



Cisco 2-port T1/E1-RAN Optimization Installation Instructions

November 8, 2005

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Product Number: VWIC-2T1/E1-RAN

This document describes the Cisco 2-port T1/E1-RAN (Radio Access Network) Optimization interface card, and provides instructions for installing the card. The following sections are included in this document:

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

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Document Revision History

The Document Revision History table below records technical changes to this document. The table shows the document revision number for the change, the date of the change, and a brief summary of the change. Note that not all Cisco documents use a Document Revision History table.

Revision	Date	Change Summary
78-17001-02	November 8, 2005	Revised Table 2, “RJ-48C Pinout for Shielded and Unshielded Cables” .
78-17001-01	August 9, 2005	Initial release.

Product Overview

A typical RAN is composed of thousands of Base Transceiver Stations/Node Bs, hundreds of Base Station Controllers/Radio Network Controllers (BSCs/RNCs), and several Mobile Switching Centers (MSCs). The BTSs/Node Bs and BSCs/RNCs are often separated by large geographic distances, with the BTSs/Node Bs located in cell sites uniformly distributed throughout a region, and the BSCs, RNCs, and MSCs located at suitably selected Central Offices (COs) and/or Mobile Telephone Switching Offices (MTSOs). The traffic generated by a BTS/Node B is transported to the corresponding BSC/RNC across a network, referred to as the *backhaul network*, which is often a hub-and-spoke topology with hundreds of BTSs/Node Bs connected to a given BSC/RNC by point-to-point TDM trunks. These TDM trunks may be leased line T1/E1s or their logical equivalents, such as microwave links or satellite channels. The interface between the BTS and BSC in Global System for Communication (GSM) and Code Division Multiplex Access (CDMA) systems is called the *Abis interface*. The interface between the Node B and RNC in a Universal Mobile Telecommunication System (UMTS) is called the *Iub interface*.

The Cisco 2-port T1/E1-RAN interface card supports GSM, UMTS, and IP Backhaul on the Cisco MWR 1941-DC-A Mobile Wireless Edge Router for T1/E1 networks. This module is a dual-port, T1/Fractional T1 or E1/Fractional E1, with integrated T1 CSU/DSUs or E1 DSUs. The Cisco 2-port T1/E1 RAN interface card supports T1 framed traffic and E1 framed traffic that conforms to the ITU-T G.703 standard for full 2.048-Mbps bandwidth.

The Cisco 2-port T1/E1-RAN interface card performs GSM multiplexing at the Abis interface in a multi-rate and multi-vendor environment for the Cisco MWR 1941-DC-A router.

The Cisco 2-port T1/E1-RAN interface card allows compression, multiplexing, and optimizing of the GSM-Abis, UMTS Iub, and IP Backhaul radio traffic transmission across T1/E1 WAN connections used for backhaul between the cell site BTS and the BSC.

Each Cisco 2-port T1/E1-RAN interface card also features protection switch solid state relays on the line interfaces, which together with redundancy logic and relay control added in a Cisco IOS feature set on the Cisco MWR 1941-DC-A router, can be used to provide T1/E1 protection switching between redundant routers in applicable implementations.

The Cisco 2-port T1/E1-RAN interface card provides redundancy support where the incoming bit stream is forwarded to the built-in (fixed) high performance advanced integration module for ATM (AIM-ATM) daughter card located on the motherboard of the Cisco MWR 1941-DC-A router. The AIM-ATM card performs framing and enhanced ATM segmentation and reassembly (SAR) functionality. This includes normal SAR functions for ATM Adaptation Layer traffic as well as indications for resource management (RM) and operation and maintenance (OAM) cells. The AIM-ATM card then interrupts the CPU with

reassembled ATM Adaptation Layer traffic packets for backhaul (see the *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Hardware Installation Guide* for more information about the AIM-ATM daughter card).

**Note**

For information on the Cisco MWR 1941-DC-A router implementations and the Cisco IOS software available for those implementations, see the *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Software Configuration Guide*.

The Cisco MWR 1941-DC-A router provides three WAN interface slots, which support up to six T1/E1s. If an NM-2W network module is added into the network interface slot on the Cisco MWR 1941-DC-A router, two additional Cisco 2-port T1/E1-RAN interface cards can be installed, for a total of 10 Cisco 2-port T1/E1-RAN interface cards on the Cisco MWR 1941-DC-A router.

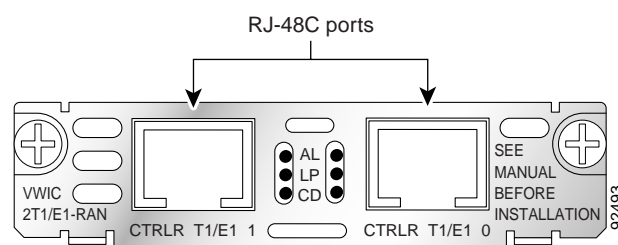
Hardware Description

Contained in a circuit card enclosure, the Cisco 2-port T1/E1-RAN interface card weighs from 0.12 to 0.18 pounds (56 to 82 g) and it measures 0.8 in. high x 3.1 in. wide x 4.8 in. deep (2.03 cm x 7.87 cm x 12.2 cm). Each Cisco 2-port T1/E1-RAN interface card provides two RJ-48C ports. Each RJ-48C port supports either T1 or E1. This T1/E1 VWIC slides into a Cisco MWR 1941-DC-A router VWIC slot or network module slot and connects directly to the backplane, where each card connects to power and communications.

Faceplate Features

On the Cisco 2-port T1/E1-RAN interface card faceplate (see [Figure 1](#)), six LEDs (labeled AL for alarm, LP for loopback or line state, and CD for data carrier detect) are provided (see [Table 1](#) for a description). The RJ-48C connectors (also located on the front panel) are labeled CTRLR T1/E1 1 for controller T1/E1 serial interface 1 and CTRLR T1/E1 0 for controller T1/E1 serial interface 0 (see the “[Cables, Connectors, and Pinouts](#)” section on [page 4](#) for more information).

Figure 1 Cisco 2-port T1/E1-RAN Interface Card Front Panel



LEDs

The Cisco 2-port T1/E1-RAN interface card has six LEDs (three for each T1/E1 port) as described in [Table 1](#).

Table 1 Cisco 2-port T1/E1-RAN Interface Card LEDs

LED	Color	State	Description
Alarm (labeled AL)	Amber	On	A local or remote alarm state exists.
		Off	The Cisco 2-port T1/E1-RAN interface card is operating normally.
Loopback (labeled LP)	Amber	On	A loopback or line state has been detected or has been manually set by the user.
		Off	The Cisco 2-port T1/E1-RAN interface card is operating normally.
Data Carrier Detect (labeled CD)	Green	On	A carrier has been detected, and the internal CSU/DSU in the Cisco 2-port T1/E1-RAN interface card is communicating with another CSU/DSU. This LED is on during normal operation.
		Off	No carrier has been detected.

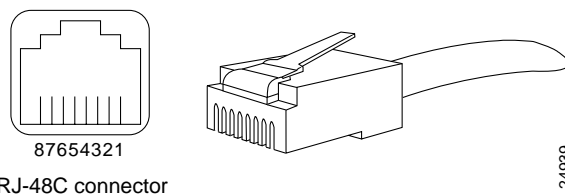
Cables, Connectors, and Pinouts

The T1/E1 interface ports on the Cisco 2-port T1/E1-RAN interface card are RJ-48C connectors for both T1 and E1.

The pinout orientation and description are described in the following sections.

Pinout Orientation

Figure 2 on page 4 shows the orientation of the Cisco 2-port T1/E1-RAN interface card RJ-48C connectors.

Figure 2 RJ-48C Connection

Pinout Description

Table 2 identifies the pinouts of the Cisco 2-port T1/E1-RAN interface card RJ-48C connectors for both the shielded and unshielded cables for either T1 or E1 (see “[Connecting the Cisco 2-port T1/E1-RAN Interface Card](#)” section on page 17 for information about connecting your cables to the Cisco 2-port T1/E1 RAN Interface card.



Note

Cisco recommends using a shielded cable for your RJ-48C connectors.

Table 2 *RJ-48C Pinout for Shielded and Unshielded Cables*

Shielded		Unshielded	
Pin	Description	Pin	Description
1	Receive ring	1	Receive ring
2	Receive tip	2	Receive tip
3	Receive shield	3	
4	Transmit ring	4	Transmit ring
5	Transmit tip	5	Transmit tip
6	Transmit shield	6	
7	Not used	7	
8	Not used	8	

Specifications

[Table 3](#) lists the physical and environmental specifications for the Cisco 2-port T1/E1-RAN interface card.

Table 3 *Cisco 2-port T1/E1-RAN Interface Card Physical and Environmental Specifications*

Specification	Description
Dimensions (H x W x D)	0.8 x 3.1 x 4.8 in. (2.03 x 7.87 x 12.2 cm)
Weight	Minimum: 0.12 lb. (56 g) Maximum: 0.18 lb. (81 g)
Environmental conditions:	
Operating temperature	50 to 131 F (10 to 55 C)
Storage temperature	-13 to 158 F (-25 to 70 C)
Relative Humidity (operating)	5 to 85%, noncondensing
Relative Humidity (storage)	5 to 95%, noncondensing

Standards Compliance Specifications

When properly installed in the Cisco MWR 1941-DC-A router, the Cisco 2-port T1/E1-RAN interface card complies with the standards listed in [Tables 4](#) and [5](#).

Table 4 T1 Standards Compliance

Specification	Description
Compliance	ANSI ¹ T1.403 ATT ² 54016 Bellcore ³ —AT&T Accunet (62411) CS ⁴ -03 FCC ⁵ Part 68; FCC Part 15 Class B, T1 Canada (CSA ⁶ 950, T1; CSA C108.8 Class A, T1) Japan (VCCI ⁷ Class 2, VCCI:V-3/97.04, T1, JATE ⁸ Green Book, IEC950) U.K. (BS6301, EN60950, EN41003)
Safety conformance	UL ⁹ 1950, T1

1. ANSI = American National Standards Institute
2. ATT = American Telephone & Telegraph
3. Bellcore = Bell Communications Research
4. CS = Compliance Specification
5. FCC = U.S. Federal Communications Commission
6. CSA = Canadian Standards Association
7. VCCI = Voluntary Control Council for Interference from Information Technology Equipment
8. JATE = Japanese Approvals Institute for Telecommunications Equipment
9. UL = Underwriters Laboratories

Table 5 E1 Standards Compliance

Specification	Description
Compliance	Australia (ACA TS ¹ 016, AS/NZS ² 3548:1995) Europe (EN55022 Class B, EN55102-1, EN55102-2, CTR12, EN60950, EN50082-1:1992, EN55022:1994) France (NFC98020, EN60950, EN41003) Germany (TUV GS, EN60950; VDE 0878 part 3 and 30) Sweden (SS447-2-22, SS636334, EN60950) UK (NTR4) CCITT/ITU ³ G.704, I.431 ETSI ⁴ NET5, ETS300156 TBR ⁵ 4 CTR ⁶ -13 ETS 300011 ITU I.431

1. ACA TS = Australian Communications Authority Technical Standards
2. AS/NZS = Australian/New Zealand Standard
3. CCITT/ITU = Consultive Committee for International Telegraphy/International Telecommunications Union
4. ETSI = European Telecommunications Standard Institute
5. TBR = Technical Business for Regulation
6. CTR = Common Technical Requirements

Safety Guidelines

This section includes:

- [Safety Warnings](#), this page
- [Electrical Equipment Guidelines](#), page 14
- [Telephone Wiring Guidelines](#), page 14
- [Preventing Electrostatic Discharge Damage](#), page 15
- [FCC Class A Compliance](#), page 15

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement. The safety warnings provide safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring. Included in the warnings are translations in several languages. (See the *Cisco Regulatory Compliance and Safety Information for the Cisco MWR 1941-DC-A Mobile Wireless Edge Router* document for detailed information about compliance guidelines and translated safety warnings.)



Warning

IMPORTANT SAFETY INSTRUCTIONS

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. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Waarschuwing

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

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 de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus

TÄRKEITÄ TURVALLISUUSOHJEITA

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention IMPORTANTES INFORMATIONS DE SÉCURITÉ

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung WICHTIGE SICHERHEITSHINWEISE

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES**Varning! VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal 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 vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR**Figyelem FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejtő helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereshető meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!**Предупреждение ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

DC Power Disconnection Warning

**Warning**

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Waarschuwing

Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is.

Varoitus

Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista.

Attention

Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez que le circuit en courant continu n'est plus sous tension.

Warnung

Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält.

Figyelem!

Mielőtt a következő eljárások bármelyikét végrehajtaná, feltétlenül szakítsa meg az egyenáramú áramkör tápellátását.

Avvertenza

Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato.

Advarsel

Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen.

Aviso

Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua.

¡Advertencia!	Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF).
Varning!	Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten.
Предупреждение	Перед выполнением любых описанных ниже действий убедитесь, что цепь питания постоянным током отключена.
警告	在进行下述任一操作过程之前，要确保将电源从直流电路上断开。
警告	次の手順を開始する前に、DC回路から電源が切断されていることを確認してください。

Safety Information Referral Warning



Warning

Before you install, operate, or service the system, read the *Site Preparation and Safety Guide*. This guide contains important safety information you should know before working with the system.
Statement 200

Waarschuwing

Lees de handleiding *Vorbereiding en veiligheid van de locatie Handleiding* voordat u het systeem installeert of gebruikt of voordat u onderhoud aan het systeem uitvoert. Deze handleiding bevat belangrijke beveiligingsvoorschriften waarvan u op de hoogte moet zijn voordat u met het systeem gaat werken.

Varoitus

Ennen kuin asennat järjestelmän tai käytät tai huollat sitä, lue *Asennuspaikan valmistelu-jaturvaopas* -opasta. Tässä oppaassa on tärkeitä turvallisuustietoja, jotka tulisi tietää ennen järjestelmän käyttämistä.

Attention

Avant d'installer le système, de l'utiliser ou d'assurer son entretien, veuillez lire le *Guide de sécurité et de préparation du site*. Celui-ci présente des informations importantes relatives à la sécurité, dont vous devriez prendre connaissance.

Warnung

Warnhinweis Bevor Sie das System installieren, in Betrieb setzen oder warten, lesen Sie die *Anleitung zur Standortvorbereitung und Sicherheitshinweise*. Dieses Handbuch enthält wichtige Informationen zur Sicherheit, mit denen Sie sich vor dem Verwenden des Systems vertraut machen sollten.

Avvertenza

Prima di installare, mettere in funzione o effettuare interventi di manutenzione sul sistema, leggere le informazioni contenute nella documentazione sulla *Guida alla sicurezza*. Tale guida contiene importanti informazioni che è necessario acquisire prima di iniziare qualsiasi intervento sul sistema.

Advarsel	Før du installerer, tar i bruk eller utfører vedlikehold på systemet, må du lese <i>Veiledning for stedsklargjøring og sikkerhet</i> . Denne håndboken inneholder viktig informasjon om sikkerhet som du bør være kjent med før du begynner å arbeide med systemet.
Aviso	Antes de instalar, funcionar com, ou prestar assistência ao sistema, leia o <i>Guia de Preparação e Segurança do Local</i> . Este guia contém informações de segurança importantes que deve conhecer antes de trabalhar com o sistema.
¡Advertencia!	Antes de instalar, manejar o arreglar el sistema, le aconsejamos que consulte la <i>Guía de prevención y preparación de una instalación</i> . Esta guía contiene importante información para su seguridad que debe saber antes de comenzar a trabajar con el sistema.
Varning!	Innan du installerar, använder eller utför service på systemet ska du läsa <i>Förberedelser och säkerhet Handbok</i> . Denna handbok innehåller viktig säkerhetsinformation som du bör känna till innan du arbetar med systemet.

Qualified Personnel Warning



Warning

Only trained and qualified personnel should be allowed to install or replace this equipment.
Statement 49

Waarschuwing	Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.
Varoitus	Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.
Avertissement	Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.
Achtung	Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.
Avvertenza	Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.
Advarsel	Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.
Aviso	Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.
¡Atención!	Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.
Varning	Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.
Figyelem	A berendezést csak szakképzett személy helyezheti üzembe és cserélheti ki.

Предупреждение	Установку и замену этого оборудования может осуществлять только специально обученный квалифицированный персонал.
警告	只有经过培训且具有资格的人员才能安装或更换此设备。
警告	この装置の設置または交換は、訓練を受けた相応の資格のある人のみが行ってください。

Blank Faceplate Installation Requirement Warning



Warning

Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all modules and faceplates are in place. Statement 156

Waarschuwing

Lege vlakplaten (vulpanelen) vervullen drie belangrijke functies: ze voorkomen blootstelling aan gevaarlijke voltages en elektrische stroom binnenin het chassis; ze beperken elektromagnetische storing hetgeen andere apparaten kan storen en ze leiden een stroom van koellucht door het chassis. Bedien het systeem niet tenzij alle kaarten en vlakplaten zich op hun plaats bevinden.

Varoitus

Tyhjillä kansilaatoilla (peitelevyllä) on kolme tehtävää: ne suojaavat vaarallisilta asennuspohjan sisäisiltä jännitteiltä ja virroilta; suojaavat sähkömagneettiselta häiriöltä (EMI), joka voi haitata muiden laitteiden toimintaa; ja ohjaavat jäähdytysilmavirran asennuspohjan läpi. Laitetta ei saa käyttää, jos kaikki kortit ja peitelevyt eivät ole paikoillaan.

Attention

Les caches blancs remplissent trois fonctions importantes : ils évitent tout risque de choc électrique à l'intérieur du châssis, ils font barrage aux interférences électromagnétiques susceptibles d'altérer le fonctionnement des autres équipements et ils dirigent le flux d'air de refroidissement dans le châssis. Il est vivement recommandé de vérifier que tous les caches et plaques de protection sont en place avant d'utiliser le système.

Warnung

Unbeschriftete Aufspannplatten (Füllpaneelen) erfüllen drei wichtige Funktionen : sie schützen vor gefährlichen Spannungen und Elektrizität im Innern der Chassis; sie halten elektromagnetische Interferenzen (EMI) zurück, die andere Geräte stören könnten; und sie lenken die Kühlluft durch das Chassis. Nehmen Sie das System nur in Betrieb, wenn alle Karten und Aufspannplatten an vorgesehener Stelle ordnungsgemäß installiert sind.

Avvertenza

Le piastre di protezione (panelli di riempimento) hanno tre funzioni molto importanti: Impediscono di esporvi ai voltaggi e le tensioni elettriche pericolose del chassis; trattengono le interferenze elettromagnetiche (EMI) che possono scambussolare altri apparati; e avviano il flusso d'aria di raffreddamento attraverso il chassis. Non operate il sistema se le schede e i pannelli non sono in posizione.

Advarsel	Blanke ytterplater (deksler) har tre viktige funksjoner: De forhindrer utsettelse for farlig spenning og strøm inni kabinettet; de inneholder elektromagnetisk forstyrrelse (EMI) som kan avbryte annet utstyr, og de dirigerer luftavkjølingsstrømmen gjennom kabinettet. Betjen ikke systemet med mindre alle kort og ytterplater sitter på plass.
Aviso	As placas em bruto (painéis de enchimento) desempenham três funções importantes: evitam a exposição a voltagens e correntes perigosas no interior do chassi; protegem de interferências eletromagnéticas (IEM) passíveis de afectar outro equipamento; e orientam o fluxo do ar de refrigeração através do chassi. Não pôr o sistema a funcionar sem que todos os cartões e placas estejam no devido lugar.
¡Advertencia!	Los platos en blanco (paneles de relleno) ofrecen tres funciones importantes: previenen la exposición a voltajes peligrosos y corrientes dentro del chasis; contienen interferencias electromagnéticas (EMI) que pueden interrumpir otros equipos; y dirigen el flujo de aire refrigerante a través del chasis. No opere el sistema a menos que todas las tarjetas y platos estén en su lugar.
Varning!	Tomma planskivor (fyllnadspaneler) fyller tre viktiga funktioner: de förhindrar utsättning för farliga spänningar och elströmmar inuti chassit; de förhindrar elektromagnetisk störning (EMI) som skulle kunna rubba annan utrustning; samt de riktar flödet av kylflöde genom chassit. Använd inte systemet om inte alla kort och planskivor finns på plats.

Electrical Equipment Guidelines

Follow these basic guidelines when working with any electrical equipment:

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before moving a chassis.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; *always* check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe; carefully examine your work area for possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.

Telephone Wiring Guidelines

Use the following guidelines when working with any equipment that is connected to telephone wiring or to other network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when electronic modules or components are improperly handled, results in complete or intermittent failures. Port adapters and processor modules comprise printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Carry by using available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed board component-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.



Caution

For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 Mohm.

FCC Class A Compliance

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.

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.)

Installing the Cisco 2-port T1/E1-RAN Interface Card

The following sections describe how to install the Cisco 2-port T1/E1-RAN interface card in a Cisco MWR 1941-DC-A router:

- [Required Tools](#)
- [Inserting a Cisco 2-port T1/E1-RAN Interface Card](#)



Note

As described in the *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Hardware Installation Guide*, the router is normally shipped with network modules, voice/WAN interface cards (VWICs), and WAN interface cards (WICs) already installed. We recommend that you perform the installation or removal of the Cisco 2-port T1/E1-RAN interface card before you install the Cisco MWR 1941-DC-A router. For detailed installation and removal instructions for the Cisco MWR 1941-DC-A router, see the *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Hardware Installation Guide*.

Required Tools

In addition to the Cisco 2-port T1/E1-RAN interface card and the Cisco MWR 1941-DC-A router, you need the following items to install and connect your module:

- Number 2 Phillips screwdriver
- ESD-preventive wrist strap or other grounding device
- Appropriate connecting cable

Inserting a Cisco 2-port T1/E1-RAN Interface Card

To insert a Cisco 2-port T1/E1-RAN interface card into a Cisco MWR 1941-DC-A router, follow this procedure.



Caution

Whenever you handle Cisco 2-port T1/E1-RAN interface cards, you should wear a wrist strap or use some other grounding device to prevent ESD damage.



Caution

The Cisco 2-port T1/E1-RAN interface cards do not support online insertion and removal (hot swapping). Before inserting or removing a card from the router chassis, you must turn off the electrical power and disconnect the network cables.



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.
Statement 1030

**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. Statement 7

Step 1

Power off the Cisco MWR 1941-DC-A router by turning off the DC power source at the circuit breaker and taping the circuit breaker to the OFF position. To channel ESD voltages to the ground, do not remove the wire from the ground lug.

**Caution**

Use grounding wrist strap straps connected to a captive screw on the Cisco MWR 1941-DC-A router when inserting the Cisco 2-port T1/E1-RAN interface card. At all other times (such as, shipping or storage) keep the cards in their anti-static protective bags.

Step 2

If the Cisco MWR 1941-DC-A router was previously running, remove all network interface cables, including telephone cables, from the front panel.

Step 3

Use either a number 2 Phillips screwdriver or a small flat-blade screwdriver to remove the blank filler panel from the Cisco 2-port T1/E1-RAN interface card slot where you plan to install the Cisco 2-port T1/E1-RAN interface card. Save the filler panel for future use.

Step 4

Align the Cisco 2-port T1/E1-RAN interface card with the cable guides in the VWIC slot and slide it gently into the slot.

Step 5

Push the Cisco 2-port T1/E1-RAN interface card into place until you feel its edge connector mate securely with the connector in the VWIC slot.

Step 6

Tighten the Cisco 2-port T1/E1-RAN interface card captive mounting screws into the holes in the router faceplate, using the Phillips or flat-blade screwdriver.

Step 7

If the router was previously running, reinstall the network module cables.

Proceed to the next section, [“Connecting the Cisco 2-port T1/E1-RAN Interface Card”](#), to continue the installation.

Connecting the Cisco 2-port T1/E1-RAN Interface Card

How you connect the ports of the Cisco 2-port T1/E1-RAN interface card depends on whether you are using the Cisco MWR 1941-DC-A router in a redundant or a non-redundant configuration (see the [“Cables, Connectors, and Pinouts”](#) section on page 4 for a description of the RJ-48C connector pinout for both shielded and unshielded cables.

**Note**

Cisco recommends using a shielded cable for your RJ-48C connectors.

For information on Cisco MWR 1941-DC-A router implementations, see the *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Software Configuration Guide*.

For redundant configurations, go to the [“Redundant Configuration”](#) section on page 18.

For non-redundant configurations, go to the [“Non-redundant Configuration”](#) section on page 18.

Redundant Configuration

For redundant configurations, use a Y-cable (see the [“Y-Cable Specifications”](#) section on page 19 for details on how to use the Y-cable).



Note HSRP must be configured for redundancy to allow one router to become active (CD LED on, AL LED off) and the other to become the standby (CD LED off, AL LED on due to no framing).

-
- Step 1** Confirm that both routers are still turned off by ensuring that the circuit breaker on the power panel board is in the OFF position with the handle taped in the OFF position.
 - Step 2** Connect the end of one of the Y-cable stubs to the T1/E1 (RJ-48C) port on the Cisco 2-port T1/E1-RAN interface card in the first router.
 - Step 3** Connect the end of the other Y-cable stub to the T1/E1 (RJ-48C) port (using the same type of port as in [Step 2](#)) on the Cisco 2-port T1/E1-RAN interface card in the second router.
 - Step 4** Connect the other end of the Y-cable to the BTS patch or demarcation panel at your site.
 - Step 5** Remove the tape from the circuit breaker switch handle on the power panel board and reinstate power by moving the handle of the circuit breaker to the ON position.
 - Step 6** Check that the CD LEDs go on, which indicates that the Cisco 2-port T1/E1-RAN interface card’s internal CSU/DSU is communicating with the CSU/DSU at the T1 or E1 service provider central office.
-

Non-redundant Configuration

For non-redundant configurations, use a straight-through, shielded RJ-48C-to-RJ-48C cable.



Note If you choose to use the Cisco 2-port T1/E1-RAN interface card in a non-redundant configuration, you must close the relays on the card using the **standalone** subcommand. For more information, see the *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Software Configuration Guide*.

-
- Step 1** Confirm that the router is turned off.
 - Step 2** Connect one end of the cable to the T1/E1 (RJ-48C) port on the card.
 - Step 3** Connect the other end to the BTS patch or demarcation panel at your site.
 - Step 4** Turn on power to the router.
 - Step 5** Check that the CD LED goes on, which indicates that the module’s internal CSU/DSU is communicating with the CSU/DSU at the T1 or E1 service provider central office.
-

Proceed to the [“Configuring the Cisco 2-port T1/E1-RAN Interface Card”](#) section on page 19 to continue the installation.

Configuring the Cisco 2-port T1/E1-RAN Interface Card

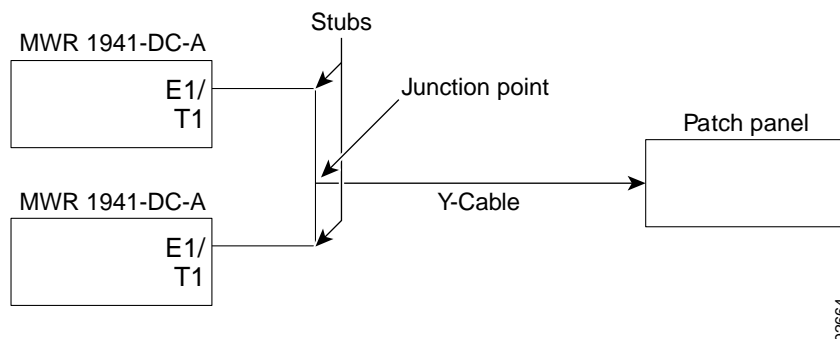
For information about configuring the Cisco 2-port T1/E1-RAN interface cards, see the *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Software Configuration Guide*.

Y-Cable Specifications

As described in the “[Connecting the Cisco 2-port T1/E1-RAN Interface Card](#)” section on page 17, depending on the Cisco MWR 1941-DC-A router implementation, the Cisco 2-port T1/E1-RAN interface card can be used in a standalone or in a redundant router configuration. For redundant configurations, a special Y-cable is required to connect the active and standby routers. The Y-cable provides a dual E1 or T1 PRI connection.

This section describes the specifications of the Y-cable.

- Cisco 2-port T1/E1-RAN interface card Y-cables should be made with 4 twisted-pair, shielded, 28-gauge cables.
- The cable length of each stub (from the RJ-48C connector to the junction point) should not exceed 3 inches (7.62 cm).
- The cable length from junction point to the patch panel is determined by the customer.



- All signals that propagate in the same direction must share the same twisted pair. For example, RX TIP and RX RING must form a single twisted pair.
- All unused twisted pairs should be cut flush on both ends of the cable. Any unused wire in a twisted pair where one wire is in use should be cut flush at both ends.

Related Documentation

This document provides information on the VWIC-2T1/E1-RAN interface card and supplements the *Cisco Interface Modules Hardware Installation Guide*.

Use this document with the following guides:

- Cisco MWR 1941-DC-A Mobile Wireless Edge Router Documents
 - *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Hardware Installation Guide*
 - *Cisco MWR 1941-DC-A Mobile Wireless Edge Router Software Configuration Guide*

- *Regulatory Compliance and Safety Information for the Cisco MWR 1941-DC-A Mobile Wireless Edge Router*
- Cisco Network Modules Installation Guides
 - *Network Modules Quick Start Guide*
 - *Cisco Network Modules Hardware Installation Guide*
- Release Notes
 - *Release Notes for Cisco MWR 1941-DC-A Mobile Wireless Edge Router for Cisco IOS Release 12.4(2)MR*

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation DVD

Cisco documentation and additional literature are available in a Documentation DVD package, which may have shipped with your product. The Documentation DVD is updated regularly and may be more current than printed documentation. The Documentation DVD package is available as a single unit.

Registered Cisco.com users (Cisco direct customers) can order a Cisco Documentation DVD (product number DOC-DOCDVD=) from the Ordering tool or Cisco Marketplace.

Cisco Ordering tool:

<http://www.cisco.com/en/US/partner/ordering/>

Cisco Marketplace:

<http://www.cisco.com/go/marketplace/>

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:
<http://www.cisco.com/en/US/partner/ordering/>
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response module (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com
- Nonemergencies—psirt@cisco.com

**Tip**

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one that has the most recent creation date in this public key server list:

<http://pgp.mit.edu:11371/pks/lookup?search=psirt%40cisco.com&op=index&exact=on>

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

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

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>

**Note**

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

<http://www.cisco.com/go/marketplace/>

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:
<http://www.ciscopress.com>
- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:
<http://www.cisco.com/packet>
- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:
<http://www.cisco.com/go/iqmagazine>
- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:
<http://www.cisco.com/ipj>
- World-class networking training is available from Cisco. You can view current offerings at this URL:
<http://www.cisco.com/en/US/learning/index.html>

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Cisco 2-port T1/E1-RAN Optimization Installation Instructions

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