# Annexure 3: Technical & Functional Specification

| 1 | **Network Switch 24 port, 10/100/1000 POE Giga port switch** |
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| | **Technical & Functional Specification:** |

1. **Switch Type:**
   - Managed Switch (providing VLAN support, QoS, SNMP, and more)
   - Layer 2 with optional Layer 3 features (static routing for small office routing needs).
2. **Port Requirements:**
   - Minimum 24 POE Gigabit Ethernet ports 10/100/1000.
   - PoE (Power over Ethernet) capabilities for powering IP phones, wireless access points, cameras, computer & Other IP devices. Total PoE budget (in watts) based on the number of PoE-enabled devices.
   - 1-2 uplink ports (10 Gbps SFP+ or 1 Gbps Ethernet) to connect to the internet or core network.
3. **Network Performance:**
   - Support for Gigabit (1Gbps) or higher network speeds for both local network connections and internet access.
   - Low latency, high throughput to ensure smooth communication, video conferencing, and file transfers. Switching Capacity: At least 48Gbps for 24-port switches
   - Support for Layer 2 (Data Link Layer) functions: MAC address learning, forwarding, and switching
4. **Security:**
   - Port security to prevent unauthorized devices from accessing the network.
   - VLAN (Virtual Local Area Network) support for segmenting network traffic.
   - 802.1X authentication for enhanced security for end devices (i.e., computers, phones).
   - ACLs (Access Control Lists) to manage which devices and users can access network resources.
   - IP-MAC binding for device authentication.
   - DHCP snooping, Dynamic ARP inspection
5. **Quality of Service (QoS):**
   - Support for QoS features to prioritize critical traffic, such as voice (VoIP) or video conferencing.
   - Traffic shaping and bandwidth management to prevent congestion during peak usage hours
6. **Management and Monitoring:**
   - Web-based GUI (Graphical User Interface) for simple configuration and monitoring.
   - CLI (Command Line Interface) for advanced configurations and automation.
   - SNMP (Simple Network Management Protocol) for monitoring and alerting.
   - VLAN tagging (802.1q) support for network segmentation and management.
7. **Redundancy & Reliability:**
   - Spanning Tree Protocol (STP) to avoid network loops.
   - Link Aggregation (LACP) for combining multiple links for increased bandwidth and redundancy.
   - PoE failover if using PoE-powered devices.
8. **Energy Efficiency:**
   - Energy Star-certified for low power consumption and efficiency.
   - Support for IEEE 802.3az (Energy Efficient Ethernet) to automatically adjust power usage based on network traffic.
   - Operating temperature 0 to 50 Degree.
9. **Scalability:**
   - Ability to easily expand by adding more switches to the network in the future.

| 2 | **Firewall** |
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| | **Technical & Functional Specification:** |

**1. Physical Interfaces**

- LAN ports: Four (4) 10/100/1000 Mbps auto-sensing, Auto Uplink RJ-45 ports
- WAN ports: Two (2) 10/100/1000 Mbps auto-sensing, Auto Uplink RJ-45 ports to connect to any broadband modem, such as DSL or cable

**2. Hardware**

- CPU: multi-core processors to handle packet filtering and stateful inspection more efficiently).
- RAM: Minimum 2GB RAM (for managing logs, VPN connections, etc.).
- Storage: 64 GB or more for log storage, with the ability to increase storage if necessary.

**3. Basic Network Security:**

- Packet Filtering: Allow or deny traffic based on predefined security rules, such as IP addresses, ports, and protocols.
- Stateful Inspection: Maintain tracking of active connections to ensure that incoming packets are part of an established connection.
- VPN Support: Provide Virtual Private Network (VPN) functionality (site-to-site or client-to-site) to securely connect remote workers or branch offices.
- Access Control: Implement rules to restrict access to specific resources on the network (e.g., only allow certain IPs or users to access specific services).
- Security Features namely IDS/IPS, Web Filtering, Antivirus, DDoS Protection, Traffic Shaping/Quality of Service (QoS).

**4. Threat Protection:**

- Intrusion Detection and Prevention: Detect and block known threats (e.g., malware, DDoS attacks, port scanning).
- Antivirus/Antimalware: Scan incoming and outgoing traffic for malicious software.
- Content Filtering: Block access to harmful websites, inappropriate content, or malware distribution sites.
- Application Layer Filtering: Ability to filter and inspect traffic at the application layer, blocking certain applications or services (e.g., blocking Facebook, gaming, or torrenting apps).

**5. Logging and Reporting:**

- Traffic Logs: Detailed logs of inbound and outbound traffic for auditing and troubleshooting purposes.
- Event Logging: Capture security-related events such as unauthorized access attempts, malware infections, or VPN failures.
- Alerts and Notifications: Real-time alerts for security incidents or policy violations, sent to administrators via email, SMS, or dashboard.

**6. Network Address Translation (NAT):**

- Dynamic NAT: Use of NAT to hide the internal IP addresses and map them to a single public IP address to prevent direct access to internal devices.
- Port Forwarding: Securely allow external users to access specific internal resources (e.g., web server, email server) through predefined port forwarding rules.

**7. User Authentication:**

- User-Based Policies: Implement firewall rules that depend on the identity of users (via Active Directory, LDAP, or other identity management systems).
- Multi-Factor Authentication (MFA): Support MFA for administrators to ensure secure access to the firewall configuration and management interface.

**8. Remote Access Support:**

- Secure Remote Access (SSL VPN or IPsec): Allow remote employees to securely access the internal network from remote locations.

**9. Ease of Management and Configuration:**

- Web-Based Management Interface: Simplified, intuitive interface for administrators to configure and monitor firewall settings.
- Centralized Management: Support for managing multiple firewalls from a single interface, useful for larger or growing businesses with multiple locations.
- Automatic Updates: Enable automatic updates for firewall firmware, security patches, and threat signature databases.

**10. Scalability and Performance:**

- Throughput: Ensure that the firewall can handle the office's internet traffic and expected network load without causing significant performance degradation.
- QoS (Quality of Service): Prioritize certain types of traffic (e.g., VoIP or video conferencing) over others to ensure minimal latency.

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| | **11. Failover and Redundancy:**<br><br>- High Availability: In case of failure, ensure that there is a backup firewall ready to take over.<br>- Load Balancing: Optionally distribute traffic across multiple internet connections or firewalls for improved performance and reliability.<br><br>12. **Operating Temperature 0 to 40 Deg** |
| 3 | **Uninterrupted Power Supply (UPS) 1:1 3 KVA with 30 Min battery backup on full load condition**<br><br>**Technical & Functional Specification:** |
| | **1.  Input Specifications**<br>- Input Voltage: 140V – 300V AC (wide range to deal with voltage fluctuations).<br>- Input Frequency: 50Hz ± 5% (standard for India).<br>- Input Power Factor: >0.99 (preferably for higher efficiency).<br>- Input Current: 12-18 Amps<br>**2.  Output Specifications**<br>- Output Power: 3 KVA (2400W).<br>- Output Voltage: 230V ± 1% (single-phase).<br>- Output Frequency: 50Hz ± 0.2 Hz (synchronized with mains).<br>- Output Waveform: Pure Sine Wave (for Online UPS) or Simulated Sine Wave (for Line-Interactive UPS).<br>- Output Power Factor: 0.8 to 0.9.<br>**3.  Battery Specifications**<br>- Battery Type: Maintenance free battery<br>- Nominal Battery Voltage: 12/24V DC<br>- Battery Capacity: 100Ah to 200Ah (to provide adequate backup time 30 Min).<br>- Battery Charging Time: 4–6 hours for full charge.<br>- Battery Life: 3 years.<br>**4.  Efficiency**<br>- Operating Efficiency: ≥ 85% under low loads and ≥ 90% under full load.<br>**5.  Safety and Compliance**<br>- Certifications: CE, RoHS, ISO 9001, UL<br>- Protections: Overload, short-circuit, deep discharge, and overvoltage protection.<br>**6.   f. Environmental Specifications**<br>- Operating Temperature: 0°C to 40°C.<br>- Humidity: 0% to 95% (non-condensing).<br>- Noise Level: <55 dB at 1 meter.<br>**7.  Physical Dimensions and Weight**<br>- Dimensions: As per OEM<br>- Weight: Approximately 15–25 kg, depending on the battery and design. |
| 4 | **IP PAPX for at least 10 channel I/P and minimum 50 user**<br><br>**Technical & Functional Specification:** |

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| | 1. **Basic Telephony Services**:<br>• **Voice Call Handling**: outgoing/incoming calls through PSTN/VoIP).<br>• **Call Routing**: Support for automatic call distribution (ACD) to specific extensions or departments.<br>• **Voicemail**: Voicemail service for each extension with features like voicemail-to-email.<br>2. **Call Management Features:**<br>• Call Forwarding: Forward incoming calls to other extensions, mobile phones, or voicemail.<br>• Call Hold, Mute, and Transfer: Basic features for managing active calls.<br>• Call Waiting: Allows users to accept new calls while another call is active.<br>• Call Recording: Optional feature to record calls for quality or compliance purposes.<br>3. **Integration with External Lines:**<br>• PSTN Integration: Interface for traditional telephone lines (if needed).<br>• SIP Trunking: Integration with VoIP providers for cost-effective external calls.<br>• Mobile Integration: Ability to forward calls to mobile phones when staff are out of the office.<br>4. **Internal Communication:**<br>• Internal Extensions: Assign unique extensions for each user (e.g., 3-digit or 4-digit extensions).<br>• Intercom Function: Internal communication<br>• Speed Dial: Shortcut dialling for frequently called numbers.<br>5. **User Access and Configuration:**<br>• Web-based Interface, Extension Configuration, Minimal Training<br>6. **Cost-effective Setup:**<br>• Scalability: Ability to add more users or extensions as the office grows.<br>• Remote Office Support: Option for remote extensions.<br>7. **Security:**<br>• Basic Call Encryption, Firewall Protection. User Authentication<br>8. **Supported Devices:**<br>• IP Phones, SIP Trunks: Compatibility with common SIP trunk providers in India, Analog Gateways: Optional, if integrating with traditional analog phones or fax machines<br>9. **Scalability:**<br>• User Support: Minimum 30 -40 users/extensions (can scale up with additional user or extensions.<br>• Concurrent Calls: Minimum 10 concurrent call channels (expandable)<br>10. **Network and Connectivity:**<br>• Ethernet Ports: Minimum one Gigabit Ethernet ports for connecting to the local network and external devices.<br>• PoE (Power over Ethernet): If using IP phones, PoE support on the PBX or via a PoE injector/switch |
| 5 | **IP Phone** |
| | **Technical & Functional Specification:** |

1. **Basic Call Features**:
   - Voice Call Handling, Call Hold and Mute, Call Transfer, Call Waiting, Call Forwarding, Redial.
2. **Audio Quality.**
   - HD Audio (Wideband Audio): Support for HD voice) to ensure high-quality sound for clear communication.
   - Echo Cancellation & Noise Filtering
3. **User Interface:**
   - Backlit LCD Display: A simple, backlit display (e.g., 2.5" or 3.5")
   - Programmable Keys and Easy Navigation.
4. **Multi-Line Support:**
   - Multiple SIP Accounts & Call Appearance:
5. **Directory Services:**
   - **Phonebook/Contacts**: Ability to store contacts locally (e.g., 100-500 entries).
6. Call Management Features:
   - **Voicemail Access, Call Park, Conference Calling, Speed Dial**:
7. **Security:**
   - SIP Security (TLS/SRTP, Password Protection
8. **Power over Ethernet (PoE):**
   - **PoE Support**: Ability to draw power over Ethernet, reducing the need for additional power adapters
9. **Expansion and Future Proofing:**
   - **Scalability**: Ability to add additional phones and users in the future without significant additional costs.
   - **Firmware Upgrades**: Regular software updates to enhance features and security.
10. **Connectivity:**
    - Ethernet Ports: 1x 10/100/1000 Mbps.
    - Wi-Fi (Optional)
    - Headset Support: 3.5mm headset jack or Bluetooth support for hands-free operation.
11. **Environmental Factors:**
    - **Temperature**: Operates within the typical office temperature range (0°C to 40°C).
    - **Humidity**: Works under normal humidity conditions, typically 20% to 85% non-condensing
12. **Compatibility:**
    Other PBX Compatibility, & Cloud Integration

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| 6 | **Video Conference System with Commercial Smart LED Display/TV (Size 55"), Round tabletop microphone with button to mute /Unmute, Eco & noise cancellation features, HDMI & USB at least 5 Meter.** | |
| | **Technical & Functional Specification:** | |

**1 Conference System**
- Video Conferencing: Supports video calls with high-definition (HD) video and audio communication.
- Display: 55" LED commercial display for clear video and presentations.
- Audio: High-quality microphone array (round-table type) with echo cancellation and noise reduction.
- Connectivity: Compatible with popular video conferencing software (Zoom, Microsoft Teams, Google Meet, etc.).
- User Interface: Simple user interface with easy-to-use controls.
- Camera: A built-in or external high-definition camera for video capturing.
- Room Size: Designed for rooms with up to 12-15 participants.
- Speakers: Built-in speakers on the display or an external speaker system for clear audio.
- Integration: Plug-and-play integration with laptops, PCs, and mobile devices.

**2. Display:**
- Screen Size: 55 inches
- Type: Commercial-grade LED (FHD or 4K)
- Resolution: Full HD (1920 x 1080) or 4K (3840 x 2160) for better clarity
- Brightness: Minimum 350 nits (ideal for well-lit rooms)
- Refresh Rate: 60 Hz
- Connectivity: HDMI, VGA, and USB ports for easy connectivity with PCs, laptops, and other devices.
- Aspect Ratio: 16:9 (standard for video conferencing)
- Mounting Type: Wall mount or table stand (depending on room setup)

**3. Camera:**
- Type: PTZ (Pan-Tilt-Zoom) or fixed wide-angle camera
- Resolution: 1080p HD or higher
- Field of View: 90-120 degrees (to capture the entire room)
- Mounting: Tabletop or Ceiling or wall mount, adjustable
- Auto-Focus: Yes (for clear image focusing on the speaker)

**4. Microphone:**
- Type: Round table microphone array (360-degree pickup)
- Frequency Response: 100 Hz to 10 kHz (wide frequency for clear speech)
- Noise Cancellation: Built-in echo and noise cancellation technology
- Pickup Range: 3 to 5 meters (covers the entire round table area)
- Connectivity: USB or Bluetooth (depending on the device setup)
- Compatibility: Works with popular video conferencing platforms (Zoom, Teams, etc.)

**5. Speakers:**
- Type: Integrated or external soundbar speaker
- Power Output: 10W to 20W RMS (depends on room size)
- Audio Quality: Full-range speakers with clear output for meeting participants
- Connectivity: HDMI/3.5mm audio jack/Bluetooth (if external speaker is used)

**6.  System Connectivity:**
- USB Ports: For connecting external devices (camera, microphone, etc.)
- HDMI: At least one HDMI port for video input/output
- Wi-Fi/Bluetooth: Wireless connectivity for screen mirroring and other device connections
- Ethernet: Optional LAN port for stable network connection
- Audio Output: 3.5mm jack or Bluetooth for external speaker connection

**7. Software Compatibility:**
- Pre-installed Software: Zoom, Microsoft Teams, Google Meet, Skype (with easy integration)
- Browser Support: Compatible with web-based video conferencing platforms
- Operating System: Works on Windows, macOS, or Android-based systems

**8. Other Features:**
- Control: Remote control or touch screen interface for easy management of the system.
- Wall Mount Kit: Included for mounting the display on the wall.
- Privacy Features: Auto-mute or mute button for privacy when not speaking.
- Security: Encrypted video and audio calls for secure communication.
- Power Saving: Auto sleep mode or low-power standby feature.

**WIFI Access point (Indoor)**

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| 7 | **Technical & Functional Specification:** |

1. **Coverage Area:**
   - Approximate Coverage: 2,500 square feet
   - Consider site survey for optimal placement, or possibly more than one AP if the office layout is large or has many walls.
2. **Wi-Fi Standard:**
   - Wi-Fi 5 (802.11ac) or Wi-Fi 6 (802.11ax): For a small office
3. **Speed (Bandwidth):**
   - Wi-Fi 5: Support speeds up to 1,200 Mbps (for 5 GHz) and 300 Mbps (for 2.4 GHz).
   - **Antennas**: Internal or external (4-6 dB gain is typical for internal antennas).
4. Wi-Fi 6: Supports higher speeds (up to 9.6 Gbps theoretically,
5. **Dual-Band Support:**
   - 2.4 GHz: For longer-range, lower-speed connections
6. 5 GHz: For high-speed, high-throughput connections
7. **Security Features:**
   - WPA3 (Wi-Fi Protected Access 3) for stronger security.
   - WPA2 (fallback) support for backward compatibility with older devices.
   - Guest Network: Ability to create a separate network for visitors, isolated from internal systems.
   - VLAN Support: For segmenting traffic (e.g., separate networks for staff and guests).
8. **Power over Ethernet (PoE):**
   PoE Support: For easy installation without needing a separate power adapter, you can power the AP through the Ethernet cable.
9. **Management Options:**
   - Web-based Interface: For easy configuration via browser.
   - App-based Management (for more modern APs, especially for small businesses): Mobile app for configuring and monitoring the network.
   - Centralized Cloud Management: For managing multiple APs in larger setups (e.g., with mesh networks or multiple APs in a larger office).
10. **Simultaneous Connections:**
    - Supports at least 50-100 devices simultaneously: Sufficient for a small office with laptops, smartphones, and possibly printers, IP Phone, PBX & Video Conference System.
11. **Other Features:**
    - Beamforming:
    - MU-MIMO: Multi-User, Multiple Input, Multiple Output
12. **Ethernet**
    - 1x Gigabit Ethernet (RJ45) for connection to the router or switch.
13. **Mounting Options**:
    - Wall-mountable or ceiling-mountable for optimal signal coverage.
    - Compact design