

**MINISTRY OF HEALTH & FAMILY WELFARE,
GOVERNMENT OF INDIA**

Tender

For

**Establishment of Local Area Network (LAN) and Queue/Token
Management System for Temporary OPD at AIIMS, Raibareli
(UP)**

**Volume-III
Specifications**

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Tender No. HSCC/IT/Temp-OPD/Raibareli/2014

Development of IT Infrastructure for Temporary OPD at AIIMS, Raebareli

Scope of Work

1. Establishment of Computer Network Infrastructure – LAN (Local Area Network) & Wi-Fi System.
2. Establishment of Queue Management System (QMS) for OPD and Consultant's rooms
3. Supply, Customization, Installation, Testing, Training and Maintenance of Application Software for Patient Registration for OPD.
4. Supply, Installation, Testing and Commissioning of 20 KVA UPS with panel.
5. Supply, Installation, Testing and Commissioning of Server for LAN and Application Software for Patient Registration.

LAN

(Local Area Network)

1. Network Infrastructure

Establishment of Local Area Network (LAN) for temporary OPD at AIIMS, Raebareli.

Scope of work

1. Cable (UTP Cat 6A) based network shall be established at temporary OPD.
2. The entire Local Area Network shall be established on Gigabit connectivity.

The area to cover for network connectivity- Temporary OPD Block– Ground Floor (Details mentioned at Annexure-A)

LAN will be used for running Internet, network facility & Registration Application and any other application as per the requirement of the OPD.

Approx.50 nos. of Network points shall be required for the temporary OPD through LAN connectivity.

The scope of work of the Agency/firm shall include, but not limited to the following:

1. Structured communication network comprising of UTP Cat 6A cables, switches, patch panels, connectors, racks, etc. for communication.
2. Necessary cables including power cable and accessories as may be required for smooth and reliable operation of networking equipment.
3. Supply, Installation, Configuration, Testing and Maintenance for the Network switches.
4. Racks for mounting of network equipment including dressing of cables with proper marking in the rack.
5. All pipes & cable laying including termination, accessories including PVC conduits/channels, supporting structures, clamps, identification tags, ferrules etc. required for laying of cables.
6. Supply of all spares required during erection, testing, commissioning and warranty maintenance.
7. Agency/Firm shall use his own sets of tools, tackles, etc. required for erection, testing, commissioning and warranty maintenance of the system.
8. Minor civil works (if required) such as chipping/ cutting of floors for making grooves, making holes/ opening through walls, ceiling or floors, drilling of holes through steel structures and frames, grouting of frames, hooks on walls/ceiling etc. required for execution of work. After erection, surface shall be made good by plastering/painting to their original shape and finish.
9. Necessary Training for IT staff of the OPD as per the requirements.
- 10. Agency/Firm shall provide comprehensive onsite warranty services for the complete hardware, software & cabling system of the proposed networking system for minimum period of One year.**
11. Agency/Firm shall arrange for posting of required technical supervision staffs during erection, testing and commissioning and maintenance of the system.
12. Network points for Temporary OPD Block are mentioned in the enclosed list.

13. Provision of UPS supply has been made for Temporary OPD Block. UPS Power supply arrangement from input source up to the equipment of proposed system shall be done.

14. Completeness

Any equipment, materials or supplies which may not be specifically mentioned, but are necessary for carrying out the contract work shall be in the scope of the agency/firm and the system must be complete in all respect.

Additional specific terms of the contract for establishment of Local Area Network (LAN) and Wi-Fi System.

- a) All Switches shall be from **HP/Cisco/Juniper/Brocade**. All Wireless device shall be from **Ruckus/HP/Cisco/Juniper/Brocade**.
- b) All the passive devices (UTP and Optical Fibre Cable components) from **Molex/Systimax/R&M/AMP/Panduit**.
- c) **All products shall be offered with One (1) year comprehensive warranty.**
- d) Licensing – All the licenses of the software will be provided in the name of the client (AIIMS, Raebareli)
- e) Agency/Firm sole responsible for all the maintenance support of all the items supplied and installed for the period of one year from the date of commissioning and handing over of all the items.
- f) After award of work and at the time of implementation, in case the quoted model(s) are out-dated and new upgraded model introduce in the market then service provider shall supply the latest upgraded model without any extra charges. All the latest product and technology to be used at the time of establishment of the LAN System at site. Any product and technology should not be six months old and should be as per the requirement of the block.
- g) If any promotional scheme is launched by the manufacturer at the time of supply of the item, all the benefits of the scheme will be given to the client/consignee.
- h) Agency/firm has to provide the plan, design and site preparation as per requirement and as directed to the satisfaction of engineer and as per terms of the technical specifications.
- i) A detailed shop drawings indicating line diagram, route diagram showing details of laying underground, overhead or under wall cables showing details of cable, switches, joint etc. complete in all respect to be submitted to engineer for approval before ordering any items & start of execution work within 15 days of award of work. The design if required will be revised as per direction of engineer before approval.
- j) Agency/Firm is responsible for all unpacking, assembling, wiring, installation, cabling between equipment and components and connection to power supplies. They will test all Systems operations and perform all the necessary setup, configuration and customization for successful operation of the Network at site.
- k) Inspection – The inspection shall be carried out by authorized representative.

Client/Purchaser have the right to inspect and/or to test the material to confirm their conformity with the contract and in case any inspected/tested goods fail to perform to the specifications, the client may reject them and the supplier shall either replace the rejected

goods or make alteration necessary to meet the specifications free of cost to the Client/purchaser.

l) Agency/Firm should provide the standard technical literature (not photocopies) of the entire offered product.

m) The following networking, hardware and software manuals shall be furnished both in CD and hardcopies by agency/firm-

- Equipment specification supported with manufacture's catalogue
- The agency/firm shall provide complete documentation covering the installation and maintenance of the building cabling system
- Logical screen shots for hardware/software configuration
- Training documents as per the requirement.
- All Licenses for the Networking Switches, software, application etc
- As built drawings in three copies.
- List of deviations from the Technical Specification, if any, with reasons thereof.

n) Necessities during cabling -

- Casing capping, Flexible pipes may be use wherever is required. Open wire will not be allow.
- Cable shall be neatly bundled and dressed to their respective panels or blocks
- Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed clearly without removing the bundle support ties.
- Group cables neatly together in bundles.
- An axial spacing of 150 mm (minimum) shall be maintained between power and network cable.
- Cables shall not be attached to ceiling grid or lighting support wires.

Queue Management System

2. Queue Management System

Background

The number of seriously ill patients admitted to the hospitals has increased steadily over the years. Overcrowding of Out Patient Department (OPDs) and the wards is now a common scenario. This can largely be attributed to the number of the patients receiving care, healthcare professionals providing that care, and often people visiting the patients. Overcrowding may affect patient's symptoms, clinical outcome and satisfaction levels. It can also affect physician's effectiveness and lead to frustration and sometimes violence.

The Problem needs urgent redressal lest public may not rely on the quality of the care provided by the hospitals. The OPD in any hospital is considered as the mirror of the hospitals which reflects the functionality- being first point of contact between the patient and the hospital staff.

As such, providing best OPD services are one of the primacies of the hospital. This can, to a great extent, be overcome by using IT, leading to enhanced productivity and reduction in waiting time. Queue Management system can be deployed to streamline the patient flow in the hospitals.

The System

Queue Management System essentially comprises of Token Dispenser Unit with touch screen, Master Display (LCD/LED TVs), Computer desktops (each with a different client operator software) installed at the registration counter connected through LAN, Counter Display, and Server with Manager Console server software.

The location of these would, however, depend upon the current OPD setup in a hospital. The visiting patients could be categorised as – General, Ladies, Hospital Staff, Senior Citizens/Handicap.

Complete infrastructure for Queue Management System for all the OPD and Doctor/Consultant's room in the entire hospital to be provided and this is to be linked with the Hospital Management Information System through Appointment module. All the customization and integration shall be done in the Application Software of the QMS as per the requirement of the Hospital.

Functional and Technical Requirements

Queue Management System shall be required for the OPD for waiting of the patient at OPD area and further required in each Consultant's room for waiting of the doctor/consultant in the hospital.

Technology should be latest for all the equipment.

Details of the Registration Counter, Token Counter and Consultant's room in OPD block

Sr. no.	Floor	No. of Registration Counter	No. of Proposed Token counter	Proposed QMS System for Consultant's Room (Nos.)
1	Ground Floor	6	2	13
	Total	6	2	13

Technical Requirements

1. System - Based on Controller/Server with latest technology

- The system should be able to connect to 2 or more separate token display units.
- The system should manage queue in real time and integrated with speakers.
- The system GUI should have multi-lingual Support (English & Hindi).
- The system should provide touch screens for selecting services.
- The system should support single / multiple selection of service/s at the time of dispensing the token.
- The system should support the nested services under the services which can be selected by the patient/operator.
- In nested services/ multiple services, the system should automatically move as the next service to the next counter immediately once the customer has finished with previous Service at the previous counter.
- The system should support generation of unique token number for the day & station.
- The System should allow the administrator to modify the details to be printed on the token.
- The system should provide generation of alphanumeric token numbers.
- The system should be able to print the token in the language selected by the customer.
- The QMS system should flash promotional / compliance messages while idle.
- Admin should be able to change the promotional messages and edit the list of services and customer types displayed in the input module.
- The system should have facility of displaying the token number to be serviced.
- The status of the token should be displayed on the LCD/LED screen tokens and in an easy format.
- Display should be able to accommodate additional counters added by admin or any changes to the counters without affecting the view ability.

- The system should generate the audio alerts (voice) and display the information on the LCD/LED.
- The system should provide multiple languages for voice notification.
- The voice call should be in the language selected by the customer at the time of taking the token.
- The system should have facility of categorizing the customers.
- The system should have facility of prioritizing the services for priority customers.
- The system should keep information of skipped token/s
- Operator should be able to view the services aligned against his counter, upcoming token no., past token nos. serviced, tokens missed.
- Ability to service a customer out of turn.
- Ability to invoke an idle counter by calling the next customer on the counter through administrator access.
- The system should be able to redirect / reassign between service to service,
- Operator should be able to stop or pause operations. On pausing, the counter should not be available to the scheduler for allocating a customer during this time
- The system should allow system administrator to activate / deactivate services across the counters.
- Group calling: During the rush hours (configurable for each branch), 2, 3 or 4 successive token tickets carry same token numbers and separate subscripts. Customers carrying token tickets of same token numbers are called together to a counter and are served as per their respective subscripts.
- Multi-counter services: Some services may require the customer to go the multiple counters to complete the process. Our system supports such functions. If a service is so configured, then after getting served at one counter, he will automatically be queued up at the next counter listed for that service. This feature can be used in addition to or in place of Multi-service selection by the customer.
- Built-in Information Kiosk in the touch screen based user panel. Not only it provides additional information about listed services, a customer can also use it to obtain detailed information about various services and schemes offered by the bank.
- Facility for user configurable form based data collection against each token
- Touch screen should use latest SAW based technology.
- Admin should be able to define counters, i.e. which counters will do what services and what are the timings of each counter
- Admin should be able to add or reduce counters or change counter definitions on the fly and token dispensations should change accordingly.
- Admin should be able to change some or the entire algorithm parameters basis the dynamic situation in his station.
- The system should allow text chat between operators and between manager & operators

- The system should allow system administrator to view the services available at any counter.
- The system should allow system administrator to monitor the workload across the counters.
- The system should be able to provide real time floor view to the admin and enable manager to send message to underperforming counter.
- The system should have facility of assigning benchmark time for different services.
- Admin can view patient details such as arrival time, patient details, amount of time waited, expected wait time
- System administrator should have the permission of modifying the text on the LCD/LED scrolling display.
- The system should be able to use existing PC's at the stations for the implementation of the Q-Management software.
- The system should provide Web based access by the users through Station's standard web browser.
- The software should also be capable of running on thin clients.
- In the absence of the PC at the counter the system should have the capability, through some other gadget to include that counter in the QMS system.
- The system should have capability of integrating with the HMIS application.
- The system should be able to provide configuration like adding /deleting services, change the token machine display properties (color, width, fonts, etc), language, change LCD display unit properties (fonts, logo, token no & counter no. layout, etc), change elements in token (logo, waiting customer count, promotional message, etc.)
- The system should be able to generate following reports with facility to drill down:
 - Ability to view end of day and period wise MIS reports on footfalls, patient mix, transaction mix.
 - Service wise break up of tokens
 - Average service time and wait time for operator/ Counter Operator productivity, view reasons for operator breaks pauses.
 - Service wise break-up for selected month
 - Average Service time and average wait time for selected month
 - Day-wise breakup of services offered for selected month
 - Benchmark service time for different services.
 - Consolidated report of the total no of service availed by the customers during the day.
 - The system should be able to export reports to MS word, excel & PDF formats.
- The system should be able to provide a non-interactive live view of real time statistics for all the stations remotely from central location.
- Should have Built-in digital signage, so that in addition to displaying Token Number-counter table, it can display promotional video/images and multilingual scrolling text as configured.
- Map services to multiple Operator counters
- Generate Statistical data on patient wait times and transaction times
- Generate Employee efficiency statistics

- Optimize staffing models on basis of work force efficiencies

2. Counter Display Unit (BOQ Sr. no. 6.2 & 6.10)

- 4" character height 3 digit with Beeper (seven segments) or as per the requirements.
- Dimensions: 4"= 14"x6x1.75" or as per the requirements
- Support Multiple counter Display.
- Should give information of current tokens being serviced.

3. LCD/LED Display (Master display) (BOQ Sr. no. 6.3)

- LCD/LED TV with size of 40" or as per the requirements (make – Sony/Samsung/Panasonic/Toshiba)
- HD Ready
- SVGA connectivity or use any latest technology for connectivity
- Support Multiple LCD/LED display
- The LCD/LED Master display can be configured to show promotional messages (images/flash) on the right side of the display and promotional scrolling text at the bottom.
- Should be integrated with speakers.
- Supports announcement of tokens in English & Hindi.
- The status of the token should be displayed on the LCD/LED screen an easy format.
- Display module should give information of current tokens being serviced.
- Display should be able to accommodate additional counters added by admin or any changes to the counters without affecting the view ability.
- Should generate the alerts and display the information on the LCD/LED.
- In addition to the token, counter and service information, the LCD/LED should be able to display scrolling information that hospital may want to convey to their patients.
- Scrolling text should be displayed on LCD/LED.
- In addition to the token, counter and service information, the LCD/LED should be able to display scrolling information that hospital may want to convey to their patients.

4. Calling Pad/Call Console for Doctor's/Consultant's room(BOQ Sr. no. 6.11)

- 4x4 multipurpose keyboard and 3 digit, 1" token number display or as per the requirement. Facility to call next token, to call any specific token number and call token from another queue as per the requirement.
- Full function Call pad for non-PC counters. Counters with Server/PC and counters without Server/PC can be mixed in the same system.

5. Software Application

- Web and client/server based application
- Database – as per the requirements
- Desktop application – Browser based
- Software Application to be integrated with the HMIS application if required or as per the requirement of the hospital.

6. Cabling work

Necessary cabling & conduiting work with all the accessories (VGA adapter, distributor etc.) to be done for the system for data and power supply as per the requirement. All modules are interconnected through a 4-wire 1MM copper bus that carries data and power.

Completeness of the system

Any equipment, hardware, software, accessories, cabling etc. which may not be specifically mentioned, but are necessary for carrying out the contract work shall be in the scope of the Agency/Firm provider and the system must be completed in all respect.

Other special Terms and conditions for implementation of Queue Management System for OPD and Consultant's room.

- (1) Agency/Firm has to provide the plan, design and site preparation as per requirement and as directed to the satisfaction of the engineer and as per terms of the technical and functional requirements of the hospital. If required, Software application for Queue Management System to be customized as per the requirements of the hospital.
- (2) All the latest equipment should be supplied at the time of implementation of the Queue Management System. Technology of all the equipment including LCD/LED TV should not be more than six months old.
- (3) Above system to be supplied with 1 year on site Comprehensive Maintenance (labor and parts). Consumable items like stationary (paper roll) etc. shall not be covered in the comprehensive maintenance and to be charged separately.
- (4) Agency/firm should have experience for implementation of the Queue Management System in Govt. Hospital which caters at-least 1000-2000 patient per day in OPD and system should use multiple token dispenser units (at least 4 or more) for printing of tokens simultaneously. Service provider also has experience for implementation of the QMS for the consultant's room.
- (5) All the license of the software will be provided in the name of the client (AIIMS, Raebareli).

Technical Specification for the Queue Management system Kiosk

It should be Wall Mount/Table mount with Touch Screen comprising of the following

- Switch , multiple Services and multiple counters support
 - Integrated PC with Windows 7/8 OS or latest Windows OS
 - Additional VGA port and VGA amplifier to drive Master LCD displays
 - Thermal Printer with auto-cutter (Token Dispenser Unit)
 - AQMS server software
 - Required interfaces and power supply
- Support multiple services and multiple counters as per the requirements.

- Paper width – 58mm, Paper Roll size – 50 meter or as per the requirements.
- Dispenser machine minimum capacity holding capacity of 50 meters to generate at least 500 tickets without a refill or as per the requirements.
- Support multiple Dispenser connectivity.
- The system should have the capability of generating alerts to the administrator for events like device fault, printer out of paper, paper jam etc.
- The system should be able to connect to 2 or more separate token display units as per the requirements.

Application Software for Patient Registration

Scope of work:

Supply, Customization, Installation, Testing, Training and Maintenance of Application software for Patient Registration.

Technical Specification

- Application should be based on Client/Server technology.
- Data is centrally stored on the server along with the server application.
- This application should be accessible through all the client (desktop) at each registration counter through internet browsers (Mozilla, chrome, IE etc.)
- Registration card of the patient is to be customized as per the requirement of the OPD.
- Provision of various MIS reports is also to be provided in this application as per the requirement.
- Minimum one year onsite maintenance support (labour and part) shall be provided.
- Approx. 6-7 users to be used this application at Registration Counter.

Approve make for IT Work

Sr. no.	Item	Make
1.	Networking Switch (Active items of the LAN)	- HP/Cisco/Juniper/Brocade
2.	Wireless Access Points	- HP/Cisco/Juniper/Brocade/Ruckus
3.	UTP Components (Passive devices for LAN)	- Molex/Systimax/R&M/AMP/Panduit
4.	Server Hardware	- HP/Dell/IBM
5.	LCD/LED TV	- Sony/Samsung/Panasonic/Toshiba
6.	UPS	- APC/Emerson/Merlinzerin/Eaton Powerware

Annexure-A

(Proposed Network Point for
Temporary OPD Block at AIIMS,
Raebareli)

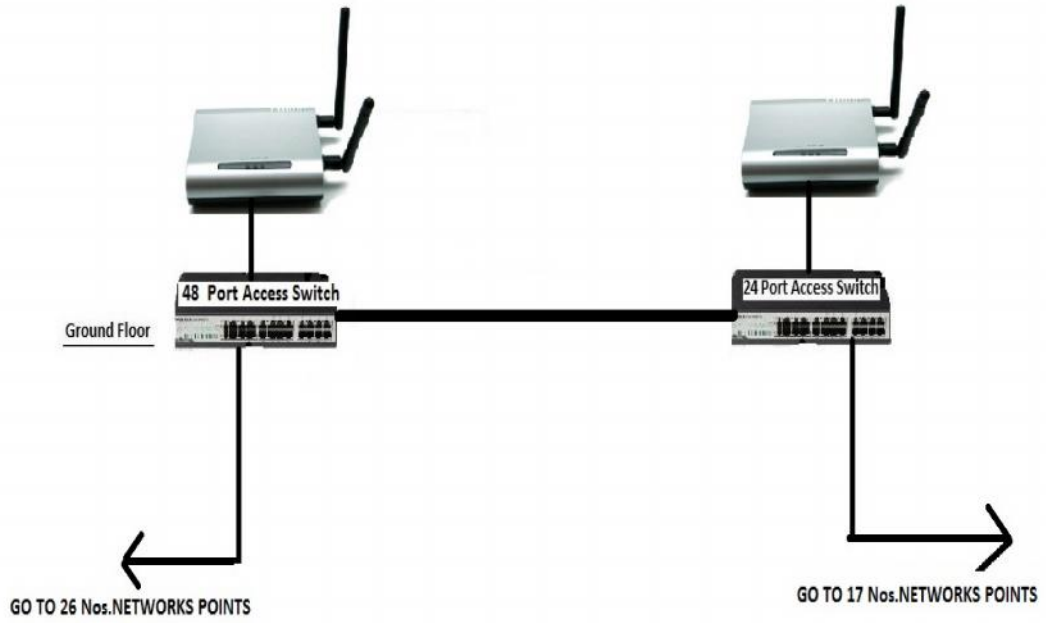
Temporary OPD at AIIMS, Raebareli

Sr. No.	Description	No. of Network Point
1	Only Reception (1)	1
2	Registration	6
3	Consultant Room (15)	15
4	SMO Room	1
5	General Office	1
6	Staff Office	1
7	Resident Room	1
8	Meeting Room	1
9	Nurse Station	1
10	Records Room	1
11	Store Room (2)	2
12	Sample collection	1
13	Lab(2)	4
14	X- Ray	1
15	Ultrasound	1
16	Pharmacy	1
17	Minor OT	1
18	Server Room	3
19	Wireless Points	2
20	Additional Points	5
	Total	50

Annexure-B

(Proposed Network diagram for
Temporary OPD Block at AIIMS,
Raebareli)

LOCAL AREA NETWORK (LAN) DIGRAM FOR TEMPORARY OPD AT AIIMS, RAEBARELI



- 1 Nos. 48 Port Access Switch
- 1 Nos. 42 Port Access Switch
- 2 Nos. Wireless Access Point
- Cat6 A

HSCC/Temporary OPD/AIIMS RAEBARELI/IT Works/2014

Annexure-C

(Technical Specification for Active devices of Local Area Network (LAN) and Wi-Fi and Server Hardware for Temporary OPD at AIIMS, Raebareli)

Technical Specification for Active devices of Local Area Network (LAN) for Temporary OPD at AIIMS, Raebareli

1. 48 Port Access Switch (Make – HP/Cisco/Juniper/Brocade)

(Sr. no. 1.1 in BOQ for LAN)

Sr. No	Specifications
1	Access Switch should have 48 ports of 100/1000 RJ45 and 4 port of 1/10G fiber based.
2	Access Switches should support non-blocking switching fabric capacity of min 175 Gbps and forwarding capacity of 130 Mpps. IPv4 to IPv6 conversion should not affect the expected throughput.
3	The Access switch should support min 16K MAC addresses and min 100 VLAN
4	The Access Switch should support stacking of minimum 8 units with a stacking bandwidth of minimum 40Gbps
5	The access switch should support upto 8 hardware queues per port
6	The Access Switch should support full Layer 2 features like STP, RSTP, MSTP, PVST, LAG, LACP, ACL, QoS, IGMPv1/v2 from day 1.
7	The Access Switch should support basic L3 features like IPv4 & IPv6 static routing, Layer 3/4 ACLs, ECMP, virtual interfaces and routed interfaces from day 1.
8	The Access Switch should have an optional license based upgrade path to support advance Layer 3 features like RIPv1/v2, OSPFv2 and VRRP.
9	The Access Switch should support IPv6 management features like IPv6 ping, IPv6 trace route, IPv6 Telnet, IPv6 TACACS, IPv6 DNS, and IPv6 RADIUS.
10	The Access Switches and Transceivers should be of same OEM make as the Core switches and the access switches.
11	The Access Switch should have support for internal/external redundant power supply
12	<p>The requirement of access switches is as follows:</p> <ul style="list-style-type: none"> • Access switch : 48 port GE non-PoE Access switch with 4 1/10G uplink: Nos. • 10G SFPP single mode optics: Nos. • 10G SFPP Multi-mode optics: Nos. • 1G SFPP multi-mode optics: Nos. • OEM Stack cable : Nos.
13	All access switches should be provided with 3 years warranty including Technical Assistance Center (TAC) support

2. 24 Port Access Switch (Make – HP/Cisco/Juniper/Brocade)

(Sr. no. 1.2 in BOQ for LAN)

Sr. No	Specifications
1	Access Switch should have 24 ports of 100/1000 RJ45 and 4 port of 1/10G fiber based.
2	Access Switches should support non-blocking switching fabric capacity of min 125 Gbps and forwarding capacity of 95 Mpps. IPv4 to IPv6 conversion should not affect the expected throughput.
3	The Access switch should support min 16K MAC addresses and min 100 VLAN
4	The Access Switch should support stacking of minimum 8 units with a stacking bandwidth of minimum 40Gbps
5	The access switch should support upto 8 hardware queues per port
6	The Access Switch should support full Layer 2 features like STP, RSTP, MSTP, PVST, LAG, LACP, ACL, QoS, IGMPv1/v2 from day 1.
7	The Access Switch should support basic L3 features like IPv4 & IPv6 static routing, Layer 3/4 ACLs, ECMP, virtual interfaces and routed interfaces from day 1.
8	The Access Switch should have an optional license based upgrade path to support advance Layer 3 features like RIPv1/v2, OSPFv2 and VRRP.
9	The Access Switch should support IPv6 management features like IPv6 ping, IPv6 trace route, IPv6 Telnet, IPv6 TACACS, IPv6 DNS, and IPv6 RADIUS.
10	The Access Switches and Transceivers should be of same OEM make as the Core switches and the access switches.
11	The Access Switch should have support for internal/external redundant power supply
12	<p>The requirement of access switches is as follows:</p> <ul style="list-style-type: none"> • Access switch : 24 port GE non-PoE Access switch with 4 1/10G uplink: Nos. • 10G SFPP single mode optics: Nos. • 10G SFPP Multi-mode optics: Nos. • 1G SFPP multi-mode optics: Nos. • OEM Stack cable : Nos.
13	All access switches should be provided with 3 years warranty including Technical Assistance Center (TAC) support

3. Wireless Access Points (Serial no. 2.1 in BOQ)

Wireless Access Points Specifications:	802.11a/b/g/n - For Medium User Density Environment
Specifications	Feature
General Features	The Access Point should have 1 Port 10/100/1000Mb, & 1 port 10/100 Mbps (1 POE Uplink and 1 LAN)
	802.11n Access Point should be able to power up using standards 802.3af POE input, and at the same time operate in full MIMO mode. It should also have option to powered through DC power Adaptor.
	AP should have Dual Radios to support 2.4 GHz & 5Ghz concurrent users with 802.11 a/b/g/n capability. AP Must support 2x2 MIMO.
	AP should be able to handle upto 500 Concurrent users.
	AP should provide minimum 23dBm transmission power for 2.4Ghz and 21dBm for 5Ghz. (limited as per govt regulation for indoor AP's).
	AP should have -100 dB or better Receiver Sensitivity.
	Access Points can perform encryption / decryption on itself so as not to bottleneck the controller
	Operating Frequency :
	•IEEE 802.11n: 2.4 – 2.484 GHz and 5.15 – 5.85 GHz
	•IEEE 802.11a: 5.15 – 5.85 GHz
	•IEEE 802.11b: 2.4 – 2.484 GHz
	SSID support : 32 BSSID (16 BSSID per Radio)
	Data rate supported with automatic fallback:
	802.11b: 11, 5.5, 2 and 1 Mbps
	802.11g: 54, 48, 36, 24, 18, 12, 9 and 6 Mbps
	802.11a: 54, 48, 36, 24, 18, 12, 9 and 6 Mbps
	802.11n: 6.5Mbps – 130Mbps (20MHz) 6.5Mbps – 300Mbps (40MHz)
	The access point should support 802.1q VLAN tagging
	Antenna: Integrated omni-directional, with min 6 dB Gain for 2.4Ghz and 5Ghz both.
	Implement Wi-Fi alliance standards WMM, WMM-PS, 802.11d, 802.11h and 802.11e
Channel selection based on measuring throughput capacity in real time and switching to another channel should the capacity fall below the statistical average of all channels without using background scanning as a method.	
AP should support spectrum Analysis to detect RF interference in indoor area.	

	AP should support Polarization Diversity to provide better reception for hard to hear clients and consistent performance while clients change their orientation
	Should support Transmit power tuning by changes in Tx power.
	Should support the operating temp 0° to 50° C and Humidity: 10 to 95% non-condensing.
Security:	The access point should support following security mechanism : WEP, WPA-PSK, WPA-TKIP, WPA2 AES, 802.11i.
	System should support Authentication via 802.1X, local authentication database, support for RADIUS and ActiveDirectory.
	Access points should have antitheft mechanism.
Management	• Web User Interface (HTTP/S) • CLI (Telnet/SSH), SNMP v1, 2, 3
	Should be managed by Controller or standalone if required
	Support FTP to propagate the configuration file and firmware to the Wi-Fi enabled device
Regulatory	WEEE/RoHS compliance, EN 60601-1-2, Wi-Fi Alliance certified
	Should be WPC approved; ETA certificate to be enclosed

4. Server Hardware (Sr. no. 4.4 in BOQ)

	Make	HP/Dell/IBM
1	Server Model	Server Model with below specification with redundant enablement kit and all the accessories etc. complete in all respect
2	Processor type	Intel Xeon Processor E5-2420 (1.9 GHz/6-core/95W/15MB) or Superior
3	Number of processors	2 Processor or superior
4	Standard memory	16 GB (8x2) or higher
5	Internal hard disk drive	Minimum 3 nos. 300 GB 6G SAS or higher
6	Hard disk controller	Smart Array P420/1GB FBWC Controller or higher
7	Internal drive bays	hot plug advanced key (RAID Technology)
8	Optical drives	OEM SATA DVD+/- RW Drive
9	Power Supply	Redundant power supply (provide additional power supply kit for power redundancy)
10	Network interface	Embedded Dual Port Gigabit Server Adopter

11	Keyboard & Mouse	OEM standard keyboard and mouse (PS2)
12	Monitor	OEM standard 18.5"
13	Compatible operating systems	Microsoft® Windows® Server 2012 and Linux Operating System (Latest)
14	Warranty	Three years onsite comprehensive maintenance including labour & parts shall be provided through Manufacturer Warranty/Care Pack/Support Pack.