

Annexure – 12A Wireless Controller (Compliance Sheet)

Sr No	Required Minimum Specifications Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
Hardware			
1	Controller should be hardware appliance and support 250 APs and 5000 clients from day-1		
2	It should possible to upgrade controller to support additional 100 APs. If not, Bidder needs to provide controller hardware to support up to 350 APs from day-1		
3	The controller shall support deployment flexibility without compromising any features		
4	The controller shall support 5 Gbps tunneling capacity		
5	The controller shall support 2x 10G / Multigigabit copper		
6	Wireless Controller shall support link aggregation and load sharing between Access Point to WLC links		
7	The controller shall support hardware encrypted data plane between Access Point and Controller		
High Availability			
1	All feature license needs to be provided with controller from day-1		
2	High Availability mode shall support controller inline data plane mode as well as local switching mode and Mesh mode		
3	High Availability mode shall allow geographically dispersed installation between Controllers		
4	The controller failover shall not trigger client de - authentication and re-association		
5	Heartbeat interval shall not be longer than 100msec		
6	The controller shall support hot WLC software patching for fixing bugs		
7	The controller shall support hot AP software patching for fixing bugs		
8	The controller shall support new AP hardware without need for upgrading entire controller software.		
9	The controller shall support rolling AP upgrade		
10	The controller shall support rolling AP upgrade without need for clustering		
Software			
1	The redundant Controller shall sync Access Point and Client Status, including DHCP IP lease status		
2	Access Point shall be able to proactively distributes Client connection before and after association and tracking client condition in real time using data packet RSSI		
3	The controller shall support standard-based, secure AP-Controller data & control protocol like CAPWAP. Protocol that has known vulnerability like PAPI cannot be used.		

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4	The controller shall support Inter-Controller Wireless Roaming		
5	The controller shall maintains per-user Application usage and shall be able to export it for network analytic.		
6	The controller shall support Multi Languages options from embedded GUI Management		
7	The controller shall provide per-Client Connection Scoring and provide reasoning of Client Connection Score		
RF Management			
1	The controller shall support Cellular offload using IPv6 tunneling to Mobile Core network		
2	The controller shall be able to support multiple RF Management profile per group of APs, including Transmit Power Control and Dynamic Channel Assignment on both 2.4GHz and 5Ghz		
3	The controller shall be able to identify and avoid interferers with network performance impact analysis report		
Mesh			
1	The controller shall support optimized, automatic channel width (20~160Mhz) selection over 5GHz, 802.11ac		
2	Mesh AP nodes shall provide quick convergence and fast failover to new root mesh node		
3	Mesh Backhaul interface shall support full duplex operation using wired daisy chaining		
Application Recognition and Control			
1	Mesh AP shall support fast roaming for Wired-client through wired-to-wireless bridge client		
2	The controller shall support per-user and per-WLAN based application recognition and control that throttle usage by rate-limiting		
3	The controller application recognition technology shall support exporting to 3rd party compatible format, such as NetFlow v9		
4	The controller shall provide policy-based mDNS gateway including Chromecast gateway		
BYOD & Security			
1	The controller shall support new application signatures without upgrading controller software		
2	The controller shall provide Device Profiling using multiple profiling methods to reduce false-detection		
3	The system shall provide secure onboarding service for both employee and guest based on standard-based security protocol Proposed system shall not use public cloud as user data repository		

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4	The controller shall be able to embedded custom web portal page (HTML) to fully customize user experience without additional cost or extra box		
5	The controller shall provide rule-based rogue classification and automatically run rogue mitigation action		
6	The controller shall be able to detect employee device connection to Rogue Access Point and contain it automatically. It should also support protection from Honeypot or Evil twin.		
7	The controller shall support Content Security using DNS integration, Web Classification shall be fully customizable		
8	The system shall support control plane encryption on both IPv4 and IPv6		
9	The Controller's image upgrade shall be done through secure, encrypted transport		
10	The controller shall be able to provide unique pre-shared keys to the devices that do not support the 802.1x security protocol		
11	The controller shall support Identity PSK for on boarding		
Network			
1	The controller shall support identification & mitigation of threats inside encrypted traffic		
Configuration			
1	The controller shall support mapping of specific VLANs to single SSID, depending on Access Point location and user		
2	The controller shall support automatic VLAN assignment per SSID to load-balance user connection.		
3	The controller shall support embedded best practice configuration profile and setup		

Annexure – 12B –Network Switch(Compliance Sheet)

Sr No	Required Minimum Specifications Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
General Features			
1	The Switch should be 1U and rack mountable in standard 19" rack.		
2	The Switch should support redundant power supply from day 1		
3	The Switch should have minimum 2 GB RAM and 2 GB Flash.		
4	The Switch should have dedicated slot for modular stacking, in addition to asked uplink ports. Should support for minimum 48 Gbps of stacking throughput with 8 switch in single stack.		
5	The Switch must provide the capability of performing cold patch		
Performance			
1	The Switch shall have minimum 56 Gbps of switching fabric and Minimum 40 Mbps of forwarding rate.		
2	The Switch shall have minimum 16K MAC Addresses and 250 active VLAN.		
3	The switch Should support minimum 11K IPv4 routes or more		
4	The Switch shall have 1K or more multicast routes.		
5	The Switch should support atleast 16K flow entries		
6	The Switch should support 128 or more STP Instances.		
7	The Switch should have 6MB or more packet buffer.		
Functionality			
1	The Switch should support IEEE Standards of Ethernet: IEEE 802.1D, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1p, 802.1Q, 802.3, 802.3u, 802.3ab, 802.3z.		
2	The Switch must have functionality like static routing, RIP, PIM, OSPF, VRRP, PBR and QoS features from Day1		
3	The Switch should support network segmentation that overcomes the limitation of VLANs using VXLAN and VRFs.		
4	The Switch shall have 802.1p class of service, marking, classification, policing and shaping and eight egress queues.		
5	The Switch should support management features like SSHv2, SNMPv2c, SNMPv3, NTP, RADIUS and TACACS+.		
6	The Switch should support IPv6 Binding Integrity Guard, IPv6 Snooping, IPv6 RA Guard, IPv6 DHCP Guard, IPv6 Neighbor Discovery Inspection and IPv6 Source Guard.		
7	The Switch should support 802.1x authentication and accounting, IPv4 and IPv6 ACLs and Dynamic VLAN assignment and MACSec-128 on hardware for all ports.		
8	The Switch must have the capabilities to enable automatic configuration of switch ports as devices connect to the switch for the device type.		
9	During system boots, the system's software signatures should be checked for integrity. System should capable to understand		

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	that system OS are authentic and unmodified, it should have cryptographically signed images to provide assurance that the firmware & BIOS are authentic.		
10	The Switch must support push-based, streaming telemetry to send operational data to an external collector		
11	The Switch shall be capable of providing a first line of defense by inspecting the Domain Name System (DNS) query and prevent a user from accessing a site if it is known to be malicious		
12	The Switch should support application visibility for custom applications		
Interfaces			
1	The Switch shall have 24 nos. 10/100/1000 Base-T ports and additional 4 nos. SFP uplinks ports.		
2	All 24 port should support PoE (802.3af) and PoE+ (802.3at) with a PoE power budget of 370 W.		
Certification			
1	Switch shall conform to UL 60950 or IEC 60950 or CSA 60950 or EN 60950 Standards for Safety requirements of Information Technology Equipment.		
2	Switch shall conform to EN 55022 Class A/B or CISPR22 Class A/B or CE Class A/B or FCC Class A/B Standards for EMC (Electro Magnetic Compatibility) requirements.		
3	Switch / Switch's Operating System should be tested for EAL 2/NDPP or above under Common Criteria Certification.		

Annexure – 12C – Wireless Access Point (Compliance Sheet)

Sr No	Required Minimum Specifications Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
General			
1	Access Point shall support 4x4 MIMO on both 2.4 and 5GHz radio interfaces		
2	Access Point shall be able to powered up using PoE (.af) and should support full features with PoE+		
3	Access Point shall support assurance, packet capture, sensor capabilities		
4	Access Point shall support application visibility and control		
5	Access Point shall support encrypted traffic visibility		
6	Access Point shall support integrated BLE5 radio		
7	Access Point shall ship with metal-based mounting bracket for durability and reliability		
8	Access Point shall support Console port that uses Standard Port (RJ-45) type connection		
9	Access Point should have 1x 100, 1000, 2500 Multigigabit Ethernet (RJ-45) – IEEE 802.3bz		
10	Access Point should have USB port for future requirement.		
11	Must have atleast 3 dBi Antenna gain on each radios		
12	Must Support data rate upto 5 GBPS.		
13	Must support minimum of 23dbm of transmit power in both 2.4Ghz and 5Ghz radios. And should follow the local regulatory Norms.		
14	Must support AP enforced load-balance between 2.4Ghz and 5Ghz band.		
15	Must incorporate radio resource management for power, channel and performance optimization		
16	Must have -97 dB or better Receiver Sensitivity.		
17	Must support Proactive Key Caching and/or other methods for Fast Secure Roaming.		
18	Must support Management Frame Protection.		
19	Should support locally-significant certificates on the APs using a Public Key Infrastructure (PKI).		
20	Access Points must support Hardware-based encrypted user data and management traffic between controller and Access point for better security.		
21	Must support the ability to serve clients and monitor the RF environment concurrently.		
22	Same model AP that serves clients must be able to be dedicated to monitoring the RF environment.		
23	Must be plenum-rated (UL2043).		
24	Must support 16 WLANs per AP for SSID deployment flexibility.		
25	Access Point Must continue serving clients when link to		

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	controller is down. It should also have option to authenticate user through Radius server directly from Access Point during link unavailability to controller.		
26	Must support telnet and/or SSH login to APs directly for troubleshooting flexibility.		
27	802.11e and WMM		
28	Must support QoS and Video Call Admission Control capabilities.		
29	Access point should be Wi-Fi 6 certifiable.		

Annexure – 12D Router (Compliance Sheet)

Sr No	Required Minimum Specifications Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
Router Architecture requirements			
1	Multi-core processor architecture		
2	The router should have 2 gigabit 10/100/1000 Mbps Ethernet LAN/WAN ports with RJ 45 interface from day one. The router should support minimum 4 gigabit 10/100/1000 Mbps Ethernet LAN ports with RJ 45. Out of 4 LAN ports, 2 ports must support POE.		
3	One USB port for storage		
4	The router's performance should support minimum 200 Mbps of WAN bandwidth.		
5	Minimum 4 GB of SDRAM should be supported from day one.		
6	Minimum of 4 GB Flash memory supported from day one.		
7	Router should support at least 200000 routes in routing table		
Security			
1	GRE and IP Sec 3DES/AES and complex suit of crypto for configuration of VPN tunnels.		
2	Support for IPSEC Site-to-Site and Remote Access VPNs. System Should provide hardware assisted IPSec acceleration.		
3	VPN support – Dynamic/Automatic tunnel-less VPN, IPSec VPN etc.		
4	IKEv2 support and IPv6- IKEv2, IPSec support		
5	MD5, SHA-1, SHA-2 Authentication support		
6	PKI (CA certificate) infrastructure support		
7	IEEE standard protocol for tuneless any to any dynamic VPN support technology.		
8	NAT, PAT		
9	Access control - Multilevel for use with RADIUS and TACACS+		
10	Support ACL's to provide supervision and control.		
11	Multiple Privilege Levels for managing & monitoring		
12	Support for Remote Authentication User Service (RADIUS) and AAA		
13	Support for Standard, Advanced, time based Access Lists to provide supervision and control.		
14	Controlled SNMP Access using ACL on router to ensure SNMP access only to identified NMS/EMS. SNMP v1, 2c, 3 should be supported from day one		
15	DNS, DHCP, DNS spoofing		
16	Router should able to support native integration with cloud based security for future requirement		
17	DoS prevention through TCP Intercept & DDoS protection		
Protocols			
1	Static Routes		

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2	RIPv1, RIPv2, RIPv6		
3	OSPFv2 and v3.		
4	BGP for IPv4 and BGP+ for IPv6		
5	IS-IS routing protocols for IPv4 and IPv6		
6	Policy Based Routing: System should support policy based routing for providing different path selection for different applications and also should support best path selection using parameters like jitter, link load distribution, minimum cost, network path availability, packet loss etc.		
7	Performance Based Routing		
8	Should support load balancing of the links		
9	Bidirectional Forwarding detection (BFD)		
10	Multicast Listener Discovery (MLD)		
11	Multicast over GRE Tunnels		
12	PPP, Multi-link PPP		
13	Load Balancing Protocol using ECMP, uRPF		
14	IPv4, IPv6		
15	MPLS L2 & L3		
16	VRRP / HSRP for IPv4 and IPv6		
17	Shall support IPv6 features with no additional cost		
QOS to eliminate Congestion			
1	QOS based on: Source and destination IP address, Source and destination TCP port, Source and destination UDP port, CoS value Application, Random Early Detection, Weighted Fair Queuing, Priority Queuing, Low-Latency Queuing (LLQ), DiffServ, RSVP, WRED, Traffic Shaping (TS), Traffic Policing (TP), DSCP Marking, policing and shaping, IPv6 Packet classification & Marking, IPv6 Policing & Shaping, IPv6 Queuing, IPv6 Dual Stack.		
2	The Router should recognize and classify minimum 1000 common applications (i.e. voice, video, peer to peer, encrypted, social media applications) with deep inspection mechanism. It should be possible to define QoS based on application to give higher priority to corporate and business critical applications.		
3	Router should identify home grown or custom applications used in the enterprise and it should be possible to define custom application based on Port numbers, payload analysis or URL/URI from day one		
IP Multicasting			
1	IGMPv1&v2, PIM-SM, PIM-DM.		
Management			

Sr No	Required Minimum Specifications Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
1	IP SLA or equivalent		
2	EEM or equivalent		
3	SLA verification probes/alerts configurations		
4	Real-time performance monitoring		
BYOD & Security			
1	Router should able to provide end to end application response time to identify potential issues at LAN or WAN side for application performance		
2	Functionality of measuring service level indicators including delay, jitter & availability		
3	Accessibility using Telnet, SSH, Console access, RMON		
4	Software upgrades using FTP, TFTP, CLI, etc.		
5	SNMP Support for v1, v2 , v3		
6	Should support auto deployment using USB disk or via central management system		
7	Should be able to integrate with any SNMP based NMS tool		
8	Syslog, Buffer logging		
9	Configuration Rollback function		
10	Netflow or equivalent feature for network & security monitoring		
11	Monitor network performance for VOIP, Video & VPN Network monitoring		
12	Monitor events and take informational, corrective action when the monitored events occur or when a threshold is reached.		
13	Should be able to integrate with third party enterprise network management tool		
14	IP SLA or equivalent		
15	EEM or equivalent		
16	SLA verification probes/alerts configurations		
17	Real-time performance monitoring		
18	Sessions, packets, bandwidth usage		
Debug & Diagnostics			
1	Display of input and output error status on all interfaces		
2	Display of Dynamic ARP table		
3	Display of physical layer line status signals like DCD, DSR, DTR, RTS, CTS on all interfaces		
4	Trace-route, Ping, extended PING		

Sr No	Required Minimum Specifications Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
Others			
1	EAL 2 or higher certified		
2	Safety certifications UL 60950-1		
3	AC Power Cord (Indian standard)		
4	Console Cable		
5	AC Power Supply 60 Watt AC version platforms		
6	Rack mount kit		