

x330 Series

Stackable Gigabit Layer 3 Access Switches



Overview

Allied Telesis x330 Series provides an excellent Gigabit to the desktop solution with Multi-Gigabit and 10 Gigabit copper uplinks. The compact fanless design of the 10GTX, 20GTX and 28GTX provide silent operation for work area deployment. Layer 3 routing support means the x330 Series can also be deployed as distribution or small branch office core switches, with the ability to stack (20GTX, 28GTX and 52GTX) providing scalability and resiliency.

Manageable

The x330 Series run 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 management.

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

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 x330 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 x330 Series to isolate the affected part of the network, and quarantine the suspect device. Vista Manager EX alerts network administrators of threats that have been dealt with.

Network protection

Advanced features include bandwidth limiting, policy-based and packet storm protection. Network storms are often caused by cabling errors that result in a loop. The x330 Series uses loop detection and thrash limiting, and takes immediate action to prevent network storms.

Secure

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

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

Allied Telesis x330 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.

Resilient

Allied Telesis Ethernet Protection Switched Ring (EPSRing™), and the

Key Features

- AlliedWare Plus Enterprise-class operating system
- Autonomous Management Framework Plus (AMF Plus)
- Vista Manager EX compatible
- VCStack up to 6 units (20GTX, 28GTX, and 52GTX)
- AMF-Security compatible
- 10G copper and fiber uplinks
- Multi-Gigabit (1/2.5/5/10G) port for flexible uplink options
- EPSRing™ and G.8032 for resilient rings
- EPSR Master
- Energy Efficient Ethernet saves power
- Upstream Forwarding Only (UFO)
- Active Fiber Monitoring
- Static and dynamic routing
- Fanless for silent operation (10GTX, 20GTX, 28GTX)
- Web-based Device GUI
- Multicast Source Discovery Protocol (MSDP)
- Link Monitoring
- NETCONF/RESTCONF with YANG data modelling

standards-based G.8032 Ethernet Ring Protection, ensure that distributed network segments have high-speed, resilient access to online resources and applications.

Future-proof

The x330 Series are Software Defined Networking (SDN) ready and able to support OpenFlow v1.3.

ECO friendly

The x330 Series support Energy Efficient Ethernet, which automatically reduces the power consumed by the switch whenever there is no traffic on a port.

The x330 Series includes fanless models, which are ideal for desktop or work area deployment.

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 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.

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).

Virtual Chassis Stacking (VStack™)

The x330-20GTX, 28GTX, and 52GTX can form a VStack of up to six switches, with 40 Gbps of stacking bandwidth. VStack provides a highly-available system in which network resources are spread out across stacked units, minimizing the impact should any unit fail.

Ethernet Protection Switched Ring (EPSRing™)

EPSRing allows several x330 switches to join a protected ring capable of recovery within as little as 50ms. This feature is perfect for high availability in enterprise networks.

The x330 Series can act as the ESPR Master, or be deployed as an EPSR transit node.

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.

Access Control Lists (ACLs)

The x330 Series feature 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.

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.

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 3 switch, a static route can be added to allow a user in a different subnet to manage the switch.

The Device GUI enables graphical monitoring and management of the switch, simplifying administration

Open Shortest Path First (OSPFv2, OSPFv3)

OSPF is a scalable and adaptive routing protocol for IP networks. The addition of OSPFv3 provides support for IPv6 and further strength for next generation networking.

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.

sFlow

sFlow is an industry-standard technology for monitoring high-speed switched networks. It provides complete visibility into network use, enabling performance optimization, usage accounting/billing, and defense against security threats. Sampled packets sent to a collector ensure a real-time view of network traffic.

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.

Tri-authentication

Authentication options on the x330 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.

Premium Software License

By default, the x330 Series offer 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.

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.

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.

NETCONF/RESTCONF

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

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.

VLAN Translation

VLAN Translation allows traffic arriving on a VLAN to be mapped to a different VLAN on the outgoing interface.

Service Providers can provide customers with a unique VLAN ID, which can be changed for data transfer through the SP's network.

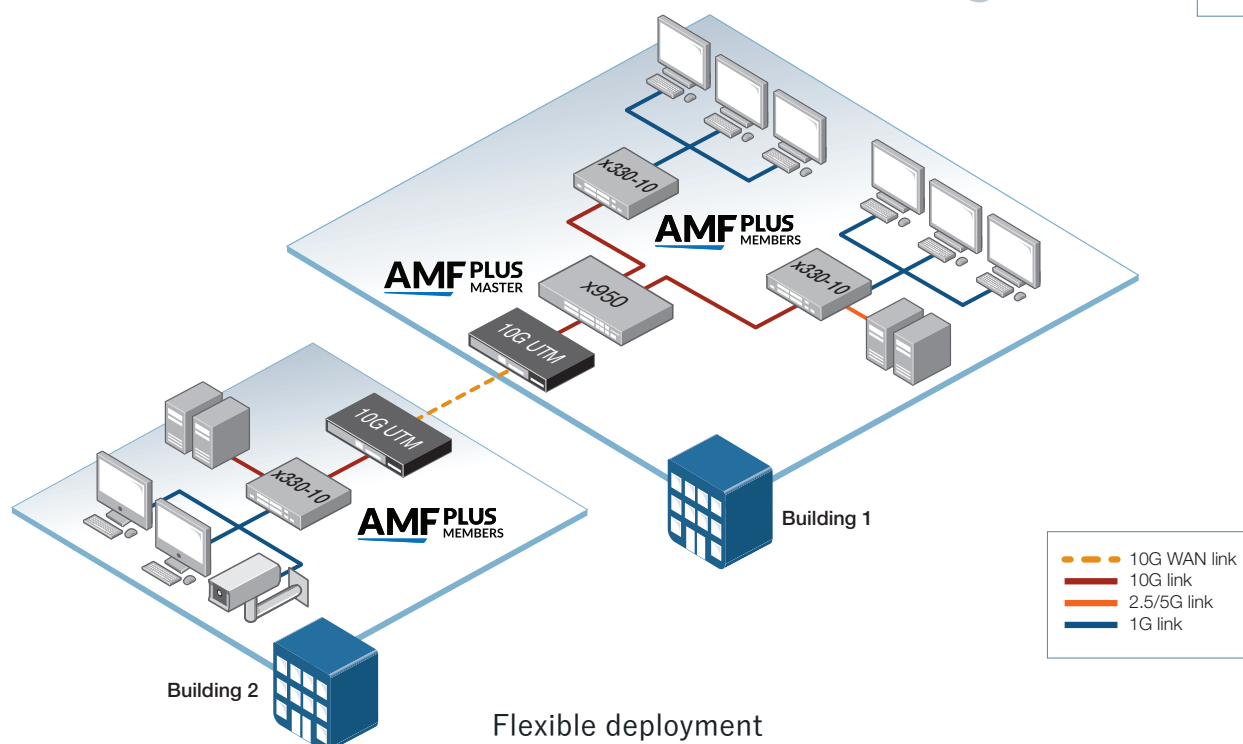
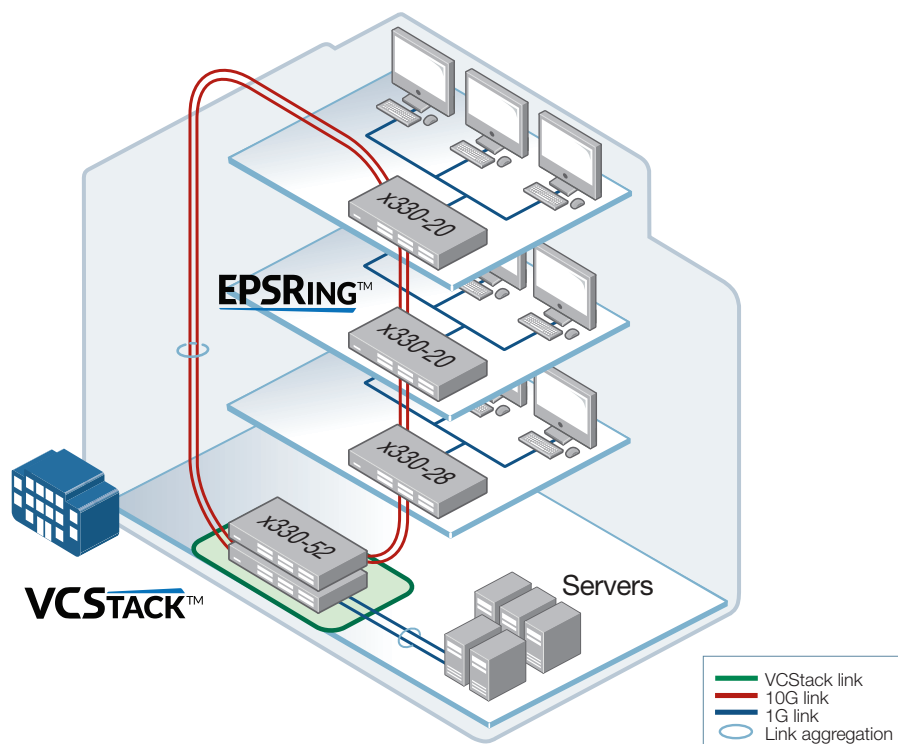
In the Enterprise, it can be used to merge two networks together, without manually reconfiguring the VLAN numbering scheme.

Resilient Small Network Core

Resilient small network core

The x330-20GTX, 28GTX, and 52GTX can form a VcStack of up to 6 switches to provide load-sharing and network redundancy for flexible deployment. The addition of dynamic routing and multicasting capability, makes the x330 Series ideal as a resilient small network core solution.

The x330 series support EPSR master capability with no feature license required. With EPSRing, the x330 series can deliver high-performance resilient ring connectivity with automatic recovery in as little as 50ms.



Flexible deployment

The fanless and compact design of the x330-10GTX makes it ideal for use in office spaces where quiet operation is required. Advanced network control features ensure secure always-on access to online resources and applications.

10 Gigabit uplinks from the x330-10GTX edge switches provides maximum throughput, and business buildings can be connected with secure 10G WAN connectivity for high performance. The flexible x330 series are capable of connecting at 2.5G and 5G Multi-Gigabit speeds, which enables fully flexible deployment that maximizes network and building infrastructure.

SPECIFICATIONS

Performance

- Supports 10KB L2 jumbo frames for 2.5G connections, or 12KB for all other connection speeds (10GTX, 20GTX, 28GTX)
- Supports 10KB L2 jumbo frames for 1000M, 2.5G connections, or 12KB for 5G, 10G connection speeds, does not support jumbo frames for 10/100M connection speeds (52GTX)
- Wire speed multicasting
- 4094 configurable VLANs
- 16K MAC addresses
- 1GB DDR3 SDRAM, 256MB NAND flash memory
- Packet buffer memory: 2MB

Reliability

- Modular AlliedWare Plus operating system
- Temperature and internal voltages. SNMP traps alert network managers in case of any failure
- MTBF (Mean Time Between Failures)
 - x330-10GTX: 550,000 hours
 - x330-20GTX: 440,000 hours
 - x330-28GTX: 390,000 hours
 - x330-52GTX: 220,000 hours

Expandability

- Create a VcStack of up to six x330-20GTX, 28GTX, and 52GTX switches
- Versatile licensing options 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
- The 1/2.5/5/10G Multi-Gigabit port enables flexible uplink options, and support for legacy cabling
- Port speed and duplex configuration can be set manually or by auto-negotiation
- Front-panel SFP+ stacking ports can be configured as 1G/10G Ethernet ports

Diagnostic Tools

- Connectivity Fault Management (CFM) - Continuity Check Protocol (CCP) for use with G.8032 ERPS
- Built-In Self Test (BIST)
- Ping polling and traceroute for IPv4 and IPv6
- Port mirroring
 - No limit on mirrored ports
 - Up to 4 mirror (analyzer) ports for received traffic
 - 1 mirror (analyzer) port for transmitted traffic
- Optical Digital Diagnostic Monitoring (DDM)
- Find-me device locator
- Automatic link flap detection and port shutdown
- Cable fault locator (TDR)
- Link Monitoring
- Uni-Directional Link Detection (UDLD)
- Active Fiber Monitoring detects tampering on optical links

IPv4 Features

- Equal Cost Multi Path (ECMP) routing
- Static unicast and multicast routing for IPv4
- UDP broadcast helper (IP helper)
- Directed broadcast forwarding
- DHCP client, relay and server for IPv4

- Black hole routing
- DNS relay
- Route redistribution (OSPF and RIP)
- Policy-based routing

IPv6 Features

- Device management over IPv6 networks with SNMP, Telnet and SSH
- IPv4 and IPv6 dual stack
- Log to IPv6 hosts with Syslog
- NTP client and server
- DNS client and relay
- DHCPv6 client, relay and server for IPv6
- Static IPv6 unicast and multicast routing
- IPv6 aware storm protection and QoS
- IPv6 hardware ACLs

Management

- Industry-standard CLI with context-sensitive help
- Built-in text editor and powerful CLI scripting engine
- Comprehensive SNMP MIB support for standards-based device management
- Console management port on the front panel for ease of access
- Event-based triggers allow user-defined scripts to be executed upon selected system events
- NETCONF/RESTCONF northbound interface with YANG data modelling
- Eco-friendly mode allows ports and LEDs to be disabled to save power
- OpenFlow v1.3 for software-defined network orchestration
- USB interface allows software release files, configurations and other files to be stored for backup and distribution to other devices
- Front panel 7-segment LED provides at-a-glance status and fault information
- Web-based Graphical User Interface (GUI)
- Allied Telesis Autonomous Management Framework Plus (AMF Plus) enables powerful centralized management and zero-touch device installation and recovery.

Quality of Service

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

Resiliency Features

- EPSRing (Ethernet Protection Switched Rings) with Super Loop Protection (SLP) and enhanced recovery
- STP root guard
- Loop protection: thrash limiting and loop detection

- Dynamic link failover (host attach)
- Control Plane Prioritization (CPP) ensures the CPU always has sufficient bandwidth to process network control traffic
- PVST+ compatibility mode
- BPDU forwarding
- VcStack fast failover minimizes network disruption
- SFP+ stacking ports can be configured as 10G Ethernet ports

Security Features

- MAC address filtering and MAC address lock-down
- Port-based learn limits (intrusion detection)
- Access Control Lists (ACLs) based on layer 3 and 4 headers
- Secure Copy (SCP)
- BPDU protection
- Network Access and Control (NAC) features manage endpoint security
- Dynamic VLAN assignment
- Tri-authentication: MAC-based, web-based and IEEE 802.1x
- DoS attack blocking and virus throttling
- DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI)
- Strong password security and encryption
- Auth fail and guest VLANs
- Secure File Transfer Protocol (SFTP) client
- RADIUS and TACACS+ for Authentication, Authorization and Accounting (AAA)
- Bootloader can be password protected for device security
- Local RADIUS server for user and device authentication
- Configurable ACLs for management traffic
- RADIUS group selection per VLAN or port
- Simple Certificate Enrollment Protocol (SCEP) supports secure management

VLAN Support

- Generic VLAN Registration Protocol (GVRP)
- Private VLANs provide security and port isolation for multiple customers using the same VLAN
- Upstream Forwarding Only (UFO)
- VLAN ID translation
- Voice VLAN

Environmental Specifications

- Operating temperature range: 0°C to 50°C (32°F to 122°F)
- 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: EN55032 class A, FCC class A, VCCI class A, ICES-003 class A
- Immunity: EN55035, EN61000-3-levels 2 (Harmonics), and 3 (Flicker) – AC models only

Safety

- Standards: UL62368-1, CAN/CSA-C22.2 No.62368-1, EN62368-1, EN60825-1, AS/NZS62368.1
- Certification: UL, cUL

Restrictions on Hazardous Substances (RoHS) Compliance

- EU RoHS compliant
- China RoHS compliant

Product Specifications

	10/100/1000T (RJ-45) Copper Ports	1/2.5/5/10 Gigabit Ports	1/10 Gigabit SFP+ Ports	Total Ports	Stacking Ports	Switching Fabric	Forwarding Rate
x330-10GTX	8	1	1	10	-	56Gbps	41.6Mpps
x330-20GTX	16	2	2	20	4	72Gbps	83.38Mpps
x330-28GTX	24	2	2	28	4	128Gbps	95.2Mpps
x330-52GTX	48	2	2	52	4	176Gbps	130.9Mpps

Physical Specifications

	Width	Depth	Height	Mounting	Unpacked Weight	Packaged Weight	Packaged Dimensions
x330-10GTX	263 mm (10.35 in)	179 mm (7.04 in)	38 mm (1.497 in)	Rack-mount	1.60 kg (3.53 lb)	2.97 kg (6.55 lb)	462 x 258 x 107 mm (18.19 x 10.15 x 4.21 in)
x330-20GTX	341 mm (13.42 in)	231 mm (9.09 in)	44 mm (1.73 in)	Rack-mount	3.0 kg (6.61 lb)	4.42 kg (9.74 lb)	530 x 360 x 120 mm (20.86 x 14.17 x 4.72 in)
x330-28GTX	341 mm (13.42 in)	231 mm (9.09 in)	44 mm (1.73 in)	Rack-mount	3.1 kg (6.84 lb)	4.42 kg (9.74 lb)	530 x 360 x 120 mm (20.86 x 14.17 x 4.72 in)
x330-52GTX	441 mm (17.36 in)	323 mm (12.71 in)	44 mm (1.73 in)	Rack-mount	4.5 kg (9.92 lb)	6.20 kg (13.66 lb)	530 x 360 x 120 mm (20.86 x 14.17 x 4.72 in)

Power and Noise Characteristics

	Max Power Consumption	Max Heat Dissipation	Noise
x330-10GTX	21W	71 BTU/h	Fanless
x330-20GTX	28W	963 BTU/h	Fanless
x330-28GTX	33W	114 BTU/h	Fanless
x330-52GTX	52W	181 BTU/h	45.4 db

Latency (microseconds)

	Port Speed				
	100Mbps	1Gbps	2.5Gbps	5Gbps	10Gbps
x330-10GTX	6.22µs	3.68µs	5.63µs	3.49µs	2.12µs
x330-20GTX	7.32µs	3.73µs	7.72µs	5.23µs	2.56µs
x330-28GTX	7.18µs	3.71µs	-	-	1.63µs
x330-52GTX	7.11µs	3.62µs	-	-	1.63µs

STANDARDS & PROTOCOLS

AlliedWare Plus Operating System

Version 5.5.6-1

Authentication

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

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 Standards

- IEEE 802.2 Logical Link Control (LLC)
- IEEE 802.3 Ethernet
 - IEEE 802.3ab1000BASE-T
 - IEEE 802.3ae10 Gigabit Ethernet
 - IEEE 802.3azEnergy Efficient Ethernet (EEE)
 - IEEE 802.3bz2.5GBASE-T and 5GBASE-T ("multi-gigabit")
 - IEEE 802.3u 100BASE-X
 - IEEE 802.3x Flow control - full-duplex operation
 - IEEE 802.3z 1000BASE-X

IPv4 Features

- RFC 768 User Datagram Protocol (UDP)
- RFC 791 Internet Protocol (IP)
- RFC 792 Internet Control Message Protocol (ICMP)
- RFC 793 Transmission Control Protocol (TCP)

- RFC 826 Address Resolution Protocol (ARP)
- RFC 894 Standard for the transmission of IP datagrams over Ethernet networks
- RFC 919 Broadcasting Internet datagrams
- RFC 922 Broadcasting Internet datagrams in the presence of subnets
- RFC 932 Subnetwork addressing scheme
- RFC 950 Internet standard subnetting procedure
- RFC 951 Bootstrap Protocol (BootP)
- RFC 1027 Proxy ARP
- RFC 1035 DNS client
- RFC 1042 Standard for the transmission of IP datagrams over IEEE 802 networks
- RFC 1071 Computing the Internet checksum
- RFC 1122 Internet host requirements
- RFC 1191 Path MTU discovery
- RFC 1256 ICMP router discovery messages
- RFC 1518 An architecture for IP address allocation with CIDR
- RFC 1519 Classless Inter-Domain Routing (CIDR)
- RFC 1542 Clarifications and extensions for BootP
- RFC 1591 Domain Name System (DNS)
- RFC 1812 Requirements for IPv4 routers
- RFC 1918 IP addressing
- RFC 2581 TCP congestion control
- RFC 3021 Using 31-bit prefixes on IPv4 point-to-point links

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	
ANSI/TIA-1057 LLDP-Media Endpoint Detection	
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 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 4502	RMON 2
RFC 4560	Definitions of managed objects for remote ping, traceroute and lookup operations
RFC 5424	The 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 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 4604	Using IGMPv3 and MLDv2 for source-specific multicast
RFC 4607	Source-specific multicast for IP
RFC 7761	Protocol Independent Multicast - Sparse Mode (PIM-SM)

Open Shortest Path First (OSPF)

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

ITU-T G.8032 / Y.1344 Ethernet Ring Protection Switching (ERPS)	
IEEE 802.1ag CFM Continuity Check Protocol (CCP)	
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 802.3adStatic and dynamic link aggregation	
RFC 5798	Virtual Router Redundancy Protocol version 3 (VRRPv3) for IPv4 and IPv6

Routing Information Protocol (RIP)

RFC 1058	Routing Information Protocol (RIP)
RFC 2080	RIPng for IPv6
RFC 2081	RIPng protocol applicability statement
RFC 2082	RIP-2 MD5 authentication
RFC 2453	RIPv2

Security Features

SSH remote login	
SSLv2 and SSLv3	
TACACS+ Accounting, Authentication and Authorization (AAA)	
IEEE 802.1X	Authentication protocols (TLS, TTLS, PEAP and MD5)
IEEE 802.1X	Multi-supplicant authentication
IEEE 802.1X	Port-based network access control
RFC 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 AuthenticationProtocol (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 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 (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 3396	Encoding long options in DHCPv4
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 4954	SMTP service extension for authentication
RFC 5905	Network Time Protocol (NTP) version 4

VLAN Support

Generic VLAN Registration Protocol (GVRP)	
IEEE 802.1adProvider bridges (VLAN stacking, Q-in-Q)	
IEEE 802.1Q Virtual LAN (VLAN) bridges	
IEEE 802.1v VLAN classification by protocol and port	
IEEE 802.3acVLAN tagging	

FEATURE LICENSES

	Description	Includes	Stack Licensing
AT-FL-x330-01	x330 Premium license	■ OSPF¹ (256 routes) ■ PIMv4-SM, DM and SSM v4 ■ RIPng² (256 routes) ■ OSPFv3² (256 routes) ■ PIM-SMv6/SSMv6 ■ MLD v1/v2 ■ VLAN double tagging (Q-in-Q) ■ VLAN translation	■ One license per stack member
AT-FL-x330-8032	ITU-T G.8032 license	■ G.8032 ring protection ■ Ethernet CFM	■ One license per stack
AT-FL-x330-OF13-1YR	OpenFlow license	■ OpenFlow v1.3 for 1 year	■ Not supported on a stack
AT-FL-x330-OF13-5YR	OpenFlow license	■ OpenFlow v1.3 for 5 years	■ Not supported on a stack

¹ The standard switch software supports 1,000 IPv4 Static, 256 RIP, and 64 OSPF routes
² The standard switch software supports 1,000 IPv6 Static, and no RIPng or OSPFv3 routes

ORDERING INFORMATION

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

AT-x330-10GTX-xx	8-port 10/100/1000T switch, with 1 x 1/2.5/5/10G copper port, 1 x SFP/SFP+ port, and 1 fixed PSU
AT-x330-20GTX-xx	16-port 10/100/1000T switch, with 2 x 1/2.5/5/10G copper ports, 2 x SFP/SFP+ ports, and 1 fixed PSU
AT-x330-28GTX-xx	24-port 10/100/1000T switch, with 2 x 1/2.5/5/10G copper ports, 2 x SFP/SFP+ ports, and 1 fixed PSU
AT-x330-52GTX-xx	48-port 10/100/1000T switch, with 2 x 1/2.5/5/10G copper ports, 2 x SFP/SFP+ ports, and 1 fixed PSU
AT-RKMT-J05	Rack Mount Tray for x330-10GTX
AT-RKMT-J13	Rack Mount Kit for x330-20GTX and 28GTX
AT-RKMT-SL01	Sliding rackmount kit for x330-52GTX
AT-BRKT-J23	Wall mount kit for x330-10GTX
AT-BRKT-J24	Wall mount kit for 330-20GTX and 28GTX
AT-VT-Kit3	Management Cable (USB to Serial Console)
AT-STND-J03	Stand-kit for 330-20GTX and 28GTX

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

Accessories

10GbE SFP+ Modules	
Any 10G SFP+ module or cable can be used for stacking with the front panel 10G ports	
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-SP10TM	1G/2.5G/5G/10G, 100 m copper, TAA ³
AT-SP10BD10/I-12	10 GbE Bi-Di (1270 nm Tx, 1330 nm Rx) fiber up to 10 km industrial temperature, TAA ³
AT-SP10BD10/I-13	10 GbE Bi-Di (1330 nm Tx, 1270 nm Rx) fiber up to 10 km industrial temperature, TAA ³
AT-SP10BD20/I-12	10 GbE Bi-Di (1270 nm Tx, 1330 nm Rx) fiber up to 20 km, TAA ³
AT-SP10BD20/I-13	10 GbE Bi-Di (1330 nm Tx, 1270 nm Rx) fiber up to 20 km, TAA ³
AT-SP10BD40/I-12	10 GbE Bi-Di (1270 nm Tx, 1330 nm Rx) fiber up to 40 km industrial temperature, TAA ³
AT-SP10BD40/I-13	10 GbE Bi-Di (1330 nm Tx, 1270 nm Rx) fiber up to 40 km industrial temperature, TAA ³
AT-SP10ER40a/I	10GER 1310 nm long-haul, 40 km with SMF industrial temperature
10GbE SFP+ Cables	
AT-SP10TW1	1 meter SFP+ direct attach cable
AT-SP10TW3	3 meter SFP+ direct attach cable

1000Mbps SFP Modules	
AT-SPTXc	100 m, 10/100/1000T SFP, RJ-45
AT-SPSX	1000SX GbE multi-mode 850 nm fiber up to 550 m
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	1000BX GbE Bi-Di (1310 nm Tx, 1490 nm Rx) fiber up to 20 km industrial temperature
AT-SPBD20-14/I	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
AT-SPZX80	1000ZX GbE single-mode 1550 nm fiber up to 80 km

³ Trade Act Agreement compliant (TAA)