

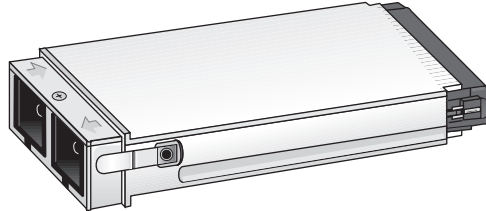


70-km Gigabit Ethernet GBIC Transceiver Installation Guide

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:

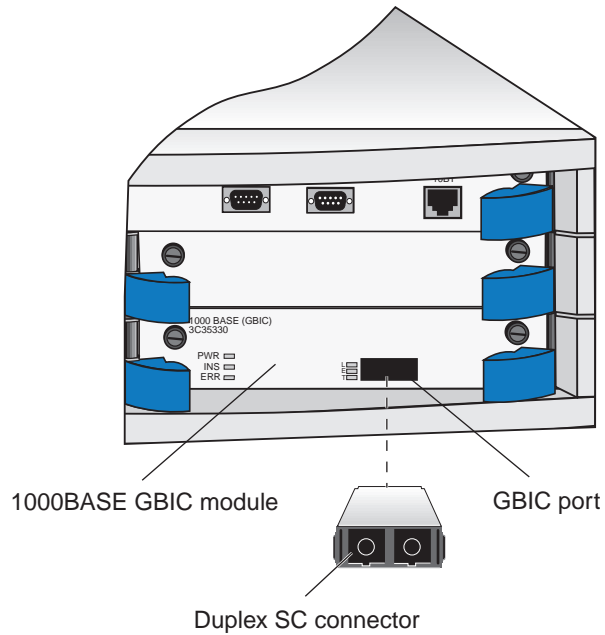
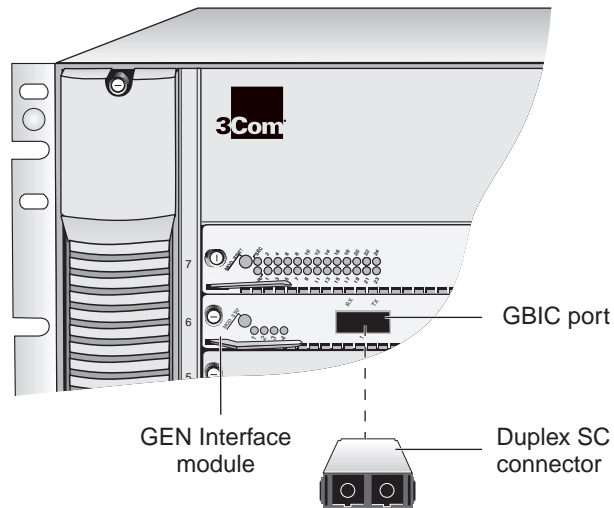
http://www.3com.com/gigabit_ethernet/gbics

- 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.

YEAR 2000 WARRANTY

In addition to the Hardware Warranty and Software Warranty stated above, 3Com warrants that each product sold or licensed to Customer on and after January 1, 1998, that is date sensitive will continue performing properly with regard to such date data on and after January 1, 2000, provided that all other products used by Customer in connection or combination with the 3Com product, including hardware, software, and firmware, accurately exchange date data with the 3Com product, with the exception of those products identified at 3Com's Web site, <http://www.3com.com/products/yr2000.html>, as not meeting this standard. If it appears that any product that is stated to meet this standard does not perform properly with regard to such date data on and after January 1, 2000, and Customer notifies 3Com before the later of April 1, 2000, or ninety (90) days after purchase of the product from 3Com or its authorized reseller, 3Com shall, at its option and expense, provide a software update which would effect the proper performance of such product, repair such product, deliver to Customer an equivalent product to replace such product, or, if none of the foregoing is feasible, refund to Customer the purchase price paid for such product.

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.

OBTAINING WARRANTY SERVICE

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.

3Com shall not be responsible for any software, firmware, information, or memory data of Customer contained in, stored on, or integrated with any products returned to 3Com for repair, whether under warranty or not.

Dead- or Defective-on-Arrival. In the event a product completely fails to function or exhibits a defect in materials or workmanship within the first forty-eight (48) hours of installation but no later than thirty (30) days after the date of purchase, and this is verified by 3Com, it will be considered dead- or defective-on-arrival (DOA) and a replacement shall be provided by advance replacement. The replacement product will normally be shipped not later than three (3) business days after 3Com's verification of the DOA product, but may be delayed due to export or import procedures. The shipment of advance replacement products is subject to local legal requirements and may not be available in all locations. When an advance replacement is provided and Customer fails to return the original product to 3Com within fifteen (15) days after shipment of the replacement, 3Com will charge Customer for the replacement product, at list price.

Advance Replacement is provided for ninety (90) days, after which time it may be available for a specified fee. 3Com will make commercially reasonable efforts to ship the replacement product not later than five (5) business days after receiving the request for advance replacement, but may be delayed due to product availability or export or import procedures. The shipment of advance replacement products is subject to local legal requirements and may not be available in all locations. When an advance replacement is provided and Customer fails to return the original product to 3Com within fifteen (15) days after shipment of the replacement, 3Com will charge Customer for the replacement, at list price. This advance replacement is different from the fee-based Advance Hardware Replacement Service, which is available as a contracted service offering.

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.

WARRANTIES EXCLUSIVE

IF A 3COM PRODUCT DOES NOT OPERATE AS WARRANTED ABOVE, CUSTOMER'S SOLE REMEDY FOR BREACH OF THAT WARRANTY SHALL BE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. TO THE FULL EXTENT ALLOWED BY LAW, THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES, TERMS, OR CONDITIONS, EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING WARRANTIES, TERMS, OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, SATISFACTORY QUALITY, CORRESPONDENCE WITH DESCRIPTION, AND NONINFRINGEMENT, ALL OF WHICH ARE EXPRESSLY DISCLAIMED. 3COM NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, OR USE OF ITS PRODUCTS.

3COM SHALL NOT BE LIABLE UNDER THIS WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT OR MALFUNCTION IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY CUSTOMER'S OR ANY THIRD PERSON'S MISUSE, NEGLIGENCE, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO OPEN, REPAIR, OR MODIFY THE PRODUCT, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING, POWER CUTS OR OUTAGES, OTHER HAZARDS, OR ACTS OF GOD.

LIMITATION OF LIABILITY

TO THE FULL EXTENT ALLOWED BY LAW, 3COM ALSO EXCLUDES FOR ITSELF AND ITS SUPPLIERS ANY LIABILITY, WHETHER BASED IN CONTRACT OR TORT (INCLUDING NEGLIGENCE), FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, OR FOR LOSS OF REVENUE OR PROFITS, LOSS OF BUSINESS, LOSS OF INFORMATION OR DATA, OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE SALE, INSTALLATION, MAINTENANCE, USE, PERFORMANCE, FAILURE, OR INTERRUPTION OF ITS PRODUCTS, EVEN IF 3COM OR ITS AUTHORIZED RESELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND LIMITS ITS LIABILITY TO REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE PAID, AT 3COM'S OPTION. THIS DISCLAIMER OF LIABILITY FOR DAMAGES WILL NOT BE AFFECTED IF ANY REMEDY PROVIDED HEREIN SHALL FAIL OF ITS ESSENTIAL PURPOSE.

DISCLAIMER

Some countries, states, or provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages for certain products supplied to consumers, or the limitation of liability for personal injury, so the above limitations and exclusions may be limited in their application to you. When the implied warranties are not allowed to be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights which may vary depending on local law.

GOVERNING LAW

This Limited Warranty shall be governed by the laws of the State of California, U.S.A., excluding its conflicts of laws principles and excluding the United Nations Convention on Contracts for the International Sale of Goods.

3Com Corporation, 5400 Bayfront Plaza, P.O. Box 58145, Santa Clara, CA 95052-8145 (408) 326-5000

3Com Corporation
5400 Bayfront Plaza
Santa Clara, California
95052-8145

Copyright © 2000, 3Com Corporation. All rights reserved. No part of this documentation may be reproduced in any form or by any means or used to make any derivative work (such as translation, transformation, or adaptation) without written permission from 3Com Corporation. 3Com Corporation reserves the right to revise this documentation and to make changes in content from time to time without obligation on the part of 3Com Corporation to provide notification of such revision or change.

3Com Corporation provides this documentation without warranty, term, or condition of any kind, either implied or expressed, including, but not limited to, the implied warranties, terms, or conditions of merchantability, satisfactory quality, and fitness for a particular purpose. 3Com may make improvements or changes in the product(s) and/or the program(s) described in this documentation at any time.

3Com registered trademarks are registered in the United States and may or may not be registered in other countries. 3Com, the 3Com logo, CoreBuilder, and SuperStack are registered trademarks of 3Com Corporation.

All other company and product names may be trademarks of the respective companies with which they are associated.