

Intelligent Gigabit Layer 3+ Switches - x600-24 and 48 Series



The x600 Layer 3+ switches offer an impressive set of features in a high-value package.

Network Access Control (NAC) assures **security**, giving you unprecedented control over user access to the network, in order to mitigate threats to network infrastructure. The x600 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 authentication or offer remediation.

The x600 family is **scalable**, with an extensive range of port-density and uplink-connectivity options. The choice of 24-port and 48-port versions, coupled with the ability to stack up to 4 units, means that this one switch family can connect anything from a small workgroup right up to a large business. The choice of 1 Gigabit or 10 Gigabit uplink ports allows you to tailor the uplink bandwidth to suit your network application.

VCStack™ provides excellent **resiliency** by allowing you to create a single "virtual chassis" from up to four physical switches. If one stacked switch fails, traffic routes seamlessly to another, preventing network disruption. VCStack delivers a resilient core at a fraction of the cost of a full chassis-based system, and it allows you to manage the stack as a single node on the network, greatly simplifying your management tasks.

Enjoy **high performance** - stacking bandwidth is provided separately from the 10-gig uplink ports - enabling a 4-unit stack to have a massive 160 Gigabits of uplink bandwidth with no reduction in stacking backplane throughput. Plus, the AlliedWare Plus™ Operating System's rich Layer 3 feature set and industry-standard CLI provide you with even greater AlliedWare Plus™ robustness and ease of management.

Key Features

Secure - Advanced security features protect your network - from the edge to the core. Network Access Control (NAC) gives unprecedented control over user access to your network

Scalable - Enjoy the choice of 24 port and 48 port options, coupled with the ability to stack up to 4 units, as well as an extensive range of port density and uplink connectivity options.

Resilient - VCStack provides fast failover for uninterrupted network service. Sophisticated high availability features ensure traffic flow continues even during outages.

High-performing - Non-blocking architecture and superior QoS ensure wire-speed delivery of all your critical IPv4 and IPv6 traffic.

Easy to manage - The industry standard CLI reduces training needs, and each VCStack appears as one virtual chassis with a single IP address to simplify management. 'Network in a Box' simplifies administration. Plus, the GUI allows easy management control.

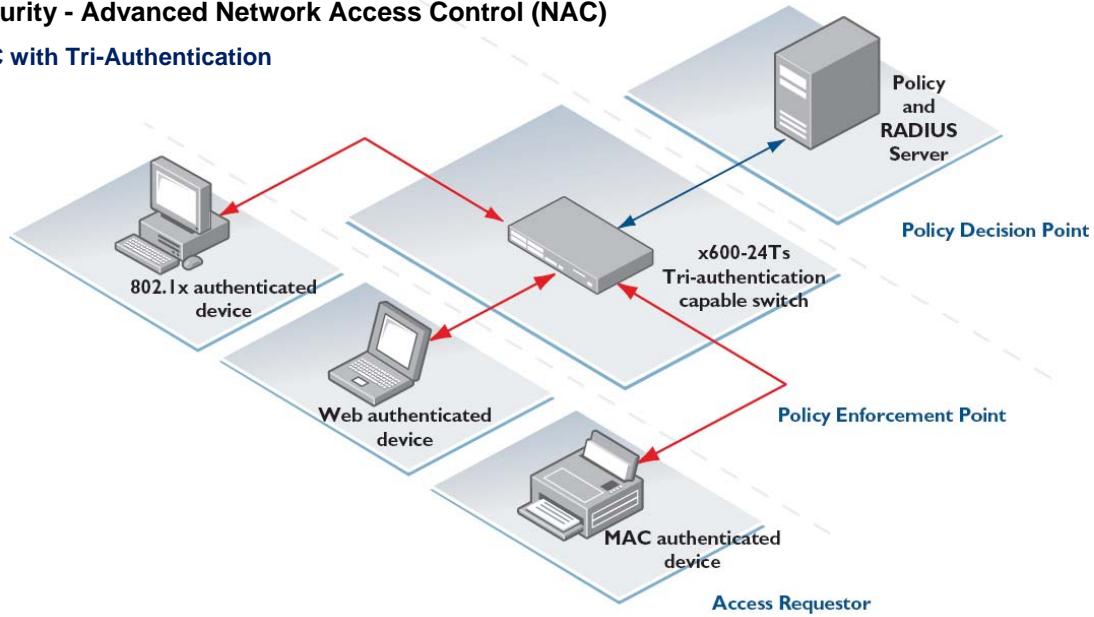


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Applications

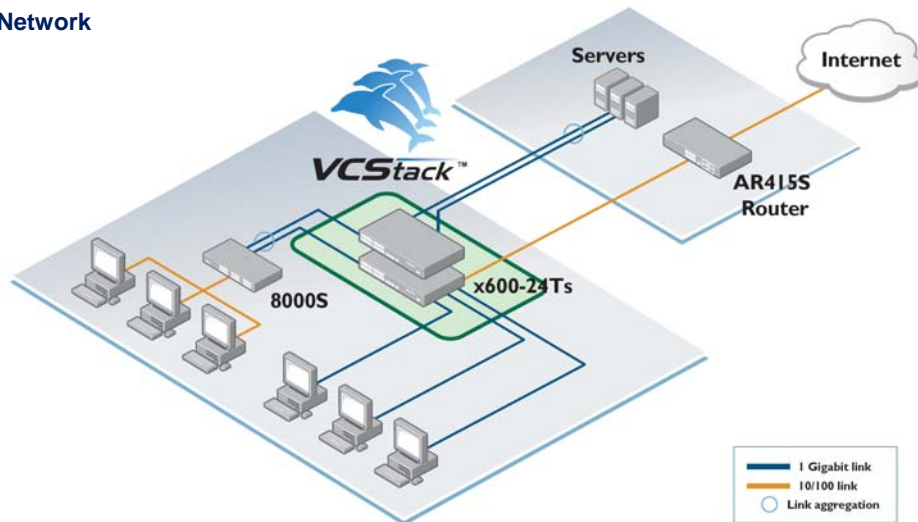
Security - Advanced Network Access Control (NAC)

NAC with Tri-Authentication

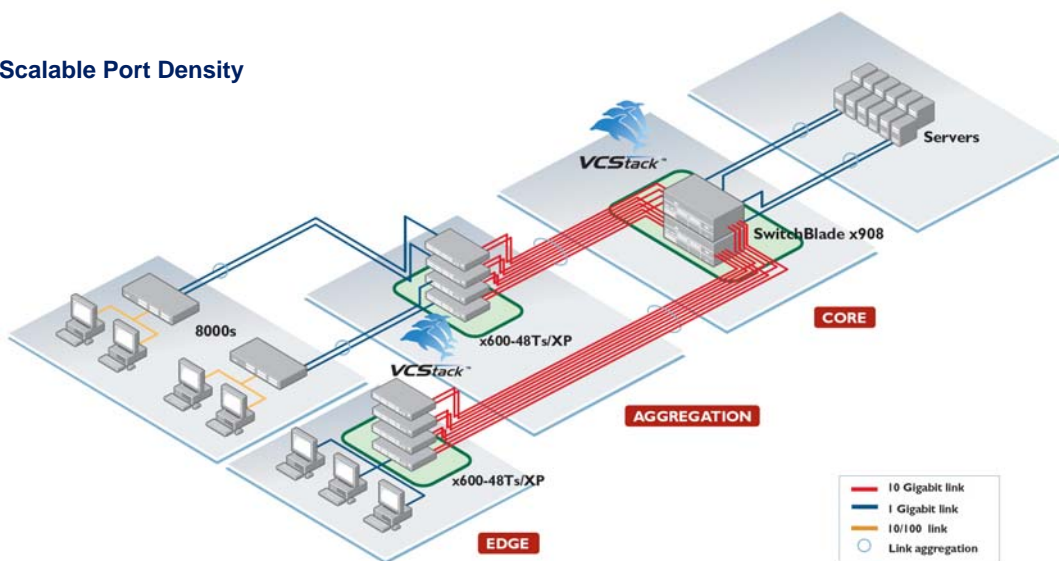


Resilient and Scalable Networking with Virtual Chassis Stacking (VCSStack)

VCSStack - Resilient Network



VCSStack - Scalable Port Density



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Specifications

The x600 24 and 48 Series:

x600-24Ts

24 x 10/100/1000BASE-T (RJ-45) copper ports
4 x 1000BASE-X SFP combo ports

x600-24Ts/XP

24 x 10/100/1000BASE-T (RJ-45) copper ports
4 x 1000BASE-X SFP combo ports
2 x XFP ports

x600-48Ts

44 x 10/100/1000BASE-T (RJ-45) copper ports
4 x 1000BASE-X SFP ports

x600-48Ts/XP

44 x 10/100/1000BASE-T (RJ-45) copper ports
4 x 1000BASE-X SFP ports
2 x XFP ports

Performance

- Switching Fabric:
 - x600-24Ts - 96 Gbps
 - x600-24Ts/XP - 136 Gbps
 - x600-48Ts - 144 Gbps
 - x600-48Ts/XP - 184 Gbps
- Forwarding Rate:
 - x600-24Ts - 35.7Mpps
 - x600-24Ts/XP - 65.5Mpps
 - x600-48Ts - 71.4Mpps
 - x600-48Ts/XP - 101.2Mpps

- 48 Gbps of stacking bandwidth
- Extensive wire-speed traffic classification for ACLs and QoS
- Supports 9KB Jumbo frame size for data center and server aggregation applications
- Wire-speed multicasting
- Up to 16K MAC addresses
- 4K VLANs
- 512MB DDR SDRAM
- 64MB Flash Memory
- Packet Buffer Memory
 - x600-24Ts - 2MB
 - x600-24Ts/XP - 2MB
 - x600-48Ts - 4MB
 - x600-48Ts/XP - 4MB

Reliability

- MTBF
 - x600-24Ts - 130,000 hours
 - x600-24Ts/XP - 130,000 hours
 - x600-48Ts - 80,000 hours
 - x600-48Ts/XP - 80,000 hours
- Modular AlliedWare Plus operating system
- Redundant Power Supply available to load share with internal power supply providing uninterrupted power and extra reliability
- Full environmental monitoring of PSUs, fans, temperature and internal voltages. SNMP traps alert network managers in case of any failure

Power Characteristics

- AC Voltage: 100 to 240V (+/-10% auto ranging)
- Frequency: 47 to 63Hz

Power Consumption

- x600-24Ts**
87 Watts (297 BTU/hr)
- x600-24Ts/XP**
87 Watts (297 BTU/hr)
- x600-48Ts**
112 Watts (382 BTU/hr)
- x600-48Ts/XP**
112 Watts (382 BTU/hr)

Environmental Specifications

- Operating Temperature Range: 0°C to 40°C (32°F to 104°F). Derated by 1°C per 305 Meters (1000ft)
- 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 (10,000ft)

Expandability

- 1 expansion bay for AT-StackXG module supporting 2 high speed 24Gbps stacking ports
- IPv6 routing option

Flexibility and compatibility

- Gigabit SFP ports will support any combination of 1000BASE-T or 1000BASE-X SFPs, 1000BASE-SX, 1000BASE-LX, or 1000BASE-ZX SFPs

Resiliency

- STP, RSTP, MSTP (802.1s)
- Up to 31Link Aggregation (802.3ad) groups
- Up to 150 VRRP groups
- Up to 16 EPSR domains
- Dynamic Link Failover
- Thrash Limiting
- Loop Detection
- VCStack

Routing

- Up to 5K RIP routes
- Up to 15K OSPF routes (with license)
- Up to 5K BGP routes (with license)
- Up to 5K RIPng routes (with license)
- Route Maps

VLAN support

- Supports 4096 VLANs
- VLAN Double Tagging

Security

- Private VLANs, providing security and port isolation of multiple customers using the same VLAN
- Dynamic VLAN assignment
- NAC
- 802.1x support
- MAC-based authentication
- Web-based authentication
- Multi-suplicant
- BPDU Protection
- STP Root Guard
- DOS attack blocking
- ACLs
- Local RADIUS server

Quality of Service

- Policy based QoS features
- Highly configurable traffic classification
- Extensive remarking capabilities, to fit in with any network's QoS scheme
- Control plane traffic prioritization
- Mixed scheduling, to support complex traffic queuing requirements
- 8 QoS queues per port
- Two-rate three-color (green, yellow, red) bandwidth metering, with burst sizes for improved TCP-IP bandwidth limiting performance and bandwidth resolution down to 64Kbps
- Low switching latency essential for Voice over IP (VoIP) and real-time streaming media applications

Management

- The GUI simplifies network performance monitoring and network event trouble shooting.
- The AlliedWare Plus™ Operating System's rich Layer 3 feature set and industry-standard CLI provide you with even greater robustness and ease of management.
- Console management port on the front panel for ease of access
- An SD memory card socket on the front panel, allowing software release files, configurations and other files to be stored for backup and distribution to other switches
- Port mirroring
- SSH and SNMPv3 for secure management
- RADIUS Authentication
- RMON (4 groups)
- Broadcast Forwarding to allow the switch broadcast packets to reach across subnets.
- IP Helper enables broadcasts from clients in different subnets to be relayed to their destination, instead of being blocked at the switch.

Physical Dimensions

Model	Height	Width	Depth	Mounting
x600-24	44mm	440mm	305mm	1RU rack mount
x600-48	44mm	440mm	305mm	1RU rack mount

Weights

Product	Unpackaged	Packaged
x600-24Ts	4.50 kg	6.10 kg
x600-24Ts/XP	4.60 kg	6.20 kg
x600-48Ts	4.90 kg	6.50 kg
x600-48Ts/XP	4.90 kg	6.50 kg

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
Certification: UL, cUL, TUV

Restrictions on Hazardous Substances (RoHS) Compliance

EU RoHS Compliant

Country of Origin

China



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Standards and Protocols

AlliedWare Plus™ Operating System Version 5.3.1

Authentication

RFC 1321 MD5 Message-Digest Algorithm
RFC 1828 IP Authentication using Keyed MD5

Border Gateway Protocol (BGP)

BGP Dynamic Capability
BGP Graceful Restart
BGP Outbound Route Filtering
Extended Communities Attribute
RFC 1771 Border Gateway Protocol 4 (BGP-4)
RFC 1772 Application of the Border Gateway Protocol in the Internet
RFC 1997 BGP Communities Attribute
RFC 2385 Protection of BGP Sessions via the TCP MD5 Signature Option
RFC 2439 BGP Route Flap Damping
RFC 2796 BGP Route Reflection - An Alternative to Full Mesh IBGP
RFC 2858 Multiprotocol Extensions for BGP-4
RFC 2918 Route Refresh Capability for BGP-4
RFC 3065 Autonomous System Confederations for BGP
RFC 3107 Carrying Label Information in BGP-4
RFC 3392 Capabilities Advertisement with BGP-4

Diagnostic Tools

BIST (Built-In Self Test)
Ping Polling
Trace Route

Encryption

FIPS 180-1 Secure Hash Standard (SHA-1)
FIPS 186 Digital Signature Standard (RSA)
FIPS 46-3 Data Encryption Standard (DES & 3DES)

Ethernet

IEEE 802.2 Logical Link Control
IEEE 802.3 Ethernet CSMA/CD
IEEE 802.3ab 1000BASE-T
IEEE 802.3ad Link Aggregation (static & LACP-based dynamic)
IEEE 802.3ae 10 Gigabit Ethernet
IEEE 802.3u 100BASE-T
IEEE 802.3x Flow Control - Full Duplex Operation
IEEE 802.3z Gigabit Ethernet

General Routing

Broadcast Forwarding
ECMP Equal Cost Multi Path routing
UDP Broadcast helper
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 903 Reverse ARP
RFC 919 Broadcasting Internet Datagrams
RFC 922 Broadcasting Internet Datagrams in the presence of subnets
RFC 925 Multi-LAN ARP
RFC 932 Subnetwork addressing scheme
RFC 950 Internet Standard Subnetting Procedure
RFC 951 Bootstrap Protocol (BootP) relay and server
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 & Extensions for the Bootstrap Protocol
RFC 1700 Assigned Numbers
RFC 1812 Requirements for IPv4 Routers
RFC 1918 IP Addressing
RFC 2131 DHCP for IPv4
RFC 2132 DHCP Options and BOOTP Vendor Extensions
RFC 2581 TCP Congestion Control

RFC 3046 DHCP Relay Agent Information Option (DHCP Option 82)
RFC 3232 Assigned Numbers
RFC 3993 Subscriber-ID Suboption for DHCP Relay Agent Option

IPv6 Features

6to4 Tunnelling
IPv4 and IPv6 Dual Stack
IPv6 Management via Ping, TraceRoute, Telnet and SSH
Static Unicast Routes for IPv6
RFC 1886 DNS Extensions to support IPv6
RFC 1887 An Architecture for IPv6 Unicast Address Allocation
RFC 1981 Path MTU Discovery for IPv6
RFC 2460 IPv6 specification
RFC 2461 Neighbour Discovery for IPv6
RFC 2462 IPv6 Stateless Address Autoconfiguration
RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
RFC 2526 Reserved IPv6 Subnet Anycast Addresses
RFC 2553 Basic Socket Interface Extensions for IPv6
RFC 2711 IPv6 Router Alert Option
RFC 2851 Textual Conversions for Internet Work Addresses
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
RFC 3484 Default Address Selection for IPv6
RFC 3513 IPv6 Addressing Architecture
RFC 3587 IPv6 Global Unicast Address Format
RFC 4443 Internet Control Message Protocol (ICMPv6)

Management

AT Enterprise MIB
Control Plane Prioritisation
SNMP Traps
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 1493 Bridge MIB
RFC 2011 SNMPv2 MIB for IP using SMIv2
RFC 2012 SNMPv2 MIB for TCP using SMIv2
RFC 2013 SNMPv2 MIB for UDP using SMIv2
RFC 2096 IP Forwarding Table MIB
RFC 2574 User-based Security Model (USM) for SNMPv3
RFC 2575 View-based Access Control Model (VACM) for SNMP
RFC 2674 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions (VLAN)
RFC 2741 Agent Extensibility (AgentX) Protocol
RFC 2790 Host MIB
RFC 2819 RMON MIB
RFC 2863 Interfaces Group MIB
RFC 3164 Syslog Protocol
RFC 3412 Message Processing and Dispatching for the SNMP
RFC 3413 SNMP Applications
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 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

Bootstrap Router for PIM-SM
IGMP Proxy
IGMP Snooping
MLD Snooping (v1 and v2)
RFC 1112 Host extensions for IP multicasting
RFC 2236 Internet Group Management Protocol v2 (IGMPv2)
RFC 2362 PIM-SM
RFC 2715 Interoperability Rules for Multicast Routing Protocols
RFC 3376 IGMPv3
RFC 3973 PIM-DM
RFC 4541 IGMP & MLD snooping switches



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Open Shortest Path First (OSPF)

Graceful OSPF Restart
 OSPF Link-local Signaling
 OSPF MD5 Authentication
 OSPF Restart Signaling
 OSPF TE Extensions
 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 3101 OSPF Not-So-Stubby Area (NSSA) Option
 RFC 3509 Alternative Implementations of OSPF Area Border Routers

Quality of Service

ACLs Access Control Lists
 IEEE 802.1p Priority Tagging
 RFC 2211 Specification of the Controlled-Load Network Element Service
 RFC 2474 DiffServ Precedence for 8 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

Dynamic Link Failover
 Ethernet Protection Switched Rings (EPSR)
 Loop Protection - Loop Detection
 Loop Protection - Thrash Limiting
 STP Root Guard
 IEEE 802.1D Spanning Tree Protocol (STP) - MAC Bridges
 IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
 IEEE 802.1t - 2001 802.1D maintenance
 IEEE 802.1w - 2001 Rapid Spanning Tree Protocol (RSTP)
 RFC 3768 Virtual Router Redundancy Protocol (VRRP)

Routing Protocols

Route Maps
 Route Redistribution (OSPF, BGP, 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

BPDU Protection

Dynamic VLAN Assignment

Guest VLAN support (IEEE 802.1x)
 IEEE 802.1x Port Based Network Access Control
 IEEE 802.1x Authentication protocols (TLS, TTLS, PEAP & MD5)
 IEEE 802.1x Multi Supplicant authentication MAC-based authentication
 Port Security
 SSH Remote Login
 SSLv2
 SSLv3
 Web-based Authentication
 RFC 2246 TLS Protocol v1.0
 RFC 2865 RADIUS
 RFC 2866 RADIUS Accounting
 RFC 2868 RADIUS Attributes for Tunnel Protocol Support
 RFC 3546 Transport Layer Security (TLS) Extensions
 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

Services

SCP Secure Copy
 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 1305 NTPv3
 RFC 1350 Trivial File Transfer Protocol (TFTP)
 RFC 1985 SMTP Service Extension
 RFC 2049 MIME
 RFC 2554 SMTP Service Extension for Authentication
 RFC 2616 Hypertext Transfer Protocol - HTTP/1.1
 RFC 2821 Simple Mail Transfer Protocol (SMTP)
 RFC 2822 Internet Message Format

User Interface Features

Event-based Triggers
 Graphical User Interface (GUI)
 Industry-standard CLI with built-in Help
 Powerful CLI scripting tool

VLAN Support

Private VLANs
 IEEE 802.1ad VLAN double tagging (Q-in-Q)
 IEEE 802.1Q Virtual LANs
 IEEE 802.1v VLAN classification by protocol & port
 IEEE 802.3ac VLAN tagging

Ordering Information

Product	Description
AT-x600-24Ts	Intelligent Gigabit Layer 3+ Switch 24 x 10/100/1000BASE-T (RJ-45) copper ports 4 x 1000BASE-X SFP combo ports
AT-x600-24Ts/XP	Intelligent Gigabit Layer 3+ Switch 24 x 10/100/1000BASE-T (RJ-45) copper ports 4 x 1000BASE-X SFP combo ports 2 x XFP ports
AT-x600-48Ts	Intelligent Gigabit Layer 3+ Switch 44 x 10/100/1000BASE-T (RJ-45) copper ports 4 x 1000BASE-X SFP ports
AT-x600-48Ts/XP	Intelligent Gigabit Layer 3+ Switch 44 x 10/100/1000BASE-T (RJ-45) copper ports 4 x 1000BASE-X SFP ports 2 x XFP ports

SFP Modules

Module	Description
AT-SPTX	10/100/1000BASE-T 100m Copper
AT-SPSX	1000BASE-SX GbE multi-mode 850nm fiber
AT-SPLX10	1000BASE-LX GbE single-mode 1310nm fiber up to 10km
AT-SPLX40	1000BASE-LX GbE single-mode 1310nm fiber up to 40km
AT-SPZX80	1000BASE-ZX GbE single-mode 1550nm fiber up to 80km
AT-SPBD10-13	1000BASE-BX Bi-Di (1310nm Tx, 1490nm Rx) fiber up to 10km
AT-SPBD10-14	1000BASE-BX Bi-Di (1490nm Tx, 1310nm Rx) fiber up to 10km
AT-SPEX	1000BASE-SX multi-mode fiber extender up to 2km

10GbE XFP Modules

Module	Description	Specifics
AT-XPSR	10GBASE-SR	850nm Short-haul, 300m with MMF
AT-XPLR	10GBASE-LR	1310nm Medium-haul, 10km with SMF
AT-XPER40	10GBASE-ER	1550nm Long-haul, 40km with SMF

Stacking accessories

Module	Specifics
AT-StackXG-00	Stacking module with one AT-StackXG/0.5-00 cable included.
AT-StackXG/0.5-00	0.5 meter cable for stacking
AT-StackXG/1-00	1 meter cable for stacking

Redundant Power Supplies

Module	Specifics
AT-RPS3204	Chassis for up to 4 redundant power supplies (Chassis includes one power supply and one cable)
AT-PWR3202	Additional 200w redundant power supply with cable

Feature licenses

Name	Description	Includes
AT-FL-X600-01	x600 Advanced Layer 3 license	<ul style="list-style-type: none"> • OSPF¹ • PIM-SM • PIM-DM • BGP4 • VLAN Double Tagging (Q in Q)
AT-FL-X600-02	x600 IPv6 Pack	<ul style="list-style-type: none"> • IPv6 Management • IPv6 Static Routes • IPv6 Unicast Forwarding • RIPng • MLD Snooping

¹ The standard switch software supports 64 OSPF routes. The Advanced Layer 3 license supports 15K OSPF routes.



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