

**X**TRAMUS

# **XG2**

# **User Manual**

## Foreword

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## Revision History

Date	FW Version	FPGA Version	USM Version	History
Feb, 2009			1.0.	First version
April, 2010			1.1.	Second version, changing XG2 overview/feature based on latest PBF, adding XG2 series specification table, changing chapter arrangements, and deleting Chapter 4 "Maintenance".
August, 2010			1.2.	Updating XG2 console interface.
2011/01/10			1.3	Change the Foreword on page 2.

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## 1. XG2 Overview

### 1.1. General Description of XG2

XG2 Series are high-performance 10G media converters for connecting different 10G devices and link. XG2 Series functions as a copper-to-fiber converter, a fiber mode converter, or a fiber repeater. Five interface of XG2 series are available and supported: RJ45 to SFP+, SFP+ to SFP+, SFP+ to XFP, RJ45 to XFP, and CX4 to SFP+.



All XG2 Series are equipped with real-time LEDs which display the status of each port. The built-in loopback functions make XG2 Series ideal for troubleshooting by sending packets like BERT patterns to network equipment.

For example, as a media converter, XG2 provides a bi-directionally conversion between 10GBASE-R (fiber) and 10GBASE-T (copper). If the ISP administrator would like to deploy FTTX services from central office to the user's street or large organization building by fiber as the last mile connection, XG2 could convert the media type from fiber to copper wire, and then distribute to any nearby location with 10Gbps Ethernet switch, or to xDSL modem via DSLAM.

XG2 could also act as an auxiliary device for testing 10GBASE-T/ 10GBASE-R equipments by connecting NuStreams 10Gbps Ethernet fiber modules such as XM-28L1 and XM-28L1CX4.

With various interfaces, XG2 Series provide different conversions between fibers and copper wires in 10Gbps Ethernet.

### 1.2. Key Features of XG2

- Real-Time conversion between 10GBASE-T, 10GBASE-R, and 10GBASE-CX4
  - Interface of 10GBASE-T based on IEEE 802.3an
  - Interface of 10GBASE-R based on IEEE802.3ae
  - Interface of 10GBASE-CX4 based on IEEE 802.3ak
- Conversion of media type between fiber (SFP+, XFP) and twisted pair copper wire (RJ-45, CX4)
- Real-time LEDs that display running status
  - SFP+ status: Indicate the SFP+ fiber connector is connected or not
  - LR status: Indicate the LR Transceiver or SR transceiver is plugged or not
  - Link/Rx status: Display the Network linked/Receive status
  - SFP+/Rx status: Display the Network linked/Receive status (For XG2-1 only)
  - Loopback status: Indicate the Loopback test status of A and B ports
  - SYS status: Indicate system operation status
- Console for updating firmware and configuring loopback functions
- Both SFP+ and RJ-45 port can connect to other 10Gbps Ethernet switch for expansion.
- Subsidiary device for test on 10Gbps Ethernet switch with 10GBASE-T and/or 10GBASE-R ports

### 1.3. XG2 Series Outer Case/Interface Overview

#### Front & Rear Side



#### Right Panel

XG2's right panel contains its interface ports and information LEDs. The type of XG2's interface ports and LED displays are different among XG2, XG2-1, XG2-2, XG2-3, and XG2-4.

XG2			
	<b>Interface</b>	RJ45 to/from SFP+	
	<b>Protocol</b>	<b>Port A</b>	IEEE802.3an (10GBase-T)
		<b>Port B</b>	IEEE802.3ae (10GBase-R)
	<b>Fixed Port</b>	One 10Gbps UTP Port One 10Gbps SFP+ Port One RS-232 Console Port One Power Jack	
<b>LED Display</b>	SFP+ Link/Rx A Link/Rx B	LR Loopback SYS	

XG2-1			
	<b>Interface</b>	SFP+ to/from SFP+	
	<b>Protocol</b>	<b>Port A</b>	IEEE802.3ae (10GBase-R)
		<b>Port B</b>	IEEE802.3ae (10GBase-R)
	<b>Fixed Port</b>	Two 10Gbps SFP+ Port One RS-232 Console Port One Power Jack	
<b>LED Display</b>	LR A LR B SYS	SFP+/Rx A SFP+/Rx B Loopback	

**XG2-2**


<b>Interface</b>	SFP+ to/from XFP	
<b>Protocol</b>	<b>Port A</b>	IEEE802.3ae (10GBase-R)
	<b>Port B</b>	IEEE802.3ae (10GBase-R)
<b>Fixed Port</b>	One 10Gbps SFP+ Port One 10Gbps XFP Port One RS-232 Console Port One Power Jack	
<b>LED Display</b>	Link/Rx A Link/Rx B	Loopback SYS

**XG2-3**


<b>Interface</b>	RJ45 to/from XFP	
<b>Protocol</b>	<b>Port A</b>	IEEE802.3an (10GBase-T)
	<b>Port B</b>	IEEE802.3ae (10GBase-R)
<b>Fixed Port</b>	One 10Gbps UTP Port One 10Gbps XFP Port One RS-232 Console Port One Power Jack	
<b>LED Display</b>	Link/Rx A Link/Rx B	Loopback SYS

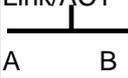
**XG2-4**


<b>Interface</b>	CX4 to/from SFP+	
<b>Protocol</b>	<b>Port A</b>	IEEE802.3ae (10GBase-CX4)
	<b>Port B</b>	IEEE802.3ae (10GBase-R)
<b>Fixed Port</b>	One 10Gbps SFP+ Port One 10Gbps CX4 Port One RS-232 Console Port One Power Jack	
<b>LED Display</b>	Link/Rx A Link/Rx B	Loopback SYS

XG2-5			
	<b>Interface</b>	XFP to/from XFP	
	<b>Protocol</b>	<b>Port A</b>	IEEE802.3ae (10GBase-R)
		<b>Port B</b>	IEEE802.3ae (10GBase-R)
	<b>Fixed Port</b>	Two 10Gbps XFP Ports One RS-232 Console Port One Power Jack	
<b>LED Display</b>	Link/Rx A Link/Rx B	Loopback SYS	

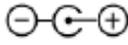
Please note that for network flow conversion, the media speed of two ends has to be symmetrical; otherwise, packet loss happens during conversion. Hence, the connection speed of copper UTP port A must be 10Gbps connection, for the conversion of 10Gbps SFP+ connection. 10M/100M/1000Mbps UTP connection is not applicable to XG2.

**XG2 Right Panel LEDs**

Type	Label	LED	Description
Fiber Connector (Transceiver) Status	SFP+	Amber	Remind user that the SFP+ form factor transceiver (connector) is connected.
		Green	Transceiver (connector) with powered optical fiber is connected.
		OFF	No SFP+ transceiver (connector) is plugged.
10BASE-R Mode	LR (*Note 1)	Green	Connector of LR Transceiver is plugged.
		Amber	Connector of SR Transceiver is plugged.
Connection Status	Link/ACT  A            B	ON (Green)	Display the Network linked/Active status. ON at Port A: connection of network cable at port A is linked. ON at Port B: connection of optical fiber at port B is linked.
		OFF	No connection
		Blinking	Data is receiving.
Loopback Test Status	↻ (A + B)	ON (Green)	Loopback mode of A and B ports is enabled. Loopback test is the method to send out signal and quickly back to the same source entity to test the transmission and route problem of infrastructure. When loopback is enabled, XG2 returns incoming data flow back to original entity.
		OFF	Loopback test is disabled.
System Status	SYS	Blinking Green	Status of system operation. System is ready.
		Amber	System is starting.

**XG2 Left Panel**

**Connection Ports**

Type	Label	Description
9 pin RS-232 Console	38400, n, 8, 1	Control of Loopback test and other application
Power Socket	12V DC 	Plug power from DC 12V adapter.  Note: XG2 media converter has to convert and transmit data flow for both copper and fiber connection that has larger power consumption. Please <b>do</b> use the power adapter that comes with XG2 to prevent damage.

**LED Status**

Type	Label	Description
Power Status	Power	LED is ON when power jack of adapter is plugged.

## 2. XG2 Installation

XG2 is an equipment that administrator only has to plug fiber/cable and then it works, as easy as general Ethernet switch without extra configuration. Hence, the most important things are not the operation of XG2. The configuration of cabling, selections of physical media and applications in your environment is more important.

### 2.1. Choice of UTP Cable and Optical fiber

#### 2.1.1. 10GBASE-T (Copper Wire)

10GBASE-T, or IEEE 802.3an-2006, is a standard released in 2006 to provide 10 gigabit/second connections over unshielded or shielded twisted pair cables, over distances up to 100 meters (330 ft). 10GBASE-T cable infrastructure can also be used for 1000BASE-T, allowing a gradual upgrade from 1000BASE-T, and auto-negotiation to select which speed to use.

##### **Connectors**

10GBASE-T uses 650 MHz versions of the venerable IEC 60603-7 8P8C (RJ-45) connectors, that is already widely used in Ethernet.

##### **Cables**

10GBASE-T works up to 55 m (180 ft) with existing Category 6 cabling. In order to allow deployment at the usual 100 m (330 ft), the standard uses a new partitioned Category 6a cable specification, designed to reduce crosstalk between UTP cables.

##### ***Category of UTP network cable for reference***

###### ***Cat 5***

Provides performance of up to 100 MHz, and was frequently used on 100 Mbps Ethernet networks. May be unsuitable for 1000BASE-T gigabit Ethernet.

###### ***Cat 5e***

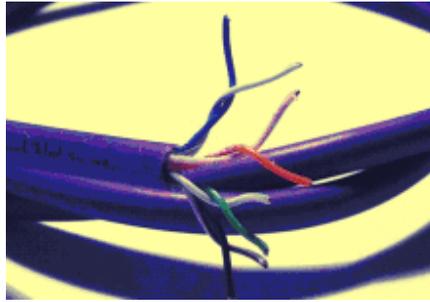
Provides performance of up to 100 MHz, and is frequently used for both 100 Mbit/s and Gigabit Ethernet networks.

###### ***Cat 6***

Provides performance of up to 250 MHz, more than double of category 5 and 5e. It works up to 55 m (180 ft) for 10Gbps Ethernet.

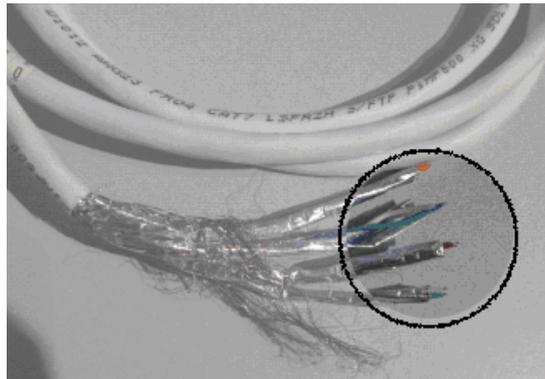
###### ***Cat 6a***

Provides performance of up to 500 MHz, double of category 6. It is suitable for 10GBASE-T. It works up to 100 m (330 ft) for 10Gbps Ethernet. All the cables above does not have individually-shielded pairs as the picture below, including Cat 6a.



**Cat 7**

This standard specifies four individually-shielded pairs (STP) inside an overall shield. Designed for transmission at frequencies up to 600 MHz. It has better performance than Cat 6a.



## 2.1.2. 10GBASE-R (Optical Fiber)

10GBASE-R is 10Gbps Ethernet connection that based on IEEE802.3ae. It uses fiber as transmission media with different specification of fiber, connector and transceiver. XG2 uses two standards, 10GBASE-LR and 10GBASE-SR.

### 10GBASE-SR

10GBASE-SR ("short range") uses 64B/66B encoding and 850 nm wavelength lasers. It is designed to support short distances over deployed multi-mode fiber cabling, it has a range of between 26 meters (85 ft) and 82 meters (270 ft) depending on cable type. It also supports 300 meters (980 ft) operation over new, 50  $\mu$ m 2000 MHz\*km OM3 multi-mode fiber (MMF).

The transmitter can be implemented with a VCSEL (Vertical Cavity Surface Emitting Laser) which is low cost and low power. MMF has the advantage of having lower cost connectors than SMF (single-mode fiber) due to its wider core.

10GBASE-SR delivers the lowest cost, lowest power and smallest form factor optical modules.

### 10GBASE-LR

10GBASE-LR ("long range") is a Long Range Optical technology delivering serialized 10 gigabit Ethernet over a laser with 1310 nm wavelength connection on single-mode fiber via IEEE 802.3 Clause 49 64B-66B Physical Coding Sub layer (PCS) using a line rate of 10.3125.

Single-mode optical cabling is used to interconnect transceivers at a distance spaced at 10 kilometers (6.2 mi), but it can often reach distances of up to 25 kilometers (16 mi) with no data loss.

Fabry-Perot lasers are commonly used in 10GBASE-LR optical modules. Fabry-Perot lasers are more expensive than VCSELs (mentioned above) but their high power and focused beam allow efficient coupling into the small core of single mode fiber.

### Fiber Specification

Fibers which support many propagation paths or transverse modes are called multi-mode fibers (MMF). Fibers which can only support a single mode are called single-mode fibers (SMF). Multi-mode fibers generally have a larger core diameter, and are used for short-distance communication links and for applications where high power must be transmitted. Single-mode fibers are used for most communication links longer than 200 meters.

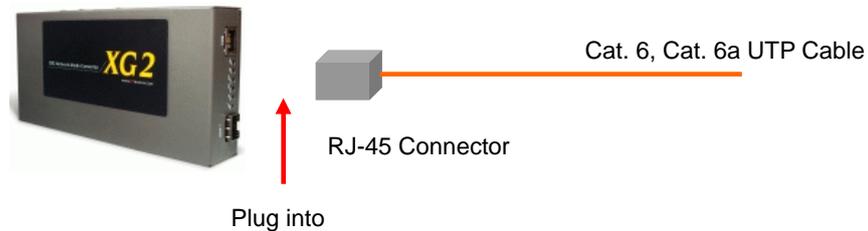
Fiber Buffer/Jacket color	Meaning
Yellow	Single-mode optical fiber, long distance connection
Orange	Multi-mode optical fiber, short distance connection

## 2.2. Connection of UTP Cable and Optical fiber

### 2.2.1. 10GBASE-T (Copper Wire)

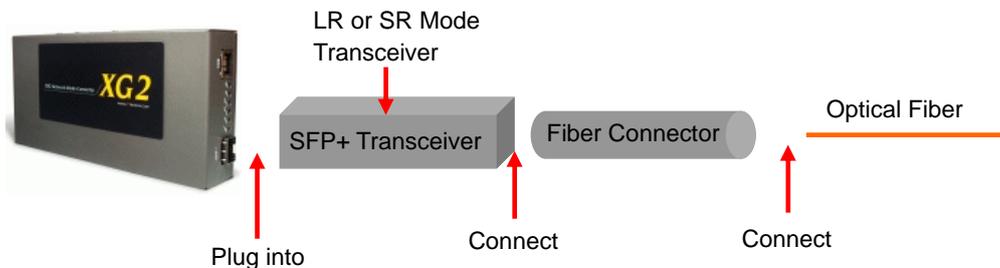
10GBASE-T uses the same RJ-45 connector that is the same as original 100M/1000Mbps Ethernet network. Plug the RJ-45 connector into the port of 10Gbps, then it is ready to work.

Watch the LED status of Link/ACT of port A to know the connection status.



### 2.2.2. 10GBASE-R (Optical Fiber)

The connection of optical fiber can be departed to 4 sections



#### Optical Fiber:

As the description above, there are Single-mode and Multi-mode optical fiber. Both of them can be used for XG2

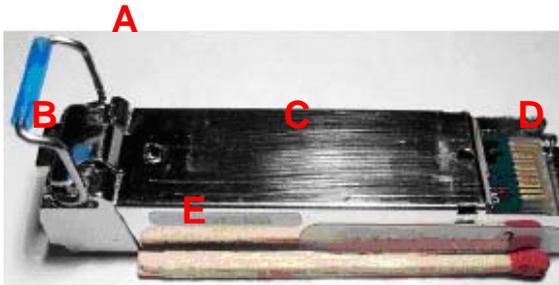
#### Fiber Connector:

Unlike RJ-45 connector, the fiber can be removed from SFP+ transceiver easily. At two ends of fiber, it has connector that can attach to SFP+ transceiver. There are two fibers for one SFP+ transceiver. One fiber is for receiving and one fiber is for transmission. The picture below is called LC connector that can attach to SFP+ transceiver.



### Transceiver (Connector):

SFP+ Transceiver is the hardware that is pluggable into the body of XG2. Unlike RJ-45 connector that there is no component inside at all, SFP+ Transceiver is an active component that consumes power from XG2 and it has the key function that convert signals between optical data flow and electronic data flow.



- A:** Handgrip to remove module from XG2 easily
- B:** Connection from LC fiber connector that is described above
- C:** Bottom of the transceiver module
- D:** Electronic conductor to XG2 body
- E:** Size of matchstick.

For different transmission purpose, the component inside SFP+ form factor can be 10BASE-LR or 10BASE-SR mode.

When SFP+ transceiver is plugged into the XG2, the LED of SFP+ is Amber. If the inserted SFP+ transceiver is attached by a fiber with LC connector with going on signaling, the LED becomes Green. The LED of LR is either Green for 10BASE-LR mode or Amber for 10BASE-SR mode. Details are shown at the table below:

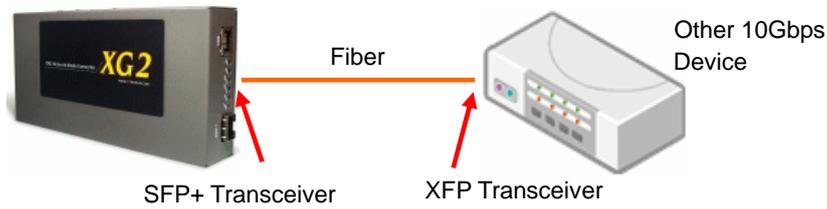
### LED Status

Type	Label	LED	Description
Fiber Connector (Transceiver) Status	SFP+	Amber	Remind user that the SFP+ form factor transceiver (connector) is connected.
		Green	Transceiver (connector) with powered optical fiber is connected.
		OFF	No SFP+ transceiver (connector) is plugged.
10BASE-R Mode	LR	Green	Connector of LR Transceiver is plugged.
		Amber	Connector of SR Transceiver is plugged.

SFP+ LED	LR LED	Description
		No SFP+ form factor transceiver (connector) is plugged.
 (Amber)	 (Green)	LR mode SFP+ form factor transceiver (connector) is plugged. No powered fiber is connected
 (Amber)	 (Amber)	SR mode SFP+ form factor transceiver (connector) is plugged. No powered fiber is connected
 (Green)	 (Green)	LR mode SFP+ form factor transceiver (connector) is plugged. Powerd fiber is connected
 (Green)	 (Amber)	SR mode SFP+ form factor transceiver (connector) is plugged. Powerd fiber is connected

The size and specification of transceiver are independent from the Ethernet protocol transmitted and received inside fiber.

Hence, there is no problem for the fiber connection between XG2's SFP+ transceiver (connector) and XFP transceiver (connector) that is plugged at other device.

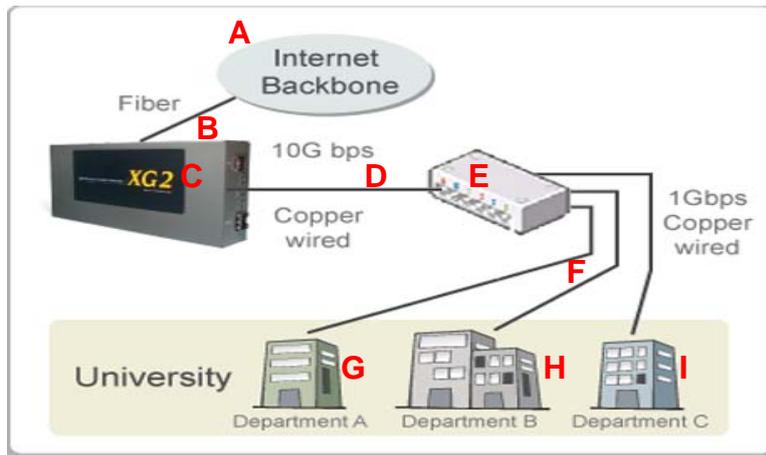


Note: SFP+ Transceiver that complies with 10GBASE-LR/SR standard is suitable for XG2. For recommended SFP+ Transceiver, please contact with distributor.

## 2.3. Application for your network

### 2.3.1. Application for University

10Gbps speed Ethernet connection may not be common seen in the office; however, administrator may has Gigabit Ethernet in the control room of office already. Get a 10Gbps Ethernet connection from backbone and distribute it to different Gigabit Ethernet segment for different building or organization is practical and more cost-effective. Here is an example of possible plan.



This example is a possible network structure of a university.

**A:** Internet backbone from ISP.

**B:** The distance from the central office to the university might be long, so construct the connection via single-mode optical fiber with 10BASE-LR mode, which can extend the distance beyond several tenth of kilometer.

**C:** XG2 is located at the computer center of university.

**D:** After the conversion of XG2, expensive equipment for transmitting/receiving network data via optical fiber is not required afterward.

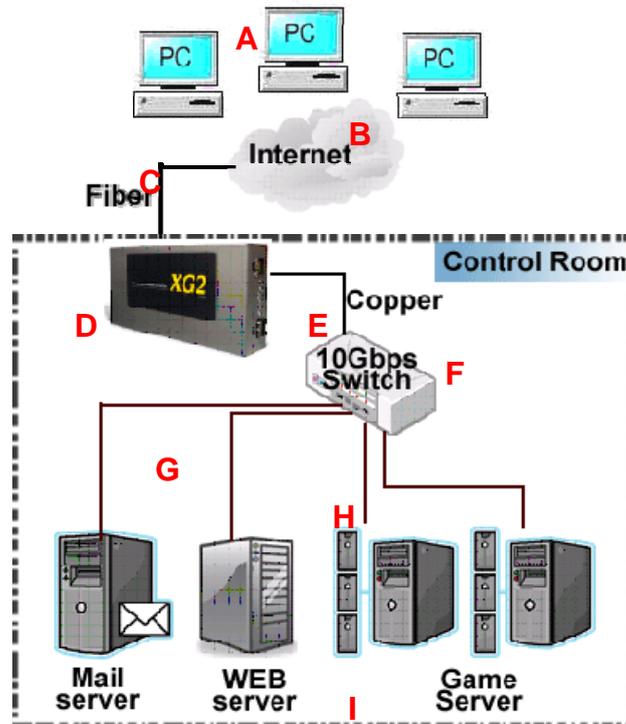
**E:** Full 10Gbps Ethernet Switch may beyond your budget or it is not available. Some 1Gbps Switch reserves a swappable slot for the upgrade of future technology. Plug a 10Gbps module with one 10Gbps port to this kind of Switch is enough for this application.

**F:** After the distribution of 1Gbps Ethernet Switch with attached 10Gbps module, several 1Gbps connections can be distributed to different buildings inside the university by Cat. 6a network cable, which can be extended to 100 meters.

**G, H, I:** Different buildings or departments in one building. General switch with 1Gbps and 100Mbps ports can be connected here for end-user.

### 2.3.2. Application for Online Game Company

For ISP or online game company, XG2 may also save lots of money for cabling their control room. ISP runs lots of customer's service such as e-mail server, web server or any co-located network services in the control room. These equipments may not have interface for the connection of optical fiber. For online game company, administrator may have lots of online game servers that need high-speed connection to Internet backbone in the control room.

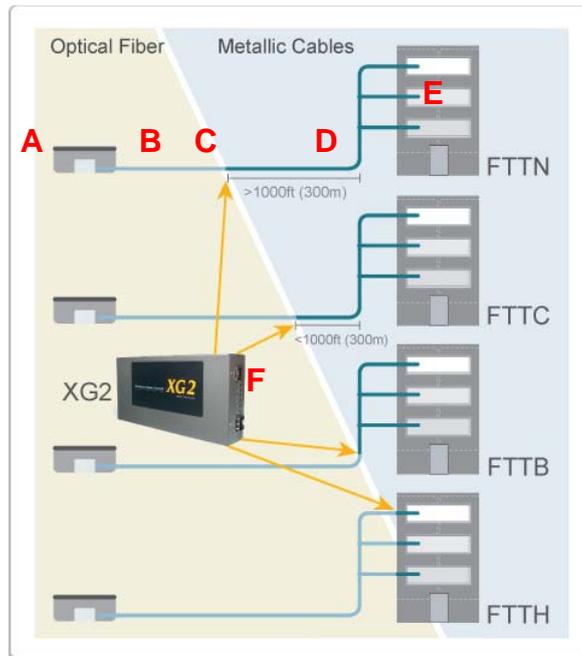


- A:** Client users from Internet
- B:** For the mass requests from general public. The main requests come from other ISP in Internet.
- C:** The distance from the other ISP to the game company might be long, so construct the connection via single-mode optical fiber with 10BASE-LR mode, which can extend the distance beyond several tenth of kilometer.
- D:** XG2 is located at the control room of the game company.
- E:** After the conversion of XG2, transceiver and equipment of optical fiber is not required in the control room afterward.
- F:** Depending on the requirement of loading, Ethernet Switch with full 10Gbps ports or partial 10Gbps/1Gbps ports is configured for the distribution of data flow.
- G:** Assume that the bandwidth requirement of co-located mail servers for some companies is not heavy; connect them to 1Gbps port of 10Gbps switch.
- H:** Assume that the bandwidth requirement of online game servers is heavy; connect them to 10Gbps port of 10Gbps switch.
- I:** Different kinds of server with different applications are located side by side by connections from 10Gbps Ethernet Switch via inexpensive Cat.6 cable.

### 2.3.3. Application for Home User

A schematic illustrating how the FTTH architectures vary with regard to the distance between the optical fiber and the end-user. Fiber to the x (FTTx) is a generic term for any network architecture that uses optical fiber to replace all or part of the usual copper local loop used for telecommunications. The four technologies, in order of an increasingly longer fiber loop are:

- Fiber to the node / neighborhood (FTTN)
- Fiber to the curb (FTTC) / Fiber to the kerb (FTTK)
- Fiber to the building (FTTB)
- Fiber to the home (FTTH)



The building on the left is the central office; the building on the right is one of the buildings served by the central office. The white or gray blocks represent separate rooms or office spaces within the same building.

**A:** Central Office of ISP

**B:** Network connection via optical fiber

**C:** Installation of XG2 for media conversion

**D:** Network connection via copper wire. It can be Cat. 6a cable (under 300 meters) or telephone line via xDSL (Technologies such as VDSL provide high speed, short-range link are used often in FTTx service)

**E:** Different rooms of home or different compartments in the same building.

**F:** XG2 can be located at any place that near or away from building, depending on the service to home users.

#### Advantage for ISP

For the time before, if the client has requirement of lots bandwidth, ISP has to cabling several fibers with gigabit connection to the same location and distributes the connection by Gigabit switch or media converter to copper wired destination.

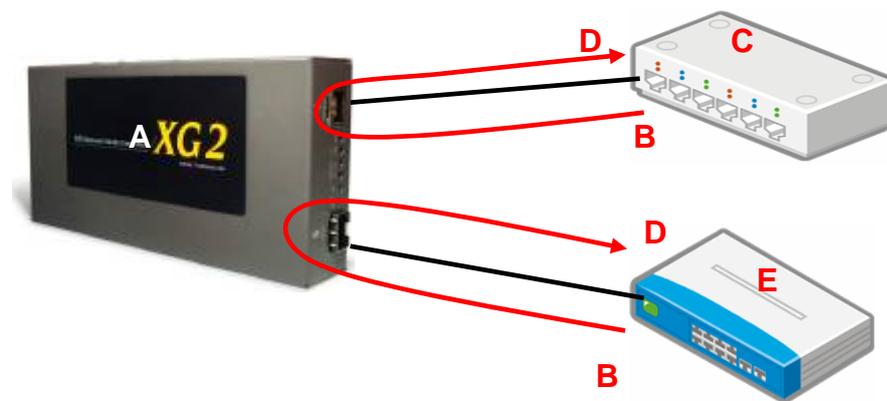
Depends on the bandwidth required for client, ISP can configure a XG2 media converter between the connection of light blue and dark blue line in the graph. With 10G Ethernet conversion between fiber and copper wire, ISP can provide heavyweight bandwidth service that is closer to the client without spending too much cost.

### 3. Additional Function

#### 3.1. Loopback

XG2 has loopback function for the trouble shooting of network. Loopback test is the method to send out signal and quickly back to the same source entity to test the transmission and route problem of infrastructure. Test equipment with this troubleshooting technique sends specific patterns, and counts any errors that come back (BERT, Bit Error Rate Test). From the operation of console port, user can active loopback test. When it is enabled, data stream from test equipment to the XG2 flows returns to their source entity.

Here it illustrates how loopback works.



**A:** XG2 that loopback function is enable for other test equipment or network infrastructure.

**B:** Signal with test patterns such as BERT is sent.

**D:** Signal with test patterns is back to original entity (test equipment).

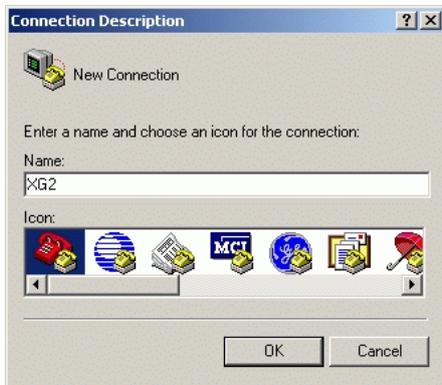
**C:** Network equipment or test equipment with 10GBASE-T port that is able to send test patterns with destination of itself via XG2

**E:** Network equipment or test equipment with 10GBASE-R port that is able to send test patterns with destination of itself via XG2

## 3.2. Operation via Console Port

After connecting the COM port of PC to Console port of XG2 via Console cable, power on the PC and configure the PC parameters as following path of Windows (by using Windows Hyper Terminal software):

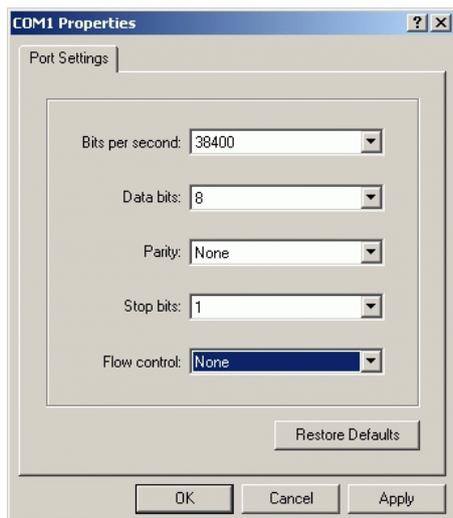
Start → All programs → Accessories → Communications → Hyper Terminal



1. Input a name for this connection, such as XG2, and also select an icon for this connection.

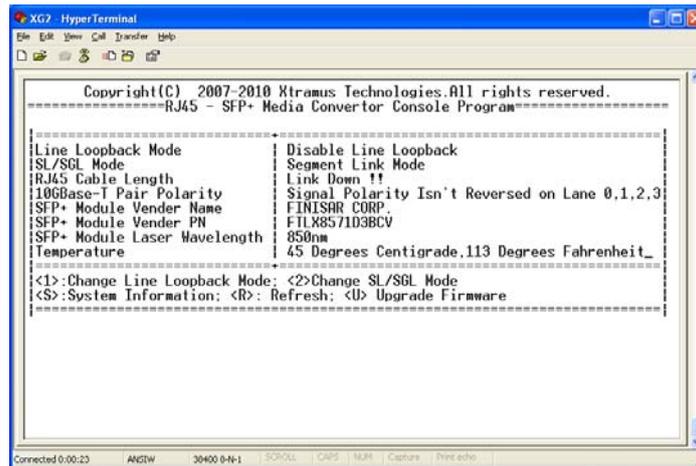


2. Select the COM port of PC for this connection. Generally, it is COM1.

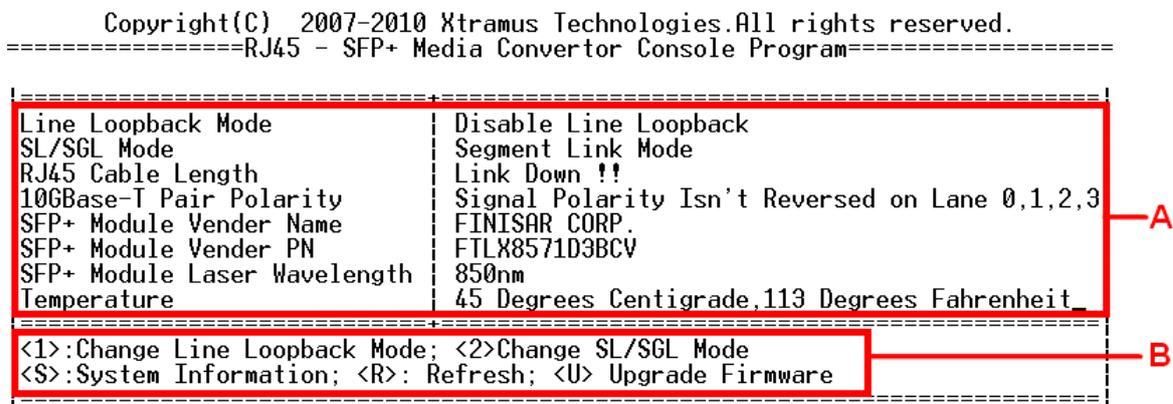


3. Configure the parameter of COM port as below, 38400, 8, None, 1, None

Press "Enter" key to build connection and system enter into the main windows of XG2 Console Program



You can view XG2 system information, switching XG2 modes, or upgrading XG2 firmware with XG2 Console Program.



XG2 system information is displayed in **A**. Information displayed here includes: **Line Loopback Mode**, **SL/SGL Mode**, **RJ45 Cable Length**, **100GBase-T Pair Polarity**, **SFP+ Module Vender Name**, **SFP+ Module Vender PN**, **SFP+ Module Laser Wavelength**, and **Temperature**.

Also, you can key in numbers/characters listed in **B** with your keyboard to input commands for XG2.

<b>&lt;1&gt; Change Line Loopback Mode</b>	
Disable Line Loopback ↑ ↓ Enable Line Loopback	You can enable/disable line loop back by pressing <b>1</b> on your keyboard. For more information, please refer to <b>3.1. Loopback</b> .
<b>&lt;2&gt; Change SL/SGL Mode</b>	
Segment Link Mode ↑ ↓ Slave Link Mode	You can switch the SL/SGL Mode by pressing <b>2</b> on your keyboard. <b>SL Mode</b> stands for <b>Slave Link Mode</b> , while <b>SGL Mode</b> stands for <b>Segment Mode</b> . Two XG2s can't be joined if they are both under <b>Slave Link Mode</b> .

### <S> System Information

```

XG2 - RJ45 - SFP+ Media Converter Console Program
-----
System Information
Module Name      : XG2
Agent           : 0
Customer        : 0
Serial Number    : 0123456789
Hardware Version : v4
Firmware Version : 1.00004; Date: 2010-06-10
FPG Version      : 1.00002; Date: 2010-05-20
Manufacture Date : 2009-01-01 00:00
Accumulated Running Time: 939135 Minutes
Press any key to continue...
  
```

By pressing **S** on your keyboard, you can view detail XG2 information. To exit System Information, please press any key on your keyboard.

### <R> Refresh

To refresh all the information listed on XG2 Console Program, press **R** on your keyboard.

### <U> Update Firmware

To update XG2 firmware, press **U** on your keyboard, and follow the steps down below:

1. Press **U** on your keyboard. System will ask if you want to update Firmware. Please press **Y** on your keyboard.

```

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=====RJ45 - SFP+ Media Converter Console Program=====
-----
|Line Loopback Mode      |Disable Line Loopback|
|SL/SGL Mode            |Segment Link Mode    |
|RJ45 Cable Length      |Link Down !!         |
|10GBase-T Pair Polarity|Signal Polarity Isn't|
|SFP+ Module Vender Name|FINISAR CORP.        |
|SFP+ Module Vender PN  |FTLX8571D3BCV        |
|SFP+ Module Laser Wavelength|850nm                |
|Temperature             |46 Degrees Centigrade,114 Degrees Fahrenheit|
-----
<1>:Change Line Loopback Mode; <2>Change SL/SGL Mode
<S>:System Information; <R>: Refresh; <U> Upgrade Firmware
  
```

Are You Sure You Want To Update Firmware?(Y/N)\_

2. XG2 Console Program will start the process required for updating firmware.

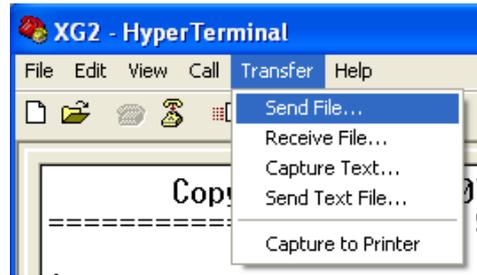
```

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=====RJ45 - SFP+ Media Converter Console Program=====
-----
|Line Loopback Mode      |Disable Line Loopback|
|SL/SGL Mode            |Segment Link Mode    |
|RJ45 Cable Length      |Link Down !!         |
|10GBase-T Pair Polarity|Signal Polarity Isn't|
|SFP+ Module Vender Name|FINISAR CORP.        |
|SFP+ Module Vender PN  |FTLX8571D3BCV        |
|SFP+ Module Laser Wavelength|850nm                |
|Temperature             |46 Degrees Centigrade,114 Degrees Fahrenheit|
-----
<1>:Change Line Loopback Mode; <2>Change SL/SGL Mode
<S>:System Information; <R>: Refresh; <U> Upgrade Firmware
  
```

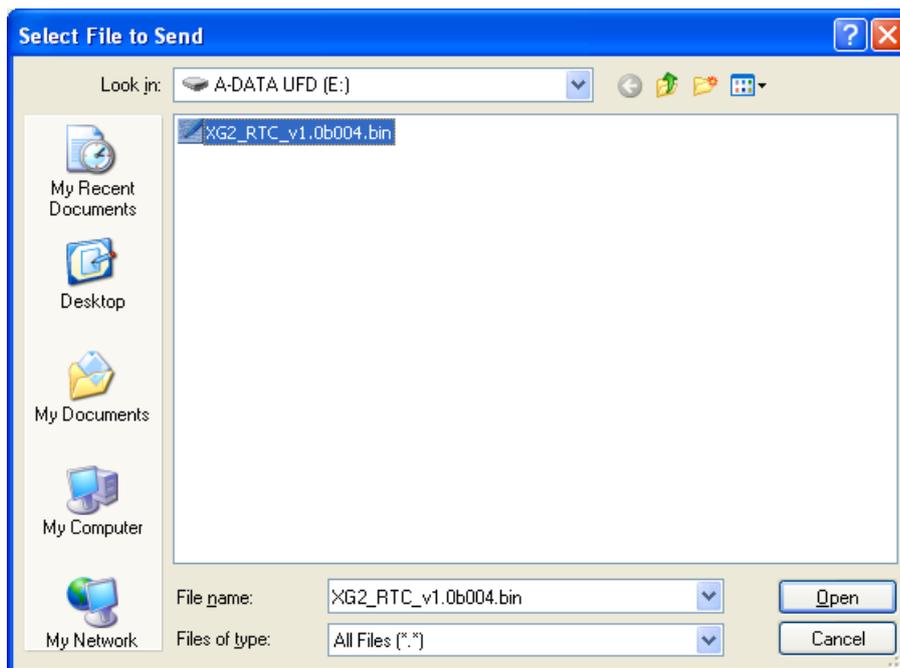
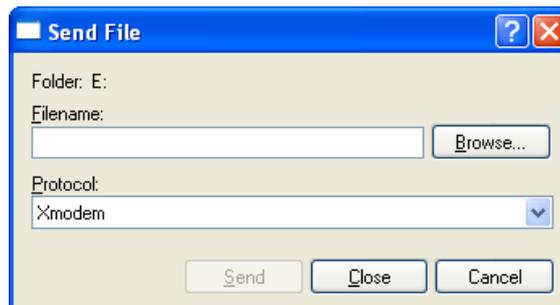
```

Are You Sure You Want To Update Firmware?(Y/N)
Erasing code space.....
Please transfer the firmware file with XModem protocol
CCC
  
```

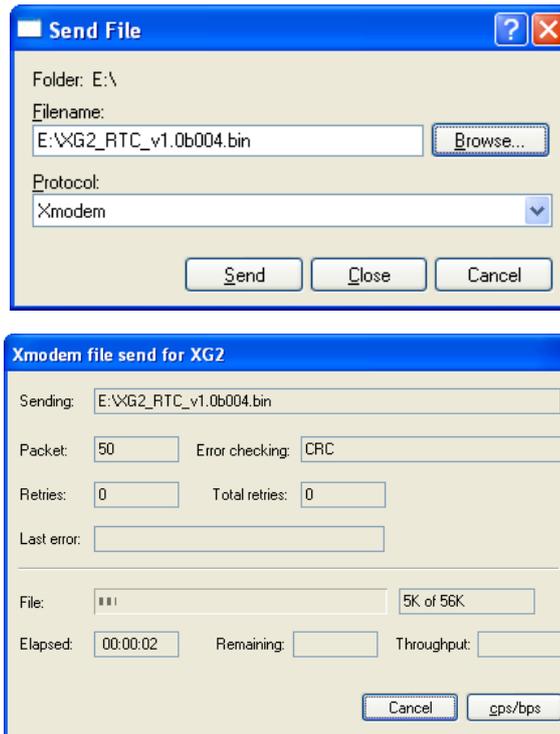
3. Please select **Transfer** → **Send File** on HyperTerminal's menu bar.



4. A **Send File** window will pop up. Please set the **Protocol** to **Xmodem**, click **Browse...** button to choose the XG2 firmware you would like to update, and click **Open**.



5. Click **Send** button on the **Send File** pop-up window to start sending firmware to XG2.



6. XG2 will reboot when finishing updating its firmware.

```

Booting Procedure
Power On Self Test.....OK

Module Name           : XG2
Agent                 : 0
Customer              : 0
Serial Number         : A123456789
Hardware Version      : v4
Firmware Version      : 1.0b004; Date 2010-06-10
FPGA Version          : 1.0b003; Date 2010-05-20
Manufacture Date      : 2009-01-01 00:00
Accumulated Running Time: 939135 Minutes
    
```

## 4. XG2 Specifications

### XG2 Series Common Specifications

Type	Converter	Management Port	Serial Port
Data Transfer Rate	10Gbps	Plug & Play	Yes
Connectivity	Wired	Standalone	Yes
Platform	PC	Dimensions	175 x85.9x32.6mm (L x W x H)
Dimensions	175 x85.9x32.6mm (L x W x H)		
Temperature	<ul style="list-style-type: none"> <li>Operating: 0°C~ 40°C (32°F~ 104°F)</li> <li>Storage: 0°C~ 50°C (32°F~ 122°F)</li> </ul>		
Humidity	<ul style="list-style-type: none"> <li>Operating: 0% ~ 85% RH</li> <li>Storage: 0% ~ 85% RH</li> </ul>		
Maximum Packet Forwarding Rate (packet per second)	14,880,950		

### XG2 Series Detailed Specifications

XG2			
	Interface	RJ45 to/from SFP+	
	Protocol	Port A	IEEE802.3an (10GBase-T)
		Port B	IEEE802.3ae (10GBase-R)
	Fixed Port	10Gbps UTP Portx1    10Gbps SFP+ Portx1 RS-232 Console Portx1    Power Jack x 1	
LED Display	<ul style="list-style-type: none"> <li>➤ SFP+</li> <li>➤ LR</li> </ul>	<ul style="list-style-type: none"> <li>➤ Link/Rx A</li> <li>➤ Link/Rx B</li> </ul>	<ul style="list-style-type: none"> <li>➤ Loopback</li> <li>➤ SYS</li> </ul>
XG2-1			
	Interface	SFP+ to/from SFP+	
	Protocol	Port A	IEEE802.3ae (10GBase-R)
		Port B	IEEE802.3ae (10GBase-R)
	Fixed Port	10Gbps SFP+ Port x 2 RS-232 Console Portx1    Power Jack x 1	
LED Display	<ul style="list-style-type: none"> <li>➤ LR A</li> <li>➤ LR B</li> </ul>	<ul style="list-style-type: none"> <li>➤ SFP+/Rx A</li> <li>➤ SFP+/Rx B</li> </ul>	<ul style="list-style-type: none"> <li>➤ Loopback</li> <li>➤ SYS</li> </ul>
XG2-2			
	Interface	SFP+ to/from XFP	
	Protocol	Port A	IEEE802.3ae (10GBase-R)
		Port B	IEEE802.3ae (10GBase-R)
	Fixed Port	10Gbps SFP+ Portx1    10Gbps XFP Portx1 RS-232 Console Portx1    Power Jack x 1	
LED Display	<ul style="list-style-type: none"> <li>➤ SFP+</li> <li>➤ LR</li> </ul>	<ul style="list-style-type: none"> <li>➤ Link/Rx A</li> <li>➤ Link/Rx B</li> </ul>	<ul style="list-style-type: none"> <li>➤ Loopback</li> <li>➤ SYS</li> </ul>

**XG2-3**

	<b>Interface</b>	RJ45 to/from XFP	
	<b>Protocol</b>	<b>Port A</b>	IEEE802.3an (10GBase-T)
		<b>Port B</b>	IEEE802.3ae (10GBase-R)
	<b>Fixed Port</b>	10Gbps UTP Portx1	10Gbps XFP Portx1
	RS-232 Console Portx1	Power Jack x 1	
<b>LED Display</b>	➤ Link/Rx A	➤ Loopback	
	➤ Link/Rx B	➤ SYS	

**XG2-4**

	<b>Interface</b>	CX4 to/from SFP+	
	<b>Protocol</b>	<b>Port A</b>	IEEE802.3ae (10GBase-CX4)
		<b>Port B</b>	IEEE802.3ae (10GBase-R)
	<b>Fixed Port</b>	10Gbps SFP+ Portx1	10Gbps CX4 Portx1
	RS-232 Console Portx1	Power Jack x 1	
<b>LED Display</b>	➤ Link/Rx A	➤ Loopback	
	➤ Link/Rx B	➤ SYS	

**XG2-5**

	<b>Interface</b>	XFP to/from XFP	
	<b>Protocol</b>	<b>Port A</b>	IEEE802.3ae (10GBase-R)
		<b>Port B</b>	IEEE802.3ae (10GBase-R)
	<b>Fixed Port</b>	10Gbps XFP Port x 2	
	RS-232 Console Portx1	Power Jack x 1	
<b>LED Display</b>	➤ Link/Rx A	➤ Loopback	
	➤ Link/Rx B	➤ SYS	