



## AT-9900 SERIES

### Multilayer IPv4 and IPv6 Gigabit Switches

#### AT-9924T

24 x 10/100/1000BASE-T copper ports and  
4 x 1000BASE-X SFP combo ports

#### AT-9924SP

24 x 100/1000BASE-X SFP ports

#### Industry Leading Features

The AT-9900 series delivers performance, flexibility, and reliability. Packaged in a 1RU standard rack mount chassis, all AT-9900 switches incorporate a switching core that yields wire-speed Layer 3 IPv4 routing, exceptional Quality of Service (QoS) features, and a robust hardware design with dual hot-swappable power supplies.

#### Policy-based Quality of Service

Comprehensive, low latency QoS features operating at wire-speed provide flow-based traffic management with full classification, prioritization, traffic shaping and min/max bandwidth profiles. The AT-9924 QoS features are ideal for service providers wanting to ensure maximum availability of premium voice, video and data services, and at the same time manage customer service level agreements (SLAs). For enterprise customers, the AT-9924 QoS features protect productivity by guaranteeing performance of business-critical applications including VoIP services, and help restore and maintain responsiveness of enterprise applications in the networked workplace.

#### EPSR

Ethernet Protection Switched Rings prevents loops in ring-based Ethernet networks. EPSR provides high availability for mission critical traffic, preventing loss of video, voice, or data packets in the event of device failure.

#### Management Stacking

Stacking provides CLI-based management of up to nine switches with the same effort as for one switch. The Allied Telesis solution uses open standards interfaces as stacking links so that many switches can be stacked across different sites, which is not possible using the proprietary stacking cable solutions. Also, the use of open standards interfaces avoids the use of expensive specialized hardware with limited topologies.

#### Reliability

Dual internal hot-swappable load-sharing power supplies provide ultimate space-saving reliability and redundancy for maximum service uptime. Both 110/240V AC and 48V DC PSU versions are available. There is no requirement for an external RPS, and combined with front-to-back cooling and a 1RU height, the AT-9924 is perfect for the high-density rack environment where conditions are demanding and space is at a premium.

#### Power to Perform

The AT-9924 top-of-the-line multilayer switch is part of a series built to meet the needs of high performance network services. Together with Allied Telesis' advanced software feature set, AlliedWare, the AT-9924 is a superior high-density gigabit switching solution, bringing true intelligence to the network.

#### Key Features

- 1RU form factor
- Non-blocking Layer 2 and 3 IPv4 switching and routing at wire-speed
- Provides up to 256K Layer 3 IPv4 address table entries
- Supports full 4096 VLANs
- Supports 4096 Layer 3 interfaces
- Supports VLAN double tagging
- Private VLANs, providing security and port isolation of multiple customers using the same VLAN
- 802.1x support for network security
- Supports 9KByte Jumbo frame size<sup>1</sup>
- 100MB SFP support (AT-9924SP-V2 only)
- Full environmental monitoring, with alerts to network manager in case of failure
- Extensive wire-speed traffic classification
- Comprehensive wirespeed QoS features
- Low switching latency, ideal for voice and multi-media applications
- Advanced routing protocols OSPF, BGP-4, RIP and RIPv2, DVMRP, PIM-SM, PIM-DM
- STP, RSTP, MSTP (802.1s)
- DHCP Snooping
- DHCP Option 82
- Port trunking (802.3ad LACP)
- Port mirroring
- Asynchronous management port
- SSH for secure management
- SNMPv3
- GUI
- EPSR
- VRRP

<sup>1</sup> When Jumbo frame support is enabled, the MRU is 9710 bytes for ports operating at 10/100Mbps, and 10,240 bytes at 1Gbps, however maximum layer 3 supported frame size is 9198 bytes.

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### Performance

- Switching Capacity 48Gbps
- Forwarding Rate 36Mpps

Up to 256K IPv4 routes  
 Up to 16K MAC addresses  
 Up to 80K BGP routes  
 4K VLANs  
 Packet buffer memory:  
 64MB  
 160MB  
 16MB Flash Memory

### Reliability

MTBF  
 1 PSU: 130,000 hours<sup>2</sup>  
 2 PSUs: 240,000 hours<sup>2</sup>

### Acoustic Noise

51.0 dB

### Power Characteristics

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

DC:  
 Voltage: 40-60V DC

### Power Consumption

75Watts (256 BTU/hour) maximum

### Environmental Specifications

Operating Temp:  
 0°C to 50°C (32°F to 122°F)  
 Storage Temp:  
 -25°C to 70°C (-13°F to 158°F)  
 Operating Humidity:  
 5% to 80% non-condensing  
 Storage Humidity:  
 5% to 95% non-condensing  
 Operating Altitude: 10,000ft

### Physical Dimensions

Height: 44.5mm (1.75")<sup>3</sup>  
 Width: 440mm (16.7")  
 Depth: 440mm (16.7")<sup>4</sup>  
 Mounting 19" rack mountable, 1 RU form-factor

### Weight

AT-9924T: 6.8kg (15.0 lbs) or 7.7kg (17.0 lbs) packaged<sup>5</sup>  
 AT-9924SP: 6.8kg (15.0 lbs) or 7.7kg (17.0 lbs) packaged<sup>5</sup>  
 AT-PWR01 (AC or DC): 1.0 kg (2.2 lbs) or 1.8 kg (4.0 lbs) packaged

### Electrical Approvals and Compliances

EMC  
 EN55022 class A, FCC class A, VCCI class A,  
 AS/NZS CISPR22 class A  
 Immunity: EN55024, EN61000-3-2/3, CNS 13438 Class A.

### Safety

UL60950-1, CAN/CSA-C22.2 No. 60950-1-03,  
 EN60950-1, EN60825-1, AS/NZS 60950  
 Certification: UL, cUL, TUV

### Restrictions on Hazardous Substances (RoHS) Compliance

EU RoHS compliant

### Country of Origin

Singapore

### Standards and Protocols Software Release 2.9.1

#### BGP-4

RFC 1771 Border Gateway Protocol 4  
 RFC 1966 BGP Router Reflection  
 RFC 1997 BGP Communities Attribute  
 RFC 1998 Multi-home Routing  
 RFC 2385 Protection of BGP Sessions via the TCP MD5 Signature Option  
 RFC 2439 BGP Route Flap Damping  
 RFC 2858 Multiprotocol Extensions for BGP-4  
 RFC 2918 Route Refresh Capability for BGP-4  
 RFC 3065 Autonomous System Confederations for BGP  
 RFC 3392 Capabilities Advertisement with BGP-4

#### Encryption

RFC 1321 MD5  
 RFC 2104 HMAC  
 FIPS 180 SHA-1  
 FIPS 186 RSA  
 FIPS 46-3 DES  
 FIPS 46-3 3DES

#### Ethernet

RFC 894 Ethernet II Encapsulation  
 IEEE 802.1D MAC Bridges  
 IEEE 802.1Q Virtual LANs  
 IEEE 802.1v VLAN Classification by Protocol and Port  
 IEEE 802.2 Logical Link Control  
 IEEE 802.3ab 1000BASE-T  
 IEEE 802.3ac VLAN TAG  
 IEEE 802.3ad (LACP) Link Aggregation  
 IEEE 802.3u 100BASE-T  
 IEEE 802.3x Full Duplex Operation  
 IEEE 802.3z Gigabit ethernet  
 GARP  
 GVRP

#### General Routing

RFC 768 UDP  
 RFC 791 IP  
 RFC 792 ICMP  
 RFC 793 TCP  
 RFC 826 ARP  
 RFC 903 Reverse ARP  
 RFC 925 Multi-LAN ARP  
 RFC 950 Subnetting, ICMP  
 RFC 1027 Proxy ARP  
 RFC 1035 DNS  
 RFC 1122 Internet Host Requirements  
 RFC 1256 ICMP Router Discovery Messages  
 RFC 1288 Finger  
 RFC 1332 The PPP Internet Protocol Control Protocol (IPCP)  
 RFC 1518 CIDR  
 RFC 1519 CIDR  
 RFC 1542 BootP  
 RFC 1552 The PPP Internetworking Packet Exchange Control Protocol (IPXCP)  
 RFC 1570 PPP LCP Extensions  
 RFC 1661 The Point-to-Point Protocol (PPP)  
 RFC 1762 The PPP DECnet Phase IV Control Protocol (DNCP)  
 RFC 1812 Router Requirements  
 RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses  
 RFC 1918 IP Addressing

<sup>2</sup> MTBF is measured and calculated according to the Telcordia methodology, for data-path components only, with AC PSU(s) installed.

<sup>3</sup> With rubber feet height is 51 mm (2.00").

<sup>4</sup> This depth measurement excludes the PSU handles.

<sup>5</sup> One PSU.

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RFC 1962 The PPP Compression Control Protocol (CCP)  
 RFC 1968 The PPP Encryption Control Protocol (ECP)  
 RFC 1974 PPP Stac LZS Compression Protocol  
 RFC 1978 PPP Predictor Compression Protocol  
 RFC 1990 The PPP Multilink Protocol (MP)  
 RFC 2125 The PPP Bandwidth Allocation Protocol (BAP)  
 / The PPP Bandwidth Allocation Control Protocol (BACP)  
 RFC 2131 DHCP  
 RFC 2132 DHCP Options and BOOTP Vendor Extensions  
 RFC 2390 Inverse Address Resolution Protocol  
 RFC 2516 A Method for Transmitting PPP Over Ethernet (PPPoE)  
 RFC 2661 L2TP  
 RFC 2822 Internet Message Format  
 RFC 3046 DHCP Relay Agent Information Option  
 RFC 3232 Assigned Numbers  
 RFC 3993 Subscriber-ID Sub-option for DHCP Relay Agent Option  
<http://www.iana.org/assignments/bootp-dhcp-parameters>  
 BootP and DHCP parameters

### IP Multicasting

RFC 1075 DVMRP  
 RFC 1112 Host Extensions  
 RFC 2236 IGMPv2  
 RFC 2362 PIM-SM  
 RFC 2715 Interoperability Rules for Multicast Routing Protocols  
 RFC 3973 PIM-DM  
 draft-ietf-idmr-dvmrp-v3-9 DVMRP  
 draft-ietf-magma-snoop-02 IGMP and MLD snooping switches

### IPv6

RFC 1981 Path MTU Discovery for IPv6  
 RFC 2080 RIPng for IPv6  
 RFC 2365 Administratively Scoped IP Multicast  
 RFC 2375 IPv6 Multicast Address Assignments  
 RFC 2460 IPv6  
 RFC 2461 Neighbour Discovery for IPv6  
 RFC 2462 IPv6 Stateless Address Autoconfiguration  
 RFC 2463 ICMPv6  
 RFC 2464 Transmission of IPv6 Packets over Ethernet Networks  
 RFC 2465 Allocation Guidelines for Ipv6 Multicast Addresses Management Information Base for IP Version 6: Textual Conventions and General Group  
 RFC 2466 Management Information Base for IP Version 6: ICMPv6 Group  
 RFC 2472 IPv6 over PPP  
 RFC 2526 Reserved IPv6 Subnet Anycast Addresses  
 RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels  
 RFC 2710 Multicast Listener Discovery (MLD) for IPv6  
 RFC 2711 IPv6 Router Alert Option  
 RFC 2851 Textual Conventions for Internet Network Addresses  
 RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers  
 RFC 3056 Connection of IPv6 Domains via IPv4 Clouds  
 RFC 3307 Allocation Guidelines for IPv6 Multicast Addresses  
 RFC 3315 DHCPv6  
 RFC 3484 Default Address Selection for IPv6  
 RFC 3513 IPv6 Addressing Architecture  
 RFC 3587 IPv6 Global Unicast Address Format  
 RFC 3596 DNS Extensions to support IPv6

RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6

### Management

RFC 1155 MIB  
 RFC 1157 SNMP  
 RFC 1212 Concise MIB definitions  
 RFC 1213 MIB-II  
 RFC 1493 Bridge MIB  
 RFC 1643 Ethernet MIB  
 RFC 1657 Definitions of Managed Objects for BGP-4 using SMIv2  
 RFC 2011 SNMPv2 MIB for IP using SMIv2  
 RFC 2012 SNMPv2 MIB for TCP using SMIv2  
 RFC 2096 IP Forwarding Table MIB  
 RFC 2576 Coexistence between V1, V2, and V3 of the Internet-standard Network Management Framework  
 RFC 2578 Structure of Management Information Version 2 (SMIv2)  
 RFC 2579 Textual Conventions for SMIv2  
 RFC 2580 Conformance Statements for SMIv2  
 RFC 2665 Definitions of Managed Objects for the Ethernet-like Interface Types  
 RFC 2674 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions (VLAN)  
 RFC 2790 Host MIB  
 RFC 2819 RMON (groups 1,2,3 and 9)  
 RFC 2856 Textual Conventions for Additional High Capacity Data Types  
 RFC 2863 The Interfaces Group MIB  
 RFC 3164 Syslog Protocol  
 RFC 3410 Introduction and Applicability Statements for Internet-Standard Management Framework  
 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 the SNMP  
 RFC 3416 Version 2 of the Protocol Operations for SNMP  
 RFC 3417 Transport Mappings for the SNMP  
 RFC 3418 MIB for SNMP  
 RFC 3636 Definitions of Managed Objects for IEEE 802.3 MAUs  
 RFC 3768 VRRP  
 draft-ietf-bridge-8021x-00.txt Port Access Control MIB  
 EPSR  
 IEEE 802.1AB LLDP

### OSPF

RFC 1245 OSPF protocol analysis  
 RFC 1246 Experience with the OSPF protocol  
 RFC 2328 OSPFv2  
 RFC 3101 The OSPF Not-So-Stubby Area (NSSA) Option

### QoS

RFC 2205 Reservation Protocol  
 RFC 2211 Controlled-Load  
 RFC 2474 DSCP  
 RFC 2475 An Architecture for Differentiated Services  
 RFC 2597 Assured Forwarding PHB  
 RFC 2697 A Single Rate Three Color Marker  
 RFC 2698 A Two Rate Three Color Marker

RFC 3246 Expedited Forwarding PHB  
 IEEE 802.1p Priority Tagging

### RIP

RFC 1058 RIPv1  
 RFC 2082 RIP-2MDS Authentication  
 RFC 2453 RIPv2

### Security

RFC 1492 TACACS  
 RFC 1779 X.500 String Representation of Distinguished Names  
 RFC 1858 Fragmentation  
 RFC 2284 EAP  
 RFC 2510 PKI X.509 Certificate Management Protocols  
 RFC 2511 X.509 Certificate Request Message Format  
 RFC 2559 PKI X.509 LDAPv2  
 RFC 2585 PKI X.509 Operational Protocols  
 RFC 2587 PKI X.509 LDAPv2 Schema  
 RFC 2865 RADIUS  
 RFC 2866 RADIUS Accounting  
 RFC 2868 RADIUS Attributes for Tunnel Protocol Support  
 RFC 3280 X.509 Certificate and CRL profile  
 RFC 3580 IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines  
 draft-grant-tacacs-02.txt TACACS+  
 Draft-IETF-PKIX-CMP-Transport-Protocols-01 Transport Protocols for CMP  
 draft-yonen-ssh-protocol-00.txt SSH Remote Login Protocol  
 IEEE 802.1x Port Based Network Access Control  
 PKCS #10 Certificate Request Syntax Standard  
 Diffie-Hellman

### Services

RFC RFC 854 Telnet Protocol Specification  
 RFC 855 Telnet Option Specifications  
 RFC 856 Telnet Binary Transmission  
 RFC 857 Telnet Echo Option  
 RFC 858 Telnet Suppress Go Ahead Option  
 RFC 932 Subnetwork addressing scheme  
 RFC 951 BootP  
 RFC 1091 Telnet terminal-type option  
 RFC 1179 Line printer daemon protocol  
 RFC 1305 NTPv3  
 RFC 1350 TFTP  
 RFC 1510 Network Authentication  
 RFC 1542 Clarifications and Extensions for the Bootstrap protocol  
 RFC 1945 HTTP/1.0  
 RFC 1985 SMTP Service Extension  
 RFC 2049 MIME  
 RFC 2068 HTTP/1.1  
 RFC 2156 MIXER  
 RFC 2821 SMTP

### SSL

RFC 2246 The TLS Protocol Version 1.0  
 draft-freier-ssl-version3-02.txt SSLv3

### STP / RSTP / MSTP

IEEE 802.1Q - 2003 MSTP (802.1s)  
 IEEE 802.1t - 2001 802.1D maintenance  
 IEEE 802.1w - 2001 RSTP

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### Ordering Information

#### AT-9924T

24 x 10/100/1000BASE-T and 4 x 1000BASE-X SFP combo ports and 256MB of SDRAM factory fitted.

1 PSU and blanking plate

AT-9924T-xx

Order number: 990-001077-xx

2 PSUs

AT-9924T-DP-zz

Order number: 990-002072-zz

#### AT-9924SP

24 x 100/1000BASE-X SFP ports and 256MB of SDRAM factory fitted.

Note: V2 supports 100MB SFPs

1 PSU and blanking plate

AT-9924SP-v2-xx

Order number: 990-002215-xx

2 PSUs

AT-9924SP-DP-v2-zz

Order number: 990-002214-zz

Where xx = 00 for all power cords  
20 for no power cord  
60 for all power cords (AT-9924SP-v2)  
80 for 48V DC power supply

Where zz = 10 for U.S. power cord  
20 for no power cord  
30 for U.K. power cord  
40 for Asia/Pacific power cord  
50 for European power cord  
80 for 48V DC power supply

### Compact Flash

AT-CF128A-00

128MB CF Card

Order number: 990-000819-00

### 100 MB SFP modules (AT-9924SP only)

AT-SPFXBD-LC-13

100BASE-BX Bi-Di (1310nm Tx, 1550 Rx) fiber up to 15km

AT-SPFXBD-LC-15

100BASE-BX Bi-Di (1550nm Tx, 1310 Rx) fiber up to 15km

AT-SPFX/2

100BASE-FX 1310nm fiber up to 2km

AT-SPFX/15

100BASE-FX 1310nm fiber up to 15km

AT-SPFX/40

100BASE-FX 1310nm fiber up to 40km

### GbE SFP modules<sup>6</sup>

AT-SPTX

1000T 100m Copper

AT-SPSX

GbE multi-mode 850nm fiber

AT-SPLX10

GbE single-mode 1310nm fiber up to 10km

AT-SPLX40

GbE single-mode 1310nm fiber up to 40km

AT-SPLX40/1550

GbE single-mode 1550nm fiber up to 40km

AT-SPZX80

GbE single-mode 1550nm fiber up to 80km

### Power Supply Units

AT-PWR01-xx

Power supply module

Spare hot-swappable load-sharing power supply modules for the AT-9924 series of switches

Order number: 990-001084-xx

Where xx = 10 for U.S. power cord  
20 for no power cord  
30 for U.K. power cord  
40 for Asia/Pacific power cord  
50 for European power cord  
80 for 48V DC power supply

### Software Options

AT-9900FL3UPGRD

AT-9924 full Layer 3 upgrade:

- RSVP
- DVMRP
- VRRP
- PIM SM
- PIM DM

Order number: 980-000001-00

AT-9900ADVL3UPGRD

AT-9924 series advanced Layer 3 upgrade:

- IPv6
- BGP-4

Order number: 980-000009-00

AT-AR-VLANDTAG

AT-9924 VLAN double tagging (Q-in-Q / Nested VLANs) upgrade:

Order number: 980-10041-00

AT-AR-3DES (for SSL)

AT-9924 3DES upgrade:

Order number: 980-10000-yyy

Where yyy = 00 for 1 shot  
01 for 1 licence  
05 for 5 licences  
10 for 10 licences  
25 for 25 licences  
50 for 50 licences  
100 for 100 licences  
250 for 250 licences

<sup>6</sup> Please check with your sales representative, for RoHS compliance on SFP modules.

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### About Allied Telesis

Allied Telesis is part of the Allied Telesis Group. Founded in 1987, the company is a global provider of secure Ethernet/IP access solutions and an industry leader in the deployment of IP Triple Play networks over copper and fiber access infrastructure. Our POTS-to-10G iMAP integrated Multiservice Access Platform and iMG intelligent Multiservice Gateways, in conjunction with advanced switching, routing and WDM-based transport solutions, enable public and private network operators and service providers of all sizes to deploy scalable, carrier-grade networks for the cost-effective delivery of packet-based voice, video and data services.

Visit us online at [www.alliedtelesis.com](http://www.alliedtelesis.com).

### Service & Support

Allied Telesis provides value-added support services for its customers under its Net.Cover programs. For more information on Net.Cover support programs available in your area, contact your Allied Telesis sales representative or visit our website. [www.alliedtelesis.com](http://www.alliedtelesis.com)

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