Signamax Connectivity Systems

065-1096RED

10/100/1000BaseT/TX to 2-slot 1000BaseSX/LX Gigabit Redundant Link SFP Media Converter

User's Manual

Issue date: April 2008

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FCC WARNING

This equipment has been tested and found to comply with the limits for a class A device, pursuant to part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. 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 the user's own expense.

CE

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Take special care to read and understand all the content in the warning boxes:

Warning

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1 About This Guide

1.1 Welcome

Thank you for choosing the Signamax 065-1096RED 10/100/1000BaseT/TX to 2-slot 1000Base-SX/LX (SFP) Media Converter. This device integrates Gigabit Ethernet triple-speed copper and Gigabit fiber segments in a highly flexible package.

1.2 Purpose

This guide discusses how to install and configure your 10/100/1000BaseT/TX to 2-slot 1000Base-SX/LX (SFP) Media Converter.

1.3 Terms/Usage

In this guide, the term “Converter” (first letter upper case) refers to your 065-1096RED 10/100/1000BaseT/TX to 2-slot 1000BaseSX/LX (SFP) Media Converter, and “converter” (first letter lower case) refers to other converters.

1.4 Features

Standards:
- IEEE 10/100BaseT/TX
- IEEE 802.3ab 1000BaseT
- IEEE 802.3z 1000BaseSX/LX

Interface:
- One 10/100/1000 Mbps Ethernet port
- Auto MDI/MDI-X support on RJ-45 port
- Two SFP slots for redundant Gigabit Ethernet links
- Extends distances up to 550 m (1,804.46 ft) for multimode 850 nm fiber modules, or up to 110 km (317,625 ft) for singlemode fiber modules (dependent on SFP module chosen)

Redundancy:
- Fail-over on dual fiber links
- Issues an alarm if a fiber link fails
- Link Fault Signaling occurs when either the copper link or BOTH fiber links fail
- Automatically switches back to the primary fiber link if it recovers after a failure and fail-over to the redundant fiber link

Management:
- Alarm LED illuminates to indicate link failure
- Status LEDs for easy monitoring of device’s status

Mechanical & Environmental:
- External power supply

- FCC Class A & CE approved

1.5 Specifications

Standards:	IEEE 802.3 (10BaseT Ethernet); IEEE 802.3u (100BaseTX/ Fast Ethernet); IEEE 802.3ab (1000BaseT); IEEE 802.3z 1000BaseSX/LX	
Connectors:	1x RJ-45 2x Fiber SFP	
Max. Distance:	UTP: 100 m (Cat 5/5e/6) Fiber Optic: SFP; up to 550 m (multimode, 850 nm), 110 km (singlemode)	
Cable:	Multimode fiber optic: 50/125 or 62.5/125um Singlemode fiber optic: 9/125um Copper: Cat 5E/6 or better	
Data Rates:	Fiber: 1000 Mbps Copper: 10/100/1000 Mbps	
Unit LED:	PWR: ALM: PRI: (Fiber Link) RDT: (Fiber Link)	Illuminated for normal operation Illuminated when failure occurs on fiber or copper link Primary link – Illuminated when receiving link pulses from compliant devices Flashing when data packets are being transmitted / received Redundant link – Illuminated when receiving link pulses from compliant devices Flashing when data packets are being transmitted / received
DIP Switches:	DIP 1 – LFS: Enable/disable Link Fault Signaling (LFS)	
Power:	12V DC @ 0.5A, external power supply adapter Frequency: 50Hz to 60Hz	
Environment:	Temperature: Relative Humidity: Storage: Relative Humidity:	Operating: 0°C to 50°C 10% to 90%, non-condensing -20°C to 70°C 5% to 90%, non-condensing
Emissions:	FCC Part 15 of Class A & CE approved	
Dimensions:	110 x 74 x 23.4mm (L x W x H)	

1.6 Package Contents

The package should include the following:

- One Converter unit
- One power adapter (please check connector type and input power specification)
- Four self-adhesive pads
- User's Manual

2 Hardware Description

2.1 Product Overview

This 10/100/1000BaseT/TX to 2-slot 1000BaseSX/LX (SFP) Media Converter is primarily designed for larger workgroups which demand higher speed and broader bandwidth – and which require migration and expansion from copper-based Gigabit triple speed segments to fiber-based Gigabit networks.

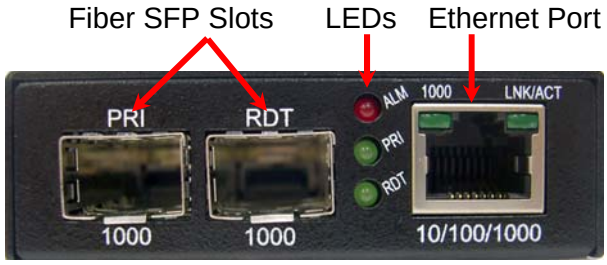
It features automatic MDI/MDI-X on the RJ-45 port that allows for direct connection to a workstation, switch or hub. Now, the network manager does not need to worry about the cable configuration (cross-over or straight-through) when establishing links between RJ-45 ports.

The Converter features an RJ-45 jack and two SFP slots which allows it to easily integrate a 10/100/1000BaseT/TX network to a 1000BaseSX/LX fiber network with redundant link. Data packets received on the copper port will be converted and transmitted to the primary fiber port as default. If this primary fiber link fails, the traffic will automatically be switched to the redundant fiber link. If the primary link recovers, the packets are instantly switched back to the primary port.

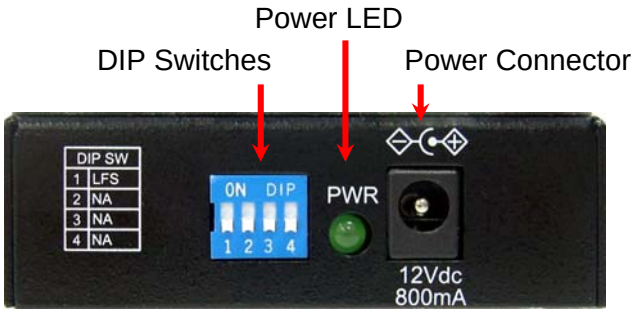
If the LFS DIP switch is set to ON, the Link Fault Signaling function is enabled. If the copper link fails, both fiber ports will be disabled by the Converter. If the primary fiber port loses signal, the traffic will be switched to the redundant port as a precaution. If both fiber ports lose signal, the copper port will be disabled by the Converter and thus enable the Spanning Tree Protocols of the neighboring switch to kick in. Any link failure will cause the ALM LED to light up, including during periods of precautionary switching to the redundant link and during Link Fault Signaling.

2.2 Product Illustrations

Front Panel



Rear Panel



2.3 DIP Switches

DIP 1	Enables / disables Link Fault Signaling (LFS)
DIP 2	N/A
DIP 3	N/A
DIP 4	N/A

3 LED Indicators

This Device has LED indicators located at the front of the device. The LEDs have been designed to give easy at-a-glance network status, and provide 'real-time' connectivity information. Please see below for an interpretation of their functions:

LED Indicators

LED	Condition	Status
PWR	On (Green)	Unit is receiving power
	Off	Power off or failure
LNK / ACT	On (Green)	Copper link up
	Flashing (Green)	Data packets being transmitted or received via Ethernet port
	Off	Copper link down
1000	On (Green)	1000 Base Mode
	Off	10/100 Base Mode
PRI	On (Green)	Primary fiber port receiving link signals
	Off	Signal loss on primary fiber port
RDT	On (Green)	Redundant fiber port receiving link signals
	Off	Signal loss on redundant fiber port
ALM	On (Red)	Any link failure or LFS

4 Installation

In this chapter, we will take a look at how to install the Converter within its operating environment. To install your Media Converter, please read the following subjects:

- Location
- 10/100/1000BaseT/TX port
- Gigabit SFP slot
- Link Fault Signaling
- Desktop installation
- Powering on unit

4.1 Location

The location selected for installing the Converter may greatly affect its performance. When selecting a site, we recommend considering the following rules:

1. Install the Converter in a fairly cool and dry place. See *Technical Specifications* for the acceptable temperature and humidity operating environments.
2. Install the Converter in a location free from strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.
3. Leave at least 10 cm of space at the front and rear of the unit for ventilation.
4. Affix the provided rubber pads to the bottom of the Converter for grip, and to protect the case from scratching.

4.2 10/100/1000BaseT/TX Port (RJ-45)

The auto MDI/MDI-X and auto-negotiation on the RJ-45 port eliminates the problem of cabling configuration when connecting the Converter to a 10/100/1000BaseT/TX device. It accepts both ‘straight-through’ and ‘cross-over’ Ethernet cables without the need to reconfigure the port. Whether connecting to a switch, LAN card, or other network device via the RJ-45 port, simply plug and go!

4.3 Redundant Gigabit SFP Slot

To connect a fiber cable’s connector to the Converter’s SFP slot, slide the selected SFP module (mini-GBIC) into the SFP slot, making sure that the module’s receptors line up with the receptors at the back of the slot. Push until you hear a click. Once the module is inserted correctly, take the cable connector and turn it so that it will fit into the mouth of the module. Then push the connector into the mouth until its catches click into the receiving grooves in the module’s mouth. Use the appropriate type of multi-mode or single-mode fiber, depending on the SFP module being used. The fiber optics transmit data at up to 1000Mbps and can maintain data integrity over cable distances as long as 110km, depending on the selected SFP (mini-GBIC) module.
The user traffic will be passed through the primary link once it is normally working. If the primary port loses optical signal because of fiber-cut, the traffic is automatically switched to the redundant link, and the Alarm (ALM) LED is lighted. When the primary link is back to normal, the traffic will be switched back to it automatically. The Link Fault Signaling (LFS) function takes effect if both links fail at fiber side and the function is enabled.

Warning:
Because invisible laser radiation may be emitted from the aperture of the fiber port when no cable is connected, avoid exposure to laser radiation and do not stare into the open apertures.

4.4 Link Fault Signaling

LFS is an important function that is extremely beneficial in terms of network status monitoring. The LFS function monitors both the copper and fiber segments to ensure that Spanning Tree Protocol responds the moment a link failure occurs on either segment.

Set LFS to **ON** for normal operations.

Set LFS to **OFF** when installing cables or when testing the network connection.

NOTE: The LFS feature influences both fiber and copper segments. When disruption occurs on the copper segment, the fiber segment will be disabled. When the fiber segment loses signal, the copper segment will be disabled.
To utilize the full benefits of LFS, four converters can be used to build a primary and a secondary path between two switches. The switches must support Spanning Tree or Fast Spanning Tree protocols. By default, transmission of data will travel via the primary path. If a link failure is detected, transmission will automatically be switched to the secondary path by Spanning Tree Protocol, delivering non-stop network connectivity.

4.5 Desktop Installation

Follow the instructions listed below to install the Converter in a desktop location.

1. Locate the Converter in a clean, flat and safe position that has easy access to AC power.
2. Affix the four (4) self-adhesive rubber pads to the underside of the Converter.
3. Apply AC power to the Converter. (The green PWR LED on the rear panel should light).
4. Connect cables from the network partner devices to the ports on the front panel. (The green LNK LED on the front panel associated with the port should light).

This converter can also be mounted on a vertical surface.

Warning:
Please exercise caution when using power tools. Also, install this unit away from damp or wet locations, or in close proximity to very hot surfaces. These types of environments can have a detrimental effect on the converter and cables. An ideal location is a lightly cooled place such as a typical equipment room.

4.6 Powering On the Unit

The Converter uses an external power supply of 9~32V DC @ 0.5A – 50Hz to 60Hz.

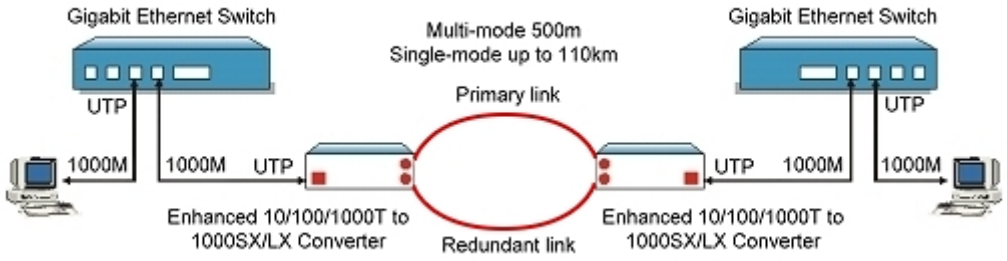
1. Insert the power cable plug directly into its receptacle located at the back of the device.
2. Plug the power adapter into an available socket.
3. Check the rear-panel LEDs as the device is powered on to verify that the Power LED is lit. If not, check that the power cable is correctly and securely plugged in.

5 Appendix: Application Diagrams

5.1 Application Diagram I

In the figure below, the Converter is functioning as a high-speed bridge between switches, creating increased capacity for each user (node) on the local area network. It is providing a 10/100/1000Mbps full duplex link to a variety of Fast Ethernet or Gigabit network devices within a LAN.

Switch ↔ CONVERTER ↔ CONVERTER ↔ Switch



5.2 Application Diagram II

In the figure below, the Converter is functioning as a server aggregation for an enterprise or LAN configuration. It is providing a 10/100/1000Mbps full-duplex link to a workgroup of 10/100/1000 switches located on separate floors within a single building.

Switch ↔ CONVERTER ↔ CONVERTER ↔ Server