x600 Series
Intelligent Gigabit Layer 3+ Switches

The Allied Telesis x600 Series is an advanced series of stackable switches providing high performance, flexibility and reliability.

Scalable

The choice of 24-port and 48-port versions, coupled with the ability to stack up to 4 units, allows the Allied Telesis x600 Series to connect anything from a small workgroup right up to a large business.

With a choice of 1 or 10 Gigabit uplink ports, bandwidth can be tailored to suit the network application. Hot-swappable XFPs provide high-speed, high-capacity fiber uplinks, with up to 40Gbps uplink capacity from each switch to the network core — so a 4-unit stack can provide a massive 160Gbps of uplink bandwidth independent from stacking bandwidth.

The flexibility of the x600 Series, coupled with the ability to stack multiple units, ensures a future-proof network.

Secure

Advanced security features protect the network from the edge to the core. Network Access Control (NAC) assures security, allowing unprecedented control over user access to the network and mitigating threats to network infrastructure. 802.1x port-based authentication, in partnership with standards-compliant dynamic VLAN assignment, assesses a user's network security adherence and either grants authentication or offers remediation.

Authentication options on the x600 Series also include 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. All three authentication methods — 802.1x, MAC-based and Web-based, — can be enabled simultaneously on the same port. This is called tri-authentication.

Manageable

The x600 Series runs the advanced AlliedWare Plus™ fully featured operating system, delivering a rich feature set and an industry-standard CLI. The industry-standard CLI reduces training requirements and is consistent across all AlliedWare Plus devices, simplifying network management.

The built-in, web-based Graphical User Interface is an easy-to-use and powerful management tool. With comprehensive monitoring facilities and the ability to view a virtual chassis as a single entity, the GUI is an essential part of a network management toolkit.

AlliedWare Plus™ OPERATING SYSTEM

2002/95/EC RoHS COMPLIANT

IPv6 READY

New Features

▶ EPSR SuperLoop Protection

▶ Optical DDM

▶ PIM - SSM

▶ TACACS+ Accounting

▶ IPv6 Features

Key Features

Network Access Control (NAC)

▶ NAC allows for unprecedented control over user access to the network, in order to mitigate threats to network infrastructure. Furthermore, if multiple users share a port multi-authentication is used. Different users on the same port can be assigned into different VLANs, and so given different levels of network access. Additionally, a Guest VLAN can be configured to provide a catch-all for users who aren't authenticated.

Integrated Management

▶ Simplifies administration by integrating several network services into the x600 switch.

▶ Radius Server checks the identity of users to keep the network safe.

▶ Storm Control ensures a robust network by managing the amount of traffic allowed on the network, and dealing with any unexpected surges.

▶ DHCP server automates the distribution of network addresses to PCs.

▶ A centralized Timekeeper ensures the network is always working in full synchronicity.

▶ Loop Protection guards against accidental wiring mistakes.

VCStack™ (Virtual Chassis Stacking)

▶ Create a VCStack with up to four units. 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.

EPSRing™ (Ethernet Protection Switched Rings)

▶ EPSR and 10 Gigabit Ethernet allow several x600 Series to form a high speed protected ring capable of recovery within as little as 50ms. This feature is perfect for high performance and high availability in enterprise 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 wirespeed 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 such as voice and video take precedence over non-essential services such as file downloads, maintaining responsiveness of Enterprise applications.

Power over Ethernet Plus (PoE+)

▶ With the AT-x600-24Ts-POE and POE+, a separate power connection to media endpoints such as IP phones and wireless access points is not required. PoE+ provides even greater flexibility, as it is capable of connecting devices that require more power (up to 30 Watts), for example tilt and zoom security cameras. Diagram 1 shows an example of PoE+ power provisioning.

Link Layer Discovery Protocol–Media Endpoint Discovery (LLDP–MED)

▶ LLDP-MED extends LLDP's basic network endpoint discovery and management functions. LLDP-MED allows for media endpoint specific messages, providing detailed information on power requirements, network policy, location discovery (for Emergency Call Services) and inventory.

Voice VLAN

▶ Voice VLAN automatically separates voice and data traffic into two different VLANS. This automatic separation places delay-sensitive traffic into a voice dedicated VLAN, which simplifies QoS configurations.

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 defense against security threats. Sampled packets sent to a collector ensure it always has a real-time view of network traffic.

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 x600 Series provides easy access to this information simplifying diagnosing problems with optical modules and fiber connections.
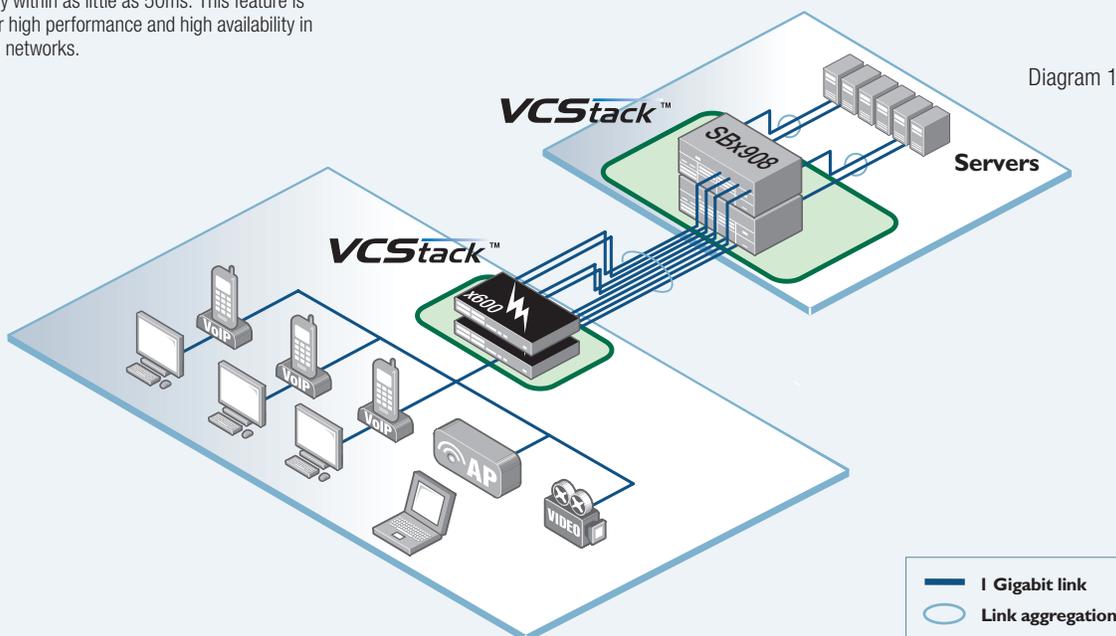

Diagram 1: PoE+ provision

VCStack™
SBx908
Servers

VCStack™
x600

VoIP
AP
VIDEO

▬▬ 1 Gigabit link
⬭ Link aggregation

Key Solutions

NAC (Network Access Control)

**Policy
and
RADIUS
Server**

Policy Decision Point

**x600-24Ts
Tri-authentication
capable switch**

**802.1x authenticated
device**

**Web authenticated
device**

Policy Enforcement Point

**MAC authenticated
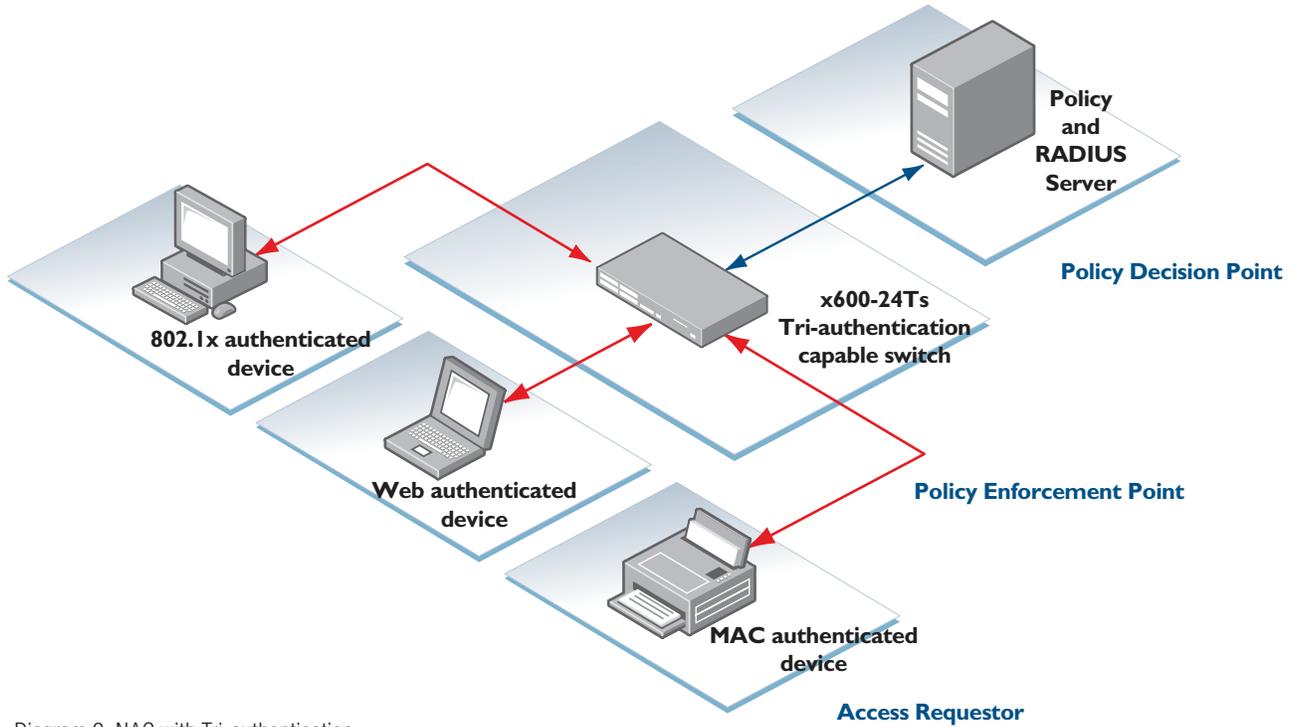device**

Access Requestor

Diagram 2: NAC with Tri-authentication

One of the major security issues facing enterprise networks is prevention of internal breaches and malicious software infiltration. Internal defense requires significant involvement with individual network devices, which is costly and time consuming. NAC lowers this overhead and provides an effective solution to internal network security.

NAC automates network security policy management, allowing easy control of network access and management of network security. NAC uses 802.1x port-based authentication in partnership with standards-compliant dynamic VLAN assignment, to assess a user's adherence to network 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 that do not have an 802.1x supplicant.

Tri-Authentication provides a way for the network to successfully manage authentication of all devices.

Allied Telesis is a partner with Microsoft, supporting Microsoft Network Access Protection (NAP) technology. Allied Telesis is committed to providing secure networks, and interoperability with Microsoft's network access control solution is an important component of an already comprehensive security set. The Allied Telesis NAC solution also interoperates with many other third party NAC solutions.

Key Solutions

VCStack (Virtual Chassis Stacking)

VCStack: Resiliency and Stability

Today's modern Enterprise business relies 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. The Allied Telesis x600 Series switches provide the ideal solution with VCStack.

With VCStack, multiple switches appear as a single virtual chassis. In normal operation, this virtual chassis acts as a single switch, simplifying management.

Diagram 3 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 needed.

The x600 Series provides an extensive range of port-density and uplink-connectivity options, when used as aggregation layer switches or Gigabit to the desktop edge switches. This scalable switch family can connect anything from a small workgroup to a large business.

Diagram 4 shows four AT-x600-48Ts/XP switches connected as a virtual chassis for maximum Gigabit to the desktop or aggregation layer port density. With the stacking bandwidth provided separately from the 10 Gigabit uplink ports, this solution provides a massive 160 Gigabits of uplink bandwidth to the network core, while the stacking backplane throughput is completely unaffected for maximum performance.

Whether used to provide a virtual network core, or to maximize port density, the x600 family switches together with VCStack provide resiliency, scalability and ease of management. VCStack makes networking reliable.
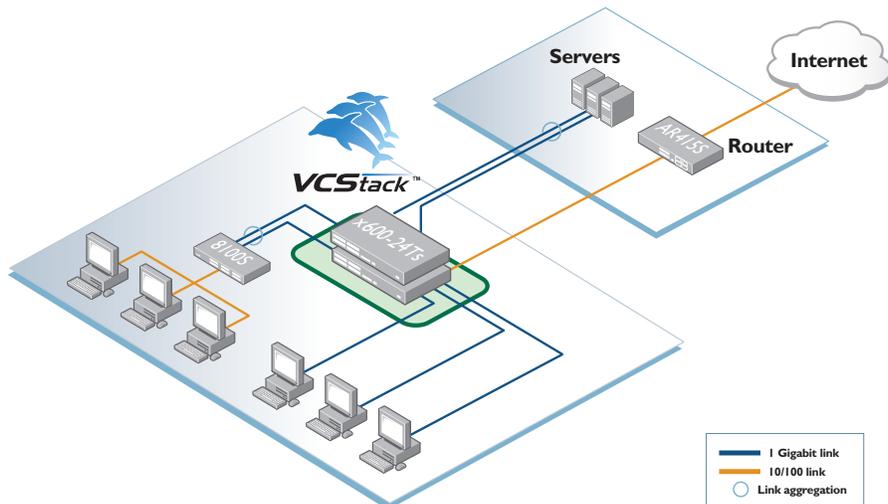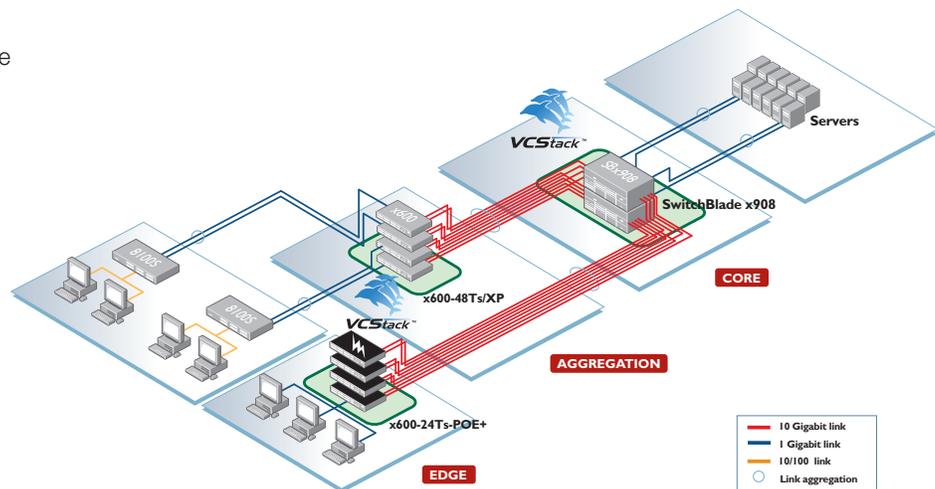

Diagram 3: VCStack - resilient network

Diagram 4: VCStack - scalable port density

Specifications

PRODUCT	10/100/1000T (RJ-45) COPPER PORTS	1000X SFP PORTS	1000X SFP COMBO PORTS	10GIGABIT XFP PORTS	MAX PoE/POE+ PORTS	SWITCHING FABRIC	FORWARDING RATE
AT-x600-24Ts	24	-	4	-	-	96Gbps	71.4Mpps
AT-x600-24Ts-POE	24	-	4	-	24 PoE	96Gbps	71.4Mpps
AT-x600-24Ts-POE+	24	-	4	-	24 PoE/12 PoE+	96Gbps	71.4Mpps
AT-x600-24Ts/XP	24	-	4	2	-	136Gbps	101.2Mpps
AT-x600-48Ts	44	4	-	-	-	144Gbps	107.1Mpps
AT-x600-48Ts/XP	44	4	-	2	-	184Gbps	136.9Mpps

Performance
▶ 48Gbps of stacking bandwidth
▶ Extensive wirespeed traffic classification for ACLs and QoS
▶ Supports 9KB jumbo frames
▶ Wirespeed multicasting
▶ Up to 16K MAC addresses
▶ 4K VLANs
▶ 4K Layer 3 entries
▶ 512MB DDR SDRAM
▶ 64MB flash memory
▶ Packet buffer memory: AT-x600-24T - 2MB
        AT-x600-48T - 4MB

Reliability
▶ Modular AlliedWare PlusTM operating system
▶ Redundant power supply available to load share with internal power supply, providing uninterrupted power and extra reliability
▶ Full environmental monitoring of PSUs, fans, temperature and internal voltages. SNMP traps alert network managers in case of any failure

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

Expandability
▶ One expansion bay for AT-StackXG module supporting two high speed stacking ports (on non-PoE models, stacking ports are built-in on PoE models)
▶ Stackable up to four units in a VCStack
▶ IPv6 routing license option
▶ Advanced Layer 3 license option

Flexibility and Compatibility
▶ Gigabit SFP ports will support any combination of 1000T, 1000X SFPs, 1000SX, 1000LX, or 1000ZX SFPs
▶ Mix up to four x600 and x610 units in the same VCStack

Diagnostic Tools
▶ Built-In Self Test (BIST)
▶ Ping polling
▶ Port mirroring
▶ Traceroute
▶ Optical Digital Diagnostic Monitoring (SFF-8472)

General Routing
▶ Black hole routing
▶ Directed broadcast forwarding

▶ DNS relay
▶ Equal Cost Multi-Path (ECMP) routing
▶ Policy-based routing
▶ Route maps
▶ Route redistribution (OSPF, BGP, RIP)
▶ UDP broadcast helper (IP helper)

IPv6 Features
▶ 6to4 tunnelling
▶ DHCPv6 relay, DNSv6, NTPv6
▶ IPv4 and IPv6 dual stack
▶ IPv6 management via ping, Traceroute, Telnet and SSH

Management
▶ Eco-friendly mode allows ports and LEDs to be disabled to save power
▶ Console management port on the front panel for ease of access
▶ Web-based Graphical User Interface (GUI)
▶ Industry-standard CLI with context-sensitive help
▶ Powerful CLI scripting tool
▶ SD/SDHC memory card socket allowing software release files, configurations and other files to be stored for backup and distribution to other devices.
▶ Configurable logs and triggers provide an audit trail of SD card insertion and removal
▶ Secure Copy (SCP)
▶ Built-in text editor
▶ Event-based triggers allow user-defined scripts to be run upon selected system events

Quality of Service (QoS)
▶ Limit bandwidth per port or per traffic class 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
▶ Strict priority scheduling, weighted round robin or mixed
▶ RED and WRED curves for drop precedence

Resiliency
▶ Control plane prioritization ensures the CPU always has sufficient bandwidth to process network control traffic
▶ Dynamic link failover
▶ EPSRing (Ethernet Protection Switched Rings)
▶ EPSR Super Loop Protection

▶ Loop protection: loop detection and thrash limiting
▶ PVST+ compatibility-mode
▶ STP root guard
▶ VCStack fast failover minimizes network disruption

Security Features
▶ Access Control Lists (ACLs)
▶ Auth fail VLAN
▶ BPDU protection
▶ DHCP snooping, IP source guard and dynamic ARP inspection
▶ DoS attack blocking and virus throttling
▶ Dynamic VLAN assignment
▶ Guest VLAN
▶ MAC-based authentication
▶ Port-based learn limits (intrusion detection)
▶ Private VLANs, providing security and port isolation of multiple customers using the same VLAN
▶ Strong password security
▶ Web-based authentication

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: -25°C to 70°C (-13°F to 158°F)
▶ Operating relative humidity range: 5% to 90% non-condensing
▶ Storage relative humidity range: 5% to 95% non-condensing
▶ Operating altitude: 3,048 meters maximum (10,000 ft)
▶ Front to back forced air cooling

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

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
▶ China

x600 Series | Intelligent Gigabit Layer 3+ Switches

Physical Specifications

PRODUCT	WIDTH	DEPTH	HEIGHT	MOUNTING	WEIGHT	
					UNPACKAGED	PACKAGED
AT-x600-24Ts	440 mm (17.32 in)	305 mm (12.0 in)	44 mm (1.73 in)	1 RU rack mount	4.5 kg (9.92 lb)	6.1 kg (13.44 lb)
AT-x600-24Ts-POE	440 mm (17.32 in)	408 mm (16.06 in)	44 mm (1.73 in)	1 RU rack mount	6.9 kg (15.21 lb)	8.5 kg (18.73 lb)
AT-x600-24Ts/PoE+	440 mm (17.32 in)	408 mm (16.06 in)	44 mm (1.73 in)	1 RU rack mount	6.9 kg (15.21 lb)	8.5 kg (18.73 lb)
AT-x600-24Ts/XP	440 mm (17.32 in)	305 mm (12.0 in)	44 mm (1.73 in)	1 RU rack mount	4.6 kg (10.14 lb)	6.2 kg (13.66 lb)
AT-x600-48Ts	440 mm (17.32 in)	305 mm (12.0 in)	44 mm (1.73 in)	1 RU rack mount	4.9 kg (10.80 lb)	6.5 kg (14.33 lb)
AT-x600-48Ts/XP	440 mm (17.32 in)	305 mm (12.0 in)	44 mm (1.73 in)	1 RU rack mount	4.9 kg (10.80 lb)	6.5 kg (14.33 lb)
AT-StackXG	150 mm (5.9 in)	95 mm (3.74 in)	30 mm (1.18 in)	Internal	0.2 kg (0.44 lb)	0.5 kg (1.1 lb)

Power and Noise Characteristics

PRODUCT	NO POE LOAD			15W PER PORT POE LOAD	
	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE	MAX POWER CONSUMPTION	HEAT DISSIPATION
AT-x600-24Ts	87W	297 BTU/hr	45.8 dBA	-	-
AT-x600-24Ts-POE	78W	268 BTU/hr	48.1 dBA	462W	1,579 BTU/hr
AT-x600-24Ts-POE+	78W	268 BTU/hr	46.8 dBA	462W	1,579 BTU/hr
AT-x600-24Ts/XP	87W	297 BTU/hr	45.8 dBA	-	-
AT-x600-48Ts	112W	382 BTU/hr	46.8 dBA	-	-
AT-x600-48Ts/XP	112W	382 BTU/hr	46.8 dBA	-	-

NOISE tested to ISO7779; front bystander position

Latency (microseconds)

PRODUCT	SPEED			
	10 MBPS	100 MBPS	1 GBPS	10 GBPS
AT-x600-24Ts	32.3µs	6.0µs	3.7µs	
AT-x600-24Ts/X	32.3µs	6.0µs	3.7µs	6.1µs
AT-x600-48Ts	32.3µs	6.0µs	3.7µs	
AT-x600-48Ts/X	32.3µs	6.0µs	3.7µs	7.7µs

Standards and Protocols

AlliedWare Plus Operating System
Version 5.4.2 or higher

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

Border Gateway Protocol (BGP)
BGP dynamic capability
BGP graceful restart
BGP outbound route riltering
Extended communities attribute
RFC 1771   Border Gateway Protocol 4 (BGP-4)
RFC 1772   Application of the Border Gateway Protocol 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 2796   BGP route reflection - an alternative to full mesh IBGP
RFC 2858   Multiprotocol extensions for BGP-4
RFC 2918   Route refresh capability for BGP-4
RFC 3065   Autonomous system confederations for BGP
RFC 3107   Carrying label information in BGP-4
RFC 3392   Capabilities advertisement with BGP-4
RFC 4893   BGP support for four-octet AS number space

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-2008 link aggregation (static and dynamic)
IEEE 802.2   Logical Link Control
IEEE 802.3   Ethernet CSMA/CD
IEEE 802.3ab   1000BASE-T
IEEE 802.3ae   10 Gigabit Ethernet
IEEE 802.3af   Power over Ethernet (PoE)
IEEE 802.3at   Power over Ethernet Plus (PoE+)
IEEE 802.3u   100BASE-X
IEEE 802.3x   Flow control - full-duplex operation
IEEE 802.3z   Gigabit Ethernet

General Routing
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) relay and server
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 the bootstrap protocol
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 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 autoconfiguration
RFC 5014   IPv6 socket API for source address selection
RFC 5095   Deprecation of type 0 routing headers in IPv6
RFC 5175   IPv6 router advertisement flags option
RFC 6105   IPv6 router advertisement guard

Management

AT Enterprise MIB
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 1493   Bridge 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 2574   User-based Security Model (USM) for SNMPv3
RFC 2575   View-based Access Control Model (VACM) for SNMP
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 3412   Message processing and dispatching for the SNMP
RFC 3413   SNMP applications
RFC 3418   MIB for SNMP
RFC 3621   PoE MIB
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

Multicast Support

Bootstrap router for PIM-SM
IGMP proxy
IGMP query solicitation
IGMP snooping
RFC 1112   Host extensions for IP multicasting
RFC 2236   Internet Group Management Protocol v2 (IGMPv2)
RFC 2362   PIM-SM
RFC 2715   Interoperability rules for multicast routing protocols

RFC 3376   IGMPv3
RFC 3973   PIM-DM
RFC 4541   IGMP and MLD snooping switches
RFC 4604   Using IGMPv3 and MLDv2 for Source Specific Multicast
RFC 4607   Source-Specific Multicast for IP

Open Shortest Path First (OSPF)

Graceful OSPF restart
OSPF link-local signaling
OSPF MD5 authentication
OSPF restart signaling
OSPF TE extensions
OSPFv3 TE extensions
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

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-2004   MAC bridges
IEEE 802.1D-2004   Rapid Spanning-Tree Protocol (RSTP)
IEEE 802.1Q-2005   Multiple Spanning-Tree Protocol (MSTP)
RFC 3768   Virtual Router Redundancy Protocol (VRRP)

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 Features

SSH remote login
SSLv2 and SSLv3
TACACS+ accounting
TACACS+ authentication
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 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   DHCP for IPv4
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 3993   Subscriber-ID suboption for DHCP relay agent option
RFC 5905   Network Time Protocol version 4 (NTPv4)

VLAN Support

Generic VLAN Registration Protocol (GVRP)
IEEE 802.1ad Provider bridges (VLAN stacking, Q-in-Q)
IEEE 802.1Q-2005 Virtual LAN (VLAN) bridges
IEEE 802.1v VLAN classification by protocol and port
IEEE 802.3ac VLAN tagging

Voice over IP (VoIP) Support

LLDP-MED ANSI/TIA-1057
Voice VLAN