

INVITATION TO BID

TIER III DATA CENTER FACILITY INSIDE ICT DEPARTMENT, PIACL COMPUTER CENTER

The PIACL invites sealed bids, through this Request for Proposal (RFP) from the bidders (registered with Income Tax and Sales Tax Departments), to prominently achieve major expansion as “Concurrent Maintainable IT data center expansion/new retrofit out site covering Power cooling and ITDC monitoring infrastructure completion supporting entire passive infrastructure deployment to achieve smooth and uninterrupted data center operations 24x7 eliminating all single point of failures in Power and cooling with best possible and maximum protection level overall up to Rating/Tier III conformance (Tier-III benchmark guides and specifications for Telecom, Electrical, Architectural, Mechanical, fit out).

Bidding documents, which are containing detailed terms and conditions, method of procurement, procedure for submission of bids, bid security, bid validity, opening of bid, evaluation criteria, clarification / rejection of bids, performance guarantee etc. are available for the interested bidders at www.piac.com.pk

Prospective firms/companies are required to submit Tender Fee of **Rs. 2,000** (non-refundable) in shape of a Pay Order along with ‘Technical Proposal’ and Earnest Money (refundable) amounting to equivalent 2% of total bid value in shape of pay order along with ‘Financial Proposal’ in the name of PIAC (Local Bidders Only).

In order to address the queries pertaining to the tender, a pre-bid meeting (pre-response conference) is (done) on **23-11-2016 (1500 Hrs)**.

Tenders are called on “Two Stage Two Envelope” basis. The bids, prepared in accordance with the instructions in the bidding documents, must reach at **GM Contracts Management, Procurement and Logistics Department, PIA Head Office, Karachi** on or before **23-01-2017** up to 1030 (PST). Technical bids will be opened the same day at **1100 Hrs. (PST)**. This advertisement with complete RFP is also available on PPRA website at www.ppra.org.pk

Bids must be valid for 150 days.

PIAC reserves the right to reject any or all bids or cancel the procurement process at any stage in line with PPRA rules.

GM Contracts Management
Address: Procurement and Logistics
Department, PIA Head Office, Karachi.
Ph: 021 9904 4423, 9904 4101, 9904 3081
Email: khijzpk@piac.aero,
srspo.ptc@piac.aero
contract.administration@piac.aero

Ref: PIAC/ P&L/ Data Centre (ICT) /22/16

Invitation to Bid

Tier III Data Center Facility Inside ICT Department, PIACL Computer Centre

M/S _____

Sub: Tier III Data Center Facility Inside ICT Department, PIACL Computer Centre

Dear Sirs,

We are pleased to invite your sealed tenders for the item/ services mentioned above. In case of more than one schedule separate tender for each schedule should be furnished. The terms & conditions of the tender/ supplies/ services are given below:-

A) SUBMISSION OF TENDER

1. You are required to send your tenders addressed to GM Contracts Management, P&L Department, PIA Head Office, Karachi, latest by **23-01-2017** by **1030 Hrs.** The tenders may be dropped in the tender box marked as “**Tender Box Commercial Purchases**” placed at the entrance of the PIA Procurement & Logistics Building latest by 10:30 hours on the specified date. You may also send your tenders through registered A/D mail addressed to General Manager Contracts Management P&L, which must reach before the closing date and time mentioned above. Tenders will be opened at **11:00 hours** on the same day in the presence of the bidders.

2. Tenders received after stipulated date & time shall not be considered. The Corporation will not be responsible for postal delays. The decision of Chairman Tender Committee in this respect shall be final and binding.

3. Bidders are required to submit a Pay Order of Rs.2000/- (Non-Refundable) as tender fees along with Technical Proposal (Local Bidders).

B) EARNEST MONEY (Local Bidders)

The Tender should be accompanied a Pay Order payable (valid for 90 days from the date of tender opening) equivalent to 2 % of total bid value in the name of M/S PAKISTAN INTERNATIONAL AIRLINES as interest free Earnest Money (Refundable). Earnest Money in any other shape shall not be accepted. Earnest / Security Money deposited against a running contract (s) purchase orders(s) shall not be transferable as earnest money for any other tender. All tenders without Earnest Money shall not be considered.

C) SECURITY DEPOSIT (Local Bidders)

The successful tenderer upon award of Contract/Purchase Order will be required to furnish security deposit (pay order) in the amount equivalent to 5% of total tender value stated in the Letter of Acceptance as interest free Security deposit and to remain valid 3-months after the expiry period of the Contract. The Earnest Money already held can be converted into Security Deposit and balance amount if any shall be deposited as above.

Instructions to Bidder

Two Stage - two envelope bidding procedure:-

First stage

- (i) the bid shall comprise a single package containing two separate envelopes. Each envelope shall contain separately the financial proposal and the technical proposal;
- (ii) the envelopes shall be marked as “FINANCIAL PROPOSAL” and “TECHNICAL PROPOSAL” in bold and legible letters to avoid confusion;
- (iii) initially, only the envelope marked “TECHNICAL PROPOSAL” shall be opened;
- (iv) the envelope marked as “FINANCIAL PROPOSAL” shall be retained in the custody of the procuring agency without being opened;
- (v) the technical proposal shall be discussed with the bidders with reference to the procuring agency's technical requirements;
- (vi) those bidders willing to meet the requirements of the procuring agency shall be allowed to revise their technical proposals following these discussions;
- (vii) bidders not willing to conform their technical proposal to the revised requirements of the procuring agency shall be allowed to withdraw their respective bids without forfeiture of their bid security;

Second stage

- (Viii) after agreement between the procuring agency and the bidders on the technical requirements, bidders who are willing to conform to the revised technical specifications and whose bids have not already been rejected shall submit a revised technical proposal and supplementary financial proposal, according to the technical requirement;
- (ix) the revised technical proposal along with the original financial proposal and supplementary financial proposal shall be opened at a date, time and venue announced in advance by the procuring agency: Provided that in setting the date for the submission of the revised technical proposal and supplementary price proposal a procuring agency shall allow sufficient time to the bidders to incorporate the agreed upon changes in the technical proposal and to prepare the required supplementary financial proposal; and
- (x) the procuring agency shall evaluate the whole proposal in accordance with the evaluation criteria and the bid found to be the lowest evaluated bid shall be accepted.

PIA requirements are given.

Bidders **MUST**:

- Be registered with Sales Tax Authorities; please attach copy of Registration Certificate (Local Bidders Only).
- Affix the company seal on all tender documents.

Mention clearly Tender Reference on **TOP RIGHT CORNER OF PROPERLY SEALED ENVELOPE, BEARING COMPANY'S STAMP**

D) PREPARATION OF TENDER - TECHNICAL PROPOSAL:

All mandatory requirements are given in the schedule

Please give all the available technical details of the items offered by you, supported with the technical literature, brochure, drawings and pictures, client list details, authorization certificates etc.

BIDS / Tenders / Technical Proposal received shall be evaluated in accordance with the given technical specifications/ requirements.

E) PREPARATION OF TENDER – FINANCIAL PROPOSAL

The tenders should be enclosed in double cover. The inner cover should be sealed having enclosed the following documents:

- a) Schedules duly filled in, signed and sealed.
- b) Original Pay Order for Earnest Money.
- c) Undertaking on Rs. 100/= above non-judicial Stamp Paper duly signed and stamped by a Public Notary Oath Commissioner.
- d) The outer cover should bear address of the General Manager Contracts Management, P&L Department, PIA Head Office, Karachi and reference number of the tender with description and opening date of tender.
- e) All information about the services /material proposed to be supplied must be given as required in the schedules to tender.

F) PRICES

- a) The Prices mentioned in the tender will be treated as firm till the completion of Purchase Order/Contract.
- b) The Prices must be stated both in words and figures. Additional information, if any must be linked with entries on the Schedule to Tender.
- c) Offers must be valid for 150 days from the date of the opening technical proposals.
- d) Taxes should be mentioned (i.e. Provincial/FBR/other) along with tax rate.

G) SERVICES & MAINTENANCE PERIOD

Material, workmanship and services quality to be warranted for a period of two years commencing from go live date of the project and services & maintenance shall be provided by the firm for above period on Free of Cost (FOC) basis. Warranty of the equipment, as per manufacturer's standard conditions.

H) Quantities may be increased/ decreased upto ± 15 % of services, material & equipment.

GM Contracts Management

Enclosed: TOR
Evaluation Criteria
Draft SLA
Integrity Pact
Undertaking to Execute the Contract

1. Introduction:

Pakistan International Airline Corporation Limited, hereinafter referred to as “PIACL,” has issued this Request for Proposals (RFP) to define minimum contract requirements; solicit responses; detail response requirements; and, outline the process for evaluating responses and selecting a contractor to provide the needed goods or services.

Through this RFP, the PIACL seeks to procure necessary goods or services at the most favorable, competitive prices.

1.1. Statement of Procurement Purpose

The PIACL seeks to obtain, through this Request for Proposal (RFP), are to prominently achieve major expansion as “Concurrent Maintainable IT data center expansion/new retrofit out site covering Power cooling and ITDC monitoring infrastructure completion supporting entire passive infrastructure deployment to achieve smooth and uninterrupted data center operations 24x7 eliminating all single point of failures in Power and cooling with best possible and maximum protection level overall up to Rating/Tier III conformance (Tier-III benchmark guides and specifications for Telecom, Electrical, Architectural, Mechanical, fit out).

Address of the location where this facility will be built is as under:

PIACL ICT Department, PIA Head Office, Karachi Airport, Karachi- Pakistan.

1.1.1. General Information

The characteristics of the existing PIACL Data Center is as follows:

PIACL Data Center, Inside PIACL ICT Department

- Located near Karachi Airport (old Airport) inside PIACL ICT Department
- Total square footage:
4000 square feet approx.
having same square feet
raised floor
- Mechanical and Electrical space is inside Data Center
- Office space for 6-8 people for 24x7 shift

- Heating Ventilation and Air Conditioning (HVAC)
 - 12- 12 Ton
Capacity Standing AC
- Emergency Power
 - Emergency backup power to support all critical systems in the facility o (2) Generators
- Dual Power 120 K Uninterruptable Power Supply (UPS) system
- Security Services
- No electronic or physical security
- Fire suppression
 - Extinguisher based Fire Suppression

1.2. Scope of Service, Contract Period, & Required Terms and Conditions

The following attachments state the different requirements:

- (A) Technical Specifications/Scope of Services
 - Electrical System
 - Diesel Generator
 - UPS
 - Power Cable
 - Cooling System
 - Racks & Accessories
 - Data Center Infrastructure Management Solution
 - Civil Works
 - Physical Security & Safety System
 - Air Purification System
 - Video Surveillance System
 - Raised Floor
 - Data Structured Cabling System
 - Drawings & Diagrams
- (B) Technical Selection Criteria
- (C) Financial Selection Criteria
- (D) Draft Contract
- (E) Bill of Material

2. RFP SCHEDULE OF EVENTS

2.1. The following RFP Schedule of Events represents the PIACL's best estimate for this RFP.

	EVENT	DATE
1.	RFP Issued	November 12, 2016
2.	PIA Data Center Visit	November 21, 2016
3	Pre-response Conference	November 23, 2016
4	Written "Questions & Comments" Deadline	November 25, 2016
5	PIACL Response to Written "Questions & Comments"	December 02, 2016
6	Opening of Technical proposals	January 23, 2017
7	PIACL Completion of Technical Evaluation	February 06, 2017
8	Issuance of Technical Report	February 09, 2017
9	Meeting with Technically Qualified Vendor(s)	February 10, 2017
10	Revised Proposals (if required)	February 17, 2017
11	Technical Evaluation of revised proposals (if required)	February 23, 2017
12	PIACL Opening Cost Proposals	February 27, 2017
13	Evaluation of Cost/ financial proposal	March 02, 2017
14	PIACL Notice of Intent to Award Contract	TBD
15	Contractor Signature Deadline	TBD

The PIACL reserves the right, at its sole discretion, to adjust the RFP Schedule of Events as it deems necessary.

RESPONSE REQUIREMENTS

3.1. Response

A response to this RFP must consist of two parts, a Technical Response and a Cost Proposal.

3.1.1. **Technical Response.** Selection Criteria, attachment (B) provides the specific requirements for submitting a response. This includes mandatory requirement items, general qualifications and experience items, technical qualifications, experience, and approach items and cost evaluation criteria all of which must be addressed.

NOTICE: A technical response must not include any pricing or cost information. If any pricing or cost information amounts of any type (even pricing relating to other projects) are included in any part of the technical response, the PIACL may deem the response to be non-responsive and reject it.

3.1.1.1. A Vendor must use the Selection Criteria attachment (B) to organize, reference, and draft the Technical Response by duplicating the attachment, adding appropriate page numbers as required, and using the guide as a table of contents covering the Technical Response. All information and documentation included in a Technical Response should respond to or address a specific requirement detailed in the Selection Criteria attachment (B). All information must be incorporated into a response to specific requirement and clearly referenced. Any information not meeting these criteria will be deemed extraneous and will not contribute to evaluations.

3.1.1.2. The PIACL may determine a response to be non-responsive and reject it if:

- a. the Vendor fails to organize and properly reference the Technical Response as required by this RFP and the Selection Criteria attachment (B); or
- b. The Technical Response document does not appropriately respond to, address, or meet all of the requirements and response items detailed in the Selection Criteria attachment (B).

3.2. Response Errors & Revisions

A Vendor is responsible for any and all response errors or omissions. A Vendor will not be allowed to alter or revise response documents after the Response Deadline time and date detailed in the RFP Section 2, Schedule of Events unless such is formally requested, in writing, by the PIACL.

3.3. Response Withdrawal

A Vendor may withdraw a submitted response at any time before the Response Deadline time and date detailed in the RFP Section, Schedule of Events by submitting a written request signed by an authorized Vendor representative. After withdrawing a response, a Vendor may submit

another response at any time before the Response Deadline. After the Response Deadline, a Vendor may only withdraw all or a portion of a response where the enforcement of the response would impose an unconscionable hardship on the Vendor.

3.4. Additional Services

If a response offers goods or services in addition to those required by and described in this RFP, the PIACL, at its sole discretion, may add such services to the contract awarded as a result of this RFP. Notwithstanding the foregoing, a Vendor must not propose any additional cost amounts or rates for additional goods or services. Regardless of any additional services offered in a response, the Vendor's Cost Proposal must only record the proposed cost as required in this RFP and must not record any other rates, amounts, or information.

3.5. Response Preparation Costs

The PIACL will not pay any costs associated with the preparation, submittal, or presentation of any response.

4. GENERAL CONTRACTING INFORMATION & REQUIREMENTS

4.1. RFP Amendment

The PIACL at its sole discretion may amend this RFP, in writing, at any time prior to opening of technical bid. However, prior to any such amendment, the PIACL will consider whether it would negatively impact the ability of potential Vendors to meet the response deadline and revise the RFP Schedule of Events if deemed appropriate. If an RFP amendment is issued, the PIACL will convey it to potential Vendors. A response must address the final RFP (including its attachments) as amended.

4.2. RFP Cancellation

The PIACL reserves the right, at its sole discretion, to cancel the RFP **at any stage** or to cancel and reissue this RFP in accordance with applicable laws and regulations.

4.3. PIACL Right of Rejection

4.3.1. Subject to applicable laws and regulations, the PIACL reserves the right to reject, at its sole discretion, any and all responses.

4.3.2. The PIACL may deem as non-responsive and reject any response that does not comply with all terms, conditions, and performance requirements of this RFP.

4.4. Assignment, Subcontracting **and Joint Venture**

4.4.1. The Contractor may not subcontract, transfer, or assign any portion of the Contract awarded as a result of this RFP without prior approval of the PIACL. The PIACL reserves the right to refuse approval, at its sole discretion, of any subcontract, transfer, or assignment.

4.4.2. If a Vendor intends to use subcontractors, the response to this RFP must specifically identify the scope and portions of the work each subcontractor will perform.

4.4.3. JV is allowed.

4.5. Right to Refuse Personnel or Subcontractors

The PIACL reserves the right to refuse, at its sole discretion and notwithstanding any prior approval, any personnel of the prime contractor or a subcontractor providing goods or services in

the performance of a contract resulting from this RFP. The PIACL will document in writing the reason(s) for any rejection of personnel.

Contract Approval and Contract Payments

4.6.1 After contract award, the Contractor who is awarded the contract must submit appropriate documentation with the Procurement & Logistics Department of PIACL

4.6.2 This RFP and its contractor selection processes do not obligate the PIACL and do not create rights, interests, or claims of entitlement in either the Vendor with the apparent best-evaluated response or any other Vendor. PIACL obligations pursuant to a contract award shall commence only after the contract is signed by the PIACL agency head and the Contractor and after the Contract is approved by all other PIACL officials as required by applicable laws and regulations.

4.6.3 No payment will be obligated or made until the relevant Contract is approved as required by applicable statutes and rules of the PIACL.

4.6.3.1 The PIACL shall not be liable for payment of any type associated with the Contract resulting from this RFP (or any amendment thereof) or responsible for any goods delivered or services rendered by the Contractor, even goods delivered or services rendered in good faith and even if the Contractor is orally directed to proceed with the delivery of goods or the rendering of services, if it occurs before the Contract start date or after the Contract end date.

4.6.3.2 All payments relating to this procurement will be made in accordance with the Payment Terms and Conditions of the Contract resulting from this RFP

4.5. Contractor Performance

The Contractor who is awarded a contract will be responsible for the delivery of all acceptable goods or the satisfactory completion of all services set out in this RFP (including attachments) as may be amended. All goods or services are subject to inspection and evaluation by the PIACL. The PIACL will employ all reasonable means to ensure that goods delivered or services rendered are in compliance with the Contract, and the Contractor must cooperate with such efforts.

4.6. Severability

If any provision of this RFP is declared by a court to be illegal or in conflict with any law, said decision will not affect the validity of the remaining RFP terms and provisions, and the rights and obligations of the PIACL and Vendors will be construed and enforced as if the RFP did not contain the particular provision held to be invalid.

5. Evaluation and Selection Process

5.1. Evaluation Criteria, Categories & Maximum Points

Selection will be made on the combine weightage of Technical and Financial Proposals. Weightage factor is as under:

Technical Proposal: 65% (General Qualification & Experience + Technical Qualification, Experience & Approach * 0.65)

Financial Proposal: 35% (Acquired Marks * 0.35)

Final Total Marks = Technical + Financial

Technical Evaluation:

Technical Evaluation is comprised of Mandatory Requirements, General Qualification & Experience and Technical Qualification, Experience & Approach. Vendor must comply with all of the Mandatory Requirement. Failure to comply with any of the Mandatory Requirements item will automatically disqualify the bid.

Technical Evaluation is based on scoring system. Vendor must acquire 70 marks of the Technical Requirements to qualify for the opening of Financial Proposal. Less than 70 score will result in bid's disqualification.

The PIACL will consider qualifications, experience, technical approach, and cost in the evaluation of responses and award points in each of the categories detailed below (up to the maximum evaluation points indicated) to each response deemed by the PIACL to be responsive.

EVALUATION CATEGORY	MAXIMUM POINTS POSSIBLE
General Qualifications & Experience (Attachment B)	50
Technical Qualifications, Experience & Approach (Attachment B)	50
Financial (Attachment B)	50

5.2. Evaluation Process

The evaluation process is designed to award the contract resulting from this RFP not necessarily to the Vendor offering the lowest cost, but rather to the Vendor deemed by the PIACL to be responsive and responsible who offers the best combination of attributes based upon the evaluation criteria. ("Responsive Vendor" is defined as a Vendor that has submitted a response that conforms in all material respects to the RFP. "Responsible Vendor" is defined as a Vendor that has the capacity in all respects to perform fully the contract requirements, and the integrity and reliability which will assure good faith performance.)

5.2.1. Technical Response Evaluation.

5.2.1.1. The PIACL reserves the right, at its sole discretion, to request Vendor clarification of a Technical Response or to conduct clarification discussions with any or all Vendors. Any such clarification or discussion will be limited to specific sections of the response identified by the PIACL. The subject Vendor must put any resulting clarification in writing as may be required and in accordance with any deadline imposed by the PIACL.

5.2.1.2. The Evaluation Team will review each Technical Response to determine compliance with Technical Specifications/Scope of Services attachment (A), and Selection Criteria attachment (B). If Evaluation Team determines that a response failed to meet one or more of the mandatory requirements, the Proposal Evaluation Team will review the response and document the team's determination of whether:

- a. the response adequately meets RFP requirements for further evaluation;

- b. the PIACL will request clarifications or corrections for consideration prior to further evaluation; or,
- c. The PIACL will determine the response to be non-responsive to the RFP and reject it.

5.2.2. **Cost Proposal Evaluation.** Vendors are required to submit costs as per BOQ attached. However, marks will be given and weightage will be calculated at Total Cost of Project. Vendors are required to clearly submit Total Cost of Project. The Evaluation Team will open for evaluation the Cost Proposal of each Vendor deemed by the PIACL to be responsive and responsible and calculate and record each Cost Proposal score in accordance with the RFP Attachment (B) Financial Proposal.

Total Response Score. The Evaluation Team will calculate the sum of the Technical Response section scores and the Cost Proposal score and record the resulting number as the total score for the subject Response.

RFP ATTACHMENT (A) — Technical Specifications / Scope of Work

Technical Specifications

This section describes technical specifications of components, materials and appliances to be delivered, the building work to be executed and the services to be provided as part of the Data Centre Infrastructure. The document is structured such that the bidder is aware of the complete set of requirements which include civil works, equipment, systems, integration, processes, post installation work and subsequent operating support. As such the bidder can be aware of the expectations and offer the equipment and services accordingly. This documentation will be carried over to the implementation agreements as well.

The intended achievable results from this RFP are to prominently achieve major expansion as “Concurrent Maintainable IT data center expansion/new retrofit out site covering Power cooling and ITDC monitoring infrastructure completion supporting entire passive infrastructure deployment to achieve smooth and uninterrupted data center operations 24x7 eliminating all single point of failures in Power and cooling with best possible and maximum protection level overall upto Rating/Tier III conformance (Tier-III benchmark guides and specifications for Telecom, Electrical, Architectural, Mechanical, fit out).

Deployment of Integrated Solution “Modular POD IT Data Center”

The Data Centre BOM should be covering its detailed pricing segmented based on specifying/ SOW covering in below highlighted areas as under:

- To upgrade/migrate/refit-out after dismantling exiting ITDC and retrofit-able New ITDC in same premises.
- Data Centre Cable management with Labeling Standard EIA/TIA 606a
- Data Centre design/layout and deployment conformance to EIA/TIA 942-A standard
- HVAC based on ASHARE and Datacenter approved Standards referring TIA-942-A least having Tier III conformance with redundant configuration and centralized monitoring option.
- End to end enablement of Environmental Monitoring System Integration and Battery Monitoring System
- H07RN-F/XLPE/LSHF Electrical Cabling infrastructure deployment end to end from Upstream to downstream side using Type Tested/ASTA-certified From I,II-III level certified switchboard / panels ”Where applicable”.
- New Modular UPS system for Data Centre electrical Systems deployment along with fit out in to system hence to be fit out as per conformance to Tier-III level.
- Enablement of Physical Security, Safety and Monitoring, Vesda Deployment along with FM200/NOVEC/Inergen system by managing all accessories for Datacenter’s new site / new supply where applicable including complete integration of new Genset(s) with monitoring option on concept to delivery “proof of concept” in entire ITDC solution.

- Physical fit out of data Centre covering end to end all modification jobs covering Mechanical/Electrical/Architectural areas covered as per agreed and final SOW with PIAC.

The power system required for this data center shall have 2(N+1) redundancy i.e. there shall be two independent paths of power, whereas, cooling system shall have N+1 but with independent power paths from upstream side with 2N design configuration with High availability and redundancy to have concurrent maintainability to manage the cooling requirements of the data center. The average power dissipation per Rack shall be 6kW/Rack.

The building owner will supply raw power (Utility) to the Data Centre. The work beyond this will be the responsibility of the bidder. The vendor will be given the existing Data Center area and will need to dismantle the existing setup and build the new infrastructure as the provided layouts including detailed migration plan submission for all physical tier of IT equipment that is housed in side exiting IT Racks in the premises.

Raw power will be provided through main building electrical panels and will then take it to the proposed Electrical Switchboard/Panel Room of the Data Centre till the rack PDUs for dual power distribution to the Servers, SAN and Networking equipment. Provisioning of power distribution panel to transport raw power to UPS, cooling units and allied equipment will be responsibility of the contractor.

The proposal shall be accompanied with detailed drawings, calculations and all other documentation needed for assessment.

Please take all elements into consideration: aisle containment, power to the racks, and power for the CRAC units etc.

The following general requirements and conditions that apply to some or all of the following sections are defined below in this section:

The Data Center must be in conformity with the stipulated requirements of the local and regulatory authorities. The site preparation should follow the current norms prevalent in the industry specially TIA-942A and ASHRAE with most recent and updated guides and specifications. All equipment and material used should have relevant IEC certification. The bidder must include a schematic drawing for all proposed installable systems for approval with the proposal. The bidder is advised to inspect the site and assess the requirements needed for establishing this Tier III IT-Data Center.

The Data Centre infrastructure should must be compliant to minimum TIA-942 Tier- III or above specifications especially on a principle to meet dedicated use of PDU/Cooling/Fir suppression system for each proposed physical compartment in design if required by the guides specified by relevant referred standard that are already addressed above in detail.

The vendor must also provide schematic in the form of a single line diagram for all electrical, mechanical, air-conditioning systems etc. and CAD/layout drawings/shop drawings/General arrangement drawings/ data sheets/for the proposed Data Center.

The bidder must be familiar with AHJ rules International conformance VS local safety rules and regulations and the proposed IT Data Center solution must be in conformance to the both.

POWERDISTRIBUTIONSYSTEM

Data Center shall have 2 (N+ 1) power distribution systems. Power distribution system shall include raw power input from building power system, power distribution panels for power distribution to Data Center UPS, Cooling Units, lighting and other allied equipment. It should also include main circuit power distribution to electrical PDUs through power troughs mounted on top of IT racks. The UPS system should be modular and scalable so that it can be upgraded without equipment down time and without removing existing components to meet future expansion needs.

LV POWERDISTRIBUTIONBOARD

Supply & installation of ASTA Certified/type tested LV switchboard & switchgear as per following specification. Switchboard and switchgear should be of the same manufacturer.

Switch boards should include the following features:

- 1- All distribution boards shall manufactured according to the latest international standards IEC 61439-1:2011 and IEC 61439-2:2011; LV Switchgear and Control Gear Assemblies and supplied from manufacturer certified by the association of short circuit testing authorities (ASTA).
- 2- The entire equipment must be ASTA Certified / type tested low voltage switchboard and should comply with the specifications defines in the IEC Standard
 - ASTA Certified/Type tested LV Switchboard must be submitted with Shop drawings and must include time-current coordination curves for each type and rating of over current protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of over current protective device.
 - Switchboards shall withstand the effects of earthquake motions determined according to seismic zoning to Pakistan's geographical location. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event. Supplier should make sure that the anchoring of the boards are as per the requirement.
 - Shop drawings must include Field Quality-Control Reports:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
 - Closeout submittals for switchboards and components to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Routine maintenance requirements for switchboards and all installed components.
 - b. Manufacturer's written instructions for testing and adjusting over current protective devices.
 - c. Time-current coordination curves for each type and rating of over current protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of over current protective device.
 - Where applicable, Air Circuit Breakers (A.C.Bs), Miniature circuit breakers (M.C.B's) and molded case circuit breakers (MCCBs), all should be with "PAD lock control knob" and shall be of the molded pattern and their switching levers shall be in such a way that they are accessible through the safety plate for operation.
- 3- The switchboards must have Colour Touch Screen Display is required with SLD display on Main LT Panel Door (for Breaker ON/OFF/Trip Status & energy analyser should be installed for both main LV & MCC) the analyser should have communication interface of appropriate protocol for integration with DCIM.

Ingress Protection

Unless otherwise stated all equipment supplied shall conform as a minimum to the following protection classes:

Indoor I.P.31

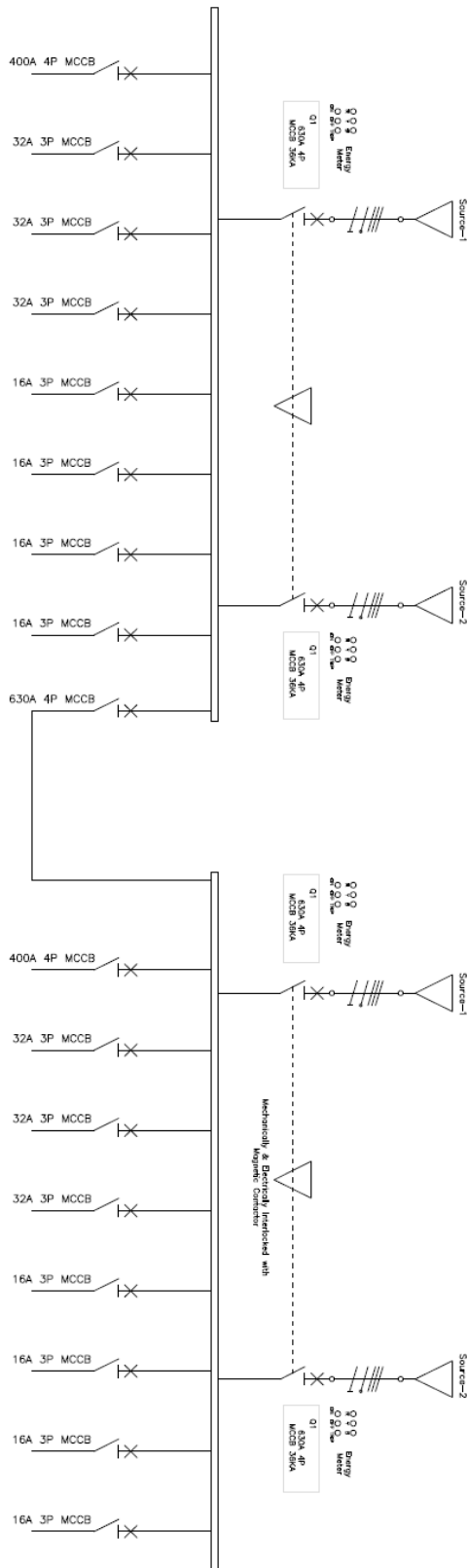
Quality Assurance

1. Installer Qualifications: An employer of workers qualified and trained in electrical safety as required by NFPA 70E.
2. Source Limitations: Obtain switchboards, over current protective devices, components, and accessories from single source from single manufacturer.

Manufactured Units

1. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other

- items. Comply with indicated maximum dimensions.
2. Quality Products: Products supplied are from an ISO & OHSA certified manufacturer complying with the latest international quality, health & safety requirements.
 3. Bus bars and conductors connected directly thereto shall be of hard drawn, high conductivity tinned copper conductors. The current carrying capacity (1.55 A/mm²), temperature rise and spacing between bus bars shall comply with B.S. 158, BS 1432 and 159.
 4. The bus bars shall be rectangular cross-section type and of air insulation type. They shall be rigidly supported by non-tracking fiberglass polyester and self-extinguishing support which offering high dielectric withstand, high mechanical stress withstand and non-magnetic assembling parts characteristic.
 5. The bus bar mounting support system shall be in accordance to the **ASTA Certificate/Type Tested OEM Verification Test report**. The order of bus bar phasing shall be red, yellow, blue and black as viewed from the front of cubicle.
 6. The bus bar system shall be accessible for construction and maintenance duties. All bus bar connections shall be made in an approved manner to ensure faultless contacts.
 7. An earth bar of appropriate rating, complied with IEC 61439-1 in according to the specified short circuit level shall be run at full length in each switchboard.



DIESEL GENERATOR

Diesel Generator any Internationally recognized brand (300-350 kVA / 240-280 kW)

Two SNMP monitoring enabled generators are required one generator should acts as primary and second generator as standby with option of manual changeover to route the power if primary generator fails to start. PVC coated branded grounding wire (2 earth pits minimum) and turnkey installation and commissioning. Emergency generator is required to provide the standby backup power to data center in case of power failure at any path A & B or Both Paths. Generator, AMF Panel according to proposed solution.

Engine and Alternator Specifications:

(Only internationally renowned engines like Perkins (UK made), Cummins and Olympia engines are acceptable)

- 3 Phase
- Rated Frequency (Hz) 50 Hz
- Rate Voltage (AC) (V) 400-415 /215-230
- Rated Current (AC) (A) 400-450
- Power Factor (COSΦ) 0.8 (lag)
- Power Supply AC, 3-phase, 4-lines
- Type In-line, 4-strokes, water cooled, direct injection, diesel engine
- Number of Cylinders: Minimum 6-Vertical in line.
- Voltage Regulator
- Phase Selector
- Voltmeter
- Fuel Tank Capacity: **500-600**Liters with built-in fuel tank with a capacity of approx. 8 hours running at Full Load for each Generator in electric design.
- Safety shutdown for Oil Pressure, Water Temperature, Warning Lights indicate abnormal conditions

3.1 Auto Transfer Switch Panel

The ATS should be of same specifications as per designed load ratings for between 300-350 kVA / 240-280 kW OR 400-600 Amps TPNE to support Generators with all safety features (Site visit to each facility is mandatory to size the DG exact match to actual capacity as per offered design load from vendors).

The Section includes transfer switches rated Available to 600 VAC or less, including the following: Automatic transfer switches.

Typically, the system consists of an engine generator and an automatic transfer switch (ATS) which transfers the load from the utility to the generator.

1. The ATS has to be listed to UL 1008 standard for total system loads and CSA standard C22.2 for automatic transfer switches.
2. Meets NFPA 110 for Emergency and Standby Power Systems and the National Electrical Code (NEC) Articles 700, 701 and 702.
3. Controller is RoHS compliant (Restriction of Hazardous Substances).
4. Available upto 400-600 amps ratings in a compact design.
5. Available to 600 VAC or less, three phase. True double-throw operation: The single solenoid design is inherently inter-locked and prevents contacts from being in contact with both sources at the same time.
6. There's no danger of the ATS transferring loads to a dead source because the unique single-solenoid operator derives power to operate from the source to which the load is being transferred.
7. Easy to navigate 128x64 graphical LCD display with keypad provides LED indicators for switch position, source availability, not in auto, and alert condition.
8. Integrated multilingual user interface for configuration and monitoring. Delayed transition operation is now available (Dual Operator Configuration).
9. Non-automatic operation can be selected using the key pad without opening enclosure door. Relay expansion module with extra relays for accessory outputs (Optional).
10. Includes soft keys for test function and time delay bypass as standard features. Historical event log (Optional).
11. Statistical ATS system monitoring information. Diagnostic Functions. Password protection to prevent unauthorized tampering of settings.
12. Adjustable time-delay feature prevents switch from being activated due to momentary utility power outages and generator dips.
13. Supplied with solid neutral termination. Optional switched neutral pole available.
14. Field modification accessory kits available.

UL Listed Withstand & Close-On Ratings /Available Symmetrical Amperes RMS

Switch Ratings Amps	Current Limiting Fuses		Specific Breaker	
	480V Max.	600V Max.	480V Max.	600V Max.
150-400 upto 600Amps	200kA	200kA	50kA	42kA

Designed to Agility

The ATS must represent the most compact design of automatic power transfer switches in the industry. With space in electrical closets being at a premium, the use of wall or floor-mounted Power Transfer Switches assures designers optimum utilization of space.

All transfer switches through 400-600 amps ratings designed to be completely front accessible. This permits the enclosures to be installed flush to the wall and still allows installation of all power cabling and connections from the front of the switch. Cable entrance plates are also standard on the units to install optional side-mounted pull boxes for additional cable bending space.

Control and Display Panel

Easy to navigate 128x64 graphical LCD display with keypad provides LED indicators for switch position, source availability, not in auto, and alert conditions. It also includes test and time delay bypass soft keys.

Voltage & Frequency Sensing

1. 3 — Phase under and over voltage settings on normal and single phase sensing on emergency source.
2. Under and over frequency settings on normal and emergency.
3. True RMS Voltage Sensing with +/-1% accuracy Frequency Sensing Accuracy is +/-0.1Hz Voltage and Frequency parameters adjustable in 1% increments
4. Selecting settings : single or three phase voltage sensing on normal, and single phase sensing on emergency; 50 Hz
5. Load current sensing card (Optional)

Microprocessor Controller incorporates the group “G” controller with enhanced capabilities for dependable operation in any environment.

Time Delays

1. Engine start time delay – delays engine starting signal to override momentary normal source outages – adjustable to 0 to 6 seconds (Feature 1C)
2. Transfer to emergency time delay – adjustable 0 to 60 minutes (Feature 2B).
3. Emergency source stabilization time delay to ignore momentary transients during initial generator set loading – adjustable 0 to 4 seconds (Feature 1F)
4. Re-transfer to normal time delay – adjustable 0 to 10 hours (Feature 3A)
5. Unloaded running time delay for engine cool down – adjustable 0 to 60 minutes (Feature 2E)
6. Pre and post signal time delay for selective load disconnect with a programmable bypass on source failures – adjustable 0 to 5 minutes (specify Optional accessory 31Z)
7. Optional fully programmable engine exerciser with seven independent routines to exercise the engine generator, with or without loads, on a daily, weekly, bi weekly or monthly basis (Specify optional accessory feature bundle 11BE)
8. Delayed transition load disconnect time delay – adjustable 0 to 5 minutes.

Standard Selectable Features

1. In phase monitor to transfer motor loads, without any intentional off time, to prevent inrush currents from exceeding normal starting levels.
2. Engine exerciser to automatically test backup generator each week—with or without load 20 minutes not adjustable.
3. Commit to transfer.

4. Selective load disconnect control contacts (two provided) which operate with time delay prior to and/or after load transfer and re-transfer.
5. 50Hz selectable switch.
6. Three – phase selectable switch.

Remote Control Features

External Inputs for connecting:

1. Remote test switch.
2. Remote contact for test or for peak shaving applications. If emergency source fails, switch will automatically transfer back to normal source if acceptable.
3. Inhibit transfer to emergency.
4. Remote time delay bypass switch emergency to normal.

Super-Silenced Acoustic Canopy

- Fresh air provided through Acoustic Louvers.
- Hinged and lockable door all around Canopy for easy access to DG Set for routine maintenance.
- Sound level within 72 dB (A) at 1-6 meter.
- Canopy painted with two coats of Epoxy primer and final painted with two coats of chemical resistant Epoxy paint OR PLAS-COAT PAINTING for very hard environment like offshore application. Otherwise anticorrosive phosphate coating can also be used.

Cables for upstream side Diesel Gensets Tap-off

- 4 core H07RN/XLPE/PVC/LSHF ISO certified with applicable BS standards.

Installation

1. RCC foundation for installation as per site surveys from all bidders

Transient Voltage Surge Suppression devices – TVSS

Surge Protection Device Description: ANSI/UL 1449 Third Edition Type 2; cUL-Certified with NEMA Type 12, UL 1449.

UNINTERRUPTIBLE POWERSUPPLYSYSTEM

UPSs which filter, condition and regulate the power supply should be installed to provide power to Data Center load and supporting infrastructure equipment (excluding cooling units). UPS batteries should be capable of maintaining the critical loads of the hardware for a minimum of 30minutes during power failure.

All hardware installed in the data center white space and supporting areas will be fed by two UPS for redundancy 2(N+1). Other features include automatic self-test, audible alarms, automatic internal by-pass, hot swappable batteries, hot swappable power modules, LCD Display, LED status indicator, network manageable and scalable power capacity.

UPS shall be equipped with output distribution breaker to supply the feed to Electrical PDU's.

Each UPS acts as a permanent double converter with the online principle (not an interactive off line system) and must correspond to class VFI-SS-111(according to standards EN50091-3, EN62040-3andIEC62040-3). The UPS facility shall possess certified radio interference suppression according to EN55022Class“A”.

The facility shall further comply with the EN 50091electromagnetic compatibility (EMC) standards. Operational and fault messages must be relayed to a master fault signaling system via SNMP protocol as well as dry contacts for critical alarms for remote monitoring.

System requirement is 2(N+1) redundancy, two UPSs with internal redundancy of“N+1” shall be required, thus comprising 2(N+1)system, shall be installed in the UPS room as indicated in the floor layout. These UPSs shall be fed from the MDB LV panel. The UPSs shall be capable of remote monitoring via SNMP.

Uninterruptible Power Supply

Specifications

SYSTEM REQUIREMENTS

- A. The UPS shall be sized for 60 kVA and 60 kW load.
- B. The UPS battery shall be sized for 60KW at a Power Factor of unity for 30 minutes.

SYSTEM CHARACTERISTICS

- A. **System Capacity:** The system shall be rated for full kW output in the following frame sizes:
 1. 60 kVA/kW - Can be configured up to 120 kW with one redundant power module for N+1

B. Input:

1. **AC Input Nominal Voltage:** 380 V, 400 V or 415 V with 3 Phase 4 wire, with ground 50/60vHz
2. **AC Input Voltage Window:** 200 V - 477 V
3. **Short Circuit Withstand Rating:** 30,000 Symmetrical Amperes with gG fuse in front of system
4. **Maximum Frequency Range:** 40-70 Hz
5. **Input Power Factor:** > .99 at greater than 25% load
6. **Input Current Distortion with no additional filters:** < 5% at 100% load
7. **Soft-Start:** Shall be linear from 0-100% input current and shall not exhibit inrush. This shall take place over a
15 second time period

C. UPS Output:

1. **AC Output Nominal Output:** 380V/400V/415V, 3 Phase 4 wire with ground, 50/60 Hz.
2. **AC Output Voltage Regulation:**
 - a. +/- 1% For 100 % linear load
 - b. +/- 3% for 100% non-linear load
3. **Voltage Transient Response:** +/- 5% maximum for 100% load step
4. Voltage Transient Recovery within <50 milliseconds
5. **Output Voltage Harmonic Distortion according to IEC/EN62040-3:**
 - a.<2% THD maximum for a 100% linear load
 - b.<6% THD maximum for a 100% non-linear load
6. **Overload Rating:**
 - a. **Normal Operation:**
 - 1) 150% for 60 seconds in normal operation
 - 2) 125% for 10 minutes in normal operation
 - 3) 150% for 60 seconds in battery operation
 - b. **Bypass Operation:**
 - 1) 110% continuous
 - 2) 1000% for 100 milliseconds
7. **System AC-AC Efficiency:** >95% at 35 - 100% load
8. **Output Power Factor Rating:** For loads exhibiting a power factor of .5 leading to .5 lagging no derating of the UPS shall be required.

OPERATING PRINCIPLES

A. **Normal operation:** The input converter and output inverter shall operate in an on-line manner to continuously regulate power to the critical load. The input and output converters shall be capable of full battery recharge while simultaneously providing regulated power to the load for all line and load conditions within the range of the UPS specifications.

B. **Battery:** Upon failure of the AC input source, the critical load shall continue being supplied by the output inverter, which shall derive its power from the battery system. There shall be no interruption in power to the critical load during both transfers to battery operation and retransfers from battery to normal operation.

C. **Recharge:** Upon restoration of the AC input source, the input converter and output inverter shall simultaneously recharge the battery and provide regulated power to the critical load.

D. **Static Bypass:** The static bypass shall be used to provide transfer of critical load from the Inverter output to the bypass source. This transfer, along with its retransfer, shall take place with no power interruption to the critical load. In the event of an emergency, this transfer shall be an automatic function.

E. **Maintenance Bypass:** The system shall be equipped with an external make-before-break Maintenance Bypass Cabinet (MBC) to electrically isolate the UPS during routine maintenance and service of the UPS. The MBC shall completely isolate both the UPS input and output connections.

ELECTRICAL CHARACTERISTICS

A. Input power converter:

1. The input power converters of the system are housed within the parallel connected, removable power modules, and shall constantly control the power imported from the mains input of the system, to provide the necessary UPS power for precise regulation of the DC bus voltage, battery charging, and Main Inverter regulated output power.

2. **Input Current Total Harmonic Distortion:** The input current THD shall be held to 5% or less at full system, while providing conditioned power to the critical load bus, and charging the batteries under steady-state operating conditions. This shall be true while supporting loads of both a linear or non-linear type. This shall be accomplished with no additional filters, magnetic devices, or other components

3. **Soft-Start Operation:** As a standard feature, the UPS shall contain soft-start functionality, capable of limiting the input current from 0-100% of the nominal input over a default 15 second period, when returning to the AC utility source from battery operation. The change in current over the change in time shall take place in a linear manner throughout the entire operation. ($di/dt = \text{constant}$).

4. **Magnetization Inrush Current:** The UPS shall exhibit 0 inrush current as a standard product. If provided with an optional isolation transformer, inrush shall be limited to 6 times the nominal input current of the transformer.

5. Input Current Limit:

a. The input converter shall control and limit the input current draw from utility to 150% of the UPS output. During conditions where input current limit is active, the UPS shall be able to support 100% load, charge batteries, and provide voltage regulation.

b. In cases where the source voltage to the UPS is nominal and the applied UPS load is equal to or less than 100% of UPS capacity, input current shall not exceed 125% of UPS output current, while importing necessary power for system losses.

6. Charging:

a. The battery charging shall keep the DC bus float voltage of +/- 218v, +/-1%. Slight deviation is acceptable if it doesn't affect the design and standard requirement

b. The battery charging circuit shall contain a temperature compensation circuit, which will regulate the battery charging to optimize battery life.

c. The battery charging circuit shall remain active when in requested Static Bypass and in Normal Operation.

7. **Back-feed Protection:** The above-mentioned logic controlled contactor also provides the back-feed protection.

B. Output inverter:

1. The UPS output inverter shall constantly recreate the UPS output voltage waveform by converting the DC bus voltage to AC voltage through a set of IGBT driven bi-directional power converters. In both normal operation and battery operation, the output inverters shall create an output voltage independent of the mains input voltage. Input voltage anomalies such as brown-outs, spikes, surges, sags, and outages shall not affect the amplitude or sinusoidal nature of the recreated output voltage sine wave of the output inverters.

2. **Overload Capability:** The output power converters shall be capable of 1000% for short-circuit clearing. Steady-state overload conditions, of up to 150% of system capacity, shall be sustained by the inverter for 60 seconds in normal and battery operation. Should overloads persist past the outlined time limitation, the critical load will be switched to the auto matic static bypass output of the UPS.

3. **Output Contactor:** The output inverter shall be provided with an output mechanical contactor to provide physical isolation of the inverter from the critical bus. With this feature a failed inverter shall be removed from the critical bus.

4. **Battery Protection:** The inverter shall be provided with monitoring and control circuits to limit the level of discharge on the battery system.

5. **Redundancy:** The UPS shall be configured with redundant output inverters, each with semiconductor fusing, and logic controlled contactors to remove a failed component from the critical bus.

C. Static Bypass:

1. As part of the UPS, a system static bypass switch shall be provided. The system static bypass shall provide no break transfer of the critical load from the Inverter output to the static bypass input source during times where maintenance is required, or the inverter cannot support the critical bus. Such times may be due to prolonged or severe overloads, or UPS failure. The UPS and static bypass switch shall constantly monitor the auxiliary contacts of their respective circuit breakers, as well as the bypass source voltage, and inhibit potentially unsuccessful transfers to static bypass from taking place. a. Rated voltage: 400 volts rms, adjustable via the user interface (see section 10), within tolerances of +/- 3% in order to take into account voltage drops in the cables.

2. As design of the static switch power path shall consist of Silicon Controlled Rectifiers (SCR) with a continuous duty rating of 125% of the UPS output rating.

3. **Automatic Transfers:** An automatic transfer of load to static bypass shall take place whenever the load on the critical bus exceeds the overload rating of the UPS. Automatic transfers of the critical load from static bypass back to normal operation shall take place when the overload condition is removed from the critical bus output of the system. Automatic transfers of load to static bypass shall also take place if for any reason the UPS cannot support the critical bus.

4. **Manual Transfers:** Manually initiated transfers to and from static bypass shall be initiated through the UPS display interface.

5. **Overloads:** The static bypass shall be rated and capable of handling overloads equal to or less than 125% of the rated system output continuously. For instantaneous overloads caused by inrush current from magnetic devices, or short circuit conditions, the static bypass shall be capable of sustaining overloads of 1000% of system capacity for periods of up to 100 milliseconds.

6. **Modular:** The static bypass switch shall be of a modular design.

7. **System Protection:** As a requirement, back-feed protection in the static bypass circuit shall also be incorporated in the system design. To achieve back-feed protection, a mechanical contactor in series with the bypass SCR(s) shall be controlled by the UPS/static switch, to open

immediately upon sensing a condition where back-feeding of the static switch by any source connected to the critical output bus of the system is occurring. One such condition could be a result of a shorted SCR.

ENVIRONMENT CONDITIONS

- A. **Storage Ambient Temperature:** -15° C to +40° C.
- B. **Operating Ambient Temperature:** 0°C to +40°C (+25° C is ideal for most battery types).
- C. **Relative humidity:** 0 to 95% non-condensing.
- D. **Altitude:** Maximum installation with no derating of the UPS output shall be 1000 meters above sea level:
 - 1. 1500 m -95% load
 - 2. 2000 m -91% load
 - 3. 2500 m -86% load
 - 4. 3000 m -82% load

BATTERY

- A. The UPS battery shall be of modular construction made up of user replaceable, hot swappable, fused, battery modules for 30 minutes backup. Each battery module shall be monitored for voltage and temperature for use by the UPS battery diagnostic, and temperature compensated charger circuitry.
- B. The battery jars housed within each removable battery module shall be of the Valve Regulated Lead Acid (VRLA) type.
- C. The UPS shall incorporate a battery management system to continuously monitor the health of each removable battery module. This system shall notify the user in the event that a failed or weak battery module is found.
- D. The batteries shall have design life of 5 to 8 years. The battery casing shall be flame retardant type.

DISPLAY AND CONTROLS

- A. **Control Logic:** The UPS shall be controlled by two fully redundant, user-replaceable / hot swappable control modules. These modules shall have separate, optically isolated, communication paths to the power and static switch modules. Logic power for the control modules shall be derived from redundant power supplies, each having a separate AC and DC input and output. The communication of the control modules shall be of Controller Area Network (CAN Bus).
- B. **Display Unit:** A microprocessor controlled display unit shall be located on a hinged door in the front of the system. The display shall consist of an alphanumeric display with backlight, four LEDs for quick status overview, and a keypad consisting of pushbutton switches.
- C. **Metered Data:** The following metered data, shall be available on the alphanumeric display:
 - 1. Year, Month, Day, Hour, Minute, Second of occurring events
 - 2. Source Input Voltage
 - 3. Output AC voltage
 - 4. Output AC current
 - 5. Input Frequency
 - 6. Battery voltage
- D. **Event log:** The display unit shall allow the user to display a time and date stamped log of the most recent status and alarm events.
- E. **Alarms:** The display unit shall allow the user to display a log of all active alarms. The following minimum set of alarm conditions shall be available:

1. Input Frequency outside configured range
2. AC adequate for UPS but not for Bypass
3. Low/No AC input, startup on battery
4. Intelligence Module inserted
5. Intelligence Module removed
6. Redundant Intelligence Module inserted
7. Redundant Intelligence Module removed
8. Number of Batteries changed since last ON
9. Number of Power Modules changed since last ON
10. Number of Batteries increased
11. Number of Batteries decreased
12. Number of Power Modules increased
13. Number of Power Modules decreased
14. Number of External Battery Cabinets increased
15. Number of External Battery Cabinets decreased
16. Redundancy Restored
17. Need Battery Replacement
18. The Redundant Intelligence Module is in control
19. on Battery
20. Shutdown or unable to transfer to battery due to overload
21. Load Shutdown from Bypass. Input Frequency Volts outside limits
22. Fault, Internal Temp exceeded system normal limits
23. Input Circuit Breaker Open
24. System level fan failed
25. Bad Battery Module
26. Bad Power Module
27. Intelligence Module is installed and failed
28. Redundant Intelligence Module is installed and failed
29. Redundancy has been lost
30. Redundancy is below alarm threshold
31. Runtime is below alarm threshold
32. Load is above alarm threshold
33. Load is no longer above alarm Threshold
34. Minimum Runtime restored
35. Bypass is not in range (either frequency or voltage)
36. Backfeed contactor stuck in OFF position
37. Backfeed contactor stuck in ON position
38. UPS in Bypass due to Internal Fault
39. UPS in Bypass due to overload
40. System in Forced Bypass
41. Fault, Bypass Relay Malfunction
42. High DC Warning
43. High DC Shutdown
44. Low Battery Shutdown
45. Low Battery Warning

F. Controls: The following controls or programming functions shall be accomplished by use of the display unit. Pushbutton membrane switches shall facilitate these operations.

1. Silence audible Alarm.
2. Display or set the date and time.
3. Enable or disable the automatic restart feature.
4. Transfer critical load to and from static bypass.
5. Test battery condition on demand.
6. Set intervals for automatic battery tests.
7. Adjust set points for different alarms.
8. Program the parameters for remote shutdown.

G. Potential Free (Dry) Contacts: The following potential free contacts shall be available on an optional relay interface board:

1. Normal Operation.
2. Battery Operation.
3. Bypass Operation.
4. Common Fault.
5. Low Battery.
6. UPS Off.

H. Communication Interface Board: A communication interface board shall provide the following communication ports which can be used simultaneously:

1. RS232 Serial Port #1.

SOFTWARE AND CONNECTIVITY

A. Network Adaptor: The Ethernet Web/SNMP Adaptor shall allow one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments. The management information base (MIB) shall be provided in DOS and UNIX "tar" formats.

B. Unattended Shutdown:

1. The UPS, in conjunction with the network adaptor, shall be capable of gracefully shutting down one or more operating systems.
2. The UPS shall also be capable of using an RS232 port to communicate by means of serial communications to gracefully shut down one or more operating systems during an on battery situation.

1.9 ACCESSORIES

A. Battery Disconnect Breaker: Each UPS system shall have a 320 A 500 V DC rated, thermal magnetic trip molded case circuit breaker. Each circuit breaker shall be equipped shunt trip mechanisms and 1A/1B auxiliary contacts. The circuit breakers are to be located within the UPS enclosure or as part of a line-up-and-match type battery cabinet.

B. Wall-mount Maintenance Bypass Panel: The wall-mount maintenance bypass panel provides maintenance bypass without modular power distribution or batteries.

REMOTE UPS MONITORING

The following three methods of remote UPS monitoring shall be available:

A. Web Monitoring: Remote monitoring shall be available via a web browser such as Internet Explorer.

B. RS232 Monitoring: Remote UPS monitoring shall be possible via either RS232 or contact closure signals from the UPS.

C. Simple Network Management Protocol (SNMP): Remote UPS Monitoring shall be possible through a standard MIB II compliant platform.

SOFTWARE COMPATIBILITY

A: The UPS manufacturer shall have available software to support graceful shutdown and remote monitoring for the following systems:

1. Microsoft Windows 95/98/XP
2. Microsoft Windows NT 4.0 SP6/2000
3. OS/2
4. Netware 3.2 – 5.1
5. MAC OS 9.04, 9.22, 10
6. Digital Unix/True 64
7. SGI 6.0-6.5
8. SCO UNIX
9. SVR4 2.3, 2.41

10. SCO Unix Ware 7.0 - 7.11
11. SUN Solaris 2.6-2.8
12. SUN OS 4.13, 4.14
13. IBM AIX 4.3x-4.33g, 5.1
14. HP-UX 9.x-11.i

STANDARD AND TESTS

A. **Standards:** All equipment shall be designed and built in accordance with accepted engineering practice and applicable international standards, in particular the standards listed below.

1. 89/336/EEC
2. 73/23EEC
3. EN/IEC62040-1-1, EN/IEC/UL60950-1
4. EN50091-2 / IEC62040-2 (class A), FCC15A
5. IEC EN/IEC62040-3
6. VFI-SS-111
7. IEC62040-2 / EN/IEC 61000-4-2 level 3
8. IEC62040-2 / EN/IEC 61000-4-4 level 2
9. IEC62040-2 / EN/IEC 61000-4-3 level 2
10. IEC62040-2 / EN/IEC 61000-4-5 Level 3

UPS OUTPUT/IT POWERDISTRIBUTION SYSTEM

The electrical PDU shall have minimum capacity of 60 poles. PDU should be capable of housing 3 phase power modules or single phase power modules of rating 32A. The specifications of these modules are as follows. Each module should be hot-swappable.

Each circuit breaker remote monitoring through TCP/IP shall be required and connectivity with DCIM shall be ensured.

RACKMOUNTPOWERDISTRIBUTIONUNIT (METERED)

For purposes of distributing power within an IT enclosure, rack mount power distribution units shall be available for installation within the IT enclosure. The rack mount power distribution units shall be capable of being installed in the back of the accompanying enclosure to consume zero U-space in the front of the rack, and shall not require tools for installation within the rack.

- Metered PDU: 32A Fixed, 18 way C13 + 6 way C19, or as per manufacturer standard Digital meter display, Black, 0U
- Input Voltage 220VAC
- Rate Current 32Amp
- Input Cable 3 x 4mm² x 3m
- Output Receptacle C13 x 18 + C19 x 6
- Easy and accessible integral web based managing tool
- Real-time electrical parameters such as information display of voltage, amps, kW, power factor and kW-hr.
- Each Rack is required to be fitted with two Zero U PDUs
- Tool less mounting into enclosure
- The unit should have Adjustable orientation inlet cable
- SNMP enabled

Key Features

- Single-phase input that support strip/branch -level metering or strip/branch-level metering and outlet switching.
- Measures and monitors voltage, current (branch), frequency, power (kW), energy consumption (kWh) and power factor.
- Threshold/Alert Capabilities provide preemptive notification of any impending overload issues before they occur.
- Supports external environmental sensors such as temperature, humidity, cabinet door status, water leakage and infrared motion sensors for notification of any impending environmental issues.

- LED display and a built-in browser interface for local and remote access with real-time data.
- Remote switching capability to power on/off outlets (Only for Switched PDU)
- Power sequential startup and reboot on outlets groups defined by user (Only for Switched PDU) – Protects plugged-in devices from sudden power surge
- Onboard data log for individual PDU with up to 10,000 empirical data and alarm logs.
- Highly compatible with multiple management software platform including Low and high level integration.
- IP and Serial Interface Options – Options to install by connecting directly to the network or save IP connections by using the serial interface to connect directly to DCIM appliances already connected to the network.
- Supports horizontal and vertical models for a variety of rack configurations in branch and remote offices.

OVERHEAD DISTRIBUTION

Branch Circuit Distribution:

For purposes of overhead distribution wiring of data center branch circuits, Flexible conductors shall be equipped with NEMA or IEC style cord caps and shall be agency-approved under UL60950 as part of the system.

Cable Ladder:

For purposes of routing data and power cables between rows in a data center aisle layout, cable ladders shall be available to span the gap between rows. Cable ladders shall be agency-approved under UL60950 as part of the system. This means of cable management shall facilitate ease of installation of power and data cabling in data centers.

Power and Data Cable Trough/Trays:

For purposes of routing data and power cable along the length of a row of IT enclosures in a data center environment, cable troughs shall be available above the racks as a means of separating and housing data and power cable.

Fiber Runner

Designed to provide a safe, & easy to use management system for fragile optical cables with specifications and components.

Specifications:

1. Fully Integrated system giving unrivalled flexibility to fit for all possible layouts.
2. Cable Management System should allow to route fiber optic cables among equipment and provides the physical protection and bend radius management that is crucial to optical cable performance.
3. Constructed of halogen free PC/ABS material to protect cabling from the point of building entry right up to the terminal devices.

Component:

1. Main Duct
2. Joiner
3. Vertical inside elbow
4. Trumpet
5. Threaded rod mounting bracket
6. Threaded rod attachment bracket (ceiling mounting)
7. Cross
8. Reducer
9. Spillover

POWER CABLES

Power cables used should be compatible with H07RN-F4/XLPE/LSHF ISO certified with applicable standards/classifications. Separate cable trays/ladder and troughs are required.

L.V Cables

LV cables and wires shall be with stranded copper conductor's single/multi-core, for socket outlet circuits they shall be 450/750 volts grades to BS 6004.

All power cables for main, sub-main feeders and power equipment etc. shall be of 450/750 or 600/1000 volts grade to BS-6346 Phase, neutral and grounding conductors shall be color coded red/yellow/blue, black and green. Each circuit shall have its own neutral and grounding conductor. The looping-in system shall be used throughout the installation. Any joint in wires is not permitted.

Copper lugs shall be used for termination of cables. All multi-core cables shall be provided with glands of suitable size at entry to the panels.

Power cables shall be installed on cable trays or in cable ladder including all installation materials and fixing accessories as specified. All installation materials and fixing accessories such as glands, lugs, saddles, clamps, brackets etc. shall be provided without any additional cost.

Cable shall be run in continuous unbroken lengths and joints will not be permitted. Unless the route length exceeds the maximum manufactured drum length, or there is specific authorization for jointing of the cable by consultant/owner.

Each cable shall be subjected to an insulation resistance and continuity test after installation and prior to final dressing in to position and termination. Results shall be recorded and approved by PIAC.

All jointing and termination work shall be carried out by practicing, fully trained tradesmen, qualified in such a work for the operating voltage concerned.

Ferrules used for identification shall be of the interlocking permanently engraved type, designed to encircle the core completely. Markers of the adhesive type will not be permitted. Ferrules shall be correctly sized. There shall be no improvisation and engravings must not be altered

DATA CENTER COOLING SYSTEM

Direct Expansion (DX Type) cooling system is desirable for Data Center, Electrical Panel Rooms, and UPS rooms. In-Row Cooling units are required in data center whereas floor mounted top discharge precision cooling units are required for Electrical Panel Rooms and UPS rooms to maintain 21-24 °C and 50-55%RH.

N+1 cooling redundancy is required for In-Row and front flow cooling units. Cooling system shall essentially consist of following major components; Aisle Containment:

In Row Cooling Units

Top Discharge Cooling Units with plenums

Aisle Containment

INROW Cooling Units for Data Center

STANDARD COMPONENTS

A. CABINET CONSTRUCTION

- 1- Exterior panels shall be 18 gauge steel. Front and rear exterior panels shall be 18 gauge perforated steel and equipped with a keyed lock to provide a means of securing access to the internal components of the unit
- 2- The frame shall be constructed of 16 gauge formed steel welded for maximum strength. All units shall provide maintenance from the front and rear, allowing units to be placed within
A row of racks
- 3- All exterior panels and frame shall be powder coated for durability and attractive finish

B. VARIABLE SPEED FAN ASSEMBLY

Variable Speed Fans: The unit is equipped with variable speed, electrically commutated, 400 mm backward incline fans complete with Inlet Volute.

Fan Protection: discharge finger guard. Outlet of the fan should include acage type

C. MAIN DISCONNECT SWITCH

- 1 Unit shall be provided with Thermal-Magnetic circuit breakers with interrupt capacity ratings per UL489/CSA C22.2/IEC-947.
- 2 Air-cooled: Units shall include a main disconnect switch located on the E-panel in order to disconnect power input.

E. MICROPROCESSOR CONTROLLER

- 1 Monitoring and Configuration: The master display shall allow monitoring and configuration of the air-conditioning unit through a menu-based control. Functions include status reporting, set-up, and temperature set points. Four LEDs report the operational status of the connected air-conditioning unit.
- 2 Controls: The microprocessor controller shall come equipped with control keys to allow the user to navigate between menus, select items, and input alpha numeric information.
- 3 Alarms: The micro processor controller shall activate a visible and audible alarm in the occurrence of the following events:
 - a. Cool Fail
 - b. Rack in let temperature violation
 - c. Rack in let temperature sensor fault
 - d. Air filter clogged
 - e. Air filter run hours exceeded
 - f. Filter DP sensor failure
 - g. Supply air sensor fault
 - h. Return air sensor fault
 - i. Supply air high temperature violation
 - j. Return air high temperature violation
 - k. Fan fault
 - l. Fan run hours exceeded
 - m. Water detection fault
 - n. Condensate pump fault
 - o. Condensate run hours exceeded
 - p. Humidifier water conductivity high violation
 - q. Humidifier fault tolerance exceeded
 - r. Humidifier low water
 - s. Humidifier excessive output reduction
 - t. Humidifier drain fault
 - u. Humidifier cylinder full
 - v. Humidifier replace cylinder
 - w. Humidifier RS485 communication fault
 - x. Humidity high/low violation
 - y. Supply humidity sensor fault
 - z. Return humidity sensor fault
 - aa. Heater fault
 - ab. Heater run hours exceeded
 - ac. Group communication fault
 - ad. Containment DP sensor failure
 - ae. Containment DP high violation
 - af. Input contact fault
 - ag. Invalid supply set point
- 4 Logging: The micro processor controller shall log and display all available Alarm log shall contain time/date stamp as well as operating

occurrence. Controller shall display the runtime hours for major components.

F. NETWORKMANAGEMENTCARD

The unit shall include a network management card to provide management through a computer network through TCP/IP. Bidder can use gateway for same function. Management through the network should include the ability to change set points as well as view and clear alarms.

G. COOLINGCOIL AND CONDENSATE PAN

Direct Expansion: Cooling coil shall use raised lance type corrugated aluminum fin and 1/2 inch OD(12.7 mm) copper tube coils. Fin shall be a minimum of 0.0055 inch thick. Tube wall shall be a minimum of 0.016 inch thick wall. Coil end supports shall be a minimum 18 gauge G90 galvanized steel. Coil shall be rated for a maximum pressure of 500psig (3447.3kPa), and the coils are certified in accordance with UL207. Coil header is equipped with a drip plate in the bottom to capture and direct the condensation accumulating on the suction header tube to the drain pan. Coil has 6 circuits complete with brass distributor and copper distribution tubes. Slight deviation is acceptable if functions and capacity is not compromised.

H. VARIABLE SPEED COMPRESSOR/ VFD ASSEMBLY / DIGITAL SCROLL

- 1 Compressor: The unit shall be configured with a variable speed reciprocating hermetic compressor using a matched VFD. As a result, the compressor speed can be varied through a range between 30 and 85Hz to accommodate varying load conditions. VFD firm ware is written to include oil return protection in cases where pipe velocities may drop to low speeds during low loading periods. Or as per manufacturer standards based on digital scroll compressors.
- 2 Compressor is electrically protected through the VFD.
- 3 Compressor utilizes a noise cap for noise reduction.
- 4 Sight glass provided for air cooled system oil charging.

I. CONDENSATE PUMP

Factory Installed and wired condensate pump shall pump at 11.5 ft (as per manufacturer standard) of head. Pump shall have dual internal floats and reservoir.

K. FILTERS

- 1 The standard filters shall be 30% efficient per ASHRAE Standard 52.1, UL Class 2 (MERV 8 per ASHRAE 52.2). Filters shall be EN779 G4 efficient. The 3.75 in (96 mm) deep, pleated filters shall be replaceable from the rear of the unit.
- 2 The optional filters shall be 85% efficient per ASHRAE Standard 52.1 (MERV 13 per ASHRAE 52.2, EN779 F7).

L. HUMIDIFIER

Humidifier shall be able to modulate capacity. The humidifier shall be self-contained, steam-generating type, factory piped and wired, with disposable cylinder and automatic solid-state control circuit. Humidifier canisters shall be replaceable. The humidifier controller shall communicate directly to the micro processor controller and provide complete status and control at the operator interface. Humidifier shall control flush cycling and conductivity via automated controls. Humidifier shall be capable of producing up to 6.6lb (3 kg) of steam per hour. Slight deviation is acceptable only if function and capacity is not compromised.

M. ELECTRIC REHEAT

- 1 Reheat elements shall be below watt density, wired for three-phase, loaded equally on all three phases and shall be electrically and thermally protected by both automatic and manual reset cutouts. Reheat capacity shall be 6 kW.
- 2 Reheat coils shall be stainless steel, fin tubular construction. Heater casing shall be 20 gauge G90 galvanized steel.

- 3 Heater shall be provided with self-engaging electrical connectors upon installation. Heater with manually connected conductors are not acceptable.

N. TEMPERATURE AND HUMIDITY SENSORS

- 1 Internal Temperature Sensors: Thermister temperature sensors shall be mounted behind the front and rear doors to provide control inputs based on supply and return air temperature. Sensor accuracy shall be within +/-1 degree F accuracy.
- 2 Remote Temperature Sensors: Three remote rack inlet temperature sensors shall be shipped with the unit to provide control input based on rack inlet temperature.
- 3 Internal Humidity Sensors: Humidity sensors shall be mounted behind both the Front and rear doors and shall provide control input based on humidity in supply air. Humidifier sensor shall be +/-3%RH accuracy full scale.
- 4 Water Sensors: Internal supply and return chilled water temperature sensors shall be installed into sealed wells. Wells are filled with thermal conducting heat transfer grease to provide accurate temperature sensors.

P. SELECTABLE TOP OR BOTTOM PIPING

- 1 Pipe connections: The unit is equipped with field connection from either top or bottom of the unit. Unit connections shall be made internal to the unit.
- 2 Pipe adapters: The unit shall include 1 inch Rot lock to sweat adapters and associated Teflon seals.

Q. FLOW METER

- 1 Flow meters shall be factory piped inside the unit and connected to micro processor controls to provide water flow rate through the unit. The micro processor controller shall also use this information to provide total unit capacity out of the unit while in operation.
- 2 Flow meter shall be stainless steel construction turbine type meter, compatible with glycol/water solutions upto 60%, with accuracy of 1% or better on range 3-50 GPM.

R. CABLE WATER DETECTOR

- 1 A leak detection sensing cable shall be shipped loose with the unit. If water or other conductive liquids contact the cable anywhere along its length, the main controller visually and audibly annunciates the leak.
- 2 The detector shall be provided with a 20 ft (6.1 m) of cable. Cable may be cascaded up to 80 ft (24.4 m).

Cold/Hot Aisle Containment:

Cold/Hot Aisle Containment to reduce energy consumption while supporting higher density IT and networking equipment without compromising the requirement for availability.

Aisle Containment should be design to;

Optimize Cooling system efficiency

- 30+% efficiency increase
- Continuous dynamic adaptation to load
- Less fan power per KW cooling

Eliminate Hot/Cold Air Mixing

- Uniform and predictable temperature to all IT equipment
- Integrate the Cooling unit air flow delivery with IT equipment requirements

Increase Capacity

- 25+% increase in available cooling capacity
- Extend capacity of existing precision cooling system

Allow Easy Retrofit

- No requirement to replace existing cooling infrastructure
- Component fit through standard door ways

Provide Fast Return on Investment (ROI)

- Payback within a few months to less than 2 years
- Low initial investment.

Door System and Safety Requirement.

Double Door or Sliding door can be chosen for the front and close with Automatic Door. In the Event of an Emergency the Cold Aisle can be quickly exited by simple pushing the Door Open.

TOP Covers.

- Top Covers are Transparent in the standard Option to use the Room Light.
- Halogen-Free Plexiglas is used to keep the Thermal load as low as possible.
- Cross Braces are used for Sealing Areas of and precise positioning and also provide stability as tilt Restrain.

ELECTRICAL PANEL, UPS, BATTERY ROOM COOLING UNITS

Cooling Units are required to maintain environment inside datacenter at $20C \pm 1C$ and relative humidity at 40% to 55%.

For these areas Direct Expansion (DX Type) Up flow AC's with plenum, built in Humidifier & Electrical Reheat are required.

- 12KW Floor standing Precision Air-conditioning units
- Auto Restart Option
- Cooling design to be implemented in complete mechanical installation on end to end basis in closed conformance as per major guide lines from ASHRAE to meet TIA-942 Tier-III bench mark.
- High efficiency cooling system with high air flow-rates and efficient heat exchanger design provide the high sensible heat ratios required by equipment rooms.
- Energy efficiency of cooling and power should be also maximized by the use advanced scroll compression technology with high efficiency copper-tube aluminum-fin heat exchangers and advanced software control enable energy.
- Should give energy savings of 20-30% compared to "Comfort" air conditioners, with operating in the same conditions.
- Must be up-flow unit and be installed with/without considering raised floor option meeting -high air flow volume upto 2700 m³/h per unit.
- Should have large 128 64 character blue backlit LCD screen with multi-level password protection to avoid unauthorized-operation of units during production and maintenance environment.
- SNMP based Monitoring covering central Control module for proper duty cycle rotation on N+1 Basis.
- Temperature and Humidity Sensor(s) installation if applicable based on cooling design.
- Proper Outdoor fittings with brackets, metal sheet over copper piping with floor hanging option away from common traffic corridor especially without any hurdle and disturbance from commercial vehicles in nearby passage.
- Testing and commissioning
- One year equipment warranty
- Service maintenance (2 times/ year)
- 2x4x365, SLA covered
- High Power and designed to operate 24 X7
- Filter cleaning indications sensors
- Three Phase Input
- Branded Compressor

- Turnkey installation.

RACKS&ACCESSORIES

IT enclosures shall be available for housing of Owner-supplied IT equipment. Enclosures shall be listed under the same UL60950 agency approval as other products outlined within this Section.

General Requirements:

The enclosure shall be designed to provide a secure, managed environment for computer and networking equipment.

The enclosure shall conform to EIA310 and accommodate industry standard 19 inch(483mm) rack mount equipment.

The enclosure shall be designed with vertical posts to allow rack mount equipment installation utilizing four vertical mounting rails.

Static Load Capacity Up to 1,300KG **or higher**

Door Perforation Rate 75%

Protection Category IP20

Material and Coating Steel frame work Powder coating for rack surface

Standard Compliance (19") rack mount equipment EIA-310-DEnvironmental Compliance: RoHS

Color RAL 7021, Black

Excellent Rack Cooling Efficiency

1. The Enclosure door should be With 70+% door perforation rate that enhances heat management.
2. Front and rear doors are perforated for cooling efficiency with additional blanking panel to separate cold and hot spots in the rack.

Enhanced Rack Installation Space Efficiency

1. Combined integrated steel frame design
2. With rack static load capacity of up to 1,300 KG **or higher**

Enhanced Rack System Applicability in Data Center

1. Customized features for specific requirements in datacenter
2. Accessories available for cabling and air flow management

Increased Convenience in Installation and Maintenance

1. Modular rack design for easy assembly and disassembly
2. Tool-less design of accessories for flexible and quick installation.

Physical Requirements:

External width dimensions shall be Rack 42U 600mmX 1090/1070mm, **or as per manufacturer standard**, as per the quantities mentioned in the BOQ.

Rack enclosure shall also be designed and manufactured to be matching in both color and construction to the UPS, PDU/system by pass and extended run time battery enclosures to provide a uniform and consistent appearance in a data center environment.

Equipment Access and Mounting:

The enclosure shall provide 42U of equipment vertical mounting space.

1. 1 hardware bag.
2. 4 casters.
3. Baying kit, 4 pcs.
4. All rack panels are inherently grounded
5. Open bottom area.
6. 1 Single arch mesh front door.
7. 1 double flat mesh door.
8. 1 roof top with cable entry plates.

9. 4 entries for roof top with 600mm width.
10. 5 entries for roof top with 800mm width.
11. 2 pairs of split side panels.
12. 4 x (19") vertical mounting rails.
13. 4 leveling feet 2x 42U (Or 47U) vertical cable tray.
14. 1 user manual.

The vertical mounting rails shall be adjustable to allow different mounting depths.

Front and rear doors of the enclosure shall be designed with quick release hinges allowing for easy detachment without the use of tools.

Data Center Infrastructure Management Solution DCIM.

A DCIM for monitoring and control of the facility's technical systems shall be provided. The systems shall be integrated into the 3rd party's (SNMP enabled) remote monitoring system to be ultimately displayed on the video wall placed inside the network operation centre.

An efficient way to monitor company-wide multi-vendor physical infrastructure: power, cooling, security, and environment. Real-time monitoring, reports, and instant fault notification and escalation enable quick assessment and resolution of critical infrastructure events that can adversely affect IT system availability. This centralized repository of critical information can be accessed by multiple users from anywhere on the network, creating a consolidated view of the physical infrastructure. Can grow with changing business needs through additional device licenses and add-on surveillance, capacity management and change management modules.

Following is the desired functionality

- Centralized Management of the physical infrastructure.
- Real-time monitoring of entire physical infrastructure through centralized, real-time device monitoring and notification enabling quick assessment of events as they occur.
- Real-time event notification of critical physical infrastructure situations to reduce mean time to repair, improve efficiency, and maximize uptime. Receive alerts via mobile phones (SMS) and e-mail.
- Multi-vendor device support for monitoring networked SNMP devices. Enable visibility of SNMP devices through threshold alert notifications, data trending and reporting.
- Quickly locate devices and alerts through the free search field.
- Customize the user interface to display devices in critical, warning or normal device statuses.

DCIM:

The DCIM shall integrate, monitor and manage the following systems:

- Power supply system.
- UPS.
- HVAC and Precision AC.
- Dray contact and FPS general alerts and alarms including VEDSA integration
- Each malfunctioning and fault of the technical infrastructure service systems must trigger a trouble alarm.

In addition, appropriate reporting including historical analysis and trend monitoring shall be provided.

Environmental Monitoring System

Environmental monitoring solutions provide early warning of conditions that lead to equipment failure, allowing you to react to changes and minimize the impact on network availability.

Following functionality is required for the monitoring of data centre closets environment

- Remote device management
- Temperature monitoring
- Humidity monitoring
- Fault notification
- Data logging
- Event logging
- Expandable
- Password Security
- Read-only Access
- Remote device management
- Monitor at minimum the temperature and relative humidity. It should have historical records capabilities. The historical data will be used to analyze seasonal changes and other outside influences. The temperature and humidity information is to be gathered from all areas of the Data Center using sensors.
- Integration with a tracking system for all parts of the Data Center which can include the in-room air conditioners and humidifiers, cooling support systems, power backup, water detection, security.
- The monitoring system should have critical alarm capabilities. At the very least, the system should be set to notify when conditions move outside the set parameters.
- The monitoring system can use SNMP/Modbus protocol to integrate into overall Data Center management systems.
- Integrated environmental sensors (temperature, humidity, airflow, door)
- External temperature sensor.
- External humidity sensor.
- Leak Sensor.

Functional Procedure for Complete DCIM Suite

Environment Monitoring:-

- Infrastructure management solution that allows data center administrators to manage environmental conditions i.e. temperature, humidity, Water leak, Smoke, vibrations and digital
- Environmental Monitoring: Prevent equipment failure from a full range of threatening environmental conditions. Key integrated sensors include temperature, humidity/dew point, airflow, and audio.
- Inputs and outputs. It is also capable of monitoring infrastructure appliances such as UPS, precision cooling units, generator sets etc to provide following info.
- Monitoring of the health and status of the equipment
- Monitoring of environmental conditions i.e. temperature and humidity, leak and smoke.
- Monitor the improved communication speed in transmitting control or commands to the equipment and parameter setting Records Data and Logs of historical information of alarms and notifications.
- 3rd Party Communication
- SNMP
- Modbus 485
- Dry contacts
- Analog Signals
- Temp and Temp/Hum Sensor
- By default (without the optional THUB) it can support up to 32 sensors.

Digital Input Sensor (Door Sensor, Water Leak

- Sensor, Smoke Sensor, Motion Sensor, Vibration Sensor)
- By default (without the optional 8DIAI

- Real Time Monitoring

Remote Management

- Full video surveillance of the facility that includes recording, replay and image Capture.
- Offers a user friendly GUI to setup and ménage Data Center.

Real Time monitoring on environmental Power and Cooling and security in Data Center.

WATER LEAKAGE DETECTION

- Water leakage detection systems should be installed, below the air conditioners and any adjacent areas prone to water leakage. Sensors should be installed in addition to water leakage monitors and leakage notification facility.

CIVILWORKS

All Data Centre Rooms must be dust free by sealing all windows and related orifice by proper sealant. Painting of ceilings and walls is required in the server rooms. Any paintwork must comply with the following requisites (Bidder Survey to site before solution submission is essential including migration plan the existing IT equipment with old to new ITDC area in same facility):

Construction OR Fit out of data centre hall and NOC Area along with ATS/LT ROOMS/Switchboard Rooms/ UPS/Battery rooms on compartmentalization approach.

DRY WALLS/BLOCK MASONARY

100 mm thick Drywall partition consisting of:

Galvanized steel 150 x 75 mm stove enameled in black finish bottom channel.

Rolled formed galvanized steel head track.

Rolled formed galvanized steel studs placed at 600 mm centre vertically and 1200 mm center horizontally.

One layer of 12 mm thick standard KNAUF Gypsum board on each side.

50 mm thick 60 kg/m³ rock wool insulation.

FIRE RATED DOORS

All the doors in the Data Center should be designed to meet the sixty (60) minutes fire withstand rating.

PAINT

Fire-resistant, durable paints must be applied to all areas on walls and floors. Painting includes the preparation of the various surfaces, primer and top coat.

Walls shall be painted with an anti-humidity, anti-dust material (primer). All materials used in the DC space will not emit any fumes, contaminants or corrosive gasses at any point in the life time of the DC.

FALSE CEILING

Existing False ceiling will be dismantled and new metallic (Fire Resistant) false ceiling will be deployed as per the new design.

ILLUMINATION SYSTEM

The LED Panel lights shall be installed the lighting system shall be provided with occupancy sensor in zoning manner. The lighting system shall satisfy the following European Standards: EN12464, EN12665, EN60598

The lighting system shall satisfy the following minimum requirements:

Luminance in all room:500Lux

Light color: standard white or daylight white: 5.300K Colorrenderingproperties:2 Aequals90

EMERGENCY LIGHTING

The emergency exits in rooms need to be indicated with permanently illuminated 'emergency exit' signs. Safety lights or battery powered lights need to be setup where necessary.

GROUNDING SYSTEM

The grounding system will compose a Common Bonding Network (CBN)- Earthing System, and will interconnect an Underflow Telecommunication Grounding Bus (TGB) constructed using bare AWG#2 bus bar.

The Common Bonding Network will be professionally constructed in adherence to the following applicable standards and recommendations: Alliance for Telecommunications Industry Solutions ATIS: JSTD- 607-A-2002, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications referring Telecommunications Industry Association TIA: ANSI/TIA-942-A Draft 5.0a – Telecommunications Infrastructure Standard for Data Center The Institute of Electrical and Electronics Engineers, Inc. (IEEE): IEEE Std 1100-1999 (IEEE Emerald Book) – IEEE Recommended Practice for Powering and Grounding Electronic Equipment NEBS Level 3 Approval as Tested by Telcordia Technologies: NEBS Level 3 Criteria is the minimum level of environmental compatibility needed to provide maximum assurance of equipment operability within the network facility environment.

Underwriters Laboratories (UL): UL 467 Grounding and Bonding Equipment, and UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors

The Common Bonding Network Grounding System will effectively interconnect all sub floor metal structure, Metal Duct, Building steel, Water Pipes, HVAC equipment, Air handling Equipment; in addition, it will interconnect all Data Center metal structures, Cabinets, Racks, and all Above False Ceiling metal structure, including Fire Suppression pipes, Ducts and Raceways.

To construct a network of grounding rods system to achieve a high efficiency ground system. The system will be constructed from multiple copper earth rods driven into the ground as per the industry's best practices, and achieving ground resistance of **less than 1 ohm** or better. This Grounding System will be interconnected to the Common Bonding Network A suitable Signal Reference Grid is to constructed effectively presenting a low-impedance path to ground for high frequency interference signals that cannot be achieved by simple 'earthing'. The Signal Ground will have the following requirements:

A signal reference grid will be installed according to IEEE 1100-1999— Grid of Copper 50mm copper strips. The high frequency signal reference structure will consist of a (60 × 60 cm or less) Bare copper, flat tape grid.

The raised floor structure will be connected to the grounding grid at each pedestal as well as all other under-floor substructures and each PDU and air handler. Each network cabinet will be grounded to the grid with 2 grounding straps or bonding conductor

Signal reference Ground (SRG) will comply with the TIA Standards 607, 606A

RODENT REPLENISHMENT SYSTEM

Rod interpellant system to be installed in the Data Centre to prevent damage to the data cabling.

PHYSICAL SECURITY & SAFETY SYSTEM

Buildings and internal security are as will be accessed via secured doors, controlled by a proximity system with secured data communication and biometric identification. The sub-systems for security and safety shall be:

Video Surveillance System

Access Control System

Addressable Fire Alarm and Smoke Detection System

Fire Extinguishing System (NOVEC1230)

Very Early Smoke Detection Alarm System (VESDA)

Data Center Air Purification System

A self-contained, air cleaning system, designed to provide pressurization air, free of corrosive gases. The system is will be used for controlled environments containing sensitive computer electronics and electrical equipment in Data Center.

1. System to operate 24x7x365.
2. System to maintain continuous positive pressure within the space. Up to 50% of the air handling capacity should be dedicated to introducing outside pressurization air, while the other 50% or greater can be used for recirculation.
3. The system is an in-room housing containing a blower, particulate and gaseous filtration, and an air measuring station, gage units, and a field adjustable damper.
4. The system should be configured with two separate passes of chemical filtration media. This should allow a user to choose the media whose performance characteristics are particularly suited for targeted contaminant gases.
5. System construction to be of:
 - a. Painted 14 gauge cold rolled steel construction
 - b. Direct Drive Fan
 - c. Variable Frequency Drive
 - d. Integral balancing damper
 - e. 0.2 IWG external static (saturated filters)
6. Fresh Air Duct work to be extended and connected to this system
7. Pre stage filter
8. Final Stage Filter
9. Industrial grade chemical based filter
10. System to be designed and assured to meet ISA class G1.
Painted 14 gauge cold rolled steel construction
Full charge of granular media
11. Direct Drive Fan
12. Variable Frequency Drive
13. Integral balancing damper
14. Particulate filter
15. Reverse airflow in vertical units (upward)
16. Optional air openings to match other equipment
17. Floor casters
18. Additional sound insulation for occupied spaces
19. Additional external static
20. Gage units measuring room pressure, outside air, and particulate pressure

Real Time Corrosion Monitoring

Real-time monitoring of the overall reactivity level of Airborne Molecular Contaminants (AMC) present in the environment as well as temperature and relative humidity. Data should either be logged by an internal data logger or transmitted directly to the facility monitoring system via a 4-20 mA output signal. Reactivity monitoring should be accurate and reliable method of evaluating the quality of makeup and recirculation air, developing an AMC baseline or "fingerprint" and evaluating the effectiveness of an AMC control program.

Unit to possess 1 x copper and silver coupons for continuous corrosion monitoring inside the data center area.

VIDEO SURVEILLANCE SYSTEM

The Video Surveillance System ensures the optical surveillance of all the Electrical, UPS and data center rooms. Adequate numbers of cameras should be installed to cover all rows of Data Center room. These cameras should be coupled with motion sensors so that cameras can start recording

only when they detect movement in the defined areas. The surveillance system should be connected to a central monitoring room(NOC). Monitoring via the internet (IP monitoring) should also be available.

Expected general functionality of the VSS Storage of alarm sequences for at least 30 days.

Automatic backup and storage on data backup media: DVD, Tape, Disk, Other
Minimum 25 pictures/sec with several non-synchronized cameras
Manipulation detection and alarm handling for all cameras

Joy stick control device for 360 degrees dome camera

Motion detection with automatic recording feature

Continuous 24 centralized supervision of the functionality of all cameras

Remote Monitoring available as an option

Fixed Dome Network Camera

- The indoor network dome camera shall offer multiple simultaneous video streams with standard definition 800 x 600 resolution, auto iris and varifocal lens.
- The indoor network dome camera shall provide a manual 3-axis (pan/tilt/rotation) positioning to allow adjustment for optimum camera rotation and placement.
- The indoor network dome camera shall provide a discreet liner integrated to the camera module.
- The environmental network dome camera shall have a temperature compensated auto back focus.
- The indoor network dome camera shall feature an unsupervised alarm input, relay output and line level/external microphone input connections.
- The indoor network dome camera shall provide a removable, local storage medium (Micro SD) to capture video clips of varying lengths upon camera sabotage, motion, or relay alarm. Video can be retrieved from the card through the FTP protocol.
- The indoor network dome camera shall provide a service video stream in addition to and independent of the video streams.
- The indoor network dome camera shall provide advanced low-light capabilities for day/night models with sensitivity down to 0.01 lux in night mode.
- The indoor network dome camera shall support industry standard Power over Ethernet (PoE) IEEE 802.3af, Class 2 to supply power to the camera over the network.
- The indoor network dome camera shall have a mechanical IR cut filter mechanism for increased sensitivity in low-light installations. Set points for the IR cut filter feature shall be configurable through an embedded Web browser.
- The indoor network dome camera shall support H.264 High or Main profiles, or MJPEG using constant bit rate (CBR), and constrained variable bit rate (CVBR) with configurable maximum value.
- The indoor network dome camera shall support two simultaneous, configurable video streams. H.264 and MJPEG compression formats shall be available for primary and secondary streams with selectable Unicast and Multicast protocols.
- The indoor network dome camera shall support configurable frame rates, bit rates and group of pictures (GOP) structures for additional bandwidth administration.
- The indoor network dome camera shall be conformant to the ONVIF Profile S and Profile G supporting open architecture best practices with a published API available to third-party network video recording and management systems.
- The indoor network dome camera shall support 4 window blanks to conceal user-defined privacy areas that cannot be viewed by an operator.
- The indoor network dome camera shall offer local storage capture of 10-second video clips on camera from alarms created by sabotage, motion detection, or alarm inputs.
- The indoor network dome camera shall offer the ability to record continuous video in the case of network outage, where the camera is powered by 24 VAC. It will be accessible through FTP protocol.
- The indoor network dome camera shall provide the ability to backup and restore camera settings through an embedded Web browser.
- The indoor network dome camera shall provide 802.1x port security to establish point-to-point access through a wired or wireless port using Extensible Authentication

Protocol (EAP). Supported EAP methods shall include EAP-MD5, EAP-TLS, EAP-TTLS, EAP-PEAP.

- The indoor network dome camera shall support SNMP v2c and v3.
- The indoor network dome camera shall provide flicker correction with selections for 50 Hz or 60 Hz line frequency.
- The indoor network dome camera shall provide motorized zoom capabilities with a Web browser interface for remote configuration and administration.
- The indoor network dome camera shall provide autofocus capabilities with a Web browser interface for remote configuration and administration. The automatic autofocus shall be triggered when the camera detects an environmental temperature change and when the camera changes from color to monochrome or vice versa. User-selectable options for full-range auto-focus and quick auto-focus shall be available.
- The indoor network dome camera shall provide user-selectable configurations for day/night auto mode. Transitional levels shall be used to set the desired light level for transitioning to night mode. Transition detect time shall control the length of time that the camera is exposed to a light level before changing to color or monochrome mode.

ACCESS CONTROL SYSTEM

- Supply, install and commission Weigand based Access control system with magnetic locks. The Biometric and RFID door readers and controllers should be mounted according to the Drawing. The detailed technical specifications of the products will be as follows.
- Access control system shall be installed for total of 11 Doors. The Main Access controller units (Door processing units) should be mounted according to the drawings.
- The monitoring of the access control will be done in the security room
- All doors of POD areas will have (3 in 1) RFID + keypad + Biometric readers for Entry and others will have just RFID Reader.
- All doors will have RFID only readers for Exit

These are base line requirements for CCTV and Access Control. Minor deviations are accepted as per manufacturer standard if it does not affect the design and availability of Data Center.

Required Specifications

- Access control system should have the capability to integrate with the fire alarm system and in case of fire doors should automatically unlock.
- Access control system should have at least 01 web client licenses for remote monitoring
- Access control system should fully integrate with IP CCTV system in such a way that in case of unauthorized attempt with any door nearest IP CCTV camera should popup in front of operator
- Access control system should have the capability to integrate with BMS system.
- The wiegand wiring of RFID readers to the main controller should be done with Belden AWG 22 or CAT6 UTP AWG23 cable.

3 in 1 Entry Readers (RFID + Keypad + Biometric)

- The Entry Reader should be bioCLASS Compatible and should use contactless smart card reader/writer with keypad and biometric sensor that provides access control verification, in addition to host-controlled read/write to iCLASS smart cards
- The Entry Reader Should Use 13.56 MHz contactless smart card technology and should be compatible with the bio CLASS Technology

Read Range	iCLASS Card: Up to 4" (10.2 cm) iCLASS Key/Tag: Up to 1.25" (3.2 cm)
Mounting	Mounting plate attaches to US/EU/ Asian back box, 52-60 mm screw hole spacing (vertical or horizontal). LCD/Keypad reader housing latches onto mounting plate; fingerprint module secured to reader with a screw
Power Supply	9-12 VDC, Linear supply recommended
Current Requirements	245 mA AVG, 299 mA PEAK
Environmental	Indoor Only
Transmit Frequency	13.56 MHz
Cable Distance	Wiegand/Clock-and-Data Interface: 500 ft (150 m) (22AWG), RS232: 50 ft (15 m), RS485: 4000 ft (1220 m), USB: 16 ft (4 m), UART: 1 ft (0.30 m)
Card Compatibility	iCLASS 15693 & 14443B - read-only on 16k bit (2k Byte), 32k bit (4k Byte); HID Application iCLASS 15693 & 14443B - read/write (RWKLB575 only) on 16k bit (2k Byte), 32k bit (4k Byte); Application Space
Language Support	English, International Spanish, Brazilian Portugese, German, Italian, French, Russian, Chinese (Mandarin), Korean, Japanese
Certifications	UL294/cUL (US), FCC Certification (US), IC (Canada), CE (EU), C-tick (Australia, New Zealand), SRRC (China), MIC (Korea), NCC (Taiwan), MIC (Japan), iDA (Singapore), RoHS
Housing Material	UL94 Polycarbonate
Fingerprint sensor type	Optical
Resolution	500 dpi, 256-bit gray scale, 18 x 22 mm sensor area
Timing	Card read < 0.5 sec Fingerprint capture < 2 sec, typical 1 sec Verification of captured finger < 1 sec
False Accept/Reject Rate	FAR < 0.01%, FRR < 0.01%
Graphical Display	LCD display offers a 60 x 18 mm viewing area,

RFID EXIT Readers (RFID)

- A. The Exit Reader should be bioCLASS Compatible and should use contactless smart card and iCLASS smart cards
- B. The Entry Reader Should Use 13.56 MHz contactless smart card technology.

Read Range	iCLASS Card : Up to 3.25" (8.9 cm) iCLASS Key/Tag : Up to 1.5" (3.8 cm) MIFARE / DESFire Card (CSN) : Up to 2.0" (5.1 cm)
Mounting	mullion-mounted door installations
Power Supply	5-16 VDC, Linear supply recommended
Current Requirements	55mA AVG, 116mA PEAK
Operating Temperature	-31° to 150° F (-35° to 65° C)
Operating Humidity	5% to 95% relative humidity non-condensing
Environmental	IP55
Transmit Frequency	13.56 MHz
Cable Distance	Wiegand/Clock-and-Data Interface 500ft (150m) 22 AWG
Card Compatibility	•15693 - read only; 2k bit (256 Byte), 16k bit (2k Byte), 32k bit (4k Byte) iCLASS credentials, serial

	<p>number</p> <ul style="list-style-type: none"> •14443B - read only; 2k bit (256 Byte), 16k bit (2k Byte), 32k bit (4k Byte) iCLASS credentials serial number •14443A - read only; MIFARE[®] and DESFire (serial number) • US Government PIV • FeliCaIDm (Transit Readers Only) • CEPAS CAN/CSN (Transit Readers Only)
Certifications	<p>UL294/cUL (US), FCC Certification (US), IC (Canada), CE (EU), C-tick (Australia, New Zealand), SRRC (China), MIC (Korea), NCC (Taiwan), iDA (Singapore), RoHS</p>
Housing Material	<p>UL94 Polycarbonate</p>

Access Control Main Controller (Door Processing Unit)

- Native Ethernet IP Access Controller
- Access control for 1 to 8 readers
- Powerful CPU with 128 MB of DDRSDRAM and 32 MB Flash
- Dedicated processor for reader inputs
- Battery backed storage for up to 480,000 personnel records
- Flash for easy online software updates
- Plain English (PE) language simplifies programming
- Compatible with Cyber Station v1.8 and higher software. (Cyber Station v1.74 SP2 may be used with limited feature set.)
- Secure 10/100 Ethernet communications via IPsec/IKE Encryption with hardware acceleration for Authentication and Encryption
- Easy configuration using embedded configuration web pages
- Support for Area Lockdown and Condition “Threat” Level based access rights
- Support for 2nd Generation Drivers
- HSPD-12/FIPS 201 Ready

Magnetic Locks

High graded magnetic locks will be installed to secure the doors. The power supply and the cabling of the locks will be the responsibility of the contractor.

Reports.

The Contractor will configure the system to generate the reports listed below:

- a. Access Events, by time, by door
- b. Alarm Events, by date and by priority

FIRE AND SMOKE DETECTION SYSTEM

A fire detection system (HSSD) that provides an early warning alert and conform to the NFPA-75/2001 standard should be used along with the following features:

Programmable temperature sensors should be provided.

The detection and suppression systems within the premises should be linked to the electronic monitoring system.

The control panel should be programmable to allow adjustments to sensitivity and parameters, such as time delays, threshold, passwords and other features.

Fire alarm monitors, control panels and notification mechanisms should be installed. Automated alerts when thresholds are reached should also be sent to the relevant staff;

Fire detection systems should provide audio/visual notification mechanisms. It should have a 200+ event buffer and should be capable of intelligent smoke detection (VESDA), heat and fire;

Fire suppression systems NOVEC1230 should be installed and should not be harmful to the staff and equipment in case of release; and Proper battery backup (redundant) should be in place to make sure all detection and suppression equipment will function properly.

Fire and Smoke Detection System Specifications

Basic response sensitivity: 0.05%/m

Fault report optionally saved or not saved

Temperature range: 0 to +60 degree centigrade

Addressable fire alarm panels shall be connected to the EMS.

Fire Extinguishing System

A fire extinguishing (NOVEC1230) system is required to be installed in Electrical, UPS, Battery and Data Center rooms. The system has to comply with the current regional and national NFP-75/NFPA-2001.

RAISED FLOOR

System Description:

- A. Access floor system shall consist of nominal 600mm square, removable, modular panel finished in high-pressure lamination complete with stringers and pedestals. The stringer network shall support the panels and laterally stabilize the system. Stringers shall be supported by and bolted to pedestals.
- B. All components of the access floor system are to be of steel construction except for panel surfacing materials and sound-deadening pads between panel and supports. Panels shall be easily removable by one person with a lifting device and shall be interchangeable except where cut for special conditions. Panel shall be high pressure laminated finished.
- C. Stringers shall be easily removable without the use of special tools. Fasteners for stringer attachment shall be accessible from the top surface of the stringer.
- D. Complete floor system shall be sturdy, rigid, and free of overall rocking, rattles, squeaks and noises. The finished floor shall be level within +/- 0.062" in 10" and +/- 0.100" across the entire floor.
- E. System shall be electrically conductive for dissipation of static while having enough electrical resistance to provide protection against electrical shock.
- F. Plates which are positioned over sensors, e.g. gas outlets should be assigned a colored point (different colors for each use). These plates should be fixed by chains to a pedestal.

Technical Specifications

The access floor system shall consist of All-Steel panels with Rigid Grid under structure.

a) Floor Panels

- A. High density chipboard core panels covered with antistatic HPL laminate plastic on the top.
- B. Panel trim shall be integral to the high-pressure laminate (HPL). Separate trim pieces area is not acceptable.
- C. Load rating shall be identified by stamping the panel type and concentrated load rating into the metal at the bottom surface of each panel.

b) Pedestals

- A. Pedestal assemblies shall be all-steel, welded construction, corrosion resistant and capable of supporting a 5KN point load and 15KN per square meter uniform distributed load without permanent deformation of any part. Pedestal head shall be die-cut steel,

welded to a 7/8 14 UNF threaded tube with a leveling nut and a gravity - activated metal locking collar. Pedestal head assembly shall provide vibration proof leveling in increments of 0.012" and an overall vertical height adjustment of 2".

- B. Pedestal base shall be a galvanized steel tube of (80 x 40 x 1.5) mm thickness.
- C. The pedestals will be fixed by 2 screws
- D. Pedestal assemblies adhered to sub-floor without panels or stringers in place shall be capable of resisting a 1,000 in-lb, overturning moment without failure of adhesive of any part of pedestal.
- E. Pedestals shall be secured to sub-floor with adhesive approved by Architect.

c) Stringers

- A. Stringers shall support each edge of panel.
- B. Stringers shall be galvanized steel
- C. Stringers shall have conductive material for sound deadening and plenum seal.
- D. Stringers shall be individually and rigidly fastened to the pedestals with one 1/4" bolt for each foot of stringer length. Bolts shall provide positive electrical contact between the stringers and pedestals. Connections depending on gravity or spring action are unacceptable.

d) Electrical Resistance

The resistance of the access floor system shall be between 5.0 x 10⁵ and 2.0 x 10¹⁰ ohms resistance. Continuity clips shall be attached to the stringers as required.

DATA STRUCTURED CABLING SYSTEM (Data Center Specialized Networking)

To supply and install Cat6A F/UTP Network Cable with patch panels and Multimode OM3 Fiber cabling and ODF (Optical Fiber Distribution Frame) installed in allocated racks. The nodes distribution will be done with the consultation of concerned personnel in IT department. The network cabling and cable dressing in Data center should be done professionally and according to the existing setup in operation. All terminated nodes will be certified with Fluke DTX-1800 Cable analyzer.

GENERAL

- A. Equipment and materials used shall be standard components that are manufactured and available for purchase as standard replacement parts as long as the product is commercially available from the manufacturer.
- B. All manufactured products shall be thoroughly tested and proven in actual use.
- C. The manufacturer shall repair or replace without charge, manufactured products proven defective in material or workmanship for the stated warranty period from the date of shipment.
- D. The vendor should have experience of establishing at least 05 Data Centers internationally.

Cat 6A F/UTP Technical Specifications

The system of cabling, connectors and connecting hardware shall be in accordance with, or exceed the requirements of, the latest revision of EIA/TIA standards 568A and 568B distribution standards.

All copper and connecting hardware shall be of the EIA/TIA 568B category 6A as specified, and the manufactured shall be ISO-9002 certified. Structured cabling should provide the best options for maximizing utilization, scalability, and reliability of the network infrastructure.

Network Cabling Specifications

- A. 100 ohms, 500 MHz, 4 pairs with overall screen, cross filler to organize the pairs.
- B. Outward shield (aluminum side outside) outer sheath LSZH
- C. Compatible with PoE (Power over Ethernet) and PoEP (Power over Ethernet Plus) which
 - a. allow to supply equipment (IP phone, camera, WIFI hotspot...) until 13W or 25W
 - b. Performances
- D. Compliant to EN50173-1, ISO/IEC11801 Ed2.1, IEC 61156-5 Ed2 and Draft EN50288-10-1
- E. The Data Center shall be wired up as per facilities plans with cable that meets all Category 6A F/UTP standards.
- F. Network Equipment should be Compliant to EN50173-1, ISO/IEC11801 Ed 2, IEC61156-5, EN50288-6-1 and TIA/EIA-568-B.2-1 standards.

Specification of Patch Panel

24 Port Cat 6A FTP Patch Panel with the following specification

- Front face numbered from 1 to 24
- Cable management at the back
- Suitable for RJ45 jacks (Cat. 6A FTP)
- Recessed or Flushed
- 24 ports Modular RJ45

UTILIZATION

LAN cross-connection for copper horizontal and vertical links

Specification of CAT 6A FTP Patch Cords

- Cat.6 F/UTP patch cable, PVC Halogen Free external sheath
- De-embedded Cat.6A plugs
- Straight cabling, 4 pairs RJ45 to RJ45
- 100 Ohms impedance
- Required lengths: 2 / 5 / 10 meters According to design
- EIA / TIA 568 B color coding

Fiber Cable Specifications

- Compact and universal cables suitable for indoor installations:
- Low Smoke Zero Halogen (LSZH) external sheath
- UV resistant
- dielectric
- high tensile strength
- rodent retardant
- longitudinally watertight

Performances

OM3, 10G, 50/125 compliant with ITU G.651 IEC 60793-2-10 Type A1a.2 and ISO/IEC 11801 Ed.2.1 OM3.

Fiber ODF Specifications

- Rack Mountable

- 12 Port SC Duplex connectors
- Complete with couplers and pigtailed
- Sliding or Fixed tray
- Fiber cable management inside ODF

Fiber Patch Cords Specifications

- Multimode OM3 50/125 μm 10G
- SC to LC
- 5 meter length

CAT 6 A F/UTP Cable Laying Plan

All CAT 6A F/UTP cable for data center will be laid in cable baskets / Wire trays installed under the raised floor. All the equipment racks in each row will have one patch panel of 24 U installed. These patch panels will be terminated in Passive cabling rack cabinet on the same row. Patch cords will be used to complete connectivity on both ends.

CAT 6A F/UTP Cable installation and Termination

The contractor should be lay, install and terminate the CAT6A cable according to the EIA /TIA standards. No sharp bends or right angle turns should be used while laying the cable.

Fiber Cable Laying Plan

Fiber cable will be laid on overhead Fiber runner /Cable duct system with spill overs on active equipment racks and required equipment racks. ODFs will be mounted in the active equipment / switch racks. ODF to switch connectivity will be attained with fiber patch cords.

Testing and Certification

The contractor will be required to test and certify all CAT 6A nodes and Fiber nodes with Fluke DTX-1800 Cable analyzer. The test results in PDF format should be submitted to the project manager.

Labeling

All nodes and cable bunches should be properly labeled according to TIA 942 /606a guidelines. The origin and ending of all nodes should be clear.

DRAWINGS AND DIAGRAMS

Two set of concept drawings, design details and diagrams, the text being in English, shall be required with the technical proposal.

In particular, the following coordinated diagrams (as different layers on the AutoCAD drawing) are required:

- Detailed layouts of racks, In-row coolers, UPS and CRAC units.
- Single line diagram indicating the entire power distribution starting from the main supply to the rack.
- All circuit breakers should have ratings/settings well indicated in SLD.
- The line diagrams for Fire extinguishing system, Access control, Security Cameras, and other utility services should be submitted.
- Tile flow / CFD Analysis Report of the proposed Cooling System and detailed diagrams for the Precision AC's Piping Cooling & Air flow analysis report.

Bill of Quantities (BOQ)

Sr. #	Description of Items	Manufacturer	Part No.	Qty	Unit	Unit Price	Total Price	Total GST	Extended Price
1	ATS/AMF Panel & LV Electrical Panel - Type Tested			1	Nos				
1.1	ATS/AMF Panel - Type Tested								
	Management of 2 x KESC & 2 x 250KVA Gensets with MOR								
	Chassis Rating IP31								
	Flexible Copper Bus Bars								
	Remote Monitoring through TCP/IP, Touch Screen and Energy Analysers								
	Connectivity to NOC screen through centralized monitoring system								
2	DG-Sets								
2.1	DG SET 300 to350 KVA, 400 V, 50 Hz			2	Nos				
2.2	Construction of RCC Foundation Pad			2	Nos				
2.3	Supply of Sound and Weather Proof Canopy			2	Nos				
2.4	Placement, Loading, Unloading along with Grouting, bolting Alignment			2	Nos				
2.5	Earthing Pits and Earthing of Genset with all respects			4	Nos				
2.6	Supply and Installation of 1000 Ltrs Capacity Diesel Tank			2	Nos				
2.7	Auto Fueling			2	Nos				
2.8	Installation & Commissioning			2	Nos				
3	LV Electrical Panel - Type Tested								
3.1	Low Voltage Electrical Panel - Type Tested			1	Nos				
	Chassis Rating IP21								
	Flexible Copper Bus Bars								
	Remote Monitoring through TCP/IP, Touch Screen and Energy Analysers								
	Connectivity to NOC screen through centralized monitoring system								
	Two Mains Incoming circuits with bus coupling.								
	2 x 120KW UPS incoming & outgoing								
	Power Factor Correction			1	Nos				
3.2	MCC for AC outgoing, ACs to be powered through both sources			1	Nos				
3.3	Lighting DB and auxilliary controlls			1	Nos				
3.4	Installation & Commissioning			1	Nos				
4	UPS System 2(N+1)								
4.1	60kW Modular UPS Scalable to 120kW with builtin static bypass and external service bypass			2	Nos				
	Matching Battery Bank for 30 Minutes Backup on full load at unity power factor with hot swappable batteries								
4.2	Redundent Hot Swapable Power Module			2	Nos				
5	Electrical PDU for Rack Power Distribution								
5.1	Electrical PDU's with Hot Swapable Circuit Breaker Modules. Monitoring of each breaker through SNMP and connectivity with NOC			2					
5.2	3x1 Pole 3 Wire 32A Hot Swapable Breaker Modules with 3x6 sq mm size of cables to connect with Rack PDU			16					

5.3	Hot Swapable Power Distribution Cable Extensions with 3 Wire 32A IEC309 Connetors, 120cm cable length.			4				
5.4	Hot Swapable Power Distribution Cable Extensions with 3 Wire 32A IEC309 Connetors, 240cm cable length.			8				
5.5	Hot Swapable Power Distribution Cable Extensions with 3 Wire 32A IEC309 Connetors, 480cm cable length.			4				
5.6	3 Pole 5 Wire 32A Hot Swapable Breaker Modules with 5x6mm size of cables to connect with Rack PDU for three phase power supply			4				
6	Metered Rack PDU							
6.1	32A Vertical Rack PDU, 230V, 18-C13 and 2- C19			20	Nos			
7	Power Cabling							
7.1	1 x 1 x 240 sq mm per phase and neutral from ATS/AMF Panel to Electrical Panel (H07RN-7 Classification)							
7.2	1 x 5 x 95 sq mm from Electrical Panel to UPS & UPS to Electrical PDU (H07RN-7 Classification)							
7.3	1 x 5 x 95 sq mm from Electrical Panel to MCC (H07RN-7 Classification)							
7.4	2 x 1 x 70 sq mm for LV panel Grounding (H07RN-7 Classification)							
7.5	1 x 1 x 70 sq mm for UPS Grounding (H07RN-7 Classification)							
7.6	1 x 5 x 25 sq mm for INROW ACs (H07RN-7 Classification)							
7.7	1 x 5 x 10 sq mm for Upflow ACs (H07RN-7 Classification)							
7.8	1 x 3 x 4 sq mm for In row AC Condensers (H07RN-7 Classification)							
7.9	1 x 5 x 2.5 sq mm for Upflow AC Condensers (H07RN-7 Classification)							
7.10	3 Pin 32 A Industrial Sockets							
7.11	1 x 3 x 4 sq mm for 3 pin industrial socket wiring in Staging & Meet Me Room (H07RN-7 Classification)							
7.12	Earthing Bus Bars							
7.13	1.5 sq mm for lights							
7.14	Wiring Accessories							
7.15	Power Cable Laying & Termination							
8	Racks							
8.1	42U 600mm Wide x 1000mm/1070mm/1090mm Deep Enclosure or as per manufacturer standard			8	Nos			
8.2	42U 800/750mm Wide x 1000mm/1070mm/1090mm Deep Enclosure as per manufacturer standard			2	Nos			
9	Trays for Power, Cooling & Data							
9.1	Galvanized Cable Tray for Power and Cooling			250	Mtr			
9.2	Mesh Tray for Data Cabling			30	Mtr			
9.3	Overhead Power Cable Tray			1	job			
9.4	Overhead Data Cable Tray or Partition			1	job			
9.5	Overhead Fiber Runner for Fiber from Comms Room to Data Center Racks			1	job			
10	Aisle Containment							
10.1	Aisle Containment with Sliding Doors, Poly Carbonate Ceiling and all accessories			2	Nos			
10.2	1U Black Modular Toolless Blanking Panel (Pack of 200)			3	Nos			
10.3	42U 600mm Wide blanking panel for the future expansion Inrow AC's			2	Nos			
11	InRow Type Precision Air Conditioners							
11.1	Supply of Direct Expansion unit with total cooling capacity of 25 kw or higher at 45 C ambient temperature, builtin humidifier and electrical rehaet.			4	Nos			
11.2	Air Cooled Condensers designed to operate at 45C temperature.			4	Nos			
11.3	Loading, unloading, uplifting and installation of indoor / outdoor units at designated place.			4	Nos			
11.4	Supply, laying and fitting of copper pipe size 1-1/8" with insulation where necessary, supports and metallic trunking complete in all respect.			400	RFT			
11.5	Supply, laying and fitting of copper pipe size 7/8" with insulation where necessary, supports and metallic trunking complete in all respect.			400	RFT			

11.6	Supply, laying and fitting of UPVC pipe of appropriate size for condensate water, with insulation where necessary, complete with metallic trunking, in all respect			200	RFT				
11.7	Supply, laying and fitting of PPRC pipe for fresh water supply for humidifier size 1/2", complete with metallic trunking, in all respect			200	RFT				
11.8	Pressure testing, vacuum of refrigerant circuits and supply / charging of refrigerant R407C/R410			16	Cyl.				
11.9	Configuration, Commissioning & Test Run								
12	Upflow Type Precision Air Conditioners								
12.1	Supply of Precision Air Conditioning Unit, Capacity 12KW with air cooled condenser			8	Nos				
12.2	Monitoring Card			1	Nos				
12.3	Loading, unloading, uplifting and installation of indoor / outdoor units at designated place.			8	Nos				
12.4	Supply, laying and fitting of copper pipe size 7/8", with insulation where necessary, supports and metallic trunking complete in all respect.			800	RFT				
12.5	Supply, laying and fitting of copper pipe size 5/8", with insulation where necessary, supports and metallic trunking complete in all respect.			800	RFT				
12.6	Supply, laying and fitting of UPVC pipe of appropriate size for condensate water, with insulation where necessary, complete with metallic trunking, in all respect			400	RFT				
12.7	Supply, laying and fitting of PPRC pipe for fresh water supply for humidifier size 1/2", complete with metallic trunking, in all respect			400	RFT				
12.8	Pressure testing, vacuum of refrigerant circuits and supply / charging of refrigerant R407C/R410 & POE Oil in both circuits, complete in all respect			15	Cyl.				
12.9	Testing, Configuration, Commissioning & Test Run			8	L.S				
13	Environmental Monitoring System								
13.1	Rack Monitor			3	Nos				
13.2	Rack Sensor Pod			4	Nos				
13.3	Temperature & Humidity Sensor for Racks			10	Nos				
13.4	Rope Type water leak detector			6	Nos				
13.5	Rope leak extension cables			4	Nos				
13.6	24 Port 10/100 Ethernet Switch			1	Nos				
13.7	Horizontal Cable Organizer 1U w/brush strip			1	Nos				
13.8	Server			1	Nos				
13.9	Extra Node License			1	Nos				
13.10	Modbus Ethernet Gateway			1	Nos				
14	Access Control								
14.1	Access Controller for four Doors with allied accessories			2	Nos				
14.2	Bioclass Reader with keypad+fingerprint+Card (Entry)			1	Nos				
14.3	Field Enroller			1	Nos				
14.4	RFID Reader (Entry & Exit)			14	Nos				
14.5	16k/16 iClass Card 37b (100-Cards)			1	Nos				
14.6	Single User Software with two web clients			1	Nos				
14.7	Reporting module (Events+ Time tracker+ remote reporting)			1	Nos				
14.8	CAT6 UTP Cable (305 Meter)			1	Nos				
14.9	Magnetic Lock			8	Nos				
14.10	Power supplies for Magnetic locks			8	Nos				
14.11	Rack Mountable Server for Software			1	Nos				
14.12	Installation, Configuration & Commissioning for above system			1	Nos				
15	IP Based CCTV Cameras								

15.1	Indoor Fixed Mini Dome POE, 24V Camera Standard 0.5MP Resolution 30FPS DayNight DC Auto Iris lens.			12	Nos				
15.2	PTZ Camera with H.264 compression 23X flush/in-ceiling environmental mount, black back box, and clear bubble. PAL.			2	Nos				
15.3	Camera Licences			6	Nos				
15.4	2 RU Network Video Recorder 12TB, with 8 free Licences			1	Nos				
15.5	24-Port PoE Switch 10/100/1000			2	Nos				
15.6	CAT6 Cable (305 meter roll)			2	Nos				
15.7	Viewing Work Station PC Workstation Core i7			6	Nos				
15.8	Installation, Configuration and Commissioning of above equipment.			14	Nos				
16	Data Cabling								
16.1	CAT 6A Cable (305 meter roll)			30	Nos				
16.2	CAT 6A 24 Port Patch Panel Loaded			20	Nos				
16.3	1U Horizontal cable organizers with cable management rings			20	Nos				
16.4	Cat 6A Patch cord 3 meter			140	Nos				
16.5	Cat 6A Patch cord 5 meter			60	Nos				
16.6	Cat 6A Patch cord 10 meter			30	Nos				
16.7	CAT 6A Cable laying and termination			1	Job				
16.8	CAT 6A complete nodes certification with Fluke tester (With Reports)			1	Job				
16.9	12 Core Multimode 10G Fiber Optic Indoor cable			300	Mtr				
16.10	Rack Mountable 12 port SC type ODF, Multimode, 10G (loaded)			24	Nos				
16.11	10G, Multimode SC-LC Fiber Patch Cords (3 meter)			100	Nos				
16.12	10G, Multimode SC-LC Fiber Patch Cords (5 meter)			100	Nos				
16.13	Fiber cable Splicing charges			60	Nod e				
16.14	Fiber Cable laying and termination			1	Job				
16.15	Fiber complete ODF nodes certification with Fluke Test Reports			1	Job				
16.16	Certification of every node by Fluke DTX-1800 or equivalent			1	Job				
17	Fire Detecction & Suppression								
17.1	Supply and installation of Intelligent addressable fire detection system. Each room should be considered as separate fire suppression zone and all zones will be monitored through fire alarm control panel (FACP).			1	Job				
17.2	Supply and installation of Aspiration smoke detection system in all areas, monitorable and integratable with FACP.			1	Job				
17.3	Supply and installation of NOVEC 1230 Fire Suppression System for all fore zones with all accessories.			1	Job				
18	Raised Floor								
18.1	Raised Flooring								
	450 mm Finished Floor Height suspended floor								
	600x600 Aluminum Back Tiles								
	Primery and secondry steel tubing size (80x40x1.5)mm								
	Point Load: 5KN								
	Unifrom Distributed Load: 15KN/Square Meter								
18.2	Raised Floor Laying, Fitting & Fixing								
19	False Ceiling & Lighting								
19.1	False Ceiling								
19.2	LED Lights (600 x 600)mm			60	Nos				
19.3	Motion Sensors			12	Nos				
19.4	Emergency Lights			10	Nos				
19.	Exit Lights			9	Nos				

5									
20	Rodent Repellent System								
20.1	Ultrasonic Rodent Repellent devices			14	Nos				
21	Civil Works & Partitioning Walls								
21.1	Creation of Temporary Data center with existing equipment			As per Design					
21.2	Dismantling of existing infrastructure			As per Design					
21.3	Civil Works as per the attached layout								
22	Fire Rated Doors								
22.1	60 Minutes Fire rated doors			8	Nos				
22.2	Emergency exit door			1	Nos				
23	NOC Furniture								
23.1	High quality curve tables with drawers and trolley			6	Nos				
23.2	Chairs			6	Nos				
23.3	Core i7 Work Stations with 15" screens for NOC			6	Nos				
23.4	55" LED Screen			4	Nos				
24	Air Purifier								
24.1	Air Purifier for Datacenter			1	Nos				

RFP ATTACHMENT (B) — Selection Criteria
Section A: Mandatory Requirements

S. No.	Requirements	Documents/Description
1	Bid must comply with all technical requirements/objectives/scope of work	Separate sheet with clearly mentioned Yes/No against each item of Scope of work/Objectives
2	Vendor must have NTN and must be SECP registered	SECP Certificate and NTN
3	Vendor must have PSEB and/or related Government licenses for providing services	Copies of Licenses
4	Vendor must provide a written statement affirming that within the last five (5) years, has provided maintenance and management services for at least one large data center designed as a Tier III or Tier IV facility which required an uptime of at least 99.9%.	Name & Contact of Client
5	Provide a current bank reference indicating that the vendor's business relationship with the financial institution is in positive standing. Such reference must be written in the form of a standard business letter, signed, and dated within the past three (3) months.	
6	Site visit by vendor's managed/built Data Center Facility	Date and other details
7	Must have presence in Karachi	Karachi Office address and contact
8	Provide a statement of whether the Vendor intends to use subcontractors to meet the Vendor's requirements of any contract awarded pursuant to this RFP, and if so, detail: 1. The names of the subcontractors along with the contact person, mailing address, telephone number, and e-mail address for each; 2. A description of the scope and portions of the goods each subcontractor involved in the delivery of goods or performance of the services each subcontractor will perform	Written statement and details
9	Vendor must provide detail plan about how existing Data Center Operations will run during this project. Vendor will solely responsible for operational continuity till the end of project and migration of operations.	Complete plan

RFP ATTACHMENT (B) — Selection Criteria (continued)

SECTION B: GENERAL QUALIFICATIONS & EXPERIENCE. The Vendor must address all items detailed below and provide, in sequence, the information and documentation as required (referenced with the associated item references). The Vendor must also detail the response page number for each item in the appropriate space below.

S.No.	Requirements	Marks	Documents/Description
1	Provide a brief, descriptive	10 Yes = 10	

	statement detailing evidence of the vendor's ability to deliver the goods or services as mentioned in attachment (A) of this RFP (e.g., prior experience, training, certifications, resources, program and quality management systems, etc.).	No = 0	
2	Provide description of the proposed project team, its members, and organizational structure along with an organizational chart identifying the key people/sub-contractor who will be assigned to deliver the goods or services required by this RFP.	10 Yes = 15 No = 0	CVs with contacts, detail of sub-contractor (if any)
3	Customer references of Tier III / IV Data Centers for which Vendor has actually provided/designed services sought under this RFP.	10 No = 0 1-2 = 10 3 or more = 15	Project's and customer's List along with customer's letter/any document which verify the claim
5	Number of years in business	10 3-5 = 5 6-10 = 7 >10 = 10	SECP/NTN Certificate
6	Auto CAD diagram for proposed Data Center design	10 Yes = 10 No = 0	
Total Marks 50			

RFP ATTACHMENT (B) — Selection Criteria (continued)

SECTION C: TECHNICAL QUALIFICATIONS, EXPERIENCE & APPROACH.

The Vendor must address all items(below) and provide, in sequence, the information and documentation as required (referenced with the associated item references). The Vendor must also detail the response page number for each item in the appropriate space below.

A Proposal Evaluation Team will evaluate and score the response to each item. Team will use the following whole number, raw point scale for scoring each item:

0 = little value 1 = ok 2 = fair 3 = satisfactory 4 = good 5 = excellent

The Team will multiply the Item Score by the associated Evaluation Factor (indicating the relative emphasis of the item in the overall evaluation). The resulting product will be the item's Raw Weighted Score for purposes of calculating the section score as indicated.

S.No	Requirements	Item Score	Evaluation Factor	Raw Score	Weighted
1	Provide a Project Plan that illustrates how the Vendor will complete the scope of services, accomplish required Objectives.		3		

2	How many large (over 20 racks) data centers have Vendor provided management services for in the last five (5) years?		5	
3	Provide a statement of how the Vendor intends to address all major disciplines (architectural, structural, civil, mechanical, plumbing, electrical, and special consultants) throughout all aspects of this RFP.		2	
4	Provide a comprehensive narrative, captioned "Data Center Staffing Plan," that illustrates how the Vendor will staff. This Plan shall include proposed on-site team, and support staffing. The Plan shall include: <ul style="list-style-type: none"> • Identity of the Vendor's on-site team, and business administration team. These individuals cannot be substituted without written approval of the PIACL. • Vendor's staffing for this particular project shall be indicative of their ability to provide professional project management, operational expertise, and building administration that is effective, efficient, and thorough. 		4	
5	Describe generally how your organization proposes to seamlessly manage transition. Provide transition plan with sufficient detail for the PIACL to be able to determine the quality and reasonableness of the Vendor's approach		2	
6	Describe your organization's methodology for supporting the PIACL's data centers on a 7x24x365 basis.		4	
7	Describe what services your company typically performs as a part of normal everyday operating duties (e.g. monitoring procedures, test plans, managing parts inventory, review maintenance logs, establish maintenance schedules, emergency response, etc.).		2	
8	Describe how your company manages the many disciplines of total plant management including; complex megawatt UPS systems, elaborate HVAC systems, plumbing, roofing, foundation, piping, wiring, structure, and general conditions /simple repairs like drywall patches and moving		4	

	furniture.			
9	Describe how your company determines that it is not cost effective to repair a piece of equipment and when replacement is more cost effective.		1	
10	Describe how your company staff covers a facility that requires staff support of 7x24x365		3	
11	Describe how your company manages catastrophic events that would require extended on-site presence and staff augmentation		3	
12	Describe the IT systems your company will use in support of this contract. How do they track preventive maintenance and on-demand work orders? What type of reporting do they provide? Do you have a Call Center?		2	
The Team will use this sum and the formula below to calculate the score. Total Raw Weighted Score: (sum of Raw Weighted Scores above) $\frac{\text{Total Raw Weighted Score}}{\text{Maximum Possible Raw Weighted Score}} \times 50 = \text{Score}$ (i.e., 5 x the sum of item weights above)				

RFP ATTACHMENT (C) — Financial Selection Criteria

Financial Evaluation

Audited reports of last three years will be submitted with Technical Proposal; however, their marks will be counted during Financial Evaluation of the bids.

S.No.	Criteria	Marks
1	Vendor will require to submit last three years' audited reports	10
		Yes = 10 No = 0
2	Lowest Bid	40
		40
		2 nd Lowest
		3 rd Lowest
		Rest of the bids
Total Marks		50

RFP ATTACHMENT (D) — Draft Agreement

**CONTRACT
BETWEEN PIACL
AND
CONTRACTOR NAME**

This Contract, by and between the Pakistan International Airline Corporation Limited, , hereinafter referred to as the ‘PIACL’ and -----, hereinafter referred to as the “Contractor,”

A. SCOPE OF SERVICES:

A.1. The Contractor shall provide all service and deliverables as required, described, and detailed in RFP Attachment (A)

A.2. Summary of Services

Vendor will perform the following services:

1. Building of new Tier III Data Center as per specifications mentioned in RFP Attachment (A).
2. Provide support & Services for the period of three (03) years starting from the date of handing over the new Data Center to PIACL
3. Responsible for migration of services
4. Responsible for shifting of operations of existing Data Center

A.3. Building Analysis and Condition Assessment.

Contractor will perform a thorough analysis of the data center building for the purpose of determining and documenting existing conditions and requirements. The Contractor will field-verify accuracy of available as-built drawings and generate required drawings for areas where drawings do not exist. Studies include, but are not limited to, the building’s mechanical and electrical systems, indoor air and water quality, and energy usage and sustainable design attributes, including feasibility to meet LEED™ certification, Energy Star, and all PIACL rules, and regulations.

A.4. Alert Monitoring Per Data Center. The Contractor shall provide the following services for Data Center:

- a. The Contractor will investigate, document, and implement best practices for monitoring critical mechanical, electrical, and plumbing systems (what alerts / how to monitor 7X24X365).
- b. The Contractor will develop and review procedures for planned response to critical events; develop service plans and schedules, and a plan for adherence.
- c. The Contractor will develop and document a complete set of test plans that ensure all critical systems are operable and calibrated properly.
- d. Alert monitoring and response will be real time (7x24x365). Electricians, HVAC specialists, and Facility Managers are required to carry two-way radios and pagers to respond to any / all critical alerts for HVAC (Heating Ventilation and Air Conditioning) and electrical emergencies (Contractor provides communication equipment). Cell phones are required for the Facility Managers

and their designees. Acceptable emergency response times are within twenty (20) minutes for call back, and on-site and working the issue within two (2) hours. Priority repairs will be worked until issue is resolved or until a workaround has been put in place.

A.5. Physical Plant Systems

- a. Follow all industry best practices for operations, maintenance, and monitoring of the following:
 - i. HVAC (end to end); Uninterruptable Power Supply (UPS) (All systems, static transfer switches, remote power panels, breakers, etc...);
 - ii. Power (utility and generators - end to end);
 - iii. Fire alert / suppression;
 - iv. Facility security equipment;
 - v. Building shell;
 - vi. Water leak detection (interior / and building shell);
 - vii. Building plumbing, roofing, foundation, piping, wiring, structure, and general condition; and,
 - viii. Storm water monitoring and control.
- b. The Contractor will maintain complete 'as-built' building drawings for data center and create schematics where they don't exist.
- c. The Contractor will develop and maintain maintenance schedules for all equipment
- d. The Contractor will ensure all filters, belts, fasteners, fixtures, lubricants, and other routine maintenance items are installed, working properly.
- e. The Contractor will maintain a supply of maintenance and critical replacement parts/supplies, either on-site or readily available (within 24 hours).
- f. The Contractor will maintain a complete hardware set (bolts, washers, screws, nails, tie-wraps, fasteners, glues, etc.) in order to maintain the facility.
- g. The Contractor will provide complete up-to-date documentation. This documentation should include naming standards and conventions for all components, UPS, breakers, Power Distribution Units (PDUs), through to the receptacle. The documentation should include a best practice model for maintaining an accurate accounting of all circuits and what computer equipment is powered by which breaker. Detailed panel schedules will be provided to the Contractor.
- h. Contractor will provide a method for tracking and measuring circuit loads and capacity, as not to allow any over loading or underutilization of UPS, PDUs or circuits.
- i. The Contractor will provide (for new or modified equipment) and maintain interfaces into the facilities monitoring and control systems. The Contractor will ensure that all critical systems are properly monitored in real time and have a planned and documented response to critical events. The PIACL will review and approve all policies and methodologies.
- j. Contractor will perform any enhancements or break/fix repairs needed to maintain the physical plant systems.

A.6. Preventative Maintenance. The Contractor will use preventative maintenance as the primary approach to ensuring the availability of the entire data center power train (generators, transfer switches, transformers, batteries, breakers and switches, PDUs, UPSs, etc...) and cooling train (Computer Room Air Conditioners (CRACs), Computer Room Air Handlers (CRAHs), humidifiers, condensers, variable air volumes (VAVs), chillers, etc...). The Contractor will:

- a. Maintain all preventative maintenance, whether unscheduled or scheduled

- b. Develop a calendar-based scheduled maintenance inspection for each facility during which fully trained and qualified maintenance experts observe the physical infrastructure equipment to look for changes in equipment appearance and performance and listen for changes in the sounds produced by the equipment. “Fully trained and qualified maintenance expert” is defined as individual(s) holding manufacturers’ certifications for equipment to be maintained.
- c. The Contractor will provide historical data for reporting usage trends, capacity demands, meantime to failure, and downtime / repair statistics.
- d. The Contractor will identify potential issues and take immediate action to prevent a future failure.
- e. The Contractor will ensure that all major equipment is maintained under either a service maintenance program or warranties provided by the original equipment manufacturer and that the preventative maintenance procedures include all manufacturers’ recommendations and best practices. The maintenance may include, but is not limited to, thermal scanning, calibration, adjustments, cleaning / replacing air or water filters, lubrication, and replacement of parts or updating of physical infrastructure firmware / software.
- f. Adhere to all maintenance procedures and schedules recommended in manufacturers’ manuals.
- g. The Contractor shall monitor, maintain, and test general maintenance items including but not limited to plumbing, lamp changes, wiring, etc.
- h. Provide and / or ensure availability of proper diagnostic tools on-site to accomplish all preventative maintenance and define efficiency goals. Continuous diagnostics used as predictive maintenance tool to prevent failures should be scheduled and documented. A diagnostic plan should include in-line troubleshooting and be non-disruptive.
- i. Thermal scans and internal temperature measurements of all electrical equipment (Panel boards, UPS modules, transfer switches, transformers, disconnects, Remote Power Panel (RPPs), etc...) will be completed annually and reported on annually.
- j. Torque connections, check fans, check capacitors, vibration test, and update firmware will be a part of the comprehensive preventative maintenance plan.
- k. The Contractor shall initiate preventative maintenance, outside of the scheduled maintenance routine, if deemed necessary to prevent an imminent outage. Whenever possible, the Contractor will provide the PIACL a ten (10)-day advance notice of such maintenance and any/all preventative maintenance will be completed after the PIACL’s approval. Prior to any work being performed, all maintenance activity will include a risk management assessment, a detailed plan with time-lines, along with back-out plans, unless otherwise directed.

A.7. Disaster Recovery Assistance

In the event of a disaster, the Contractor shall provide assistance to the PIACL in the event either building is damaged to the extent that processing is interrupted. The assistance may include, but is not limited to, the following:

- a. Damage assessment from a mechanical, electrical, building envelope and/or structural aspect to be reported to the PIACL;
- b. Provide clean up assistance as required; and,
- c. Repair or replace damaged components of the physical plant and/or environmental equipment as requested by the PIACL.

A.8. Spare Parts

- a. The Contractor shall keep certain spare parts on site for purposes of break/fix repairs. Inventory management of these parts will be the responsibility of the Contractor. The Contractor shall ensure that sufficient spare parts are readily available, such parts shall remain the property of the Contractor until such time as they are installed at the PIACL Data Center as a result of a repair.
- b. Assuming the parts expense is compensable, upon installation, the Contractor may invoice the PIACL for cost of the parts.
- c. Contractor will provide a recommended spare parts list for critical systems in each facility, within ninety (90) days of the Contract Start Date. The PIACL will review this list and may make recommendations for additional parts that shall be added. In any event, the PIACL will be the final arbiter of the parts that should be kept on site.
- d. The PIACL shall also have the capacity to purchase whatever spare parts the PIACL wishes to maintain in its own inventory.

A.9. Tools

Contractor is required to provide and maintain a complete tool set on-site. The Contractor must provide all tools required to perform the services including specialty tools or rental equipment (e.g., lifts, load bank, backhoe) that may be required to perform the services.

A.10. Reporting Requirements

a. Maintenance Logs

The Contractor will keep all maintenance logs up-to-date and available for periodic management review. The Contractor will be required to input all maintenance schedules and activities into the Contractor's provided management system.

b. Monthly, Quarterly and Annual Reporting

The Contractor shall develop and provide facility metrics for all mechanical systems, electrical systems, reliability / availability, service schedules, system performance, systems availability, Mean Time Between Failure (MTBF), Mean Time Between Repair (MTBR), and outages and Contractor incident response times. The Contractor will develop KPIs, metrics, review procedures, schedules, measurements, and reporting programs to ensure all critical systems, alerts, and faults are being properly monitored and all systems are being adequately maintained. All reports must be completed using Microsoft Office programs. Gas emissions monitoring reports (battery room hydrogen, carbon monoxide, etc.);

A.11. Facility Enhancement

a. Floor Tile Cutouts

The Contractor will be responsible for floor tile cutouts for grommets, and cable pathways as required. The Contractor will provide any tools required to accomplish this work.

b. Additional Enhancements

From time to time, additional minor enhancements will be necessary.

A.12. General Service Provisions

a. General Office Space

The PIACL will provide work area, general office space and inventory storage space for three Contractor-provided personnel and janitorial staff in each of the two facilities. The office space will include desks and chairs, high speed connectivity to the Internet, local phone service and use of copiers and fax machines.

A.13. Staff Requirements. The Contractor will provide the following staff to perform the day-to-day services required by this Contract from the date of handover for the period of one year.

a. **Demonstrated Experience.** Individuals performing work in facility must have demonstrated experience in the management and / or maintenance of a facility with the same level of complexity as PIACL's data center.

b. On-Site Facility Managers

i. The Contractor shall provide one on-site Facility Managers. Facility manager will be dedicated primarily to the assigned facility (minimum of 40 hours per week, at least 95% of the time, This Facility Managers will be responsible for all maintenance functions within the facility. He will serve as the primary liaison between the facility maintenance staff and the PIACL facility

ii. Facility Managers will be responsible for:

- (1) Overseeing Contractor staff for all services described in the Contract. "Contractor staff" will cover any staff provided by this Contractor, whether they work directly for the Prime Contractor or whether they are the Contractor's sub-contractors.
- (2) Acting as a single point of contact for all facility management related issues to include but not limited to; all contracts, all maintenance personnel, reporting, compliance, troubleshooting, repairs, emergencies, etc.
- (3) Administration of third-party service agreements for the facility infrastructure systems to include emergency generators, UPS and battery systems, RPPs, electrical switch gear, etc. to ensure the contracted services are being provided in a timely manner and in accordance with contract specifications.
- (4) Maintaining operational logs and reports on facility operation and performance of maintenance routines.
- (5) Overseeing and directing their sub-contractors making repairs to or performing preventative maintenance on all electrical and mechanical building systems.
- (6) Administering all of their own contractors in such a way that will be transparent to the PIACL.
- (7) Trouble shooting and diagnosing equipment failures and make provisions for necessary repairs.
- (8) Ensuring facility repairs such as painting, wall and ceiling repairs, carpet and flooring repairs, lamp replacement, plumbing repairs, minor electrical repairs, etc. is complete and all work is performed with high standards.

- (9) Responding to emergency situations such as fire, flood, power failure, storms, etc.; initiating remedial actions as necessary and keeping PIACL management informed in accordance with established procedures.
- (10) Ensuring all areas of these facilities are clean, organized, and free of clutter.
- (11) Providing checklist for daily routine facility inspection.
- (12) Managing, supervising, and organizing any / all plant maintenance activity.
- (13) The safety of every maintenance and repair staff, contractor, and employee. Any safety training program required.
- (14) Preparing annual budgets which cover all maintenance and operational items which are included in this RFP.
- (15) Provide support for an annual audit and inspection of the facility.
- (16) Conduct documented on-going training of the mechanical and electrical systems.
- (17) Participate in PIACL conducted tours of the facilities.

A.14. Contractor Licensure and Work Procedures

- a. Contractor Licensure. The Contractor is responsible for all licenses, certifications, permits, etc. required for completion of the work as required by this Contract. The Contractor must maintain appropriate license(s) throughout the term of the Contract.

The Contractor shall notify the PIACL of any changes in licensure that occur during the term of the Contract.

- b. Work Procedures. The Contractor must replace or restore (at least to the original condition) any damage to floor, ceiling, walls, furniture, landscape, etc. caused by its personnel and/or operations, at the Contractor's expense.
 - i. During site installation/construction, the Contractor must maintain a clean and safe working environment for not only Contractor staff, but also PIACL workers and the public.
 - (1) The Contractor must minimize disruptions to the PIACL work force as much as possible.
 - (2) The Contractor must leave all work areas secured, safe, and clean after stopping for the day.

B. General Terms & Conditions:

1. Approvals:

- 1.1 Contractor shall obtain and maintain in force at all times during the Term all licenses, approvals, consents, authorizations and licenses necessary to provide the Services to the PIA as per the terms of the Agreement including without prejudice to the generality hereof the requisite licenses, approvals from PTA or any other relevant authority, agency or body.
- 1.2 The PIA shall obtain and maintain in force at all times during the Term all licenses, approvals, consents, authorization and licenses necessary to avail the Services.
- 1.3

2. Force Majeure:

- 2.1 No delay or failure in performance by either Party hereto shall constitute default hereunder or give rise to any claim for loss, costs, damages and expenses if, and to the extent, such delay or failure is caused by force majeure. Unless such force majeure substantially frustrates performance of this Agreement, force majeure shall not operate to excuse, but only to delay, performance.
- 2.2 Force majeure is an occurrence beyond the control and without the fault or negligence of the Party affected and which said Party is unable to prevent or provide against by the exercise of reasonable diligence including but not limited to: acts of God or the public enemy; changes in applicable law; war, rebellion, civil disturbances, sabotage, riots, floods that could not reasonably have been anticipated; fires, explosions, or other catastrophes which are not within the reasonable control of the Party (“Force Majeure Event”).

3. Liabilities:

- 3.1 Neither Party shall be liable to the other for (i) libel, slander, or infringement of copyright from or in connection with the transmission of communications hereunder, (ii) any claim arising out of any act or omission of the other Party or its employees, agents or contractors ; or (iii) any claim arising out of a breach in the privacy or security of communications transmitted over the facilities or other property of Contractor and Contractor will not be liable for any unlawful or unauthorized use of the Equipment or Services by the PIA, its employees or agents (including all its employees, directors and sub-contractors).
- 3.2 Contractor shall not be liable in respect of Services provided to the PIA for any indirect, incidental or consequential loss, including loss of expected profits and any third party liabilities.

4. Suspension/Termination/ of the Agreement:

- 4.1 The occurrence of any of the following events of default by either Party which if not cured within the time period permitted (if any) to cure, shall give rise to the right on the part of the other Party to terminate this Agreement; provided, however, that no such event shall be an event of default by a Party (i) if it results from a breach by the other Party or (ii) if it occurs as a result of or during a Force Majeure event:
 - 4.1.1 the passing of a resolution by the shareholders of either Party for the winding up of such Party;
 - 4.1.2 the voluntary filing by either Party of a petition of bankruptcy, moratorium, or other similar relief; the appointment of a provisional liquidator in a proceeding for the winding up of either Party after notice to such Party and due hearing, which appointment has not been set aside or stayed within ninety (90) days of such appointment; the making by a court with jurisdiction over either Party of an order winding up such Party that is not stayed or reversed by a court of competent authority within thirty (30) Days;
 - 4.1.3 faulty, inefficient, defective or deficient transmission/ provision of the Services which is not remedied within ten (10) days after notice of the defect is given;
 - 4.1.4 suspension or outage of the Services for a period of 10 days or longer or cumulative periods together and excess of 15 days subject to clause 7 and 9.
 - 4.1.5 any material breach by either Party of this Agreement, which is not remedied within ten (10) days after notice from the other Party to the Party in breach, which notice states that a material breach of such agreement has occurred that could result in the termination of such agreement, identifies the breach in question and demands remedy thereof.
- 4.2 Where the PIA wishes to cancel at any time after the commencement of Services then PIA shall pay Contractor an amount equivalent to three (03) months service charges or give Contractor a three (3) months’ notice, in writing
- 4.3 Notice of Termination: If either Party commits any breach of this Agreement and

fails to remedy it within the applicable cure period agreed between the parties, if any, the Party not in default may by written notice immediately terminate this Agreement.

- 4.4 Upon expiration or termination of this Agreement, the Parties shall have no further obligations hereunder except for obligations that arose prior to such expiration or termination and obligations that expressly survive such expiration or termination pursuant to this Agreement.

5. Waiver:

- 5.1 Failure by either Party to exercise any rights under this Agreement in any one or more instances shall not constitute a waiver of such rights in any other instance. Waiver by such Party of any default under this Agreement shall not be deemed a waiver of any other default or continuing default, as the case may be.

6. Governing Law:

- 6.1 This Agreement shall be governed by the laws of Pakistan. Any dispute between the parties arising out of the agreement if not amicably settled shall be referred for arbitration in accordance with arbitration act of 1940. The seat of the arbitration shall be at Karachi. The parties agree to submit to the exclusive jurisdiction of the courts at Karachi.

7. Confidentiality:

- 7.1 Contractor and the PIA, to the extent of their contractual and lawful right to do so, shall exchange proprietary or confidential information as reasonably necessary for each to perform its obligations under this Agreement. All information relating to the Agreement provided by either Party to the other, whether oral or written, and when identified in writing as confidential or proprietary is hereby deemed to be confidential and proprietary information (“Proprietary Information”). The obligation of a Party in relation to the Proprietary Information shall not apply to that information which:

- 7.1.1 now or hereafter enters the public domain through no fault of that party; or
7.1.2 can be proved to have been in the possession of that party at the time of disclosure and which has not been previously obtained, directly or indirectly, from the other party hereto as evidenced by the receiving party’s written records; or
7.1.3 otherwise lawfully becomes available to that party from a third party under no obligation of confidentiality at the time of disclosure; and
7.1.4 is required to be disclosed by any applicable law, governmental order, decree, regulation, license or rule to which the relevant party is subject.

8. Notices:

- 8.1 All notices provided for herein (other than routing communications concerning the services to be provided hereunder) shall be given in writing, and shall be mailed by registered or certified mail, return receipt requested be addressed to the following point of contact;

9. Payment:

- 9.1 Payments will be made on **milestone** basis. Invoice will be billed to PIA including GST which will be paid by PIA.

If to the PIA

Name:
Title:

Address:

(By Mail / Fax or personal delivery)

If to Contractor

Name:

Title:

Address:

(By Mail / Fax or personal delivery)

IN WITNESS WHEREOF this Agreement is executed by the parties hereto;

For: PIA

For: -----

By: _____
(Name in Block Letters)

By: _____
(Name in Block Letters)

(Title in Block Letters)

(Title in Block Letters)

(Signature)

(Signature)

(Date)

(Date)

Witnessed By

Witnessed By

1. _____
(Name in Block Letters)

1. _____
(Name in Block Letters)

(Title in Block Letters)

(Title in Block Letters)

(Signature)

Signature)

(Date)

Date)

2. _____
(Name in Block Letters)

2. _____
(Name Block Letters)

(Title in Block Letters)

(Title in Block Letters)

(Signature)

(Signature)

(Date)

(Date)

INTEGRITY PACT / DISCLOSURE CLAUSE

(To be submitted on Company's Letterhead)

Declaration of Fees, Commissions and Brokerage Etc. Payable by the Suppliers, Vendors, Distributors, Manufacturers, Contractor & Service Providers of Goods, Services & Works _____ the Seller / Supplier / Contractor hereby declares its intention not to obtain the procurement of any Contract, right, interest, privilege or other obligation or benefit from Government of Pakistan or any administrative sub-division or agency thereof or any other entity owned or controlled by it (GOP) through any corrupt business practice.

Without limiting the generality of the forgoing the Seller / Supplier / Contractor represents and warrants that it has fully declared the brokerage, commission, fees etc., paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback whether described as consultation fee or otherwise, with the object of obtaining or including the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from Government of Pakistan, except that which has been expressly declared pursuant hereto.

The Seller / Supplier / Contractor certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with Government of Pakistan and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

The Seller / Supplier / Contractor accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall without prejudice to any other right and remedies available to Government of Pakistan under any law, contract or other instrument, be void-able at the option of Government of Pakistan.

Notwithstanding any rights and remedies exercised by Government of Pakistan in this regard, the Seller / Supplier / Contractor agrees to indemnify Government of Pakistan for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to Government of Pakistan in any amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by the Seller / Supplier / Contractor as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever from Government of Pakistan.

(To be submitted on Rs. 100 Stamp Paper)

GM Contracts Management
P&L Department
Pakistan International Airlines,
Karachi.

Subject: Undertaking to Execute the Contract

Dear Sir,

1. We/I, the undersigned tenderer do hereby confirm, agree and undertake to do following in the event our / my tender for supply/Services of _____ to PIA is approved and accepted:
2. That we / I will into and execute the formal contract, a copy of which has been supplied to us / me, receipt whereof is hereby acknowledge and which has been studied and understood by me / us without any change, amendment, revision or addition thereto, within a period of seven days when required by PIA to do so.
3. That all expense in connection with the preparation and execution of the contract including stamp duty will be borne by us / me.
4. That we / I shall deposit with PIA the amount of security as specified in the contract which shall continue to be held by PIA until three months after expiry of the contract period.
5. That in event of our / my failure to execute the formal contract within the period of seven days specified by PIA the Earnest money held by PIA, shall be forfeited and we / I shall not question the same.

Tenderer's Signature _____

Name in full _____

Designation _____

Address _____

Phone / Fax # _____

CNIC _____

Seal _____

Date _____