

# x550 Series

## Stackable 10 Gigabit Intelligent Switches

The Allied Telesis x550 Series of stackable 10 Gigabit Layer 3 switches have capacity and resiliency coupled with easy management, meeting the needs of even the most demanding network core and distribution applications.



### Overview

Allied Telesis x550 switches are high performing and feature-rich, making them the ideal choice for today's networks.

Three models provide 16 x 1G/10G copper, 16 x 1G/10G SFP+ slots, or 8 x 1G/2.5G/5G/10G copper and 8 x 1G/10G SFP+ slots, all with two 40G uplinks. With the power of Allied Telesis Virtual Chassis Stacking (VCStack™), the x550 Series is ideal for the network core, and demanding distribution applications.

### Network automation

Vista Manager™ EX bundled with Allied Telesis Autonomous Management Framework™ Plus (AMF Plus) meets the increasing management requirements of modern networks. While AMF Plus allows an entire network to be securely and easily managed as a single virtual device, Vista Manager EX provides an intuitive and powerful graphical tool for monitoring and managing AMF Plus wired and Autonomous Wave Control (AWC) wireless devices.

### Device and network management

The Device GUI on the x550 Series enables graphical monitoring of key switch features to support easy management.

Integrated into the Device GUI, Vista Manager™ mini supports visibility and management of AMF Plus wired and AWC wireless network devices, making it ideal as a one-stop solution for small to medium-sized networks.

AWC is an intelligent, easy to use Wireless LAN controller that automatically maintains optimal wireless coverage. Vista Manager mini includes AWC floor and heat maps showing wireless coverage. It also supports AWC Channel Blanket hybrid operation, providing maximum performance and seamless roaming,

as well as AWC Smart Connect for simplified deployment, and a resilient Wi-Fi network solution using wireless uplink connectivity.

### Resiliency

Converging network services means 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 provides access application resiliency.

Ethernet Protection Switched Ring (EPSRing™), and the standards-based G.8032 Ethernet Ring Protection, ensure distributed networks have high-speed access to online resources and applications.

### High-speed wireless

The spread of high-speed wireless (802.11ac or "Wave2") is problematic for network infrastructure. Unless the infrastructure is upgraded to cope with increased speeds, it creates a bottleneck which negatively impacts the effectiveness of the wireless network.

But increasing speeds from 1 Gigabit has traditionally meant moving to 10 Gigabit. This requires new cabling, which is expensive and time consuming to install.

The x550-18XSPQm solves these issues because it provides support for 2.5 and 5 Gigabit. At this speed, the wireless network runs at full capacity, and there is no need to replace existing Cat5E and Cat6 cables.

### Secure

The x550 Series offers powerful control over network traffic types, secure management options, loop guard to protect against cabling mistakes, and tri-authentication for comprehensive access control.

### Future-proof

The x550 Series ensures a future-proof network, with superior flexibility coupled

with the ability to stack multiple units. All x550 Series models feature 40 Gigabit uplinks ports, and support OpenFlow and a comprehensive IPv6 feature set, to ensure they are ready for SDN and future network traffic demands.

### Environmentally friendly

The x550 Series supports Energy Efficient Ethernet (EEE), automatically reducing the power consumed by the switch whenever there is no traffic on a port.



## Key Features

- ▶ Allied Telesis Autonomous Management Framework™ Plus (AMF Plus)
- ▶ Continuous PoE
- ▶ VCStack up to 4 units at any port speed
- ▶ VCStack-LD for long distance stacking
- ▶ 40G uplinks
- ▶ 4 x 10G breakout cables for 40G ports
- ▶ 2.5G for high-speed wireless applications
- ▶ OpenFlow v1.3
- ▶ EPSR and G.8032 Ethernet Ring Protection
- ▶ EPSR Master
- ▶ Precision Time Protocol (PTP) Transparent Mode
- ▶ Media Access Control Security (MACSec)
- ▶ Multicast Source Discovery Protocol (MSDP)
- ▶ Link Monitoring
- ▶ Upstream Forwarding Only (UFO)
- ▶ AT-Vista Manager mini enables:
  - ▶ Wired and wireless network visibility
  - ▶ AWC wireless network management
  - ▶ AWC-Channel Blanket hybrid wireless
  - ▶ AWC-Smart Connect wireless uplinks
- ▶ FIPS 140-2 certified
- ▶ NETCONF/RESTCONF with YANG data modelling

## Key Features

### Vista Manager mini

- ▶ Integrated into the Device GUI, Vista Manager mini provides full network visibility of AMF Plus wired and AWC wireless devices. Manage and simplify wireless deployment with AWC-Smart Connect, and support optimal wireless performance from AWC hybrid operation with maximum throughput and a seamless Wi-Fi user experience.

### Allied Telesis Autonomous Management Framework™ Plus (AMF Plus)

- ▶ AMF Plus 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 x550 Series switch can operate as the AMF Plus 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.
- ▶ An AMF Plus license (from AW+ version 5.5.2-2 onwards) provides all standard AMF network management and automation features, and also enables the AMF Plus intent-based networking features menu in Vista Manager EX (from version 3.10.1 onwards).

### AWC Wireless Management

- ▶ Optimize wireless network performance with the Autonomous Wave Controller (AWC), built-in to the x550 Series. AWC analyzes wireless traffic patterns and automatically reconfigures access points to meet demand.
- ▶ Wireless network operation in multi-channel, single-channel (Channel Blanket), and hybrid (multi-channel and Channel Blanket) modes, supports maximum data throughput and seamless roaming for the most flexible wireless solution available.
- ▶ AWC-Smart Connect (AWC-SC) enables plug-and play wireless network growth, as new APs only need a power connection, and will then automatically create resilient wireless uplink connections to other APs.

### Virtual Chassis Stacking (VCStack™)

- ▶ Create a VCStack of up to four units with 160Gbps 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 (VCStack-LD)

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

### Flexible Deployment

- ▶ The compact x550-18XTQ and x550-18XSQ enable easy deployment, and 2 units can be installed side-by-side in 1RU, saving valuable rack space. VCStack enables a single 32-port 1RU virtual unit with built in resiliency.

### Ethernet Protection Switched Ring (EPSRing™)

- ▶ EPSRing and 10 Gigabit Ethernet allow several x550 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. x550 Series switches can act as the EPSR Master.

### 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.
- ▶ Ethernet Connectivity Fault Monitoring (CFM) proactively monitors links and VLANs, and provides alerts when a fault is detected.

### NETCONF/RESTCONF

- ▶ NETCONF/RESTCONF with YANG data modeling provides a standardized way to represent data and securely configure devices.

### 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.

### Continuous PoE

- ▶ Continuous PoE allows the switch to be restarted without affecting the supply of power to connected devices. Smart lighting, security cameras, and other PoE devices will continue to operate during a software upgrade on the switch.

### Upstream Forwarding Only (UFO)

- ▶ UFO lets you manage which ports in a VLAN can communicate with each other, and which only have upstream access to services, for secure multi-user deployment.

### 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 (up to 5 collectors can be configured) 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 analyzed locally. Traffic being transmitted or received on the port is duplicated and sent across the network on a special VLAN.

### Active Fiber Monitoring

- ▶ AFM prevents eavesdropping on fiber data or stacking links by monitoring received optical power. If an intrusion is detected, the link can be automatically shut down, or an alert sent.

### Tri-authentication

- ▶ Authentication options include 802.1x port-based authentication, web authentication for guest access, and MAC authentication for endpoints that do not have an IEEE 802.1x supplicant. All three methods can be enabled simultaneously.

### TACACS+ Command Authorization

- ▶ TACACS+ Command Authorization offers centralized control over which commands may be issued by each specific AlliedWare Plus device user. It complements authentication and accounting services for a complete AAA solution.

### Premium Software License

- ▶ By default, the x550 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.

### VLAN Access Control List (ACLs)

- ▶ ACLs simplify access and traffic control across entire segments of the network. They can be applied to a VLAN as well as a specific port.

### 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.

### Precision Time Protocol (PTP)

- ▶ PTP (IEEE 1588v2) synchronizes clocks throughout the network with micro-second accuracy, supporting industrial automation and control systems. PTP operates on standalone or stacked switches.

### Media Access Control Security (MACSec)

- ▶ 802.1AE MACSec secures all traffic on point-to-point Ethernet links between directly connected nodes, ensuring protection against security threats such as denial of service, intrusion, man-in-the-middle, passive wiretapping, and playback attacks.

### Multi-speed Ports

- ▶ Copper ports on the x550-18XSPQm support 2.5 and 5 Gigabit connectivity to enable high-speed wireless, and the use of legacy Cat5E/6 cabling.

### Multicast Source Discovery Protocol (MSDP)

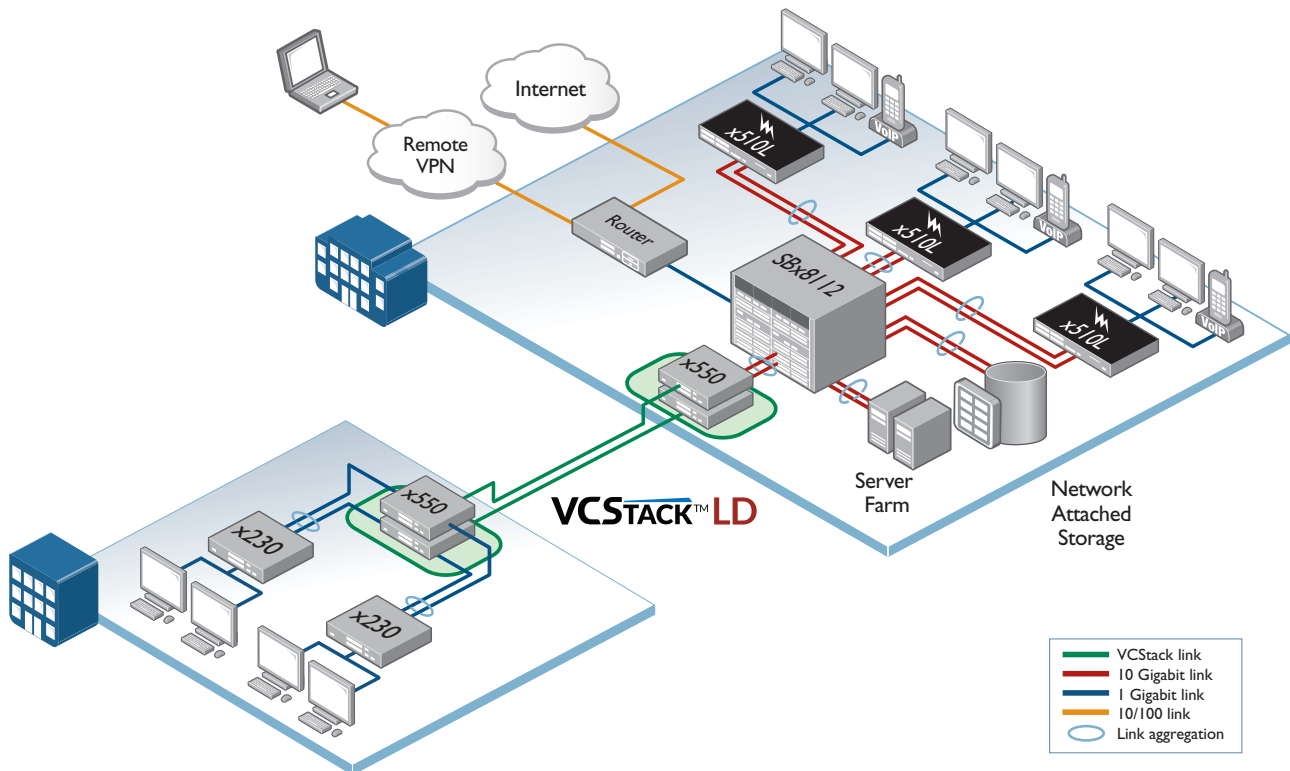
- ▶ MSDP enables two or more PIM-SM (Sparse Mode) domains to share information on active multicast sources, for more efficient forwarding of multicast traffic.

### Link Monitoring (Linkmon)

- ▶ Linkmon enables network health monitoring by regularly sending probes over key links to gather metrics comprising latency, jitter, and probe loss. This supports pro-active network management, and can also be used with triggers to automate a change to device or network configuration in response to the declining health of a monitored link.

## Key Solutions

# Network Distribution



### Resilient distribution switching

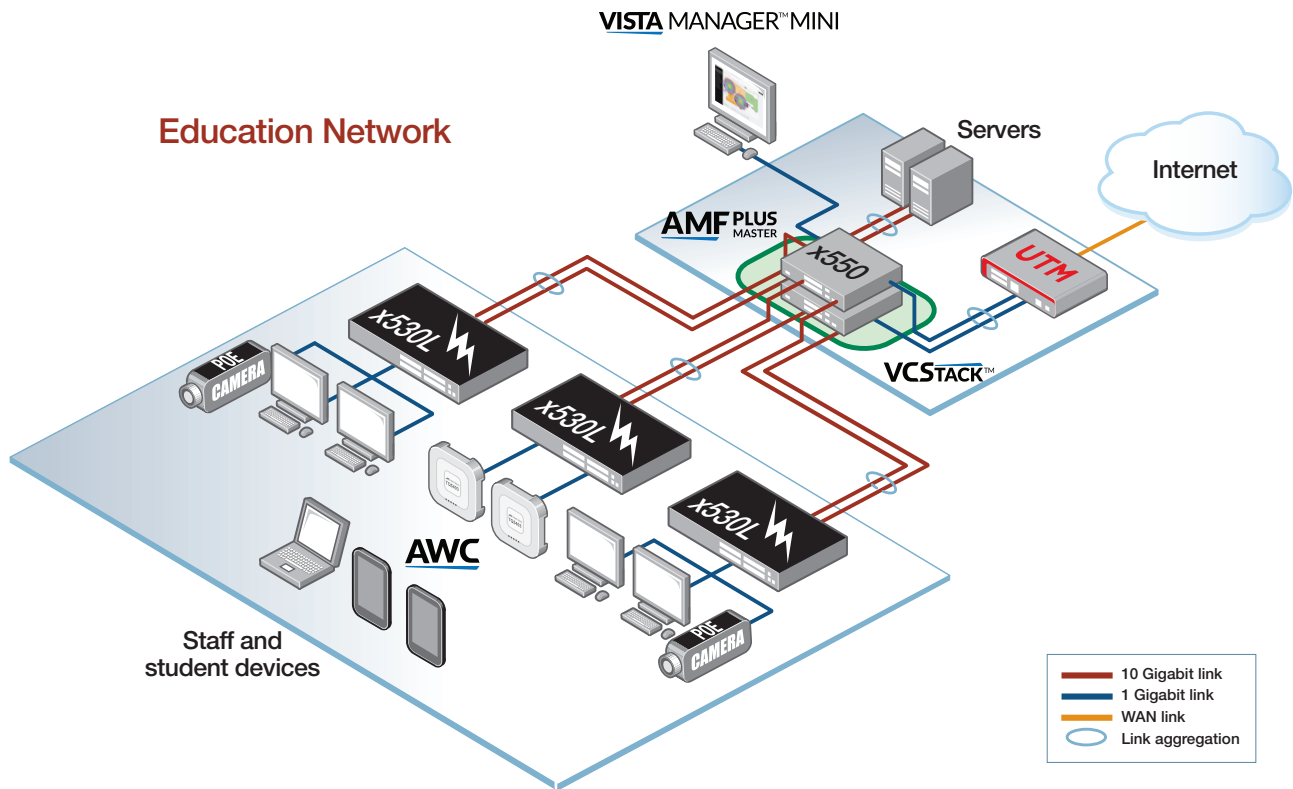
Allied Telesis x550 Series switches are ideal for distribution solutions, where resiliency and flexibility are required. In the above diagram, distribution switches utilize long-distance Virtual Chassis Stacking (VCStack-LD) to create a single virtual unit out of multiple devices. By using fiber stacking 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, and which fully utilizes all available network bandwidth.

x550 switches provide a resilient and reliable distribution solution to support all networks with business-critical online resources and applications.

## Key Solutions

# Resilient Network Core



### Resilient network core

x550 switches have the power of Virtual Chassis Stacking (VCStack), which removes any single point of failure from the network—making them perfect for small business or education solutions.

The diagram shows a pair of x550 switches in an education environment, with link aggregation between the core VCStack and servers, the firewall, and edge switches to provide 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.

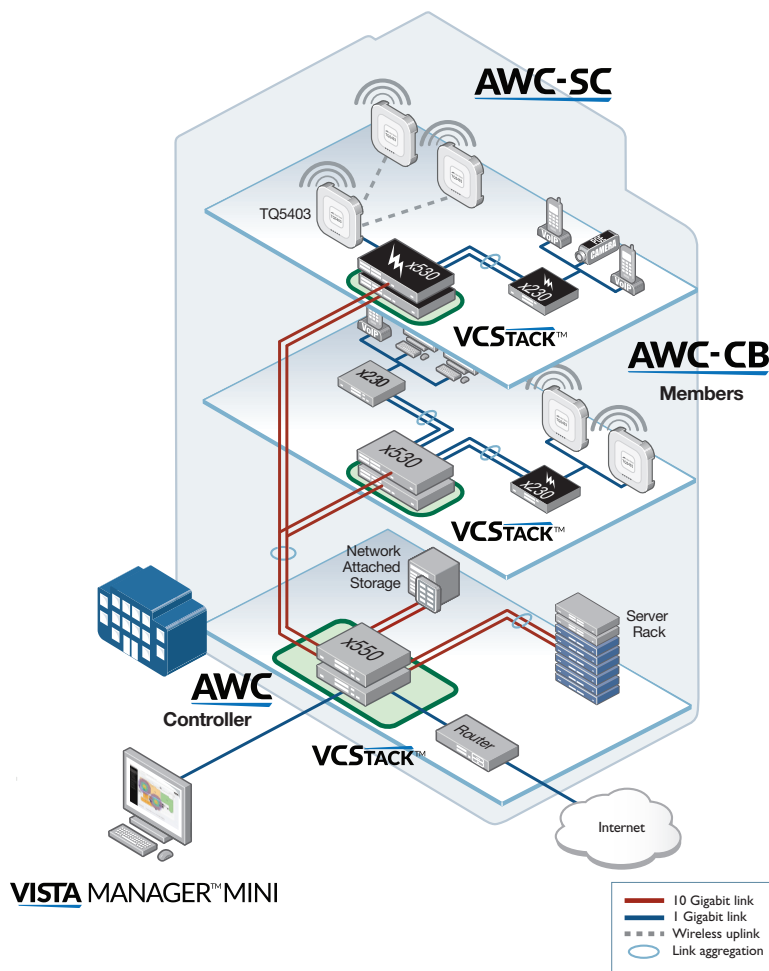
Autonomous Management Framework Plus (AMF Plus) simplifies and automates many day to day administration tasks, easing the burden of network management. The x550 switches act as the AMF Plus master, automatically backing up the entire network, and providing plug-and-play network growth and zero-touch unit replacement.

Autonomous Wave Control (AWC) automatically optimizes the wireless network to maximize performance, and minimize interference.

Vista Manager mini provides integrated management of the AWC wireless network, with floor and heat maps enabling performance monitoring.

## Key Solutions

# Integrated wireless LAN management



Allied Telesis Autonomous Wave Controller (AWC) offers solutions for two of the most common problems with Wireless LANs: initial setup complexity and on-going performance degradation. Initial WLAN set-up usually requires a site survey to achieve the best coverage; and performance of WLANs can often change over time as external sources of radio interference reduce coverage and bandwidth. These issues can be time-consuming to identify and resolve.

AWC features an intelligent process that automatically recalibrates the signal strength and radio channel of each Access Point (AP) for optimal WLAN performance.

AWC Smart Connect (AWC-SC) uses wireless uplink connections between APs, so deployment is as easy as plugging in and powering on the new APs, which automatically extend the Wi-Fi network, creating a resilient solution.

Vista Manager mini is integrated into the Device GUI of the x550 Series and provides an ideal solution for modern enterprise networks, enabling management of both the wired (with AMF Plus) and wireless (with AWC) networks to be automated. This reduces both the time and cost of network administration, as well as maximizing network performance for a superior user experience.

Up to 5 TQ Series wireless APs can be managed for free, and up to a further 40 APs (max 45) with feature licenses, available separately.

On some AP models, hybrid channel blanket enables multi-channel and single-channel WiFi operation simultaneously. This supports seamless roaming and maximum throughput. Channel Blanket licenses are available for up to 40 APs. For plug-and-play wireless deployment AWC-SC licenses are available for up to 40 APs.

## Specifications

PRODUCT	1G/10G (RJ-45) COPPER PORTS	1G/2.5G/5G/10G (RJ-45) COPPER PORTS	1G/10G SFP+ PORTS	40G QSFP PORTS	MAX POE ENABLED PORTS	SWITCHING FABRIC	FORWARDING RATE
x550-18XTQ	16	-	-	2	-	480Gbps	357.1Mpps
x550-18XSQ	-	-	16	2	-	480Gbps	357.1Mpps
x550-18XSPQm	-	8	8	2	8	480Gbps	357.1Mpps

### Performance

- ▶ 160Gbps of stacking bandwidth
- ▶ Supports L2 jumbo frames
  - ▶ 12.3KB at 1G, 10G, 40G
  - ▶ 6.5KB at 2.5G
  - ▶ 10.0KB at 5G
- ▶ Supports 9KB L3 jumbo frames
- ▶ Wirespeed multicasting
- ▶ 4094 configurable VLANs
- ▶ Up to 16K MAC addresses
- ▶ Up to 256 multicast entries
- ▶ Up to 128 Link Aggregation Groups (LAGS) - any combination of static and dynamic (LACP)
- ▶ 1024MB DDR SDRAM, 1024MB flash memory
- ▶ Packet buffer memory: 4MB

### Reliability

- ▶ Modular AlliedWare Plus™ operating system
- ▶ 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

### Expandability

- ▶ Stack up to four units in a VCStack
- ▶ Premium license option for additional features

### Flexibility and Compatibility

- ▶ 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 from 10G or 40G 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)
- ▶ Cable fault locator (TDR)
- ▶ Find-me device locator
- ▶ 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
- ▶ Uni-Directional Link Detection (UDLD)

### IPv4 Features

- ▶ Black hole routing
- ▶ Directed broadcast forwarding
- ▶ DNS relay
- ▶ Equal Cost Multi Path (ECMP) routing

- ▶ Policy-based routing
- ▶ Route redistribution (OSPF, RIP, BGP)
- ▶ Static unicast and multicast routing for IPv4
- ▶ UDP broadcast helper (IP helper)

### IPv6 Features

- ▶ DHCPv6 client and relay
- ▶ DNSv6 client and relay
- ▶ IPv4 and IPv6 dual stack
- ▶ IPv6 aware storm protection and QoS
- ▶ IPv6 hardware ACLs
- ▶ Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6
- ▶ NTPv6 client and server
- ▶ Static unicast and multicast routing for IPv6
- ▶ Log to IPv6 hosts with Syslog v6
- ▶ IPv6 Ready certified

### Management

- ▶ Front panel 7-segment LED provides at-a-glance status and fault information
- ▶ Allied Telesis Management Framework Plus (AMF Plus) enables powerful centralized management and zero-touch device installation and recovery
- ▶ Console management port on the front panel for ease of access
- ▶ NETCONF/RESTCONF northbound interface with YANG data modelling
- ▶ 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
- ▶ IPv6 QoS support
- ▶ Policy-based QoS based on VLAN, port, MAC and general packet classifiers
- ▶ Policy-based storm protection
- ▶ Extensive remarking capabilities
- ▶ Taildrop for queue congestion control
- ▶ Queue scheduling options for strict priority, weighted round robin or mixed scheduling

- ▶ Type of Service (ToS) IP precedence and DiffServ marking based on layer 2, 3 and 4 headers

### Resiliency Features

- ▶ Control Plane Prioritization (CPP) ensures the CPU always has sufficient bandwidth to process network control traffic
- ▶ Dynamic link failover (host attach)
- ▶ EPSRing (Ethernet Protection Switched Rings) with SuperLoop Protection (SLP) and enhanced recovery for extra resiliency
- ▶ Flexi-stacking - use any port speed to stack: 10G fiber, 10G copper or 40G fiber
- ▶ Long-Distance VCStack over fiber with 10G SFP+ modules or 40G QSFP+ modules (LD-VCStack)
- ▶ Loop protection: loop detection and thrash limiting
- ▶ PVST+ compatibility mode
- ▶ STP root guard
- ▶ VCStack fast failover minimizes network disruption

### Security Features

- ▶ Federal Information Processing Standard Publication 140-2 (FIPS 140-2) certified
- ▶ Access Control Lists (ACLs) based on layer 3 and 4 headers
- ▶ ACL Groups enable multiple hosts/ports to be included in a single ACL, reducing configuration
- ▶ 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
- ▶ Media Access Control Security (MACSec)
- ▶ Network Access and Control (NAC) features manage endpoint security
- ▶ Learn limits (intrusion detection) for single ports or LAGs
- ▶ Private VLANs provide security and port isolation for multiple customers using the same VLAN
- ▶ Secure Copy (SCP)
- ▶ Secure File Transfer Protocol (SFTP) client
- ▶ Strong password security and encryption
- ▶ Tri-authentication: MAC-based, web-based and IEEE 802.1x
- ▶ Web-based authentication

### Software Defined Networking

- ▶ OpenFlow v1.3 including support for connection interruption, control plane encryption and inactivity probe

### 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)

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- ▶ 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, FIPS 140-2

### Restrictions on Hazardous Substances (RoHS) Compliance

- ▶ EU RoHS compliant
- ▶ China RoHS compliant

### Physical Specifications

PRODUCT	WIDTH	DEPTH	HEIGHT	WEIGHT
x550-18XTQ	210 mm (8.3 in)	346 mm (13.6 in)	44 mm (1.7 in)	3.1 kg (6.85 lb)
x550-18XSQ	210 mm (8.3 in)	346 mm (13.6 in)	44 mm (1.7 in)	3.2 kg (7.00 lb)
x550-18XSPQm	440 mm (17.3 in)	260 mm (10.2 in)	44 mm (1.7 in)	4.2 kg (9.15 lb)

### Power Characteristics

PRODUCT	NO POE LOAD			FULL POE+ LOAD			MAX POE POWER	MAX POE+ PORTS AT 30W PER PORT
	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE		
x550-18XTQ	128W	436 BTU/h	50 dBA	-	-	-	-	-
x550-18XSQ	111W	378 BTU/h	46 dBA	-	-	-	-	-
x550-18XSPQm	99W	338 BTU/h	47 dBA	391W	1334 BTU/h	47 dBA	240W	8

### Latency (Microseconds)

PRODUCT	PORT SPEED		
	1GBPS	10GBPS	40GBPS
x550-18XTQ	3.9µs	3.0µs	2.2µs
x550-18XSQ	3.9µs	3.0µs	2.2µs
x550-18XSPQm	3.8µs	3.0µs	2.3µs

### Standards and Protocols

#### AlliedWare Plus Operating System

Version 5.5.4

#### Authentication

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

#### Border Gateway Protocol (BGP)

- BGP dynamic capability
- BGP outbound route filtering
- RFC 1772 Application of the Border Gateway Protocol (BGP) in the Internet
- RFC 1997 BGP communities attribute
- RFC 2385 Protection of BGP sessions via the TCP MD5 signature option
- RFC 2439 BGP route flap damping
- RFC 2545 Use of BGP-4 multiprotocol extensions for IPv6 inter-domain routing
- RFC 2858 Multiprotocol extensions for BGP-4
- RFC 2918 Route refresh capability for BGP-4
- RFC 3392 Capabilities advertisement with BGP-4
- RFC 3882 Configuring BGP to block Denial-of-Service (DoS) attacks
- RFC 4271 Border Gateway Protocol 4 (BGP-4)
- RFC 4360 BGP extended communities
- RFC 4456 BGP route reflection - an alternative to full mesh iBGP

- RFC 4724 BGP graceful restart
- RFC 4893 BGP support for four-octet AS number space
- RFC 5065 Autonomous system confederations for BGP

#### 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 802.1AE Media Access Control Security (MACSec)

- IEEE 802.2 Logical Link Control (LLC)
- IEEE 802.3 Ethernet
- IEEE 802.3ab1000BASE-T
- IEEE 802.3ae10 Gigabit Ethernet
- IEEE 802.3af Power over Ethernet (PoE)
- IEEE 802.3an10GBASE-T
- IEEE 802.3at Power over Ethernet Plus (PoE+)
- IEEE 802.3azEnergy Efficient Ethernet (EEE)
- IEEE 802.3ba40GBASE-X
- IEEE 802.3bz2.5GBASE-T and 5GBASE-T
- IEEE 802.3x Flow control - full-duplex operation
- IEEE 802.3z 1000BASE-X
- IEEE 1588v2 Precision clock synchronization protocol v2

#### 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 2711	IPv6 router alert option
RFC 3484	Default address selection for IPv6
RFC 3587	IPv6 global unicast address format
RFC 3596	DNS extensions to support IPv6
RFC 4007	IPv6 scoped address architecture
RFC 4193	Unique local IPv6 unicast addresses
RFC 4213	Transition mechanisms for IPv6 hosts and routers
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 Plus MIB and SNMP traps	
AT Enterprise MIB	
SNMPv1, v2c and v3	
IEEE 802.1ABLink Layer Discovery Protocol (LLDP)	
RFC 1155	Structure and identification of management information for TCP/IP-based Internets
RFC 1157	Simple Network Management Protocol (SNMP)
RFC 1212	Concise MIB definitions
RFC 1213	MIB for network management of TCP/IP-based Internets: MIB-II
RFC 1215	Convention for defining traps for use with the SNMP
RFC 1227	SNMP MUX protocol and MIB
RFC 1239	Standard MIB
RFC 1724	RIPv2 MIB extension
RFC 2578	Structure of Management Information v2 (SMIv2)
RFC 2579	Textual conventions for SMIv2
RFC 2580	Conformance statements for 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 3176	sFlow: a method for monitoring traffic in switched and routed networks
RFC 3411	An architecture for describing SNMP management frameworks
RFC 3412	Message processing and dispatching for the SNMP
RFC 3413	SNMP applications
RFC 3414	User-based Security Model (USM) for SNMPv3
RFC 3415	View-based Access Control Model (VACM) for SNMP
RFC 3416	Version 2 of the protocol operations for the SNMP
RFC 3417	Transport mappings for the SNMP
RFC 3418	MIB for SNMP

RFC 3635	Definitions of managed objects for the Ethernet-like interface types
RFC 3636	IEEE 802.3 MAU MIB
RFC 4022	MIB for the Transmission Control Protocol (TCP)
RFC 4113	MIB for the User Datagram Protocol (UDP)
RFC 4188	Definitions of managed objects for bridges
RFC 4292	IP forwarding table MIB
RFC 4293	MIB for the Internet Protocol (IP)
RFC 4318	Definitions of managed objects for bridges with RSTP
RFC 4560	Definitions of managed objects for remote ping, traceroute and lookup operations
RFC 5424	Syslog protocol
RFC 6527	Definitions of managed objects for VRRPv3

## Multicast Support

Bootstrap Router (BSR) mechanism for PIM-SM	
IGMP query solicitation	
IGMP snooping (IGMPv1, v2 and v3)	
IGMP snooping fast-leave	
IGMP/MLD multicast forwarding (IGMP/MLD proxy)	
MLD snooping (MLDv1 and v2)	
PIM for IPv6 and PIM 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 3306	Unicast-prefix-based IPv6 multicast addresses
RFC 3376	IGMPv3
RFC 3618	Multicast Source Discovery Protocol (MSDP)
RFC 3810	Multicast Listener Discovery v2 (MLDv2) for IPv6
RFC 3956	Embedding the Rendezvous Point (RP) address in an IPv6 multicast address
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
OSPF link-local signaling	
OSPF MD5 authentication	
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
RFC 5340	OSPFv3 for IPv6 (partial support)

## 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 802.1AXLink aggregation (static and LACP)
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IEEE 802.1D	MAC bridges
IEEE 802.1s	Multiple Spanning Tree Protocol (MSTP)
IEEE 802.1w	Rapid Spanning Tree Protocol (RSTP)
IEEE 802.3ad	Static and dynamic link aggregation
RFC 5798	Virtual Router Redundancy Protocol version 3 (VRRPv3) for IPv4 and IPv6

## 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-suplicant authentication
IEEE 802.1X	Port-based network access control
RFC 2560	X.509 Online Certificate Status Protocol (OCSP)
RFC 2818	HTTP over TLS ("HTTPS")
RFC 2865	RADIUS authentication
RFC 2866	RADIUS accounting
RFC 2868	RADIUS attributes for tunnel protocol support
RFC 2986	PKCS #10: certification request syntax specification v1.7
RFC 3546	Transport Layer Security (TLS) extensions
RFC 3579	RADIUS Support for Extensible Authentication Protocol (EAP)
RFC 3580	IEEE 802.1x RADIUS usage guidelines
RFC 3748	PPP Extensible Authentication Protocol (EAP)
RFC 4251	Secure Shell (SSHv2) protocol architecture
RFC 4252	Secure Shell (SSHv2) authentication protocol
RFC 4253	Secure Shell (SSHv2) transport layer protocol
RFC 4254	Secure Shell (SSHv2) connection protocol
RFC 5176	RADIUS CoA (Change of Authorization)
RFC 5246	Transport Layer Security (TLS) v1.2
RFC 5280	X.509 certificate and Certificate Revocation List (CRL) profile
RFC 5425	Transport Layer Security (TLS) transport mapping for Syslog
RFC 5656	Elliptic curve algorithm integration for SSH
RFC 6125	Domain-based application service identity within PKI using X.509 certificates with TLS
RFC 6614	Transport Layer Security (TLS) encryption for RADIUS
RFC 6668	SHA-2 data integrity verification for SSH

## Services

RFC 854	Telnet protocol specification
RFC 855	Telnet option specifications
RFC 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 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

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	



## x550 Series | Stackable 10 Gigabit Intelligent Switches

### Feature Licenses

NAME	DESCRIPTION	INCLUDES	STACK LICENSING
AT-FL-x550-01	x550 premium license	<ul style="list-style-type: none"> <li>▶ BGP4 (256 routes)</li> <li>▶ RIP (256 routes)</li> <li>▶ OSPF (256 routes)</li> <li>▶ PIMv4-SM, DM and SSM</li> <li>▶ EPSR master</li> <li>▶ VLAN double tagging (Q-in-Q)</li> <li>▶ RIPng (256 routes)</li> <li>▶ OSPFv3 (256 routes)</li> <li>▶ MLDv1 and v2</li> <li>▶ PIM-SMv6/SSMv6</li> <li>▶ UDLD</li> <li>▶ PTP Transparent mode</li> </ul>	▶ One license per stack member
AT-SW-APM10-1YR <sup>1,2</sup>	Cumulative AMF Plus Master license	▶ AMF Plus Master license for up to 10 nodes for 1 year	▶ One license per stack
AT-SW-APM10-5YR <sup>1,2</sup>	Cumulative AMF Plus Master license	▶ AMF Plus Master license for up to 10 nodes for 5 years	▶ One license per stack
AT-SW-AWC10-1YR <sup>3</sup>	Cumulative AWC license	▶ Autonomous Wave Control (AWC) license for up to 10 access points for 1 year	▶ One license per stack
AT-SW-AWC10-5YR <sup>3</sup>	Cumulative AWC license	▶ Autonomous Wave Control (AWC) license for up to 10 access points for 5 years	▶ One license per stack
AT-SW-CB10-1YR-2022 <sup>4</sup>	Cumulative AWC-CB and AWC-SC license	▶ AWC Channel Blanket and AWC Smart Connect license for up to 10 access points for 1 year	▶ One license per stack
AT-SW-CB10-5YR-2022 <sup>4</sup>	Cumulative AWC-CB and AWC-SC license	▶ AWC Channel Blanket and AWC Smart Connect license for up to 10 access points for 5 years	▶ One license per stack
AT-FL-x550-OF13-1YR	OpenFlow license	▶ OpenFlow v1.3 for 1 year	▶ Not supported
AT-FL-x550-OF13-5YR	OpenFlow license	▶ OpenFlow v1.3 for 5 years	▶ Not supported
AT-FL-x550-8032	ITU-T G.8032 license	<ul style="list-style-type: none"> <li>▶ G.8032 ring protection</li> <li>▶ Ethernet CFM</li> </ul>	▶ One license per stack member
AT-FL-x550-CPOE	Continuous PoE license	▶ Continuous PoE power for XSPQm model	▶ One license per stack member
AT-FL-x550-MSEC	MACSec license	▶ Media Access Control Security	▶ One license per stack member

<sup>1</sup> From AW+ version 5.5.2-2 onwards, AMF Plus licenses provide all standard AMF network management and automation features. They also enable the AMF Plus intent-based networking features menu in Vista Manager EX (from version 3.10.1 onwards)

<sup>2</sup> Purchase one license per 10 nodes (up to 40 nodes maximum)

<sup>3</sup> 5 APs can be managed for free. Purchase one license per 10 additional APs (up to 40 APs maximum)

<sup>4</sup> Channel Blanket and Smart Connect are not available as free services. Both an AWC-CB license and an AWC license are required for Channel Blanket and/or Smart Connect to operate. Purchase one AWC-CB license per 10 APs (up to 40 APs maximum). Channel Blanket is supported on TQ6602, TQ5403, and TQ5403e access points. Smart Connect is supported on TQ5403, and TQ5403e access points



## Ordering Information

### Switches

Model availability can vary between regions. Please check our website to see which models are available in your region.

#### AT-x550-18XTQ-xx

16-port 1G/10G BaseT stackable switch with 2 QSFP ports, and a single fixed power supply

#### AT-x550-18XSQ-xx

16-port 1G/10G SFP+ stackable switch with 2 QSFP ports, and a single fixed power supply

#### AT-x550-18XSPQm-xx

8-port 1G/2.5G/5G/10G BaseT PoE+ and 8-port 1G/10G SFP+ stackable switch with 2 QSFP ports, and a single fixed power supply

Note: switches ship with 19-inch rack mount brackets

#### AT-RKMT-J15

Rack mount kit to install two XTQ and/or XSQ devices side by side in a 19-inch equipment rack

#### AT-STND-J03

Stand-kit for AT-x550-18XTQ and AT-x550-18XSQ

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

### 40GbE QSPF Modules

#### AT-QSFPLR4

40GLR4 1310 nm medium-haul, 10 km with SMF

#### AT-QSFPSR4

40GSR4 850 nm short-haul up to 150 m with MMF

#### AT-QSFPER4

40GER4 1310 nm long-haul, 40 km with SMF

#### AT-QSFP1CU

QSFP+ copper cable 1m

#### AT-QSFP3CU

QSFP+ copper cable 3m

### Breakout Cables For 4 x 10G connections

#### AT-QSFP-4SFP10G-3CU

QSFP to 4 x SFP+ breakout direct attach cable (3 m)

#### AT-QSFP-4SFP10G-5CU

QSFP to 4 x SFP+ breakout direct attach cable (5 m)

### 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-SP10LRa/I

10GLR 1310 nm medium-haul, 10 km with SMF industrial temperature

#### AT-SP10LR20/I

10GER 1310 nm long-haul, 20 km with SMF industrial temperature

#### AT-SP10ER40/I

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

#### AT-SP10ZR80/I

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

#### AT-SP10BD10/I-12

10 GbE Bi-Di (1270 nm Tx, 1330 nm Rx) fiber up to 10 km industrial temperature, TAA<sup>5</sup>

#### AT-SP10BD10/I-13

10 GbE Bi-Di (1330 nm Tx, 1270 nm Rx) fiber up to 10 km industrial temperature, TAA<sup>5</sup>

#### AT-SP10BD20-12

10 GbE Bi-Di (1270 nm Tx, 1330 nm Rx) fiber up to 20 km, TAA<sup>5</sup>

#### AT-SP10BD20-13

10 GbE Bi-Di (1330 nm Tx, 1270 nm Rx) fiber up to 20 km, TAA<sup>5</sup>

#### AT-SP10BD40/I-12

10 GbE Bi-Di (1270 nm Tx, 1330 nm Rx) fiber up to 40 km industrial temperature, TAA<sup>5</sup>

#### AT-SP10BD40/I-13

10 GbE Bi-Di (1330 nm Tx, 1270 nm Rx) fiber up to 40 km industrial temperature, TAA<sup>5</sup>

#### AT-SP10TM

1G/2.5G/5G/10G, 100m copper, TAA<sup>5</sup>

#### AT-SP10TW1

1 meter SFP+ direct attach cable

#### AT-SP10TW3

3 meter SFP+ direct attach cable

### 1000Mbps SFP Modules

#### AT-SPTXa

1000T 100 m copper

#### AT-SPSX

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

#### 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-SPLX40

1000LX GbE single-mode 1310 nm fiber up to 40 km

Note that any Allied Telesis 40G or 10G module or direct attach cable can also be used for stacking. Stacking is also supported using the 10G RJ45 copper ports.

<sup>5</sup>Trade Act Agreement compliant