



## **NC7131 Gigabit Server Adapter**

User Guide

First Edition (April 2001)  
Part Number 207746-00A  
Compaq Computer Corporation

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# About This Guide

This user guide can be used for reference when installing a Compaq NC7131 Gigabit Server Adapter.



**WARNING:** To reduce the risk of personal injury from electrical shock and hazardous energy levels, only authorized service technicians should attempt to repair this equipment. Improper repairs could create conditions that are hazardous.

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**IMPORTANT:** The installation of options and servicing of this product shall be performed by individuals who are knowledgeable of the procedures, precautions, and hazards associated with equipment containing hazardous energy circuits.

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## Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

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**CAUTION:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

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**IMPORTANT:** Text set off in this manner presents clarifying information or specific instructions.

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**NOTE:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

## Compaq Technician Notes



**WARNING:** Only authorized technicians trained by Compaq should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard. Any indications of component replacement or printed wiring board modifications may void any warranty.

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**WARNING:** To reduce the risk of personal injury from electrical shock and hazardous energy levels, do not exceed the level of repair specified in these procedures. Because of the complexity of the individual boards and subassemblies, do not attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs could create conditions that are hazardous.

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**WARNING:** To reduce the risk of electric shock or damage to the equipment:

- If the system has multiple power supplies, disconnect power from the system by unplugging all power cords from the power supplies.
  - Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
  - Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- 



**CAUTION:** To properly ventilate your system, you must provide at least 12 inches (30.5 cm) of clearance at the front and back of the computer.

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**CAUTION:** The computer is designed to be electrically grounded. To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

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## Where to Go for Additional Help

In addition to this guide, the following information sources are available:

- README files in the \DIAGS directory on the Compaq Software and Documentation CD. To view these files, insert the CD, switch to the \DIAGS directory on that drive, and enter:  
SETUP /README
- *Compaq NC7131 Gigabit Server Adapter Quick Installation Card*  
(Part Number 207748-021)

## Compaq Customer Support

You can reach Compaq automated support services 24 hours a day, every day at no charge. The services provide the most up-to-date information about Compaq products. You can access installation instructions, troubleshooting information, and general product information from the Compaq website.

For comprehensive online support, refer to:

[www.compaq.com](http://www.compaq.com)

For international information, refer to:

[www.compaq.com/corporate/overview/world\\_offices.html](http://www.compaq.com/corporate/overview/world_offices.html)

## Compaq Website

For Compaq Web-based support services, visit

<http://www.compaq.com/support>

Navigate to a specific product and then look for support information from this list of support resources.

For a complete list of available SoftPaq files, navigate to:

<http://www.compaq.com/support/files/allsp.html>

Send email to:

[support@compaq.com](mailto:support@compaq.com)

## PaqFax Number

The Compaq fax-on-demand retrieval system provides product-specific information. To use the fax system, you must be in North America and you must have a fax machine or fax modem to receive the automated fax transmittals. Call 1-800-345-1518, option 1, and request a product catalog. After you receive the catalog, you can order the documents through the Compaq fax-on-demand retrieval system.

## Calling the Compaq Support Line

When you call the Compaq Support line, you must be at your server with your software running and the product documentation at hand. The Compaq technician may ask for the following information:

- Your address and telephone number
- The name and model number of the Compaq product you are calling about
- The serial number of your Compaq product
- The names and version numbers of the software you are using to operate the Compaq product
- The name and version number of the operating system you are using
- The system type (manufacturer and model number)
- The expansion boards or add-in cards in your server
- The amount of memory in your server

### **North America**

The Compaq Customer Support department for North America can be reached at

1-800-652-6672 (1-800-OKCOMPAQ)

For continuous quality improvement, calls may be monitored or recorded.

### **Europe, the Middle East, and Africa**

In Europe, the Middle East, and Africa, contact your local Compaq authorized service provider. Details of your local Compaq authorized service provider can be obtained from your Compaq authorized reseller, dealer, or from the Compaq website at

<http://www.compaq.com>

### **Worldwide Access**

Compaq has technical support centers worldwide. Many of the centers are staffed by technicians who speak the local languages. For a list of Compaq support centers, go to:

<http://www.compaq.com>

From the Compaq Worldwide home page, select your country and click **Go** to find the nearest Compaq office.



# Chapter 1

## Introduction

### Overview

The Compaq NC7131 Gigabit Server Adapter is a high-performance Ethernet adapter with a fully integrated 10/100/1000 controller that delivers up to 1000 Mb/s Ethernet over twisted-pair (copper) cabling. The Compaq NC7131 adapter has one auto-negotiating RJ-45 port and LED indicators showing link, activity, and port speed. The NC7131 Gigabit Server Adapter is a supported option for selected Compaq *ProLiant*<sup>™</sup> servers.

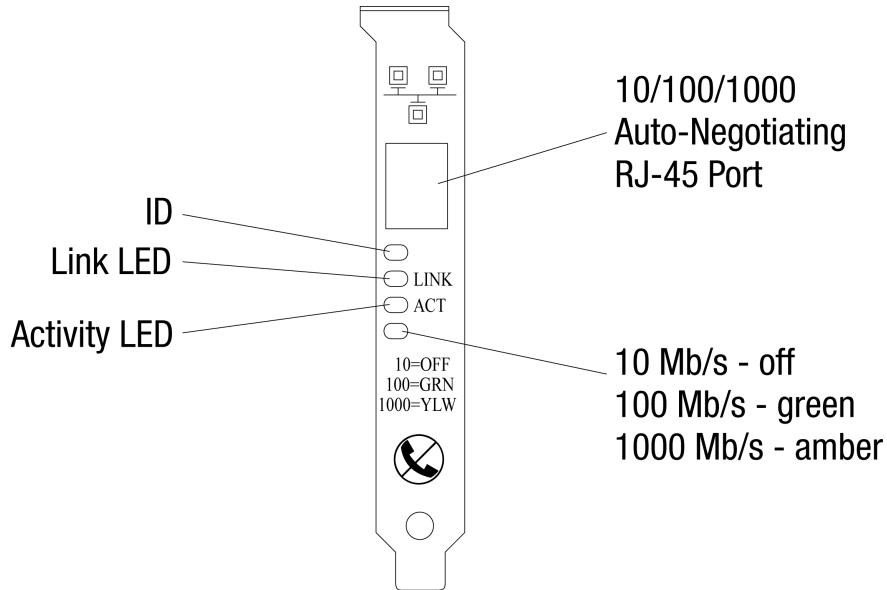
### Features

Standard features of the NC7131 Gigabit Server Adapter include:

- Auto-negotiating 10/100/1000 RJ-45 port delivers Gigabit Ethernet over copper cabling
- 64-bit/66MHz PCI, compatible with 64-bit/33MHz or 32-bit/33MHz Bus Master DMA
- Support for IEEE standards 802.3ab, 802.3u, 802.3x, 802.1p, and 802.1Q
- Support for IEEE 802.3ad Link Aggregation (static configuration mode only)
- Support for Fast EtherChannel and Gigabit EtherChannel
- PCI Hot Plug compliant
- LED indicators for activity, link integrity, and speed
- 64-bit addressing for systems with more than 4GB of physical memory
- Operating system support on CD for Microsoft Windows 2000, Microsoft Windows NT 4.0, Microsoft Windows 2000 Advanced Server, Microsoft Windows 2000 Datacenter Server, Novell NetWare 4.2, 5.0, and 5.1, and operating system support on the Compaq website for SCO Open Server 5.x and SCO UnixWare 7.x, and Linux (open source)
- Full- and half-duplex operation
- Adaptive Load Balancing (ALB)
- Network Fault Tolerance (NFT)

## Hardware Overview

The NC7131 Server Adapter has one auto-negotiating 10/100/1000 RJ-45 port. LED indicators show link, activity, and port speed. See Table 1-1 for descriptions of LED operations.



## NC7131 Gigabit Server Adapter

Figure 1-1. RJ-45 port and LED locations

## LED Indicators

The following table describes the adapter LED indicators located on the front panel of the Compaq NC7131 Server Adapter.

**Table 1-1**  
**10/100/1000 LED Operations for the NC7131 Adapter**

LED	Display	Description
LNK	On	Link to the adapter is established. The adapter is receiving power and the cable connection is secure.
	Off	There is no link to the adapter. The adapter is not receiving power, the cable connection is faulty, or the driver is not loaded.
ACT	On	The adapter is sending or receiving network data at 10/100/1000 Mb/s, as indicated by the 10/100/1000 (speed) LED. The adapter is receiving power and the cable connection is good.
	Off	No network data is being sent or received. The adapter is not receiving power, the cable connection is faulty, or the driver is not loaded.
10/100/1000	Off	The adapter is sending or receiving network data at 10 Mb/s.
	Green	The adapter is sending or receiving network data at 100 Mb/s.
	Amber	The adapter is sending or receiving network data at 1000 Mb/s.

## UTP Category 5 Cable

The NC7131 Server Adapter can use existing Category 5 (or better) cable to deliver Gigabit Ethernet over copper, according to the IEEE 802.3ab specifications. For new installations, Category 5e cable is recommended. For troubleshooting and other information about cabling, see, "UTP Cable Specifications" in Appendix C.

## Chapter 2

# Installing the Adapter

This chapter describes installation precautions and explains how to install the adapter. It also describes how to connect the network cable.



**WARNING:** To avoid the risk of personal injury or damage to the equipment, consult the safety information and user documentation provided with your equipment before attempting the installation of the adapter.

Many servers are capable of producing energy levels that are considered hazardous. Users should not remove enclosures nor should they bypass the interlocks provided for removal of these hazardous conditions.

Installation of this adapter should be performed by individuals who are both qualified in the servicing of computer equipment and trained in the hazards associated with products capable of producing hazardous energy levels.

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**NOTE:** Before removing the cover of your server, refer to the Compaq documentation for the proper methods for installing a PCI card and avoiding electric shock hazards.

## Electrostatic Discharge Precautions

A discharge of static electricity from a finger or other conductor can damage components on the adapter. This can make the adapter inoperable. In addition to the following information, see Appendix B for more precautions.

To prevent electrostatic damage, observe the following precautions:

- Always properly ground yourself when touching a static-sensitive component or assembly.
- Avoid hand contact by transporting and storing parts in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free locations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.

## Installing the Adapter in a Server

Refer to the Compaq ProLiant server documentation for additional information on how to safely install a PCI card in your server.

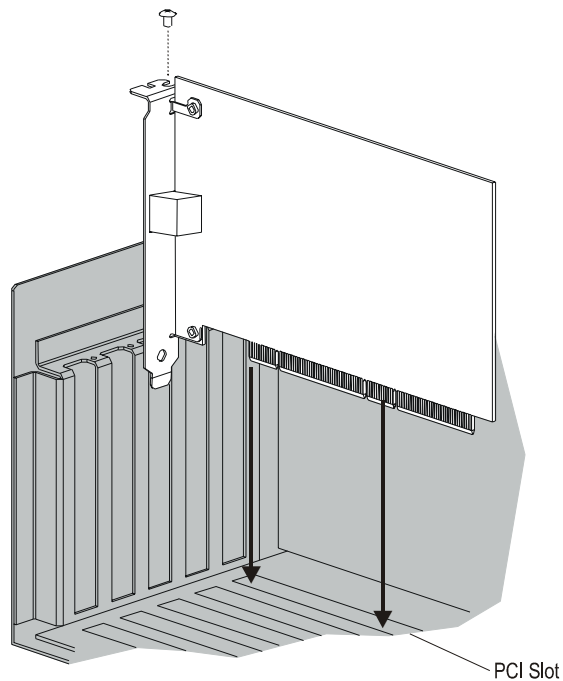


Figure 2-1. Installing the adapter in a server

1. If the server is not PCI Hot Plug compliant, power down the server and unplug the power cord.
2. Remove the server cover and the cover bracket from a PCI slot.



**WARNING:** To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

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**CAUTION:** If the server is not PCI Hot Plug compliant, power it down and unplug the power cord from the power outlet before removing the server cover. Failure to do so may damage the adapter or server.

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3. Firmly seat the adapter in a PCI slot and secure the adapter bracket.
4. Replace the server cover and plug in the power cord.

## **Connecting the Network Cable**

Network connections for the NC7131 Server Adapter can employ existing UTP Category 5 (or better) cable for Gigabit over copper transmissions. For new installations, Category 5e (enhanced Category 5) or better cable is recommended.

To secure the cable, plug the cable connector into the RJ-45 port. Ensure that the tab on the plug clicks into position indicating that it is properly seated.

For more information, see “UTP Cable Specifications” in Appendix C.

## **Regulatory Compliance Notices**

### **Federal Communications Commission Notice**

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 in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

### **Modifications**

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the equipment.

### **Declaring of Conformity for Products Marked with the FCC Logo – United States Only**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact:

Compaq Computer Corporation  
P. O. Box 692000, Mail Stop 530113  
Houston, Texas 77269-2000

or call 1-800-652-6672 (1-800-OK COMPAQ). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact:

Compaq Computer Corporation  
P. O. Box 692000, Mail Stop 510101  
Houston, Texas 77269-2000

or call (281) 514-3333.

To identify this product, refer to the Part, Series, or Model number found on the product.

## Canadian Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

### Avis Canadien

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## European Union Notice

Products with the C0E Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

- EN55022 (CISPR 22) – Electromagnetic Interference
- EN55024 (IEC61000-4-2,3,4,5,6,8,11) – Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) – Power Line Flicker
- EN60950 (IEC950) – Product Safety



## Taiwanese Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

## Japanese Notice

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

## Electrostatic Discharge

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

### Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm  $\pm 10$  percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have a Compaq authorized reseller install the part.

**NOTE:** For more information on static electricity or assistance with product installation, contact your Compaq authorized reseller.

## Specifications

### NC7131 Gigabit Server Adapter Specifications

**Table C-1**  
**NC7131 Gigabit Server Adapter Specifications**

Specification	Description
Network Controller Chipset	Intel 82543GC MAC
Data Transfer Method	64-bit/66MHz PCI, compatible with 64-bit/33MHz or 32-bit/33MHz Bus Master DMA
Standards Supported (Varies by OS)	IEEE 802.3ab, 802.3u, 802.1Q, 802.1p, 802.3ad (static configuration mode), 802.3x
Dimensions	7.0 x 4.8 inches (L x W), 17.8 cm x 12.2 cm (including bracket)
Connector and Distances	One RJ-45, 100 meters (328 feet) on Category 5 or better cable
Interrupts Supported	Automatically configured
Temperature Range	Operating: 0°C to 55°C / 32°F to 131°F Storage: -65°C to 85°C / -85°F to 185°F
Relative Humidity	Operating: 10% to 90% Storage: 5% to 95%
Agency Approvals	<ul style="list-style-type: none"> <li>■ FCC Class B</li> <li>■ VCCI Class B</li> <li>■ BSMI Class A</li> <li>■ CISPR 22 Class B</li> <li>■ EN60950</li> <li>■ EN 55022 Class B</li> <li>■ EN55024</li> <li>■ UL</li> <li>■ Canada UL</li> <li>■ ICES-003 Class B</li> </ul>
Power Requirement	1600 mA @ 5V max
Data Transmission Rate	10/100/1000 (Full- and Half-duplex)

## UTP Cable Specifications

To connect to the network, the NC7131 adapter uses the following cable for 1000Base-T transmission.

- Category 5 or better UTP twisted-pair
- 22-26 AWG, 100Ω at 1 MHz
- EIA/TIA 568a or EIA/TIA 568b

### Using UTP Category 5 Cable in Gigabit over Copper Installations

For Gigabit over copper installations, UTP Category 5 or better 1000Base-T cable must comply with the IEEE 802.3ab 1000Base-T standard. For new installations, Category 5e (enhanced Category 5) or better cable is recommended. Maximum distances for Gigabit over copper cable are 100 meters (328 feet).

## RJ-45 Pinouts and Crossover Function

The Ethernet standard also specifies that each segment implement a crossover function to connect the transmitter of one device to the receiver of a device at the other end, and vice-versa. The crossover function may be implemented internally at the hub or switch, or externally through the twisted-pair media.

### 10/100 Straight-Through Pinouts

If the crossover function is implemented internally, the port is labeled MDI-X (Medium Dependent Interface–Crossover). When an MDI-X port is connected to an MDI port, the twisted pair media should be wired straight-through using the physical pinouts indicated in Table C-2.

**Table C-2**  
**10/100 Pinouts Using Internal, Straight-Through Crossover**

Pin	Function	Color Match	Function	Pin
1	TD+	White/Orange	TD+	1
2	TD-	Orange/White	TD-	2
3	RD+	White/Green	RD+	3
4		Blue/White		4
5		White/Blue		5
6	RD-	Green/White	RD-	6
7		White/Brown		7
8		Brown/White		8

Figure C-1 shows the straight-through 10/100 connector wiring to be used when the crossover function is implemented on the hub or switch.

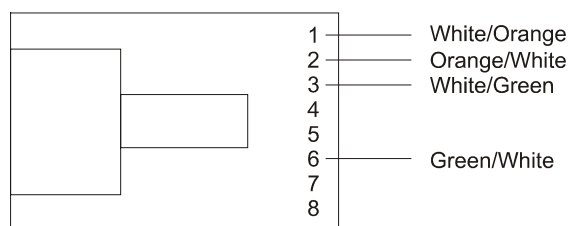


Figure C-1. 10/100 straight-through wiring for RJ-45 connector

## 10/100 Crossover Pinouts

When the crossover function is not provided within the hub or switch, you must implement the crossover through the twisted pair media using the physical pinouts indicated in Table C-3.

**Table C-3**  
**10/100 Pinouts Using External Crossover**

Pin	Function	Color Match	Function	Pin
1	TD+	White/Orange	RD+	3
2	TD-	Orange/White	RD-	6
3	RD+	White/Green	TD+	1
4		Blue/White		
5		White/Blue		
6	RD-	Green/White	TD-	2
7		White/Brown		
8		Brown/White		

Figure C-2 shows the correct 10/100 wiring to use when the crossover function is implemented externally in the twisted-pair cabling.

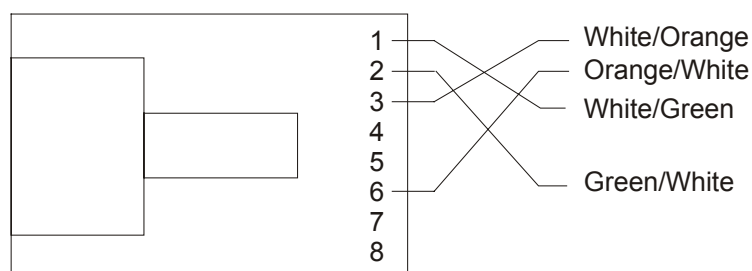


Figure C-2. 10/100 external crossover for RJ-45 connector

## Gigabit over Copper Internal Straight-Through Pinouts

Unlike connections in which the crossover function is implemented internally at the hub or switch, the NC7131 adapter provides its own automatic crossover function. This means you can wire twisted-pair media straight-through for adapter-to-hub, adapter-to-switch, or adapter-to-adapter connections using the pinouts shown in Table C-4.

**NOTE:** To operate at Gigabit speeds, all four pairs of wires must be terminated within the RJ-45 connector.

**Table C-4**  
**Gigabit over Copper Pinouts Using Internal Crossover**

Pin	Function	Color Match	Function	Pin
1	BI_DA+	White/Orange	BI_DA+	1
2	BI_DA-	Orange/White	BI_DA-	2
3	BI_DB+	White/Green	BI_DB+	3
4	BI_DC+	Blue/White	BI_DC+	4
5	BI_DC-	White/Blue	BI_DC-	5
6	BI_DB-	Green/White	BI_DB-	6
7	BI_DD+	White/Brown	BI_DD+	7
8	BI_DD-	Brown/White	BI_DD-	8

Figure C-3 shows straight-through Gigabit over copper connector wiring to be used when the crossover function is implemented within the hub or switch.

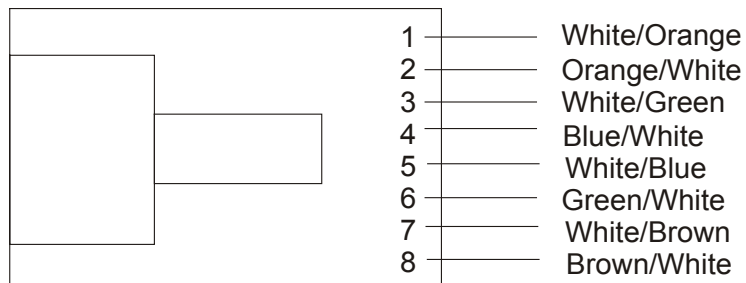


Figure C-3. Gigabit straight-through wiring for RJ-45 connector

## Gigabit over Copper External Crossover Pinouts

When a crossover function is not provided by the adapter or the hub or switch, you must implement it through the twisted-pair media using the physical pinouts shown in Table C-5.

**Table C-5**  
**Gigabit over Copper Crossover Pinouts**

Pin	Function	Color Match	Function	Pin
1	BI_DA+	White/Orange	BI_DB+	3
2	BI_DA-	Orange/White	BI_DB-	6
3	BI_DB+	White/Green	BI_DA+	1
4	BI_DC+	Blue/White	BI_DD+	7
5	BI_DC-	White/Blue	BI_DD-	8
6	BI_DB-	Green/White	BI_DA-	2
7	BI_DD+	White/Brown	BI_DC+	4
8	BI_DD-	Brown/White	BI_DC-	5

Figure C-4 shows the correct Gigabit over copper wiring to be used when the crossover function is implemented externally in the twisted-pair cabling.

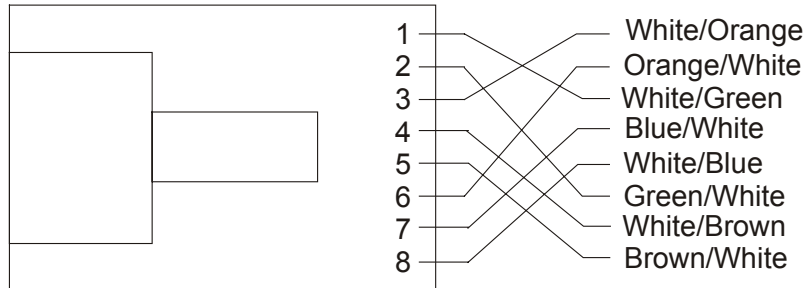


Figure C-4. Gigabit over copper external crossover for RJ-45 connector