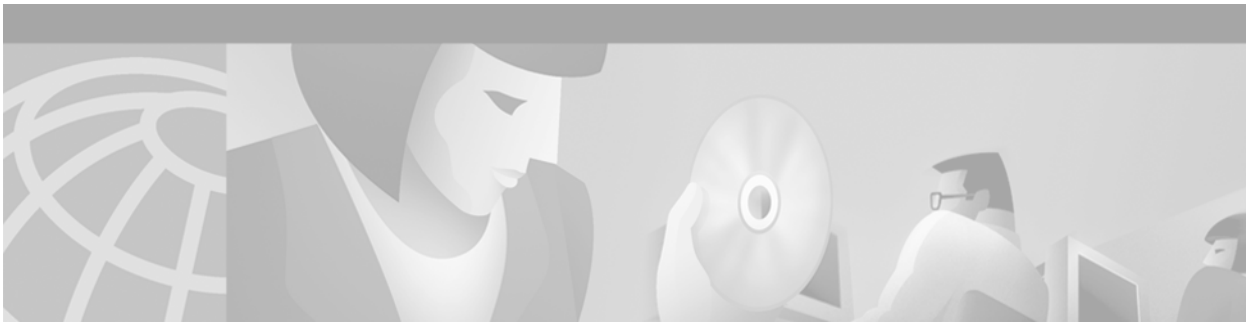


Cisco uBR10-SRP-OC12SML DPT WAN Line Card for the Cisco uBR10012 Router

78-13602-01
January 2002

This document describes the Cisco uBR10-SRP-OC12SML DPT WAN line card used in the Cisco uBR10012 chassis. This document provides the following information:

Note Before using this product, see the translations for these warnings and other warnings that apply to this product in the "Safety Information and Warnings" section on page 8.

Warning **Class 1 laser product.**

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

CISCO SYSTEMS

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

Feature Overview

The Cisco uBR10 Spatial Reuse Protocol (SRP) OC12 single-mode fiber, long reach (SML) dynamic packet transport (DPT) WAN line card provides shared IP over SONET capability for the Cisco uBR10012 router platform.

The Cisco uBR10-SRP-OC12SML DPT WAN line card:

- Accommodates large scale network topology.

  The WAN card is deployed in SONET OC-12 DPT rings. The DPT rings are connected to SONET Add Drop Multiplexers (ADMS) allowing the creation of small or very large rings. Each DPT ring supports a maximum of 64 nodes.

- Leverages fiber optics capacity at OC-12c line rates.

  The WAN card has two SC duplex ports. Each SC duplex port provides the physical connection to an adjacent device in a DPT ring.

- Supports single mode fiber transmissions.
- Allows data to obtain fair-shared access to the OC-12c rings.
- Supports Version 1 SRP Protocol
- Implements protection mechanisms, including wrap and unwrap, in the event of fiber or node failure.

The Cisco uBR10-SRP-OC12SML DPT WAN line card requires two card slots. For that reason, the card is normally installed in Slot 2 and Slot 4 if you are using two cards. If you are using only one card than install the card in Slot 2, Slot 3 or Slot 4. See Figure 1.

Attenuation

The Cisco uBR10-SRP-OC12SML DPT WAN line card is designed to be used at any distance between 15 and 40 kilometers (km). For shorter distance operations (less than 15 km), use a 10 dBm optical attenuator on the link (see Figure 6 on page 7) between the two nodes to prevent clipping and over saturation of the optical receiver. The attenuator should be made of a non-metallic or plastic material.

The exact attenuation value is based on the real cable length or the number of couplers and splicers on the link. For example, 5 dBm attenuator could be used in a 7 km link.

Note The maximum distance of 40 km assumes that the 1310 nm SMF optical cable attenuation is no more than 0.5dB per kilometer; and that there is no optical coupler or splicer in on the link (each could add 0.5dB loss).

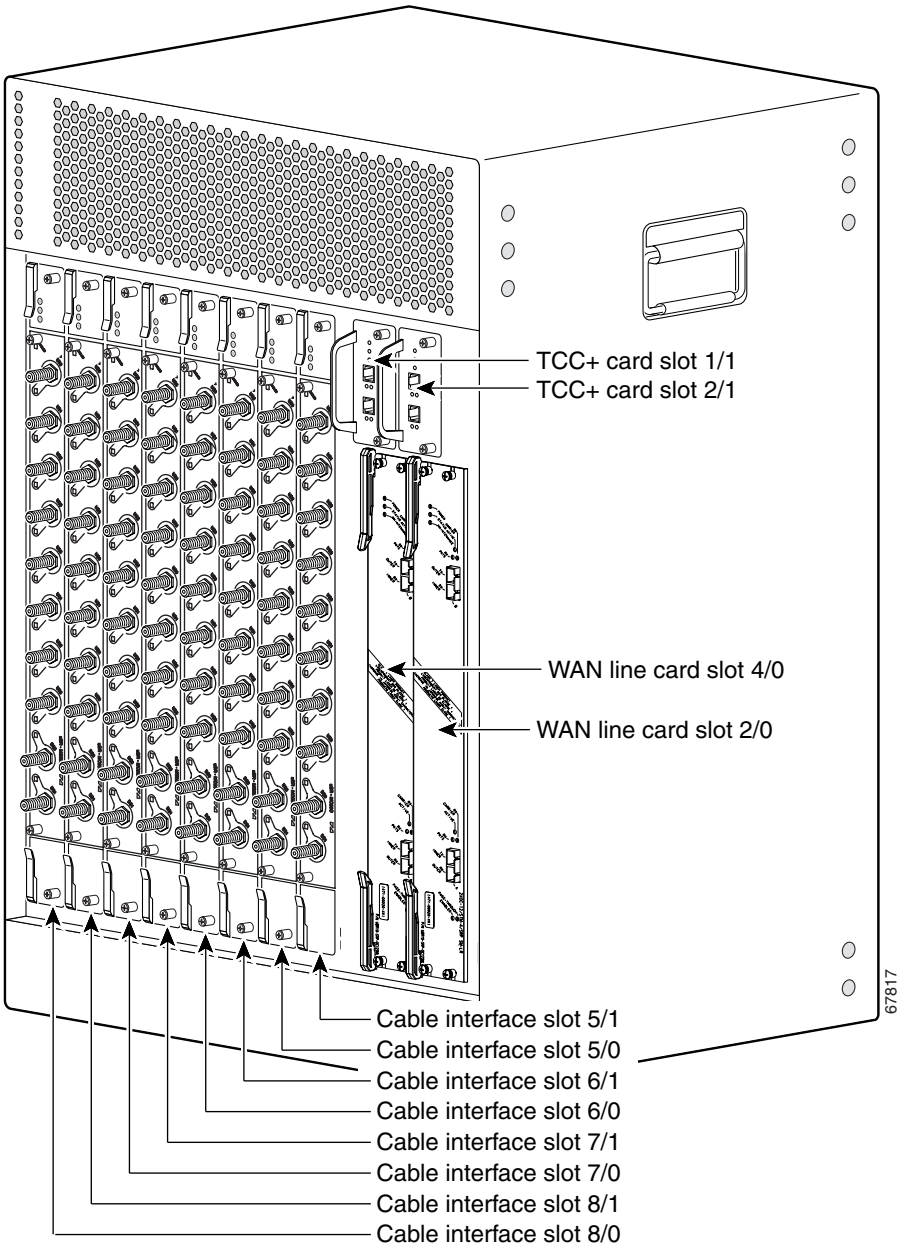
Cisco recommends the use of a SC/PC female to SC/PC male optical attenuator.

Tip The SC/PC (Standard Connector/Physical Contact) denotes a connector with a rectangular shape. The surfaces are parallel with respect to the port (not angled). SC/APC (Standard Connector Angled Physical Contact) denotes an angled surface.

Caution Make sure that you obtain the correct connector type (SC/PC) when purchasing optical attenuators. Angled SC/APC type mating surfaces can damage the Cisco uBR10-SRP-OC12SML DPT WAN line card (RX port) interface.

See "Connectors and Cables" section on page 6.

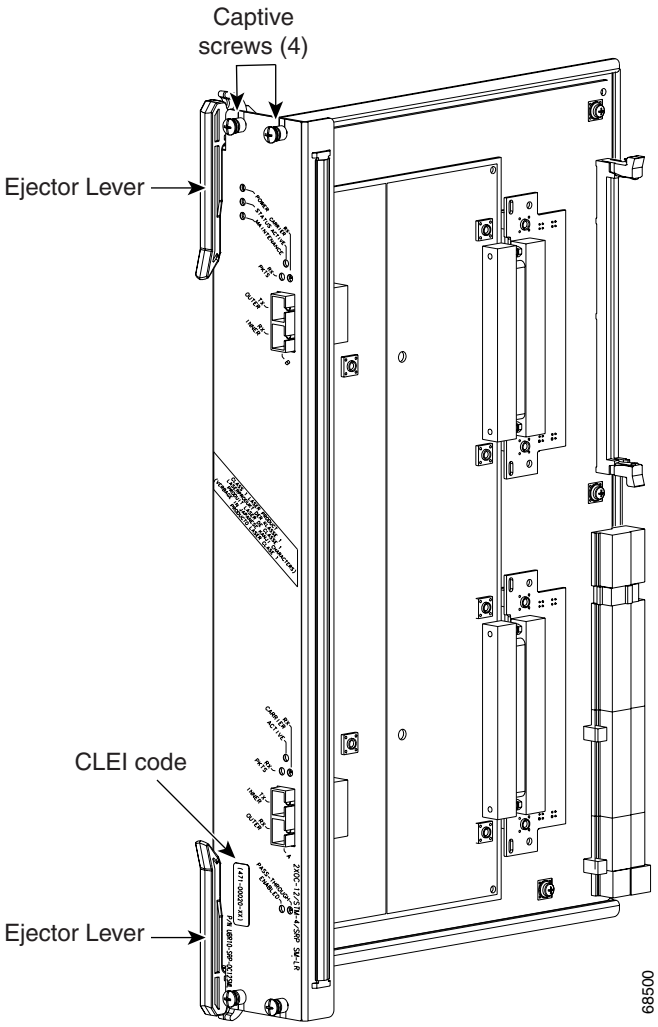
Figure 1 Cisco uBR10012 Router Chassis with Card Slots Identified



Physical Description

Figure 2 shows the Cisco uBR10-SRP-OC12SML DPT WAN line card.

Figure 2 Cisco uBR10-SRP-OC12SML DPT WAN Line Card



The part number of the card (UBR10-SRP-OC12SML) is next to the CLEI code label.

The label (2xOC-12/STM-4/SRP SM-LR) above the transmit and receive port connections defines the optical carrier specifications for this card.

Figure 3 Cisco uBR10-SRP-OC12SML DPT FacePlate

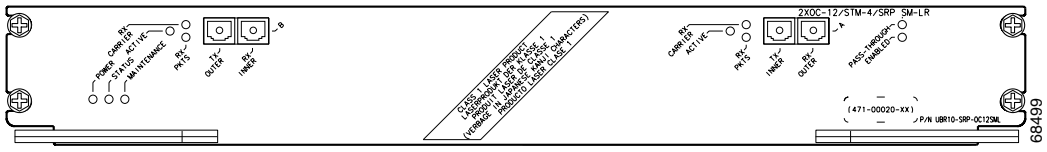


Table 1 describes the LEDs on the uBR10-SRP-OC12SML DPT WAN line card.

Table 1 Cisco uBR10-SRP-OC12SML DPT WAN Line Card LEDs and Their Functions

LED	Status	Description
POWER	Green	Indicates that power is being supplied to the Cisco uBR10-SRP- OC12SML DPT WAN line card.
	Off	Power off.
STATUS - bi-color	Yellow	Indicates that the CPU is in the bootup process, self test, or downloading code.
	Green	Indicates that the CPU has successfully completed the boot, self test, and code download process, and that the Cisco uBR10-SRP- OC12SML DPT WAN line card is the active card.
MAINTENANCE	Off	Normally off. Indicates that no maintenance action is required.
	Yellow	Indicates a required maintenance operation and that the Cisco uBR10-SRP- OC12SML DPT WAN line card can be hot-swapped.
RX CARRIER–B	Green	Indicates that the DPT port WAN has detected valid SONET or SDH framing on the received carrier.
	Off	No valid SONET or SDH framing.
ACTIVE	Green	Indicates that side B of the DPT port line is functioning.
	Off	Not active.
RX PKTS (Packets)	Blinking Green	Indicates that the DPT port line has received a packet. This LED flickers in normal operation, indicating traffic.
	Off	No traffic.
RX CARRIER–A	Green	Indicates that the DPT port line has detected valid SONET or SDH framing on the received carrier.
	Off	No valid SONET or SDH framing.
ACTIVE	Green	Indicates that side A of the DPT port line is functioning.
	Off	Not Active
RX PKTS (Packets)	Blinking Green	Indicates that the DPT port line has received a packet. This LED flickers in normal operation, indicating traffic.
	Off	No traffic
PASS-THROUGH	Amber	Indicates that the DPT port line is in a pass-through state.
	Off	Not active.
ENABLED	Green	Indicates that the DPT port line is enabled for operation; however, the interface port might be in the shutdown state.
	Off	Not active.

Connectors and Cables

The Cisco uBR10-SRP-OC12SML DPT WAN line card uses a single-mode fiber-optic interface cable to connect the Cisco uBR10012 router to another router or switch. See Figure 6 on page 7.

Table 2 Cable Specification

Fiber Type	Wavelength, nm	Core Size, microns	Cable Distance
Single-mode fiber	1310	8 to 10	49,213 - 131,234 ft. (15 - 40 km)

Single-mode cables are yellow.

Note Single-mode fiber-optic cables are not available from Cisco Systems.

For SONET or SDH single-mode fiber-optic connections, use one duplex SC-type connector (Figure 4) or two simplex SC-type connectors. See Figure 5.

Figure 4 Duplex SC Cable Connector

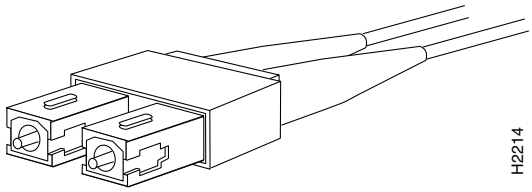
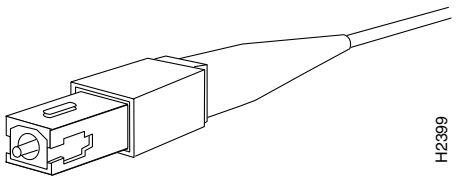
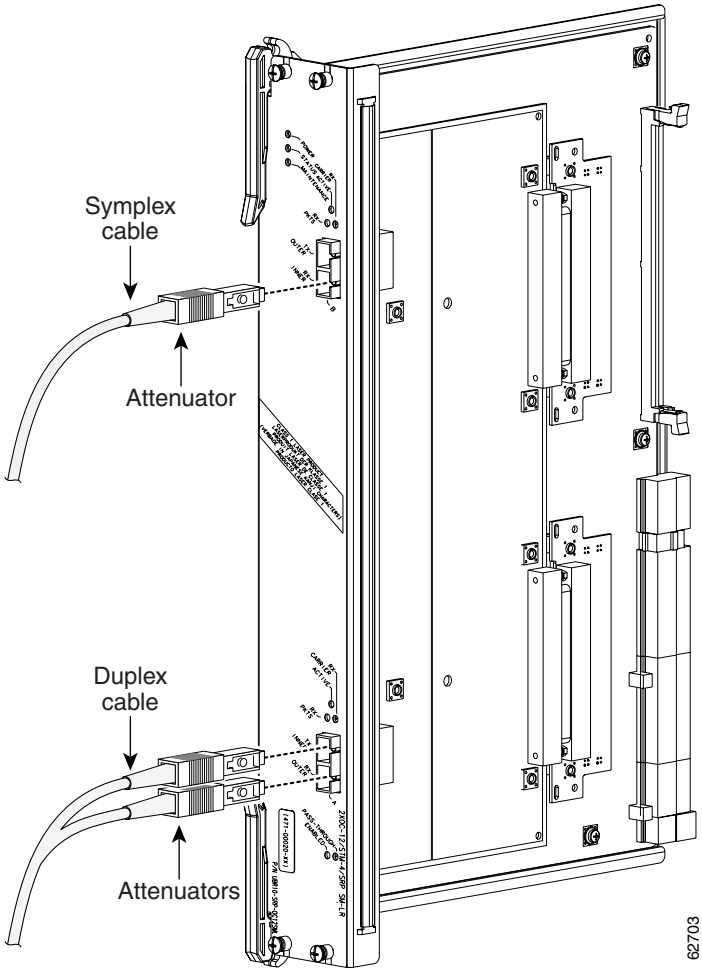


Figure 5 Simplex SC Cable Connector



You can use either a duplex fiber cable or two simplex fiber cables between the DPT port line and the device to which the DPT port line is connected. If you are using an attenuator with the cable, see Figure 6 on page 7.

Figure 6 Attaching the Attenuator and Duplex Fiber-Optic Cables to the WAN Line Card



Safety Information and Warnings

Following are safety guidelines that you should follow when working with any equipment that connects to electrical power.

Equipment Hazard Warning

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 for the appropriate Cisco chassis.**

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, dient u het document betreffende regulatieve naleving en veiligheidsinformatie voor het juiste Cisco-chassis te raadplegen.**

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 kyseessä olevaa Cisco-asennuspohjaa koskevasta säännösten noudattamista ja turvallisuustietoja koskevasta asiakirjasta.**

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 sur la conformité aux normes et la sécurité pour le châssis Cisco approprié.**

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, sollten Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren bewusst und mit den Standardpraktiken zur Vermeidung von Unfällen vertraut sein. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit) für den entsprechenden Cisco-Einbaurahmen.**

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. Per la traduzione delle avvertenze riportate in questa pubblicazione, fare riferimento alla guida di installazione e della risoluzione dei problemi inviata insieme al prodotto Cisco in dotazione.**

Advarsel **Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på noe utstyr, må du vare 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 håndboken, se samsvarsforskriftene og sikkerhetsinformasjonen som gjelder for den aktuelle Cisco-rammen.**

Aviso **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 deste manual, consulte o documento acerca dos Regulamentos e Informação de Segurança apropriado fornecido com o produto Cisco.**

¡Advertencia! **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, consulte el documento Regulatory Compliance and Safety Information (Información sobre homologaciones regulatorias y de seguridad) para el chasis correspondiente de Cisco.**

Varning! **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 som rör uppfyllelse av regler och säkerhetsinformation för lämplig Cisco-chassi.**

Installation Warning

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

Waarschuwing **Deze apparatuur mag alleen worden geïnstalleerd, vervangen of hersteld door bevoegd geschoold personeel.**

Varoitus **Tämän laitteen saa asentaa, vaihtaa tai huoltaa ainoastaan koulutettu ja laitteen tunteva henkilökunta.**

Attention **Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés.**

Warnung **Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet werden.**

Avvertenza **Questo apparato può essere installato, sostituito o mantenuto unicamente da un personale competente.**

Advarsel **Bare opplært og kvalifisert personell skal foreta installasjoner, utskiftninger eller service på dette utstyret.**

Aviso **Apenas pessoal treinado e qualificado deve ser autorizado a instalar, substituir ou fazer a revisão deste equipamento.**

¡Advertencia! **Solamente el personal calificado debe instalar, reemplazar o utilizar este equipo.**

Varning! **Endast utbildad och kvalificerad personal bör få tillåtelse att installera, byta ut eller reparera denna utrustning.**

Hazardous Voltages in WAN Ports

Warning **Hazardous network voltages are present in WAN ports regardless of whether power to the router is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the router first.**

Waarschuwing **Er is gevaarlijke netwerkspanning aanwezig in WAN poorten ongeacht of de stroom naar de router INGESCHAKELD of UITGESCHAKELD is. Om elektrische schokken te vermijden, dient u voorzichtig te werk te gaan wanneer u in de nabijheid van WAN poorten werkt. Wanneer u kabels losmaakt, dient u eerst het uiteinde dat zich het verst van de router vandaan bevindt, te verwijderen.**

Varoitus **WAN-porteissa on vaarallisia verkkojännitteitä riippumatta siitä, onko reitittimen virta kytketty vai ei. Välttyäksesi sähköiskulta ole varovainen työskennellessäsi WAN-porttien lähettyvillä. Kun irrotat kaapeleita, irrota reitittimestä kauempana sijaitseva pää ensiksi.**

Attention **Les ports de réseau longue distance (WAN) gèrent des tensions de réseau dangereuses, que le routeur soit sous tension ou pas. Pour éviter tout risque d'électrocution, prenez toutes les précautions nécessaires avant de travailler à proximité des ports WAN. Pour déconnecter les câbles, commencez par débrancher l'extrémité la plus éloignée du routeur.**

Warnung **In WAN-Ports sind gefährliche Netzspannungen vorhanden, auch wenn der Strom zum Router abgeschaltet wurde. Zur Vermeidung von Elektroschock Vorsicht bei der Arbeit in der Nähe von WAN-Ports. Beim Abtrennen von Kabeln zuerst das vom Router entfernte Ende lösen.**

Avvertenza **Nelle porte WAN sono presenti tensioni di rete pericolose, sia che il router sia acceso o meno (ON od OFF). Per evitare scosse elettriche, fare attenzione quando si lavora in prossimità di porte WAN. Quando si scollegano cavi, staccare per primo il connettore collegato al router.**

Advarsel **Det er livsfarlig nettverksspenning i WAN-utganger, uavhengig av om strømmen til fordelingsenheten er slått av (OFF) eller på (ON). Vær forsiktig når du jobber nær WAN-utganger slik at du unngår elektrisk støt. Hvis du skal løsne kabler, må du først løsne den enden som er lengst borte fra fordelingsenheten.**

Aviso **Existem sempre tensões de rede perigosas nas portas WAN, independentemente da corrente para o dispositivo repartidor de mensagens estar ligada (ON) ou desligada (OFF). Para evitar choques eléctricos, tenha o devido cuidado ao trabalhar perto das portas WAN. Ao desconectar os cabos, separe primeiro a extremidade que se encontra ligada ao dispositivo repartidor de mensagens.**

¡Advertencia! **Hay tensiones de red peligrosas en los puertos de redes de área extendida (WAN), tanto con la alimentación al router conectada como desconectada. Para evitar la sacudida eléctrica, proceda con precaución cuando trabaje en las proximidades de puertos WAN. Para desconectar los cables, desconecte primero el extremo que va al router.**

Varning! **Farlig nätverksspänning föreligger i WAN-portarna oavsett om strömförsörjningen till distributören är bruten eller ej. För att undvika elektriska stötar ska du vara försiktig vid arbete i närheten av dessa portar. När du kopplar bort en kabel ska du först koppla bort den ände som inte är ansluten till distributören.**

Class 1 Laser Product Warning

Warning **Class 1 laser product.**

Waarschuwing **Klasse-1 laser produkt.**

Varoitus **Luokan 1 lasertuote.**

Attention **Produit laser de classe 1.**

Warnung **Laserprodukt der Klasse 1.**

Avvertenza **Prodotto laser di Classe 1.**

Advarsel **Laserprodukt av klasse 1.**

Aviso **Produto laser de classe 1.**

¡Advertencia! **Producto láser Clase I.**

Varning! **Laserprodukt av klass 1.**

Taiwan version:

Ⅰ類雷射產品

Mainland China version:

Ⅰ類激光產品

Warning Statement for Finland

Varoitus **Alleviates ja suojalukitus ohitettaessa olet alttiina näkymättömälle lasersäteilylle. Äjä katso säteeseen.**

Warning Statement for Sweden

Warning **Invisible laser radiation when this component is opened and the preregulation is disabled. Do not look into the laser beam.**

Varning! **Osynlig laserstrålning när denna del är öppen och förregleringen är urkopplad. Rikta inte blicken in mot strålen.**

Invisible Laser Radiation Warning

Warning Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.

Waarschuwing Omdat er onzichtbare laserstraling uit de opening van de poort geëmitteerd kan worden wanneer er geen kabel aangesloten is, dient men om blootstelling aan laserstraling te vermijden niet in de open openingen te kijken.

Varoitus Kun porttiin ei ole kytketty kaapelia, portin aukosta voi vuotaa näkymätöntä lasersäteilyä. Älä katso avoimiin aukkoihin, jotta et altistu säteilylle.

Attention Etant donné qu'un rayonnement laser invisible peut être émis par l'ouverture du port quand aucun câble n'est connecté, ne pas regarder dans les ouvertures béantes afin d'éviter tout risque d'exposition au rayonnement laser.

Warnung Aus der Öffnung des Ports kann unsichtbare Laserstrahlung austreten, wenn kein Kabel angeschlossen ist. Kontakt mit Laserstrahlung vermeiden und nicht in offene Öffnungen blicken.

Avvertenza Poiché quando nessun cavo è collegato alla porta, da quest'ultima potrebbe essere emessa radiazione laser invisibile, evitare l'esposizione a tale radiazione e non fissare con gli occhi porte a cui non siano collegati cavi.

Advarsel Usynlige laserstråler kan sendes ut fra åpningen på utgangen når ingen kabel er tilkoblet. Unngå utsettelse for laserstråling og se ikke inn i åpninger som ikke er tildekket.

Aviso Evite uma exposição à radiação laser e não olhe através de aberturas expostas, porque poderá ocorrer emissão de radiação laser invisível a partir da abertura da porta, quando não estiver qualquer cabo conectado.

¡Advertencia! Cuando no esté conectado ningún cable, pueden emitirse radiaciones láser invisibles por el orificio del puerto. Evitar la exposición a radiaciones láser y no mirar fijamente los orificios abiertos.

Varning! Osynliga laserstrålar kan sändas ut från öppningen i porten när ingen kabel är ansluten. Undvik exponering för laserstrålning och titta inte in i ej täckta öppningar.

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.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which occurs when electronic cards or components are improperly handled, can result in complete or intermittent failures. The AC-input power shelf and its AC power modules contain a printed circuit card that is fixed in a metal carrier. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the cards from ESD, use an antistatic strap each time you handle the modules.

Following are guidelines for preventing ESD damage:

- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact. Before removing a card from the chassis, connect the equipment end of the strap to a bare metal, unpainted surface on the chassis or rack-mount.
- Handle components by the carrier edges only; avoid touching the card components or any connector pins.
- When removing a module, place it on an antistatic surface or in a static-shielding bag. If the module will be returned to the factory, immediately place it in a static-shielding bag.
- Avoid contact between the modules and clothing. The wrist strap protects the card from ESD voltages on the body only; ESD voltages on clothing can still cause damage.

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

About Removing and Replacing a Cisco uBR10-SRP-OC12SML DPT WAN Line Card

Use the following procedure to install a new Cisco uBR10-SRP- OC12SML DPT WAN line card or to replace an existing line card. If two line cards are installed for redundant operation, you can remove one card and replace it without interrupting system operations.

Warning **Warning Because invisible radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.**

Tools and Parts Required

To remove and replace an individual Cisco uBR10-SRP- OC12SML DPT WAN line card you need the following:

- Replacement Cisco uBR10-SRP- OC12SML DPT WAN line card, product order number UBR-1OC12/P-SML=.
- ESD-preventive wrist strap.
- Anti-static surface.
- Screwdriver (number 2 Phillips head recommended).

Unpacking the Cisco uBR10-SRP-OC12SML DPT WAN Line Card

To unpack the line card complete the following steps:

Caution Make sure you are properly grounded with an ESD preventative ground strap.

Step 1 Open the shipping box.

Step 2 Remove the Cisco uBR10-SRP- OC12SML DPT WAN line card from the box.

Step 3 Place the Cisco uBR10-SRP- OC12SML DPT WAN line card on an anti-static surface.

Removing the Line Card from the Chassis

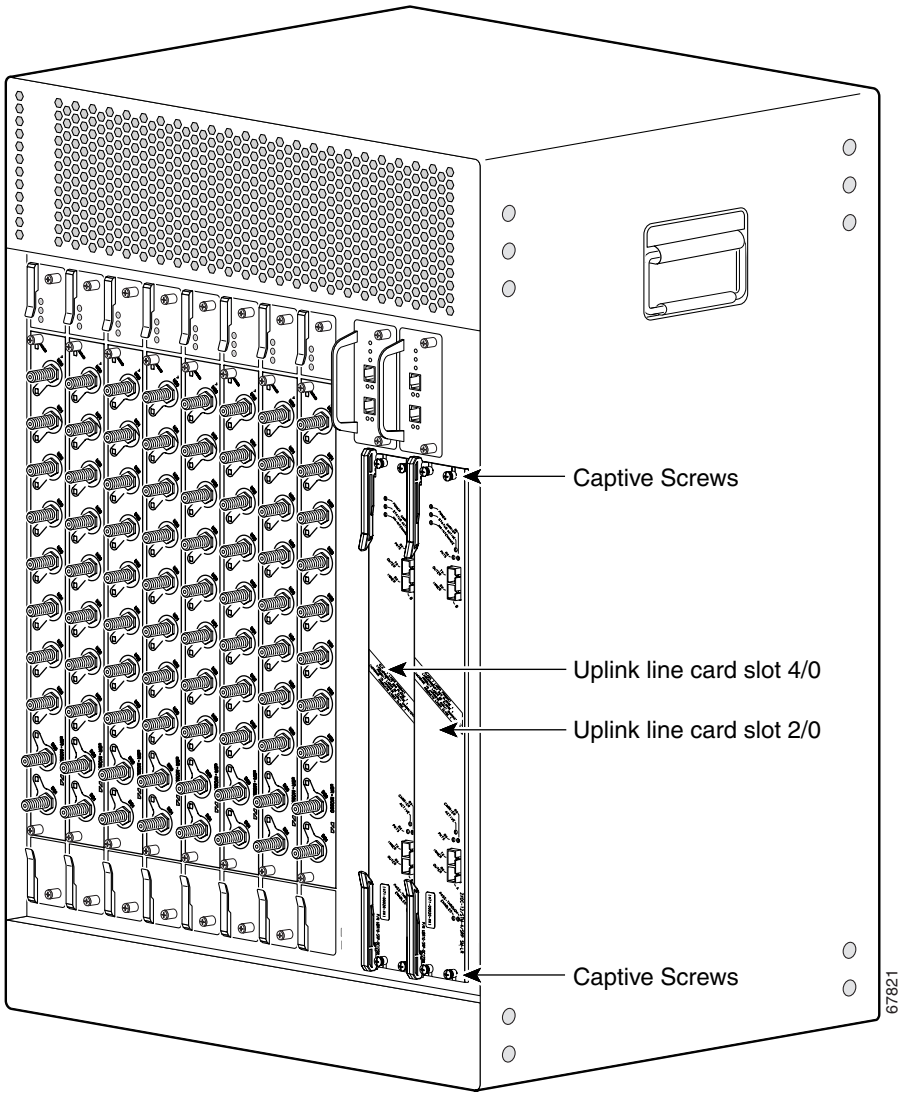
Tip Attach an ESD preventative ground strap to your wrist and to a bare metal, unpainted surface on the chassis or frame.

Step 1 Face the back of the Cisco uBR10012 chassis. If necessary, clear enough interface and power cables to allow sufficient space to work.

Step 2 If you are replacing the Cisco uBR10-SRP- OC12SML DPT WAN line card, disconnect the cables from the line card being replaced.

If you are installing a new line card, remove the blank slot cover and discard it; then, go to Replacing the Cisco uBR10-SRP-OC12SML DPT WAN Line Card, page 19.

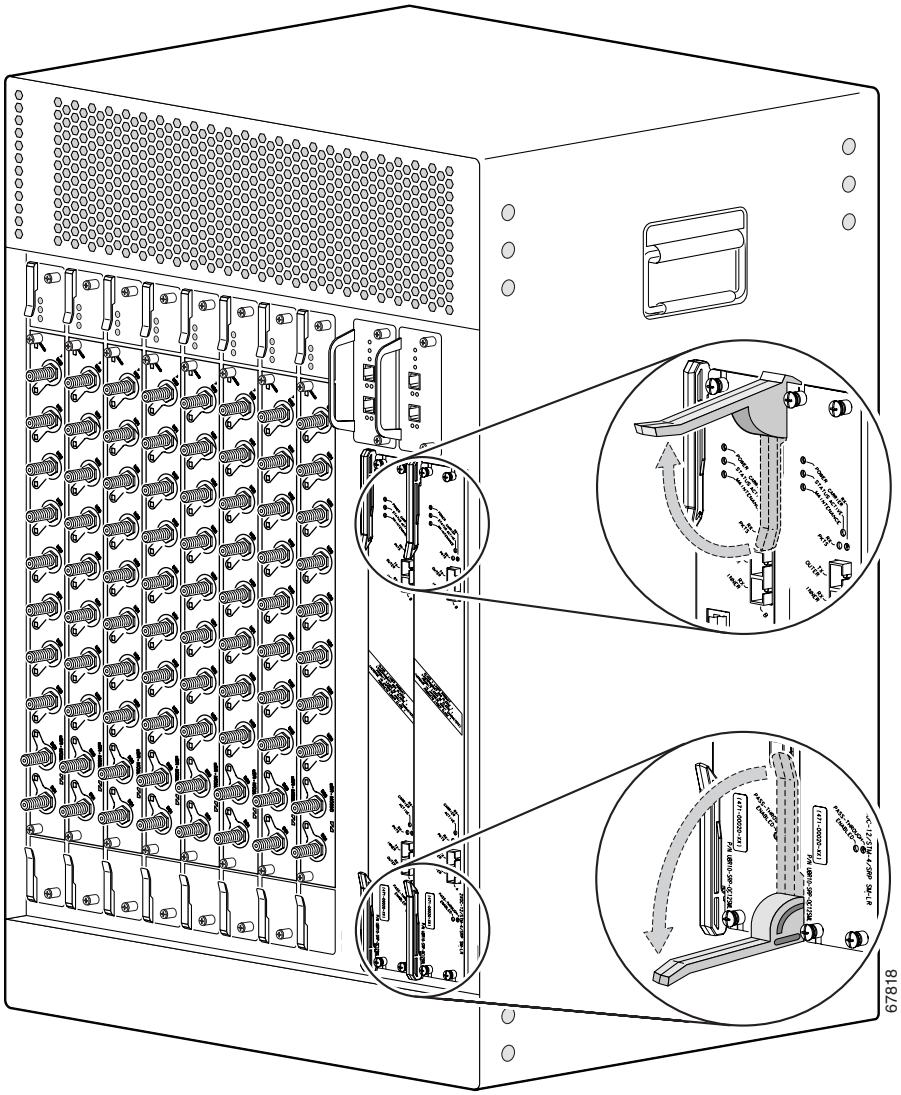
Figure 7 Location of Cisco uBR10-SRP- OC12SML DPT WAN Line Card Captive Screws



Step 3 Unscrew the top and bottom captive screws (4) on the Cisco uBR10-SRP- OC12SML DPT WAN line card (Figure 7 on page 16).

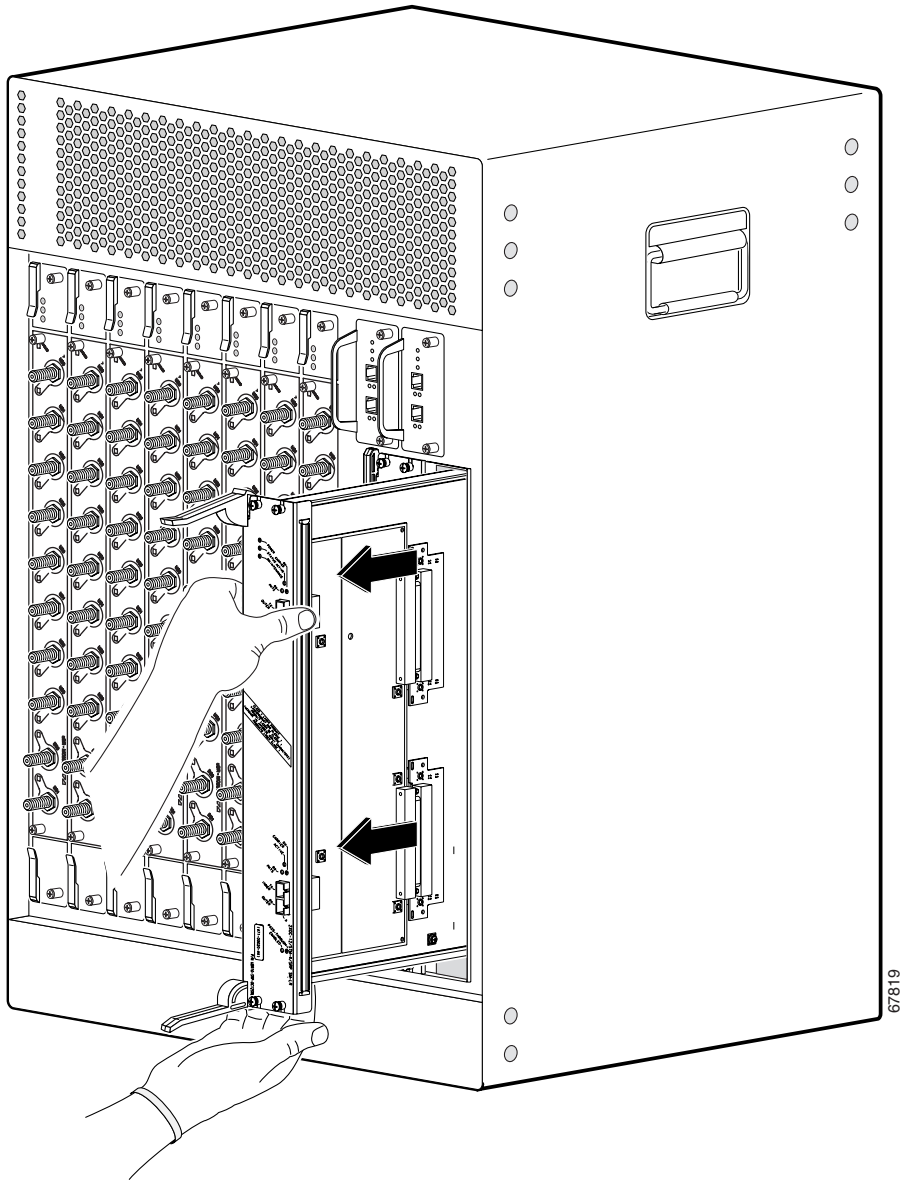
Step 4 Simultaneously open both ejector levers on the front of the card.

Figure 8 Opening the Ejector Levers



Step 5 Pull the card out of the slot and place it on an anti-static surface or in an anti-static bag (Figure 9).

Figure 9 Removing the Cisco uBR10-SRP- OC12SML DPT WAM Line Card from the Chassis



Step 6 If you are installing a replacement card, go to Replacing the Cisco uBR10-SRP-OC12SML DPT WAN Line Card, page 19. Otherwise, install a blank cover over the slot.

Step 7 Tighten the captive screws finger tight.

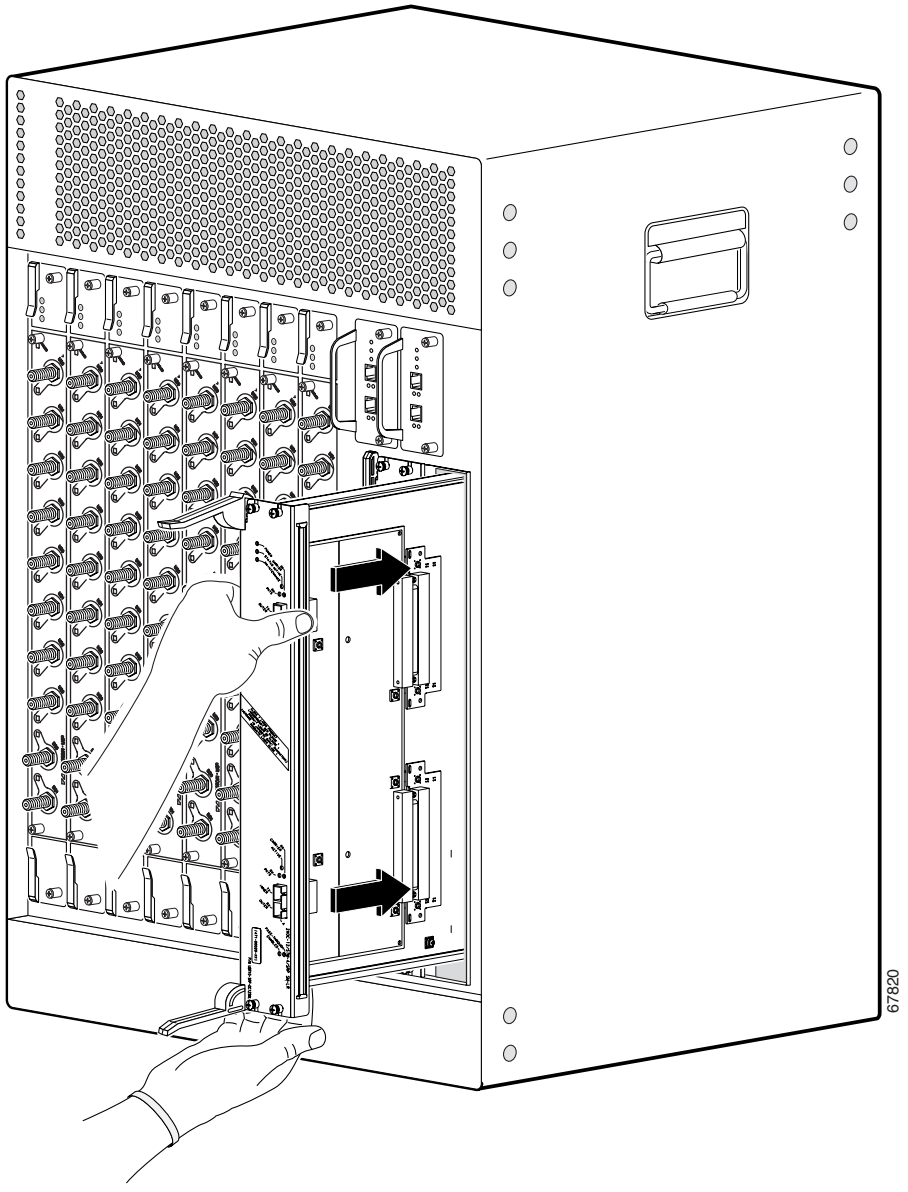
Caution For proper cooling and airflow, a cover must always be installed in a blank Cisco uBR10-SRP- OC12SML DPT WAN line card slot. The product order number for the blank Cisco uBR10-SRP- OC12SML DPT WAN line card cover is ESR-LC-COVER=.

Replacing the Cisco uBR10-SRP-OC12SML DPT WAN Line Card

Step 1 Pick up the replacement Cisco uBR10-SRP- OC12SML DPT WAN line card and position it in front of the card cage slot.

Step 2 Carefully align the upper and lower edges of the card with the upper and lower guides in the chassis.

Figure 10 Inserting the Cisco uBR10-SRP- OC12SML DPT WAN Line Card



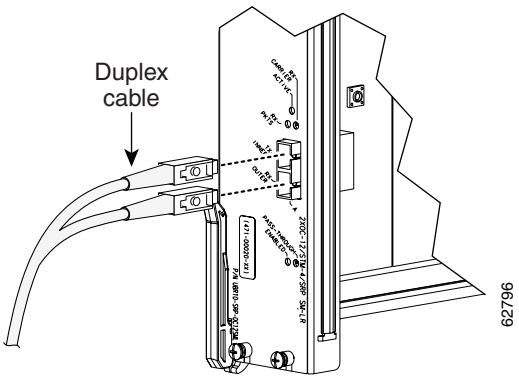
Step 3 Slide the line card into the card slot in the chassis so that it firmly seats in the backplane connectors.

Step 4 To secure the line card in the chassis, simultaneously close the ejector levers.

Caution Excessive transmit signal levels at the receiver port can damage the card. Receiver input specifications are P_{min}= –31 dBm, P_{max} = –7 dBm.

Step 5 Use an optical power meter to verify that receiver signal levels are within the specifications listed (P_{typ} = –29.0 dBm, P_{min} = –31 dBm, P_{max} = –7 dBm).

Figure 11 Attaching Duplex Fiber-Optic Cables



Step 6 Connect all the cables to the line card. If you are using an attenuator with the cable, see Figure 6 on page 7.

Step 7 Tighten the top and bottom captive screws (Figure 7 on page 16).

Caution Always tighten the captive screws on each Cisco uBR10-SRP- OC12SML DPT WAN line card. These screws prevent accidental removal and provide proper grounding for electromagnetic interference (EMI) shielding.

When fully inserted, the line card cycles through its power-on self-test. The Maintenance LED stays on briefly (about 5 to 6 seconds) and then shuts off. If the Maintenance LED remains on or is flashing, see About Troubleshooting the Cisco uBR10-SRP-OC12SML DPT WAN Line Card.

For short distances (less than 15 km) an attenuator must be added to the cable configuration for the Cisco BR10-SRP-OC12SML DPT WAN line card. See Technical Specifications, page 22.

Step 8 Configure the Cisco uBR10-SRP- OC12SML DPT WAN line card if necessary.

Refer to the “Formatting Flash Memory Cards and Disks” section in the *Cisco uBR10012 Universal Broadband Router Hardware Installation Guide* or the *Cisco uBR10012 Universal Broadband Software Configuration Guide*, at http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/index.htm.

For information about configuring the Cisco uBR10-SRP- OC12SML DPT WAN line card see Cisco uBR10-SRP-OC12SML-DPT WAN Line Card Feature Module at http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/frus/index.htm.

Note It is not necessary to configure the Cisco uBR10-SRP- OC12SML DPT WAN line card if you are installing a replacement card in the identical slot. The system automatically downloads the necessary configuration information from the PRE.

About Troubleshooting the Cisco uBR10-SRP-OC12SML DPT WAN Line Card

Check the following items if a problem appears on one of the OC12SML DPT WAN line cards.

Step 1 Verify that the card is securely seated in the chassis

- Remove the line card and reinsert it, making sure that it firmly connects to the backplane and that both captive screws are tightly connected.
- While the card is out of the chassis, check for bent pins on the backplane.
  - If there are bent pins, contact TAC for instructions.

Step 2 Verify that the PRE modules are operating properly.

- The Status LED is on (green).
- The Fail LED is off.
- No Alarm LED's are on (yellow).

Step 3 If both PREs are operating correctly, check the Power LEDs on each uBR10-SRP- OC12SML DPT WAN line card. Are the Power LEDs on each line card on (green)?

- If no, remove the line card and reinsert it, making sure that it firmly connects to the backplane and that both captive screws are tightly connected.
- If yes, proceed to the next step.

Step 4 Is the STATUS LED on the Cisco uBR10-SRP- OC12SML DPT WAN line card is on?

- If no, check that the version of Cisco IOS you have loaded on the router supports the Cisco uBR10-SRP- OC12SML DPT WAN line card.

Technical Specifications

Table 3 lists the specifications for the Cisco uBR10-SRP- OC12SML DPT WAN line card:

Table 3 Cisco uBR10-SRP- OC12SML DPT WAN Line Card Specifications

Description	Specifications
Product order numbers WAN Card Slot cover for WAN card	 • UBR-SRP-OC12SML= • ESR-LC-COVER=
Card dimensions	• Height: 16 in. (40.64 cm) • Width: 2.38 in. (6.045 cm) • Depth: 10.56 in. (26.822 cm)
Weight	6 lb. (2.7 kg)
Power consumption	40 W (136.5 btu[1])
MTBF	153,624 hours
Temperature range	• Operating: 41 to 104°F (5 to 40°C) • Storage: –40 to 158°F (–40 to 70°C)
Relative humidity	• Operating: 5 to 85% • Storage: 5 to 95%
Operating altitude	–197 to 13,123 ft. (–60 to 4000 m)
Receiver sensitivity	P_{typ} = –29.0 dBm P_{min} = –31 dBm P_{max} = –7 dBm
Transmitter output power	P_{typ} = –1.0 dBm P_{min} = –3 dBm P_{max} = +2 dBm
Other information	The maximum distance of 40 km assumes that: 1. The 1310 nm SMF optical cable attenuation is no more than 0.5 dB per kilometer. 2. No optical coupler or splicer is on the link (each coupler or splicer adds 0.5 dB loss). The exact attenuation value is based on: 1. The real cable length. (For example: a 5 dBm attenuator may be used for a 7 km link.) 2. The number of couplers or splicers on the link.

1. British Thermal Units

Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

World Wide Web

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

http://www.cisco.com

Translated documentation is available at the following URL:

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

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped 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 through 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

- 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, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

If you are reading Cisco product documentation on Cisco.com, you can submit technical comments electronically. Click **Leave Feedback** at the bottom of the Cisco Documentation home page. After you complete the form, print it out and fax it to Cisco at 408 527-0730.

You can e-mail your comments to bug-doc@cisco.com.

To submit your comments by mail, use the response card behind the front cover of your document, or write to the following address:

Cisco Systems
Attn: 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 by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you to

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages
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You can self-register on Cisco.com to obtain customized information and service. To access Cisco.com, go to the following URL:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.

- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

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

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

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

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

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

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

This document is to be used in conjunction with the *Cisco uBR10012 Universal Broadband Router Hardware Installation Guide*.