x510 Series

Including x510, x510DP and x510L Series Switches

The Allied Telesis x510 Series of stackable Gigabit Layer 3 switches includes a full range of security and resiliency features, coupled with easy management, making them the ideal choice for network access applications.

Overview

Allied Telesis x510 Series switches are a high-performing and feature-rich choice for today's networks. They offer a versatile solution for Enterprise applications. With a choice of 24- and 48-port models with 1/10Gigabit uplink ports, plus the power of Allied Telesis Virtual Chassis Stacking (VCStack™), the x510 Series can connect anything from a small workgroup to a large business.

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.

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

Network resiliency

The convergence of network services in the enterprise has led to increasing demand for highly available networks with minimal downtime. VCStack, in conjunction with link aggregation, provides a network with no single point of failure and an easy, resilient solution for high availability applications. The x510 Series can form a VCStack of up to four units for enhanced resiliency and simplified device management.

Allied Telesis Ethernet Protection Switched Ring (EPSRing™), and the standards-based G.8032 Ethernet Ring Protection, ensure that distributed network segments have high-speed, resilient access to online resources and applications.

Ring Protection and VCStack Long-Distance (VCStack-LD), which enables stacks to be created over long distance fiber links, make the x510 Series the perfect choice for distributed environments.

Reliable

The x510 Series was designed with reliability in mind, and guarantees continual delivery of essential services. With dual built-in power supplies and near-hitless online stack reconfiguration, maintenance may be performed without affecting network uptime.

The x510DP features dual hot-swappable load-sharing power supplies for maximum uptime. With front-to-back or back-to-front cooling options, the x510DP is ideal for data center applications.

The x510L Series switches enable high-value solutions at the network edge.

Secure

Advanced security features protect the network. Unprecedented control over user access is provided with Network Access Control (NAC), mitigating threats to network infrastructure. This ensures the network is accessed only by known users and devices — all users' adherence to network security policies is checked, and then either access is granted or remediation is offered. Secure access can also be provided for guests.

PoE plus | AlliedWare Plus™ OPERATING SYSTEM | R6 READY

Future-proof

The x510 Series ensures a future-proof network, with superior flexibility coupled with the ability to stack multiple units. All x510 Series models feature 1/10 Gigabit uplinks ports and a comprehensive IPv6 feature set, to ensure they are ready for future network traffic demands. All x510 24-port models are Software Defined Networking (SDN) ready and are able to support OpenFlow v1.3.

Environmentally friendly

The x510 Series supports Energy Efficient Ethernet (EEE), automatically reducing the power consumed by the switch whenever there is no traffic on a port. This sophisticated feature can significantly reduce operating costs by reducing the power requirements of the switch and any associated cooling equipment.

eco friendly

New Features

- AMF secure mode
- G.8032 Ethernet Ring Protection
- Active Fiber Monitoring
- OpenFlow for SDN
- VLAN Mirroring (RSPAN)
- VLAN ACLs
- TACACS+ Command Authorization

VCStack™ | AMF™ | EPSRing™ | 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 x510 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.
- AMF secure mode encrypts all AMF traffic, provides unit and user authorization, and monitors network access to greatly enhance network security.
- AMF Guestnode allows Allied Telesis wireless access points and further switching products, as well as third party devices such as IP phones and security cameras, to be part of an AMF network.

Virtual Chassis Stacking (VCStack)

- Create a VCStack of up to four units with 40 Gbps 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.

Ethernet Protection Switched Ring (EPSRing)

- EPSRing and 10 Gigabit Ethernet allow several x510 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.
- Super-Loop Protection (SLP) enables a link between two EPSR nodes to be in separate EPSR domains, improving redundancy and network fault resiliency.

G.8032 Ethernet Ring Protection

- G.8032 provides standards-based high-speed ring protection, that can be deployed stand-alone, or interoperate with Allied Telesis EPSR.

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. Boosted network performance and guaranteed delivery of business-critical Ethernet services and applications are provided. Time-critical services such as voice and video take precedence over non-essential services such as file downloads, maintaining responsiveness of Enterprise applications.

Loop Protection

- Thrash limiting, also known as rapid MAC movement, detects and resolves network loops. It is highly user-configurable — from the rate of looping traffic to the type of action the switch should take when it detects a loop.
- With thrash limiting, the switch only detects a loop when a storm has occurred, which can potentially cause disruption to the network. To avoid this, loop detection works in conjunction with thrash limiting to send special Loop Detection Frame (LDF) packets that the switch listens for. If a port receives an LDF packet, you can choose to disable the port, disable the link, or send an SNMP trap. This feature can help to detect loops before a network storm occurs, avoiding the risk and inconvenience of traffic disruption.

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+ reduces costs and provides even greater flexibility, providing the capability to connect devices requiring more power (up to 30 Watts) such as pan, tilt and zoom security cameras.

High Reliability

- The x510 Series switches feature front to back cooling and dual power supply units (PSUs). The x510DP features dual hot-swappable load sharing power supplies for maximum uptime, and the option of either front-to-back or back-to-front cooling. This makes it ideal for use as a top-of-rack data center switch.

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.

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.

VLAN Mirroring (RSPAN)

- VLAN mirroring allows traffic from a port on a remote switch to be analysed locally. Traffic being transmitted or received on the port is duplicated and sent across the network on a special VLAN

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.

Active Fiber Monitoring

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

Tri-authentication

- Authentication options on the x510 Series also include alternatives to IEEE 802.1x port-based authentication, such as web authentication, to enable guest access and MAC authentication for endpoints that do not have an IEEE 802.1x supplicant. All three authentication methods—IEEE 802.1x, MAC-based and Web-based—can be enabled simultaneously on the same port for tri-authentication.

TACACS+ Command Authorization

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

Premium Software License

- By default, the x510 Series offers a comprehensive Layer 2 and basic Layer 3 feature set that includes static routing and IPv6 management features. The feature set can easily be elevated to full Layer 3 by applying the premium software license. This adds dynamic routing protocols and Layer 3 multicasting capabilities.

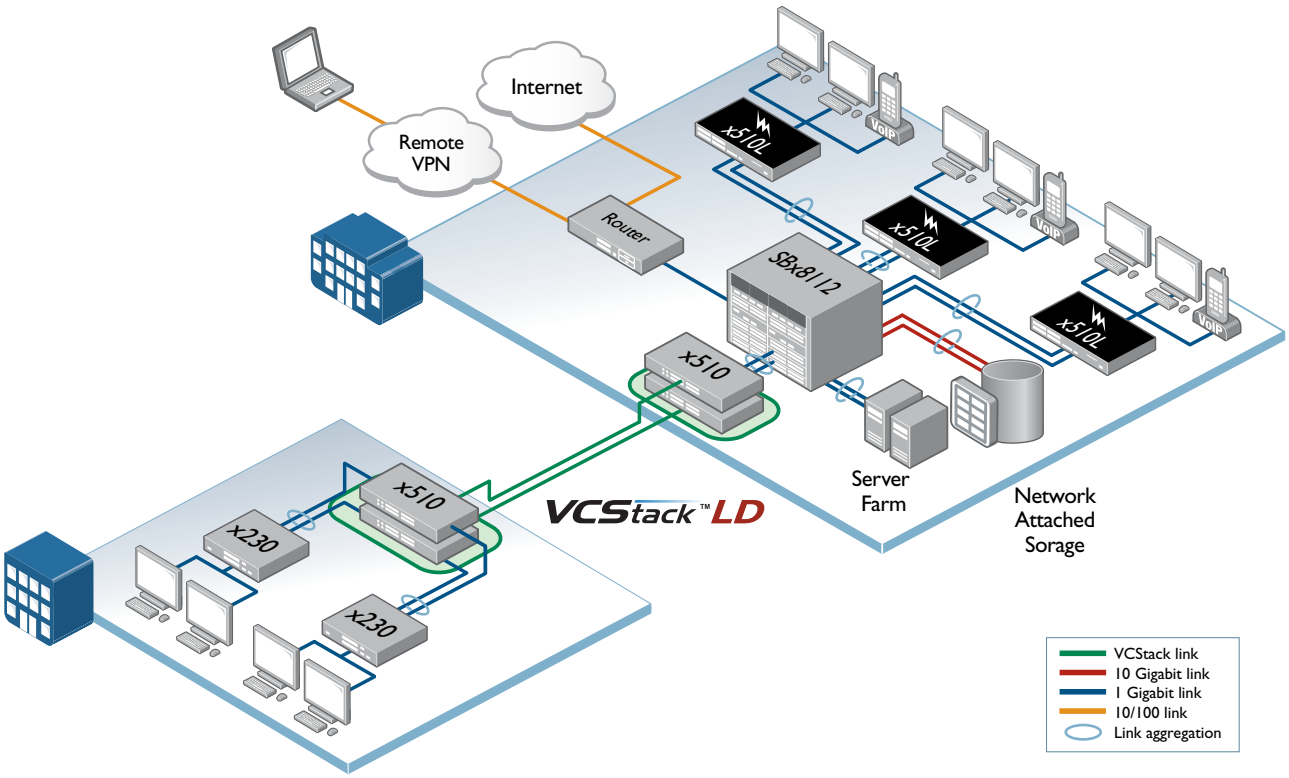
Software Defined Networking (SDN)

- OpenFlow is a key technology that enables the use of SDN to build smart applications that unlock value and reduce cost.

VLAN ACLs

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

Key Solutions



Resilient distribution switching

Allied Telesis x510 Series switches are ideal for distribution solutions, where resiliency and flexibility are required. In the above diagram, distribution switches utilize long-distance Virtual Chassis Stacking (VCStack-LD) to create a single virtual unit out of multiple devices. By using fiber stacking connectivity, units can be kilometers apart – perfect for a distributed environment.

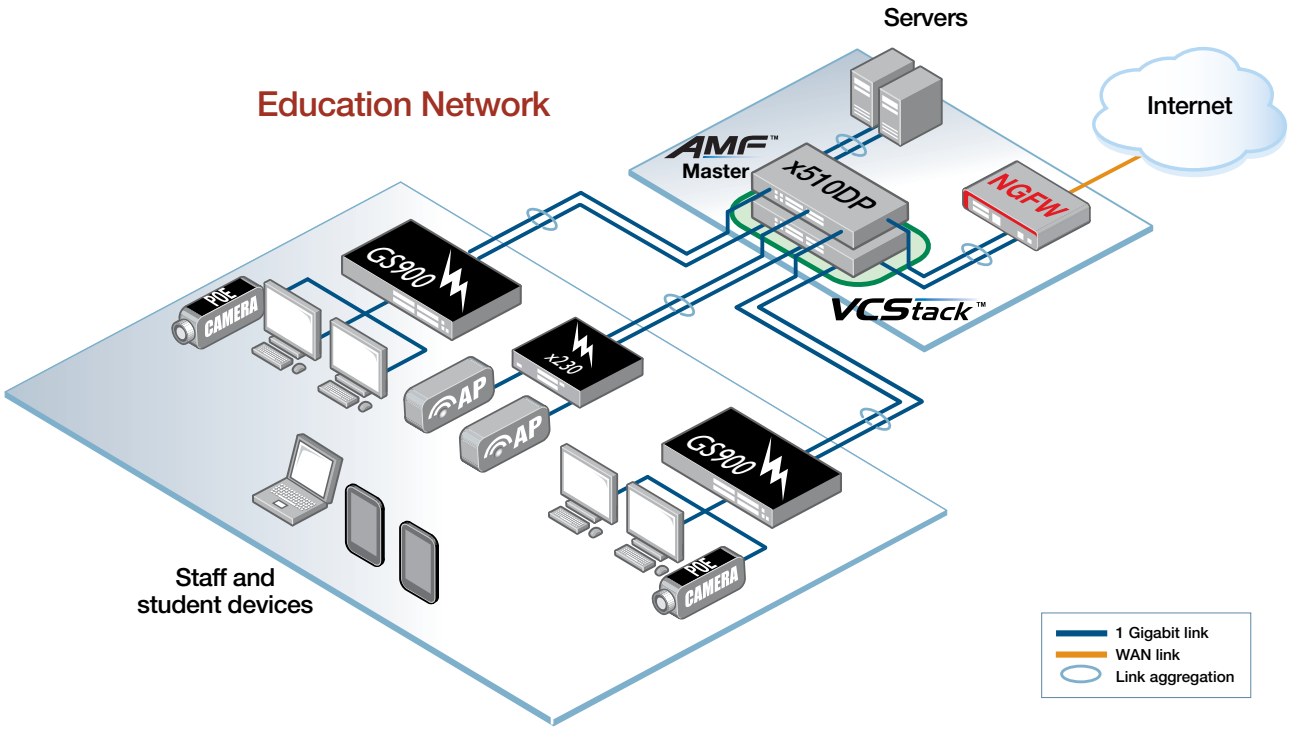
When combined with link aggregation, VCStack provides a solution with no single point of failure that fully utilizes all network bandwidth.

Allied Telesis x510 Series switches support Enterprises and their use of business-critical online resources and applications, with a resilient and reliable distribution solution.

Peace of mind at the network edge

Allied Telesis x510L Series switches make the ideal choice at the network edge where security, resiliency and flexibility are required. In the above diagram, security is enforced using Network Access Control (NAC) combined with tri-authentication to prevent unauthorized users and devices from connecting to the network. Link aggregations are used to provide both resiliency back to the core chassis, and an increase in available bandwidth over a single link. Flexibility is ensured with the range of interface types and PoE options available on the x510L Series.

Key Solutions



Resilient small network core

The x510DP models have two hot-swappable load-sharing PSUs for the ultimate in reliability and ease of maintenance. The x510DP switches also feature the power of Virtual Chassis Stacking (VCStack), removing any single point of failure from the network, and making them perfect for small business or education solutions.

The diagram shows a pair of x510DP switches in an education environment, where link aggregation between the VCStack core and servers, the firewall, and edge switches provides resilient connectivity.

Allied Telesis edge switches connect and power access points for wireless network connectivity for staff and students, as well as IP security cameras to ensure a safe learning environment.

The Allied Telesis Management Framework (AMF) simplifies and automates many day to day administration tasks, easing the burden of network management. The x510DP switches act as the AMF master, automatically backing up the entire network, and providing plug-and-play network growth and zero-touch unit replacement.

Specifications

PRODUCT	10/100/1000T (RJ-45) COPPER PORTS	100/1000X SFP PORTS	1/10 GIGABIT SFP+ PORTS	10 GIGABIT STACKING PORTS	POE+ ENABLED PORTS	SWITCHING FABRIC	FORWARDING RATE
x510-28GTX	24	-	4 (2 if stacked)	2**	-	128Gbps	95.2Mpps
x510-28GPX	24	-	4 (2 if stacked)	2**	24	128Gbps	95.2Mpps
x510-28GSX	-	24	4 (2 if stacked)	2**	-	128Gbps	95.2Mpps
x510-28GSX-80	-	24	4 (2 if stacked)	2**	-	128Gbps	95.2Mpps
x510-52GTX	48	-	4 (2 if stacked)	2**	-	228Gbps	130.9Mpps
x510-52GPX	48	-	4 (2 if stacked)	2**	48	228Gbps	130.9Mpps
x510DP-28GTX	24	-	4 (2 if stacked)	2**	-	128Gbps	95.2Mpps
x510DP-52GTX	48	-	4 (2 if stacked)	2**	-	228Gbps	130.9Mpps
x510L-28GT	24	-	4 (2 if stacked)*	2**	-	128Gbps	95.2Mpps
x510L-28GP	24	-	4 (2 if stacked)*	2**	24	128Gbps	95.2Mpps
x510L-52GT	48	-	4 (2 if stacked)*	2**	-	228Gbps	130.9Mpps
x510L-52GP	48	-	4 (2 if stacked)*	2**	48	228Gbps	130.9Mpps

* A feature license is required on x510L Series switches to upgrade uplink ports from 1G to 10G
** Stacking ports can be configured as additional 1G/10G Ethernet ports when unit is not stacked

Performance

- 40Gbps of stacking bandwidth
- Supports 13KB jumbo frames
- Wirespeed multicasting
- 4094 configurable VLANs
- Up to 16K MAC addresses
- Up to 256 OpenFlow v1.3 entries
- 512MB DDR SDRAM, 64MB flash memory
- Packet buffer memory: AT-x510-28 - 2MB
AT-x510-52 - 4MB

Reliability

- Modular AlliedWare Plus™ operating system
- The x510 features dual internal redundant PSUs
- The x510-28GSX-80 features dual DC PSUs
- The x510DP features dual hot-swappable PSUs, providing uninterrupted power and extra reliability
- The x510L has a single internal PSU
- Full environmental monitoring of PSUs, fans, temperature and internal voltages. SNMP traps alert network managers in case of any failure

Power Characteristics

- AC voltage: 90 to 260V (auto-ranging)
- Frequency: 47 to 63Hz
- DC voltage (x510-28GSX-80): -48/-60V

Expandability

- Stack up to four units in a VCStack
- Premium license option for additional features
- 10G upgrade license for using uplink ports at 10Gbps (x510L models only)

Flexibility and Compatibility

- Gigabit SFP ports on x510-28GSX will support any combination of Allied Telesis 100Mbps and 1000Mbps SFP modules listed in this document under Ordering Information
- 10G SFP+ ports will support any combination of Allied Telesis 1000Mbps SFP and 10GbE SFP+ modules and direct attach cables listed in this document under Ordering Information*
- Stacking ports can be configured as 10G Ethernet ports*
- Port speed and duplex configuration can be set manually or by auto-negotiation

Diagnostic Tools

- Active Fiber Monitoring detects tampering on optical links
- Built-In Self Test (BIST)
- Find-me device locator
- Automatic link flap detection and port shutdown
- Optical Digital Diagnostic Monitoring (DDM)
- Ping polling and TraceRoute for IPv4 and IPv6
- Port and VLAN mirroring (RSPAN)
- Cable fault locator (TDR)
- UniDirectional Link Detection (UDLD)

IPv4 Features

- Black hole routing
- Directed broadcast forwarding
- DHCP server and relay
- DNS relay
- Equal Cost Multi Path (ECMP) routing
- Policy-based routing
- Route redistribution (OSPF, RIP)
- Static unicast and multicast routes for IPv4
- UDP broadcast helper (IP helper)

IPv6 Features

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

Management

- Front panel 7-segment LED provides at-a-glance status and fault information
- 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
- Powerful CLI scripting engine
- 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
- USB interface allows software release files, configurations and other files to be stored for backup and distribution to other devices

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
- IP precedence and DiffServ marking based on layer 2, 3 and 4 headers

Resiliency Features

- 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)
- EPSR enhanced recovery for extra resiliency

* License required for 10G operation on x510L models

- Long-Distance stacking (VCStack-LD)
- 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) based on layer 3 and 4 headers, per VLAN or port
- Configurable ACLs for management traffic
- Auth-fail and guest VLANs
- Authentication, Authorization 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
- RADIUS group selection per VLAN or port

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)
- 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)

Electrical Approvals and Compliances

- EMC: EN55022 class A, FCC class A, VCCI class A, ICES-003 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 (TUV is on all models except the AT-x510DP-52GTX)

Restrictions on Hazardous Substances (RoHS) Compliance

- EU RoHS compliant
- China RoHS compliant

Country of Origin

- China

Physical Specifications

PRODUCT	WIDTH X DEPTH X HEIGHT	MOUNTING	WEIGHT		PACKAGED DIMENSIONS
			UNPACKAGED	PACKAGED	
x510-28GTX	440 x 325 x 44 mm (17.32 x 12.80 x 1.73 in)	Rack-mount	4.3 kg (9.48 lb)	6.3 kg (13.89 lb)	57 x 43 x 15 cm (22.4 x 16.9 x 5.9 in)
x510-28GPX	440 x 400 x 44 mm (17.32 x 15.75 x 1.73 in)	Rack-mount	5.8 kg (12.79 lb)	7.8 kg (17.20 lb)	57 x 51 x 15 cm (22.4 x 20.1 x 5.9 in)
x510-28GSX	440 x 325 x 44 mm (17.32 x 12.80 x 1.73 in)	Rack-mount	4.8 kg (10.58 lb)	6.8 kg (14.99 lb)	57 x 43 x 15 cm (22.4 x 16.9 x 5.9 in)
x510-28GSX-80	440 x 325 x 44 mm (17.32 x 12.80 x 1.73 in)	Rack-mount	4.8 kg (10.58 lb)	6.8 kg (14.99 lb)	57 x 43 x 15 cm (22.4 x 16.9 x 5.9 in)
x510-52GTX	440 x 325 x 44 mm (17.32 x 12.80 x 1.73 in)	Rack-mount	5.2 kg (11.47 lb)	7.2 kg (15.88 lb)	57 x 43 x 15 cm (22.4 x 16.9 x 5.9 in)
x510-52GPX	440 x 400 x 44 mm (17.32 x 15.75 x 1.73 in)	Rack-mount	6.2 kg (13.67 lb)	8.2 kg (18.08 lb)	57 x 43 x 15 cm (22.4 x 16.9 x 5.9 in)
x510DP-28GTX	440 x 480 x 44 mm (17.32 x 18.89 x 1.73 in)	Rack-mount	5.3 kg (11.68 lb)	7.3 kg (16.09 lb)	57 x 53 x 15 cm (22.4 x 20.9 x 5.9 in)
x510DP-52GTX	440 x 480 x 44 mm (17.32 x 18.89 x 1.73 in)	Rack-mount	5.7 kg (12.57 lb)	7.7 kg (16.98 lb)	57 x 55 x 15 cm (22.4 x 21.6 x 5.9 in)
x510L-28GT	440 x 325 x 44 mm (17.32 x 12.80 x 1.73 in)	Rack-mount	4.2 kg (9.26 lb)	6.2 kg (13.67 lb)	57 x 43 x 15 cm (22.4 x 16.9 x 5.9 in)
x510L-28GP	440 x 400 x 44 mm (17.32 x 15.75 x 1.73 in)	Rack-mount	5.2 kg (11.47 lb)	7.2 kg (15.88 lb)	57 x 51 x 15 cm (22.4 x 20.1 x 5.9 in)
x510L-52GT	440 x 325 x 44 mm (17.32 x 12.80 x 1.73 in)	Rack-mount	4.8 kg (10.58 lb)	6.8 kg (14.99 lb)	57 x 43 x 15 cm (22.4 x 16.9 x 5.9 in)
x510L-52GP	440 x 400 x 44 mm (17.32 x 15.75 x 1.73 in)	Rack-mount	5.7 kg (12.57 lb)	7.7 kg (16.98 lb)	57 x 51 x 15 cm (22.4 x 20.1 x 5.9 in)

Power and Noise Characteristics

PRODUCT	NO POE LOAD			FULL POE+ LOAD			MAX POE POWER	MAX 15.4W POE PORTS	MAX 30W POE+ PORTS
	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE			
x510-28GTX	52W	177 BTU/h	45 dBA	-	-	-	-	-	-
x510-28GPX	67W	229 BTU/h	45 dBA	530W	605 BTU/h	55 dBA	370W	24	12
x510-28GSX	74W	252 BTU/h	45 dBA	-	-	-	-	-	-
x510-28GSX-80	74W	252 BTU/h	45 dBA	-	-	-	-	-	-
x510-52GTX	86W	293 BTU/h	45 dBA	-	-	-	-	-	-
x510-52GPX	93W	317 BTU/h	45 dBA	550W	620 BTU/h	55 dBA	370W	24	12
x510DP-28GTX	66W	225 BTU/h	44 dBA	-	-	-	-	-	-
x510DP-52GTX	95W	324 BTU/h	44 dBA	-	-	-	-	-	-
x510L-28GT	52W	177 BTU/h	45 dBA	-	-	-	-	-	-
x510L-28GP	67W	229 BTU/h	45 dBA	290W	330 BTU/h	55 dBA	185W	12	6
x510L-52GT	86W	293 BTU/h	45 dBA	-	-	-	-	-	-
x510L-52GP	93W	317 BTU/h	45 dBA	320W	365 BTU/h	55 dBA	185W	12	6

Noise: tested to ISO7779; front bystander position

Latency (microseconds)

PRODUCT	PORT SPEED			
	10MBPS	100MBPS	1GBPS	10GBPS
x510-28GTX	66µs	9.3µs	3.9µs	3.0µs
x510-28GPX	65µs	9.4µs	3.9µs	3.0µs
x510-28GSX	66µs	9.3µs	3.9µs	3.0µs
x510-28GSX-80	66µs	9.3µs	3.9µs	3.0µs
x510-52GTX	68µs	11.7µs	6.2µs	4.8µs
x510-52GPX	68µs	11.7µs	6.2µs	4.8µs
x510DP-28GTX	66µs	9.3µs	3.9µs	3.0µs
x510DP-52GTX	68µs	11.7µs	6.2µs	4.8µs
x510L-28GT	66µs	9.3µs	3.9µs	3.0µs
x510L-28GP	66µs	9.3µs	3.9µs	3.0µs
x510L-52GT	68µs	11.7µs	6.2µs	4.8µs
x510L-52GP	68µs	11.7µs	6.2µs	4.9µs

Standards and Protocols

AlliedWare Plus Operating System

Version 5.4.7

Cryptographic Algorithms

FIPS Approved Algorithms

Encryption (Block Ciphers):

- AES (ECB, CBC, CFB and OFB Modes)
- 3DES (ECB, CBC, CFB and OFB Modes)

Block Cipher Modes:

- CCM
- CMAC
- GCM
- XTS

Digital Signatures & Asymmetric Key Generation:

- DSA
- ECDSA
- RSA

Secure Hashing:

- SHA-1
- SHA-2 (SHA-224, SHA-256, SHA-384. SHA-512)

Message Authentication:

- HMAC (SHA-1, SHA-2(224, 256, 384, 512)

Random Number Generation:

- DRBG (Hash, HMAC and Counter)

Non FIPS Approved Algorithms

RNG (AES128/192/256)
DES
MD5

Ethernet

IEEE 802.1AXLink aggregation (static and LACP)
IEEE 802.2 Logical Link Control (LLC)
IEEE 802.3 Ethernet
IEEE 802.3ab1000BASE-T
IEEE 802.3adStatic and dynamic link aggregation
IEEE 802.3ae10 Gigabit Ethernet
IEEE 802.3af Power over Ethernet (PoE)
IEEE 802.3at Power over Ethernet Plus (PoE+)
IEEE 802.3azEnergy Efficient Ethernet (EEE)
IEEE 802.3u 100BASE-X
IEEE 802.3x Flow control – full-duplex operation
IEEE 802.3z 1000BASE-X

IPv4 Features

RFC 768 User Datagram Protocol (UDP)
RFC 791 Internet Protocol (IP)
RFC 792 Internet Control Message Protocol (ICMP)
RFC 793 Transmission Control Protocol (TCP)
RFC 826 Address Resolution Protocol (ARP)
RFC 894 Standard for the transmission of IP datagrams over Ethernet networks
RFC 919 Broadcasting Internet datagrams
RFC 922 Broadcasting Internet datagrams in the presence of subnets
RFC 932 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 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 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

AT Enterprise MIB
AMF MIB and traps
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 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 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 4022 SNMPv2 MIB for TCP using SMIv2
RFC 4113 SNMPv2 MIB for UDP using SMIv2
RFC 4293 SNMPv2 MIB for IP using SMIv2
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 (v1, v2 and v3)
IGMP/MLD multicast forwarding (IGMP/MLD proxy)
MLD snooping (v1 and v2)
PIM for IPv6 and SSM for IPv6
RFC 2236 Internet Group Management Protocol v2 (IGMPv2)
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2818 HTTP over TLS ("HTTPS")
RFC 3280 Internet X.509 PKI Certificate and Certificate Revocation List (CRL) profile
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 Features

SSH remote login
SSLv2 and SSLv3
TACACS+ Accounting, Authentication, Authorization (AAA)
IEEE 802.1X authentication protocols (TLS, TTLS, PEAP and MD5)
IEEE 802.1X multi-supplicant authentication
IEEE 802.1X port-based network access control
RFC 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-x510-01	x510 premium license	▶ RIP (256 routes) ▶ OSPF (256 routes) ▶ PIMv4-SM, DM and SSM ▶ EPSR master ▶ VLAN double tagging (Q-in-Q) ▶ RIPng (256 routes) ▶ OSPFv3 (256 routes) ▶ MLDv1 and v2 ▶ PIMv6-SM ▶ UDLD	▶ One license per stack member
AT-FL-x510L-10G	10G upgrade license (x510L only)	▶ Upgrades the 1G uplink ports to 1G/10G on x510L for Ethernet operation. License not required to enable stacking.	▶ One license per stack member
AT-FL-x510-AM20-1YR	AMF Master license	▶ AMF Master 20 nodes for 1 year	▶ One license per stack
AT-FL-x510-AM20-5YR	AMF Master License	▶ AMF Master 20 nodes for 5 years	▶ One license per stack
AT-FL-x510-OF13-1YR	OpenFlow license	▶ OpenFlow v1.3 for 1 year	▶ Not supported on a stack
AT-FL-x510-OF13-5YR	OpenFlow license	▶ OpenFlow v1.3 for 5 years	▶ Not supported on a stack
AT-FL-x510-8032	ITU-T G.8032 license	▶ G.8032 ring protection	▶ One license per stack member

Switches

AT-x510-28GTX-xx
24-port 10/100/1000T stackable switch with 4 SFP+ ports and 2 fixed power supplies

AT-x510-28GPX-xx
24-port 10/100/1000T PoE+ stackable switch with 4 SFP+ ports and 2 fixed power supplies

AT-x510-28GSX-xx
24-port 100/1000X SFP stackable switch with 4 SFP+ ports and 2 fixed power supplies

AT-x510-28GSX-80
24-port 100/1000X SFP stackable switch with 4 SFP+ ports and 2 fixed DC power supplies

AT-x510-52GTX-xx
48-port 10/100/1000T stackable switch with 4 SFP+ ports and 2 fixed power supplies

AT-x510-52GPX-xx
48-port 10/100/1000T PoE+ stackable switch with 4 SFP+ ports and 2 fixed power supplies

AT-x510DP-28GTX-00
24-port 10/100/1000T stackable switch with 4 SFP+ ports and 2 hot-swappable power supplies*

AT-x510DP-52GTX-00
48-port 10/100/1000T stackable switch with 4 SFP+ ports and 2 hot-swappable power supplies*

AT-x510L-28GT-xx
24-port 10/100/1000T switch with 4x1G SFP uplink ports (software upgradeable to 10G SFP+ ports) and a single fixed PSU

AT-x510L-28GP-xx
24-port 10/100/1000T PoE+ switch with 4x1G SFP uplink ports (software upgradeable to 10G SFP+ ports) and a single fixed PSU

AT-x510L-52GT-xx
48-port 10/100/1000T switch with 4x1G SFP uplink ports (software upgradeable to 10G SFP+ ports) and a single fixed PSU

AT-x510L-52GP-xx**
48-port 10/100/1000T PoE+ switch with 4x1G SFP uplink ports (software upgradeable to 10G SFP+ ports) and a single fixed PSU

AT-RKMT-SL01
Sliding rack mount kit for x510DP models

Power Supplies (for the x510DP Series)

AT-PWR100R-xx
100W AC system power supply (reverse airflow)

AT- PWR250-xx
250W AC system power supply

AT-PWR250R-80
250W DC system power supply (reverse airflow)

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

1000Mbps SFP Modules

AT-SPTX[1]
1000T 100 m copper

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

AT-SPSX/I[1]
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

AT-SPBD20-13/I
1000BX GbE Bi-Di (1310 nm Tx, 1550 nm Rx) fiber up to 20 km

AT-SPBD20-14/I
1000BX GbE Bi-Di (1490 nm Tx, 1310 nm Rx) fiber up to 20 km

[1] Supported on x510-28GSX

100Mbps SFP Modules

100Mbps SFP modules are only compatible with the SFP ports on the AT-x510-28GSX switch.

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

10GbE SFP+ Modules

(Note that any Allied Telesis 10G SFP+ module or direct attach cable can also be used for stacking)

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

AT-SP10T
10GBase-T 20 m copper

AT-SP10TW1
1 meter SFP+ direct attach cable

AT-SP10TW3
3 meter SFP+ direct attach cable

AT-SP10TW7
7 meter SFP+ direct attach cable

* Power supplies ordered separately
** AT-x510L-52GP not available in NA
*** These modules support dual-rate 1G/10G operation

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