



## 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 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>
- Gigabit SFP ports will support any combination of 10/100/1000BASE-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX or 1000BASE-ZX CWDM SFPs
- 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)
- Port trunking (802.3ad LACP)
- Port mirroring
- Asynchronous management port
- SSH for secure management
- SNMPv3
- GUI
- EPSR
- RoHS compliant

<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.

# AT-9900 SERIES | Multilayer IPv4 and IPv6 Gigabit Switches

## Performance

- Switching Capacity 48Gbps
- Forwarding Rate 36Mpps

Up to 256K IPv4 routes  
Up to 12K MAC addresses typical  
4K VLANs  
Up to 512MB CPU SDRAM  
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

## Country of Origin

Singapore

<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 51mm (2.00").

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

<sup>5</sup> One PSU.

## Standards and Protocols

### Software Release 2.8.1

### BGP-4

RFC 1966 BGP Router Reflection  
RFC 1771 Border Gateway Protocol 4  
RFC 1997 BGP Communities Attribute  
RFC 1998 Multi-home Routing  
RFC 3065 Autonomous System Confederations for BGP  
RFC 2842 Capabilities Advertisement with BGP-4  
RFC 2858 Multiprotocol Extensions for BGP-4  
RFC 2918 Route Refresh Capability for BGP-4  
RFC 2439 BGP Route Flap Damping  
RFC 2385 Protection of BGP Sessions via the TCP MD5 Signature Option

### 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 1256 ICMP Router Discovery Messages  
RFC 793 TCP  
RFC 2822 Internet Message Format  
RFC 826 ARP  
RFC 903 Reverse ARP  
RFC 925 Multi-LAN ARP  
RFC 950 Subnetting, ICMP  
RFC 1518 CIDR  
RFC 1519 CIDR  
RFC 1812 Router Requirements  
RFC 1027 Proxy ARP  
RFC 1035 DNS  
RFC 1122 Internet Host Requirements  
RFC 1288 Finger  
RFC 2390 Inverse Address Resolution Protocol  
RFC 2131 DHCP  
RFC 3046 DHCP Relay Agent Information Option  
RFC 3993 Subscriber-ID Sub-option for DHCP Relay Agent Option  
RFC 1542 BootP  
RFC 2132 DHCP Options and BOOTP Vendor Extensions  
RFC 1918 IP Addressing  
RFC 3232 Assigned Numbers  
RFC 1332 The PPP Internet Protocol Control Protocol (IPCP)  
RFC 1570 PPP LCP Extensions  
RFC 1661 The Point-to-Point Protocol (PPP)  
RFC 1552 The PPP Internetworking Packet Exchange

Control Protocol (IPXCP)  
RFC 1762 The PPP DECnet Phase IV Control Protocol (DNCP)  
RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses  
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 2516 A Method for Transmitting PPP Over Ethernet (PPPoE)  
RFC 2661 L2TP

## IP Multicasting

RFC 1075 DVMRP  
RFC 1112 Host Extensions  
RFC 1812 Router Requirements  
RFC 2236 IGMPv2  
RFC 2362 PIM-SM  
RFC 3973 PIM-DM  
RFC 2715 Interoperability Rules for Multicast Routing Protocols  
draft-ietf-idmr-dvmrp-v3-9 DVMRP  
draft-ietf-magma-snoop-02 IGMP and MLD snooping switches

## IPv6

RFC 3596 DNS Extensions to support IPv6  
RFC 1981 Path MTU Discovery for IPv6  
RFC 2080 RIPng for IPv6  
RFC 3513 IPv6 Addressing Architecture  
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 2472 IPv6 over PPP  
RFC 2526 Reserved IPv6 Subnet Anycast Addresses  
RFC 3484 Default Address Selection for IPv6  
RFC 2710 Multicast Listener Discovery (MLD) for IPv6  
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6  
RFC 2711 IPv6 Router Alert Option  
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels  
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers  
RFC 3056 Connection of IPv6 Domains via IPv4 Clouds  
RFC 3315 DHCPv6  
RFC 3587 IPv6 Global Unicast Address Format  
RFC 2365 Administratively Scoped IP Multicast  
RFC 3307 Allocation Guidelines for IPv6 Multicast Addresses  
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 2851 Textual Conventions for Internet Network Addresses

## Management

RFC 1155 MIB  
RFC 1157 SNMP  
RFC 1212 Concise MIB definitions  
RFC 1213 MIB-II  
RFC 1643 Ethernet MIB  
RFC 1493 Bridge MIB  
RFC 2790 Host MIB  
RFC 1515 Definitions of Managed Objects for IEEE 802.3 MAUs  
RFC 1573 Evolution of the Interfaces Group of MIB-II

RFC 1657 Definitions of Managed Objects for BGP-4 using SMIv2  
RFC 1757 RMON (groups 1,2,3 and 9)  
RFC 2011 SNMPv2 MIB for IP using SMIv2  
RFC 2012 SNMPv2 MIB for TCP using SMIv2  
RFC 2096 IP Forwarding Table MIB  
RFC 3768 VRRP  
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 2856 Textual Conventions for Additional High Capacity Data Types  
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  
draft-ietf-bridge-8021x-00.txt Port Access Control MIB

## OSPF

RFC 1245 OSPF protocol analysis  
RFC 1246 Experience with the OSPF protocol  
RFC 1587 The OSPF NSSA Option  
RFC 2328 OSPFv2

## QoS

RFC 2205 Reservation Protocol  
RFC 2211 Controlled-Load  
RFC 2474 DSCP  
RFC 2597 Assured Forwarding PHB  
RFC 3246 Expedited Forwarding PHB  
RFC 2475 An Architecture for Differentiated Services  
IEEE 802.1p Priority Tagging  
RFC 2697 A Single Rate Three Color Marker  
RFC 2698 A Two Rate Three Color Marker

## RIP

RFC 1058 RIPv1  
RFC 1723 RIPv2  
RFC 2453 RIPv2  
RFC 2082 RIP-2 MD5 Authentication

## Security

RFC 1492 TACACS  
RFC 1779 X.509 String Representation of Distinguished Names  
RFC 1858 Fragmentation  
RFC 2865 RADIUS  
RFC 2866 RADIUS Accounting  
RFC 2868 RADIUS Attributes for Tunnel Protocol Support  
RFC 3580 IEEE 802.IX Remote Authentication Dial In User Service (RADIUS) Usage Guidelines  
RFC 2459 X.509 Certificate and CRL profile  
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  
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 2821 SMTP  
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 1305 NTPv3  
RFC 1091 Telnet terminal-type option  
RFC 1179 Line printer daemon protocol  
RFC 1350 TFTP  
RFC 1510 Network Authentication  
RFC 1542 Clarifications and Extensions for the Bootstrap protocol  
RFC 2049 MIME  
RFC 1985 SMTP Service Extension  
RFC 2156 MIXER  
RFC 1945 HTTP/1.0

## 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

# AT-9900 SERIES | Multilayer IPv4 and IPv6 Gigabit Switches

## Ordering Information

### AT-9924T-xx

24 x 10/100/1000BASE-T and 4 x 1000BASE-X SFP combo ports and 256MB of SDRAM factory fitted.  
Order number: 990-001077-xx

### AT-9924SP-xx

24 x 1000BASE-X SFP ports and 256MB of SDRAM factory fitted.  
Order number: 990-001081-xx

Where xx = 00 for all power cords  
20 for no power cord  
80 for 48V DC power supply

All AT-9900 series switches include a single PSU module and blanking plate (required when only one PSU is installed).

## SDRAM

### AT-SD256B-00

256MB SDRAM  
Order number: 990-001453-00

### AT-SD512A-00

512MB SDRAM  
Order number: 990-001346-00

All AT-9900 Series switches are shipped with 256MB SDRAM of memory which supports up to 256K IPv4 routes and 80K BGP routes. With 512MB SDRAM, the AT-9900 supports up to 256K IPv4 routes and 292 BGP routes.

## Compact Flash

### AT-CF128A-00

128MB CF Card  
Order number: 990-000819-00

## SFP modules

### AT-SPTX

10/100/1000T 100m Copper  
Order number: 990-000262-00

### AT-SPSX

GbE multi-mode 850nm fiber  
Order number: 990-00028-00

### AT-SPLX10

GbE single-mode 1310nm fiber up to 10km  
Order number: 990-00029-00

### AT-SPLX40

GbE single-mode 1310nm fiber up to 40km  
Order number: 990-00161-00

### AT-SPLX40/1550

GbE single-mode 1550nm fiber up to 40km  
Order number: 990-00160-00

### AT-SPZX80

GbE single-mode 1550nm fiber up to 80km  
Order number: 990-00031-00

### AT-SPZX80/wwwww

GbE single-mode CWDM fiber up to 80km  
Order number: 990-000xx-00

| Where<br>wwwww= | Where xx= | CWDM<br>Wavelength |
|-----------------|-----------|--------------------|
| 1610            | 32        | 1610NM             |
| 1590            | 33        | 1590NM             |
| 1570            | 34        | 1570NM             |
| 1550            | 35        | 1550NM             |
| 1530            | 36        | 1530NM             |
| 1510            | 37        | 1510NM             |
| 1490            | 38        | 1490NM             |
| 1470            | 39        | 1470NM             |

## 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 of 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-yyy

### AT-9900ADVL3UPGRD

AT-9924 series advanced Layer 3 upgrade:

- IPv6
- BGP-4

Order number: 980-000009-yyy

### AT-AR-VLANDTAG

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

Order number: 980-10041-yyy

### AT-AR-3DES (for SSL and SSH)

AT-9924 3DES upgrade:

Order number: 980-10000-yyy

Where yyy= 00 for 1 shot  
001 for 1 licence  
005 for 5 licences  
010 for 10 licences  
025 for 25 licences  
050 for 50 licences  
100 for 100 licences  
250 for 250 licences

## About Allied Telesis

Allied Telesis was founded in 1987 and now has offices around the globe, more than 2,800 employees and over \$500M of worldwide annual revenue. The attributes which have led Allied Telesis to achieve its leading position in the enterprise, operator and connectivity business segments can be summarised by four key elements: its business focus on networking technology for professional markets, where Allied Telesis has proved to be the only company capable of providing a total end-to-end solution at a high price/performance ratio; the ability to handle every aspect of its own products from design to marketing; the development of components and solutions which accommodate flexible, efficient and reliable network construction; and support from sound warranty terms and quality services. Allied Telesis connects the IP world efficiently thanks to affordable and highly reliable network solutions. For more information see: [www.alliedtelesis.com](http://www.alliedtelesis.com)

## Service & Support

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

USA Headquarters | 19800 North Creek Parkway | Suite 200 | Bothell | WA 98011 | USA | T: +1 800 424 4284 | F: +1 425 481 3895

European Headquarters | Via Motta 24 | 6830 Chiasso | Switzerland | T: +41 91 69769.00 | F: +41 91 69769.11

Asia-Pacific Headquarters | 11 Tai Seng Link | Singapore | 534182 | T: +65 6383 3832 | F: +65 6383 3830

[www.alliedtelesis.com](http://www.alliedtelesis.com)

© 2006 Allied Telesis Inc. All rights reserved. Information in this document is subject to change without notice. All company names, logos, and product designs that are trademarks or registered trademarks are the property of their respective owners.

617-006150 Rev.G