Allied Telesis™

# Centre COM® FS980M Series

## Fast Ethernet Managed Access Switches

Allied Telesis CentreCOM FS980M switches feature centralized network management via Allied Telesis Autonomous Management Framework™ (AMF), and a redundant system with Virtual Chassis Stacking (VCStack™). These high-performing switches deliver flexible uplink connectivity and lower management costs.

**Allied**Ware Plus™
OPERATING SYSTEM

## Overview

FS980M switches provide high-performance Fast Ethernet connectivity right where you need it—at the network edge. Flexible and robust, the FS980M series provide total security and management features for enterprises of all sizes. They also support video surveillance and Point of Sale (POS) applications.

Reduce network running costs by automating and simplifying many day-to-day tasks—an FS980M is the ideal AMF edge switch when an AMF Master switch is available in the network.

With both copper and Power over Ethernet (PoE) models, the FS980M Series has the ideal solution for your network. All models are available with 8, 16, 24 and 48 × 10/100TX Fast Ethernet ports. PoE models support the IEEE 802.3at (PoE+) standard, delivering up to 30 Watts of power per port for video surveillance and security applications.

## Key Features

### AMF

▶ AMF is a sophisticated suite of management tools that provides a simplified approach to network management. Common tasks are automated, or made so simple, that your network can run without the need for highly-trained and expensive network engineers. Powerful features like centralized management, auto-backup, auto-upgrade, auto-provisioning and auto-recovery enable Plug-and-Play networking and zero-touch management.

▶ AMF secure mode increases network security with management traffic encryption, authorization, and monitoring.

▶ The FS980M can function as an AMF edge switch when an AMF Master switch is available in the network.

### EPSRing™

▶ Ethernet Protection Switched Ring (EPSRing) allows several FS980M switches to join a protected ring, capable of recovery within as little as 50ms. This feature is perfect for high availability in enterprise networks.

### Layer 3 Routing

▶ The FS980M Series provides static IPv4 routing at the edge of the network, as well as support for RIPv1 and RIPv2.

### VCStack

▶ FS980M/28, FS980M/28PS, FS980M/52, FS980M/52PS models.

▶ Create a VCStack of up to four units with 2 Gbps of stacking bandwidth per each unit. VCStack provides a highly-available system in which network resources are spread out across stacked units, minimizing the impact should any unit fail.

### Centralized Power with PoE+

▶ PoE+ provides centralized power connection to media, cameras, IP phones and wireless access points.

▶ PoE+ reduces costs and offers greater flexibility with the capability to connect devices requiring more power (up to 30W), such as pan-tilt-zoom security cameras.

### Security at the Edge

▶ The edge is the most vulnerable point of the network—the FS980M Series protects you with a full set of security features including Multi Supplicant Authentication, IEEE 802.1x, RADIUS, TACACS+, and Dynamic VLAN.

▶ Guest VLAN ensures visitors or unauthorized users can only connect to user-defined services—for example, Internet only.

▶ Access Control Lists (ACLs) enable inspection of incoming frames and classify them based on various criteria. Specific actions are applied to effectively manage the network traffic. Typically, ACLs are used as a security mechanism, either permitting or denying entry.

**VCS**tack™     **EPSR**ing™     **AMF**™

## Specifications

### Physical Specifications

| PRODUCT | 10/100T (RJ-45) COPPER PORTS | 10/100/1000T (RJ-45) COPPER PORTS | 100/1000X SFP PORTS | SWITCHING FABRIC | FORWARDING RATE | WIDTH X DEPTH X HEIGHT | WEIGHT | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | UNPACKAGED | PACKAGED |
| FS980M/9 | 8 | 1 combo | 1combo | 3.6 | 2.68 Mpps | 330 x 204 x 43.6 mm (13.0 x 8.0 x 1.7 in)) | 2.0 kg (4.41 lb) | 3.7 kg (8.2 lb) |
| FS980M/9PS | 8 | 1 combo | 1combo | 3.6 | 2.68 Mpps | 330 x 204 x 43.6 mm (13.0 x 8.0 x 1.7 in) | 2.5 kg (5.51 lb) | 4.2 kg (9.3 lb) |
| FS980M/18 | 16 | 2 combo | 2 combo | 7.2 | 5.36 Mpps | 330 x 204 x 43.6 mm (13.0 x 8.0 x 1.7 in) | 2.15 kg (4.74 lb) | 4.0 kg (8.8 lb) |
| FS980M/18PS | 16 | 2 combo | 2 combo | 7.2 | 5.36 Mpps | 440 x 257 x 43.2 mm (17.3 x 10.1 x 1.7 in) | 3.6 kg (7.94 lb) | 5.7 kg (12.5 lb) |
| FS980M/28 | 24 | - | 4 | 12.8 | 9.52 Mpps | 440 x 257 x 43.2 mm (17.3 x 10.1 x 1.7 in) | 3.2 kg (7.05 lb) | 5.3 kg (11.7 lb) |
| FS980M/28PS | 24 | - | 4 | 12.8 | 9.52 Mpps | 440 x 345 x 43.2 mm (17.3 x 13.6 x 1.7 in) | 5.1 kg (11.24 lb) | 7.6 kg (16.8 lb) |
| FS980M/52 | 48 | - | 4 | 17.6 | 13.09 Mpps | 440 x 257 x 43.2 mm (17.3 x 10.1 x 1.7 in) | 3.4 kg (7.50 lb) | 5.6 kg (12.3 lb) |
| FS980M/52PS | 48 | - | 4 | 17.6 | 13.09 Mpps | 440 x 345 x 43.2 mm (17.3 x 13.6 x 1.7 in) | 5.4 kg (11.91 lb) | 8.2 kg (18.1 lb) |

### Power and Noise Characteristics

| PRODUCT | NO POE LOAD | | | FULL POE+ LOAD | | |
|---|---|---|---|---|---|---|
| | MAX POWER CONSUMPTION (W) | MAX HEAT DISSIPATION (BTU/HR) | MAX NOISE (DB) | MAX POWER CONSUMPTION (W) | MAX SYSTEM HEAT DISSIPATION (BTU/HR) | MAX NOISE (DB) |
| FS980M/9 | 6.3 | 22 | fanless | - | - | - |
| FS980M/9PS | 13 | 45 | 37 | 190 | 660 | 49 |
| FS980M/18 | 12 | 42 | fanless | - | - | - |
| FS980M/18PS | 24 | 82 | 33 | 320 | 1,100 | 46 |
| FS980M/28 | 19 | 66 | fanless | - | - | - |
| FS980M/28PS | 49 | 170 | 36 | 520 | 1,800 | 49 |
| FS980M/52 | 36 | 120 | 51 | - | - | - |
| FS980M/52PS | 63 | 210 | 36 | 540 | 1,800 | 49 |

### Power over Ethernet specifications

| PRODUCT | POE POWER BUDGET(W) | MAX POE ENABLED PORTS AT 7.0W PER PORT | MAX POE ENABLED PORTS AT 15.4W PER PORT | MAX POE+ ENABLED PORTS AT 30W PER PORT |
|---|---|---|---|---|
| FS980M/9PS | 150 | 8 | 8 | 4 |
| FS980M/18PS | 250 | 16 | 16 | 8 |
| FS980M/28PS | 375 | 24 | 24 | 12 |
| FS980M/52PS | 375 | 48 | 24 | 12 |

### Performance

- ▶ 4 Gbps of stacking bandwidth
- ▶ Supports 10K jumbo frames
- ▶ Wirespeed multicasting
- ▶ Up to 16K MAC addresses
- ▶ 512 MB DDR2 SDRAM
- ▶ 128 MB flash memory

### Power Characteristics

- ▶ FS980M/9 and FS980M/18    100-240VAC, 0.9A maximum, 50/60Hz
- ▶ FS980M/9PS    100-240VAC, 3.9A maximum, 50/60Hz
- ▶ FS980M/18PS    100-240VAC, 4.0A maximum, 50/60Hz
- ▶ FS980M/28 and FS980M/52    100-240VAC, 1.5A maximum, 50/60Hz
- ▶ FS980M/28PS and FS980M/52PS    100-240VAC, 8.0A maximum, 50/60Hz

### Latency

| PRODUCT | 64byte | | | 1518byte | | |
|---|---|---|---|---|---|---|
| | 10Mbps | 100Mbps | 1000Mbps | 10Mbps | 100Mbps | 1000Mbps |
| FS980M/9 | 24.45μs | 4.50μs | - | 24.58μs | 4.474μs | - |
| FS980M/9PS | 24.45μsc | 4.50μs | - | 24.58μs | 4.474μs | - |
| FS980M/18 | 82.05μs | 10.05μs | 3.44μs | 1,245.36μs | 126.64μs | 15.20μs |
| FS980M/18PS | 82.05μs | 10.05μs | 3.44μsc | 1,2456.μs | 126.64μs | 15.20μsc |
| FS980M/28 | 80.20μs | 9.94μs | 3.23μs | 1,234.27μs | 126.72μs | 15.01μs |
| FS980M/28PS | 80.05μs | 9.91μs | 3.24μs | 1,243.55μs | 126.72μs | 15.01μs |
| FS980M/52 | 80.11μs | 9.96μs | 3.23μs | 1,234.36μs | 126.74μs | 15.01μs |
| FS980M/5PS | 80.61μs | 9.91μs | 3.24μs | 1,243.28μs | 126.76μs | 15.01μs |

### Diagnostic Tools

- ▶ Find-me device locator
- ▶ Automatic link flap detection and port shutdown
- ▶ Optical Digital Diagnostic Monitoring (DDM)
- ▶ Ping polling for IPv4 and IPv6

- Port mirroring
- TraceRoute for IPv4 and IPv6
- UniDirectional Link Detection (UDLD)

## IP Features
- RIP and static routing for IPv4 (16 routes)
- Device management over IPv6 networks with SNMPv6, Telnetv6 and SSHv6
- NTP client
- Log to IPv6 hosts with Syslog v6

## Management
- Allied Telesis Management Framework (AMF) enables powerful centralized management and zero-touch device installation and recovery
- Console management port on the front panel for ease of access
- Eco-friendly mode allows ports and LEDs to be disabled to save power
- Industry-standard CLI with context-sensitive help
- Powerful CLI scripting engine
- Comprehensive SNMP MIB support for standards-based device management
- Built-in text editor
- Event-based triggers allow user-defined scripts to be executed upon selected system events

## 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
- Extensive remarking capabilities
- 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

## Resiliency
- Control Plane Prioritization (CPP) ensures the CPU always has sufficient bandwidth to process network control traffic
- Dynamic link failover (host attach)
- Ethernet Protection Switched Ring (EPSRing™)
- Link aggregation (LACP) on LAN ports
- Loop protection: loop detection and thrash limiting
- PVST+ compatibility mode
- Spanning Tree (STP, RSTP, MSTP)
- STP root guard

## Security
- Access Control Lists (ACLs) based on layer2, 3 and 4 headers
- Auth-fail and guest VLANs
- Authentication, Authorization 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
- 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

## Environmental Specifications
- Operating ambient temp. 0°C to 50°C (32°F to 113°F)
- Storage temp. -20°C to 60°C (-4°F to 140°F)
- Operating humidity 5% to 90% non-condensing
- Storage humidity 5% to 95% non-condensing
- Maximum Operating Altitude:
  28-port and 52-port version 3048m
  9-port and 18-port version TBD

## Safety and Electromagnetic Emissions
- EMI : FCC part15 B, EN55022 Class A,
- CISPR22:2006, VCCI Class A, C-Tick, EN 55024
- Safety : UL 60950-1 Ed2, C22.2 NO.60950-1, EN 60950-1 Ed2, IEC60950-1 Ed.2, EN60950-1 Ed2.

## Compliance
- Compliance Marks : CE, cULus, TUV
- EU RoHS compliant

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

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

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

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

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

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

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

## Ethernet Standards
IEEE 802.2   Logical Link Control (LLC)
IEEE 802.3   Ethernet
IEEE 802.3ab 1000BASE-T
IEEE 802.3af Power over Ethernet (PoE)
IEEE 802.3at Power over Ethernet plus (PoE+)
IEEE 802.3x  Flow control - full-duplex operation
IEEE 802.3z  1000BASE-X

## IPv4 Standards
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 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 1591   Domain Name System (DNS)
RFC 1812   Requirements for IPv4 routers
RFC 1918   IP addressing
RFC 2581   TCP congestion control

## IPv6 Standards
RFC 1981   Path MTU discovery for IPv6
RFC 2460   IPv6 specification
RFC 2464   Transmission of IPv6 packets over Ethernet networks
RFC 3484   Default address selection for IPv6
RFC 3587   IPv6 global unicast address format
RFC 3596   DNS extensions to support IPv6
RFC 4007   IPv6 scoped address architecture
RFC 4193   Unique local IPv6 unicast addresses
RFC 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

## Management
AMF edge node[1]
AT Enterprise MIB including AMF MIB and SNMP traps
SNMPv1, v2c and v3
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 1155   Structure and identification of management information for TCP/IP-based Internets
RFC 1157   Simple Network Management Protocol (SNMP)
RFC 1212   Concise MIB definitions
RFC 1213   MIB for network management of TCP/IP-based Internets: MIB-II
RFC 1215   Convention for defining traps for use with the SNMP
RFC 1227   SNMP MUX protocol and MIB
RFC 1239   Standard MIB
RFC 2578   Structure of Management Information v2 (SMIv2)

[1] AMF edge is for products used at the edge of the network, and only support a single AMF link. They cannot use cross links or virtual links.

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 2819    RMON MIB (groups 1,2,3 and 9)
RFC 2863    Interfaces group MIB
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    MIB for the Transmission Control Protocol (TCP)
RFC 4113    MIB for the User Datagram Protocol (UDP)
RFC 4188    Definitions of managed objects for bridges
RFC 4292    IP forwarding table MIB
RFC 4293    MIB for the Internet Protocol (IP)
RFC 4318    Definitions of managed objects for bridges with RSTP
RFC 4560    Definitions of managed objects for remote ping, traceroute and lookup operations
RFC 5424    Syslog protocol

## Multicast Support

IGMP query solicitation
IGMP snooping (IGMPv1, v2 and v3)
IGMP snooping fast-leave
MLD snooping (MLDv1 and v2)
RFC 2715    Interoperability rules for multicast routing protocols
RFC 3306    Unicast-prefix-based IPv6 multicast addresses
RFC 4541    IGMP and MLD snooping switches

## Quality of Service (QoS)

IEEE 802.1p    Priority tagging
RFC 2211    Specification of the controlled-load network element service
RFC 2474    DiffServ precedence for eight queues/port
RFC 2475    DiffServ architecture
RFC 2597    DiffServ Assured Forwarding (AF)
RFC 2697    A single-rate three-color marker
RFC 2698    A two-rate three-color marker
RFC 3246    DiffServ Expedited Forwarding (EF)

## Resiliency

IEEE 802.1AX Link aggregation (static and LACP)
IEEE 802.1D    MAC bridges
IEEE 802.1s    Multiple Spanning Tree Protocol (MSTP)
IEEE 802.1w    Rapid Spanning Tree Protocol (RSTP)
IEEE 802.3ad Static and dynamic link aggregation

## Routing Information Protocol (RIP)

RFC 1058    Routing Information Protocol (RIP)
RFC 2082    RIP-2 MD5 authentication
RFC 2453    RIPv2

## Security

SSH remote login
SSLv2 and SSLv3
TACACS+ Accounting, 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 2560    X.509 Online Certificate Status Protocol (OCSP)
RFC 2818    HTTP over TLS ("HTTPS")
RFC 2865    RADIUS authentication
RFC 2866    RADIUS accounting
RFC 2868    RADIUS attributes for tunnel protocol support
RFC 2986    PKCS #10: certification request syntax specification v1.7
RFC 3546    Transport Layer Security (TLS) extensions
RFC 3579    RADIUS support for Extensible 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 protocol
RFC 5246    Transport Layer Security (TLS) v1.2
RFC 5280    X.509 certificate and Certificate Revocation List (CRL) profile
RFC 5425    Transport Layer Security (TLS) transport mapping for Syslog
RFC 5656    Elliptic curve algorithm integration for SSH

RFC 6125    Domain-based application service identity within PKI using X.509 certificates with TLS
RFC 6614    Transport Layer Security (TLS) encryption for RADIUS
RFC 6668    SHA-2 data integrity verification for SSH

## 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 client
RFC 2616    Hypertext Transfer Protocol - HTTP/1.1
RFC 2821    Simple Mail Transfer Protocol (SMTP)
RFC 2822    Internet message format
RFC 4330    Simple Network Time Protocol (SNTP) version 4
RFC 5905    Network Time Protocol (NTP) version 4

## VLAN Support

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

## Ordering Information

**AT-FS980M/9-xx**[1]
8-port 10/100TX switch with 1 Gigabit/SFP combo uplinks and one fixed AC power supply

**AT-FS980M/9PS-xx**[1]
8-port 10/100TX PoE+ switch with 1 Gigabit/SFP combo uplinks and one fixed AC power supply

**AT-FS980M/18-xx**[1]
16-port 10/100TX switch with 2 Gigabit/SFP combo uplinks and one fixed AC power supply

**AT-FS980M/18PS-xx**[1]
16-port 10/100TX PoE+ switch with 2 Gigabit/SFP combo uplinks and one fixed AC power supply

**AT-FS980M/28-xx**
24-port 10/100TX switch with 4 SFP uplinks and one fixed AC power supply

**AT-FS980M/28PS-xx**
24-port 10/100TX PoE+ switch with 4 SFP uplinks and one fixed AC power supply

**AT-FS980M/52-xx**
48-port 10/100TX switch with 4 SFP uplinks and one fixed AC power supply

**AT-FS980M/52PS-xx**
48-port 10/100TX PoE+ switch with 4 SFP uplinks and one fixed AC power supply

**AT-BRKT-J22**
Wall-mount kit for FS980M/9, 9PS, 18, 18PS, 28, 28PS, 52, 52PS

[1] Rackmount kit is included

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

## Small Form Pluggable (SFP) Optics Modules

### 1000Mbps SFP modules

**AT-SPSX**
1000SX GbE multi-mode 850 nm fiber up to 550 m

**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-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

**AT-SPBD10-13**
1000LX GbE Bi-Di (1310 nm Tx, 1490 nm Rx) fiber up to 10 km

**AT-SPBD10-14**
1000LX GbE Bi-Di (1490 nm Tx, 1310 nm Rx) fiber up to 10 km

**AT-SPBD20-13/I**
1000BX GbE Bi-Di (1310 nm Tx, 1550 nm Rx) fiber up to 20 km

**AT-SPBD20-14/I**
1000BX GbE Bi-Di (1490 nm Tx, 1310 nm Rx) fiber up to 20 km

**AT-SPSX/I**
1000SX GbE multi-mode 850 nm fiber up to 550m Industrial Temperature

**AT-SPLX10/I**
1000LX GbE single-mode 1310 nm fiber up to 10 km industrial temperature

**AT-SPTX***
1000T 100m copper
* Supported on 28 and 52 port models

## 100Mbps 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

### Stacking modules

**AT-SP10TW1**
Direct attach stacking cable (1.0m)

## Feature Licenses

| NAME | DESCRIPTION | INCLUDES |
|---|---|---|
| AT-FL-FS98M-UDLD | UniDirectional Link Detection | ▶ UDLD |

**Allied Telesis**

**NETWORK SMARTER**

617-000603 RevL