SwitchBlade® x8100 Series

With CFC400 Controller

Next generation intelligent Layer 3+ chassis switches

The Allied Telesis SwitchBlade x8100 Series of advanced Layer 3+ chassis switches are available in 6 and 12 slot models. The CFC400 based system delivers high availability, wirespeed performance, and a high port count. Advanced features provide the ideal solution for the modern enterprise network, where resiliency, reliability and high performance are the key requirements.

CFC400 | AlliedWare Plus™ OPERATING SYSTEM | R6 READY

Overview

SwitchBlade x8100 Series switches provide a high performing scalable solution, with an extensive range of connectivity options. Dual CFC400 control cards provide resiliency. Gigabit and 10 Gigabit line card options ensure a system capable of meeting the requirements of today's networks, and the flexibility to expand when required.

High performing

Dual CFC400 control cards provide 80Gbps non-blocking throughput to each line card slot, providing maximum performance and wirespeed delivery of critical IPv4 and IPv6 traffic.

Enjoy effortless maximum availability of premium services and applications, with industry-leading Quality of Service (QoS) features managing network responsiveness.

Powerful network management

The Allied Telesis Management Framework (AMF) meets the increased management requirements of modern converged networks, automating many everyday tasks including configuration management. AMF has powerful centralized management features that manage a complete network as a single virtual device. The network can be expanded with plug-and-play simplicity, and network node recovery is fully zero-touch. AMF Guestnode allows third party devices, such as IP phones and security cameras, to be part of an AMF network.

Resilient

SwitchBlade x8100 Series switches operate with one AC or DC system PSU. Installing a second load-sharing PSU provides ultimate redundancy. Installing two Power over Ethernet (PoE) PSUs maximizes power available to connected devices.

The active/active control cards interconnect through redundant paths to the line cards over a passive backplane. Control cards, line cards, power supplies and fan tray are all hot-swappable, to minimize downtime when performing maintenance or upgrading the system.

To provide a high-speed solution where recovery occurs within as little as 50ms, SwitchBlade x8100 Series switches can be deployed in a ring-based topology, with the protected ring running at up to 10Gbps. This high performing resilient design for distributed networks is made possible with Allied Telesis EPSRing™ (Ethernet Protection Switched Ring) technology.

Scalable

The choice of 6 and 12-slot chassis versions provides a powerful solution for networks of all sizes, and both versions share the same fully featured AlliedWare Plus™ Operating System.

To expand the SwitchBlade x8100 system to encompass large networks, including stacking two chassis with VCStack Plus™, the CFC400 control cards can be replaced with CFC960 control cards.

There are currently three 24-port Gigabit line cards available: copper, PoE+ and fiber (SFP).
The 40-port Gigabit copper line card maximizes port density, providing up to 400 Gigabit copper ports in a single 7RU SwitchBlade x8112 chassis, or 200 Gigabit copper ports in a single 4RU SwitchBlade x8106 chassis.

The 6-port 10 Gigabit (SFP+) line card provides the SwitchBlade x8100 Series with high-speed backbone connectivity.

Power over Ethernet Plus (PoE+)

SwitchBlade x8100 Series switches support IEEE 802.3at PoE+ (30W). The greater power supplied by PoE+ supports devices such as pan, tilt and zoom IP surveillance cameras, IP video phones, and wireless access points.

PoE plus™

Environmentally friendly

SwitchBlade x8100 Series switches are designed to reduce power consumption and minimize hazardous waste. Features include high efficiency power supplies and low power chip sets. An ECO-Switch button on the front panel allows additional power conservation, by turning off all diagnostic LED indicators when they are not required.

eco friendly

New Features

- AMF Guestnode
- AMF Starter
- Active Fiber Monitoring
- Policy-based Routing
- Microsoft Network Load Balancing (MS NLB) support

AMF™ EPSRing™ ACTIVE Fiber Monitoring™

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. Powerful features like centralized management, auto-backup, auto-upgrade, auto-provisioning and auto-recovery enable plug-and-play networking and zero-touch management.
- Any SwitchBlade x8100 Series switch can operate as the AMF network master, storing firmware and configuration backups for all other network nodes. The AMF master enables auto-provisioning and auto-upgrade by providing appropriate files to new network members. New network devices can be pre-provisioned making installation easy because no on-site configuration is required.
- AMF Guestnode allows Allied Telesis wireless access points and further switching products, as well as third party devices such as IP phones and security cameras, to be part of an AMF network
- The CFC400 can manage AMF networks of up to 80 nodes, which can be located locally or across WAN links.

EPSRing™ (Ethernet Protection Switched Ring)

- EPSRing and 10 Gigabit Ethernet allow several switches to form high-speed protected rings capable of recovery within as little as 50ms. This feature is perfect for high performance and high availability at the core of enterprise or provider access networks.
- Superloop Protection enables a link between two EPSR nodes to be in separate EPSR domains, improving redundancy and network fault resiliency.

Access Control Lists (ACLs)

- AlliedWare Plus™ delivers industry-standard access control functionality with ACLs. ACLs filter network traffic to control whether routed 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 otherwise influenced.

Industry-leading Quality of Service (QoS)

- Comprehensive low-latency wirespeed QoS provides flow-based traffic management with full classification, prioritization, traffic shaping and min/max bandwidth profiles. Enjoy boosted network performance and guaranteed delivery of business-critical Ethernet services and applications. Time-critical services such as voice and video take precedence over non-essential services such as file downloads, maintaining responsiveness of enterprise applications.

Power over Ethernet Plus (PoE+)

- With PoE, a separate power connection to media end points such as IP phones and wireless access points is not necessary. PoE+ provides even greater flexibility, providing the capability to connect devices requiring more power (up to 30 Watts)—for example, tilt and zoom security cameras.

Ease of management

- The AlliedWare Plus operating system incorporates an industry standard CLI, facilitating intuitive manageability.
- Configuration tasks can be automated since commands may be used in scripts. Triggers can also be utilized. These provide a powerful mechanism for automatic and timed management, by automating command execution in response to specific events.
- With three distinct user modes, the CLI is very secure, and the use of encrypted remote login sessions ensures CLI access is not compromised.
- A web-based Graphical User Interface (GUI) simplifies management and monitoring

AlliedWare Plus licensing unlocks new features

- With AlliedWare Plus, a single license password is all that is necessary to unlock additional feature bundles that ship with the switch. The feature bundles provide a very simple upgrade path.

Dynamic Host Configuration Protocol (DHCPv6)

- DHCPv6 is used to dynamically assign IPv6 addresses to hosts from a central location. Acting as DHCPv6 client enables the switch to receive an IPv6 address, and acting as server enables the switch to dynamically allocate IPv6 addresses to hosts. The DHCPv6 server and client both support the Prefix Delegation feature which allocates a whole IPv6 subnet to a DHCP client. The client, in turn, can allocate addresses from this subnet to the hosts that are connected to it.

Virtual Router Redundancy Protocol (VRRPv3)

- VRRPv3 is a protocol for providing device redundancy, by connecting redundant WAN gateway routers or server access switches in an IPv6 network. It allows a backup router or switch to automatically take over if the primary (master) router or switch fails.

sFlow

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

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.

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.

Tri-authentication

- Authentication options on SwitchBlade x8100 switches also include alternatives to IEEE 802.1x port-based authentication, such as Web authentication to enable guest access, and MAC authentication for end points that do not have an IEEE 802.1x supplicant. All three authentication methods—IEEE 802.1x, MAC-based and Web-based—can be enabled simultaneously on the same port. This is called tri-authentication.

Link aggregation

- Link aggregation allows a number of individual switch ports to be combined, forming a single logical connection of higher bandwidth. This provides a higher performance link, and redundancy for a reliable and robust network. The SwitchBlade x8100 Series allow link aggregation groups to be created across line cards to maximize link resiliency.

Microsoft Network Load Balancing (MS NLB) Support

- Support for MS NLB, which clusters identical servers together for increased performance through load-sharing.

Key Solutions

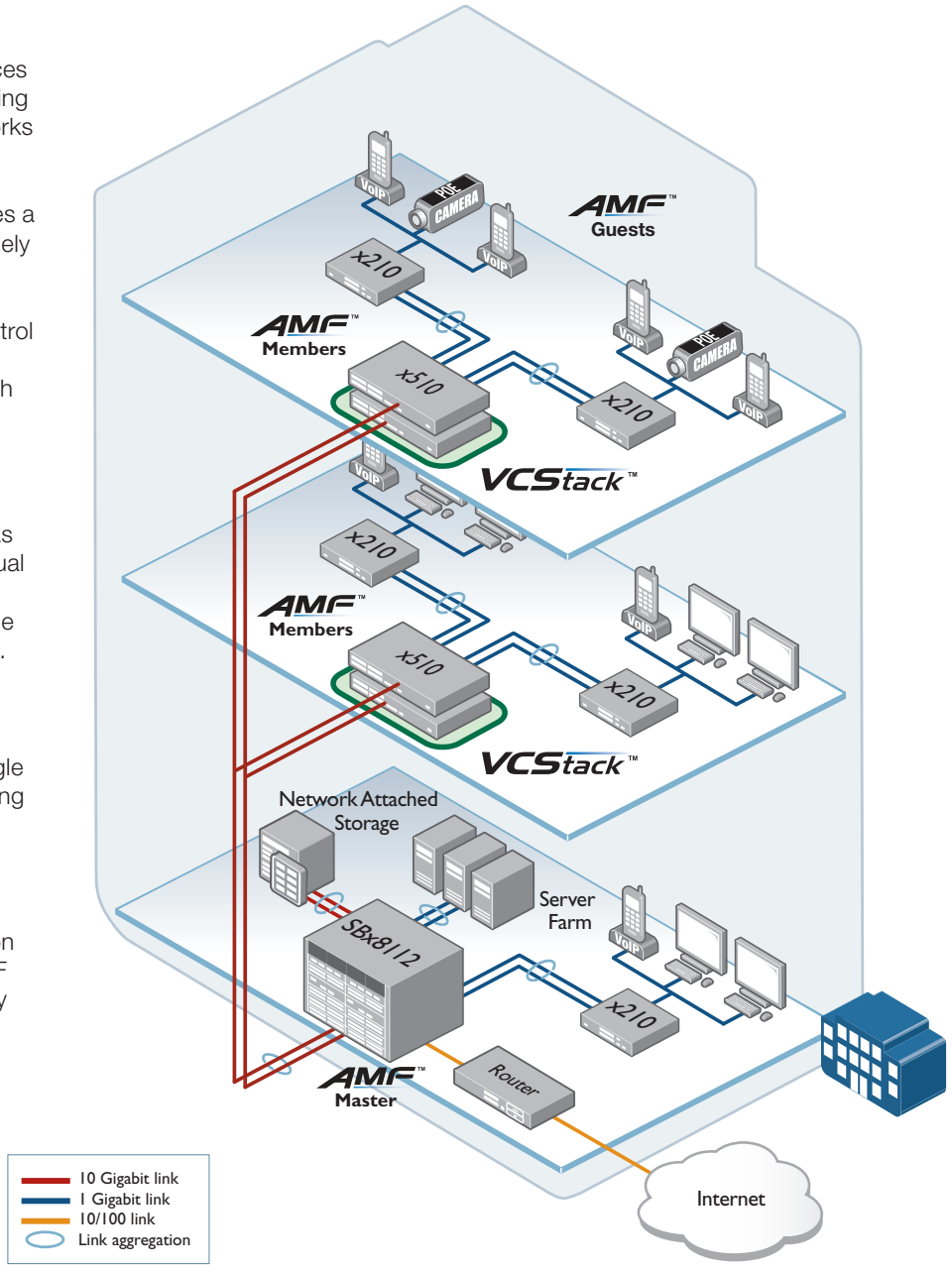
Network core resiliency

The convergence of network services in the enterprise has led to increasing demand for high performing networks with minimal downtime. In this solution, a SwitchBlade x8112 with dual CFC400 control cards provides a powerful network core with extremely high reliability. PSU redundancy ensures maximum uptime, while hot-swappable PSUs, fan tray, control and line cards allow for system maintenance or reconfiguration with no network interruption.

Real-time applications like VoIP and streaming video are assured premium service on the network, as near hitless failover between the dual control cards on the SwitchBlade x8112 means there is no perceptible disruption in the case of a problem.

Link aggregation across line cards to servers, network storage, and distribution switches leaves no single point of failure in this high performing network core.

AMF allows the whole network to be managed as a single virtual entity, with plug-and-play expansion and zero-touch recovery. With AMF Guestnode, IP phones and security cameras are also part of the AMF network.

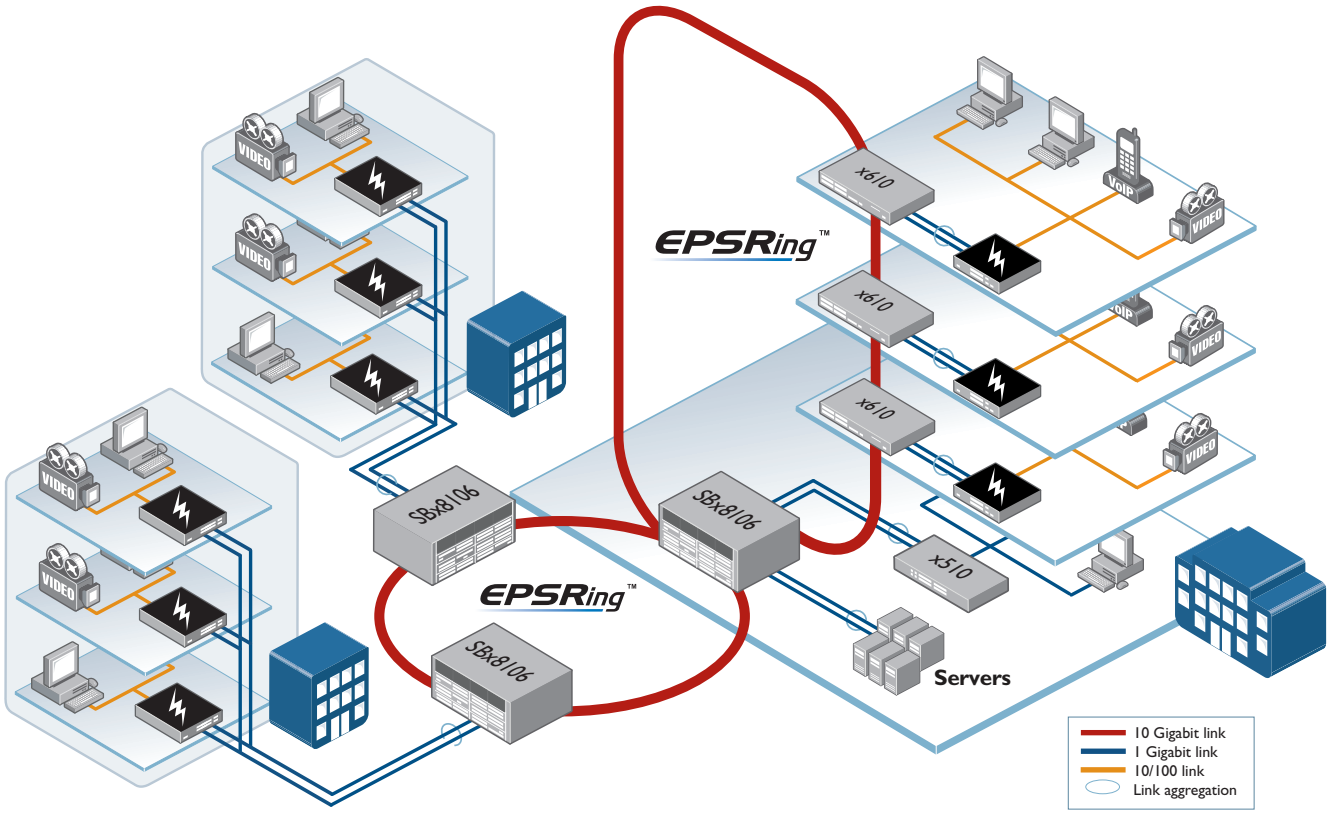


Key Solutions

Distributed network with EPSRing

Wherever a distributed network design is required, Allied Telesis Ethernet Protection Switched Ring (EPSRing) with the SwitchBlade x8106 is ideal, providing high-speed 10GbE connectivity. Failover in a little as 50ms prevents a node or link failure from affecting customer experience, even when using demanding applications such as IP telephony and video monitoring.

This is the ideal solution for ensuring continual access to online resources and applications in a multi-building business. Now that technology has made high-availability and high-bandwidth so accessible, corporate business, education providers and other enterprise network users can enjoy the many benefits that EPSRing provides. This advanced self-healing network technology meets today's constant demand for information.



Product Specifications

AT-SBx81CFC400 (Controller Fabric Card)

- 512MB SDRAM
- 512KB NVRAM
- 128MB flash memory
- Up to 32K MAC addresses*
- 24Mbit packet buffer memory
- Supports 10KB jumbo packets
- 4K VLANs

AT-SBx81GP24 (24 x 10/100/1000T PoE+ line card)
AT-SBx81GT24 (24 x 10/100/1000T line card)

- 12Mbit packet buffer memory

AT-SBx81GS24a (24 x 100/1000 SFP line card)
AT-SBx81XS6 (6 x 10Gbps SFP+ line card)

- 24Mbit packet buffer memory

AT-SBx81GT40 (40 x 10/100/1000T RJ.5 line card)

- 32Mbit packet buffer memory

Note: AT-SBx81XS16 line card is not supported by the SBx8100 CFC400

Reliability

- Modular AlliedWare Plus operating system
- Redundant controller fabric cards
- Redundant 1200W AC or DC system power supplies
- Load-sharing 1200W PoE+ power supplies
- Full environmental monitoring of PSUs, fans, temperature and internal voltages. SNMP traps alert network managers in case of failure
- Built-in over-temperature monitoring

Expandability

- High-speed line slots support any mix of hot-swappable cards for port flexibility and application versatility
- A line card can be installed in the second CFC slot of the SBx8106 chassis for extra port density
- Premium license option for additional features
- AMF Master license option for 40 and 80 node networks

Flexibility and compatibility

- Gigabit SFP ports will support any combination of Allied Telesis SFP modules listed in this document under Ordering Information
- 10G SFP+ ports will support any combination of Allied Telesis SFP+ modules and direct attach cables listed in this document under Ordering Information

Diagnostic tools

- Active Fiber Monitoring detects tampering on optical links
- Cable fault locator (TDR)
- UniDirectional Link Detection (UDLD)
- Hardware health monitoring
- Automatic link flap detection and port shutdown
- Optical Digital Diagnostic Monitoring (DDM)
- Ping polling and TraceRoute for IPv4 and IPv6
- Port mirroring

IPv4 features

- Black hole routing
- Directed broadcast forwarding
- DNS relay
- Policy-based routing
- Equal Cost Multi Path (ECMP) routing
- Route maps and route redistribution (OSPF, BGP, RIP)
- Static unicast and multicast routes for IPv4
- UDP broadcast helper (IP helper)

IPv6 features

- DHCPv6 relay, DHCPv6 client
- DNSv6 relay, DNSv6 client
- IPv4 and IPv6 dual stack
- IPv6 QoS and hardware ACLs
- Device management over IPv6 networks with SNMPv6, Telnetv6, SSHv6 and Syslogv6
- NTPv6 client and server
- Static unicast and multicast routes for IPv6

Management

- Allied Telesis Management Framework (AMF) enables powerful centralized management and zero-touch device installation and recovery
- Try AMF for free with the built-in AMF Starter license
- 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
- Out-of-band 10/100/1000T Ethernet management port on the CFC front panel for ease of access
- Powerful CLI scripting engine and built-in text editor
- Comprehensive SNMP MIB support for standards-based device management
- Management via Telnet or SSH to CLI, or HTTP to web interface (GUI)
- Event-based triggers allow user-defined scripts to be executed upon selected system events
- USB interface allows software release files, configurations and other files to be stored for backup and distribution to other devices

Quality of Service (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
- 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
- DSCP remarking based on TCP/UDP port number

Resiliency features

- Control Plane Prioritization (CPP) ensures the CPU always has sufficient bandwidth to process network control traffic
- Dynamic link failover (host attach)
- EPSRing (Ethernet Protection Switched Rings) with SuperLoop Protection (SLP)
- EPSR enhanced recovery for extra resiliency
- Loop protection: loop detection and thrash limiting
- PVST+ compatibility mode
- STP root guard

Security features

- Access Control Lists (ACLs) based on layer 3 and 4 headers
- Configurable ACLs for management traffic
- Auth-fail and guest VLANs
- Authentication, Authorisation and Accounting (AAA)
- Bootloader can be password protected for device security
- BPDU protection
- DHCP snooping, IP source guard and Dynamic ARP Inspection (DAI)
- 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 40°C (32°F to 104°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
- Certification: UL, cUL, TUV

Restrictions on Hazardous Substances (RoHS) compliance

- EU RoHS compliant
- China RoHS compilant

Country of origin

- Indonesia

* Depending on selected configuration

Standards and Protocols

AlliedWare Plus Operating System
Version 5.4.6

Border Gateway Protocol (BGP)
BGP dynamic capability
BGP outbound route filtering
RFC 1772 Application of the Border Gateway Protocol (BGP) in the Internet
RFC 1997 BGP communities attribute
RFC 2385 Protection of BGP sessions via the TCP MD5 signature option
RFC 2439 BGP route flap damping
RFC 2545 Use of BGP-4 multiprotocol extensions for IPv6 inter-domain routing
RFC 2858 Multiprotocol extensions for BGP-4
RFC 2918 Route refresh capability for BGP-4
RFC 3392 Capabilities advertisement with BGP-4
RFC 3882 Configuring BGP to block Denial-of-Service (DoS) attacks
RFC 4271 Border Gateway Protocol 4 (BGP-4)
RFC 4360 BGP extended communities
RFC 4456 BGP route reflection - an alternative to full mesh iBGP
RFC 4724 BGP graceful restart
RFC 4893 BGP support for four-octet AS number space
RFC 5065 Autonomous system confederations for BGP

Cryptographic Algorithms
FIPS Approved Algorithms
Encryption (Block Ciphers):
- AES (ECB, CBC, CFB and OFB Modes)
- 3DES (ECB, CBC, CFB and OFB Modes)

Block Cipher Modes:
- CCM
- CMAC
- GCM
- XTS

Digital Signatures & Asymmetric Key Generation:
- DSA
- ECDSA
- RSA

Secure Hashing:
- SHA-1
- SHA-2 (SHA-224, SHA-256, SHA-384. SHA-512)

Message Authentication:
- HMAC (SHA-1, SHA-2(224, 256, 384, 512)

Random Number Generation:
- DRBG (Hash, HMAC and Counter)

Non FIPS Approved Algorithms
RNG (AES128/192/256)
DES
MD5

Ethernet
IEEE 802.1AXLink 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 802.3ae10 Gigabit Ethernet
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 features
RFC 768 User Datagram Protocol (UDP)
RFC 791 Internet Protocol (IP)
RFC 792 Internet Control Message Protocol (ICMP)
RFC 793 Transmission Control Protocol (TCP)
RFC 826 Address Resolution Protocol (ARP)
RFC 894 Standard for the transmission of IP datagrams over Ethernet networks
RFC 919 Broadcasting Internet datagrams
RFC 922 Broadcasting Internet datagrams in the presence of subnets
RFC 932 Subnetwork addressing scheme
RFC 950 Internet standard subnetting procedure
RFC 951 Bootstrap Protocol (BootP)
RFC 1027 Proxy ARP
RFC 1035 DNS client
RFC 1042 Standard for the transmission of IP datagrams over IEEE 802 networks
RFC 1071 Computing the Internet checksum
RFC 1122 Internet host requirements
RFC 1191 Path MTU discovery
RFC 1256 ICMP router discovery messages
RFC 1518 An architecture for IP address allocation with CIDR
RFC 1519 Classless Inter-Domain Routing (CIDR)
RFC 1542 Clarifications and extensions for BootP
RFC 1591 Domain Name System (DNS)
RFC 1812 Requirements for IPv4 routers
RFC 1918 IP addressing
RFC 2581 TCP congestion control

IPv6 features
RFC 1981 Path MTU discovery for IPv6
RFC 2460 IPv6 specification
RFC 2464 Transmission of IPv6 packets over Ethernet networks
RFC 3056 Connection of IPv6 domains via IPv4 clouds
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
RFC 5175 IPv6 Router Advertisement (RA) flags option
RFC 6105 IPv6 Router Advertisement (RA) guard

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 1724 RIPv2 MIB extension
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 2787 Definitions of managed objects for VRRP
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
RFC 6527 Definitions of managed objects for VRRPv3

Multicast support
Bootstrap Router (BSR) mechanism for PIM-SM
IGMP query solicitation
IGMP snooping (v1, v2 and v3)
IGMP snooping fast-leave
IGMP/MLD multicast forwarding (IGMP/MLD proxy)
MLD snooping (v1 and v2)
PIM-SM and 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 3376 IGMPv3
RFC 3810 Multicast Listener Discovery v2 (MLDv2) for IPv6
RFC 3973 PIM Dense Mode (DM)
RFC 4541 IGMP and MLD snooping switches
RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): protocol specification (revised)
RFC 4604 Using IGMPv3 and MLDv2 for source-specific multicast
RFC 4607 Source-specific multicast for IP

Open Shortest Path First (OSPF)
OSPF link-local signaling
OSPF MD5 authentication
OSPF restart signaling
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

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 3246 DiffServ Expedited Forwarding (EF)

Resiliency features

IEEE 802.1D MAC bridges
IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
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 and authentication
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 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 protoco
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 (server, relay and client)
RFC 2132 DHCP options and BootP vendor extensions
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
RFC 3046 DHCP relay agent information option (DHCP option 82)
RFC 3315 DHCPv6 (server, relay and client)
RFC 3633 IPv6 prefix options for DHCPv6
RFC 3646 DNS configuration options for DHCPv6
RFC 3993 Subscriber-ID suboption for DHCP relay agent option
RFC 4330 Simple Network Time Protocol (SNTP) version 4
RFC 5905 Network Time Protocol (NTP) version 4

VLAN support

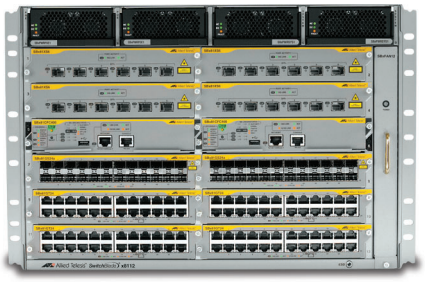
Generic VLAN Registration Protocol (GVRP)
IEEE 802.1ad Provider bridges (VLAN stacking, Q-in-Q)
IEEE 802.1Q Virtual LAN (VLAN) bridges
IEEE 802.1v VLAN classification by protocol and port
IEEE 802.3ac VLAN tagging

Voice over IP (VoIP)

LLDP-MED ANSI/TIA-1057
Voice VLAN

Physical specifications

Product	Dimensions (WxDxH)	Weight (kg/lbs)
AT-SBx8112 chassis	48.0 x 38.8 x 31.0 cm	17.8 kg (39.1 lb)
AT-SBx8106 chassis	48.0 x 38.8 x 17.6 cm	14.4 kg (31.8 lb)
AT-SBx81CFC400 controller fabric card	20.7 x 31.3 x 4.1 cm	1.1 kg (2.4 lb)
AT-SBx81GP24 PoE+ line card	20.7 x 31.3 x 4.1 cm	1.1 kg (2.3 lb)
AT-SBx81GT24 line card	20.7 x 31.3 x 4.1 cm	1.1 kg (2.3 lb)
AT-SBx81GT40 RJ point five line card	20.7 x 31.3 x 4.1 cm	1.1 kg (2.3 lb)
AT-SBx81GS24a SFP line card	20.7 x 31.3 x 4.1 cm	1.1 kg (2.3 lb)
AT-SBx81XS6 SFP+ line card	20.7 x 31.3 x 4.1 cm	0.8 kg (1.8 lb)
AT-SBxPWRSYS2 AC sys power supply	10.2 x 32.2 x 4.3 cm	2.8 kg (6.1 lb)
AT-SBxPWRSYS1-80 DC sys power supply	10.2 x 32.2 x 4.3 cm	2.8 kg (6.1 lb)
AT-SBxPWRPOE1 PoE power supply	10.2 x 32.2 x 4.3 cm	2.7 kg (6.0 lb)
AT-SBxFAN12 fan tray	2.7 x 33.4 x 26.0 cm	1.8 kg (4.0 lb)
AT-SBxFAN06 fan tray	2.6 x 29.8 x 10.3 cm	0.86 kg (1.9 lb)



PoE power provisioning

Maximum number of ports that can be powered (with 2 x AT-SBxPWRPOE1 installed)

	PoE Power	Class 3 (15.4W)	Class 4 (30W)
PSUs in redundant mode	1200W	77	40
PSUs in boost mode	2400W	155	80

Power consumption

	Maximum	Heat dissipation
AT-SBx81CFC400	48.3W	164.8 BTU/hr
AT-SBx81GP24	34.4W	117.4 BTU/hr
AT-SBx81GT24	34.4W	117.4 BTU/hr
AT-SBx81GT40	53.9W	183.7 BTU/hr
AT-SBx81GS24a	56.3W	192.1 BTU/hr
AT-SBx81XS6	48.3W	164.8 BTU/hr

Power efficiency

Maximum power supply efficiency (based on 100V input voltage)

AT-SBxPWRSYS2	78.4% (100% load) 81.8% (50% load)
AT-SBxPWRPOE1	81.3% (100% load) 83.6% (50% load)

Power characteristics

Voltage: 100-240V AC (10% auto-ranging)
Frequency: 50/60 Hz
Maximum current: 16A @ 100V

Chassis switching fabric

	2 x CFC400
SBx8112	800Gbps
SBx8106	320Gbps

Control and line card switching capacity and forwarding rates (per card)

	Switching capacity	Forwarding rate
SBx81XS6	120Gbps	89Mpps
SBx81GT24	48Gbps	36Mpps
SBx81GP24	48Gbps	36Mpps
SBx81GS24a	48Gbps	36Mpps
SBx81GT40	80Gbps	60Mpps

Latency

Measured in microseconds (µs) at 64byte framesize

	10Mbit	100Mbit	1000Mbit
AT-SBx81GP24	36.0 µs	5.6 µs	2.6 µs
AT-SBx81GT24	36.0 µs	5.6 µs	2.6 µs
AT-SBx81GT40	165.0 µs	20.0 µs	6.0 µs
AT-SBx81GS24a	38.5 µs	7.0 µs	2.8 µs
AT-SBx81XS6	3.1 µs (10Gbit)		

Feature licenses

NAME	DESCRIPTION	INCLUDES
AT-FL-CFC400-01†	AT-SBx8100 Premium License	▶ OSPF* (5,000 routes) ▶ BGP4 (5,000 routes) ▶ PIMv4-SM, DM, SSM ▶ VLAN double tagging (Q-in-Q) ▶ RIPng (1,000 routes) ▶ OSPFv3 (1,000 routes) ▶ BGP4+ for IPv6 (1,000 routes) ▶ MLDv1 & v2 ▶ PIMv6-SM, SSM ▶ RADIUS-Full ▶ UDLD
AT-FL-CF4-AM40-1YR†	AMF Master License	▶ AMF Master 40 nodes for 1 year
AT-FL-CF4-AM40-5YR†	AMF Master License	▶ AMF Master 40 nodes for 5 years
AT-FL-CF4-AM80-1YR†	AMF Master License	▶ AMF Master 80 nodes for 1 year
AT-FL-CF4-AM80-5YR†	AMF Master License	▶ AMF Master 80 nodes for 5 years

* 64 OSPF routes included in base license
† Only a single license is required per chassis. This is automatically synchronized to the second control card

Ordering Information

AT-SBx8112-96POE+
96-port PoE+ starter bundle
1 x AT-SBx8112 chassis
1 x AT-SBx81CFC400 controller fabric card
4 x AT-SBx81GP24 PoE+ line card
1 x AT-SBxPWRSYS1 system power supply
1 x AT-SBxPWRPOE1 PoE power supply

AT-SBx8112-12XR
12-port 10G resiliency starter bundle
1 x AT-SBx8112 chassis
2 x AT-SBx81CFC400 controller fabric card
2 x AT-SBx81XS6 SFP+ Ethernet line card
2 x AT-SBxPWRSYS1 system power supply

AT-SBx8112
Rack mount 12-slot chassis with fan tray

AT-SBx8106
Rack mount 6-slot chassis with fan tray

AT-SBxFAN12
Contains four fans, temperature sensors and controller board for SBx8112 chassis

AT-SBxFAN06
Contains two fans, temperature sensors and controller board for SBx8106 chassis

AT-SBx81CFC400
400Gbps Controller fabric card

AT-SBx81GP24
24-port 10/100/1000T PoE+ Ethernet line card

AT-SBx81GT24
24-port 10/100/1000T Ethernet line card

AT-SBx81GT40
40-port 10/100/1000T RJ.5 Ethernet line card

AT-SBx81GS24a
24-port 100/1000X SFP Ethernet line card

AT-SBx81XS6
6-port 10GbE SFP+ Ethernet line card

AT-SBxPWRSYS2-xx
1200W AC system power supply

AT-SBxPWRSYS1-80
1200W DC system power supply

AT-SBxPWRPOE1-xx
1200W AC PoE+ power supply

Where xx =
10 for US power cord
20 for no power cord
30 for UK power cord
40 for Australian power cord
50 for European power cord

Power cords are only shipped with AT-SBxPWRSYS2 or AT-SBxPWRPOE1 power supplies.
Note: Power entry connector is IEC 60320 C19 (High capacity)

Accesories

10GbE SFP+ modules

AT-SP10SR
10GSR 850 nm short-haul, 300 m with MMF

AT-SP10SR/I
10GSR 850 nm short-haul, 300 m with MMF industrial temperature

AT-SP10LRM
10GLRM 1310 nm short-haul, 220 m with MMF

AT-SP10LR
10GLR 1310 nm medium-haul, 10 km with SMF

AT-SP10LR/I
10GLR 1310 nm medium-haul, 10 km with SMF industrial temperature

AT-SP10LR20/I
10GER 1310nm long-haul, 20 km with SMF industrial temperature

AT-SP10ER40/I
10GER 1310nm long-haul, 40 km with SMF industrial temperature

AT-SP10ZR80/I
10GER 1550nm long-haul, 80 km with SMF industrial temperature

10GbE cables

AT-SP10TW1
1 meter SFP+ direct attach cable

AT-SP10TW3
3 meter SFP+ direct attach cable

AT-SP10TW7
7 meter SFP+ direct attach cable

RJ.5 to RJ-45 cables
For use with AT-SBx81GT40

AT-UTP/RJ.5-100-A-008
RJ point five to RJ-45 1 m Ethernet cables (pack of 8)

AT-UTP/RJ.5-300-A-008
RJ point five to RJ-45 3 m Ethernet cables (pack of 8)

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, 1310nm 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/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-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

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