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About Gigabit Modules

The SNMP-manageable **Gigabit** module provides a single conversion between 1000Base-T twisted pair and 1000Base-SX/LX fiber. Each *Gigabit* module includes one RJ-45 connector and one pair of SC fiber optic connectors, or an SC connector for single-strand fiber. *Gigabit* modules install in any Black Box modular, SNMP-manageable chassis series.

- Gigabit Module, TX/SX-MM850-SC (LGC5108C-R2)
- Gigabit Module, TX/LX-SM1310/PLUS-SC (LGC5109C-R2)
- Gigabit Module, TX/SSLX-SM1310-SC (LGC5844C)
- Gigabit Module, TX/SSLX-SM1550-SC (LGC5845C)
- Gigabit Module, TX/SSLX-SM1310/PLUS-SC (LGC5846C)
- Gigabit Module, TX/SSLX-SM1550/PLUS-SC (LGC5847C)

NOTE

If you have a previous version of the Gigabit module, please refer to the manual shipped with that module for installation and configuration information.

Configuration Instructions

Gigabit modules have user-configurable features. Please refer to the diagram/chart on page 2 for available features. Instructions for configuring both managed (via an SNMP-compatible management application like *iView*²) and unmanaged *Gigabit* modules follow.

MANAGED MODULES

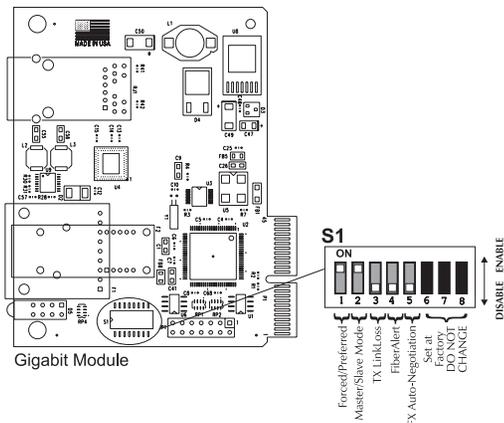
To manage one or more *SNMP Modules*, an SNMP agent must be present in the chassis: *Media Converter System II* chassis include embedded management; other SNMP-manageable media converters require a *Master Module*. When configuring managed modules, install the module first (see page 4), then configure it using the management software. Within *iView*² for *SNMP-Manageable Media Converters*, features and troubleshooting functions are configured in the Module Detail section under the picture of the module. See the *iView*² help file for more information.

NOTE

Management software will override hardware settings (e.g., jumper, switch, etc.), so you **MUST** configure a module that will be managed via the software. Until you configure a managed module via the software, the module (and its LEDs) may not work properly.

UNMANAGED MODULES

Before installing, configure *Gigabit Modules* for desired features. The diagrams below shows the switch location on *Gigabit*. The chart below states the available features and settings for each module. After configuring the switch for the desired settings, install the module (see page 5) and connect the appropriate cables.



SWITCH CONFIGURATION CHART			
Module	Feature	Switch	Default
GIGABIT R2 Board	Forced/Preferred*	DIP Switch 1 on S1	ON
	Master/Slave*	DIP Switch 2 on S1	ON
	TX LinkLoss	DIP Switch 3 on S1	OFF
	FiberAlert	DIP Switch 4 on S1	OFF
	FX Auto-Negotiation	DIP Switch 5 on S1	OFF

*These features are hardware configurable ONLY.

Please DIP switches appropriately for your application requirements.

About LinkLoss and FiberAlert

Gigabit modules include the troubleshooting features *FiberAlert* and *TX LinkLoss* that help locate "silent failures" on your network. It is vital that you understand how *FiberAlert* and *LinkLoss* work, and how they will react in your network configuration, before attempting to install the module(s).



Installing modules without understanding the effects of *FiberAlert/LinkLoss* can cause perfectly functioning units to appear flawed or even dead.

ABOUT LINK INTEGRITY

During normal operation, link integrity pulses are transmitted by all point-to-point Ethernet devices. When a Black Box media converter receives valid link pulses, it knows that the device to which it is connected is up and sending pulses, and that the copper or fiber cable coming from that device is intact. The appropriate "LNK" (link) LED is lit to indicate this.

FIBER OPTIC CLEANING GUIDELINES

Fiber Optic transmitters and receivers are extremely susceptible to contamination by particles of dirt or dust, which can obstruct the optic path and cause performance degradation. Good system performance requires clean optics and connector ferrules.

- 1) Use fiber patch cords (or connectors, if you terminate your own fiber) only from a reputable supplier; low-quality components can cause many hard-to-diagnose problems in an installation.
- 2) Black Box installs dust caps to ensure factory-clean optical devices. These protective caps should not be removed until the moment of connecting the fiber cable to the device. Assume that the fiber is properly terminated, polished and free of any dust or dirt, and that the location is as free from dust and dirt as possible.
- 3) Store spare caps in a dust-free environment such as a sealed plastic bag or box so that when reinstalled they do not introduce any contamination to the optics.
- 4) Should it be necessary to disconnect the fiber device, reinstall the protective dust caps.
- 5) If you suspect that the optics have been contaminated, alternate between blasting with clean, dry, compressed air and flushing with methanol to remove particles of dirt.

ELECTROSTATIC DISCHARGE PRECAUTIONS

Electrostatic discharge (ESD) can cause damage to your add-in modules. Always observe the following precautions when installing or handling an add-in module or any board assembly.

- 1) Do not remove unit from its protective packaging until you're ready to install it.
- 2) Wear an ESD wrist grounding strap before handling any module or component. If you do not have a wrist strap, maintain grounded contact with the system unit throughout any procedure requiring ESD protection.



WARNING! Integrated circuits and fiber optic components are extremely susceptible to electrostatic discharge damage. Do not handle these components directly unless you are a qualified service technician and use tools and techniques that conform to accepted industry practices.

- 3) Hold boards by the edges only; do not touch the electronic components or gold connectors.
- 4) After removal, always place the boards on a grounded, static-free surface, ESD pad or in a proper ESD bag. Do not slide the board over any surface.

SAFETY CERTIFICATIONS

UL/CUL: Listed to Safety of Information Technology Equipment, Including Electrical Business Equipment.

CE: The products described herein comply with the Council Directive on Electromagnetic Compatibility (89/336/EEC) and the Council Directive on Electrical Equipment Designed for use within Certain Voltage Limits (73/23/EEC). Certified to Safety of Information Technology Equipment, Including Electrical Business Equipment. For further details, contact Black Box.



Class 1 Laser product, Luokan 1 Laserlaitte, Laser Klasse 1, Appareil A'Lasers de Classe 1

FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class A computing device, pursuant to Part 15 of the 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 the 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 the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

The use of non-shielded I/O cables may not guarantee compliance with FCC RFI limits.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

Installation Troubleshooting

- During installation, first test the fiber and twisted pair connections with all troubleshooting features disabled, then enable these features, if desired, just before final installation. This will reduce the features' interference with testing.
- When working with units where the features cannot be disabled, you must establish BOTH your twisted pair and fiber connections before the link LEDs will light!
- When connecting the fiber interface of a *Gigabit* module (R1) to the fiber interface of a Gigabit switch (with fixed configuration or modular design, GBIC/SFP), you may experience difficulty establishing a link. Please check the following:
 - Solution 1:** Within the switch configuration (either via SNMP or a CLI), ensure that the setting for the fiber port in use is set to 1000 Mbps, Full-Duplex. Manually setting the switch port will result in normal operation and a link will be established. Also, ensure auto-negotiation is switched OFF.
 - Solution 2:** Within the switch configuration, ensure that IEEE 802.3x Flow Control is disabled for the Gigabit port in use.
- If using a high powered device (which is designed for long distance installations) for a short distance installation, the fiber transmitters may overdrive the receivers and cause data loss. If this is the case, you may need to add an optical attenuator to your connection. For fiber specifications please contact Black Box Technical Support.

General Information

Black Box Customer Service Information

Order toll-free in the U.S.: Call 877-877-BBOX
(outside U.S. call 724-746-5500)

FREE technical support, 24 hours a day, 7 days a week:

Call 724-746-5500 or Fax 724-746-0746

Mail order: Black Box Corporation
1000 Park Drive, Lawrence, PA 15055-1018

Web site: www.blackbox.com

E-mail: info@blackbox.com

SPECIFICATIONS

Environmental

Operating Temperature: 32° - 104° F (0° - 40° C)

Storage Temperature: 0° - 160° F (-20° - 70° C)

Humidity: 5 - 95% (non-condensing)

Power Consumption (Typical)

Gigabit Module: 0.55 Amp

WARRANTY

Contact Black Box for warranty information

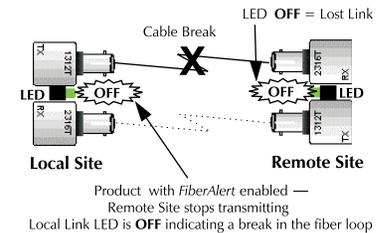
The Black Box media converter also sends out link pulses from its copper and fiber transmitters, but normally has no way of knowing whether the cable to the other device is intact and the link pulses are reaching the other end. The combination of *FiberAlert* and *LinkLoss* allows this information to be obtained, even when physical access to a remote device (and its link integrity LED) is not available.

WHAT IS TX LINKLOSS?

TX LinkLoss is a troubleshooting feature. When a fault occurs on the twisted pair segment of a conversion, *TX LinkLoss* detects the fault and passes this information to the fiber segment. If a media converter is not receiving a twisted pair link, *TX LinkLoss* disables the transmitter on the media converter's fiber port. This results in a loss of link on the device connected to the fiber port.

WHAT IS FIBERALERT?

FiberAlert minimizes the problems associated with the loss of one strand of fiber. If a strand is unavailable, the Black Box device at the receiver end notes the loss of link. The device will then stop transmitting data and the link signal until a signal or link pulse is received. The result is that the link LED on BOTH sides of the fiber connection will go out indicating a fault somewhere in the fiber loop. Using *FiberAlert*, a local site administrator is notified of a fault and can quickly determine where a cable fault is located.



NOTE

Enable *FiberAlert* on ONE side of a media conversion only; Enabling it on both sides would keep both transmitters off indefinitely!

USING FIBERALERT AND LINKLOSS

Modules ship from the factory with troubleshooting features disabled. Refer to the configuration instructions on pages 2-4 of this manual, or the help file to enable/disable this feature. The following chart provides an overview of the troubleshooting features, their functionality and the recommended settings for a pair of media converters in a typical central/main site to remote site application:

LINKLOSS / FIBERALERT COMPARISON TABLE			
Feature	Fault Location	Disabled LEDs	Enable At:
TX LinkLoss	Twisted Pair	Fiber	Remote Site Only
FiberAlert	Fiber	Fiber	Remote Site Only

If you are unsure of how best to implement these features in your configuration, contact Black Box technical support.

Additional Gigabit Features

MASTER/SLAVE MODE

This **Master/Slave** mode feature determines which clock will be used between the *Gigabit* module and the device it is connected to (a switch, NIC, or another *Gigabit* module, etc.). Slave mode is the default setting. In **Slave** mode, the *Gigabit* module will receive and use the clock of the connected device. **Master** mode uses the *Gigabit* module's clock. The Master/Slave mode is only valid for the twisted pair link. **This feature is hardware configurable ONLY.**

NOTE: On the Gigabit (R1) module, Master/Slave modes are referred to as Switch/Repeater modes; Switch = Master mode and Repeater = Slave mode.

NOTE: Check the Installation Troubleshooting section on page 6 if having difficulty linking up.

PREFERRED/FORCED MODE

In addition to Master/Slave modes, *Gigabit* modules also include **Preferred/Forced** modes for Master/Slave negotiation. Preferred mode helps determine whether the module should act as a Master or Slave. Forced Mode should typically only be used when connecting to some legacy switches, or when there is difficulty establishing a link. **This feature is hardware configurable ONLY.**

Since most switches today typically function as Masters, Black Box recommends configuring *Gigabit* modules as indicated in the chart to the right.

DIP Switch	Setting
S1-1	ON (Preferred)
S1-2	ON (Slave)

FX Negotiation on Gigabit Modules

Gigabit modules now include the *FX Negotiation* feature which negotiates flow control, duplex mode and remote fault information. The default for this feature is disabled. You must enable or disable this feature on both ends of the connection or you may have difficulty establishing a link. If the device you are connecting to the *Gigabit* module does not support this auto-negotiation feature, disabling the feature on the *Gigabit* module forces the link up. The following table shows various configurations and the resulting link status:

FX Auto-Negotiation on a Switch or Gigabit Module	FX Auto-Negotiation on Gigabit Module	Link Status
Gigabit - OFF	OFF	Link
Gigabit - ON	ON	Link
Gigabit - OFF	ON	No Link
Switch - ON	OFF	No Link
Switch - ON	ON	Link
Switch - OFF	OFF	Link
Switch - OFF	ON	Link

Installing a Gigabit Module

Gigabit Modules install in Black Box SNMP-manageable media converter chassis. To install a module, remove the blank bracket covering the slot where the module is to be installed by removing the screws on the outside edges of the bracket. Slide the module into the chassis, via the cardguides, until the module is seated securely in the connector. Secure the module to the chassis by tightening the captive screw. Save any “blanks” removed during installation for future use should configuration requirements change.

INSTALLATION TIP

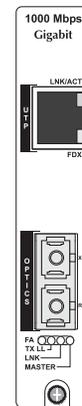
When testing, Black Box recommends testing modules first in an **unmanaged** environment. To do this, disable management (turn management off or remove the management module from the chassis), follow the unmanaged configuration instructions (see opposite page), then install the unit, connect the cables and test the LEDs. When finished, re-activate management and configure the unit via the software.

Twisted Pair Crossover/Pass-Through Connections

Gigabit Modules support both crossover and straight-through Cat5 twisted pair cabling types of connections with *AutoCross*, a feature which automatically selects between the two, depending on the connected device.

LED Operation

Each *Gigabit Module* features diagnostic LEDs (see following diagram) that provide information on features and ports.



LEDs on the Gigabit Module

LNK/ACT Glows green when a twisted pair *link* is established. Blinks green when data is detected on the port. Located on RJ-45 connector.

FDX Glows amber port is operating in Full-Duplex mode. Located on RJ-45 connector.

FA Glows green when *FiberAlert* is enabled.

TX LL Glows green when *TX LinkLoss* is enabled on the port.

LNK Glows green when a fiber *link* is established.

MASTER Glows amber when operating as a Master.