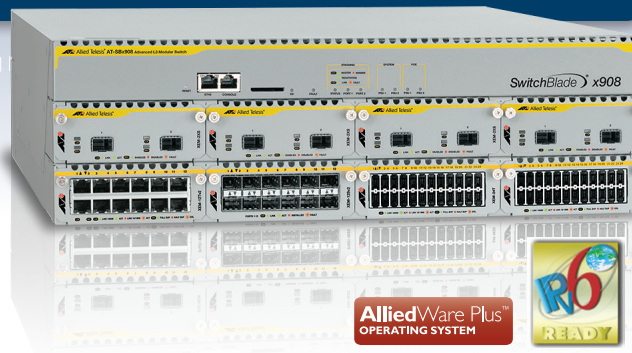


# SwitchBlade® x908

## ADVANCED LAYER 3+ MODULAR SWITCH

The Allied Telesis SwitchBlade x908 modular switch is the ideal solution for the modern enterprise network core where reliability, resiliency and high performance are the key requirements.



### Reliable

The SwitchBlade x908 was designed with reliability in mind. With dual power supplies, fan modules and a comprehensive range of expansion modules (XEMs) — all hot-swappable — the SwitchBlade x908 can be maintained and reconfigured when necessary without affecting network uptime.

The SwitchBlade x908 switch operates with one PSU, and installing a second PSU provides ultimate redundancy. Dual internal PSUs eliminate the need for an external Redundant Power Supply (RPS), thus saving valuable rack space. Built-in redundancy guarantees uninterrupted delivery of essential services.

The SwitchBlade x908 also features front-to-back cooling, making it ideal for data center applications.

### Powerful Network Management

Meeting the increased management requirements of modern converged networks, Allied Telesis Management Framework (AMF) automates many everyday tasks including configuration management. The complete network can be managed as a single virtual device with powerful centralized management features. Growing the network can be accomplished with plug-and-play simplicity, and network node recovery is fully zero-touch.

### Resilient

High availability features such as VCStack™ (Virtual Chassis Stacking) and EPSRing™ (Ethernet Protection Switched Rings) ensure traffic flow continues even during unscheduled outages.

VCStack provides excellent resiliency by creating a single “virtual chassis” from two SwitchBlade x908 physical devices, using dedicated high speed stacking links. VCStack provides a highly available system where network resources are spread out across stacked units, reducing the impact should one of the stacked units fail. Switch ports may be aggregated on different units, for excellent high availability. VCStack delivers a resilient solution at a fraction of the cost of a full chassis-based system, and the stack may be managed as a single network node, greatly simplifying management tasks.

EPSRing™ (Ethernet Protection Switched Ring) and 10 Gigabit Ethernet allow several switches to form a high speed protected ring, capable of recovery within as little as 50ms. This feature is perfect for network designs that demand high performance and high availability.

### High Performing

The SwitchBlade x908 features fully non-blocking switching on all ports, to facilitate low latency, wirespeed IPv4 and IPv6 Layer 2 switching and Layer 3 routing. This is ideal for high-end server deployments. When combined with a large Layer 3 route table, it is ideal for aggregating gigabit connections.

Comprehensive low-latency wire-speed QoS provides flow-based traffic management with full classification, prioritization, traffic shaping and min/max bandwidth profiles. Enjoy boosted network performance and guaranteed delivery of business-critical Ethernet services and applications. Time-critical services like voice and video applications take precedence over non-essential services like file downloads, maintaining responsiveness of Enterprise applications.

### MEF Certified

The SwitchBlade x908 has been certified by the Metro Ethernet Forum (MEF) Certification program, which tests products for conformance to the strict requirements of Carrier Ethernet. Specifically, the SwitchBlade x908 is certified for compliance to MEF 9 and MEF 14 Ethernet Services tests.



## New Features

- » Allied Telesis Management Framework (AMF)
- » AMF master role for SBx908
- » AT-XEM-24T
- » BGP4+ for IPv6

# Key Features

## Allied Telesis Management Framework (AMF)

- » Allied Telesis Management Framework (AMF) is a sophisticated suite of management tools that provide a simplified approach to network management. Common tasks are automated or made so simple that the every-day running of a network can be achieved without the need for highly-trained, and expensive, network engineers. Powerful features like centralized management, auto-backup, auto-upgrade, auto-provisioning and auto-recovery enable plug-and-play networking and zero-touch management.
- » The SwitchBlade x908 switch can operate as the AMF network master, storing firmware and configuration backups for all other network nodes. The AMF master enables auto-provisioning and auto-upgrade by providing appropriate files to new network members.

## Virtual Routing and Forwarding (VRF Lite)

- » VRF Lite provides Layer 3 network virtualization by dividing a single switch into multiple independent virtual routing domains. With independent routing domains, IP addresses can overlap without causing conflict, allowing multiple customers to have their own secure virtual network within the same physical infrastructure.

## Scalable

- » Allied Telesis high speed XEMs provide both copper and fiber connectivity, delivering the ultimate in flexibility. XEM options are:
  - » AT-XEM-1XP - 1 x 10GbE (XFP) port
  - » AT-XEM-2XP - 2 x 10GbE (XFP) ports
  - » AT-XEM-2XS - 2 x 10GbE (SFP+) ports
  - » AT-XEM-2XT - 2 x 10GbE (RJ-45) ports
  - » AT-XEM-12S - 12 x 100/1000X SFP ports
  - » AT-XEM-12T - 12 x 10/100/1000T (RJ-45) ports
  - » AT-XEM-12Sv2 - 12 x 1000X SFP ports
  - » AT-XEM-12Tv2 - 12 x 10/100/1000T (RJ-45) ports
  - » AT-XEM-24T - 24 x 10/100/1000T (RJ Point 5) ports

All XEMs provide non-blocking performance. XEMs are ideal for aggregating Gigabit to the desktop, or for Gigabit uplinks from Fast Ethernet switches.

## EPSRing™ (Ethernet Protection Switched Rings)

- » EPSRing and 10GbE modules allow the SwitchBlade x908, with a number of x900 Series or iMAPs, to form a protected ring with 50ms failover — perfect for high performance at the core of Enterprise or Provider Access networks.
- » SuperLoop Protection enables a link between two EPSR nodes to be in separate EPSR domains, improving redundancy and network fault resiliency.

## sFlow

- » sFlow is an industry standard technology for monitoring high speed switched networks. It provides complete visibility into network use, enabling performance optimization, usage accounting/billing, and defence against security threats. Sampled packets sent to a collector ensure it always has a real-time view of network traffic.

## Network Access Control (NAC)

- » NAC allows for unprecedented control over user access to the network, in order to mitigate threats to network infrastructure. The SwitchBlade x908 supports NAC by using 802.1x port-based authentication in partnership with standards-compliant dynamic VLAN assignment, to assess a user's adherence to the network's security policies and then either grant authentication or offer remediation.
- » Allied Telesis NAC also supports alternatives to 802.1x port-based authentication, such as web authentication to enable guest access, and MAC authentication for end points without an 802.1x supplicant. Furthermore, if multiple users share a port, multi-authentication can be used and a Guest VLAN (also known as Default VLAN) can be configured to provide a catch-all for users without an 802.1x supplicant.
- » Additional security features include a full RADIUS client and server implementation for remote and local user authentication, Private VLANs to provide port isolation when multiple customer use the same VLAN, and STP Root Guard to protect against an unauthorized device becoming the STP Root Bridge.

## Dynamic Host Configuration Protocol (DHCPv6)

- » DHCPv6 is used to dynamically assign IPv6 addresses to hosts from a central location. Acting as DHCPv6 client enables the switch to receive an IPv6

address, and acting as server enables the switch to dynamically allocate IPv6 addresses to hosts. The DHCPv6 server and client both support the Prefix Delegation feature which allocates a whole IPv6 subnet to a DHCP client. The client, in turn, can allocate addresses from this subnet to the hosts that are connected to it.

## Virtual Router Redundancy Protocol (VRRPv3)

- » VRRPv3 is a protocol for providing device redundancy, by connecting redundant WAN gateway routers or server access switches in an IPv6 network. It allows a backup router or switch to automatically take over if the primary (master) router or switch fails.

## Find Me

- » In busy server rooms comprising of a large number of equipment racks, it can be quite a job finding the correct switch quickly among many similar units. The 'Find Me' feature is a simple visual way to quickly identify the desired physical switch for maintenance or other purposes, by causing its LEDs to flash in a specified pattern.

## Optical DDM

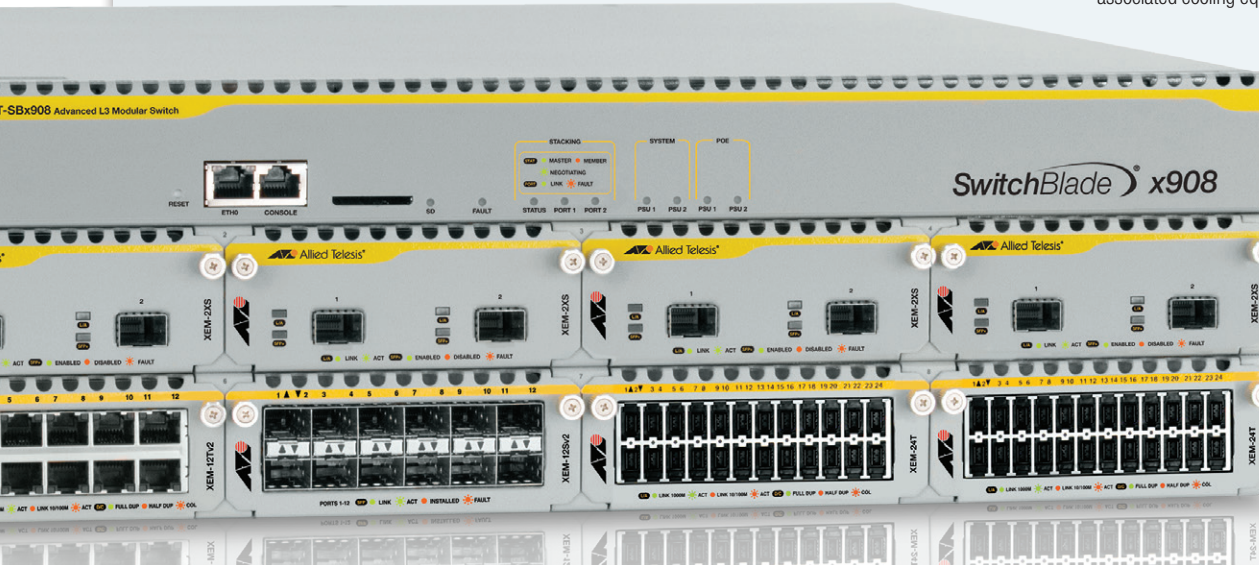
- » Most modern optical SFP/SFP+/XFP transceivers support Digital Diagnostics Monitoring (DDM) functions according to the specification SFF-8472. This enables real time monitoring of the various parameters of the transceiver, such as optical output power, temperature, laser bias current and transceiver supply voltage. Easy access to this information simplifies diagnosing problems with optical modules and fiber connections.

## Extended Mode

- » Users can now configure the SwitchBlade x908 to use larger hardware table sizes and more ACLs, QoS traffic classes and Link Aggregation Groups (LAGs). These increases make the SwitchBlade x908 more suitable for applications in the core or distribution layers of larger networks.
- » Refer to the table on page 5 for details.

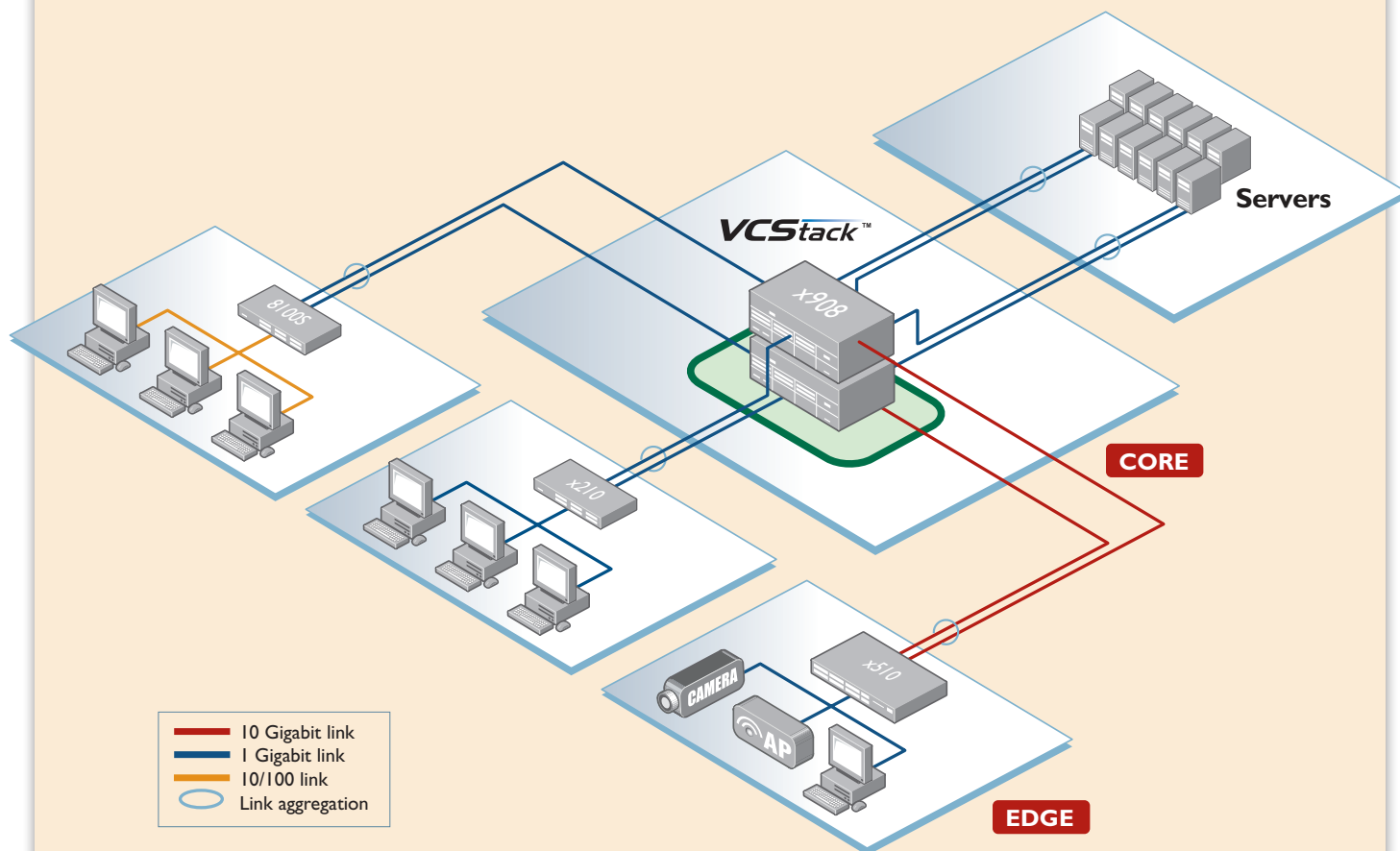
## Energy Efficient Ethernet

- » The SwitchBlade x908 supports Energy Efficient Ethernet on the XEM-12Tv2, which automatically reduces the power consumed by the switch whenever there is no traffic on a port. This sophisticated feature can significantly lower operating costs by reducing the power requirements of the switch and any associated cooling equipment.



Key Solution

# VCStack (Virtual Chassis Stacking)



### VCStack: Resiliency and Stability

Today's enterprises rely on Information Technology resources and applications to access business-critical information, and for day-to-day work. A high-availability infrastructure is of paramount importance, starting with a resilient network core. VCStack on the SwitchBlade x908 provides the ideal solution — without the expense of a full chassis. With the benefits of high availability, increased capacity and ease of management, VCStack makes networking reliable and simple.

Using VCStack at the core of the network allows multiple switches to appear as a single virtual chassis. In normal operation, this virtual chassis acts as a single switch, simplifying management.

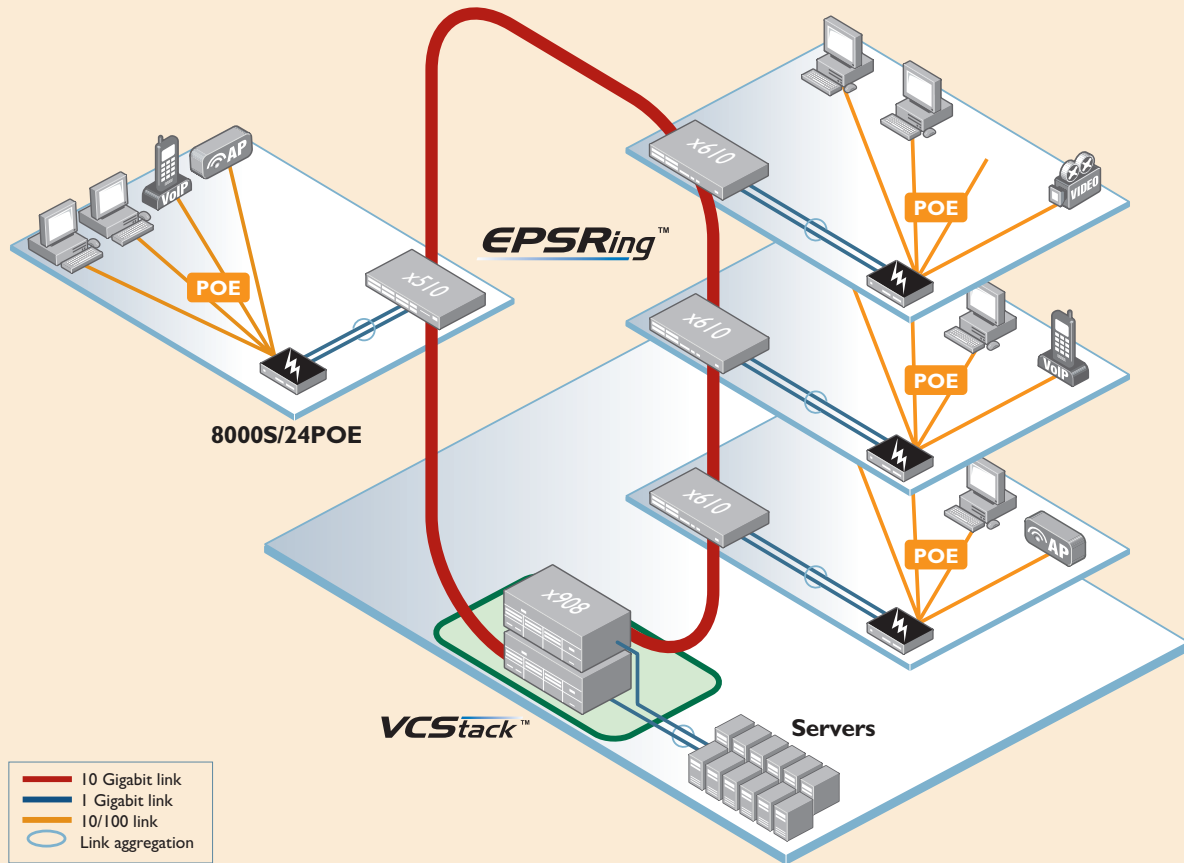
The diagram above shows link aggregation between the core VCStack and the edge switches. With link aggregation across ports on different virtual chassis members, there is no perceptible disruption in the case of a link failure, and the full bandwidth of the network remains available. Fast failover

ensures absolutely minimal network downtime in the event of a problem.

VCStack and link aggregation provide a solution where network resources are spread across the virtual chassis members, ensuring device and path resiliency. Virtualization of the network core ensures uninterrupted access to information when needed.

Key Solution

# EPSR (Ethernet Protection Switched Ring)



## EPSR: Resiliency and Fault Tolerance

The increasing convergence of services and applications in the enterprise has led to increasing demand for highly available networks with minimal downtime. High bandwidth is also required for the multiple applications simultaneously using the network. Real-time applications like surveillance, video streaming and Voice over IP (VoIP) are used alongside data and Internet access.

When a high-performing, resilient Enterprise core network is required, using EPSRing with the SwitchBlade x908 provides the ideal solution. EPSR creates a high speed resilient ring that can utilize today's maximum Ethernet standard

of 10Gbps, and provide extremely fast failover between nodes. EPSR enables rings to recover within as little as 50ms, preventing a node or link failure from affecting customer experience, even with demanding applications such as IP telephony and video monitoring.

The diagram above shows a corporate network based on a central EPSR ring. The inclusion of Allied Telesis VCStack (Virtual Chassis Stacking) technology at the core of the network adds a further layer of resiliency, increasing the availability of critical resources.

Now that technology has made high-availability and high-bandwidth so

accessible, corporate business, education providers and other enterprise network users can enjoy the many benefits that EPSRing provides. By ensuring always-available online applications and resources, this advanced self-healing network technology meets the constant demand for information at your fingertips.

## Specifications

### Performance

- » 357Mpps forwarding rate
- » Extensive wirespeed traffic classification for ACLs and QoS
- » Supports 10KB Jumbo frame size for data center and server aggregation applications
- » Wirespeed multicasting
- » 640Gbps Switching Fabric
- » Up to 256K IPv4 routes
- » Up to 16K MAC addresses (64K in Extended Mode)
- » Up to 4K Layer 2 multicast entries
- » Up to 1K Layer 3 IPv4 multicast entries
- » 4K VLANs
- » 512MB DDR SDRAM
- » Separate packet buffer memory
- » 64MB Flash Memory

### Reliability

- » Modular AlliedWare Plus operating system
- » Dual hot swappable PSUs with 1 + 1 redundancy
- » Dual feed support: a separate power circuit can feed each power supply providing extra reliability
- » Hot-swappable XEMs
- » Hot-swappable fan modules
- » Full environmental monitoring of PSUs, fans, temperature and internal voltages, with SNMP traps to alert network managers in case of any failure

### Expandability

- » 8 high speed 60Gbps expansion bays
- » 2 x 80Gbps stacking connectors on the rear of the chassis, to create a single VCStack from 2 physical units
- » IPv6 routing license option
- » Advanced Layer 3 license option
- » AMF Master license option

### Power Characteristics

- » AC Voltage: 100 to 240V (+/-10% auto ranging)
- » Frequency: 47 to 63Hz
- » DC Voltage: 36 to 72V

### Flexibility and Compatibility

- » Eight expansion bays supporting a choice of modules, for port flexibility and application versatility
- » XEM modules compatible with AT-x900-24X and AT-x900-12XT/S
- » SFP ports will support any combination of 1000T, 100FX, 100BX, 1000SX, 1000LX, 1000ZX or 1000ZX CWDM SFPs

### Diagnostic Tools

- » Built-In Self Test (BIST)
- » Find-me device locator
- » Hardware health monitoring
- » Automatic link flap detection and port shutdown
- » Optical Digital Diagnostic Monitoring (DDM)
- » Ping polling for IPv4 and IPv6
- » Port mirroring
- » TraceRoute for IPv4 and IPv6

### IPv4 Features

- » Black hole routing

- » Directed broadcast forwarding
- » DNS relay
- » Equal Cost Multi Path (ECMP) routing
- » Policy-based routing
- » Route maps
- » Route redistribution (OSPF, BGP, RIP)
- » IPv4 static unicast and multicast routing
- » UDP broadcast helper (IP helper)
- » Up to 64 Virtual Routing and Forwarding (VRF lite) domains (with license)

### IPv6 Features

- » DHCPv6 relay, DHCPv6 client
- » DNSv6 relay, DNSv6 client
- » IPv4 and IPv6 dual stack
- » IPv6 hardware ACLs
- » Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6
- » NTPv6 client and server
- » IPv6 static unicast and multicast routing

### Management

- » Allied Telesis Management Framework (AMF) enables powerful centralized management and zero-touch device installation and recovery
- » Console management port on the front panel for ease of access
- » Eco-friendly mode allows ports and LEDs to be disabled to save power
- » Web-based Graphical User Interface (GUI)
- » Industry-standard CLI with context-sensitive help
- » Out-of-band 10/100/1000T Ethernet management port
- » SD/SDHC memory card socket allows software release files, configurations and other files to be stored for backup and distribution to other devices
- » Powerful CLI scripting engine
- » Configurable logs and triggers provide an audit trail of SD card insertion and removal
- » Comprehensive SNMP MIB support for standards-based device management
- » Built-in text editor
- » Event-based triggers allow user-defined scripts to be executed upon selected system events

### Quality of Service (QoS)

- » 8 priority queues with a hierarchy of high priority queues for real time traffic, and mixed scheduling, for each switch port
- » Limit bandwidth per port or per traffic class down to 64kbps
- » Wirespeed traffic classification with low latency essential for VoIP and real-time streaming media applications
- » Policy-based QoS based on VLAN, port, MAC and general packet classifiers
- » Policy-based storm protection
- » Extensive remarking capabilities
- » Taildrop for queue congestion control
- » Strict priority, weighted round robin or mixed scheduling
- » IP precedence and DiffServ marking based on layer 2, 3 and 4 headers

### Resiliency

- » Control Plane Prioritization (CPP) ensures the CPU always has sufficient bandwidth to process network control traffic
- » Dynamic link failover (host attach)
- » EPSRing (Ethernet Protection Switched Rings) with SuperLoop Protection (SLP)
- » EPSR enhanced recovery for extra resiliency
- » Loop protection: loop detection and thrash limiting
- » PVST+ compatibility mode
- » STP root guard
- » VCStack fast failover minimizes network disruption

### Security

- » Access Control Lists (ACLs) based on layer 3 and 4 headers
- » Configurable auth-fail and guest VLANs
- » Authentication, Authorisation and Accounting (AAA)
- » Bootloader can be password protected for device security
- » BPDU protection
- » DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI)
- » Dynamic VLAN assignment
- » MAC address filtering and MAC address lock-down
- » Network Access and Control (NAC) features manage endpoint security
- » Port-based learn limits (intrusion detection)
- » Private VLANs provide security and port isolation for multiple customers using the same VLAN
- » Secure Copy (SCP)
- » Strong password security and encryption
- » Tri-authentication: MAC-based, web-based and IEEE 802.1x

### Environmental Specifications

- » Operating temperature range: 0°C to 40°C (32°F to 104°F)  
Derated by 1°C per 305 meters (1,000 ft)
- » Storage temperature range: -30°C to 70°C (-13°F to 158°F)
- » Operating relative humidity range: 5% to 85% non-condensing
- » Storage relative humidity range: 5% to 95% non-condensing
- » Operating altitude: 3,050 meters maximum (10,000 ft)

### Electrical Approvals and Compliances

- » EMC: EN55022 class A, FCC class A, VCCI class A
- » Immunity: EN55024, EN61000-3-levels 2 (Harmonics), and 3 (Flicker)

### Safety

- » Standards: UL60950-1, CAN/CSA-C22.2 No. 60950-1-03, EN60950-1, EN60825-1, AS/NZS 60950
- » Certification: UL, cUL, TUV

### Restrictions on Hazardous Substances (RoHS) Compliance

- » EU RoHS compliant
- » China RoHS compliant

### Country of Origin

- » Singapore

# SwitchBlade x908 | Advanced Layer 3+ Modular Switch

## Physical Specifications

PRODUCT	WIDTH	DEPTH	HEIGHT	MOUNTING	WEIGHT	
					UNPACKAGED	PACKAGED
SwitchBlade x908	440 mm (17.32 in)	456 mm (17.95 in)	132 mm (5.19 in)	3 RU	14.32 kg (31.57 lb)	16.7 kg (36.81 lb)
AT-PWR05	84 mm (3.30 in)	299 mm (11.77 in)	40 mm (1.57 in)	N/A	1.32 kg (2.91 lb)	1.9 kg (4.18 lb)
AT-XEM-12T	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-12S	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-12Sv2*	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-12Tv2*	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-24T**	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-STK	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-1XP	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-2XP	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-2XS	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)
AT-XEM-2XT	109 mm (4.29 in)	253 mm (9.96 in)	45 mm (1.77 in)	N/A	0.82 kg (1.80 lb)	1.4 kg (3.08 lb)

Chassis with 2 x PSU's and 8 x XEMs is 25.2 kg \* Require AlliedWare Plus software release 5.4.2 - 2.5 or later \*\* Require AlliedWare Plus software release 5.4.3 - 2.5 or later

## Power Characteristics

PRODUCT	FULLY LOADED (ONE AC PSU)		FULLY LOADED (TWO LOAD-SHARING AC PSUs)	
	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION
SwitchBlade x908	675W	2305 BTU/hr	700W	2390 BTU/hr

## Latency (microseconds)

PRODUCT	PORT SPEED			
	10 MBPS	100 MBPS	1 GBPS	10 GBPS
AT-XEM-12Sv2			3.7µs	
AT-XEM-12Tv2	83.8µs	11.4µs	4.2µs	
AT-XEM-24T	83.9µs	11.5µs	4.2µs	
AT-XEM-2XT				5.5µs
AT-XEM-2XS				4.9µs
AT-XEM-2XP				3.9µs

## Extended Mode

Extended Mode takes advantage of larger table sizes and increased limits, and can be enabled via the CLI when compatible XEMs are installed:

	STANDARD MODE	EXTENDED MODE
MAC entries	16K	64K
Nexthop entries	2.5K	8K
QoS Traffic Classes	713	4,096
LAGs	31	128
ACLs	1,024	4,096
Compatible XEMs	All	XEM-24T XEM-12Sv2 XEM-12Tv2 XEM-2XP XEM-2XS XEM-2XT

## Standards and Protocols

### AlliedWare Plus Operating System

Version 5.4.4

### Authentication

RFC 1321 MD5 Message-Digest algorithm  
RFC 1828 IP authentication using keyed MD5

### Border Gateway Protocol (BGP)

BGP dynamic capability  
BGP outbound route filtering  
RFC 1772 Application of the Border Gateway Protocol (BGP) in the Internet  
BGP communities attribute  
RFC 2385 Protection of BGP sessions via the TCP MD5 signature option  
RFC 2439 BGP route flap damping  
RFC 2545 Use of BGP-4 multiprotocol extensions for IPv6 inter-domain routing  
RFC 2858 Multiprotocol extensions for BGP-4  
RFC 2918 Route refresh capability for BGP-4  
RFC 3392 Capabilities advertisement with BGP-4  
RFC 3882 Configuring BGP to block Denial-of-Service (DoS) attacks  
RFC 4271 Border Gateway Protocol 4 (BGP-4)  
RFC 4360 BGP extended communities  
RFC 4456 BGP route reflection - an alternative to full mesh iBGP  
RFC 4724 BGP graceful restart  
RFC 4893 BGP support for four-octet AS number space  
RFC 5065 Autonomous system confederations for BGP

### Encryption

FIPS 180-1 Secure Hash standard (SHA-1)  
FIPS 186 Digital signature standard (RSA)  
FIPS 46-3 Data Encryption Standard (DES and 3DES)

### Ethernet

IEEE 802.2 Logical Link Control (LLC)  
IEEE 802.3 Ethernet  
IEEE 802.3ab 1000BASE-T  
IEEE 802.3ad Static and dynamic link aggregation  
IEEE 802.3ae 10 Gigabit Ethernet  
IEEE 802.3an 10GBASE-T  
IEEE 802.3az Energy Efficient Ethernet (EEE)  
IEEE 802.3u 100BASE-X  
IEEE 802.3x Flow control - full-duplex operation  
IEEE 802.3z 1000BASE-X

### IPv4 Standards

RFC 768 User Datagram Protocol (UDP)  
RFC 791 Internet Protocol (IP)  
RFC 792 Internet Control Message Protocol (ICMP)  
RFC 793 Transmission Control Protocol (TCP)  
RFC 826 Address Resolution Protocol (ARP)  
RFC 894 Standard for the transmission of IP datagrams over Ethernet networks  
RFC 919 Broadcasting Internet datagrams  
RFC 922 Broadcasting Internet datagrams in the presence of subnets  
RFC 932 Subnetwork addressing scheme  
RFC 950 Internet standard subnetting procedure  
RFC 951 Bootstrap Protocol (BootP)  
RFC 1027 Proxy ARP  
RFC 1035 DNS client

RFC 1042 Standard for the transmission of IP datagrams over IEEE 802 networks  
 RFC 1071 Computing the Internet checksum  
 RFC 1122 Internet host requirements  
 RFC 1191 Path MTU discovery  
 RFC 1256 ICMP router discovery messages  
 RFC 1518 An architecture for IP address allocation with CIDR  
 RFC 1519 Classless Inter-Domain Routing (CIDR)  
 RFC 1542 Clarifications and extensions for BootP  
 RFC 1591 Domain Name System (DNS)  
 RFC 1812 Requirements for IPv4 routers  
 RFC 1918 IP addressing  
 RFC 2581 TCP congestion control

## IPv6 Standards

RFC 1981 Path MTU discovery for IPv6  
 RFC 2460 IPv6 specification  
 RFC 2464 Transmission of IPv6 packets over Ethernet networks  
 RFC 3056 Connection of IPv6 domains via IPv4 clouds  
 RFC 3484 Default address selection for IPv6  
 RFC 3596 DNS extensions to support IPv6  
 RFC 4007 IPv6 scoped address architecture  
 RFC 4193 Unique local IPv6 unicast addresses  
 RFC 4291 IPv6 addressing architecture  
 RFC 4443 Internet Control Message Protocol (ICMPv6)  
 RFC 4861 Neighbor discovery for IPv6  
 RFC 4862 IPv6 Stateless Address Auto-Configuration (SLAAC)  
 RFC 5014 IPv6 socket API for source address selection  
 RFC 5095 Deprecation of type 0 routing headers in IPv6  
 RFC 5175 IPv6 Router Advertisement (RA) flags option  
 RFC 6105 IPv6 Router Advertisement (RA) guard

## Management

AMF MIB and SNMP traps  
 AT Enterprise MIB  
 SNMPv1, v2c and v3  
 IEEE 802.1AB Link Layer Discovery Protocol (LLDP)  
 RFC 1155 Structure and identification of management information for TCP/IP-based Internets  
 RFC 1157 Simple Network Management Protocol (SNMP)  
 RFC 1212 Concise MIB definitions  
 RFC 1213 MIB for network management of TCP/IP-based Internets: MIB-II  
 RFC 1215 Convention for defining traps for use with the SNMP  
 RFC 1227 SNMP MUX protocol and MIB  
 RFC 1239 Standard MIB  
 RFC 1724 RIPv2 MIB extension  
 RFC 2011 SNMPv2 MIB for IP using SMIPv2  
 RFC 2012 SNMPv2 MIB for TCP using SMIPv2  
 RFC 2013 SNMPv2 MIB for UDP using SMIPv2  
 RFC 2096 IP forwarding table MIB  
 RFC 2578 Structure of Management Information v2 (SMIPv2)  
 RFC 2579 Textual conventions for SMIPv2  
 RFC 2580 Conformance statements for SMIPv2  
 RFC 2674 Definitions of managed objects for bridges with traffic classes, multicast filtering and VLAN extensions  
 RFC 2741 Agent extensibility (AgentX) protocol  
 RFC 2787 Definitions of managed objects for VRRP  
 RFC 2819 RMON MIB (groups 1,2,3 and 9)  
 RFC 2863 Interfaces group MIB  
 RFC 3164 Syslog protocol  
 RFC 3176 sFlow: a method for monitoring traffic in switched and routed networks  
 RFC 3411 An architecture for describing SNMP management frameworks  
 RFC 3412 Message processing and dispatching for the SNMP  
 RFC 3413 SNMP applications  
 RFC 3414 User-based Security Model (USM) for SNMPv3

RFC 3415 View-based Access Control Model (VACM) for SNMP  
 RFC 3416 Version 2 of the protocol operations for the SNMP  
 RFC 3417 Transport mappings for the SNMP  
 RFC 3418 MIB for SNMP  
 RFC 3635 Definitions of managed objects for the Ethernet-like interface types  
 RFC 3636 IEEE 802.3 MAU MIB  
 RFC 4188 Definitions of managed objects for bridges  
 RFC 4318 Definitions of managed objects for bridges with RSTP  
 RFC 4560 Definitions of managed objects for remote ping, traceroute and lookup operations  
 RFC 6527 Definitions of managed objects for VRRPv3

## Multicast Support

Bootstrap Router (BSR) mechanism for PIM-SM  
 IGMP query solicitation  
 IGMP snooping (IGMPv1, v2 and v3)  
 IGMP snooping fast-leave  
 IGMP/MLD multicast forwarding (IGMP/MLD proxy)  
 MLD snooping (MLDv1 and v2)  
 PIM for IPv6  
 RFC 1112 Host extensions for IP multicasting (IGMPv1)  
 RFC 2236 Internet Group Management Protocol v2 (IGMPv2)  
 RFC 2710 Multicast Listener Discovery (MLD) for IPv6  
 RFC 2715 Interoperability rules for multicast routing protocols  
 RFC 3376 IGMPv3  
 RFC 3810 Multicast Listener Discovery v2 (MLDv2) for IPv6  
 RFC 3973 PIM Dense Mode (DM)  
 RFC 4541 IGMP and MLD snooping switches  
 RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): protocol specification (revised)  
 RFC 4604 Using IGMPv3 and MLDv2 for source-specific multicast  
 RFC 4607 Source-specific multicast for IP

## Open Shortest Path First (OSPF)

OSPF link-local signaling  
 OSPF MD5 authentication  
 OSPF restart signaling  
 Out-of-band LSDB resync  
 RFC 1245 OSPF protocol analysis  
 RFC 1246 Experience with the OSPF protocol  
 RFC 1370 Applicability statement for OSPF  
 RFC 1765 OSPF database overflow  
 RFC 2328 OSPFv2  
 RFC 2370 OSPF opaque LSA option  
 RFC 2740 OSPFv3 for IPv6  
 RFC 3101 OSPF Not-So-Stubby Area (NSSA) option  
 RFC 3509 Alternative implementations of OSPF area border routers  
 RFC 3623 Graceful OSPF restart  
 RFC 3630 Traffic engineering extensions to OSPF  
 RFC 4552 Authentication/confidentiality for OSPFv3  
 RFC 5329 Traffic engineering extensions to OSPFv3

## Quality of Service (QoS)

IEEE 802.1p Priority tagging  
 RFC 2211 Specification of the controlled-load network element service  
 RFC 2474 DiffServ precedence for eight queues/port  
 RFC 2475 DiffServ architecture  
 RFC 2597 DiffServ Assured Forwarding (AF)  
 RFC 2697 A single-rate three-color marker  
 RFC 2698 A two-rate three-color marker  
 RFC 3246 DiffServ Expedited Forwarding (EF)

## Resiliency

IEEE 802.1D MAC bridges  
 IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)  
 IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)  
 RFC 5798 Virtual Router Redundancy Protocol version 3 (VRRPv3) for IPv4 and IPv6

## Routing Information Protocol (RIP)

RFC 1058 Routing Information Protocol (RIP)  
 RFC 2080 RIPng for IPv6  
 RFC 2081 RIPng protocol applicability statement  
 RFC 2082 RIP-2 MD5 authentication  
 RFC 2453 RIPv

## Security

SSH remote login  
 SSLv2 and SSLv3  
 TACACS+ accounting and authentication  
 IEEE 802.1X authentication protocols (TLS, TTLS, PEAP and MD5)  
 IEEE 802.1X multi-suplicant authentication  
 IEEE 802.1X port-based network access control  
 RFC 2246 TLS protocol v1.0  
 RFC 2865 RADIUS  
 RFC 2866 RADIUS accounting  
 RFC 2868 RADIUS attributes for tunnel protocol support  
 RFC 3546 Transport Layer Security (TLS) extensions  
 RFC 3579 RADIUS support for Extensible Authentication Protocol (EAP)  
 RFC 3580 IEEE 802.1x RADIUS usage guidelines  
 RFC 3748 PPP Extensible Authentication Protocol (EAP)  
 RFC 4251 Secure Shell (SSHv2) protocol architecture  
 RFC 4252 Secure Shell (SSHv2) authentication protocol  
 RFC 4253 Secure Shell (SSHv2) transport layer protocol  
 RFC 4254 Secure Shell (SSHv2) connection protocol

## Services

RFC 854 Telnet protocol specification  
 RFC 855 Telnet option specifications  
 RFC 857 Telnet echo option  
 RFC 858 Telnet suppress go ahead option  
 RFC 1091 Telnet terminal-type option  
 RFC 1350 Trivial File Transfer Protocol (TFTP)  
 RFC 1985 SMTP service extension  
 RFC 2049 MIME  
 RFC 2131 DHCPv4 (server, relay and client)  
 RFC 2132 DHCP options and BootP vendor extensions  
 RFC 2554 SMTP service extension for authentication  
 RFC 2616 Hypertext Transfer Protocol - HTTP/1.1  
 RFC 2821 Simple Mail Transfer Protocol (SMTP)  
 RFC 2822 Internet message format  
 RFC 3046 DHCP relay agent information option (DHCP option 82)  
 RFC 3315 DHCPv6 (server, relay and client)  
 RFC 3633 IPv6 prefix options for DHCPv6  
 RFC 3646 DNS configuration options for DHCPv6  
 RFC 3993 Subscriber-ID suboption for DHCP relay agent option  
 RFC 4330 Simple Network Time Protocol (SNTP) version 4  
 RFC 5905 Network Time Protocol (NTP) version 4

## VLAN Support

Generic VLAN Registration Protocol (GVRP)  
 IEEE 802.1ad Provider bridges (VLAN stacking, Q-in-Q)  
 IEEE 802.1Q Virtual LAN (VLAN) bridges  
 IEEE 802.1v VLAN classification by protocol and port  
 IEEE 802.3ac VLAN tagging

## Voice over IP (VoIP)

LLDP-MED ANSI/TIA-1057  
 Voice VLAN

# SwitchBlade x908 | Advanced Layer 3+ Modular Switches

## Feature Licenses

NAME	DESCRIPTION	INCLUDES
AT-FL-SBX9-01	SwitchBlade x908 Advanced Layer 3 license	<ul style="list-style-type: none"> <li>» OSPF<sup>1</sup></li> <li>» BGP4</li> <li>» PIM-v4-SM, DM &amp; SSM</li> <li>» VLAN double tagging (Q-in-Q)</li> <li>» VRF Lite</li> </ul>
AT-FL-SBX9-02	SwitchBlade x908 IPv6 Pack	<ul style="list-style-type: none"> <li>» RIPng</li> <li>» MLDv1 &amp; v2</li> <li>» PIMv6-SM</li> <li>» BGP4+ for IPv6</li> <li>» OSPFv3</li> </ul>
AT-FL-RADIUS-FULL	Increase local RADIUS server support limits <sup>2</sup>	<ul style="list-style-type: none"> <li>» 5000 users</li> <li>» 1000 NAS</li> </ul>
AT-FL-SBX9-AM40	AMF Master License for up to 40 nodes	» AMF Master
AT-FL-SBX9-AMAL	AMF All Clients License	» AMF All Clients

<sup>1</sup> 64 OSPF routes included in base software

<sup>2</sup> 100 users and 24 NAS can be stored in local RADIUS database with base software

## Ordering Information

### SwitchBlade x908

Advanced Layer 3 modular switch chassis  
8 x high speed expansion bays

### AT-PWR05-xx

Hot-swappable AC load-sharing power supply

### AT-PWR05-80

Hot-swappable DC load-sharing power supply

### AT-FAN03<sup>3</sup>

Spare fan module

### AT-XEM-1XP

1 x 10GbE (XFP) port

### AT-XEM-2XP

2 x 10GbE (XFP) ports

### AT-XEM-2XS

2 x 10GbE (SFP+) ports

### AT-XEM-2XT

2 x 10GbE (RJ-45) ports

### AT-XEM-12S

12 x 100/1000X SFP ports

### AT-XEM-12T

12 x 10/100/1000T (RJ-45) ports

### AT-XEM-24T

24 x 10/100/1000T (RJ Point 5) ports

### AT-XEM-12Sv2

12 x 1000X SFP ports

### AT-XEM-12Tv2

12 x 10/100/1000T (RJ-45) ports

### AT-HS-STK-CBL650

650mm high speed stacking cable

## SFP Modules

### AT-SPFX/2

100FX multi-mode 1310 nm fiber up to 2 km

### AT-SPFX/15

100FX multi-mode 1310 nm fiber up to 15 km

### AT-SPFXBD-LC-13

100BX Bi-Di (1310 nm Tx, 1550 nm Rx) fiber to 15 km

### AT-SPFXBD-LC-15

100BX Bi-Di (1550 nm Tx, 1310 nm Rx) fiber to 15 km

### AT-SPTX

1000T 100m copper

### AT-SPSX

1000SX GbE multi-mode 850 nm fiber up to 550 m

### AT-SPSX/I

1000SX GbE multi-mode 850 nm fiber up to 550 m industrial temperature

### AT-SPEX

1000X GbE multi-mode 1310nm fiber up to 2 km

### AT-SPLX10

1000LX GbE single-mode 1310 nm fiber up to 10 km

### AT-SPLX10/I

1000LX GbE single-mode 1310 nm fiber up to 10 km industrial temperature

### AT-SPBDI0-13

1000LX GbE Bi-Di (1310 nm Tx, 1490 nm Rx) fiber up to 10 km

### AT-SPBDI0-14

1000LX GbE Bi-Di (1490 nm Tx, 1310 nm Rx) fiber up to 10 km

### AT-SPLX40

1000LX GbE single-mode 1310 nm fiber up to 40 km

### AT-SPZX80

1000ZX GbE single-mode 1550 nm fiber up to 80 km

### 10GbE XFP Modules

For use with XEM-1XP and XEM-2XP

### AT-XPSR

10GbE-SR 850 nm short-haul, 300 m with MMF

### AT-XPLR

10GbE-LR 1310 nm medium-haul, 10 km with SMF

### AT-XPER40

10GbE-ER 1550 nm long-haul, 40 km with SMF

### 10GbE SFP+ Modules

For use with XEM-2XS

### AT-SPIOSR

10GSR 850 nm short-haul, 300 m with MMF

### AT-SPIOLR

10GLR 1310 nm medium-haul, 10 km with SMF

### AT-SPIOLR/I

10GLR 1310 nm medium-haul, 10 km with SMF industrial temperature

### AT-SPIOLRM

10GLR 1310 nm medium-haul, 10 km with MMF

### AT-SPIOER40/I

10GER 1310nm long-haul, 40km with SMF industrial temperature

### AT-SPIOZR80/I

10GER 1550nm long-haul, 80 km with SMF industrial temperature

### 10GbE SFP+ Cables for use with XEM-2XS

### AT-SPIOTW1

1 meter SFP+ direct attach cable

### AT-SPIOTW3

3 meter SFP+ direct attach cable

### AT-SPIOTW7

7 meter SFP+ direct attach cable

### RJ.5 to RJ45 Cables

For use with XEM-24T

### AT-UTP/RJ.5-100-A-008

RJ.5 to RJ45 1 m Ethernet cables (pack of 8)

### AT-UTP/RJ.5-300-A-008

RJ.5 to RJ45 3 m Ethernet cables (pack of 8)

<sup>3</sup> For spares only. Fan modules are included with chassis.

Where xx = 10 for US power cord  
20 for no power cord  
30 for UK power cord  
40 for Australian power cord  
50 for European power cord

Note that NO power supplies ship with the base chassis product, they must be ordered separately.



the solution : the network

North America Headquarters | 19800 North Creek Parkway | Suite 100 | Bothell | WA 98011 | USA | T: +1 800 424 4284 | F: +1 425 481 3895

Asia-Pacific Headquarters | 11 Tai Seng Link | Singapore | 534182 | T: +65 6383 3832 | F: +65 6383 3830

EMEA & CSA Operations | Incheonweg 7 | I437 EK Rozenburg | The Netherlands | T: +31 20 7950020 | F: +31 20 7950021

alliedtelesis.com

© 2014 Allied Telesis, Inc. All rights reserved. Information in this document is subject to change without notice. All company names, logos, and product designs that are trademarks or registered trademarks are the property of their respective owners. C617-000468 Rev Z1