ALCATEL-LUCENT ENTERPRISE OMNISWITCH 6450

STACKABLE GIGABIT ETHERNET LAN SWITCH FAMILY

The Alcatel-Lucent OmniSwitch™ 6450 Stackable Fast Ethernet and Gigabit Ethernet LAN value switch family offers versatile, 24/48-port fixed configuration switches with optional upgrade paths for 10 Gigabit Ethernet (GigE) stacking, 10 GigE uplinks and metro Ethernet services.

Promoting a design optimized for flexibility, scalability, and low power consumption, the OmniSwitch 6450 is an outstanding edge solution. It uses the field-proven Alcatel-Lucent Operating System (AOS) to deliver highly available, secure, self-protective, easily managed and eco-friendly networks.

The Alcatel-Lucent OmniSwitch 6450 family is embedded with the latest technology innovations and offers maximum investment protection.

The following types of deployments benefit from the OmniSwitch 6450 family:

- Edge of small-to-mid-sized networks
- Branch office enterprise and campus workgroups
- Residential and commercially managed service applications
- Service provider network deployments



OmniSwitch 6450-24/P24



OmniSwitch 6450-48/P48



OmniSwitch 6450-U24/U24S

BENEFITS

- Meets all customer configuration needs and offers excellent investment protection and flexibility with easy deployment, operation, and maintenance
- Provides outstanding performance when supporting real-time voice, data, and video applications for converged scalable networks
- Ensures efficient power management, reduces operating expenses (OPEX) and lowers total cost of ownership (TCO) through low power consumption and dynamic PoE allocation, which delivers only the power needed by the attached device
- Field-upgradeable solution makes the network highly available and reduces OPEX
- Fully secures the network at the edge at no additional cost
- Enterprise-wide cost reduction through hardware consolidation to achieve network segmentation and security without additional hardware installation
- Supports cost-effective installation and deployment with automated switch setup and configuration and end-to-end virtual LAN (VLAN) provisioning
- Simplifies metro Ethernet network OA&M for service providers

Alcatel·Lucent Enterprise

FEATURES

- 24-port and 48-port, Power over Ethernet (PoE), non-PoE, and 24-port fiber models with two fixed small form factor pluggable (SFP+) 10-G-ready interfaces
- Scalability from 24 to 384 Fast Ethernet and gigabit ports with 16 10 GigE ports
- Optional SFP+ stacking module
- Optional 10 GigE uplink license option
- Optional metro services feature license for service provider deployments
- Support for IEEE 802.3af as well as IEEE 802.3at-compliant PoE
- Support for Precision Timing Protocol (PTP) through IEEE 1588v2 ("S" models only)
- Internal AC or DC -redundant power supplies

MANAGEMENT

- AOS field-proven software managed through a web interface (WebView), command line interface (CLI), and Simple Network Management Protocol (SNMP)
- Support for programmable AOS OpenFlow for the creation of specialized services.
- Ethernet operations, administration and management (OA&M) support for service configuration and monitoring
- Supported by Alcatel-Lucent OmniVista™ 2500 Network Management System (NMS)
- Alcatel-Lucent 5620 Service Aware Manager (SAM) applications for service providers

SECURITY

- Flexible device and user authentication with Alcatel-Lucent Access Guardian (IEEE 802.1x/MAC/captive portal) with Host Integrity Check (HIC) enforcement
- Enables deployment of comprehensive and secure bring your own device (BYoD) services in enterprise networks, such as guest management, device on-boarding, device posturing, application management, and dynamic change of authentication (CoA).
- Advanced Quality of Service (QoS) and Access Control Lists (ACLs) for traffic control, including an embedded denial of service (DoS) engine to filter out unwanted traffic attacks
- Extensive support for user-oriented features, such as learned port security (LPS), port mapping, Dynamic Host Configuration Protocol (DHCP) binding tables, and User Network Profile (UNP)

PERFORMANCE AND REDUNDANCY

- Advanced layer-2+ features with basic layer-3 routing for both IPv4 and IPv6
- Triple speed (10/100/1000) user interfaces and fiber interfaces (SFPs) supporting 100Base X or 1000Base-X optical transceivers
- 10 G uplinks with license installed
- Wire-rate switching and routing performance
- High availability with virtual chassis concept, redundant stacking links, primary/secondary unit failover, hot-swappable power options and configuration rollback

CONVERGENCE

- Enhanced Voice over IP (VoIP) and video performance with policy-based QoS
- Future-ready support for multimedia applications with wire-rate multicast
- Airgroup™ Network Services for Bonjour speaking devices providing a consistent experience over wireless and wired networks
- IEEE 802.3at PoE+ support for IP phones, wireless LAN (WLAN) access points and video cameras

TECHNICAL INFORMATION

All models ship with two fixed SFP+ ports that operate at 1 Gb/s by default. Operation at 10 Gb/s requires installing the OS6450-SW-PERF license. These models also offer a two-port expansion slot for additional gigabit uplinks or 10 Gb/s stacking modules. Both PoE and non-PoE models are full rack width, power optimized, fixed configuration chassis in a 1U form factor. The "S" models support IEEE 1588v2 Precision Timing Protocol (PTP) through end-to-end Transparent Clock (TC) for network-wide time-synchronized applications.

24/48 port models

CHASSIS	10/100 RJ-45 PORTS	10/100/1000 RJ45 PORTS	SFP+ GIGABIT UPLINK SFP+ 10 GIGABIT UPLINK**	10 GB/S SFP+ STACKING EXPANSION MODULE PORTS	PRIMARY POWER	BACKUP POWER
Non-PoE models						
OS6450-24L	24	0*	2	2	Internal AC	Internal AC/DC
OS6450-48L	24	0*	2	2	Internal AC	Internal AC/DC
OS6450-24	0	24	2	2	Internal AC	Internal AC/DC
OS6450-48	0	48	2	2	Internal AC	Internal AC/DC
PoE models						
OS6450-P24L	24	0*	2	2	Internal AC	Internal AC
OS6450-P48L	24	0*	2	2	Internal AC	Internal AC
OS6450-P24	0	24	2	2	Internal AC	Internal AC
OS6450-P48	0	48	2	2	Internal AC	Internal AC

User port speed upgradeable to gigabit speed with a license upgrade
** Requires the OS6450-SW-PERF license to enable 10 G uplink capability.
• OmniSwitch 6450-P24L/P24 and OmniSwitch 6450-P48L/P48 models comply with both IEEE 802.3af/at standards.

CHASSIS	10/100/1000 SFP PORTS	10/100/1000 COMBO PORTS	SFP+ GIGABIT UPLINK SFP+ 10 GIGABIT UPLINK**	10 GB/S SFP+ STACKING EXPANSION MODULE PORTS	PRIMARY POWER	BACKUP POWER
Fiber models						
OS6450-U24	22	2	2	2	Internal AC	Internal AC/DC
OS6450-U24S	22	2	2	2	Internal AC	Internal AC/DC

** Requires the OS6450-SW-PERF license to enable 10 G uplink capability.
• Combo ports are individually configurable to be 10/100/1000Base-T or 100/1000Base-X based on SFP transceivers.
• SFP ports support 100/1000 Base-X SFP transceivers.
• "S" models only support 1588v2 Transparent Clock in non-stacking configuration.

Expansion port models

EXPANSION MODULE	GIGABIT RJ45 PORTSSFP PORTS	GIGABIT SFP PORTS	10 GB/S SFP+ ***
OS6450-XNI-U2	0	0	2
OS6450-GNI-U2	0	2	0
OS6450-GNI-C2	2	0	0

*** Only stacking mode supported
• Expansion modules are not 1588v2 capable.
• 1588v2 precision timing is disabled if expansion modules are installed.

DETAILED PRODUCT FEATURES

Simplified management

- **Configuration management interfaces**
  - ¬ Intuitive Alcatel-Lucent CLI with a familiar interface, reducing training costs
  - ¬ Easy-to-use, point-and-click web-based element manager (WebView) with built-in help for easy configuration
  - ¬ Integration with Alcatel-Lucent OmniVista 2500 for network management
  - ¬ Full configuration and reporting using SNMPv1/2/3 across all OmniSwitch families to facilitate third-party NMS integration
  - ¬ Remote Telnet management or Secure Shell access using SSHv2
  - ¬ File upload using USB, TFTP, FTP, SFTP, or SCP for faster configuration
  - ¬ Human-readable ASCII-based configuration files for offline editing and bulk configuration
  - ¬ Managed by Alcatel-Lucent 5620 Service Aware Manager
- **Monitoring and troubleshooting**
  - ¬ Local (on the Flash) and remote server logging: Syslog and command log
  - ¬ Port-based mirroring for troubleshooting and lawful interception supports four sessions with multiple sources-to-one destination
  - ¬ Policy-based mirroring that allows selecting the type of traffic to mirror using QoS policies
  - ¬ Remote port mirroring that facilitates passing mirrored traffic through the network to a remotely connected device
  - ¬ Port monitoring feature that allows capturing Ethernet packets to a file, or to an on-screen display to assist in troubleshooting
  - ¬ sFlow v5 and RMON for advanced monitoring and reporting capabilities for statistics, history, alarms, and events
  - ¬ IP tools: Ping and trace route
  - ¬ Digital Diagnostic Monitoring (DDM): Real-time diagnostics of fiber connections for early detection of optical signal deterioration
  - ¬ Time Domain Reflectometry (TDR) for locating breaks or other discontinuity in copper cables
- **Network configuration**
  - ¬ Remote auto-configuration download
  - ¬ Auto-negotiating: 10/100/1000 ports automatically configure port speed and duplex setting
  - ¬ Auto MDI/MDIX configuring transmit and receive signals to support straight-through and crossover cabling
  - ¬ BOOTP/DHCP client that allows auto-configuring switch IP information for simplified deployment
  - ¬ DHCP relay for forwarding client requests to a DHCP server
  - ¬ Alcatel-Lucent Mapping Adjacency Protocol (AMAP) for building topology maps
  - ¬ IEEE 802.1AB Link Layer Discovery Protocol (LLDP) with MED extensions for automated device discovery
  - ¬ Multiple VLAN Registration Protocol (MVRP) for IEEE 802.1Q-compliant VLAN pruning and dynamic VLAN creation
  - ¬ Auto QoS for switch management traffic and traffic from Alcatel-Lucent IP phones
  - ¬ Network Time Protocol (NTP) for network-wide time synchronization
  - ¬ IEEE 1588v2 Precision Timing Protocol (PTP) through end-to-end Transparent Clock (TC) for network-wide time synchronized applications: ("S" models only)
  - ¬ Stackable to eight units

Resiliency and high availability

- Ring Rapid Spanning Tree (RRSTP) optimized for ring topology to provide less than 100 ms convergence time
- IEEE 802.1s Multiple Spanning Tree Protocol: Encompasses IEEE 802.1D STP and IEEE 802.1w Rapid Spanning Tree Protocol
- Per-VLAN spanning tree (PVST) and Alcatel-Lucent 1x1 STP mode
- Support for IEEE 802.3ad Link Aggregation Control Protocol (LACP) and static LAG groups across modules
- Dual-home link (DHL) support for sub-second link protection without STP
- Virtual Router Redundancy Protocol (VRRP) providing highly available routed environments
- Broadcast and multicast storm control to avoid degradation in overall system performance
- Unidirectional Link Detection (UDLD) for detecting and disabling unidirectional links on fiber optic interfaces
- Layer-2 port loopback detection for preventing customer loops on Ethernet access ports
- Redundant and hot-swappable power supplies; transceiver modules offering uninterruptable service
- Dual image and dual configuration file storage provide backup

Advanced security

- **Access control**
  - ¬ AOS Access Guardian framework for comprehensive user-policy-based network access control (NAC)*
  - ¬ Auto-sensing IEEE 802.1X multi-client, multi-VLAN MAC-based authentication for non-802.1X hosts
  - ¬ Web-based authentication (Captive Portal): A customizable web portal residing on the switch that can be used for authenticating supplicants and non-supplicants
  - ¬ Group mobility rules and "guest" VLAN support
  - ¬ Host integrity check (HIC) agent on each switch acting as an HIC enforcer and facilitating endpoint device control for company policy compliance. Support for quarantine and remediation as required.
  - ¬ Support for dynamic change of authentication (CoA) and enforcing traffic remediation or restriction for non-compliant devices
  - ¬ User network profile (UNP): Simplifying NAC management and control by dynamically providing predefined policy configuration to authenticated clients (VLAN, ACL, BW, HIC)
  - ¬ SSH for secure CLI session with public key infrastructure (PKI) support
  - ¬ Centralized Remote Access Dial-In User Service (RADIUS) and LDAP user authentication
  - ¬ Private VLAN for user traffic segregation
- **Containment, monitoring and quarantine**
  - ¬ DHCP snooping, DHCP IP spoof protection
  - ¬ Terminal Access Controller Access Control System Plus (TACACS+) client allowing authentication, authorization and accounting with a remote TACACS+ server
  - ¬ Dynamic ARP protection and ARP poisoning detection
  - ¬ ACLs for filtering out unwanted traffic including DoS attacks; flow-based filtering in hardware (L1 to L4)
  - ¬ BPDU blocking: Automatically shutting down user ports if an STP BPDU packet is seen to prevent topology loops
  - ¬ STP Root Guard: Preventing edge devices from becoming Spanning Tree Protocol root nodes

Converged networks

- **PoE**
  - ¬ PoE models support Alcatel-Lucent IP phones and WLAN access points, as well as any IEEE 802.3af or IEEE 802.3at-compliant end devices
  - ¬ Configurable per-port PoE priority and max power for power allocation
  - ¬ Dynamic PoE allocation: Delivering only the amount of power needed by the powered devices (PD) up to the total power budget for most efficient power consumption
- **QoS**
  - ¬ Priority queues: Eight hardware-based queues per port for flexible QoS management
  - ¬ Traffic prioritization: Flow-based QoS with internal and external (remarking) prioritization
  - ¬ Bandwidth management: Flow-based bandwidth management, ingress rate limiting; egress rate shaping per port
  - ¬ Queue management: Configurable scheduling algorithms, including Strict Priority Queuing (SPQ), Weighted Round Robin (WRR) and Deficit Round Robin (DRR)
  - ¬ Congestion avoidance: Support for End-to-End Head-Of-Line (E2E-HOL) blocking protection
  - ¬ Auto QoS for switch management traffic and traffic from Alcatel-Lucent IP phones
  - ¬ Three-color marker: Single/Dual Rate policing with commit BW, excess BW and burst size

Layer-2/Layer-3 Routing and Multicast

- **Layer-2 switching**
  - ¬ Up to 16,000 MACs
  - ¬ Up to 4000 VLANs
  - ¬ Up to 2000 ACLs
  - ¬ Latency: < 4 µs
  - ¬ Max Frame: 9216 bytes (jumbo)
- **IPv4 and IPv6**
  - ¬ Static routing for IPv4 and IPv6
  - ¬ RIP v1 and v2 for IPv4; RIPng for IPv6
  - ¬ Up to 256 IPv4 and 128 IPv6 static and RIP routes
  - ¬ Up to 128 IPv4 and 16 IPv6 interfaces
  - ¬ Up to 1000 Arp entries
- **Multicast**
  - ¬ IGMPv1/v2/v3 snooping for optimized multicast traffic
  - ¬ Multicast Listener Discovery (MLD) v1/v2 snooping
  - ¬ Up to 1000 multicast groups per stack
  - ¬ IP Multicast VLAN (IPMVLAN) for optimized multicast replication at the edge, saving network core resources
- **Network protocols**
  - ¬ DHCP relay including generic UDP relay
  - ¬ ARP
  - ¬ Dynamic Host Configuration Protocol (DHCP) relay
  - ¬ DHCP relay to forward client requests to a DHCP server
  - ¬ Generic User Datagram Protocol (UDP) relay per VLAN
  - ¬ DHCP Option 82: Configurable relay agent information

Metro Ethernet access (features available through Metro license upgrade)

- Ethernet services support per IEEE 802.1ad Provider Bridge
  - ¬ Transparent LAN Services with Service VLAN (SVLAN) and Customer VLAN (CVLAN) concept
  - ¬ Ethernet network-to-network interface (NNI) and user network interface (UNI) services
  - ¬ Service Access Point (SAP) profile identification
  - ¬ CVLAN to SVLAN translation and mapping
- IEEE 802.1ag Ethernet OAM: Connectivity Fault Management (L2 ping and link trace)
- Ethernet OAM compliant with IEEE 802.3ah
- ITU-T G.8032 Ethernet Ring Protection designed for loop protection and fast convergence times (< 50 ms) in ring topologies
- Private VLAN for user traffic segregation
- Service Assurance Agent (SAA) for proactively measuring network health, reliability and performance. Four SAA tests including L2-MAC, IP, ETH-LB and ETH-DMM depending on network requirements
- Customer provider edge (CPE) test head traffic generator and analyzer tool used in the metro Ethernet network to validate customer Service Level Agreements (SLAs)
- IPMVLAN for optimized multicast replication at the edge, saving network core resources
- Layer-2 Multicast VLAN Replication (MVR) that allows users from different multicast VLANs to subscribe to a multicast group from an upstream trunk interface
- Three color marker: Single/Dual Rate policing with commit BW, excess BW and burst size
- TR-101 PPPoE Intermediate Agent allowing the PPPoE network access method
- MAC-Forced forwarding support according to RFC 4562
- Layer-2 Control Protocol (L2CP) for tunneling a customer's L2CP frames, through a-well known address, on a given UNI for Ethernet Private Line (EPL) and Ethernet Virtual Private Line (EVPL) services
- Dying Gasp through SNMP and Ethernet OAM delivery
- Metro Ethernet Forum CE 2.0 certified
- Managed by Alcatel-Lucent 5620 SAM

TECHNICAL SPECIFICATIONS

PORT	OS6450-24L	OS6450-P24L	OS6450-48L	OS6450-P48L	OS6450-U24/-U24S
RJ-45 10/100 ports	24	24	48	48	0
PORT	OS6450-24	OS6450-P24	OS6450-48	OS6450-P48	OS6450-U24/-U24S
RJ-45 10/100/1000 ports	24	24	48	48	0
PERFORMANCE (Gigabit models)					
Switch capacity with 2x10 G ports and 2x10 G stacking	128 Gb/s	128 Gb/s	176 Gb/s	176 Gb/s	128 Gb/s
Switch frame rate with 2x10 G ports and 2x10 G stacking	95.3 Mp/s	95.3 Mp/s	131.0 Mp/s	131.0 Mp/s	95.3 Mp/s
Stacking capacity (aggregated)	40 Gb/s	40 Gb/s	40 Gb/s	40 Gb/s	40 Gb/s
PORT	OS6450-24L/ OS6450-24	OS6450-P24L/ OS6450-P24	OS6450-48L/ OS6450-48	OS6450-P48L/ OS6450-P48	OS6450-U24/ OS6450-U24S
RJ-45/SFP 10/100/1000 combo ports	0	0	0	0	2
SFP 100/1000 ports	0	0	0	0	22
SFP+ Gigabit/10 Gigabit uplink ports	2	2	2	2	2
Ports per expansion module	2	2	2	2	2
PoE ports	0	24	0	48	0
Max 24/48-port models in a stack	8	8	8	8	8
DIMENSIONS	OS6450-24L/ OS6450-24	OS6450-P24L/ OS6450-P24	OS6450-48L/ OS6450-48	OS6450-P48L/ OS6450-P48	OS6450-U24/ OS6450-U24S
Width	44.0 cm (17.32 in)	44.0 cm (17.32 in)	44.0 cm (17.32 in)	44.0 cm (17.32 in)	44.0 cm (17.32 in)
Height	4.4 cm (1.73 in)	4.4 cm (1.73 in)	4.4 cm (1.73 in)	4.4 cm (1.73 in)	4.4 cm (1.73 in)
Depth	31.24 cm (12.3 in)	31.24 cm (12.3 in)	39.1 cm (15.4 in)	39.1 cm (15.4 in)	31.24 cm (12.3 in)
Weight	4.08 kg (9.0 lb)	5.05 kg (11.0 lb)	5.44 kg (12.0 lb)	6.8 kg (15.0 lb)	4.08 kg (9.0 lb)

OPERATING CONDITIONS	OS6450-24L/ OS6450-24	OS6450-P24L/ OS6450-P24	OS6450-48L/ OS6450-48	OS6450-P48L/ OS6450-P48	OS6450-U24/ OS6450-U24S
Operating temperature	0°C to +45°C 32°F to +113°F	0°C to +45°C 32°F to +113°F	0°C to +45°C 32°F to +113°F	0°C to +45°C 32°F to +113°F	0°C to +45°C 32°F to +113°F
Storage temperature	-40°C to +75°C -40°F to +167°F	-40°C to +75°C -40°F to +167°F	-40°C to +75°C -40°F to +167°F	-40°C to +75°C -40°F to +167°F	-40°C to +75°C -40°F to +167°F
Humidity (operating and storage)	5% - 95%	5% - 95%	5% - 95%	5% - 95%	5% - 95%
Fan (variable speed)*	No fan	3 fans	3 fans	4 fans	2 fans
Acoustic (dB)	0 db (A)	<40db (A)	<40db (A)	<40db (A)	<40db (A)
MTBF (hours)	894,251	231,542	337,583	135,087	364,214
System power consumption (watts)**					
• 0% traffic	29.60W / 34.50W	31.4W / 31.84W	41.7W / 47.6W	48.26W / 59.55W	49.25W / 51.5W
• 50% traffic	30.6W / 38.70W	32.52W / 40.49	44.2W / 60.5W	50.64W / 76.09W	53.37W /55.75W
• 100% traffic	31.1W / 39.40W	32.79W / 40.99W	45.1W / 62.3W	52.38W /77.23W	56.26W / 62.9W
System heat dissipation (Btus):					
• 0% traffic	100.90 / 117.71	107.14 / 108.64	142.28 / 162.41	164.66 / 203.19	168.04 / 175.72
• 50% traffic	104.41 / 132.04	110.96 / 138.15	150.81 / 206.43	50.64 / 172.79	182.10 / 190.22
• 100% traffic	106.11 / 134.43	111.88 / 139.86	153.88 / 212.57	178.72 / 263.51	192 / 214.62
PoE power budget (watts)	N/A	390	N/A	780	N/A
PoE device heat dissipation (BTU)	N/A	1332	N/A	2663	N/A
Power supply efficiency	86.99%	88.75%	85.72%	81.25%	85.71%

* Acoustic levels measured with a single power supply at room temperature
** Power consumption measured with 64-byte packets at varied traffic conditions on all ports, including the 10GE stacking module (accounting for 8 watts).

OmniSwitch 6450 backup supplies and specifications

The OmniSwitch 6450 24/24L/48/48L/U24/U24S-port models offer a 1RU internal backup supply configuration where the redundant supply is installed in a power supply bay at the back of the unit.

The OmniSwitch 6450 P24/48-port models offer a 2RU external backup supply configuration where the redundant supply/tray combination mounts above the switch and uses a remote cable for the switch/supply connection. All parts and accessories are included with the backup supply kit.

SPECIFICATION	OS6450-BP	OS6450-BP-PH	OS6450-BP-PX	OS6450-BP-D
Style	Framed	Framed	Framed	Framed
Internal/external	Internal	External	External	Internal
Input voltage	90-220V AC	90-220V AC	90-220V AC	36-72V DC
Output voltage	12V DC	12V DC/54V DC	12V DC/54.5V DC	12V DC
Wattage	90W	530W	900W	90W
PoE power budget	N/A	410W	780W	N/A
Power supply efficiency	85%	85%	80%	85%
Weight	1.11 kg (2.45 lb)	2.59 kg (5.75 lb)	2.73 kg (6.02 lb)	1.11 kg (2.45 lb)
Total RU with BPS	1 RU	2 RU	2 RU	1 RU
Supply dimension	N\A	32 cm x 17.5 cm x 4.4cm (12.6 in x6.9 in x 1.73 in)	32 cm x 17.5 cm x 4.4cm (12.6 in x 6.9 in x 1.73 in)	N\A
Shelf dimension	N\A	35.3 cm x 21 cm x 4.4cm (13.9 in x 8.3 in x 1.73 in)	35.3 cm x 21 cm x 4.4cm (13.9in x 8.3 in x 1.73 in)	N\A
Models supported	OS6450-24/24L/48/ 48L/U24/U24S	OS6450-P24/P24L	OS6450-P48/P48L	OS6450-24/24L/48/ 48L/U24/U24S

INDICATORS

System LEDs

- System (OK) (chassis HW/SW status)
- PWR (primary power supply status)
- PRI (virtual chassis primary)
- BPS (backup power status)
- LED segment display indicates the stack ID of the unit in the stack: 1 to 8 (24/48 port models)

Per-port LEDs

- 10/100/1000: PoE, link/activity
- SFP: Link/activity
- Stacking: Link/activity

Compliance and certifications

Commercial

- EMI/EMC
- FCC CRF Title 47 Subpart B (Class A limits. Note: Class A with UTP cables)
- VCCI (Class A limits. Note: Class A with UTP cables)
- AS/NZS 3548 (Class A limits. Note: Class A with UTP cables)
- CE-Mark: Marking for European countries (Class A limits. Note: Class A with UTP cables)
- CE-Mark
  - ¬ Low Voltage Directive
  - ¬ EMC Directive
  - ¬ RoHS Directive
- EN 55022: 2010 (EMI and EMC requirement))
- EN 61000-3-3
- EN 61000-3-2 (Limits for harmonic current emissions)
- EN 55024 (ITE Immunity characteristics)
  - ¬ EN 61000-4-2
  - ¬ EN 61000-4-3
  - ¬ EN 61000-4-4
  - ¬ EN 61000-4-5
  - ¬ EN 61000-4-6
  - ¬ EN 61000-4-8
  - ¬ EN 61000-4-11
- IEEE802.3: HiPot Test (2250 V DC on all Ethernet ports)
- EN 50581: Standard for technical documentation for RoHS recast

Safety agency certifications

- CB Scheme: Certification per IEC 60950/EN 60950 with all different country deviations
  - ¬ UL 60950, United States
  - ¬ IEC 60950-1, all national deviations
  - ¬ EN 60950-1 (Electric/Health & Safety), all national deviations
  - ¬ CAN/CSA-C22.2 No. 60950-1-03
  - ¬ NOM-019 SCFI, Mexico
  - ¬ AS/NZ TS-001 and 60950, Australia
  - ¬ UL-AR, Argentina
  - ¬ UL-GS Mark, Germany
- IEC 60825-1 Laser, IEC 60825-2 Laser
- CDRH Laser

Supported standards

- IEEE 802.1D (STP)
- IEEE 802.1p (CoS)
- IEEE 802.1Q (VLANs)
- IEEE 802.1ad (Provider Bridge) Q-in-Q (VLAN stacking)
- IEEE 802.1ag (Connectivity Fault Management)
- IEEE 802.1s (MSTP)
- IEEE 802.1w (RSTP)
- IEEE 802.1X (Port Based Network Access Protocol)
- IEEE 802.3i (10Base-T)
- IEEE 802.3u (Fast Ethernet)
- IEEE 802.3x (Flow Control)
- IEEE 802.3z (Gigabit Ethernet)
- IEEE 802.3ab (1000Base-T)
- IEEE 802.3ac (VLAN Tagging)
- IEEE 802.3ad (Link Aggregation)
- IEEE 802.3ae (10 Gigabit Ethernet)
- IEEE 802.3af (Power-over-Ethernet)
- IEEE 802.3at (Power-over-Ethernet)
- IEEE 802.ah (Ethernet first mile)
- IEEE 802.3az (Energy Efficient Ethernet)
- IEEE 1588v2 Precision Timing Protocol (PTP) (“S” models only)
  - ¬ End-to-end Transparent Clock (TC)
  - ¬ IPv4 Unicast address or Ethernet Multicast Encapsulation

ITU-T recommendations

- ITU-T Y.1731 OA&M fault and performance management
- ITU-T G.8032/Y.1344 2010: Ethernet Ring Protection (ERPv2)

IETF RFCs

RIP

- RFC 1058 RIP v1
- RFC 1722/1723/1724/2453 RIP v2 and MIB
- RFC 1812/2644 IPv4 Router Requirement
- RFC 2080 RIPng for IPv6

IP Multicast

- RFC 1112 IGMP v1
- RFC 2236/2933 IGMP v2 and MIB
- RFC 2365 Multicast
- RFC 3376 IGMPv3 for IPv6

IPv6

- RFC 1886 DNS for IPv6
- RFC 2292/2373/2374/2460/2462
- RFC 2461 NDP
- RFC 2463/2466 ICMP v6 and MIB
- RFC 2452/2454 IPv6 TCP/UDP MIB
- RFC 2464/2553/2893/3493/3513
- RFC 3056 IPv6 Tunneling
- RFC 3542/3587 IPv6
- RFC 4007 IPv6 Scoped Address Architecture
- RFC 4193 Unique Local IPv6 Unicast Addresses

Manageability

- RFC 854/855 Telnet and Telnet options
- RFC 959/2640 FTP
- RFC 1155/2578-2580 SMI v1 and SMI v2
- RFC 1157/2271 SNMP
- RFC 1212/2737 MIB and MIB-II
- RFC 1213/2011-2013 SNMP v2 MIB
- RFC 1215 Convention for SNMP Traps
- RFC 1350 TFTP Protocol
- RFC 1573/2233/2863 Private Interface MIB
- RFC 1643/2665 Ethernet MIB
- RFC 1901-1908/3416-3418 SNMP v2c
- RFC 2096 IP MIB
- RFC 2131 DHCP Server/Client
- RFC 2570-2576/3411-3415 SNMP v3
- RFC3414 User-based Security Model
- RFC 2616 /2854 HTTP and HTML
- RFC 2667 IP Tunneling MIB
- RFC 2668/3636 IEEE 802.3 MAU MIB
- RFC 2674 VLAN MIB
- RFC 2818 HTTPS over SSL
- RFC 4251 Secure Shell Protocol Architecture
- RFC 4252 The Secure Shell (SSH v2) Authentication Protocol

Security

- RFC 1321 MD5
- RFC 2104 HMAC Message Authentication
- RFC 2138/2865/2868/3575/2618 RADIUS Authentication and Client MIB
- RFC 2139/2866/2867/2620 RADIUS Accounting and Client MIB
- RFC 2228 FTP Security Extensions step
- RFC 2284 PPP EAP
- RFC 2869/3579 Radius Extension

Quality of service

- RFC 896 Congestion control
- RFC 1122 Internet Hosts
- RFC 2474/2475/2597/3168/3246 DiffServ
- RFC 3635 Pause Control
- RFC 2697 srTCM
- RFC 2698 trTCM

Other

- RFC 791/894/1024/1349 IP and IP/Ethernet
- RFC 792 ICMP
- RFC 768 UDP
- RFC 793/1156 TCP/IP and MIB
- RFC 826/903 ARP and Reverse ARP
- RFC 919/922 Broadcasting Internet Datagram
- RFC 925/1027 Multi LAN ARP/Proxy ARP
- RFC 950 Sub-netting
- RFC 951 BOOTP
- RFC 1151 RDP
- RFC 1191 Path MTU Discovery
- RFC 1256 ICMP Router Discovery
- RFC 1305/2030 NTP v3 and Simple NTP
- RFC 1493 Bridge MIB
- RFC 1518/1519 CIDR
- RFC 1541/1542/2131/3396/3442 DHCP
- RFC 1757/2819 RMON and MIB
- RFC 2131/3046 DHCP/BOOTP Relay
- RFC 2132 DHCP Options
- RFC 2251 LDAP v3
- RFC 3060 Policy Core
- RFC 3176 sFlow
- RFC 3021 Using 31-bit prefixes

ORDERING INFORMATION

MODEL NUMBER	DESCRIPTION
OS6450-24L	Fast Ethernet chassis in a 1U form factor with 24 10/100 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-P24L	Fast Ethernet chassis in a 1U form factor with 24 PoE 10/100 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-48L	Fast Ethernet chassis in a 1U form factor with 48 10/100 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-P48L	Fast Ethernet chassis in a 1U form factor with 48 PoE 10/100 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-24	Gigabit Ethernet chassis in a 1U form factor with 24 10/100/1000 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-P24	Gigabit Ethernet chassis in a 1U form factor with 24 PoE 10/100/1000 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-48	Gigabit Ethernet chassis in a 1U form factor with 48 10/100/1000 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-P48	Gigabit Ethernet chassis in a 1U form factor with 48 PoE 10/100/1000 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-U24	Gigabit Ethernet chassis in a 1U form factor with 22 100/1000 Base-X SFP ports, 2 combo ports configurable to be 10/100/1000 Base-T or 100/1000 Base-X, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-U24S	Gigabit Ethernet chassis in a 1U form factor with 22 100/1000 Base-X SFP ports, 2 combo ports configurable to be 10/100/1000 Base-T or 100/1000 Base-X, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules. Supports 1588v2 precision timing protocol.
All models	All models above contain an internal AC power supply with a country-specific power cord, user manuals access card, and hardware for mounting in a 19" rack and RJ-45 to DB-9 adapter. Ethernet SFP optical transceivers, stacking module, and cables may be ordered separately.

All of the models above support the following license options:

LICENSE OPTIONS	DESCRIPTION
OS6450-SW-PERF	Performance software license enabling 10 gigabit speed on the fixed SFP+ ports of the 24- or 48-port models.
OS6450-SW-ME	Software license enabling the Metro Software features outlined in the Metro Ethernet Access section of this data sheet.
OS6450-24L-UPGD	Software license enabling gigabit speed on the RJ-45 user ports of OS6450-24L and OS6450-P24L.
OS6450-48L-UPGD	Software license enabling gigabit speed on the RJ-45 user ports of OS6450-48L and OS6450-P48L.
EXPANSION MODULE	Gigabit Ethernet chassis in a 1U form factor with 24 10/100/1000 Base-T ports, 2 fixed SFP+ (1G/10G*) ports and one expansion slot for optional stacking or uplink modules.
OS6450-XNI-U2	Optional 10 Gigabit SFP+ stacking module. Supports two SFP+ 10 Gigabit ports. Inserted into the OS6450 expansion slot at the rear of the OS6450 chassis. Stacking cables may be ordered separately. Uplink mode not supported.
OS6450-GNI-U2	Optional SFP Gigabit uplink module. Supports two SFP Gigabit ports. Inserts in the OS6450 expansion slot at the rear of the OS6450 chassis. SFPs may be ordered separately.
OS6450-GNI-C2	Optional RJ-45 Gigabit uplink module. Supports two RJ-45 Gigabit ports. Inserts in the 6450 expansion slot at the rear of the OS6450 chassis.
POWER SUPPLY	
OS6450-BP	90 W power AC backup power supply. Provides backup power to one non-PoE switch. Inserted into the backup power supply bay at the rear of the chassis. Ships with country-specific power cord.
OS6450-BP-PH	550 W AC backup power supply. Provides backup PoE power (390 W) to one 24-port PoE switch. Ships with a remote power connection cable, country-specific power cord, power shelf, and rack mounts for a 2RU configuration.
OS6450-BP-PX	900 W AC backup power supply. Provides backup PoE power (780 W) to one 48-port PoE switch. Ships with a remote power connection cable, country-specific power cord, power shelf, and rack mounts for a 2RU configuration.
OS6450-BP-D	90 W power DC backup power supply. Provides backup power to one non-PoE switch. Inserted into the backup power supply bay at the rear of the chassis.
CABLES	
OS6450S-CBL-60	60 cm long SFP+ direct stacking cable for OS6450 24- and 48-port models
OS6450S-CBL-1M	100 cm long SFP+ direct stacking cable for OS6450 24- and 48-port models
GIGABIT TRANSCEIVERS	
SFP-10G-SR	10 Gigabit optical transceiver (SFP+). Supports multimode fiber over 850 nm wavelength (nominal) with an LC connector. Typical reach of 300 m.
SFP-10G-LR	10 Gigabit optical transceiver (SFP+). Supports single-mode fiber over 1310 nm wavelength (nominal) with an LC connector. Typical reach of 10 km.
SFP-10G-ER	10 Gigabit optical transceiver (SFP+). Supports single-mode fiber over 1550 nm wavelength (nominal) with an LC connector. Typical reach of 40 km.
SFP-10G-LRM	10 Gigabit optical transceiver (SFP+). Supports multimode fiber over 1310 nm wavelength (nominal) with an LC connector. Typical reach of 220 m on FDDI-grade (62.5µm).
SFP-10G-GIG-SR	Dual-speed SFP+ optical transceiver. Supports multimode fiber over 850 nm wavelength (nominal) with an LC connector. Supports 1000Base-SX and 10GBase-SR speeds.

GIGABIT TRANSCEIVERS	
SFP-GIG-LH70	1000Base-LH transceiver with an LC interface for single-mode fiber over 1550 nm wavelength. Typical reach of 70 km.
SFP-GIG-LH40	1000Base-LH transceiver with an LC interface for single-mode fiber over 1310 nm wavelength. Typical reach of 40 km
SFP-GIG-LX	1000Base-LX transceiver with an LC interface for single-mode fiber over 1310 nm wavelength. Typical reach of 10 km.
SFP-GIG-SX	1000Base-SX transceiver with an LC interface for multimode fiber over 850 nm wavelength. Typical reach of 300 m.
SFP-DUAL-BX-D	1000Base-BX10-D transceiver with an LC-type interface for use over single-mode fiber on a single strand link up to 10 km. Operates at 100/1000 Mb speed, transmits 1500 nm and receives 1310 nm optical signal.
SFP-DUAL-BX-U	1000Base-BX10-U transceiver with an LC type interface for use over single-mode fiber on a single strand link up to 10 km. Operates at 100/1000 Mb speed, transmits 1310 nm and receives 1550 nm optical signal.
SFP-GIG-BX-D	1000Base-BX bidirectional transceiver with an LC type interface for use over single-mode fiber on a single strand link up to 10 km point to point. Transmits 1490 nm and receives 1310 nm optical signal.
SFP-GIG-BX-U	1000Base-BX bidirectional transceiver with an LC type interface for use over single-mode fiber on a single strand link up to 10 km point to point. Transmits 1310 nm and receives 1490 nm optical signal.
SFP-GIG-BX-D20	1000Base-BX bidirectional transceiver with an LC type interface for use over single-mode fiber on a single strand link up to 20 km point to point. Transmits 1490 nm and receives 1310 nm optical signal.
SFP-GIG-BX-U20	1000Base-BX bidirectional transceiver with an LC type interface for use over single-mode fiber on a single strand link up to 20 km point to point. Transmits 1310 nm and receives 1490 nm optical signal.
SFP-GIG-EXTND	1000Base-SX transceiver with an LC interface for single-mode fiber over 850 nm wavelength. Typical reach of 2 km

100 MEGABIT TRANSCEIVERS	
SFP-100-MM	100Base-FX transceiver with an LC interface for multimode fiber optic cable.
SFP-100-SM15	100Base-FX transceiver with an LC type interface for single-mode fiber optic cable up to 15 km.
SFP-100-SM40	100Base-FX transceiver with an LC type interface for single-mode fiber optic cable up to 40 km.
SFP-100-BX-U	100Base-BX bidirectional transceiver with an SC type interface for use over single-mode fiber optic on a single strand link up to 20KM point-to-point, where the client (ONU) transmits 1310nm and receives 1550nm optical signal.
SFP-100-BX-D	100Base-BX bidirectional transceiver with an SC type interface for use over single-mode fiber optic on a single strand link up to 20KM point-to-point, where the client (OLT) transmits 1550nm and receives 1310nm optical signal.

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