RAILTEL CORPORATION OF INDIA LTD.
(A Govt. of India Enterprise)
2nd Floor, B-Block, Rail Nilayam
Secunderabad - 500071

TENDER DOCUMENT
(SECTION-I)

FOR

System Design, Supply, Installation, Commissioning & Maintenance support of Datacenter for RailTel (Phase-II)

OPEN TENDER NO. RAILTEL/TENDER/OT/SR/DC/2015-16/124
Dated: 29.04.2016

COPY NO.

SOLD TO:

RAILTEL/TENDER/OT/SR/DC/2015-16/124 Dated: 29.04.2016

No. RAILTEL/TENDER/OT/SR/DC/2015-16/124 **Dated: 29.04.2016**

OPEN TENDER NOTICE

Subject: Open Tender for System Design, Supply, Installation, Commissioning & Maintenance support of Tier III Datacenter for RailTel (Phase-II)

Dear Sir,

RailTel Corporation of India Ltd. invites sealed tenders in Two Packet System for **System Design, Supply, Installation, Commissioning & Maintenance support of Tier III Datacenter for RailTel(Phase-II) at 3rd Floor, Rail Nilayam, Secunderabad**. The tender document can be purchased from this office by paying Demand Draft of Rs. 10000/- (Rs. 10500 /- if required by post) drawn in favour of **RailTel Corporation of India Ltd. Secunderabad.** The sale of tender will continue from **29.04.2016 to 31.05.2016 (upto 12.30 hrs).** Tender Notice and Tender Document are also available at RailTel's website: www.Railtelindia.com. In case Tender Document is down loaded from website, an amount of Rs. 10000/- in the form of DD shall be paid along-with submission of tender.

The last date of submission of offer is **31.05.2016** by **15:00 hrs.** The offer is to be submitted to this office at 2nd Floor, B-Block, Rail Nilayam, Secunderabad-500071. The offers (Credential Bid) shall be opened at **15:30 hrs** on **31.05.2016** in the presence of those bidders who choose to be present. Pre-bid conference shall be held on **13.05.2016** at **11:00** hrs in this office.

All pages of original tender document duly signed by the tenderer should be submitted along with offer.

For any clarifications you may contact the undersigned.

For & on behalf of RailTel Corporation of India Ltd.

Sd-
(S. Rajasekhar)
Addl.GM/Projects/SR
for RGM/SR

Source files of Drawings

The PDF files of drawings are uploaded in the website.

Bidders can get source files of these drawings by remitting a demand draft for the tender fee of Rs.10000/- or by emailing the scanned copy of the draft to sdusa@railtelindia.com. The CD containing the drawings may be collected at RailTel Secunderabad office or they will be sent by e-mail.

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SECTION I

SECTION- I

CHAPTER- I

PREAMBLE

PREAMBLE

1. NAME OF WORK:

System Design, Supply, Installation, Commissioning & Maintenance of Tier III Datacenter at 3rd Floor, Rail Nilayam, Secunderabad.

2. SCOPE OF WORK:

2.1 With respect to the RailTel's network configuration, the bidder shall carry out the following work:

2.1.1 Design of the RailTel's Data Centre at Secunderabad and the work involves -**Supply, Installation, Commissioning & Maintenance of Tier-III Datacenter(Phase-II)**

The work involves augmentation of Data centre by addition 60 rack capacity (Phase-II). The existing 40 racks capacity (phase-I) is in production. Phase-II work should be executed without interruption to the phase-I working environment.

The scope of the project is given below:

2.1.2 Turnkey design and implementation of the Datacenter at 3rd Floor, RailTel Corporation of India Limited, Rail Nilayam, Secunderabad with the following subsystems:

2.1.2.1 UPS and Power Distribution System comprising supply, installation, testing and commissioning of UPS system, power distribution units, mobile sockets to racks and earthing as per specifications outlined in Chapter III.

2.1.2.2 Precision Cooling System comprising supply, installation, testing and commissioning of Precision Air-conditioning System for the server farm,

2.1.2.3 Integrating of proposed major Equipments with existing Intelligent Building Management System

2.1.2.4 Passive networking solution: Design, supply, installation, testing and commissioning of fiber and copper based cabling system for the Datacenter

2.1.2.5 Racks: Supply, installation and commissioning of network and server racks.

2.1.2.6 Supply, Installation and commissioning of DG set, synchronization with existing DG system.

2.1.2.7 Tier III - site certification of the Datacenter from Uptime Institute.

2.1.3 Operation and Maintenance of the Datacenter for a period of one year from the date of completion of the project and acceptance by RailTel.

2.1.4 The project is a turnkey project and hence any additional supply/works, which are not explicitly mentioned in this RFP but required to complete the installation as per schedule of requirements, are in the scope of the bidder.

3. PRE-BID CONFERENCE AND CLARIFICATION REQUESTS

3.1 Pre-bid conference for this tender will be held on 13.05.2016 at 11:00 Hrs. at RailTel Corporation of India Ltd., 2nd Floor B Block, Rail Nilayam, Secunderabad – 500071, Telangana.

3.2 The queries/ request for clarifications may be sent to the RailTel's office latest by 11.05.2016

3.3 The bidder is advised to restrict the number of persons attending the pre bid meeting to maximum 3.

3.4 The bidder shall communicate the name and contact details of the persons who will be attending the pre bid conference on or before 09.05.2016.

4. TENDER BID

The tender bid shall be submitted in **two separate sealed covers** as under:-

Part-I- Technical and commercial elements of the tender bid hereinafter called **'Credential Bid'**. The soft copy of this part of tender bid shall also be submitted in CD in non-modifiable form (.PDF etc.). It must be ensured that the Price Bid is not included in CD.

Part-II- Price element of the tender bid hereinafter called **'Price Bid'**.

The details to be included in Credential Bid and Price Bid is given in Para 6.7 of Section II, Chapter I: Instructions to Tenderers and Conditions of Tendering of the tender documents.

5. QUALIFYING CRITERIA

5.1 General:

5.1.1 Qualifying criteria under this clause lays down minimum acceptable qualifications in various areas to ensure that qualified tenderer has necessary experience, technical expertise, equipments and financial and human resources to successfully complete the project.

5.1.2 If the tenderer proposes to buy any associated equipment/components from other suppliers/ sources, documents indicating the willingness to supply the equipment and provide technical support to the tenderer that may be required during installation, commissioning and warranty period and later on directly to RailTel, shall be included in the tender.

5.1.3 The tenderer should submit the details of experience of Datacenter design and implementation works or services in the projects executed, which should clearly bring out expertise in the equipment manufacture and installation etc. as per Form No. 13.

For supply of associated critical materials, the contractor, if he is not a manufacturer, shall submit a certificate from the manufacturer, whose material he intends to supply, to the effect that the manufacturer is willing and capable to supply the material in time so as to enable the contractor to complete the work within the time frame mentioned in the contract.

5.1.4 The tenderer must submit along with his / their tender, certificates from the original user for whom the project was undertaken certifying the date of award of contract, date of completion, date of commissioning and the present working state of the system so established. The tenderer shall submit these certificates for all the projects that he has executed which only satisfy the minimum requirements in each case. The certificates are to be submitted in original or their true copies duly signed by the tenderer, as per Form No. 2 of section –II chapter-III.

5.1.5 The bidder should be an Indian registered company having significant support presence in Hyderabad for providing datacenter design, implementation and maintenance services.

5.1.6 The bidder should be in the business of design, implementation, operation and maintenance of data centers in the last 3 years. Evidence with customer purchase orders, work completion certificates and customer references has to be provided.

5.1.7 The Bidders or their promoters having equity stake or operating partnership in companies, which are in the business of Telecom/ISP/MPLS/NLD/Data Center, services are not eligible.

5.2 Technical

5.2.1 The bidder shall be an OEM of major Datacenter components such as UPS, Precision AC and DG Sets or authorized system integrator of the

OEM. In case the bidder is not an OEM of the products being offered, bidder has to submit an authorization letter from the respective OEMs.

5.2.2 The OEM shall also certify that the products offered are not end of life or end of service and they would provide support for these products for a period of at least 10 years.

5.2.3 The bidder should have designed and executed a similar project (as defined in para 18 of Section I, Chapter I Preamble) on a turnkey basis in his name. Evidence with customer purchase orders, work completion certificates and customer references has to be provided.

5.2.4 RailTel reserves the right:-

a) To verify, if so desired, the correctness of documentary evidence furnished by the tenderer.

b) To verify the successful operation and performance of qualifying projects and tenderer shall arrange permission for the same.

c) To carry out capability assessment of the bidder(s) including referral to in-house information.

d) RailTel shall not be responsible for any delay in the receipt of tenders and reserves the right to accept/reject any or all tenders without assigning any reason.

The tenderer should indicate year-wise position of installation and commissioning of Datacenter.

5.2.5 WORK LOAD

The tenderer to submit the present work load of the Datacenter Contracts in hand as per the format (Form No.9). The performance of the tenderer with regard to satisfactory execution of more than one contract simultaneously in the past shall be taken into account.

5.3 Financial:

5.3.1 a) (i) The tenderer should have completed at least one similar single work for a minimum value of Rs. 2.50 Crores , in the last three financial years (i.e. current year and three previous financial years) . The definition of similar work is given in para 18 of preamble.

(ii)The average annual turnover during the last three years by tenderer shall be a minimum of Rs. 22 Crores.

b)The bidder should produce Audited Balance Sheet and P & L statement of all the preceding three financial years.

c) On award of LOA, the successful bidder is to provide the bank particulars i.e account no. and IFSC code to the purchaser for effecting smooth RTGS payment'

5.3.2 The tenderer shall furnish such documents as to establish the financial soundness of his company. The latest balance sheet audited or certified by a neutral agency shall be furnished.

5.4 Equipment / Material:

5.4.1 The tenderer shall clearly identify the sources from which the equipment / material to be supplied under this tender will be obtained. The tenderer should also enclose an undertaking from the sources, from where he is procuring the material, to the effect that the material shall be supplied in time so as to enable the tenderer to complete the work within the completion period.

5.4.2 All equipment/materials proposed to be used shall be of proven design and performance.

5.4.3 The equipment/materials shall be covered by the performance guarantee of the original manufacturer.

5.4.4 The tenderer shall submit a declaration from the original equipment manufacturers regarding the service support available within the country.

5.4.5 The purchaser or his representative may undertake type tests to determine the compliance to the specification and accord type approval before the equipment are manufactured, inspected and supplied.

5.5 Engineering Organization

The tenderers shall depute the required technical and project management personnel for design and implementation of the Datacenter as per the specifications. The project organization chart shall be enclosed as part of the tender.

The bidder shall depute certified datacenter engineers with at least 3 year datacenter experience. The list and CV of proposed technical personnel shall be included in the tender.

The qualification and experience of these proposed personnel should be enclosed along with the bid.

5.6 Constructions and Maintenance Machinery

The tenderer should furnish the details of the machinery and plants, test and measuring instruments to be deployed by him for installation & commissioning testing of work

5.7 It will be incumbent on the part of tenderer to list specifically the details in respect of each of the sub clauses of Clause 5 of preamble of the tender document as to how the tenderer fulfils the criteria. The details may be submitted in table as below:

S.No.	Paragraph/ Clause no. of eligibility criteria	Description of eligibility criteria	Remarks to whether complied or not	Folio no. of User Certificate as per Form 2 relevant in the offer against this compliance of the particular preamble.
1.	5.1 of Preamble (enclose for each sub clause separately)			
2.	5.2 of preamble (Enclose for each sub clause separately)			

6. LAST DATE OF SUBMISSION AND DATE OF OPENING OF TENDER

The tender shall be received up to 15:00 hrs. on 31.05.2016 at RailTel Corporation of India Limited, 2nd Floor B Block, Rail Nilayam, Secunderabad – 500071. The tender (credential bid) will be opened at 15:30 hrs. on 31.05.2016 at the same address.

7. COMPLETION PERIOD OF WORK:

The works is to be completed within 120 days from the date of issue of "Letter Of Acceptance" of the tender with due cognizance to intermediate stages of completion of work.

8. VALIDITY OF OFFER:

The tenderer shall keep the offer open for 180 days from the date of opening of tender. Within that period the tenderer can not withdraw his offer subject to the period being extended further, if required, by mutual agreement from time to time. Any contravention of the above condition will lead to forfeiture of his Earnest Money.

9. THE LIST OF ADDRESS TO WHICH CORRESPONDENCE AND DOCUMENTS RELATING TO THE CONTRACT SHOULD BE SENT:

In the initial phase of the project, communication has to be done with:

Additional. General Manager/Projects
RailTel Corporation Of India Ltd., 2nd Floor B Block, Rail Nilayam, Secunderabad – 500071
Phone : +91 40 27821134
Email : srajasekhar@railtelindia.com.

For site related queries and arranging site visits, the bidders shall contact.

Senior Manager/DC
RailTel Corporation Of India Ltd., 2nd Floor B Block, Rail Nilayam, Secunderabad – 500071
Phone : +91 40 27821134
Email : sdusa@railtelindia.com.

10. EARNEST MONEY

Tenderer shall deposit a sum Rs. 5,20,000/- (Rupees Five Lakhs Twenty Thousand only) as Earnest Money in a manner prescribed in Para 5 of section –II chapter –I (Instructions to Tenderers and Conditions of Tendering) of tender document.

11. SECURITY DEPOSIT

On receipt of Letter of Acceptance of Tender from the RailTel, the tenderer shall, within a period of 15 days, deposit Security Deposit in favour of M/s.

RailTel Corporation of India Limited, Secunderabad an amount in terms of Para-3 of section-II chapter-II (Special Conditions of Contract) for due fulfillment of contract.

12. **SPECIFICATIONS**

Reference of specifications of the important equipments and materials required for execution of the contract is given in the section-I chapter-II (system requirement and SOR) and Section-I chapter-III (Technical specifications) of tender document. The work shall be executed in compliance with all the technical requirements given therein.

13. **SCHEDULE OF REQUIREMENT**

The various items to be supplied and services to be provided by the tenderer are indicated in section-I chapter –II (system requirement & SOR) of tender document. The tenderer is advised to quote for all the items. The make and model of all the equipments proposed to be supplied must be indicated by the tenderer/s.

14. **WORK TO BE DONE BY RAILTEL.**

Following shall be arranged by RailTel: -

i) Open space will be provided by RailTel. The bidder shall arrange the required shelter/safety measures at their own cost for safely storing equipments.
ii) Amenities such as temporary power and water shall be arranged by RailTel on chargeable basis as per the prevailing norms.

The bidder to clearly mention any specific requirements to be done by RailTel for successful execution of the project. RailTel reserves to right accept/reject any such requests.

15. MATERIALS TO BE SUPPLIED BY RAILTEL

Tenderer's special attention is invited to the fact that no material is required to be arranged / supplied by RailTel for commissioning of the Datacenter.

16. MATERIALS TO BE SUPPLIED BY CONTRACTOR

All materials including the materials not covered under the Schedule of Requirement and those required to achieve the end objective including cable trays, connectors, termination accessories, patch cables, connectors/ adaptors Ladders/ Runway, using and any special protection materials etc. as required are to be supplied by the contractor.

17. The tenderer shall submit their bid by giving all the information in the relevant forms attached as Annexure to this document and suitably numbering each page of the bid documents with a content list indicating availability of various

documents with their serial numbers. In the absence of numbering of pages and the content list, there is a likelihood of any important document going unnoticed for which the tenderer shall be solely responsible.

18. SIMILAR WORK-

Similar work for shall be as under –

Turnkey implementation of datacenter consisting of supply, installation and commissioning of HT and LT power distribution, DG Sets, UPS and Batteries, Precision cooling systems, safety & security systems, building management system, datacenter infrastructure management systems, networking and Uptime site certification

The above datacenter should have at least N+1 power redundancy and N+1 cooling redundancy with concurrent maintainability. The bidder shall provide design documents for the required evidence. If required, RailTel may visit the implemented site to ascertain the bidder's claim. The bidder shall make arrangements for the site visits.

The work should have been carried out in India.

The bidder should have executed all the above in a single order.

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SECTION-I

CHAPTER-II

SYSTEM REQUIREMENT & SOR

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1. Introduction

RailTel Corporation of India (RailTel) is proposing to construct a The Phase 2 of Datacenter at Secunderabad for providing hosting services, cloud computing and other value added services to their customers. The Datacenter will have a raised floor area of approximately 250 Square Meter and other areas such as NOC, Staging area, Telecom rooms, UPS rooms, Support areas, etc.

The main objective is to host clients' infrastructure as well as to enable RailTel to offer hosting, storage and management services.

RailTel proposes to implement the datacenter with high availability and energy efficiency complying with at least Tier III specifications and Green Datacenter best practices.

RailTel invites proposals from prospective bidders for the turnkey implementation of the the Phase 2 of Datacenter as per the scope and specifications outlined in this RFP document.

2. Scope of Work

The scope of the project is given below:

- Turnkey implementation of the Phase 2 of Datacenter at 3rd Floor, RailTel Corporation of India Limited, Rail Nilayam, Hyderabad with the following subsystems:
    - Diesel Generators with Exhaust, BBT connection and synchronizing with existing DG Sync panels and fuel tanks.
    - UPS and Power Distribution System comprising supply, installation, testing and commissioning of UPS system,
    - Precision Cooling System comprising supply, installation, testing and commissioning of Precision Air-conditioning System for the server farm.
    - Intelligent Building Management System : Integrate all the proposed equipments with the existing IBMS.
    - Passive networking solution: Design, supply, installation, testing and commissioning of fiber and copper based cabling system for the Datacenter
- Warranty and Maintenance Support for a period of ONE year from the date of completion of the project and acceptance by RailTel.
- Long term Operation and Maintenance of the Datacenter for a period of 5 years from the date of completion of the project and acceptance by RailTel (Optional). Duration of long term operation and maintenance may be reduced to be in phase with the existing O&M duration.
- The project is a turnkey project and hence any additional supply/works, which are not explicitly mentioned in this RFP but required to complete the installation, are in the scope of the bidder and has to attain ultimate capacity specified and obtain UPTIME Tier-III facility certification.

3. Datacenter Design Requirements

3.1 Location and Environment

The location of the proposed Datacenter is 3rd Floor B Block, Rail Nilayam, Secunderabad 500071, Andhra Pradesh.

The Datacenter subsystems shall be designed for the following ambient conditions:

Temperature: 45 Degree C

Relative Humidity: 0 to 95%

Seismic: Zone I

3.2 Functional Areas

3.2.1 Datacenter

RailTel is proposing to extend the existing constructed Datacenter meeting Tier III guidelines in a space of 250 Sq Mtr.

The proposed layout for Phase 2 scope is given in the Drawing “Datacenter Layout”.

3.2.2 DG yard

The HT/Transformer yard is located in the open area within the Rail Nilayam premises. This site is approximately 200 metre from the DC site. Bidder has to install 2 DG Sets in the provided space in HT / Transformer Yard, the bidder is required to visit the site and carry out a site survey prior to submission of the bids.

The HT/Transformer yard shall have the following functional areas:

- Install 2 more DG sets in the existing Yard
- Bidder needs to verify & confirm the synchronization of the Proposed DGs with the existing sync panel.
- Cover over the proposed DG sets similar to the existing cover.

3.3 Server Farm

It is proposed to house about 60 racks in the server farm area. The racks are organized as 6 rows of 10 racks each. The server farm area is divided into 3 zones depending on the power load density:

- Zone 1: Average 5kw per rack
- Zone 2: Average of 7.5kW per rack
- Zone 3: Average of 10kW per rack

3.4 Power Supply Distribution

- As per the power load density specified in section 3.2, the total IT load is calculated as below:

Sl.No.	Load	Number of Racks	Power/ Rack (KW)	Total (KW)
1	Server farm Zone 1	40	5	200
2	Server Farm Zone 2	10	7.5	75
3	Server Farm Zone 3	10	10	100
	TOTAL			375

So the maximum IT load of the Datacenter – Phase – II will be 375kW.

- The UPS system to be provided in such way that, it should be synchronized with the existing UPS which is 400KVA and both have to be in load sharing mode
- The Diesel Generating (DG) sets should be designed to meet N+N configuration.
- Power distribution for racks and PAC units shall be implemented for 60 racks in phase-II
- Phase-I load is 227 KW and Phase-II is 375 KW so total IT Load will be 612 KW, for 612 KW Tier III Uptime facility Certification is required.

3.5 Cooling

- Precision cooling system for Server farm.
- At least N+1 Redundancy required for all the cooling systems.
- Outside Ambient Temperature to be considered for the design is 45 degree Celsius.
- The Precision cooling system shall be designed for Cold Aisle temperature of at least 22 +/- 1 Degree.
- Humidity shall be maintained at 50% +/- 5% RH for server farms, network and telecom rooms.
- Cold Aisle Containment shall be provided for the server farm area with smart sensor logic in which PAC unit fan shall modulate based on load in Cold Aisle through Pressure/Temperature sensor. Minimum 3 No. Pressure/Temperature sensor to be provided per Aisle.
- The cooling system shall be compliant to TIER III specifications of Uptime Institute/TIA942
- The cooling system shall be designed as per ASHRAE standards and recommendations.

- Redundancy and concurrent maintainability shall be ensured for all the existing critical capacity components (UPS, DG, AC Units, etc).

3.6 Safety and Security Systems

Sl.No.	Parameter	Design Criteria/Details
1	IBMS	TIA 942 & Best practices of Data Centre
2	Standards	NFPA, TIA942, Local standards/regulatory codes.

3.7 Passive Networking

Sl. No.	Parameter	Design Criteria/Details
1	Passive Network	• Passive network to be deployed for total area in phase-II • Hybrid (Fiber and Copper) cabling to racks to be done in phase-II without disturbances to the existing set-up. • Suitable for flexible network architecture deployment such as Top of Rack and End of Row.
2	Tier	TIER III
3	Standards	EIA 568, EIA606 and other relevant standards.

3.8 Design Guidelines

The following are the design considerations of the Datacenter:

- **High Availability (Tier III or better):** All subsystems of the datacenter shall be designed and implemented as per the Tier III guidelines specified by the Uptime Institute's topology and TIA942 standards. The bidder shall obtain Tier III design certification from Uptime Institute.
- **Energy Efficiency:** The Datacenter shall be designed with an energy efficient design. The target average annualized Category 1 PUE shall be better than 1.5.
- **Modular Design:** The Datacenter design shall be modular so that the capacities can be added on demand.

3.9 Tier III Certification

The successful contractor shall obtain Tier III site certification from Uptime Institute for 612KW Load. The bidder is solely responsible for the design. The design provided by RailTel as part of this RFP is the minimum requirements. The bidder may make suitable modifications, if required, to meet the Tier III guidelines and submit the design along with the bid.

4. Schedule of Requirements

Sl. No	Item / Work Description	Unit	Qty.	Rate in figure (Rs)	Amount in figure (Rs)	Rate in words (Rs)	Total in word (Rs.)
1	2	3	4	5	6	7	8
1	**Any Civil and Interiors work required to complete the project including demolition etc.**	LS	1				
2	**PRECISION COOLING SYSTEM**						
2.1	Supply, installation and commissioning of Floor Mounted, Bottom discharge, Air Cooled DX type CRAC units for high density application, equipped with most advanced industry technology to operate at higher return air temperatures , guaranteeing precise control of 22+/-1 Deg C, non-condensing air in Cold Aisle of Data Centre and server room as per the specifications and BOM. The Cooling system is for 6 Rows of 10 racks each with load density of 5KW/7.5KW/10KW. The system shall have at least N+1 redundancy as per Tier-III design.	No.	7				
2.2	Precision Cooling Unit low Side as per specification	Lot					
2.3	Cold Aisle Containment as per the specification	Lot	3				
3	**UPS & BATTERY SYSTEM**						
3.1	Supply, Installation, testing & Commissioning of UPS & Battery System- UPS - 400kVA/Kw (KVA=KW), 3Ph 415V, 50Hz with SNMP + MODBUS card. Battery of 12 V, SMF Battery with 15min backup at full load with Battery Rack and cable as per specification	Set	2				
4	**ELECTRICAL LOW SIDE WORK as per specification**						
4.1	Cabling & terminations as per specification	Job	1				
4.2	Mobile sockets and straight plugs as per specifications	Lot	1				

1	2	3	4	5	6	7	8
4.3	Cable tray as per specifications	Lot	1				
4.4	Manual Change over Switch for PAC Units - MCOS - of required capacity and required quantity	lot	1				
5	**RACK POWER DISTRIBUTION UNITS - PDU**						
5.1	Supply, Installation, testing & Commissioning of 225kVA Power Distribution Units as per specification, it included Cabinet with LCD Display, K 13 Isolation Transformer(Cu), TVSS, BCMS & OC WEB card.	Job	1				
6	**RACKS**						
6.1	Supply, installation and commissioning of Server Racks (42U height x 600 widthx1000mm depth) and required accessories as per specifications	No.	54				
6.2	Supply, installation and commissioning of Network Racks (42U height x 800widthx1000mm depth) and required accessories as per specifications	No.	9				
7	**DG SET SYSTEM**						
7.1	Supply, installation, commissioning of 1250 KVA OPEN DG Set comprising engine developing required BHP Coupled to 1250 KVA, 415 V alternator mounted on a common base frame as per specification	Set	2				
7.2	Exhaust system as per specification	Job	1				
7.3	Control Cable as per specification	Job	1				
7.4	Fuel pipe between Day tank-existing UG fuel and day tank-DG set as per specification	Job	1				
7.5	Earthing as per specification	Lot	1				
7.6	DG MISC. DG foundation, exhaust stack foundation, cover over DG sets, various approvals, etc. as per the list, and specification	Job	1				
7.7	Bus duct between DG & existing SYNC panel as per specification	Job	1				

1	2	3	4	5	6	7	8
8	**PASSIVE NETWORK CABLING**						
8.1	Supply and installation of OM4 Fiber cabling system, MPO or equivalent termination with LC type connectors, 24 core fiber cabling from each central network cabling rack to row network rack, LIUs, Pigtails and other accessories as per specifications	Row	6				
8.2	Supply and installation of Single Fiber cabling system, MPO or equivalent termination with LC type connectors, 24 core fiber cabling from each central network cabling rack to row network rack as per specifications	Row	6				
8.3	Supply and installation of UTP cabling system with 24 runs of Cat6A cabling from each central network rack to each of row network racks, Patch panels, cable managers, patch cables and other accessories as per specifications. If the existing UTP cabling ducts are not adequate, then a new cabling duct has to be supplied and installed for each row of server racks from the designated network rack to server racks	Row	6				
8.4	Supply and installation of OM4 Fiber cabling system, MPO or equivalent termination with LC type connectors, 2x12 core fiber cabling from each server rack to row network rack, LIUs, Pigtails and other accessories as per specifications	Racks	54				
8.5	Supply and installation of UTP cabling system with 12 runs of Cat6A cabling from each server to row network racks, Patch panels, cable managers, patch cables and other accessories as per specifications	Racks	54				
9	**BUILDING MANAGEMENT SYSTEM**						
9.1	Integration of Phase 2 system with existing BMS of phase-I	Lot	1				

1	2	3	4	5	6	7	8
10	**MISC. ITEMS LIKE SUPPORTS & ACC.**						
10.1	Design, Engineering, Installation, configuration, commissioning, documentation and training of Electrical System as per above requirements.	Lot	1				
11	**PROJECT MANAGEMENT COST**						
11.1	Integrated System Acceptance Test to be carried for continues 72 Hours after system commissioning with load Bank / heater Banks as per required IT load for achieving and assuring satisfactory working of system.	Job	1				
12	**Tier III Uptime Institutes Facility certification includes providing load bank/heater bank required for demonstration with all expenses etc.**	Job	1				
	Total (Rs.)						

Important Note:

1. The bidder shall enclose detailed BOQ for each system with rates in the price bid for each component/subsystem as per their design (in line with the design requirements). **The detailed BOQ without prices shall be included in the technical bid.**
2. The rates quoted above shall be all inclusive prices.
3. The rates quoted shall include the cost of operation maintenance support during the warranty period (12 months) as specified in the special conditions of the contract.
4. The bidder should indicate the taxes, duties and other levies for each item separately.
5. **The Long Term Maintenance support charges will not be used for determining the L1 bidder.**

Seal and Signature of Tenderer

SECTION-I

CHAPTER-III

Technical Specifications

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1. Civil Works - Misc

- Chipping, Removal and disposal in all areas wherever applicable within the Datacenter.
- Provision of Pedestrians for ODU's
- Providing Pest Control for the complete III floor
- Any other civil works required to complete the works in the datacenter shall be in the scope of the bidder.

2. DG Sets

General

1250 KVA DG SET	
Genset prime power (PRP)	: 1250KVA
Cylinder arrangement	: As per OEM
Alternator	: Stamford/LS
Rating	: 1250KVA
Rated Power Factor	: 0.8 lag
Rated Voltage	: 415V
Quantity	: 2 Nos.

Reference and Standard

Diesel Engine Power	: ISO 3046-1
Speed Governor	: ISO 3046-4
Generator	: IS 4722 / IS 13364
Permissible limits of Noise level of Rotating Machines	: IS 12065
Diesel Fuel	: IS 1460
Hot dip-Galvanizing steel	: IS 2629
Codes of fire safety	: IS 3034
Battery & Charging	: IS 7372
Degree of Protection of generator	: IP 23 as per IS 4691
Degree of Protection of Control panel	: IP 41 as per IS 2147
Control Panel	: IS 8623 Part I

DG Set of Continuous Rating 1250KVA, 415V, 50Hz

1000kW/1250 KVA Diesel Generating set comprising of diesel Engine with radiator cooling and with all standard features coupled to 1250KVA Alternator with Class H insulation and VPI epoxy impregnated winding, coupled together and mounted on a rigid base frame and comprising of following accessories like separate fuel tank of 990 liters, Batteries 2 Nos. 12 Volts / 180Ah, Battery leads, Electronic modular control panel with AMF Control Panel & Acoustic Enclosure suitable for outdoor applications.

DG Set Area shall be covered with GI sheet shed with proper MS structure.

DG Set Foundations:

Required foundations for DG Sets need to be considered as per the OEM recommendations

DIESEL ENGINE

1250 KVA Engine	
Engine Make	:Perkins/Cummins/Doosan/or equivalent
Cylinders	: As per OEM
Bore x Stroke	: As per OEM
Displacement	: As per OEM
Compression Ratio	: As per OEM
Governor	: Electronic
Piston Speed	: 9.5 m/sec
Recommended fuel	: HSD as per IS 1460
Fuel Consumption*	: As per OEM
100% load	: As per OEM
75% load	: As per OEM
50% load	: As per OEM

* Fuel Consumption values are subjected to +5% tolerances.

The Engine shall be complete with the following accessories:

Air Inlet System

- After cooler
- Air cleaner - Dry paper element with Service Indicators
- Turbo chargers

Cooling System

- Recommended Coolant: 50 % inhibited ethylene glycol or 50 % inhibited propylene glycol and 50% clean water. For combined heat and power system and where there is no likelihood of ambient below 10oC, Then Clean soft water may be used, treated with 1 % volume of inhibitor in the cooling system. The Inhibitor is available in 1 litre bottles. System designed for high ambient temperatures.

The standard scope of supply also includes

- Two twin thermostat
- Powder coated radiator comprising of fuel oil cooler, all pipes, hoses, and clips Fan, pulley, fan belts and safety guards.

Exhaust System

- Exhaust manifolds, dry with residential silencer
- Turbocharger, dry with 8 Inch outlet elbow
- Exhaust flexible fitting
- Exhaust flange - 2 Nos. 8 Inch
- Exhaust system piping shall be supported with suitable steel structure and shall be provided as per the CPCB/other regulatory norms.

Fuel System

- Electronic Unit Injectors (EUI)
- Fuel filter, spin-on type
- Fuel transfer pump
- Primary fuel filter
- Fuel priming pump
- Flexible fuel lines
- Water separator

Lubrication System

- Wet Sump with filter and dip stick
- Full flow spin on oil filter
- Engine jacket water /lube oil temperature stabilizer

Flywheel& Flywheel Housing

- Flywheel, SAE - 1
- Flywheel Housing, SAE - 1
- SAE standard rotation

Charging System

- Charging alternator, 24 V, 35 Amps
- Ammeter, 24 V

Control System

- Governor, ELECTRONIC (ECM)

Instrumentation

The set will be supplied with Electronic Modular Control Panel with the following features.

- Auto start/stop with safety shut down

LCD Readouts for

- Engine Oil Pressure
- Coolant Temperature
- Engine RPM
- System DC Volts
- Engine Running Hours
- Generator AC Volts, Amps and Frequency

LCD Indicators for

- Low Oil Pressure
- High Coolant
- Low Coolant Level
- Over speed, over crank, Emergency Stop
- Spare Fault Shutdown and Alarm
- Generator AC Volts
- Amps and Frequency
- Adjustable Cycle Cranking
- Adjustable Cool down timer
- Programmable for Energize to Shut Off or Energize to run
- Generator Voltage Adjust Potentiometer
- Indicator / Display Test Switch
- NEMA 1/IP 22 enclosure
- Emergency Stop Push – Button

Base Frame and Coupling

Diesel engine and alternator are coupled together with closed coupling and placed on robust, sturdy iron base frame specially designed to absorb vibrations for the smooth operation of the D.G. set. Spring mounted Anti-vibration mounting shall be supplied.

Alternator

1250 Kva STAMFORD/Leroy Somer	
Continuous Output	: 1250 kVA
No: of Phase	: 3
Power factor	: 0.8 lag
Reference Altitude	: 1000 meters above MSL
Ambient Temp	: 43°c
No: of poles	: 4 pole
Insulation Class	: H
Excitation type	: Brushless
Voltage Regulator	: AVR
Voltage Regulation	: +/- 5%

Fuel Tank

990 litres capacity fuel tank made up of quality M.S. sheet tested for leak and pressure and supplied with filling point, breather, and level indicator with graduation, outlet valve, drain plug, lifting hooks and provision for return fuel.

Battery and Battery charger

Minimum of 2 Nos. 12 V. Maintenance free batteries along with inter connection cables and Battery chargers will be supplied or as per the OEM specification. Suitable M. S. battery stand with proper earthing will be provided.

The power supply shall be provided to battery charging from redundant circuits and shall be concurrently maintainable.

Acoustic Enclosure

Acoustic enclosure is state-of-art construction and specially designed to meet the stringent norms laid by MOEF / CPCB, meeting the noise barrier of 75 dB @ 1 mtr. Distance from the enclosure at free field conditions. The Enclosure is fabricated to have optimum serviceability. The air inlet louvers are specially designed such that the system operates at rated load even at 50 deg C ambient temp. These sound attenuators are fabricated using special purpose CNC machines for consistency in quality and workmanship. All the five sides are powder coated for superior finish and long lasting life. Use of stainless steel hardware in addition to IS 8183 spec. material we

achieve better noise insulation resulting in the best sound attenuation. The Enclosures are containerized type housing the Engine, Alternator, Fuel Tank, and Batteries.

Standard AMF Panel (existing panel specification is given below, DG sets to be supplied in the current tender has to be integrated and should be in Sync with the existing DG sets)

Cubicle type, base / floor mounting control panel with hinged doors undrilled bottom gland plate accommodating the following:

SWITCH GEARS

2500A, 3 Pole ACB EDO Type for ALTERNATOR MICROPROCESSOR BASED AMF MODULE

INCORPORATING

Functions

- Supply Failure Timer
- Restoration Timer
- 3 Impulse automatic engine Start / Stop logic
- Mains / Generator Voltage & Frequency Sensing

ADDITIONAL FEATURES

Metering

- Combined Meter for Voltage / Ampere / Frequency
- Combined Meter for KW / Power Factor / KVA
- Electronic kWh Meter (Counter Display)
- Current Transformers

Relay

- Electronic Earth Fault Relay

Indications (LED)

- DG ON , Load on DG
- Mains ON, Load on Mains, Battery Charger ON
- Push Buttons (AMF MODULE BY PASS MODE):
- Engine START / STOP
- Generator Breaker CLOSE / TRIP
- Fault ACCEPT / RESET

TECHNICAL PARTICULARS OF DG SET		
Description	**Units**	**Rating**
Type		Turbocharged, Air-to-Water cooling
Displacement	Vee	As per OEM
Cylinder arrangement	Litres	As per OEM
Bore and stroke	MM	As per OEM
Compression ratio	Ratio	16.5 : 1
Rated speed	RPM	1500
Altitude capability above MSL	Mtrs	1500
Lube oil & filter change period	Hours	500
Minimum continuous load	%	20
Piston speed	Mtrs/sec	10.5
Engine kW at rated RPM	Kw (HP)	As per OEM
Fuel stop power as per ISO-3046	Kw (HP)	As per OEM
Frequency regulation, steady state	%	+/- 0.25
BMEP	kPa	1990
Governor type	-	Electronic, Isochronous (Droop adjustable to 4%)
Governor class	-	ISO 8528-5, better than Class G3
Engine over speed shutdown	RPM	1800
Exhaust System		
Exhaust gas flow Exhaust gas temperature Exhaust back pressure - Design value/Maximum	m3/min Deg C mbar	240 430 30/85
Fuel System		
Fuel filter filtration capacity - Secondary Fuel filter pressure differential - Max Fuel pressure at return - Max Maximum suction head at pump inlet Fuel supply flow - Max	LPM Bar Bar Mtrs Microns	

Fuel temperature at fuel inlet - Max Type of injection	Degre C	
Lube Oil System		
Lube oil filter filtration capacity Recommended lube oil grade Normal lube oil temperature Lube oil differential pressure Total system capacity Normal lube oil pressure	Microns Deg C Bar Litres Bar	12 API-CI4 88-98 1.5 260 5.5
Heat Balance @ 100% Load		
Energy to radiation Energy to coolant Energy to charge air cooler	kW kW kW	75 540 200
Combustion/Air Intake		
Combustion air flow Charge air pressure Air filter	m3/min Bar Type	96 2.6 Dry paper type - 2 Nos.
Coolant System		
Recommended coolant Total system capacity Cooling sytem operating pressure Coolant temperature Coolant flow Coolant pump inlet pressure - Min/Max Radiator fan power Radiator fan air flow (with 200 pa duct allowance) Cooling system ambient capability	 Litres Bar Deg C m3/Hr Bar HP CFM Deg C	Engine extended life coolant 400 2.5 100/55 56/30 0.4/1.52 55 74800 50
Engine Electrical System		
Type Charging alternator volys/current Starter power	 VDC / Amps kW	 24V negative earth 28 / 70 2X9

Pollution Control Board Certificate should be provided for the installed DG Sets.

3. DG Fuel Storage and Distribution System

- Two Underground Fuel tanks are existing onsite with a storage capacity of 20 KL to run existing DGs for 72 hours on Full Load capacity with a Fuel line to Day tanks and sump tanks have proper valves at proper locations.
- The new Fuel line to the proposed DG set's day tank should be of C Class MS pipes to have Flame proof pumps with starters run by a logic control panel for auto operation of fuel level refilling has to be provided
- Existing Underground tanks to Day Tank fuel line should have proper valves at proper location and should be as per Tier-III UPTIME designs of concurrent maintainability.
- A semi rotary hand pump to be provided.
- The fuel distribution system shall be designed with redundant pumps, pipings and valve arrangements to ensure redundancy and concurrent maintainability meeting Tier III guidelines.
- The bidder shall share the design drawing for the fuel distribution system along with bid.

4. Power House Civil Works

- The powerhouse and DG yard is located at a distance of 200 meters from the Datacenter Area
- The bidder has to install 2 DG sets in the existing DG yard, required modifications / Alterations to the existing civil structure will be in bidder scope.
- The bidder shall carry out site survey, assess the requirements and submit the offer accordingly.
- Bidder shall submit the design layout and drawings for entire area.
- Cover /shed over the proposed DG sets similar or better than the existing cover/ shed at power house.

5. Uninterrupted Power Supply (UPS)

Bidder should supply UPS systems capable of delivering 400kVA output power and suitable for synchronising with the existing UPS of 400KVA units for achieving concurrently maintainable configuration of Tier III standards

For Bidder understanding please refer the single line drawing and also should carry the site to understand the existing system

Module AC Input

A Voltage Range: 324V to 478, at rated Load. 228-478 at 50% Load

B Frequency Range: 45~65Hz

C Power Walk-In: 10s to reach full rated current (selectable 5s through 30s in 5-second intervals)

D Power Factor: Input power factor shall be > 0.98 without any optional filter at rated UPS full output load.

E. Current Distortion: Less than <= 3% at full rated UPS output load

UPS Module AC Output:

Three-phase, 4-wire plus ground.

A Load Rating: 100% continuous load rating for any combination of linear and non-linear loads.

B Voltage Stability: +/-1% output voltage stability in steady-state condition for input within permitted limits and loads from 0 to 100%.

C Bypass Line Sync Range: Field selectable □0.5 to 3.0 Hz at .

D Frequency Stability: Frequency regulation shall be ± 0.1% in Battery mode or in asynchronisation condition

E Frequency Slew Rate: the slew rate shall be <1Hz per sec.

F Efficiency: It is defined as output kW / input kW:

- AC to AC efficiency should be Min >94% in double conversion mode across load at 25%. Overall Efficiency not less than 95% at Rated load.
- Not less than 98% at full rated load in digital interactive mode.

G Phase Unbalance: 120º ±1º el. for 100% balanced loads.

H Voltage Transients: Complies with IEC/EN62040-3,Class1,

I Transient Recovery Time: Return to within 5% of steady state output voltage <20msec

J Distortion : (100% rated load with crest factor 3:1)

- Less than 1% total harmonic distortion (THD) for linear loads

- <3% THD for 100% balanced non-linear loads as specified by IEC/EN62040-3

K Module Overload Capability at Rated Output Voltage:

- 105% of UPS rated output continuous.
- >105 to 125% of UPS rated output for ten minutes.
- >125% to 150% of UPS rated output for load up to 30 sec
- >150% of UPS rated output for load up to 10 cycle

Bypass Static Switch

A. Voltage Range:
   Upper limit: +10%, to 20% (Selectable)
   Lower limit: -10% to -40% (Selectable)
B. Frequency Range: 50Hz ±10% (± 0.5 Hz to ± 3Hz Selectable)
C. Overload Capability:
   110% for Continuous
   400% for 100msec
   >400% to 1000% for 1 Cycle
D. Neutral Conductor Sizing: min 1.3 times rated current.

Technical Compliance

Sl No	Description	Specifications
1	UPS Capacity	400kVA/400KW at 40degC
2	Standards	
	Design and test	IEC62040-3
	Safety Requirements	IEC62040-1-1
	EMC	EN62040-2
3	UPS technology	Double conversion on line UPS with DSP Technology
		a) Rectifier/Charger
		b)Battery Management
		c)Inverter
		d)Static Switch
		e)Maintenance bypass
4	Environmental conditions	
	Temperature (design ambient)	0 to 40 Deg C

	Relative humidity	< 95%
	IP Class	IP20
	Acoustic Noise measured at 1 Mt distance	<74db

5	Input	
	Voltage Range	380/400/415 V (Range 320V ac to 460Vac) 3Three Phase 4 wire
	Frequency Range	50Hz (Range 45HZ to 65HZ)
	Power walk-in facility and time	10 s to reach full taed current
	Pre charge hold -off Delay	selectable 5s through 30s in 5-second intervals
	Input total current harmonic distortion THDi at input Voltage THDv<1% @	
	100% Load	<3%
	75% Load	<5%
	50% Load	<5%
	25% Load	<15%
	Input Power Factor	>0.99
	AC to AC efficiency	
	At 100% Load	>94.5%
	At 75% Load	>95%
	At 50% Load	>95%
	At 25% Load	>93%
6	Rectifier/Charger	
	Duration in which totally discharged batteries are to be recharged	8 -10 hours
	Nominal DC bus Voltage	480V DC (480Vdc – 600Vdc) or as per design std of Manufacturer
	I) During Battery float mode	To be specified by bidder
	ii) During Battery Boost mode	To be specified by bidder

	Battery charging with temp. Compensation	Should be available
	Ripple voltage at full load	<2% RMS without Battery and <1% with Battery
	Battery charger features	
	I) Type of charging circuit.	Constant Voltage With Current Limit
	ii) Battery protection circuits for	Over Voltage and Under Voltage
7	Battery Low	1.67 to 1.8 auto adjustable with load %(back-up time).However Battery sizing should based on end cell voltage as 1.7 vDC
8	UPS Output	
	Output power	400KVA/400KW
	Voltage	380/400/415Vac (Three- Phase Four-wire)
	Technology of inversion	IGBT with PWM
	Load power Factor Handling Capability	0.9 Lagging to 0.9 leading without derating
	Output voltage regulation	
	I) steady State	+/-1%
	ii) 0 to 100% step Loads	As per IEC62040-3
	UPS Output frequency:	50HZ
	Synchronization mode range	+/-0.5HZ to +/-3HZ selectable
	free running on battery Mode or Asynchronization	+/- 50HZ +/-0.1%
	Transient voltage regulation for following conditions:	
	I) 25% step load change	As per IEC62040-3
	ii) 50% step load change	
	iii) 100% step load change	
	Iv) Recovery time for 100% step load change	
	Wave form	Pure Sine wave
	Crest Factor	3:1

	output voltage harmonic distortion:	
	I) Total harmonic distortion at 100% non -linear load	<3%
	ii) Total harmonic distortion at 100% linear load.	<1%
	Voltage Phase displacement:	
	I) Balanced load	120deg+/-1% angle
	ii) 100% Unbalanced load	120deg +/-2% angle
	Transfer time	
	I) Synchronous mode	0 Sec
	ii) Asynchronous mode	<20 m sec
	Synchronizing range with bypass I/P	48HZ to 52 HZ
	Overload	125% for 10Min,and 150% for 1 Min
9	Bypass	
	Static Bypass:	In built with UPS
	Maintenance Bypass	In built with UPS
	Static bypass over Load	110% for Continuous 400% for 100msec >400% to 1000% for 1 Cycle
	By pass input Voltage	380/400/415 (Three-phase four-wire)
	By pass voltage range	+/-10%
10	Battery	
	Battery Backup	10 Minutes Battery Backup at 360KW Load consider PF0.9
	Type of batteries	12V SMF Batteries
11	Protections	DC Over Voltage
		DC Under Voltage
		Battery charging Current limit

		AC Under Voltage protection
		AC Over voltage protection
		Output Over load
		output Shot circuit
12	LED MiMIC	Mimic provided on front panel to indicate power flow to the critical Load with an indication of the availably of the Rectifier, battery, automatic, bypass, Inverter and Load
13	Alarms and Status Information	All faults conditions are display in LCD with Alarm (sound)
14	Metering	Input Voltage (Line to Neutral)
		Bypass frequency
		Bypass Voltage(Line to Line and line to Neutral)
		Output Voltage (line To Neutral)
		Output Current per Phase (L1,L2,L3)
		Output Frequency
		Output load current (%) (L1,L2,L3)
		Output Load (%) Average
		Output Real power (KW) (L1,L2,L3)
		Output Apparent power (kVA))(L1,L2,L3)
		Battery Current (charge/discharge)
		Battery Voltage
		Should be available
15	Parallel & LBL option	
16	Communication	SNMP/RS232/RS485
	Communication ports	HTTP/SNMP/Mod-bus
	Protocols	
17	Dimensions of UPS panels	Specify
	Width (in mm)	Specify
	Depth (in mm)	Specify
	Height (in mm)	
18	TVSS (Transient Voltage Surge Suppressor)	(L-L, L-N, L-G, N-G)

	All Modes Protection	200KA
	Surge Current Capacity	200Ka/C
	Fault Current rating	Parallel
	Connection Type	<0.5 Nano Sec
	Response Time	LEDs and Dry Contacts
	Status Indication	< 0.8 kV
	Protection Level	45db Typical
	EMI /RFI Attenuation	UL1449
	Certifications	The Manufacturer should have ISO 9001 and 14001 Certificates
19	Credentials	

6. Server Farm Power Distribution

The server farm power distribution shall consist of cabling of appropriate sizing from the Datacenter LT panel to the Server farm area, Packaged Power Distribution units and Cabling from power distribution unit to the racks.

The Power distribution shall be redundant and concurrently maintainable meeting Uptime Institute Tier III guidelines.

6.1 Power Distribution Units

Packaged Power Distribution Unit shall be of suitable capacity to with conditioning, distribution, monitoring & control in a single unit.

The PDU should integrate the following features:

- Shunt trip main input breaker
- K13 Copper winding Isolation Transformer
- Computer Grade grounding
- EPO Controls
- Flexible output distribution
- Comprehensive Monitoring

The PDU shall provide monitoring of the following parameters:

- Input and Output voltages
- Input and Output Voltages;
- Output, Neutral and Ground Currents;
- Output Voltage THD; Output Current THD;
- KVA; KW; KWH; Percent Load;
- Power Factor and Frequency.

The PDU shall provide monitoring of the above parameters for each output feeder and integrate with existing IBMS/DCIM.

Technical Requirement of PDU

Sl No	Description	Specifications
1	Capacity	225 KVA
2	**Input Supply**	
	Input Mains Voltage	380/400/415V ac
	In put Supply	3 Phase 3 wire plus ground
	In put Voltage Tolerance	415VAC +/-10%
	In put frequency	50HZ +/- 5%
3	**Output Voltage**	
	Output Supply	Three Phase /Single Phase
	Rated Output Voltage	380/400/415 or 220/230/240
	Efficiency	Above 96%
4	**Isolation Transformer**	
	Configuration	Three Phase, Delta/Star
	Insulation	Class- H
	K-Factors	K13 with Copper Winding

	Voltage Adjustment	+/-2.5% by selecting Taps on Primary
	Voltage Regulation	2-4% for 100% Change in current
	Transformer Input/output MCCB	Must be provided
5	**Output Feeders**	
	Out Put feeder MCBs rating	As per SLD
	No of Output feeders	Should meet the No. Of Racks + 10 % spare
6	**Monitoring parameters from LCD**	
	High visibility LCD must be in built at least 4 x 20 –Characters	Must be provided
	Input Volts, L-L, Each Phase	Required
	Output Volts, L-L & L-N, Each Phase	Required
	Output Voltage THD, Each Phase	Required
	Output Current, Each Phase, N & G	Required
	Output Current THD, Each Phase	Required
	Output Current Crest Factor, Each Phase	Required
	Output kVA, kW, PF, & % Load	Required
	Output frequency	Required
	Output K-Factor, Each Phase	Required
7	**Alarm Conditions**	
	Output Over & Under voltage	Required
	Output overload	Required
	Output Over Current	Required
	Neutral Over Current	Required
	Ground Over Current	Required
	Output Voltage Distortion (THD) high	Required
	Frequency Deviation	Required
	Phase Sequence Error & Phase Loss	Required
8	**Communication**	
	Local EPO	Must be provided
	NO & NC remote EPO	Must be provided
	Built-in RS232 service port	Must be provided
	Operational SNMP/NIC	Must be provided
9	**Environmental characteristics**	
	Operating temperature	0-40degC
	Relative Humidity	<90% at31degC
10	**Protection Grade**	IP20
11	**TVSS (Transient Voltage Surge Suppressors)**	
	All Modes Protection	L-L,L-N,L-G
	Surge Current Capacity	50KA
	Fault Current rating	14kA/C
	Connection Type	Parallel
	Response Time	<0.5NanoSec
	Status Indication	LEDs and Dry Contacts
	EMI /RFI Attenuation	40db Typical
12	**Credentials**	The Manufacturer should have ISO 9001 and 14001 Certificates

6.2 Cabling between PDU and Rack

- Supply, installation and commissioning of overhead cabling of suitable rating for UPS power distribution in the server farm..
- Two independent cables are required for redundancy. The redundant cabling shall be distributed in such a manner to ensure concurrent maintainability.
- The Cables shall be terminated in a power distribution unit other side thru Mobile socket of 32A/63A Amps as per Rack density requirements. At least three+three redundant feed of 3 Ph, 5 wire supply is required per row at the center of Rack
- The cables used should be of FRLS type and should be dressed properly in overhead tray of suitable size and loading capacity.

6.3 Power distribution for HVAC systems

- Dedicated and redundant power distribution panels are provided for HVAC Systems (for precision). Bidder has to provide Manual Change over arrangement for each PAC separately next to PAC.
- Each of the Precision AC system should be dual powered from two different distribution panels. In case of dual power supply options not available, a static transfer switch of appropriate rating shall be used.
- The electrical grounding and protection for HVAC equipment shall be done as per applicable Industry standards and best practices.
- The power cables for the cooling units shall be taken under the false floor.

7. Cable Trays and ducting

- All electrical cabling inside the datacenter area shall be done using corrosion resistant metal cable trays of appropriate size and weight carrying capacity.
- The overhead cable trays shall be appropriately fixed to the ceiling using anchor fasteners
- The cable trays sizing shall be done such that there shall be at least 30% spare capacity for future use
- All cable trays shall be earthed as per standards. Earthing continuity shall be provided at cable tray joints.
- The fixing of underground and overhead cable trays shall be as per industry best practices and shall be approved by RailTel.
- The bidder shall submit the proposed design, layout drawings and BOQ of cable ducting.

8. Datacenter Earthing

SCOPE

The scope of work is inclusive of but not limited to the following:

i) Design and engineering of earthing system and supply, delivery, installation, testing and successful commissioning as per the drawings and BOQ.

ii) Beside connections of different risers below and above ground up to equipments and different structures and other important installations are also within the scope of bidder.

iii) Special treatment in Earth pit other than charcoal and salt, if necessary, shall be adopted to ensure good earthing.

iv) Besides electrical installations, Earthing System for RF earthing for UPS and the earthing of servers are also included in this scope. Reference earthing for false flooring pedestals are also included with thin scope of work.

v) Inside the Data Centre, need to connect to the existing earthing system. However, for internal distribution, local earth stations / Earth boxes need to be provided.

STANDARD

Proper grounding of data center equipment, often called network grounding or the data center grounding infrastructure, is defined by TIA/EIA-942 Telecommunications Infrastructure Standard for Data Centers, and goes beyond the requirements of the National Electrical Code (NEC) to protect equipment and improve system reliability. The bidder shall follow both TIA and NEC; however whenever NEC does not cover any aspect or there is difference between the two, TIA/EIA-942 would prevail.

IEEE Std 1100 ™ -2005 (IEEE recommended Practice of Powering Grounding shall also be acceptable. Earthing schematic to be submitted along with electrical SLD with detailed should be mentioned of conductors.

DESIGN CRITERIA

The two goals of the grounding system are (1) to equalize electrical potentials and (2) to create a low resistance path to ground to ensure equipment safety and personnel safety. It should facilitate proper operation of protection system during earth fault in the system. Five basic principles shall be used when designing a grounding system to accomplish these goals:

i) Careful planning must be given to network. As the grounding system is no more reliable than its weakest link, only high-quality components can be used and trained professionals must make all connections.

ii) The grounding system shall be visually verifiable so as to be able to visually inspect degradation of any component of the grounding system, from the equipment to the

rack, to the common bonding network (CBN), to the earth. The system shall be accessible during moves, adds, and changes (MACs), ensuring long-term system reliability and scalability.

iii) The grounding system shall be adequately sized to prevent premature equipment failure that contributes to increased operating costs.

iv) The grounding system shall make each rack to bond directly to the CBN, thereby directing current away from sensitive electronics. (For instance, a common error is to daisy-chain racks together. During a surge event, the entire row of daisy-chained racks becomes energized with stray current, potentially resulting in additional damaged equipment).

v) All metallic components in the data centre e.g., equipment, racks, cabinets, ladder racks, enclosures, and cable trays shall be bonded to the grounding system to ensure all conductive materials at the same electrical potential to minimize current flow.

Installation Criteria

i) The bidder shall, however, is liable for proper quantification for the work.

ii) The design shall ensure that the ground resistance shall be within the limit. The composite of all ground electrodes connected together at a single point must have an impedance of less than 2 ohms to ground. If this impedance exceeds 2 ohms, then additional, driven ground rods or a chemically assisted grounding electrode must be added to reduce this value to below 5 ohms.

iii) Standby Generator or UPS system are considered to be separately derived systems (by the definition in NEC Article 100.I) and, therefore, must be separately grounded in accordance with NEC Article 250-30.

iv) Methods for attaining low impedance to ground for data processing grounding electrode may include:

- An array of grounding electrodes spaced at least 10 ft apart
- A buried ground loop with multiple ground rods
- Chemically enhanced grounding electrodes
- Ufer grounds or other types of grounding systems.

v) Once the grounding electrode has been established (location, low impedance, minimum length, configuration, etc.), all electrical distribution components associated with the data center should be connected to a central ground bus. This ground bus is an insulated, isolated ground bus and is intended for a signal reference ground—not an equipment, safety ground. It will be connected to the isolated ground bus in the UPS, the PDUs, the branch circuit panels, and the isolated ground conductors going to the individual server racks. This bus will be completely isolated within the data center room from the green-insulated or bare, safety-grounding conductor that is connected

to the conduit, boxes, panel board cabinets, server rack frames, UPS enclosures, generator frames, and the like. It is critical to the data center grounding system's integrity that there are no connections between these two systems within the data center and, in fact, no connections anywhere—with the exception of a single bonding jumper specifically located to minimize the interactions between the electrical distribution system and the data center ground system.

vi) Thus by providing two separate low-impedance grounding electrodes (one for the main electrical service and one for the sensitive electronic system), and connecting them with the smallest bonding conductor permitted by the NEC (i.e., the conductor with the highest impedance), a reliable, low-noise, low-impedance, virtually isolated, signal reference ground for electronic systems.

vii) Apart from the two types of grounding system mentioned above one more type of earthing, named Signal reference earthing, needs to be implemented with braided copper wire tied with false floor pedestal. It will eventually create a mess system the level of which will be in between power and data cable trays.

viii) Because most racks and cabinets are made of painted components that are bolted together, there remains uncertainty about electrical continuity from one rack component to the next. In the data center, rack and cabinet continuity is important for safety; electrostatic discharge (ESD) protection; and the proper grounding of switches, servers, and power strips. Continuity may not exist if the installer fails to scrape paint between sections of rack or use specially designed paint-piercing hardware.

ix) To avoid loosening of grounding connectors over time, permanent copper compression lugs shall be used instead of setscrews to fasten conductor.

x) Failing to create an electrical bond between the structural components of racks and cabinets, can trap currents within sections of them, resulting in potential safety hazards, failure of ESD protection, and ungrounded equipment. So Components, such as hardware and jumper cables, that are tested for their ability to create electrical bonds and carry current.

TEST

- All tests as required for successful commissioning of the system shall be carried out by the contractor at site.

9. Datacenter Cooling Solution

9.1 Precision Cooling System

The AC Units should have high sensible heat ratios, to match high sensible loads of Server Rooms. A Microprocessor controlled Precision package AC system with R-410A refrigerant shall be suitable to take thermal and air quantity. Inputs from the server and adjust its operation accordingly so as to achieve highest levels of performance and efficiency.

The Indoor unit shall comprise of Variable capacity Digital Scroll/Inverter Scroll Compressor in independent or Tandem circuit, Fiberglass corrosion resistant EC fans, Evaporator DX Cooling Coil with hydrophilic coating, Microprocessor controllers, Expansion valves, Driers, G4 Filter, Suction and Discharge piping, Internal power and Control wiring, Crankcase heaters, Infrared/Electrode Humidifier, Heaters, HP/LP Cutouts, Power and Control contactors, water leak detectors and Other Electrical accessories.

Fixed capacity compressor technology like multiple scrolls or Fixed capacity Tandem scrolls are strictly not allowed. Systems should mandatorily be having variable capacity compressors and performance as per above specifications.

The Units shall be designed for 68-69 DBA at 1.5 meter from the unit outlet quiet operation with all moving parts mounted on anti-vibration mounting and carefully balanced to ensure minimum vibration.

Precision COOLING SYSTEMS shall be designed to suit the site condition and the load density requirements as below:

- Floor discharge cooling units for low density racks

The Precision Air conditioner shall be high sensible cooling capacity and high SHR minimum 95% (i.e. the sensible to total cooling capacity ratio). Low running costs, achieved by means of sophisticated design, latest& Proven Technology, combined with an accurate selection of the components.

Precision AC Indoor units shall be placed inside the Equipment room only. Hence the Footprint area of the Unit is extremely important to accommodate the same inside the existing Equipment Room. The unit shall require front access only for routine service and installation work.

The Cooling Units shall be designed at N+1 configuration in which minimum 25% standby units shall be Provided.

PAC units should be designed based on 22±1 ºC Cold Aisle Temperature and RH : 40% to 60% at 45 ºC outside temperature.

Design Requirements

The environmental control system shall be Factory assembled unit. It shall be floor mounted, optimized for maximum cooling capacity in a minimum footprint. It shall be specifically designed for service from the front of the unit. The system shall be designed for draw-through air arrangement to insure even air distribution to the entire face area of the coil. The unit shall modulate cooling capacity and airflow based on requirements.

The unit shall be ready to allow the installation of shackles for top handling. Forklift handling should be possible as well.

Quality Assurance

The specified system shall be factory end of line tested (functionality test) before shipment and designed to meet CE requirements. The system shall be designed and manufactured according to world-class quality standards. The manufacturer shall be ISO 9001 certified.

Cabinet Construction

The cabinet is manufactured from galvanized steel sheet, externally painted with RAL 7021 colour epoxy-polyester powder paint and assembled using stainless steel screws and high tensile rivets.

The rear and the fans section panels are double-skinned, with 20mm (frontal fan section panel with 40mm) Class ‘O’ (A1 EU) fireproof insulation sandwiched between the skins to reduce noise emission and heat loss. The side panels, which are isolated from the inside of the unit to form a complete double-skinned cabinet, the small service panel for electrical heaters, are also lined with 10mm Class ‘O’ (A1 EU) fireproof insulation .

The frontal panel(s) are assembled on hinges to make the access easier; this can be opened by the fast closing lock.

The rear and side panels are screwed to the supports. The rear panel(s) are screwed directly to the frame.

Fans

The unit is fitted with one (two,three) direct-driven, high efficiency, single inlet, backward curved, centrifugal ‘plug’ type innovating EC fan(s). The fan(s) have an impeller with curved blades corrosion resistant made of fibreglass plastic. This new technology allows keeping the current high strength of aluminium alloy adding the benefits of light weight and full flexibility on blade design of the new material. The good dampening behavior of the plastic also helps to reduce noise emissions.

The fan motors are Electronically Commutated, IP54, with internal protections, continuous speed regulation via controller signal. The motor is three-phase with IP54 protection; provided with internal thermal protection.

The fan wheel is statically and dynamically balanced; the bearings are self-lubricating.

Between the fans shall be installed an “S” shape separator design to eliminate turbulence effects of one fan to the others; it shall be also designed to increase efficiency compared to simple plate separator.

Fan(s) removal(s) shall be made faster thanks to the use of buttonhole specifically designed and tested to allow 10 cm increasing height during the operation.

Evaporator Coil

One (Two) refrigeration circuit(s), (each) incorporating one (two) high efficiency, fully hermetic Copeland Digital Scroll/Inverter Scroll compressor/s with crankcase heater, air-cooled condenser, liquid receiver with outlet service valve, safety valve, filter drier, moisture indicating sight glass, liquid line solenoid valve and an electronic expansion valve directly controlled by the unit microprocessor to allow the highest energy saving.

Each circuit is equipped with pre-set high pressure switch and low pressure transducer for protection against high condensing and low evaporating temperatures. The low pressure transducer is managed by microprocessor controller, whilst to avoid compressor cycling at high discharge pressures, the high pressure switch is equipped with a manual reset.

The inclined evaporator coil is manufactured from copper tubes, mechanically bonded to hydrophilic painted aluminium fins, with a stainless steel condensate drain pan. The large face area/low velocity coil allows precise control of temperature and humidity during cooling and dehumidification, and is designed to optimise fluid velocity and minimise pressure drop.

The evaporator shall be staged coil to allow a maximum efficiency on partial loads.

The moisture indicating sight glass and liquid line solenoid valve for each circuit are mounted visible from a service window, immediately accessible once open the frontal door/s, to allow checking and adjustment while the unit is in operation.

Filtration

The standard filtration grade is G4 (95% down to 5 microns). The filter pleated structure gives high filtration efficiency, low pressure drop and permit to use the filter without metallic or cardboard frame. They are easily accessed/replaced by opening the front panels.

The unit is fitted with a filter differential pressure switch, connected to the microprocessor controller to provide ‘Filter Clogged’ warning indication.

Compressor

Latest-generation hermetic scroll compressors characterized by a high COP (coefficient of performance) and consequently also a high energy efficiency. Each unit should be having minimum 2 nos. of compressor for high reliability.

The compressor shall be scroll type and support capacity modulation using a suitable technology (E.g. Inverter or Digital scroll or equivalent technologies). The bidders shall provide the technical details of the capacity modulation technique employed in the products offered by them.

Refrigerating Circuits

Each circuit should be composed of as standard, a fluid intake complete with a rotalock on-off cock and safety valve, a dehydrating filter and flow sensor. The former enables the refrigerating circuit to be kept free of humidity (thus increasing the life of all the circuit's components), while the latter enables a rapid check on whether the system is charged with refrigerant correctly and whether it contains any humidity.

There should be minimum two independent refrigerant circuits operating to achieve good efficiency at part load conditions.

Suitable expansion valve to adjust the flow of refrigerant fluid through the evaporator, controlling the real evaporator superheating in relation to variations in the ambient conditions in the room being air-conditioned & improving in this way precision of cooling and the energy efficiency of the cooling cycle.

Liquid receiver with safety plug shall be installed inside the unit.

Remote air-cooled condenser

These condensers are characterized by a dual-circuit exchanger with aluminum finned copper tubes, complete with low-speed axial-flow fans to reduce the sound pressure level. The frame is made of embossed aluminum with excellent weather-resistant characteristics. The remote condenser is complete with an electric power and control board, fully wired and tested at the factory. Condensers shall be suitable for 24 hours operation and be capable of providing vertical or horizontal discharge.

Condenser fan shall be provided with Fan speed controller working based on condensing pressure and should control speed according varying ambient conditions.

Electrical Heating

The heating resistors are of a rigid design for extended operational life and are normally utilized to maintain room dry-bulb conditions during a system call for dehumidification. Each stage of heaters is made of finned armored stainless steel AISI 304 to maintain a low surfaces power density. Ionization effects are eliminated owing to the low heater surface temperature.

Heating control is of the ON-OFF type. The heaters are phase balanced and are provided with a manual reset safety thermostat to disable them in the event of a high temperature.

The heating system also incorporates Miniature Circuit Breaker(s) which protect the heater(s) from short circuits, should the harness be damaged accidentally.

Humidifier

The humidification system is provided by an electronic control humidifier. The dehumidification function, which is supplied as standard when the humidifier option is installed, acts by reducing the fan speed with consequent reduction of the air flow and at the same time operating the variable capacity compressors at full capacity

Humidification control may be of the proportional or of the on-off type, according to the requirements of the installation: on/off is set as standard. Any amongst the following two may be used for Humidification:

1. Infrared Humidifier

The unit is fitted with an infrared humidifier suitable for use with water of varying degrees of hardness. The humidifier is complete with a water inlet valve, and a maximum water level sensor; the humidifier includes 3 high-intensity quartz lamps shine on water creating instantaneous moisture using almost any water quality. The cleanable stainless steel humidifier pan is removable from front of the unit

2. Electrode Humidifier

The unit is fitted with an electrode boiler humidifier suitable for use with water of varying degrees of hardness, provided that the water is not treated or demineralised (Conductivity range 125-1250 μS/cm). The humidifier is complete with a water inlet valve, water outlet pump and a maximum water level sensor.

Steam from the cylinder is mixed with the discharge air from the evaporating coil by means of a copper steam distributor.

The unit controller monitors the condition of the steam cylinder, and generates an alarm when the cylinder needs to be changed. Cylinder replacement is easy and quick.

The humidifier is complete with a self-adapting flow control system, which monitors and controls the electrical current passing through the cylinder. Output adjustment is from 30-100% via the unit controller

Switch Board

Switchboard shall be situated in a compartment separated from the air flow and made in compliance with the directive 73/23/EEC and related standards. The main characteristics are 24V AC low-voltage secondary circuit with isolation transformer, plastic insulating screen for protection from live components, general isolator with mechanical interlock, thermo magnetic circuit-breakers for protection, terminal board for no-voltage signal and control contacts. All the units must undergo

a safety test cycle to check the continuity of the protection circuit and the insulation resistance, and a voltage (dielectric strength) test.

Microprocessor control system

The Control System is microprocessor based, 32 bit RISC. It can be programmed to control the function of every device within the unit via I/O.

The controller allows setting and monitoring of the following room parameters via a 3 button keypad:

- Air Temperature
- Temperature set-point
- Temperature band
- Humidity
- Humidity set-point
- Humidity band

The parameters are indicated using symbols and text on a back-lit, 3 digits Liquid Crystal Display. Cooling and heating modes are also indicated on the LCD screen. Alarm conditions activate a visual indicator. Three LED's indicate the unit status – 'Power on' (Yellow), 'Unit on' (Green) and 'Warning/Alarm activated' (Red)

The controller shall provide **Unit to Unit Ethernet connection** to operate with multiple units, run/stand-by rotation, automatic changeover and parameter sharing functions, external communications through BMS, sequential auto restart timer, with adjustable time delays to be applied to unit restart after a power loss.

The following warnings / alarms are included:

- High temperature
- Low temperature
- High relative humidity
- Low relative humidity
- Humidifier failure
- Fan failure
- Electrical heater high temperature (When applicable)
- Sensor failure
- Controller errors

Terminals are provided for remote start/stop control plus Volt-free 'Common Alarm' and 'Unit Run' indication

The display shall provide with track recorded of temperature and humidity with graphically display on the screen.
A buzzer provides audible indication of a 'Warning' or 'Alarm' condition

Unit memory shall hold the 200 most recent alarms with time and date stamp for each alarm

Unit memory shall hold the 400 most recent events with id number, time and date stamp for each event

Menu shall display accumulative component operating hours for major components including compressors, fan motor, humidifier and reheat.

Safety interlocks:

Operation of heaters & humidifiers shall be possible only when blower fan is in operation. Fire detection signal from fire detector system shall be able to switch off the package unit operation in event of fire in conditioned space.

Sequencing: The units should have sequencing as an inbuilt feature. The units shall be designed to work for equal no of run hours also incase of fault the stand by unit should Start. The units should have weekly programmer.

The microprocessor control system can be supplied with the following optional cards:

RS485 serial adapter for data transfer to a central supervisor system with STD protocol or MODBUS protocol

REFRIGERANT PIPING

Each refrigerant circuit shall be suitable for operation on R-407C/R410a and shall include the following items:

a) Expansion valve with pressure equalization;
b) Removable liquid line drier / filter.
c) Liquid line sight glass with moisture indicator.
d) Hand shut off valves.

9.2 AISLE CONTAINMENT

General

- The Cold Aisle containment should be constructed between two symmetrical rows of racks facing each other in Cold Aisle.
- The Cold Aisle containment should be modular to enable to add the racks.
- All the components used in the Aisle containment shall be Fire Retardant.

Entry Doors of Containment:

- Entry and Exit Doors of the Cold Aisle should have openable or sliding double door
- Each door should have CRCA frame with fire retardnent 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

- 4 columns should be grouted to real floor or can be fixed to the base frame of rack
- Vertical columns should be connected to each other with help of Cross members. These Cross members should be length of Cold Aisle width
- The Doors must have a Steel Picture Frame fabricated in 1.2mm thick CRCA sheet as per "IS 513 Grade D" standards
- PU Foam Gasket should used across the metal edges of the door to prevent any leakage on cold air
- The doors should have automatic door closers installed to ensured that those are closed.
- Polyamide Cable Brushes should be fitted at the bottom of doors to avoid leakage of cold air when doors are closed.

Top Panels

- Top of the cold aisle should be covered with either fire rated Glass or Polycarbonate panels
- Top Panels are fixed in CRCA frame per "IS 513 Grade D" with thickness of 1.2 mm
- The Glass/ Polycarbonate in the top Panels are of 4 mm thick
- Top Panel must be tool less installation to offer quick access to area above the contained aisle during the maintenance activity
- Top Panel must have opening for Smoke Sensor/ FM System wherever necessary Powder Coating
- The Powder coating complies with ROHS requirement to avoid hazardous substance contamination in the Data Center. Pre-treatment Nano Ceramic process should be followed.
- The powder coating thickness is 80-100 Microns

Vendor to offer the below method of air flow and temperature control :

- Cold aisle containment should be done to avoid mixing of cold air with hot air. Precision AC unit's microprocessor controller should be connected to cold aisle temperature directly, multiple sensors installed in the cold aisle top shall modulate the EC fan speed at part load. CRAC unit's temperature to be maintained by supply air control mechanics by modulating the compressor based on supply air temperature sensor. This practice will result into substantial power savings.
- Cold aisle to be filled with required amount of cold air at desired temperature conditions. There should be uniform air flow pattern in the cold aisle (High opening grills to be placed based on the air flow requirement). The air from the false floor can be regulated via the fan speed of the down flow units connected to cold aisle temperature sensors. The temperatures on top of the server rack provide an indication of whether sufficient air is being fed into the cold zones.

- Vendors need to consider the prices for software and hardware required for enabling the above solution in all the units. Incase if one unit controller fails other units to take the commands to insure the higher availability.
- CRAC units shall communicate each other and shall work as team to modulate the fans at parts for high power savings
- If the room temperature in the cold zones deviates from the specified level, the fan speed is increased or decreased as required". This insures 24 Hours X 365days continues monitoring of air flow and temperature in the cold aisle resulting into high power savings and uptime.
- RH control shall be done though return air.

10. Safety and Security Systems

10.1 BUILDING MANAGEMENT SYSTEM

At present RailTel has a BMS system for monitoring the existing infra of the Data Centre. The proposed infra of the current Tender should be integrated with the existing BMS. Integration of individual system/ sub-system should be similar to the existing model.

The proposed integration can utilize the existing Controller/driver where ever available and care should be taken to keep a buffer of 10% spare after new installation and integration without disturbing the working systems. If the capacities are not available, necessary provisions are to be made in the current tender requirement and as per the technical specification furnished to achieve end objective.

SYSTEM DESCRIPTION & INPUT OUTPUT SUMMARY

- The system will consist of a flat, open architecture that utilizes high-speed communication protocol between all controlled and controlling devices.
- Microprocessor based Direct Digital Distributed Controllers (DDC) shall interface with sensors, actuators and environmental control systems (i.e. HVAC units, chillers, pumps, electrical & plumbing system etc.) and carry out followings functions :
    a. Individual input/output point scanning, processing and control.
    b. Centralized operation of the plant (remote control).
    c. Dynamic graphic details of plant and building.
    d. Energy Management through optimization of all connected electrical and mechanical plants.
    e. Alarm Detection and early recognition of faults.
    f. Time, event and holiday scheduling as well as temporary scheduling.
    g. Prevention of unauthorized or unwanted access.
    h. Communication interfaces and control.
- The control system shall be designed such that mechanical equipment will be able to operate under stand-alone control. In general, the operation of any controllers on the network shall not rely on any other controller for its functional operation. System controllers that require a master computer will not be considered. Function specific modules may be used to supplement the functionality resident in each controller. As such, in the event of a network communication failure or the loss of any other controller on the communication network, the control system shall continue to independently operate under local control of the resident program stored in nonvolatile memory as detailed herein. In such a case, each individual controller shall continue to perform basic functions until a network connection can be restored.

- Each standalone intelligent outstation controller shall control a maximum of One AHU/CRAC unit and shall be located adjacent to the Units.
- The number of controllers for central plant room equipments shall be decided by the contractor with a maximum capacity limited to 24 points per controller. Overall, the system shall be provided with 15% spare capacity, with spare of at least 15% points on each controller.
- There shall be one control station located in BMS Room. The computer shall be sized to cover the graphic display memory and planning information. The display shallbe in the form of dynamic colour graphics and text format with menu driven pop-up windows and help facility.

Reference Standards

- Control system components shall be new and in conformance with the following applicable standards for products specified:
- ANSI/EIA 709.1 (LonTalk Protocol)
- LonMark Certified (Version 3.1 Guidelines)
- BacNet/IP
- Modbus
- UL 916 (Energy Management Equipment)
- OPC

Products

- Utilize standard components for all assemblies. Custom hardware, operating system, and utility software are not acceptable.
- All products (PCU's, TDCU's and ID's) shall contain LonWorks/BacNet/Modbus networking elements to allow ease of integration of devices from multiple vendors.
- All materials, equipment and software shall be standard components, regularly manufactured for this and other systems and custom designed for this project. All systems and components shall be thoroughly tested.

CENTRAL STATIONS HARDWARE

The Control stations shall comprise of Personal computers (PC) providing high-level operator interface with the system. The terminals shall be capable of providing the operator with the facility for remote system interrogation, control, and retrieval / storage of logged data, annunciation of alarms and reports, analysis of recorded data and the formatting of management reports.

The control station shall consist of the following hardware with all of them suitable for the power supply voltage of 230 V AC ± 10% , 50 HZ + 3%.

- PC with Core I7 Processor/2GB RAM/1TB Hard Disk
- 21" LCD Display
- Suitable Dotmatrix printer for printing of Alarms
- Windows 7 operating system and other required software shall be included.

CENTRAL STATION SOFTWARE

A. Command & Operating Software

1. As a minimum, the menu driven command and operating software shall permit the operator to perform the following tasks with a minimum knowledge of the HVAC Control System provided and basic computing skills.
   i. Configure the network.
   ii. Create control sequences.
   iii. Graphical interface to systems.
2. Provide additional third party software to permit the operator to manage hard drive files such as access, delete, copy, modify, etc. The package shall be object oriented and permit the user to manage directories upon boot-up. The file management software shall organize directories and sub-directories using files, file folder objects.
3. On-Line Help. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext.
4. Security. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system supervisor shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operator's access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.
5. System Diagnostics. The system shall automatically monitor the operation of all HVAC control workstations, printers, modems, network connections, and nodes. The failure of these devices shall be annunciated to the operator.
6. Reports and Logs. Provide a reporting package that allows the operator to select, modify, or create reports. Each report shall be definable as to data

content, format, interval, and date. Report data shall be archived on the hard disk for historical reporting. Provide the ability for the operator to obtain real time logs of designated lists of objects. Reports and logs shall be stored on the PC hard disk in a format that is readily accessible by other standard software applications including spreadsheets and word processing. Reports and logs shall be readily printed to the system printer. Data shall be able to transferable to other software packages so as to create custom reports.

7. Web Browser Access: The DDC system shall provide total integration of the facility infrastructure systems with user access to all system data, either locally over a secure Intranet within the building or by remote access by a standard Web Browser over the Internet.

B. Graphical Object-Oriented Programming Software

1. The system shall include a graphical object-oriented programming function which shall be used to create all control sequences utilized in programmable nodes (PN). The graphical object-oriented programming function shall provide programming elements to be connected together to create a logic diagram. The graphical object-oriented programming function shall include elements for mathematical, logical, timing, setpoint, display and input/output functions to create logic diagrams that represent sequences of operation for PNs.
2. Program elements shall be able to be combined into a custom template that can then be used as a standard function.
3. Program checkout and debug tools shall include display of real-time and/or simulated system variables and inter-object data on the programming screens. The user shall be able to assign fixed or variable values to inputs during the dynamic debugging of the control sequence.
4. The graphical programming tools shall provide the ability to print I/O lists, lists of standard network variables and lists of all parameters to be viewed by the HMI.
5. The programming software shall reside on each POT and OW server for programming and/or configuring each model of PN on the project. The applications shall be downloaded and executed at the appropriate nodes. The software shall allow for updated applications via the network from the OW.
6. DDC programs are to be provided to meet the control strategies as called for in the sequence of operation sections of these specifications. Each PN shall have available a full library of DDC algorithms, intrinsic control operators, arithmetic, trigonometric, logic, Proportional Control, Proportional plus Integral (PI),

Proportional plus Integral plus Derivative (PID), and relational operators for implementation of control sequences. 2-POSITION, FLOATING, STANDARD I/O AND COUNTER INPUTS, TIME BASED DATA, CURVE FIT FUNCTION, PSYCHOMETRIC FUNCTIONS, INTEGRATION.

7. All DDC setpoints, gains, and time constants associated with DDC programs shall be available to the operator for display and modification via the POT, DDU or OW interface.

C. Library of Applications: A library of control, application, and graphic objects shall be provided to enable the creation of applications and user interface screens. Provide the capability to cut & paste objects and libraries into applications for a node/system. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and linking them together, using a built-in graphical connection tool. Completed applications may be stored in the library for future use. Graphical User Interface screens shall be created in the same fashion. Data for the user displays is obtained by graphically linking the user display objects to the application objects to provide “real-time” data updates. Any real-time data value or object property may be connected to display its current value on a user display. Systems requiring separate software tools or processes to create applications and user interface display shall not be acceptable.

D. Provide integral trend-logging presentation in the programming screen.
E. Print capability, with page break reference tags to allow down to 8 ½”x 11” size paper
F. Off-line simulations (step function, continuous run function, simulation of external inputs)
G. Dynamic presentation of logic in on-line state (all intermediate values)
H. Text to logic screens
I. Memory monitoring
J. Power cycle restart function
K. Run-time capability
L. Calculator objects, (basic stuff), including if-then-else, log, ln, exp, and trig functions.
M. Recognize standard network variable type data (nvi) and create network variables to put on the network (nvo)
N. Programming Objects

1. Provide the capability to copy objects from the supplied libraries, or from a user-defined library to the user’s application. Objects shall be linked by a graphical linking scheme by dragging a link from one object to another. Object links will support one-to-one, many-to-one, or one-to-many relationships. Linked objects

shall maintain their connections to other objects, regardless of where they are positioned on the page and shall show link identification for links to objects on other pages for easy identification.

2. Configuration of each object will be done through the object's property sheet using fill-in the blank fields, list boxes, and selection buttons. Use of custom programming, scripting language, or a manufacturer-specific procedural language for configuration will not be accepted.
3. The software shall provide the ability to view the logic in a monitor mode. When on-line, the monitor mode shall provide the ability to view the logic in real time for easy diagnosis of the logic execution. When off-line (debug), the monitor mode shall allow the user to set values to inputs and monitor the logic for diagnosing execution before it is applied to the system (step function and run mode, integral trend logging).
4. The system shall support object duplication within the Owner's database. An application, once configured, can be copied and pasted for easy re-use and duplication. All links, other than to the hardware, shall be maintained during duplication.

O. Object Libraries

1. A standard library of object function blocks shall be included for development and setup of application logic, user interface displays, system services, and communication networks.

2. The function blocks in this library shall be capable of being copied and pasted into the user's database and shall be organized according to their function. In addition, the user shall have the capability to group objects created in their application and store the new instances of these objects in a user-defined library.

3. Start-Stop Time Optimization Object. Provide a start-stop time optimization object to provide the capability of starting equipment just early enough to bring space conditions to desired conditions by the scheduled occupancy time. Also, allow equipment to be stopped before the scheduled un-occupancy time just far enough ahead to take advantage of the building's "flywheel" effect for energy savings. Provide automatic tuning of all start / stop time object properties based on the previous day's performance.

P. Application Specific Node Configuration software Tools: Provide application specific node configuration software tools that will permit the individual network nodes to be configured

and commissioned with appropriate parameters. This software will reside on the POT. Functionality shall include:

1. Recognize all Standard Configuration Parameters (SCPTs)
2. Provide capability for setting all Standard Configuration Parameters (SCPTs)
3. Translation capability for user defined configuration parameters
4. Monitoring capability for nvo's from the nodes
5. Ability to set the values for nvi's to the nodes

Q. Network Management

Network Management Software for Windows network management software tool shall be used to assign domain, subnet, and node addresses to nodes; configure all routers and repeaters; define network data connections between LonWorks® /BacNet Device/Modbus Device network variables, known as "binding;" and record binding data into node addressing tables, and create a database of all addressing and binding information for all nodes on the network.

Network management shall include the following services: browse all network variables on nodes; Attach, Detach, Manage, Add, Remove, and Replace nodes; plus transmission error off-line, on-line reporting.

The network management database shall be resident in the operator workstation server, ensuring that anyone with proper user name/password authorization has access to the network management database at all times.

The software shall have Client/server capability to allow multiple users ability to manipulate the database simultaneously.

R. Human-Machine Interface - Operator Workstation Software (OWS)

1. The HMI shall be a client/server architecture to allow multiple client access to an Ethernet connected server. The workstation shall operate also as a stand-alone workstation/server.

2. The software shall enable an operator to interact with various devices including network nodes(Lonwork/Modbus/BacNet), recorders, input/output (I/O) systems, intelligent transmitters, and other field devices.

3. It shall provide the following functions:
   i. Calendar.
   ii. Scheduling.

iii. Trending.
iv. Alarm monitoring and routing.
v. Time synchronization.
vi. Time zone handling
vii. Integration of controller data
viii. Object linking and embedding for process control (OPC) for connectivity to third party OPC compliant software/devices
ix. Color graphic display
x. On-line plots
xi. Use Microsoft NT security
xii. System documentation generation
xiii. Dynamic data exchange (DDE)
xiv. Dispatch of a single time schedule to all programmable nodes

4. System Configuration. At a minimum, the HMI shall permit the operator to perform the following tasks, with proper password access:

i. Create, delete, upload, or modify control strategies.
ii. Add/delete objects to the system.
iii. Tune control loops through the adjustment of control loop parameters.
iv. Enable or disable systems
v. Generate text file reports to a networked printer.
vi. Select points to be alarmable and define the alarm state.
vii. Configure alarms to be sent to Microsoft windows mail client
viii. Select points to be trended over a period of time and initiate the recording of values automatically.
ix. Provide different levels of security to every object in the HMI database
x. Modify and create users with passwords and access levels and also be able to use currently logged on users and passwords

5. Event Alarm Notification and Actions
i. The HMI software shall provide alarm recognition, storage, routing, management, and analysis.
ii. The HMI software shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.

iii. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including, but not limited to:
    a. To alarm.
    b. Return to normal.
    c. To fault.

iv. Provide for the creation of alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc.
v. Provide timed (schedule) routing of alarms by class, object, group, or node.
vi. Provide alarm generation from “runtime” and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.
vii. Control equipment and network failures shall be treated as alarms and annunciated.
viii. Alarms shall be annunciated in any of the following manners as defined by the user:
    a. Screen message text.
    b. Email of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on:
        i. Day of week.
        ii. Time of day.
        iii. Recipient.
    c. Shot Message Service (SMS)
ix. Auto answer (at OWS) and auto dial (from node)
x. Graphic with flashing alarm object(s).
xi. Printed message, routed directly to a dedicated alarm printer.
xii. Audio messages.
xiii. The following shall be recorded by the OWS HMI software for each alarm (at a minimum):
    a. Time and date.
    b. Location (building, floor, zone, office number, etc.).
    c. Equipment (air handler #, accessway, etc.).
    d. Acknowledge time, date, and user who issued acknowledgement.
    e. Number of occurrences
xiv. Alarm actions may be initiated by user defined programmable objects created for that purpose.

xv. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.

xvi. A log of all alarms shall be maintained by the OWS HMI and shall be available for review by the user.

xvii. Attach a graphic screen, text notes, and/or plant status report, to each alarm, as defined by user.

xviii. Repeat/nuisance alarms must have feature to be disabled, and a feature for monitoring disabled alarms.

xix. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm. An alarm notification window will supercede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and un-acknowledged alarms.

xx. The dedicated alarm window shall provide user selectable colors for each different priority of alarm.

6. Data Collection and Storage Requirements

i. The OWS HMI shall have the ability to collect data for any property of any object and store this data for future use.

ii. The data collection shall be performed by objects, resident in the node, and if desired OWS, shall have, at a minimum, the following configurable properties:

a. For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.

b. For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.

c. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.

d. Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.

e. All log data shall be stored in a database in the OWS HIM and the data shall be accessed from a server (if the system is so configured) or a standard Web Browser.

f. Systems that cannot provide log data in HTML formats at a minimum shall not be acceptable.

g. The OW shall have the ability to archive its log data either locally (to itself), or remotely to a OWS server. Provide the ability to configure the following archiving properties, at a minimum:

i. Archive on time of day.

ii. Archive on user-defined number of data stores in the log (buffer size).

iii. Archive when log has reached its user-defined capacity of data stores.

iv. Provide ability to clear logs once archived.

7. Audit Log

Provide and maintain an Audit Log that tracks all activities performed on the OWS HMI. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached its user-defined buffer size. Provide the ability to archive the log locally to OWS HMI or to a server. For each log entry, provide the following data:

i. Time and date.

ii. User ID.

iii. Change or activity: i.e., change setpoint, add or delete objects, commands, etc.

8. Database Backup And Storage

i. The OW shall have the ability to automatically backup its database. The database shall be backed up based on a user-defined time interval.

ii. Shall have the ability to automatically complete full or partial backups; and have the ability to full or partial restore. Partial is defined as only items that have changed in the database.

iii. Copies of the current database and, at the most recently saved database shall be stored in the OW. The age of the most recently saved database is dependent on the user-defined database save interval.

9. Graphical Real-Time Displays. The HMI, shall at a minimum, support the following graphical features and functions:

i. Graphic screens shall be developed using any drawing package capable of generating and importing a GIF, BMP, DWG, DXF, or JPG file format. In

addition to, or in lieu of a graphic background, the HMI shall support the use of scanned pictures.

ii. Graphic screens shall contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML, or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.

iii. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.

iv. Commands to start and stop binary objects shall be done by clicking the selected object and selecting the appropriate command from the pop-up menu. Data entry may be typed or mouse entered.

v. Adjustments to analog objects, such as set points, shall be done by clicking the selected object and entering value or using a graphical slider to adjust the value.

vi. The OWS shall be able to support multiple graphic objects at the same time. If tiled, then each graphical object shall be fully scalable or aspect locked.

vii. Trend Displays (variable versus time) - A trend display shall show the values of points plotted versus time similar to a strip chart recorder. Eight tags shall be trended per trend. The HMI software shall provide real-time and historical trending (for data which had been logged). This may be achieved by either color graphic page display or an Microsoft excel based display.

viii. Real-Time Trends - shall contain real-time data without consuming hard disk space.

ix. Historical Trends Logs - A historical trend log display presents data stored on the computer's hard disk.

x. X-Y Plots (variable versus variable) - An x-y plot shall dynamically represent the real-time or historical relationship one variable plotted against another variable.

xi. Automatic Generation - All trends and plots shall be self-generated and not require any programming by the user.

xii. The HMI software shall provide dialog boxes and menu picks for configuring trends and plots.

xiii. Any analog or binary data may be trended or plotted.

xiv. The software shall store pre-configured presentation of trends to facilitate operator call-up of trend log displays. It shall be possible to call up a trend log with pre-assigned data.

10. Graphics Builder - The HMI software shall provide a graphics builder.
    i. Display Documentation - The graphics builder shall provide show, simulate, review, and document animation functions to allow the user to identify, diagnose, change, and document animation points on each display.
    ii. A library of vendor-supplied objects will be included. These objects, widgets, and symbols must be continuously scalable. These items shall be editable by the user.
    iii. A library of animated graphic objects shall be included.
    iv. Animation - The Graphics Builder will animate process graphics with real-time data from field devices.
    v. Multi-State Color Animation shall be provided to change a graphic object's color from a palette of colors.
    vi. Alarm Color - Color animation for normal, alarm, and alarm acknowledged states for both analog and binary point tags shall be provided. The user shall define the foreground and background colors for each state.
    vii. Alarm Blink – Objects and text data shall blink based on alarm state and acknowledged state.
    viii. Text and Numeric Animation - The software shall display the numeric value of an analog point, text of a text point, and the descriptors of a binary point. Display Linking - The software shall provide a display linking function. Clicking the object associated with the link changes the display to a new user-defined display.
    ix. Pickable/Non-Pickable - The software shall enable active points to be selected with the mouse and accessed. It shall be possible to make a point non-pickable: the dynamic information shall be displayed, but the operator will not be able to access a detail display, change the value, etc. based on security settings of the software.
    x. Ability to open external executable files from button click
    xi. Ability to open HTML web pages from button click
    xii. Ability to view Microsoft Excel files from button click
11. On-Line Help. Provide a context sensitive help system to assist the operator in operation and editing of the system. Help screens shall be available for all applications and shall provide the relevant data for that particular screen.
12. Security. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data.
    i. System security shall be selectable for each operator.

ii. The system administrator shall have the ability to set passwords and security levels for all other operators.
iii. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object.
iv. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected.
v. All system security data shall be stored in an encrypted format.
vi. Each object in the HMI database must be able to have a security policy applied to it.

13. System Diagnostics. The system shall automatically monitor the operation of network connections and controllers. The failure of any device shall be annunciated to the operator.

14. DDE Server - The HMI software shall be able to communicate and exchange data with any Third Party DDE compliant application.

15. MICROSOFT REPORT GENERATION – The HMI software shall be able to seamlessly interact with Microsoft Office Products, including Excel, with no additional programming.

DIRECT DIGITAL CONTROLLER

DIRECT DIGITAL CONTROLLER (DDC) HARDWARE REQUIREMENT:

1) DDC controllers shall be capable of fully "stand- alone" operation i.e. in the event of loss of communication with other DDC's or Control Station, they shall be able to function on their own. The controllers shall be LonWorks/BacNet/Modbus based products.

2) The controllers shall consist of minimum single 32-bit microprocessors for reliable throughput, based with EEPROM based operating system (O.S.).

3) The memory available to the controller board as working space for storage of the Operating system software and data files shall be decided on the basis of number of points being controlled by them.

4) The controllers shall be UL listed and conforming to CE (Euro norms).

5) Controllers requiring nickle-cadmium/lithium battery to support the full operation of the RAM, shall have battery back-up upto 12 hours in the event of a localised mains failure. The battery shall not be required to supply power to actuators, valves, dampers etc.

In addition to the above battery reserve a further battery shall be provided to retain the RAM for a minimum of 2 days, after the expiration of the standard battery.

A low battery alarm shall be provided with each Controller and with an indication at the Control Station.

In case the memory is stored on EEPROM, the battery backup will not be required.

6) The Controllers shall have proportional control, Proportional plus Integral (PI) Control, Proportional plus Integral plus Derivative (PID) Control, Two Position Control and Time Proportioning Control and algorithms etc, all in its memory and all available for use by the user, i.e. all the control modes shall be software selectable at any time and in any combination. The analog output of Proportional Control, PI Control, and PID Control shall continuously be updated and output by the program shall be provided. Between cycles the analog output shall retain its last value. Enhanced integral action in lieu of Derivative function shall not be acceptable.

7) The controllers shall have a resident real time for providing time of day, day of week, date, month and year. These shall be capable of being synchronized with other clocks in the network.

Back-up power shall support the clock. Upon power restoration all clocks shall be automatically synchronized.

8) The microprocessorbased DDC's shall be provided with power supply, A/D and D/A converters, memory, and capacity to accommodate a maximum of 18 input/output (I/O) hardware points (with or without an expansion board). DDC's with a lower capacity of points shall preferably be provided at the locations with relatively less input/output points.

9) If the controllers provided by the contractor have the configurable plug in function cards, then the following minimum specifications shall have to be met:

i) In addition to the basic outstation, a minimum of two slots shall be provided for the insertion of plug-in function cards.

ii) The cards shall provide for analog or digital, input or output, hardwired connections to the installed plant.

iii) The quantity and combination of these cards shall be determined by the requirements of the plant in that location with the concurrence of the Owner/ Consultant.

10) The DDC's shall have 15% spare capacity (digital/analog input/output) to give flexibility for future expansion.

11) All DDC controllers shall be capable of handling voltage, mili-ampere, resistance or open and closed contacts inputs in any mix, if required.

Analog inputs/outputs of the following minimum types shall be supported:

i) 4-20 mA.
ii) 0-1 volts.
iii) 0-10 volts.
iv) 0-5 volts, and
v) 2-10 volts.
vi) Resistance Signals (either PTC or NTC)
(PT 100, PT 1000, PT 3000, Balco 500, NI 1000)

Digital input/output types to be supported shall be, but not limited to the following :

i) Normally-open contacts.
ii) Normally-closed contacts.

Modulating outputs shall be true proportional outputs and not floating control type.

12) Controller's packaging shall be such that complete installation and check out of field wiring can be done prior to the installation of electronic boards.

13) All board terminations shall be made via plug-in connectors to facilitate trouble-shooting, repair and replacement. Soldering of connections shall not be permitted.

14) Controllers shall preferably be equipped with diagnostic LED indicators with at least indication for Power up Test OK, and Bus Error. All LED's shall be visible without opening the panel door.

15) It shall be possible for the controllers to accept regulated uninterrupted power supply to maintain full operation of the controller functions (control, logging, monitoring and communications) in the event of a localized mains failure.

16) Controllers requiring fan cooling are not acceptable.

17) There shall be the facility for accessing controller data information locally , via a portable plug-in keypad display which can be common to all controllers and normally removed to prevent unauthorized tampering. Alternatively each controller shall have a keypad and display integral with its casing for local interrogation and adjustment. In either case, access to the system thus provided shall be restricted by passwords in the same way as at the main operator terminal.

18) In case the Portable operator Terminals (POT) is required to programme the controllers, sockets shall be provided for same. Attachment of POT shall not interrupt or disable normal panel operation or bus connection in any way.

19) The controllers shall be housed in vandal proof boxes to protect them from tampering by any unauthorized personnel. All DDC controllers used in plant room spaces and external application shall be housed IP66/IP54 rating enclosures.

20) It shall be possible to add new controllers to the system without taking any part of the system off-line.

DIRECT DIGITAL CONTROLLERS CAPABILITIES:

1) The Controllers shall have a self analysis feature and shall transmit any malfunction messages to the Control Station. For any failed chip the diagnostic tests, printout shall include identification of each and every chip on the board with the chip number/location and whether the chip "Passed" or "Failed" the diagnostic test. This is a desired requirement as it would facilitate trouble-shooting and ensure the shortest possible down time of any failed controller. Controllers without such safety feature shall be provided with custom

software diagnostic resident in the EEPROM. The tenderer shall confirm in writing that all controllers are provided with this diagnostic requirement.

2) Operating system (O.S.) software for controllers shall be EPROM resident. Controllers shall have resident in its memory and available to the programs, a relevant library of algorithms, intrinsic control operators, arithmetic, logic and relational operators for implementation of control sequences.

3) In the event of failure of communication between the controllers and/or Control Station terminal, alarms, reports and logs shall be stored at the controllers and transmitted to the terminal on restoration of communication.

4) In the event of memory loss of a Controller, or the expiration of back-up power, on start-up of the unit the necessary data-base shall be downloaded automatically and without operator instruction. Controllers requiring a manual intervention for the re-boot of software are not desired.

5) Where information is required to be transmitted between controllers for the sharing of data such as outside air temperature, it shall be possible for global points to be allocated such that information may be transmitted either on change of incremental value or at specific time intervals.

6) Controllers must be able to perform the following energy management functions as a minimum.

   a) Time & Event programs
   b) Holiday Scheduling
   c) Maximum and Distributed power demand
   d) Optimum start and stop program
   e) Night purge
   f) Load reset
   g) Zero energy band
   h) Duty cycle
   i) Enthalpy analysis and control
   j) Run Time Totalization
   k Sequencing and Optimization
   l) Exception scheduling

Detailed description of software features and operating sequence of all available energy management software shall be submitted with the tender for evaluation by the Consultant.

7) The DDC Controllers shall have Adaptive Control capability whereby the control software measures response time and adjusts control parameters accordingly to provide optimum control. The software shall allow self-tuning of the variable control loops (all or any of P, P+I, P+I+D) of the AHU's and chiller system so as to provide the most efficient and optimized controls at different load conditions. The energy management programs shall update their parameters based on past experience and current operating conditions.

8) Alarm Lockout shall be provided to prevent nuisance alarms. On the initial start up of air handler and other mechanical equipment a "timed lockout" period shall be assigned to analog points to allow them to reach a stable condition before activating an alarm comparison logic.

Tenderers shall indicate their proposed system alarm handling capability & features.

9) Run time shall be accumulated based on the status of a digital input point. It shall be possible to total either ON time or OFF time. Run time counts shall be resident in non-volatile memory.

10) It shall be possible to accommodate Holiday and other planned exceptions to the normal time programs. Exception schedules shall be operator programmable up to one year in advance.

11) Distributed power demand program shall be based on a sliding window instantaneous demand trend algorithm. The DDC interfaced to the demand meter shall calculate the demand, forecast the demand trend, compare it to the established demand limits, and initiate load shedding or re-establishment of loads as required. Shedding shall be on a sequential basis with least important loads shed first and restored last.

SYSTEM INTERFACE UNITS (SIU) / LAN ROUTERS / REPEATERS

A. General

1. Equip each router with a network transceiver on each network port (inbound and outbound) as dictated by the network type (Type 1 - FTT, Type 2 - TP).
2. The network router shall be designed to route messages from a segment, sub-net, or domain in full duplex communication mode.
3. Routers shall utilize LonTalk/Modbus/BacNet protocol transport, network, session layers to transparently route messages bound for a node address in another sub-net or domain.

4. Routers and repeaters shall be fully programmable and permit a systems integrator to define message traffic, destination, and other network management functions utilizing suitable software tool.
5. The routers and repeaters shall be capable of DIN rail or panel mounting and be equipped with status LED lights for Network traffic and power.
6. Provide a minimum of two Neuron 3120 or 3150 processors for use as the network router communication controller.

B. Ethernet IP Router

1. Equip each router with an Ethernet IP communication on one side and a Lon Talk/Modbus/BacNet transceiver Type 1 FTT or Type 2 - TP on the other side.
2. The network router shall be designed to route messages from a segment, sub-net, or domain in full duplex communication mode.
3. On Ethernet IP side, the router shall utilize Ethernet IP protocol transport to route messages.
4. On the LonTalk/Modbus/BacNet side, the routers shall utilize LonTalk/Modbus/BacNet protocol transport, network, and session layers to transparently route messages bound for a node address in another sub-net or domain.
5. Routers shall be fully programmable and permit a systems integrator to define message traffic, destination, and other network management functions utilizing the software tool.
6. The routers shall be capable of DIN rail or panel mounting and be equipped with status LED lights for Network traffic and power.

PORTABLE OPERATORS TERMINAL (POT)

A. General Requirements.

1. The DDUs shall permit the project operating staff to:
   i. Display point values
   ii. Display parameters
   iii. Change time schedule elements
   iv. List and acknowledge alarms
   v. Monitor points in the system
   vi. Command points (manual overrides) of points
   vii. Override input points (put inputs in test)
   viii. Read and check LonWorks variables on the network

ix. Password protected
x. Node configuration for Fan Coil and Rooftop Unit TCUs

2. DDU with the following components:
i. Liquid Crystal Display
ii. Minimum 4x20 character
iii. Pushbuttons for scrolling display and enter
iv. Permanent mount or portable connection.

DATA COMMUNICATION

The communication between controllers shall be via a dedicated communication network as per LonWorks/BacNet/Modbus recommended standards. Controllers microprocessor failures shall not cause loss of communication of the remainder of any network. All networks shall support global application programs, without the presence of a host PC.

Each controller shall have equal rights for data transfer and shall report in its predetermined time slot. There shall be no separate device designated as the communication's master. Those systems using dependent controllers shall be pointed out by the contractor and a dual redundant transmission media with automatic switching and reporting in the event of line faults will have to be provided.

The communication network shall be such that:

1) Every DDC must be capable of communicating with all DDC's.

2) Network connected devices with no messages to transmit shall indicate "No failure" message each cycle. Lack of this message after successive retries shall constitute a communication or device failure

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FIELD DEVICES

ELECTRIC AND ELECTRONIC CONTROLS RELATED EQUIPMENT

General Requirements

All controls shall be capable of operating in ambient conditions varying between 0-55 deg. C and 90% R.H. non-condensing.

All Control devices shall have a 20 mm conduit knockout. Alternatively, they shall be supplied with adaptors for 20 mm conduit.

Ancillary Items

When items of equipment are installed in the situations listed below, the BAS contractor shall include the following ancillary items :

(i) Weather Protection

All devices required to be weatherproofed are detailed in the Schedule of Quantities. IP ratings for the equipment is mentioned in the respective section.

(ii) Pipe work Immersion

Corrosion resisting pockets of a length suitable for the complete active length of the device, screwed ½" (13 mm) or ¾" (20 mm) NPT suitable for the temperature, pressure and medium.

(iii) Duct Mounting (Metal or Builders Work)

Mounting flanges, clamping bushes, couplings, locknuts, gaskets, brackets, sealing glands and any special fittings necessitated by the device.

Additional features

(i) Concealed Adjustment : All two position switching devices shall have concealed adjustment unless detailed otherwise in the Schedule of Quantities.

(ii) Operating Voltage : All two position switching devices shall operate on 230 v a.c and all accessible live parts shall be shrouded. An earth terminal shall be provided.

TEMPERATURE SENSOR

Temperature sensors for space, pipes and ducts, shall be of the Resistance Temperature detector (RTD) type or thermistor. These shall be two wire type and shall conform to the following specifications :

1) Immersion sensors shall be high accuracy type with a high resistance versus temperature change. The accuracy shall be at least ± 0.33 degrees F and sensitivity of at least 2 ohm/F.

2) Immersion sensors shall be provided with separate stainless steel thermo well. These shall be manufactured from bar stock with hydrostatic pressure rating of at least 10 kgf/cm^2.

3) The connection to the pipe shall be screwed ¾ inch NPT (M). An aluminum sleeve shall be provided to ensure proper heat transfer from the well to the sensor. Terminations to be provided on the head. Flying leads shall not be acceptable.

4) The sensor housing shall plug into the base so that the same can be easily removed without disturbing the wiring connections.

5) Duct temperature sensors shall be with rigid stem and of averaging type. These shall be suitable for duct installation.

6) Outdoor air temperature sensor shall be provided with a sun shield.

7) The sensors shall not be mounted near any heat source such as windows, electrical appliances etc.

The temperature sensors may be of any of the following types :

- PT 100, PT 1000, PT 3000
- NI 100, NI 1000
- Balco 500.
- Thermistor
- NTC1800

HUMIDITY SENSOR

Space and duct humidity sensors shall be of capacitance type with an effective sensing range of 10% to 90% RH. Accuracy shall be + 3% or better. Duct mounted humidity sensors shall be provided with a sampling chamber. Wall mounted sensors shall be provided with a housing. The sensor housing shall plug into the base so that the same can be easily removed without disturbing the wiring connections. The sensors shall not be mounted near any heat source such as windows, electrical appliances etc.

DIFFERENTIAL PRESSURE SWITCH FOR PIPE WORK

These shall be used to measure pressure differential across suction and discharge of pumps. The range shall be as specified in the data sheet. Switch shall be ON with increase in differential. Housing for these shall be weather proof with IP 55 protection. The pressure switch shall be capable of withstanding a hydraulic test pressure of 1.5 times the working pressure. The set point shall fall in 40-70% of the scale range and shall have differentials adjustable over 10%-30% of the scale range. The switches shall be provided with site adjustable scale and with 2 NO/NC contacts.

DIFFERENTIAL PRESSURE SWITCH FOR AIR SYSTEMS

These shall be diaphragm operated. Switches shall be supplied with air connections permitting their use as static or differential pressure switches.

The switch shall be of differential pressure type complete with connecting tube and metal bends for connections to the duct. The housing shall be IP 54 rated. The pressure switches shall be available in minimum of 3 ranges suitable for applications like Air flow proving, dirty filter, etc. The set point shall be concealed type. The contact shall be SPDT type with 230 VAC, 1 A rating.

The switch shall be supplied suitable for wall mounting on ducts in any plane. It should be mounted in such a way that the condensation flow out of the sensing tips. Proper adaptor shall be provided for the cables.

The set point shall fall within 40%-70% of the scale range and I have differentials adjustable over 10%-30% of the scale range.

The switches shall be provided with site adjustable scale and with 2 NO/NC contacts.

AIR FLOW SWITCHES

Air flow switches shall be selected for the correct air velocity, duct size and mounting attitude. If any special atmospheric conditions are detailed in the Schedule of Quantity the parts of the switches shall be suitably coated or made to withstand such conditions. These shall be suitable for mounting in any plane. Output shall be 2 NO/NC potential free. Site adjustable scale shall also be provided.

AIR PRESSURE SENSOR

The pressure sensor shall be differential type. The construction shall be spring loaded diaphragm type. The movement of the membrane in relation to the pressure should be converted by an inductive electromagnet coupling which would give an output suitable for the controller. The pressure sensor shall be in a housing having IP 54 ratings in accordance with IEC 529. Suitable mounting arrangement shall be available on the sensor. The sensor shall come complete with the PVC tubes & probes.

WATER FLOW SWITCH

These shall be paddle type and suitable for the type of liquid flowing in the line. Output shall be 2NO/2NC potential free.

TRANSDUCERS FOR ELECTRICAL SERVICES

Electrical transducers shall be integrated electronic type and rack mounted on the field. These shall work on 230 V supply with the output being standard type i.e. 4-20 mA, 0-10 Volts etc.

Power factor, Voltage, Current, Frequency and Kilowatt transducers shall have standard output signal for measurement for the specified variable.

Kilowatt-Hour metering(if any) shall be poly-phase, three- element with current transformer (CT) operated type. The metering shall feature high accuracy with no more than +/- 1% error over the expected load range. The coils shall be totally encapsulated against high impulse levels.

LEVEL SWITCH

The level switches shall have to meet the following requirement :

Type	:	Float Type/Capacitance type/Conductivity type
Mounting	:	To suit application.
Connection	:	Flanged ANSI 150 lbs RF Carbon steel
Float material	:	316 SS
Stem Material	:	316 SS
Output	:	2 NO, 2 NC potential free
Switch Enclosure	:	IP 55

Thermostat

Thermostat shall be snap acting fixed differential type thermostat for air-conditioning application for actuating the two way valve at each fan coil unit with HI-MED-LO fan switch and system setting OFF-FAN-COOL. Switching off must break fan circuit. Thermostat shall be provided with necessary relays to operate valve of cooling coil.

ELECTRONIC METERING

Electronic metering shall be provided on the main LT panel at incoming and outgoing feeders. These meters shall be installed in the LT panel by the Electrical contractor. The electrical contractor shall also provide necessary CT, PT and 220 V power input for the meters. All further control wiring and networking of the meters shall be in scope of BAS contractor.

The specifications for the electronic meters to be supplied by BAS contractor is as follows:

Type	:	Static Power Meter Class 1.0 accuracy.
Instantaneous Measurements	:	a. V (1-n), V (1-1) & 1 per ph & avg. V & I unbalance b. PF per ph & total, frequency

c. Power & BI-directional energy (active, apparent, reactive)

d. Peak & Predictive Demand (I, W, VA, VAR totals)

e. V & I harmonics (Individual & Total)

f. Time of use (internal calendar, multiple daily tariff, energy & demand accumulators).

Features	a.	Event Triggered
	b.	Sequence of event
	c.	Panel mountable
	d.	Internal battery backup
	e.	Transducerless connection via standard CT / PT
Display	Local LCD display panel user formattable display with scrollable screens.	

Software interface shall be ensured by contractor for the electronic meters. Systems requiring transducers for duplicating the data shall not be accepted.

All the instantaneous measurements shall be displayed on the control stations and the data shall be logged. It shall be possible to access minimum / maximum logging of any parameter with alarm annunciation for unusual measurements. The system shall also accept user defined “Set-Point” limit of any parameter.

ENCLOSURES FOR CONTROLLERS AND ELECTRICAL PANELS

All the controllers shall be housed in Lockable Vandal proof boxes which shall either be floor mounted or wall mounted. These shall be free standing, totally enclosed, dust and vermin proof and suitable for tropical climatic conditions.

The panel shall be metal enclosed 14 SWG CRCA sheet steel cubicle with gaskets between all adjacent units and beneath all covers to render the joints dust proof. All doors and covers shall be hinged and latched and shall be folded and braced as necessary to provide a rigid support. Joints of any kind in sheet metal shall be seam welded with welding slag grounded off and welding pits wiped smooth with plumber metal.

All panels and covers shall be properly fitted and secured with the frame and holes in the panels correctly positioned. Fixing screws shall enter into holes tapped into an

adequate thickness of metal or provided with nuts. Self threading screws shall not be used in the construction of control panels. Knockout holes of approved size and number shall be provided in the panels in conformity with the location of incoming and outgoing conduits/cables. lamps shall be provided to support the weight of the cables. The dimension of the boxes shall depend on the requirement with the colour decided in consultation with the Architect/Consultant.

Note : All panel enclosures used in plant room spaces and external to building shall be suitable for outdoor application (IP 54 protection) and UL listed.

CONDUITS AND WIRING

Prior to laying and fixing of conduits, the contractor shall carefully examine the drawings indicating the layout, satisfy himself about the sufficiency of number and sizes of conduits, sizes and location of conduits and other relevant details. Any discrepancy found in the drawings shall be brought to the notice of Architect/Engineers Any modifications suggested by the Contractor shall be got approved by the Architect /Engineers before the actual laying of conduits is commenced.

CONDUITS / TRUNKER

Conduits and accessories shall conform to relevant Indian Standards. PVC conduits of required dia shall be used as called for in the schedule of quantities. Joints between conduits and accessories shall be securely made, with help of adhesive.

The conduits shall be delivered to the site of construction in original bundles and each length of conduit shall bear the label of the manufacturer.

CONNECTIONS

All jointing methods shall be subject to the approval of the Architect/Engineer. Separate conduits shall run for all power wiring.

The threads and sockets shall be free from grease and oil. Connections between conduit and controller metal boxes shall be by means of brass hexagon smooth bore bush, fixed inside the box and connected through a coupler to the conduit. The joints in conduits shall be smooth to avoid damage to insulation of conductors while pulling them through the conduits.

BENDS IN CONDUIT

Where necessary, bends or diversions may be achieved by means of bends and/or circular inspection boxes with adequate and suitable inlet and outlet screwed joints. In case of recessed system each junction box shall be provided with a cover properly secured and flush with a finished wall surface. No bends shall have radius less than 2-1/2 times the outside diameter of the conduit.

SIGNAL CABLING & COMMUNICATION CABLING

The signal cable shall be of the following specifications :

a.	Wire	:	Annealed Tinned Copper
b.	Size	:	1.5 sq. mm, 7 strands
c.	No. of conductors	:	Two (One pair)
d.	Shielding	:	Overall beld foil Aluminum polyester shield.
e.	Jacket	:	Chrome PVC
f.	Nominal DCR	:	17.6 ohm/km for conductor 57.0 ohm/km for shield
g.	Nominal OD	:	8.5 mm
h.	Nominal capacitance	:	130 pF/m between conductors at 1 KHz 180 pF/m between one conductor and other conductors connected to shield.
i.	Color	:	Black and Red

COMMUNICATION CABLE

The communication cable shall be of the following specifications :

a.	Wire	:	Annealed Tinned Copper
b.	Size	:	Minimum 24 AWG stranded
c.	No. of conductors	:	One pair (2 conductor)
d.	Shielding	:	Overall beld foil Aluminum polyester shield.
e.	Jacket	:	Chrome PVC
f.	Nominal DCR	:	78.7 ohm/km for conductor 55.8 ohm/km for shield
g.	Nominal OD	:	5.64 mm
h.	Nominal capacitance	:	131 pF/m between conductors at 1 KHz 243 pF/m between one conductor and other conductors connected to shield.
i.	Color	:	Black and Red, Black and White)

10.2 IP based CCTV Surveillance System

The IP based Closed Camera surveillance system is installed and use state of the art technology. Additional CCTV surveillance system shall have to comply with the UL standards.

The IP based systems shall either use integrated or encoders for their camera systems and shall be from the same manufacturer as that of the IP Digital Video management system provider.

All the cameras proposed shall be power over Ethernet with option for 24 Vac input.

The system shall support open architecture and shall not have any proprietary equipments to ensure future compatibility with third party systems

The scope shall include supply, installation, testing, commissioning and maintenance of the IP based CCTV system proposed.

Scope shall includes Supply , installation , testing and commissioning of cameras, managed network switches / network video recorders/severs , Digital Video Management Software (DVMS) software workstations , monitors , racks , consoles cables , UPS etc . The specifications for these components shall be as mentioned below.

The location of the Cameras shall be such that no blank spot is observed in the Server Room Area and all the external equipments shall be under CCTV Surveillance.

IP Based Varifocal Lens Dome camera (Indoor – Internal Server & other Critical Areas)

- The IP based domes cameras shall support power over Ethernet (IEEE802.3at)
- The IP cameras shall support open architecture and shall support the following protocols TCP / IP, UDP / IP (Unicast , multicast IGMP) UPnP, DNS, DHCP, RTP, NTP .
- The camera shall support multilevel password protection.
- The camera shall provide 3 simultaneous video streams – Dual MPEG4 both 25 fps (Pal) and scalable MJPEG .
- The cameras shall be enclosed in tamper resistant hardware with puncture proof bubble. Outdoor cameras shall have IP 66 protection.

- The cameras shall have optics options available for low light , day night , extreme light and shall be of high resolution with minimum 540 TV lines
- The varifocal lens shall be available in following options 3 to 9 mm and 9 to 22 mm
- The cameras shall use 1/3 inch interline color CCD/CMOS imaging device.
- The sensitivity of the cameras shall be a minimum of 0.5 lux @ 40 IRE and for outdoor applications it shall be sensitive upto 0.015 lux @ 40 IRE with infrared cut filter and optical low pass filter

IP Based C / CS Mount Colour Camera(Indoor/Outdoor)

- The IP based domes cameras shall support power over Ethernet (IEEE802.3at)optionally shall also support BNC output.(composite video output)
- The IP cameras shall support open architecture and shall support the following protocols TCP / IP, UDP / IP (Uncast, multicast IGMP) UPnP, DNS, DHCP, RTP, NTP.
- The camera shall support multilevel password protection.
- The camera shall provide 3 simultaneous video streams – Dual MPEG4 both 25 fps (Pal) and scalable MJPEG .
- Cameras for outdoor application shall be used with suitable lens in a outdoor housing with suitable heater, defroster, sun shroud kit as required with IP 66 protection.
- The cameras shall have a minimum of 480 TVL lines along with extended dynamic range
- The cameras shall use 1/3 inch imager, with minimum illumination of 0.5 lux @ 40 IRE.
- Fixed / varifocal lens shall be s selected as per the site conditions.
- Cameras shall be UL listed

IP Based High Speed PTZ Dome camera(Outdoor–DG Set/Power House/Condenser Units)

- The camera shall support simultaneous IP and Analog Video and Control
- The camera shall provide 3 simultaneous video streams – Dual MPEG4 both 25 fps (Pal) and scalable MJPEG .
- The IP cameras shall support open architecture and shall support the following protocols TCP / IP , UDP / IP (Unicast , multicast IGMP) UPnP , DNS , DHCP , RTP , NTP .
- The camera shall support multilevel password protection.
- The cameras shall support 4 auto focus, high resolution integrated camera and optics package

Optics package shall have the following specs

¼ in format , Exview HAD CCD

Resolution 540 TVL

Lens – 3.6 to 119 mm (35 X) optical with 12 X digital

Sensitivity – 0.55 lux @ 35 IRE (color only) / 0.00018 (mono)

Electronic Image stabilization

Inbuilt motion detection

Wide Dynamic range range upto 128 X

IP 66 rated

Minimum 99 presets

Accuracy of up to +/- 0.1 deg

Pan speed – 360 deg / sec and Tilt speed 200 /sec

Tilt speed – 200 deg / sec

Auto flip upto 180 deg /sec

Multiple park and power-up option

All the proposed cameras shall be UL Listed.

11. Racks

1 Cabinet should be constructed in Steel of IS 513 D. Rated for 1000 Kgs equipment loads. Cabinet should be 42U,19" 600WX1200D for server racks and 42U, 19” 800W x 1000D for network racks.

Cabinet should have form factor of not more than 1.05 when compared between overall height to usable height Cabinet should be possible to completely knock down able.

3 pairs of depth support channels should be fixed between the front and the rear picture frame for additional rigidity to the frame. These depth Support should be designed for tool less installation

The Cabinet should have bottom cover in split in two section in 18 gauge. These bottom cover will have 45 deg angled end for aesthetic looks. The height of the bottom cover should not exceed 45mm. The rear Bottom Cover should have provision for cable entry. Provision for mounting Cable brush should be provided in the rear Bottom Cover. The Top cover should be fixed from inside of the cabinet. The rear side of the top cover should have provision for cable entry. Provision for mounting cable brush should be provided in the rear top cover. The top Cover should have provision for installing display panel without occupying 19" usable area.

2 Side panels should be fixed from inside there by not providing access to open the side panels from outside. Side panel should be locked without key from inside preferable with use of a latches. Rack should be provided with a dual side panel on each side for easy of handling. Side Covers should be in two section in 18 Gauge. These covers should be hooked from the top and locked at bottom from Inside of the rack.

3 Cabinet should have provision for mounting PDU which are recessed towards the side panel to offer clear path for accessing the 19" Mounting angle. Rack should be provided with full height Frames positioned along the edges of the cabinet and outside of the active 19” space so as to provide clear access to the rear of installed equipment and not to impede the flow of warm exhaust air towards the cabinet rear door

4 Completely recessable 19" equipment mounting angles should be in 14 Gauge with notches at regular interval for mounting of equipment such as High end Servers, Telecom equipment, etc as per Industry standards to be provided. The Cabinet should be able to install any standard equipment with varying depth without the use of any additional accessories.

5 The Cabinet should be designed for structure cabling.

The cabinet will have ease of routing the cable into the cabinet or taking out of the cabinet without any down time. In other wrds the cabinet can be positioned in place once the cabling is

completed. Bottom rear side of the rack should be provided with cable entry cutout with cable brushes.

6 Front and Rear doors should be made in Steel and with hexagonal perforation, The perforated area of the front door should cover 100% of the active equipment area of the cabinet. The Door should be with three point locking mechanism and should be designed for tool less installation for ease of handling and installation on site. Option of Installing Split door should also be available. The Front and rear doors will close between the top and Bottom Cover

7 Rack should be provide with base frame to eliminate point loads

8 Rack should be provide with proper earthing arrangement in both front and rear with use of a earthing sqid.

9 Rack should be modular in nature, provision of adding a Integrated cabling frame (200 mmW) with over all depth matching the depth of the main rack, the rack can be converted for handling dense cabling in front & rear for networking.

12. Network Cabling

- Hybrid network cabling with fiber and copper shall be implemented for the datacenter
- Every row of racks in the server farms shall have a network rack placed at the end of the row.
- The network rack shall aggregate cables from each server rack and also house the end of row switches.
- Cables from server racks will be terminated in network racks in the same row as well as the next row for redundancy.
- 12 runs for CAT6A cable shall be provided from each server rack to network rack of the same row and additional 6 runs shall be provided to the network of the neighboring row.
- Similarly 12-core OM4 fiber cabling shall be provided from each server rack to the network rack of the same row and additional 12 core OM4 fiber shall be provided to the network of the neighboring row.
- Each server rack shall have a 24-port Angled CAT6A Jackpanel and 24-port fiber LIU with OM4 adapters.
- Each network rack shall have two separate 24 Runs of CAT6 Cabling to two different network racks in the network room.
- Each Network rack shall have two separate runs of 24 core OM4 fiber and 24 core SM fiber.
- All cables shall be LSZH type
- All cables shall be laid on overhead cable trays with redundant routes as per the enclosed drawing.
- The cabling and conduit systems shall be any one of AMP/Tyco, Clipsal and Commscope makes.

13. DC Certification

A. The Datacenter shall be designed and constructed as per the Tier III guidelines of Uptime Institute.
B. The successful bidder has to obtain design certification from Uptime of their datacenter design before commencing of the implementation. The bidder is solely responsible for the design. Any changes in design or increase in BOQ required for the design certification shall be to the account of the bidder.
C. The design provided as a part of this RFP is indicative. The bidder may suitably modify the design to meet the guidelines of the Uptime Institute. However the capacity and performance requirements as specified in the RFP shall remain the same.
D. After installation, the bidder has to obtain site certification of the facility from Uptime Institute. The site acceptance process will start only after the site certification.
E. If required, RailTel may require the proof of quotes from certifying agency both for design and site certification to be enclosed to decide the reasonableness of the rates.

13.1. PUE Calculation

PUE Metric Calculation

Power Usage Effectiveness (PUE) is the recommended metric for characterizing and reporting overall data center infrastructure efficiency. The task force strongly recommends annual energy Consumption (kWh) for all energy types as the unit of measure for PUE calculation. However an entry level measurement category has been included in the recommendations to allow operators that do not have consumption measurement capability to utilize demand based power readings.

PUE is defined by the following formula:

PUE = (Total data center energy consumption or power / IT energy consumption or power)

The following sections detail boundary considerations for both Dedicated Data Centers and Mixed-Use Data Centers, describe the four recommended PUE categories for data centers, and address calculation details associated with proper accounting of all fuels and on-site systems.

Data Center Boundaries

The PUE calculation guidelines presented in this document address two data center configurations: Dedicated Data Center i.e. the data center is a free-standing building.

Mixed-Use Data Center with dedicated infrastructure i.e. the data center is within a larger building that has other uses, but the data center has dedicated HVAC and electrical systems.

The PUE calculation approach presented below is the same for both these configurations.

However, there are some minor differences in how the boundary for total energy use is defined for each configuration, as shown in Figure 1:

In Dedicated Data Centers, the boundary is the building boundary i.e. all energy uses within in the building are included.

In Mixed-Use Data Centers, shared ancillary services such as common lobbies, common bathrooms and elevators may be excluded from the energy use boundary. However, ancillary services that are dedicated to the data center must be included (e.g. lobby, bathrooms, office spaces that are dedicated to the data center operation).

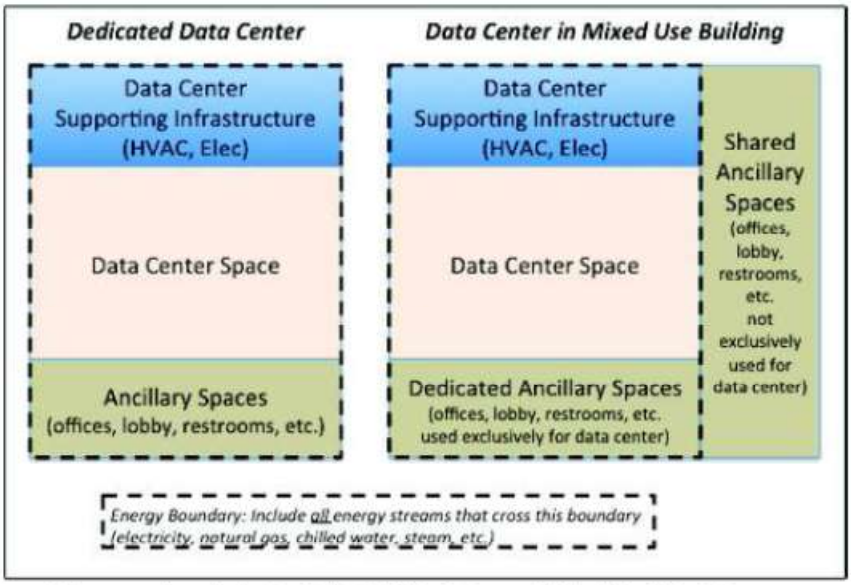

Figure 1: Energy use boundaries for Dedicated Data Centers and Mixed-Use Data Centers.

PUE Categories

Table 1: PUE measurement categories recommended by this task force.

	PUE Category 0*	PUE Category 1	PUE Category 2	PUE Category 3
IT energy measurement location	UPS output	UPS output	PDU output	IT equipment input
Definition of IT energy	Peak IT electric demand	IT annual energy	IT annual energy	IT annual energy
Definition of Total energy	Peak Total electric demand	Total annual energy	Total annual energy	Total annual energy

*For PUE Category 0 the measurements are electric demand (kW).

PUE Category 0

This is a demand based calculation representing the peak load during a 12-month measurement period. IT power is represented by the demand (kW) reading of the UPS system output (or sum of outputs if more than one UPS system is installed) as measured during peak IT equipment utilization. Total data center power is measured at the data center boundary (e.g. point of electric feed for Mixed-Use Data Centers or utility meters for Dedicated Data Centers) and is typically reported as demand kW. As this is a snapshot measurement, the true impact of fluctuating IT or

mechanical loads can be missed. However consistent measurement can still provide valuable data that can assist in managing energy efficiency. PUE category 0 may only be used for all electric data centers i.e. it cannot be used for data centers that also use other types of energy (e.g. natural gas, district chilled water, etc.).

PUE Category 1

This is a consumption based calculation. The IT load is represented by a 12-month total kWh reading of the UPS system output (or sum of outputs if more than one UPS system is installed).This is a cumulative measurement and requires the use of kWh consumption meters at all measurement points. The total energy must include all fuel types that enter the data center boundary (electricity, natural gas, chilled water, etc). Annual reading should reflect 12 consecutive months of energy data. This measurement method captures the impact of fluctuating IT and cooling loads and therefore provides a more accurate overall performance picture then PUE Category 0.

PUE Category 2

This is a consumption based calculation. The IT load is represented by a 12-month total kWh reading taken at the output of the PDU's supporting IT loads (or sum of outputs if more than one PDU is installed). This is a cumulative measurement and requires the use of kWh consumption meters at all measurement points. The total energy is determined in the same way as Category 1.

PUE Category 3

This is a consumption based calculation. The IT load is represented by a 12 month total kWh reading taken at the point of connection of the IT devices to the electrical system. This is a cumulative measurement and requires the use of kWh consumption meters at all measurement points. The total energy is determined in the same way as Category 1.

REQUIRED PUE FOR PHASE 2 shall be 1.5 Category 1. Bidder can ask for existing system details for arriving to the PUE Value

PUE Calculation to be submitted in below format,

POWER USAGE EFFECTIVENESS CALCULATION - 01						
Sr. No.	**Details of Load**		**30%**	**50%**	**70%**	**100%**
	IT LOAD & TOTAL SYSTEM LOAD					
A	IT Load Running Load in KW (AC + DC)					
	TOTAL POWER CONSUMPTION IN KWH FOR IT Racks (8760Hours) - KWH					
A'	Maximum Demand Load(At LT Panel) in kW					
B	ELECTRICAL SYSTEM LOSSES (TOTAL)					
I	**UPS Losses**					
Iii	IT load Isolation Transformer Losses					

Iv	Distribution & Panel, Lighting, Cabling Losses of Connected Load.					
V	Distribution Transformer loss					
	TOTAL LOSSES OF ELECTRICAL SYSTEM					
	TOTAL POWER LOSS IN KWH IN ELECTRICAL SYSTEM (8760Hours)	**KWH**				
C	COOLING SYSTEM POWER CONSUMPTION					
I	**Server Room Cooling Unit**					
Ii	**Electrical Room Cooling Units**					
Iii	**Battery Room Cooling Units**					
Iv	Comfort AC Power Consumption					
V	NOC Room Workstation load & IBMS Load					
	TOTAL POWER CONSUMPTION IN KWH FOR HVAC SYSTEM (8760Hours)	**KWH**				
D	**Lighting Load - 8.4kW (only 30% working) rest on motion sensor**	**KWH**				
E	**Total Load (A+B+C+D+E) - Annualised Power Consumption in kWH**	**KWH**				
F	**PUE = F / A**					

14. Submittals

The bidder shall submit the documents including but not limited to the following as part of the technical bid:

1. Details electrical SLD of Phase 2 Datacenter scheme conformance to Uptime Tier III guidelines of concurrent maintainability.
2. Details Earthing Scheme for Phase 2 as per IEEE 1100 and TIA 942 compliance.
3. Detailed Phase 2 DC layout with Cross section view
4. Cable Tray Layouts for Phase 2
5. HVAC and piping layout.
6. DG/Transformer yard/Power House.
7. Datasheet/Technical Brochures of all the Equipments proposed in Datacenter
8. Detailed BOQ for all components and subsystems. Each subsystem BOQ shall contain detailed break up of the components and quantities without prices.
9. PUE Calculation as per Category 1 as per tender format to be provided.
10. OEM/Manufacturer Authorization letter in Original duly signed by authorized signatory of OEM for UPS, PAC, PDU, Racks, DGs, IBMS services and other components.
11. List of documents for demonstrating compliance to Eligibility Criteria.
12. Details on Tier III Design and Certification experience, If any through certificate/letter from Certification Authority.

These submittal forms part of technical evaluation process.

The design document would be evaluated for compliance to the design requirements, technical specifications and compliance to specified standards such as Uptime Institute Tier III, TIA 942, NFPA, IEEE, etc.

Any bid not compliant to this requirement is liable to be rejected.

15. Approved Makes of components

1. The bidder has to use high quality components from reputed OEMs. The make/model number of all components has to be specified for all the components.
2. All the components/equipment used should be manufactured in a facility with minimum quality certification of IS9001:2008.
3. The components/equipments shall be ISI certified wherever required/applicable.
4. The list of approved makes and model numbers are given in the following table. For those components, which are not listed in the table, they should be from reputed manufacturers with significant market share in India.
5. Any makes/brands specified in the technical specifications (Section 1, Chapter III) shall also be applicable.

Sr. No.	Components/Equipments	Makes Preferred
1	HT Switch Gears	Schneider/ Siemens/ABB
2	ACBs/MCCBs	Schneider/Siemens/ABB
3	MCBs	Schneider/Seimens/ABB/Legrand
4	Engine	Perkins/Cummins/ MTU/Volvo/Caterplier
5	Alternator	Stanford/LS/SDMO
6	UPS	Schneider/Emerson/Socomec
7	HT & LT Cables	Finolex/Polycab/KEI/RPG
8	Lighting	Wipro/Philips/Crompton
9	LT Panel Builder	Schneider/ABB/Seimens
10	Precision AC	Stulzs/Uniflair/Emerson
11	IBMS	Honeywell/Siemens/JCI/Schneider
12	CCTV	Honeywell/Bosch/Cisco/DVTel/Pelco/Axis
13	Racks	APC/Emerson/Rittal/APW President
14	Structured cabling	Tyco/Commscope/Clipsal/Belden
15	Fiber/Copper cabling trays/wire baskets	Tyco or equivalent
16	Packaged PDU	APC/Emerson

SECTION-I

CHAPTER-IV

DRAWINGS (enclosed separately)

RAILTEL CORPORATION OF INDIA LTD.
(A Govt. of India Enterprise)
2nd Floor, B-Block, Rail Nilayam
Secunderabad – 500 071

TENDER DOCUMENT

SECTION -II

COPY NO.

SOLD TO:

INDEX

SECTION II

CHAPTER - I

INSTRUCTIONS TO TENDERERS

AND

CONDITIONS OF TENDERING

INSTRUCTIONS TO TENDERERS AND CONDITIONS OF TENDERING

INDEX

22. AGREEMENT

23. FOREIGN EXCHANGE AND HIGH SEA SALE

24. TENDERER'S ADDRESS

25. PREFERENCE TO PUBLIC SECTOR UNDERTAKING

INSTRUCTIONS TO TENDERERS AND CONDITIONS OF TENDERING

1. GENERAL INSTRUCTIONS

1.1 Tender is invited on behalf of M/s RailTel Corporation of India Limited, 2nd Floor, B-Block, Rail Nilayam, Secunderabad – 500 071for the work as defined in preamble para 1.

1.2 The Preamble, Instructions to Tenderers and Conditions of Tendering, Special Conditions of Contract, Technical Specifications & Supplement, Schedule of Requirements, all Annexures & Forms and Corrigendum & Addendum etc, if any, shall, hereafter, be collectively referred to as the **"Tender Papers"**.

2. INTERPRETATIONS

The following terms wherever occurring in the tender papers and wherever used throughout the execution of the work, shall, unless excluded by or repugnant to the context, have the meaning attributed thereto as follows:

"CONTRACT" Means the Contract resulting from the acceptance by the Purchaser of this Tender whether in whole or in part.

"CONTRACTOR" Means the successful Tenderer, i.e., the Tenderer whose Tender has been accepted either in whole or in part.

"CONTRACTOR's REPRESENTATIVE" Shall mean a person in supervisory capacity who shall be so declared by the Contractor and who shall be authorized under a duly executed power of attorney to receive materials issued by the Purchaser to the Contractor for the works. He shall be responsible for proper execution of works at each or all places and shall take orders from Purchaser's Engineers and carry out the same.

" ENGINEER / ENGINEER-IN-CHARGE " Shall mean an executive of RailTel incharge of works and shall include the superior executives of RailTel. He is responsible for ensuring that all field works covered by the contract are carried out in accordance with approved designs, drawings & specifications and conditions of contract as agreed to.

" ENGINEER'S REPRESENTATIVE " Shall mean the supervisor of RailTel in direct charge of the works.

"EQUIPMENT" Means all or any equipment considered necessary by the Purchaser's Engineers for satisfactory operation, as a whole, of the installations.

"MONTH" Means any consecutive period of thirty days.

"MATERIALS" Means all equipments, components, fittings and other materials including raw materials required to complete the work..

"PURCHASER" Means Executive Director, RailTel Corporation of India Limited, 2nd Floor, B-Block, Rail Nilayam, Secunderabad-500071 .

"PURCHASER'S ENGINEER" Means the General Manager of RailTel or successor who will decide all matters relating to design, manufacture, installation and commissioning of the plant and equipment at site.

"SUB-CONTRACTOR" Means an individual or a firm of Contractor or a Company registered under Indian Company Act or an approved supplier of materials to whom the Contractor sublets portions of the contract.

"CONSIGNEE" Means the person specified in the Acceptance of Tender to whom Stores are to be delivered at the destination.

"INSPECTING OFFICER" Means the person ,or organisation specified in the contract for the purpose of inspection of stores of work under the contract and includes his/their authorised representative.

"RailTel" Means RailTel Corporation of India Limited, 2nd Floor, B-Block, Rail Nilayam, Secunderabad-500071

"SITE" Means the areas to be taken up by the permanent works, together with any other area or areas as shall be determined by the Purchaser's Engineer, which may be placed at the disposal of the Contractor for the purpose of the contract and also such area or areas used for store yards, works yards or workshop in proximity of the works as the Purchaser's Engineer may have authorized as an extension of the site, irrespective of the terms and conditions under which they are occupied by the Contractor.

"**BLOCK SECTION"** Means the distance along the railway track between two consecutive Railway stations.

"TENDERER" Means and includes any firm of engineers or Contractors or any company or body, corporate or otherwise, who submit the Tender which has been invited.

"WORK OR WORKS" Means all or any of the items of the work for which the Tenderer /Contractor has Tendered/contracted according to the specifications, drawings and Annexure hereto annexed or to be implied there from, or incidental thereto or to be hereafter specified or required in such explanatory instructions and drawings, being in conformity with the original specifications, drawings, Annexure and schedules and also such instructions and drawings additional to the aforementioned as may from time to time be issued by the Purchaser's Engineer during the progress of the contracted work.

"WRITING" Includes all matters written, typewritten or printed either in whole or in part.

3. LOCAL CONDITIONS

3.1 It will be imperative on each tenderer to fully acquaint himself with all the local conditions and factors which would have any effect on the performance of the contract and cost of the stores. The purchaser shall not entertain any request for clarifications from the tenderer regarding such local conditions. No request for the change of price, or time schedule of delivery of stores shall be entertained after the offer is accepted by the purchaser on account of any local condition or factor.

3.2 The intending tenderer is advised to study the tender papers carefully. Any submission of a bid by the tenderer shall be deemed to have been done after a careful study and examination of these documents with full understanding of the implication thereof. These conditions and specifications shall be deemed to have been accepted unless otherwise, specifically commented upon by the Tenderer in his quotation. Failure to adhere to anyone or all these instructions may render his offer liable to be ignored without any reference.

3.3 Should a tenderer find discrepancies in, or omission from, the drawings or any of the Tender papers or he has any doubt to their meaning, he should at once notify the RailTel who may send a written clarification to all tenderers.

4. COMPLIANCE TO TENDER CONDITIONS, SPECIFICATIONS & DRAWINGS

4.1 The tenderer shall indicate paragraph by paragraph for each section of the tender document that either his tender complies in every respect with the requirements of each clause and sub clause or if not, precisely how they differ from the requirements of the tender. In latter case, the Tenderer shall enclose a separate statement as per proforma given, indicating only the deviations for any clause or sub clause of Special Conditions of Contract, Instructions to Tenderers and Conditions of Tendering, Technical Specifications, Preamble etc. which he proposes with justifications for deviations proposed. The purchaser reserves the right to accept or reject these deviations and his decision thereon shall be final (see Form 5).

4.2 The equipment offered shall be in accordance with the drawings and specifications. Details of variation from the drawings and specifications, if any, should be clearly indicated separately for each annexure with justification for deviations proposed. The Purchaser reserves the right to accept or reject these deviations and his decision thereon shall be final.

4.3 Firms should give details of similar works carried out giving details of the name of the project, date of award, length of the section, value of the contract, the original execution period and the actual execution time taken.

4.4 The tenderer should serially number all the pages of the credential bid (part I).

4.5 The tenderer should provide information about the compliance of various clauses / sub clauses / paragraphs (when tenderer plans to give separate compliance of

each paragraph or sub clause) of section I,II and III of the tender document as per following table.

1.1.1.1.1

Serial no.	Clause no. with chapter and volume no.	First few words of clause / sub clause / paragraph	Compliance status (compliant/ partially compliant/non-compliant)	Reference of clause /page no. of supporting document (this page no. shall correspond to the serial numbering of the credential bid)	Remarks if any

The table given above , complete in all respects, must be placed with offer letter in the Credential bid (Part I) of the document. For partially compliant and non-compliant items, suppliers shall state if functionality will be fully supported in future release of equipment.

5. EARNEST MONEY/ BID GUARANTEE

5.1 The tenderer shall furnish an amount given in of “Preamble para 10” as earnest money in favour of RailTel Corporation of India Limited.

5.2 The tenderers shall hold the offer open till such date as specified in Clause 9 of this chapter. It being understood that the tender documents have been sold/issued to the tenderer and the tenderer has been permitted to tender in consideration of the stipulation on his part that after submitting his tender he will not resile from his offer or modify the terms and conditions thereof in a manner not acceptable to RailTel. If the tenderer fails to observe or comply with the foregoing stipulation, the aforesaid amount deposited as Earnest Money shall be liable to be forfeited by the RailTel.

5.3 The Earnest Money receipt shall be incorporated in the original copy of the tender document. Other copies of the offer shall contain true copies of Earnest Money receipt. The Earnest Money should be furnished in the form of an Account Payee Demand Draft in favour of M/s RailTel Corporation of India Limited payable at Secunderabad (India) from SBI or a Nationalized Bank or a schedule Commercial Bank operating in India.

5.4 The earnest money may be forfeited.

5.4.1 If tenderer withdraws its tender during the period of tender validity specified in clause 9 of Instructions to tenderers and Conditions of Tendering.

5.4.2 In the case of successful tenderer, If the tenderer fails to sign the contract in accordance with clause 2 of Special Conditions of Contract and to furnish performance guarantee in accordance with clause 3.1 of Special Conditions of Contract.

5.5 The earnest money of unsuccessful tenderer will save as herein before provided, be returned within reasonable time to the unsuccessful tenderer but the RailTel shall not be responsible for any loss or depreciation that may happen to the security for the due performance of the above stipulation to keep offer open for the period specified in the tender documents or to the Earnest Money while in their possession nor be liable to pay interest thereon.

5.6 If the tender is accepted, the amount of Earnest Money will be held as security deposit for due and faithful fulfillment of contract. The Earnest Money of successful tenderer will be returned after the Contract Performance Guarantee (Security Deposit) as required under para clause of Special Conditions of Contract is furnished and formal contract duly signed is received by the purchaser.

5.7 The tender not accompanied by Earnest Money as mentioned in clause 5.3 above will be **summarily rejected**.

6. SUBMISSION OF OFFERS

6.1 The offer in the prescribed forms should be submitted before the time and date fixed for the receipt of the offers. Offers received after the stipulated time and date will be **summarily rejected.**

6.2 In case the date of opening happens to be a holiday, the tender will be received and opened at the same time on the next working day.

6.3 The offer shall be either type written or written neatly in indelible ink in English. Each page of the offer must be numbered consecutively. A reference to total number of pages comprising the offer must be made at the top right hand corner of the top page. The supporting documents should be submitted either in original or duly signed by the authorised signatory of the tenderer. The original documents shall be produced for verification when called for.

6.4 All copies of the tender papers shall be signed in ink by the tenderer, on each page including closing page in token of his having studied the tender papers carefully.

6.5 **RATES IN FIGURES & WORDS** :-

(I) All prices and other information like discounts etc. having a bearing on the price shall be written both in figures and in words in the prescribed offer form. In case of difference in words and figures the amount written in words will be taken into consideration.

(ii) In the event of any discrepancy between unit rate and total cost, the value shown in unit rate will be taken for evaluation purpose.

(iii) In case the schedule of requirement quoted by tenderer is incomplete with reference to tender document, the offer is liable to be rejected.

6.6 **ATTESTATION OF ALTERATION**: No scribbling is permissible in the tender documents. Tender containing erasures and alterations in the tender documents are liable to be rejected. Any correction made by the tenderer/ tenderers in his/their entries must be signed (not initialed) by him/them.

6.7 The tender shall be submitted in two parts, **Part I - Technical Bid** along with soft copy in CD and **Part II - Price Bid.** Both bids shall be sealed in separate envelops and both envelops put in one large envelop. All the three envelops should bear the tender number its description and date of closing/opening.

(i) The tenderer shall submit his tender in three copies in one sealed cover. Each copy of the tender shall be complete in all respects. The copies should be marked "original" & 'Duplicate'.

(ii) The original tender paper purchased from this office/ down loaded from web site shall be submitted with each page duly signed and stamped along with the original offer

(a) **Part-I "Technical BID "** :- The credential bid shall consist of the following:-

- Offer letter complete. (Form-I)
- Schedule of Supply and Services (i.e., Schedule of Requirements) with summary of prices blanked out.
- Bill of material with prices blanked out.
- Earnest Money in prescribed form. (Clause 5.0)
- Audited balance sheet duly certified by tenderer.
- Constitution of Firm and Power of Attorney (Clause 7)
- Clause wise compliance to tender conditions & statement of deviations (Clause 4). (Form No.5)
- Tenderer's credentials and willingness of original manufacturer as per Qualifying Criteria. (Clause 5.1.2 of preamble)
- Similar works executed or under execution. (Form No. 13) (Clause 5.1.3 of Preamble)
- User's Certificate (Form No. 2) (Clause 5.1.4 of preamble)
- System performance guarantee (Clause 20). (Form no. 7)
- Complete technical data and particulars of the equipment offered, as specified in the Tender papers together with descriptive literature, leaflets, Drawings, if any, complete with list etc. (Clause 5.4 of preamble).
- Name of manufacturers, place of manufacture and the certificate for proven design and performance (Clause 5.4 of preamble)
- Technical proposal of tenderer in conformity with system design or alternative proposal of the tenderer, if any.
- Any other information desired to be submitted by the tenderer.
- The present work load of the datacenter turnkey contracts in hand as per the format (Form No.9). (Clause 5.2.5 of preamble)
- A checklist should be submitted indicating requirement of eligibility criteria and document submitted against the same

Note: The Credential Bid (Part-I) under no circumstances should contain the rates offered otherwise the bid shall be

summarily rejected. This envelop shall be clearly superscribed with "Credential Bid (Part I)"alongwith tender number, its description and NOT to be opened before due date in bold letters & sealed.

(b) **Part-II " Price Bid "** Shall contain the offer letter and the price of each item quoted exactly according to the proforma and schedule of requirements and shall be clearly superscribed with "Price Bid (Part-II)" along with tender number and its description in bold letters & sealed.

7. CONSTITUTION OF FIRM AND POWER OF ATTORNEY

7.1 Any individual(s) signing the tender or other documents connected therewith should specify whether he is signing:-

(a) As sole proprietor of the concern or as attorney of the sole Proprietor.
(b) As a partner or partners of the firm.
(c) As a Director, Manager or Secretary in the case of Limited Company duly authorized by a resolution passed by the Board of Directors or in pursuance of the authority conferred by Memorandum of Association.
d) As a lead member of Consortium or joint venture of firms

7.2 In the case of a firm not registered under the Indian Partnership Act, all the partners or the attorney duly authorized by all of them should sign the tender and all other connected documents. The original Power of Attorney or other documents empowering the individual or individuals to sign should be furnished to the Purchaser for verification, if required.

7.3 The RailTel will not be bound by Power of Attorney granted by the tenderer or by the changes in the composition of the firm made subsequent to the execution of the contract agreement.

7.4 In case where the Power of Attorney partnership deed has not been executed in English, the true and authenticated copies of the translation of the same by Advocate, authorized translators of Courts and Licensed Petition Writers should be supplied by the Contractor(s) while tendering for the work.

7.5 The duly notorised Power of Attorney, Partnership Deed, Memorandum of Joint Venture as the case may be in original or duly signed.

8. UNIT PRICES

The Unit prices should be quoted in Indian Rupees by the tenderer after taking all the relevant factors into consideration and these should be Firm and all inclusive without any variation clauses. The prices shall be quoted in rupees for the units under metric system.

9. VALIDITY OF OFFER

The tenderer should keep the offers valid for the period as mentioned in “Preamble” Clause 8.

10. RATES DURING NEGOTIATION

The tenderer/s shall not increase his/their quoted rates in case the RailTel Administration negotiates for reduction of rates. Such negotiations shall not amount to cancellation or withdrawal of the original offer and the rates originally quoted will be binding on the tenderer/s.

11. Deleted

12. PERIOD OF COMPLETION AND TIME PROGRESS GRAPH

The works/work are/is to be completed within a period as mentioned in preamble from the date of issue of Letter of Acceptance of the tender. Tenderer shall submit target dates for various stages of contract execution to ascertain completion period.

13. OPENING OF TENDER:

13.1Tenderer’s Credential Bid (Part-I) will be opened at the time & date of opening of the tender given in the preamble in presence of such Tenderers/Authorized Representatives who choose to be present.

13.2 After scrutinizing Credential Bid, "Price Bid (Part- II)" will be opened on a time and date to be informed separately in presence of those Tenderers who qualify in "Credential Bid (Part-I)" as per qualifying criteria laid down in Clause 18 of this Chapter and meeting with technical specifications and who choose to be present.

13.3 Price Bid (part-II) envelops of those Tenderers who are not found to meet tender conditions will not be opened.

14. NON-TRANSFERABILITY AND NON-REFUNDABILITY

The tender documents are not transferable. The cost of tender paper is not refundable.

15. ERRORS, OMISSIONS & DISCREPANCIES

The Contractor(s) shall not take any advantage of any mis-interpretation of the conditions due to typing or any other error and if in doubt, shall bring it to the notice of the Engineer without delay.
In case of any contradiction only the printed rules, and books should be followed and no claim for the mis-interpretation shall be entertained.

16. WRONG INFORMATION BY TENDERER

If the tenderer/s deliberately gives/give wrong information in his/their tender which creates/create circumstances for the acceptance of his/their tender the RailTel reserves the right to reject such tender at any stage.

17. DELETED

18. QUALIFYING CRITERIA

For qualifying in credential bid the contractor shall be required to meet the eligibility requirements as given in para 5 of preamble.

19. NOT USED

20. SYSTEM PERFORMANCE GUARANTEE

20.1 The OEM shall give unqualified and unconditional guarantee that when the equipment / material supplied by him is installed and commissioned at site, it shall achieve the desired objective and that in the event of performance of the system when installed not complying with the end objective or with the specifications, he shall provide further inputs to enable the RailTel to realize the end objectives with full compliance of the specifications contained in these documents. No additional payment will be made to the contractor for supply of any additional goods and service required in this regard.

20.2 This certificate in the proforma given in Form No. 7, shall accompany the final offer. Absence of this certificate which will form part of the agreement shall disqualify the tenderer automatically.

21. EVALUATION OF OFFER

The authority for the acceptance of the tender rests with the Purchaser. The tenders received will be evaluated by the Purchaser to ascertain the best acceptable tender in the interest of the Purchaser.

However, the purchaser shall not be bound to accept the lowest or any tender or to assign any reason for non-acceptance or rejection of a tender. The purchaser reserves the right to accept any tender in respect of the whole or any portion of the work specified in the tender paper or to sub-divide the work among different Tenderers or to reduce the work or to accept any tender for less than the tendered quantities without assigning any reason whatsoever.

22. AGREEMENT

The successful tenderer/s shall be required to execute an agreement with the representative of RailTel for carrying out the work according to the tender documents as indicated in para 2 of Special Conditions of Contract (Section II Chapter II).

23. DELETED

24. TENDERER'S ADDRESS

Tenderer shall state in the tender his postal address fully and clearly. Any communication sent to the tenderers by post at his said address shall be deemed to have reached the tenderer duly & timely, not withstanding the fact that the communication could not reach the tenderer at all or in time for whatever reason. Important documents shall be sent by Registered Post.

25. PREFERENCE TO PUBLIC SECTOR UNDERTAKING

Due preference as per the extant rules if applicable will be given to Public Sector Undertakings.

26. National Interest

While evaluating the tender, regards would be paid to National Defence and security considerations.

The directives issued from time to time by the Department of Telecommunications (DoT), Ministry of Communications and IT or any other Ministry of Govt. of India on security considerations shall be applicable to the present tender. Accordingly, as per the extent amendment of the National Long Distance (NLD) Service License Agreement for Security related concerns for expansion of Telecom Services in various zones of the country issued vide Department of Telecommunication, Ministry of Communication and IT, Govt. of India's letter no. 10-54/2010-CS-III (NLD) dated: 31.05.2011, the successful bidder's OEM shall comply with the provisions stated in the above mentioned directive of DoT and shall have to enter into an agreement with RailTel as per the template agreement between Telecom Service Provider and the vendor of equipment, product and services (available on DoT website). The tenderer must submit a declaration along with their techno commercial bid (Part-I)

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SECTION- II

CHAPTER - II

SPECIAL CONDITIONS OF CONTRACT

SPECIAL CONDITIONS OF CONTRACT

I N D E X

46. MOBILISATION ADVANCE

47. INSURANCE

48. FORCE MAJEURE CLAUSE

49. SETTLEMENT OF DISPUTE AND ARBITRATION

50. TERMINATION OF CONTRACT

SPECIAL CONDITIONS OF CONTRACT

1. TENDER DOCUMENTS

1.1 The goods and services required, bidding procedure and contract terms are prescribed in the tender documents. The set of tender documents issued for the purpose of bidding includes following together with Corrigendum and Addendum, if any.

Section-I:
I) Preamble.
II) System Requirement & SOR
III) Technical Specifications

Section-II:
I) Instructions to tenderers and conditions of tendering.
II) Special conditions of contract
III) Form of Tender
IV) Inspection, Test, Installation & Commissioning.

1.2 If the Tender submitted by a Tenderer is accepted and the contract awarded to the Tenderer the various works coming under the purview of the contract shall be governed by tender documents mentioned above.

1.3 Any special conditions stated by the Tenderer in the covering letter submitted alongwith the tender shall be deemed to be a part of the Contract to such extent only as have been explicitly accepted by the RailTel.

2. AGREEMENT

The successful Tenderer shall within 15 days after having been called upon by notice to do so be bound to execute an agreement based on accepted rates and conditions, in such form as the RailTel may prescribe, and lodge the same with the RailTel together with the conditions of contract, specifications and Schedule of prices referred to therein duly completed. The form for agreement is included in Section II, Chapter III (Form No.3).

3. CONTRACT PERFORMANCE GUARANTEE (SECURITY DEPOSIT)

3.1 On receipt of the Letter of Acceptance of Tender from the RailTel the successful Tenderer shall within a period of 15 days deposit with the RailTel an amount equal to 10% of the value of contract rounded off the nearest whole number in terms of thosands of rupees towards payment of performance guarantee for due fulfillment of the contract..

3.2 The Earnest Money already paid by the successful Tenderer (see Clause 5 of Instructions to Tenderers and Conditions of Tendering) may at the discretion of the successful Tenderer be adjusted towards payment of this Performance Guarantee and the additional amount shall be paid in any one of the following forms:

(a) Bank draft

(b) Irrevocable Bank Guarantee issued by SBI or Nationalized Banks or scheduled commercial bank .

3.3 The Performance Guarantee will bear no interest.

3.4 The Instruments for security deposit should be valid for four months beyond the warranty period (para 29 of SCC - Section II Chapter II). On expiry of the warranty period and issue of the certificate of final acceptance of the entire system, the Performance Guarantee will be refunded or Bank guarantee released to the contractor after adjustment of any dues payable by the contractor.

4. CONTRACTOR'S OFFICE & STORES DEPOT

The Contractor shall within Fifteen days of issue of letter of acceptance of tender establish an office and store depot at a convenient place for receiving and storing equipments and materials and progressing field work expeditiously in consultation with the approval of the purchaser's Engineer. He shall intimate the purchaser's Engineer address thereof to which all correspondence should be sent. Any communication sent to the contractor by post at his said address shall be deemed to have reached the contractor duly and in time. Important documents shall be sent by Registered post.

5. USE OF RAILWAY LAND

Use of Railway land required by the Contractor for construction of temporary offices, quarter(s), hutments etc. for the staff and for storing materials etc. will be permitted to him/them subject to approval by Railways, if available at the charges prescribed by the Railways. The land will be restored to Railways by the Contractor(s) in the same condition as when taken over or in vacant condition as desired by the Engineer after completion of the work or at any earlier day as specified by the Engineer. Failure to do so will make the Contractor(s) liable to pay the cost incurred by the Railway for getting possession of land.

6. PROGRAMME OF WORK

6.1 The Contractor shall have necessary resources to execute the work so that the entire work is completed within a period as mentioned in the preamble from the date of issue of Letter of Acceptance of the tender. He shall also have necessary resources to take up the work simultaneously at more than one independent places in order to expedite the completion of work.

6.2 Within a period of 15 days beginning from the date of issue of Letter of Acceptance of Tender the Contractor shall submit the detailed time Schedule for the execution of work based on the conditions in consultation with the RailTel to the authority mentioned in the Preamble and approved by the later in writing before commencement of the work.

6.3 The Contractor shall be held responsible for the execution of the work according to the Program given above in full compliance of the various clauses of the Technical specifications, instructions/ drawings etc. Failure to comply with any of these will be dealt with as per provision laid down in Conditions of Tendering.

6.4 Approach roads , where ever available can be used for carting materials. While RailTel may facilitate the contractor for getting approval from the Railways, if required, for carting the material to the site, the responsibility for ensuring that the material reaches the site in time, lies entirely with the contractor. The contractor has to bear the necessary expenses for carting the material to the site.

6.5 The contractor will program his work in such a manner so as not to interfere in the working telecom circuits and movement of trains.

7. COMPETENT SUPERVISORS

7.1 The Contractor shall place and keep competent representatives / Supervisors / Engineers as his representative on the works who will be authorized to receive and acknowledge materials issued by the RailTel and take all orders issued by the RailTel. The said representatives shall be present at site during working hours and any written orders or instructions which the purchaser's Engineer may give to the said representatives of the contractor shall be deemed to have been duly given or communicated to the contractor.

8 &9 NOT USED

10. TEST & MEASURING INSTRUMENTS AND SPECIAL TOOLS ETC.

10.1 Special tools & instruments required for installation and commissioning of the work as detailed in preamble shall be arranged by contractor at his own cost.

10.2 All tests and measuring instruments and other arrangements required for carrying out all the acceptance tests etc shall be provided by the contractor at his own cost.

11. STORES TO BE SUPPLIED BY CONTRACTOR

11.1 All materials required for the execution of the contract shall be arranged and supplied by the Contractor as detailed in the scope (Preamble) so as to realize the end objective. The supply of equipments and materials shall also include required installation and other materials and documents etc which may not be specifically mentioned herein but which are usually necessary for completing the work in all respects.

12 SUPPLY OF TECHNICAL LITERATURES, DOCUMENTATION, DRAWINGS, INSTRUCTION BOOK & COMPLETION PLANS ETC.

12.1 The supply of equipment and materials shall include supply of two sets of printed documents from original equipment manufacturers with each equipment as given in technical supplement.

12.2 Except where printed documents are supplied with each equipment by original equipment manufacturer, all other documentation and information as mentioned in the technical specifications shall be prepared using CAD or any other software package duly approved by Engineer. In addition to what is specified in the technical specifications, two complete hard sets of documents shall also be supplied for ready use duly bounded in good plastic folders.

13. SPARES

13.1 The tenderer shall indicate recommended quantities of spares other than those mentioned in SOR of supplies under spare item for each type of equipment for efficient maintenance of the equipment and the systems for a period of 5 years to ensure that the quality & reliability is achieved. The details, unit price and the total cost of recommended spares, shall be included in the tender only as an option. However, the cost of such recommended spares shall not be considered for tender evaluation.

13.2 The tenderer shall attach Unit Rate Analysis of each item of the Schedule Of Requirements (cost of each sub-assembly, card etc.) in his Price Bid. The quoted Unit Rate of spares should correspond to the referred Rate Analysis.

14 LONG TERM AVAILABILITY OF SPARES AND SYSTEM SUPPORT

14.1 The tenderer shall undertake to supply on payment all maintenance spares and tools required for the equipment at least for five years after the expiry of warranty. He shall also undertake to supply additional equipment required for replacement or expansion of the network, that may become necessary due to additional traffic requirements.

14.2 The manufacturer shall guarantee that spare parts for the system shall be available for a minimum of five years after expiry of the warranty period. The manufacturer shall also undertake to inform RailTel at least six months in advance before any equipment or components are discontinued or phased out from the manufacturing plans.

15. QUALITY ASSURANCE

In the event of RailTel waving off the inspection, the quality assurance department of the manufacturer shall carry out all the tests as per the specification and issue a certificate indicating clearly the test results and the adherence to the technical specifications. This is without prejudice to the purchaser's right to accept or reject the supplies if not found in conformity to its requirement.

Manufacturer shall furnish MTBF values wherever applicable.

16 NOT USED

17. INSPECTION OF MATERIALS

17.1 All equipments materials fittings and components will be subject to inspection by the purchaser or his representative at the manufacturer's factory/tenderer works before dispatch and no materials shall be dispatched until these are inspected and/or approved. The materials may also be inspected by the purchaser or his representative again at the contractor's depot.

17.2 All materials shall be procured from the manufacturers of repute/their authorized dealers. Such materials are to be accepted by the Engineer. The Contractor may be required to produce test certificate from the manufacturer wherever called for by the Engineer.

17.3 The cost of equipment and materials, all tests and/or analysis performed for inspection shall be borne by the Contractor.

17.4 The inspection charges, if any, payable to the purchaser's representative for carrying out the inspection shall be borne by the purchaser.

17.5 RailTel reserves the right to waive the factory inspection for some or all components/equipment.

18. INSPECTION OF WORKS

The Engineer or his representative may inspect and test the various portions of the work at all stages and shall have full power to reject all or any portion of the work that he may consider to be defective or inferior in quality of materials, workmanship or design in comparison to what is called for in the specification. In the event of rejection of any work already executed and not in accordance with specification as in this tender and/or as determined by the Engineer or which the Contractor has been apprised, the Contractor shall carry out alterations/ replacements to such works to the satisfaction of the Engineer for which no additional expenses will be borne by the RailTel.

19. VARIATION IN QUANTITIES

19.1 The quantities indicated in Schedule of Requirements are approximate and purport to convey the tenderer an idea of the magnitude of the work. The quantities quoted in the bid are not firm and may be varied at the time of awarding of the Contract.

19.2 The Contract value may vary within +/-25% of the grand total of schedule of requirements as included in the Letter of Acceptance to tender. In case of such variation in quantities the contractor shall be bound to carry out the work at the rates agreed in the schedule up to the limit of +/-25% variation in the value of contract and shall not be entitled to any claim or any compensation whatsoever.

20. Fall Clause : Fall clause is not applicable for this tender.

21. SUBLETTING AND ASSIGNMENT

21.1 The contractor may sublet a part of the work under this contract with prior approval of RailTel.

21.2 The contractor shall arrange for effective supervision of sub contractor's work and remain solely responsible for materials supplied and for works carried out on his behalf by the sub contractor.

22. EXECUTION OF WORK

All the works shall be executed in strict conformity to the provisions of the contract document and with such explanatory detailed drawings, specifications and instructions as may be approved from time to time based on detailed design and engineering carried out by contractor in line with requirements as per contract document. The contractor shall be responsible for ensuring that the work throughout are executed in the most substantial, proper and workmanlike manner with the quality of material and workmanship in strict accordance with the specifications and as per sound industrial practices and to the entire satisfaction of the RailTel.

23. Not used

24. MAINTENANCE OF WORKS

The contractor shall at all times during the progress and continuance of the works and also for the period of maintenance specified in the tender form and after the date of passing of the certificate of completion by the RailTel's representative or any other earlier date subsequent to the completion of the works that may be fixed by RailTel's representative be responsible for and effectively maintain and uphold in good, substantial, sound and perfect condition all and every part of the works and shall make good from time to time and at all times, as often as the RailTel's representative shall require, any damage or defect that may, during the above period, arise in or be discovered or be in any way connected with the works provided that such damage or defect is not directly caused by errors in the contract documents, act of providence or insurrection or civil riot and the contractor shall be liable for and shall pay and make good to the RailTel or other persons legally entitled thereto whenever required by the RailTel's representative so to do, all losses, damages, costs and expenses they or any of them may incur or be put or be liable to, by reason or inconsequence of the operations of the contractor or his failure in any respect.

25. CLEARANCE OF SITE

At the end of the work the Contractor shall as a part of his Contractual obligation leave the area completely neat and clean.

26. PROVISIONAL ACCEPTANCE

26.1 Immediately after the completion of the work the contractor shall certify and advise the purchaser in writing that the installation is (i) complete (ii) ready for satisfactory commercial service and (iii) ready to be handed over. The datacenter shall be operational for minimum 30 days and monitored from BMS/DCIM.

26.2 The test or tests specified in Technical supplement (Chapter IV Section II) will be conducted jointly by purchaser and contractor as soon as possible after receipt of advice of completion by purchaser from the contractor. The test schedule shall be finalized by mutual discussion between the contractor and M/S RailTel Corporation of India Limited,. Any component, modules, sub assemblies or equipment failing during the commissioning test shall be replaced/repaired free of cost by tenderer.

26.3 Purchaser's Engineer shall issue a Provisional Acceptance certificate for successful commissioning of the datacenter covering all materials and services included in the Schedule of works after the final acceptance test as per the approved test procedure have been completed and the performance has been found to meet the specifications. The Provisional Acceptance Certificate shall not be held up due to minor deficiencies, which shall be attended by Contractor during maintenance period.The Provisional Acceptance Certificate shall be signed by both the parties. The period of maintenance of works shall commence from the date of issue of last Provisional Acceptance Certificate.

27. PLACING IN SERVICE & MAINTENANCE SUPERVISION

27.1 After the work has been completed & placed in service and Provisional Acceptance certificate issued by Purchaser’s Engineer, the contractor shall be responsible for proper maintenance supervision of the work for a period of twelve months from the date of commissioning.

For this purpose the bidder shall prepare a maintenance plan and make available the services of qualified maintenance engineers for critical subsystems (power, cooling) stationed at the location on 24x7x365 approved by Purchaser’s Engineer to provide comprehensive onsite support. Contractor shall submit monthly maintenance report jointly with RailTel Engineer.

At Present one BMS trained engineer is provided for 24x7x365 at the location.

27.2 During this period of maintenance supervision if any lacuna is noticed in the functioning, as a result of any deficiency in work, the contractor will rectify the same at no cost to RailTel. During such rectification if any faulty equipment/modules need replacement or repair, they shall be provided by the contractor from the set of equipment or modules that the contractor should bring to the site of installation in addition to all the materials to be supplied against this contract. Use of spare modules covered under the Schedule of material of this tender shall not be

permitted to be used during installation, commissioning and period of maintenance supervision.

28. FINAL ACCEPTANCE

28.1 The final acceptance of the works completed shall take effect from the date of expiry of the period of maintenance supervision as defined in para 27 or the expiry of the last of the respective period of maintenance supervision of various sub-sections for which Provisional Acceptance Certificates are issued or brought into commercial operation, provided in any case that the contractor has complied fully with his obligations in respect of each item under the contract.

28.2 Notwithstanding the issue of Final Acceptance Certificate the contractor and the purchaser (subject to Sub Clause as above) shall remain liable for fulfillment of any obligation incurred under the provision of the contract prior to the issue of Final Acceptance Certificate which remains unperformed at the time such certificate is issued and for determining the nature and extent of such obligation the contract shall be deemed to remain in force between the parties hereto.

29. WARRANTY SUPPORT & LONG TERM MAINTENANCE SUPPORT

A. Warranty Support

29.1 All equipment and system supplied by the Contractor shall be guaranteed against the defects for a period of twelve months from the date of issue of Provisional Acceptance Certificate. The contractor shall provide comprehensive warranty support for all the items supplied by him against this tender.

29.2 Material for repair shall be handed over /taken over to contractors engineer at the Datacenter location.

To enforce fulfillment of support objectives, For this purpose he shall prepare a maintenance plan and make available the services of qualified maintenance engineers for critical subsystems (power, cooling) stationed at the location on 24x7x365 approved by Purchaser’s Engineer. Contractor shall submit monthly maintenance report jointly with RailTel Engineer. In addition one BMS trained engineer shall be provided for 24x7x365 at the location. The cost of these manpower shall be included in the offer.

The Contract’s Engineer shall be responsible to identify the fault and advise corrective measures by coordinating with their/OEM support team and ensure that defective equipment are serviced or replenished.

During this period , the contractor shall remain responsible to arrange replacement within 30 days and for setting right at his own cost any equipment installed by him which is of defective manufacture or design or becomes unworkable due to any cause whatsoever. The decision of the RailTel's representative in this regard to direct the contractor to attend to any damage or defect in work shall be final and binding on the Contractor.

During this period, the contractor shall provide updates, upgrades, patches and bugfixes available from the OEM from time to time for all the software supplied and installed by the bidder as a part of the contract without any additional cost. The contractor shall keep RailTel updated of the availability of such updates and install them after getting approval from RailTel.

29.3 During this period , the contractor shall be responsible to the extent expressed in this clause for any defects that may develop under the conditions provided for by the contract and under proper use, arising from faulty materials, design or workmanship in the plant, or from faulty execution of the plant by the contractor but not otherwise and shall remedy such defects at his own cost when called upon to do so by the Purchaser Engineer who shall state in writing in what respect the portion is faulty.

29.4 If it becomes necessary for the contractor to replace or renew any defective portions of the system under this clause, the provisions of this clause shall apply to the portions of the plant to be replaced or renewed until the expiration of three months from the date of such replacement or renewal or until the end of the support period whichever may be later. If any defect is not remedied within reasonable time, the purchaser may proceed to do the work at contractor's risk and expense, but without prejudice to any other rights which the purchaser may have against the contractor in respect of such defects.

29.5 Until the Final Acceptance Certificate shall have been issued, the contractor shall have the right of entry, at his own risk and expense, by himself or his duly authorised representatives, whose names shall have previously been communicated in writing to the purchaser at all reasonable working hours upon all necessary parts of the works for the purpose of inspecting the working and the records of the system and taking notes there from and, if he desires at his own risk and expense, making any tests subject to the approval of the purchaser which shall not be unreasonably withheld.

29.6 In subject of this warranty, the contractor shall make his security deposit, as required under Clause 3 of Special Conditions of Contract, valid to cover the period of warranty also.

29.7 During the free warranty maintenance period contractor should stabilize the working of the system. Purchaser has the right to extend the period of supervision of the maintenance free of cost till the system stabilizes and works satisfactorily for a reasonable period of time. If during the time any equipment etc. is to be added or deficiencies are to be rectified to make the system work trouble free the same also will have to be done by the contractor at no cost to RailTel as to make good all the deficiencies.

B. Long Term Maintenance Support

29.8 Tenderer shall provide maintenance support from OEM after successful completion of the warranty obligations for a minimum period of 5 years. During this period the terms & conditions similar to as mentioned in para 29.2, 29.3 and 29.4 above shall be applicable.

Separate agreement for long term maintenance support after warranty period shall be entered with the contractor by RailTel. A fresh Bank Guarantee for a value of 10% of annual cost of long term maintenance support, shall be required to be submitted by the contractor, on year to year basis, for due fulfillment of long term maintenance support obligation.

Note : The acceptance of the above clause is mandatory and any deviation / non acceptance will lead to rejection of the bid summarily.

29.9 The Scope: Periodical preventive maintenance as per the fixed schedule by OEMs of the equipment and attending to the failures of the equipment on the emergency basis on the all-out effort.
In the event of failure of any system, on duty staff shall report the same to Sr. Manager/ Data Center / RailTel immediately in addition to informing the same to the in-charge of Vendor team of Data Center. The in-charge in turn shall take all steps to attend the failure as early as possible duly consulting the CSM team as per the escalation matrix. The Time lines for the restoration shall be given in writing/ mail to RailTel/ Engineer/ Data Center and Sr.Manager/Data Center.

29.9.1 Periodical preventive maintenance as per the fixed schedule by OEMs: The details of equipment and the periodicity given is minimum in the absence of OEM schedule. OEM schedule if available will prevail upon the periodicity and table is;

S.NO	Description of Equipment	PM Under AMC
1	Diesel Generators	Every 3 Months
2	DG Sync Panels	Every 3 Months
3	HSD Day Tanks	Every 3 Months
4	UPS	Every 3 Months
5	PPC (Power Distribution Units-PDU)	Every 3 Months
6	Batteries	Every 3 Months
7	Precision AC (PEX Machine)	Every 2 Months
8	CCTV System (POI switch- PTZ Camera, Dome cameras, Verifocal Camera, Monitors	Every 3 Months

If the OEM of the equipment specifies PM with different periodicity, whichever is lower shall be followed.
The above list is only indicative; all the equipment supplied in the phase-2 has to under go PM check as per OEM or every quarter, whichever is less.

If any equipment is required to be shut down for its periodical preventive maintenance activity, Vendor shall give a notice of one week for the same.
Spares for the maintenance:

a) All the spares required for maintenance/ rectification of failures shall be borne by Vendor.

b) The required spares of equipment viz. UPS, PPC, PAC and other equipment for maintenance / rectification of failures shall be made available at Hyderabad in the Hyderabad Ware House of vendor.

C. Service Level Agreement:

The contractor shall ensure that the data centre infrastructure built by them shall have an uptime of 99.982%. During the support period contract shall submit a monthly uptime report of the infrastructure. For every additional minute of downtime beyond SLA, a penalty at the rate of Rs.10000/- per minute.

Any failure of critical components (Power Distribution Equipments, Cooling for system for Data Center, Network room and UPS room) shall be restored within 30 minutes from the time of failure. For any delays beyond 30 minutes, a penalty of Rs. 1000/- per minute.

Any failure of non critical components shall be restored within 4 hours from the time of failure. For any delays beyond 4 hours, a penalty of Rs. 1000/- per hour.

The total value of the penalty shall be limited to a maximum of 10% of the contract value.

D. Payment Terms for Long Term maintenance:

Quarterly after every quarter of the year, vendor shall submit a invoice for an amount of 1/4th of annual Maintenance contract value+ Service Tax as applicable on the date of invoice and RailTel shall pay the amount in the first fortnight of the quarter under consideration.

30. TRAINING

30.1 The tenderer shall undertake to train RailTel engineers and other staff nominated by the RailTel in different aspects of equipment designs, functioning, field installation, testing, commissioning, operation, maintenance and repair, covering both hardware and software. The training should be comprehensive for transfer of complete know-how so as to impart full knowledge and competence to independently and successfully execute the installation, operation, user related software changes, maintenance and repair of all equipment. The training courses should, apart from formal class room training, include hands on practical experience at the manufacturer's premises and visits to working installation.

30.2 In the event of any equipment/sub-system being manufactured in India in technical collaboration with foreign firm by the tenderer or any of its sub-contractor, the training as per schedule shall be provided at the collaborator's premises/training centre abroad

30.3 The contractor shall at every stage of installation, testing and commissioning provide all facilities for adequate training of RailTel personnel who may be deputed to work on the project.

30.4 Set of Documents related to training to each of the trainees shall be provided.

30.5 All expenses for travel to and from the place of training, boarding and lodging of the trainees shall be borne by the RailTel.

31. INFRINGEMENT OF PATENTS:

(a) The Contractor is forbidden to use any patents or registered drawings, processes or patterns in fulfilling his contract without prior consent in writing of the owner of such patents, drawings, patterns or trade marks except where these are specified by the Purchaser himself. Royalties where payable for the use of such patented processes, registered drawings or patterns shall be borne exclusively by the Contractor. The Contractor shall advise the Purchaser of any proprietary rights that may exist on such processes, drawings or patterns which he may use of his own accord.

(b) In the case of patents taken out by the Contractor of the drawings or patterns registered by him or of those patents, drawings or patterns for which he holds a license, the signing of the contract automatically gives the Purchaser the right to repair by himself the purchased articles covered by the patent or by any person or body chosen by him and to obtain from any sources he desires the component parts required by him for carrying out the repair work. In the event of infringement of any patent rights due to above action of the Purchaser he shall be entitled to claim damages from the Contractor on the grounds of any loss of any nature which he may suffer e.g. in the case of attachment because of counterfeiting.

32. LICENSE AS PER GOVT. OF INDIA CONTRACT LABOUR ACT

The Contractors are required to produce license as enjoined in the Government of India Contract Labour (Regulation and Abolition) Act (1978) with latest amendments, if any. They shall not be allowed to undertake or execute any work through contract Labour except under and in accordance with a license issued under the said Act in that behalf by the authorized licensing Officer.

33. DEFAULTS AND DELAYS

The Contractor shall execute the work with due diligence and expedition, keeping to the approved time schedule. Should he refuse or neglect to comply with any reasonable orders given to him in writing by the Purchaser's Engineers in connection with the work or contravene the provision of the Contract or the progress of work lags persistently behind the time schedule due to his neglect, the Purchaser shall be at liberty to give seven days notice in writing to the Contractor requiring him to make good the neglect or contravention complained of and should the Contractor fail to comply with the requisitions made in the notice within seven days from the receipt thereof, it shall be lawful for the purchaser to take the work wholly or in part out of the Contractor's hands without any further reference and get the work or any part thereof, as the case may be, completed by other agencies without prejudice to any other right or remedy of the Purchaser Whenever the contractor is unable to complete the work and contract is rescinded The security deposit & PBG shall be forfeited and the balance work shall be got done independently without risk & cost of the failed Contractor. The failed contractor shall be debarred from participating in the Tender for executing the balance work. If the failed contractor is a JV or partnership firm, then every member/partner of such a firm shall be debarred from participating in the tender for the balance work either in his/her individual capacity or as a partner of any other JV/partnership firm.

34. LOSS SUSTAINED DUE TO DEFAULTS AND DELAYS

In the event of any loss to the purchaser on account of execution and/or completion of the work or any part thereof by agencies other than the contractor, in terms of para 33 the contractor shall be liable to reimburse the loss to purchaser without prejudice to the other rights and remedies of the purchaser and the reimbursement in full or in part, as the case may be, shall be met at the option of the purchaser form out of all or any of the following sources viz :

(a) i. Any amount due and payable to the contractor by the purchaser on any account whatsoever;
ii.The Contractor's security deposit in the hands of the purchaser as far as available, and;
iii.Any other assets whatsoever of the contractor;

(b) In the event of re-imbursement from out of sources (i) and/or (ii) above mentioned, the purchaser shall have the right of appropriation suo moto.

35. PENALTY FOR DELAY IN COMPLETION

35.1 If the contractor fails to execute and complete the work within the time specified in the Agreement or within the period of extension granted under para 36, the contractor shall accept reduction in the total amount payable to him by the purchaser at the rate of 0.5% per week or part thereof (rounded off to the nearest whole number) of the incomplete/uncommissioned value of the contract for the actual delay occasioned beyond the appointed time by which the work shall have been completed under the contract.

35.2 The total value of penalty on account of above shall be limited to maximum of 10% (Ten percent) of the total contract value.

35.3 Such reduction shall be accepted by the purchaser in full satisfaction of the contractor's liability arising from delay only. This penalty for delay in completion will be applicable separately for each stage of completion of work when two or more stage of completion are specified in the contract. The purchaser's engineer shall at his sole discretion specify a time limit within which the unfinished portion of the work shall be completed after serving on the contractor a notice of Purchaser's intention to recover the said penalty in Form 11. In the event of failure of the contractor, the purchaser shall be at liberty to take action in accordance with provisions in Para 33 and 34.

NOTE: For purpose of this para the value of work shall be calculated on the basis of unit prices included in schedule of requirements.

36. ADHERENCE OF TIME SCHEDULE

36.1 Timely completion of the work is the essence of the contract. While delay in execution will attract penalty, early completion will be rewarded.

36.2 If any delay as aforesaid in clause 35 shall have arisen from any cause which the Purchaser may agree as being a reasonable ground for extension of time the purchaser's engineer or his representative may allow such additional time as he may in his absolute discretion consider to be reasonably justified by the circumstances of the case. Such extensions shall be considered , on request from contractor, .

37. CONTRACTOR'S LIABILITIES FOR COSTS AND DAMAGES

37.1 WITHHOLDING AND LIEN IN RESPECT OF SUMS CLAIMED

a) Whenever any claim or claims for payment of a sum of money arises out of or under the contract against the contractor, the Purchaser shall be entitled to withhold and also have lien to retain such sum or sums in whole or in part from the security, if any, deposited by the contractor and for the purpose aforesaid the purchaser shall be entitled to withhold the said cash security deposit or the security, if any, furnished as the case may be and also have lien over the sum pending finalisation or adjudication of any such claim.

b) In the event of the security being insufficient to cover the claimed amount or amounts or if no security has been taken from the Contractor, the Purchaser shall be entitled to withhold and have lien to retain to the extent of such claim amount or amounts referred to spura, from any sum or sums found payable or which at any time thereafter may become payable to the Contractor under the same contract or any other department of the Central Government pending finalization or adjudication of any such claims.

c) It is an agreed term of the contract that the sum of money or moneys so withheld or retained under the lien referred to by the purchaser till the claim arising out of or under the contract is determined by the Arbitrator (if the contract is governed by the Arbitration clause) or by the competent court, as the case may be, and that the contractor will have no claim for interest of damages whatsoever on any account in respect of such withholding or retention under the lien referred to spura and duly notified as such to the Contractor.

d) For the purpose of this clause, where contractor is a partnership firm or a limited company, the purchaser shall be entitled to withhold and also have a lien to retain towards such claimed amount or amounts in whole or in part from any sum found payable to any partner/limited company, as the case may be, whether in his individual company or otherwise.

37.2 The Maximum Liablity of contractor to any Loss/Damages to RailTel including Liquidity Damages and Performance Bond shall be limited to 100% of Value of contract.

38. UNIT PRICES

38.1 The prices quoted by the Tenderer shall include the prices of materials including all incidental charges for transport, loading/unloading and handling of materials, charging for arranging dispatch by rail/road direct from manufacturer's factory. The prices would also include charges towards completing all necessary formalities such as submission of forwarding notes, arranging placement of Wagon, Siding/shunt charges, banker's charges for Bank guarantee, Indemnity Bonds inclusive of cost of Stamp etc. as applicable and also the charges, if any, levied by the RailTel.

38.2 The prices shall include all taxes, duties, Royalty and levies (including Octroi / Entry Tax, Custom Duty with/without High Sea Sale etc.) applicable on this contract. Therefore, the bidder should quote their prices taking into account the rate of central sales tax/ local sales tax/ VAT or any other tax leviable on contract..

Form-C will be issued by RailTel for items in Schedule of Supplies, if applicable.

38.3 The prices quoted by the tenderer shall include cost of commissioning and testing and all costs of Administration of Contract, Insurance Premium, Banker's charges for guarantees, custom handling, cost of storage in custom and other locations during execution of work, loading-unloading and handling of materials

and road transport which the contractor may use for carriage of materials to his depot/ site of work and any other charges incurred towards delivery of the material at site. The prices shall include the cost of works and adjustments necessary to be done by the contractor during or after tests carried out by the purchaser.

38.4 The price to be quoted by the tenderers should take into account the credit availed on inputs under the CENVAT scheme. The tenderers should give a declaration that any set off in respect of duties on inputs as admissible under law is being totally and unconditionally passed on to the purchaser in the price quoted by him (see para 43). The bidder in this regard shall submit the details of breakup of Excise Duty, Counter Vailing Duty, Service Tax and Surcharge & Cess on these, so that RailTel can avail the CENVAT credit benefit. The firm will furnish documentary evidence of such duties/taxes paid, to enable the purchaser to avail CENVAT credit.

38.5 The prices quoted in the contract shall be inclusive of all taxes i.e. custom duty, excise duty, octroi, local levies, sales tax levied by any statuary authority , VAT or any other tax. The tenderer will indicate the details of taxes included in the unit price. Offer received without specific details/ breakup of various taxes included in the unit prices are liable to summarily rejected.

38.6 The purchaser shall make statutory deductions if required to do so. The deducted amount shall be remitted to the concerned authority and the purchaser shall in no way be responsible for any disputes between such authorities and the contractor in this regard.

38.7 All taxes, duties and levies (Including octroi etc.) arising out of the transaction between the contractor and his sub contractor/supplier for this work will be included in the rates quoted by the contractor in the relevant Schedule.

38.8 Arrangement for all permits/licenses required for delivery of materials at site including Road Permits etc. will be the responsibility of contractor and the contractor will have to make his own arrangements. RailTel shall facilitate by way of authorization /request letters whenever needed. Import license of RailTel can be used for materials procured under high sea sale.

39. MEASUREMENT OF WORKS

39.1 Payments for the works shall be made in accordance with approved designs & drawings and measured in relevant units except where provided or otherwise. The measurements will be made generally in accordance with standard engineering practices.

39.2 MEANING AND INTERPRETATION BY RAILTEL TO BE FINAL- All measurement, method of measurement, meaning an intent of specifications and interpretation of Special Conditions of Contract, given and made by the Purchaser or by the Purchaser's Engineer shall be final and binding.

40. TERMS OF PAYMENT

40.1 All bills shall be submitted to the authority concerned in RailTel, Secunderabad.

40.2 Subject to any deductions or recovery which the RailTel may be entitled to make under contract, the Contractor will be entitled to be paid from time to time by way of 'on account payment' for supply of goods and 'progress payment' for works as in the opinion of the Engineer he has executed in terms of Contract.

40.3 ON ACCOUNT PAYMENT FOR SUPPLY OF EQUIPMENT & MATERIAL

"On account payment" for supply of equipments, materials indicated in the schedule of requirements subject to recoveries of liquidated damages, if any, shall be once in a calender month as given below.

60% (Sixty percent) of the value of equipments/ material supplied of each consignment shall be paid on production of the following documents :

a) On receipt of materials at site.

b) Original Inspection certificate issued by Inspecting Officer.

c) Manufacturer's inspection certificate that the materials are in accordance with the specifications of the contract.

d) Delivery Challan / Invoice in duplicate duly accepted by RailTel Authorised Engineer.

e) A certificate that the materials supplied are as per the contract and the amount claimed in the invoice is correct as per terms of the contract.

f) Project Insurance policy for material .

g) All on account payments shall be covered by a standing indemnity bond in the approved form (see form No.6).

h) The Contractor should furnish a Bank Guarantee for 15% of the amount claimed alongwith the invoices for on account payment for supply of goods. The bank guarantee shall be in the prescribed form from State Bank of India/any Nationalized Bank or from any scheduled Bank in the form No.14 and valid for 2 months beyond the date of Completion of work. In the event of extension to the time of completion, the Contractor shall suitably extend the validity of the Bank Guarantee. Incase the Contractor is unable to furnish the Bank Guarantee, equivalent cash would be held by the purchaser from the payments due to the contractor. The Bank guarantee amount may be progressively decreased to the extent of the materials used in sub section on issue of the PAC of sub section. The Bank Guarantee shall be released on issue of Provisional Acceptance Certificate.

40.4.1 The on account payments made will subsequently be adjusted against payments due on Provisional Acceptance or Final Acceptance.

40.4.2 20% (Twenty five percent) value of goods supplied shall be paid after the successful completion of installation of these equipments and completion of all measurements and testing to the satisfaction of Engineer.

40.4.3 15% (Fifteen percent) value of the goods supplied shall be paid after the successful completion of installation & commissioning of whole system, receipt of Site certification from Uptime Institute and issue of "Provisional Acceptance Certificate by Purchaser's Engineer.

40.4.4 Deleted

40.5 PROGRESS PAYMENT FOR EXECUTION OF WORK (SCHEDULE OF SERVICES)

'Progress payment' shall be made separately for each item/sub-item of work given in the Schedule of Services, once in a calender month.

40.5.1 75% (Seventy five percent) of the progress payment for each item of Schedule of Services shall be made after successful completion the respective services joint measurement and testing to the satisfaction of Engineer.

40.5.2 20% (Twenty percent) value of the works/services completed shall be made after the issue of Provisional Acceptance Certificate and supply of Documentation as per Para 12.

40.5.3 100% of the certification charges (design/site) shall be paid on successful issue of the certification from the Uptime Institute.

40.6 Quarterly payment shall be made separately for each item of work given in schedule of services for long term maintenance (Clause 29.8) and maintenance support (clause 27) and warranty support clause 29.1 to 29.7.

41. FINAL PAYMENT

Final payment of 5% of the contract value shall be made after satisfactory operation and maintenance of the work under the supervision of the contractor for a period of one year after commissioning and issue of Final Acceptance Certificate.

41.1 On the basis of Final Acceptance Certificate from the Purchaser's Engineer for all the works at all the locations covered in this contract and reconciliation of materials issued, the final bill for the balance payment for each item of work shall be submitted by the Contractor along with a clear 'No Claim Certificate'. The Final Acceptance Certificate shall be issued by the Purchaser's Engineer only when he has accepted the work wholly after conducting the acceptance tests as per the details given in the technical specification and supplement.

42 FINAL SETTLEMENT

On expiry of the warranty period and issue of the certificate of final acceptance of the entire installations, the security deposit (Para 3) will be refunded or Bank Guarantee released to the Contractor after adjustment of any dues payable by the contractor.

43. CERTIFICATE FOR CENVAT BENEFITS ON BILLS

a) The Contractor should submit the following certificate along with the bills :- (see para 38.4) "We certify that no additional duty set offs on the Goods supplied by us have accrued under the VAT/ CENVAT Scheme in force on the date of supply after we submitted our quotations and submitted the present bill".

b) In the event of VAT/ CENVAT credit being extended by the Government of India to more items that already covered, the firm should advise the purchaser about the additional benefits accrued through a letter containing the following certificate, or any variation thereof, as may be considered necessary by RailTel administration:- "We hereby declare that we can avail additional duty set offs as per latest VAT/ CENVAT scheme in force now and we hereby give a reduction of (----------) per unit and agree to revise the prices indicated in the order. The current E.D. of (----------) is payable on this reduced price. Therefore, we request you to amend the order accordingly."

44. DEDUCTION FROM ON ACCOUNT PAYMENT BILLS

(i) All costs, damages or expenses, which RailTel may have been paid or incurred which under the provisions of contract are Contractor's obligations will be deducted by RailTel from progress payment Bills/Invoice of Contractor, as and when it is understood that such an expense has been incurred or paid for.

(ii) All such claims of RailTel shall, however, be duly supported by appropriate and certified vouchers, receipts or explanations as are available to enable the Contractor to identify such claims.

45. TAXES

45.1 The Contractor and all personnel employed by him shall pay such taxes like Income Tax etc as are payable under statutory laws of India and the Purchaser **WILL NOT ACCEPT** any liability for the same.

45.2 Deduction of Income Tax at source as per provisions of Finance Act and Income Tax in force shall be made from the Contractor/Sub-Contractor and the amount so deducted may be credited to the Central Government.

45.3 Wherever the law makes it statutory for the Purchaser to deduct any amount towards Sales Tax on Works Contract, the same will be deducted and remitted to the concerned authority.

46. MOBILISATION ADVANCE

(a) If required by the Contractor, mobilisation advance limited to 10% of contract value {if contract value exceeds Rs.1.00 (one) crore} shall be payable on submission of irrevocable Bank Guarantee from a Nationalized Bank in India or the State Bank of India in a form acceptance to the RailTel (Form No.8). Bank Guarantee should clearly cover Principle plus interest 14%.

Interest: The mobilisation advance shall carry an interest at the rate of 14% (fourteen percent) per annum for the period commencing from date of payment of mobilisation advance. The advance plus interest is fully adjusted and recovery of the mobilisation advance along with its interest shall be made from 'On account' and progress bills including design payment and advance payments for the work on prorata basis. The interest will be charged on balance outstanding on the first day of each month.

The recovery of the advance shall be commenced from the first on account bill itself.

(b) In case principal and interest could not be deducted progressively from progress/on account bills during the course of the year, the interest on mobilisation advance as accrued in the end of an year will be recovered within the first 30 days of the next year from the first progress/on account bills or any other bills which may be made by the RailTel to the Contractor. If, for the reason whatever, no progress/on account bill or any other amount is paid to the Contractor, he will still pay to the RailTel the accrued interest in full within the said 30 days of the next year. Otherwise, the unpaid interest will be added onto the Principal and interest for the next year will be charged on the balance comprising Principal as well as unpaid interest.

(c) In case of extension of the date of completion due to any reason whatsoever, the interest on the mobilisation advance outstanding would continue to accrue as specified earlier and the contractor/firm would make the payment against the advance in the same manner is specified in Para (b) above.

(d) No advance/extra payment other than stated above shall be payable against the works.

(e) The Tenderers shall specifically indicate in their offer whether mobilisation advance is required by them. In case no specific demand has been made in the offer, grant of mobilisation advance shall not be considered subsequently.

(f) No mobilization advance would be considered for Contract with a value less than Rs. 1.00 crore.

47. INSURANCE OF MEN, OFFICE/STORES ETC

47.1 The Contractor shall take out and keep in force a policy or policies of insurance against all liabilities of the Contractor or the Purchaser at common law or under any statute in respect of accidents to persons who shall be employed by the contractor in or about the site for the purpose of carrying out the works on the site. The Contractor shall also take out and keep in force a policy or policies of Insurance against all recognized risks to their offices and depots. Such insurance shall in all respects be to the approval of the Purchaser and if he so requires in his name.

47.2 INSURANCE OF MATERIALS & INSTALLATIONS

The Contractor shall take out and keep in force a Policy or policies of Insurance for all materials including RailTel supply materials/ equipments irrespective of whether used up in the portion of work already done or kept for the use in the balance portion of the work until such works are provisionally handed over to the RailTel. For this purpose, the works are deemed to have been provisionally handed over when provisional acceptance certificate is issued or the section is put into commercial use for the locations as per para 26.

47.3 The Contractor shall not be liable for losses/damages to the materials either used up in the portion of work done or his material kept for use at site, in consequence of Mutiny, or other similar causes over which the Contractor has no control and which cannot be insured. Such losses or damages shall be the liability of the Purchaser and if required by the Purchaser, be made good by the contractor at the cost of the Purchaser.

47.4 The Contractor should, however, insure the stores brought to site, against risks in consequence of war and invasion, as required under the Emergency Risk (Goods) Insurance Act inforce from time to time.

47.5 It may be noted that the beneficiary of the insurance policy should be RailTel or the policies should be pledged in favour of RailTel. The contractor shall keep the policy/policies current till the installations are provisionally handed over to the purchaser. It may also be noted that in the event of contractor's failure to keep the policy current and alive, renewal of policy will be done by purchaser for which the cost of the premium plus 20% of premium shall be recovered from the contractor.

47.6 For the purpose of enabling the contractor to take the insurance cover in connection with this contract, the purchaser's Engineer will advise the approximate price of all the RailTel supply materials to the Contractor.

48. FORCE MAJEURE CLAUSE

If at any time, during the continuance of this Contract, the performance, in whole or part, by either party, of any obligation under this contract shall be prevented or delayed by reason of any war, hostility, act of the public enemy, Civil Commotion, Sabotage, Fires, Floods, Earth quakes, explosions, strikes,

epidemics, quarantine restrictions, lockouts, any statute, statutory rules/ regulations, order of requisitions issued by any Government Department or Competent Authority, acts of God (here-in-after referred to as event) then provided notice of the happening of any such event is give by either party to the other within twenty one days from the date of occurrence thereof, neither party shall, by reason of such event, be entitled to terminate this Contract nor shall either party have any claim for damage against the other in respect of such non-performance or delay in performance, and the obligations under the Contract shall be resumed as soon as practicable after such event has come to an end or ceased to exist, PROVIDED FURTHER that if the performance in whole or part of any obligation under this Contract is prevented or delayed by reason of any such event beyond a period as mutually agreed to by the RailTel and the Contractor after any event or 60 days in the absence of such an agreement whichever is more, either party may at its option terminate the Contract provided also that if the contract is so terminated under this clause the RailTel may at the time of such termination take over from the Contractor at prices as provided for in the contract, all works executed or works under execution.

49. SETTLEMENT OF DISPUTE AND ARBITRATION

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

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

49.3 The Arbitral Tribunal shall consist of the sole Arbitrator appointed by mutual agreement of the parties.

49.4 Each of the parties agree that not withstanding that the matter may be reffered to Arbitrator as provided herein, the parties shall nevertheless pending the resolution of the controversy or disagreement continue to fulfill their obligation under this Agreement so far as they are reasonably able to do so.

50 TERMINATION OF CONTRACT OWING TO DEFAULT OF CONTRACTOR :

50.1 If the Contractor should :

(i) become bankrupt or insolvent or

(ii) make an arrangement with or assignment in favour of his creditors, or agree to carry out the contract under a committee of inspection of his creditors, or

(iii) being a Company or Corporation, go into liquidation (other than voluntary liquidation for the purpose of amalgamation or reconstruction) , or

(iv) have an execution levied on his goods or property on the works, or

(v) assign the contract or any part thereof otherwise than as provided in clause-21 of SCC, or

(vi) abandon the contract, or

(vii) persistently disregard the instructions of the RailTel's Engineer or contravene any provision of the contract, or

(viii) fail to adhere to the agreed programme of work by a margin of 10% of the Stipulated period, or

(ix) fail to remove materials from the site or to pull down and replace the work after receiving from the Engineer's notice to the effect that the said materials or works have been condemned or rejected, or

(x) fail to take steps to employ competent or additional staff and labour as required under clause 7 of SCC, or

(xi) fail to supply material and/or carry out the works as per contractual specifications, or

promise offer or give any bribe, commission, gift or advantage either himself or through his partner, agent or servant to any officer or employee of RailTel or any person on his or on their behalf in relation to the execution of this or any other contract with the RailTel, then and in any of these said cases, the Engineer on behalf of the RailTel may serve the Contractor with a notice in writing to that effect and if the Contractor does not, within 7 days after the delivery to him of such notice, proceed to make good his default in so far as the same is capable of being made good and carry on the work or comply with such directions as aforesaid to the entire satisfaction of the Engineer, the RailTel shall be entitled after giving 48 hours notice in writing under the hand of the Engineer to rescind the contract as a whole or in part or parts (as may be specified in such notice) and adopt either or both the following courses: A final termination notice will be issued by RailTel after expiry of 48 hrs. notice

(a) to carry out the whole or part of the work from which Contractor has been removed by the employment of the required labour and materials, the cost of which shall include lead, lift, freight, supervision and all incidental charges.

(b) to measure up the whole or part of the work from which the Contractor has been removed and to get it completed by another contractor, the manner and method in which such work is completed shall be in the entire discretion of the Engineer whose decision shall be final; and in both cases (a) and (b) mentioned above the RailTel shall be entitled (i) to

forfeit the whole or such portion of the security deposit as it may consider fit, and (ii) to recover from the Contractor the cost of carrying out the work in excess of the sum which would have been payable according to the certificate of the Engineer to the Contractor if the works had been carried out by the Contractor under the terms of the Contract, such certificate being final and binding upon the Contractor, provided, however, that such recovery shall be made only when the cost incurred in excess is more than the security deposit proposed to be forfeited and shall be limited to the amount by which the cost incurred in excess exceeds the security deposit proposed to be forfeited. The amount thus to be forfeited or recovered may be deducted from any moneys then due which at any time thereafter may become due to the Contractor by the RailTel under this or any other contract or otherwise.

Provided always that in any case in which any of the powers conferred upon the RailTel by Sub-clause above shall have become exercisable and the same shall not be exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions thereof and such power shall not withstanding be exercisable in the event of any future case of default by the Contractor for which his liability for past and future shall remain unaffected.

50.3 **RIGHT OF RAILTEL AFTER TERMINATION OF CONTRACT OWING TO DEFAULT OF CONTRACTOR** :

In the event of any or several of the courses, referred in Sub-clause 50.1 above, being adopted :

(a) The Contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased or procured any materials or entered into any commitments or made any advances on account of or with a view to the execution of the works or the performance of the contract and Contractor shall not be entitled to recover or be paid any sum for any works thereto not actually performed under the contract, unless or until the Engineer shall have certified the performance of such work and the value payable in respect thereof and the Contractor shall only be entitled to be paid the value so certified.

(b) The Engineer or Engineer's Representative shall be entitled to take possession of any materials, tools, implements, machinery or buildings on the works or on the property on which these are being or ought to have been executed, and to retain the employ the same in the further execution of the works or any part thereof until the completion of the works without the Contractor being entitled to any compensation for the use and employment thereof or for wear and tear or destruction thereof.

(c) The Engineer shall, as soon as may be practicable after removal of the Contractor fix and determine exparte or by or after reference to the parties or after such investigation or enquiries as he may consider fit to make or institute and shall certify what amount (if any) has at the time of termination of the contract been reasonably earned by or would reasonably accure to the

Contractor in respect of the work then actually done by him under the contract what was the value of any unused or partially used materials, any constructional plants and any temporary works upon the site.

(d) The RailTel shall not be liable to pay to the Contractor any moneys on account of the contract until the expiration of the period of maintenance and thereafter until the cost of completion and maintenance damages for delay in completion (if any) and all other expenses incurred by the RailTel have been ascertained and the amount thereof certified by the Engineer. The Contractor shall have no claim to any payment of compensation or otherwise howsoever on account of any profit or advantage which he might have derived from execution of the work in full but he did not derive in consequence of termination of the contract. The Contractor shall then be entitled to receive only such sum or sums (if any) as the Engineer may certify would have been due to him upon due completion by him after deduction of the said amount; but if such amount shall exceed the sum which would have been payable to the Contractor, then the Contractor shall upon demand pay to the RailTel the amount of such excess and it shall be deemed a debt due by the Contractor to the RailTel and shall be recoverable accordingly.

****

SECTION – II

CHAPTER - III

FORMS OF TENDER

FORMS OF TENDER

INDEX

FORM –I
PARA 6.8 (a) Section-II Chapter -I

OFFER LETTER

To
RailTel Corporation of India Limited,
2nd Floor, B-Block,
Rail Nilayam,
Secunderabad-500 071

(i) I/We _____ have read the various conditions to tender attached here to and hereby agree to ABIDE BY THE SAID CONDITIONS. I/We also agree to keep this tender open for acceptance for a period of 180 days from the date fixed for opening the same and in default thereof, I/We will be liable for forfeiture of my/our Earnest Money. I/We offer to do the work **(NAME OF WORK)** Corporation of India Limited at the rates quoted in the attached schedules and hereby bind myself/ourselves to complete the work within 120 days from the date of issue of Letter of Acceptance of the tender. I/We also hereby agree to abide by the Various Conditions of Contract and to carry out the work according to the Specifications for materials and works laid down by the RailTel for the present contract.

2. A sum of Rs.5,20,000/- (Rupees Five Lakhs Twenty Thousand Only) is herewith forwarded as “Earnest Money”. The full value of Earnest Money shall stand forfeited without prejudice to any other rights or remedies if,

a) I/We do not execute the contract agreement within 15 days after receipt of notice issued by the RailTel that such documents are ready or,
b) I/We do not commence the work within 15 days after receipt of orders to that effect.

3. Until a formal agreement is prepared and executed the acceptance of this tender shall constitute a binding contract between us subject to modifications, as may be mutually agreed to between us and indicated in the “Letter of Acceptance” of my/our offer for this work.

SIGNATURE OF CONTRACTOR (S)
Date

SIGNATURE OF WITNESS
1.
2.

CONTTRACTOR (S) ADDRESS

Form – 2
Para 5.2.2 of preamble.

USER'S CERTIFICATE
(Related to para 5.2.2 of tender document)

1. (a) Name and complete address of the firm :
   (b) Telephone numbers and Corporate email ID:

2. Contract No. & Date :

3. (a) Scope and Work :
   (b) P.O No. and Date:
   (c) Total value of the contract:

4. Completion period as per P.O/Contract :

5. Description and No. of Equipments:

   (a) As mentioned in above P.O and as executed:
   (i) Server Farm Area_____ Square Meter.

   (ii) Designed IT Load _____ kW.

   (iii) UPS Capacity_____kW

   (iv) PAC Tonnage _____kW

   (v) Transformer _____kVA

   (vi) DG Sets _____kVA

   (vii) Power Redundancy (N+1 or N+N)

   (viii) Cooling Redundancy (N+1 or N+N)

   (ix) Other scope included:

   - Fire alarm and suppression (Yes/No)
   - CCTV Surveillance (Yes/No)
   - BMS (Yes/No)
   - Datacenter Infrastructure Management (Yes/No)
   - UTP and Fiber cabling (Yes/No)

6. Period for which the above Datacenter is operational : _____ months and _____ years.

7. Date of Commencement:

8. Actual date of Successful completion:

9. Total invoiced value:

10. Number of extensions given:

11. Penalty/LD levied:

12. Present working state of the Datacenter:

Signature of the user with Company Seal

Name:

Dated: Designation:

Phone:

Fax :

FORM – 3
Para- 2 Section-II Chapter II

AGREEMENT

An AGREEMENT made this _____day of_____ two thousand and one, between RailTel Corporation of India Limited, 2nd floor, B-Block, Rail Nilayam, Secunderabad – 500 071, acting in the premises through Executive Director/SR (hereinafter referred to as 'RailTel ') of one part and M/s _____
(hereinafter referred to as 'contractor') of the other part.

Whereas in response to a call for Tender for **(NAME OF WORK)** as per Tender papers at Annexure'A' hereto the Contractor has submitted a bid as per Annexure 'B' hereto and whereas the said Tender of the Contractor has been accepted for _____
_
as per copy of Letter of Acceptance of Tender No. _____ dated_____ complete with enclosures at the accepted rates and agreed deviations from Tender Papers _____ as per Annexure-C hereto and at an estimated contract value of Rs._____(Rupees _____ Only).

Now this agreement witnesses that in consideration of the premises and the payment to be made by the Purchaser to the Contractor provided for herein below the Contractor shall supply all equipment and materials and execute and perform all works for which the said Tender of the Contractor has been accepted strictly according to the various provisions in Annexure 'B' and 'C' hereto and upon such supply, execute and performance to the satisfaction of the purchaser and the purchaser shall pay to the Contractor at the rates accepted as per the said Annexure 'C' and in terms of the provisions therein.

In the witness where of the parties have hereunto set and subscribed their respective hands and/or seals day and year respectively mentioned against their respective signatures.

Signed and delivered at _____ by Shri _____ for and on behalf of M/s. _____

The contractor within named in the presence of :

1. Signatures
   Date
   Name in Block Capitals
   Address

2. Signatures
Date
Name in Block Capitals
Address

Signed and delivered at _____ for and on behalf of RailTel by Shri _____ (Director / Projects or his successor) in the presence of :-

1. Signatures
Date
1.1.1.2 Name in Block Capitals

2. Signature
Date
Name in Block Capitals

Address:

Annexure 'A' : Tender Paper No.
Annexure 'B' : Firm's Tender No.
Annexure 'C' : Letter of Acceptance of

(Signature)_____
Dated:
Complete with enclosures

Form - 4
Para 3 / Section-II Chapter – II

GURANTEE BOND FOR SECURITY DEPOSIT

(On Stamp Paper of requisite value)
(To be used by approved Scheduled Banks)

1. In consideration of the RailTel Corporation of India Limited, 2nd Floor, B-Block, Rail Nilayam, Secunderabad (Herein after called RailTel) having agreed to exempt …….. (Hereinafter called " the said Contractor(s)") from the demand, under the terms and conditions of an Agreement No. …… …… dated …… made between …… and …….. for (hereinafter called " the said Agreement") of security deposit for the due fulfillment by the said Contractor (s) of the terms and conditions contained in the said Agreement, or production of a Bank Guarantee for Rs. …….. (Rs. …….. only). We, ……(indicate the name of the Bank) hereinafter referred to as " the Bank") at the request of ……. ……. Contractor(s) do hereby undertake to pay the RailTel an amount not exceeding Rs. ……. Against any loss or damage caused to or suffered or would be caused to or suffered by the RailTel by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.
2. We, ……. Bank do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on demand from the RailTel stating that the amount is claimed is due by way of loss or damage caused to or would be caused to or suffered by the RailTel by reason of breach by the said Contractor(s) of any of terms or conditions contained in the said Agreement or by reason of the Contractor(s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ……
3. We, …….. bank undertake to pay to the RailTel any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) / Supplier(s) in any suit or proceedings pending before any court or Tribunal relating thereto our liability under this present being, absolute and unequivocal.
   The payment so made by us under this Bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) / Supplier(s) shall have no claim against us for making such payment.
4. We, ……. Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the RailTel under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till RailTel certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this Guarantee. Unless a demand or claim under the Guarantee is made on us in writing on or

before the ……. (1) ……. We shall be discharged from all liability under this Guarantee thereafter.

5. We, …… We, …… (indicate the name of Bank) Further agree with the RailTel that the RailTel shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Agreement or to extend time of to postpone for any time or from time to time any of the powers exercisable by the RailTel against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension to the said Contractor(s) or for any forbearance, act or omission on the part of RailTel or any indulgence by the RailTel to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have affect of so relieving us.
6. This Guarantee will not be discharged due to the change in the Constitution of the Bank or the Contractor(s) Supplier(s).
7. (indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the RailTel in writing.

1.1.1.2.1 Dated the day of 2012

for ……..
(indicate the name of the Bank)

Witness

1. Signature
   Name
2. Signature
   Name

NOTE: The Guarantee shall be valid for a period of four months after the expiry of the warranty period of the equipment as per para 29 S.C.C.

FORM – 5
Para 4 Section-II Chapter-I

STATEMENT OF DEVIATIONS

PROFORMA FOR STATEMENT OF DEVIATIONS

1. The following are the particulars of deviations from requirement of the Instructions to Tenderers and Conditions of Tendering , Preamble and Special Conditions of Contract.

1.1 Instructions to Tenderers and Conditions of Tendering

Clause	Deviation	Remarks (Including Justification)

1.2 Preamble

Clause	Deviation	Remarks (Including Justification)

1.3 Special conditions of Contract.

Clause	Deviation	Remarks (Including Justification)

2. The following are the particulars of deviations from requirement of the technical specifications.

Annexure	Clause	Deviation	Remarks (Including Justification)

Notes:

Where there is no deviation, the statement should be returned duly signed with an endorsement indicated no deviations.

SIGNATURE AND SEAL OF THE
MANUFACTURER / TENDERER

FORM - 6
Para 8.2. Section-II Chapter –II

STANDING INDEMNITY BOND
(For on Account Payments and Stores supplied by RailTel)

(On Stamp paper of Requisite Value)

We, M/s _____ hereby undertake that we hold at our Stores Depot/s at _____ for and on behalf of RailTel Corporation of India Limited in the premises through Director/Projects or his successor hereinafter referred to as "the Purchaser" all materials for which 'On Account' payments have been made to us against the Contract for ---------- vide letter of Acceptance of Tender No. _____ and the materials handed over to us by the Purchaser for all purpose of execution of the said Contract, until such time the materials are duly erected or otherwise handed over to him.

We shall be entirely responsible for the safe custody and protection of said materials against all risk till they are duly delivered as erected equipment to the purchaser or as he may direct otherwise and shall indemnify the Purchaser against any loss, damage or deterioration whatsoever in respect of the said materials while in our possession and against disposal of surplus materials. The said materials shall at all times be open to inspection by any engineer authorized by the Director / Projects (whose address will be intimated in due course).

Should any loss, damage or deterioration of materials occur or surplus materials disposed off and refund becomes due, the purchaser shall be entitled to recover from us the full cost as per prices included in the Contract (as applicable) and also compensation for such loss or damage, if any, alongwith the amount to be refunded without prejudice to any other remedies available to his by deduction from any sum due or any sum which at any time hereafter becomes due to us under the said or any other Contract.

Dated this _____ day of _____ 2009

for and on behalf of M/s _____ (Contractor)

Signature of witness

Name and witness in Block letters

Address

FORM – 7
PARA 20.2 / Section-II Chapter –I

SYSTEM PERFORMANCE GUARANTEE

PROFORMA FOR THE SYSTEM PERFORMANCE GUARANTEE

To

The Director / Projects,

I / We …… hereby guarantee that the design on the basis of which we have submitted our tender no. …… has been carefully made to conform to the end objectives in the tender documents and to technical specification therein. We further guarantee that in the event of the performance of the system, when installed, not complying with the end objectives or with the specifications contained in the tender documents, we shall provide further inputs to enable the RailTel to realize the end objectives contained in these documents without any additional payment for any additional equipment which may be required in this regard. We further guarantee that all the expenses for providing the additional inputs under the System Guarantee will be borne by us. We further guarantee that these additional inputs will be provided by us to make the system workable within 1 months from the date on which this guarantee is invoked by the Purchaser. The guarantee is valid for a period of one year from the date of commissioning of the system.

(Signature of Firm's Authorized Officer)

Seal

Signature of witness:

1. ……

2. ……

FORM – 8
PARA 46 / Section-II Chapter – II

PROFORMA OF BANK GUARANTEE FOR MOBILISATION ADVANCE

(On Stamp paper of requisite value)
(To be used by approved Scheduled Banks)

1. In consideration of the RailTel Corporation Of India Ltd 2nd Floor, B-Block, Rail Nilayam, Secunderabad- 500071 (Hereinafter called " the RailTel") having agreed to exempt …… ……..(hereinafter called " the said Contractor(s)") from the demand, under the terms and conditions of an Agreement No. …… …… dated …… made between …… and …… …….. for (hereinafter called " the said Agreement") of Mobilisation Advance for the due fulfillment by the said contractor)s) of the terms and conditions contained in the said Agreement, or production of a Bank Guarantee for Rs. …….. (Rs. …….. only). We, ……(indicate the name of the Bank) hereinafter referred to as " the Bank") at the request of ……. ……. Contractor(s) do hereby undertake to pay the RailTel an amount not exceeding Rs. ……. Against any loss or damage caused to or suffered or would be caused to or suffered by the RailTel by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.
2. We, …… Bank do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on demand from the RailTel stating that the amount is claimed is due by way of loss or damage caused to or would be caused to or suffered by the RailTel by reason of breach by the said Contractor(s) of any of terms or conditions contained in the said Agreement or by reason of the Contractor(s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ……
3. We, …….. bank undertake to pay to the RailTel any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) / Supplier(s) in any suit or proceedings pending before any court or Tribunal relating thereto our liability under this present being, absolute and unequivocal.
   The payment so made by us under this Bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) / Supplier(s) shall have no claim against us for making such payment.

4. We, …… Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the RailTel under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till RailTel certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this Guarantee. Unless a demand or claim under the Guarantee is made on us in writing on or before the ……. (1)

…… We shall be discharged from all liability under this Guarantee thereafter.

5 We, …… (indicate the name of Bank) Further agree with the RailTel that the RailTel shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Agreement or to extend time of to postpone for any time or from time to time any of the powers exercisable by the RailTel against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension to the said Contractor(s) or for any forbearance, act or omission on the part of RailTel or any indulgence by the RailTel to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have affect of so relieving us.

6. This Guarantee will not be discharged due to the change in the Constitution of the Bank or the Contractor(s) Supplier(s).

7. We, …… (indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the RailTel in writing.

Dated the day of 2012

for ……..
(indicate the name of the Bank)

Witness

1. Signature
   Name

2. Signature
   Name

FORM – 9
Clause 5.2.5 of preamble

WORKS IN HAND

S. N	System and Name of Project details	Party's address for whom the work is being done	Total value of contract (and details)	Schedule period of execution (in months)	%age progress in terms of works done	Likely date of completion	No of Extensions Granted	Payments received till date	Remarks

FORM - 11

Para - 35 Section-II Chapter - II

EXTENSION OF PERIOD OF COMPLETION OF WORK ON CONTRACTOR'S ACCOUNT

No. Date:

To,

……..

……..

Sub: (i) (Name of Work)
(ii) Acceptance Letter No.
(iii) Undertaking / Agreement No.

Ref: …….(Quote specific application of the Contractor for extension to date, if received).

Dear Sir,

The stipulated date for completion of the work mentioned above is ……..from the progress made so far and the present rate of progress, it is unlikely that the work will be completed by the above date (or However, the work was not completed on this date)

Expecting that you may be able to complete the work if some time is given the Director / Projects RailTel Corporation of India Limited, Secunderabad although not bound to do so, hereby extends the time for completion from …… to …… .

Please note that an amount equal to 0.5% of the total value of the contract per week or part thereof (rounded off to the nearest whole number) subject to a maximum of 10% of the total contract value of the works as a recovery for delay in the completion of the work after the expiry of (1) ……. will be recovered from as mentioned in para 35 chapter II, section II of the special conditions of contract for the extended period notwithstanding the grant of this extension. You may proceed with the work accordingly.

The above extension of the completion date will also be subject to the further condition that no increase in rates on any account will be payable to you.

Please intimate within a week of the receipt of this letter your acceptance of the extension on the conditions stated above.

Please note that in the event of declining to accept the extension on the above said conditions or, in the event of your failure after accepting or acting up to this extension to

complete the work by (2) ……. here mention the extended date), further action will be taken in terms of relevant para of special conditions of contract.

Yours faithfully,
for & on behalf of RailTel Corporation of India Limited

Note:

1. Give here the stipulated date for completion without any penalty fixed earlier.
2. Here mention the extended date.

Sub: (i) (Name of Work)
(ii) Acceptance Letter No.

FORM - 13

Para 5.1.3 of preamble

QUALIFICATION EXPERIENCE

Details of works executed and under execution during the last 3 years should be furnished in the following format.

S.No.	Name of Project and description of work.	Party's Address of whom the work was done	Total value of contract (in Indian Rupees)	Year of completion and schedule period of execution (in months)	Year of co mpletion and actual period of execution (in months)

Note: A certificate from the organisation , for which the work was executed, should preferably be executed to indicate that the contract was satisfactorily performed.

Signature and Seal of the
Manufacturer / contractor

FORM – 14
PARA 40.5 / Section-II Chapter – II

GUARANTEE BOND AGAINST 'ON ACCOUNT' PAYMENTS

(On Stamp paper of requisite value)
(To be used by approved Scheduled Banks)

In consideration of the RailTel Corporation of India Limited, 2nd Floor, B-Block, Rail Nilayam, Secunderabad – 500 071 (hereinafter called "the RailTel") having agreed to exempt …… ……..(hereinafter called " the said Contractor(s)") from the demand, under the terms and conditions of an Agreement No. …… ……dated……made between …… and ..... for (hereinafter called " the said Agreement") of on Account Payment for the due fulfillment by the said contractor)s) of the terms and conditions contained in the said Agreement, or production of a Bank Guarantee for Rs. …….. (Rs. …….. only). We, ……(indicate the name of the Bank) hereinafter referred to as " the Bank") at the request of …….. …… Contractor(s) do hereby undertake to pay the government an amount not exceeding Rs. ……. Against any loss or damage caused to or suffered or would be caused to or suffered by the RailTel by reason of any breach by the said Contractor(s) of any of the terms or conditions contained in the said Agreement.

We, …… Bank do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on demand from the RailTel stating that the amount is claimed is due by way of loss or damage caused to or would be caused to or suffered by the RailTel by reason of breach by the said Contractor(s) of any of terms or conditions contained in the said Agreement or by reason of the Contractor(s) failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. ……

We, …….. Bank undertake to pay to the RailTel any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) / Supplier(s) in any suit or proceedings pending before any court or Tribunal relating thereto our liability under this present being, absolute and unequivocal.

The payment so made by us under this Bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) / Supplier(s) shall have no claim against us for making such payment.

4. We, …… Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the RailTel under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till RailTel certifies

that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this Guarantee. Unless a demand or claim under the Guarantee is made on us in writing on or before the ……. (1) …….. We shall be discharged from all liability under this Guarantee thereafter.

5. We, ……(indicate the name of Bank)…….. further agree with the RailTel that the government shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Agreement or to extend time of to postpone for any time or from time to time any of the powers exercisable by the RailTel against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension to the said Contractor(s) or for any forbearance, act or omission on the part of RailTel or any indulgence by the RailTel to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have affect of so relieving us.

6. This Guarantee will not be discharged due to the change in the Constitution of the Bank or the Contractor(s) Supplier(s).

7. We, …… (indicate the name of Bank) lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the RailTel in writing.

Dated the day of 2012

for ……..

(indicate the name of the Bank)

Witness

1. Signature
   Name
2. Signature
   Name

Form-15
Clause 17, 17A of Insructions to Tenderer

AFFIDAVIT

(To be given separately by each Consortium/Joint Venture member of the Bidder on Stamp Paper of Rs. 10)

I, _____ S/o _____, Resident of _____, _____, the _____ [insert designation] of the [insert name of single bidder / Consortium/Joint Venture member if Consortium/Joint Venture] do solemnly affirm and state as follows:

1. I say that I am the authorized signatory of _____ [insert name of company/Consortium/Joint Venture member] (hereinafter referred to as "Bidder/Consortium/Joint Venture Member") and I am duly authorized by the Board of Directors of the Bidder/Consortium/Joint Venture Member to swear and depose this Affidavit on behalf of the Bidder/Consortium/Joint Venture Member.

2. I say that I have submitted information with respect to our eligibility for RailTel Corporation of India Ltd. (hereinafter referred to as "RCIL") **(NAME OF WORK)** (hereinafter referred to as "Project") Request for Proposal ('RFP') document and I further state that all the said information submitted by us is accurate, true and correct and is based on our records available with us.

3. I say that, we hereby also authorize and request any bank, authority, person or firm to furnish any information, which may be requested by RCIL to verify our credentials / information provided by us under this tender and as may be deemed necessary by RCIL.
4. I say that if at any point of time including the concession period, in case RCIL requests any further/additional information regarding our financial and/or technical capabilities, or any other relevant information, we shall promptly and immediately make available such information accurately and correctly to the satisfaction of RCIL.
5. I say that, we fully acknowledge and understand that furnishing of any false or misleading information by us in our RFP shall entitle us to be disqualified from the tendering process for the said Project. The costs and risks for such disqualification shall be entirely borne by us.
6. I state that all the terms and conditions of the Request for Proposal (RFP) document has been duly complied with.

DEPONENT

VERIFICATION

I, the above-named deponent, do very that the contents of paragraphs 1 to 6 of this affidavit are true and correct to my own knowledge. No part of it is false and nothing material has been concealed. Verified at _____, on this ___ day of _____, 2008.

DEPONENT

CHAPTER-IV

INSPECTION, TEST, INSTALLATION

&

COMMISSIONING

1. Engineering

Upon award of the contract, the contractor shall complete the engineering design of the datacenter in line with the design requirements and specifications. The contractor shall submit preliminary design, detailed design and test plan. The submittals shall include but not limited to:

- Preliminary design document
- Detailed design document
- Samples and Datasheets
- GFC drawings
- BOQ as per the design
- Acceptance test plan

Only after approval of the design documents and BOQ, the contractor can initiate their procurement process.

2. Procurement

After the design approval of every subsystem, the contractor shall go ahead the procurement and construction as per the approved design, GFC drawings and BOQ.

When the materials are received at site, RailTel will inspect the materials as per the test/inspection plan. Based on the inspection, the contractor shall prepare a material inspection report (MIR) which shall be jointly signed by the authorized signatories of the contractor and RailTel.

The contractor shall keep all the materials in their own safe custody until installation, commissioning and provisional acceptance.

3. Testing

The contractor shall conduct necessary tests for verification of compliance with the technical specifications. The testing shall be conducted for all critical components such as UPS, Batteries, Diesel Generators, Cables, Transformers, Panels, HVAC systems, etc. However, the tests shall not be limited to these components. RailTel may require testing of any other components during execution of the projects.

3.1 TEST CATEGORIES

i) The following tests shall be conducted for acceptance of the equipment and the system before final acceptance of the system.

A1 Sample Approvals
A2 Pre-Factory Acceptance Testing
A3 Factory Acceptance Testing (FAT)
A4 Pre-commissioning test (after installation) for total integrated system.
A5 Site Acceptance Testing (SAT)
A6 Trial Run

ii) These tests shall be carried out on all equipment supplied by Tenderer including those supplied by sub-vendors, if any.

iii) Tenderer shall arrange all necessary test instruments, manpower, test-gear, accessories etc.

iv) All technical personnel assigned by Tenderer shall be fully conversant with the system specifications and requirements. They shall have the specific capability to make the system operative quickly and efficiently and shall not interfere or be interfered by other concurrent testing, construction and commissioning activities in progress. They shall also have the capability to incorporate any minor modifications/suggestions put forward by Purchaser/Engineer.

v) The Tenderer shall arrange power supply and any temporary commissioning facility including communication system required for installation/testing/commissioning.

vi) Test Plan: The Contractor shall submit to Purchaser 'Test Plans' well in advance of commencement of actual testing in each of the above mentioned test categories.

The plans shall include:

1) System/Equipment functional and performance description (in short) and Tests to be conducted and purpose of test.

2) Test procedures (including time schedule for the tests) and identification of test inputs details and desired test results

3) Test Report:

The observations and test results obtained during various tests conducted shall be compiled and documented to produce Test Reports by Tenderer. The Test Reports shall be given for each equipment/item and system as a whole. The report shall contain the following information to a minimum:

i) Test results

ii) Comparison of test results and anticipated (as per specifications) test result as given in test plans and reasons for deviations, if any.

iii) The data furnished shall prove convincingly that

a. The system meets the Guaranteed Performance objectives
b. Mechanical and Electrical limits were not exceeded.

c. Failure profile of the equipment during the tests are well within the specified limits

vii) Failure of Components:

Till the system is accepted by the Purchaser, a log of each and every failure of components shall be maintained. It shall give the date and time of failure, description of failed component, circuit, module, component designation, effect of failure of component on the system/equipment, cause of failure, date and time of repair, mean time to repair etc. Repair/modification done at any point of time at one site, shall be carried out by Tenderer at all the sites. Detailed documentation for the same shall be submitted to Purchaser for future reference.

If the malfunction and/or failures of a unit/module/sub-system/equipment repeat during the test, the test shall be terminated and Tenderer shall replace the necessary component or module to correct the deficiency. Thereafter, the tests shall commence all over again from the start.

If after the replacement the equipment still fails to meet the specification, Tenderer shall replace the equipment with a new one and tests shall begin all over again. If a unit/ subsystem/module has failed during the test, the test shall be suspended and restarted all over again only after the Tenderer has placed the Equipment back into acceptable operation. Purchaser's approval shall be obtained for any allowable logical time required to replace the failed component/unit/module/sub-system.

viii) **Readjustments**

No adjustments shall be made to any equipment during the acceptance tests. If satisfactory test results cannot be obtained unless readjustments are made, Tenderer shall carry out only those readjustment needed to ready the equipment/system for continuance of tests. A log of all such adjustments shall be kept giving date and time, equipment, module, circuit, adjustments, reasons, test result before and after adjustment etc. Fresh acceptance tests shall be conducted after the readjustments have been completed.

3.2 Sample Approvals

The contractor shall provide samples of various components such as civil/interior materials (such as tiles), cables, accessories, furnitures, etc prior to their procurement. For components such as UPS, Transformers, DG, etc where samples cannot be provided, the contractor shall submit OEM datasheets of those components for approval by RailTel. The contractor shall go ahead with the procurement only after RailTel's approval.

3.3 Pre Factory Acceptance Testing

The Tenderer on his own exactly in line with FAT shall conduct pre-factory acceptance testing and test reports for the same shall be forwarded to Purchaser/Engineer before start of FAT.

3.4 Factory Acceptance Testing (FAT)

RailTel may require factory acceptance testing to some or all the components to be supplied and installed by the successful bidder.

Factory acceptance tests shall be carried out after review and approval of FAT procedure/documents as per bid requirements and review of Pre-Factory acceptance results & shall be conducted at the manufacturing facilities from where the respective equipment/subsystems are offered. The factory acceptance testing shall be conducted in the presence of the Purchaser/Engineer. The tests shall be carried out on all equipment/items including those supplied by Sub-vendors and factory acceptance certificates shall be issued.

RailTel reserves the right to waive factory acceptance testing to some or all the equipments.

The factory tests shall include but not be limited to:

A) Equipment Testing :

i. Mechanical checks to the equipment for dimensions, inner and outer supports, finishing, welds, hinges, terminal boards, connectors, cables, painting etc.

ii. Electrical checks including internal wiring, external connections to other equipment etc.

iii. Check for assuring compliance with standards mentioned in the specifications.

iv. Individual check on each/module/sub-assembly in accordance with the modes and diagnostics programs of the Tenderer.

v. Checks on power consumption and heat dissipation characteristics of various equipment

vi. Environment testing and other laid down tests in Type Tests plan of the specification of the equipment.

vii. Functional testing

viii. Any other test not included in FAT document but relevant to the project as desired by the Purchaser/Engineer at the time of factory acceptance testing.

B) System Integration Testing

Functional and performance test should be conducted for each complete system/component that require integration with other components/subsystems of the datacenter. The interfacing subsystems/components can be simulated reflecting the production scenario.

All functions of the BMS/DCIM shall be demonstrated in totality with integration with all the test systems concerned.

3.5 Installation

After successful completion of factory acceptance testing, equipment shall be sent to site for installation. Equipment without factory acceptance certificates shall not be acceptable at site.

Prior to installation, all equipment shall be checked for completeness as per the specifications of equipment required for a particular station. Installation shall be carried out in accordance with the installation manuals and approved installation drawings in the best workmanship.

Tenderer shall indicate the number of teams and the list of equipment for each teams to be deployed for installation of the total telecom system in order to complete the work within the stipulated time frame.

Tenderer shall bring all installation tools, accessories, special tools, test gears, spars parts etc. at his own cost as required for the successful completion of the job.

If during installation and commissioning any repairs are undertaken, the maintenance spares supplied with equipment shall not be used for the repair. Tenderer shall arrange his own spare parts for such activities till such time the system has been finally accepted by the Purchaser. A detailed report & log of all such repairs shall be made available by the Tenderer to Purchaser/Engineer and shall include cause of faults and repair details, within 2 weeks of fault occurrence.

A detailed time schedule for these activities shall be submitted by Tenderer to Purchaser/Engineer to enable their representatives to be associated with the job.

Tenderer shall supply all installation materials required for proper installation of the equipment. These shall include but not be limited to, all connectors, interbay and inter equipment cables, power supply cables and connectors, power distribution boxes, anchoring bolts, nuts, screws, washers, raceways, cable management accessories, protection/safety accessories and any other components to complete the installation as per the technical specifications and local/international standards/best practices.

The installation of equipment shall be done as to present neat and clean appearance in accordance with approved installation document drawings.

3.6 Pre-Commissioning

On completion of installation of equipment, the correctness and completeness of the installation as per Manufacturer's manual and approved installation documents shall be checked by the Tenderer on his own.

A list of Pre-Commissioning tests (same as approved by the Purchaser/Engineer for site acceptance testing) and activities shall be prepared by Tenderer and the test shall be carried out by the Tenderer on his own. After the tests have been conducted to the Tenderer's own satisfaction, the Tenderer shall provide the test results for review by Purchaser/Engineer and then offer the system for Site Acceptance Testing.

During pre-commissioning, if any fault occurs to any equipment or system, Tenderer shall identify the same and provide report/history of all faults to the Purchaser.

During installation and pre-commissioning of the telecom system, Tenderer shall have enough number of commissioning spares so that the installation is not held up because of non-availability of commissioning spares. Tenderer shall ensure that the spares meant for operation and maintenance are not used during installation and commissioning.

3.7 Site Acceptance Testing (SAT)

On completion of Pre-commissioning, site acceptance testing shall be conducted on the system as per approved SAT procedures and its constituents by the Tenderer under the presence of Purchaser/Engineer.

The tests shall include, but not be limited the following:

a) Checks for proper installation as per the approved installation drawings for each equipment/item and system as a whole.

b) Guaranteed performance specifications of individual equipment/item.

c) Self diagnostics test on individual equipment

d) Compliance to standards/best practices

e) Load Testing

f) Integration testing between various subystems

g) Redundancy Testing

h) Testing for Concurrent Maintenability

i) Tier III Site certification tests by Uptime Institute.

3.8 SPARES

3.8.1 MANDATORY SPARES

The contractor shall maintain sufficient mandatory spares for meeting the Service Level Requirement specified in the tender. The bidder shall provide a list of mandatory spares as a part of their technical bid. Unit rates for each spares required for operation and maintenance shall be provided as a part of their price bid.
Spares shall be provided from the same manufacturing facilities/location from where the respective equipment, subsystems are offered.

Tenderer shall provide the address, contact person, fax, telephone no. of the manufacturer of the spare parts. The Tenderer shall warrant that spare part for the system would be available for minimum of 10 years after system commissioning (taking over). After this period if the Tenderer discontinues the production of the spare parts, then he shall give at least 12 months notice prior to such discontinuation so that Purchaser may order the requirements of spares in one lot.

3.8.2 Commissioning spares

The commissioning spare shall be arranged by the Tenderer to cater to the requirement during installation, commissioning, site acceptance testing, trial run and warrantee period. These spares shall be readily available with the Tenderer.

These commissioning spares are different from mandatory spares and Tenderer shall not use mandatory spares as commissioning spares.

3.9 TRIAL RUN

Upon conclusion of the site acceptance testing the Tenderer shall keep the Datacenter facility commissioned for 2 months for ‘TRIAL RUN’. During this period Tenderer shall provide all specialist Engineers & Technicians including experts to maintain the total log, incidents, failures & for assisting site engineer & for total co-ordination. However, the personnel of the Purchaser trained for the purpose shall perform the normal operation and maintenance of the system.

If during ‘Trial run’ any defect is noted in the system, the Tenderer shall rectify, replace the same to the satisfaction of Purchaser’s/Engineer. The decision to repeat the final test or restart the ‘Trial’ shall be of Purchaser/Engineer depending upon the severity of the defect.

During trial run, if any fault occurs to any equipment of system, Tenderer shall identity and rectify the same and provide report, history of all faults to the Purchaser.

Ideally, during the 'Trial run, no shutdown of the system due to failure of equipment, power supply etc. should happen. A record of all failures shall be kept for each manned/unmanned station and the availability of the system on per hop and end to End basis shall be calculated, accordingly and results submitted to Purchaser/engineer.

If the system fails to come up to the guaranteed performance, the Tenderer, within a period of thirty (30) days shall take any and all corrective measures and resubmit the system for another 'Trial Run' of trial period. All modifications, changes, corrective measures, labour etc. shall be at the cost of the Tenderer. In case the date of completion for the second trial run exceeds the time schedule for the project, he shall be liable to pay liquidated damages. If the system fails to reach the guaranteed performance even after the second trial run, the Purchaser shall be free to take any action as he deems fit against the Tenderer and to bring the system to the guaranteed performance with the help of third party at the expense of the Tenderer.

3.10 QUALITY ASSURANCE

i) Tenderer shall submit the details of Quality Assurance program followed by him beginning with raw materials, active, passive and fabricated components, units, sub-assemblies, assemblies, wiring, interconnections, structures. Etc. to finished product. Tenderer shall obtain and forward the Quality Assurance Program for equipment supplied by Sub-vendor, if any.

ii) The Purchaser's/engineer reserves the right to inspect and test each equipment at all stages of production and commissioning of the system. The inspection and testing shall include but not be limited to raw materials. , components, sub-assemblies, prototypes, production units, guaranteed performance specifications etc.

iii) For Factory inspection and testing, Tenderer shall arrange all that is required e.g. quality assurance personnel, space, test gear etc. for successful carrying out of the job by the Purchaser/Engineer, at Tenderer's cost, at the Manufacturer's works.

iv) Purchaser's/Engineer shall have free entry and access to any and all parts of the Manufacturer's facilities associated with manufacturing and testing of the system at any given time.

v) It shall be explicitly understood that under no circumstances shall any approval of the Purchaser's/Engineer relieve the Tenderer of his responsibility for material, design, quality assurance and the guaranteed performance of the system and its constituents.

vi) Tenderer shall invite the Purchaser's/Engineer, at least 40 days in advance, of the date at which system shall be ready for Inspection and Testing. All relevant documents and manuals approved Engineering drawings etc. shall

be available with the Purchaser/Engineer well in advance of the start of Inspection and Testing.

Purchaser's Engineer or his representative shall, after completion of inspection and testing to their satisfaction, issue factory acceptance certificates to release the equipment for shipment. No equipment shall be shipped under any circumstances unless a factory acceptance certificate has been issued for it, unless agreed otherwise by Purchaser's Engineer.