PLANET
Networking & Communication

User's Manual

GST-702/702S
GST-705/705A
GST-706A15/706B15
GST-706A60/706B60

1000Base-T to 1000Base-LX/SX Smart Media Converter

Trademarks

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FCC Warning

This equipment has been tested and found to comply with the limits for a Class B digital 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 case the user will be required to correct the interference at his own expense.

CE Mark Warning

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

WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Revision

PLANET 1000Base-T to 1000Base-LX/SX Smart Media Converter User's manual

MULTI-MODE: GST-702 / GST-705 / GST-705A

SINGLE-MODE: GST-702S / GST-705A / GST-706A15 / GST-706B15 / GST-706A60 / GST-706B60

REVISION: 1.0 (MARCH.2007)

Part No.: EM-GST70x_v1.0 (2080-AA3450-000)

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Checklist

Thank you for purchasing PLANET 1000Base-T to 1000Base-LX/SX Smart Media Converter, the 1000Base-T to 1000Base-LX/SX Smart Media Converter package shall contain following contents:

Check the contents of your package for following parts:

- 1000Base-T to 1000Base-LX/SX Smart Media Converter x1
- User's manual CD x1
- DC 5V 2A Power Adapter x1

If any of these pieces are missing or damaged, please contact your dealer immediately, if possible, retain the carton including the original packing material, and use them against to repack the product in case there is a need to return it to us for repair.

1.2 About the 1000Base-T to 1000Base-LX/SX Smart Media Converter

The GST-70x series Smart Media Converter provide Media conversion between 1000Base-T and 1000Base-LX/SX interfaces, such as multi-mode LC/SC connectors(220m/550m), single-mode LC/SC connector(10/20/40/50/70/120km) and single fiber connector(WDM,15/60km) fiber connection options for various application.

The GST-70x series Smart Media Converter provide Auto MDI/MDI-X on its TP port and use the DIP switch from the GST-70x to configure the available smart functions, such as the auto-negotiation / force for fiber interface and Link Pass Through function(LLCF/LLR). The LLCF default set on board and work with LLR in diagnosing network connections, also the LLR function can immediately alarm network administrator the media link issue and provide efficient solution to monitor the entire network.

The GST-70x series Smart Media Converter can allow two type segments connect easily with efficiently and cost effective, these Smart Media converter can be use us a standalone unit when it power on by it's DC adapter. Or use as a slide-in module to the PLANET new 19-inch Web Smart 16-Slots Media converter chassis (MC-1600MR/MC-1600MR48), with this Web Smart Media converter chassis, the GST-70x able to manage and status monitor through the local RS-232 console and remote web interface.

1.3 Features

- Complies with IEEE 802.3ab, 1000Base-T and IEEE 802.3z 1000Base-LX/SX Ethernet standard
- Provides one 1000Base-T port with RJ-45 connector, one 1000Base-LX/SX port with LC/SC/WDM connector supporting multi-mode or single-mode fiber optic cable
- LED indicators for converter status
- Provide DIP switch to setting fiber (Auto-negotiation / Manual) and LLR(Disable / Enable)
- Auto-MDI / MDI-X for 1000Base-T port
- Back-pressure & IEEE 802.3x compliant flow control and full wire-speed forwarding rate
- Link Loss Return(LLR) switch on each fiber optic to aid in troubleshooting remote network connections
- Link Loss Carry Forward(LLCF) work with LLR in diagnosing network connections
- Manageable through Web Smart Media Converter Chassis System
- Used as a stand-alone device or with a chassis for up to 16 converter with redundant power supply for optional expansion use
- EMI standards complies with FCC, CE class B

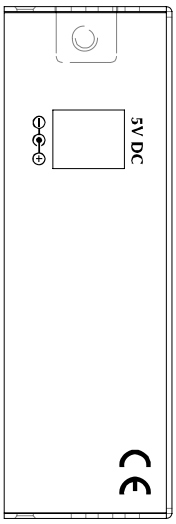
1.4 Specification

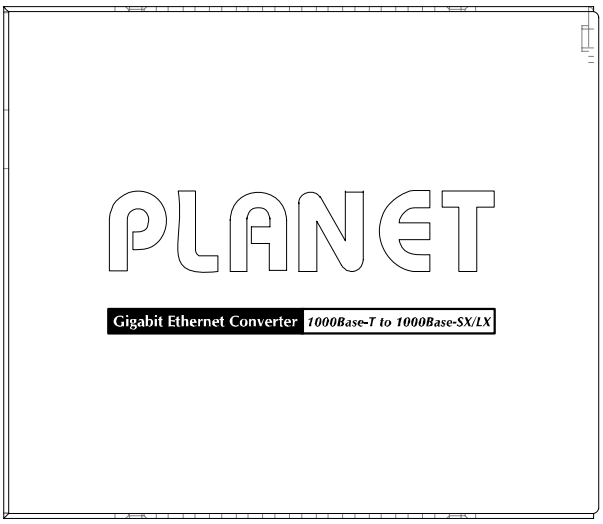
Model	GST-702	GST-702S	GST-705	GST-705A	GST-706A15	GST-706B15	GST-706A60	GST-706B60
Hardware Specification								
Standards	IEEE 802.3ab 1000Base-T, IEEE 802.3z 1000Base-LX/SX							
Ports	1 1000Base-T port , 1 1000Base-LX/SX port							
Fiber connector	SC	SC	LC	SFP, LC	WDM	WDM	WDM	WDM
Cable	1000Base-T: 2-pair Cat. 5,5e,6 UTP cable, up to 100 meters 1000Base-SX: 50/125μm or 62.5/125μm multi-mode fiber cable, up to 220/550m. 1000Base-LX: 9/125μm single-mode cable, provide long distance for 10/20/40/50/70/120km							
LED indicator	System: PWR TP: LNK,ACT LX / SX: LNK, ACT, FDX							
DIP switch	Fiber (Auto-negotiation / Manual), LLR(Disable / Enable)							
Speed	Gigabit Ethernet: 1000/2000Mbps for half / full-duplex							
Power input	DC 5V 2A							
Power consumption	6.2 Watts / 21 BTU(maximum)							
Operate environment	0~50 Degree C, 5%~90%RH							
Storage environment	-20~70 Degree C, 5%~90%RH							
Dimension (W x D xH)	81 x 94 x 26mm							
Weight	0.22kg							
Emission	FCC Class B, CE mark							

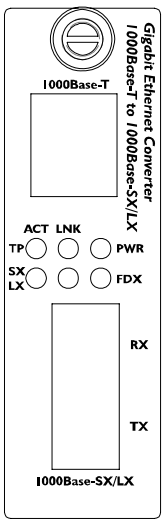
1.5 Product Outlook

Right View: there is one RJ-45 twisted-Pair jack (Auto-MDI/MDI-X), one fiber-optic connector (vary by model) and six LED indicators.

Left View: there is one DC jack for DC 5V power adapter.







LED Indicators

LED	Color	Status	Indication
PWR(Power)	Green	Lights On	Power on – when +5V DC detected.
		Lights Off	Power off.
FDX	Green	Lights On	Connection at 1000Mbps Full-Duplex mode.
		Lights Off	Connection not 1000Mbps Full-Duplex mode.
TP LINK	Green	Lights On	The link through that port is successfully established.
		Lights Off	The link through that port is not established.
TP ACT	Green	Lights Off	Without data transmitting or receiving on that port.
		Lights Blinking	Data transmitting or receiving on that port.
LX/SX LINK	Green	Lights On	The link through that port is successfully established.
		Lights Off	The link through that port is not established.
LX/SX ACT	Green	Lights Off	Without data transmitting or receiving on that port.
		Lights Blinking	Data transmitting or receiving on that port.

2. HARDWARE INSTALLATION

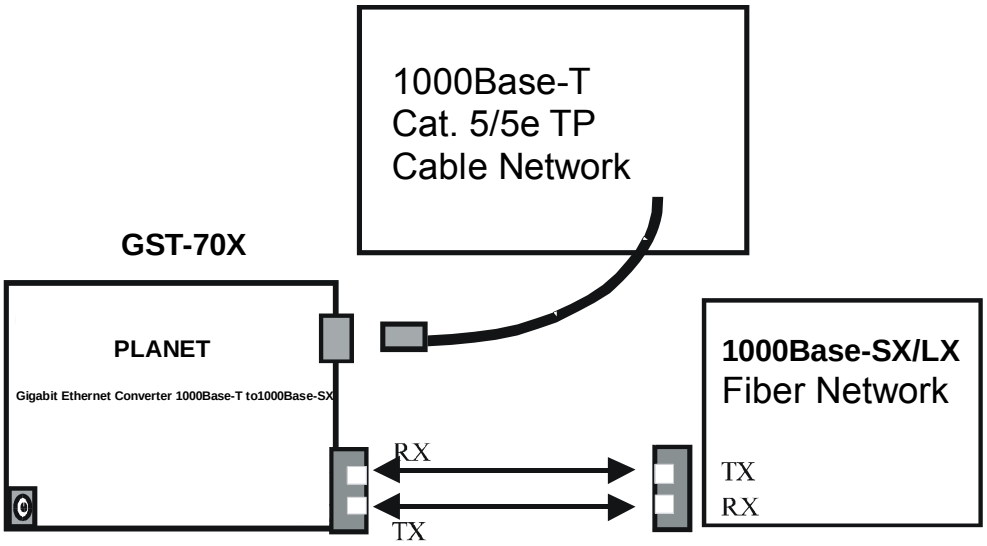
This product provides two different running speeds – 1000Base-T and 1000Base-LX/SX in the same device.

This section describes the hardware installation of GST-70x. Before connecting any network device to the GST-70x, read this chapter carefully.

2.1 Stand-alone Media Converter Installation

The GST-70x can use as a stand-alone Media Converter for Plug & Play and quick network environment deploy, please follow these steps to install the converter:

- Turn off the power of the device/station in a network to which the GST-70x will be attached.
- Ensure that there is no activity in the network.
- Attach fiber cable from the GST-70x to the fiber network. TX, RX must be paired at both ends.
- Attach a Cat. 5 UTP cable from the 1000Base-T network to the RJ-45 port on the GST-70x.
- Connect the 5VDC power adapter to the GST-70x and verify that the Power LED lights up.
- Turn on the power of the device/station, the TX Link /Act and LX/SX Link/Act LEDs should light when all cables are attached.

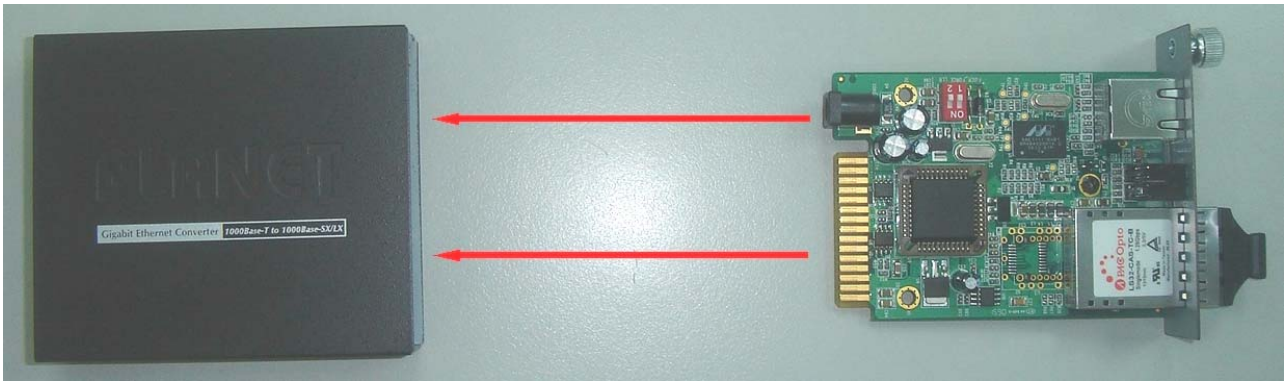


Notice:

- 1. RJ-45/STP, UTP Cat 5/5E, straight/crossover cable is accepted.
- 2. Please refer to Appendix A for more about the wiring distance of your TP and fiber- Optic cable.

2.2 Slide Media Converter module into MC-1600MR/R48 Chassis installation

Step 1- Unscrew and pull out the GST-70x Media Converter board.



Step 2- Remove a blank faceplate from an empty expansion slot on the front of the chassis. The GST-70x Media Converter board can be installed in any expansion slot.

Step 3- Slide the GST-70x Media Converter board into the expansion slot, aligning it with the guide rails, until it firmly connects to the chassis' backplane.

Step 4- Secure the GST-70x Media Converter board to the chassis by tightening the thumbscrew.

2.3 Real Ethernet environment application

Standalone and centralize management Media Converter installation

Afford the current network grows and expanding, the PLANET GST-70x provide advanced Media conversion technology to fill this kind of demand. The GST-70x provide the diverse fiber connect type options to meet different network application, it is very flexible for GST-70x work as a standalone devices or install into the central Web Smart Media converter chassis for centralize management. Once, install into Web Smart Media Converter chassis and the GST-70x supports hot swappable to avoid network downtime, the GST-70x is ideal solution for building a network solution of FTTH(Fiber to the Home) or FTTC(Fiber to the Curb) and FTTB(Fiber to the Building) for ISPs, campuses and enterprise.

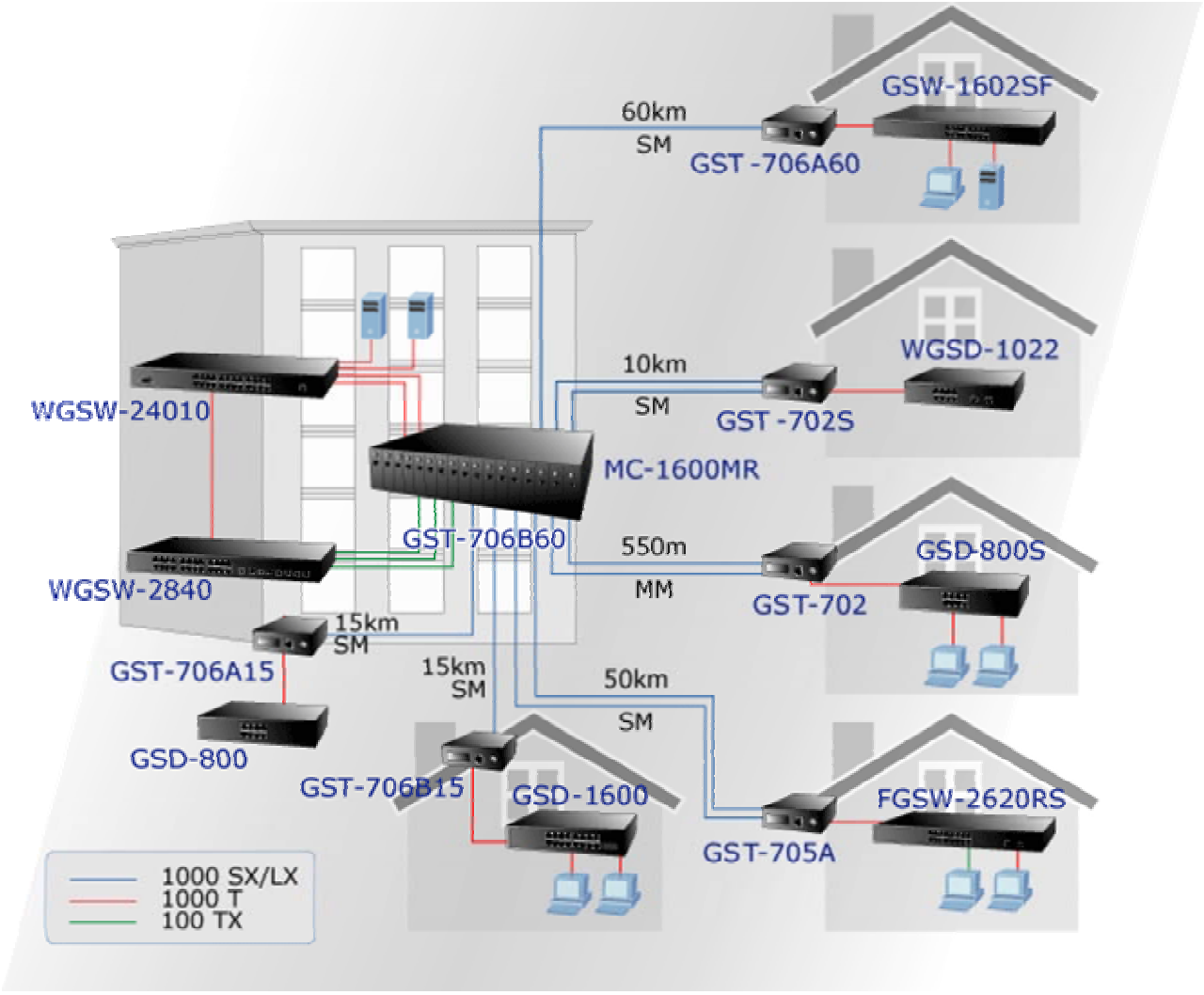


Figure 1. GST-70x Ethernet envirnoment application

3. MANAGE THE MEDIA CONVERTER

This product provides two different managed methods – configure through its DIP Switch or install into the central Web Smart Media converter chassis for centralize management.

This section describes how to managed the GST-70x through its DIP Switch and Web Smart Media converter chassis. Before use the GST-70x smart function, please read this chapter carefully.

3.1 DIP Switch configuration

The GST-70x provide DIP switch to setting fiber (Auto-negotiation / Manual) and LLR (Disable / Enable). Please refer to the table below for more detail decription.

DIP Switch	Mode	Description
DIP Switch 1	On	Fiber operates at Forced Mode.
	Off	Fiber operates at Auto-Negotiation **(default)**.
DIP Switch 2	On	LLR Enable.
	Off	LLR Disable **(default)**.

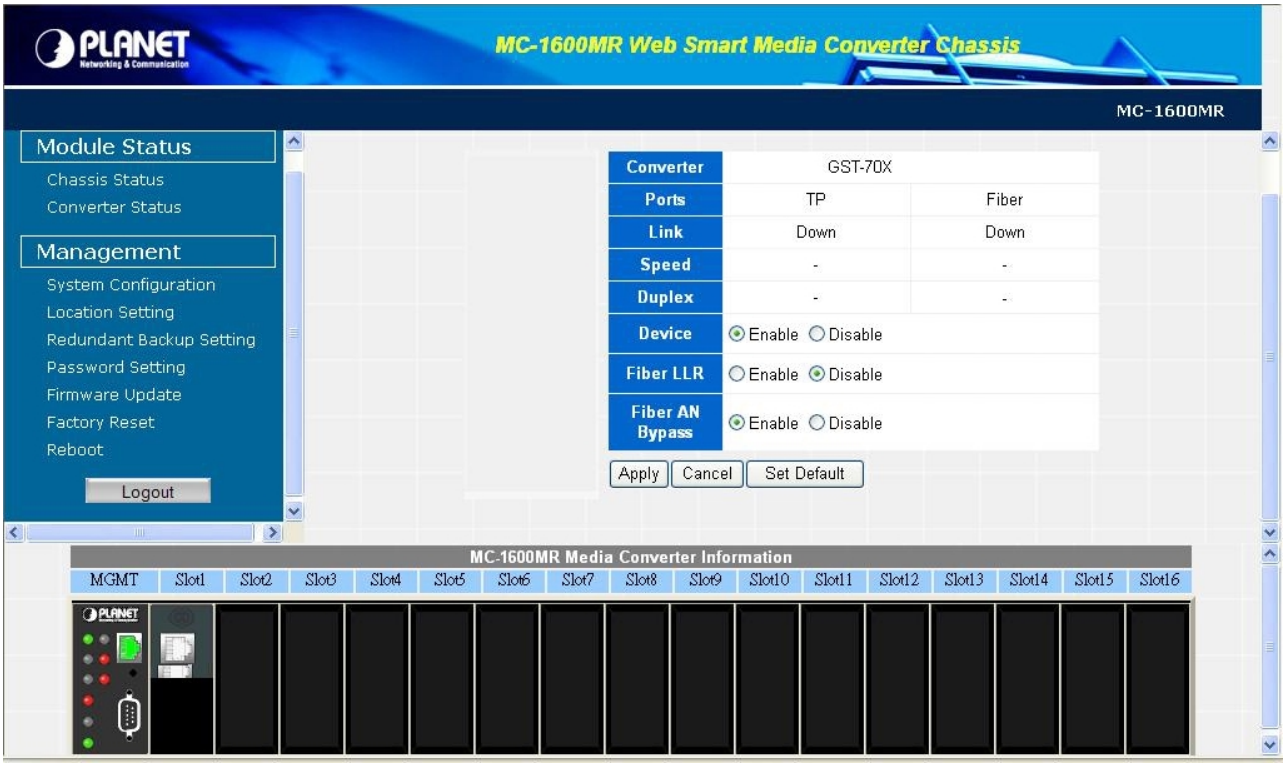
Notice:

1. After change the DIP Switch setting, please power off and power on the GST-70x to take affect.
2. Be sure the opposite end is using the same setting (forced or Auto-negotiation). And when using two converters at the same time, the two converters MUST set to forced mode.
3. When using two converters, don't enable the both device's LLR function at the same time.

3.2 Managed Media Converter module through MC-1600MR/R48 Chassis

The Web Smart Media Coverter Chassis that can control GST-70x through the management system, GST-70x can be controlled through Web Browser and terminal emulation program.

The Web Smart Media Converter Chassis will display out the status of GST-70x, also the Web Smart Media Coverter Chassis can control the function through the management system.



Through the Web Smart Media Coverter Chassis System, you can control the setting of GST-70x, such as fiber (Auto-negotiation / Manual) and LLR (Disable / Enable).

Item	Description
Device	To enable or disable per GST-70x Converter board.
Fiber LLR	To enable or disable the LLR function of the Fiber port.
Fiber AN Bypass	To set the Auto negotiation bypass function of the Fiber port to enable or disable.

Notice:

Please to note that if converter is connect with switch whichis Auto negotiation, must enable the Auto by pass function. If both devices are conveters must disable the auto by pass function.

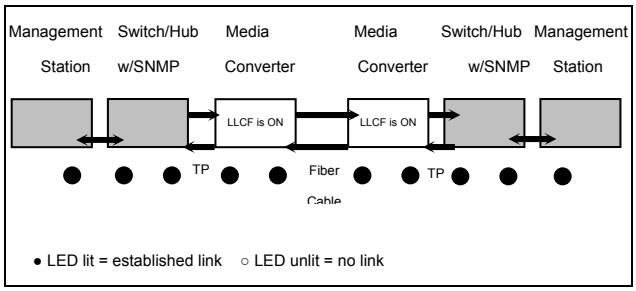
4. LINK PASS THROUGH FUNCTION

The LFP function includes the Link Fault Pass Through function (LLCF/LLR) and the DIP Switch design. LLCF/LLR can immediately alarm administrators the problem of the link media and provide efficient solution to monitor the net. The DIP Switch provides disable or enable the LFP function.

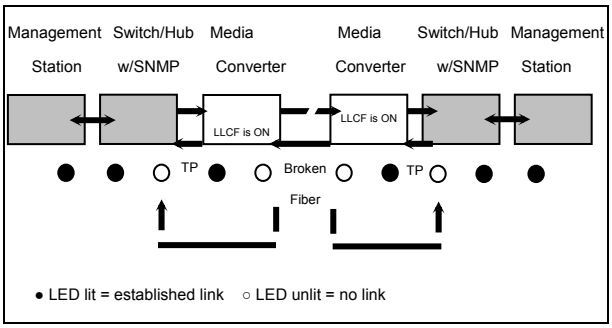
LLCF (Link Loss Carry Forward) means when a device connected to the converter and the TP line loss the link, the converter's fiber will disconnect the link of transmit. LLR (Link Loss Return) means when a device connected to the converter and the fiber line loss the link, the converter's fiber will disconnect the link of transmit. Both can immediately alarm administrators the problem of the link media and provide efficient solution to monitor the net.

4.1 Link Loss Carry Forward (LLCF)

The GST-70X modules incorporates default LLCF function for troubleshooting a remote connection; the Fiber/TP ports do not transmit a link signal until they receive a link signal from the opposite port.
The diagram below shows a typical network configuration with a good link status using GST-70X for remote connectivity.



If the connection breaks, GST-70X that link loss forward to the switch/hub which generates a trap to the management station. The administrator can then determine the source of the issue.



Notice:

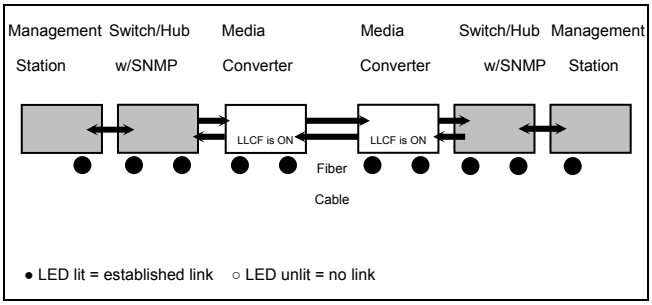
1. When connecting GST-70X with LLCF default enabled to an auto-negotiating-capable device, force both sides of the configuration to 10 or 100Mbps full or half duplex. This allows the converter to immediately see link pulses and start passing data.
2. Units are shipped with the default LLCF function enabled.

4.2 Link Loss Return (LLR)

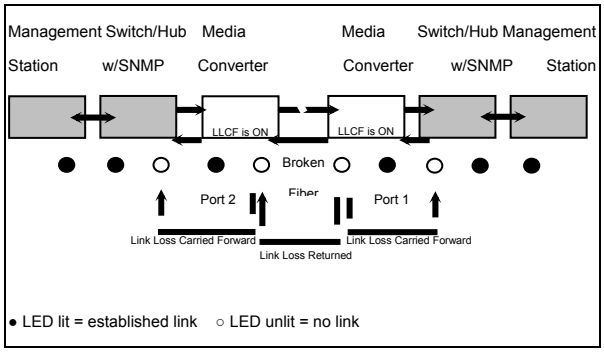
The fiber ports of GST-70X have been designed with an LLR function for troubleshooting a remote connection. LLR works in conjunction with LLCF.

When LLR is enabled*, the port's transmitter shuts down when its receiver fails to detect a valid receive link. LLR should only be enabled on one end of the link and is typically enabled on either the unmanaged or remote device.

The diagram below shows a typical network configuration with a good link status using GST-70X for remote connectivity. Note that LLR is enabled as indicated in the diagram.



If one of the optical conductors is bad (as shown in the diagram box below), the converter with LLR enabled will return a no-link condition to its link partner. With LLCF also default enabled, the no-link condition is carried forward to the switch/hub where a trap is generated to the management station, and the administrator can then determine the source of the loss.



Notice:

1: LLR must NOT be active on both ends of a configuration. If it is, the link can never be established.

2. Units are shipped with the LLR function disabled (DOWN).

5. TROUBLESHOOTING

This chapter contains information to help you solve issues. If the GST-70x is not functioning properly, make sure the GST-70x was set up according to instructions in this manual.

The Power LED is not lit

Solution:

Check the power cable connection between power adapter and GST-70X.

Why I connect GST-70x to device with 1000Base-LX/SX interface and the 1000Base-LX/SX fiber connection fail?

Solution:

1. Please check the fiber connection between two devices is correct.
2. Please check the 1000Base-LX / SX interface from both devices run at force full duplex mode.
3. Check and if the 1000Base-LX/SX interface of other device run at Auto-negotiation mode only, please enable the Auto negotiation bypass function of GST-70x for successful fiber connection.

1000Base-T port link LED is lit, but the traffic is irregular

Solution:

1. Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.
2. Check and assure the TP ports from both GST-70x and attached device run at Auto-negotiation mode.

Why I change the GST-70x DIP switch setting and seems the function without any different?

Solution:

Please power off and power on the GST-70x to take effect.

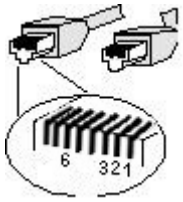
APPENDIX A NETWORKING CONNECTION

A.1 Switch‘s RJ-45 Pin Assignments

1000Mbps, 1000Base T

Contact	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

A.2 RJ-45 cable pin assignment



The standard RJ-45 receptacle/connector

There are 8 wires on a standard UTP/STP cable and each wire is color-coded. The following shows the pin allocation and color of straight cable and crossover cable connection:

Figure A-1: Straight-Through and Crossover Cable

Please make sure your connected cables are with same pin assignment and color as above picture before deploying the cables into your network.

A.3 Cable Connection Parameter

The limitations are shown as below;

Standard	Fiber Type	Cable Specification
1000Base-SX (850nm)	Multi-mode	50/125μm or 62.5/125μm
1000Base-LX (1300nm)	Multi-mode	50/125μm or 62.5/125μm
	Single-mode	9/125μm

Wiring Distances:

Standard	Fiber	Diameter (micron)	Modal Bandwidth (MHz * km)	Max. Distance (meters)
1000Base-SX	MM	62.5 62.5 50 50	100 200 400 500	220 275 500 550
1000Base-LX	MM	62.5 50 50	5 4 5	550
	SM	9	N/A	5000*

Notice:

1: Consult your local dealer for more about PLANET single mode fiber connectivity.

2. The Single-mode port (1000Base-LX port) of GST-702S, GST-705A, GST-706A15/B15 and GST-706A60/B60 is complied with LX 5 kilometers and provides additional margin allowing for a **10/15/60 kilometers** Gigabit Ethernet link on single mode fiber.

3. A model (TX: 1310nm; RX: 1550nm) and B model (TX: 1550nm; RX: 1310nm) should runs in pair.

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CE