limiting features (for egress as well as ingress traffic) for specified Host, network, Applications etc.		
22.	Quality of Service (QoS) Features	Strict priority queuing guarantees that the highest-priority packets are serviced ahead of all other traffic.		
23.	Security Features	Switch should support MAC address based filters/ access control lists (ACLs) on all switch ports.		
24.	Security Features	Switch should support Port as well as VLAN based Filters/ ACLs.		
25.	Security Features	Switch should support RADIUS and TACACS+ for access restriction and authentication.		
26.	Security Features	Secure Shell (SSH) Protocol, HTTP and DoS protection		
27.	Security Features	IP Route Filtering, ARP spoofing, DHCP snooping etc.		
28.	Security Features	Should support DHCP snooping, DHCP Option 82, Dynamic ARP Inspection (DAI)		
29.	Security Features	Should support a mechanism to shut down Spanning Tree Protocol Port Fast-enabled interfaces when BPDUs are received to avoid accidental topology loops.		
30.	Security Features	Should support a mechanism to prevent edge devices not in the network administrator's control from becoming Spanning Tree Protocol root nodes.		
31.	Security Features	Switch should support static ARP, Proxy ARP, UDP forwarding and IP source guard.		



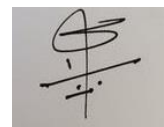
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
32.	Management, Easy-to-Use Deployment and Control Features	Switch should have a console port with RS-232 /RJ-45 Interface for configuration and diagnostic purposes.		
33.	Management, Easy-to-Use Deployment and Control Features	Switch should be SNMP manageable with support for SNMP Version 1, 2 and 3.		
34.	Management, Easy-to-Use Deployment and Control Features	Switch should support all the standard MIBs (MIB-I & II).		
35.	Management, Easy-to-Use Deployment and Control Features	Switch should support TELNET and SSH Latest Version		
36.	Management, Easy-to-Use Deployment and Control Features	Switch should support system and event logging functions as well as forwarding of these logs to multiple syslog servers.		
37.	Management, Easy-to-Use Deployment and Control Features	Switch should support on-line software reconfiguration to implement changes without rebooting. Any changes in the configuration of switches related to Layer-2 & 3 functions, VLAN, STP, Security, QoS should not require rebooting of the switch.		
38.	Management, Easy-to-Use Deployment and Control Features	Support to detect unidirectional links caused by incorrect fiber-optic wiring or port faults and disable on fiber-optic interfaces		
39.	Management, Easy-to-Use Deployment and Control Features	Switch should have comprehensive debugging features required for software & hardware fault diagnosis.		
40.	Management, Easy-to-Use Deployment and Control Features	Should support DHCP Server feature to enable a convenient deployment option for the assignment of IP addresses in networks that do		
41.	Management, Easy-to-Use Deployment and Control Features	Switch should support Multiple privilege levels to provide different levels of access.		



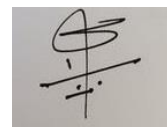
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
42.	Management, Easy-to-Use Deployment and Control Features	Switch should support NTP (Network Time Protocol)		
43.	Management, Easy-to-Use Deployment and Control Features	Switch should support FTP / TFTP		
44.	Standards	IEEE 802.1x support.		
45.	Standards	IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports.		
46.	Standards	IEEE 802.1D Spanning-Tree Protocol.		
47.	Standards	IEEE 802.1p class-of-service (CoS) prioritization.		
48.	Standards	IEEE 802.1Q VLAN.		
49.	Standards	IEEE 802.3u 10 BaseT / 100 Base Tx / 1000 Base Tx.		

1.2.11 Technical Requirements Specifications - 8 Port Managed Fiber Access Switch

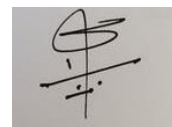
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
1.	Switch Architecture and Performance	Switch should have 8 Nos. 10/100/1000 Base-TX auto-sensing plus with minimum 2x1G SFP uplinks.	Yes	
2.	Switch Architecture and Performance	Switch should support link aggregation across multiple switches in a stack.		
3.	Switch Architecture and Performance	Switch should have non-blocking wire-speed architecture.		
4.	Switch Architecture and	Switch should support IPv4 and IPv6		



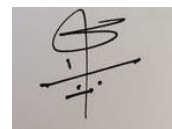
SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
	Make			
	Model			
	Performance	from day One		
5.	Switch Architecture and Performance	Switch should have non-blocking switching fabric of minimum 128 Gbps or more		
6.	Switch Architecture and Performance	Switch should have Forwarding rate of minimum 14.8 Mpps.		
7.	Layer 2 Features	IEEE 802.1Q VLAN tagging.		
8.	Layer 2 Features	802. 1Q VLAN on all ports with support for minimum 255 active VLANs and 1k VLAN ids		
9.	Layer 2 Features	Support for 8k MAC addresses		
10.	Layer 2 Features	Spanning Tree Protocol as per IEEE 802.1d		
11.	Layer 2 Features	Multiple Spanning-Tree Protocol as per IEEE 802.1s		
12.	Layer 2 Features	Rapid Spanning-Tree Protocol as per IEEE 802.1w		
13.	Layer 2 Features	Self-learning of unicast & multicast MAC addresses and associated VLANs		
14.	Layer 2 Features	Jumbo frames up to 9000 bytes		
15.	Layer 2 Features	Link Aggregation Control Protocol (LACP) as per IEEE 802.3ad.		
16.	Layer 2 Features	Port mirroring functionality for measurements using a network analyzer.		
17.	Layer 2 Features	Switch should support IGMP v1 / v2 / v3 as well as IGMP v1 / v2 / v3 snooping.		
18.	Quality of Service (QoS) Features	Switch should support classification and scheduling as per IEEE 802.1P on all ports.		
19.	Quality of Service (QoS) Features	Switch should support QoS configuration on per switch port basis.		
20.	Quality of Service (QoS) Features	Switch should support classification and marking based on IP Type of Service (TOS) and DSCP.		
21.	Quality of Service (QoS) Features	Switch should provide traffic shaping and rate limiting features (for egress		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
		as well as ingress traffic) for specified Host, network, Applications etc.		
22.	Quality of Service (QoS) Features	Strict priority queuing guarantees that the highest-priority packets are serviced ahead of all other traffic.		
23.	Security Features	Switch should support MAC address based filters/ access control lists (ACLs) on all switch ports.		
24.	Security Features	Switch should support Port as well as VLAN based Filters/ ACLs.		
25.	Security Features	Switch should support RADIUS and TACACS+ for access restriction and authentication.		
26.	Security Features	Secure Shell (SSH) Protocol, HTTP and DoS protection		
27.	Security Features	IP Route Filtering, ARP spoofing, DHCP snooping etc.		
28.	Security Features	Should support DHCP snooping, DHCP Option 82, Dynamic ARP Inspection (DAI)		
29.	Security Features	Should support a mechanism to shut down Spanning Tree Protocol Port Fast-enabled interfaces when BPDUs are received to avoid accidental topology loops.		
30.	Security Features	Should support a mechanism to prevent edge devices not in the network administrator's control from becoming Spanning Tree Protocol root nodes.		
31.	Security Features	Switch should support static ARP, Proxy ARP, UDP forwarding and IP source guard.		
32.	Management, Easy-to-Use Deployment and Control Features	Switch should have a console port with RS-232 /RJ-45 Interface for configuration and diagnostic purposes.		
33.	Management, Easy-to-Use Deployment and Control Features	Switch should be SNMP manageable with support for SNMP Version 1, 2 and 3.		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
34.	Management, Easy-to-Use Deployment and Control Features	Switch should support all the standard MIBs (MIB-I & II).		
35.	Management, Easy-to-Use Deployment and Control Features	Switch should support TELNET and SSH Latest Version		
36.	Management, Easy-to-Use Deployment and Control Features	Switch should support system and event logging functions as well as forwarding of these logs to multiple syslog servers.		
37.	Management, Easy-to-Use Deployment and Control Features	Switch should support on-line software reconfiguration to implement changes without rebooting. Any changes in the configuration of switches related to Layer-2 & 3 functions, VLAN, STP, Security, QoS should not require rebooting of the switch.		
38.	Management, Easy-to-Use Deployment and Control Features	Support to detect unidirectional links caused by incorrect fiber-optic wiring or port faults and disable on fiber-optic interfaces		
39.	Management, Easy-to-Use Deployment and Control Features	Switch should have comprehensive debugging features required for software & hardware fault diagnosis.		
40.	Management, Easy-to-Use Deployment and Control Features	Should support DHCP Server feature to enable a convenient deployment option for the assignment of IP addresses in networks that do		
41.	Management, Easy-to-Use Deployment and Control Features			
42.	Management, Easy-to-Use Deployment and Control Features	Switch should support Multiple privilege levels to provide different levels of access.		
43.	Management, Easy-to-Use Deployment and Control Features	Switch should support NTP (Network Time Protocol)		



SL. No.	Item	Minimum Requirement Description	Compliance (Yes / No)	Deviations / Remarks
Make				
Model				
44.	Management, Easy-to-Use Deployment and Control Features	Switch should support FTP / TFTP		
45.	Standards	IEEE 802.1x support.		
46.	Standards	IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports.		
47.	Standards	IEEE 802.1D Spanning-Tree Protocol.		
48.	Standards	IEEE 802.1p class-of-service (CoS) prioritization.		
49.	Standards	IEEE 802.1Q VLAN.		
50.	Standards	IEEE 802.3u 10 BaseT / 100 Base Tx / 1000 Base Tx.		

1.2.11.1 Link Performance

The Link performance for ES, SES and BER for the fibre optic links shall correspond to National Network as defined in ITU-T G.826.

a) FODP to SDH Equipment

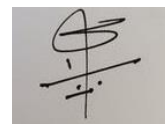
The Contractor shall be responsible for connectivity between the FODP and the SDH equipment. The Contractor shall provide FC PC coupled patch cords. The patch-cord length between the FODP & equipment rack shall be suitably protected from rodents, abrasion, crush or mechanical damage.

b) Patch Cords

The Contractor has to supply FC PC coupled Patch cords. The Patch cord return loss shall be equal to or better than 40 dB and insertion loss equal to or less than 0.5 dB.

c) Telecommunication Management Network / Network Management System (As Applicable)

The Contractor shall provide a Telecommunications Management Network System (TMN) for operational support to the FOTS. This TMN shall provide the capability to monitor, reconfigure and control elements of the telecommunications network from a centralized location and at each node of the network where equipment is located. This TMN system shall assist Employer/Owner in the operations and maintenance of the wideband communication resources of the including detection of degraded circuits, system performance, the diagnosis of problems, the implementation of remedial actions and the allocation or reallocation of telecommunications resources and addition/deletion of network elements. The contractor shall supply a single TMN for all the NEs (Network Elements) such as SDH equipment etc. The bidder shall provide details of the offered TMN in the bid.



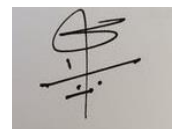
d) Applicable Standards

The TMN design concept, functional and informational architecture and physical architecture, shall be in compliance with ITU-T Recommendation M.3010. The offered TMN system shall be capable of integration to other supplier's Network Management System (NMS) upwardly through North bound interfaces. The north bound interface in the EMS shall be CORBA/TMF-814 compliant.

e) TMN Architecture

The TMN shall provide

1. Collection of Management data from all Network Elements (NEs) supplied under this package. The minimum monitoring and control requirements for the communication equipment shall be as defined in this section.
2. Processing of above management data by using processor(s) located at control Centre and additional intermediate station processor(s), wherever required.
3. Monitoring and control of the NEs as defined below:
 - I) TMN system at LDC (including local operator console, if applicable) shall support management of all equipment supplied and monitoring of the entire regional network supplied under this package. At minimum functions of Network management layer (NML) and Element management layer (EML) as defined in CCITT M3010.
 - II) Monitoring and control of NEs using Craft Terminals as defined in this Section.
4. Supervisory monitoring and control of the following station associated devices:
 - I) Intrusion Detection Alarms
 - II) Power Failure
 - III) Fire and Smoke Detection
 - IV) Environmental Control (Temperature, Humidity etc.)
5. Communication channel support for TMN System.
6. The supplied TMN system shall be capable of handling all management functions for at least 200% of the final network elements. Further, the centralized TMN system shall also have provision for addition of at least two remote operator consoles. The TMN hardware shall be so designed that failure of a single processor/component (router, switch, converter etc.) shall not inhibit any of the functionality of the TMN at control centre. The Contractor shall submit for Employer's approval the TMN architecture describing in detail the following subsystems/features:
 - i. Database used in TMN
 - ii. Master Processor, server/workstation, LAN, Peripherals and hardware
 - iii. Software and operating system
 - iv. Local Consoles/remote consoles
 - v. Craft Terminals
 - vi. Data communication between NEs, Remote/Local Consoles and TMN Processor(s)
 - vii. Routers/Bridges
 - viii. Expansion Capabilities (200%)



1.2.11.2 Management Functions

The TMN shall support following Management functions:

1.2.11.2.a.1 Configuration Management

Configuration management is concerned with management, display, and control of the network configuration. Minimum specific requirements that shall be satisfied include the following:

- i. Provide tools to establish and maintain the backbone topology and configuration information and provide graphical maps depicting the configurations.
- ii. Gather descriptive information about the current configuration of the equipment, provide operator displays, and prepare reports.
- iii. Provide tools for planning, establishing, and changing the static equipment configuration. Provide for changes to the equipment configuration in response to equipment failures, planned upgrades, and operator requests to take equipment offline for testing.
- iv. Provide verification testing to support new equipment installation.

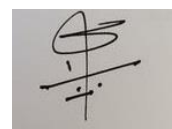
1.2.11.2.a.2 Fault Management

Fault management is concerned with detecting, diagnosing, bypassing, directing service restoration, and reporting on all the backbone network equipment, systems, and links. Minimum specific requirements that shall be satisfied include the following:

- i. Display equipment status in a consistent fashion regardless of the source of the data on a graphical topological, map-type display. Status shall be displayed through the use of colours on links and nodes as well as through text.
- ii. Obtain status and detect faults through periodic polling, processing of unsolicited alarms and error events, and periodic testing for connectivity.
- iii. Maintain an alarm summary of unacknowledged alarm events on the management station display and maintain a log of all received alarms. The operator shall be able to acknowledge and clear alarms individually and as a group. The use of alarm correlation techniques is encouraged to minimize the proliferation of alarms caused by a single, common event. All alarms shall be configurable as critical alarms, major alarms and minor alarms with different colours.
- iv. Provide the capability to diagnose and isolate failures through analysis of error and event reports and through the use of both on-line and off-line diagnostic tests and display of monitored data.
- v. The criteria for fail over shall be configurable as automatic fail over to redundant equipment wherever possible and through operator-initiated actions where automatic fail over is not possible. The status of fail over shall be reported to the NMS.
- vi. Track network equipment failure history.

1.2.11.2.a.3 Performance Management

Performance management is concerned with evaluation of the use of network equipments and their capability to meet performance objectives. Minimum specific requirements that shall be satisfied include the following:



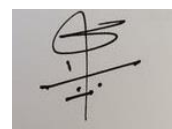
- a. Provide support for an operator to initiate, collect, and terminate performance metrics under both normal and degraded conditions. For example, BER of each link, together with other data measured at each node, shall be available on operator request (at least for SDH).
- b. Monitor point to point & end to end signal quality and history. Provide operator controls to monitor performance of specified events, measures, and resources (at least for SDH). Specifically provide displays to permit the operator to:
 - i. Select/deselect network equipment's, events, and threshold parameters to monitor
 - ii. Set monitoring start time and duration or end time
 - iii. Set monitoring sampling frequency
 - iv. Set/change threshold values on selected performance parameters
 - v. Generate alarm events when thresholds are exceeded.
 - vi. Set multiple thresholds on certain performance parameters. Alarm categories include as a minimum a warning and a failure.
 - vii. Calculate selected statistical data to measure performance on selected equipment based on both current and historical performance data maintained in performance logs. Performance data provided is limited to what is available from the equipment Contractors.
 - viii. Provide graphical displays of point to point and end to end current performance parameter values. Provide tabular displays of current, peak, and average values for performance parameters.
 - ix. Generate reports on a daily, weekly, monthly, and yearly basis containing system statistics.

1.2.11.2.a.4 Security Management

The TMN shall be provided with security features to limit access to monitoring and control capabilities to only authorized personnel. One access level of System Administrator and at least two levels of operator access shall be provided - read (view) only, and write (configure). The system administrator shall be able to create, define and modify operators with different access levels, network domains and perform all kind of maintenance and up gradation of the TMN system. With "read only" access level, network parameters should only be viewed. Access to database maintenance, command control and test functions shall be available with "write " access level. Means shall be provided to ensure only one authorized user has write capability for a selected domain of the network. It shall be possible to define multiple domains for purposes of monitoring and control. Human error and conflict detection are also required. Such errors and access violations shall be reported to the offending user as error messages and warnings.

1.2.11.2.a.5 Communication Channel Requirement and Integration

Communication requirements for TMN system have not been considered in Appendices and the Contractor shall provide these as a part of TMN system. The Contractor shall provide all required interface cards / devices, LAN, routers/bridges, channel routing, cabling, wiring etc. and interfacing required for full TMN data transport. The TMN data transport shall utilize the wideband communications transmission system service channel in the overhead whenever possible. This will provide inherent critical path protection Should the configuration requirements dictate multiple TMN



station processors, the TMN Master Station shall require bidirectional data transport with its station processor(s). This communications interfacing shall be via critically protected data channels. It shall be the Contractor's responsibility to provide for and equip all necessary critically protected TMN data channel support. In case supervisory channels are not available, the Contractor shall provide suitable interfaces in their supplied equipment for transport of TMN data. The Contractor shall also be responsible for providing suitable channels with appropriate interfaces to transport the TMN data. The NMS information of existing SDH system shall be transported through the new communication network, wherever required, up to the NMS location. The NMS information of the new SDH system being procured under the package shall be transported through the existing communication network using 64 kbps/2Mbps (G.703) interfaces. Any hardware required for above interfacing shall be provided by the Contractor. The bidders shall describe in the proposal the TMN data transport proposed to be used by the bidder in detail including capacity requirements and various components/equipment proposed to be used.

1.2.11.2.a.6 Craft Terminal

Each equipment (SDH equipment etc.) on the fibre optic communication network shall include provision for connecting a portable personal computer (PC) to be known as craft terminal to support local commissioning and maintenance activities. Through the use of this PC and local displays/controls, the operator shall be able to:

- a. Change the configuration of the station & the connected NEs.
- b. Perform tests
- c. Get detailed fault information

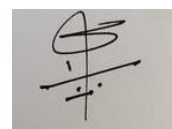
The craft terminal shall be connected to the interface available in the communication equipment. Portable (laptop) computers (Craft terminals), each complete with necessary system and application software to support the functions listed above, shall be supplied to the employer.

1.2.12 MODEM (4G LTE with fall back to 3G/2G compatible)

The offered MODEM shall be an intelligent device connected to an RTUs/FRTUs by means of RS232 port, installed at various location to collect the following data as per configured frequency/on demand. The MODEM shall have 4G LTE with fall back to 3G/2G Compatibility

1.2.12.1 Key Features:

- a) **Internal Antenna**
- b) **Mounting arrangement : DIN Rail Mounting**
- c) Shall have auto restart feature with built-in watchdog timers and intelligence.
- d) Shall have program over the air (POTA) feature that will reduce the manual field visits and save project time.
- e) The modem firmware shall be reprogrammed from the server remotely.
- f) Remote start/stop and restart feature.
- g) Auto recover feature in case modem / network hanging.
- h) Comprehensive self-diagnosis feature which will create log file with all at a periodicity and link check for communication.
- i) On demand SMS request through SMS for Instantaneous Parameters .
- j) Real time outages, alarms as alerts to server and to configured mobile numbers Automatic connection (no AT commands required) and watchdog for reliable Communication.



- k) Inbuilt three Phase Power supply as well as operational on single phase.
- l) IP (internet protocol) based Communication, enabling simultaneous data access from thousands of Modems.
- m) Shall have a configuration over the air feature through which all the MODEM operational settings will be configured.

1.2.12.2 Power Supply Section:-

DC – 24V to 48 Vdc

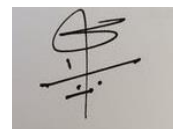
AC- 230 V Single Phase AC.

The offered MODEMs should capable of operating on three-phase supply drawn from the RTUs/FRTUs input itself. Auxiliary power supply will not be acceptable.

1.2.12.3 SIM Card Section:-

- For placing the SIM Card, a SIM Card Holder shall be provided on the motherboard and shall be accessible only by opening/sliding the cover, MODEM shall not be opened for replacing the SIM card.
- The SIM Card supported shall be of 1.8V/3V Interface.
- Interlocking facility shall be provided under the device cover.
- SIM card slot/cover shall be sealed to avoid access to unauthorized. The offered MODEM shall comply for ESD as per IEC61000-4-2.

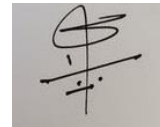
1.2.12.4 Degree of Protection : Degree of ingress protection shall be considered IP 51.



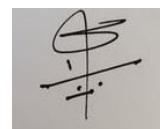
3. Clarifications

Clarification to the Specific Queries :

Content of RFP requiring clarification	Points of clarification required	Clarification/Response
The A/C should have a minimum cooling capacity of 55kW on the following condition: return air dry bulb temperature 35°C, relative humidity 26%, and outdoor temperature 35°C	Considering the overall space inside the Data hall, we would need confirmation if we can propose different capacity of cooling units complying UPTIME TIER Standards	It's our minimum requirement as per RFP, Bidder can propose higher specification with no change in price
A high-efficiency PAC unit has cooling capacity with stepless adjustments between 10 percent and 100 percent.	Request to accept cooling capacity with stepless adjustments from 20% to 100%	As per RFP
The PAC unit should achieve stable and fast dehumidification at a minimum of 10 percent low IT load and greater than 95 percent relative humidity conditions	Request to accept Minimum 20% IT load needed to maintain the Humidity inside the room	As per RFP
The evaporator should be a 'V'-type design to provide better air distribution	Request to accept Evaporator coil with Slant type design	As per RFP
The compressor and dry filter should use a threaded connection so there is no welding work during maintenance.	Request to accept brazed type Compressor and filter drier as per OEM Standard	As per RFP
The PAC should use an energy saving humidifier so that maximum humidification power consumption will be lower than 50W,	Please clarify on the humidifier power consumption	It's simply the power consumed by humidifier equipment.



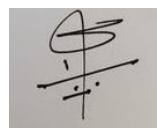
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
PAC unit should be configured with surge protection device to increase safety and reliability. No less than 6kV ability is recommended.	Please clarify if Surge protection system can be provided as optional	As per RFP
PAC evaporator should be equipped with a four-row inner-grooved copper pipe and blue hydrophilic aluminium fin to ease condensation water drainage and prevent water loss while improving heat exchange. The evaporator should be a 'V'-type design to provide better air distribution and prevent air pressure drop.	Please accept "PAC units suitable number of rows as per the OEM design standards and Slant type Evaporator coil as per OEM standard for ease of maintenance	As per RFP
The screen can graphically display the running status of each PAC component.	Kindly modify as LCD/LED Display as per OEM Standards	As per RFP
The PAC should have a large-capacity memory to store at least 1500 historical fault alarms.	Kindly accept minimum 100 Recent Alarms on Display and remaining through monitoring software	As per RFP
At least 32 PACs can be controlled and managed in the same area in a unified manner	Kindly accept Maximum 10Units linked at a time in same area	As per RFP
The fan rotation speed can be lowered under partial loads to save energy. The pressure difference control module should be installed inside the unit.	Kindly accept Fan rotation speed managed through a separate accessory needed with supply of unit	As per RFP
The PAC should have a large-capacity memory to store at least 1000 operation logs.	Kindly accept minimum 100 Recent Alarms on Display and remaining through monitoring software	As per RFP



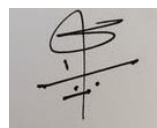
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
The screen can display 30 days' worth of temperature and humidity curves in color, making it easy for operations staff to check the status inside the data center.	Kindly modify as LCD/LED Display as per OEM Standards; Graphs and trends can be monitored through monitoring software	As per RFP
A PAC controller should use a 7-inch, true-color LCD touch screen that features good human-machine interaction,	Kindly modify as LCD/LED Display as per OEM Standards	As per RFP
10.2.7. The modular UPS system shall use concentrated bypass and the bypass module shall be hot swappable. A built-in bypass shall be provided	The primary components in modular UPS which ensure power supply continuity to critical load are Power Modules, Control Modules and Control Power Supply Modules while the Static Switch module is the secondary component which remains in standby condition. We propose modular UPS with hot swappable Power Module and Control Module. However the built-in Centralized Static Switch module can be swapped by transferring the load to maintenance bypass. Please provide your confirmation to proceed.	As per RFP



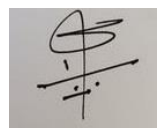
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
<p>Standard battery technology should be 12 V SMF Valve Regulated Lead Acid (VRLA). Batteries to be connected in Parallel. Batteries should be housed in the same rack as the power section or separate rack. The UPS battery should be of modular construction made up of user replaceable, hot swappable, Batteries should be modular on pull out shelves for quick replacement and servicing. In event of failure of any single battery only battery backup time must reduce and should not become zero.</p>	<p>The Modular Battery System using 12Volt SMF VRLA battery has been asked with the UPS. However in the clause no 10.2.7 "Technical Specification Power system" the Lithium Ion battery has been asked for the UPS to provide 30min backup. The Lithium Ion battery system have many advantages over VRLA battery which resulted into Higher Uptime and Lower Total Cost of Ownership for the customer. Please provide your confirmation on which battery technology shall be considered along with the UPS.</p>	<p>As per RFP, pls refer clarification-1 and clarification-2</p>
<p>Each door should have CRCA frame with fire retardant glass sheet of 4 mm thick or Fire Retardant Rigid UL V-0 Plastic 3 mm. The frame of door should have 4 vertical MS Columns of rectangular section with thickness of 1.5mm Columns should be grouted to real floor or can be fixed to the base frame of rack</p>	<p>Allow for Extruded Aluminium frame for door and vertical columns</p>	<p>As per RFP</p>
<p>The Doors must have a Steel Picture Frame fabricated in 1.2mm thick CRCA sheet as per "IS 513 Grade D" standards</p>	<p>Allow for extruded Aluminium door frame</p>	<p>As per RFP</p>
<p>b. The racks should be UL Approved and comply to EIA-310, REACH and RoHs.</p>	<p>Allow ISO certified instead of UL</p>	<p>As per RFP</p>
<p>h. The front and rear doors should open a minimum of 140 degrees to allow easy access to the interior.</p>	<p>Allow door opening up to 120 degrees</p>	<p>As per RFP</p>



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
The roof of the racks should be removable from the interior of the enclosure without tools and should have cable entry holes to allow up to 2000 cables or 60A PDU plugs.	Allow for non removable top panel but with sufficient cable entry provision	As per RFP
m. Server Racks should be of 600 mm wide and 1200 mm deep with caster wheels and levelling feet. Overall height of Racks should not exceed 1998 mm including castor and wheels.	Allow overall height up to 2120mm	As per RFP
n. Network Racks should be of 800 mm wide and 1200 mm deep with caster wheels and levelling feet. Overall height of Racks should not exceed 1998 mm including castor and wheels	Allow overall height up to 2120mm	As per RFP
q. All rack sheet metal components should be powder coated RAL7021 (Black).	Allow black color with RAL 9002	As per RFP
The cabinet is made of high-intensity class A carbon cold rolled steel plates and zinc-coated steel plates.	Allow for phosphate coating for pre treatment	As per RFP
The door frames of the cabinet can be installed with expansion bolts (ground) or bolts (base).	Require more information. Kindly confirm the application of the same	It's about IT Rack's door expansion



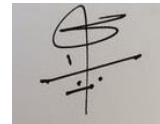
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
The thickness of the non-load-bearing part of the cabinet is not less than 1.0 mm, the thickness of the load-bearing part is not less than 1.5 mm, the static bearing capacity is not less than 1500 kg, and the test report issued by a third party authority is provided.	Kindly allow for 1300Kg	As per RFP
Connecting parts such as cabinet materials, screws, and bolts should be stainless.	Allow hardware with MS material	As per RFP
f. The mechatronic lock should have LED indication for status and field for display of rack name and number.	Allow for display of rack name and number separately	Shall be considered during DDE
b) Input current rating: 230V ,1-ph, 32A or 400V,3 -ph as per requirement.	Kindly confirm if we can consider 7 kW Single Phase PDU as load is not more than 4 kW	As per RFP
d) It should have billing grade +/-1% Accurate Metering of electrical parameters as per ANSI Standards	Allow for +/-3% accuracy	As per RFP
a) No. of output sockets should be minimum IEC 320 C13 x 18 and IEC 320 C19 x 6	Kindly allow for IEC 320 C13 x 21 and IEC 320 C19 x 3	As per RFP
g) All plug types, input as well as outlet should conform to best industry standards and should have locking capability to avoid accidental dislodging.	Allow to provide with locking power cord	All global std. certifications shall be accepted



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
f) It should confirm to UL/CE, IEC Norms	Allow for VDE certified	All global std. certifications shall be accepted
g) It should support High Operating temperature of 0 to 60 deg C to take care of high operating temperature at back of Rack	Allow operating temperature of 0 to 45 deg C	As per RFP
k) It should provide following measurement parameters at Socket level: Current (A), voltage (V), real power (W), apparent power (VA), consumption (kWh) and power factor	Allow monitoring of Current, Voltage, Real Power and Consumption	As per RFP
l) iPDU should have capability to Daisy Chain min 16 iPDUs to reduce use of number of Network Ports usage. During Daisy Chaining each PDU should retain its own IP Address for easy identification and Mapping and should maintain high availability over network.	Allow max daisy chain up to 4 PDUs	As per RFP
m) The iPDU should have dual Ethernet Ports.	Allow for 1 ethernet port	As per RFP
o) Communication module in the rack PDU should be Hot Swappable.	Allow for field replaceable	As per RFP
v) ARP, IPv4, IPv6, ICMP, ICMPv6, NDP, TCP, UDP, DNS, HTTP, HTTPS, SMTP, SMTSP, DHCP, SNMP (v1/v2c/v3), and Syslog.	Allow, IP4, IP6, Ping response, HTTP, HTTPS, FTP, Telnet, SSH/SCP, SNMPv1, SNMPv3, and Syslog	As per RFP
y) iPDU should have capability to connect to 16 sensors (temperature,	Kindly allow for 1 sensor of Temperature + Humidity per	As per RFP



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
humidity, airflow, Dew Point).	PDU	
It should have maximum of 16 ports with 2 remote users concurrency	Kindly accept 1 remote user and 1 local user	As per RFP
Same switch should also support connecting serial devices with RS232 interface through different interface adaptor.	Kindly remove this clause as the KVM asked for is IP based	As per RFP
Serial session launched through KVM switch shouldn't be considered as a digital path.	Kindly remove this clause as the KVM asked for is IP based	As per RFP
Remote console level access of both Servers and serial devices such as routers. Serial adaptor should support supports SSH such as routers connections pin out to make connections to Cisco equipment quick and easy without the need for any additional external wiring adapters or special wiring.	Kindly remove this clause as the KVM asked for is IP based	As per RFP
It should have facility to integrate with secure management devices. It should support Virtual media enables remote USB devices. connections and support for smart card/CAC readers.	Request to exclude smart and CAC readers	As per RFP
Shall have redundant power supplies installed.	Allow for single power supply	As per RFP
The connectivity between the KVM and servers should be UTP using a compatible server interface module with dual USB and has to support BIOS level virtual media.	Allow for single USB	As per RFP



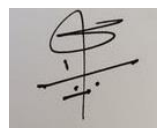
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
Compliance from Approved Agency: UL, FCC, cUL, CE, VCCI,CTick, CB	Kindly allow for C-Tick, CE, EAC, TAA compliance, UL-AR, VCCI class A, VDE, FCC part 15 class A, ICES-003, UL 60950-1	All global std. certifications shall be accepted
Should support max resolution 1600 x 1200 at 60 Hz suitable for connection with KVM.	Allow for max resolution of 1280 x 1024 @ 60Hz	As per RFP
Operating temperature should be 0°C to 50°C	Allow for 0°C to 40°C	As per RFP
It should have cable management arm(CMA).	Kindly allow without cable management arm, Additional horizontal cable manager can be provided	As per RFP
It should be global certified by agencies UL, CE, CCC, BSMI, CTick, EAC, VCCI, KCC, FCC, Class A	Kindly allow for C-Tick CE Industry Canada KCC NOM UL listed VCCI class A VDE standards EN 55022 class A EN 55024 EN 60950 FCC part 15 class A IEC 60950	All global std. certifications shall be accepted.
Centralized management software should provide "Hub and Spoke" architecture allows for high availability and distributed access across locations. Hub and spoke architecture based solution for failover and replication of management database across	Request to remove this clause as this specific to one OEM	As per RFP



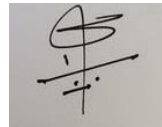
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
locations both being on Active-Active mode.		
The system should easily integrate with the existing security infrastructure, authenticating against our internal or external standards-based services. Integration with LDAP, NT /AD, TACACS+, RADIUS and RSA Secure ID is required	Allow without TACACS+	As per RFP
It should allow: TCP/IP, HTTP/HTTPS, SSL, DNS, and LDAP/LDAPS through network interfaces.	Kindly exclude LDAP/LDAPS	As per RFP
The system should be open and support the following interface protocols: Common open standard protocols, such as Webservice API, SNMP, Modbus, and BACnet, facilitate quick capacity expansion in the future	Request to exclude BACnet from list of protocols, DCIM can provide data in all other protocols	As per RFP
DC should be as per TIA 942 Rated 3 & TIER III Standards	Please confirm whether we need to consider UPTIME or TIA 942 Certification and Standards to be considered as some points are not applicable for UPTIME TIER III	As per RFP
hot and cold aisle containment separated hot & cold air in datahall to improve cooling Efficiency	Please confirm if we have to consider Hot aisle containment or cold aisle containment	Hot and Cold Both assuring best cooling efficiency
The lithium battery provide 30 minutes system backup time	please clarify back up time to be considered as in Page 351 it is mentioned as 15 mins	Pls refer clarification-1 and Clarificatin-2 li-ion battery is asked.
The lithium battery support old and new battery mixed	Please allow for proposing Samsung/Vision Make LIB	As per RFP



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
used ; the same brand with UPS	Battery systems as UPS OEM do not manufacture the same	
In-room cooling air conditioner with N+1 redundancy	Please clarify whether we should consider N+1 or N+2 redundancy as per Page 316	As per RFP
Dimension:600*1100*2000 mm for IT rack ,800*1100*2000mm for network rack ; Ventilation Rate of Front and Rear Door no less than 70%,static load no less than 1500kg;with monitor rack PDU for each rack	Please clarify whether we need to consider 1100 mm deep racks or 1200 mm deep racks as per Page 373 and 405	As per RFP
Each UPS should have Hot swappable/trained-user replaceable Minimum 30 kW / kVA power module shall contain a fully rated,	Please clarify whether we need to consider hot swappable batteries or LIB	It's about hot swappable power supply module not battery.
The Present IT load per rack to be considered as 7 kW and 10 KW per Rack.	Please clarify whether we need to consider load of 4 kw for server racks and 2 kw for network rack as per page 313	As per RFP
Units should be offered with two plug EC Direct Drive Backward Curved Fan, High efficiency, EC motor with integrated electronics, Maintenance free design and construction. The fan section should be designed for higher air flow. Each unit should deliver minimum 80-90 CFM per every kW of cooling as per the server actual requirement, Minimum 3200 CFM per each Machine	Please clarify the CFM as IT equipment would require minimum 120 - 130 CFM per kW of Heat Load	As per RFP



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
<p>The cooling for the data centre to be achieved with the help of horizontal flow in row type cooling units which should be positioned between the IT Racks which shall help to achieve maximum operational efficiency.</p>	<p>Please clarify whether we need to consider In row type cooling of In room cooling as mentioned in rest of the pages and BoQ in tender</p>	<p>As per RFP</p>
<p>Meteorological data: a) Altitude above sea level: 1420 m- b) Ambient Air Temperature: -5 °C (minimum) to 40 °C (maximum) c) Average Humidity (in %) : 100 (maximum), 40 (minimum) d) The project locations are lying in the Wind Speed Zone 4. e) Seismic Requirement for Substations: 0.5 g (Horizontal peak acceleration value). Ok However, for design purposes, ambient temperature should be considered as 50 degree centigrade and Relative humidity 100%. Altitude (from MSL) to be considered as 1400 meter.</p>	<p>Kindly confirm if these are applicable only for the container enclosures</p>	<p>This is kathmandu valley meteorological information provided as a reference for overall projects.</p>



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
<p>Degree of Protection The enclosures of the Control Cabinets, Junction boxes and Marshalling Boxes, panels etc. to be installed shall provide degree of protection as detailed here under:</p> <p>a) Installed out door: IP- 55 - Ok b) Installed indoor in air conditioned area: IP-31 c) Installed in covered area: IP-52 d) Installed indoor in non-air conditioned area where possibility of entry of water is limited: IP-41. e) For LT Switchgear (AC & DC distribution Boards): IP-52</p> <p>The degree of protection shall be in accordance with IEC-60947 (Part-I) / IEC-60529. Type test report for degree of protection test, shall be submitted for approval.</p>	<p>Kindly confirm if these are applicable only for the container enclosures</p>	<p>Applicable as mentioned in RFP</p>
<p>The reports for all type tests as per technical specification shall be furnished by the Contractor alongwith equipment / material drawings. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on IEC Guide 25 / 17025 or EN 45001 by the national accreditation body of the country where laboratory is located) or witnessed by Utility or representative of accredited test lab or reputed consultant.</p>	<p>Test Certificate of Material used , Product Test for IP will be Provided , Please clarify which Test Clause to be considered for Enclosure.</p>	<p>As per RFP any Global std. test certificates shall be allowed.</p>



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
<p>anti-interference capacity, leakproofness, lightning protection, and grounding should meet the requirements of the equipment and local code. The design and construction must comply with related international standards, specifications, and regulations. In addition, the construction requirements of the construction site must be strictly followed. A modern and standardized computer pre-fab building must be constructed according to international specifications.</p>	<p>Kindly clarify the anti-interference capacity.</p>	<p>Equipment in room shall be interference free zone from outside.</p>
<p>The building shall be housed in structures constructed from standard prefabricated container modules, pre-fitted with all the relevant fit-outs.</p> <p>Ø The dimensions of the prefabricated modules should comply the certification of IACS (Classification society). For enough indoor space of equipment the recommendation height of each floor should not less than 3.6m.</p> <p>Ø The recommendation dimension of pre-fab module is 600mm×2438mm×12192mm (H*W*D), 3600mm×3495mm×12192mm (H*W*D). For the convenience of transportation and installation, the width and length of the prefabricated modules should be 2438mm×12192mm, 3495mm×12192mm.</p>	<p>These modules shall be completely Non-ISO due to change in heights mentioned in the tender. Please confirm the applicability of IACS which is applicable only for Standard ISO containers</p>	<p>600mm×2438mm×12192mm (H*W*D) has not mentioned pls correct it by 3600mm×2438mm×12192mm (H*W*D)</p>



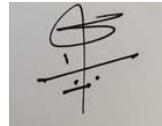
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
<p>Anti-seismic test and fire resistance test should be implemented. The prefabricated module should meet the local standard of anti-seismic performance. Also should meet the requirement of 90min fire proof requirement. The vendor should provide 90min fire-proof third party test report.</p> <p>Ø For better cooling energy efficiency, the thermal insulation layer of the prefabricated modules should be ≥100 mm thickness while the thermal efficiency should ≤0.3W/ (m2*K).</p> <p>Ø In order to provide better performance of building, all pre-fab modules need to pass no less than UL 1440 hour salt spray test and provide third party reports.</p> <p>Ø Steps, stairs and ramps are to be provided to access all the prefabricated modules.</p> <p>Ø The building construction provider must have no less than 5 cases that building is construct by pre-fab module which no less than 3-layers, and no less than 40 cases that building is construct by pre-fab module-Ok</p>	<p>Kindly confirm if software based test report is submitted for Anti Seismic test as there is testing body in the region, Please share details of testing body which carry seismic test for enclosure in the region , 90 min fire proof third party test Report can be provided , The Required thermal Insulation can be met, salt spray test 1000 hrs can be met & Need UL 1440 requirement details so that we can consider the same.</p>	<p>Test reports as per RFP</p>
<p>n ISO 9001/TL 9000 International quality system certification</p> <p>n ISO 14001 International environmental management system certification</p> <p>n OHSAS 18001 Occupational Health and Safety Management System Certification</p> <p>Ø The Energy Facility of DC room should be pre-assembled and pre-tested in factory no less than 80% and can support FAT in factory- Schneider</p>	<p>Please consider ISO 50001 instead of ISO 18001</p>	<p>As per RFP</p>



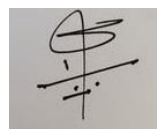
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
Scope		
<p>1. Enclosure Components The enclosure skeleton is the main support structure that allows the enclosure to be hoisted and loaded. All the side panels, thermal insulation layer, and openings of the enclosure are dependent on the skeleton. The skeleton provides ports for hoisting, securing, and transporting the enclosure, and is welded by corner fittings, columns, and cross beams.</p> <p>2. Front Panel The front panels are the first surface visible to customers. Installation positions for devices such as the fire door, card reader, fire control panel, emergency door release button, and fire alarm horn strobe are designed on the front panels. The front panels are welded with the enclosure skeleton with 25 mm thick corrugated boards. A square pipe framework is reserved on the door installation position to ensure the strength.</p> <p>3.Rear Panel The rear panels are opposite to the front panels and are deployed at the rear of the enclosure. The layout of the rear panels varies with products.</p>	<p>Kindly clarify if these are applicable for room walls</p>	<p>Pls refer RFP</p>



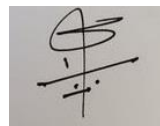
Content of RFP requiring clarification	Points of clarification required	Clarification/Response
<p>4.Side Panel There are two types of side panels: transport side panel and welded side panel. The transport side panels are secured to the enclosure using bolts to ensure the enclosure strength and protect equipment inside the enclosure during transportation. They should be removed before combining enclosures onsite. welded side panel are composed of corrugated boards. They are directly welded on the enclosure skeleton during fabrication. Installation positions for the fire door, cabling window, emergency door release button, and fire alarm horn strobe are reserved on the welded side panels as required.</p> <p>5. Top Panel Top panels provide external protection for the entire enclosure to prevent the impact of external factors such as rains, snows, and sunlight on the building. Embedded parts welded at the top panels can be used to install and support overhead devices such as cable trays and the thermal insulation layer.</p> <p>6.Bottom Panel : The bottom panels of the enclosure are assembled by bottom cross beams for the standard enclosure at equal spacing. All cross beams are welded to the bottom side beams, and 4 mm thick steel plates are paved on the cross beams for securing and supporting equipment installation kits. The corrugated boards are welded under the cross beams, and rock wool is filled between two layers of steel plates to insulate</p>	<p>Kindly clarify if these are applicable for room walls</p>	<p>Pls refer RFP</p>



Content of RFP requiring clarification	Points of clarification required	Clarification/Response
heat, preserve temperature, and avoid condensation at the bottom of the enclosure.		
<p>The Prefab Module dimension The exposed plates of modules should be weathering steel plates commonly used for same with marine containers. Compared with common steel plates, the weathering steel plates have better anti-corrosion and coating performance. The weathering steel plates are coated with anti-corrosion paint in the factory, meeting the requirements for application in outdoor Class C environments. Two types pre-fab module are combined to form a module building to provide all required function area rooms.</p>	The same shall be complied only for container enclosure.	Pls refer RFP
General Query	As these are Containers without interior walls stacking one above the other would lead to high loading which shall not comply to standards, hence we recommend to have Steel structure of 3 storeyed in which the Pre fab modules are assembled to meet the overall technical requirements	As per RFP
General Query	Please clarify whether the outdoor units of the Precision AC would be mounted directly on top of the 2nd floor as in tender it is mentioned as in future one more storey should be developed	This can be designed by the successful bidder during DDE



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<p>The fire control panel is connected to the DCIM over TCP/IP to upload fire alarms and fault signals. The fire extinguishing components in the protected area, such as the fire alarm bell, horn strobe, extinguishing abort button, warning signs, manual/automatic switches, start up controller, pneumatic switch, and electrical actuator are all connected to the control panel for fire control and management.</p>	<p>We request and recommend all Facility related devices to be discovered, monitored and controlled by Building Management Software / tool only. Because, it will be a single point of view for easy monitoring ; Hence request to remove this clause from DCIM</p>	<p>As per RFP</p>
<p>Proposed DCIM shall provide mobile device capability preferably iOS solution. It shall enable barcode and device recognition for easy inventory management. It shall include an audit capability, so user can scan and asset and quickly determine correct or incorrect placement of the device.</p>	<p>Tender asked for Asset Management at U level also. So which one to be proposed. Barcode or U Level Asset Management</p>	<p>As per RFP, Barcode is preferred.</p>
<p>Dynamic Single Line diagram should enable logical mapping from LT/ HT Panel to IT equipment and provide exact alert/alarm can be pin point problems through this solution.</p>	<p>We request and recommend all Facility related devices to be discovered, monitored and controlled by Building Management Software / tool only. Because, it will be a single point of view for easy monitoring, Hence remove this clause from DCIM</p>	<p>As per RFP, Bidders are free to propose any advanced technology facility without extra payment.</p>



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<p>"Data accuracy When the hardware and monitoring devices are not faulty, the false positive rate of the system must be less than 0.1%. The data and alarms reported by the system must be accurate. The precision of the data displayed on the monitoring terminal should meet relevant requirements. The alarm accuracy should reach 100%. The control accuracy of the monitoring system is 100%. The specific requirements are as follows: <input type="checkbox"/> DI: Accuracy 100%; <input type="checkbox"/> DO: Accuracy 100%;</p>	<p>Data Accuracy depends upon the Facility devices. DCIM software will show the parameters of the facility devices. So the accuracy should check and managed at the facility devices.</p>	<p>As per RFP</p>

