

# x230 Series

## Enterprise Gigabit Edge Switches

The Allied Telesis x230 Series of Layer 3 Gigabit switches offer an impressive set of features in a compact design, making them ideal for applications at the network edge.



### Overview

Allied Telesis x230 Series switches provide an excellent access solution for today's networks, supporting Gigabit to the desktop for maximum performance. The Power over Ethernet Plus (PoE+) models provide an ideal solution for connecting and remotely powering wireless access points, IP video surveillance cameras, and IP phones. The x230 models feature 8, 16 or 24 Gigabit ports, and 2 or 4 SFP uplinks, for secure connectivity at the network edge.

### Secure

Network security is guaranteed, with powerful control over network traffic types, secure management options, and other multi-layered security features built right into the x230 Series switches.

Network Access Control (NAC) gives unprecedented control over user access to the network, in order to mitigate threats to network infrastructure.

Allied Telesis x230 switches 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. Allied Telesis x230 Series switches provide features to detect loops as soon as they are created. Loop detection and thrash limiting take immediate action to prevent network storms.

### Manageable

The x230 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.

### Future-proof

x230 Series switches are Software Defined Networking (SDN) ready and able to support OpenFlow v1.3.

### 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.

### ECO Friendly

The x230 Series supports Energy Efficient Ethernet, which automatically reduces the power consumed by the switch whenever there is no traffic on a port. This sophisticated feature can significantly reduce your operating costs by reducing the power requirements of the switch and any associated cooling equipment.



## New Features

- ▶ x230-10GT
- ▶ ACLs for management traffic
- ▶ VLAN ACLs
- ▶ TACACS+ Command Authorization
- ▶ Active Fiber Monitoring
- ▶ OpenFlow for SDN
- ▶ VLAN Mirroring (RSPAN)



## 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. Common tasks are automated or made so simple that the every-day 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.

### 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 tilt and zoom security cameras.

### Ethernet Protection Switched Ring (EPSRing™)

- ▶ EPSRing allows several x230 switches to join a protected ring capable of recovery within as little as 50ms. This feature is perfect for high availability in enterprise networks.

### Access Control Lists (ACLs)

- ▶ The x230 Series features industry-standard access control functionality through ACLs. ACLs filter network traffic to control whether packets are forwarded or blocked at the port interface. This provides a powerful network security mechanism to select the types of traffic to be analyzed, forwarded, or influenced in some way. An example of this would be to provide traffic flow control.

### 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.

### 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.
- ▶ As a Layer 2+ switch, a static route can be added to allow a user in a different subnet to manage the switch.

### 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 x230 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

- ▶ 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.

### UniDirectional Link Detection

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

### 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.

### 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.

### IPv6 support

- ▶ With the depletion of IPv4 address space, IPv6 is rapidly becoming a mandatory requirement for many government and enterprise customers. To meet this need, now and into the future, the x230 Series supports IPv6 forwarding in hardware and features MLD snooping for efficient use of network bandwidth.



## Key Solutions

### 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 x230 switches with high performance EPSR connectivity to the x610 VCSStack core. This topology provides recovery in as little as 50ms, if required.

### Network flexibility

Flexible network deployment is facilitated by the compact 10 and 18 port x230 PoE+ models, as shown in the Campus network in diagram 2. With the growth of wireless networking and digital security, the x230 PoE+ models are ideal supplying connectivity and power at the network edge, supporting the full 30 watts of PoE+. AMF provides an easy yet powerful solution for managing multiple devices with plug-and-play simplicity.

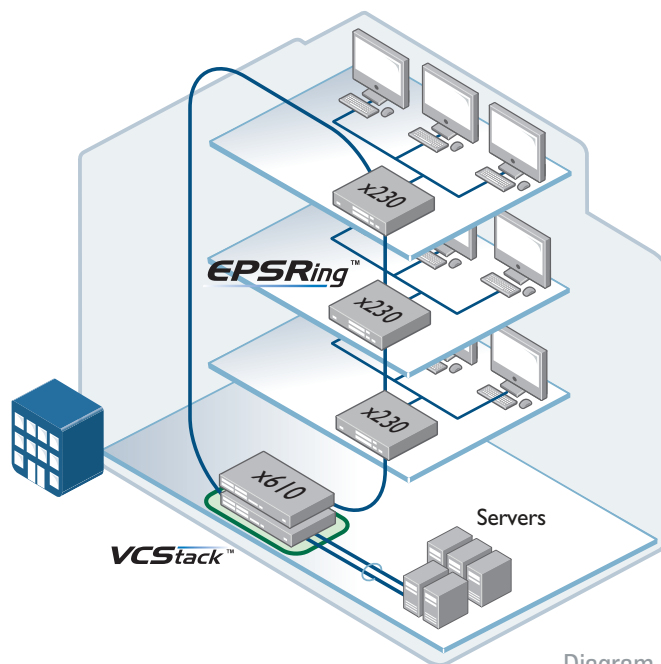


Diagram 1

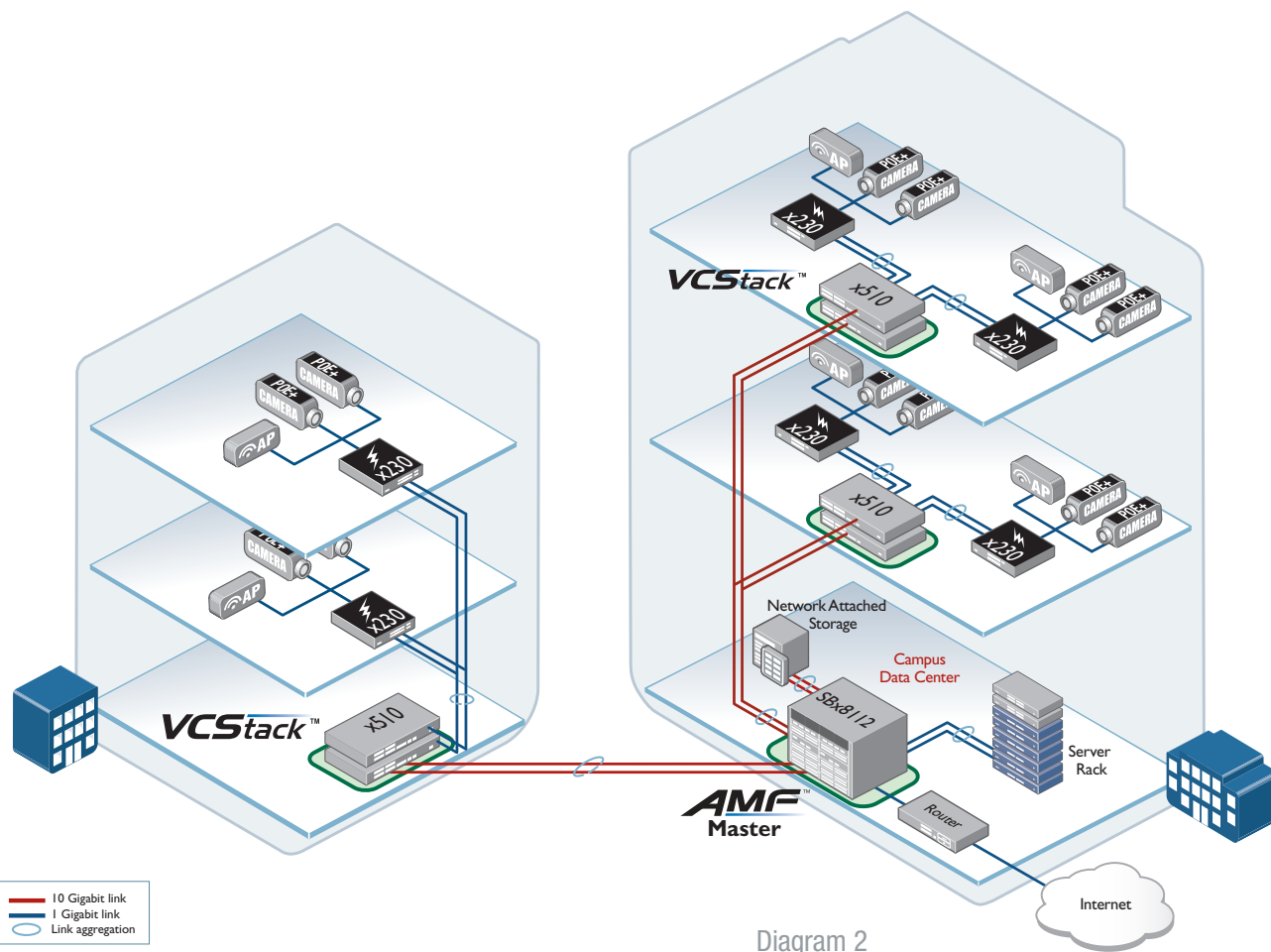


Diagram 2

## Product Specifications

PRODUCT	10/100/1000T (RJ-45) COPPER PORTS	100/1000X SFP PORTS	TOTAL PORTS	POE+ ENABLE PORTS	SWITCHING FABRIC	FORWARDING RATE
x230-10GP	8	2	10	8	40Gbps	14.9Mpps
x230-10GT	8	2	10	-	40Gbps	14.9Mpps
x230-18GP	16	2	18	16	40Gbps	26.8Mpps
x230-18GT	16	2	18	-	40Gbps	26.8Mpps
x230-28GP	24	4	28	24	56Gbps	41.7Mpps
x230-28GT	24	4	28	-	56Gbps	41.7Mpps

### Physical specifications

PRODUCT	HEIGHT	WIDTH	DEPTH	WEIGHT
x230-10GP	42.5 mm (1.67 in)	210 mm (8.27 in)	275 mm (10.83 in)	2.1 kg (4.6 lb)
x230-10GT	42.5 mm (1.67 in)	265 mm (10.43 in)	180 mm (7.08 in)	1.5 kg (3.3 lb)
x230-18GP	44 mm (1.73 in)	341 mm (13.42 in)	231 mm (9.09 in)	3.0 kg (6.6 lb)
x230-18GT	44 mm (1.73 in)	341 mm (13.42 in)	231 mm (9.09 in)	2.4 kg (5.3 lb)
x230-28GP	44 mm (1.73 in)	440 mm (17.32 in)	290 mm (11.42 in)	4.7 kg (10.4 lb)
x230-28GT	44 mm (1.73 in)	341 mm (13.42 in)	231 mm (9.09 in)	2.4 kg (5.3 lb)

### Latency (microseconds)

PRODUCT	PORT SPEED		
	10MBPS	100MBPS	1GBPS
x230-10GP/GT	55µs	7.8µs	3.4µs
x230-18GP/GT	56µs	7.9µs	3.4µs
x230-28GP/GT	59µs	8.6µs	4.3µs

### Performance

- ▶ Up to 16K MAC addresses
- ▶ 256MB DDR SDRAM
- ▶ 64MB flash memory
- ▶ Packet Buffer memory: 1.5MB
- ▶ Supports 10KB 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 10/100/1000T, 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
- ▶ Cable fault locator (TDR)
- ▶ Optical Digital Diagnostics Monitoring (DDM)
- ▶ Automatic link flap detection and port shutdown
- ▶ Ping polling for IPv4 and IPv6
- ▶ Port and 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
- ▶ NTPv6 client and server

### Management

- ▶ Allied Telesis Management Framework (AMF) enables powerful centralized management and zero-touch device installation and recovery
- ▶ 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 with built-in text editor
- ▶ SD/SDHC memory card socket allows software release files, configurations and other files to be stored for backup and distribution to other devices
- ▶ Configurable logs and triggers provide an audit trail of SD card insertion and removal
- ▶ Comprehensive SNMP MIB support for standards-based device management
- ▶ Management stacking allows up to 32 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

### Resiliency

- ▶ 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

- ▶ 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)
- ▶ 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 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

## Country of origin

- ▶ China

## Power characteristics

100-240 VAC, 50-60Hz, 2.4A maximum

PRODUCT	NO POE LOAD			FULL POE+ LOAD			MAX POE POWER	MAX POE PORTS AT 15W PER PORT	MAX POE+ PORTS AT 30W PER PORT
	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE	MAX POWER CONSUMPTION	MAX HEAT DISSIPATION	NOISE			
x230-10GP	16W	55 BTU/hr	33 dBA	180W	126 BTU/hr	41 dBA	124W	8	4
x230-10GT	16W	55 BTU/hr	33 dBA	-	-	-	-	-	-
x230-18GP	21W	72 BTU/hr	34 dBA	330W	169 BTU/hr	42 dBA	247W	16	8
x230-18GT	18W	61 BTU/hr	29 dBA	-	-	-	-	-	-
x230-28GP	37W	127 BTU/hr	33 dBA	520W	303 BTU/hr	42 dBA	370W	24	12
x230-28GT	26W	89 BTU/hr	34 dBA	-	-	-	-	-	-

## Standards and Protocols

### AlliedWare Plus Operating System

Version 5.4.6-2

### 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 802.3af 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 standards

RFC 791 Internet Protocol (IP)

RFC 792 Internet Control Message Protocol (ICMP)

RFC 826 Address Resolution Protocol (ARP)

RFC 894

Standard for the transmission of IP data grams 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 data grams 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 1812

Requirements for IPv4 routers

RFC 1918

IP addressing

### IPv6 standards

RFC 1981

Path MTU discovery for IPv6

RFC 2460

IPv6 specification

RFC 2464

Transmission of IPv6 packets over Ethernet networks

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

### Management

AMF MIB and SNMP traps

AT Enterprise MIB

Optical DDM 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 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 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

### Multicast support

IGMP query solicitation

IGMP snooping (IGMPv1, v2 and v3)

IGMP snooping fast-leave

MLD snooping (MLDv1 and v2)

### Quality of Service (QoS)

IEEE 802.1p Priority tagging

RFC 2211 Specification of the controlled-load network element service

RFC 2474

DiffServ precedence for eight queues/port

RFC 2475

DiffServ architecture

RFC 2597

DiffServ Assured Forwarding (AF)

RFC 2697

A single-rate three-color marker

RFC 2698

A two-rate three-color marker

RFC 3246

DiffServ Expedited Forwarding (EF)

## Resiliency

IEEE 802.1D MAC bridges  
IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)  
IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)

## Routing Information Protocol (RIP)

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

## Security

SSH remote login  
SSLv2 and SSLv3  
TACACS+ Accounting, Authentication, Authorization (AAA)  
IEEE 802.1X authentication protocols (TLS, TTLS, PEAP, MD5)  
IEEE 802.1X multi-suplicant 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 client  
RFC 2616 Hypertext Transfer Protocol - HTTP/1.1  
RFC 2821 Simple Mail Transfer Protocol (SMTP)  
RFC 2822 Internet message format  
RFC 3315 DHCPv6 client  
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

LLDP-MED ANSI/TIA-1057  
Voice VLAN

## Ordering Information

### AT-x230-10GP

L3 switch with 8 x 10/100/1000T PoE ports and 2 x 100/1000X SFP ports

### AT-x230-10GT

L3 switch with 8 x 10/100/1000T ports and 2 x 100/1000X SFP ports

### AT-x230-18GP

L3 switch with 16 x 10/100/1000T PoE ports and 2 x 100/1000X SFP ports

### AT-x230-18GT

L3 switch with 16 x 10/100/1000T ports and 2 x 100/1000X SFP ports

### AT-x230-28GP

L3 switch with 24 x 10/100/1000T PoE ports and 4 x 100/1000X SFP ports

### AT-x230-28GT

L3 switch with 24 x 10/100/1000T ports and 4 x 100/1000X SFP ports

### AT-RKMT-J05

Rack mount kit for x230-10GT

### AT-RKMT-J13

Rack mount kit for x230-18GP/18GT

### AT-RKMT-J14

Rack mount kit for x230-10GP

## SFP modules

### AT-SPFX/2

100FX multi-mode 1310 nm fiber up to 2 km

### AT-SPFX/15

100FX single-mode 1310 nm fiber up to 15 km

### AT-SPFXBD-LC-13

100BX Bi-Di (1310 nm Tx, 1550 nm Rx) fiber up to 10 km

### AT-SPFXBD-LC-15

100BX Bi-Di (1550 nm Tx, 1310 nm Rx) fiber up to 10 km

### AT-SPTX

1000T 100 m copper

### AT-SPSX

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

### AT-SPSX/I

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

### AT-SPEX

1000X GbE multi-mode 1310 nm fiber up to 2 km

### AT-SPLX10

1000LX GbE single-mode 1310 nm fiber up to 10 km

### AT-SPLX10/1

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

## Feature Licenses

NAME	DESCRIPTION	INCLUDES
AT-FL-x230-QinQ	x230 VLAN double tagging (Q-in-Q) license	▶ VLAN Q-in-Q
AT-FL-x230-OF13-1YR	OpenFlow license for 1 year	▶ OpenFlow v1.3
AT-FL-x230-OF13-5YR	OpenFlow license for 5 years	▶ OpenFlow v1.3
AT-FL-x230-UDLD	UniDirectional Link Detection	▶ UDLD