

x900 Series

Advanced Gigabit Layer 3+ Expandable Switches



The Allied Telesis x900 Series of Layer 3+ switches feature high speed 60Gbps expansion bays, providing a level of port flexibility and application versatility unmatched by any other 1RU Gigabit Ethernet switch on the market.



Flexible

Allied Telesis x900 Series switches utilize a sophisticated, highly modular design, allowing the network to grow in response to demand. A comprehensive range of hot-swappable copper and fiber expansion modules (XEMs) is available, from 10/100/1000Mbps to 10 Gigabit Ethernet (10GbE). Dual redundant Power Supply Units (PSUs) on x900-24X models are also hot-swappable, adding to the impressive list of high-availability features.

10GbE XEMs provide high speed, high capacity fiber or copper uplinks of 20Gbps to the network core. The new XEM-24T increases port density without consuming additional rack-space.

Reliable

Hot-swappable XEMs, redundant hot-swappable PSUs and replaceable fans ensure no network interruptions during maintenance or reconfiguration.

The x900-24X Series operate 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 the continued delivery of essential services. The x900 Series switches also feature front-to-back cooling, making them an ideal choice 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 x900 Series physical devices with XEM-STK modules, providing dedicated high speed stacking links. VCStack creates 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 on different units can be aggregated for excellent high availability. VCStack delivers a resilient solution at a fraction of the cost of a full chassis-based system, and allows management of the stack as a single network node, greatly simplifying management tasks.

EPSRing 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 when the network design demands high performance and high availability.

MEF Certified

The Allied Telesis x900 Series 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 x900 Series is certified for compliance to MEF 9 and MEF 14 Ethernet Services tests.



New Features

- ▶ Allied Telesis Management Framework (AMF)
- ▶ AT-XEM-24T
- ▶ BGP4+ for IPv6

VCStack™

EPSRing™

AMF™

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.

VCStack (Virtual Chassis Stacking)

- ▶ Create a VCStack of two units with 60Gbps of stacking bandwidth to each unit. VCStack provides a highly available system where network resources are spread out across stacked units, reducing the impact if one of the units fails. Aggregating switch ports on different units across the stack provides excellent network resiliency.

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

- ▶ Our 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.

* Require AlliedWare Plus software release 5.4.2 - 2.5 or later

**Require AlliedWare Plus software release 5.4.3 - 2.5 or later

EPSRing (Ethernet Protection Switched Rings)

- ▶ EPSRing and 10GbE modules allow the x900 Series 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.

Industry-leading 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.

Control Plane Prioritization (CPP)

- ▶ Ensure maximum performance and prevent network outages with CPP. CPP prevents the Control Plane from becoming flooded in the event of a network storm or Denial of Service (DoS) attack, ensuring critical network control traffic always reaches its destination.

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 unprecedented control over user access, in order to mitigate threats to network infrastructure. The x900 Series use 802.1x port-based authentication in partnership with standards-compliant dynamic VLAN assignment, to assess a user's adherence to network security policies to be assessed, and then either grant access 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 that do not have an 802.1x supplicant. If multiple users share a port then multi-authentication can be used. A Guest

VLAN (also known as Default VLAN) can also be configured to provide a catch-all for users without an 802.1x supplicant.

Terminal Access Controller Access-Control System Plus (TACACS+) Authentication and Accounting

- ▶ TACACS+ provides access control and accounting for network users from a centralized server. Authentication is carried out via communication between the local switch and a TACACS+ server to check the credentials of users seeking network access. Accounting enables user sessions and CLI commands to be logged to create an audit trail for user activity.

Optical DDM

- ▶ Most modern optical SFP/SFP+/XFP transceivers support Digital Diagnostics Monitoring (DDM) functions according to the specification SFF-8472. This enables various parameters of the transceiver to be monitored in real-time, such as optical output power, temperature, laser bias current and transceiver supply voltage. The x900 Series provides easy access to this information simplifying diagnosing problems with optical modules and fibre connections.

Dynamic Host Configuration Protocol (DHCPv6)

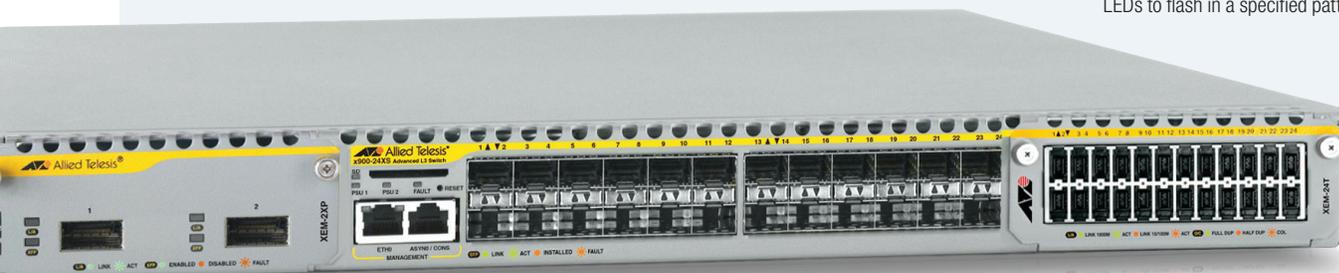
- ▶ DHCPv6 is used to dynamically assign IPv6 addresses to hosts from a central location. Acting as DHCPv6 client enables the switch to receive an IPv6 address, and acting as server enables the switch to dynamically allocate IPv6 addresses to hosts. The DHCPv6 server and client both support the Prefix 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.

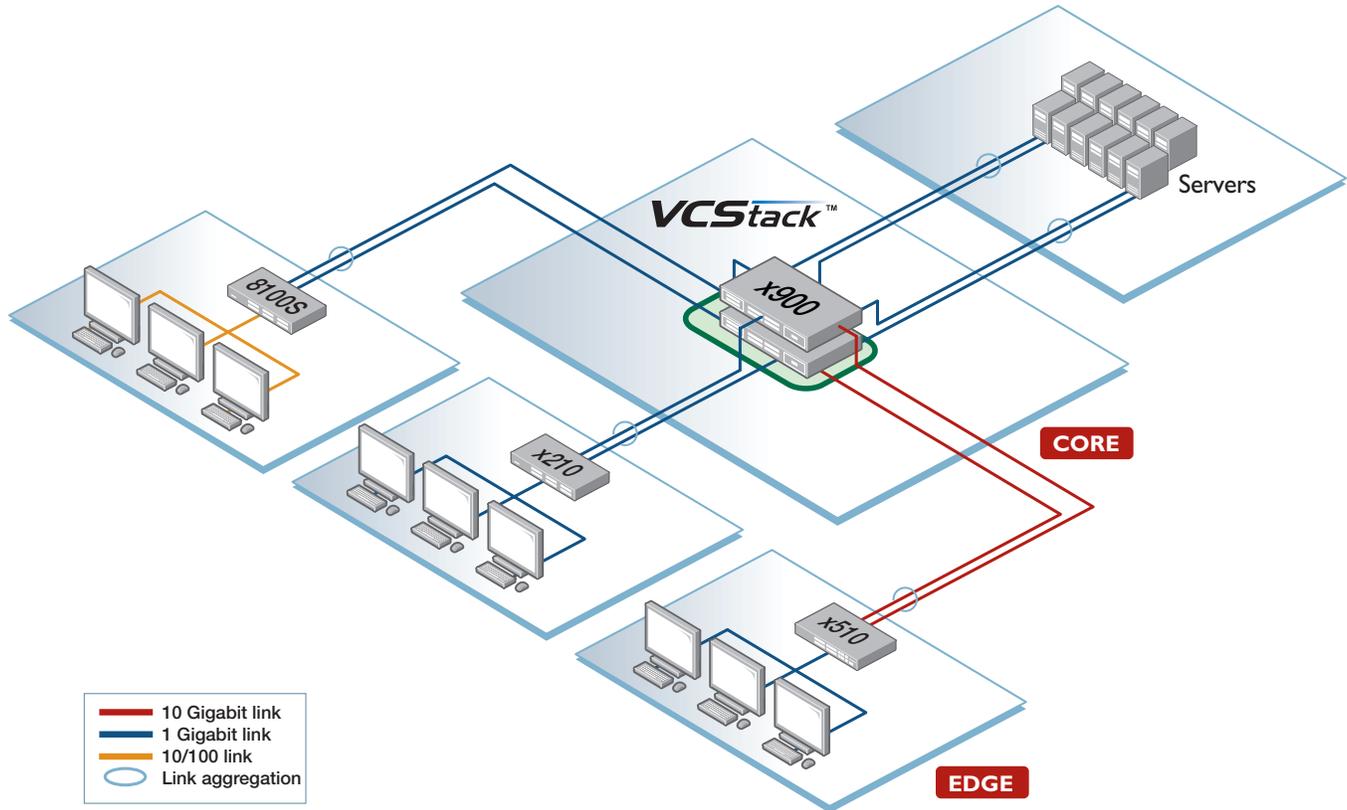
Find Me

- ▶ 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.



Key Solutions

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. The Allied Telesis expandable x900 Series switches provide the ideal solution — without the expense of a full chassis. With the benefits of high availability, increased capacity and ease of management, Virtual Chassis Stacking 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.

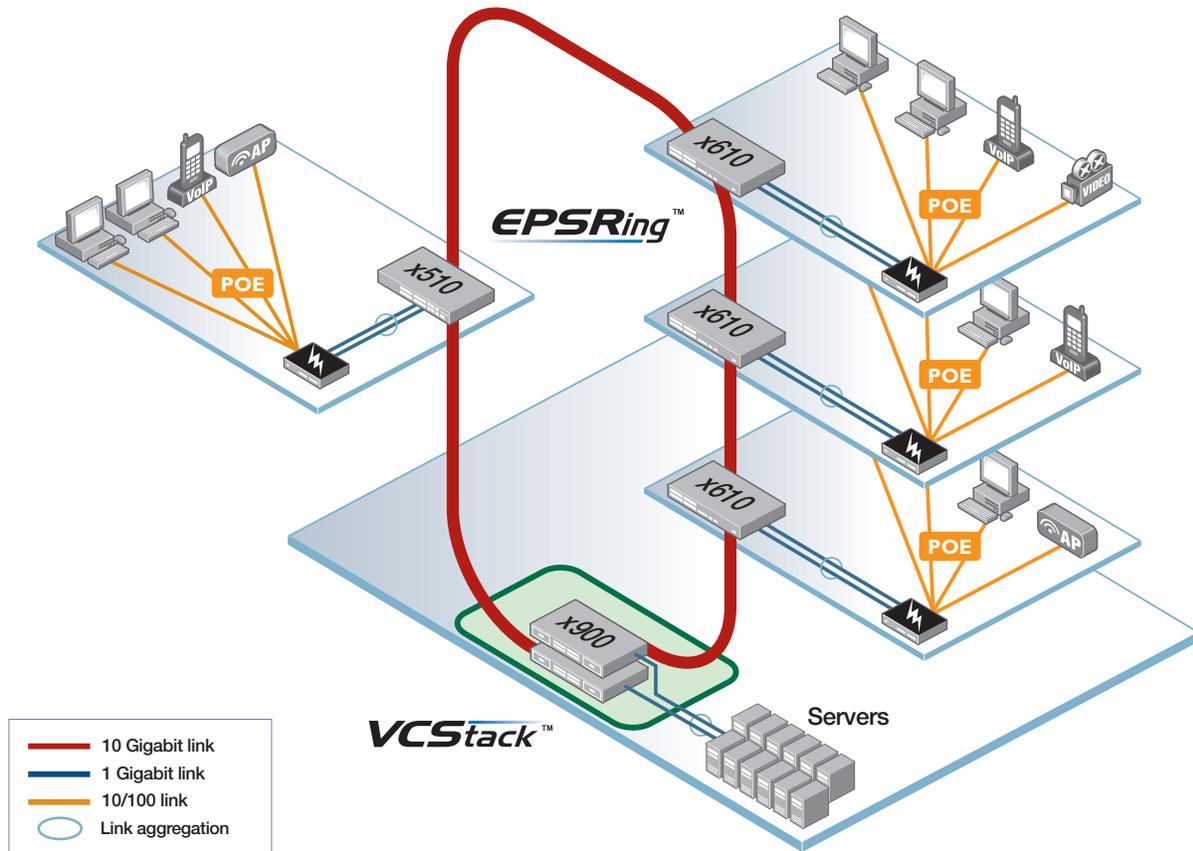
The diagram above shows link aggregation between the core VCStack and the edge switches.

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 access to information when you need it.

Key Solutions

EPSR (Ethernet Protection Switched Ring)



EPSRing: Resiliency and Fault Tolerance

The increased 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 network is required for the enterprise core, using EPSR with the Allied Telesis x900 Series switches provides the ideal solution.

EPSRing 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 above diagram shows a corporate network based on a central EPSR ring. The inclusion of Allied Telesis VCStack 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 benefits that EPSRing has to offer. By ensuring always-available online applications and resources, this advanced self-healing network technology meets the constant demand for information at the fingertips.

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Specifications

Performance

- ▶ Forwarding Rate:
AT-x900-24X: 110.1Mpps
AT-x900-12XT/S: 62.5Mpps
- ▶ Switching Fabric:
AT-x900-24X: 168Gbps
AT-x900-12XT/S: 84Gbps
- ▶ Extensive wirespeed traffic classification for ACLs and QoS
- ▶ Supports 10KB jumbo frames
- ▶ Wirespeed multicasting
- ▶ Up to 16K MAC addresses
- ▶ Up to 4K Layer 2 multicast groups
- ▶ 4K Layer 3 interfaces
- ▶ Up to 1K Layer 3 IPv4 multicast groups
- ▶ 4K VLANs
- ▶ 512MB DDR SDRAM
- ▶ 64MB flash memory
- ▶ Separate packet buffer memory

Reliability

- ▶ The x900-24X Series feature dual hot-swappable PSUs with 1 + 1 redundancy and dual feed support — a separate power circuit can feed each power supply providing extra reliability
- ▶ Hot-swappable XEMs
- ▶ Full environmental monitoring of PSUs, fans, temperature and internal voltages. SNMP traps alert network managers in case of any failure

Power Consumption

AT-x900-24X

- ▶ With 1 PSU and 1 fan module:
110 Watts (375 BTU/hr)
- ▶ With 2 PSUs and 2 XEM-1XP modules:
191 Watts (652 BTU/hr)

AT-x900-12XT/S

- ▶ With 1 XEM-12: 104 Watts (355 BTU/hr)
- ▶ With no XEM: 68 Watts (232 BTU/hr)

Power Characteristics

- ▶ AC Voltage: 100 to 240V (+/-10% auto ranging)
- ▶ Frequency: 47 to 63Hz
- ▶ DC Voltage: : 40 to 60V

Expandability

- ▶ Two high speed 60Gbps expansion bays on x900-24X
- ▶ One high speed 60Gbps expansion bay on x900-12XT/S
- ▶ Stackable up to two units in a VCStack
- ▶ IPv6 routing license option
- ▶ Advanced Layer 3 license option

Flexibility and Compatibility

- ▶ SFP ports will support any combination of 1000T, 100FX, 100BX, 1000SX, 1000LX, 1000ZX or 1000ZX CWDM SFPs (Note XEM-12Sv2 does not support 100X)
- ▶ XEM modules are compatible with SwitchBlade x908 Layer 3 modular switch
- ▶ 60Gbps expansion bays supporting a choice of XEM modules for port flexibility and application versatility

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
- ▶ 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

- ▶ 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
- ▶ RED and WRED curves for sophisticated drop precedence
- ▶ 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

- ▶ AAccess Control Lists (ACLs) based on layer 3 and 4 headers
- ▶ Configurable auth-fail and guest VLANs
- ▶ Authentication, Authorisation and Accounting (AAA)
- ▶ 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:
AT-x900-24X 0°C to 40°C (32°F to 104°F)
AT-x900-12XT/S 0°C to 50°C (32°F to 122°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 80% 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) – AC models only
- ▶ NEBS: GR63, GR1089 level 3. AT-x900-24XT-N and AT-XEM-12S

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Safety

- ▶ Standards: UL60950-1, CAN/CSA-C22.2 No. 60950-1-03, EN60950-1, EN60825-1, AS/NZS 60950.1
- ▶ Certification: UL, cUL, TUV

Restrictions on Hazardous Substances (RoHS) Compliance

- ▶ EU RoHS compliant
- ▶ China RoHS compliant

Country of Origin

- ▶ Singapore

Physical Specifications

PRODUCT	WIDTH	DEPTH	HEIGHT	MOUNTING	WEIGHT	
					UNPACKAGED	PACKAGED
AT-x900-24XT	440 mm (17.32 in)	440 mm (17.32 in)	44.5 mm (1.75 in)	1 RU	† 7.3 kg (16.09 lb) 9.3 kg (20.50 lb) max	† 8.8 kg (19.40 lb) 10.8 kg (23.80 lb) max
AT-x900-24XS	440 mm (17.32 in)	440 mm (17.32 in)	44.5 mm (1.75 in)	1 RU	† 7.3 kg (16.09 lb) 9.3 kg (20.50 lb) max	† 8.8 kg (19.40 lb) 10.8 kg (23.80 lb) max
AT-x900-12XT/S	440 mm (17.32 in)	350 mm (13.77 in)	44.5 mm (1.75 in)	1 RU	5.3 kg (11.68 lb) no XEM 6.0 kg (13.22 lb) with XEM	7.9 kg (17.41 lb) no XEM 8.6 kg (18.95 lb) with XEM
AT-PWR01	-	-	-	N/A	AC - 1 kg (2.20 lb) DC - 1 kg (2.20 lb)	AC - 1.8 kg (3.96 lb) DC - 1.5 kg (3.30 lb)
AT-FAN01	-	-	-	N/A	0.6 kg (1.32 lb)	1.4 kg (3.08 lb)
AT-XEM-Modules	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)

† with 1 PSU and 1 fan module

Latency (microseconds)

PRODUCT	PORT SPEED			
	10 MBPS	100 MBPS	1 GBPS	10 GBPS
AT-x900-24XT	35.5µs	8.0µs	5.8µs	3.8µs*
AT-x900-24XS	37.9µs	8.4µs	5.9µs	3.8µs*
AT-x900-12XT/S	33.2µs	7.6µs	5.7µs	3.8µs*

* with XEM-2XP

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
- 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 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 802.1AX Link aggregation (static and LACP)
- 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

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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 SMIv2
RFC 2012	SNMPv2 MIB for TCP using SMIv2
RFC 2013	SNMPv2 MIB for UDP using SMIv2
RFC 2096	IP forwarding table MIB
RFC 2578	Structure of Management Information v2 (SMIv2)
RFC 2579	Textual conventions for SMIv2
RFC 2580	Conformance statements for SMIv2
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 Features

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	RIPv2

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

Ordering Information

Feature Licenses

NAME	DESCRIPTION	INCLUDES
AT-FL-X900-01	x900 Advanced Layer 3 license	<ul style="list-style-type: none"> ▶ OSPF¹ (10,000 routes) ▶ BGP4 (5,000 routes) ▶ PIMv4-SM, DM & SSM ▶ VLAN double tagging (Q-in-Q) ▶ VRF Lite (64 domains)
AT-FL-X900-02	x900 IPv6 pack	<ul style="list-style-type: none"> ▶ RIPng (1,000 routes) ▶ MLDv1 & v2 ▶ PIMv6-SM ▶ BGP4+ for IPv6 (5,000 routes) ▶ OSPFv3 (8,000 routes)
AT-FL-RADIUS-FULL	Increase local RADIUS server support limits ²	<ul style="list-style-type: none"> ▶ 5000 users ▶ 1000 NAS

¹ 64 OSPF routes included in base software

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

x900 Series | Advanced Gigabit Layer 3+ Expandable Switches

Ordering Information

x900 Series

AT-x900-24XT-P-xx

24 x 10/100/1000T (RJ-45) copper ports,
2 x high speed expansion bays, removable PSU

AT-x900-24XT-N-85

24 x 10/100/1000T (RJ-45) NEBS compliant,
2 x high speed expansion bays, removable PSU

AT-x900-24XS-P-xx

24 x 10/100/1000X SFP combo ports,
2 x high speed expansion bays, removable PSU

AT-x900-12XT/S-yy

12 x 1000T combo ports, 1 x high speed expansion
bay, internal PSU

AT-RKMT-SL01

Sliding rack mount kit

Expansion Modules

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

AT-XEM-STK

2 x high speed stacking ports
(stacking cable sold separately)

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
industrial temperature

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
industrial temperature

AT-SP10ER40/I

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

AT-SP10ZR80/I

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

SFP Modules

AT-SPFX/2

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

AT-SPFX/15

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

AT-SPFXBD-LC-13

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

AT-SPFXBD-LC-15

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

AT-SPTX³

1000T 100 m 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 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
industrial temperature

AT-SPBD10-13

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

AT-SPBD10-14

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

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

AT-XPLR

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

AT-XPER40

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

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 1m Ethernet cables (pack of 8)

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

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

Stacking Cables For use with XEM-STK

AT-XEM-STK-CBL350

350 mm stacking cable

AT-XEM-STK-CBL2.0

2.0 meter stacking cable

Power Supplies

AT-PWR01-xx

Hot-swappable load sharing power supply

AT-FAN01

Fan only module

Where xx = 20 for no power cord

60 for all power cords

80 for 48VDC power supply

Where yy = 20 for no power cord

60 for all power cords

³ The AT-SPTX is not supported on the AT-x900-12XT/S