

# x220 Series

## Gigabit Edge Switches



### Overview

The Allied Telesis x220 Series are fully-managed high-performing Gigabit Layer 3 switches. Integrated security features, plus 28 SFP or 48 Gigabit copper ports, make them the ideal choice for long-distance fiber or high-density copper connectivity at the edge of the network.

The x220-28GS features 24 x 100/1000X SFP slots and 4 x 100/1000X SFP uplinks to provide extended reach at the network edge in distributed environments. Secure data transfer is ensured with Allied Telesis Active Fiber Monitoring (AFM) preventing data eavesdropping on all short and long-distance fiber links.

The x220-52GP/GT have 48 x 10/100/1000T RJ-45 copper ports and 4x 100/1000X SFP uplinks. The Power over Ethernet Plus (PoE+) model (52GP) is ideal for connecting and powering wireless access points, IP video surveillance cameras, and IP phones.

### Resilient

Allied Telesis Ethernet Protection Switched Ring (EPSRing™) enables distributed network segments to have resilient high-speed access to online resources and applications, and provides continuous traffic flow even during unscheduled outages.

### Network management

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, Autonomous Wave Control (AWC) wireless, and third party (SNMP) devices.

### Cybersecurity

The x220 Series acting as AMF Plus members are compatible with our AMF-Security solution, which enables a self-defending network. The AMF-Sec controller responds immediately to any internal malware threats by instructing the x220 Series to isolate the affected part of the network, and quarantine the suspect device. Vista Manager EX alerts networks administrators of threats that have been dealt with.

### Secure

Network Access Control (NAC) gives unprecedented control over user access to the network, successfully mitigating threats to network infrastructure.

The x220 Series use 802.1x port-based authentication, in partnership with standards-compliant dynamic VLAN assignment, to assess a user's adherence to network security policies and either grant access or offer remediation. Tri-authentication ensures the network is only accessed by known users and devices. Secure access is also available for guests.

Security from malicious network attacks is provided by a comprehensive range of features such as DHCP snooping, STP root guard, BPDU protection and access control lists. Each of these can be configured to perform a variety of actions upon detection of a suspected attack.

### Network protection

Advanced storm protection features include bandwidth limiting, policy-based storm protection and packet storm protection.

Network storms are often caused by cabling errors that result in a network loop.



### Key Features

- Allied Telesis Autonomous Management Framework™ Plus (AMF Plus)
- AMF-Security compatible
- Active Fiber Monitoring
- AlliedWare Plus operating system
- EPSR™ and G.8032 high-speed ring connectivity
- Management stacking
- Static routing and RIP
- DHCP snooping
- IEEE 802.1x/MAC/Web authentication support
- PoE+ supplies up to 30W per port
- PoE power budget of 740 Watts
- Continuous PoE
- Link Monitoring
- Upstream Forwarding Only (UFO)
- NETCONF/RESTCONF with YANG data modelling
- IPFIX (IP Flow Information Export)
- Enhanced Transmission Selection (ETS)

The x220 Series provides features to detect loops as soon as they are created. Loop detection and thrash limiting take immediate action to prevent network storms.

### Effortless management

The x220 Series runs the advanced AlliedWare Plus™ fully featured operating system, delivering a rich feature set and an industry-standard Command Line Interface (CLI). This reduces training requirements and is consistent across all AlliedWare Plus devices, simplifying network management.

The web-based Graphical User Interface (GUI) is an easy-to-use and powerful management tool, with comprehensive monitoring facilities.

# KEY FEATURES

## Autonomous Management Framework™ Plus (AMF Plus)

AMF Plus is a sophisticated suite of management tools that provide a simplified approach to network management. Common tasks are automated or made so simple that the everyday running of a network can be achieved without the need for highly-trained, and expensive, network engineers. Powerful features like centralized management, auto-backup, auto-upgrade, auto-provisioning and auto-recovery enable plug-and-play networking and zero-touch management.

AMF Plus secure mode encrypts all AMF traffic, provides unit and user authorization, and monitors network access to greatly enhance network security.

From AW+ 5.5.2-2 onwards, an AMF Plus license operating in the network provides all standard AMF network management and automation features, and also enables the AMF Plus intent-based networking features in Vista Manager EX (from version 3.10.1 onwards).

## Active Fiber Monitoring (AFM)

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.

## 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.

## Ethernet Protection Switched Ring (EPSRing™)

EPSRing allows several x220 switches to form a protected ring capable of recovery within as little as 50ms. This feature is perfect for high availability in enterprise networks.

## G.8032 Ethernet Ring Protection

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

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

## Access Control Lists (ACLs)

ACLs filter network traffic to control whether routed packets are forwarded or blocked, and can be applied to a specific port or a VLAN. This provides a powerful network security mechanism to select the types of traffic to be analyzed, forwarded, or influenced in some way.

## NETCONF/RESTCONF

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

## Easy To Manage

The AlliedWare Plus operating system incorporates an industry standard CLI, facilitating intuitive manageability.

With three distinct modes, the CLI is very secure, and the use of SSHv2 encrypted and strongly authenticated remote login sessions ensures CLI access is not compromised.

## Storm protection

Advanced packet storm control features protect the network from broadcast storms:

Bandwidth limiting minimizes the effects of the storm by reducing the amount of flooding traffic.

Policy-based storm protection is more powerful than bandwidth limiting. It restricts storm damage to within the storming VLAN, and it provides the flexibility to define the traffic rate that creates a broadcast storm. The action the device should take when it detects a storm can be configured, such as disabling the port from the VLAN or shutting the port down.

Packet storm protection allows limits to be set on the broadcast reception rate, multicast frames and destination lookup failures. In addition, separate limits can be set to specify when the device will discard each of the different packet types.

## 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 packets, called Loop Detection Frames (LDF), that the switch listens for. If a port receives an LDF packet, one can choose to disable the port, disable the link, or send an SNMP trap.

## Spanning Tree Protocol (STP) Root Guard

STP root guard designates which devices can assume the root bridge role in an STP network. This stops an undesirable device from taking over this role, where it could either compromise network performance or cause a security weakness.

## Bridge Protocol Data Unit (BPDU) protection

BPDU protection adds extra security to STP. It protects the spanning tree configuration by preventing malicious DoS attacks caused by spoofed BPDUs. If a BPDU packet is received on a protected port, the BPDU protection feature disables the port and alerts the network manager.

## Tri-authentication

Authentication options on the x220 Series include alternatives to 802.1x port-based authentication, such as web authentication, to enable guest access and MAC authentication for end points that do not have an 802.1x supplicant. All three authentication methods—802.1x, MAC-based and Web-based—can be enabled simultaneously on the same port, resulting in tri-authentication.

## 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.

## 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.

## 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.

## Find Me

In busy server rooms comprised 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.

## 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.

## IPFIX (IP Flow Information Export)

IPFIX enables exporting IP flow data in a network for analysis. This provides network administrators with information for accounting, billing, capacity planning, and performance optimization.

## sFlow

sFlow monitors switched networks, and provides visibility to enable performance optimization, usage accounting/billing, and defense against security threats. Sampled packets sent to a collector provide a real-time view of network traffic.

## Link Monitoring (Linkmon)

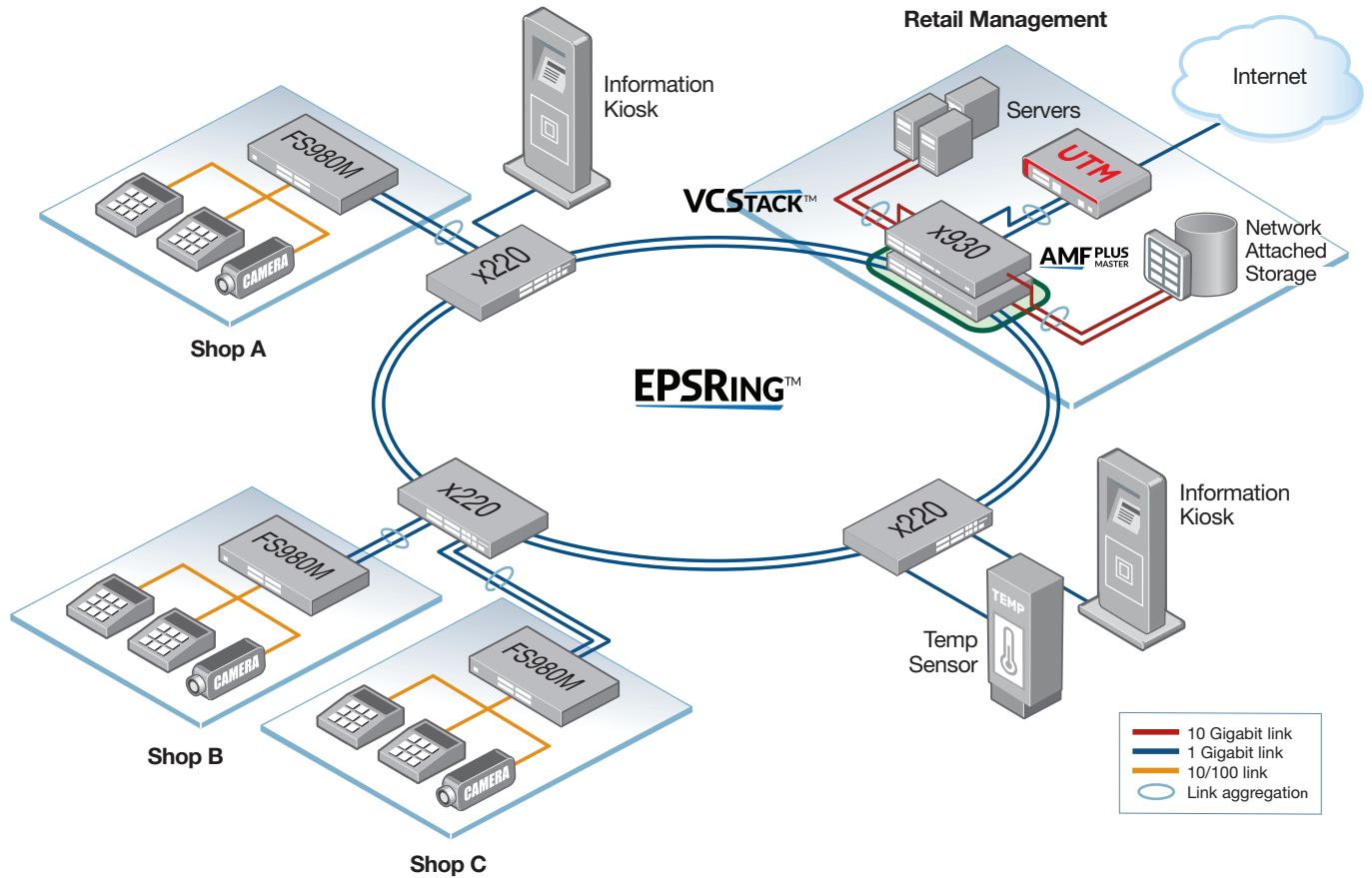
Linkmon enables network health monitoring by regularly sending probes over key links to gather metrics comprising latency, jitter, and probe loss. This supports pro-active network management, and can also be used with triggers to automate a change to device or network configuration in response to the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

## Quality of Service

Enhanced Transmission Selection (ETS) provides quality of service by allocating bandwidth to important traffic classes, with the flexibility to share remaining bandwidth to maximize traffic throughput and performance.

## KEY SOLUTIONS

# Distributed Retail Network



The growth of large retail shopping complexes, and open-air malls (as shown in the diagram above) have increased the need for high performing networks. The convergence of data from visitor information kiosks, monitoring sensors, security management, and point of sale systems requires a resilient solution.

The x220 Series supports Allied Telesis Ethernet Protection Switched Ring (EPSRing) to ensure distributed network segments have high-speed access to online systems. Continuous traffic flow is enabled with failover in a little as 50ms in the case of an unscheduled device outage or link failure.

With 28 SFP ports, the x220-28GS extends network reach to enable access connectivity right around the retail precinct, or similarly an education campus, manufacturing plant, or large distributed business. All fiber links are kept secure with Active Fiber Monitoring, which detects attempted data eavesdropping and protects against intrusion.

To simplify and automate network management, Allied Telesis Autonomous Management Framework Plus automatically backs-up the entire network, and provides plug-and-play network growth and zero-touch unit replacement.

# Network

## Network convergence

The convergence of network services in the Enterprise has led to increasing demand for highly available networks with minimal downtime. Diagram 1 shows x220 switches with high performance EPSR connectivity to the SwitchBlade x8106 core chassis. This topology provides recovery in as little as 50ms, if required.

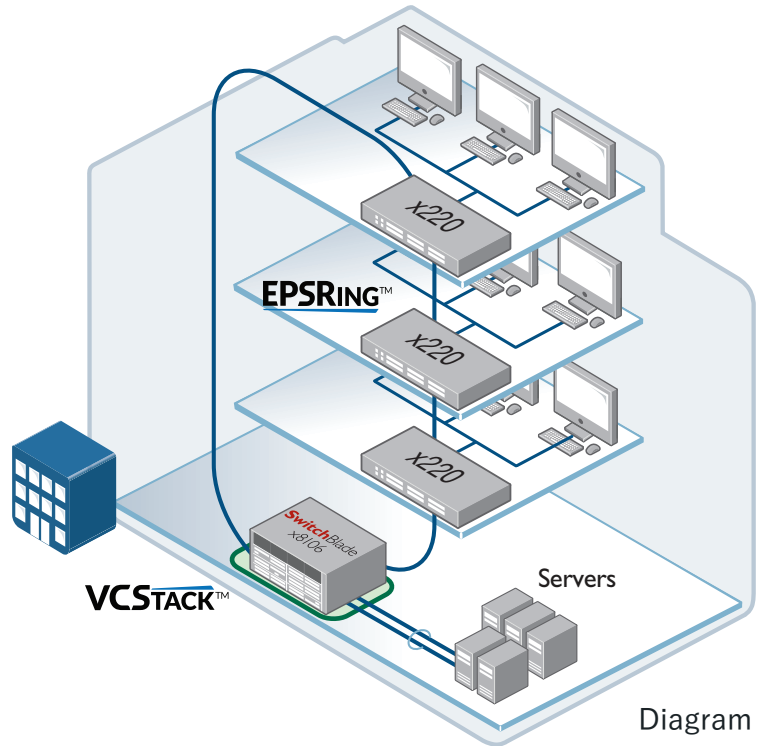


Diagram 1

## Network flexibility

Flexible network deployment is facilitated by the x220 PoE+ models, as shown in the Campus network in diagram 2. With the growth of wireless networking and digital security, the x220 PoE+ models are ideal supplying connectivity and power at the network edge, supporting the full 30 watts of PoE+.

AMF Plus provides an easy yet powerful solution for managing multiple devices with plug-and-play simplicity.

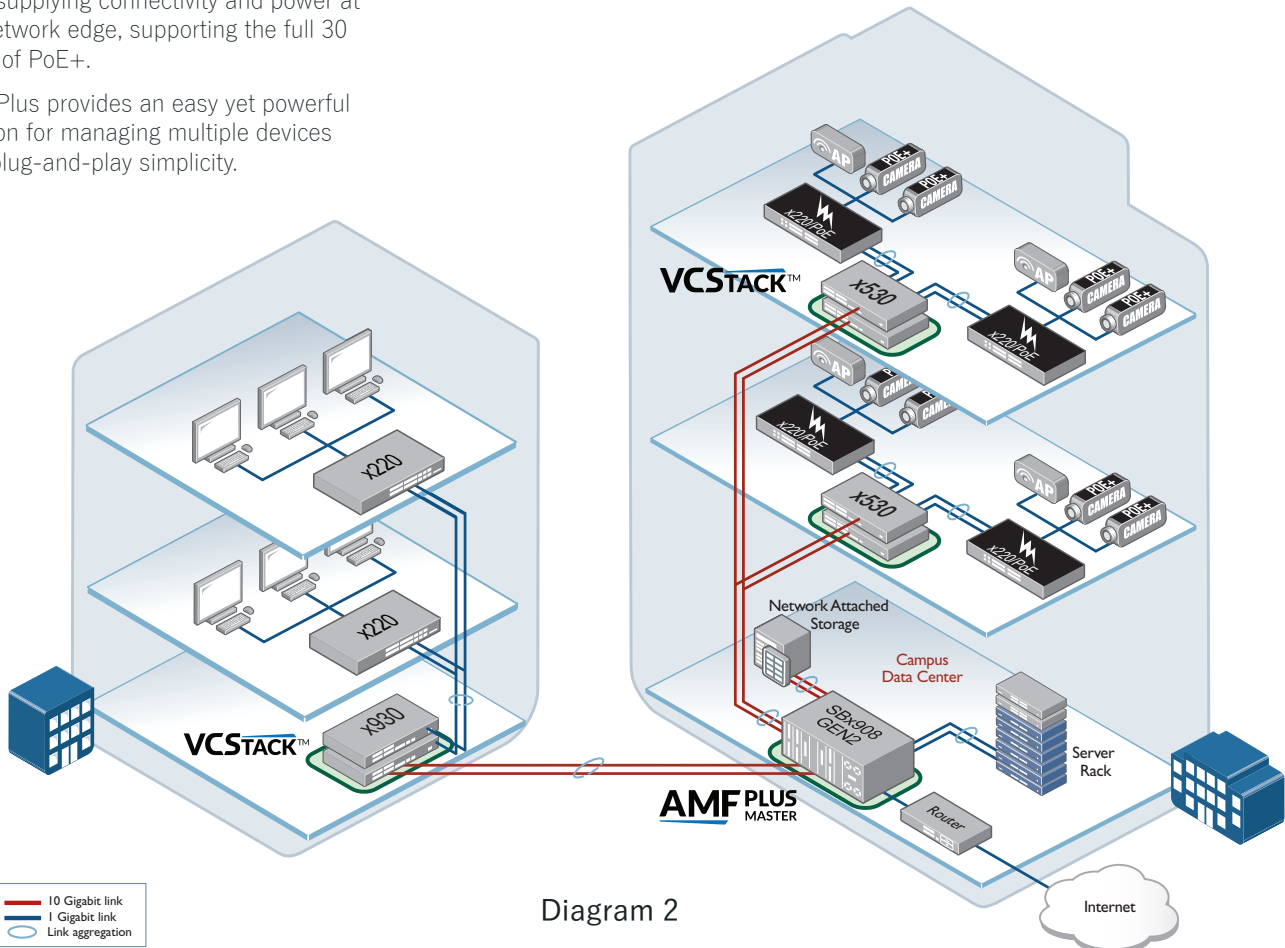


Diagram 2



# SPECIFICATIONS

## Product Specifications

	10/100/1000T (RJ-45) Copper Ports	100/1000X SFP Ports	Total Ports	PoE Enabled Ports	Switching Fabric	Forwarding Rate
<b>x220-28GS</b>	-	28	28	-	56Gbps	41.7Mpps
<b>x220-52GP</b>	48	4	52	48	104Gbps	77.4Mpps
<b>x220-52GT</b>	48	4	52	-	104Gbps	77.4Mpps

## Physical Specifications

	Width	Depth	Height	Mounting	Unpacked Weight	Packaged Weight	Packaged Dimensions
<b>x220-28GS</b>	441 mm (17.36 in)	323 mm (12.72 in)	44 mm (1.73 in)	1RU Rack-mount	4.3 kg (9.47 lb)	6.1 kg (13.45 lb)	575 x 445 x 150 mm (22.64 x 17.52 x 5.90 in)
<b>x220-52GP</b>	441 mm (17.36 in)	359 mm (14.13 in)	44 mm (1.73 in)	1RU Rack-mount	5.8 kg (12.79 lb)	7.8 kg (17.20 lb)	575 x 520 x 150 mm (22.64 x 20.47 x 5.90 in)
<b>x220-52GT</b>	441 mm (17.36 in)	323 mm (12.72 in)	44 mm (1.73 in)	1RU Rack-mount	4.5 kg (9.92 lb)	6.4 kg (14.12 lb)	575 x 445 x 150 mm (22.64 x 17.52 x 5.90 in)

## Power and Noise Characteristics

	No PoE Load			Full PoE+ Load (PWR800)			PoE Power Budget	Poe Sourcing Ports	
	Max Power Consumption	Max Heat Dissipation	Noise	Max Power Consumption	Max Heat Dissipation	Noise		PoE (15W)	PoE (30W)
	<b>x220-28GS</b>	52W	179 BTU/h	39 dBA	-	-	-	-	-
<b>x220-52GP</b>	48W	164 BTU/h	42 dBA	909W	577 BTU/h	42 dBA	740W	48	24
<b>x220-52GT</b>	47W	160 BTU/h	39 dBA	-	-	-	-	-	-

## Latency (microseconds)

	Port Speed		
	10Mbps	100Mbps	1Gbps
<b>x220-28GS</b>	39.6µs	6.8µs	3.8µs
<b>x220-52GP</b>	35.1µs	5.5µs	2.6µs
<b>x220-52GT</b>	35.1µs	5.5µs	2.6µs

## Performance

- Up to 16K MAC addresses
- Routes: 16 (IPv4), 16 (IPv6)
- Up to 2K multicast entries
- 512MB DDR SDRAM
- 128MB flash memory
- 4094 configurable VLANs
- Packet Buffer memory: 1.5MB(28GS), 3MB(52GT)
- Supports 10KB L2 jumbo frames
- Wirespeed forwarding

## Reliability

- Modular AlliedWare Plus operating system
- Full environmental monitoring of PSU internal temperature and internal voltages. SNMP traps alert network managers in case of any failure

## Flexibility and compatibility

- SFP ports will support any combination of 1000T, 100X, 100FX, 100BX, 1000X, 1000SX, 1000LX, 1000ZX or 1000ZX CWDM SFPs

## Diagnostic tools

- Active Fiber Monitoring detects tampering on optical links
- Built-In Self Test (BIST)
- Find-me device locator
- Optical Digital Diagnostics Monitoring (DDM)
- Automatic link flap detection and port shutdown
- Ping polling for IPv4 and IPv6
- Port mirroring
  - No limit on mirrored ports
  - 1 mirror (analyzer) port
- VLAN mirroring (RSPAN)
- TraceRoute for IPv4 and IPv6

## IP features

- IPv4 static routing and RIP
- DHCPv6 client
- Device management over IPv6 networks with SNMPv6, Telnetv6, SSHv6 and Syslogv6
- NTP client and server
- IPv6 Ready certified

## Management

- 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
- Industry-standard CLI with context-sensitive help
- Powerful CLI scripting engine with built-in text editor
- Web-based Graphical User Interface (GUI)
- USB interface allows software release files, configurations and other files to be stored for backup and distribution to other devices
- Comprehensive SNMP MIB support for standards-based device management
- Management stacking allows up to 24 devices to be managed from a single console
- 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
- 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
- Enhanced Transmission Selection (ETS)

### 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 enhanced recovery for extra resiliency
- Loop protection: loop detection and thrash limiting
- PVST+ compatibility mode
- RRP snooping
- STP root guard

### Security Features

- Access Control Lists (ACLs) based on layer 3 and 4 headers, per VLAN or port
- Configurable ACLs for management traffic
- Dynamic ACLs assigned via port authentication
- ACL Groups enable multiple hosts/ports to be included in a single ACL, reducing configuration
- 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
- 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)
- Simple Certificate Enrollment Protocol (SCEP) supports secure management
- 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 50°C (32°F to 122°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
- 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
- Certifications: UL, cUL, UL-EU

### Restrictions on Hazardous Substances (RoHS) Compliance

- EU RoHS compliant
- China RoHS compliant

## STANDARDS & PROTOCOLS

### AlliedWare Plus Operating System

Version 5.5.6

### 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 802.2 Logical Link Control (LLC)

IEEE 802.3 Ethernet

IEEE 802.3ab1000BASE-T

IEEE 802.3af Power over Ethernet (PoE)

IEEE 802.3at Power over Ethernet plus (PoE+)

IEEE 802.3u 100BASE-X

IEEE 802.3x Flow control - full-duplex operation

IEEE 802.3z 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 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 1518 An architecture for IP address allocation with CIDR

RFC 1519 Classless Inter-Domain Routing (CIDR)

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

AT Enterprise MIB including AMF Plus MIB and SNMP 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 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 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 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 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 7011 IPFIX: a method of exporting IP flow data in a network for analysis

### Multicast support

IGMP query solicitation  
 IGMP snooping (IGMPv1, v2 and v3)  
 IGMP snooping fast-leave  
 MLD snooping (MLDv1 and v2)  
 RFC 2236 Internet Group Management Protocol v2 (IGMPv2)  
 RFC 2715 Interoperability rules for multicast routing protocols  
 RFC 3306 Unicast-prefix-based IPv6 multicast addresses  
 RFC 3376 IGMPv3  
 RFC 4541 IGMP and MLD snooping switches

### Quality of Service (QoS)

IEEE 802.1p Priority tagging  
 IEEE 802.1Qaz Enhanced Transmission Selection (ETS)  
 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

ITU-T G.8032 / Y.1344 Ethernet Ring Protection Switching (ERPS)  
 IEEE 802.1AX Link aggregation (static and LACP)  
 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

### Routing Information Protocol (RIP)

RFC 1058 Routing Information Protocol (RIP)  
 RFC 2082 RIP-2 MD5 authentication  
 RFC 2453 RIPv2

### Security Features

SSH remote login  
 SSLv2 and SSLv3  
 TACACS+ Accounting, Authentication and Authorisation (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 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  
 RFC 8446 Transport Layer Security (TLS) v1.3  
 RFC 8894 Simple Certificate Enrollment Protocol (SCEP)

### 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 relay and client  
 RFC 2616 Hypertext Transfer Protocol - HTTP/1.1  
 RFC 2821 Simple Mail Transfer Protocol (SMTP)  
 RFC 2822 Internet message format  
 RFC 3315 DHCPv6 relay and client  
 RFC 4330 Simple Network Time Protocol (SNTP) version 4  
 RFC 5905 Network Time Protocol (NTP) version 4

### VLAN support

IEEE 802.1Q Virtual LAN (VLAN) bridges  
 IEEE 802.1v VLAN classification by protocol and port  
 IEEE 802.3ac VLAN tagging

### Voice over IP

LLDP-MED ANS/TIA-1057  
 Voice VLAN

## FEATURE LICENSES

	Description	Includes
<b>AT-FL-x220-8032</b>	ITU-T G.8032 license	<ul style="list-style-type: none"> <li>■ G.8032 ring protection</li> <li>■ Ethernet CFM</li> </ul>
<b>AT-FL-x220-CPOE</b>	Continuous PoE license	<ul style="list-style-type: none"> <li>■ Continuous PoE power for x220-52GP only</li> </ul>

## ORDERING INFORMATION

19 inch rack-mount brackets included

<b>AT-x220-28GS-xx</b>	28-port 100/1000X SFP switch
<b>AT-x220-52GP-xx</b>	48-port 10/100/1000T-POE+ switch with 4 SFP uplink ports and single fixed PSU
<b>AT-x220-52GT-xx</b>	48-port 10/100/1000T switch with 4 SFP uplink ports and single fixed PSU
<b>AT-x220-52GP-J90<sup>1</sup></b>	48-port 10/100/1000T-POE+ switch with 4 SFP uplink ports and single fixed PSU
<b>AT-VT-Kit3</b>	Management Cable (USB to Serial Console)

Where xx = 10 for US power cord  
 20 for no power cord  
 30 for UK power cord  
 40 for AU power cord  
 50 for EU power cord

<sup>1</sup> J1TC approved models only available in North America. Please contact your sales representative

## Accessories

1000Mbps SFP Modules	
AT-SPTXc	1000T 100 m copper
AT-SPSX <sup>2</sup>	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-SPLX10a	1000LX GbE single-mode 1310 nm fiber up to 10 km
AT-SPLX10a/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-SPBD20-13/I <sup>3</sup>	1000BX GbE Bi-Di (1310 nm Tx, 1490 nm Rx) fiber up to 20 km industrial temperature
AT-SPBD20-14/I <sup>3</sup>	1000BX GbE Bi-Di (1490 nm Tx, 1310 nm Rx) fiber up to 20 km industrial temperature
AT-SPBD40-13/I	1000LX GbE single-mode Bi-Di (1310 nm Tx, 1490 nm Rx) fiber up to 40 km, industrial temperature
AT-SPBD40-14/I	1000LX GbE single-mode Bi-Di (1490 nm Tx, 1310 nm Rx) fiber up to 40 km, industrial temperature
AT-SPLX40	1000LX GbE single-mode 1310 nm fiber up to 40 km

100Mbps SFP Modules	
AT-SPFX/2	100FX multi-mode 1310 nm fiber up to 2 km
AT-SPFXBD-LC-13	100BX Bi-Di (1310 nm Tx, 1550 nm Rx) fiber up to 15 km
AT-SPFXBD-LC-15	100BX Bi-Di (1550 nm Tx, 1310 nm Rx) fiber up to 15 km
AT-SPFX30/I	100FX single-mode 1310 nm fiber up to 30 km

<sup>2</sup> The tri-speed AT-SPSX only supports Gigabit connectivity in the x220-28GS

<sup>3</sup> Only supported in the x220-28GS