

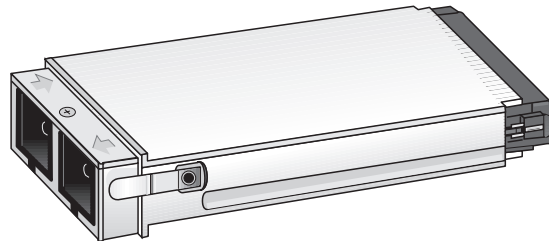


70-km Gigabit Ethernet GBIC Transceiver Installation Guide

For 3Com Gigabit Interface Converter (GBIC) Transceivers

Description The Gigabit Interface Converter (GBIC) ports on your system connect to Gigabit Ethernet networks through a GBIC transceiver (Figure 1), providing a high-speed connection over fiber-optic cable. The transceiver connects to the network using a fiber-optic duplex Subscriber Connector (SC). You can remove and replace the transceiver with the system on (which is called *hot-swapping*).

Figure 1 70-km Gigabit Ethernet GBIC Fiber-Optic Transceiver



To ensure optimal performance, compatibility, and regulatory compliance, use only GBIC transceivers that 3Com supports. For a list of currently supported GBICs, see this 3Com Web site:

http://www.3Com.com/gigabit_ethernet/gbics

For the most up-to-date information about this and other 3Com products, always see the User Guides and Release Notes at this 3Com Web site:

<http://support.3Com.com/nav/switches.htm>

Table 1 shows the transmission range and other data for this connection.

Table 1 70-km Gigabit Ethernet GBIC Single-Mode Transmission Range

Fiber Type	Diameter (microns)	Minimum Connector End Polish	Transmission Range
Single-mode	9 μ m core	PC	10 – 70 km (6.2 – 43.4 mi)

Table 2 shows the optical parameters of the 70-km Gigabit Ethernet GBIC.

Table 2 Optical Parameters

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
Transmitter						
Wavelength	λ_c	1540	1550	1570	nm	
Optical output power	P_{out}	-4	N/A	N/A	dBm	Average power coupled into single-mode fiber
Receiver						
Optical input power	P_{in}	-24	N/A	N/A	dBm	BER < 10 ⁻¹² with PRBS 2 ⁷ -1 test data pattern @ 1.25Gb/s

Safety Precautions

Be sure to follow all safety precautions when you replace a GBIC transceiver in the system. To avoid electric shocks and burns to yourself and damage to the equipment, read and follow these warnings:



WARNINGS: *When the system is on:*

- *Never insert a metal object such as a screwdriver or a finger with jewelry into open module slots.*
- *Do not touch any connections inside the chassis with your hands or fingers.*

Fiber Safety Precautions

The GBIC ports on your system use lasers. To ensure your safety when you install or work with these GBIC systems, read and comply with the precautions in this section.



WARNING: The fiber optic lasers used in 3Com GBIC ports meet the regulatory requirements for casual exposure to the eye. As with any source of bright light, however, 3Com recommends that you do not look into the laser light source.

FDA Class 1 Laser Device

This product complies with U.S. Department of Health and Human Services Rules 21 CFR Subchapter J applicable at date of manufacture.



IEC 825, Class 1 Laser Devices are for connection only to Class 1 Laser Devices. Multimode and single-mode fiber optic interfaces use lasers.

Inserting the Transceiver

Before you connect the system to the Gigabit Ethernet network, first insert the transceiver into the GBIC port on the system, as described in this section. The procedure is similar for all relevant CoreBuilder® chassis.



To ensure optimal performance, compatibility, and regulatory compliance, use only GBIC transceivers that 3Com supports. For a list of GBIC devices that are qualified for the CoreBuilder 3500, 9000, and 9400, see this 3Com Web site:

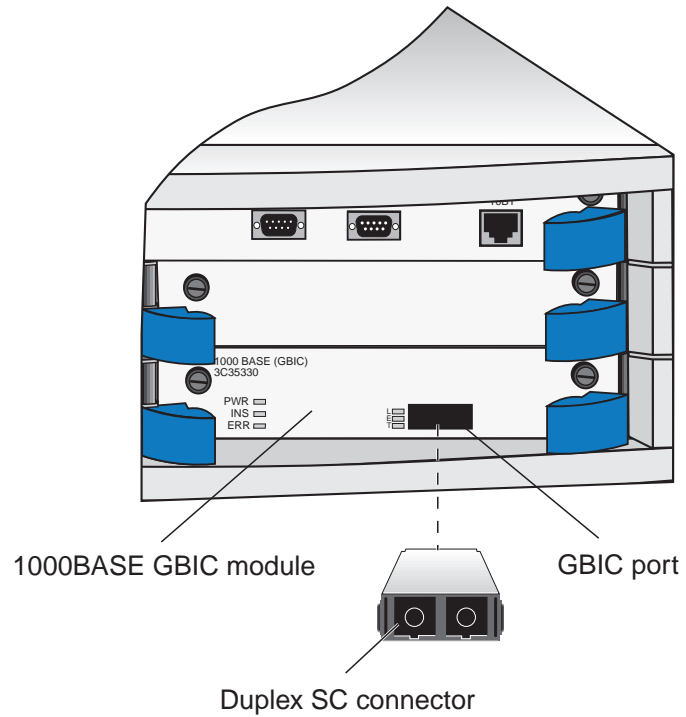
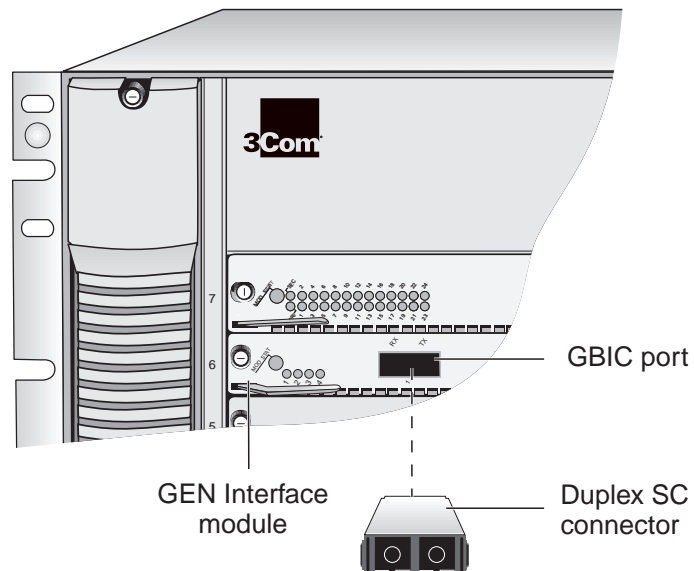
http://www.3com.com/gigabit_ethernet/gbics

- 1 Read and follow the instructions in "Safety Precautions" earlier in this guide.
- 2 Orient the transceiver so that the duplex SC connector is toward you.



CAUTION: GBIC transceivers are keyed and can be properly inserted only one way. If the transceiver does not click when you insert it, turn it over and reinsert it.

- a Figure 2 shows how to insert the transceiver into a CoreBuilder 3500 GBIC port.
- b Figure 3 shows how to insert the transceiver into a GBIC port on the CoreBuilder 9000 7-slot chassis. Installation in the 8-slot and 16-slot chassis is the same except that the chassis ports are oriented vertically.

Figure 2 Inserting the 70-km GBIC Transceiver in a CoreBuilder 3500**Figure 3** Inserting the 70-km GBIC Transceiver in a CoreBuilder 9000

- 3 Gently slide the transceiver into the GBIC port until it clicks into place.



CAUTION: GBIC transceivers are keyed and can be properly inserted only one way. If the transceiver does not click when you insert it, turn it over and reinsert it.

- 4 You are now ready to cable the system to the Gigabit Ethernet network.

Removing the Transceiver

To replace an existing GBIC transceiver, compress the side tabs and gently pull the old transceiver out of the port.

Troubleshooting Transceivers

After you insert the GBIC transceiver into the port, the system software verifies the transceiver operation, as discussed in this section.



To ensure optimal performance, compatibility, and regulatory compliance, use only GBIC transceivers that 3Com supports. For a list of currently supported GBICs, see this 3Com Web site:

http://www.3com.com/gigabit_ethernet/gbics

If the transceiver is not working properly, the system displays an appropriate error message, as described in the following sections.

“Unqualified GBIC” Error

If the system detects an unqualified GBIC or a problem with the integrity of the GBIC, it sets the port type to `Unqualified GBIC`, displays a short description at the display (`Uqual.GBIC`), and captures the error in the event log.

WARNING

The GBIC in Port xx is NOT approved by 3Com & may violate electromagnetic emission or safety requirements for your country. Refer to 3Com's web page (www.3com.com/gigabit_ethernet/gbics) for our current approved list.



Using a newer version GBIC transceiver (GBIC91, GBIC92, or GBIC97) in a system running older code (pre-Release 3.0) can generate the above message. For a list of GBIC devices that are qualified for the CoreBuilder 3500, 9000, and 9400, see this 3Com Web site:

http://www.3com.com/gigabit_ethernet/gbics

The event log may show one of the following informational messages:

■ Unqualified GBIC: I2C read error

Meaning The transceiver, which connects to the module host board through a 20-pin connector is not seated properly, and a clean connection cannot be established.

Corrective action To correct this problem, completely remove the transceiver and then reinsert it. If the problem persists, contact 3Com Technical Support. For contact information in the United States and Canada, call 1-800-NET-3COM. For the number to call in other locations, visit the 3Com Web site: <http://www.3com.com/util/enterprise.html>

■ Unqualified GBIC: Checksum match error

Meaning The system uses checksum error detection to verify the integrity of the GBIC data. If the system detects a problem with the data, it displays an error message that indicates a checksum failure.

Corrective action Although this condition does not necessarily indicate that the GBIC transceiver will not function in the system, replace the transceiver to ensure proper operation.

■ Unqualified GBIC: MODDEF Value - xx

■ Unqualified GBIC: Transceiver byte(s) error

Meaning For both of these messages, the value (xx) of this GBIC type is not a Module Definition 4 GBIC (Serial Identification) as defined by the Gigabit Interface Converter specification.

Corrective action Replace this transceiver with a GBIC that is qualified by 3Com.

GBIC Disable Error

If the system detects that the transceiver cannot emit the proper laser signal, it disables the port, sets the port type to `disabled`, displays a short description (`GBIC Disable`), and captures the error in the event log.

The following message appears in the event log:

```
Due to excessive TxFault conditions, GBIC Port xx has been disabled.
```

Meaning Excessive Tx Fault conditions indicate a faulty GBIC.

Corrective action Replace the transceiver. If the problem persists, contact network supplier or 3Com Technical Support. For contact information, see the Technical Support appendix in the *Getting Started Guide* for your system.

“Unapproved GBIC” Error

Supported transceivers are those that 3Com has specifically tested and qualified for use with 3Com GBIC systems. Pretesting at 3Com ensures proper functionality, compatibility, and regulatory compliance.

If the system detects a transceiver that 3Com does not support, it sets the port type to `Unqualified GBIC`, displays a short description, (`Unappr.GBIC`), and captures the error in the event log.

WARNING

The GBIC in Port xx is NOT approved by 3Com & may violate electromagnetic emission or safety requirements for your country. Refer to 3Com's web page (www.3com.com/gigabit_ethernet/gbics) for our current approved list.

The following informational message is shown in the event log:

```
Unqualified GBIC: Unqualified vendor part number
```

Corrective action Although this report does not necessarily indicate that the GBIC transceiver will not function properly with the system, it does indicate that 3Com has not qualified the transceiver and does not support it.

Incorrect Value in the Ethernet Display Field (CoreBuilder 3500)

An incorrect value appears in the Ethernet display field when *all* of these conditions are true:

- Your CoreBuilder 3500 is running system software at Release 2.1 or earlier.
- You have installed or reinstalled a new or replacement GBIC (for example, Model Number 3CGBIC91, 3CGBIC92 or 3CGBIC97).
- You enter the `ethernet summary` or the `ethernet detail` command for the first time.

When all of these conditions are true, the text `(GBIC) Non-qualified` appears in the `portType` field of the Ethernet display even though the GBIC *is* qualified and functions properly. Disregard this incorrect value.

Calculating the Link Budget for the 70-km GBIC Transceiver

The 70-km GBIC has an optical budget of 20 dB and operates at a wavelength of 1550 nm. Calculate potential link distances as follows:

- Minimum launch power is -4 dBm.
- Minimum receive sensitivity is -24 dBm.

The optical budget is arrived at by subtracting the minimum receive sensitivity of -24 dBm from the minimum launch power of -4 dBm, which yields an optical budget of 20 dB.

- Allow 0.25 dB attenuation per kilometer of single-mode fiber at 1550 nm.
- Allow 0.5 dB attenuation per mating connector.

Sample Calculations

System A

60 km of fiber with 8 mating connectors:

- 1 60 km of single-mode fiber
x 0.25 dB per km
= 15 dB fiber attenuation
- 2 8 mating connectors
x 0.50 dB per connector
= 4 dB connector attenuation
- 3 15 dB fiber attenuation
+ 4 dB connector attenuation
= 19 dB total link attenuation

System B

75 km of fiber with 2 mating connectors:

- 1 75 km of single-mode fiber
x 0.25 dB per km
= 18.75 dB fiber attenuation
- 2 2 mating connectors
x 0.50 dB per connector
= 1 dB connector attenuation
- 3 18.75 dB fiber attenuation
+ 1 dB connector attenuation
= 19.75 dB total link attenuation

System C

90 km of fiber with 4 mating connectors:

- 1 90 km of single-mode fiber
x 0.19 dB per km
= 17.1 dB fiber attenuation
- 2 4 mating connectors
x 0.5 dB per connector
= 2 dB connector attenuation
- 3 17.1 dB fiber attenuation
+ 2 dB connector attenuation
= 19.1 dB total link attenuation

The budget figures for all three of the sample systems reflect conservative values for fiber attenuation and connector attenuation to assure operation at 70 km under typical to less-than-ideal conditions. Link distances of greater than 70 km can be attained when conditions allow. Fiber attenuation of 0.19 dB per km and lower is possible, allowing link lengths beyond 70 km. Consult your fiber installer to obtain actual link attenuation values at 1550 nm for the fiber intended for use with the 70-km GBIC transceiver.

3Com Corporation LIMITED WARRANTY

3Com GBIC Transceivers

HARDWARE

3Com warrants to the end user ("Customer") that this hardware product will be free from defects in workmanship and materials, under normal use and service, for one (1) year from the date of purchase from 3Com or its authorized reseller.

3Com's sole obligation under this express warranty shall be, at 3Com's option and expense, to repair the defective product or part, deliver to Customer an equivalent product or part to replace the defective item, or if neither of the two foregoing options is reasonably available, 3Com may, in its sole discretion, refund to Customer the purchase price paid for the defective product. All products that are replaced will become the property of 3Com. Replacement products may be new or reconditioned. 3Com warrants any replaced or repaired product or part for ninety (90) days from shipment, or the remainder of the initial warranty period, whichever is longer.

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Any software update or replaced or repaired product will carry a Year 2000 Warranty for ninety (90) days after purchase or until April 1, 2000, whichever is later.

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Customer must contact a 3Com Corporate Service Center or an Authorized 3Com Service Center within the applicable warranty period to obtain warranty service authorization. Dated proof of purchase from 3Com or its authorized reseller may be required. Products returned to 3Com's Corporate Service Center must be preauthorized by 3Com with a Return Material Authorization (RMA) number or User Service Order (USO) number marked on the outside of the package, and sent prepaid and packaged appropriately for safe shipment, and it is recommended that they be insured or sent by a method that provides for tracking of the package. Responsibility for loss or damage does not transfer to 3Com until the returned item is received by 3Com. The repaired or replaced item will be shipped to Customer, at 3Com's expense, not later than thirty (30) days after 3Com receives the defective product.

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INCLUDED SERVICES:

Telephone Support, with coverage for basic troubleshooting only, will be provided for ninety (90) days from the date of purchase, on a commercially reasonable efforts basis. Please refer to the Technical Support appendix in the Getting Started Guide for telephone numbers.

3Com's Web and Bulletin Board Services provide 3Knowledgebase, bug tracking, documentation, release notes, and some software maintenance releases at no charge.

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