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.

The Allied Telesis Autonomous Management Framework (AMF) meets the increased management requirements of modern converged networks, automating many everyday tasks including configuration management. AMF has powerful centralized management features that manage a complete network as a single virtual device. The network can be expanded with plug-and-play simplicity, and network node recovery is fully zero-touch.

AMF secure mode increases network security with management traffic encryption, authorization, and monitoring. AMF Guestnode allows third party devices, such as IP phones and security cameras, to be part of an AMF network.

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.

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
- AMF secure mode
- AMF Guestnode
- AMF Starter
- Active Fiber Monitoring
- Microsoft Network Load Balancing (MS NLB) support
- VLAN ACLs
Key Features

**Allied Telesis Autonomous Management Framework (AMF)**
- Allied Telesis Autonomous 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.
- AMF secure mode encrypts all AMF traffic, provides unit and user authorization, and monitors network access to greatly enhance network security.
- AMF Guestnode allows Allied Telesis wireless access points and further switching products, as well as third party devices such as IP phones and security cameras, to be part of an AMF network.

**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-2XP - 2 x 10GbE (XFP) ports
  - AT-XEM-2XS - 2 x 10GbE (SPF+) ports
  - AT-XEM-12Sv2 - 12 x 1000X SFP ports
  - AT-XEM-12Tv2 - 12 x 10/100/1000T (RJ-45) ports
  - AT-XEM-2XS - 24 x 10/100/1000T (RJ-45) 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 several switches to form protected rings 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.

**Quality of Service (QoS)**
- 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.

**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.

**Microsoft Network Load Balancing (MS NLB) Support**
- Support for MS NLB, which clusters identical servers together for increased performance through load-sharing.

**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+ modules 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.

**Active Fiber Monitoring**
- Active Fiber Monitoring prevents eavesdropping on fiber communications by monitoring received optical power. If an intrusion is detected, the link can be automatically shut down, or an operator alert can be sent.

**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 6 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.

**VLAN ACLs**
- Simplify access and traffic control across entire segments of the network. Access Control Lists (ACLs) can be applied to a Virtual LAN (VLAN) as well as a specific port.

**TACACS+ Command Authorization**
- Centralize control of which commands may be issued by a specific user of an AlliedWare Plus device. TACACS+ command authorization complements authentication and accounting services for a complete AAA 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 Solutions

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.
SwitchBlade x908 | Advanced Layer 3+ Modular Switch

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 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 SRAM
- 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 VCS/Stack from 2 physical units
- Versatile licensing options for additional features

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-x900-12X/TS
- SFF ports will support any combination of 1000T, 10GFX, 10GBX, 10GSSX, 10GOLX, 10G02X or 10G02X CWDM SFPs (XEM-12Sv2 does not support 100X)

Diagnostic Tools
- Active Fiber Monitoring detects tampering on optical links
- Built-In Self Test (BIST)
- Cable fault locator (TDR)
- UniDirectional Link Detection (UDLD)
- Find-me device locator
- Hardware health monitoring
- Automatic link flap detection and port shutdown
- Optical Digital Diagnostic Monitoring (ODM)
- 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)
- Static unicast and multicast routes for IPv4
- UDP broadcast helper (IP helper)
- Up to 64 Virtual Routing and Forwarding (VRF) lite domains (with license)

IPV6 Features
- DHCPv6 client and relay
- DNSv6 client and relay
- IPv4 and IPv6 dual stack
- IPv6 aware storm protection and QoS
- IPv6 hardware ACLs
- Device management over IPv6 networks with SNMPv6, Telemetrics6 and SSHv6
- NTPv6 client and server
- Static unicast and multicast routes for IPv6
- Log to IPv6 hosts with Syslog-v6

Management
- Allied Telepresence Management Framework (AMF) enables powerful centralized management and zero-touch device installation and recovery
- Try AMF for free with the built-in AMF Starter license
- 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
- Built in text editor with 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
- 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
- IPv6 QoS support
- Policy-based QoS based on VLAN, port, MAC and general packet classifiers
- Policy-based storm protection
- Extensive marking 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 Features
- 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) and enhanced recovery for extra resiliency
- Loop protection: loop detection and thrashing limiting
- PVST+ compatibility mode
- STP root guard
- VCS/Stack fast failover minimizes network disruption
- BPDU forwarding

Security Features
- Access Control Lists (ACLs) based on layer 3 and 4 headers, per VLAN or port
- Configurable ACLs for management traffic
- 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) and Secure File Transfer Protocol (SFTP)
- Strong password security and encryption
- Tri-authentication: MAC-based, web-based and IEEE 802.1x
- RADIUS group selection per VLAN or port

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: -20°C to 60°C (-4°F to 140°F)
- Operating relative humidity range: 0% to 80% non-condensing
- Storage relative humidity range: 0% 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
- Safety: UL60950-1, CSA/CSA-C22.2 No. 60950-1-03, EN60950-1, EN60825-1, AS/NZS 60950
- Certification: UL, cUL, TUV
SwitchBlade x908 | Advanced Layer 3+ Modular Switch

Physical Specifications

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>WIDTH X DEPTH X HEIGHT</th>
<th>MOUNTING</th>
<th>WEIGHT (UNPACKAGED)</th>
<th>WEIGHT (PACKAGED)</th>
<th>PACKAGED DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SwitchBlade x908</td>
<td>440 x 456 x 132 mm</td>
<td>3 RU</td>
<td>14.32 kg (31.57 lb)</td>
<td>16.7 kg (36.81 lb)</td>
<td>58 x 57 x 25 cm</td>
</tr>
<tr>
<td>PWR05</td>
<td>84 x 289 x 40 mm</td>
<td>N/A</td>
<td>1.32 kg (2.91 lb)</td>
<td>1.9 kg (4.18 lb)</td>
<td>33 x 16 x 18 cm</td>
</tr>
<tr>
<td>XEM-12Sv2*</td>
<td>109 x 253 x 45 mm</td>
<td>N/A</td>
<td>0.82 kg (1.80 lb)</td>
<td>1.4 kg (3.08 lb)</td>
<td>32 x 20 x 13 cm</td>
</tr>
<tr>
<td>XEM-12Tv2*</td>
<td>109 x 253 x 45 mm</td>
<td>N/A</td>
<td>0.82 kg (1.80 lb)</td>
<td>1.4 kg (3.08 lb)</td>
<td>32 x 20 x 13 cm</td>
</tr>
<tr>
<td>XEM-24T**</td>
<td>109 x 253 x 45 mm</td>
<td>N/A</td>
<td>0.82 kg (1.80 lb)</td>
<td>1.4 kg (3.08 lb)</td>
<td>32 x 20 x 13 cm</td>
</tr>
<tr>
<td>XEM-2XP</td>
<td>109 x 253 x 45 mm</td>
<td>N/A</td>
<td>0.82 kg (1.80 lb)</td>
<td>1.4 kg (3.08 lb)</td>
<td>32 x 20 x 13 cm</td>
</tr>
<tr>
<td>XEM-2XS</td>
<td>109 x 253 x 45 mm</td>
<td>N/A</td>
<td>0.82 kg (1.80 lb)</td>
<td>1.4 kg (3.08 lb)</td>
<td>32 x 20 x 13 cm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>FULLY LOADED (ONE AC PSU)</th>
<th>FULLY LOADED (TWO LOAD-SHARING AC PSU)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAX POWER CONSUMPTION</td>
<td>MAX HEAT DISSIPATION</td>
</tr>
<tr>
<td>SwitchBlade x908</td>
<td>675W</td>
<td>2305 BTU/hr</td>
</tr>
</tbody>
</table>

Latency (microseconds)

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>PORT SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 Mbps</td>
</tr>
<tr>
<td>XEM-12Sv2</td>
<td>3.2µs</td>
</tr>
<tr>
<td>XEM-12Tv2</td>
<td>3.2µs</td>
</tr>
<tr>
<td>XEM-24T</td>
<td>3.2µs</td>
</tr>
<tr>
<td>XEM-2XS</td>
<td>4.8µs</td>
</tr>
<tr>
<td>XEM-2XP</td>
<td>3.8µs</td>
</tr>
</tbody>
</table>

Restrictions on Hazardous Substances (RoHS) Compliance

- EU RoHS-compliant
- China RoHS compliant

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.

<table>
<thead>
<tr>
<th>MAC entries</th>
<th>STANDARD MODE</th>
<th>EXTENDED MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>16K</td>
<td>64K</td>
<td></td>
</tr>
<tr>
<td>5K</td>
<td>8K</td>
<td></td>
</tr>
<tr>
<td>713</td>
<td>4,096</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>1,024</td>
<td>4,096</td>
<td></td>
</tr>
</tbody>
</table>

Compatible XEMs

- XEM-24T
- XEM-12Sv2
- XEM-12Tv2
- XEM-2XP
- XEM-2XS

Standards and Protocols

AlliedWare Plus Operating System

Version 5.4.8-1

Border Gateway Protocol (BGP)

- BGP dynamic capability
- BGP outbound route filtering
- RFC 1772 Application of the Border Gateway Protocol (BGP) in the Internet
- RFC 1997 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 IPv4 inter-domain routing
- RFC 2858 Multiprotocol extensions for BGP
- RFC 2918 Route refresh capability for BGP
- RFC 3392 Capabilities advertisement with BGP
- RFC 3486 Configuring BGP to block Denial-of-Service (DoS) attacks
- RFC 4271 Border Gateway Protocol 4 (BGP)
- RFC 4360 BGP extended communities
- RFC 4456 BGP route reflection - an alternative to full mesh BGP
- RFC 4724 BGP graceful restart
- RFC 4893 BGP support for four-octet AS number space
- RFC 5065 Autonomous system confederations for BGP

Cryptographic Algorithms

FIPS Approved Algorithms

Cryptography (Block Ciphers):

- AES (ECB, CBC, CFB and OFB Modes)
- 3DES (ECB, CBC, CFB and OFB Modes)
- Block Cipher Modes:
  - CBC
  - CCM
  - CMAC
  - GCM
  - XTS

Digital Signatures & Asymmetric Key Generation:

- DSA
- ECDSA

Network Technologies

- IPv6 inter-domain routing
- IPv4 Features
- Ethernet
  - IEEE 802.3 Ethernet
  - IEEE 802.3ab 1000BASE-T
  - IEEE 802.3ae 10 Gigabit Ethernet
- IEEE 802.1Q VLAN
- IEEE 802.1p QoS
- IEEE 802.1p Expedited Forwarding
- IPv4 Support
  - RFC 1042 Standard for the transmission of IP datagrams over IEEE 802 networks
  - RFC 1027 Proxy ARP
  - RFC 1035 Bootstrap Protocol (BootP)

IPv4 Features

- 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 Subnetting IPv4
- 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 Ethernet networks

Digital Signatures & Asymmetric Key Generation:

- DSA
- ECDSA

Network SMARTER

- RSA
- Secure Hashing:
  - SHA-1
  - SHA-2 (SHA-256, SHA-384, SHA-512)
- Message Authentication:
  - HMAC (SHA-1, SHA-224, SHA-256, 384, 512)
- Random Number Generation:
  - DRBG (Hash, HMAC and Counter)

Non FIPS Approved Algorithms

- RNG (AES128/192/256)
- DES
- MD5
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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 Bootstrap
RFC 1591 Domain Name System (DNS)
RFC 1812 Requirements for IPv4 routers
RFC 1918 IP addressing
RFC 2581 TCP congestion control

IPv6 Features
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 IP 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 4444 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) flag option
RFC 6105 IPv6 Router Advertisement (RA) guard

Management
AMF MIB and SNMP traps
AT Enterprise MIB
Optical CDM 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 2578 Structure of Management Information v2 (SMIv2)
RFC 2579 Textual conventions for SMIv2
RFC 2580 Conformance statements for SMIs
RFC 2674 Definitions of managed objects for bridges with traffic classes, multicast filtering and VLAN extensions
RFC 2741 IP in IP: 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 3176 sFlow: a method for monitoring traffic in switched and routed networks
RFC 3451 An architecture for describing SNMP management frameworks
RFC 3452 Message processing and dispatching for the SNMP
RFC 3453 SNMP applications
RFC 3454 User-based Security Model (USM) for SNMPv3
RFC 3455 View-based Access Control Model (VACM) for SNMP
RFC 3456 Version 2 of the protocol operations for the SNMP
RFC 3457 Transport mappings for the SNMP
RFC 3635 Definitions of managed objects for the Ethernet-like interface types
RFC 3636 IEEE 802.3 MAU MIB
RFC 4022 SNMPv2-MIB for TCP using SMiV2
RFC 4113 SNMPv2-MIB for UDP using SMiV2
RFC 4188 Definitions of managed objects for bridges
RFC 4292 IP forwarding table MIB
RFC 4293 SNMPv2-MIB for IP using SMiV2
RFC 4318 Definitions of managed objects for bridges with RSTP
RFC 4560 Definitions of managed objects for remote ping, traceroute and lookup operations
RFC 5424 Syslog protocol
RFC 6527 Definitions of managed objects for VRRPv3

Multicast Support
Bootstrap Router (BR) mechanism for PIM-SM
IGMP query solicitation
IGMP snooping (IGMPv1, v2, and v3)
IGMP snooping fast-leave
IGMPMROUTE multicast forwarding (IGMPMROUTE proxy)
MLD snooping (MLDv1 and v2)
PIM-SM and SSIM for IPv6
RFC 1112 Host extensions for IP multicasting (IGMPv1)
RFC 2236 Internet Group Management Protocol v2 (IGMPv2)
RFC 2711 Multicaster Discovery (MLD) for IPv6
RFC 2715 Interoperability rules for multicast routing protocols
RFC 3306 PIM-Source-based MIB for IPv6 multicast addresses
RFC 3376 IGMPV3
RFC 3810 Multicast Listener Discovery v2 (MLDV2) for IPv6
RFC 3856 Embedding the Rendezvous Point (RP) address in an IPv4 multicast address
RFC 3973 PIM Dense Mode (DM)
RFC 4541 IGMP and MLD snooping switches
RFC 4604 Using IGMPv3 and PIMv2 for source-specific multicast
RFC 4607 Source-specific multicast for IP

Open Shortest Path First (OSPF)
OSPF link-local signaling
OSPF MD5 authentication
Out-of-band LSRDB 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 Graceful Restart 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/identity assurance for OSPFv3
RFC 5329 Traffic engineering extensions to OSPFv3
RFC 5340 OSPFv3 for IPv6 (partial support)

Resiliency Features
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
IEEE 802.1d MAC bridges
IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
IEEE 802.3ad Static and dynamic link aggregation
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 RIP for IPv6
RFC 2081 RIP for IPv6: Applicability statement
RFC 2082 RIP-2 MDS authentication
RFC 2453 RIPv2

Quality of Service (QoS)
IEEE 802.5 priority tagging
RFC 2211 Specification of the controlled-load network element service for IPv6

RFC 2081 RIPv2 protocol applicability statement
RFC 2082 RIPv2-MDS authentication
RFC 2453 RIPv2

Security Features
SSH remote login
SSLv2 and SSLv3
TACACS+ + Accounting, Authentication, Authorization (AAA)
IEEE 802.1X authentication protocols (TLS, TTLS, PEAP and MD5)
IEEE 802.1x multi-supplicant authentication
IEEE 802.1x port-based network access control
RFC 2560 X.509 Online Certificate Status Protocol (OCSP)
RFC 2818 HTTP over TLS ("HTTPS")
RFC 2865 RADIUS authentication
RFC 2866 RADIUS accounting
RFC 2868 RADIUS attributes for tunnel protocol support
RFC 2886 PKCS #10: certificate request syntax specification v1.7
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
RFC 5246 Transport Layer Security (TLS) v1.2
RFC 5280 X.509 certificate and Certificate Revocation List (CRL) profiles
RFC 5425 Transport Layer Security (TLS) transport mapping for Syslog
RFC 5656 Elliptic curve algorithm integration for SSH
RFC 6125 Domain-based application service identity within PKI using X.509 certificates with TLS
RFC 6614 Transport Layer Security (TLS) encryption for RADIUS
RFC 6668 SHA 2 data integrity verification for SSH

Services
RFC 854 Telnet protocol specification
RFC 855 Telnet option specifications
RFC 856 Telnet echo option
RFC 858 Telnet suppress go ahead option
RFC 1091 Telnet terminal-type option
RFC 1350 Trivial File Transfer Protocol (TFTP)
RFC 1385 SMTP service extension
RFC 2249 MIME
RFC 2211 DHCPv4 (server, relay and client)
RFC 2322 DHCP options and BOOTP vendor extensions
RFC 2464 Hypertext Transfer Protocol - HTTP/1.1
RFC 2821 Simple Mail Transfer Protocol (SMTP)
RFC 2822 Internet message format
RFC 4034 DHCP relay agent information option (DHCP option 82)
RFC 4315 DHCPv6 (server, relay and client)
RFC 4330 IPv6 prefix options for DHCPv6
RFC 4332 DNS configuration options for DHCPv6
RFC 4393 Subscriber-ID suboption for DHCP relay agent option
RFC 4505 Simple Network Time Protocol (SNTP) version 4
RFC 4507 Network Time Protocol (NTP) version 4

VLAN Support
Generic VLAN Registration Protocol (GVRP)
IEEE 802.1ad Provider Bridges (VLAN stacking, 2-in-1)
IEEE 802.1q Virtual LAN (VLAN) bridges
IEEE 802.1q Virtual LAN (VLAN) classification by protocol and port
IEEE 802.1x VLAN tagging

Voice over IP (VoIP)
LLDP-MED ANSI/TIA-1057
Voice VLAN
SwitchBlade x908 | Advanced Layer 3+ Modular Switch

Feature Licenses

<table>
<thead>
<tr>
<th>NAME</th>
<th>DESCRIPTION</th>
<th>INCLUDES</th>
<th>STACK LICENSING</th>
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</table>
| AT-FL-SBX9-01     | SwitchBlade x908 Advanced Layer 3 license | ▶ OSPF3 (10,000 routes)  
▶ PIM-v4-SM, DM & SSM  
▶ VLAN double tagging (Q-in-Q)  
▶ BGP4 (5,000 routes)  
▶ VRF Lite (64 domains)  
▶ L2LD  | One license per stack member         |
| AT-FL-SBX9-02     | SwitchBlade x908 IPv6 Pack          | ▶ RIPng (1,000 routes)  
▶ MLDv1 & v2  
▶ PIMv6-SM and SSM  
▶ BGP4+ for IPv6 (5,000 routes)  
▶ OSPFv3 (8,000 routes)  | One license per stack member         |
| AT-FL-RADIUS-FULL | Increase local RADIUS server support limits  
2  | ▶ 5000 users  
▶ 1000 NAS  | One license per stack member         |
| AT-FL-SBX9-AM40-1YR | AMF Master License                  | ▶ AMF Master 40 nodes for 1 year  | One license per stack |
| AT-FL-SBX9-AM40-5YR | AMF Master License                  | ▶ AMF Master 40 nodes for 5 years  | One license per stack |

1 64 OSPF and BGP routes included in base software
2 100 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 load-sharing power supply

AT-FAN03
Spare fan module

AT-XEM-2XP
2 x 10GbE (XFP) ports

AT-XEM-2XS
2 x 10GbE (SFP+) ports

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

AT-XEM-12Sv2
12 x 1000T SFP ports

AT-XEM-12Tv2
12 x 10/100/1000T (RJ-45) ports

AT-HS-STK-CBL650
650mm high speed stacking cable

Where xx = 10 for AC power supply with US power cord
20 for AC power supply with no power cord
30 for AC power supply with UK power cord
40 for AC power supply with AU power cord
50 for AC power supply with EU power cord
80 for DC power supply

Note that NO power supplies ship with the base chassis product, they must be ordered separately.
**SwitchBlade x908** | Advanced Layer 3+ Modular Switch

### Accessories

**SFP Modules**

**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

**AT-SEPX**
1000GX GbE multi-mode 1310 nm 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

**AT-SPBD010-13**
1000LX GbE Bi-Di (1310 nm Tx, 1490 nm Rx) fiber up to 10 km

**AT-SPBD010-14**
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

**AT-SPBD020-13/I**
1000SX GbE Bi-Di (1310 nm Tx, 1550 nm Rx) fiber up to 20 km

**AT-SPBD020-14/I**
1000SX GbE Bi-Di (1490 nm Tx, 1310 nm Rx) fiber up to 20 km

**10GbE XFP Modules**

For use with 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-SP10SR**
10GSR 850 nm short-haul, 300 m with MMF

**AT-SP10SR/I**
10GSR 850 nm short-haul, 300 m with MMF

**AT-SP10LRM**
10GLRM 1310 nm short-haul, 220 m with MMF

**AT-SP10LR**
10GLR 1310 nm medium-haul, 10 km with SMF

**AT-SP10LR/I**
10GLR 1310 nm medium-haul, 10 km with SMF industrial temperature

**AT-SP10LR20/I**
10GER 1310nm long-haul, 20 km with SMF

**AT-SP10ER40/I**
10GER 1310nm long-haul, 40 km with SMF

**AT-SP10ZP80/I**
10GER 1550nm long-haul, 80 km with SMF

**AT-SP10T**
10GBase-T 20 m copper

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

**AT-SP10TW1**
1 meter SFP+ direct attach cable

**AT-SP10TW3**
3 meter SFP+ direct attach cable

**AT-SP10TW7**
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)

* For spares only. Fan modules are included with chassis.