



## **Cisco AS5350 and Cisco AS5400 Universal Gateway Card Installation Guide**

### **Corporate Headquarters**

Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA

<http://www.cisco.com>

Tel: 408 526-4000  
800 553-NETS (6387)

Fax: 408 526-4100

Customer Order Number: DOC-7813311=  
Text Part Number: 78-13311-01

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The following information is for FCC compliance of Class A devices: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

Modifying the equipment without Cisco's written authorization may result in the equipment no longer complying with FCC requirements for Class A or Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

AccessPath, AtmDirector, Browse with Me, CCDE, CCIP, CCSI, CD-PAC, *CiscoLink*, the Cisco NetWorks logo, the Cisco *Powered* Network logo, Cisco Systems Networking Academy, the Cisco Systems Networking Academy logo, Fast Step, Follow Me Browsing, FormShare, FrameShare, GigaStack, IGX, Internet Quotient, IP/VC, iQ Breakthrough, iQ Expertise, iQ FastTrack, the iQ Logo, iQ Net Readiness Scorecard, MGX, the Networkers logo, *Packet*, RateMUX, ScriptBuilder, ScriptShare, SlideCast, SMARTnet, TransPath, Unity, Voice LAN, Wavelength Router, and WebViewer are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn, Discover All That's Possible, and Empowering the Internet Generation, are service marks of Cisco Systems, Inc.; and Aironet, ASIST, BPX, Catalyst, CCDA, CCDP, CCIE, CCNA, CCNP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, the Cisco IOS logo, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Enterprise/Solver, EtherChannel, EtherSwitch, FastHub, FastSwitch, IOS, IP/TV, LightStream, MICA, Network Registrar, PIX, Post-Routing, Pre-Routing, Registrar, StrataView Plus, Stratm, SwitchProbe, TeleRouter, and VCO are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and certain other countries.

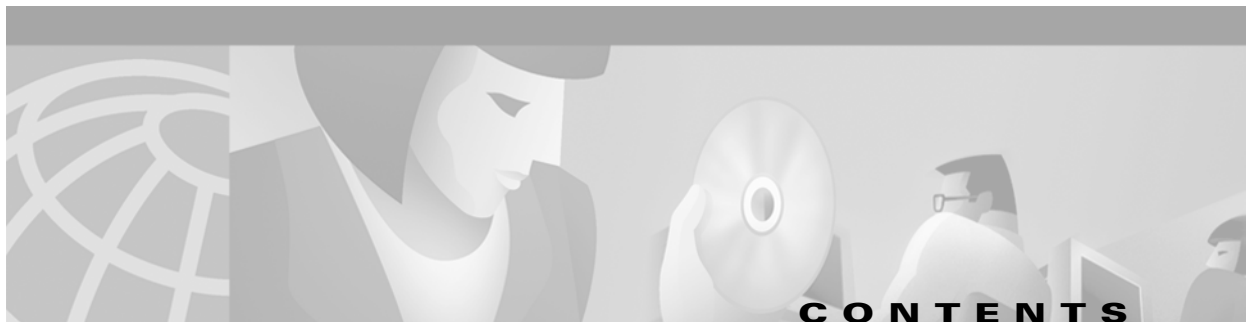
All other trademarks mentioned in this document or Web site are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0105R)

*Cisco AS5350 and Cisco AS5400 Universal Gateway Card*

*Installation Guide*

Copyright © 2001, Cisco Systems, Inc.

All rights reserved.



## CONTENTS

### **Preface**    **vii**

Document Organization	<b>vii</b>
Document Conventions	<b>viii</b>
Obtaining Documentation	<b>xi</b>
World Wide Web	<b>xi</b>
Documentation CD-ROM	<b>xi</b>
Ordering Documentation	<b>xi</b>
Documentation Feedback	<b>xi</b>
Obtaining Technical Assistance	<b>xii</b>
Cisco.com	<b>xii</b>
Technical Assistance Center	<b>xii</b>
Related Documentation	<b>xiii</b>
New Hardware Features	<b>xiii</b>

---

### **CHAPTER 1**

### **Safety Warnings, Recommendations, and Tools Required**    **1-1**

General Safety	<b>1-1</b>
Maintaining Safety with Electricity	<b>1-2</b>
Preventing Electrostatic Discharge	<b>1-3</b>
Required Tools and Equipment	<b>1-3</b>
Where to Go Next	<b>1-4</b>

---

### **CHAPTER 2**

### **Dial Feature Card and Carrier Card Guidelines**    **2-1**

Overview	<b>2-1</b>
Online Insertion and Removal (OIR) of DFCs	<b>2-2</b>
Removing and Installing Populated Carrier Cards	<b>2-2</b>
Removing a Populated Carrier Card	<b>2-3</b>
Installing a Populated Carrier Card	<b>2-5</b>
Getting Help	<b>2-7</b>
Where to Go Next	<b>2-7</b>

---

### **CHAPTER 3**

### **T1 and E1 Dial Feature Cards**    **3-1**

Overview	<b>3-1</b>
Online Installation and Removal of the T1 or E1 DFC	<b>3-3</b>

Overview	3-3
Removing the T1 or E1 DFC	3-3
Installing the T1 or E1 DFC	3-9
Configuring Input Impedance for the E1 DFC	3-11
Configuration	3-11
Verification	3-11
Getting Help	3-14
Where to Go Next	3-14

## CHAPTER 4

### T3 Dial Feature Card 4-1

Overview	4-1
Online Installation and Removal (OIR) of the T3 DFC	4-2
Overview	4-2
Removing the T3 DFC	4-2
Installing the T3 DFC	4-5
Getting Help	4-7
Where to Go Next	4-7

## CHAPTER 5

### Universal Port Dial Feature Card 5-1

Overview	5-1
Online Insertion and Removal (OIR) of the Universal Port DFC	5-2
Overview	5-2
Removing the Universal Port DFC	5-2
Installing the Universal Port DFC	5-7
SPE Firmware	5-9
Getting Help	5-9
Where to Go Next	5-9

## CHAPTER 6

### Troubleshooting 6-1

LEDs	6-1
Environment Monitoring	6-6
Overview	6-6
Displaying Environment Status	6-7
Using the Bantam Jacks for Test Port Functionality	6-9
Monitoring Mode for the T1, E1 and T3 DFCs	6-9
Drop and Insert Mode for the CT3 DFC	6-9
Troubleshooting Network Interfaces	6-10



Getting Help [6-10](#)

---

**APPENDIX A****Cabling Specifications [A-1](#)**

T1 and E1 Cable and Port Pinouts [A-1](#)

2-Port and 4-Port T1 or E1 DFC [A-1](#)

8-Port T1 or E1 DFC [A-3](#)

Attaching the 8-Port Interface Cable to a Bracket (Optional) [A-5](#)

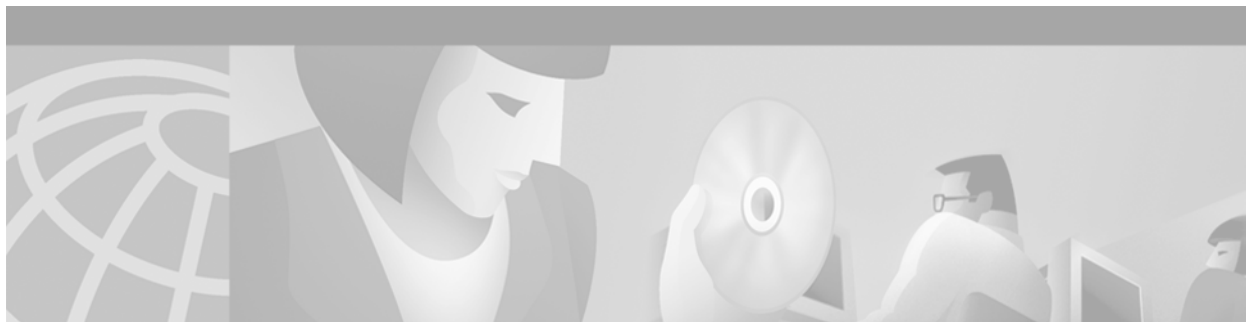
CT3 Cable and Port Pinouts [A-10](#)

Bantam Jack Port Pinouts [A-10](#)

---

**INDEX**





## Preface

---

This preface describes the objectives and organization of this document and explains how to find additional information on related products and services. This chapter contains the following sections:

- [Document Organization, page vii](#)
- [Document Conventions, page viii](#)
- [Obtaining Documentation, page xi](#)
- [Obtaining Technical Assistance, page xii](#)
- [Related Documentation, page xiii](#)
- [New Hardware Features, page xiii](#)

## Document Organization

This publication is designed for people who have some experience installing networking equipment such as routers, hubs, servers, and switches. The person installing the server should be familiar with electronic circuitry and wiring practices and have experience as an electronic or electromechanical technician.

[Table 1](#) describes the contents of each chapter in this document.

**Table 1**     *Document Organization*

Chapter	Title	Description
Chapter 1	<a href="#">Safety Warnings, Recommendations, and Tools Required</a>	Describes the safety warnings, recommendations, and the tools required to install dial feature cards in the chassis.
Chapter 2	<a href="#">Dial Feature Card and Carrier Card Guidelines</a>	Describes the tasks you must perform to remove and install carrier cards.
Chapter 3	<a href="#">T1 and E1 Dial Feature Cards</a>	Describes online insertion and removal (OIR) tasks you must perform on the T1 or E1 DFC.
Chapter 4	<a href="#">T3 Dial Feature Card</a>	Describes online insertion and removal (OIR) tasks you must perform on the T3 DFC.
Chapter 5	<a href="#">Universal Port Dial Feature Card</a>	Describes online insertion and removal (OIR) tasks you must perform on the universal port DFC.

**Table 1** Document Organization (continued)

Chapter	Title	Description
Chapter 6	<a href="#">Troubleshooting</a>	Describes how to troubleshoot using LEDs, bantam jacks, and environmental monitoring.
Appendix A	<a href="#">Cabling Specifications</a>	Describes cabling and pinout information for the dial feature cards.

## Document Conventions

This publication uses the following conventions to convey instructions and information.

Convention	Description
<b>boldface font</b>	Commands and keywords.
<i>italic font</i>	Variables for which you supply values.
[    ]	Keywords or arguments that appear within square brackets are optional.
{ x   y   z }	A choice of required keywords appears in braces separated by vertical bars. You must select one.
screen font	Examples of information displayed on the screen.
<b>boldface screen font</b>	Examples of information you must enter.
<   >	Nonprinting characters, for example passwords, appear in angle brackets in contexts where italic font is not available.
[    ]	Default responses to system prompts appear in square brackets.



### Note

Means *reader take note*. Notes contain helpful suggestions or references to additional information and material.



### Timesaver

This symbol means *the described action saves time*. You can save time by performing the action described in the paragraph.



### Caution

This symbol means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

**Tip**

This symbol means *the following information will help you solve a problem*. The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.

**Warning**

This warning symbol means ***danger***. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Waarschuwing**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

**Varoitus**

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).

**Attention**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.

**Warnung**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.

**Avvertenza**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.

<b>Advarsel</b>	<b>Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet <i>Regulatory Compliance and Safety Information</i> (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.</b>
<b>Aviso</b>	<b>Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento <i>Regulatory Compliance and Safety Information</i> (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.</b>
<b>¡Advertencia!</b>	<b>Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado <i>Regulatory Compliance and Safety Information</i> (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.</b>
<b>Varning!</b>	<b>Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förekommer i denna publikation i dokumentet <i>Regulatory Compliance and Safety Information</i> (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.</b>

# Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

## World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following sites:

- <http://www.cisco.com>
- <http://www-china.cisco.com>
- <http://www-europe.cisco.com>

## Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

## Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the Networking Products MarketPlace:  
[http://www.cisco.com/cgi-bin/order/order\\_root.pl](http://www.cisco.com/cgi-bin/order/order_root.pl)
- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:  
<http://www.cisco.com/go/subscription>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

## Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

You can e-mail your comments to [bug-doc@cisco.com](mailto:bug-doc@cisco.com).

To submit your comments by mail, for your convenience many documents contain a response card behind the front cover. Otherwise, you can mail your comments to the following address:

Cisco Systems, Inc.  
Document Resource Connection  
170 West Tasman Drive  
San Jose, CA 95134-9883

We appreciate your comments.

# Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

## Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

<http://www.cisco.com>

## Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

## Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

<http://www.cisco.com/tac>

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

<http://www.cisco.com/register/>

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

<http://www.cisco.com/tac/caseopen>



## Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

## Related Documentation

This guide describes how to install and connect the Cisco AS5350 and Cisco AS5400 dial feature cards. You will also need the following publications to configure the dial feature cards:

- Refer to the *Cisco AS5350 Universal Gateway Regulatory Compliance and Safety Information* document or the *Cisco AS5400 Universal Gateway Regulatory Compliance and Safety Information* document to familiarize yourself with safety guidelines.
- Refer to the *Cisco AS5350 Universal Gateway Chassis Installation Guide* or the *Cisco AS5400 Universal Gateway Chassis Installation Guide* to install, replace, and troubleshoot cards and modules.
- Refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide* for basic software configuration instructions.
- Refer to the Cisco IOS Release 12.2 software configuration guides and command reference publications for more advanced configuration topics. These publications are available on the Documentation CD-ROM that came with your universal gateway, on the World Wide Web from Cisco's home page, or you can order printed copies. See the [“Obtaining Documentation”](#) section on page xi.

## New Hardware Features

A description of new hardware features available after the release of this document can be found at the following URLs:

[http://www.cisco.com/univercd/cc/td/doc/product/access/acs\\_serv/as5350/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/as5350/index.htm)

[http://www.cisco.com/univercd/cc/td/doc/product/access/acs\\_serv/as5400/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_serv/as5400/index.htm)





# Safety Warnings, Recommendations, and Tools Required

---

This chapter describes the safety warnings, recommendations, and tools required to install dial feature cards in the chassis. This chapter contains the following sections:

- [General Safety, page 1-1](#)
- [Maintaining Safety with Electricity, page 1-2](#)
- [Preventing Electrostatic Discharge, page 1-3](#)
- [Required Tools and Equipment, page 1-3](#)
- [Where to Go Next, page 1-4](#)

## General Safety

Any device that uses electricity must be handled carefully; follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Put the removed chassis cover in a safe place.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.



**Warning**

---

**Ultimate disposal of this product should be handled according to all national laws and regulations. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

---

# Maintaining Safety with Electricity

**Warning**

**Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or can weld the metal object to the terminals. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Follow these guidelines when you work on equipment powered by electricity.

- Locate the emergency power-OFF switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn OFF the power.
- Before working on the system, unplug the power cord.
- Disconnect all power before doing the following:
  - Installing or removing a dial feature card
  - Working near power supplies

**Warning**

**When installing the unit, the ground connection must always be made first and disconnected last. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.

**Warning**

**Read the installation instructions before you connect the system to its power source. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety ground connections.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn OFF power to the system.
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

**Warning**

**This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors). To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

## Preventing Electrostatic Discharge

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Always follow ESD-prevention procedures when you remove and replace components. Ensure that the chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the grounding clip to an unpainted surface of the chassis frame to safely ground unwanted ESD voltages. To guard against ESD damage and shocks, the wrist strap and cord must operate properly. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohm (Mohm).

## Required Tools and Equipment

The following items are included with the universal gateway:

- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 male DCE adapter (labeled MODEM)
- RJ-45-to-RJ-45 rollover console cable
- ESD-preventive wrist strap
- Nylon cable tie
- Cable tie holder
- Grounding lug
- Alarm connector

You might need the following equipment, which is not included:

- Straight-through RJ-45-to-RJ-45 cable for an Ethernet connection
- Ethernet hub or PC with a network interface card for Ethernet LAN connections
- One breakout cable consisting of a 36-pin connector connected to eight RJ-45 adaptors for CT1/CE1 connections
- Straight through RJ-45-to-RJ-45 cable for CT1/CE1 connections
- 75-ohm coaxial cable for a CT3 connection
- PC running terminal emulation software for local administrative access
- Modem for remote administrative access

- ESD-preventive mat
- Blank filler panel

## Where to Go Next

The remaining chapters of this guide include information on installing and troubleshooting DFCs and creating cables.

- [Chapter 2, “Dial Feature Card and Carrier Card Guidelines”](#)
- [Chapter 3, “T1 and E1 Dial Feature Cards”](#)
- [Chapter 4, “T3 Dial Feature Card”](#)
- [Chapter 5, “Universal Port Dial Feature Card”](#)
- [Chapter 6, “Troubleshooting”](#)
- [Appendix A, “Cabling Specifications”](#)



# Dial Feature Card and Carrier Card Guidelines

This chapter includes the following sections:

- [Overview, page 2-1](#)
- [Online Insertion and Removal \(OIR\) of DFCs, page 2-2](#)
- [Removing and Installing Populated Carrier Cards, page 2-2](#)
- [Getting Help, page 2-7](#)
- [Where to Go Next, page 2-7](#)

## Overview

### Cisco AS5350 Chassis

The Cisco AS5350 universal gateway chassis has a motherboard, high-speed backplane, and two backplane slots. One backplane slot accepts one dial feature card (DFC) carrier card and the other backplane slot accepts one DFC.

### Cisco AS5400 Chassis

The Cisco AS5400 universal gateway chassis has a motherboard, high-speed backplane, and four backplane slots. Three backplane slots accept DFC carrier cards and the other backplane slot accepts one DFC.

### Dial Feature Cards

Each DFC carrier card accepts two DFCs which allow online insertion and removal (OIR). (See [Figure 2-1](#).)

Each DFC is a 5.1 x 13 inch PCI based interface board. The following is a brief description of the trunk types supported:

- North American robbed-bit signaling (RBS) is supported on T1 trunks, including a variety of North American RBS protocol, framing, and encoding types on these trunks.
- CAS is supported for E1 trunks, with R2 signaling.
- Many countries require an E1 R2 variant. Per-country defaults are provided for supervisory and inter-register signaling.
- The CT3 DFC provides physical line termination for a channelized T3 ingress trunk line, and it uses an onboard multiplexer to multiplex 28 channelized T1 lines into a single channelized T3 line.

- Universal access (analog modem or digital calls) is supported when an interface is configured for ISDN PRI signaling. PRI signaling is available for both T1 and E1 trunks.

In any single DFC slot, you can install your choice of:

- One T1, E1, or T3 dial feature card
- One universal port card

## Online Insertion and Removal (OIR) of DFCs

All DFCs on the Cisco AS5350 and Cisco AS5400 chassis support online insertion and removal (also known as hot swapping). You can install, remove, replace, and rearrange the DFCs without turning off the chassis power.

When the chassis detects that a DFC is installed or removed, it automatically runs diagnostic and discovery routines, acknowledges the presence or absence of the DFC, and resumes chassis operation without any operator intervention.

See:

- [Chapter 3, “T1 and E1 Dial Feature Cards,”](#) to perform OIR of the T1 or E1 DFC.
- [Chapter 4, “T3 Dial Feature Card,”](#) to perform OIR of the T3 DFC.
- [Chapter 5, “Universal Port Dial Feature Card,”](#) to perform OIR of the universal port DFC.

## Removing and Installing Populated Carrier Cards

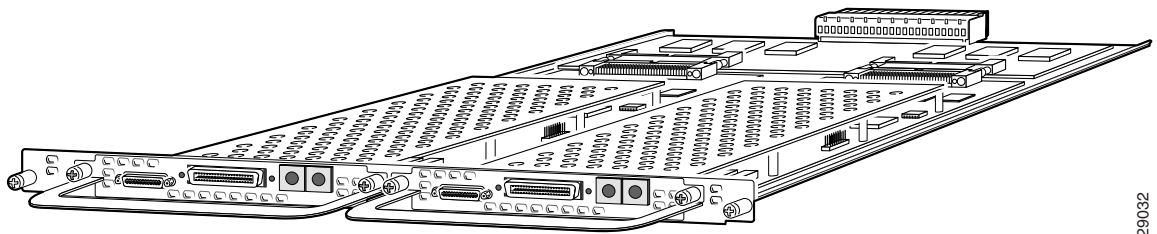


### Caution

The carrier cards that carry the DFCs are not hot swappable. Removing a card while the system is still powered on may cause permanent damage to electronic circuits on the card.

The DFC carrier card plugs into one of the backplane slots and supports two DFCs. The carrier card increases backplane capacity and allows OIR of the DFCs. (See [Figure 2-1](#).)

**Figure 2-1 Carrier Card With Two 8 PRI CT1 Cards**



### Warning

**Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**



**Warning**

Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

**Caution**

Before you remove a carrier card, read [Chapter 1, “Safety Warnings, Recommendations, and Tools Required”](#)

## Removing a Populated Carrier Card

**Warning**

Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

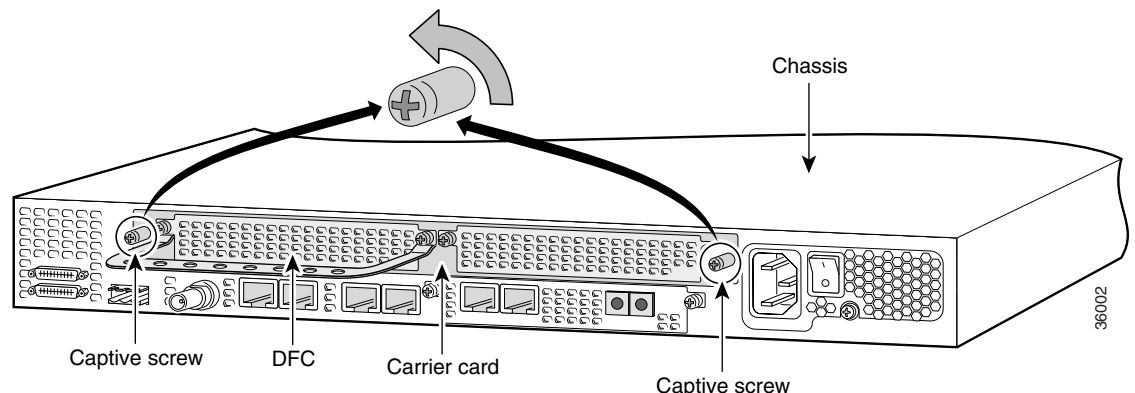
**Warning**

Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

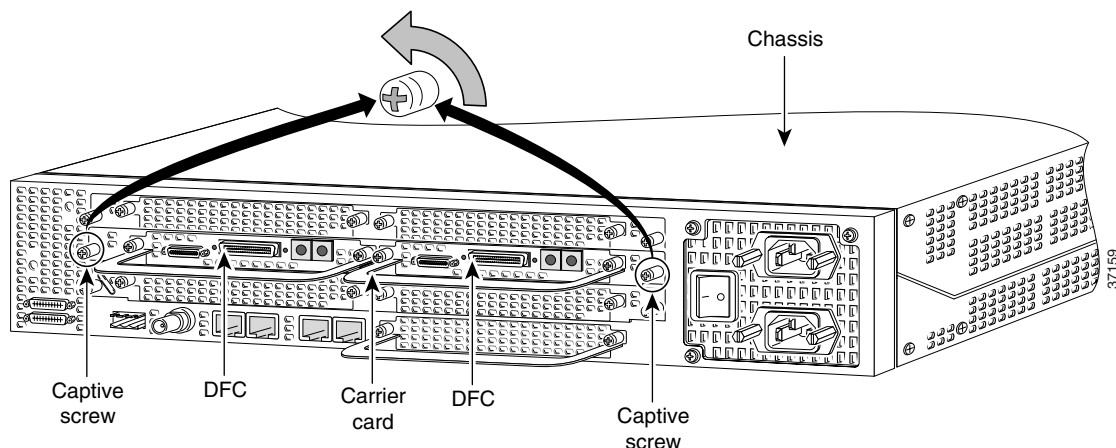
To remove a populated carrier card, follow the steps below:

- Step 1** Power off the chassis.
- Step 2** Disconnect all interface cables from the universal gateway and secure them out of the way.
- Step 3** Loosen the two captive screws that secure the carrier card to the chassis until each screw is free of the chassis. (See [Figure 2-2](#) and [Figure 2-3](#).)

**Figure 2-2 Loosen the Captive Screws on the Cisco AS5350**



**Figure 2-3** Loosen the Captive Screws on the Cisco AS5400

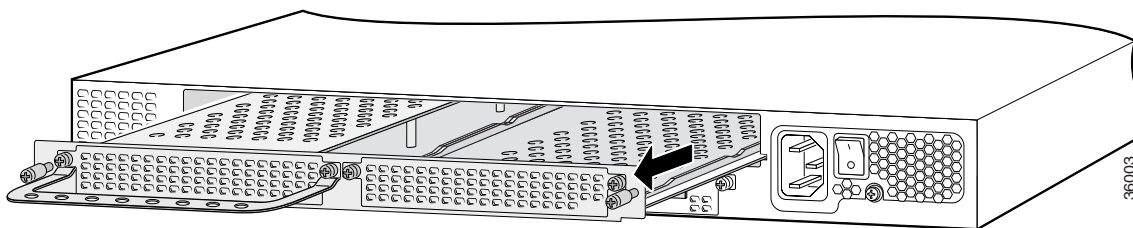


**Step 4** Grasp the DFC handles and gently pull toward you to guide the carrier card out of the slot. Place one hand under the carrier card as you pull it out of the chassis. (See [Figure 2-4](#) and [Figure 2-5](#).)

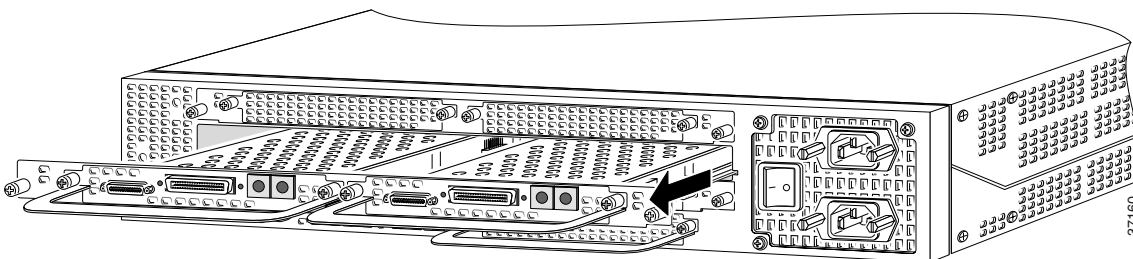


**Note** Use the DFC handles to remove the carrier card. Ensure that the DFCs are secured to the carrier card.

**Figure 2-4** Removing the Carrier Card from the Cisco AS5350



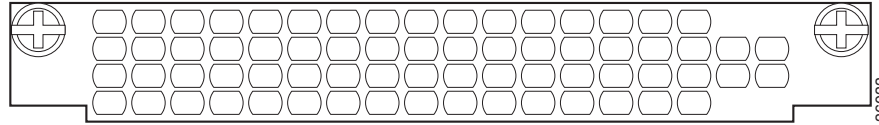
**Figure 2-5** Removing the Carrier Card from the Cisco AS5400



**Step 5** After you remove the carrier card from the chassis, set it aside on an ESD-preventive mat.

- Step 6** If the backplane slot is to remain empty, install a blank cover over the open slot to ensure proper airflow inside the chassis. (See [Figure 2-6](#).)

**Figure 2-6** Blank Filler Panel

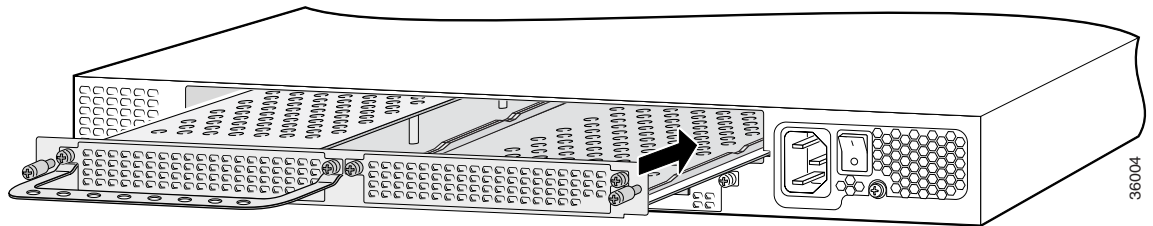


## Installing a Populated Carrier Card

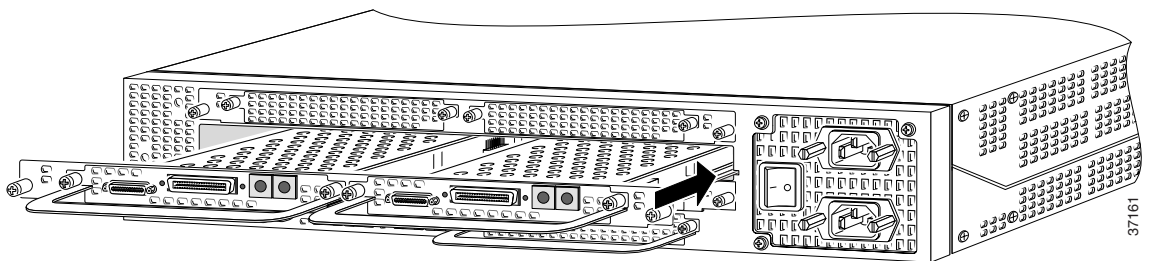
To install a populated carrier card:

- Step 1** Slide the carrier card into the slot until it touches the backplane connector. (See [Figure 2-7](#) and [Figure 2-8](#).)

**Figure 2-7** Install the Carrier Card in the Cisco AS5350



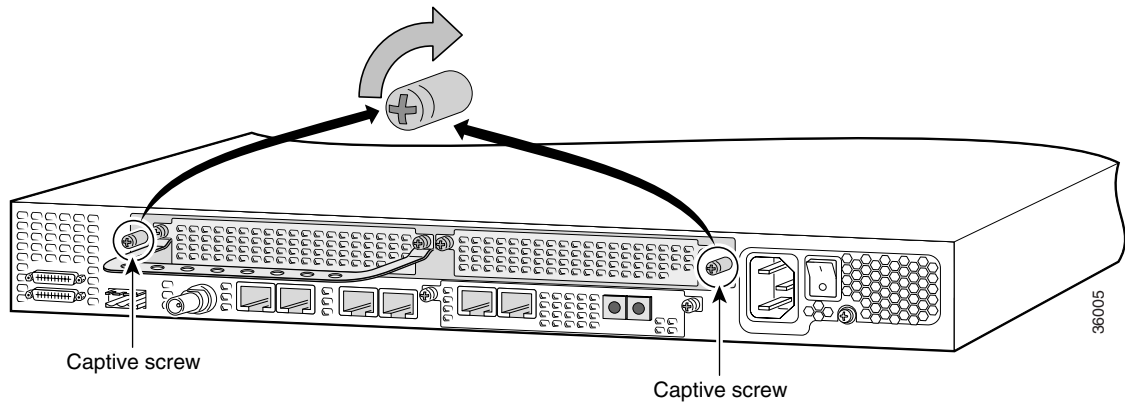
**Figure 2-8** Install the Carrier Card in the Cisco AS5400



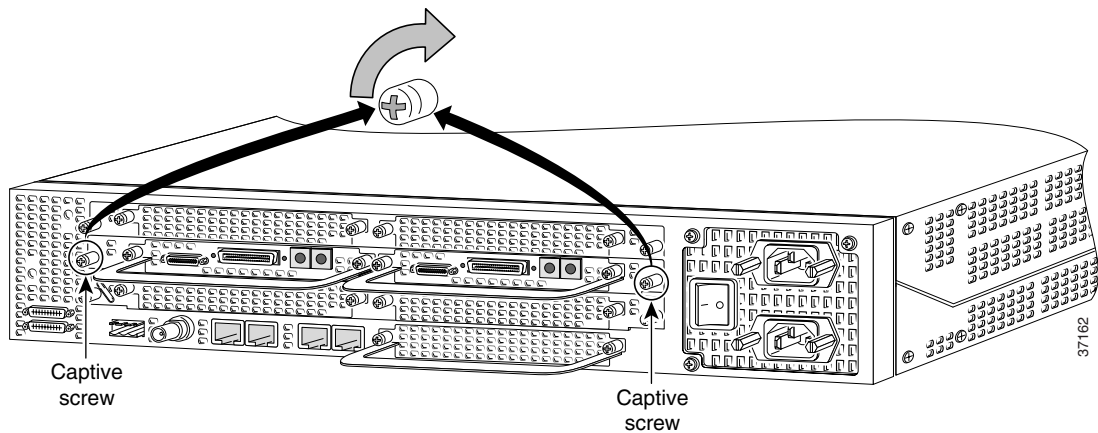
- Step 2** Align the captive screws with their holes, and seat the card completely.

- Step 3** Tighten the two captive screws to secure the carrier card to the chassis. (See [Figure 2-9](#) and [Figure 2-10](#).)

**Figure 2-9 Tighten the Captive Screws on the Cisco AS5350**

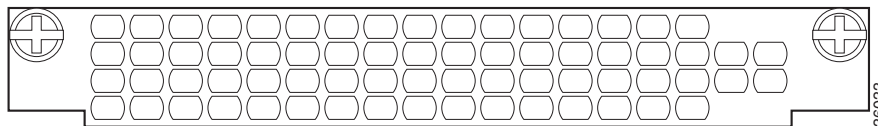


**Figure 2-10 Tighten the Captive Screws on the Cisco AS5400**



- Step 4** If the carrier card has a blank DFC slot, install a blank cover over the open DFC slot to ensure proper airflow inside the chassis. (See [Figure 2-11](#).)

**Figure 2-11 Blank DFC Cover**



- Step 5** For AC powered units, reconnect the AC power cord. For DC powered units, remove the tape from the circuit breaker switch handle, and reinstate power by moving the handle of the circuit breaker to the ON position. For more information on the AC and DC power supplies, refer to the chassis installation guide that came with your universal gateway.
- Step 6** Reconnect all interface cables.

# Getting Help

For information about technical support, onsite service, and exchange and repair services, refer to the [“Obtaining Technical Assistance” section on page -xii](#) in the “Preface.”

## Where to Go Next

For instructions on installing and removing dial feature cards, refer to:

- [Chapter 3, “T1 and E1 Dial Feature Cards.”](#)
- [Chapter 4, “T3 Dial Feature Card.”](#)
- [Chapter 5, “Universal Port Dial Feature Card.”](#)
- [Chapter 6, “Troubleshooting.”](#)
- [Appendix A, “Cabling Specifications.”](#)





## T1 and E1 Dial Feature Cards

This chapter describes the installation and removal procedures for the T1 and E1 dial feature cards (DFC) and includes the following sections:

- [Overview, page 3-1](#)
- [Online Installation and Removal of the T1 or E1 DFC, page 3-3](#)
- [Configuring Input Impedance for the E1 DFC, page 3-11](#)
- [Getting Help, page 3-14](#)
- [Where to Go Next, page 3-14](#)

### Overview

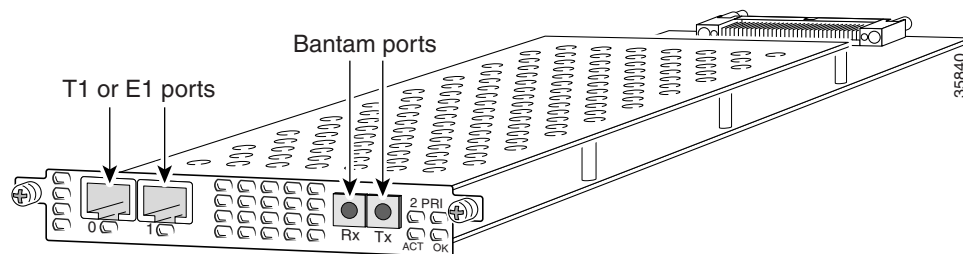
You can install a T1 or E1 dial feature card in any dial feature card slot of the universal gateway chassis. (See [Figure 3-1](#) through [Figure 3-3](#).)

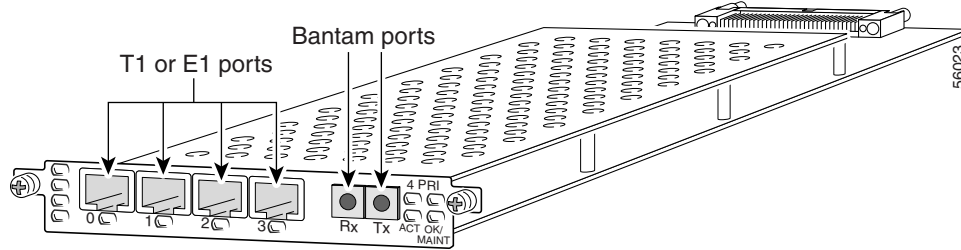
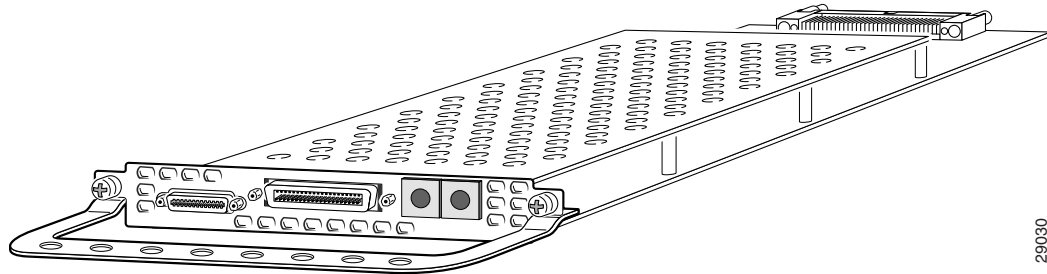
Each T1 or E1 DFC provides physical line termination for multiple DS-0 channels and uses onboard HDLC controllers to terminate digital (ISDN) calls. For network specifications see [Table 3-1](#) and [Table 3-2](#). You can use the bantam ports on the DFC to monitor a line.



**Note** The Cisco AS5350 and Cisco AS5400 support only one type of WAN DFC at a time. Refer to [Chapter 6, “Troubleshooting”](#) for more information.

**Figure 3-1 2-Port T1 or E1 DFC**



**Figure 3-2 4-Port T1 or E1 DFC****Figure 3-3 8-Port T1 or E1 DFC****Table 3-1 T1 DFC Network Specifications**

Description	Specification
Line rate	1.544 Mbps
Data rates (per port)	<i>number</i> x 56 or <i>number</i> x 64 kbps, where <i>number</i> = 1 to 24
Standards	AT&T Pub. 62411, 54016, and 43081, and ANSI T1.403
Input impedance	100 ohms per port

**Table 3-2 E1 DFC Network Specifications**

Description	Specification
Line rate	2.048 Mbps
Data rate (per port)	<i>number</i> x 56 or <i>number</i> x 64 kbps, where <i>number</i> = 1 to 31.
Input impedance	75 or 120 ohms per port  <b>Note</b> The factory default setting for the E1 ports is 120 ohm. Use a software command to change the impedance. Refer to the, Cisco AS5350 and Cisco AS5400 Universal Gateway Card Installation Guide.



# Online Installation and Removal of the T1 or E1 DFC

## Overview

To remove a DFC without dropping any calls or connections, you will need to take the DFC out of service by using the **busyout** command to disable the DFC. The **busyout** command is executed on a per DFC basis and will gracefully disable the card by waiting for the active services to terminate.

If you have active calls on the DFC after executing the **busyout** command, wait for the calls to drop. Use the **show busyout** command to view the status of the termination process.



**Caution**

The online installation and removal (OIR) of new cards should be done **ONLY** during times of low CPU utilization, such as during maintenance.



**Caution**

To avoid erroneous failure messages, remove or insert only one DFC at a time.

When you replace a DFC with a new DFC of the same type in the same slot, the system software will recognize the new trunk interfaces and bring them up automatically.

If you replace the existing DFC with a new DFC of a different type, you will have to reconfigure the system. For configuration details, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

## Removing the T1 or E1 DFC

To remove the T1 or E1 DFC, follow these steps:



**Note**

Following these steps are examples of the output from each command.

**Step 1** Determine which slot the DFC is in by entering the **show chassis** command in privileged EXEC mode:

```
Router# show chassis slot
```

**Figure 3-4 Slot Numbering on the Cisco AS5350 Chassis**

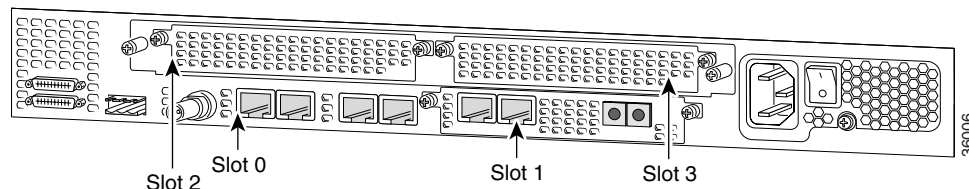
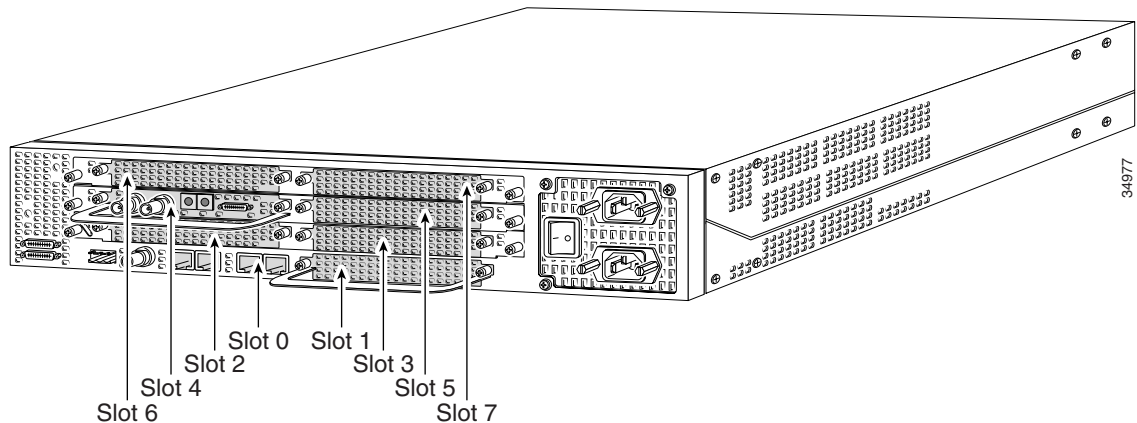


Figure 3-5 Slot Numbering on the Cisco AS5400 Chassis



**Step 2** Initialize the software busyout procedure by entering the **busyout** command:

```
Router# busyout slot-number
```

**Step 3** Enter the **show busyout** command to check busyout status for that specific slot:

```
Router# show busyout slot-number
```

**Step 4** You may use the **clear port** command to immediately disable active calls on the universal port card (UPC). For more information on the UPC, see [Chapter 5, “Universal Port Dial Feature Card”](#). Use the **show controller** command to show the universal port card associated with the T1 or E1 DFC.

```
Router# show controller t1/e1 slot-number/control-number timeslot timeslot-number
Router# clear port slot-number/port number
```



**Note** The **clear port** command only applies to the universal port DFC.

**Step 5** Verify that the OIR/MAINT LED is off; this indicates that the DFC is offline and ready to be removed.



**Note** The OK/MAINT LED is green before you enter the **busyout** command. After you enter the **busyout** command, the LED changes to yellow. The LED turns off after all calls are disconnected and resources are taken out of service, indicating that busyout is complete.

**Step 6** Attach an ESD-preventive wrist strap.



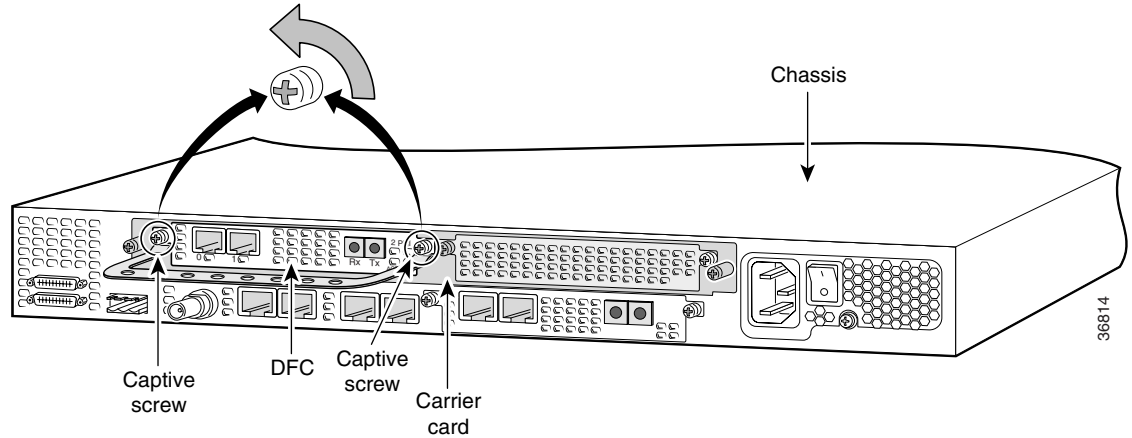
**Warning**

**Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

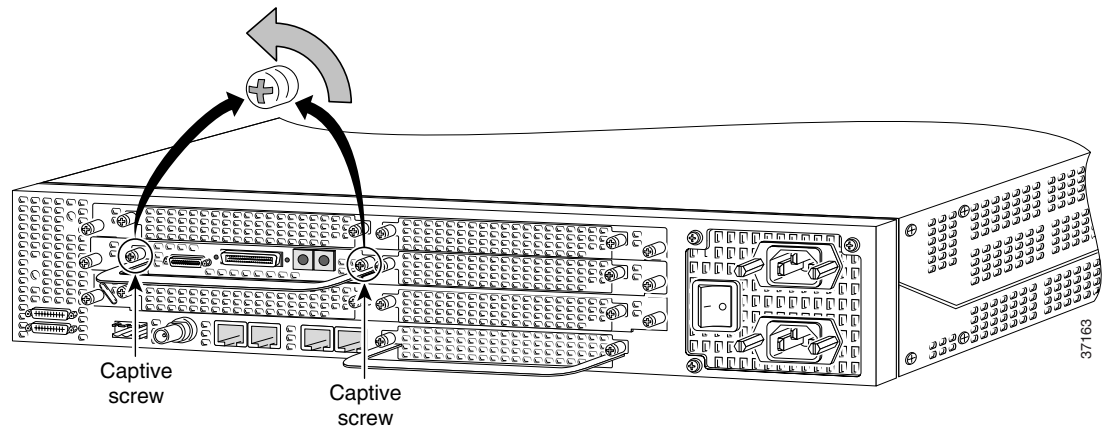
**Step 7** Disconnect all interface cables from the DFC and secure them out of the way.

- Step 8** Loosen the two captive screws that secure the DFC to the chassis until each screw is free of the chassis. (See [Figure 3-6](#) and [Figure 3-7](#).)

**Figure 3-6 Loosen the Captive Screws on the Cisco AS5350**



**Figure 3-7 Loosen the Captive Screws on the Cisco AS5400**

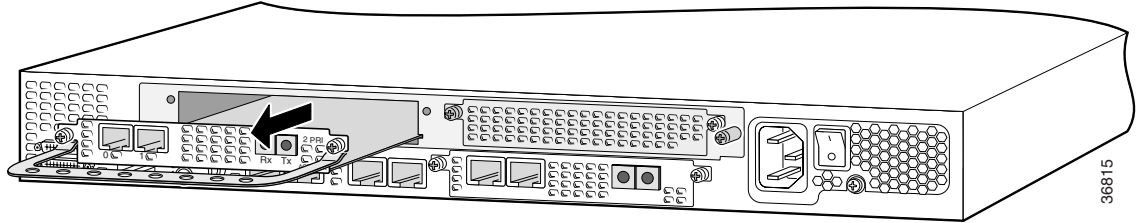
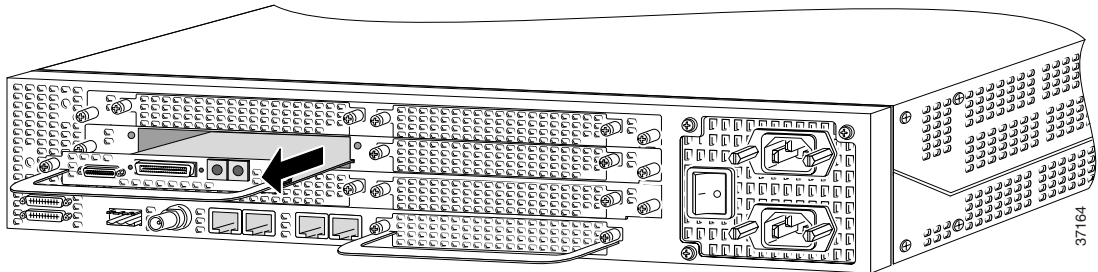


- Step 9** Grasp the DFC handle with one hand and pull the card toward you until the card slides free of the chassis. Grasp the ventilated metal cover with your other hand to support and guide the DFC out of the slot. (See [Figure 3-8](#) and [Figure 3-9](#).)



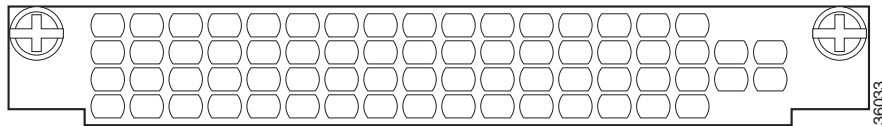
**Caution**

Avoid touching any pins or circuit board components during removal and installation of a DFC.

**Figure 3-8 Remove the DFC from the Cisco AS5350****Figure 3-9 Remove the DFC from the Cisco AS5400**

**Step 10** After you remove the DFC from the chassis, set it aside on an ESD-preventive mat.

**Step 11** If the DFC slot is to remain empty, install a blank cover over the open DFC slot to ensure proper airflow inside the chassis. (See [Figure 3-10](#).)

**Figure 3-10 Blank DFC Cover**

The following output is an example of online insertion and removal of a E1 DFC in slot 6 of the Cisco AS5400:

```
Router# show chassis slot 6

Slot 6:
DFC type is E1 8 PRI DFC

OIR events:
    Number of insertions = 0, Number of removals = 0
DFC State is DFC_S_OPERATIONAL

Router#
Router# busyout 6
Busyout in progress for 6
Router# show busyout 6
Busyout status for trunk DFC slot = 6:
DFC slot busyout is in progress
(p - pending, s - static(cfg/exec), d - dynamic, n - none)

6/0   : s s p p p p p p p p p p p p n p p p p p p p p p p p p p p p p
```

```

6/1  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/2  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/3  :s s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/4  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/5  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/6  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/7  :s s p p p p p p p p p p p n p p p p p p p p p p p p

```

Router#

Router# **show controller e1 6/0 timeslot 1-31**

E1 6/0 is up:

DS0	Type	Modem	Status	rxA	rxB	rxC	rxD	txA	txB	txC	txD
1	pri	-	idle								
2	pri	-	idle								
3	pri-modem	1/70	active								
4	pri-modem	1/46	active								
5	pri-modem	1/22	active								
6	pri-modem	4/61	active								
7	pri-modem	4/53	active								
8	pri-modem	4/45	active								
9	pri-modem	4/37	active								
10	pri-modem	4/29	active								
11	pri-modem	4/21	active								
12	pri-modem	4/13	active								
13	pri-modem	4/05	active								
14	pri-modem	2/105	active								
15	pri-modem	2/97	active								
16	pri-D channel	-	-								
17	pri-modem	2/89	active								
18	pri-modem	2/81	active								
19	pri-modem	2/73	active								
20	pri-modem	2/65	active								
21	pri-modem	2/57	active								
22	pri-modem	2/49	active								
23	pri-modem	2/41	active								
24	pri-modem	2/33	active								
25	pri-modem	2/25	active								
26	pri-modem	2/17	active								
27	pri-modem	2/09	active								
28	pri-modem	2/01	active								
29	pri-modem	1/107	active								
30	pri-modem	1/99	active								
31	pri-modem	1/91	active								

Router#

Router# **show busyout 6**

Busyout status for trunk DFC slot = 6:

DFC slot busyout is in progress

(p - pending, s - static(cfg/exec), d - dynamic, n - none)

```

6/0  :s s p p p p p p p p p p p p n p p p p p p p p p p p p
6/1  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/2  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/3  :s s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/4  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/5  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/6  :s s s p p p p p p p p p p p n p p p p p p p p p p p p
6/7  :s s p p p p p p p p p p p n p p p p p p p p p p p p

```

Router# **clear port 1/70**

This will clear port 1/70[confirm]

\*Jan 1 00:27:37.083:%PORT-6-SM\_PORT\_CLEARED:Port 1/70 Cleared

```

Router# show busyout 6
Busyout status for trunk DFC slot = 6:
DFC slot busyout is in progress
(p - pending, s - static(cfg/exec), d - dynamic, n - none)

6/0   :s s s s s s s s s s p p p p p n p p p p p p p p p p p p p p p p
6/1   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p p p
6/2   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p p p
6/3   :s s s s p p p p p p p p p p p n p p p p p p p p p p p p p p p p
6/4   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p p p
6/5   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p p p
6/6   :s s s p p p p p p p p p p p n p p p p p p p p p p p p p p p p
6/7   :s s p p p p p p p p p p p n p p p p p p p p p p p p p p p p

Router#
Router#
*Jan  1 00:32:40.271:%PORT-6-SM_PORT_CLEARED:All Ports Are Cleared
*Jan  1 00:32:40.635:%OIR-6-REMCARD:Card removed from slot 6, interfaces disabled
*Jan  1 00:32:40.643:%TRUNK_CLOCK-6-SWITCH:Switching to the clock on slot 7 port 0
priority 214 as the current primary has gone bad
*Jan  1 00:32:40.647:%CSM-5-PRI:delete PRI at slot 6, unit 0, channel 15 with index 0
*Jan  1 00:32:40.655:%CSM-5-PRI:delete PRI at slot 6, unit 1, channel 15 with index 1
*Jan  1 00:32:40.663:%CSM-5-PRI:delete PRI at slot 6, unit 2, channel 15 with index 2
*Jan  1 00:32:40.667:%CSM-5-PRI:delete PRI at slot 6, unit 3, channel 15 with index 3
*Jan  1 00:32:40.675:%CSM-5-PRI:delete PRI at slot 6, unit 4, channel 15 with index 4
*Jan  1 00:32:40.683:%CSM-5-PRI:delete PRI at slot 6, unit 5, channel 15 with index 4
*Jan  1 00:32:40.687:%CSM-5-PRI:delete PRI at slot 6, unit 6, channel 15 with index 3
*Jan  1 00:32:40.695:%CSM-5-PRI:delete PRI at slot 6, unit 7, channel 15 with index 2
Router#
*Jan  1 00:32:48.515:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/4:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/5:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/0:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/3:15, TEI 0 changed to
down
*Jan  1 00:32:48.523:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/6:15, TEI 0 changed to
down
*Jan  1 00:32:48.527:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/7:15, TEI 0 changed to
down
*Jan  1 00:32:48.527:%ISDN-6-LAYER2DOWN:Layer 2 for Interface Se6/1:15, TEI 0 changed to
down
Router#
Router# show chassis slot 6

Slot 6:
DFC type is Empty DFC
DFC is not powered

OIR events:
    Number of insertions = 0, Number of removals = 1

Router#
Router# show chassis slot 6

Slot 6:
DFC type is E1 8 PRI DFC

OIR events:
    Number of insertions = 1, Number of removals = 1
DFC State is DFC_S_OPERATIONAL

```

## Installing the T1 or E1 DFC



### Warning

Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



### Warning

The E1 interface card may only be installed in an ACA-permitted customer equipment or a Data Terminal Equipment (DTE) that is exempted from ACA's permit requirements. The customer equipment must only be housed in a cabinet that has screw-down lids to stop user access to overvoltages on the customer equipment. The customer equipment has circuitry that may have telecommunications network voltages on them. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



### Warning

The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the housing is open. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.



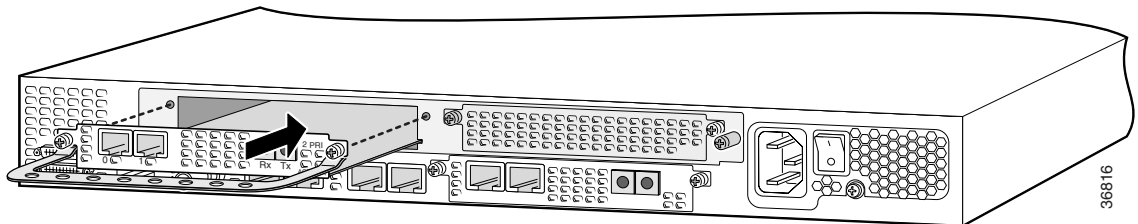
### Note

When you replace a DFC with a new DFC of the same type in the same slot, the system software will recognize the new trunk interfaces and bring them up automatically. If you replace the existing DFC with a new DFC of a different type, you will have to reconfigure the system. For configuration details, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

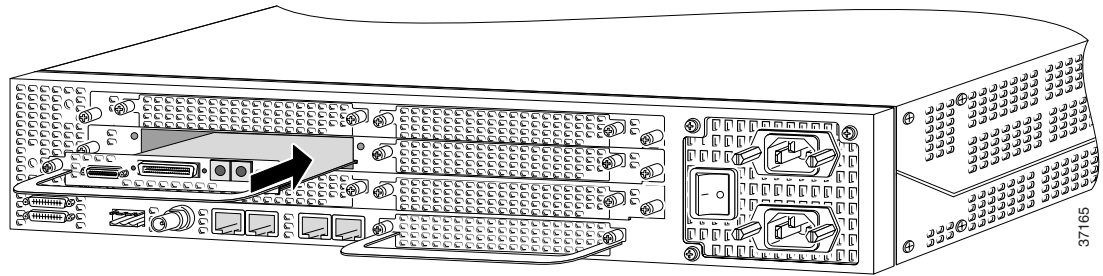
To install the T1 or E1 DFC, follow these steps:

- Step 1** Attach an ESD preventive wrist strap.
- Step 2** Slide the DFC into the slot until the connector pins make contact with the carrier card backplane connector. (See [Figure 3-11](#) and [Figure 3-12](#).)

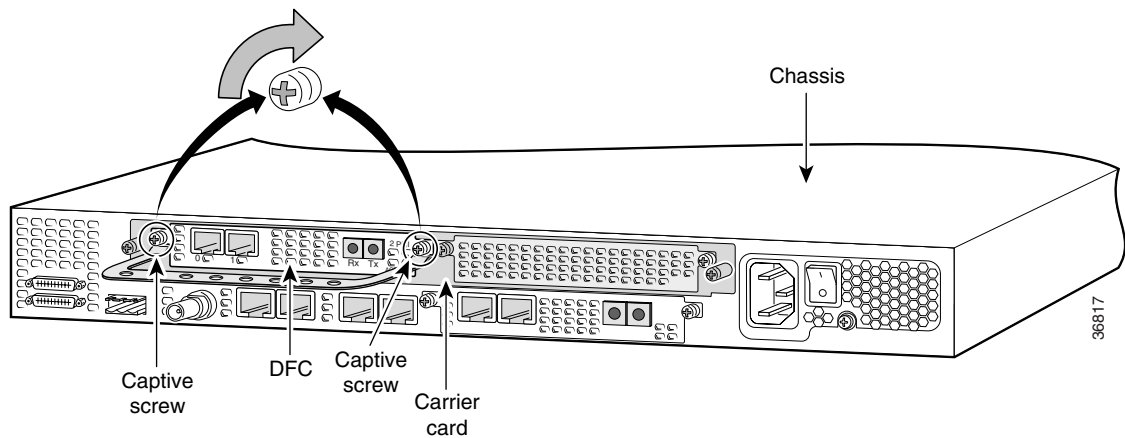
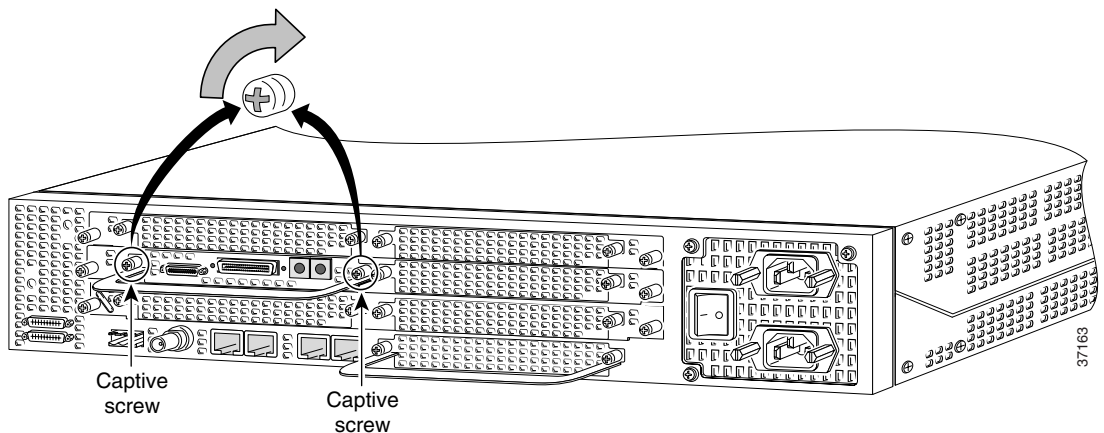
**Figure 3-11 Install the T1 or E1 DFC in the Cisco AS5350**



36816

**Figure 3-12 Install the T1 or E1 DFC in the Cisco AS5400**

- Step 3** Align the captive screws with their holes, and seat the card completely.
- Step 4** Tighten the screws to secure the DFC to the chassis. (See [Figure 3-13](#) and [Figure 3-14](#).)

**Figure 3-13 Tighten the Captive Screws on the Cisco AS5350****Figure 3-14 Tighten the Captive Screws on the Cisco AS5400**

- Step 5** Check the card LEDs to verify that the card is working properly. For information about dial feature card LEDs, refer to [Chapter 6, “Troubleshooting”](#)



**Note**

For information about configuring the T1 or E1 ports, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

## Configuring Input Impedance for the E1 DFC

Use the **line-termination** command to set the input impedance for the E1 DFC.

You can set the input impedance before or after running the setup script. For information on configuring the universal gateway with the setup script, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

### Configuration

	Command	Purpose
<b>Step 1</b>	Router> <b>enable</b> Password: <i>password</i> Router#	Enter enable mode.  Enter the password.  You have entered enable mode when the prompt changes to Router#.
<b>Step 2</b>	Router# <b>configure terminal</b> Enter configuration commands, one per line. End with CNTL/Z. Router(config)#	Enter global configuration mode. You have entered global configuration mode when the prompt changes to Router(config)#.
<b>Step 3</b>	Router(config)# <b>controller e1 0</b> Router(config-controller)#	Enter the controller number to configure.
<b>Step 4</b>	Router(config-controller)# <b>line-termination 75-ohm</b>	Sets the input impedance to 75 ohm for the controller. The factory-set default is 120 ohm. Repeat steps 3 and 4 for the other controllers.
<b>Step 5</b>	Router(config-controller)# <b>Ctrl-Z</b> Router# %SYS-5-CONFIG_I: Configured from console by console	Return to enable mode.  This message is normal and does not indicate an error.

### Verification

To verify your impedance: Enter the **show running-config** command. Note that 120 ohms is the default value and not displayed in the configuration file. The following output is an example of output after having entered the command **line-termination 75-ohm**.

```
Router# show running-config
Building configuration...

Current configuration:
!
version 12.0
no service pad
service timestamps debug datetime msec localtime
```

```

service timestamps log datetime localtime show-timezone
no service password-encryption
service internal
service udp-small-servers
service tcp-small-servers
!
hostname Router
!
boot system flash flash:1:vdukki/c5400-i-mz
enable secret 5 $1$qf01$OYKRD2cvIJx7hfQbhrJS61
enable password lab
!
bert profile default pattern 220-0.151QRSS threshold 10^-6 error-injection none duration
10
ip subnet-zero
no ip domain-lookup
ip domain-name cisco.com
!
isdn switch-type primary-5ess
clock timezone PDT8 -8
clock summer-time PDT8 recurring
partition flash 2 8 8
!
!
!
controller E1 0
clock source free-running
line-termination 75-ohm
pri-group timeslots 1-31
!
controller E1 1
clock source line secondary 1
pri-group timeslots 1-31
!
controller E1 2
clock source line secondary 2
pri-group timeslots 1-31
!
controller E1 3
clock source line secondary 3
pri-group timeslots 1-31
!
controller E1 4
clock source line secondary 4
pri-group timeslots 1-3,16
!
controller E1 5
clock source line secondary 5
pri-group timeslots 1-31
!
controller E1 6
clock source line secondary 6
pri-group timeslots 1-31
!
controller E1 7
clock source line secondary 7
pri-group timeslots 1-31
!
!
!
interface Ethernet0
ip address 1.6.44.2 255.255.255.0
no ip directed-broadcast
no ip route-cache

```

```
no ip mroute-cache
!
interface Serial0
ip address 1.1.1.1 255.255.255.0
no ip directed-broadcast
no keepalive
shutdown
no fair-queue
e2-clockrate
!
interface Serial1
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
shutdown
no fair-queue
clockrate 2015232
!
interface Serial2
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
shutdown
no fair-queue
clockrate 2015232
!
interface Serial3
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
shutdown
no fair-queue
clockrate 2015232
!
interface Serial0:15
no ip address
no ip directed-broadcast
isdn switch-type primary-5ess
no cdp enable
hold-queue 10 in
!
interface Serial1:15
no ip address
no ip directed-broadcast
isdn switch-type primary-5ess
no cdp enable
hold-queue 10 in
!
interface Serial2:15
no ip address
no ip directed-broadcast
isdn switch-type primary-5ess
no cdp enable
hold-queue 10 in
!
interface Serial3:15
no ip address
no ip directed-broadcast
isdn switch-type primary-5ess
no cdp enable
hold-queue 10 in
```

```

!
interface FastEthernet0
mac-address 0000.0c00.0011
ip address 15.0.0.1 255.0.0.0
no ip directed-broadcast
ip route-cache same-interface
no ip route-cache
no ip mroute-cache
no keepalive
duplex full
hold-queue 75 in
!
ip classless
ip route 223.255.254.254 255.255.255.255 Ethernet0
!
access-list 101 permit ip any any
access-list 101 deny igrp any any
dialer-list 1 protocol ip list 101
arp 25.0.0.1 1234.1234.1241 ARPA
arp 27.0.0.1 1234.1234.1243 ARPA
arp 26.0.0.1 1234.1234.1242 ARPA
arp 28.0.0.1 1234.1234.1244 ARPA
!
!
line con 0
exec-timeout 0 0
transport input none
line 1 54
line aux 0
transport input all
line vty 0 4
password lab
login
!
scheduler interval 500
end

Router#

```

## Getting Help

For information about technical support, onsite service, and exchange and repair services, refer to the [“Obtaining Technical Assistance”](#) section on page -xii in the “Preface.”

## Where to Go Next

The remaining chapters of this guide include information on installing and troubleshooting DFCs and creating cables.

- [Chapter 4, “T3 Dial Feature Card.”](#)
- [Chapter 5, “Universal Port Dial Feature Card.”](#)
- [Chapter 6, “Troubleshooting.”](#)
- [Appendix A, “Cabling Specifications.”](#)



## T3 Dial Feature Card

This chapter describes the T3 dial feature card and includes the following sections:

- [Overview, page 4-1](#)
- [Online Installation and Removal \(OIR\) of the T3 DFC, page 4-2](#)
- [Getting Help, page 4-7](#)
- [Where to Go Next, page 4-7](#)

### Overview

The T3 DFC provides physical line termination for a channelized T3 ingress trunk line. It uses an onboard multiplexer to multiplex 28 channelized T1 lines into a single channelized T3 line. (See [Figure 4-1](#).)

The T3 DFC provides physical line termination for up to 672 DS0 channels and uses onboard HDLC controllers to terminate digital (ISDN) calls.

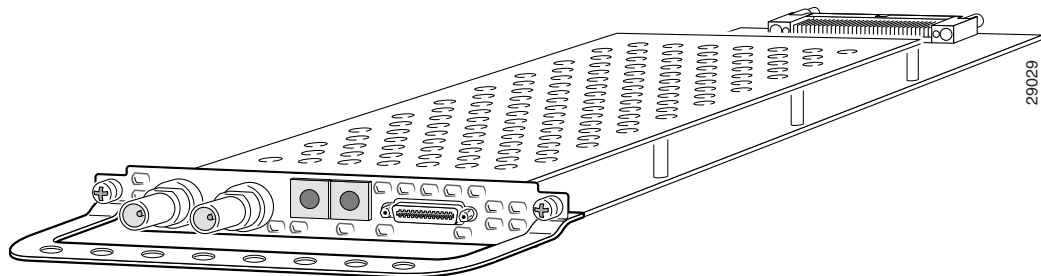
You can use the bantam jacks on the DFC to monitor a T1 line or test any one of the individual T1 circuits in drop and insert mode.

You can install a T3 DFC in any DFC slot of the universal gateway chassis.



**Note** The Cisco AS5350 and Cisco AS5400 support only one type of WAN DFC at a time. Refer to [Chapter 6, “Troubleshooting,”](#) for more information.

**Figure 4-1 T3 Dial Feature Card**



# Online Installation and Removal (OIR) of the T3 DFC

## Overview

To remove a DFC without dropping any calls or connections, you will need to take the DFC out of service by using the **busyout** command to disable the DFC. The **busyout** command is executed on a per DFC basis and will gracefully disable the card by waiting for the active services to terminate.

If you have active calls on the DFC after executing the **busyout** command, wait for the calls to drop. Use the **show busyout** command to view the status of the termination process.



### Caution

To avoid erroneous failure messages, remove or insert only one DFC at a time.

When you replace a DFC with a new DFC of the same type in the same slot, the system software will recognize the new trunk interfaces and bring them up automatically.

If you replace the existing DFC with a new DFC of a different type, you will have to reconfigure the system. For configuration details, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

## Removing the T3 DFC

To remove the T3 DFC, follow these steps:



### Note

Following these steps are examples of the output from each command.

- Step 1** Determine which slot the DFC is in (See [Figure 4-2](#) and [Figure 4-3](#).) by entering the **show chassis** command in privileged EXEC mode:

```
Router# show chassis slot
```

**Figure 4-2 Slot Numbering on the Cisco AS5350 Chassis**

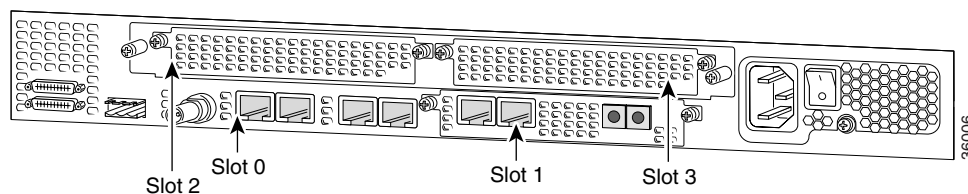
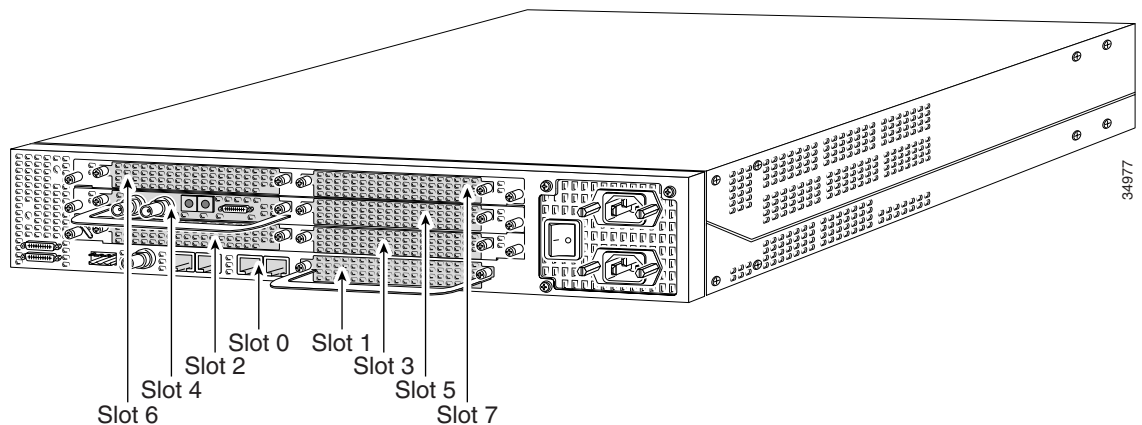


Figure 4-3 Slot Numbering on the Cisco AS5400 Chassis



**Step 2** Initialize the software busyout procedure by entering the **busyout** command:

```
Router# busyout slot-number
```

**Step 3** Enter the **show busyout** command to check busyout status for that specific slot:

```
Router# show busyout slot-number
```

**Step 4** You may use the **clear port** command to immediately disable active calls on the universal port card. Use the **show controller** command to show the universal port card associated with the T1 or E1 DFC.

```
Router# show controller t1/e1 slot-number/control-number timeslot timeslot-number
Router# clear port slot-number/port number
```



**Note** The **clear port** command only applies to the universal port DFC.

**Step 5** Verify that the OIR/MAINT LED is off; this indicates that the DFC is offline and ready to be removed.



**Note** The OK/MAINT LED is green before you enter the **busyout** command. After you enter the **busyout** command, the LED changes to yellow. The LED turns off after all calls are disconnected and resources are taken out of service, indicating that busyout is complete.

**Step 6** Attach an ESD-preventive wrist strap.



**Warning**

**Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

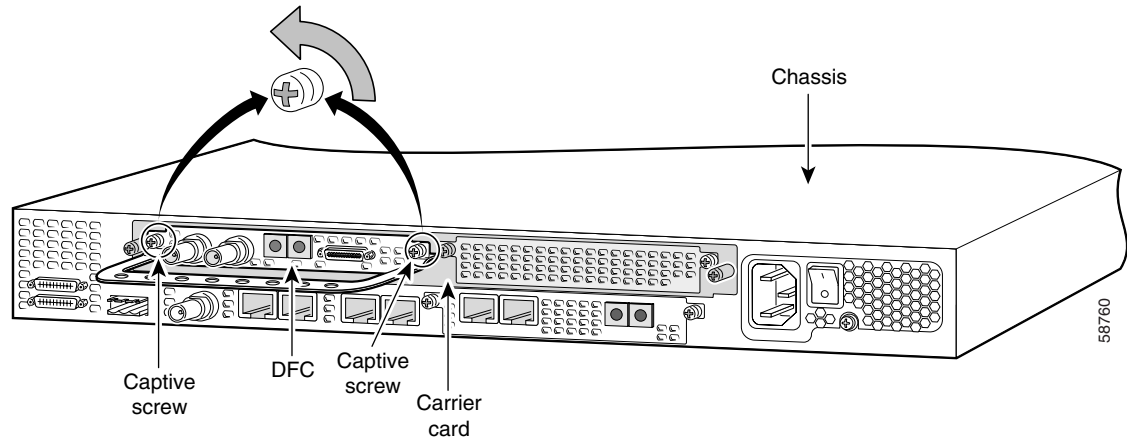
**Step 7** Disconnect all interface cables from the DFC and secure them out of the way.



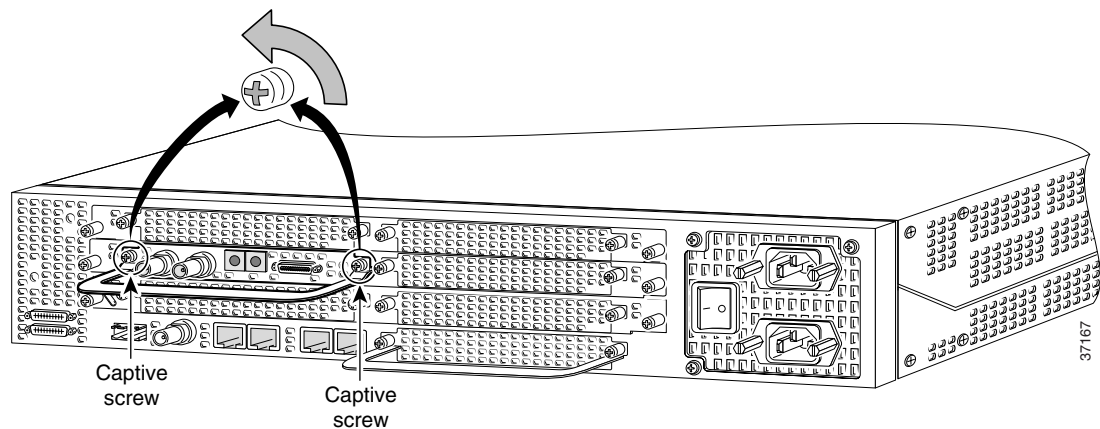
**Note** OIR of the T3 DFC is similar to that of the T1 or E1 DFC. To see an example of the output during online insertion and removal of an E1 DFC refer to [Chapter 3, “T1 and E1 Dial Feature Cards”](#)

- Step 8** Loosen the two captive screws that secure the DFC to the chassis until each screw is free of the chassis. (See [Figure 4-4](#) and [Figure 4-5](#).)

**Figure 4-4 Loosen the Captive Screws on the Cisco AS5350**



**Figure 4-5 Loosen the Captive Screws on the Cisco AS5400**



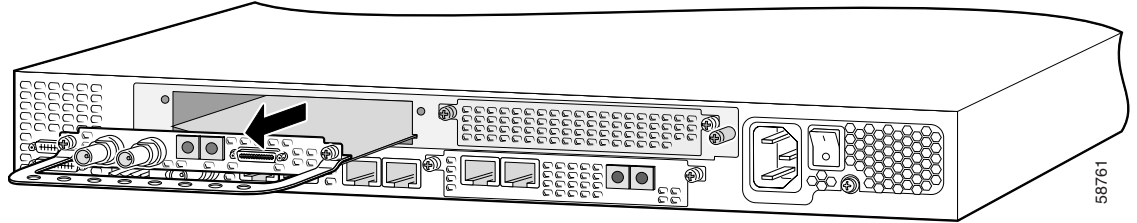
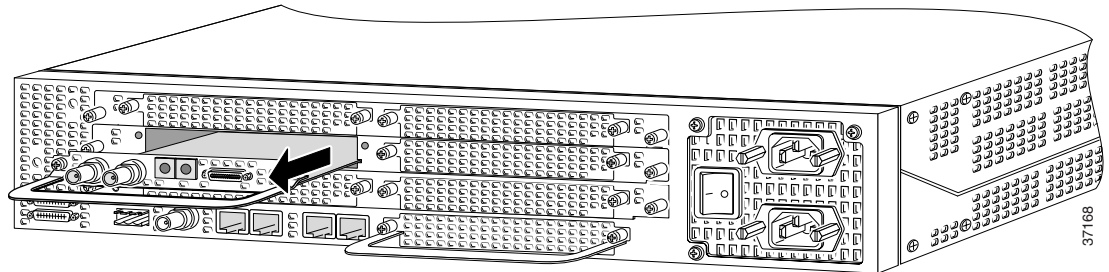
- Step 9** Grasp the DFC handle with one hand and pull the card toward you until the card slides free of the chassis. Grasp the ventilated metal cover with your other hand to support and guide the DFC out of the slot. (See [Figure 4-6](#) and [Figure 4-7](#).)



**Caution**

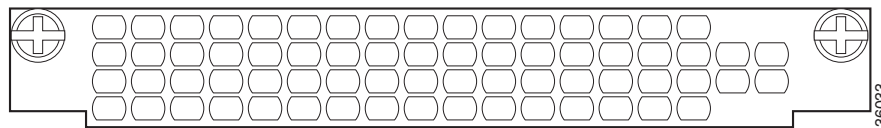
Avoid touching any pins or circuit board components during removal and installation of the DFC.



**Figure 4-6 Remove the DFC from the Cisco AS5350****Figure 4-7 Remove the DFC from the Cisco AS5400**

**Step 10** After you remove the DFC from the chassis, set it aside on an ESD-preventive mat.

**Step 11** If a DFC slot on the carrier card is to remain empty, install a blank cover over the open DFC slot to ensure proper airflow inside the chassis. (See [Figure 4-8](#).)

**Figure 4-8 Blank DFC Cover**

## Installing the T3 DFC



### Warning

**Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**



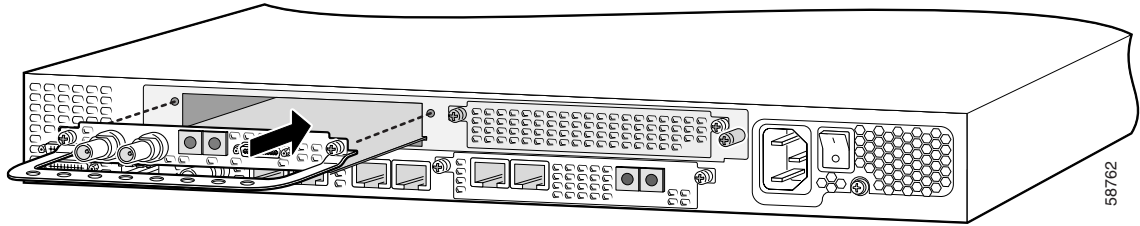
### Note

When you replace a DFC with a new DFC of the same type in the same slot, the system software will recognize the new trunk interfaces and bring them up automatically. If you replace the existing DFC with a new DFC of a different type, you will have to reconfigure the system. For configuration details, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

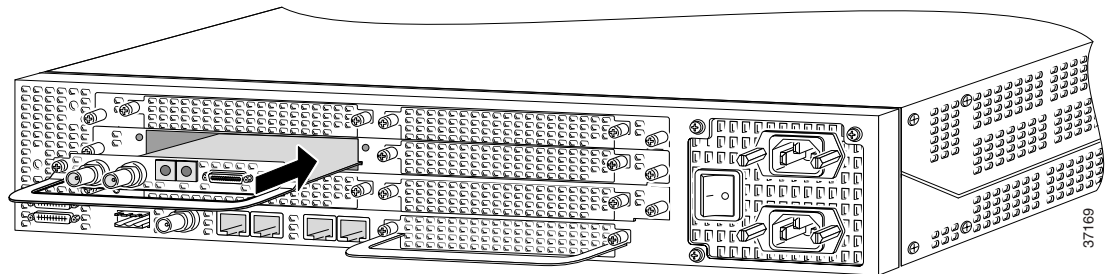
To install the T3 DFC, follow these steps:

- Step 1** Attach an ESD-preventive wrist strap.
- Step 2** Slide the DFC into the slot until the connector pins make contact with the carrier card backplane connector. (See [Figure 4-9](#) and [Figure 4-10](#).)

**Figure 4-9** Install the T3 DFC in the Cisco AS5350

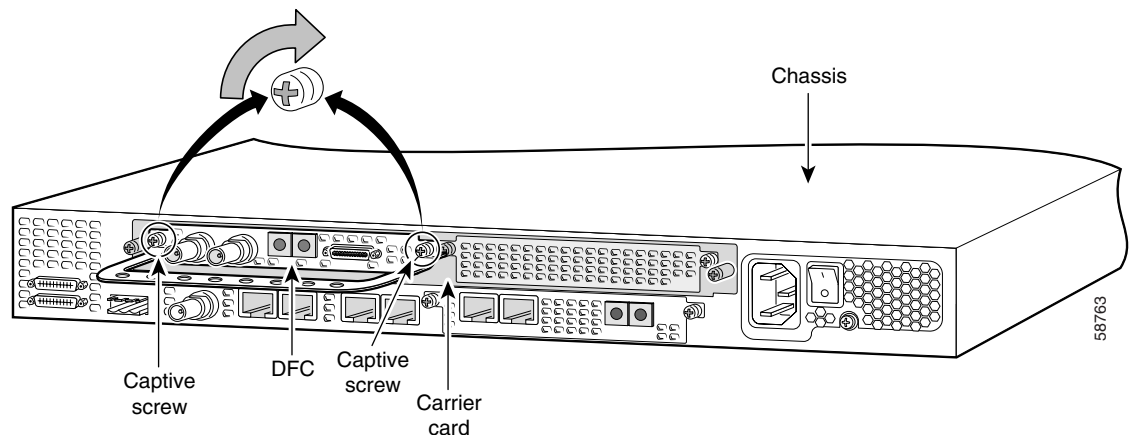


**Figure 4-10** Install the T3 DFC in the Cisco AS5400

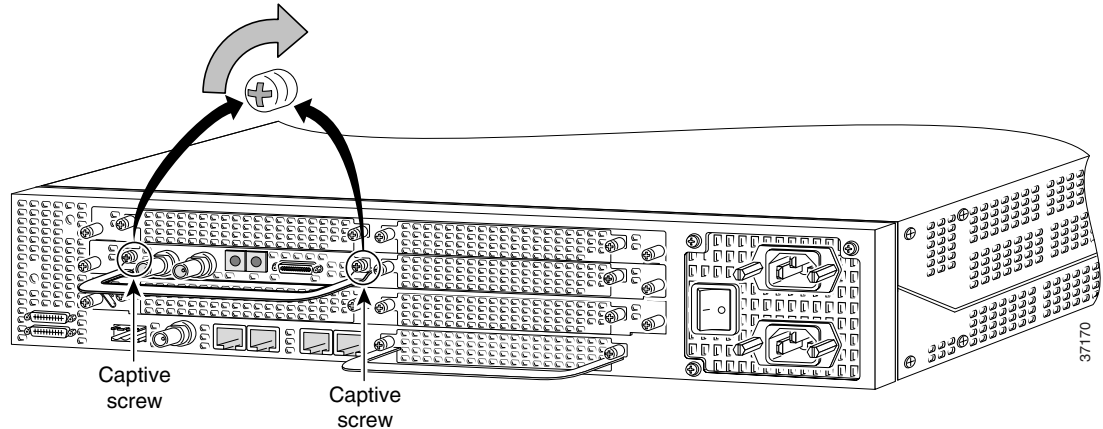


- Step 3** Align the captive screws with their holes, and seat the card completely.
- Step 4** Tighten the screws to secure the DFC to the chassis. (See [Figure 4-11](#) and [Figure 4-12](#).)

**Figure 4-11** Tighten the Captive Screws on the Cisco AS5350



**Figure 4-12 Tighten the Captive Screws on the Cisco AS5400**



- Step 5** Check the card LEDs to verify that the card is working properly. For information about dial feature card LEDs, refer to [Chapter 6, “Troubleshooting”](#)
- 

## Getting Help

For information about technical support, onsite service, and exchange and repair services, refer to the [“Obtaining Technical Assistance”](#) section on page -xii in the “Preface.”

## Where to Go Next

The remaining chapters of this guide include information on installing and troubleshooting DFCs and creating cables.

- [Chapter 5, “Universal Port Dial Feature Card.”](#)
- [Chapter 6, “Troubleshooting.”](#)
- [Appendix A, “Cabling Specifications.”](#)





## Universal Port Dial Feature Card

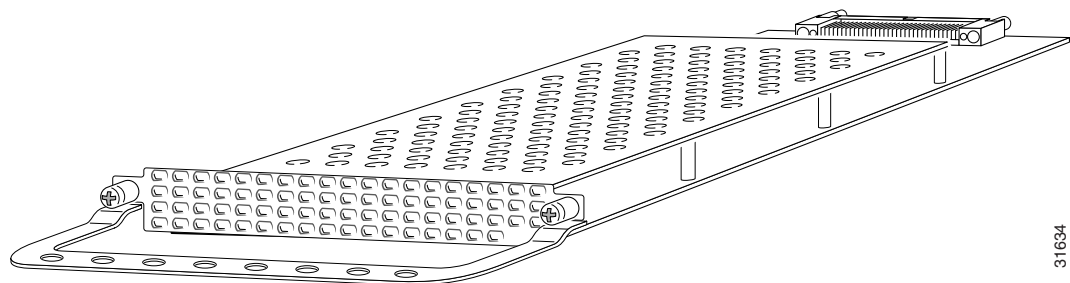
This chapter describes the universal port dial feature card (DFC) and includes the following sections:

- [Overview, page 5-1](#)
- [Online Insertion and Removal \(OIR\) of the Universal Port DFC, page 5-2](#)
- [SPE Firmware, page 5-9](#)
- [Getting Help, page 5-9](#)
- [Where to Go Next, page 5-9](#)

### Overview

The universal port DFC provides multiple port sessions, with each session capable of originating or terminating a session over a DS-0 in PCM format. The number of sessions depends on the port density of the card. You can install a universal port DFC in any DFC slot of the universal gateway chassis. The universal port DFC does not require external connections. (See [Figure 5-1](#).)

**Figure 5-1** Universal Port DFC



31634

# Online Insertion and Removal (OIR) of the Universal Port DFC

## Overview

To remove a DFC without dropping any calls or connections, you will need to take the DFC out of service by using the **busyout** command to disable the DFC. The **busyout** command is executed on a per DFC basis and will gracefully disable the card by waiting for the active services to terminate.

If you have active calls on the DFC after executing the **busyout** command, wait for the calls to drop. Use the **show busyout** command to view the status of the termination process.



### Caution

To avoid erroneous failure messages, remove or insert only one DFC at a time.

When you replace a DFC with a new DFC of the same type in the same slot, the system software will recognize the new trunk interfaces and bring them up automatically.

If you replace the existing DFC with a new DFC of a different type, you will have to reconfigure the system. For configuration details, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*. For information on voice and fax commands, refer to the [Monitoring Voice and Fax Services on the Cisco AS5350 and Cisco AS5400 Universal Gateways](#) online document.

## Removing the Universal Port DFC

To remove the universal port DFC, follow these steps:



### Note

Following these steps are examples of the output of each command.

- Step 1** Determine which slot the DFC is in (see [Figure 5-2](#) and [Figure 5-3](#)) by entering the **show chassis** command in privileged EXEC mode:

```
Router# show chassis slot
```

**Figure 5-2 Slot Numbering on the Cisco AS5350 Chassis**

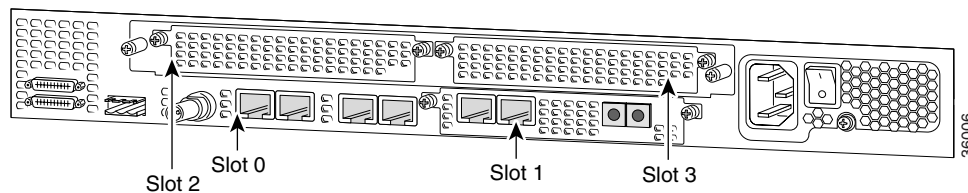
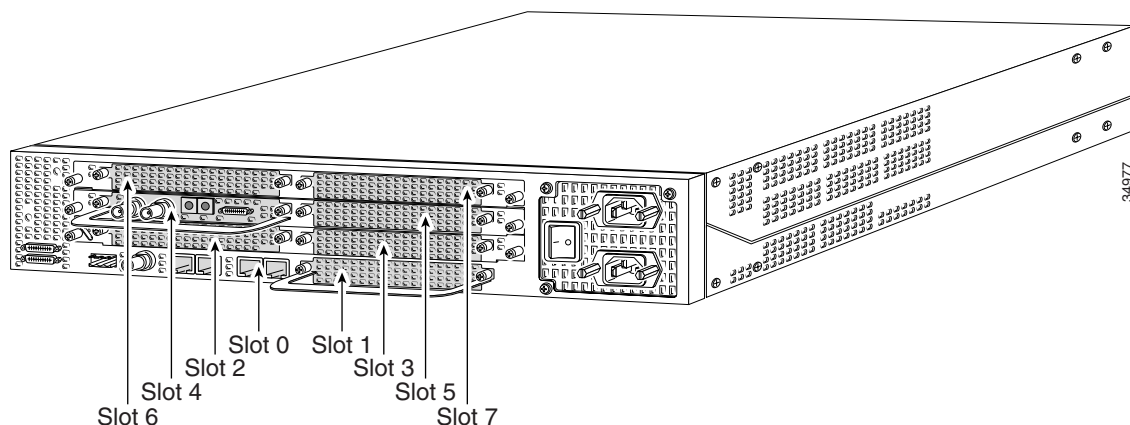


Figure 5-3 Slot Numbering on the Cisco AS5400 Chassis



**Step 2** Initialize the software busyout procedure by entering the **busyout** command:

```
Router# busyout slot-number
```

**Step 3** Enter the **show busyout** command to check busyout status for that specific slot:

```
Router# show busyout slot-number
```

**Step 4** You may use the **clear port** command to immediately disable active calls on the universal port card.

```
Router# clear port slot-number/port number
```

**Step 5** Verify that the OIR/MAINT LED is off; this indicates that the DFC is offline and ready to be removed.



**Note** The OK/MAINT LED is green before you enter the busyout command. After you enter the busyout command, the LED changes to yellow. The LED turns off after all calls are disconnected and resources taken out of service, indicating that busyout is complete.

**Step 6** Attach an ESD-preventive wrist strap.



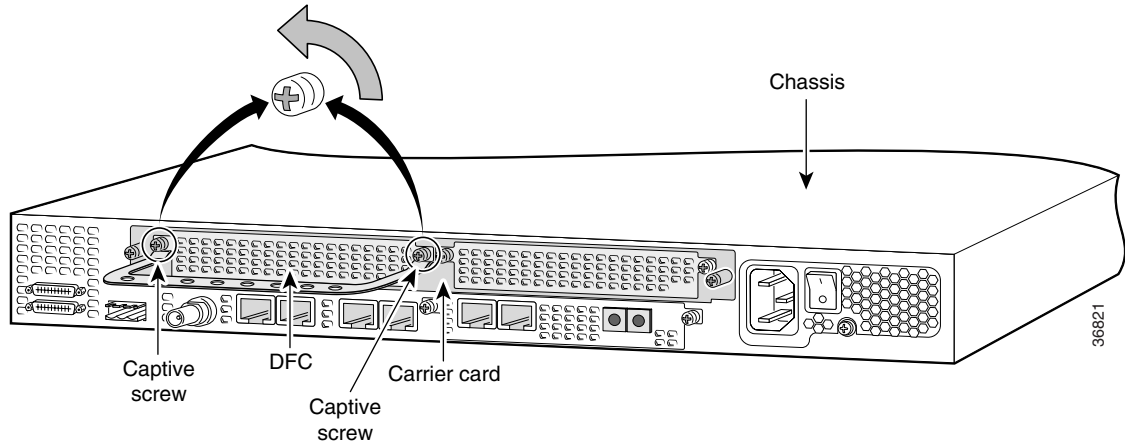
**Warning**

**Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

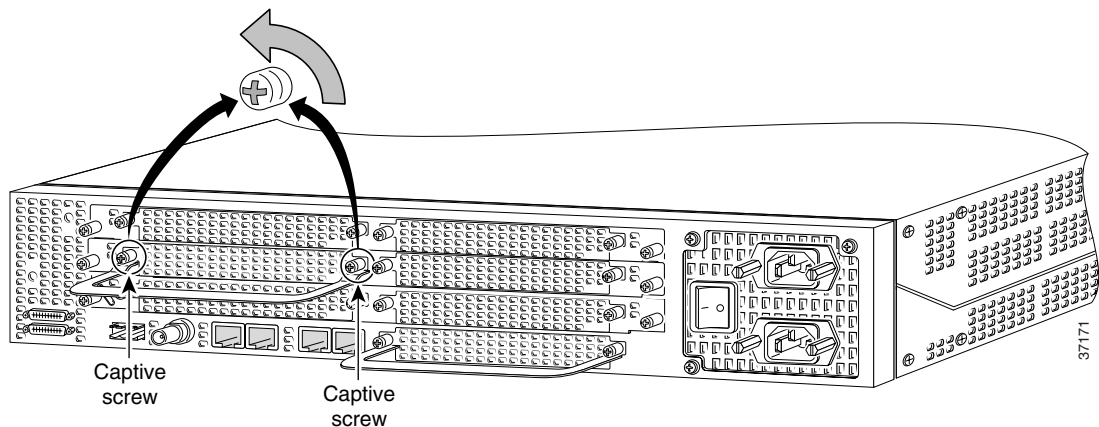
**Step 7** Disconnect all interface cables from the DFC.

- Step 8** Loosen the two captive screws that secure the DFC to the chassis until each screw is free of the chassis. (See [Figure 5-4](#) and [Figure 5-5](#).)

**Figure 5-4 Loosen the Captive Screws on the Cisco AS5350**

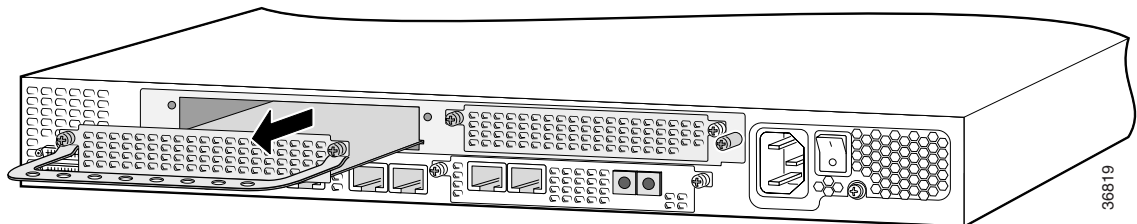


**Figure 5-5 Loosen the Captive Screws on the Cisco AS5400**

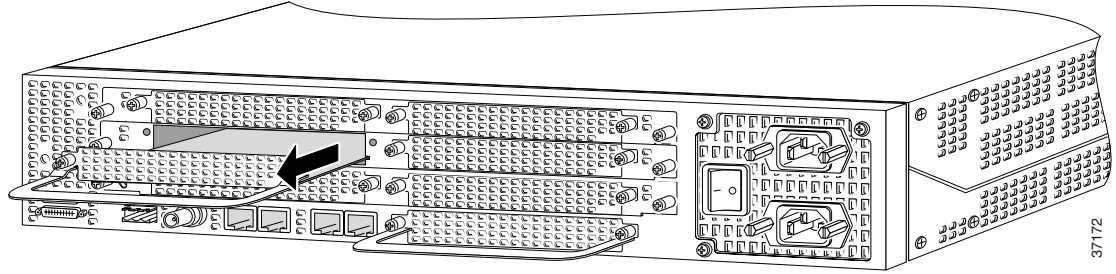


- Step 9** Grasp the DFC handle with one hand and pull the card toward you until the card slides free of the chassis. Grasp the ventilated metal cover with your other hand to support and guide the DFC out of the slot. (See [Figure 5-6](#) and [Figure 5-7](#).)

**Figure 5-6 Remove the DFC from the Cisco AS5350**

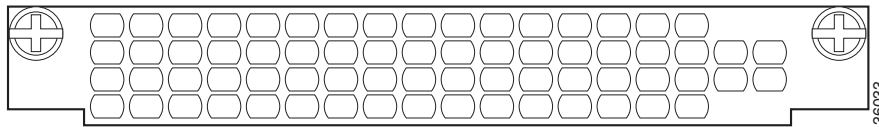




**Figure 5-7 Remove the DFC from the Cisco AS5400****Caution**

Avoid touching any pins or circuit board components during removal and installation of a DFC.

- Step 10** After you remove the DFC, set it aside on an ESD-preventive mat.
- Step 11** If the DFC slot is to remain empty, install a blank cover over the open DFC slot to ensure proper airflow inside the chassis. (See [Figure 5-8](#).)

**Figure 5-8 Blank DFC Cover**

The following output is an example of online insertion and removal of a universal port DFC in slot 3:

```
Router# show chassis slot 3

Slot 3:
DFC type is NP108 DFC

OIR events:
    Number of insertions = 0, Number of removals = 0
DFC State is DFC_S_OPERATIONAL

Router#
Router# show busyout 3
    Slot 3 is not being busied out
Router#
Router# busyout 3
    Busyout in progress for 3
Router#
Router# show busyout 3
    Slot busyout is in progress
    Slot 3:Pending (64 calls remaining)
Router#
Router# show chassis slot 3

Slot 3:
DFC type is NP108 DFC

OIR events:
    Number of insertions = 0, Number of removals = 0
DFC State is DFC_S_OPERATIONAL
```

```

Router#
Router# clear port 3
This will clear ports 3/00 - 3/107[confirm]

Router#
*Jan 1 00:14:22.555:%PORT-6-SM_PORT_CLEARED:Port 3/00 - 3/107 Cleared
Router# show busyout 3
Slot busyout is in progress
Slot 3:Pending (54 calls remaining)
Router#
Router# show busyout 3
Slot busyout is in progress
Slot 3:Pending (36 calls remaining)
Router# show busyout 3
Slot busyout is in progress
Slot 3:Pending (30 calls remaining)
Router# clear port 3
This will clear ports 3/00 - 3/107[confirm]

Router#
*JRouteran 1 00:14:59.275:%PORT-6-SM_PORT_CLEARED:Port 3/00 - 3/107 Cleared
Router# show busyout 3
Slot busyout is in progress
Slot 3:Pending (9 calls remaining)
Router# clear port 3
*Jan 1 00:15:10.355:%NP_MD-6-MODULE_DOWN:NextPort module 3/0/0 down
*Jan 1 00:15:10.363:%NP_BS-6-MODULE_STOPPED:NextPort module 3/0/0 Stopped
*Jan 1 00:15:10.363:%NP_MD-6-MODULE_DOWN:NextPort module 3/0/1 down
*Jan 1 00:15:10.371:%NP_BS-6-MODULE_STOPPED:NextPort module 3/0/1 Stopped
*Jan 1 00:15:10.371:%NP_MD-6-MODULE_DOWN:NextPort module 3/0/2 down
*Jan 1 00:15:10.379:%NP_BS-6-MODULE_STOPPED:NextPort module 3/0/2 Stopped
*Jan 1 00:15:10.379:%NP_MD-6-SLOT_REMOVED:Slot 3 removed
Router# clear port 3
*Jan 1 00:15:10.539:%OIR-6-REMCARD:Card removed from slot 3, interfaces disabled
Router# show chassis slot 3

Slot 3:
DFC type is Empty DFC
DFC is not powered

OIR events:
    Number of insertions = 0, Number of removals = 1

Router#
Router#
*Jan 1 00:16:29.047:%OIR-6-INSCARD:Card inserted in slot 3, interfaces administratively
shut down
*Jan 1 00:16:29.123:%NP_MD-6-SLOT_INSERTED:Slot 3 (108 ports max) inserted
Router#
*Jan 1 00:16:33.415:%NP_BS-6-MODULE_STARTED:NextPort module 3/0/0 Started - 1.1.3.77
Router#
*Jan 1 00:16:37.843:%NP_BS-6-MODULE_STARTED:NextPort module 3/0/1 Started - 1.1.3.77
*Jan 1 00:16:40.615:%NP_MD-6-MODULE_UP:NextPort module 3/0/0 up
Router#
*Jan 1 00:16:41.847:%NP_BS-6-MODULE_STARTED:NextPort module 3/0/2 Started - 1.1.3.77
Router#

```

```
Router# show chassis slot 3

Slot 3:
DFC type is NP108 DFC

OIR events:
    Number of insertions = 1, Number of removals = 1
DFC State is DFC_S_OPERATIONAL
```

## Installing the Universal Port DFC



### Warning

**Do not work on the system or connect or disconnect cables during periods of lightning activity. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**



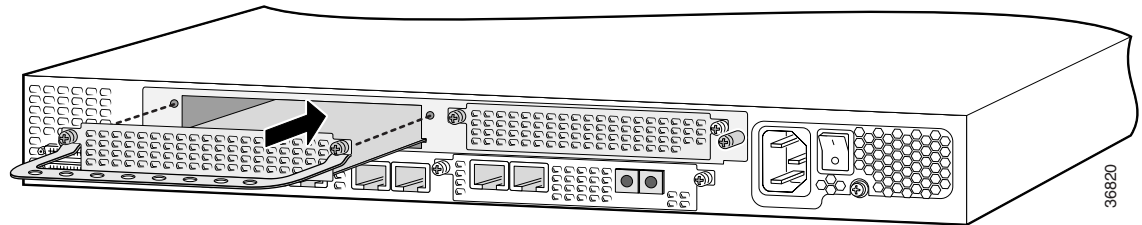
### Note

When you replace a DFC with a new DFC of the same type in the same slot, the system software will recognize the new trunk interfaces and bring them up automatically. If you replace the existing DFC with a new DFC of a different type, you will have to reconfigure the system. For configuration details, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

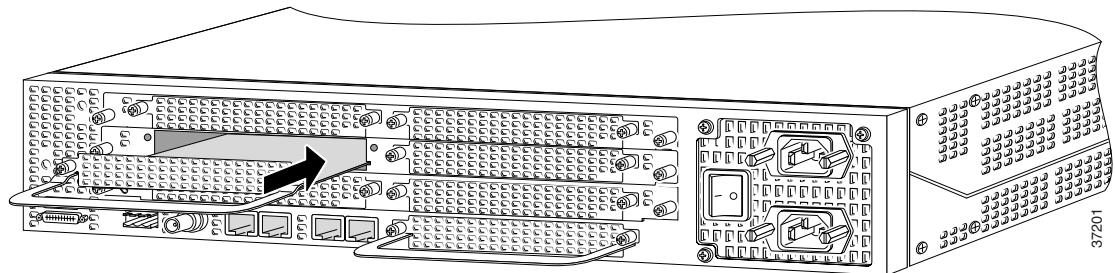
To install the universal port DFC, follow these steps:

- Step 1** Attach an ESD preventive wrist strap.
- Step 2** Slide the DFC into the slot until the connector pins make contact with the carrier card backplane connector. (See [Figure 5-9](#) and [Figure 5-10](#).)

**Figure 5-9 Install the Universal Port DFC in the Cisco AS5350**



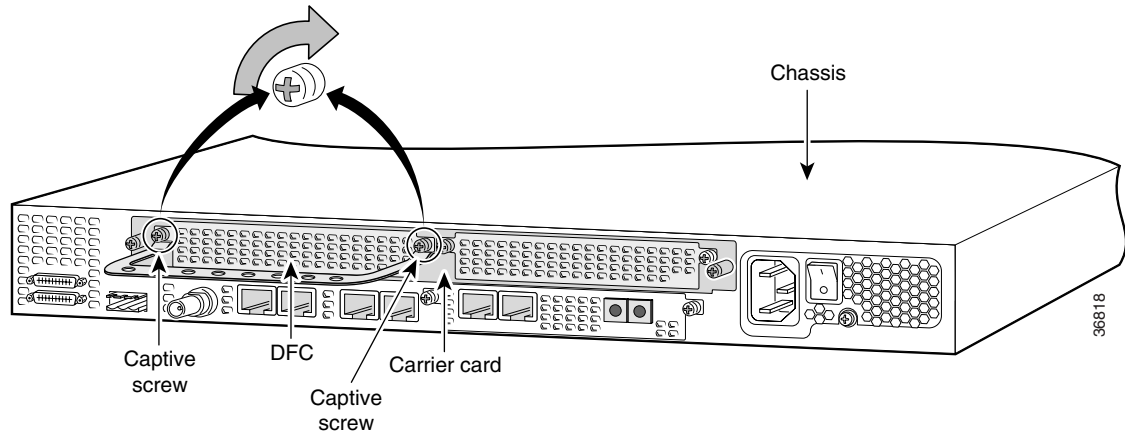
**Figure 5-10 Install the Universal Port DFC in the Cisco AS5400**



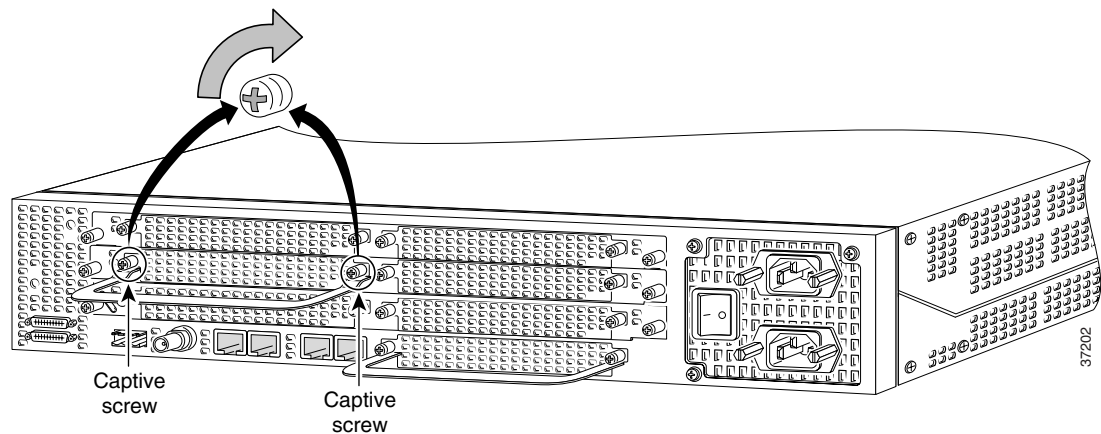
- Step 3** Align the captive screws with their holes, and then seat the card completely.

- Step 4** Seat the DFC in the carrier by pushing the card firmly until the captive screws are aligned with their holes.
- Step 5** Tighten the screws to secure the DFC to the chassis. (See [Figure 5-11](#) and [Figure 5-12](#).)

**Figure 5-11 Tighten the Captive Screws on the Cisco AS5350**



**Figure 5-12 Tighten the Captive Screws on the Cisco AS5400**



- Step 6** Check the card LEDs to verify that the card is working properly. For information about dial feature card LEDs, refer to [Chapter 6, "Troubleshooting"](#)

## SPE Firmware

SPE firmware is automatically downloaded to a universal port DFC from the Cisco IOS image when you boot the system for the first time, or when you insert a universal port DFC while the system is operating. When you insert DFCs while the system is operating, the Cisco IOS image recognizes the cards and downloads the required firmware to the cards.

For more information on universal port software and upgrade options, refer to the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide*.

For information on managing universal port services, refer to *Managing Port Services on the Cisco 5350 Universal Gateway* and *Managing Port Services on the Cisco AS5400 Universal Gateway*.

## Getting Help

For information about technical support, onsite service, and exchange and repair services, refer to the [“Obtaining Technical Assistance” section on page -xii](#) in the “Preface.”

## Where to Go Next

The remaining chapters of this guide include information on troubleshooting DFCs and creating cables.

- [Chapter 6, “Troubleshooting.”](#)
- [Appendix A, “Cabling Specifications.”](#)





## Troubleshooting

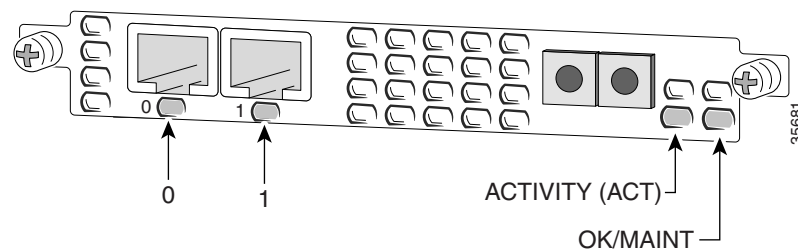
This chapter describes how to troubleshoot the universal gateway by referring to the LEDs on DFCs, and using the bantam jacks. The chapter contains the following sections:

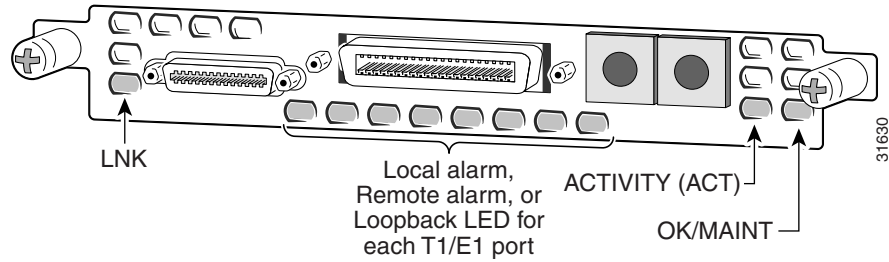
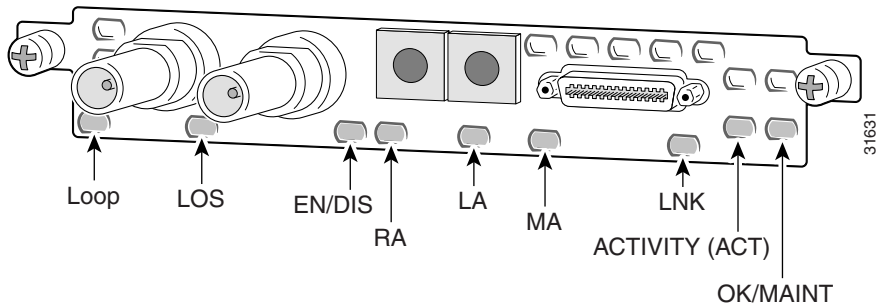
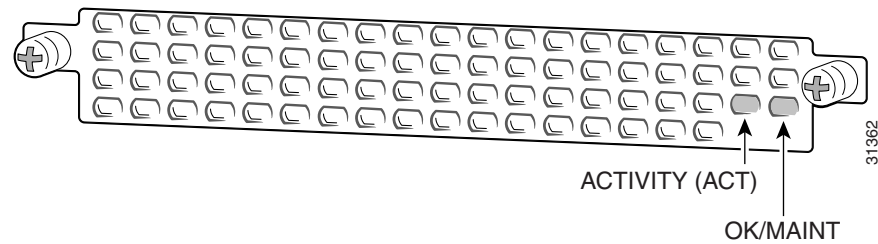
- [LEDs, page 6-1](#)
- [Mixing WAN DFCs, page 6-5](#)
- [Environment Monitoring, page 6-6](#)
- [Using the Bantam Jacks for Test Port Functionality, page 6-9](#)
- [Troubleshooting Network Interfaces, page 6-10](#)
- [Getting Help, page 6-10](#)

## LEDs

The LEDs indicate the current operating condition of the dial feature cards. Observe the LEDs (see [Figure 6-1](#) through [Figure 6-4](#)), note any fault condition that the product is encountering, and then contact your system administrator or a customer service representative (see [“Obtaining Technical Assistance”](#) in the “Preface”), if necessary. Refer to [Table 6-1](#) for a description of the LEDs.

**Figure 6-1 2-Port or 4-Port T1 or E1 DFC LEDs**



**Figure 6-2 8-Port T1 or E1 DFC LEDs****Figure 6-3 T3 DFC LEDs****Figure 6-4 Universal Port DFC LEDs**



**Table 6-1 LEDs**

DFC	LED	State	Description
T1 or E1 DFC	ACTIVITY (ACT)	Fast flicker (Green)	Indicates DFC is up and running.
		Slow flicker (Green)	Indicates DFC is not yet fully functional.
	OK/MAINT	Green	The T1 or E1 DFC has passed initial power-up diagnostics tests and is operating normally.
		Yellow	The T1 or E1 DFC is not functioning. See the console for messages.
		Off	Indicates that all calls associated with the card are shut down and it is safe to remove the card with the system powered on.
	Remote Alarm (RA), Local Alarm (LA), or Loopback (LB)	On (Yellow)	One LED below each T1/E1 port indicates one of the following: <ul style="list-style-type: none"> <li>A local or remote loopback diagnostic test is running on the associated T1 port.</li> <li>An alarm is received on the associated T1/E1 port, indicating loss of signal (LOS) or loss of multiframe alignment (LOF) at the local or remote node.</li> </ul>

**Table 6-1 LEDs (continued)**

DFC	LED	State	Description
T3 DFC	ACTIVITY (ACT)	Fast flicker	Indicates DFC is up and running.
		Slow flicker	Indicates DFC is not yet fully functional.
	OK/MAINT	On (Green)	The CT3 DFC passed initial power-up diagnostics tests and is operating normally.
		Yellow	The CT3 DFC is not functioning. See the console for messages.
		Off	Indicates that all calls associated with the DFC are shut down and it is safe to remove the card with the system powered on.
	M13 Alarm (MA)	On	Indicates the presence of one of the following on the CT3 line: Received Alarm Indication Signal (RAIS), Loss Of Signal (LOS), Receive RED Alarm (RRED), or a Far-End Receive Failure(RFERF). <sup>1</sup>
		Off	Remains off when operating condition is normal.
	Remote Alarm (RA)	On	Indicates a T1 alarm condition encountered by software.
		Off	Remains off when operating condition is normal.
	Local Alarm (LA)	On	Indicates a T1 alarm condition encountered by software for a particular port.
		Off	Remains off when operating condition is normal.
	T3 EN/DIS	Green	Indicates a CT3 card line connection enabling normal operation.
		Yellow	Normal operation is disabled.
	Low signal (LOS)	On	Indicates the CT3 LIU is experiencing a loss of signal.
		Off	Remains off when operating condition is normal.
	Network Loop (LOOP)	On	Indicates that at least one T1 is unavailable.
		Off	Remains off when operating condition is normal.

**Table 6-1 LEDs (continued)**

DFC	LED	State	Description
Universal Port DFC	ACTIVITY (ACT)	Flickering	There is call activity on the DFC.
	OK/MAINT	On	The DFC passed the initial power-up diagnostic tests and is operating normally.
		Off	Indicates that all calls associated with the card are shut down and it is safe to remove the card with the system powered on.

1. To display information about an M13 alarm, use the **show CT3 EXEC** command.

### Mixing WAN DFCs

The Cisco AS5350 and Cisco AS5400 support only one type of WAN DFC at a time. The DFCs that can be installed at one time are:

- Up to three T1 DFCs (any combination of 2, 4, or 8-port) or
- Up to three E1 DFCs (any combination of 2, 4, or 8-port) or
- One CT3 DFC or
- One CT3 DFC and up to two T1 DFCs (any combination of 2, 4, or 8-port)

The universal gateway software recognizes DFCs in the order of the slots they are in. For example, a DFC in slot 2 will be recognized before a DFC in slot 3. The system will recognize if there is a mix of WAN DFCs during both power up and OIR:

- During power up, the first WAN DFC recognized by the system will be the only type brought up.
- If there are two or more WAN DFCs of the same type and one is hot-swapped with another of a different type, the new one will not be recognized.

In both situations, an error message will appear on the console that is similar to:

```
00:01:12:%CARRIER-2-T1_E1_MIX:Cannot mix T1 and E1 8PRI DFC cards in chassis, do not power up invalid card in slot 7
```

# Environment Monitoring

## Overview

The Cisco AS5350 and Cisco AS5400 contain temperature sensors to detect abnormal temperature conditions during system operation. The three levels of sensor detection are as follows:

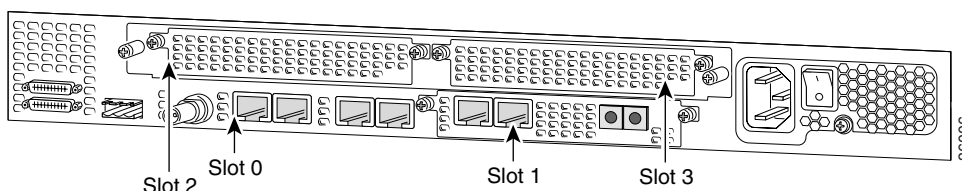
1. When the operating temperature of the system exceeds 45° C, the system reaches a warning state. A warning message appears on the console. When the operating temperature of the system drops below 45° C, another message is displayed on the console indicating a recovery. At this level of sensor detection, there is no disruption in system operation.
2. When the operating temperature of the system continues to rise above 45° C and reaches a temperature of 60° C, the system reaches a critical state.

Cisco IOS software busys out the DFCs in the chassis and shuts down the first DFC. If the operating temperature continues to be critical after 10 minutes, Cisco IOS software shuts down another DFC.

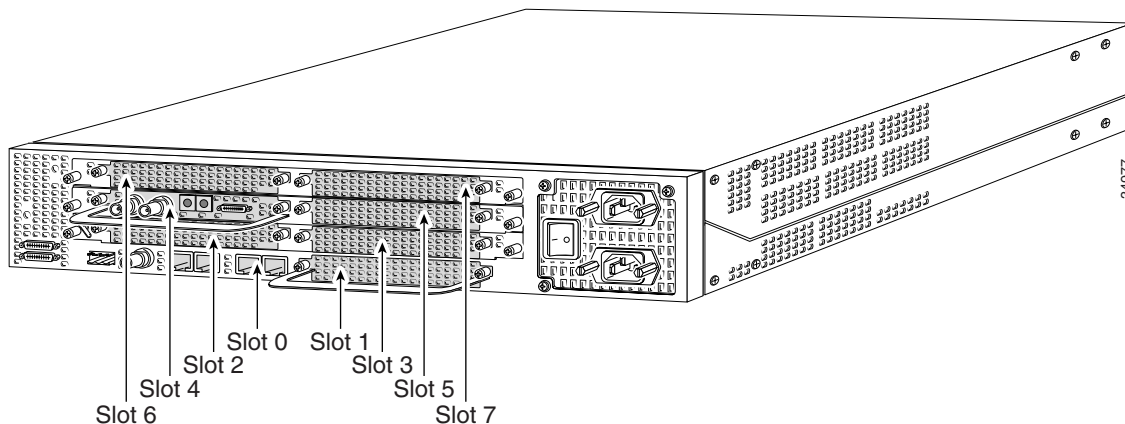

**Note**

DFC slot numbering starts from the system board and works up from left to right. Slot 0 is reserved for the motherboard. The DFC slots are numbered sequentially. (See [Figure 6-5](#) and [Figure 6-6](#).)

**Figure 6-5 Slot Numbering on the Cisco AS5350 Chassis**



**Figure 6-6 Slot Numbering on the Cisco AS5400 Chassis**



The busyout process is repeated at 10 minute intervals until the final DFC is shut down. The console displays the slot number of the DFC and the type of DFC that was shut down.

If the operating temperature cools down to 45° C, Cisco IOS software powers on the first DFC, repeating the process for each DFC at 10 minute intervals.

3. When the operating temperature of the system rises above 65° C, Cisco IOS software shuts down all DFCs immediately.

## Displaying Environment Status

You can use the command line interface (CLI) to check environment monitoring status of your universal gateway.

To check environment status, enter the **show environment** command in privileged EXEC mode.

Router> **show environment**

- The display shown below appears on your console during normal operating conditions. The slot number corresponds to the DFC in that slot. The outlet and inlet sensors read the temperature of the air circulating inside the chassis.

```
Router> show environment
Temperature:
  Temperature Reading:
    Temperature at inlet is measured as 22C/71F.
    Temperature at outlet is measured as 27C/80F.
  Temperature State:
    Temperature is in normal state.
Fans:
  Fans temperature delta is measured as 5C.
  All fans are running well.
Power Supply:
  Redundant Power System is present.
```

- The display below appears on your console when the system reaches a warning state:

```
Router> show environment
Temperature:
  Temperature Reading:
    Temperature at inlet is measured as 52C/125F.
    Temperature at outlet is measured as 64C/147F.
  Temperature State:
    Temperature is in warning state.
Fans:
  Fans temperature delta is measured as 6C.
  All fans are running well.
Power Supply:
  Redundant Power System is present.
  RPS Input Voltage status: normal
  RPS Output Voltage status: normal
  RPS Fan status: normal
  RPS Thermal status: normal
  RPS OverVoltage status: normal
Environmental monitor experienced the following events:
  Temperature:sensor failed.
  Fans:monitor dropped.
  Temperature:warning.
  Temperature:sensor recovered.
  Fans:monitor recovered.
  Fans:normal.
```

- The display below appears on your console when the system reaches a critical state:

```
Router> show environment
```

```

Temperature:
  Temperature Reading:
    Temperature at inlet is measured as 62C/143F.
    Temperature at outlet is measured as 74C/165F.
  Temperature State:
    Temperature is in critical state.
  DFC Busyout/Power-down:
    A DFC is powered down. Slot:1, Type:NP108 DFC
    A DFC is busyout. Slot:2, Type:T1 8 PRI DFC
    A DFC is busyout. Slot:3, Type:NP108 DFC

Fans:
  Fans temperature delta is measured as 6C.
  All fans are running well.

Power Supply:
  Redundant Power System is present.
  RPS Input Voltage status: normal
  RPS Output Voltage status: normal
  RPS Fan status: normal
  RPS Thermal status: normal
  RPS OverVoltage status: normal

Environmental monitor experienced the following events:
  Temperature:sensor failed.
  Fans:monitor dropped.
  Temperature:warning.
  Temperature:sensor recovered.
  Fans:monitor recovered.
  Fans:normal.
  Temperature:critical.

```

- The display below appears on your console when the system reaches a shutdown state:

```

Router> show environment
Temperature:
  Temperature Reading:
    Temperature at inlet is measured as 70C/158F.
    Temperature at outlet is measured as 82C/179F.
  Temperature State:
    Temperature is in shutdown state.
  DFC Busyout/Power-down:
    A DFC is powered down. Slot:1, Type:NP108 DFC
    A DFC is powered down. Slot:2, Type:T1 8 PRI DFC
    A DFC is powered down. Slot:3, Type:NP108 DFC

Fans:
  Fans temperature delta is measured as 6C.
  All fans are running well.

Power Supply:
  Redundant Power System is present.
  RPS Input Voltage status: normal
  RPS Output Voltage status: normal
  RPS Fan status: normal
  RPS Thermal status: normal
  RPS OverVoltage status: normal

Environmental monitor experienced the following events:
  Temperature:sensor failed.
  Fans:monitor dropped.
  Temperature:warning.
  Temperature:sensor recovered.
  Fans:monitor recovered.
  Fans:normal.
  Temperature:critical.
  Temperature:shutdown.

```

# Using the Bantam Jacks for Test Port Functionality

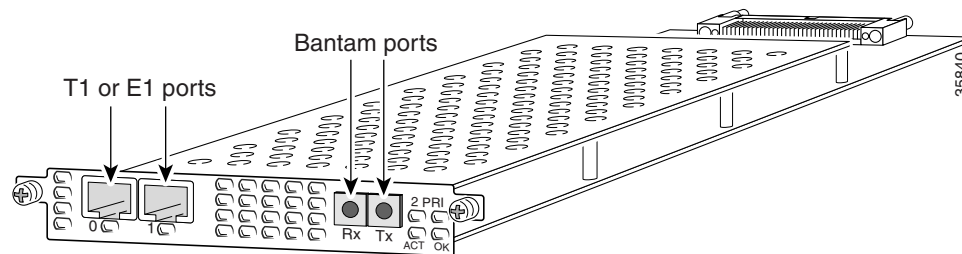
Test port functionality is supported by Cisco IOS Release 12.1(2)XD and later releases.

## Monitoring Mode for the T1, E1 and T3 DFCs

The monitor mode is available on the T1, E1 and T3 dial feature cards.

If a T1 controller does not come up, or there is a large number of errors associated with a particular controller, you might be able to determine whether the problem is in the DFC or in an external T1 line by using the test port. The test port is a set of bantam jack connectors located on the front panel of the T1, E1, and T3 DFCs. (See [Figure 6-7](#).)

**Figure 6-7 Bantam Ports**



In monitor mode, you can monitor only the ingress side of the T1 line without disrupting that line.

The bantam jack connectors located on the front panel of the DFCs allow the connection of an external test device (for example, a FIREBERD test device) to monitor the individual T1 circuit in monitor mode. Use software commands to select a T1 line. For information on software commands, see the *Cisco AS5350 and Cisco AS5400 Universal Gateway Software Configuration Guide* for details.

Passive monitoring equipment is used to listen on the TX MON and RX MON jacks during regular operation to detect T1 errors.

Connecting test equipment to the following bantam jack connectors provides various functions:

- TX MON can monitor signals coming out of the test port without interrupting normal data transmission.
- RX MON can monitor signals going in to the test port without interrupting normal data transmission.

## Drop and Insert Mode for the CT3 DFC

Drop and Insert mode is available on the T3 DFC.

The bantam jack connectors located on the front panel of the T3 DFC allow the connection of an external test device (for example, a FIREBERD test device) to test any of the 28 individual T1 circuits in drop-insert mode.

In drop-insert mode, the T1 line is dropped out of service. To prevent accidental use of the push button in drop-insert mode, use the **test trunk drop-insert** privileged EXEC command to disable the drop-insert mode on the specified T3 controller.

The **test trunk drop-insert** privileged EXEC command is used to enable or disable drop-insert mode on a T3 controller. When the system initially boots up, the drop-insert mode is disabled on all T3 controllers.

To drop a particular T1 line to the test port, follow these steps:

- Step 1** Enable drop-insert mode by entering the **test trunk drop-insert on** privileged EXEC command as follows:

```
Router# test trunk drop-insert on t1port
```



**Note** The *t1 port* is the particular T1 line that you wish to drop. T1 port numbers range from 1 to 28.

- Step 2** Disable drop-insert mode after testing the T1 lines. We recommend that you disable drop-insert mode to prevent accidental use of the push button on the CT3 board.

To disable drop-insert mode, enter the **test trunk drop-insert off** privileged EXEC command as follows:

```
Router> test trunk drop-insert off t1 port
```

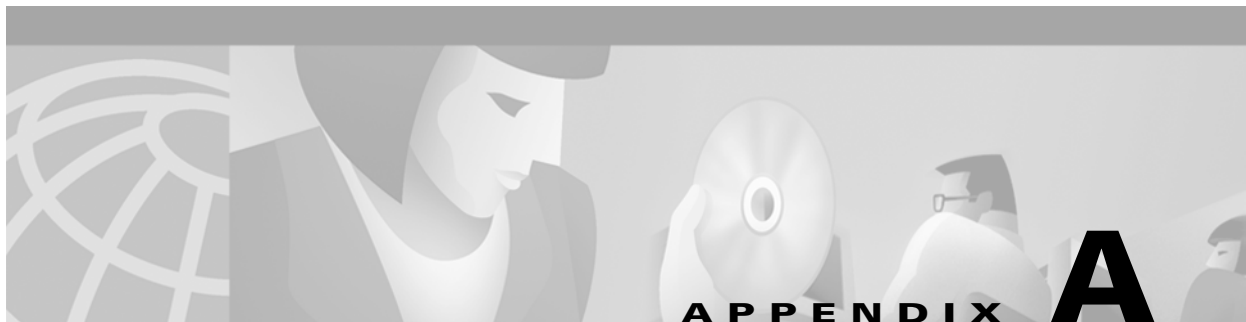
## Troubleshooting Network Interfaces

For information about isolating problems with the network connections to your universal gateway, refer to the publication *Internetwork Troubleshooting Guide* available on the web and on the Cisco Documentation CD-ROM that shipped with your universal gateway.

## Getting Help

For information about technical support, onsite service, and exchange and repair services, refer to the [“Obtaining Technical Assistance”](#) section on page -xii in the “Preface.”





## Cabling Specifications

This appendix provides cabling and pinout information for dial feature cards (DFCs) on the Cisco AS5350 and Cisco AS5400 universal gateway:

- [T1 and E1 Cable and Port Pinouts, page A-1](#)
- [Attaching the 8-Port Interface Cable to a Bracket \(Optional\), page A-8](#)
- [CT3 Cable and Port Pinouts, page A-13](#)
- [Bantam Jack Port Pinouts, page A-13](#)



### Note

This appendix specifies pinouts only for the pins used. Pins not listed in the tables in this appendix are not connected.

## T1 and E1 Cable and Port Pinouts

### 2-Port and 4-Port T1 or E1 DFC

**Table A-1** T1 or E1 Port Pinouts

RJ-45 Pin	Description
1	RX Tip
2	RX Ring
3	RX Shield
4	TX Tip
5	TX Ring
6	TX Shield
7	-
8	-

Figure A-1 through Figure A-5 show the types of cables that can connect to the RJ-45 connector on the T1 or E1 feature card.

**Figure A-1 RJ-45-to-DB-15 Cable Assembly**

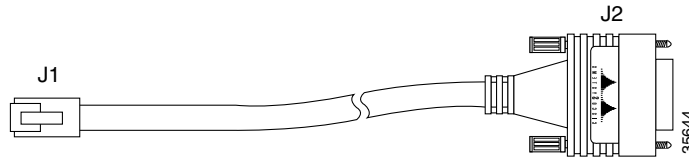


Table A-2 lists the RJ-45-to-DB-15 cable pinouts.

**Table A-2 RJ-45-to-DB-15 Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	DB-15 Pin
Shield	Ground	Shell/Braid		Shell
J1-1	RX Tip	Twisted Pair #1	←	J2-3
J1-2	RX Ring	Twisted Pair #1	←	J2-11
J1-3	RX Shield	Twisted Pair #3		J2-4
J1-4	TX Tip	Twisted Pair #2	→	J2-1
J1-5	TX Ring	Twisted Pair #2	→	J2-9
J1-6	TX Shield	Twisted Pair #4		J2-2

Table A-3 lists the RJ-45-to-DB-15 null modem cable pinouts.

**Table A-3 RJ-45-to-DB-15 Null Modem Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	DB-15 Pin
Shield	Ground	Shell/Braid		Shell
J1-1	RX Tip	Twisted Pair #1	←	J2-1
J1-2	RX Ring	Twisted Pair #1	←	J2-9
J1-3	RX Shield	Twisted Pair #3		J2-2
J1-4	TX Tip	Twisted Pair #2	→	J2-3
J1-5	TX Ring	Twisted Pair #2	→	J2-11
J1-6	TX Shield	Twisted Pair #4		J2-4

**Figure A-2 RJ-45-to-BNC Cable Assembly for 75-Ohm, Unbalanced Connections**

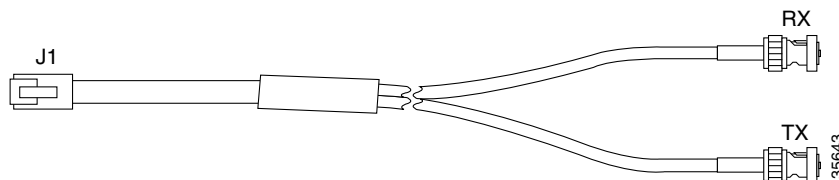


Table A-4 lists the RJ-45-to-BNC cable pinouts.

**Table A-4 RJ-45-to-BNC Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	BNC Pin
Shield	Ground	Shell		RX, TX Shields
J1-1	RX Tip	Twisted Pair #1	<—	RX-Tip
J1-2	RX Ring	Twisted Pair #1	<—	RX-Shield
J1-3	RX Shield	Twisted Pair #3		RX-Shield
J1-4	TX Tip	Twisted Pair #2	—>	TX-Tip
J1-5	TX Ring	Twisted Pair #2	—>	TX-Shield
J1-6	TX Shield	Twisted Pair #4		TX-Shield

**Figure A-3 RJ-45 to Twinax Cable Assembly for 120-Ohm, Balanced Connections**

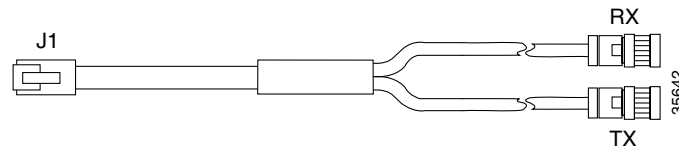


Table A-5 lists the RJ-45 to twinax cable pinouts.

**Table A-5 RJ-45 to Twinax Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	Twinax Pin
Shield	Ground	Shell		RX, TX Shields
J1-1	RX Tip	Twisted Pair #1	<—	RX-1
J1-2	RX Ring	Twisted Pair #1	<—	RX-2
J1-3	RX Shield	Twisted Pair #3		RX Shield
J1-4	TX Tip	Twisted Pair #2	—>	TX-1
J1-5	TX Ring	Twisted Pair #2	—>	TX-2
J1-6	TX Shield	Twisted Pair #4		TX Shield

**Figure A-4 RJ-45-to-RJ-45 Cable Assembly**



Table A-6 lists the RJ-45-to-RJ-45 TE cable pinouts.

**Table A-6 RJ-45-to-RJ-45 TE Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	RJ-45 TE Pin
Shield	Ground	Shell/Braid		Shield
J1-1	RX Tip	Twisted Pair #1	<—	J2-1

**Table A-6 RJ-45-to-RJ-45 TE Cable Pinouts (continued)**

RJ-45 Pin	Signal	Description	Direction	RJ-45 TE Pin
J1-2	RX Ring	Twisted Pair #1	<—	J2-2
J1-3	RX Shield	Twisted Pair #3		J2-3
J1-4	TX Tip	Twisted Pair #2	—>	J2-4
J1-5	TX Ring	Twisted Pair #2	—>	J2-5
J1-6	TX Shield	Twisted Pair #4		J2-6

Table A-7 lists the RJ-45-to-RJ-45 NT cable pinouts.

**Table A-7 RJ-45-to-RJ-45 NT Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	Signal	RJ-45 NT Pin
Shield	Ground	Shell/Braid		Ground	Shield
J1-1	RX Tip	Twisted Pair #1	<—	TX Tip	J2-4
J1-2	RX Ring	Twisted Pair #1	<—	TX Ring	J2-5
J1-3	RX Shield	Twisted Pair #3		TX Shield	J2-6
J1-4	TX Tip	Twisted Pair #2	—>	RX Tip	J2-1
J1-5	TX Ring	Twisted Pair #2	—>	RX Ring	J2-2
J1-6	TX Shield	Twisted Pair #4		RX Shield	J2-3

**Note**

Because the RJ-45-to-RJ-45 cable has polarity, the pinouts differ depending on which end of the cable you use.

Table A-8 lists the RJ-45-to-RJ-45 T1 cable pinouts.

**Table A-8 RJ-45-to-RJ-45 T1 Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	RJ-45 T1 Pin
Shield	Ground	Shell/Braid		Shield
J1-1	RX Tip	Twisted Pair #1	<—	J2-1
J1-2	RX Ring	Twisted Pair #1	<—	J2-2
J1-3	RX Shield			
J1-4	TX Tip	Twisted Pair #2	—>	J2-4
J1-5	TX Ring	Twisted Pair #2	—>	J2-5
J1-6	TX Shield			

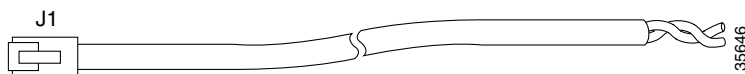
**Figure A-5 RJ-45 to Bare Wire Cable Assembly**

Table A-9 lists the RJ-45 to bare wire cable pinouts.

**Table A-9 RJ-45 to Bare Wire Cable Pinouts**

RJ-45 Pin	Signal	Description	Direction	Bare
Shield	Ground	Braid		
J1-1	RX Tip	Twisted Pair #1	<—	WIRE-1
J1-2	RX Ring	Twisted Pair #1	<—	WIRE-2
J1-3	RX Shield			
J1-4	TX Tip	Twisted Pair #2	—>	WIRE-3
J1-5	TX Ring	Twisted Pair #2	—>	WIRE-4
J1-6	TX Shield			

Table A-10 lists the cable assemblies available for the T1 and E1 dial feature cards.

**Table A-10 T1 and E1 Cable Assemblies**

Cable Description	Part Number	Product Number
RJ-45 to DB-15	72-1336-01	CAB-E1-RJ45DB15
RJ-45 to DB-15 Null	72-1337-01	CAB-E1-RJ45DB15N
RJ-45 to BNC	72-1338-01	CAB-E1-RJ45BNC
RJ-45 to Twinax	72-1339-01	CAB-E1-RJ-45TWIN
RJ-45 to RJ-45TE	72-1340-01	CAB-E1-RJ45TE
RJ-45 to RJ-45NT	72-1341-01	CAB-E1-RJ45NT
RJ-45 to RJ-45T1	72-1342-01	CAB-E1-RJ45RJ45
RJ-45 to Bare	72-1343-01	CAB-T1-RJ45BARE

## 8-Port T1 or E1 DFC

Figure A-6 shows a diagram of the T1/E1 interface cable.

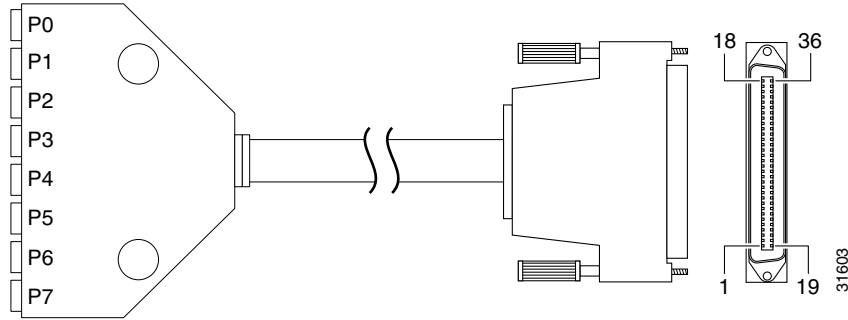
**Figure A-6 8-Port T1/E1 Interface Cable**

Table A-11 lists the port pinouts for the 8-port DFC serial port.

**Table A-11 8 PRI T1/E1 DFC Interface Cable****Male and Female RJ-45 (CAB-DFC-OCTAL-xMF)**

From	Signal	Note	Direction	Signal	To
SHELL	GROUND	SHELL/BRAID		GROUND	SHELL
J1-1	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J9-1
J1-2	RX_RING	Port 7	<-----	RX_RING	J9-2
J1-3	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J8-1
J1-4	RX_RING	Port 6	<-----	RX_RING	J8-2
J1-5	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J7-1
J1-6	RX_RING	Port 5	<-----	RX_RING	J7-2
J1-7	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J6-1
J1-8	RX_RING	Port 4	<-----	RX_RING	J6-2
J1-9	No Connect	—	—	No Connect	—
J1-10	No Connect			No Connect	
J1-11	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J5-1
J1-12	RX_RING	Port 3	<-----	RX_RING	J5-2
J1-13	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J4-1
J1-14	RX_RING	Port 2	<-----	RX_RING	J4-2
J1-15	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J3-1
J1-16	RX_RING	Port 1	<-----	RX_RING	J3-2
J1-17	RX_TIP	Twisted Pair #1	<-----	RX_TIP	J2-1
J1-18	RX_RING	Port 0	<-----	RX_RING	J2-2
J1-19	TX_TIP	Twisted Pair #2	----->	TX_TIP	J9-4
J1-20	TX_RING	Port 7	----->	TX_RING	J9-5

J1 connector is male 36 position plug, J2-J9 connectors are female RJ-45 receptacles

Table A-11 8 PRI T1/E1 DFC Interface Cable (continued)

Male and Female RJ-45 (CAB-DFC-OCTAL-xMF)					
From	Signal	Note	Direction	Signal	To
J1-21	TX_TIP	Twisted Pair #2	----->	TX_TIP	J8-4
J1-22	TX_RING	Port 6	----->	TX_RING	J8-5
J1-23	TX_TIP	Twisted Pair #2	----->	TX_TIP	J7-4
J1-24	TX_RING	Port 5	----->	TX_RING	J7-5
J1-25	TX_TIP	Twisted Pair #2	----->	TX_TIP	J6-4
J1-26	TX_RING	Port 4	----->	TX_RING	J6-5
J1-27	No Connect	—	—	No Connect	—
J1-28	No Connect			No Connect	
J1-29	TX_TIP	Twisted Pair #2	----->	TX_TIP	J5-4
J1-30	TX_RING	Port 3	----->	TX_RING	J5-5
J1-31	TX_TIP	Twisted Pair #2	----->	TX_TIP	J4-4
J1-32	TX_RING	Port 2	----->	TX_RING	J4-5
J1-33	TX_TIP	Twisted Pair #2	----->	TX_TIP	J3-4
J1-34	TX_RING	Port 1	----->	TX_RING	J3-5
J1-35	TX_TIP	Twisted Pair #2	----->	TX_TIP	J2-4
J1-36	TX_RING	Port 0	----->	TX_RING	J2-5

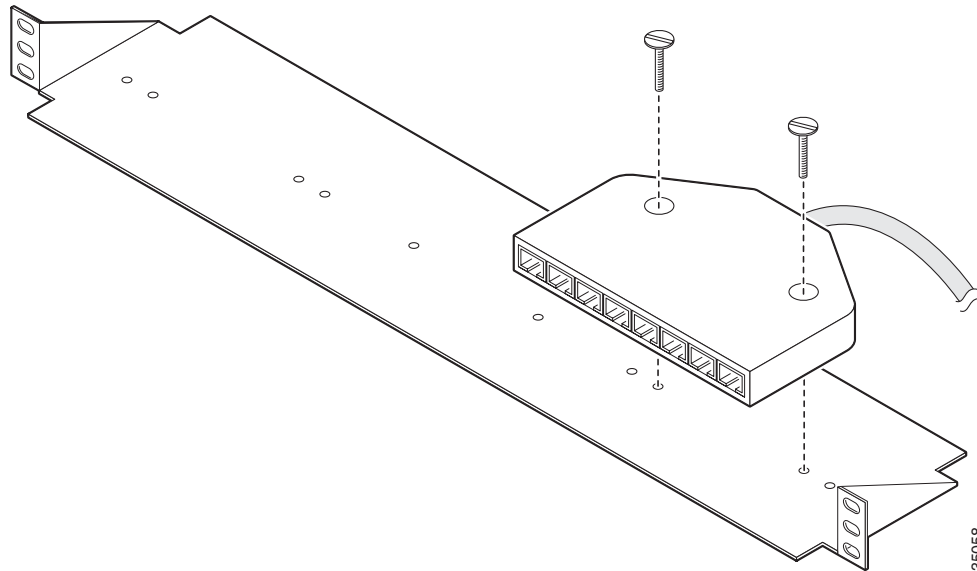
J1 connector is male 36 position plug, J2-J9 connectors are female RJ-45 receptacles

## Attaching the 8-Port Interface Cable to a Bracket (Optional)

To attach the 8CT1/CE1 cable to a bracket:

- Step 1** Place the molded RJ-45 end of the cable on the bracket with the RJ-45 ports facing you. Align the two holes on the molded RJ-45 end of the cable with the holes on the bracket. (See [Figure A-7](#).)

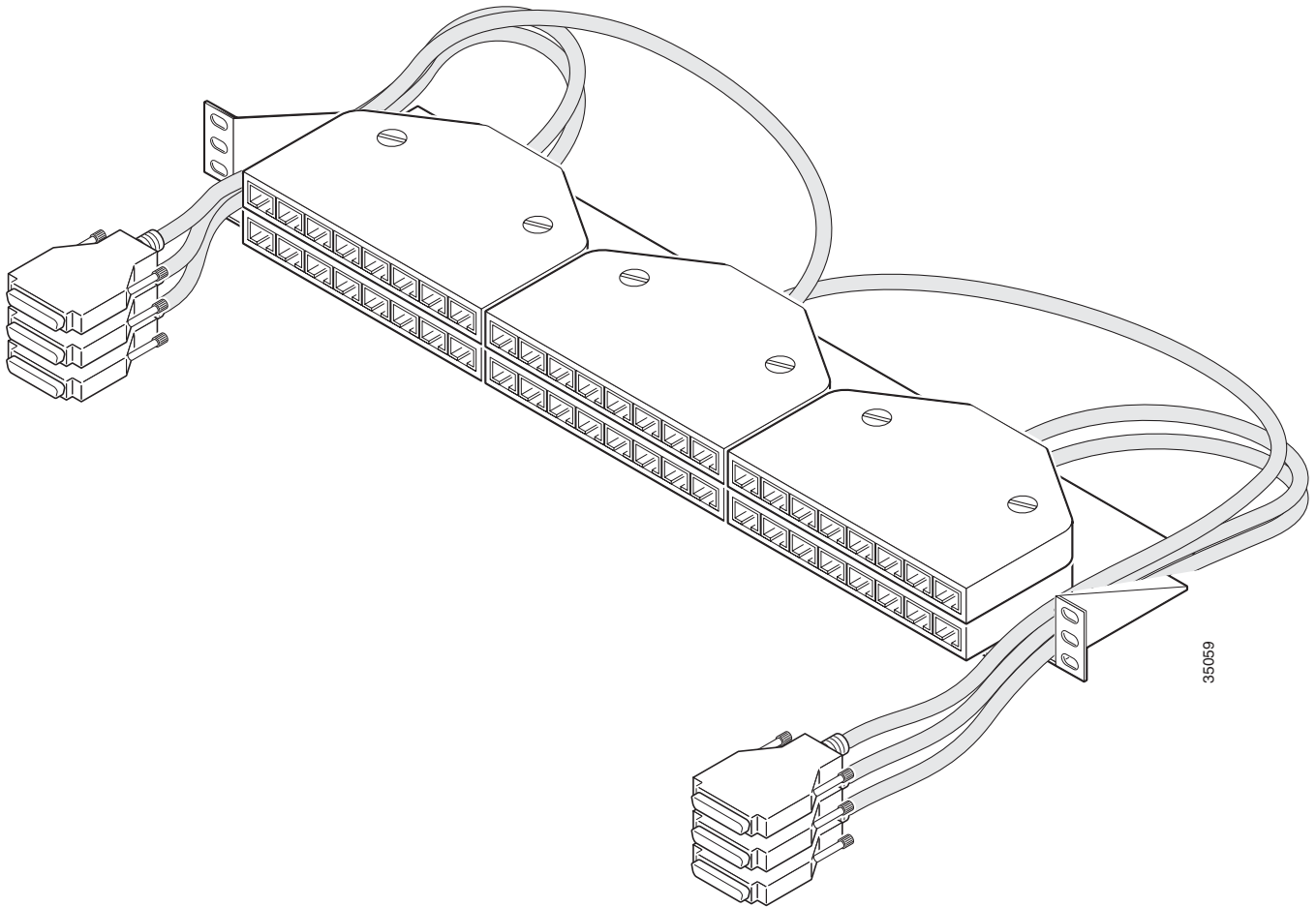
**Figure A-7** *Placing the Molded RJ-45 End of the Cable on the Bracket*





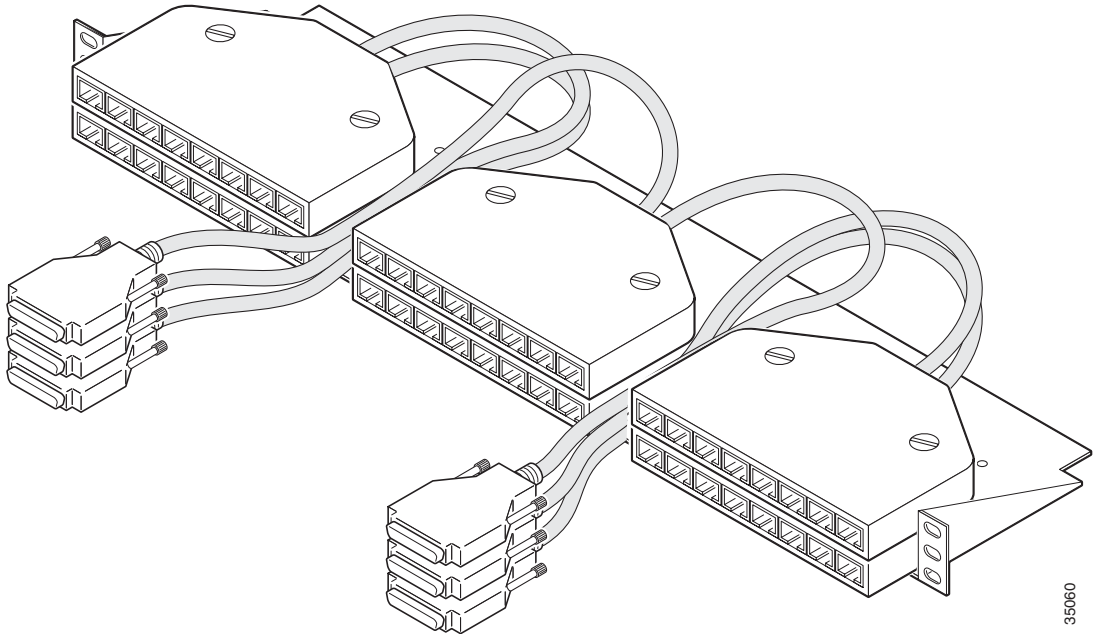
- Step 2** You can align the molded RJ-45 ends of the cables in different ways by following either Step a or Step b.
- Place the molded RJ-45 ends of the cables next to each other. This placement creates space between the last molded RJ-45 end of the cable and the edge of the bracket adjacent to it. Route the cables through this space. (See [Figure A-8](#).)

**Figure A-8** Routing Cables with Molded RJ-45 Ends of Cables Next to Each Other



- b. Align the molded RJ-45 ends of the cables with an opening between each adjacent molded RJ-45 end of the cable. This placement creates space between each adjacent molded RJ-45 end. Route the cables through this space. (See [Figure A-9](#).)

**Figure A-9** Routing Cables with Molded RJ-45 Ends of Cables Flush with Bracket Edges

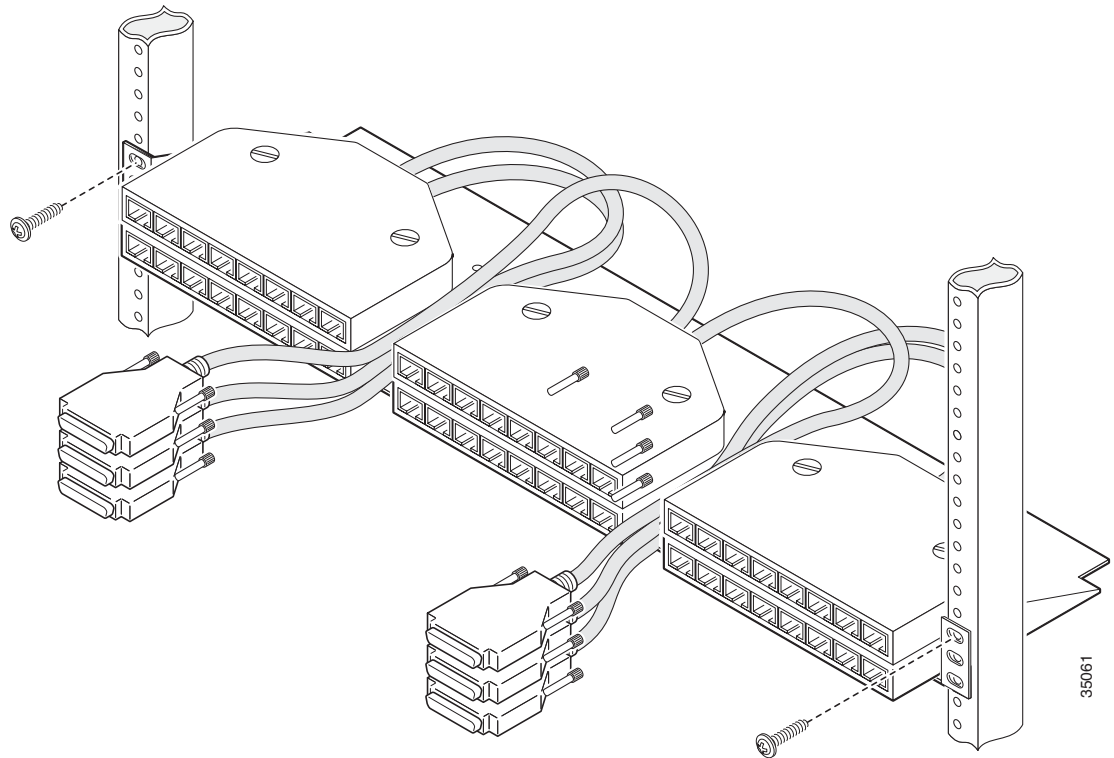


- Step 3** Secure the molded RJ-45 ends of the cables to the bracket with the flathead screws provided to you. (See [Figure A-10](#).)



**Note** To secure a single molded RJ-45 end of the cable, use the short flathead screws. To secure two (stacked) molded RJ-45 ends of the cables, use the long flathead screws.

**Figure A-10** *Securing the Cable Bracket to the Rack*

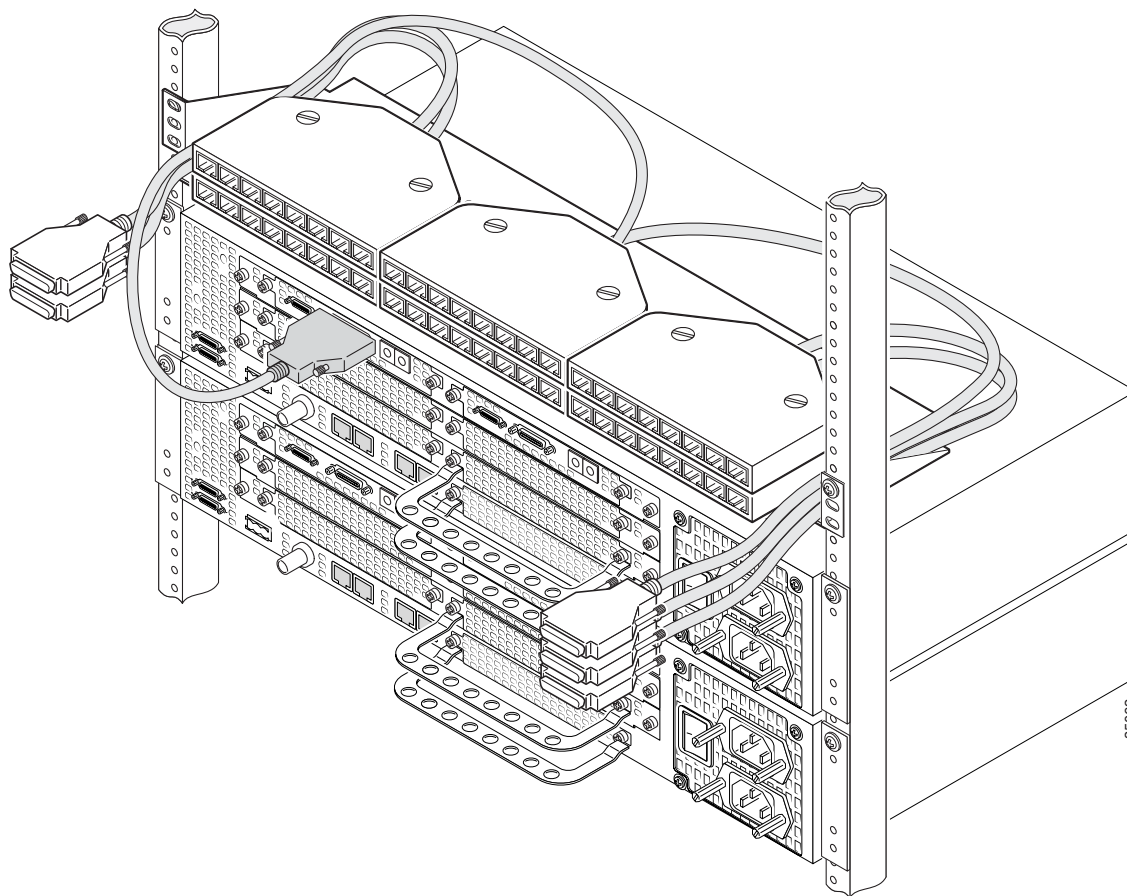


- Step 4** Use the end screws on the bracket to secure the cable bracket to the rack. (See [Figure A-10](#).)

## ■ Attaching the 8-Port Interface Cable to a Bracket (Optional)

- Step 5** Insert the 36-pin cable connector into the 36-pin port on the AS54-DFC-8CT1/CE1 card. Tighten the captive screws on the 36-pin cable connector to secure the cable to the AS54-DFC-8CT1/CE1 card. (See [Figure A-11](#).)

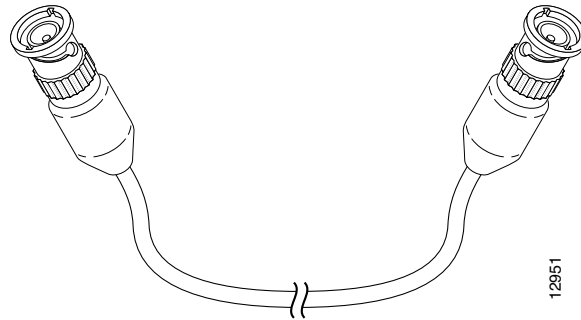
**Figure A-11** Connecting the 36-Pin Cable Connector to an 8-Port T1 DFC



## CT3 Cable and Port Pinouts

Figure A-12 shows a diagram of the CT3 interface cable assembly. See Table A-12 for the CT3 cable pinouts.

**Figure A-12 CT3 Cable Assembly**



**Table A-12 CT3 Cable Pinouts**

Pin	Description
Receiver Port (On the left)	
1	Rx signal
2	Ground
Transmitter Port	
1	Tx signal
2	Ground

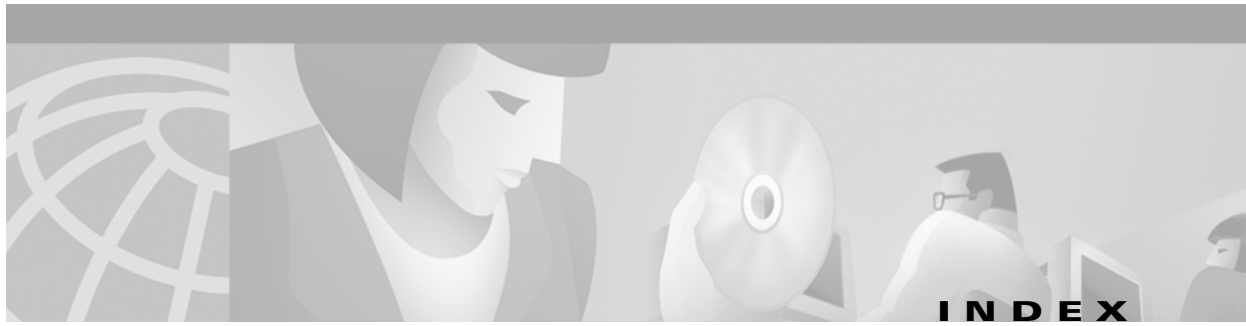
## Bantam Jack Port Pinouts

Table A-13 lists the port pinouts for the bantam jacks.

**Table A-13 Bantam Jack Port Pinouts**

Pin	Description
1	Tip
2	Ring





---

## Numerics

- 2-Port or 4-Port T1 or E1 DFC LEDs (figure) [6-1](#)
- 2-Port T1 or E1 DFC (figure) [3-1](#)
- 4-Port T1 or E1 DFC (figure) [3-2](#)
- 8-Port T1/E1 Interface Cable (figure) [A-3](#)
- 8-Port T1 or E1 DFC (figure) [3-2](#)
- 8-Port T1 or E1 DFC LEDs (figure) [6-2](#)
- 8 PRI T1/E1 interface cable pinouts (table) [A-3](#)

---

## A

- AC circuit breaker (15A) warning [1-3](#)
- attaching the 8-port interface cable bracket [A-5](#)

---

## B

- Bantam Jack, RX monitor port [6-9](#)
- Bantam Jack, TX monitor port [6-9](#)
- Bantam Jack port pinouts [A-10](#)
- bantam jack port pinouts (table) [A-10](#)
- Bantam Jack ports, testing with [6-9](#)
- Bantam Ports (figure) [6-9](#)
- blank DFC cover [5-5](#)
- blank DFC cover (figure) [2-5, 3-6, 4-5](#)
- bracket, 8-port interface cable [A-5](#)

---

## C

- Cables
  - 8-port interface cable bracket [A-5](#)
  - 8-Port T1/E1 Interface Cable [A-3](#)

- Connecting the 36-Pin Cable Connector to an 8-port T1 DFC [A-9](#)

- J-45 to DB-15 Interface Cable [A-2](#)

- RJ-45 to Bare Wire Interface Cable [A-2](#)

- RJ-45 to BNC Interface Cable for 75-Ohm, Unbalanced Connections [A-2](#)

- RJ-45 to RJ-45 Interface Cable [A-2](#)

- RJ-45 to Twinax Interface Cable for 120-Ohm, Balanced Connections [A-2](#)

- cabling specifications [A-1](#)

- carrier card, installing [2-5](#)

- carrier card, removing [2-3](#)

- Carrier Card With Two 8 PRI CT1/CE1 Cards (figure) [2-2](#)

- caution symbol, meaning of [viii](#)

- chassis warning - disconnecting telephone-network cables [2-3](#)

- Configuring Input Impedance for the E1 DFC [3-11](#)

- Connecting the 36-Pin Cable Connector to an 8-port T1 DFC [A-9](#)

- CT3, drop and insert mode [6-9](#)

- CT3 cable and port pinouts [A-10](#)

- CT3 cable assembly (figure) [A-10](#)

- customer equipment warning [3-9](#)

---

## D

- DC power disconnection warning [2-3](#)

- DFC, online insertion and removal [2-2](#)

- Dial Feature Cards, overview [2-1](#)

- documentation, getting [xi](#)

- document organization [vii](#)

- document organization (table) [vii](#)

- documents, related [xiii](#)

- drop and insert mode for the CT3 DFC [6-9](#)

## E

E1 network specifications (table) [3-2](#)  
 environment monitoring [6-6](#)  
 environment status, checking [6-7](#)  
 ESD wrist-strap, safety [1-3](#)

## F

### Figures

2-Port or 4-Port T1 or E1 DFC LEDs [6-1](#)  
 2-Port T1 or E1 DFC [3-1](#)  
 4-Port T1 or E1 DFC [3-2](#)  
 8-Port T1/E1 Interface Cable [A-3](#)  
 8-Port T1 or E1 DFC [3-2](#)  
 8-Port T1 or E1 DFC LEDs [6-2](#)  
 Bantam Ports [6-9](#)  
 Blank DFC Cover [2-5, 3-6, 4-5, 5-5](#)  
 Carrier Card With Two 8 PRI CT1/CE1 Cards [2-2](#)  
 Connecting the 36-Pin Cable Connector to an 8-port T1 DFC [A-9](#)  
 CT3 Cable Assembly [A-10](#)  
 Install the Carrier Card in the Cisco AS5350 [2-5](#)  
 Install the Carrier Card in the Cisco AS5400 [2-5](#)  
 Install the DFC in the Cisco AS5400 [5-7](#)  
 Install the T1 or E1 DFC in the Cisco AS5350 [3-9](#)  
 Install the T1 or E1 DFC in the Cisco AS5400 [3-10](#)  
 Install the T3 DFC in the Cisco AS5350 [4-6](#)  
 Install the T3 DFC in the Cisco AS5400 [4-6](#)  
 Install the Universal Port DFC in the Cisco AS5350 [5-7](#)  
 J-45 to DB-15 Interface Cable [A-2](#)  
 Loosen the Captive Screws on the Cisco AS5350 [2-3, 3-5, 4-4, 5-4](#)  
 Loosen the Captive Screws on the Cisco AS5400 [2-4, 3-5, 4-4, 5-4](#)  
 Placing the Molded RJ-45 End of the Cable on the Bracket [A-5](#)  
 Remove the DFC from the Cisco AS5350 [3-6, 4-5, 5-4](#)  
 Remove the DFC from the Cisco AS5400 [3-6, 4-5, 5-5](#)  
 Removing the Carrier Card from the Cisco AS5350 [2-4](#)

Removing the Carrier Card from the Cisco AS5400 [2-4](#)  
 RJ-45 to Bare Wire Interface Cable [A-2](#)  
 RJ-45 to BNC Interface Cable for 75-Ohm, Unbalanced Connections [A-2](#)  
 RJ-45 to RJ-45 Interface Cable [A-2](#)  
 RJ-45 to Twinax Interface Cable for 120-Ohm, Balanced Connections [A-2](#)  
 Routing Cables with Molded RJ-45 Ends of Cables Flush with Bracket Edges [A-7](#)  
 Routing Cables with Molded RJ-45 Ends of Cables Next to Each Other [A-6](#)  
 Securing the Cable Bracket to the Rack [A-8](#)  
 Slot Numbering on the Cisco AS5350 Chassis [3-3, 4-2, 5-2, 6-6](#)  
 Slot Numbering on the Cisco AS5400 Chassis [3-4, 4-3, 5-3, 6-6](#)  
 T3 DFC LEDs [6-2](#)  
 T3 Dial Feature Card [4-1](#)  
 Tighten the Captive Screws on the Cisco AS5350 [2-6, 3-10, 4-6, 5-8](#)  
 Tighten the Captive Screws on the Cisco AS5400 [2-6, 3-10, 4-7, 5-8](#)  
 Universal Port DFC [5-1](#)  
 Universal Port DFC LEDs [6-2](#)

## G

ground connection first warning [1-2](#)  
 ground connections, safety [1-2](#)

## H

hardware features, new [xiii](#)  
 help, getting [xii, 2-7, 3-14, 4-7, 5-9, 6-10](#)

## I

input impedance, configuring [3-11](#)  
 input impedance, verifying [3-11](#)  
 installation instructions warning [1-2](#)  
 installing a carrier card [2-5](#)



installing the T1 or E1 DFC [3-9](#)  
installing the T3 DFC [4-5](#)  
installing the universal port DFC [5-7](#)  
install the carrier card in the Cisco AS5350 (figure) [2-5](#)  
install the carrier card in the Cisco AS5400 (figure) [2-5](#)  
Install the DFC in the Cisco AS5400 (figure) [5-7](#)  
Install the T1 or E1 DFC in the Cisco AS5350 (figure) [3-9](#)  
Install the T1 or E1 DFC in the Cisco AS5400 (figure) [3-10](#)  
Install the T3 DFC in the Cisco AS5350 (figure) [4-6](#)  
Install the T3 DFC in the Cisco AS5400 (figure) [4-6](#)  
Install the Universal Port DFC in the Cisco AS5350 (figure) [5-7](#)

## J

J-45 to DB-15 Interface Cable (figure) [A-2](#)  
jewelry removal warning [1-2](#)

## L

LEDs (table) [6-3](#)  
LEDs, location and description on DFCs [6-1](#)  
LEDs, T1 or E1 DFC (table) [6-3](#)  
LEDs, T3 DFC (table) [6-4](#)  
LEDs, universal port DFC (table) [6-5](#)  
lightning activity warning [2-3, 3-4, 3-9, 4-3, 4-5, 5-3, 5-7](#)  
Loosen the Captive Screws on the Cisco AS5350 (figure) [2-3, 3-5, 4-4, 5-4](#)  
Loosen the Captive Screws on the Cisco AS5400 (figure) [2-4, 3-5, 4-4, 5-4](#)

## M

mixing WAN DFCs, troubleshooting [6-5](#)  
monitoring mode for the T1, E1, and T3 DFCs [6-9](#)

## N

network interfaces, troubleshooting [6-10](#)  
new hardware features [xiii](#)  
note symbol, meaning of [viii](#)

## O

obtaining documentation [xi](#)  
online insertion and removal (OIR) of DFCs [2-2](#)  
online insertion and removal (OIR) of the T1 or E1 DFC [3-3](#)  
online insertion and removal (OIR) of the universal port DFC [5-2](#)  
online installation and removal (OIR) of the T3 DFC [4-2](#)  
operating temperature [6-6](#)  
organization, document [vii](#)  
overview, Dial Feature Cards [2-1](#)  
overview, T1 or E1 DFC [3-1](#)  
overview, T3 DFC [4-1](#)  
overview, universal port DFC [5-1](#)

## P

Pinouts  
8 PRI T1/E1 DFC interface cable [A-3](#)  
Bantam Jack port [A-10](#)  
CT3 Cable Pinouts [A-10](#)  
placing the molded RJ-45 end of the cable on the bracket (figure) [A-5](#)  
power supply disconnection warning [2-2](#)  
product disposal warning [1-1](#)

## R

related documents [xiii](#)  
Remove the DFC from the Cisco AS5350 [4-5](#)  
Remove the DFC from the Cisco AS5350 (figure) [3-6, 5-4](#)  
Remove the DFC from the Cisco AS5400 (figure) [3-6, 4-5, 5-5](#)

removing a carrier card [2-3](#)

removing the carrier card from the Cisco AS5350 (figure) [2-4](#)

removing the carrier card from the Cisco AS5400 (figure) [2-4](#)

removing the T1 or E1 DFC [3-3](#)

removing the universal port DFC [5-2](#)

required tools and equipment [1-3](#)

RJ-45 to Bare Wire Interface Cable (figure) [A-2](#)

RJ-45 to BNC Interface Cable for 75-Ohm, Unbalanced Connections (figure) [A-2](#)

RJ-45 to RJ-45 Interface Cable (figure) [A-2](#)

RJ-45 to Twinax Interface Cable for 120-Ohm, Balanced Connections (figure) [A-2](#)

routing cables with molded RJ-45 ends of cables flush with bracket edges (figure) [A-7](#)

routing cables with molded RJ-45 ends of cables next to each other (figure) [A-6](#)

RX MON Bantam Jack [6-9](#)

## S

safety, ground connections [1-2](#)

safety with electricity [1-2](#)

securing the cable bracket to the rack (figure) [A-8](#)

service and support [2-7, 3-14, 4-7, 5-9, 6-10](#)

Slot Numbering on the Cisco AS5350 Chassis (figure) [3-3, 4-2, 5-2, 6-6](#)

Slot Numbering on the Cisco AS5400 Chassis (figure) [3-4, 4-3, 5-3, 6-6](#)

SPE Firmware [5-9](#)

support, getting technical [2-7, 3-14, 4-7, 5-9, 6-10](#)

Symbols

- Caution [viii](#)
- Note [viii](#)
- Timesaver [viii](#)
- Tips [ix](#)
- Warning [ix](#)

## T

T1 and E1 Cable and Port Pinouts [A-1](#)

T1 and E1 Cable Assemblies (table) [A-2](#)

T1 network specifications (table) [3-2](#)

T1 or E1 DFC, overview [3-1](#)

T1 or E1 DFCs (table) [6-3](#)

T1 or E1 Port Pinouts (table) [A-1](#)

T3 cable pinouts [A-10](#)

T3 DFC, installation and removal [4-2](#)

T3 DFC, overview [4-1](#)

T3 DFC LEDs (figure) [6-2](#)

T3 Dial Feature Card (figure) [4-1](#)

Tables

- 8 PRI T1/E1 DFC Interface Cable [A-3](#)
- Bantam Jack Port Pinouts [A-10](#)
- CT3 Cable Pinouts [A-10](#)
- Document Organization [vii](#)
- E1 Network Specifications [3-2](#)
- LEDs [6-3](#)
- T1 and E1 Cable Assemblies [A-2](#)
- T1 Network Specifications [3-2](#)
- T1 or E1 DFC LEDs [6-3](#)
- T1 or E1 Port Pinouts [A-1](#)
- T3 DFC LEDs [6-4](#)
- Universal Port LEDs [6-5](#)

technical assistance, getting [xii](#)

technical support [2-7, 3-14, 4-7, 5-9, 6-10](#)

telecommunications lines warning [3-9](#)

testing, using the Bantam Jack ports [6-9](#)

Tighten the Captive Screws on the Cisco AS5350 (figure) [2-6, 3-10, 4-6, 5-8](#)

Tighten the Captive Screws on the Cisco AS5400 (figure) [2-6, 3-10, 4-7, 5-8](#)

timesaver symbol, meaning of [viii](#)

tips symbol, meaning of [ix](#)

tools required [1-3](#)

troubleshooting [6-1](#)

troubleshooting, environment [6-6](#)

troubleshooting, mixing WAN DFCs [6-5](#)

TX MON, Bantam Jack [6-9](#)

---

## U

universal port DFC (figure) [5-1](#)

universal port DFC, overview [5-1](#)

universal port DFC LEDs (figure) [6-2](#)

---

## V

verifying input impedance on the E1 DFC [3-11](#)

---

## W

### Warnings

AC circuit breaker (15A) [1-3](#)

chassis warning - disconnecting telephone-network  
cables [2-3](#)

customer equipment [3-9](#)

DC power disconnection [2-3](#)

ground connection first [1-2](#)

installation instructions [1-2](#)

lightning activity [2-3, 3-4, 3-9, 4-3, 4-5, 5-3, 5-7](#)

power supply disconnection [2-2](#)

product disposal [1-1](#)

remove jewelry [1-2](#)

telecommunications lines [3-9](#)

Warning symbol, meaning of [ix](#)

