![Allied Telesis logo]

MMC10G Series

Layer 1 Mini Media Converters

- ❑ MMC10GSP/SP
- ❑ MMC10GT/SP

Installation Guide

Electrical Safety and Emissions Standards

This section contains the following:

❐ "US Federal Communications Commission"

❐ "Industry Canada"

❐ "Emissions, Immunity and Electrical Safety Standards" on page 4

❐ "Translated Safety Statements" on page 4

US Federal Communications Commission

Radiated Energy

Note
This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Note
Modifications or changes not expressly approved of by the manufacturer or the FCC, can void your right to operate this equipment.

Industry Canada

Radiated Energy

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Emissions, Immunity and Electrical Safety Standards

RFI Emissions   FCC Class A, EN55032 Class A, CISPR 32 Class A, VCCI Class A, RCM

⚠️ **Warning**
In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. ✍ E84

EMC (Immunity) EN55024, EN55035, EN61000-3-2, EN61000-3-3

Electrical Safety EN60950-1 (TUV), UL 60950-1 ($_C$UL$_{US}$), UL62368-1, EN62368-1, CAN/CSA C22.2 No. 60950-1

⚠️ **Warning**
Laser Safety: EN60825 ✍ L7

Translated Safety Statements

Important: Safety statements that have the ✍ symbol are translated into multiple languages in the *Translated Safety Statements* document at **www.alliedtelesis.com/library**.

Remarque: Les consignes de sécurité portant le symbole ✍ sont traduites dans plusieurs langues dans le document *Translated Safety Statements,* disponible à l'adresse **www.alliedtelesis.com/library**.

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Preface

This preface contains the following sections:

❒ "Symbol Conventions" on page 12
❒ "Contacting Allied Telesis" on page 13

This guide contains the installation instructions for the following Layer 1 Mini Media Converters.

❒ MMC10GSP/SP
❒ MMC10GT/SP

Symbol Conventions

This document uses the following conventions:

Note
Notes provide additional information.

Caution
Cautions inform you that performing or omitting a specific action may result in equipment damage or loss of data.

Warning
Warnings inform you that performing or omitting a specific action may result in bodily injury.

Warning
Laser warnings inform you that an eye and skin hazard exists due to the presence of a Class 1 laser device.

Contacting Allied Telesis

If you need assistance with this product, you may contact Allied Telesis technical support by going to the Services & Support section of the Allied Telesis web site at **www.alliedtelesis.com/support**. You can find links for the following services on this page:

- ❐ Helpdesk (Support Portal) - Log onto Allied Telesis interactive support center to search for answers to your questions in our knowledge database, check support tickets, learn about Return Merchandise Authorizations (RMAs), and contact Allied Telesis technical experts.

- ❐ Software Downloads - Download the latest software releases for your product.

- ❐ Licensing - Register and obtain your License key to activate your product.

- ❐ Product Documents - View the most recent installation guides, user guides, software release notes, white papers and data sheets for your product.

- ❐ Warranty - View a list of products to see if Allied Telesis warranty applies to the product you purchased and register your warranty.

- ❐ Allied Telesis Helpdesk - Contact a support representative.

To contact a sales representative or find Allied Telesis office locations, go to **www.alliedtelesis.com/contact**.

Chapter 1
Overview

This chapter contains the following sections:

Introduction

The MMC10G Series Mini Media Converters extend the distance of your network by interconnecting LAN devices that are physically separated by large distances.

The MMC10G Series Mini Media Converters include the following models:

❑ MMC10GSP/SP

❑ MMC10GT/SP

The MMC10GSP/SP is a fiber mode converter, and can be used for fiber extension.

The MMC10GT/SP is a copper-to-fiber converter, which can be used in Telecom or Enterprise applications where 10 Gigabit media conversion and fiber extension is required.

Note
The MMC10G Series converters can support 1Gbps and 10Gbps speeds, but as a layer 1 device cannot perform speed translation, so both endpoints must be matched.

Front and Back Panels

Figure 1 illustrates the front panel of the MMC10GT/SP Media Converter.
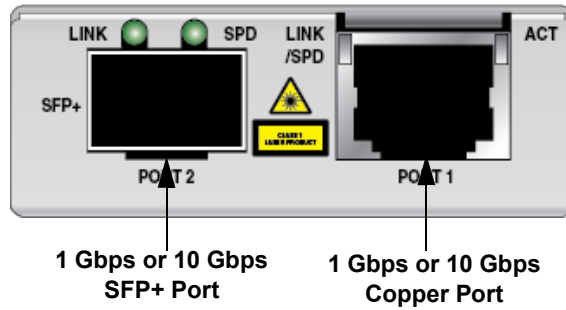
Figure 1. MMC10GT/SP Front Panel

Figure 2 illustrates the front panel of the MMC10GSP/SP Media Converter.
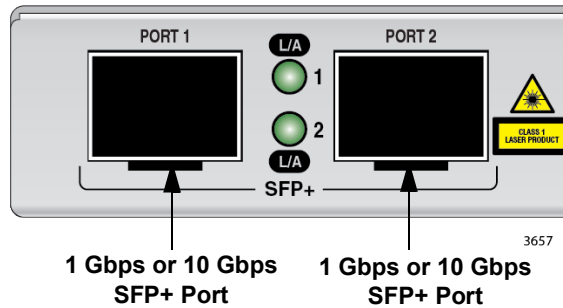
Figure 2. MMC10GSP/SP Front Panel

Figure 3 illustrates the back panel of the MMC10G Series Media Converter.
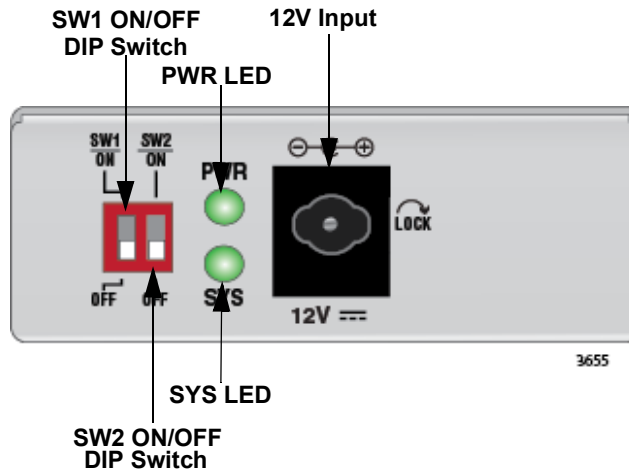
Figure 3. Media Converter Back Panel

Note

Alternately, the back panel may be labeled differently as shown in Figure 4. The DIP switches have the same ON/OFF function as described in Table 6 on page 24.
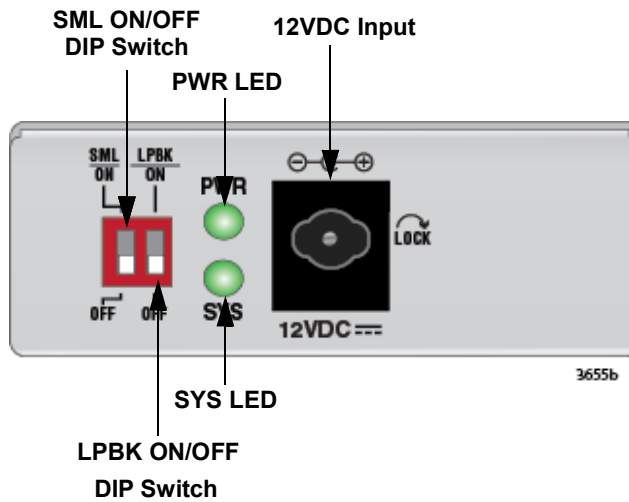
Figure 4. Alternate Media Converter Back Panel

Port Specifications

The MMC10GSP/SP Media Converter allows enterprises to connect fiber networks to fiber networks, offering a cost-effective method for integrating fiber-optic cabling into 1Gbps SFP or 10Gbps SFP+. See Table 1 for the port specifications of the MMC10GSP/SP Media Converter.

Table 1. Port Specifications for the MMC10GSP/SP

Model	Fiber-optic Port 1		Fiber-optic Port 2	
	Connector	L1 Standard	Connector	L1 Standard
MMC10GSP/SP	SFP+	1000BASE-X/ 10GBASE-R	SFP+	1000BASE-X/ 10GBASE-R

The MMC10GT/SP Media Converter allows enterprises to connect copper networks to fiber networks, offering a cost-effective method for integrating fiber optic cabling into an unshielded twisted pair (UTP) environment. See Table 2 for the port specifications of the MMC10GT/SP Media Converter.

Table 2. Port Specifications for the MMC10GT/SP

Model	Fiber-optic Port		Copper Port	
	Connector	L1 Standard	Connector	L1 Standard
MMC10GT/SP	SFP+	1000BASE-X/ 10GBASE-R	RJ-45	1000BASE-T/ 10GBASE-T

Features

Here are the key features of the MMC10G Series Media Converters:

❑ 10G copper cabling up to 100m with CAT6A

❑ MMC10GSP/SP supports two SFP+ ports

❑ MMC10GT/SP supports one SFP+ port and one copper RJ45 port

❑ MMC10GSP/SP can operate with any combination of supported multi-mode modules, single-mode modules, or direct attach cables

❑ MMC10GT/SP can convert between 10GBASE-T and any of the supported multi-mode modules, single-mode modules, or direct attach cables

❑ Supports 100% traffic throughput and has no packet restrictions

❑ Supports built-in loopback mode for installation verification and troubleshooting

❑ MMC10GT/SP supports packet generation mode for troubleshooting

❑ Facilitates quick fault detection, isolation and reporting with Smart MissingLink™ (SML)

❑ Includes a DIP switch for activating the SML feature

❑ Includes a DIP switch for Loopback mode

❑ Utilizes a 12 VDC external wall-mount AC power adapter

❑ Displays LEDs for immediate visual status of each port

❑ Provides a smaller sized space-saving alternative to connected networks

❑ Includes installation options such as desktop, media converter chassis, or wall mount bracket

❑ Provides low latency (~50ns)

❑ Supports 1G to 1G or 10G to 10G modes

❑ Auto-detects SFP+ speed

❑ Complies with RoHS requirements

❑ Complies with Trade Act Agreement (TAA) requirements

❑ Applies Auto Negotiation and Auto MDI/MDI-X on the twisted-pair port

Note

The SFP+ transceivers are sold separately. The maximum operating distance of the MMC10G Series is dependent on the specific SFP+ module. For a list of supported transceivers, refer to the product's data sheet.

Twisted-Pair Port

Here are the basic features of the twisted-pair (copper) port on the MMC10GT/SP:

- ❑ 1Gbps or 10Gbps
- ❑ IEEE 802.3u Auto-Negotiation compliant
- ❑ Auto MDI/MDI-X
- ❑ 100 meters (328 feet) maximum operating distance
- ❑ RJ45 connector

The twisted-pair port features an eight-pin RJ45 connector that uses all eight pins at 1Gbps or 10Gbps. For the port pinouts, see "RJ45 Connector and Port Pinouts" on page 71.

Note

For twisted-pair port cabling specifications, refer to "Cabling Guidelines" on page 62.

Auto-Negotiation or Full-Duplex

The MMC10GT/SP Media Converter supports Auto-Negotiation at 1Gbps or 10Gbps. The copper port will only link at the speed of the installed SFP+ module. For example, if a 10G SFP+ module is installed, the copper port can only link at 10G.

Auto MDI/ MDI-X

The 10Gbps RJ45 twisted-pair port on MMC10GT/SP can have one of two possible wiring configurations: MDI or MDI-X.

The media converter features Auto MDI/MDI-X. The twisted-pair port automatically determines the configuration of the port on the device to which it is connected and then configures itself appropriately.

This feature allows you to use a straight-through cable when connecting any type of device to the media converter, regardless of the wiring configuration of the port on the device.

Loopback Tests

Loopback tests are used to test the fiber optic network connection. In loopback mode, the copper port is disabled and the fiber port is set to loop all packets back to the sender, or generate packets, depending on the DIP switch setting. A linked switch port can transmit test packets over the fiber optic cable, which are then looped back by the connected MMC10G media converter. As the switch receives its original test packets, it checks for lost packets and packets with errors, and displays the results in statistic counters.

Guidelines

Here are guidelines for running a loopback test:

❒ Before entering the `test` command, you must run the following commands:

— `no spanning-tree rstp enable`

— `service test`

❒ After finishing a loopback test, you must run the `reboot` command to bring the configuration back to the previous state.

❒ Loopback tests only work for fiber optic ports, you cannot test a copper port.

❒ The fiber cable connectivity can only be tested using the SFP+ 10Gbps transmitter. It cannot be tested with SFP 1Gbps transmitter.

❒ Two SFP+ modules must be installed prior to enabling Loopback Mode, or loopback will not function properly.

❒ To use Loopback Mode, set SW1 to OFF and SW2 to ON. For more information about DIP switches and how to set them, see "DIP Switches" on page 27.

⚠ **Caution**

Loopback tests are disruptive to network operations. The media converters do not forward network traffic during the test. Some network traffic may be lost. ☞ E128

Loopback Test Example

Figure 5 on page 23 shows a test example, using an Allied Telesis switch as the link partner.

```
awplus> enable
awplus# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
awplus(config)# no spanning-tree rstp enable
awplus(config)# service test
awplus(config)# exit
awplus#
```

awplus#sh int port1.0.25-port1.0.26 status

Port	Name	Status	Vlan	Duplex	Speed	Type
port1.0.25		connected	10	a-full	a-10G	10GBASE-SR
port1.0.26		connected	11	a-full	a-10G	10GBASE-SR

----

awplus#test int port1.0.25-port1.0.26 time 1
awplus#Test on port1.0.25 complete
Test on port1.0.26 complete

awplus#sh test count

Board	ID	Bay	Board Name	Host Id	Rev	Serial number
Base	388	Base	AT-x930-28GPX	0	X3-0	A04879A143100019
PSU	452	PSU1	PWR150	0	B-0	A052844181300055

Interface	State	Duration (minutes)	Frame Counters Tx	RxGood	Control RxBad	RxTotal	OK	NG
eth0	no test	-	-	-	-	-	-	-
port1.0.1	no test	-	-	-	-	-	-	-
port1.0.2	no test	-	-	-	-	-	-	-
port1.0.3	no test	-	-	-	-	-	-	-
port1.0.4	no test	-	-	-	-	-	-	-
port1.0.5	no test	-	-	-	-	-	-	-
port1.0.6	no test	-	-	-	-	-	-	-
port1.0.7	no test	-	-	-	-	-	-	-
port1.0.8	no test	-	-	-	-	-	-	-
port1.0..	.t	-			-			
port1.0.22	no test	-	-	-	-	-	-	-
port1.0.23	no test	-	-	-	-	-	-	-
port1.0.24	no test	-	-	-	-	-	-	-
port1.0.25	complete	1	3066	3066	0	3066	0	0
port1.0.26	complete	1	3076	3076	0	3076	0	0
port1.0.27	no test	-	-	-	-	-	-	-
port1.0.28	no test	-	-	-	-	-	-	-

```
awplus# reboot

Are you sure you want to reboot the switch? (y/n): y
```

Figure 5. Loopback Test for MMC10GT/SP

A successful test verifies that the number of packets received equals the number of packets sent. If the numbers do not match, try restarting the media converter, making sure that the cables are connected properly or replacing the fiber cable.

LEDs   MMC10GT/SP and MMC10GSP/SP Back Panel

Figure 6 shows the PWR and SYS LEDs on the back panel.
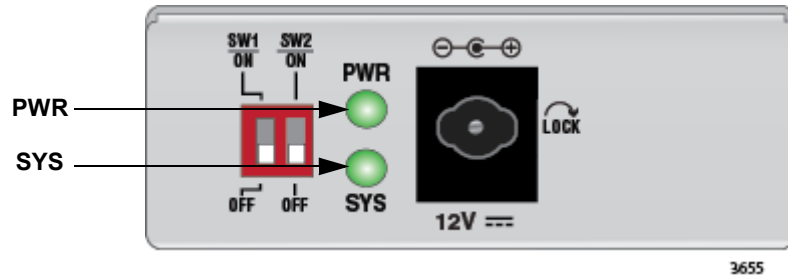
Figure 6. PWR and SYS LEDs on the Back Panel

Table 3 describes the media converter LEDs on the back panel.

Table 3. PWR and SYS LEDs on the Back Panel

LED	State	Description
PWR	Off	The media converter is not receiving power.
	Steady Green	The media converter is receiving power.
SYS	Off	The media converter is not operational and will not forward traffic.
	Steady Green	The media converter is operational in normal mode.
	Medium Flashing Green	The media converter is in Loopback mode.
	Slow Flashing Green	An error is present on the media converter. Or, an SFP in not valid.

MMC10GT/SP Front Panel

Figure 7 shows the port LEDs on the front panel of the MMC10GT/SP Media Converter.
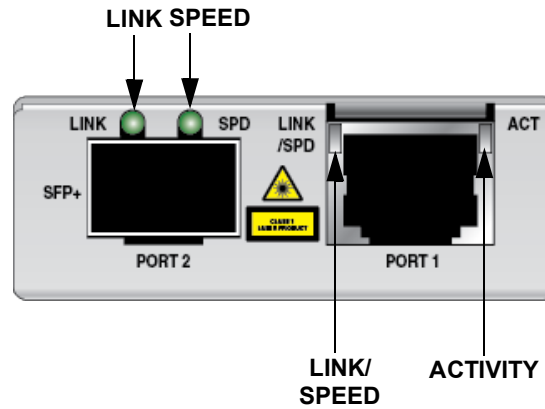
Figure 7. Port LEDs on the MMC10GT/SP Media Converter

Table 4 describes the port LEDs on the front panel of the MMC10GT/SP Media Converter.

Table 4. Port LEDs for the MMC10GT/SP

LED	State	Description
Port 1 Copper Link/Speed (Left)	Off	The port has not established a link.
	Steady Green	The port has a 10G link to a network device.
	Steady Amber	The port has a 1G link to a network device.
	Slow Flashing Green	The media converter is operating in Smart MissingLink mode and the SFP+ port has lost link.
Port 1 Copper Activity (Right)	Off	The port has not established a link.
	Steady Green	The copper port has an established a link.
	Flashing Green	There is network activity through the media converter
	Slow Flashing Green	The media converter is operating in Smart MissingLink mode and the SFP+ port has lost link.

Table 4. Port LEDs for the MMC10GT/SP (Continued)

LED	State	Description
Port 2 Fiber Optic Link (Left)	Off	The port is empty or the transceiver has not established a link.
	Steady Green	The port has a link to a network device.
	Slow Flashing Green	The media converter is operating in Smart MissingLink mode and the copper port has lost link.
Port 2 Fiber Optic Speed (Right)	Steady Green	The media converter has detected an installed 10G SFP+ module and is operating at 10Gbps.
	Steady Amber	The media converter has detected an installed 10G SFP+ module and is operating at 10Gbps.
	Off	The port is empty or the transceiver has not established a link.
	Alternating Flashing Amber and Green	The port is empty and does not have a transceiver inserted. Or, the installed transceiver is invalid.

MMC10GSP/SP Front Panel

Figure 8 shows the port LEDs on the MMC10GSP/SP Media Converter.
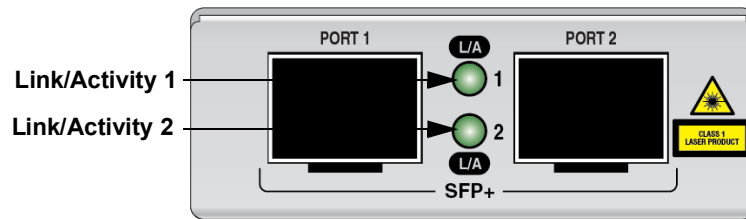
Figure 8. Port LEDs on the MMC10GSP/SP Model

Table 5 describes the port LEDs on the MMC10GSP/SP model.

Table 5. Port LEDs for the MMC10GSP/SP Model

LED	State	Description
Ports 1 and 2 Link/Activity	Off	The port has not established a link.
	Steady Green	The port has established a link to a network device.
	Slow Flashing Green	The media converter is operating in Smart Missing Link mode, and the other port has lost link.

DIP Switches

The DIP switches enable/disable SML and Loopback Modes. Refer to Figure 9.
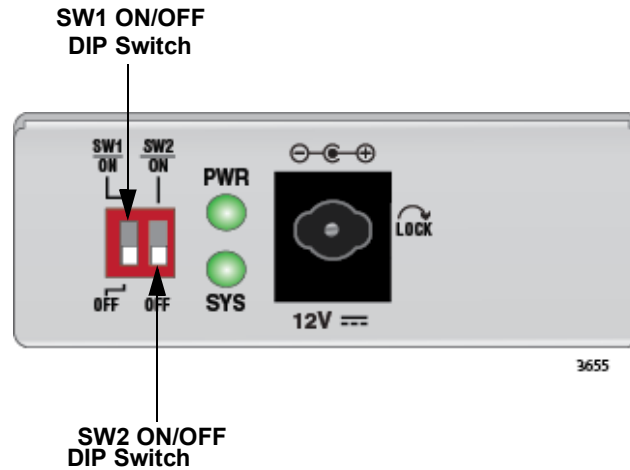
Figure 9. Media Converter Back Panel

Note

Alternately, the back panel may be labeled differently as shown in Figure 10. The DIP switches have the same ON/OFF function as described in Table 6.

**SW1/SML ON/OFF
DIP Switch**

**SW2/LPBK ON/OFF
DIP Switch**
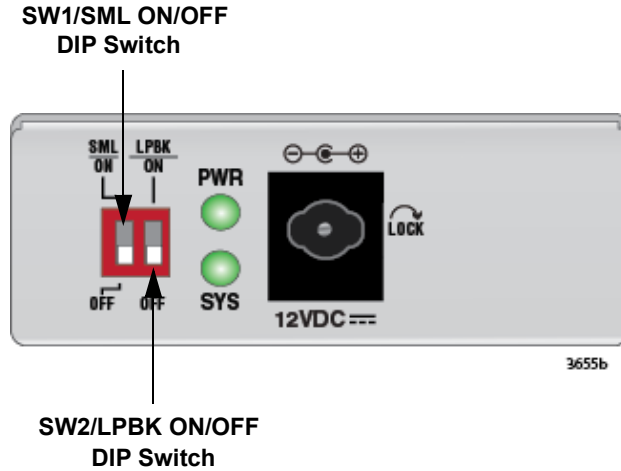
Figure 10. Alternate DIP Switch Labels

Table 6 describes the functions of the DIP switches.

Table 6. DIP Switches for the MMC10GT/SP Model

SW1/SML	SW2/LPBK	Description
Off/Down	Off/Down	Normal operation (no missing link)
On/Up	Off/Down	Smart MissingLink mode enabled
Off/Down	On/Up	Loopback mode enabled
On/Up	On/Up	**MMC10GT/SP only:** Packet generation enabled **MMC10GSP/SP only:** MissingLink mode enabled

LED Modes

The ports have LEDs that display link status and traffic activity. The LEDs have three modes:

- ▢ Regular mode
- ▢ Smart MissingLink mode
- ▢ MissingLink mode

Normal Mode

The Link/Activity LEDs on the media converter DIP switch set to the normal mode (i.e., SML and Loopback Mode are not switched on) display the status of the links on the ports to network devices. For instance, the LEDs are solid green when ports have established links to network devices, or flashing green when they are actively transmitting or receiving network traffic. Conversely, the LEDs are off on ports that are not connected to network devices or have not established links to devices.

The normal mode is typically used when the network devices connected to a media converter cannot take advantage of the Smart MissingLink mode, or when you want to use the Link LEDs to troubleshoot a link problem. This mode is also useful after you have installed the media converter modules and want to verify whether the ports have successfully established links with the local and remote network devices.

Smart MissingLink™ (SML)

If one of the Ethernet connections to the media converter loses a link, the SML feature allows you to determine which port still has a valid connection and which port requires troubleshooting. The value to this type of network monitoring and fault notification is that you can quickly determine which media converter port has failed and troubleshoot the specific area where the problem is occurring.

> **Note**
> SML only works with 10G connections.

When the media converter detects a loss of connection on one of the ports, the port's Link LED is turned OFF. At the same time, the media converter causes the opposite port's Link LED to blink while simultaneously turning OFF that port's Ethernet connection to its end node. This occurs even though the properly operating port had a valid connection before the failure occurred. The reason for this is so that its end node is notified that the data path has been compromised, and immediate action is required.

For example, if the network connection to the MMC10GT/SP Media Converter's twisted-pair port fails (as shown in Figure 14 on page 31), the fiber Port 2 Link LED blinks slowly while the fiber port's link is turned OFF.

The copper Port 1 Link LED is turned OFF, indicating a failed connection on the twisted-pair port.

If the failure had started with the fiber-optic cabling (as shown in Figure 15 on page 31), then the copper Port 1 Link LED would blink slowly, and the fiber Port 2 Link LED would turn OFF.

SML Example Scenarios in Normal Condition

Following are example scenarios with SML-enabled media converters.

Figure 11 shows Link LED behavior of end nodes and a media converter with copper and fiber ports with SML enabled under normal condition.

Figure 11. SML in Normal Condition with One Media Converter

Figure 12 shows Link LED behavior of end nodes and MMC10GT/SP media converters with SML enabled under normal condition. Two media converters with copper and fiber ports are connected in this configuration.

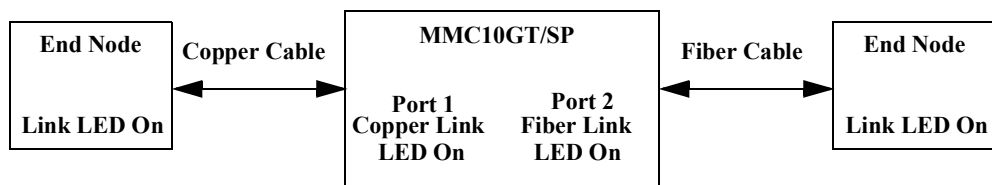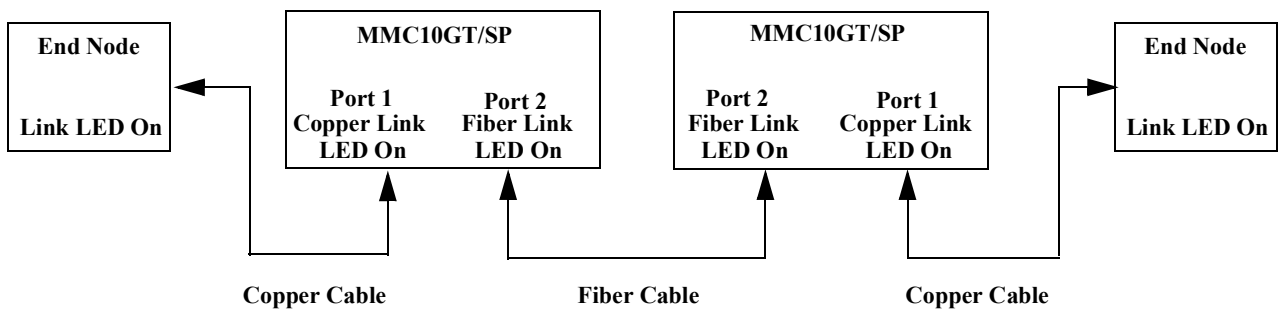Figure 12. SML in Normal Condition with Two MMC10GT/SP Media Converters

Figure 13 shows Link LED behavior of end nodes and MMC10GSP/SP media converters with SML enabled under normal condition. Two media converters with fiber ports are connected in this configuration.

Note

For SML to function properly in a back-to-back scenario, Port 2 must be used to connect the two media converters together.

```
                    ┌─────────────────┐   ┌─────────────────┐
┌───────────┐       │  MMC10GSP/SP    │   │  MMC10GSP/SP    │       ┌───────────┐
│ End Node  │       │                 │   │                 │       │ End Node  │
│           │ ◄──── │  Port 1  Port 2 │   │  Port 1  Port 2 │ ────► │           │
│Link LED On│       │Fiber Link Fiber Link│ │Fiber Link Fiber Link│   │Link LED On│
└───────────┘       │ LED On   LED On │   │ LED On   LED On │       └───────────┘
                    └─────────────────┘   └─────────────────┘
```
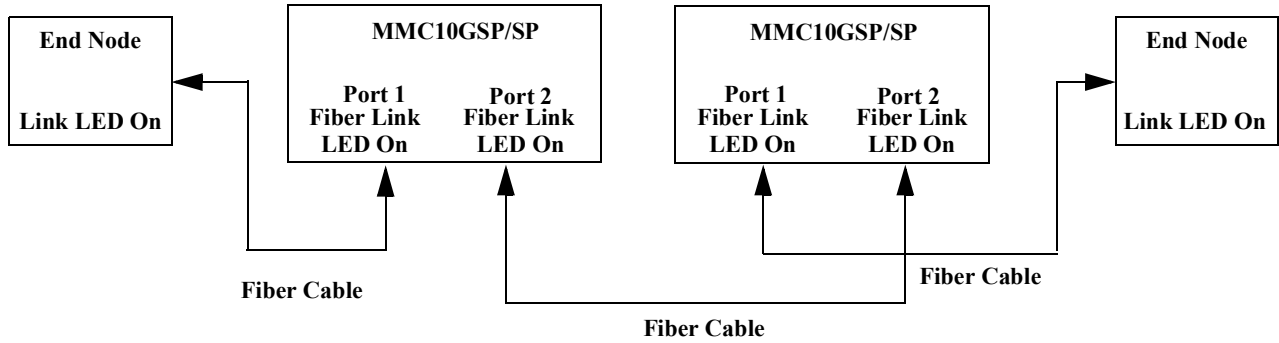
Figure 13. SML in Normal Condition with Two MMC10GSP/SP Media Converters

SML Example Scenarios with Connection Down in One Media Converter Configuration

Figure 14 shows the MMC10GT/SP media converter and end node Link LED behavior with SML enabled with a copper connection down.

```
┌───────────┐              ┌─────────────────┐             ┌───────────┐
│ End Node  │ Copper Cable │  MMC10GT/SP     │ Fiber Cable │ End Node  │
│           │ ◄──╳──►      │                 │ ◄──────►    │           │
│Link LED Off│             │  Port 1   Port2 │             │Link LED Blinking│
└───────────┘              │Copper Link Fiber Link│        └───────────┘
                           │ LED Off  LED Blinking│
                           └─────────────────┘
```

Figure 14. SML with Copper Connection Down in One Media Converter Configuration

Figure 15 shows the MMC10GT/SP media converter and end node Link LED behavior with SML enabled with a fiber connection down.

```
┌───────────┐              ┌─────────────────┐             ┌───────────┐
│ End Node  │ Copper Cable │  MMC10GT/SP     │ Fiber Cable │ End Node  │
│           │ ◄──────►     │                 │ ◄──╳──►     │           │
│Link LED Off│             │  Port 1   Port 2│             │Link LED Off│
└───────────┘              │Copper Link Fiber Link│        └───────────┘
                           │LED Blinking LED Off │
                           └─────────────────┘
```

Figure 15. SML with Fiber Connection Down in One Media Converter Configuration

SML Example Scenarios with Connection Down in Two Media Converters Configuration

Following are example scenarios with two SML enabled media converters connected back-to-back (bookend mode).

Figure 16 shows the MMC10GT/SP media converter and end node Link LED behavior with SML enabled with a copper connection down between a media converter and an end node.
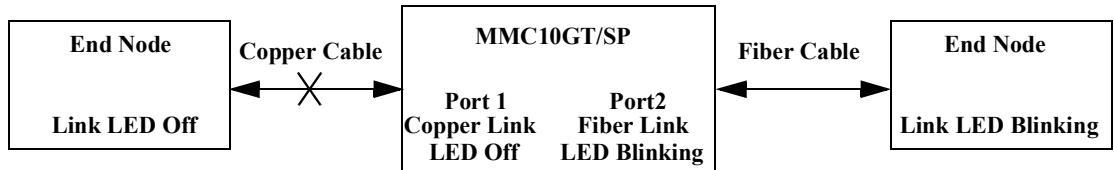
Figure 16. SML with Copper Connection Down in Two Media Converters Configuration

Figure 17 shows the MMC10GT/SP media converter and end node Link LED behavior with SML enabled with a fiber connection down between two media converters.
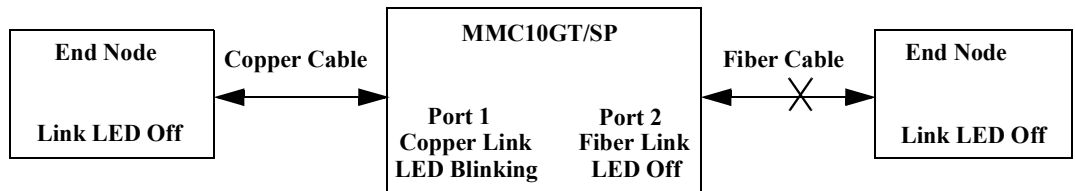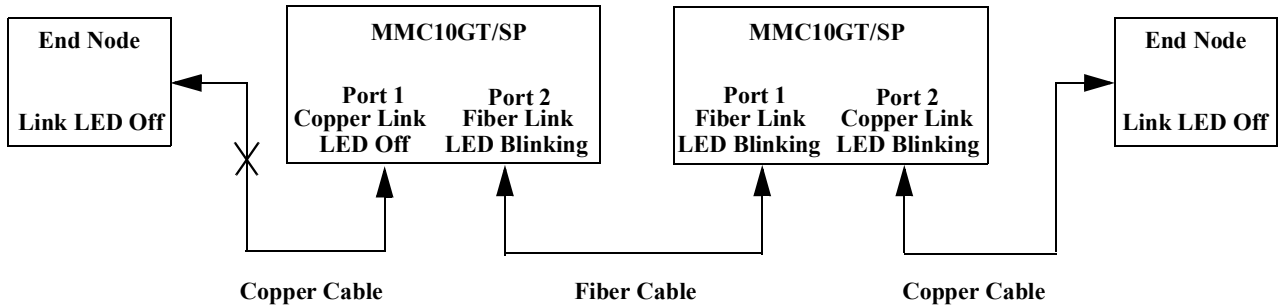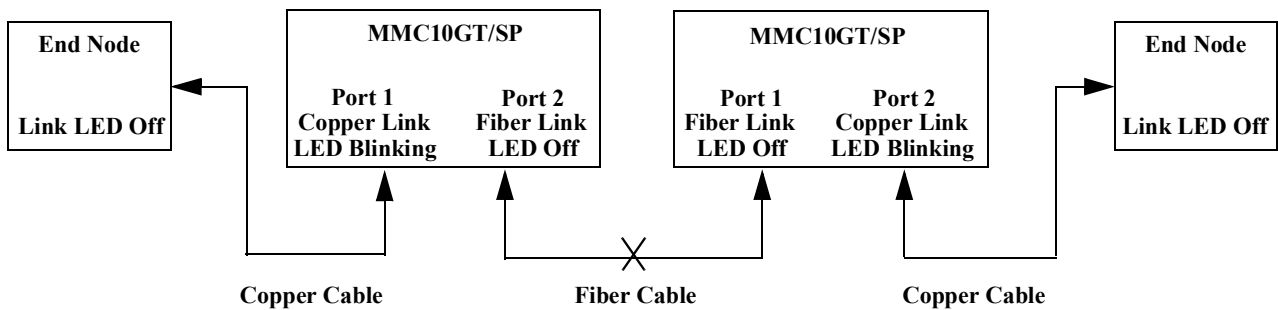
Figure 17. SML with Fiber Connection Down in Two Media Converters Configuration

SML Example Scenarios with Connection Down in Two Media Converter Configuration

Figure 18 shows MMC10GSP/SP media converter and end node Link LED behavior with SML enabled with a P1 fiber connection down between a media converter and an end node. This forces the P2 link down and flaps the P2 link status.

```
┌──────────────┐      ┌─────────────────────────┐   ┌─────────────────────────┐    ┌──────────────┐
│  End Node    │      │      MMC10GSP/SP         │   │      MMC10GSP/SP         │    │  End Node    │
│              │◄───  │                          │   │                         │ ──►│              │
│ Link LED Off │      │  Port 1        Port 2    │   │  Port 1        Port 2   │    │ Link LED Off │
│              │      │ Fiber Link   Fiber Link  │   │ Fiber Link   Fiber Link │    │              │
│              │      │  LED Off    LED Blinking │   │ LED Blinking LED Blinking│   │              │
└──────────────┘      └─────────────────────────┘   └─────────────────────────┘    └──────────────┘

        Fiber Cable                         Fiber Cable

               Fiber Cable (Link Flapping)
```
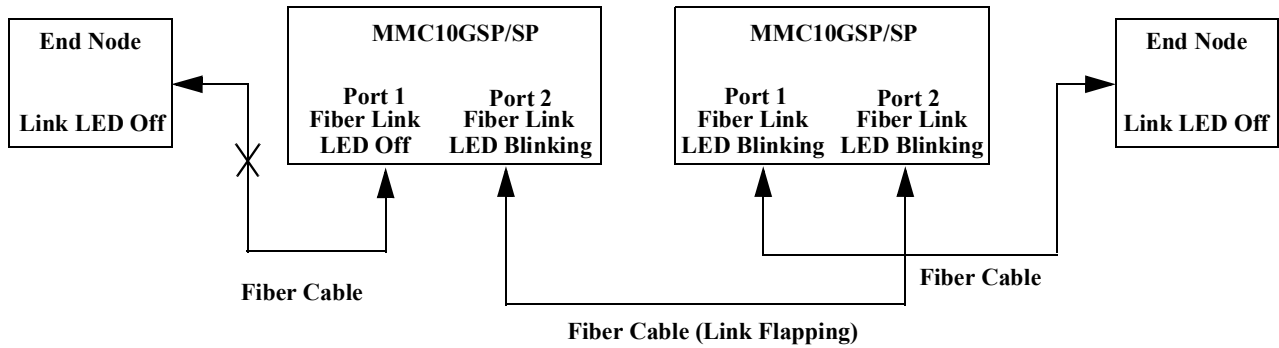
Figure 18. SML with P1 Fiber Connection Down and Link Flapping

Figure 19 shows MMC10GSP/SP media converter when P2 detects a link down or flapping, it behaves the same as ML Mode which forces P1 link down and blinks P1 LED, but does NOT flap the P1 status.

```
┌──────────────┐      ┌─────────────────────────┐   ┌─────────────────────────┐    ┌──────────────┐
│  End Node    │      │      MMC10GSP/SP         │   │      MMC10GSP/SP         │    │  End Node    │
│              │◄───  │                          │   │                         │ ──►│              │
│ Link LED Off │      │  Port 1        Port 2    │   │  Port 1        Port 2   │    │ Link LED Off │
│              │      │ Fiber Link   Fiber Link  │   │ Fiber Link   Fiber Link │    │              │
│              │      │LED Blinking   LED Off    │   │ LED Blinking  LED Off   │    │              │
└──────────────┘      └─────────────────────────┘   └─────────────────────────┘    └──────────────┘

        Fiber Cable                         Fiber Cable

               Fiber Cable
```
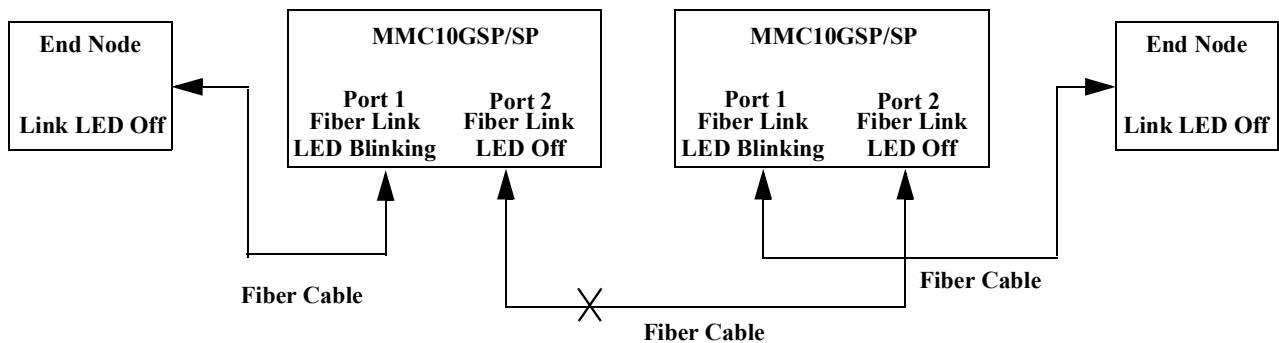
Figure 19. SML with Fiber Connection Down in Two Media Converters Configuration and No Flapping

Figure 20 on page 34 shows MMC10GSP/SP media converter and end node Link LED behavior with SML enabled with a P1 fiber connection down between a media converter and an end node. This forces the P2 link down and flaps the P2 link status.
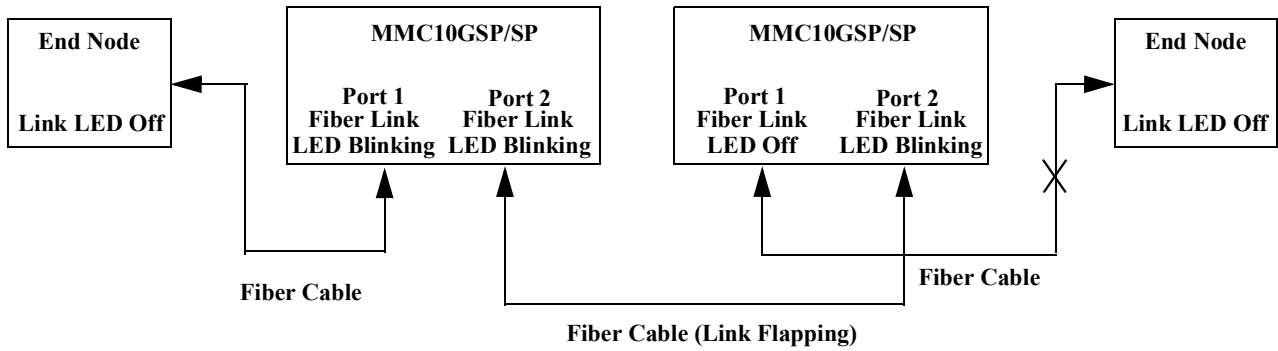
Figure 20. SML with P2 Fiber Connection Down and Link Flapping

Enabling SML

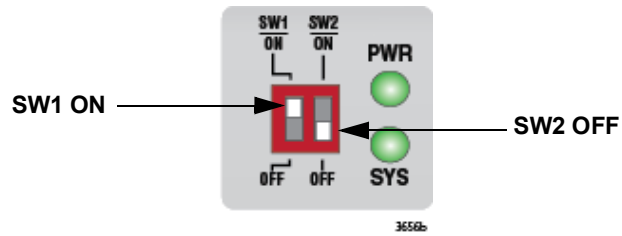To enable SML on the unit, set SW1 to the ON (up) position and SW2 to the OFF (down) position. See Figure 21.

Figure 21. SW1 and SW2 DIP Switches

MissingLink Mode

ML Example Scenarios in Normal Condition

Note

The MissingLink Mode applies to the MMC10GSP/SP Media Converter only.

Following are example scenarios with ML-enabled media converters.

Figure 22 shows Link LED behavior of end nodes and a media converter with fiber ports with ML enabled under normal condition.
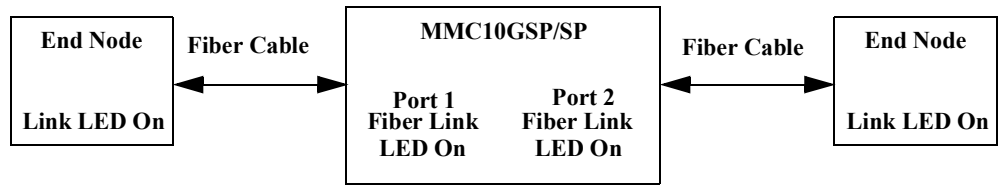

Figure 22. ML in Normal Condition with One Media Converter

ML Example Scenarios with Connection Down in One Media Converter Configuration

Figure 23 shows a media converter and end node Link LED behavior with ML enabled with a fiber connection down.
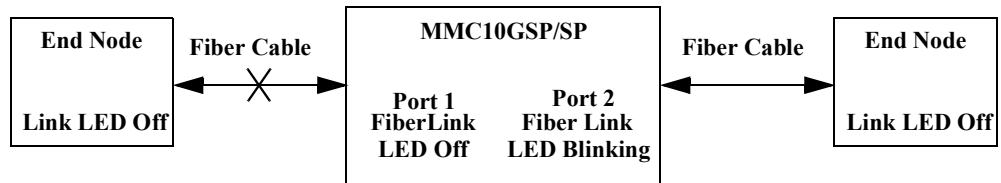

Figure 23. ML with Fiber Connection Down in One Media Converter Configuration

Figure 24 shows media converter and end node Link LED behavior with SML enabled with a fiber connection down.
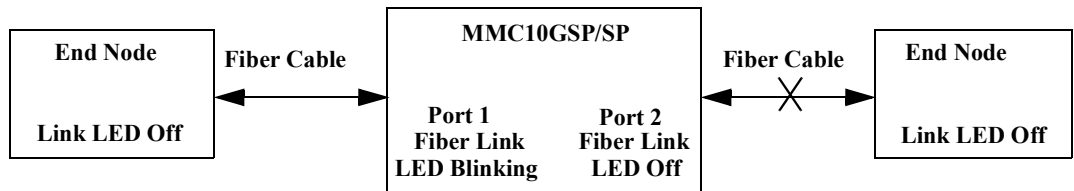

Figure 24. ML with Fiber Connection Down in One Media Converter Configuration

Enabling ML (MMC10GSP/SP Only)

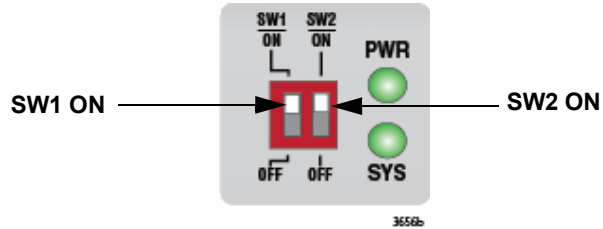To enable ML on MMC10GSP/SP, set SW1 and SW2 to the ON (up) position. See Figure 21.

Figure 25. SW1 and SW2 DIP Switch

Packet Generation Mode

In packet generation mode, the MMC10GT/SP will send a continuous stream of 1496-byte LLC/SNAP packets with empty source and destination addresses on the fiber port. This can be helpful when trying to diagnose cable connection issues; the MMC10GT/SPP can be connected to one end of the fiber cable, and the user can monitor activity at the other end to verify connectivity.

Note

This is a diagnostic mode and should not be used for normal operation.

Enabling Packet Generation Mode (MMC10GT/SP Only)

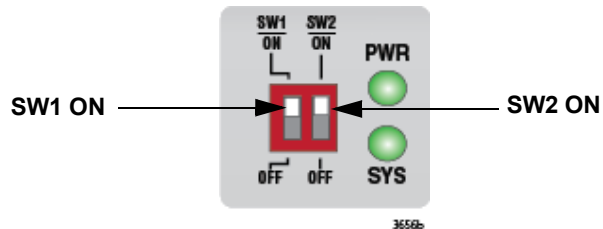To enable packet generation mode on MMC10GT/SP, set SW1 and SW2 to the ON (up) position. See Figure 21.

Figure 26. SW1 and SW2 DIP Switch

Guidelines to the LED Modes

Here are the guidelines to using the LED modes:

❐ Smart MissingLink mode is the default for MMC10GT/SP.

❐ MissingLink mode is the default for MMC10GSP/SP.

❐ The LED modes do not block or interfere with the flow of traffic between the two ports during normal network operations.

❐ Smart MissingLink and Regular modes are useful in identifying ports that cannot establish links to network devices or have lost links. In Smart MissingLink mode, if only one port has a link to a network device, the LED for the port that lost link will be off, while the LED for the port that had a valid link will blink once a second. In contrast, if the media converter is set to Regular mode, and only one port has a link to a network device, its Link LED will be on while the Link LED on the port with no link will be off.

Note
The MMC10GT/SP cannot link in 1G mode unless both ports have valid link partners

❐ The Smart MissingLink mode can also be useful in situations where both network devices connected to the ports can react to the loss of a link by performing specific actions, such as sending SNMP traps or seeking a redundant path.

External AC/DC Power Adapter

The media converter comes with a UL-approved safety compliant AC power adapter for 120 and 240 VAC environments, with a regulated output of 12 VDC. The power required for the media converter is 12 VDC, 350 mA.

The power adapter comes with four plugs. Install the correct plug for your region on the power adapter. Refer to "Unpacking the Media Converter" on page 47 and "Applying Power and Connecting the Network Cables" on page 62.

Note
The media converter power receptacle has a twist-and-lock barrel which is locked by turning the power cord clockwise one-quarter turn.

Resetting the Media Converter

You may have to power cycle the media converter when entering or exiting loopback or packet generation mode. If so, reset the media converter by powering OFF then powering ON the unit.

Chapter 2

Beginning the Installation

This chapter contains the following sections:

Reviewing Safety Precautions

Important: Safety statements that have the ↶ symbol are translated into multiple languages in the *Translated Safety Statements* document at **www.alliedtelesis.com/library**.

Remarque: Les consignes de sécurité portant le symbole ↶ sont traduites dans plusieurs langues dans le document *Translated Safety Statements,* disponible à l'adresse **www.alliedtelesis.com/library**.

Review the following safety precautions before you begin to install the chassis or any of its components.

Note

The ↶ indicates that a translation of the safety statement is available in a PDF document titled *Translated Safety Statements* on the Allied Telesis website at **www.alliedtelesis.com/support**.

Caution

Air vents must not be blocked and must have free access to the room ambient air for cooling. ↶ E6

Note

All Countries: Install product in accordance with local and National Electrical Codes. ↶ E8

Note

The power input must be provided from SELV source only, per IEC60950. Do not connect to a centralized DC battery bank. ↶ E31

Warning

Operating Temperature. MMC10GT/SP is designed for a maximum ambient temperature of 40° C and the MMC10GSP/SP for 50° C. ↶ E138

⚠️ **Caution**

Failing to pick up the ferrule tip when you reach the bottom of the cleaning surface can result in static electricity that can damage the fiber-optic cable. ↜ E82

⚡ **Warning**

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. ↜ E84

⚡ **Warning**

An SFP+ transceiver can be damaged by static electricity. Be sure to observe all standard electrostatic discharge (ESD) precautions, such as wearing an antistatic wrist strap, to avoid damaging the transceiver. ↜ E86

⚠️ **Caution**

Only use the power adapter supplied with the device. ↜ E102

☀️ **Warning**

Do not stare into the laser beam. ↜ L2

☀️ **Warning**

Do not look directly at the fiber-optic cable ends or inspect the cable ends with an optical lens. ↜ L6

☀️ **Warning**

Laser Safety: EN60825-1. ↜ L7

Selecting a Site for the Media Converter

Observe the following requirements when choosing a site for your media converter:

❑   If you are installing the media converter on a table, verify that the table is level and secure.

❑   The power outlet for the media converter should be located near the unit and should be easily accessible.

❑   The site should provide for easy access to the ports on the front of the media converter. This will make it easier for you to connect and disconnect cables, as well as view the media converter's LEDs.

❑   Do not restrict air flow around the unit and through its vents on the side so that the media converter can maintain adequate cooling.

❑   Do not place objects on top of the media converter.

❑   Do not expose the media converter to moisture or water.

❑   Use dedicated power circuits or power conditioners to supply reliable electrical power to the network devices.

Planning the Installation

Observe the following guidelines when planning the installation of your media converter.

❑ On the MMC10G Series Media Converters, the end nodes connected to the fiber/copper connectors on the media converter must operate at the same speed, either 1Gbps or 10Gbps.

❑ The MMC10G Series Media Converter ports support full-duplex mode.

❑ The devices connected to the two ports on the media converter can be a network adapter card, repeater, switch, media converter, or router.

❑ The twisted-pair port has a maximum operating distance of 100 meters (328 feet).

❑ The fiber port maximum operating distance depends on the SFP+ type.

❑ The MMC10G model has a plug-in SFP+ cage fiber connection. 1Gbps and 10Gbps modules are supported.

> **Note**
>
> For the MMC10G Series Media Converters, you must purchase the SFP+ transceiver separately. The maximum operating distance of the MMC10G Series Media Converter is dependent on the specific SFP+ module. For a list of supported transceivers, contact your Allied Telesis distributor or reseller.

Table 7 contains the cable specifications for the twisted-pair port.

Table 7. Twisted-Pair Port Cabling Specifications

Speed	Type of Cable
10Gbps	Cat 6A or 7 cable required for 100m operation. Cat 6 cable is good for up to 55m. Cat 5e cable is supported for short and medium cable lengths, but maximum distance is not specified.
1Gbps	Standard TIA/EIA 568-A-compliant Cat 5 or TIA/EIA 568-B-compliant Enhanced Cat 5 (Cat 5e) shielded or unshielded cabling with 100 ohm impedance and a frequency of 100 MHz.

Note

The twisted-pair port on the MMC10GT/SP Media Converter features Auto MDI/MDI-X when operating at 1Gbps and 10Gbps. The port is configured as MDI or MDI-X when it is connected to an end node. Consequently, you can use a straight-through twisted-pair cable when connecting any type of network device to the twisted-pair port on the media converter.

Unpacking the Media Converter

To unpack the media converter, perform the following procedure:

1. Remove all of the components from the shipping package.

    Note

    Store the packaging material in a safe location. You must use the original shipping material if you need to return the unit to Allied Telesis.

2. Place the media converter on a level, secure surface.

3. In addition to the media converter, verify that the shipping container includes the following items. Figure 27 shows shipping container items for the MMC10GSP/SP and the MMC10GT/SP Media Converters.
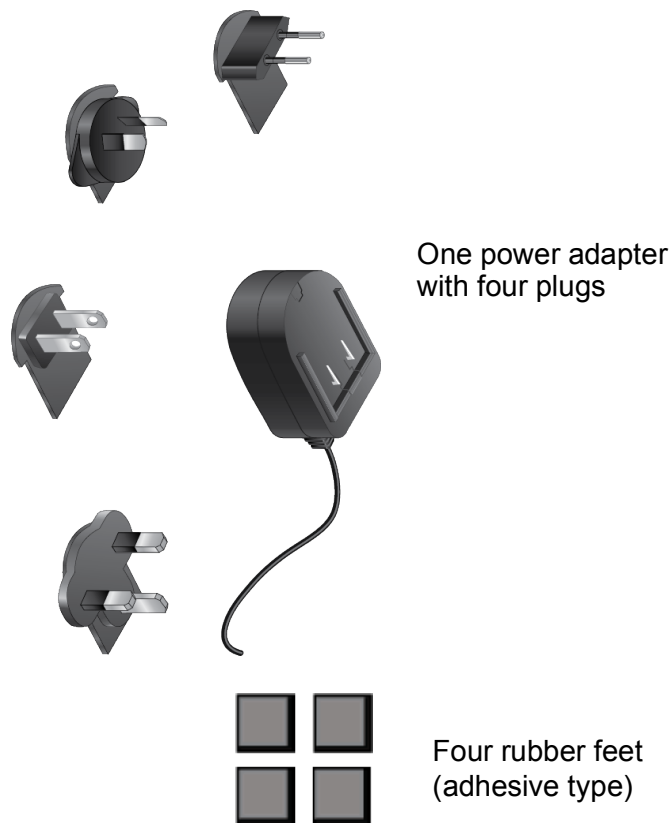
One power adapter
with four plugs

Four rubber feet
(adhesive type)

Figure 27. Shipping Package Contents

Supported Accessories

MMCWLMT Wall Mount Kit

The MMCWLMT Wall Mount Kit is used for wall mounting. For installation instructions see "MMCWLMT Kit Installation" on page 54.
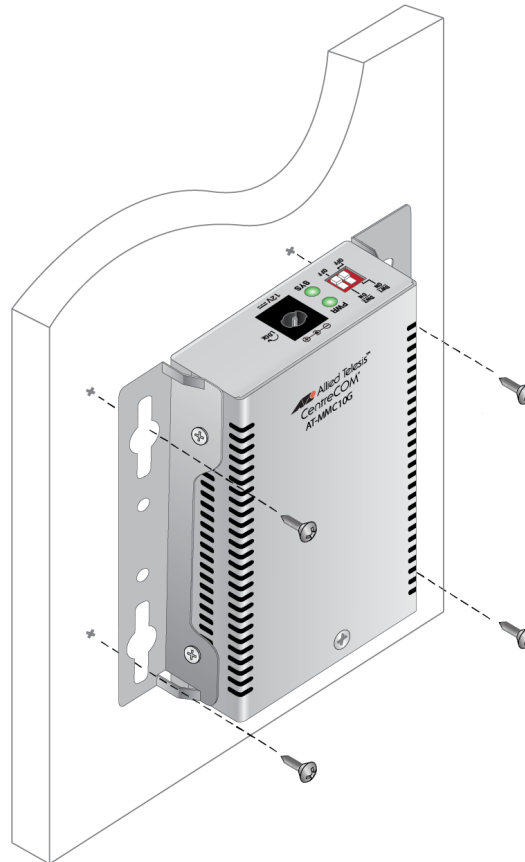
Figure 28. MMCWLMT Kit with Brackets

MMCR18 Chassis Kit

The MMCR18 Chassis Kit is used as a power chassis. The MMCR18 rack-mount chassis provides rack-mount or desktop installation for up to 18 MMC Series Media Converters. The chassis is available in both AC and DC power supply units. For installation instructions, see Allied Telesis' *AT-MMCR18 Media Converter Rack-mount Chassis Installation Guide*

Note

The MMCR18 can support up to 12 MMC10G units with fiber SFP+ modules. The MMCR18 cannot support 18 MMC10G units, because of the higher power draw of the MMC10G compared to the MMC2000. Using copper SFP+ modules in the MMC10GSP/SP will further reduce the number of units supported, due to additional power requirements.

Figure 29. MMCR18 Rack-mount Chassis

MMCTRAY6 Tray

The MMCTRAY6 Tray is used for rack mounting. The tray provides rack-mount installation for up to six MMC Series Media Converters. The tray itself does not provide power to the MMC Series Media Converters. For installation instructions, see Allied Telesis' *Installation Guide AT-MMCTRAY6 6-slot Tray for the MMC Series Media Converters.*
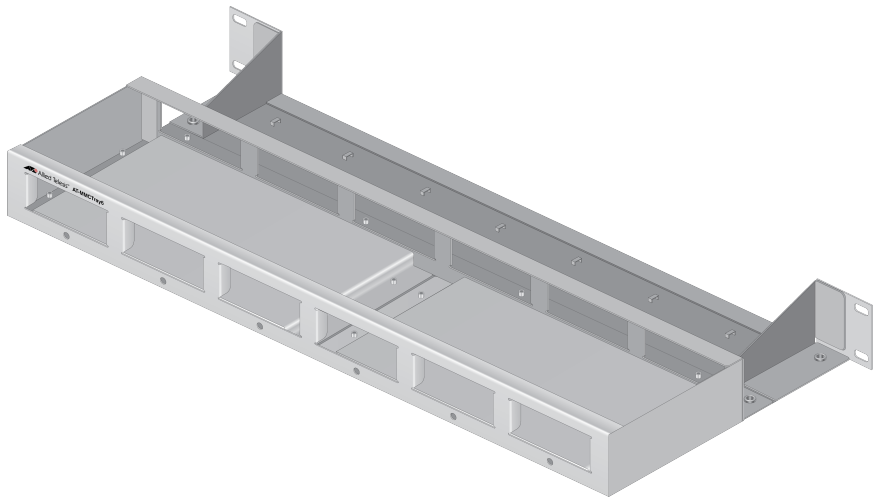

Figure 30. MMCTRAY6 Tray

Chapter 3
Installation

This chapter contains the following sections:

Installation Options

You may install the media converter on a desktop, wall or rack:

❑ To install the media converter on a desktop, see "Desktop Installation," next.

❑ To install the media converter on a wall, see "MMCWLMT Kit Installation" on page 54.

Note
To install the media converter on a wall, you must purchase the MMCWLMT Kit separately.

❑ To install the media converter in a rack, see Allied Telesis' *AT-MMCR18 Media Converter Rack-mount Chassis Installation Guide*. For another option to install the media converter in a rack, see Allied Telesis' *Installation Guide AT-MMCTRAY6 6-slot Tray for the MMC Series Media Converters.*

Desktop Installation

To install the media converter on a desktop, perform the following procedure:
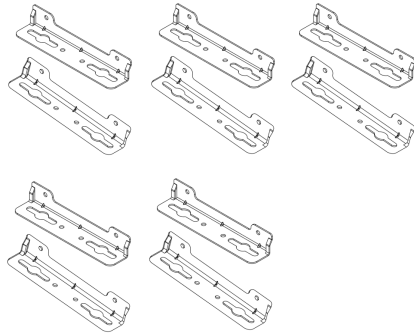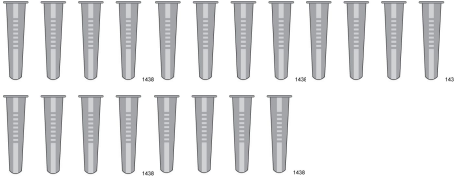
1. Place the media converter upside down on a flat, secure surface (such as a desk or table).

2. Affix the four adhesive rubber feet on the bottom of the media converter, one on each corner.

3. Turn the media converter right side up and place it on the desk or table, leaving ample space around the unit for ventilation.

4. Go to "Installing the SFP Transceiver" on page 60.

MMCWLMT Kit Installation

Before installing an MMC10G Series Media Converter on a wall, you must have an MMCWLMT Kit that is provided separately.

1. Verify that the MMCWLMT Kit contains the items shown in Table 8.

Table 8 MMCWLMT Kit Contents

Description	Illustration
5 Sets of Wall Mounting Brackets	
20 Bracket Screws	
20 Wall Mount Screws	
20 Plastic Anchors	

2. Select a wall location for the unit.

3. Place the unit on a table.

4. Orient the brackets against the sides of the unit, as shown in Figure 31, and secure them to the unit with the four of the brackets screws included.
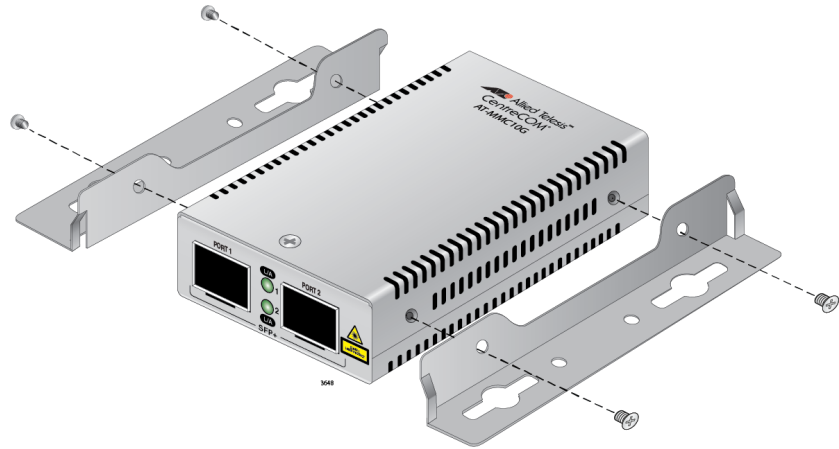
Figure 31. Attaching the Brackets to the Media Converter

5. Print out the template in Figure 32.
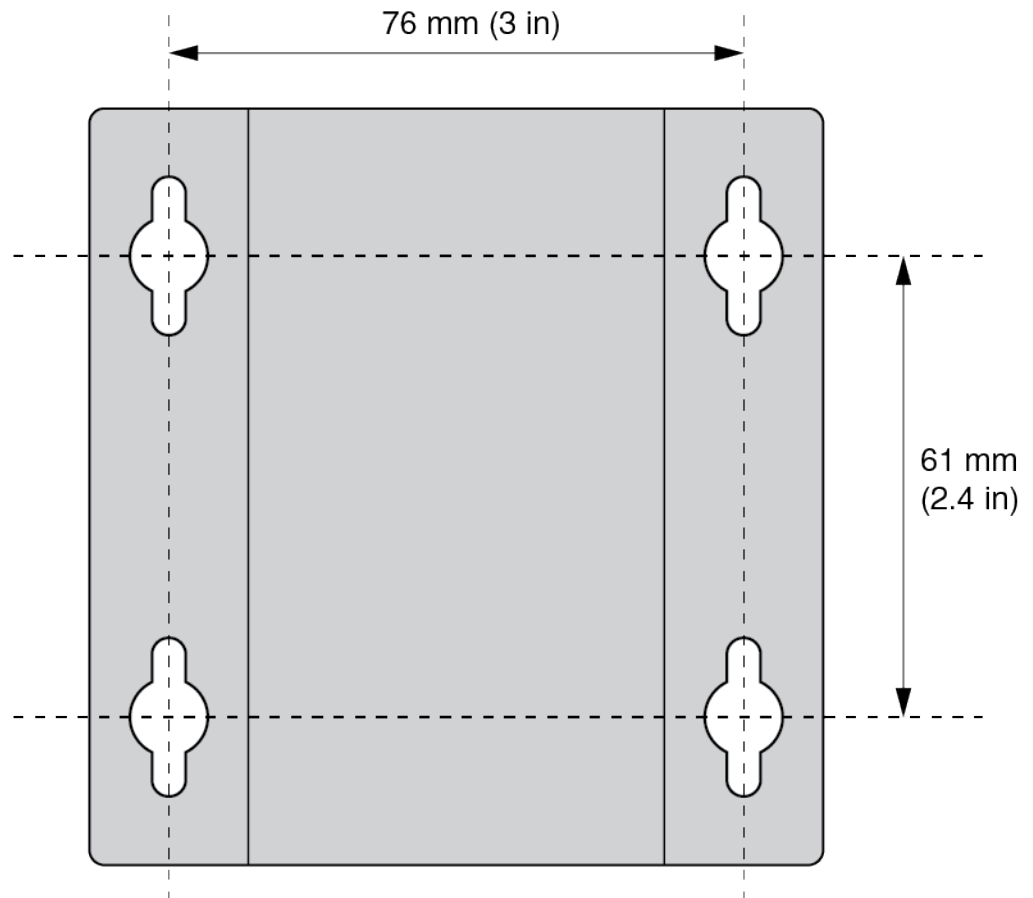
Figure 32. Wall-mount Template

6. Use scotch tape to attach the template on the wall.

7. Pre-drill four 3/16" (5mm) holes at the locations on the template as shown in Figure 33.
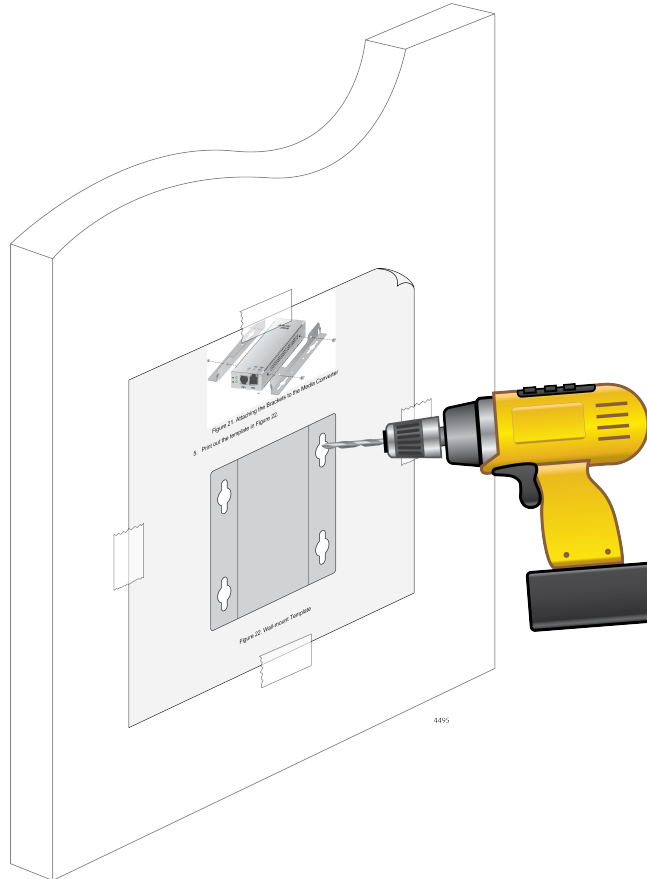
Figure 33. Placing the Template on the Wall

8. Remove the template from the wall.

9. Install four plastic anchors included with MMCWLMT Kit into the wall, in the holes you drilled in the previous step.

10. Secure the media converter unit to the wall using four wall-mounting screws. See Figure 34 on page 57.
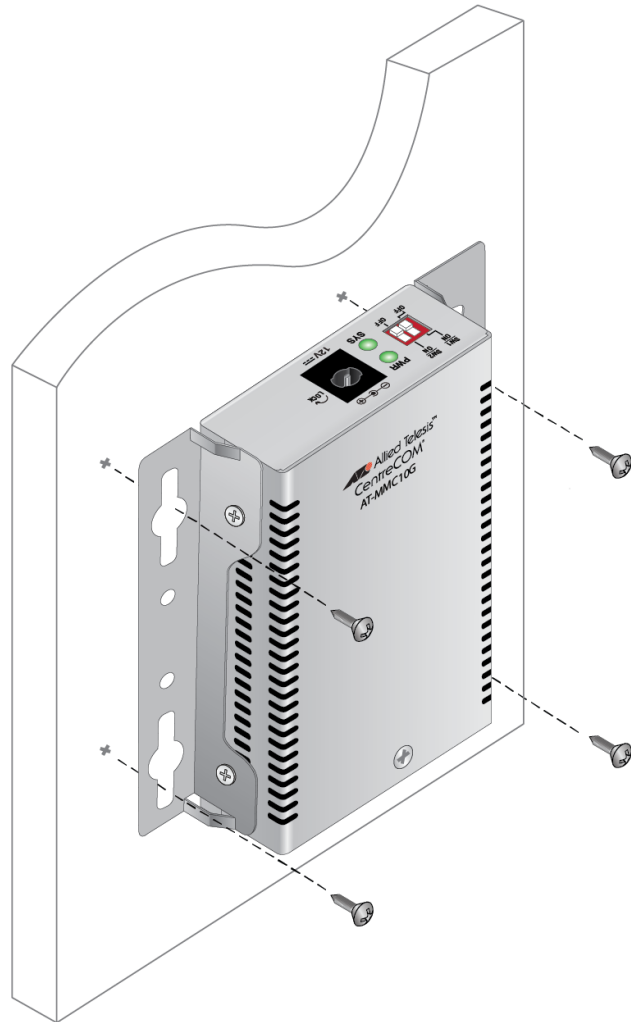
Figure 34. Securing the Media Converter to the Wall

11. Go to "Installing the SFP Transceiver" on page 60.

Chapter 4

Powering On and Cabling the Media Converter

This chapter contains the following sections:

❑ "Installing the SFP Transceiver" on page 60

❑ "Powering On and Cabling the Media Converter" on page 62

Installing the SFP Transceiver

To install an SFP transceiver, perform the following procedure:

> **Note**
>
> The transceiver can be hot-swapped; you do not need to power off the media converter to install a transceiver. However, always remove the cable before removing the transceiver.

> **Note**
>
> You should always install the transceiver before connecting the fiber-optic cable to it.

1. Remove the transceiver from its shipping container and store the packaging material in a safe location.

> ⚠️ **Warning**
>
> An SFP transceiver can be damaged by static electricity. Be sure to observe all standard electrostatic discharge (ESD) precautions, such as wearing an antistatic wrist strap, to avoid damaging the transceiver. ℰ E86

2. Position the SFP transceiver with the label facing up. Slide the transceiver into the SFP port until it clicks into place. See Figure 35.
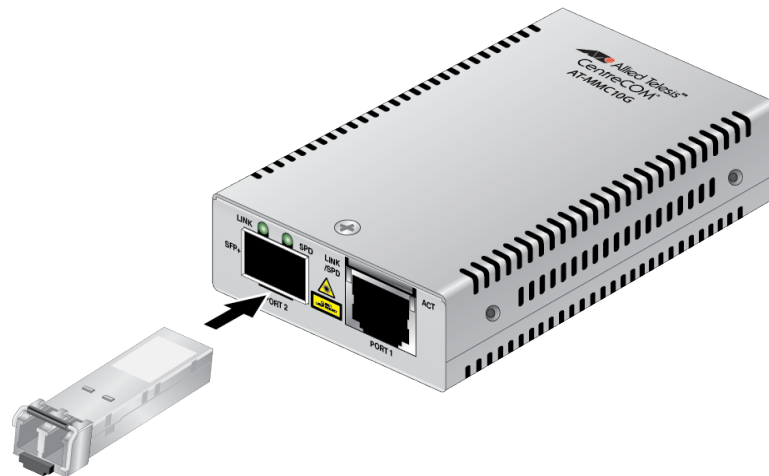
Figure 35. Inserting the SFP

3. Verify that the handle on the transceiver is in the upright position, as shown in Figure 36. This secures the transceiver and prevents it from being dislodged from the port.

SFP Transceiver Handle
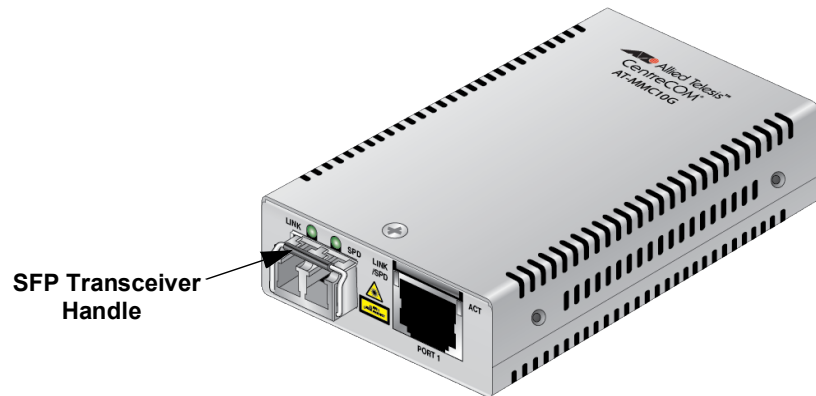
Figure 36. Positioning the SFP Handle in the Upright Position

---

Note

SFP transceivers are dust-sensitive. Always keep the plug in the optical bores when a fiber-optic cable is not installed, or when storing the SFP. When you do remove the plug, keep it for future use.

Note

Unnecessary removal and insertion of an SFP transceivers can lead to premature failure.

For information on the cable specifications of the SFP transceiver, consult the documentation shipped with the SFP transceiver.

4. Go to "Powering On and Cabling the Media Converter" on page 62.

Powering On and Cabling the Media Converter

Cabling Guidelines   Observe the following guidelines when connecting twisted-pair and fiber-optic cables to the ports on the media converter:

❑ The connector on the cable should fit snugly into the port on the media converter. The tab on the connector should lock the connector into place.

❑ Because the twisted-pair port has Auto MDI/MDI-X, you may use straight-through twisted-pair cable to connect any type of network device to that port.

❑ For the fiber optic cables, refer to the cable manufacturer specification for the minimum bend radius.

Applying Power and Connecting the Network Cables   To apply power to the media converter and connect the network cables, perform the following steps:

1. Plug the DC of the external power adapter to the power receptacle connector labeled 12VDC on the back panel of the media converter and turn the cord clockwise one-quarter turn to lock, as shown in Figure 37.
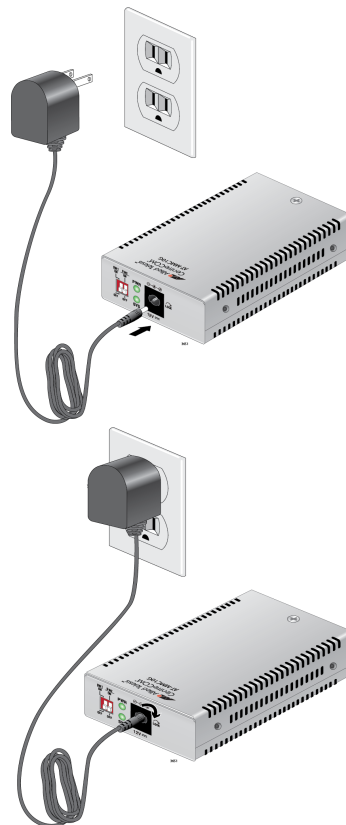
Figure 37. Connecting 12VDC Powered Unit

2. Plug the power adapter to a power outlet. Refer to "Power Specifications" on page 70 for power requirements.

3. Verify that the PWR LED is lit green. If the PWR LED is off, refer to "Troubleshooting" on page 65.

4. Verify that the SYS LED is lit green. If the SYS LED is off, refer to "Troubleshooting" on page 65.

5. If the media converter has a fiber-optic connector, remove the dust cover from the fiber-optic connector and connect the cable to the fiber-optic port.

6. For the MMC10GSP/SP model, repeat this step for the other fiber optic port.

7. For the MMC10GT/SP model, connect the twisted-pair cable to the twisted-pair port.

8. Power on the end nodes.

The media converter is now ready for use.

Chapter 5
Troubleshooting

This chapter contains information on how to troubleshoot the media converter if a problem occurs.

Note

For further assistance, please contact Allied Telesis Technical Support at **www.alliedtelesis.com/support**.

Problem 1: The PWR LED on the media converter is off.

Solutions: The unit is not receiving power. Try the following:

- ❑ Verify that the power cord is securely connected to the power source and to the DC connector on the back panel of the media converter.
- ❑ Verify that the power outlet has power by connecting another device to it.
- ❑ Try using another power adapter of the same type that came with your media converter.
- ❑ Verify that the voltage from the power source is within the required levels for your region.

Problem 2: The SYS LED on the media converter is off.

Solution: An internal component on the unit is damaged or not working properly. Try power cycling the unit. If power cycling does not clear the fault, return the unit to Allied Telesis.

Problem 3: The SYS LED on the media converter is blinking slowly.

Solutions: The media converter may be in Loopback mode or an error is present on the unit. Try power cycling the unit.

A transmit fault may be occurring on the SFP+ module. The media converter will try to clear this error, but if the error persists, try the following:

- ❑ Remove and re-seat the SFP+ module.
- ❑ Try a different SFP+ module.
- ❑ Verify the SFP+ module is the correct type for your application.

Problem 4: The twisted-pair Port 1 on the MMC10GT Media Converter is connected to an end node, but the port's copper Port 1 LINK LED is off.

Solutions: The port is unable to establish a link to an end node. Try the following:

□ Verify that the end node connected to the twisted-pair port is powered on and is operating properly.

□ Verify that the twisted-pair cable is securely connected to the port on the media converter channel and to the port on the remote end-node.

□ Verify an SFP module is installed and recognized by the media converter (MMC10GT/SP).

□ Verify that the port is connected to the correct twisted-pair cable. This is to eliminate the possibility that the port is connected to the wrong end-node, such as a powered-off device.

□ Try connecting another end node to the twisted-pair port with a different cable. If the twisted-pair port is able to establish a link, then the problem is with the cable or the other end-node.

□ Verify that the twisted-pair cable does not exceed 100 meters (328 feet).

□ Verify that the end node connected to the media converter is operating at the same speed.

□ Verify that you are using the appropriate category of twisted-pair cable:

– 1G: Cat 5e

– 10G: Verify the cable length is not too long for the type of cabling used. See Table 7, "Twisted-Pair Port Cabling Specifications" on page 45.

Note

A connection may require 5 to 10 seconds to establish a link.

Problem 5: The LINK LED for an SFP+ port is off.

Solutions: The fiber-optic port on the transceiver is unable to establish a link to an end node. Try the following:

□ Verify that the end node connected to the fiber-optic port is operating properly.

□ Verify that the fiber-optic cable is securely connected to the port on the media converter and to the port on the remote end-node.

□ Verify that the end node connected to the media converter is operating at the same speed.

□ Check that the SFP+ module is fully inserted in the port.

❏ Verify that the operating specifications and wave lengths of the fiber-optic port on the SFP+ transceiver and the remote end-node are compatible.

❏ Verify that the correct type of fiber-optic cabling is being used.

❏ Verify that the port is connected to the correct fiber-optic cable. This is to eliminate the possibility that the port is connected to the wrong remote end-node, such as a powered-off device.

❏ Try connecting another end node to the fiber-optic port using a different cable. If the port is able to establish a link, then the problem is with the cable or with the other end node.

❏ Verify that the fiber TX strand is connected to link partner's RX, and vice versa.

❏ If the remote end node is a management device, use its management firmware to determine whether its port is enabled.

❏ Test the attenuation on the fiber-optic cable with a fiber-optic tester to determine whether the optical signal is too weak (sensitivity) or too strong (maximum input power).

Problem 6: Fiber speed LED is blinking and alternating between green and amber (MMC10GT).

Solution: The media converter cannot detect the speed of the installed SFP. The copper port is disabled in this scenario.

Problem 7: Network traffic is not being received at the end point.

Solution: Verify cabling by using loopback mode attached to a managed switch port that can transmit test packets.

Problem 8: Loopback mode is not working.

Solution: Power unit off. Install (or re-seat) two 10G SFP+ modules. Power unit on and check loopback.

Appendix A

Technical Specifications

Below are the technical specifications for the media converters. The specification categories are as follows:

❑ "Physical Specifications"

❑ "Environmental Specifications"

❑ "Power Specifications" on page 70

❑ "Safety and Electromagnetic Emissions Certifications" on page 70

❑ "RJ45 Connector and Port Pinouts" on page 71

Physical Specifications

Table 9. Physical Specifications

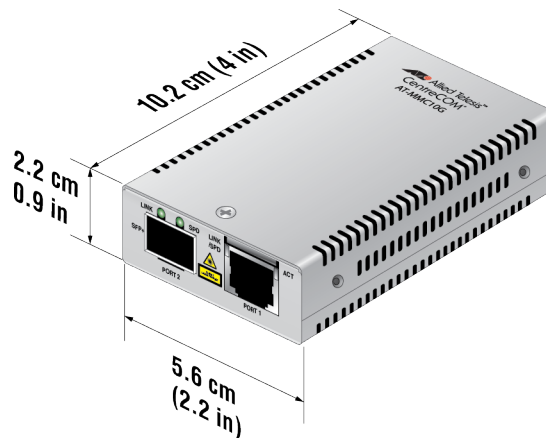| Dimensions W x D x H	5.6 cm x 10.2 cm x 2.2 cm (2.2 in x 4 in x 0.9 in)
Weight	170 g (6 oz)

Figure 38. MMC10G Series Dimensions

Environmental Specifications

Table 10. Environmental Specifications

Operating Temperature	MMC10GT/SP: 0° C to 40° C (32° F to 104° F) MMC10GSP/SP: 0° C to 50° C (32° F to 122° F)
Storage Temperature	-15° C to 70° C (-5° F to 158° F)
Operating Humidity	5% to 90% non-condensing
Storage Humidity	5% to 95% non-condensing
Operating Altitude Range	Up to 3,048 m (10,000 ft)

Power Specifications

The following specifications apply to the DC power connector on the media converter.

Table 11. Power Specifications

Input supply voltage	12 VDC
Maximum power draw	4.0 W
Maximum SFP+ power	1 W

Safety and Electromagnetic Emissions Certifications

Table 12. Safety and Electromagnetic Emissions Certifications

Safety	UL60950-1, EN60950-1, EN60825-1
Emissions (EMI)	FCC Part 15B Class A, CISPR 32 Class A, EN55032 Class A, RCM, VCCI Class A, ICES-003 Issue 6
Immunity	EN55024, EN61000-3-2, EN61000-3-3
Environmental Compliance	EU-RoHS compliant, WEEE China RoHS compliant

RJ45 Connector and Port Pinouts

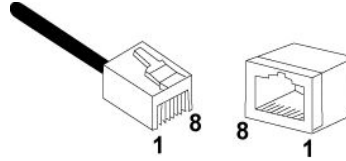Figure 39 illustrates the pin layout for the RJ45 connector and port.

Figure 39. RJ45 Connector and Port Pin Layout

Table 13 lists the pin signals when a port is operating at 1Gbps or 10Gbps.

Table 13. Pin Signals (1Gbps or 10Gbps)

Pin	Pair	Signal
1	1	TX/RX+
2	1	TX/RX-
3	2	TX/RX+
4	3	TX/RX+
5	3	TX/RX-
6	2	TX/RX-
7	4	TX/RX+
8	4	TX/RX-

Appendix A: Technical Specifications