BACHA KHAN MEDICAL COMPLEX / GAJJU KHAN MEDICAL COLLEGE MEDICAL TEACHING INSTITUTION (MTI)

Contact No: 0938-280214

BID SOLICITATION DOCUMENTS
FOR
SUPPLY & INSTALLATION OF COMPLETE LAN & WI-FI INFRASTRUCTURE

Note: The prospective bidder is expected to examine the Bidding Documents carefully, including all Instructions, Terms & Conditions, and Specifications etc. Failure to furnish all information required by the Bidding documents or submission of a Bid not substantially responsive to the Bidding Documents in every respect would result in the rejection of the Bid.

Note: Amendments / Changes are highlighted in red.

Brief Introduction of GKMC & BKMC -MTI

1   Overview of RFP:

Gajju Khan Medical College & Bacha Khan Medical Complex – MTI invites RFP response from all bidders for **"The supply & Installation of complete LAN & Wi-Fi Infrastructure"** as per guidelines mentioned in this RFP.

1.1   Proposed Methodology

Bidders will submit a detailed technical proposal including Fiber/Copper Layouts, BoQ with specification compliance as per RFP requirement, previous similar work performed and methodology to complete work. Financial proposal will also be submitted with technical proposal.

1.2   Terms of References (TORs)

1. The Procurement shall be conducted in accordance with the KPPRA Rules 2014 on **Single Stage Two Envelope Procedure**. All Bids must reach in Office at 00 :00AM on Date:00-00-0000

2. GKMC & BKMC invites two separate sealed envelopes, one for Technical Proposal and One for Financial which will be clearly marked outside the envelops.

3. The Technical bid should clearly mention Make, Model, origin and Brand, (Specification of bid) without quoting the price and must mention the warranty period. (In Case of Hardware)

4. Compliance against each Technical Specifications must be attached.

5. Company seal / stamp must be fixed on Technical Specification and Financial Proposal.

6. Bid Money will be 2% of complete Project Value.

7. **If any firm fails to qualify the Technical Evaluation Criteria based upon ToRs, then financial bid of the same will not be opened.**

8. **Mandatory Requirements are as follows: -**
   a. Manufacture Authorization Letter MAF/MAL must be attached against Quoted brand.
   b. OEM partnership letter must be attached against Quoted brand.
   c. The bidder should provide **FBR** registration certificate and ATL proof with Technical Proposal.
   d. The bidder should provide **KPRA registration** certificate with Technical Proposal.
   e. The bidder should provide an **undertaking** on stamp paper that it is not blacklisted by any of the Provincial / Federal Government or organization of the state / Federal Government in Pakistan in accordance with the Section 44(1) KPPRA Rules 2014.
   f. Bids from any bidder who is found or purported to be engaged or under investigation for offences related to fraud, under invoicing, tax evasion, concealment, money laundering etc. shall be rejected without assigning any reason.

g. The bidder must submit **Annual Audited Report** for the last three years.

h. Then bidder must submit **Bank Statement with Bank Account Managing letter for** the last three years.

i. The bidder shall give at least **three Relevant References** (Purchase Order) of similar equipment delivery / installation by their firm.

j. The bidder shall have at least **three-Year Relevant Experience** for the supply of similar equipment.

k. **Call Deposit** of Two percent (2%) of the total bid amount must be attached with financial proposal in separate sealed envelope in favor of Head IT Division, Customer Name: **on or before 10:00 AM, DD-MM-YYYY.,** The EM will be enclosed with Technical Proposal.

9. **Tender bid opening will be held on Wednesday, DD-MM-YYYY at 11:00AM at GKMC & BKMC Islamabad.**

10. **Any bid submitted after due date and time will not be entertained.**

11. The BKMC / GKMC – MTI will not be responsible for any costs or expenses incurred by bidders in connection with the preparation or delivery of bids.

12. The prices quoted shall remain valid for **120 days**, after the date of opening of the tender.

13. Delivery and installation of all items must be made within 30 days for local and 90 days for import item of issuance of purchase order.

14. All prices quoted must be inclusive of all Taxes applicable, such as GST, Income Tax, etc.

15. Rate should be quoted in words and figures.

16. **In case of failure to supply the item under specified time. The work order should be awarded to second lowest.**

17. Supply and Installation should be completed within 120 days. Failure to that, two percent (2%) Call Deposit (CDR) amount will be forfeited**.**

18. Bidders must submit the bid that matches or is better than the required specifications

19. **No negotiations and revised bids will be allowed.**

20. Proposals shall be submitted in English language.

21. The proposals shall be comprehensive, clear, and elaborate. Different sections/Annexures of the proposals shall be separated using color separators, flags, or tags. The proposals shall be prepared without any interlineations or overwriting.

22. The Hospital reserves the right to accept or reject all the proposals submitted at any time in accordance with applicable KPPRA rules.

23. All pages must be Signed & Stamp by the Authorized Authority.

24. Proposal weightage is Given below:

PROPOSAL	WEIGHT
Technical	70%
Financial	30%
TOTAL	**100%**

25. <u>Contract Period/Warranties:</u>

      a.   Minimum Warranty of the Quoted Equipment is 3 years.

22. TECHNICAL EVALUATION CRITERIA

PASSING MARKS: A technically eligible bidder, based on conditions listed in this document, not meeting the 70% pass marks limit will be rejected in Technical Evaluation, and its sealed / unopened Financial Proposal shall be returned. All bidders scoring greater than or equal to 70% of the marks will be accepted in technical proposal, and their financial bids will be opened.

The Bidders who have duly complied with the Eligibility/Qualification and Evaluation Criteria will be eligible for further processing.

The Bids which do not confirm to the Technical Specifications or Bid conditions or the Bids from the Bidders without adequate capabilities for supply and maintenance / warranty /support services will be rejected.

The technical proposals shall be evaluated by the technical evaluation committee in the light of following evaluation criteria.

Description	Maximum Points
Legal (Mandatory)	
Certificate of Company/Firm Registration/Incorporation under the laws of Pakistan	**Mandatory**
Valid Income Tax Registration	
Valid General Sales Tax Registration (Status = Active with FBR) with ATL Proof.	
KAPRA Registration	
Submission of undertaking on legal valid and attested stamp paper that the Firm is not blacklisted by any of Provincial or Federal Government Department, Agency, Organization or autonomous body or Private Sector Organization Anywhere in Pakistan (On100 Rs Stamp Paper)	
Compliance to the technical specifications of Services to be procured are Mentioned in Annex-A of this document.	
In full compliance of the Execution Schedule and Delivery Period mentioned in Tender document (Undertaking)	
OEM authorization & partnership certificate for the quoted products	
OEM (Warehouse) or Bidder's Office presence must have in major cities of Pakistan.	
Certificates must be provided: ISO 9001: 2015, Fair Price and Original Equipment undertaking. (On100 Rs Stamp Paper)	

Successful Completed ICT Projects similar nature 16 - 20 ICT Projects – 10 11 - 15 ICT Projects – 07 6 - 10 ICT Projects– 05 Less than 10 - 00	10
Human Resource: Team Leader – 5 (2.5 marks for each) IT Engineer – 6 (2 marks for each) IT Technician – 4 (1 mark for each)	5 6 4
The bidder should have at least one deployment of the similar quoted equipment / project in the teaching hospital	10
Company operating in Pakistan: 10 (Ten) Years – 10 (One mark for each year)	10
Location of offices in Peshawar / Islamabad / Rawalpindi: Office Presence – 05 No Presence-0	05
Annual Turnover: Minimum 500 Million – 15 Minimum 250 Million – 7.5	15
Performances certificate of the quoted project (one mark for each)	05
Total	*70*

Passing Marks in Technical Proposal = 49 /70

1.3   BRIEF SCOPE OF WORK for LAN & WI-FI Infrastructure:

i.   GKMC & BKMC is interested to establish Wi-Fi infrastructure in their College & Hospital Premises.

ii. At the time of installation and commissioning, Selected Bidder must provide comprehensive survey documentation of deployments laid including logical Diagrams, HLDS, LLDS, labelling, schematics, and configuration, SOPs, as part of Scope of Work.

iii. Operation and maintenance of the equipment infrastructure will be the sole responsibility of the selected bidder.

3.   PRE-DEPLOYMENT ACTIVITIES:

i.   Detailed implementation plan shall be provided within seven (07) days from the date of acceptance of site surveys and BOQ are finalized / accepted by GKMC & BKMC.

ii. Selected bidder will provide complete solution of network integration including deployment & configuration.

iii. If the Selected Bidder do not meet the requirements as per the survey report submitted on which the BoQ was finalized, then the requirement shall be met on Selected Bidder's cost.

4.   POST-CONTRACT ACTIVITIES:

i.   Passive services and the related passive equipment will be provided by selected bidder.

ii. The deployment of GKMC & BKMC must be completed in 8-10-week times upon issuance of LOI/LOA from all aspects and service delivery shall be started.

iii. Selected bidder must Provide a dedicated Account Manager to GKMC & BKMC for any Query.

5.   NETWORK COMMISSIONING REQUIREMENT

Network topology will be based on interconnected Nodes through l2/l3 switches. The selected bidder must design and configure:

   i.   Active and passive equipment supply and installation at mentioned location as per scope.

   ii. Selected bidder will provide complete solution of network integration including deployment, configuration integration with existing network, setting up server and configuring as per the given requirements.

   iii. These network commissioning requirements can be modified or removed based on design finalization between bidder and customer with commercial impact.

6.   PROJECT EXECUTION REQUIREMENTS

i.   Payments will be made onetime bases agreed terms; however, the Selected Bidder will be solely responsible for deploying system/equipment and to maintain warranties and provisioning of services for up to three (03) years.

ii. Selected bidder must design and deploy network configuration plan along with configuration design and submit/ present the same for the approval to GKMC & BKMC.

iii. After complete site surveys, BoQ will be finalized for each site as per the site requirement and will be made part of contract agreement through an Amendment.

Bid Security Form

Whereas [name of the Bidder] (hereinafter called "the Bidder") has submitted its bid dated *[date of submission of bid]* for the supply of *[name and/or description of the goods]* (hereinafter called "the Bid").

KNOW ALL PEOPLE by these presents that WE [name of bank] of [name of country], having our registered office at [address of bank] (hereinafter called "the Bank"), are bound unto [name of Procuring agency] (hereinafter called "the Procuring agency") in the sum of for which payment well and truly to be made to the said Procuring agency, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this _____ day of _____ 20_____.

THE CONDITIONS of this obligation are:

1.   If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or

2.   If the Bidder, having been notified of the acceptance of its Bid by the Procuring agency during the period of bid validity:

    a.   fails or refuses to execute the Contract Form, if required; or
    b.   fails or refuses to furnish the performance security, in accordance with the Instructions to Bidders;

We undertake to pay to the Procuring agency up to the above amount upon receipt of its first written demand, without the Procuring agency having to substantiate its demand, provided that in its demand the Procuring agency will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including twenty eight (28) days after the period of bid validity, and any demand in respect thereof should reach the Bank not later than the above date.

_____
[signature of the bank]

Performance Security Form

To: *[name of Procuring agency]*

WHEREAS [name of Supplier] (hereinafter called "the Supplier") has undertaken, in pursuance of Contract No. *[reference number of the contract]* dated _____ 20_____ to supply *[description of goods and services]* (hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Supplier shall furnish you with a bank guarantee by a reputable bank for the sum specified therein as security for compliance with the Supplier's performance obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Supplier a guarantee:

THEREFORE, WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of *[amount of the guarantee in words and figures]*, and we undertake to pay you, upon your first written demand declaring the Supplier to be in default under the Contract and without cavil or argument, any sum or sums within the limits of *[amount of guarantee]* as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the _____ day of _____ 20_____.

Signature and seal of the Guarantors

_____

[name of bank or financial institution]

_____

[Address]

_____

[date]

Contract Form

THIS AGREEMENT made the _____ day of _____ 19_____ between *[name of Procuring Agency]* of *[country of Procuring agency]* (hereinafter called "the Procuring agency") of the one part and *[name of Supplier]* of *[city and country of Supplier]* (hereinafter called "the Supplier") of the other part:

WHEREAS the Procuring agency invited bids for certain goods and ancillary services, viz., *[brief description of goods and services]* and has accepted a bid by the Supplier for the supply of those goods and services in the sum of *[contract price in words and figures]* (hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1.   In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2.   The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
        (a)   the Bid Form and the Price Schedule submitted by the Bidder;
        (b)   the Schedule of Requirements;
        (c)   the Technical Specifications;
        (d)   the General Conditions of Contract;
        (e)   the Special Conditions of Contract; and
        (f)   the Procuring agency's Notification of Award.

3.   In consideration of the payments to be made by the Procuring agency to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Procuring agency to provide the goods and services and to remedy defects therein in conformity in all respects with the provisions of the Contract

4.   The Procuring agency hereby covenants to pay the Supplier in consideration of the provision of the goods and services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the contract at the times and in the manner prescribed by the contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, sealed, delivered by _____ the_____(for the Procuring Agency)

Signed, sealed, delivered by _____ the_____(for the Supplier)

Payment:

Payment will be made after successful completion, installation and inspection of the project.

No advance payment will be made.

1.4 Bill of Materials:

1.4.1 Active Items:

Sr. No	Description	A/U	QTY
1	Router	No	1
2	Firewall with 1-year Licenses (AV, IPS, URL and Application)	No	1
3	Core Switch	No	1
4	Aggregation Switch	No	4
5	8 port Access Switch	No	40
6	24 port Access Switch	No	30
7	48 port Access Switch	No	8
8	Wi-Fi Controller	No	1
9	Access Points with Power Adapter	No	144
10	SFP 1G	No	142
11	SFP 10G	No	12
12	Campus management.	No	1
13	NMS for Network	No	1
14	Server for NMS	No	1
15	Server for HMIS	No	2
16	SAN Storage	No	1
17	Windows Server Std 2022, 64Bit English 1pk DSP OEI DVD 16 core, along with Hyper V license.	No	3
18	5KVA UPS in IT Room with 4 hours backup	No	2
19	650 VA UPS for Cabinets	No	68
20	5KVA AVR	No	1
21	Laptop Systems (Network Administration)	No	4
22	55-inch or more LED	No	2
23	Fire detection system	No	1

	Fiber Works		
1	24 Core Duct Fiber	meter	3,000
2	6 Core Fiber	meter	2,500
3	12 port ODF rack Mounted	No	68
4	48 port ODF	No	6
6	Soft/Hard Digging of Fiber including HDPE Pipe, warning tape, Hand Hole, fiber Joints Enclosures, splicing, marker post and reinstate of roads/pavements.	Job	1

1.4.2 Passive Items:

Sr. No	Description	A/U	QTY
1	CAT 6 I/O	No	670
2	3-meter Fiber Patch Cord.	No	200
3	CAT 6 Face Plate and Back Box	No	670
4	CAT 6 Cable Roll. (305 meter)	No	131
5	CAT 6 1meter Patch Cord.	No	670
6	24 Port patch Panel with I/O	No	80
7	Cabinet 6U with PDU	No	67
8	Cabinet 9U with PDU	No	2
9	Cabinet 42U with PDU - supported 4 port KVM switch and drawer	No	2
10	Power Socket	No	71
11	Power Cable 3.29 dual core. (90 meter)	No	50
12	Cable Manager	No	79
13	Duct 16x25	FT	10,000
14	Duct 16x38	FT	8,000
15	Duct 40x40	FT	2,000
16	a) Active and Passive Items installation including Configuration, Commissioning and Testing. b) Soft/Hard Digging of Fiber including HDPE Pipe, warning tape, Hand Hole, fiber Joints Enclosures, splicing, marker post and reinstate of roads/pavements. c) Power Earthing/Grounding of server room d) 10 working days extensive training of GKMC/BKMC ICT staff on installed equipment's and deployed solutions. Preparation and sharing of required user manuals/troubleshooting guide for the installed equipment's. e) Designing complete local area network with new IP Scheme, storage and managed WiFi infra structure	Job	1

1.5 Annexure:

Below are the all annexures which need to submit with technical Proposal in the form of compliances:

Sr. No	Description	Annexures
	Active Items	
1	Router	Annex-A
2	Firewall	Annex-B
3	Core Switch	Annex-C
4	Aggregation Switch	Annex-D
5	8 port Access Switch	Annex-E
6	24 port Access Switch	Annex-E
7	48 port Access Switch	Annex-E
8	Wi-Fi Controller	Annex-F
9	Access Points with Power Adapter	Annex-G
10	Secure Web Gateway.	Annex-H
11	NMS for Network	Annex-I
12	Server	Annex-J
13	SAN Storage	Annex-K
14	Laptop Systems	Annex-L
15	Fire detection System	Annex –M
16	5 KVA UPS	Annex – N
17	Passive Items	Annex- O

1.6 MINIMUM PRODUCT FEATURE RATING

Following specifications of equipment are base line specifications for the equipment to be deployed.

(Annexure A)

Annex-A		Router
Sr.No	**Description**	**Required**
Hardware Specifications		
1	CPU	1.3GHz or more
2	Forwarding Performance In Service (IMIX)	800Mbps or more
3	Memory	1GB or more
4	Flash	256MB or more
5	USB port	1
6	WAN ports	1 × GE copper port and 1 × GE combo port
7	LAN ports	4 × GE ports(can be configured as WAN interfaces)
8	Operating temperature	0ºC to 45ºC (32°F to 113°F)
9	Operating humidity	5% RH to 95% RH, non-condensing
Software Specifications		
1	Layer 2 switching	Ethernet, Ethernet II, VLAN (port-based VLAN, guest VLAN), 802.3x, 802.1p, 802.1Q, 802.1X, STP (802.1D), RSTP (802.1w), MSTP (802.1s), PPP, PPPoE client, PPPoE server, and DDR
2	IP services	Unicast/multicast, TCP, UDP, IP option, IP unnumbered, policy-based routing, NetStream, and sFlow
3	IP application	Ping, Tracert, ICMP, DHCP server, DHCP relay, DHCP client, DNS client, DNS proxy, DDNS, NTP, and SNTP
4	IPv4 routing	Static routing Dynamic routing: RIPv1/v2, OSPFv2, BGP, IS-IS Route iteration Policy routing Equal-cost multi-path routing (ECMP) Multicast routing: IGMPv1/v2/v3, PIM-DM, PIM-SM, MBGP, MSDP
5	QoS	FIFO, WFQ, CBQ Generic Traffic Shaping (GTS) Traffic classification
6	Security	PPPoE client & server, portal, 802.1X Local authentication, RBAC, RADIUS, TACACS+ Basic Firewall Function, ASPF, ACL, filter, connection limit IKE, IPsec L2TP, NAT/NAPT, PKI, RSA, SSH v1.5/2.0, URPF, mGRE, GRE ARP attack prevention SSL VPN, ADVPN, GDVPN AES, DES, 3DES,MD5, SHA1

		LDP, Static LSP
7	MPLS	L3VPN: Inter-AS MPS VPN (Option 1/2/3), MPLS nested VPN, hierarchy of PE (HoPE), dual-homed CE, MCE, and multirole host L2VPN: Martini, Kompella, CCC PWs and static PWs MPLS TE, RSVP TE
8	High availability	VRRP, VRRPv3 Bandwidth-based load balancing and backup IP address-based load balancing and backu NQA collaboration with routing, VRRP or interface backup
9	Management and Maintenance	SNMP v1/v2c/v3, MIB, SYSLOG, RMO BiMS remote management, booting from USB driv CLI, file system, and dual imag DHCP, FTP, HTTP, ICMP, UDP public, UDP private, TCP public, TCP private, and SNMP Console port login, Telnet (VTY) login, SSH login, and FTP login

Annex-B		Firewall
Sr. No	Description	Required
Hardware Specifications		
1	Ports	1 × Console port (CON) 2 × Management port 12 × Gigabit Ethernet fiber ports 14 × Gigabit Ethernet copper ports 4 × 10-Gigabit Ethernet fiber ports
2	Flash	4GB
3	SDRAM	8G
4	Temperature	Operating: 0°C to 45°C (32°F to 113°F) Storage: −40°C to +70°C (−40°F to +158°F)
5	Power Supply	Dual hot-swappable, AC or DC
Software Specifications		
1	Operation modes	Route, transparent, and hybrid
2	AAA	Portal authentication RADIUS authentication HWTACACS authentication PKI/CA (X.509 format) authentication Domain authentication CHAP authentication PAP authentication

3	Firewall	SOP virtual firewall technology, which supports full virtualization of hardware resources, including CPU, memories, and storage Security zone allocatio Protection against malicious attacks, such as land, smurf, fraggle, ping of death, teardrop, IP spoofing, IP fragmentation, ARP spoofing, reverse ARP lookup, invalid TCP flag, large ICMP packet, address/port scanning, SYN flood, ICMP flood, UDP flood, and DNS query flood Basic and advanced ACL Time range-based ACL User-based and application-based access control ASPF application layer packet filtering Static and dynamic blacklist function MAC-IP binding MAC-based ACL MAC-Limitation 802.1Q VLAN transparent transmission Bandwidth control
4	Antivirus	Signature-based virus detection Manual and automatic upgrade for the signature database Stream-based processing Virus detection based on HTTP, FTP, SMTP, and POP3 Virus types include Backdoor, Email-Worm, IM-Worm, P2P-Worm, Trojan, AdWare, and Virus Virus logs and reports
5	Deep intrusion prevention	Prevention against common attacks such as hacker, worm/virus, Trojan, malicious code, spyware/adware, DoS/DDoS, buffer overflow, SQL injection, and IDS/IPS bypass Attack signature categories (based on attack types and target systems) and severity levels (including high, medium, low, and notification) Manual and automatic upgrade for the attack signature database (TFTP and HTTP). P2P/IM traffic identification and control

6	Email/webpage/application layer filtering	Email filtering
		SMTP email address filtering
		Email subject/content/attachment filtering
		Webpage filtering
		HTTP URL/content filtering
		Java blocking
		ActiveX blocking
		SQL injection attack prevention
7	NAT	Many-to-one NAT, which maps multiple internal addresses to one public address
		Many-to-many NAT, which maps multiple internal addresses to multiple public addresses
		One-to-one NAT, which maps one internal address to one public address
		NAT of both source address and destination address
		External hosts access to internal servers
		Internal address to public interface address mapping
		NAT support for DNS
		Setting effective period for NAT
		NAT ALGs for NAT ALG, including DNS, FTP, H.323, ILS, MSN, NBT, PPTP, and SIP
8	VPN	L2TP VPN
		IPSec VPN
		GRE VPN
		SSL VPN
9	IPSEC VPN	ESP-DES-CBC/ESP-3DES-CBC/ESP-AES-128-CBC/ESP-AES-192-CBC/ESP-AES-256-CBC/ ESP-AES-128-GCM/ESP-NULL/SM1-cbc-128/SM4-cbc

10	IPv6	IPv6 status firewall
		IPv6 attack protection
		IPv6 forwarding
		IPv6 protocols such as ICMPv6, PMTU, Ping6, DNS6, TraceRT6, Telnet6, DHCPv6 Client, and DHCPv6 Relay
		IPv6 routing: RIPng, OSPFv3, BGP4+, static routing, policy-based routing
		IPv6 multicast: PIM-SM, and PIM-DM
		IPv6 transition techniques: NAT-PT, IPv6 tunneling, NAT64 (DNS64), and DS-LITE
		IPv6 security: NAT-PT, IPv6 tunnel, IPv6 packet filter, RADIUS, IPv6 zone pair policies, IPv6 connection limit
11	IEEE	IEEE 802.1X
12	High availability	SCF 2:1 virtualization
		Active/active and active/standby stateful failover
		Configuration synchronization of two firewalls
		IKE state synchronization in IPsec VPN
		VRRP
13	Configuration management	Configuration management at the CLI
		Remote management through Web
		Device management through H3C IMC SSM
		SNMPv3, compatible with SNMPv2 and SNMPv1
		Intelligent security policy

Annex-C		Core Switch
Sr.No	Description	Required
Hardware Specifications		
1	CPU	Dual Core, 1.6GHz
2	Box Switching capacity	2.56Tbps
3	Port Switching capacity	960Gbps
4	Packet forwarding rate	705Mpps
5	Service ports	24 × 1/10GE SFP+ fiber ports 2 × QSFP+ fiber ports
6	Stacking bandwidth	Maximum 480Gbps
7	Fan Trays	2 hot swappable fan trays, invertible airflow
8	Operating Temperature	0ºC to 45ºC (32°F to 113°F)
9	Storage Temperature	-40℃ to 70℃(-40°F to 158°F)
10	Operating & storage humidity	5% RH to 95% RH, non-condensing
11	Power	Dual AC
Software Specifications		
1	VxLAN	VXLAN Layer 2 switching
		VXLAN routing switching
		VXLAN gateway
		Centralized VXLAN control through OpenFlow+Netconf
2	Virtualization	Intelligent Resilient Framework 2 (IRF2)
		Distributed device management
		Distributed link aggregation
		Distributed resilient routing
		Stacking through standard Ethernet ports
		Local device stacking and remote device stacking
		LACP-, BFD-, and ARP-based multi-active detection (MAD)
3	Link aggregation	10GE/40GE/100GE port aggregation
		Static aggregation
4	Jumbo frame	Supported
5	MAC address table	Max. 256K MAC address entries
		Static MAC address
		Blackhole MAC address
		MAC learning limit
6	Openflow	Openflow1.3
7	VLAN	Port-based VLAN (up to 4094 VLANs)
		Default VLAN
		QinQ and flexible QinQ

		VLAN mapping
		PVST+ and RPVST+
8	Traffic monitoring	sFLOW
9	LLDP	LLDP/LLDP-MED
10	DHCP	DHCP client
		DHCP snooping
		DHCP relay
		DHCP server
		DHCP snooping Option 82/DHCP relay Option 82
11	ARP	Max. 128K ARP
		Static entry
		Gratuitous ARP
		Common proxy ARP and local proxy ARP
		Dynamic ARP inspection
		ARP anti-attack
		ARP source suppression
		ARP detection based on DHCP snooping safety entries, 802.1X entries, and IP/MAC static binding entries
12	Routing	Max. 128K IPV4 routing entries
		Max. 64K IPV6 routing entries
		IPv4/IPv6 static routing
		Dynamic routing such as RIP v1/2 and RIPng
		Policy routing
		Equal-cost multi-path routing (ECMP)
		VRRP
		OSPFv1/v2/v3
		BGP
		IS-IS
13	IPv6	Neighbor Discovery (ND)
		PMTU
		ICMP v6, Telnet v6, SFTP v6, SNMP v6, BFD v6, VRRP v3
		IPv6 Portal
		IPv6 tunnel
		IPV6 SAVI
14	Multicast	IGMP Snooping v2/v3
		IGMP Snooping fast-leave
		IGMP Snooping group-policy
		PIM-SM and PIM-SSM
		PIM snooping
		MVRP (GVRP analog)
		MFF
		Enhanced Layer 3 multicast

15	MPLS	Support MPLS
		Support MCE
		Support MPLS VPN, VPLS
16	Zero configuration	DHCP auto-config
		CWMP-TR069
17	Broadcast/Multicast/Unicast storm suppression	Storm suppression based on port bandwidth percentage
		Storm suppression based on PPS
		Storm suppression based on BPS
18	Loop-free redundant Layer 2 topology	STP/RSTP/MSTP
		STP Root Guard
		BPDU Guard
		BPDU Blocking and Root Guard
		Link Detection (UDLD)
		Digital Diagnostic Monitor (DDM)
		G.8032 Ethernet ring protection switching (ERPS)
19	QoS/ACL	Rate limit for receiving and transmitting packets
		CAR
		Eight output queues per port
		Flexible queue scheduling algorithms based on both port and queue, including SP, WDRR, WRR, WFQ, and SP+WRR
		802.1p priority and DSCP priority
		Layer 2 to Layer 4 packet filtering
		Traffic classification based on source MAC, destination MAC, source IP, destination IP, port, protocol, and VLAN
		Time range
		WRED
20	Mirroring	Flow mirroring
		N:4 port mirroring
		Local port mirroring and remote port mirroring
		Policy-based Mirroring

Annex-D		Aggregation Switch
Sr. No	Description	Required
Hardware Specifications		
1	CPU	Dual Core, 800MHz
2	Box switching capacity	598Gbps
3	Port switching capacity	288Gbps
4	Service ports	24 × SFP ports (including 8 combo interfaces) 4 × 10G SFP+ ports
Software Specifications		
1	VxLAN	VXLAN L2 switching
		VXLAN L3 routing
		VXLAN VTEP
		IS-IS+ENDP distributed control plane
		MP-BGP+EVPN distributed control plane
		OpenFlow+Netconf centralized control plane
2	Link aggregation	1G/10G/40G port aggregation
		Static aggregation
		Dynamic aggregation
		Multichassis link aggregation
3	Broadcast/Multicast/Unicast storm suppression	Storm suppression based on port bandwidth percentage
		Storm suppression based on PPS
		Storm suppression based on BPS
		Broadcast traffic/Multicast traffic/Unknown unicast traffic suppression
4	Jumbo frame	A maximum of 10000 bytes
5	MAC address table	64K MAC address entries
		Static MAC address
		Blackhole MAC address
		MAC learning limit
6	ARP Table	ARP entries: 32K
		Static entry
		Gratuitous ARP
		Common proxy ARP and local proxy ARP
		Dynamic ARP inspection
		ARP anti-attack
		ARP flood suppression
		ARP source suppression
		ARP detection based on DHCP snooping safety entries, 802.1X entries, and IP/MAC static binding entries
7	VLAN	Port-based VLAN (up to 4094 VLANs)
		MAC-based VLAN

		Protocol-based VLAN
		IP subnet based VLAN
		QinQ and flexible QinQ
		VLAN mapping
		Voice VLAN
		MVRP ((GVRP analog))
8	Loop-free redundant Layer 2 topology	STP/RSTP/MSTP
		STP Root Guard
		BPDU Guard
		BPDU Blocking and Root Guard
		Link Detection (UDLD)
		Digital Diagnostic Monitor (DDM)
		G.8032 Ethernet ring protection switching (ERPS)
9	DHCP	DHCP client
		DHCP snooping
		DHCP relay
		DHCP server
		DHCP snooping Option 82/DHCP relay Option 82
10	IRF2	IRF2
		Distributed device management, distributed link aggregation, and distributed resilient routing
		Stacking through standard Ethernet interfaces
		Local device stacking and remote device stacking
		Support up to 9 devices stacking
11	IP routing	IPv4 routing number 32K
		IPv6 routing number 16K
		Static routing
		RIPv1/v2 and RIPng
		OSPFv1/v2/v3
		BGP and BGP4+ for IPv6
		Equal-cost multi-path routing (ECMP) and policy routing
		VRRP/VRRPv3
12	IPv6	Neighbor Discovery (ND)
		PMTU
		IPv6-Ping, IPv6-Tracert, IPv6-Telnet, and IPv6-TFTP
		Manual tunnel
		6to4 tunnel
		ISATAP tunnel
		GRE tunnel
13	Multicast	IGMP Snooping v1/v2/v3 and MLD Snooping v1/v2
		PIM Snooping

		MLD Proxy
		Multicast VLAN
		IGMP v1/v2/v3 and MLD v1/v2
		PIM-DM, PIM-SM and PIM-SSM
		MSDP and MSDP for IPv6
		MBGP and MBGP for IPv6
14	MPLS	Support MPLS
		Support MCE
		Support MPLS VPN, VPLS
15	Mirroring	Flow mirroring
		N:4 port mirroring
		Local port mirroring and remote port mirroring
		Policy-based Mirroring
		Traffic Mirroring
16	QoS/ACL	Layer 2 to Layer 4 packet filtering
		Traffic classification based on source MAC, destination MAC, source IP, destination IP, TCP/UDP port, and VLAN
		Time range-based ACL
		Bi-directional ACLs (inbound and outbound)
		VLAN-based ACL issuing
		Rate limit for receiving and transmitting packets (a minimum CIR of 8 Kbps)
		Packet redirection
		802.1p priority and DSCP priority
		Committed Access Rate (CAR)
		Flexible queue scheduling algorithms based on both port and queue, including SP, WRR, and SP+WRR
17	Security	Hierarchical user management and password protection
		MAC-based authentication
		802.1X
		Storm constrain
		Guest VLAN
		AAA authentication
		RADIUS authentication
		HWTACACS
		SSH 2.0
		Port isolation
		Port security
		EAD
		Dynamic ARP detection
		BPDU guard and root guard
		uRPF
		IP/Port/MAC binding

		Plaintext authentication and MD5 authentication for OSPF and RIPv2 packets
		Public Key Infrastructure (PKI)
		IP Source Guard
18	IEEE	IEEE 802.3x
		IEEE 802.3ad
		IEEE 802.3af
		IEEE 802.3at
		IEEE 802.3bz
		IEEE 802.1p
		IEEE 802.1x
		IEEE 802.1q
		IEEE 802.1d
		IEEE 802.1w
		IEEE 802.1s
19	Loading and upgrading	Loading and upgrading through XMODEM/FTP/TFTP
		Loading and upgrading from USB
20	Management and maintenance	Configuration through CLI, Telnet, and console port
		SNMP v1/v2/v3
		Web network management
		Remote Monitoring (RMON) alarm, event, and history recording
		IMC network management system
		System log, alarming based on severity, debugging information output
		NTP, SNTP
		Power, fan, and temperature alarming
		Ping and Tracert
		Virtual Cable Test (VCT)
		Device Link Detection Protocol (DLDP)
		LLDP, LLDP-MED
		Loopback detection
21	Power saving	Automatic port power-down
		Scheduled port power-down (schedule job)
		802.3az Energy Efficient Ethernet (EEE) support

Annex-E		Access Switches		
Sr. No	Description	Required		
	Features	10 Port Access Switch	28 Ports Access Switch	52 Ports Access Switch
1	Switching capacity	20Gbps	56Gbps	104Gbps
2	Packet forwarding rate	15Mpps	41.7Mpps	77.4Mpps
3	Fixed ports	8*10/100/1000TX +2*SFP	24*10/100/1000TX +4*SFP	48*10/100/1000TX +4*SFP
4	Operating temperature	0ºC to 45ºC		
5	Operating humidity	10% RH to 95% RH, non-condensing		
6	Stacking	Intelligent Resilient Framework 2 (IRF2)		
7	Link aggregation	1G/10GE port aggregation		
		Static aggregation		
		Dynamic aggregation		
		Multichassis link aggregation		
8	Jumbo frame	Supported		
9	MAC address table	Blackhole MAC Address MAC learning limit		
10	Flow control	802.3x flow control and half-duplex backpressure		
11	VLAN	Port-based VLAN QinQ		
		Voice VLAN		
		MAC VLAN		
12	ARP	ARP Detection		
		ARP speed limit		
13	ND	Supported		
14	VLAN virtual port	Supported		
15	DHCP	DHCP Client		
		DHCP Snooping		
		DHCP Relay		
		DHCP Server		
		DHCP Option82		
16	DNS	Static and Dynamic DNS IPV4 and IPV6		
17	Routing protocols	IPV4/IPV6 static routing RIP/ RIPng, OSPFV1/V2/V3		
18	Multicast	IGMP Snooping V1/V2/V3		
		MVR		
19	Strom suppression	Storm suppression based on port bandwidth percentage Storm suppression based on PPS		
20	Layer 2 ring network protocol	STP/RSTP/MSTP		
		STP Root Protection		
		Smart Link		
		RRPP		

21	Mirroring	Flow mirroring
		Port mirroring
22	QoS/ACL	Packet filter
		Flexible queue scheduling algorithms based on ports and queues, including SP, WRR and SP+WRR Bidirectional ACL
		Port-based speed limit Flow redirection
		Time-range
23	Security	Hierarchical user management and password protection MAC- based authentication
		802.1X
		SSH2.0
		Port isolation
		IP source guard
		HTTPs
		EAD
24	IEEE	IEEE 802.3x
		IEEE 802.3ad
		IEEE 802.3af
		IEEE 802.3at
		IEEE 802.1p
		IEEE 802.1x
		IEEE 802.1q
		IEEE 802.1d
		IEEE 802.1w
		IEEE 802.1s
25	Loading and upgrading	Loading and upgrading through FTP/TFTP
26	Management and maintenance	Configuration from CLI
		Login through Telnet, and the console port
		Simple Network Management Protocol (SNMP)
		Remote Monitoring (RMON)
		IMC network management system
		WEB management
		System log
		Alarming based on severity
		IRF
		NTP
		Debugging information output
		Telnet-based remote maintenance
		NQA
		DLDP
		Virtual Cable Test

Annex-D		Wi-Fi Controller	
Sr. No	**Description**	**Required**	
Hardware specifications			
1	Throughput	8Gbps	
2	Port	8 GE+SFP combo	
		2 SFP+	
		1 console	
3	Power supplies	1 AC power supply included, swappable power supply, 1+1 redundant backup (separately ordered)	
4	Max power consumption	<300W	
5	Operating and storage	0℃～45℃/-40℃～70℃	
	temperature		
6	Operating and storage relative humidity	5%～95%	
7	Safety Compliance	UL 60950-1	
		CAN/CSA C22.2 No 60950-1	
		IEC 60950-1	
		EN 60950-1/A11	
		AS/NZS 60950	
		EN 60825-1	
		EN 60825-2	
		EN60601-1-2	
		FDA 21 CFR Subchapter J	
8	EMC	ETSI EN 300 386 V1.3.3:2005	
		EN 55024: 1998+ A1: 2001 + A2: 2003	
		EN 55022 :2006	
		VCCI V-3:2007	
		ICES-003:2004	
		EN 61000-3-2:2000+A1:2001+A2:2005	
		EN 61000-3-3:1995+A1:2001+A2:2005	
		AS/NZS CISPR 22:2004	
		FCC PART 15:2005	
		GB 9254:1998	
		GB/T 17618:1998	
Software specifications			
9	Basic functions	Number of managed APs by default	0
		Size of license	1/4/8/16/32/64/128/512/1024
			512

		Maximum number of managed Aps	
		Maximum number of STA	8192
10	802.11MAC	802.11 Protocols	Supported
		Multi-SSID (Per RF)	16
		SSID hiding	Supported
		11G protection	Supported
		11n only	Supported
		Use number limit	Supported: SSID based, per RF based
		Keep-alive	Supported
		Idle	Supported
		Multi-country code assignment	Supported
		Wireless user isolation	Supported:
			VLAN based wireless users 2-layer isolation
			SSID based wireless user 2-layer isolation
		20MHz/40MHz auto-switch in 40MHz mode	Supported:
		Local forwarding	Local forwarding based on SSID+VLAN
11	CAPWAP	Auto AP serial number entry	Supported:
		AC discovery (DHCP option43, DNS)	Supported:
		IPv6 tunnel	Supported:
		Clock synchronization	Supported:
		Jumbo frame forwarding	Supported:
		Assign basic AP network parameter through AC	Supported: Static IP, VLAN, connected AC address
		L2/L3 connection between AP and AC	Supported:
		NAT traversal between AP and AC	Supported:
12	Roaming	Intra-AC, Inter-AP L2 and L3 roaming	Supported:
		Inter-AC, Inter-AP L2 and L3 roaming	Supported:
13	GW features	NAT	Supported:
		PPPoE	Supported:
		DDNS	Supported:
		IPSEC VPN	Supported:
		SSL VPN	Supported:
		GRE	Supported:
14	Access control	Open system, Shared-Key	Supported:
		WEP-64/128, dynamic WEP	Supported:

		WPA, WPA2, WPA3	Supported:
		TKIP	Supported:
		CCMP	Supported:
		SSH v1.5/v2.0	Supported:
		Wireless EAD (End-point Access Domination)	Supported:
		Portal authentication	Supported: Remote Authentication, external server
		Portal page redirection	Supported: SSID based, AP Portal page push
		Portal by-pass Proxy	Supported:
		802.1x authentication	EAP-TLS, EAP-TTLS, EAP-PEAP, EAP-MD5, EAP-SIM, LEAP, EAP-FAST, EAP offload (TLS, PEAP only)
		Local authentication	802.1X, Portal, MAC authentication
		LDAP authentication	802.1X and Portal
			EAP-GTC and EAP-TLS supported by 802.1X login
		AP location-based user access control	Supported:
		Guest Access control	Supported:
		VIP channel	Supported:
		ARP attack detection	Supported: Wireless SAVI
		SSID anti-spoofing	SSID + user name binding
		AAA server selection based on SSID and domain	Supported:
		AAA server back up	Supported:
		Local AAA server for wireless user	Supported:
		TACACS+	Supported:
15	QoS	Priority mapping	Supported:
		L2-L4 packet filtering and traffic classification	Supported:
		Rate limit	Supported with granularity of 8Kbps
		802.11e/WMM	Supported:
		Access control based on user profile	Supported:
		Intelligent bandwidth limit (equal bandwidth share algorithm)	Supported:
		Intelligent bandwidth limit (user specific)	Supported:

		Intelligent bandwidth guarantee	Supported: Free flow for packets coming from every SSID When traffic is not congested, and guarantee a minimum bandwidth for each SSID when traffic is congested
		QoS Optimization for SVP phone	Supported:
		CAC (Call Admission Control)	Supported: based on user number/bandwidth
		End-to-end QoS	Supported:
		AP upload speed limit	Supported:
16	RF management	Country code lock	Supported:
		Static channel and power configuration	Supported:
		Auto channel and power configuration	Supported:
		Auto transmission rate adjustment	Supported:
		Coverage hole detection and correction	Supported:
		Load balancing	Supported: based on traffic, user & frequency (dual frequency supported)
		Intelligent load balancing	Supported:
		AP load balancing group	Supported: auto-discovery and flexible setting
17	Security	Static blacklist	Supported:
		Dynamic blacklist	Supported:
		White list	Supported:
		Rogue AP detection	Supported: SSID based, BSSID, device OUI and more
		Rouge AP countermeasure	Supported:
		Flooding attack detection	Supported:
		Spoof attack detection	Supported:
		Weak IV attack detection	Supported:
		WIPS	Supported: 7-layer mobile security
18	Layer 2 protocol	ARP (gratuitous ARP)	Supported:
		802.1p	Supported:
		802.1q	Supported:
		802.1x	Supported:
19	IP protocol	IPv4 protocol	Supported:
		Native IPv6	Supported:
		IPv6 SAVI	Supported:
		IPv6 Portal	Supported:
		DHCP Server (IPv4, IPv6)	Supported:

20	Multicast	MLD Snooping	Supported:
		IGMP Snooping	Supported:
		Multicast group	256
		Multicast to Unicast (IPv4, IPv6)	Supported: Set unicast limit based on operating environment
21	Redundancy	1+1 failover between ACs	Supported:
		Intelligent AP sharing among ACs	Supported:
		Remote AP	Supported:
22	Management and deployment	Network management	WEB, SNMP v1/v2/v3, RMON and more
		Network deployment	WEB, CLI, Telnet, FTP and more
23	Wi-Fi location	CUPID location	Supported:
24	Green features	Scheduled shutdown of AP RF interface	Supported:
		Scheduled shutdown of wireless service	Supported:
		Per-packet power adjustment (PPC)	Supported:
25	WLAN application	RF Ping	Supported:
		Remote probe analysis	Supported:
		Real Time Spectrum Guard (RTSG)	Supported:
		Wireless Intelligent Application Aware (WIAA)	Supported/ Stateful Inspection Firewall
		Packet forwarding fairness adjustment	Supported:
		802.11n packet forwarding suppression	Supported:
		Access based traffic shaping	Supported:
		Co-AP channel sharing	Supported:
		Co-AP channel reuse	Supported:
		RF interface transmission rate adjustment algorithm	Supported:
		Drop wireless packet with weak signal	Supported:
		Disable user access with weak signal	Supported:
		Disable multicast packet caching	Supported:
		Status blink (limited to some AP)	Supported:
26	New added features	Policy forwarding	Supported:
		VLAN pool	Supported:
		Bonjour gateway	Supported:
		802.11w	Supported:
		802.11k	Supported:
		Hotspot2.0 (802.11u)	Supported:

		NAT	Supported:
		VPN	Supported:

Annex-G		Access Point
Sr. No	Description	Required
Hardware specifications		
1	Ethernet ports	Two (one for 100/1000M/2.5G Rj45, one for 100/1000M Rj45 support IoT) support LACP (support between both network ports for redundancy and increased capacity)
2	PoE	Port1: 2.5GE:802.3at/802.3af Port2: GE: PSE,802.3af
3	Local Power supply	54V DC
4	Console port	One（RJ-45）One USB 2.0
5	Built-in antenna	Built-in omni-directional antenna Radio 1: 5dBi antenna gain @ 5G Radio 2: 5dBi antenna gain @ 5G
		Radio 3: 5dBi antenna gain @ 2.4G or 5dBi antenna gain @ 5G
6	Built-in Bluetooth	Built-in Bluetooth (Support to switch RFID through software), support iBeacon standard
7	IoT Extension	Support BLE, RFID, ZigBee etc.
8	Working frequencies	802.11ax/ac wave2/ac/n/a: 5.725GHz-5.850 GHz; 5.47～5.725GHz; 5.15～5.35GHz
		802.11ax/b/g/n: 2.4GHz-2.483GHz
9	Modulation technology	OFDM: BPSK@6/9Mbps、QPSK@12/18Mbps、16-QAM@24Mbps、64- QAM@48/54Mbps
		DSSS: DBPSK@1Mbps、DQPSK@2Mbps、
		CCK@5.5/11Mbps (file://dbpsk@1mbps、dqpsk@2mbps、cck@5.5/11mbps) MIMO-OFDM （11n）: MCS 0-31
		MIMO-OFDM （11ac）: MCS 0-11 MIMO-OFDM （11ax）: MCS 0-11
10	Modulation mode	11b：DSS: CCK@5.5/11Mbps, DQPSK@2Mbps, DBPSK@1Mbps
		11a/g: OFDM:64QAM@48/54Mbps,16QAM@24Mbps, QPSK@12/18Mbps, BPSK@6/9Mb
		Ps
		11n：MIMO-OFDM: BPSK, QPSK,16QAM,64QAM
		11ac：MIMO-OFDM: BPSK, QPSK,16QAM,64QAM,256QAM
		11ax: MIMO-OFDM: BPSK, QPSK,16QAM,64QAM,256QAM,1024QAM
11	Maximum transmit power	20 dBm (Transmit power is multi-chain combined power, no antenna gain is included. The actual transmit power depends on local laws and regulations)
12	Adjustable power granularity	1dBm
13	Reset/restoration to factory default	Supported
14	State LED	Alternating flashing mode, orange/green/blue for different working states, breathing mode

15	Working Temperature/ Storage Temperature	-10ºC～55ºC (32°F to 113°F)/-40ºC～70ºC (−40°F to +158°F)	
16	Working Humidity/ Storage Humidity	5%~95%(non-condensing)	
17	Protection class	IP42	
18	Overall power consumption	≤34W（excluding IoT modules）	
19	Safety compliance	GB4943、EN60601-1-2(medical electrical equipment)、UL/CSA 60950-1、EN/IEC 60950-1、EN/IEC 60950-22	
20	EMC	GB9254、EN301 489、EN55022、FCC Part 15、RSS-210	
21	Radio frequency certification	FCC Part 15、EN 300 328、EN 301 893、and MIIT SRRC	
22	Health	FCC Bulletin OET-65C、EN 50385、IC Safety Code 6	
23	MTBF	>250000H	

Software specifications

24	Compliance	802.11	Indoor, compliant with 802.11a/b/g/n/ac/ac wace2/ax
25	802.11ax	Working frequencies and MIMO	1. 5G (1) 2*2 MIMO 1.2Gbps+5G (2) 2*2 MIMO
			1.2Gbps+5G (3) 2*2 MIMO 0.867Gbps
			2. 5G (1) 2*2 MIMO 1.2Gbps+5G (2) 2*2 MIMO
			1.2Gbps+2.4G 2*2 MIMO 0.4Gbps
			3. 5G (1) 2*2 MIMO 1.2Gbps+2.4G 2*2 MIMO
			0.575Gbps+5G (2) 2*2 MIMO 0.867Gbps
			4. 5G (1) 2*2 MIMO 1.2Gbps+2.4G (1) 2*2 MIMO
			0.575Gbps+2.4G (2) 2*2 MIMO 0.4Gbps
		20MHz/40MHz bandwidth	Supported
		80MHz bandwidth	Supported
		Maximum transmission speed	5G (1):1.2Gbps
			5G (2):1.2Gbps
			2.4G: 400Mbps/5G:(can be adjusted to 5G: 867Mbps)
		A-MPDU	Supported
		A-MSDU	Supported
		Maximum likelihood decoding (MLD)	Supported
		Maximum ratio combining (MRC)	Supported
		Space-time block coding	Supported

		(STBC)	
26	Security policy	Low-density parity-check (LDPC)	Supported
		Cyclic Delay Diversity (CDD)/Cyclic Shift Diversity (CSD)	Supported
		Repeater mode	Supported
		Encryption	WEP-64/128/152bit, dynamic WEP, TKIP,
			CCMP, AES, EAP, WPA3
			Multiple triggering conditions for unicast and
			broadcast key update
		802.11i	Supported
		Authentication	802.1X authentication, MAC authentication, PSK
			authentication, Portal authentication, PPSK
			Access controllers might be required for authentication.
		User isolation	Layer 2 user isolation
			SSID-based user isolation
		Forwarding security	Packet filtering
			MAC address filtering Broadcast storm suppression
		Wireless terminal access	Wireless EAD
		SSID and VLAN binding	Supported
		Rogue device detection and countermeasure	Supported
		Dynamic ARP Inspection (DAI)	Supported
		IP Source Guard (IPSG)	Supported
		WIDS/WIPS	Supported
		Management frame protection (802.11w)	Supported
27	AAA	RADIUS client	Supported
		Multiple domain authentication server	Supported
		Backup authentication	Supported

			server
28	Layer 2 and Layer 3 features	IP address configuration	Static IP (available only in fat AP mode)
			DHCP assigned IP (Option 60)
		Native IPv6	Supported
		IPv6 Portal	Supported
		IPv6 SAVI	Supported
		ACL	IPv4/IPv6
		Local forwarding	Local forwarding based on SSID and VLAN
		Link Layer Discovery Protocol (LLDP)	Supported
		SSID-based VLAN assignment	Supported
		EoGRE Tunnel	Supported
		Multicast	IGMP Snooping/MLD Snooping
29	QoS	802.11e	Wi-Fi Multimedia (WMM)
		Priority	802.1p priority and marking on Ethernet ports
			Priority mapping for wired and wireless packets
		QoS policy mapping	SSID/VLAN and QoS policy mapping
		Layer 2 to Layer 4 packet filtering and traffic classification	Supported
		CAR	Supported
		Client bandwidth	Station-based bandwidth allocation
		management	SSID-based bandwidth allocation
		Load balancing	Traffic-based load balancing
			Session-based load balancing
			Frequency-based load balancing (supports dual- band)
		Band navigation	Supported
		Multicast optimization (IPv4/IPv6)	Supported
		Call Admission Control	Session-based CAC
		(CAC)	Channel usage-based CAC
		Airtime optimization	Supported
		Airtime fairness	Supported

		Layer 4-7 application identification	The APs can identify variety of applications and policy control can be implemented including priority adjustment, scheduling, blocking, and rate limiting on users
		SVP Phone	Supported
30	Power saving	PPC	Supported
		Green AP mode	Supported
		Dynamic MIMO power	Supported
		saving	
		E-APSD	Supported
		WMM Power Save	Supported
31	Management and maintenance	Network management	Trap, HTTP(S), SSH, Telnet, FTP/TFTP, SNMP V1/V2/V3
			only applicable in Cloud/Fat mode
		Management SSID	Supported
		Syslog	Supported
		AP Working Mode	Fit/Anchor/Cloud/Fat
		Remote probing and	Supported
		analysis	
32	Wi-Fi Certified	IEEE 802.11a/b/g/n/ac/ax, WMM, WPA, WPA2 and WPA3 – Enterprise, Personal	
		(SAE), Enhanced Open (OWE), Wi-Fi Alliance	

Annex-H		Secure web Gateway
Sr. No	**Description**	**Required**
	Secure Web Gateway	
1	**General Requirement**	
	· Must Be Listed in 2020 Gartner Magic Quadrant for Secure Web Gateway	Supported
	· Must Have Minimum 160Mbps Live Throughput (All Features Enabled)	Supported
	· Must Have Minimum 60,000 Concurrent Users	Supported
	· Must Have Minimum 128GB SSD Storage Capacity	Supported
	· Must Have Minimum 6 x 1G Ethernet Interface	Supported
	· Must have (Bypass) Copper 1 Pair	Supported
	· Must Quote 1 Years Traffic Control Features License	Supported
	· Must Quote 1 Years Software Upgrade & 24x7 Technical Support	Supported
	· Must Quote 1 Years Hardware Warranty Service	Supported
2	**User Authentication & Management**	Supported
	· Must Have User Identification Base on IP Address, MAC Address, Hostname	Supported
	· Must Have User Binding Base on IP Address and MAC Address	Supported
	· Must Have Identification of Endpoint such as Mobile, PC and etc.	Supported
	· Must Have SMS Authentication, Captive Portal and etc.	Supported
	· Must Have Captive Portal Integration with Microsoft Active Directory	Supported
	· Must Have Customizable Captive Portal HTML Page	Supported
	· Must Have URL Redirection After Captive Portal Authentication	Supported
	· Must Have Single Sign-On (SSO) Authentication Base on Active Directory, Radius, POP3 and other Database Servers	Supported
	· Must Have QR Code Authentication with Self-Registration Capability	Supported

Annex-I		NMS
Sr. No	Description	Required
1	**Simple and Effort less Monitoring**	Supported
	Agentless monitoring for Windows, Linux, and macOS	Supported
	Auto-discovery – immediate visualization of discovered devices	Supported
	Preconfigured templates for common devices and applications	Supported
	Automatic software updates	Supported
	Simple and fair licensing model including an easy upgrade path	Supported
2	**Flexible and reliable alerts**	Supported
	Alerts for individually configured criteria	Supported
	Various notification methods (email, Slack, HTTP request, Microsoft Teams, push notifications, exe, script, syslog, etc.)	Supported
	Scheduled and customizable reports (HTML, PDF)	Supported
	Detailed log files about all activities	Supported
3	**One solution for everything**	Supported
	Support for all common standards (SNMP, ICMP, WMI, HTTP, SSH, REST, OPC UA, etc.)	Supported
	Support for NetFlow and IPFIX, sFlow, jFlow and packet sniffing	Supported
	Monitoring of hardware, software, virtual environments, and applications	Supported
	Event log monitoring	Supported
	Monitoring of multiple sites with one license	Supported
4	**Data publication**	Supported
	Drag & drop map editor for individualized dashboards	Supported
	Integrated reporting engine with delivery as HTML, PDF, or CSV	Supported
	Fully featured API (Access monitoring data and manipulate monitoring objects using HTTP requests)	Supported
	Powerful interactive web interface	Supported
	Desktop app for viewing multiple installations in one dashboard	Supported

Annex-J		Servers
Sr. No	**Description**	**Required**
	Server-1	
	8SFF CTO Server	Supported
	2 x (1.9GHz/6Cores/8.25MB/85W) CPU Module	Supported
	2 x 32GB 2Rx4 DDR4-3200 CAS-22-22-22 RDIMM Memory Module	Supported
	8SFF HDD Cage Module BAY2	Supported
	2 x 600GB 12G SAS 10K 2.5in EP 512n HDD General Intelligent Disk Equipment Module	Supported
	3 x 1.2TB 12G SAS 10K 2.5in EP HDD General Intelligent Disk Equipment Module	Supported
	FHHL Riser Card (Slot 1/2) (3 X8 FHHL)	Supported
	12Gb 2 Ports SAS RAID Card (8 SAS Ports,1GB Cache, No Power Fail Safeguard)	Supported
	Power Fail Safeguard Module (with Supercap)	Supported
	4-Port GE Copper Interface MLOM(X722) Ethernet Adapter	Supported
	2 x 550W AC & 240V HVDC Power Supply (LT-R1-Platinum)	Supported
	SAS HD Transit Cable,0.83m, SAS HD 72pinS, SAS Cable,2*(SAS HD 36pinA)	Supported
	ASSY, CORD, AC, IEC TO IEC	Supported
	Power Cable with straight mode connector (3m, type G), for England	Supported
	2U Standard Fan Module	Supported
	2U Standard Rail-A	Supported
	Server-2	
	8SFF CTO Server	Supported
	2 x (1.9GHz/6Cores/8.25MB/85W) CPU Module	Supported
	2 x 32GB 2Rx4 DDR4-3200 CAS-22-22-22 RDIMM Memory Module	Supported
	8SFF HDD Cage Module BAY2	Supported
	2 x 600GB 12G SAS 10K 2.5in EP 512n HDD General Intelligent Disk Equipment Module	Supported
	3 x 1.2TB 12G SAS 10K 2.5in EP HDD General Intelligent Disk Equipment Module	Supported
	FHHL Riser Card (Slot 1/2) (3 X8 FHHL)	Supported
	12Gb 2 Ports SAS RAID Card (8 SAS Ports,1GB Cache, No Power Fail Safeguard)	Supported
	Power Fail Safeguard Module (with Supercap)	Supported
	4-Port GE Copper Interface MLOM(X722) Ethernet Adapter	Supported
	2 x 550W AC & 240V HVDC Power Supply (LT-R1-Platinum)	Supported
	SAS HD Transit Cable,0.83m, SAS HD 72pinS, SAS Cable,2*(SAS HD 36pinA)	Supported
	ASSY, CORD, AC, IEC TO IEC	Supported
	Power Cable with straight mode connector (3m, type G), for England	Supported
	2U Standard Fan Module	Supported
	2U Standard Rail-A	Supported

No.	Item	Requirement
1	System architecture*	Actual configuration: SAN-NAS integrated storage with FC SAN, IP SAN, and NAS protocols (including NFS and CIFS).
2	Storage controller*	Actual configuration: Two controllers that are interconnected with each other
3	Controller configuration	Two *controllers are configured*. The controllers use multi-core processors, and the total number of cores of the controller processors is *greater than or equal to 32*.
4	Cache size*	Cache of each controller in the system ≥ 16 GB (excluding performance acceleration modules such as FlashCache, PAM, and SSD Cache), supporting power-off protection
5	Front-end host ports*	Dual-controller architecture: 4 x 8 Gbit/s Fibre Channel +2 x 10 Gbit/s iSCSI/NAS.
6	Max. number of disk slots*	Dual-controller: ≥ 300
7	Disk configuration	4 x 600 GB 10K SAS 12 x 8 TB 7.2k NL-SAS
8	RAID level	RAID0,　RAID 1, RAID 3, RAID 5, RAID, 6, RAID 10, and RAID 50
9	Maintainability	Supports hot-swappable disks, power modules, and I/O modules.
10	Snapshot	Data snapshots. Snapshots at a certain time can be recovered without losing snapshots created at other time points.
11	Clone	Data clone
12	Replication	Data volume replication
13	Mirroring	Data volume mirroring
14	Thin provisioning	Thin provisioning that enables on-demand storage resource allocation
15	Tier	Automatic storage tiering
16	SSD Cache	SSD Cache. This feature improves the response speed to hotspot data.

17	QoS	QoS
18	NAS basic software package	NAS functions. Supports NFS, CIFS, NDMP, multi-tenancy, and directory quota.
19	NAS operating system	Adopts professional storage operating systems to provide file system services. The server + Windows storage server operating system method is not used to provide file system services.
20	Global namespace	Supports global namespace.
21	WORM	WORM. The data that has been written cannot be modified or deleted within the specific retention period but can be read multiple times, ensuring the security of mission-critical service files and complying with laws and regulations.
22	Tier	Provides file systems with storage tiering for file size-based tiering between SSDs and HDDs.
23		(Optional) Supports the built-in backup which directly backs up file systems to the backup storage, and provides local and remote backup policies. Data can be restored by using a local or remote copy.
24	Active-active	(Optional)Active-active SAN storage: 1. Provides an active-active architecture to enable two core storage systems to work in active-active mode (hosts can access the same active-active volumes), tolerating single points of failure on any of the storage systems without affecting upper-layer service systems. 2. Provides independent third-party quorum devices for the active-active architecture. When a quorum device fails, services are not interrupted, and real-time data consistency of the active-active volumes can be kept. 3. Capacity licenses are configured for the active-active storage. The capacity is not smaller than that of the disks configured.
25	Heterogeneous SAN virtualization	(Optional) Heterogeneous storage virtualization technologies 1. Provides heterogeneous storage virtualization functions. Heterogeneous storage on the live network is taken over without damaging or changing the existing data format to form a heterogeneous storage resource pool for unified resource allocation and management. 2. Interoperates with storage arrays of mainstream vendors in the industry such as EMC, HP, HDS, IBM, and

		NetApp. 3. Capacity licenses are set for heterogeneous virtualization engines. ≥ 1 PB capacity, ≥ 5 arrays 4. The heterogeneous virtualization platform supports data mirroring between heterogeneous storage systems. 5. The heterogeneous virtualization platform supports active-active apps between heterogeneous storage systems.
26	Software Features	DeviceManager,SmartThin,SmartMulti-Tenant,SmartMigration,SmartErase,SmartMotion,SystemReporter,eService,SmartQuota,NFS,CIFS,NDMP) Smart Series Value-added Software Suite License(Including SmartTier,SmartQoS,SmartPartition,SmartCache,SmartDedupe,SmartCompression,SmartEncryption)
27	Support Services	3-year 24/7 manufacturer warranty service

(Annexure L)

Annex-L		Laptop
Sr.No	Description	Required
1	Processor: 11th Gen i5	Supported
	Graphic/Display: 14" FHD (1920 x 1080) AG Non-Touch, 250nits	Supported
	Memory: 2X8 GB (16 GB) 3200MHz DDR4	Supported
	Hard Drive: M.2 512 GB PCIe Solid State Drive	Supported
	OS: Licensed Windows 10 Professional or higher	Supported
	Network / Ethernet & wireless LAN	Supported
	Warranty: General Warranty	Supported
	Bag: Branded Essential Laptop bag	Supported

(Annexure M)

Annex-M – Fire Detection System		Fire Detection
Sr.No	Description	Required
1	Fire Detection System with extinguishers. Civil Work: Dumpa Ceiling as per below room size Ceiling Lights 2x 2 qty 6 with electric wiring. IT room Size: 16 x 23 feet.	

Annex-N	UPS
Description	**Required**
5 KVA UPS backup systems for Server Room Backup Time Required: 4 Hours at least Equipment's on backup: 3 Server system with Racks, Routers, Switches, Firewall, SAN Storage etc. Description: Trolley / Rack for UPS and Batteries Batteries for UPS should be maintenance free Batteries and UPS replacement warranty: 1 Year Brand: International / European	

(Annexure O)

	Passive Items		**Unit**
1	CAT 6 I/O	3M/ Schneider/Aitek	No
2	3-meter Fiber Patch Cord.	China	No
3	CAT 6 Face Plate and Back Box	3M/ Schneider/Aitek	No
4	CAT 6 Cable Roll. (305 meter)	3M/ Schneider/Aitek	No
5	CAT 6 1meter Patch Cord.	3M/ Schneider/Aitek	No
6	24 Port patch Panel with I/O	3M/ Schneider/Aitek	No
7	Cabinet 6U with PDU	Local	No
8	Cabinet 9U with PDU	Local	No
9	Cabinet 42U with PDU –along with 4 port KVM switch and drawer	Local/imported	No
10	Power Socket	Schneider	No
11	Power Cable 3.29 dual core. (90 meter)	FAST/ GM or equivalent	No
12	Cable Manager		No
13	Duct 16x25	Adamjee / GM	FT
14	Duct 16x38	Adamjee / GM	FT
15	Duct 40x40	Adamjee / GM	FT
16	f) Active and Passive Items installation including Configuration, Commissioning and Testing. g) Soft/Hard Digging of Fiber including HDPE Pipe, warning tape, Hand Hole, fiber Joints Enclosures, splicing, marker post and reinstate of roads/pavements.	1-Job	Job

	h) Power Earthing/Grounding of server room. **i)** 10 working days extensive training of GKMC/BKMC ICT staff on installed equipment's and deployed solutions. Preparation and sharing of required user manuals/troubleshooting guide for the installed equipment's. **j)** Designing complete local area network with new IP Scheme, storage and managed WiFi infra structure	

_____ **Thank You**