Cisco uBR10-LCP2-MC16C/MC16E/MC16S Cable Interface Card for the Cisco uBR10012 Router

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Note The Cisco uBR10-LCP2-MC16x (C, E, S) cable interface line cards are end of sale. For additional information, refer to END-OF-LIFE NOTICE, NO. 2600 at the following location:

http://www.cisco.com/en/US/products/hw/cable/ps2209/prod_eol_notice0900aecd80183921.html

This document describes the Cisco uBR10-LCP2-MC16C, the Cisco uBR10-LCP2-MC16E, and the Cisco uBR10-LCP2-MC16S cable interface line cards and how to install them for use with the Cisco uBR10012 universal broadband router. This document provides the following information:

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

Cisco uBR10-LCP2-MC16C/MC16E/MC16S Overview

The cable interface line cards, together with external IF-to-RF upconverters, serve as the RF interface between the cable headend and DOCSIS/EuroDOCSIS-based cable modems.

The Cisco uBR10-LCP2-MC16C, the Cisco uBR10-LCP2-MC16E, and the Cisco-LCP2-MC16S cable interface line cards are a combination of two components:

- Cisco uBR-MC16*x* (MC16C, MC16E, and MC16S) cable interface line cards—Provide one downstream and six upstreams channels.
  - Cisco uBR-MC16C and Cisco uBR-MC16S support cable modems and set-top boxes that operate according to the Data-over-Cable Service Interface Specifications (DOCSIS). DOCSIS supports the 6-MHz North American channel plans using the ITU J.83 Annex B RF standard. The downstream uses a 6 MHz channel width in the 85- to 860-MHz frequency range, and the upstream supports the 5- to 42-MHz frequency range.

Note The Cisco uBR-MC16S main board also includes a daughter card that provides the advanced hardware-based spectrum management feature. This daughter card is an integral part of the card assembly and cannot be removed in the field.

  - Cisco uBR-MC16E supports cable modems and set-top boxes that operate according to the European DOCSIS specifications (EuroDOCSIS). EuroDOCSIS supports the 8-MHz Phase Alternating Line (PAL) and SEquential Couleur Avec Memoire (SECAM) channel plans using the ITU J.112 Annex A RF standard. The downstream uses an 8 MHz channel width in the 85- to 860-MHz frequency range, and the upstream supports multiple channel widths in the 5- to 65-MHz frequency range.
- Cisco Line Card Processor (Cisco uBR10-LCP2) adapter card—Provides the mechanical and electrical conversions necessary for the Cisco uBR-MC16C, the Cisco uBR-MC16E, or the Cisco MC16S cable interface line card to fit the form factor used in the Cisco uBR100012 chassis.

Note Currently there are two types of LCP adapter cards, LCP and LCP2. The LCP is the original adapter card shipped with the Cisco uBR10-LCP-MC16*x* card. (Installation information about the LCP adapter card also applies to the LCP2 adapter card.) The Cisco uBR10-LCP2 adapter card is replacing the old LCP adapter card. The upgrade to the Cisco uBR10-LCP2 increases the memory from 64- to 256-MB. The upgrade supports N+1 requirements when the card is used as a redundant or protect card. There is no problem with the original LCP version if the card is used as the operating card. See the *Proactive Upgrade Field Notice* number 18301 at the following URL:

http://www-tac.cisco.com/Support_Library/field_alerts/fn18103.html.

The Cisco uBR10-LCP2 and Cisco uBR-MC16*x* cable interface line cards (MC16C, MC16E, and MC16S) are mechanically connected to each other by using brackets and power connectors (see Figure 1 on page 3). The Cisco uBR10-LCP2 not only adapts the cable interface line card to the form factor of the Cisco uBR10012 chassis, but also provides:

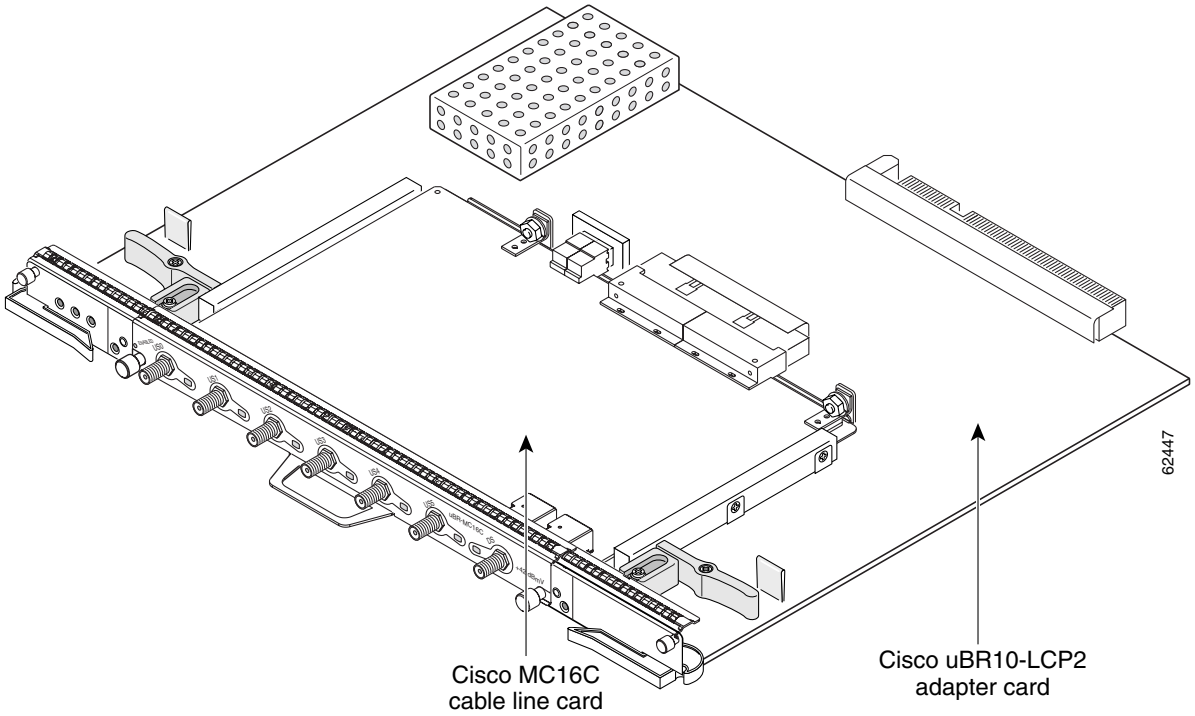
- Proper voltage conversion for the cards and chassis.
- Boot code required to use the cable interface line cards.
- SDRAM for buffering packets as they are transferred between the card and PRE1.

The cards are inserted into and removed from the Cisco uBR10012 chassis as a single logical and physical unit. All Cisco uBR10-LCP2-MC16*x* cable interface line cards support online insertion and removal (OIR). OIR uses the MAC address assigned to the Cisco uBR10-LCP2 adapter card, allowing you to replace any Cisco uBR-MC16*x* cable interface line card installed on the adapter card without losing the configuration information.

Note Do not attempt to separate or remove the cable interface line card from the Cisco uBR10-LCP2 adapter card while they are inserted in the Cisco uBR10012 chassis. Remove the card from the chassis as a unit and then separate them on a lab bench or other area that protects against ESD damage. See the "Replacing the Line Card in the Cisco uBR10-LCP2 Adapter Card" section on page 23.

Figure 1 shows the Cisco uBR10-LCP2-MC16C cable interface line card.

Figure 1 Cisco uBR10-LCP2 Adapter Card with the Cisco uBR-MC16C Cable Interface Line Card Installed



The one downstream port and six upstream ports support the modulations shown in Table 1.

Table 1 Cisco uBR10-LCP2-MC16C, E, and S Cable Interface Line Card Specifications

Cable Interface Line Card	Downstream Modulation	Upstream Modulation	Output
Cisco uBR10-LCP2-MC16C[1]	64 QAM, 256 QAM	QPSK, 16 QAM	+42 dBmV +/– 3dB
Cisco uBR10-LCP2-MC16E[2]	64 QAM, 256 QAM	QPSK, 16 QAM	+40 dBmV +/– 3dB
Cisco uBR10-LCP2-MC16S[3]	64 QAM, 256 QAM	QPSK, 16 QAM	+42 dBmV +/– 2dB

1. The Cisco uBR10-LCP2-MC16C cards support industry-standard F-connectors for the coaxial cable connections.
2. The Cisco uBR10-LCP2-MC16E cards support industry-standard F-connectors for the coaxial cable connections.
3. The Cisco uBR10-LCP2-MC16S cards support industry-standard F-connectors for the coaxial cable connections.

The default modulations are:

- 64 quatrature amplitude modulations (QAM) for downstream.
- quadrature amplitude phase-shift keying (QPSK) for upstream.

DOCSIS and EuroDOCSIS Data Rates and Modulation Schemes

Cisco cable interface line cards are configured in a number of different upstream combinations based on the card used, your cable network, and the anticipated subscription and service levels. Table 2 lists the data rates and modulation schemes for both DOCSIS and EuroDOCSIS standards.

Table 2 DOCSIS and EuroDOCSIS Upstream Data Rates

Upstream Channel Width	Modulation Scheme	Baud Rate Sym/sec	Raw Bit Rate Mbit/sec	Throughput (Bit rate - Overhead) Mbit/sec
3.2 MHz	16 QAM(4) QPSK (2)	2.56 M	10.24 5.12	9.0 4.6
1.6 MHz	16 QAM(4) QPSK (2)	1.28 M	5.12 2.56	4.5 2.3
800 kHz	16 QAM(4) QPSK (2)	640 k	2.56 1.28	2.3 1.2
400 kHz	16 QAM(4) QPSK (2)	320 k	1.28 0.64	1.2 0.6
200 kHz	16 QAM(4) QPSK (2)	160 k	0.64 0.32	0.6 0.3

Cisco uBR10-LCP2-MC16C

The Cisco uBR10-LCP2-MC16C cable interface line card output is +42 dBmV +/– 3 dB and supports all DOCSIS upstream channel widths described in Table 2. The card is configured identically to the Cisco uBR-MC16C cable interface line card.

Note The configuration information for the Cisco uBR10-LCP2-MC16C is the same as the information for the Cisco uBR10-LCP2-MC28C/Cisco uBR-MC28C, except that there are fewer upstream and downstream ports. Refer to the configuration guides.

For Cisco IOS software requirements see the "Obtaining Documentation" section on page 29.

For configuration information, refer to *Configuring the Cisco uBR-MC28C Cable Modem Card*, available on the documentation CD-ROM and Cisco.com at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_r_sw/flmc28.htm

Refer to the *Cisco uBR7200 Series Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/index.htm

Cisco uBR10-LCP2-MC16E

The Cisco uBR10-LCP2-MC16E cable interface line card output is +40 dBmV +/– 3 dB and supports all EuroDOCSIS upstream channel widths described in Table 2 on page 4. The card is configured identically to the Cisco uBR-MC16E cable interface line card.

While all other Cisco cable interface line cards transmit downstream signals to upconverters by using the 44-MHz frequency, the Cisco uBR10-LCP2-MC16E transmits downstream IF signals to an up converter by using the 36.125-MHz frequency.

For Cisco IOS software requirements see the "Obtaining Documentation" section on page 29.

For configuration information, refer to *Configuring the Cisco uBR7200 Series MC16E Cable Modem Card*, available on the documentation CD-ROM and Cisco.com or at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_r_sw/index.htm

Refer to Chapter 3 in the *Cisco uBR7200 Series Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/index.htm

Cisco uBR10-LCP2-MC16S

The Cisco uBR10-LCP2-MC16S:

- Consists of the Cisco uBR10-LCP2 adapter card, a motherboard (based on the Cisco uBR-MC16C cable interface line card) and an additional "piggy-back" spectrum management daughter card. The card is configured identically to the Cisco uBR-MC16S cable interface line card.
- Supports all DOCSIS downstream symbol rates and upstream channel widths as described in Table 2 on page 4.
- Features advanced spectrum management capabilities made possible by hardware and software enhancements. The advanced spectrum management capabilities of the Cisco uBR10-LCP2-MC16S include the ability to hierarchically scan portions of the upstream spectrum for clean channels of varying widths.

The Cisco uBR10-LCP2-MC16S spectrum management card (daughter card) is able to sample the 5 to 42 MHz upstream frequency spectrum and initiate frequency hops, modulation change, or channel-width changes based on the sampled information. When specified thresholds have been reached, the spectrum management card takes a snapshot of the available upstream spectrum and then passes this information to the Cisco IOS software, where it is analyzed for indications of significant ingress or impulse noise. From this analysis, the Cisco IOS software draws informed conclusions regarding the "cleanest" portions of the upstream frequency spectrum to initiate a frequency hop to a clean upstream channel, if warranted. The user-defined threshold values are specified by commands in the configuration file of the Cisco uBR10012 router.

For Cisco IOS software requirements see the "Related Documentation" section on page 28.

Physical Description

Figure 2 shows the chassis slot numbering for the cable interface line cards.

Figure 2 Cisco uBR10012 Router Chassis Slot Numbering

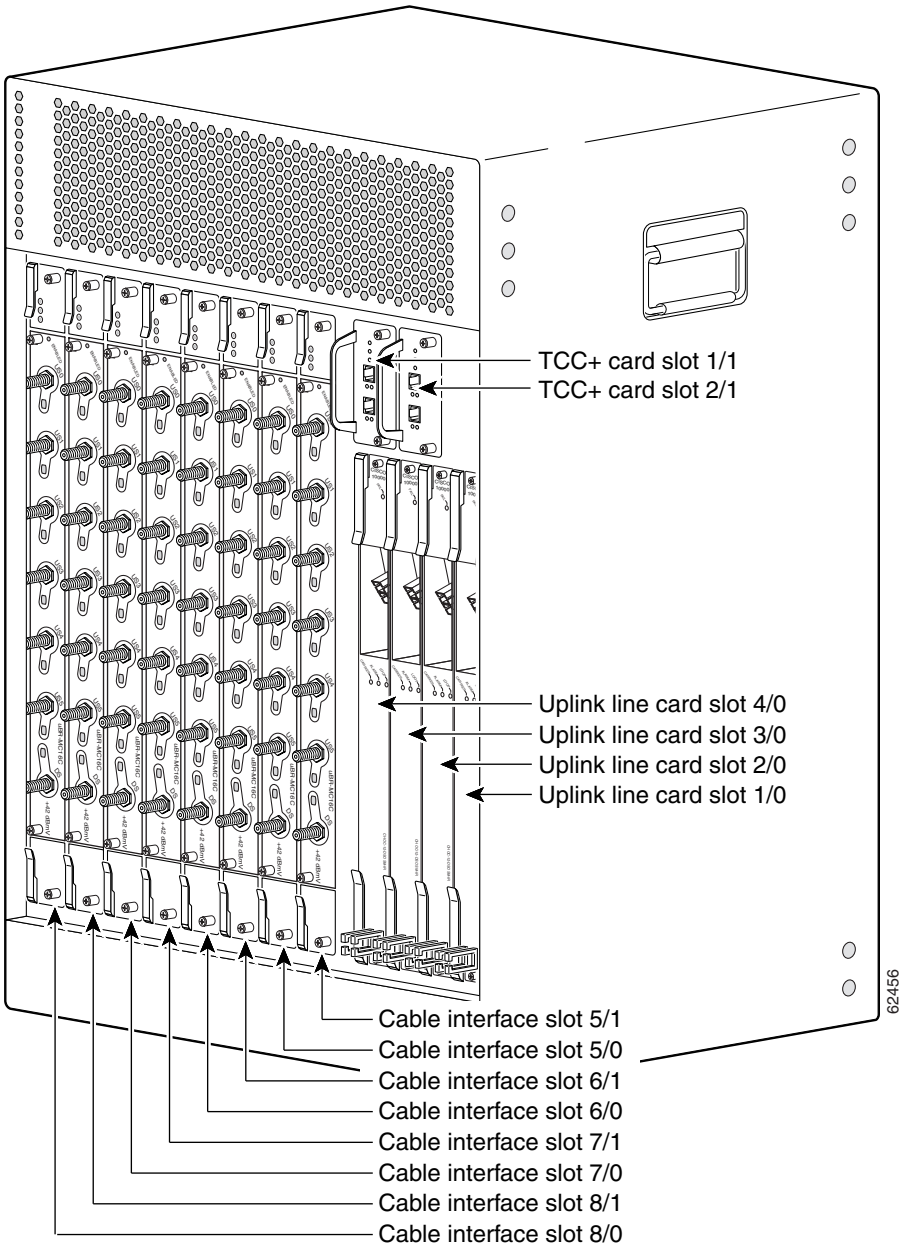


Figure 3 shows the cable interface line card and adapter card as a unit. Note the location of the ejectors used to separate the line card from the adapter card.

Figure 3 Cisco uBR10-LCP2-MC16C Cable Interface Line Card Components

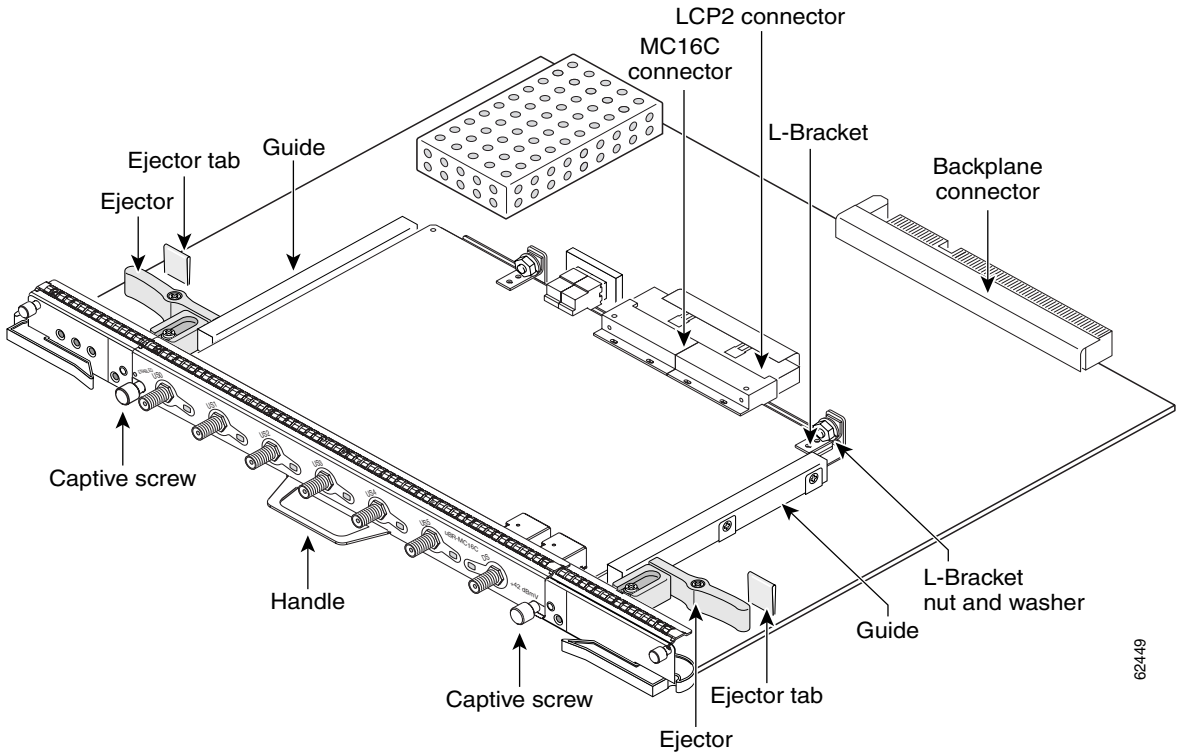
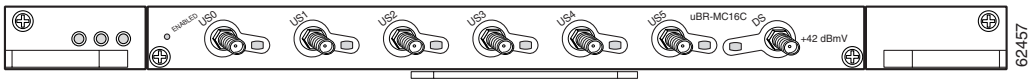


Figure 4 shows the faceplate for the Cisco uBR10-LCP2-MC16C cable interface line card.

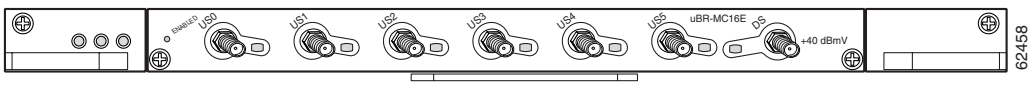
Figure 4 Cisco uBR10-LCP2-MC16C Faceplate



The Cisco uBR10-LCP2-MC16C cable interface line card has one downstream port and six upstream ports. The upstream ports are labeled US0 through US5. The downstream port is labeled DS. See Table 3 on page 8 for a description of the LCP2 adapter card LEDs and Table 4 on page 8 for descriptions of the cable interface line card LEDs and their functions.

Figure 5 shows the faceplate for the Cisco uBR10-LCP2-MC16E cable interface line card.

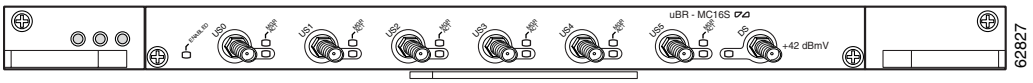
Figure 5 Cisco uBR10-LCP2-MC16E Faceplate



The Cisco uBR10-LCP2-MC16E cable interface line card has one downstream port and six upstream ports. The upstream ports are labeled US0 through US5. The downstream port is labeled DS. See Table 3 for a description of the LCP2 adapter card LEDs and Table 4 on page 8 for descriptions of the cable interface line card LEDs and their functions.

Figure 6 shows the faceplate for the Cisco uBR10-LCP2-MC16S cable interface line card.

Figure 6 Cisco uBR10-LCP2-MC16S Faceplate



The Cisco uBR10-LCP2-MC16S cable interface line card has one downstream port and six upstream ports. The upstream ports are labeled US0 through US5. The downstream port is labeled DS. There are six LEDs labeled MGR ACT (manager active) next to each upstream port. See Table 3 for a description of the LCP2 adapter card LEDs and Table 4 on page 8 for descriptions of the cable interface line card LEDs and their functions.

Cisco uBR10-LCP2-MC16x LEDs

Both the Cisco uBR10-LCP2 adapter card and the cable interface line card have their own set of status LEDs on the front of the module. The Cisco uBR10-LCP2 adapter card LEDs are described in Table 3. The Cisco uBR-MC16*x* cable interface line cards LEDs are described in Table 4 on page 8**.**

Table 3 describes the LCP2 adapter card LEDs and their functions.

Table 3 Cisco uBR10-LCP2 Adapter Card LEDs and Their Functions

LED	Status	Description
Power	Green	Indicates that the power is being supplied to the Cisco uBR10-LCP2.
	Off	Power is off.
Status	Yellow	Indicates that the Cisco uBR10-LCP2 is in the boot up process, is in self test mode, or is downloading code.
	Green	Indicates that the Cisco uBR10-LCP2 has successfully completed the boot, the self test, and the code download process.
Status LED on N+1 or redundant card in chassis	Blinking Green	Indicates that the board is in standby or protect card mode.
Maintenance	Off	Normally off to indicate that there is no maintenance action required.
	Yellow	Indicates that it is safe to remove the entire assembly (Cisco uBR10-LCP2 adapter card and Cisco uBR-MC16*x* cable interface line card) from the chassis.

Table 4 on page 8 describes the cable interface line card LEDs and their functions.

Table 4 Cisco uBR-MC16x Cable Interface Line Card LEDs and Their Functions

LED	Status	Description
Enables	Green	Cable interface line card is operating normally, is receiving DC power from the router midplane, and is configured for operation.
	Off	Either the card is shut down or the slot is not working.
Upstream	Green	Upstream path is enabled and configured (each upstream port).
	Off	Either the port is not properly configured or is shut down, or the slot is not working.

Table 4 Cisco uBR-MC16x Cable Interface Line Card LEDs (Continued)and Their Functions (Continued)

LED	Status	Description
Downstream	Green	Downstream path is enabled and is configured (each downstream port).
	Off	Either the port is not properly configured or is shut down, or the slot is not working.
MGR ACT (uBR-MC16S only)	Green	Spectrum management activity on the channel.
	Off	Spectrum management is not active.

Technical Specifications

Table 5 lists the specifications for the Cisco uBR10-LCP2-MC16C, Cisco uBR10-LCP2-MC16E, and Cisco uBR10-LCP2-MC16S cable interface line cards.

Table 5 Cisco uBR10-LCP2-MC16C/MC16E/MC16S Cable Interface Line Card Specifications

Description	Specifications
Product order number	• UBR10-LCP2, UBR10-LCP2= • UBR10-LCP2-MC16E, UBR10-LCP2-MC16E= • UBR10-LCP2-MC16C, UBR10-LCP2-MC16C= • UBR10-LCP2-MC16S, UBR10-LCP2-MC16S= • UBR10-MC-Cover=
Card dimensions (overall)	• Height: 21.25 in (53.96 cm) • Width: 1.4 in (3.56 cm) • Depth: 16.5 in (41.91 cm)
Weight	12 lb. (5.44kg)
Power consumption	80 W (273.15 btu[1])
MTBF	• UBR10-LCP2-MC16C — 138,769 hours • UBR10-LCP2-MC16E — 134,698 hours • UBR10-LCP2-MC16S — 110,946 hours
Facility 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%

Table 5 Cisco uBR10-LCP2-MC16C/MC16E/MC16S Cable Interface Line Card Specifications

Description	Specifications
Operating altitude	–197 to 13,123 ft (– 60 to 4000 m)
Cisco IOS software minimum requirements	• Cisco uBR10-LCP2-MC16C—Cisco IOS Release 12.2(4)XF or a later release • Cisco uBR10-LCP2-MC16E—Cisco IOS Release 12.2(4)XF or a later release • Cisco uBR10-LCP2-MC16S—Cisco IOS Release 12.2(8)BC2 or a later release

1. British Thermal Units

Safety Information and Warnings

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

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

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.

Warning Definition

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

주의　중요 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

Aviso　**INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES

Advarsel　**VIGTIGE SIKKERHEDSANVISNINGER**

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemesbeskadigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER

تحذير　**إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في أخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز.
قم بحفظ هذه الإرشادات

Upozorenje

VAŽNE SIGURNOSNE NAPOMENE

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE

Upozornění

DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

Προειδοποίηση

ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה

הוראות בטיחות חשובות

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כד לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena

ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.

ЧУВАЈТЕ ГИ ОВИЕ НАПАТСТВИЈА

Ostrzeżenie **WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie **DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY**

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD

Removing and Replacing a Cisco uBR10-LCP2-MC16x Cable Interface Line Card

Note This procedure applies to the Cisco uBR10-LCP2-MC16C, the Cisco uBR10-LCP2-MC16E, and the Cisco uBR10-LCP2-MC16S cable interface line cards.

To remove and replace an individual cable interface line card you need the following tools and parts:

- Replacement cable interface line card (order number UBR10-LCP2-MC16C=, UBR10-LCP2-MC16E=, UBR10-LCP2-MC16S=).
- ESD-preventive wrist strap.
- Antistatic surface or antistatic bag.
- Blank line card Cisco UBR10-MC-COVER= (if you are not replacing the card with another card).

Note For proper cooling and airflow, you must always install a blank cable interface line card cover in a blank line card slot. The product order number for the blank cable interface line card cover is Cisco UBR10-MC-COVER=.

Unpacking a Cisco uBR10-LCP2-MC16x Cable Interface Line Card

Tip Make sure that you are using the ESD-preventive wrist strap.

Step 1 Open the shipping carton by cutting the packing tape along the flaps on the top of the box.

Step 2 Remove the Cisco uBR10-LCP2-MC16*x* cable interface line card from the packaging.

Step 3 Place the card on an antistatic surface.

Removing a Cisco uBR10-LCP2-MC16x Cable Interface Line Card

Tip To prevent alarms from activating, you must administratively shut down a cable interface line card before hot swapping it. Refer to the *S*hutting Down and Restarting the Interface in the *Cisco uBR7200 Series Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/inter_c/icdoverv.htm

Otherwise, inform the network administrator that this portion of the network will be temporarily interrupted. If the maintenance LED is on, you can remove the cable interface line card without affecting systems operations.

Use the following procedure to remove an existing cable interface line card from the Cisco uBR10012 chassis.

Step 1 Attach an antistatic wrist strap to your wrist and to a bare metal, unpainted surface on the chassis or frame.

Step 2 Face the back of the Cisco uBR10012 chassis. Clear enough interface and power cables to allow sufficient space to work.

Step 3 If installing a new cable interface line card in a blank slot, remove the blank slot cover and discard it. Otherwise, disconnect all coaxial cables from the cable interface line card being replaced or removed.

Step 4 Unscrew the top and bottom captive screws on the cable interface line card (Figure 7).

Step 5 Simultaneously pivot both ejector levers away from each other to disengage the cable interface line card from the backplane (Figure 8).

Step 6 Slide the cable interface line card out of the slot and place it on an antistatic surface or in an antistatic bag (Figure 9).

Step 7 If you are installing a new or replacement cable interface line card, continue with the next procedure. Otherwise, install a blank cover over the slot and screw down its captive screws to conclude this procedure.

Note For proper cooling and airflow, you must always install a blank cable interface line card cover in a blank line card slot. Product order number Cisco UBR10-MC-COVER=.

Figure 7 Locating the Captive Screws

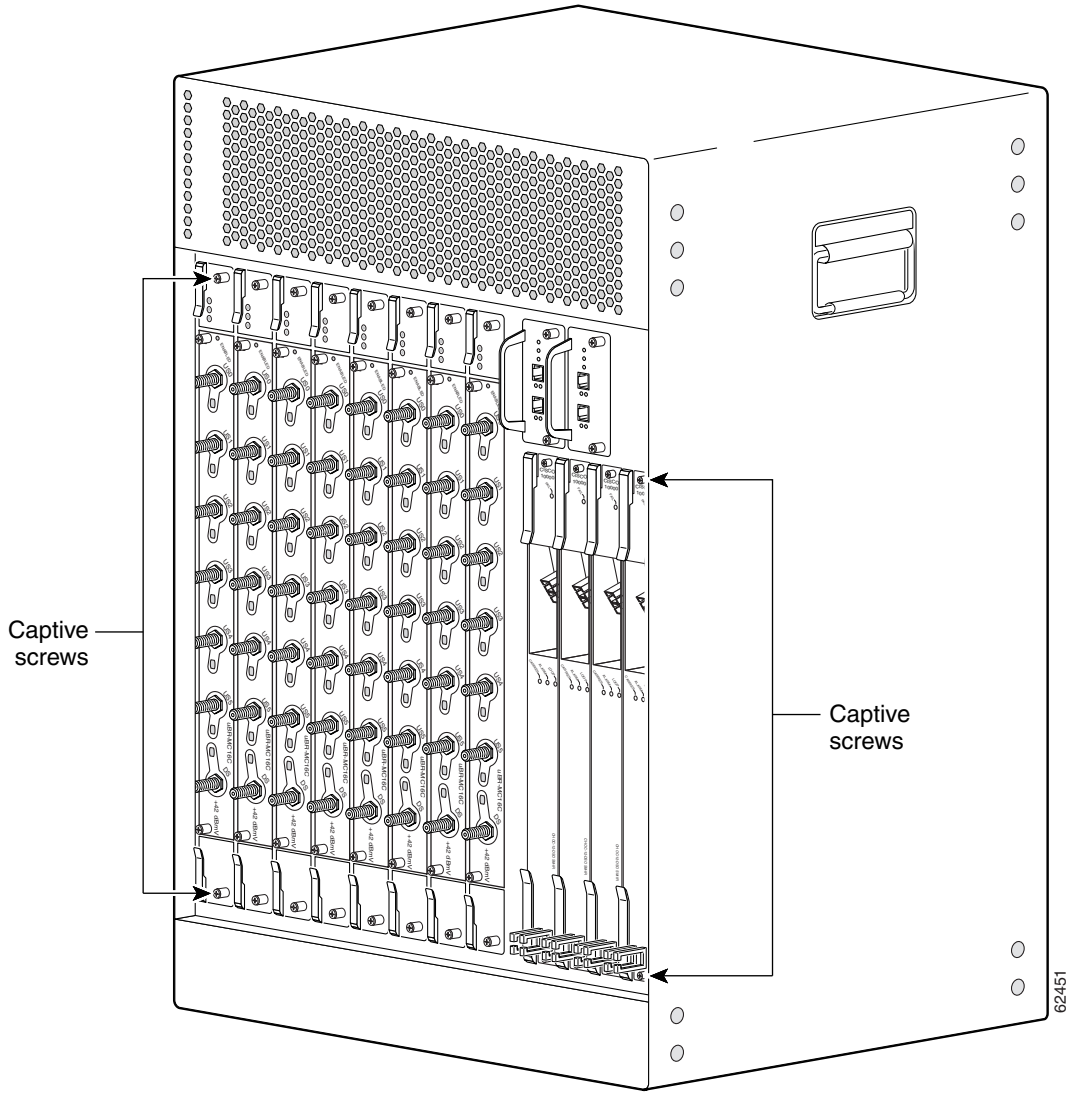


Figure 8 Opening the Ejector Levers

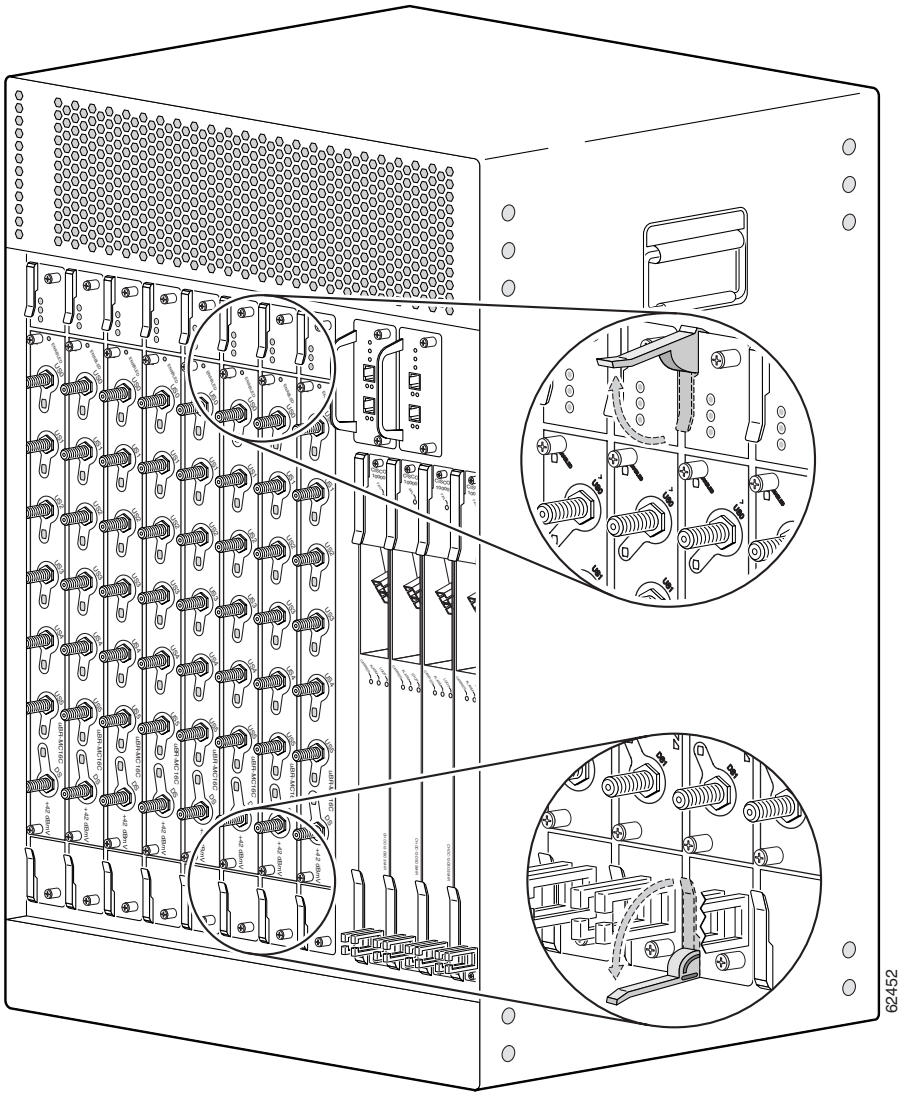
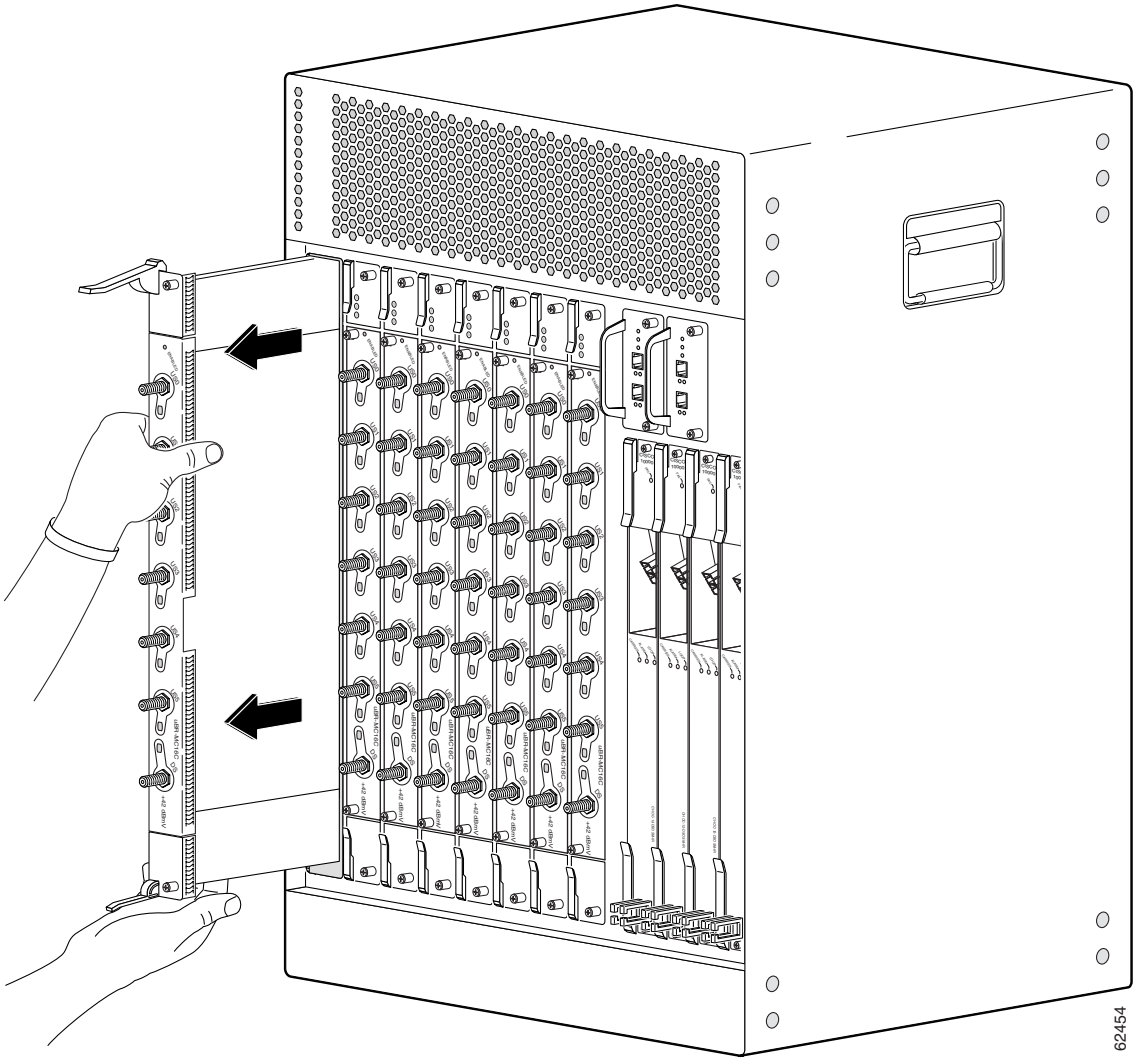


Figure 9 Removing the Cable Interface Line Card



Installing the Cisco uBR10-LCP2-MC16x Cable Interface Line Card in the Chassis

Step 1 Ensure that you are properly grounded before handling the line card.

Step 2 Grasp the faceplate of the new cable interface line card with one hand and place your other hand under the card carrier (to support the weight of the card).

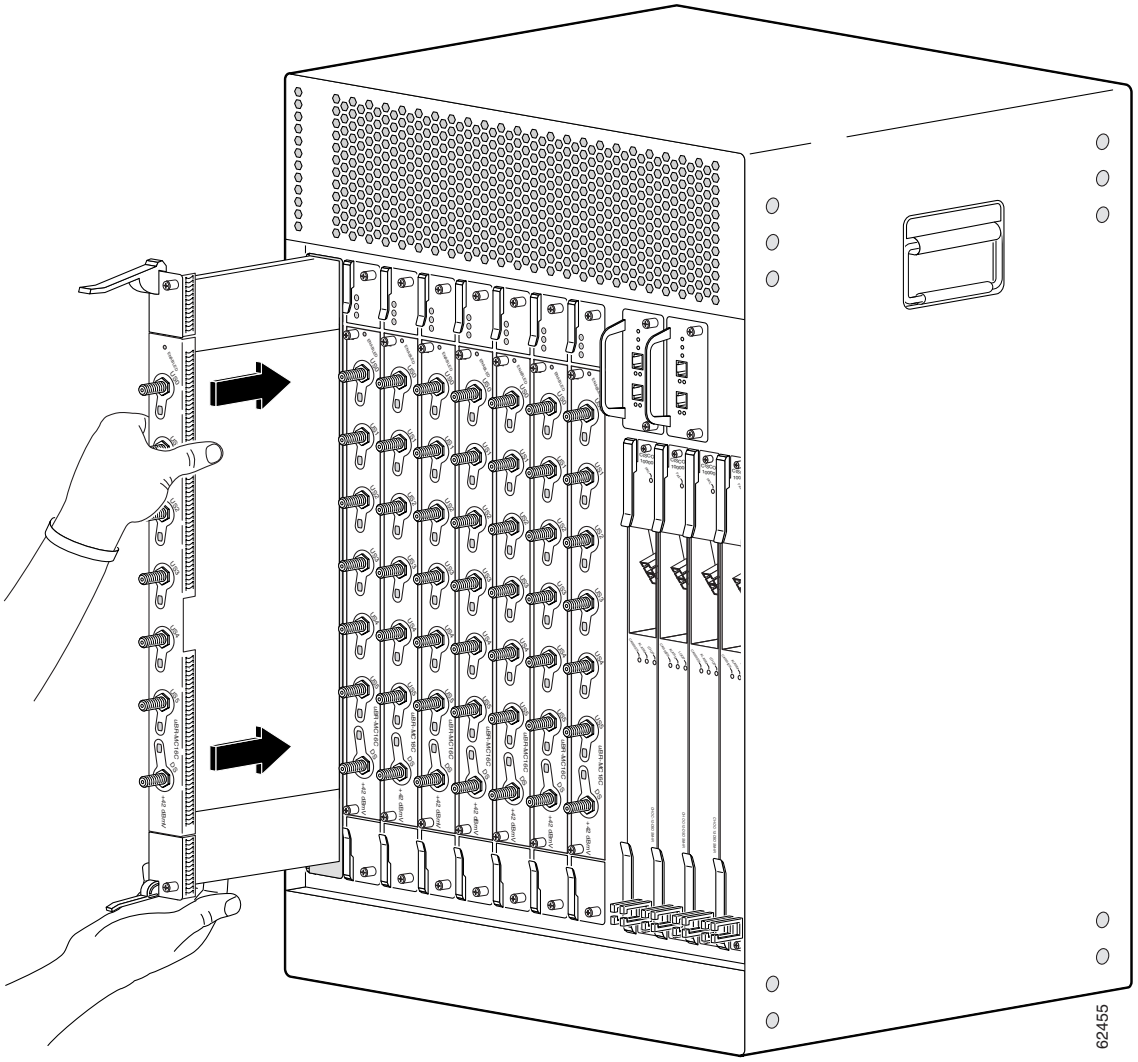
Step 3 Verify that the ejector levers are perpendicular to the faceplate. See Figure 8.

Step 4 Carefully align the upper and lower edges of the cable interface line card with the upper and lower guides in the chassis, and slide the cable interface line card into the slot until you can feel it begin to seat in the backplane connectors (Figure 10).

Step 5 To firmly seat the card in the backplane, simultaneously pivot both ejector levers toward each other until they are parallel to the faceplate (Figure 11).

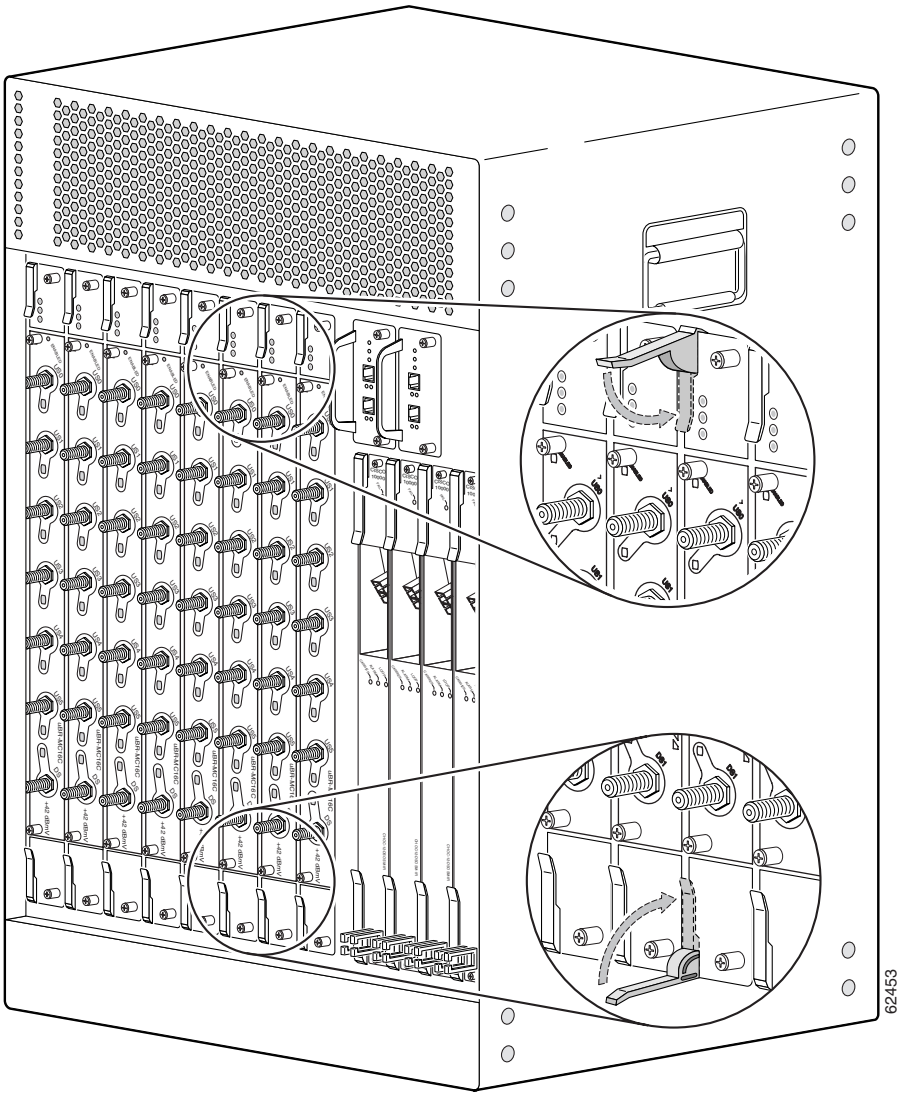
Step 6 Secure the cable interface line card in the chassis by tightening the top and bottom captive screws (see Figure 7).

Figure 10 Inserting the Cable Interface Line Card



Caution To ensure that there is adequate space for additional cable interface line cards, always tighten the captive screws on each newly installed cable interface line card *before* you insert any additional cards. These screws prevent accidental removal and provide proper grounding for electromagnetic interference (EMI) shielding.

Figure 11 Closing the Ejector Levers



Connecting the Cables

When fully inserted, the cable interface line card cycles through its power-on self-test. The Power LED comes on (green) and the Status LED comes on (yellow). If the card is operating correctly, the Status LED then turns green. If these LEDs do not operate as described, refer to the "Troubleshooting the Cisco uBR10-LCP2-MC16x Cable Interface Line Card" section on page 27 and the *Cisco uBR10012 Universal Broadband Router Hardware Installation Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/hig/index.htm.

Note It is not necessary to configure the cable interface line card if you are installing a replacement card in the identical slot. The system automatically downloads the necessary configuration information from the process routing enigne (PRE).

Step 1 Connect all downstream and upstream coaxial cables to the cable interface line card, as necessary.

Step 2 Configure the cable interface line card, if necessary. For information about configuring the cable interface line card, refer to the *Cisco uBR10012 Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/index.htm

Replacing the Line Card in the Cisco uBR10-LCP2 Adapter Card

The following section describes how to remove and replace a Cisco uBR-MC16*x* cable interface line card in the Cisco uBR10-LCP2 adapter card.

Note Do not attempt to separate or remove the cable interface line card from the Cisco uBR10-LCP2 adapter card while the combined cards are inserted in the chassis. You must remove the card as a unit; then, separate the line card from the LCP2 adapter card on a lab bench or other area that protects against ESD damage.

Tip To prevent alarms from activating, you must administratively shut down a cable interface line card before hot swapping it. Refer to "Shutting Down and Restarting the Interface" in the *Cisco uBR7200 Series Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/inter_c/icdoverv.htm

Refer to the release notes at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ub10krns/index.htm.

Otherwise, inform the network administrator that this portion of the network will be temporarily interrupted. If the maintenance LED is on, you can remove the cable interface line card without affecting systems operations.

Removing the Cable Interface Line Card from the Adapter Card

Note The Cisco uBR-MC16S main board also includes a daughter card . This daughter card is an integral part of the card assembly and cannot be removed in the field.

Step 1 Ensure that you are properly grounded before handling the line card.

Step 2 Remove the cable interface line card from the chassis. See the "Removing a Cisco uBR10-LCP2-MC16x Cable Interface Line Card" section on page 17.

Step 3 Place the cable interface line card on an antistatic surface, omponent side facing up (see Figure 12).

Step 4 Loosen and remove the two sets of retaining nuts and washers on the L-brackets on the cable interface line card and set the nuts and washer aside.

Step 5 Loosen the two captive screws on the cable interface line card. See Figure 12.

Step 6 To disengage the Cisco cable interface line card from the Cisco uBR10-LCP2 adapter card, simultaneously grip the ejector levers and the ejector tabs with your thumbs and index fingers.

Step 7 Press the ejector levers back against the ejector tab. The card snaps loose from the adapter card.

Step 8 Pull the cable interface line card straight out of the adapter card with the handle. See Figure 14.

Step 9 Place the removed cable interface line card aside on an antistatic surface.

Figure 12 Removing the Nuts and Washers

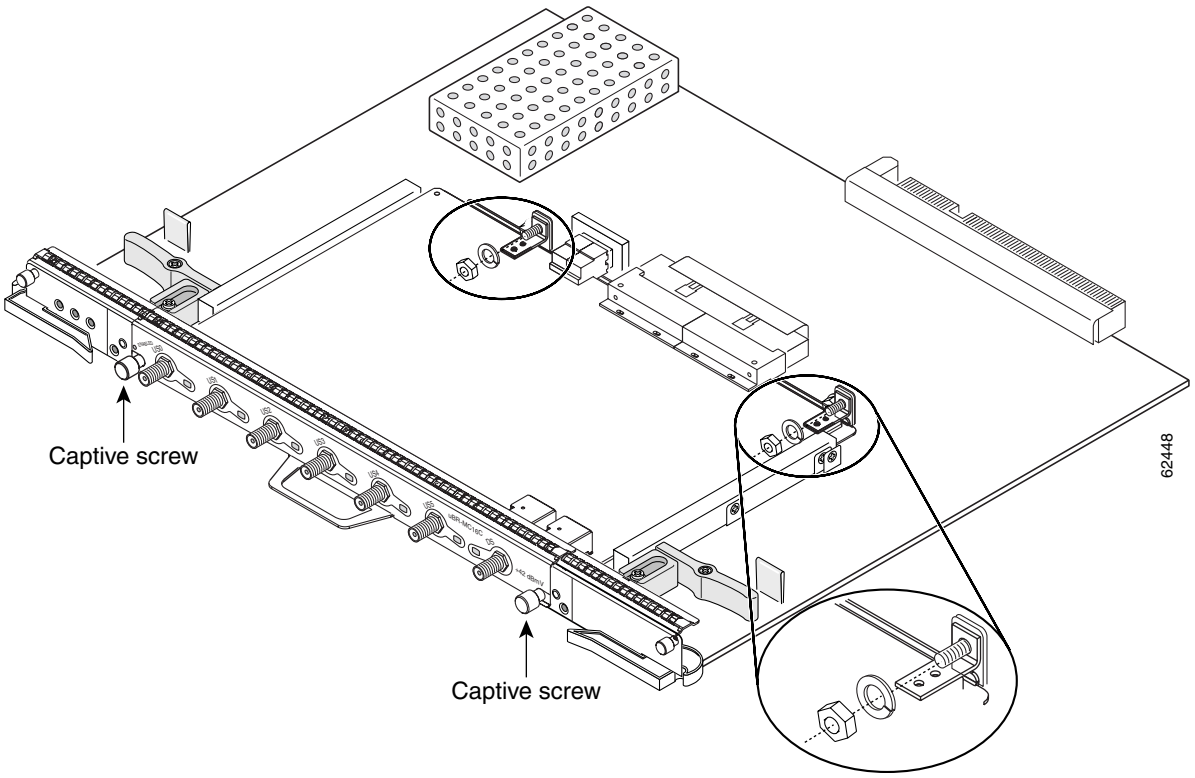


Figure 13 Ejecting the Cable Interface Line Card from the Adapter Card

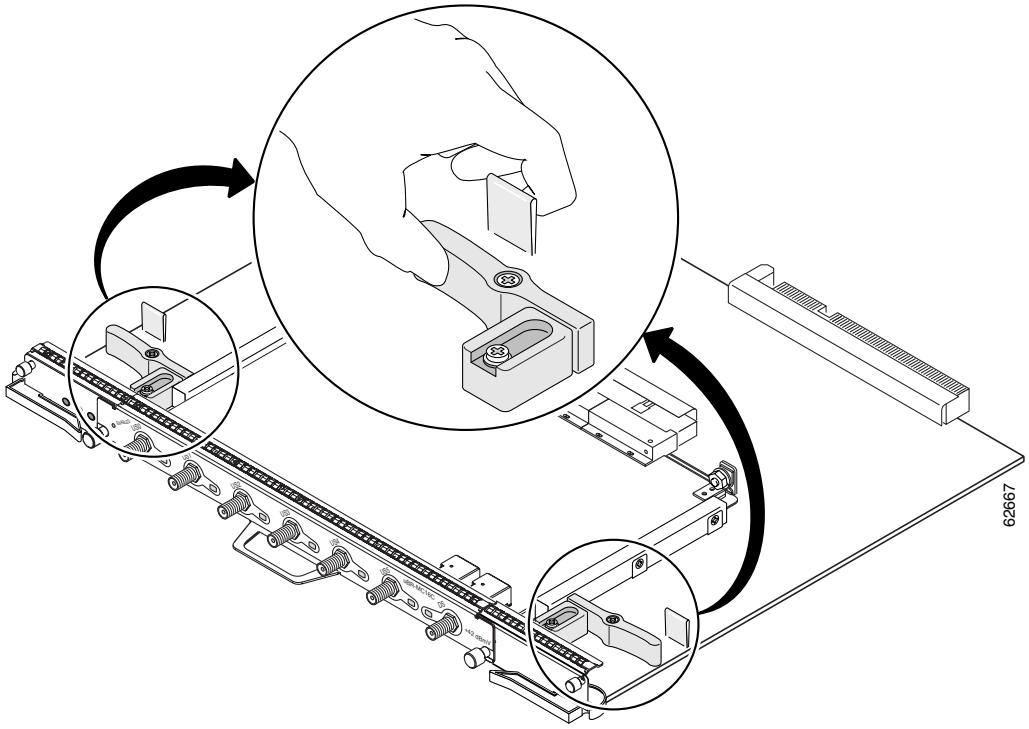
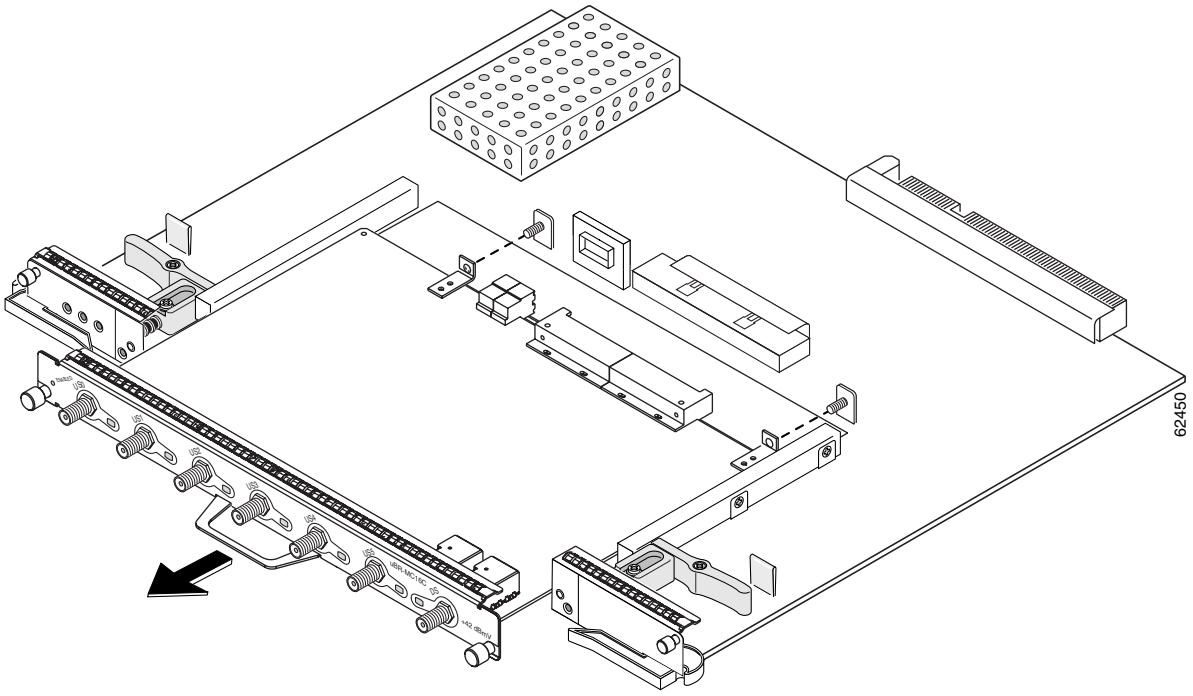


Figure 14 Removing the Cisco uBR-MC16x Cable Interface Line Card from the Adapter Card



Installing the Cisco uBR MC16x Cable Interface Line Card in the Adapter Card

Step 1 Ensure that you are properly grounded before handling the line card.

Step 2 Align the Cisco uBR10-MC16*x* cable interface line card with the guide rails on the Cisco uBR10-LCP2 adapter card. Ensure that the bottom of the cable interface line card is flush with the bottom of the LCP2 adapter card.

Step 3 Slide the new cable interface line card into the adapter card slowly, making sure that the card is sliding under the spring guides and into the guides (see Figure 3 on page 7).

Step 4 Continue pushing on the front of the card until the connectors on the card are firmly seated in the connectors on the adapter card. The ejector levers on each side of the card snap into place when the card is fully inserted.

Step 5 Verify that the power connectors are aligned with those on the adapter card.

Step 6 Continue pushing on the front of the card until the connectors on the card are firmly seated in the connectors on the adapter card. The ejector levers on each side of the card snap into place when the card is fully inserted.

Step 7 Make sure that the screws on the adapter card brackets slide cleanly into the holes in the L-brackets.

Note These brackets help align the Cisco uBR10-LCP2 adapter card and Cisco uBR-MC16*x* cable interface line card and hold the cable interface line card and the adapter card together.

Step 8 Tighten the captive screws on the cable interface line card to secure it to the LCP2 adapter card. See Figure 12 on page 24.

Step 9 Replace the retaining washers and retaining nuts on the L-brackets (see Figure 13 on page 25). Make sure that they are finger-tight.

Step 10 To secure the adapter card to the cable interface line card, turn the nuts a half-turn with the wrench.

Replacing the Cisco uBR10-LCP2-MC16x Cable Interface Line Card in the Chassis

Tip It is not necessary to configure the cable interface line card if you are installing a replacement card in the identical slot. The system automatically downloads the necessary configuration information from the PRE.

Step 1 Ensure that you are properly grounded before handling the line card.

Step 2 Grasp the faceplate of the new cable interface line card with one hand and place your other hand under the card carrier (to support the weight of the card) and position the card in front of the card cage slot.

Step 3 Carefully align the upper and lower edges of the cable interface line card with the upper and lower guides in the chassis, and slide the card into the slot until you can feel it begin to seat in the backplane connectors (Figure 10 on page 21).

Step 4 Simultaneously pivot both ejector levers toward each other (until they are parallel to the faceplate) to firmly seat the card in the backplane (Figure 11 on page 22).

Step 5 Secure the cable interface line card in the chassis by tightening the top and bottom captive screws (see Figure 7 on page 18).

Caution To ensure that there is adequate space for additional cable interface line cards, always tighten the captive screws on each newly installed card *before* you insert any additional cards. These screws prevent accidental removal and provide proper grounding for electromagnetic interference (EMI) shielding.

Connecting the Cables

When fully inserted, the cable interface line card cycles through its power-on self-test. The Power LED is on (green) and the Status LED turns yellow. If the card is operating correctly, the Status LED then turns green. If these LEDs do not operate as described, see the "Troubleshooting the Cisco uBR10-LCP2-MC16x Cable Interface Line Card" section on page 27 and the *Cisco uBR10012 Universal Broadband Router Hardware Installation Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/index.htm.

Step 1 Connect all downstream and upstream coaxial cables to the cable interface line card, as necessary.

Step 2 Configure the cable interface line card, if necessary.

For information about configuring the cable interface line card, refer to the *Cisco uBR10012 Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/scg/index.htm

See the release notes at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/cfig_nts/10494hmc.htm.

Troubleshooting the Cisco uBR10-LCP2-MC16x Cable Interface Line Card

To help isolate a problem with a card, check the following:

Step 1 Are *all* enabled LEDs on?

If yes, the system is operational.

Step 2 Are *any* enabled LEDs off?

a. If the enabled LED on a cable interface line card is off, first verify that the card has been enabled and configured for operations. The enabled LED remains off when a card has not been configured and enabled.

b. If a port has been enabled but its corresponding enabled LED is still off, check to see if the card has pulled away from the router. Reseat the card in its slot. You do not have to turn off the system power when removing or replacing a card. After the system reinitializes the interfaces, the enabled LED on the cable interface line card should come on.

c. If the enabled LED remains off after the above checks, it is likely that the system has detected a processor hardware failure. Contact a service representative for instructions. Refer to "Obtaining Technical Assistance" section on page 30.

Related Documentation

For more information, see the following:

- *Cisco uBR10012 Universal Broadband Router Hardware Installation Guide*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/hig/index.htm
- *Cisco uBR10-LCP2-MC28C Cable Interface Line Card for the Cisco uBR10012 Router*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/frus/ub10clcp.htm
- *Cisco uBR10012 Universal Broadband Router Software Configuration Guide*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/scg/index.htm
- *Cisco uBR10012 Universal Broadband Router Software Features*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/ub10ksw/index.htm
- *Cisco uBR10000 Series Universal Broadband Router Release Notes*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ub10krns/index.htm
- *Cisco Cable Modem Termination Ssystem Feature Guide*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/cmtsfg/index.htm
- *Installing a Cisco uBR10-LCP2-MCxx Cable Interface Line Card Quick Start Guide*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/index.htm
- *Cisco uBR7200 Series Universal Broadband Software Features*
  http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/ub7200sw/index.htm
- For more Cisco cable products information, go to the following URL:
  http://www.cisco.com/warp/public/44/jump/cable.shtml
- For more specific information on Cisco uBR10-LCP2-MC16S capabilities and programming, refer to:
  - *Cisco uBR10012 Universal Broadband Router Software Configuration Guide* at the following URL:
    http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/index.htm
  - *Advanced Spectrum Management Feature for the Cisco uBR-MC16S Cable Interface Line Card* at the following URL:
    http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/ub7200sw/index.htm
  - *Cisco uBR7200 Dynamic Upstream Modulation*at the following URL:
    http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/ub7200sw/index.htm

Note The advanced hardware-based spectrum management features on the Cisco uBR10-LCP2-MC16S cable interface line card must be enabled by Cisco IOS software. At the time of this document's publication, no Cisco IOS software supports the advanced hardware-based spectrum management feature. Check the release notes for succeeding Cisco IOS releases for information on this support.

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

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/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/index.shtml

- 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 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 card (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.

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

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 automatically provides recommended solutions. If your issue is not resolved using the recommended resources, your service request will be 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/

- The Cisco *Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:

  http://cisco.com/univercd/cc/td/doc/pcat/

- *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

This document is to be used in conjunction with the documents listed in the Obtaining Documentation section.