x610 Series

Layer 3+ Aggregation Switches

The Allied Telesis x610 Series is the high performing and scalable solution for today's networks, providing an extensive range of port-density and uplink-connectivity options.

With a choice of 24-port and 48-port versions and optional 10 Gigabit uplinks, plus the ability to stack up to eight units, the x610 Series can connect anything from a small workgroup to a large business.

High Performing

The x610 Series features fully non-blocking switching on all ports, so IPv4 and IPv6 Layer 2 switching and Layer 3 routing occur at wirespeed with low latency. This is ideal for high-end server deployments, and, when combined with a large Layer 3 route table, for aggregating Gigabit connections.

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

The x610 Series provides uninterrupted access to online applications by implementing a network with no single point of failure. Distributing resources across a stacked group of units means no network downtime. A fully resilient solution is created with VCStack™ (Virtual Chassis Stacking), where up to eight units can form a single virtual chassis with dual connections to key servers and access switches. VCStack can be implemented in the same cabinet over copper cabling, or to remote locations using fiber.

Allied Telesis EPSRing™ (Ethernet Protection Switched Ring), technology provides a high performing resilient design for distributed networks. A high-speed solution where recovery occurs within as little as 50ms can be deployed in ring-based topologies. Several switches can form a protected ring, running at up to 10Gbps.

Scalable

The flexibility of the x610 Series, coupled with the ability to stack multiple units, ensures a future-proof network. The choice of 24-port and 48-port versions and Gigabit or 10 Gigabit uplink ports enables uplink bandwidth to be tailored to suit network applications. Expansion modules are available for local and long-distance stacking. Long-distance expansion modules can be configured to provide two additional 10G ports.

Flexible endpoint deployment is ensured with the ability to power devices such as IP phones, security cameras, and wireless access points directly from the switch. This convergence of voice, video and data on today's networks is enabled by Power over Ethernet Plus (PoE+), which delivers the added benefit of reducing costs.

Secure

Multiple customers can have their own secure virtual network within the same physical infrastructure, as the x610 Series switches are able to divide a single router into multiple independent virtual routing domains. Layer 3 network virtualization provided by Virtual Routing and Forwarding (VRF Lite) creates independent routing domains, where IP addresses can overlap without causing conflict.

Energy Efficient Ethernet (EEE)

The x610 Series supports Energy Efficient Ethernet (EEE), which automatically reduces the power consumed by the switch whenever there is no traffic on a port. This sophisticated feature can significantly reduce your operating costs by reducing the power requirements of the switch and any associated cooling equipment.

New Features

- AMF Starter
- Active Fiber Monitoring

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. Powerful features like centralized management, auto-backup, auto-upgrade, auto-provisioning and auto-recovery enable plug-and-play networking and zero-touch management.
- Any x610 Series switch can operate as the AMF network master, storing firmware and configuration backups for other network nodes. The AMF master enables auto-provisioning and auto-upgrade by providing appropriate files to new network members. New network devices can be pre-provisioned making installation easy because no on-site configuration is required.

VCStack (Virtual Chassis Stacking)

- Create a VCStack of up to eight units with 48Gbps of stacking bandwidth to each unit. Stacking links are connected in a ring so each device has dual connections to further improve resiliency. 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.

Long-distance Stacking

- Long-distance stacking allows a VCStack to be created over longer distances, perfect for a distributed network environment.

EPSRing (Ethernet Protection Switched Ring)

- EPSRing and 10 Gigabit Ethernet allow several x610 switches to form high-speed protected rings capable of recovery within as little as 50ms. This feature is perfect for high performance and high availability in enterprise networks.
- SuperLoop Protection (SLP) enables a link between two EPSR nodes to be in separate EPSR domains, improving redundancy and network fault resiliency.

Easy to Manage

- Allied Telesis x610 Layer 3+ switches run the advanced AlliedWare Plus™ Layer 3 fully featured operating system, delivering a rich feature set and an industry-standard CLI. In addition to the CLI, x610 switches feature a comprehensive GUI for easy access to monitoring and configuration.

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 PoE, a separate power connection to media endpoints such as IP phones and wireless access points is not necessary. PoE+ provides even greater flexibility, providing the capability to connect devices requiring more power (up to 30 Watts)—for example, tilt and zoom security cameras.
- Build a redundant PoE+ high-availability solution using VCStack and additional RPS units. See the x610 PSU PoE options table on page 5 for details.

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

- LLDP-MED extends LLDP 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.

Open Shortest Path First (OSPFv3)

- OSPF is a scalable and adaptive routing protocol for IP networks. The addition of OSPFv3 adds support for IPv6 and further strengthens the Allied Telesis focus on next generation networking.

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.

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 consisting of a large number of equipment racks, it can be quite a job finding the correct switch quickly among many similar units. The “find me” feature is a simple visual way to quickly identify the desired physical switch for maintenance or other purposes, by causing its LEDs to flash in a specified pattern.

Optical DDM

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

UniDirectional link Detection

- UniDirectional Link Detection (UDLD) is useful for monitoring fiber-optic links between two switches that use two single-direction fibers to transmit and receive packets. UDLD prevents traffic from being sent across a bad link by blocking the ports at both ends of the link in the event that either the individual transmitter or receiver for that connection fails.

Key Solutions

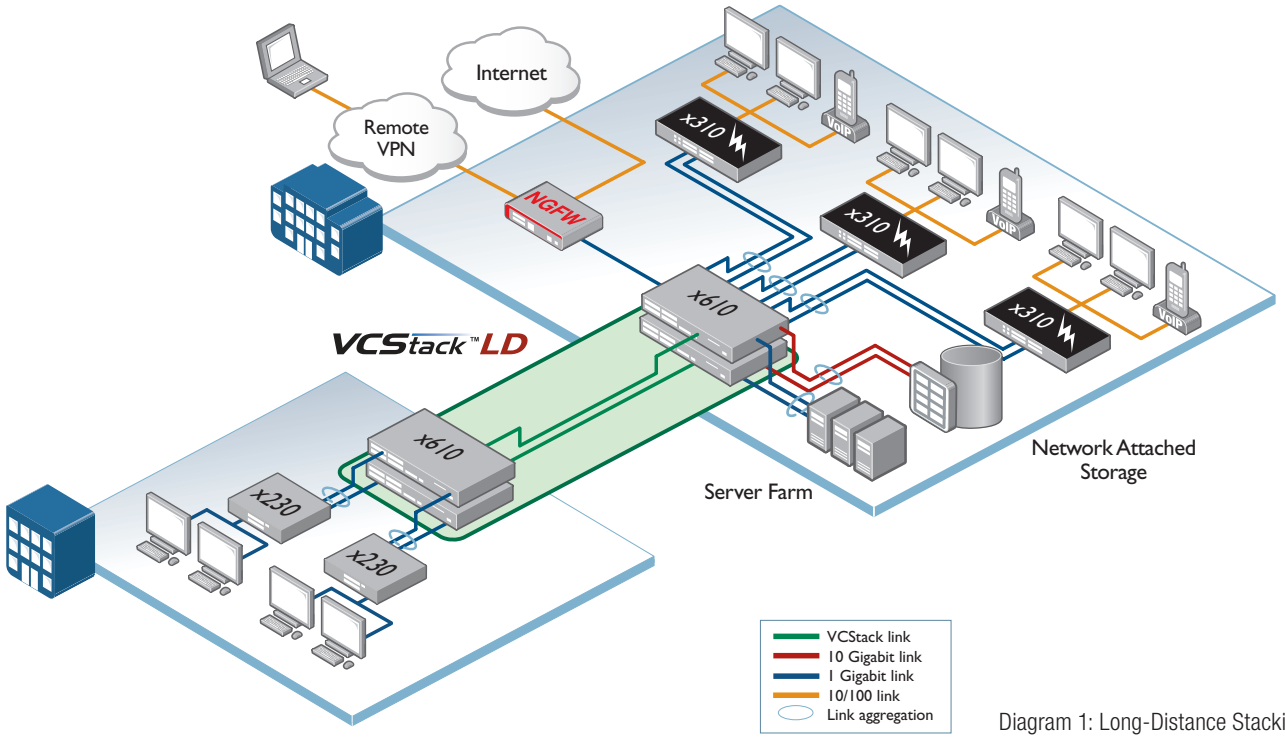

Diagram 1: Long-Distance Stacking

Distributed Core

VCStack LD (Long Distance) enables the VCStack solution to provide a distributed network core. The increased distance provided by fiber stacking connectivity means that members of the virtual chassis do not need to be co-located. Instead, they can be kilometers apart. Diagram 1 shows an example of a long distance stack, where the single virtual distributed core ensures high availability of data for network users.

Network Virtualization

Virtual Routing and Forwarding (VRF Lite) allows multiple customers to share a common infrastructure, while maintaining their own independent virtual routing domains. Individual customers can take advantage of shared resources such as printers and Internet access via filtered inter-VRF communication, while maintaining absolute security. See diagram 2.

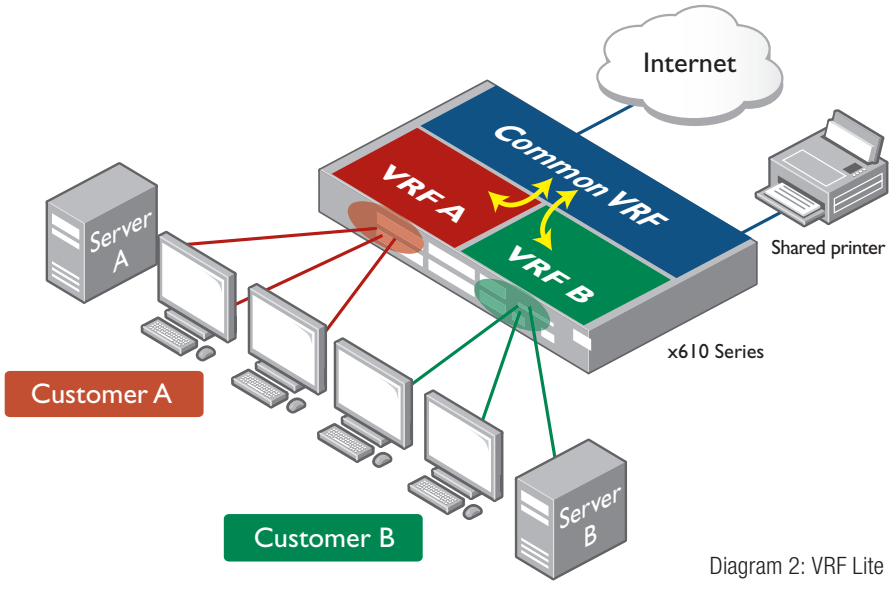

Diagram 2: VRF Lite

Specifications

PRODUCT	10/100/1000T (RJ-45) COPPER PORTS	100/1000X SFP PORTS	SFP AND 10/100/1000 COMBO PORTS	TOTAL GIGABIT PORTS	10 GIGABIT SFP+ PORTS		MAX POE+ PORTS	SWITCHING FABRIC	FORWARDING RATE
AT-x610-24Ts	20	-	4	24	-	2*	-	96Gbps	71.4Mpps
AT-x610-24Ts-POE+	20	-	4	24	-	2*	24	96Gbps	71.4Mpps
AT-x610-24Ts/X	20	-	4	24	2	4*	-	136Gbps	101.2Mpps
AT-x610-24Ts/X-POE+	20	-	4	24	2	4*	24	136Gbps	101.2Mpps
AT-x610-24SPs/X	-	20	4	24	2	4*	-	136Gbps	101.2Mpps
AT-x610-48Ts	44	-	4	48	-	2*	-	144Gbps	107.1Mpps
AT-x610-48Ts-POE+	44	-	4	48	-	2*	48	144Gbps	107.1Mpps
AT-x610-48Ts/X	46	-	2	48	2	4*	-	232Gbps	136.9Mpps
AT-x610-48Ts/X-POE+	46	-	2	48	2	4*	48	232Gbps	136.9Mpps

* with AT-x6EM/XS2 module in standalone switch

Performance

- 48Gbps of stacking bandwidth
- Supports 9KB jumbo frames
- Wirespeed multicasting
- Up to 32K MAC addresses
- 512MB DDR SDRAM
- 64MB flash memory
- Packet buffer memory: AT-x610-24Ts - 2MB
  AT-x610-48Ts - 4MB

Reliability

- Modular AlliedWare Plus 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

Expandability

- One expansion bay
- Stackable up to eight x610 units in a VCStack
- Versatile licensing options for additional features

Flexibility and Compatibility

- Mix up to four x600 and x610 units in the same VCStack
- Gigabit SFP combo ports support any combination of 1000T, 1000X SFPs, 1000SX, 1000LX, 1000ZX or 1000ZX CWDM SFPs
- SFP ports on AT-x610-24SPs/X support any combination of 10/100/1000T, 100FX, 100BX, 1000SX, 1000LX, 1000ZX or 1000ZX CWDM SFPs

Diagnostic Tools

- Active Fiber Monitoring detects tampering on optical links
- Built-In Self Test (BIST)
- Cable fault locator (TDR)
- UniDirectional Link Detection (UDLD)
- 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 and route redistribution (OSPF, BGP, RIP)
- IPv4 static unicast and multicast routing
- UDP broadcast helper (IP helper)
- Up to 64 Virtual Routing and Forwarding (VRF lite) domains (with license)

IPv6 Features

- DHCPv6 relay, DHCPv6 client
- DNSv6 relay, DNSv6 client
- IPv4 and IPv6 dual stack
- IPv6 QoS and hardware ACLs
- Device management over IPv6 networks with SNMPv6, Telnetv6, SSHv6 and Syslogv6
- 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
- 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
- SD/SDHC memory card socket allows software release files, configurations and other files to be stored for backup and distribution to other devices
- Powerful CLI scripting engine
- Configurable logs and triggers provide an audit trail of SD card insertion and removal
- Comprehensive SNMP MIB support for standards-based device management
- Built-in text editor
- Event-based triggers allow user-defined scripts to be executed upon selected system events

Quality of Service (QoS)

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

Resiliency

- Stacking ports can be configured as 10G Ethernet ports
- 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
- Long-Distance stacking (LD-VCStack)
- Loop protection: loop detection and thrash limiting
- PVST+ compatibility mode
- STP root guard
- VCStack fast failover minimizes network disruption

Security

- Access Control Lists (ACLs) based on layer 3 and 4 headers
- Configurable 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)
- DoS attack blocking and virus throttling
- Dynamic VLAN assignment
- MAC address filtering and MAC address lock-down
- Network Access and Control (NAC) features manage endpoint security
- Port-based learn limits (intrusion detection)

- Private VLANs provide security and port isolation for multiple customers using the same VLAN
- Secure Copy (SCP)
- Strong password security and encryption
- Tri-authentication: MAC-based, web-based and IEEE 802.1x

Environmental Specifications

- Operating temperature range:
  0°C to 45°C (32°F to 113°F)
  Derated by 1°C per 305 meters (1,000 ft)
  Operation up to 50°C (122°F) for limited period(s) †
- 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

† Not more than the following in a one year period:
96 consecutive hours, or 360 hours total or 15 occurrences

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

- Indonesia

Physical Specifications

PRODUCT	WIDTH	DEPTH	HEIGHT	MOUNTING	WEIGHT	
					UNPACKAGED	PACKAGED
AT-x610-24Ts	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	6.3 kg (13.89 lb)	8.8 kg (19.4 lb)
AT-x610-24Ts-POE+	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	5.6 kg (12.35 lb)	7.6 kg (16.76 lb)
AT-x610-24Ts/X	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	6.3 kg (13.89 lb)	9.7 kg (21.38 lb)
AT-x610-24Ts/X-POE+	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	5.6 kg (12.35 lb)	7.6 kg (16.76 lb)
AT-x610-24SPs/X	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	6.6 kg (14.55 lb)	9.2 kg (20.3 lb)
AT-x610-48Ts	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	6.7 kg (14.77 lb)	9.0 kg (19.84 lb)
AT-x610-48Ts-POE+	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	6.0 kg (13.23 lb)	7.8 kg (17.2 lb)
AT-x610-48Ts/X	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	6.8 kg (14.99 lb)	9.8 kg (21.61 lb)
AT-x610-48Ts/X-POE+	440 mm (17.32 in)	420 mm (16.54 in)	44 mm (1.73 in)	Rack-mount	6.0 kg (13.23 lb)	8.5 kg (18.74 lb)
AT-RPS3000	440 mm (17.32 in)	360 mm (14.17 in)	44 mm (1.73 in)	Rack-mount	4.3 kg (9.48 lb)	6.1 kg (13.45 lb)
AT-PWR250 AC	150 mm (5.9 in)	275 mm (10.83 in)	42 mm (1.65 in)	Internal	1.5 kg (3.31 lb)	2.7 kg (5.95 lb)
AT-PWR250 DC	150 mm (5.9 in)	275 mm (10.83 in)	42 mm (1.65 in)	Internal	1.5 kg (3.31 lb)	2.7 kg (5.95 lb)
AT-PWR800	150 mm (5.9 in)	275 mm (10.83 in)	42 mm (1.65 in)	Internal	1.8 kg (3.97 lb)	2.9 kg (6.39 lb)
AT-PWR1200	150 mm (5.9 in)	330 mm (13 in)	42 mm (1.65 in)	Internal	2.2 kg (4.85 lb)	4.5 kg (9.92 lb)
AT-x6EM/XS2	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)
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	INTERNAL PSU OR AT-PWR250 (NO PoE LOAD)			AT-PWR800 (FULL PoE+ LOAD)			AT-PWR1200 (FULL PoE+ LOAD)		
	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE
AT-x610-24Ts	81W	276 BTU/hr	51.2 dBA	-	-	-	-	-	-
AT-x610-24Ts-POE+	87W	297 BTU/hr	51.2 dBA	632W	519 BTU/hr	51.8 dBA	930W	717 BTU/hr	58.3
AT-x610-24Ts/X	89W	304 BTU/hr	51.2 dBA	-	-	-	-	-	-
AT-x610-24Ts/X-POE+	92W	314 BTU/hr	51.2 dBA	636W	532 BTU/hr	51.8 dBA	935W	734 BTU/hr	58.3
AT-x610-24SPs/X	108W	368 BTU/hr	51.2 dBA	-	-	-	-	-	-
AT-x610-48Ts	112W	382 BTU/hr	51.2 dBA	-	-	-	-	-	-
AT-x610-48Ts-POE+	119W	406 BTU/hr	51.2 dBA	673W	659 BTU/hr	51.8 dBA	1,027W	843 BTU/hr	58.3
AT-x610-48Ts/X	120W	409 BTU/hr	51.2 dBA	-	-	-	-	-	-
AT-x610-48Ts/X-POE+	125W	427 BTU/hr	51.2 dBA	681W	686 BTU/hr	51.8 dBA	1,034W	867 BTU/hr	58.3

Noise tested to ISO7779; front bystander position

PSU PoE Options

POWER SUPPLY UNIT	PoE POWER AVAILABLE	MAXIMUM PoE PORTS SUPPORTED			
		CLASS 1 (4.0 W)	CLASS 2 (7.0 W)	CLASS 3 (15.4 W)	CLASS 4 (30 W)
AT-PWR250	-	-	-	-	-
AT-PWR800	480W	48	48	31	16
AT-PWR1200	780W	48	48	48	26

Latency (microseconds)

PRODUCT	PORT SPEED			
	10MBPS	100MBPS	1GBPS	10GBPS
AT-x610-24Ts	30µs	5.5µs	3.7µs	
AT-x610-24Ts/X	30µs	5.5µs	3.7µs	3.3µs
AT-x610-24SPs/X	30µs	5.5µs	3.7µs	3.0µs
AT-x610-48Ts	29µs	5.5µs	3.7µs	
AT-x610-48Ts/X	29µs	5.6µs	3.7µs	4.8µs

Standards and Protocols

AlliedWare Plus Operating System
Version 5.4.5-2

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 802.3af Power over Ethernet (PoE)
IEEE 802.3at Power over Ethernet plus (PoE+)
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
Optical DDM MIB
SNMPv1, v2c and v3
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 1155 Structure and identification of management information for TCP/IP-based Internets
RFC 1157 Simple Network Management Protocol (SNMP)
RFC 1212 Concise MIB definitions
RFC 1213 MIB for network management of TCP/IP-based Internets: MIB-II
RFC 1215 Convention for defining traps for use with the SNMP
RFC 1227 SNMP MUX protocol and MIB
RFC 1239 Standard MIB
RFC 1724 RIPv2 MIB extension
RFC 2011 SNMPv2 MIB for IP using 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 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 3621 Power over Ethernet (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
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-SM and SSM for IPv6
RFC 1112 Host extensions for IP multicasting (IGMPv1)
RFC 2236 Internet Group Management Protocol v2 (IGMPv2)
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2715 Interoperability rules for multicast routing protocols
RFC 3376 IGMPv3
RFC 3810 Multicast Listener Discovery v2 (MLDv2) for IPv6
RFC 3973 PIM Dense Mode (DM)
RFC 4541 IGMP and MLD snooping switches
RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): protocol specification (revised)
RFC 4604 Using IGMPv3 and MLDv2 for source-specific multicast
RFC 4607 Source-specific multicast for IP

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

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

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

Routing Information Protocol (RIP)
RFC 1058 Routing Information Protocol (RIP)
RFC 2080 RIPng for IPv6

RFC 2081 RIPng protocol applicability statement
RFC 2082 RIP-2 MD5 authentication
RFC 2453 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-supplicant authentication
IEEE 802.1X port-based network access control
RFC 2818 HTTP over TLS ("HTTPS")
RFC 2865 RADIUS
RFC 2866 RADIUS accounting
RFC 2868 RADIUS attributes for tunnel protocol support
RFC 3280 Internet X.509 PKI Certificate and Certificate Revocation List (CRL) profile
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 TLS v1.2

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	STACK LICENSING
AT-FL-x610-01	x610 advanced Layer 3 license	▶ OSPF1 (10,000 routes) ▶ PIM-SM, DM and SSM ▶ BGP4 (5,000 routes) ▶ VLAN double tagging (Q-in-Q) ▶ VRF Lite (64 domains) ▶ UDLD	▶ One license per stack member
AT-FL-x610-02	x610 IPv6 pack	▶ RIPng (1,000 routes) ▶ OSPFv3 (5,000 routes) ▶ BGP4+ for IPv6 (5,000 routes) ▶ PIMv6-SM and SSM ▶ MLDv1 and v2	▶ 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-x610-AM20	AMF Master license	▶ AMF Master 20 nodes	▶ One license per stack member

[1] The standard switch software supports 64 OSPF routes.
[2] 100 users and 24 NAS can be stored in local RADIUS database with base software.

x610 Series

AT-x610-24Ts-60
24-port Gigabit switch with 20 x 10/100/1000T (RJ-45) copper ports and 4 additional combo ports (1000X SFP or 10/100/1000T), internal PSU

AT-x610-24Ts-POE+-00
24-port Gigabit switch with 20 x 10/100/1000T (RJ-45) Power over Ethernet (IEEE 802.3at) copper ports and 4 additional combo ports (1000X SFP or 10/100/1000T), removable PSU (PSU not included)

AT-x610-24Ts/X-60
24-port Gigabit switch with 20 x 10/100/1000T (RJ-45) copper ports, 4 additional combo ports (1000X SFP or 10/100/1000T) and 2 x SFP+ 10 Gigabit ports, internal PSU

AT-x610-24Ts/X-PoE+-00
24-port Gigabit switch with 20 x 10/100/1000T (RJ-45) Power over Ethernet (IEEE 802.3at) copper ports, 4 additional combo ports (1000X SFP or 10/100/1000T) and 2 x SFP+ 10 Gigabit ports, removable PSU (PSU not included)

AT-x610-24SPs/X-60
24-port Gigabit switch with 20 x 100/1000X (SFP) ports, 4 additional combo ports (1000X SFP or 10/100/1000T) and 2 x SFP+ 10 Gigabit ports, internal PSU

AT-x610-48Ts-60
48-port Gigabit switch with 44 x 10/100/1000T (RJ-45) copper ports and 4 additional combo ports (1000X SFP or 10/100/1000T), internal PSU

AT-x610-48Ts-POE+-00
48-port Gigabit switch with 44 x 10/100/1000T (RJ-45) Power over Ethernet (IEEE 802.3at) copper ports and 4 additional combo ports (1000X SFP or 10/100/1000T), removable PSU (PSU not included)

AT-x610-48Ts/X-60
48-port Gigabit switch with 46 x 10/100/1000T (RJ-45) copper ports, 2 additional combo ports (1000X SFP or 10/100/1000T) and 2 x SFP+ 10 Gigabit ports, internal PSU

AT-x610-48Ts/X-PoE+-00
48-port Gigabit switch with 46 x 10/100/1000T (RJ-45) Power over Ethernet (IEEE 802.3at) copper ports, 2 additional combo ports (1000X SFP or 10/100/1000T) and 2 x SFP+ 10 Gigabit ports, removable PSU (PSU not included)

Expansion Modules

AT-x6EM/XS2-00
Expansion module (2 x SFP+) for long distance stacking or two additional 10GbE ports

AT-StackXG-00
Expansion module with one AT-StackXG/0.5-00 cable included

Cables

AT-StackXG/0.5-00
0.5 meter cable for stacking

AT-StackXG/1-00
1 meter cable for stacking

AT-SP10TW1
1 meter SFP+ direct attach cable

AT-SP10TW3
3 meter SFP+ direct attach cable

AT-SP10TW7
7 meter SFP+ direct attach cable

10GbE SFP+ Modules

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

100Mbps 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, 1310nm Rx) fiber up to 10 km

1000Mbps SFP Modules

AT-SPTX
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

PoE Power Supplies

AT-PWR800-xx
Additional 800W AC system and PoE+ power supply

AT-PWR1200-xx
Additional 1200W AC system and PoE+ power supply

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

Power Supply Accessories

AT-RPS3000-00
Chassis for up to two redundant power supplies (PSUs not included)

AT-PWR250-xx
Additional 250W AC system power supply

AT-PWR250-80
Additional 250W DC system power supply

AT-RPS-CBL1.0
1 meter RPS cable

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