

Technical Specifications

1. 24-Port Managed Gigabit Network PoE Switch with 10G SFP+ Uplinks

General Requirements

- The switch shall be an **enterprise-grade Layer-2+ managed Ethernet switch** designed for campus/enterprise network environments.
 - The switch shall support **minimum 24 × 10/100/1000 Mbps RJ-45 Gigabit Ethernet ports**.
 - The switch shall support **minimum 4 × SFP/SFP+ uplink ports capable of 1G/10G operation**.
 - The switch shall have **non-blocking switching architecture with wire-speed performance**.
 - The switch shall be **rack mountable (1U) for standard 19-inch rack installation**.
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Performance Specifications

- Switching capacity: **Minimum 120 Gbps or higher**
 - Packet forwarding rate: **Minimum 95 Mpps or higher**
 - Latency:
 - $\leq 3 \mu\text{s}$ for 1GbE traffic
 - $\leq 2 \mu\text{s}$ for 10GbE traffic
 - MAC Address Table: **Minimum 16K entries**
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Interface and Port Features

- **24 × 10/100/1000Base-T RJ-45 ports with auto-negotiation**
 - **4 × 1G/10G SFP+ uplink ports**
 - Support for **Auto MDI/MDI-X**
 - Support for **Jumbo frames up to 9 KB**
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Layer-2 Switching Features

The switch shall support the following Layer-2 functions:

- **IEEE 802.1Q VLAN tagging**
- **Minimum 256 VLANs or higher**
- **Spanning Tree Protocols: STP, RSTP, MSTP**
- **Link Aggregation Control Protocol (LACP) – IEEE 802.3ad**
- **IGMP Snooping** for multicast traffic

- **Port mirroring**
 - **Broadcast/Multicast storm control**
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Layer-3 Capabilities

The switch shall support limited Layer-3 features including:

- **Static IPv4 routing**
 - **DHCP relay / DHCP client**
 - **IPv4 and IPv6 management support**
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Quality of Service (QoS)

The switch shall support:

- **IEEE 802.1p traffic prioritization**
 - **Minimum 4 hardware queues per port**
 - **Traffic shaping and rate limiting**
 - **Priority-based scheduling**
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Security Features

The switch shall include security mechanisms such as:

- **IEEE 802.1X port-based authentication**
 - **Access Control Lists (ACLs)**
 - **Port security with MAC address filtering**
 - **Secure management using HTTPS and SSH**
 - **SNMP v1/v2c/v3**
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Management Features

The switch shall support:

- **Web-based graphical management interface (GUI)**
 - **SNMP-based monitoring and configuration**
 - **Remote firmware upgrade capability**
 - **Configuration backup and restore**
 - **Support for cloud-based or centralized switch management platform**
 - **TPM-Based security: TPM for secure hardware based and storage of cryptographic keys used for secure connection.**
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Hardware Requirements

- Embedded CPU equivalent to ≥ 800 MHz network processor
 - **Minimum 512 MB RAM**
 - **Minimum 256 MB Flash memory**
 - Packet buffer: ≥ 1 MB
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Electrical Specifications

- Power Input: **100–240 VAC, 50/60 Hz**
 - Maximum Power Consumption: ≤ 30 W
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Environmental Conditions

- Operating Temperature: **0°C to 40°C**
 - Storage Temperature: **–40°C to 70°C**
 - Operating Humidity: **15%–95% non-condensing**
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Physical Characteristics

- Form Factor: **1U rack-mountable**
 - Standard **19-inch rack compatibility**
 - Weight approximately ≤ 3 kg
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Warranty & Support

- Minimum **3 years OEM warranty** or **Limited Lifetime Warranty**
- Firmware upgrades and technical support during warranty period.

Technical Specifications

2. 48-Port Managed Gigabit PoE+ Switch with 10G SFP+ Uplinks (370W PoE Budget)

General Requirements

- The switch shall be an **enterprise-grade Layer-2+ managed Ethernet switch** suitable for campus, enterprise, and institutional network environments.
 - The switch shall provide **minimum 48 × 10/100/1000 Mbps Gigabit Ethernet ports supporting PoE+ (Class 4)**.
 - The switch shall include **minimum 4 × SFP/SFP+ uplink ports supporting 1G/10G fiber connectivity**.
 - The switch shall support **non-blocking architecture with wire-speed switching**.
 - The switch shall be **rack-mountable in a standard 19-inch rack (1U form factor)**.
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PoE (Power over Ethernet) Requirements

- The switch shall support **IEEE 802.3af (PoE) and IEEE 802.3at (PoE+) standards**.
 - All 48 access ports shall support **PoE+ (Class 4)**.
 - Total PoE power budget shall be **minimum 370 Watts**.
 - The switch shall support:
 - Per-port PoE power control
 - PoE scheduling
 - PoE priority management
 - PoE support shall be suitable for powering:
 - IP phones
 - Wireless Access Points
 - IP cameras
 - IoT devices.
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Performance Specifications

- Switching capacity: **Minimum 170 Gbps or higher**
 - Packet forwarding rate: **Minimum 130 Mpps or higher**
 - MAC address table: **Minimum 16K entries**
 - Packet buffer memory: **≥ 1 MB**
 - Jumbo frame support: **Up to 9 KB**
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Interface and Port Features

- **48 × 10/100/1000Base-T RJ-45 auto-negotiating ports with PoE+ support**
 - **4 × SFP+ uplink ports supporting 1G/10G fiber modules**
 - **Support for Auto-MDI/MDI-X**
 - **LED indicators for power, system status, link/activity, and PoE status**
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Layer-2 Switching Features

The switch shall support the following Layer-2 functions:

- **IEEE 802.1Q VLAN tagging**
 - **Minimum 256 VLANs or higher**
 - **Spanning Tree Protocols:**
 - STP (802.1D)
 - RSTP (802.1w)
 - MSTP (802.1s)
 - **Link Aggregation (IEEE 802.3ad LACP)**
 - **IGMP Snooping** for multicast traffic
 - **Port mirroring**
 - **Broadcast / multicast storm control**
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Layer-3 Capabilities

The switch shall support basic Layer-3 features including:

- **Static IPv4 routing**
 - **DHCP client and relay**
 - **IPv4 / IPv6 management support**
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Quality of Service (QoS)

The switch shall support:

- **IEEE 802.1p traffic prioritization**
 - **Minimum 4 or more hardware queues per port**
 - **Traffic shaping and rate limiting**
 - **DSCP-based QoS classification**
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Security Features

The switch shall include enterprise-level security mechanisms:

- **IEEE 802.1X port-based authentication**
- **Access Control Lists (ACLs)**

- **Port security / MAC filtering**
 - Secure management using:
 - **HTTPS**
 - **SSH**
 - **SNMP v1/v2c/v3**
 - Protection against **broadcast storms and network loops**
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Management Features

The switch shall support multiple management options:

- **Web-based GUI management interface**
 - **SNMP-based network monitoring**
 - Configuration backup and restore
 - **Firmware upgrade through web interface or network management tools**
 - Support for **cloud-based or centralized network management platform**
 - TPM-Based security: TPM for secure hardware based and storage of cryptographic keys used for secure connection.
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Hardware Requirements

- Processor: Embedded network processor \geq **800 MHz equivalent**
 - Memory:
 - **Minimum 512 MB RAM**
 - **Minimum 256 MB Flash**
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Electrical Specifications

- Input voltage: **100–240 VAC, 50/60 Hz**
 - Maximum power consumption including PoE: **as per PoE budget (\geq 370W support)**
 - Internal power supply.
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Environmental Conditions

- Operating Temperature: **0°C to 40°C**
 - Storage Temperature: **–40°C to 70°C**
 - Operating Humidity: **15% – 95% non-condensing**
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Physical Specifications

- Form Factor: **1U rack mountable**
 - Standard **19-inch rack compatibility**
 - Rack mounting kit and power cable shall be supplied with the switch.
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Warranty & Support

- Minimum **3 OEM warranty** or **limited lifetime warranty**.
- OEM firmware updates and technical support shall be provided during the warranty period.

Bidder Declaration

The bidder must certify that:

- The offered product is **OEM manufactured and not refurbished**.
- The product is **compatible with standard networking protocols**.
- The OEM must have **support presence in India**.
- Datasheet of the offered model must be attached with the bid.

3. 24-Port Loaded Jack Patch Panel for Structured Cabling – AMP

General Requirement's

- The patch panel shall be a **24-Port loaded jack patch panel** suitable for structured cabling systems in LAN networks.
- The patch panel shall be **factory loaded with 24 RJ-45 keystone jacks** compatible with **Category 6 or higher UTP cabling**.
- The patch panel shall support **Gigabit Ethernet and higher network applications**.
- The unit shall be designed for **standard 19-inch rack mounting**.

4. 12-U Network Rack