

Cisco NCS 2000 Series Hardware Installation Guide

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Preface

Note The terms “Unidirectional Path Switched Ring” and “UPSR” may appear in Cisco literature. These terms do not refer to using Cisco NCS products in a unidirectional path switched ring configuration. Rather, these terms, as well as “Path Protected Mesh Network” and “PPMN”, refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This section explains the objectives, intended audience, and organization of this publication and describes the conventions that convey instructions and other information.

The sections are:

- Revision History, on page xvii
- Document Objectives, on page xviii
- Audience, on page xviii
- Document Organization, on page xviii
- Related Documentation, on page xx
- Document Conventions, on page xx
- Obtaining Optical Networking Information, on page xxvi
- Obtaining Documentation, Obtaining Support, and Security Guidelines, on page xxvii

Revision History

Date	Notes
October 2019	Updated for R11.1
April 2017	Updated for R10.6.2.
March 2017	Added a note to DLP-L78 and DLP-L29.
November 2016	Included R 10.6.1 features.
July 2016	Updated the section, “Filler and Blank Cards” in the chapter, “Installing and Configuring the Control Card”.

Date	Notes
June 2016	Updated the bandwidth specifications for NCS 2006 in the appendix, “Hardware Specifications”.
January 2016	Added content for the Cisco NCS 2015 AC chassis.
September 2015	Added content about the NCS 2015 Z-bracket and deep door.
July 2015	Added content for the Cisco NCS 2015 DC chassis.
June 2015	Added a note in the section “Alarm Connectors” in the chapter “Installing the Cisco NCS 2006 Door and Other Modules”.
December 2014	Added content for the NCS2006-DC40 power module.
November 2013	This is the first release of this publication.

Document Objectives

This document explains installation, turn up, provisioning, and maintenance for Cisco NCS 2002 and Cisco NCS 2006, and Cisco NCS 2015 systems. Use this document in conjunction with the appropriate publications listed in the Related Documentation, on page xx section.

Audience

To use this publication, you should be familiar with Cisco or equivalent optical transmission hardware and cabling, telecommunications hardware and cabling, electronic circuitry and wiring practices, and preferably have experience as a telecommunications technician

Document Organization

Title	Summary
Overview, on page 1	Provides an overview of the Cisco NCS (ANSI and ETSI), NCS 2002, NCS 2006, and NCS 2015 shelf install.
Preparing to Install the Cisco NCS 2002, NCS 2006, and NCS 2015 Shelf, on page 13	Explains how to prepare for the NCS(ANSI and ETSI), NCS 2002, NCS 2006, and NCS 2015 shelf install.
Cisco NCS 2002 Installation Overview, on page 27	Provides an overview of the steps involved to install the NCS 2002.
Mounting the Cisco NCS 2002 Brackets, on page 45	Explains how to mount the Cisco NCS 2002 brackets.
Mounting the Cisco NCS 2002 Shelf, on page 61	Explains how to mount the Cisco NCS 2002 shelf.

Title	Summary
Connecting Power and Ground, on page 71	Explains how to connect the power and ground for NCS 2002.
Connecting and Routing the Cables and Wires, on page 91	Explains how to connect the routing cables and wires NCS 2002.
Cisco NCS 2002 Shelf Installation Acceptance Test , on page 101	Explains how to perform the acceptance test for the NCS 2002 shelf installation.
Installing the Cisco NCS 2002 Door and Other Modules, on page 105	Explains how to install the NCS 2002 Door and other modules
NCS 2006 Installation Overview, on page 139	Provides an overview of the steps involved to install the NCS 2006.
Mounting the Brackets on NCS 2006 Shelf, on page 159	Explains how to mount the Cisco NCS 2006 brackets.
Mounting the Cisco NCS 2006 Shelf, on page 181	Explains how to mount the Cisco NCS 2006 shelf.
Connecting Power and Ground, on page 193	Explains how to connect the power and ground NCS 2006.
Connecting and Routing the Cables, on page 213	Explains how to connect the routing cables and wires for NCS 2006.
NCS 2006 Shelf Installation Acceptance Test, on page 231	Explains how to perform the acceptance test for the NCS 2006 shelf installation.
Installing the Cisco NCS 2006 Door and Other Modules, on page 233	Explains how to install NCS 2002 Door and other modules
NCS 2015 Installation Overview, on page 277	Provides an overview of the steps involved to install the NCS 2015.
Mounting the Brackets on the NCS 2015 Shelf, on page 279	Explains how to mount the Cisco NCS 2015 brackets.
Mounting the Cisco NCS 2015 Shelf, on page 287	Explains how to mount the Cisco NCS 2015 shelf.
Connecting Power and Ground, on page 299	Explains how to connect the power and ground NCS 2015.
Connecting and Routing the Cables, on page 317	Explains how to connect the routing cables and wires for NCS 2015.
NCS 2015 Shelf Installation Acceptance Test, on page 327	Explains how to perform the acceptance test for the NCS 2015 shelf installation.
Installing the Cisco NCS 2015 Door and Other Modules, on page 329	Explains how to install NCS 2015 Door and other modules
Installing and Configuring the Control Card, on page 359	Explains how to install and configure the control card for NCS 2002, NCS 2006, and NCS 2015.

Title	Summary
Multishelf Management, on page 367	Explains how to manage multi shelves in NCS 2015, NCS 2006, and ONS 15454 shelves.
Maintaining the NCS 2002, NCS 2006, and NCS 2015 Shelves, on page 401	Explains how to maintain the NCS 2002, NCS 2006, and NCS 2015 shelf installations
Hardware Specifications, on page 423	Provides hardware specifications of the NCS (ANSI and ETSI), NCS 2002, NCS 2006, and NCS 2015 shelves.

Related Documentation

Use the Cisco NCS 2000 Series Hardware Installation Guide in conjunction with the following referenced publications:

- *Cisco NCS 2000 Series Control Card and Node Configuration Guide*
- *Cisco NCS 2000 Series Network Configuration Guide*
- *Cisco NCS 2000 Series Line Card Configuration Guide*
- *Cisco NCS 2000 Series TL1 Command Guide*
- *Regulatory Compliance and Safety Information for Cisco NCS 2000 Series*
- *Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series*
- *Cisco NCS 2000 Series Troubleshooting Guide*
- *Cisco NCS 2000 Series Licensing Configuration Guide*

For an update on End-of-Life and End-of-Sale notices, refer to http://www.cisco.com/en/US/products/hw/optical/ps2006/prod_eol_notices_list.html .

Document Conventions

This document uses the following conventions:

Convention	Description
^ or Ctrl	Both the ^ symbol and Ctrl represent the Control (Ctrl) key on a keyboard. For example, the key combination **^D** or **Ctrl-D** means that you hold down the Control key while you press the D key. (Keys are indicated in capital letters but are not case sensitive.)
bold font	Commands and keywords and user-entered text appear in **bold** font.
Italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
`Courier font`	Terminal sessions and information the system displays appear in `courier` font.
`Bold Courier font`	Bold Courier font indicates text that the user must enter.
[x]	Elements in square brackets are optional.

Convention	Description
...	An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.
|	A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.
[x | y]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
{x | y}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Reader Alert Conventions

This document uses the following conventions for reader alerts:



Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.



Tip Means *the following information will help you solve a problem.*



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



Timesaver Means *the described action saves time.* You can save time by performing the action described in the paragraph.



Warning **Means *reader be warned.* In this situation, you might perform an action that could result in bodily injury.**

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 آخر 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**

Obtaining Optical Networking Information

This section contains information that is specific to optical networking products. For information that pertains to all of Cisco, refer to the Obtaining Documentation, Obtaining Support, and Security Guidelines, on page xxvii section.

Where to Find Safety and Warning Information

For safety and warning information, refer to the following document that accompanied the product:

Regulatory Compliance and Safety Information for Cisco NCS 2000 Series

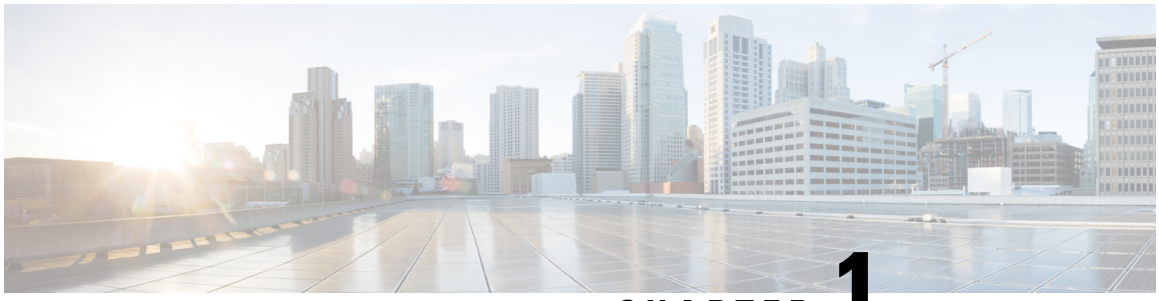
This publication describes the international agency compliance and safety information for the Cisco NCS 2002, NCS 2006, and NCS 2105 system. It also includes translations of the safety warnings that appear in the Cisco NCS system documentation.

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation* , which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.



CHAPTER 1

Overview

This chapter provides an overview of the Cisco NCS 2002, NCS 2006, and NCS 2015 shelf install.

Note The Cisco NCS shelf assemblies are intended for use with telecommunications equipment only.

The sections are:

- Compliance Standards, on page 1
- Safety Labels, on page 1
- Cisco NCS 2002 Shelf, on page 3
- Cisco NCS 2006 Shelf, on page 6
- Cisco NCS 2015 Shelf, on page 7

Compliance Standards

Install the NCS 2002, NCS 2006, and NCS 2015 shelves in compliance with your local and national electrical codes:

- United States: National Fire Protection Association (NFPA) 70; United States National Electrical Code.
- Canada: Canadian Electrical Code, Part I, CSA C22.1.
- Other countries: If local and national electrical codes, are not available, refer to IEC 364, Part 1 through Part 7.

Safety Labels

Cisco NCS 2000 Series chassis is classified as Hazard Level 1M as per IEC 60825-2 and Laser Class 1M as per IEC 60825-1, since it may include embedded or pluggable optical modules Class 1 or Class 1M.

The Class 1/1M Laser Product label is shown in the following figure.

Figure 1: Class 1/1M Laser Product Label



This section explains the significance of the safety labels attached to the NCS 2002, NCS 2006, and NCS 2015 chassis. The faceplates of the chassis are clearly labeled with warnings about the laser radiation levels.

You must understand all warning labels before working on the chassis.

Figure 2: Class 1M Laser Product Label



Safety Precaution for Module Installation and Removal

Ensure to observe the following safety precautions when you are working with the chassis modules.

Invisible laser radiations present. Statement 1016

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Figure 3: Class 1/1M Laser Product Label



Safety Precaution for Laser Radiation

Cisco NCS 2000 Series chassis is classified as Hazard Level 1M as per IEC 60825-2 and Laser Class 1M as per IEC 60825-1, since it may include embedded or pluggable optical modules Class 1 or Class 1M.

Figure 4: Class 1M Laser Product Label



Cisco NCS 2002 Shelf

The NCS 2002 is designed to comply with Telcordia GR-1089-CORE, Issue 5. The NCS 2002 provides only Type 2 and Type 4 interfaces. A single NCS 2002 shelf supports both ANSI and ETSI standards.

The NCS 2002 is Federal Information Processing Standard (FIPS) 140-2 and Common Criteria (CC) compliant.

The NCS 2002 shelf has 3 horizontal card slots —Slot 1, Slot 2, and Slot 3. While Slot 2 and Slot 3 house MSTP cards that provide 10 to 100 Gbps interconnections, Slot 1 accommodates the TNC, TNCE, TSC, or TSCE card (timing and control card). The NCS 2002 system can be powered by AC or DC power module. The NCS 2002 system contains backup flash memory that supports the database (DB) and image backup in the single mode operation. The NCS 2002 shelf can be mounted on an ANSI or an ETSI rack using the mounting brackets or air deflectors. The air deflectors orient the air flow in a specific direction. The NCS 2002 shelf can also be wall-mounted or desktop-mounted.

When installed in an equipment rack, the Cisco NCS 2002 shelf is typically connected to a fuse panel to provide distributed power for the NCS 2002. The fuse panel is a third-party equipment and is not described in this documentation. If you are unsure about the requirements or specifications for a fuse, consult the user documentation for the related equipment.

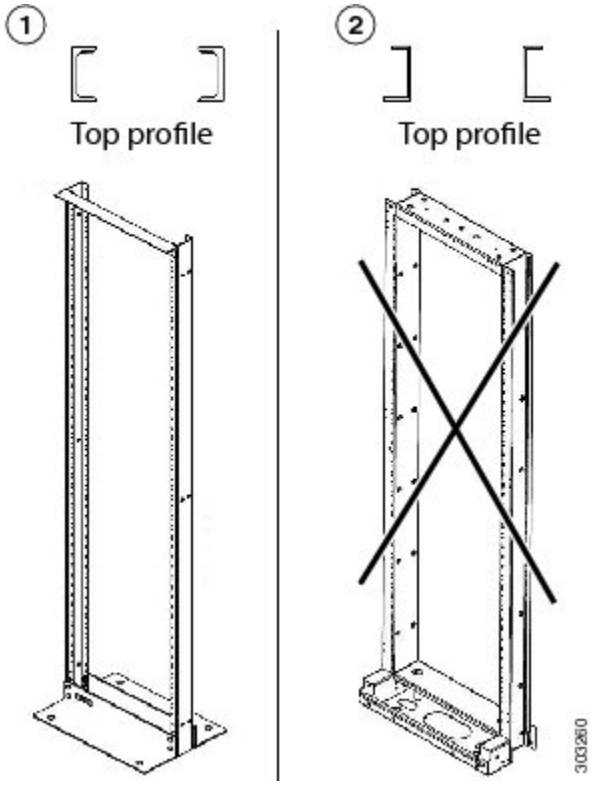
Install and operate the NCS 2002 only in environments that do not expose wiring or cabling to the outside plant.

Two types of front doors can be attached to the Cisco NCS 2002 shelf— the standard door and the deep-front panel. The front door provides access to the shelf, and acts as a protective panel. The deep-front panel provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door. It also provides more space for fiber bend radius and to manage the line card connections.The deep door does not have a hinge and cannot be rotated like the standard door. .

You can mount the NCS 2002 on a 19-inch or 23-inch ANSI rack (482.6 or 584.2 mm), or on a 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) ETSI standard equipment rack. The NCS 2002 shelf can also be wall mounted or desktop mounted. The shelf weighs approximately 11.02 pounds (5 kg) with no cards installed.

It is mandatory that the correct type of 19-inch ANSI rack is chosen to mount the NCS 2002 shelf. The recommended shape of the rack post is shown in the figure below.

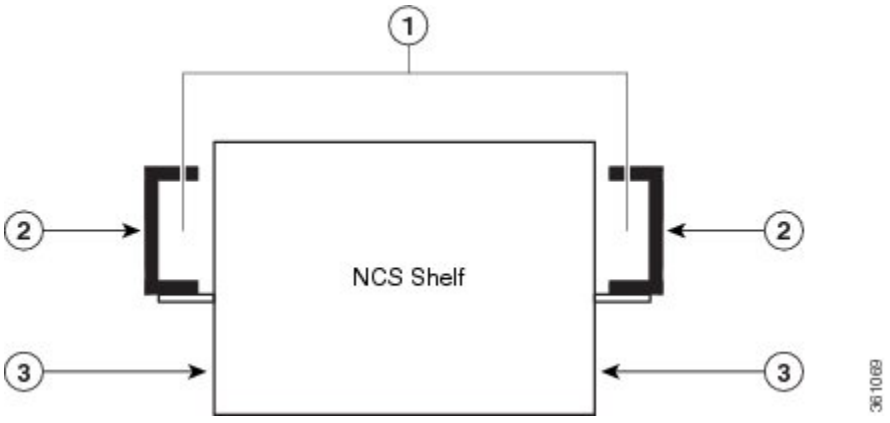
Figure 5: 19-inch ANSI Rack Post Recommended for Cisco NCS 2006 and 2002 Shelves



1	19-inch ANSI rack recommended for the Cisco NCS 2006 shelf	2	19-inch ANSI rack prohibited for the Cisco NCS 2002 shelf

For proper airflow and cooling of the shelf, the shape of the vertical posts of the rack should be such that the airflow vents are not covered. There must be sufficient space between the shelf side walls, and the vertical walls of the rack post that are parallel to the shelf side walls, as shown in the figure below.

Figure 6: 19-inch Rack Opening for Air Flow



1	Empty space for air flow	2	Rack

3	Shelf side wall		

For information on hardware and software specifications for the NCS ETSI shelf, refer to the NCS 2002 Shelf Specifications, on page 423.

Cisco NCS 2006 Shelf

The NCS 2006 is designed to comply with Telcordia GR-1089-CORE, Issue 5.

The NCS 2006 provides only Type 2 and Type 4 interfaces. A single NCS 2006 shelf supports both ANSI and ETSI standards.

The NCS 2006 is FIPS 140-2 and CC compliant.

The NCS 2006 shelf has 8 horizontal card slots numbered 1 to 8. While Slot 2 to Slot 7 house MSTP cards that provide 10 to 100 Gbps interconnections, Slot 1 and Slot 8 accommodate the TNC, TNCE, TSC, or TSCE cards (timing and control cards). The NCS 2006 system can be powered by redundant AC or DC power modules. A single power module (AC or DC) can be used to power up the entire NCS 2006 system. The NCS 2006 system contains backup flash memory that supports the database (DB) and image backup in the single mode operation.

The front door of the NCS 2006 shelf allows access to the shelf, fan-tray assembly, fiber-routing area, power connectors, external alarms and controls, timing input and output, and craft interface terminals. Two types of front doors can be attached to the NCS 2006 shelf—the standard door and the deep-front panel. The front door provides access to the shelf, and acts as a protective panel. The deep-front panel provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door. It also provides more space for fiber bend radius and to manage the line card connections.The deep door does not have a hinge and cannot be rotated like the standard door. The fiber or cable guide used in the NCS 2006 shelf provides improved fiber management.

The NCS 2006 is mounted on a 19-inch or 23-inch ANSI rack, or on a 600 x 600-mm or 600 x 300-mm ETSI standard equipment rack. The rack mounting is done using the mounting brackets or air deflectors. The air deflectors orient the air flow in a specific direction.

Depending on the position of the mounting bracket, the chassis may project to different distances outside the rack. If the chassis projects outside the rack, the cabinet doors must be kept open (if present). The table below displays the details below:

Door Type	Chassis Depth (mm)	Bracket Mount Position	Chassis Projection Outside Rack (mm)
Standard door	287 mm	Front mount	50 mm
Standard door	287 mm	Mid mount	135 mm
Deep door	337 mm	Front mount	100 mm
Deep door	337 mm	Mid mount	185 mm

It is mandatory that the correct type of 19-inch ANSI rack is chosen to mount the NCS 2006 shelf. For proper airflow and cooling of the shelf, the shape of the vertical posts of the rack should be such that the airflow vents are not covered. There must be sufficient space between the shelf side walls, and the vertical walls of the rack post that are parallel to the shelf side walls.

When installed in an equipment rack, the Cisco NCS 2006 shelf is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the NCS 2006. Fuse and alarm panels are third-party equipment and are not described in this documentation. If you are unsure about the requirements or specifications for a fuse and alarm panel, consult the user documentation for the related equipment.

The shelf with preinstalled air filter weighs approximately 23.55 pounds (10.680 kg) with no cards installed.

Note Install and operate the NCS 2006 only in environments that do not expose wiring or cabling to the outside plant.

For information on hardware and software specifications for the NCS ETSI shelf, see the NCS 2006 Shelf Specifications, on page 426.

Cisco NCS 2015 Shelf

Watch the video for a brief overview of the Cisco NCS 2015 shelf.

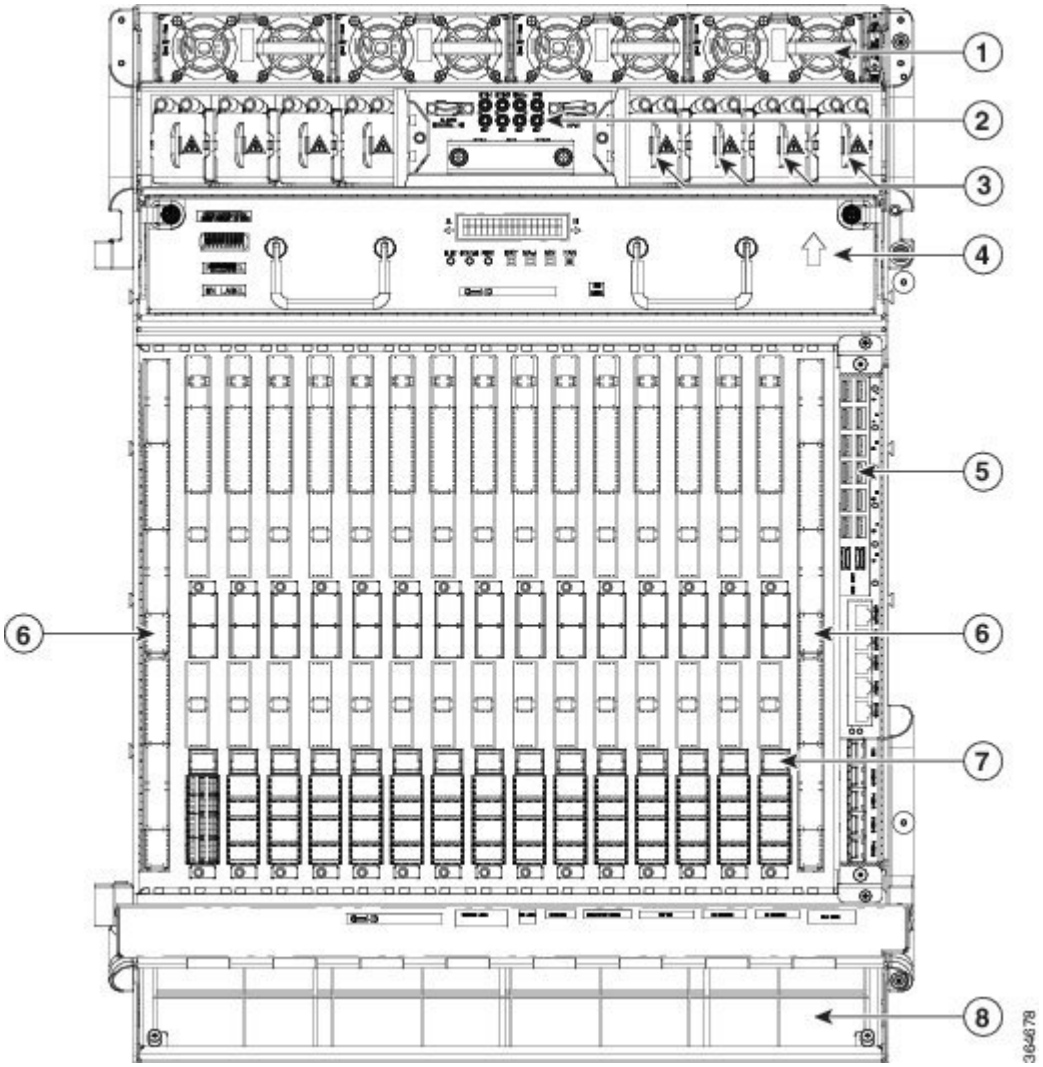
The NCS 2015 is designed to comply with Telcordia GR-1089-CORE and Telcordia GR-63-CORE.

The NCS 2015 provides only Type 2 interfaces. A single NCS 2015 shelf is 14 rack units (RU) and supports both ANSI and ETSI standards.

The NCS 2015 is FIPS 140-2 and CC compliant.

The NCS 2015 shelf has 18 vertical slots numbered 1 to 18. Slot 2 to Slot 16 is for line cards that provide 10 to 100 Gbps interconnections. Slot 1 and Slot 17 is for the TNCS or TNCS-O cards (timing and control cards). Slot 18 is for the external connection unit (ECU). The NCS 2015 system can be powered by redundant AC or DC power modules. The maximum chassis power is 5250 W. The NCS 2015 system contains backup flash memory that supports the database (DB) and image backup in the single mode operation. The LCD unit is integrated with the fan tray assembly. The following figure shows the front view of the Cisco NCS 2015 DC chassis.

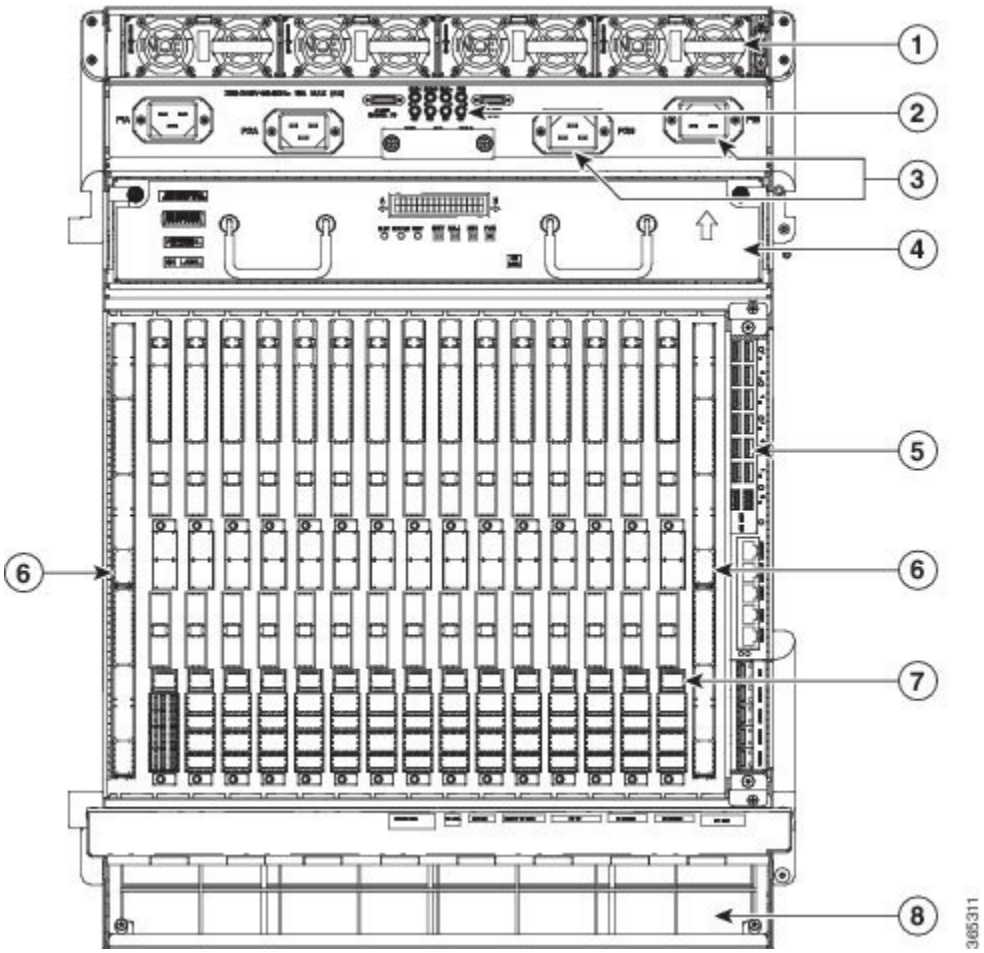
Figure 7: Front View of the NCS 2015 DC Chassis



1	Power modules	2	Alarm dry contacts and BITS in the power input panel
3	DC termination blocks	4	Fan tray assembly with LCD panel
5	External connection unit (ECU)	6	TNCS/TNCS-O cards in slots 1 and 17
7	Line cards	8	Air inlet

The following figure shows the front view of the Cisco NCS 2015 AC chassis.

Figure 8: Front View of the NCS 2015 AC Chassis

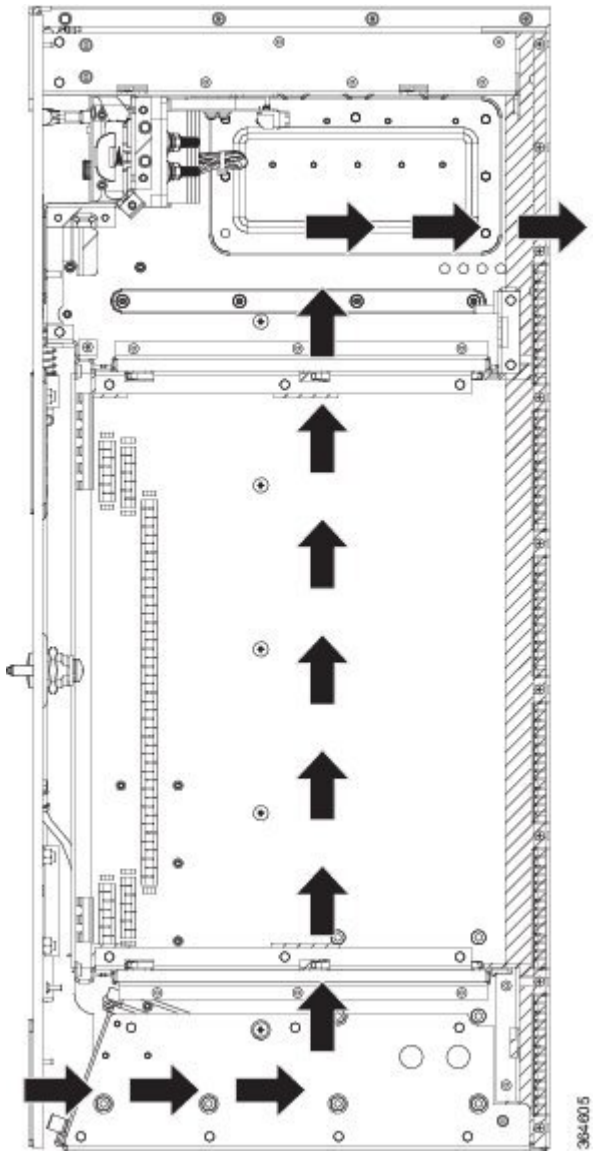


1	Power modules	2	Alarm dry contacts and BITS in the power input panel
3	AC cable connectors	4	Fan tray assembly with LCD panel
5	External connection unit (ECU)	6	TNCS/TNCS-O cards in slots 1 and 17
7	Line cards	8	Air inlet

The front door of the NCS 2015 shelf allows access to the shelf, fan-tray assembly, fiber-routing area, power connectors, external alarms and controls, timing input and output, and craft interface terminals. The front door also acts as a protective panel. The fiber or cable guide used in the NCS 2015 shelf provides improved fiber management.

The air in the NCS 2015 chassis is drawn in through a two-inch inlet at the bottom of the chassis, and expelled at the top-rear as seen in the following figure.

Figure 9: Airflow Direction in the NCS 2015 DC Chassis



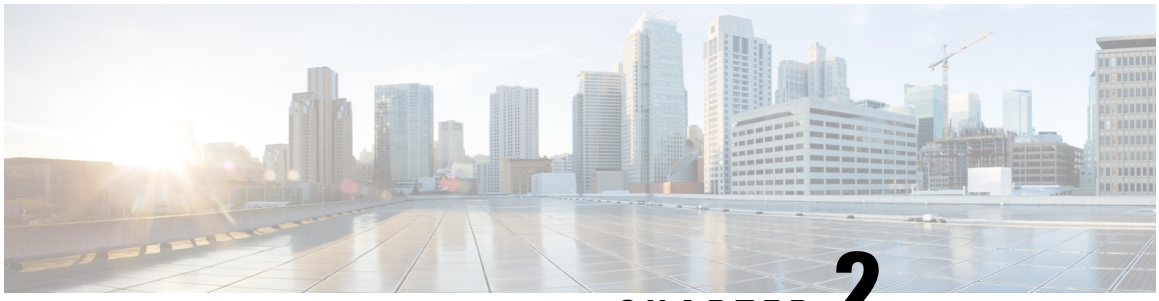
The NCS 2015 is mounted on a 19-inch or 23-inch ANSI rack (482.6 or 584.2 mm), or on a 600 x 300-mm (23.6 x 11.8-inch) ETSI standard equipment rack. The rack is mounted using mounting brackets.

When installed in an equipment rack, the Cisco NCS 2015 shelf is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the NCS 2015. Fuse and alarm panels are third-party equipment and are not described here. If you are unsure about the requirements or specifications for a fuse and alarm panel, consult the user documentation for the related equipment.

The empty shelf weighs approximately 69.225 pounds (31.4 kg).

Note Install and operate the NCS 2015 only in environments that do not expose wiring or cabling to the outside plant.

For information on hardware and software specifications for the NCS shelf, see the NCS 2015 Shelf Specifications, on page 432 and the datasheet.



CHAPTER 2

Preparing to Install the Cisco NCS 2002, NCS 2006, and NCS 2015 Shelf

This chapter explains how to prepare for the Cisco NCS 2002, NCS 2006, and NCS 2015 shelf install.

The sections are:

- Important Safety Recommendations, on page 13
- Required Tools and Equipment, on page 15
- Ordering Solutions for NCS 2002, NCS 2006, and NCS 2015, on page 20
- Card Slot Requirements, on page 20
- NTP-L41 Unpacking and Inspecting the Shelf, on page 23

Important Safety Recommendations



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.** Statement 274



Warning **Installation of the equipment must comply with local and national electrical codes.** Statement 1074



Warning **This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general-purpose outlet could be hazardous. The telecommunications lines must be disconnected 1) before unplugging the main power connector or 2) while the housing is open, or both.** Statement 1043

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022

Caution **This equipment is suitable for installations utilizing the insert Common Bonding Network (CBN).** Equipment Bonding Networks CBN—Statement 7013

Note These routers are designed to boot up in less than 30 minutes, provided the neighboring devices are in full operational state.

Note The NCS 2002, NCS 2006, and NCS 2015 are suitable for mounting on concrete or other noncombustible surfaces only.

Note In this chapter, “shelf” refers to the steel enclosure that holds cards and connects power, and “node” refers to the entire hardware and software system. Unless otherwise specified, NCS 2002, NCS 2006, and NCS 2015 refers to both ANSI and ETSI environments.

Note The NCS 2006 is suitable for installation in network telecommunication facilities where the National Electric Code (NEC) applies.

Required Tools and Equipment

The following sections describe the tools and equipment you need to install and test the NCS 2002, NCS 2006, or NCS 2015 shelves.

Cisco Supplied Materials

The following table lists the materials that are required to install, and are shipped with the NCS 2002, NCS 2006, and NCS 2015 shelves (wrapped in plastic). The shipped quantity of each item is in parentheses.



Note To avoid damage during shipment, either a standard front door or a temporary front door is preinstalled in the Cisco NCS 2006 shelves. If a front door is ordered, a standard front door is preinstalled. If a front door is not ordered, a temporary front door is preinstalled.

Table 1: Cisco Supplied Materials Required to Install

Cisco Supplied Material	NCS 2002	NCS 2006	NCS 2015
Brackets	**ANSI**RJ LAN bracket (1)	**ANSI**RJ LAN bracket (1)	—
Bracket Cover	**ANSI** RJ LAN cable bracket cover (1)	**ANSI** RJ LAN cable bracket cover (1)	—
Bumpers	Rubber bumpers (4)		—
Cables	Cable assembly, Ethernet, RJ-45 (1)	Cable assembly, Ethernet, RJ-45 (1)	—
Emery Cloth	Emery cloth (1)	Emery cloth (1)	Emery cloth (1)
ESD wrist strap	ESD wrist strap (disposable) (1)	ESD wrist strap (disposable) (1)	ESD wrist strap (disposable) (1)

Cisco Supplied Material	NCS 2002	NCS 2006	NCS 2015
Grounding Lug	• Double-hole grounding lug for ground connection with a wire receptacle to accommodate the recommended 13.3 mm² (#6 AWG) multistrand copper wire (1). • Double-hole grounding lug for ground connection with a wire receptacle to accommodate the recommended 13.3 mm² (#6 AWG) multistrand copper wire angled at 45 degree (1)	• Double-hole grounding lug for ground connection with a wire receptacle to accommodate the recommended 13.3 mm² (#6 AWG) multistrand copper wire (1) • Double-hole grounding lug for ground connection with a wire receptacle to accommodate the recommended 13.3 mm² (#6 AWG) multistrand copper wire angled at 45 degree (1)	Double-hole grounding lug for ground connection with a wire receptacle to accommodate the recommended 21.2 mm² (#4 AWG) multistrand copper wire (1)
Lacing Twine	Lacing twine (1)	Lacing twine (1)	—
Lock Washers	M6 lock washers (8)	**ANSI** M6 lock washers (8)	—
Mounting Brackets	Reversible ANSI 19"/23" bracket and ETSI bracket	Reversible ANSI 19"/23" bracket and ETSI bracket	ANSI 19" bracket (EIA), ANSI 23" bracket (EIA), ANSI 23” Z bracket (EIA), and ETSI bracket
Power Lug	**ANSI** Double-hole power lug for DC power connection with a wire receptacle to accommodate the recommended 8.4 mm² (#8 AWG) multistrand copper wire (1)	—	Double-hole power lug for DC power connection with a wire receptacle to accommodate the recommended 13.29 mm² (#6 AWG) multistrand copper wire. Based on the door that is installed, use either short barrel lugs or long barrel lugs: • Standard door—Use short barrel lug (16) • Deep door—Use long barrel lug (16)
Mounting bracket screws	**ANSI**#12-24 x 0.50 pan-head Phillips screws (8) **ETSI** M6.0 x 20 pan-head Phillips screws (8)	**ANSI** #12-24 x 0.50 pan-head Phillips screws (8) **ETSI** M6.0 x 20 pan-head Phillips screws (8)	**ANSI** M4.0 x 6mm flat-head Phillips screws (10) **ETSI** M4.0 x 6 flat-head Phillips screws (10)
Deep door bracket screws and washer	—	—	• M3 x 10 mm screws (10) • M3 x 8 mm screw (1) and safety washer (1)

Cisco Supplied Material	NCS 2002	NCS 2006	NCS 2015
Screws and lock washers for grounding the chassis	—	—	• M6.0 x 16mm pan-head Phillips screws (2) • M6 lock washers (2)
Tie Wraps	Tie wraps (10)	Tie wraps (10)	Tie wraps (10)
Mounting screws and washers	—	—	• **ANSI** #12-24 x 0.50 inch pan-head Phillips mounting screws (16) • **ETSI** M6 x 20 mm pan-head Phillips mounting screws (16) • Washers (16)
Screw for ground strap cable	—	—	M3 x 6 mm screw (1)
Anti-oxidant	—	—	Anti-oxidant (1)

Caution Only use the power cables that are designed to be used with the NCS 2002, NCS 2006, or NCS 2015. These are sold separately.

User Supplied Materials

The following materials, tools, and equipment are required but are not supplied with the NCS 2002, NCS 2006, and NCS 2015.

Table 2: User Supplied Materials

User Supplied Material	NCS 2002	NCS 2006	NCS 2015
Bit error rate (BER) tester	—	—	—
BNC insertion tool	—	—	—
Chassis grounding, connecting power	1/4" socket wrench, sockets, and a torque wrench	1/4" socket wrench, sockets, and a torque wrench	1/4" socket wrench, sockets, and a torque wrench

User Supplied Material	NCS 2002	NCS 2006	NCS 2015
Cables	ANSI • Power cable (from fuse and alarm panel to assembly), #12 AWG or larger, copper conductors, 194 degrees Fahrenheit (90 degrees Celsius). • Ground cable #6 AWG stranded • Alarm cable pairs for all alarm connections, #22 or #24 AWG (0.51 mm² or 0.64 mm²), solid tinned. • 100-ohm shielded building integrated timing supply (BITS) clock cable pair #22 or #24 AWG (0.51 mm² or 0.64 mm²), twisted-pair T1-type ETSI • Copper ground cable 13.3-mm² (#6 AWG) stranded, specified for up to 90 degrees Celsius (194 degrees Fahrenheit) • Alarm cable pairs for all alarm connections, 0.51 mm² or 0.64 mm² (#22 or #24 AWG), solid-tinned	ANSI • Power cable (from fuse and alarm panel to assembly), #8 AWG or larger, copper conductors, 194 degrees Fahrenheit (90 degrees Celsius). • Ground cable #6 AWG stranded • Alarm cable pairs for all alarm connections, #22 or #24 AWG (0.51 mm² or 0.64 mm²), solid tinned. • 100-ohm shielded building integrated timing supply (BITS) clock cable pair #22 or #24 AWG (0.51 mm² or 0.64 mm²), twisted-pair T1-type ETSI • Copper ground cable 13.3-mm² (#6 AWG) stranded, specified for up to 90 degrees Celsius (194 degrees Fahrenheit) • Alarm cable pairs for all alarm connections, 0.51 mm² or 0.64 mm² (#22 or #24 AWG), solid-tinned	• Power cable (from fuse and alarm panel to assembly), #6 AWG, copper conductors, 194 degrees Fahrenheit (90 degrees Celsius). • Ground cable #4 AWG stranded • Alarm cable pairs for all alarm connections, #22 or #24 AWG (0.51 mm² or 0.64 mm²), solid tinned. ANSI • 100-ohm shielded building integrated timing supply (BITS) clock cable pair #22 or #24 AWG (0.51 mm² or 0.64 mm²), twisted-pair T1-type ETSI • 75-ohm coaxial cable with a DIN-1.0/2.3 miniature coaxial connector.
Cleaning Cassette	CLETOP cleaning cassette	CLETOP cleaning cassette	CLETOP cleaning cassette
Crimp tool	Crimping tool—This tool must be large enough to accommodate the girth of the grounding lug when you crimp the grounding cable into the lug. Use the lug manufacturer's suggested dye for crimping.	Crimping tool—This tool must be large enough to accommodate the girth of the grounding lug when you crimp the grounding cable into the lug. Use the lug manufacturer's suggested dye for crimping.	Crimping tool—This tool must be large enough to accommodate the girth of the grounding lug when you crimp the grounding cable into the lug. Use the lug manufacturer's suggested dye for crimping.
Fuse and Alarm panel	ANSI Fuse and alarm panel ETSI Fuse and alarm panel	ANSI Fuse and alarm panel ETSI Fuse and alarm panel	ANSI Fuse and alarm panel ETSI Fuse and alarm panel
Jumper	Single-mode SC fiber jumpers with UPC polish (55 dB or better) for optical (OC-N) cards	Single-mode SC fiber jumpers with UPC polish (55 dB or better) for optical (OC-N) cards	Single-mode SC fiber jumpers with UPC polish (55 dB or better) for optical (OC-N) cards

User Supplied Material	NCS 2002	NCS 2006	NCS 2015
Labels	Labels	Labels	Labels
Power Meter	Optical power meter (for use with fiber optics only)	Optical power meter (for use with fiber optics only)	Optical power meter (for use with fiber optics only)
Rack	ANSI • 19-inch ANSI Standard (Telcordia GR-63-CORE) (482.6 mm) rack; total width 22 inches (558.8 mm) • 23-inch ANSI Standard (Telcordia GR-63-CORE) (584.2 mm) rack; total width 26 inches (660.4 mm) ETSI Equipment rack (ETSI rack, 2200 mm [86.6 inch] H x 600 mm [23.6 inch] Wx 300 mm [11.8 inch] D)	ANSI • 19-inch ANSI Standard (Telcordia GR-63-CORE) (482.6 mm) rack; total width 22 inches (558.8 mm) • 23-inch ANSI Standard (Telcordia GR-63-CORE) (584.2 mm) rack; total width 26 inches (660.4 mm) ETSI Equipment rack (ETSI rack, 2200 mm [86.6 inch] H x 600 mm [23.6 inch] Wx 300 mm [11.8 inch] D)	ANSI • 19-inch ANSI Standard (Telcordia GR-63-CORE) (482.6 mm) rack; total width 22 inches (558.8 mm) • 23-inch ANSI Standard (Telcordia GR-63-CORE) (584.2 mm) rack; total width 26 inches (660.4 mm) ETSI Equipment rack (ETSI rack, 2200 mm [86.6 inch] H x 600 mm [23.6 inch] Wx 300 mm [11.8 inch] D)
Screw Driver	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screw driver	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screw driver	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screw driver
Tie wraps and/or lacing cord	Tie wraps or lacing cord (or both)	Tie wraps or lacing cord (or both)	Tie wraps or lacing cord (or both)
Video fiber connector inspection instrument	Video fiber connector inspection instrument	Video fiber connector inspection instrument	Video fiber connector inspection instrument
Voltmeter	Voltmeter	Voltmeter	Voltmeter
Wire Cutters	Wire cutters	Wire cutters	Wire cutters
Wire Strippers	Wire strippers	Wire strippers	Wire strippers
Wire Wrapper	Wire wrapper	Wire wrapper	Wire wrapper

Note Ring runs are not provided by Cisco and can hinder side-by-side shelf installation where space is limited.

Ordering Solutions for NCS 2002, NCS 2006, and NCS 2015

Two ordering solutions for the NCS 2002 shelf are offered. Select one of these solutions:

- Shelf that is preinstalled with all the ancillary units such as fan tray assembly and power module.
- Shelf that is not preinstalled with the ancillary units but can be ordered separately.

Note In both the ordering solutions, the front door is preinstalled with the NCS 2002 shelf.

Two ordering solutions for the Cisco NCS 2006 shelf are offered. Select one of these solutions:

- Shelf assembly that is preinstalled with all the ancillary units such as fan tray assembly, LCD unit, power module and NCS 2006 ECU.
- Shelf assembly that is not preinstalled with the ancillary units but can be ordered separately.

One ordering solution for the Cisco NCS 2015 shelf is offered.

- Shelf assembly that is not preinstalled with the ancillary units but can be ordered separately.

Card Slot Requirements

The cards have electrical plugs at the back that plug into electrical connectors on the shelf backplane. When the ejectors are fully closed, the card plugs into the assembly backplane.

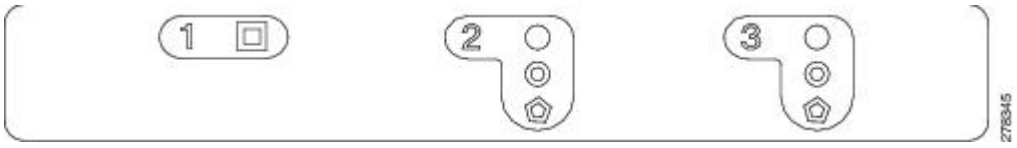
NCS 2002

The NCS 2002 shelf assemblies have 3 card slots numbered sequentially from bottom to top. Slot 1 is reserved for control cards (TNC, TNCE, TSC, or TSCE). Slot 2 and Slot 3 are dedicated for common line cards.

Caution The NCS 2002 shelf must be equipped with a TNC, TNCE, TSC, or TSCE card.

Shelf slots have symbols indicating the type of cards that you can install in them. Each NCS 2002 card has a corresponding symbol. The symbol on the card must match the symbol on the slot.

Figure 10: Slot Symbols



The following table shows the slot and card symbol definitions.

Table 3: Slot and Card Symbols

Symbol Color/Shape	Definition
Purple/Square	Slot 1. TNC/TNCE/TSC/TSCE card slot. Only install the card with a square symbol on the faceplate.
Orange/Circle	Slots 2 and 3. Only install cards with a circle symbol on the faceplate.
Orange/Hollow Circle	Slots 2 to 3. New line cards with high speed back plane connectors.
Pink/Pentagon	Slots 2 and 3. New Uplink card.

NCS 2006

The NCS 2006 shelf assemblies have eight card slots numbered sequentially from bottom to top. Slots 1 and 8 are reserved for control cards (TNC, TNCE, TSC, or TSCE). Slots 2, 3, 4, 5, 6, and 7 are dedicated for common line cards.

Caution The NCS 2006 system can work with a single control card (TNC, TNCE, TSC, or TSCE). The TNC, TNCE, TSC, and TSCE cards cannot operate in a shelf at the same time.

The shelf assembly slots have symbols indicating the type of cards that you can install in them. Each card has a corresponding symbol. The symbol on the card must match the symbol on the slot.

Figure 11: Slot Symbols



The following shows the slot and card symbol definitions.

Table 4: Slot and Card Symbols

Symbol Color/Shape	Definition
Purple/Square	Slots 1 and 8. TNC/TNCE/TSC/TSCE card slot. Install cards only with a square symbol on the faceplate.
Orange/Circle	Slots 2 to 7. Install cards only with a circle symbol on the faceplate.
Orange/Hollow Circle	Slots 2 to 7. New line cards with high-speed backplane connectors.
Pink/Pentagon	Slots 4 and 5. New Uplink card.

Note When the NCS 2006 shelf is powered at –60 VDC (nominal), only TNC, OPT-AMP-C, OPT-AMP-17-C, OPT-EDFA-17, OPT-EDFA-24, and NCS 2006 ECU can be installed.

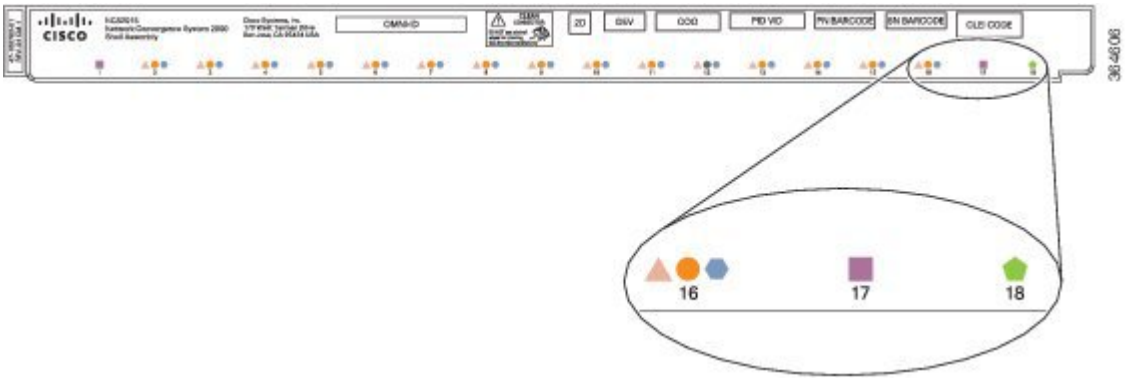
NCS 2015

The NCS 2015 shelf assemblies have 18 card slots numbered sequentially from left to right. Slots 1 and 17 are reserved for control cards (TNCS or TNCS-O). Slots 2 through 16 are dedicated for common line cards and slot 18 is reserved for the ECU.

Caution The NCS 2015 system can work with a single control card (TNCS or TNCS-O.)

The shelf assembly slots have symbols indicating the type of cards that you can install in them. Each card has a corresponding symbol. The symbol on the card must match the symbol on the slot.

Figure 12: Slot Symbols



The folowing table shows the slot and card symbol definitions.

Table 5: Slot and Card Symbols

Symbol Color/Shape	Definition
Purple/Square	Slots 1 and 17. TNCS or TNCS-O card slot.
Orange/Circle	Slots 2 through 16. Install only cards with a circle symbol on the faceplate.
Pink/Triangle	Slots 2 through 16. Install only line cards with circle or a triangle symbol on the faceplate.
Blue/Hexagon	Slots 2 through 16. Install only line cards with a blue hexagon symbol on the faceplate.
Green/Pentagon	Slot 18. ECU slot.

Card Replacement

To replace a card with another card of the same type, you do not need to make any changes to the database; remove the old card and replace it with a new card. To replace a card with a card of a different type, physically remove the card and replace it with the new card, then delete the original card from CTC. For specifics, refer to the “Maintain the Node” chapter in the *Cisco NCS 2000 Series Network Configuration Guide* .

Caution Removing any active card from the shelf can result in traffic interruption. Use caution when replacing cards and verify that only inactive or standby cards are being replaced. If the active card needs to be replaced, switch it to standby prior to removing the card from the node.

Note An improper removal (IMPROPRMVL) alarm is raised whenever a card pull (reseat) is performed, unless the card is deleted in CTC first. The alarm clears after the card replacement is complete.

NTP-L41 Unpacking and Inspecting the Shelf

Purpose	This procedure explains how to unpack the NCS 2002, NCS 2006, and NCS 2015 shelves and verify their contents.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Complete the DLP-L62 Unpacking and Verifying the Shelf , on page 23.

Step 2 Complete the DLP-L63 Inspecting the Shelf, on page 26.

Stop. You have completed this procedure.

DLP-L62 Unpacking and Verifying the Shelf

Purpose	This task removes the shelves from the package.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required

Onsite/Remote	Onsite
Security Level	None

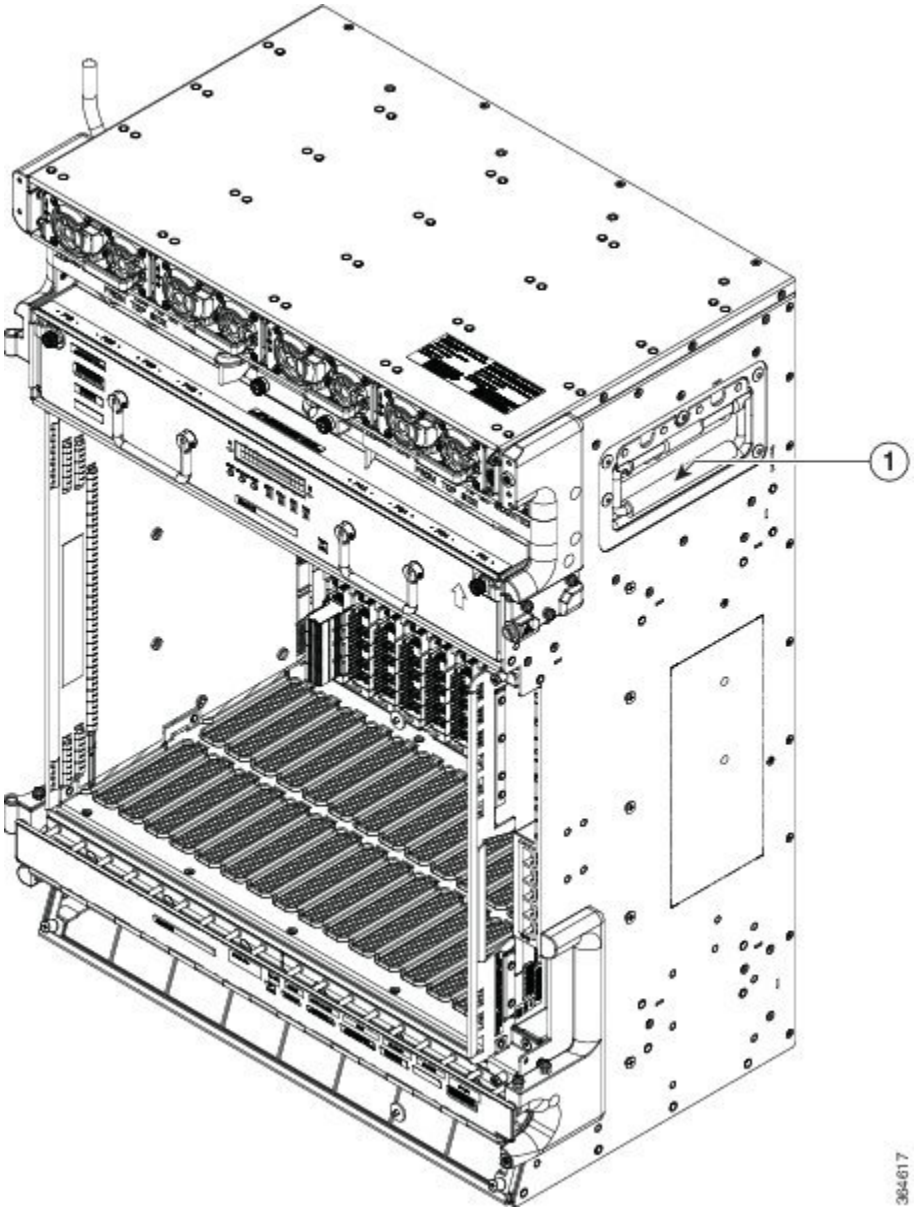
Procedure

Step 1 When you receive the NCS 2002, NCS 2006, or NCS 2015 system equipment at the installation site, open the top of the box. The Cisco Systems logo designates the top of the box.

Step 2 Remove the foam inserts from the box. The box contains the NCS shelf (wrapped in plastic) and a smaller box of items needed for installation.

Step 3 To remove the shelf, grasp both rings of the shelf removal strap and slowly lift the shelf out of the box. The NCS 2015 chassis has lifting handles at either side for this purpose (see figure below).

Figure 13: Handling the NCS 2015 DC Chassis During Installation



1	Lifting handle

Step 4 Open the smaller box of installation materials, and verify that you have all items listed in the Required Tools and Equipment, on page 15.

Note
If the NCS 2006 shelf and ancillary units are ordered separately, then the power modules, LCD module, NCS HIG 2006 ECU module, fan-tray assembly, and mounting brackets are shipped separately.

Step 5 Return to your originating procedure (NTP).

DLP-L63 Inspecting the Shelf

Purpose	This task verifies that all parts of the shelf are in good condition.
Tools/Equipment	None
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

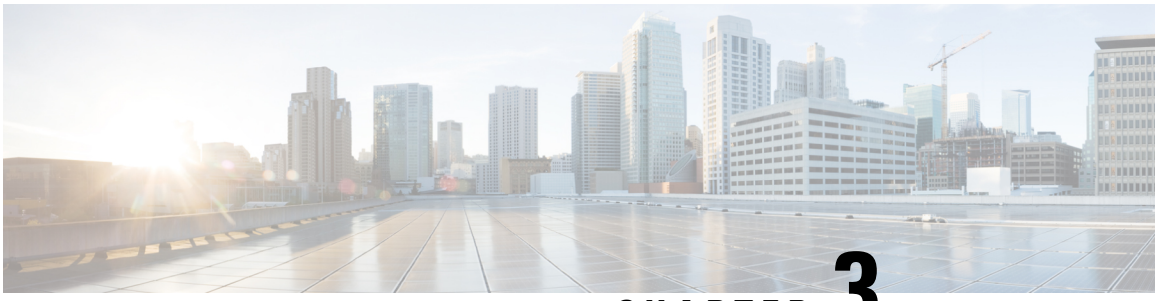
Step 1 (Cisco NCS 2002 and NCS 2006) Open the shelf removing temporary door or standard door. For more information, see the DLP-L46 Removing the Standard Door of the NCS 2002 Shelf, on page 110 and DLP-L13 Removing the Standard Door of the NCS 2006 Shelf , on page 241.

Step 2 Verify the following:

- The pins are not bent or broken.
- The frame is not bent.

Step 3 If the pins are bent or broken, or the frame is bent, call your Cisco sales engineer for a replacement.

Step 4 Return to your originating procedure (NTP).



CHAPTER 3

Cisco NCS 2002 Installation Overview

This chapter provides an overview of the NCS 2002 installation.

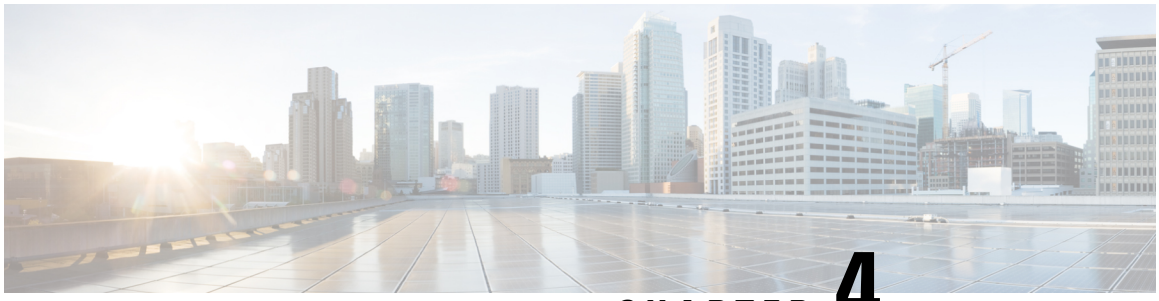
- Cisco NCS 2002 Installation Overview, on page 27

Cisco NCS 2002 Installation Overview

This chapter includes these sections:

- Mounting the brackets
- Mounting the shelf
- Installing the door and other modules
- Connecting the power and ground
- Connecting and routing the cables
- Installing and configuring the control card
- Performing the shelf acceptance test

Cisco NCS 2002 Installation Overview



CHAPTER 4

Installing the Air Flow Regulator

This chapter explains how to install the regulators to maintain the air flow for ANSI and ETSI configurations in NCS 2002 shelf.

The air flow within the equipment must be maintained at a nominal temperature. This task can be accomplished using one of these mechanisms:

- Air deflector
- Air plenum

The sections are:

- Air Deflector, on page 29
- Air Plenum, on page 29
- Air Plenum Rack and Cabinet Compatibility, on page 31
- NTP-L42 Install the Air Plenum in NCS 2002 Shelf, on page 32

Air Deflector

An air deflector is a sheet-metal part that is mounted on the NCS 2002 shelf to orient the air flow in a specific direction.

The air deflectors can be mounted in different positions to control the air flow:

- Front to Front— Only ETSI rack
- Front to Back— For ANSI and ETSI racks
- Front to Top— Only ETSI rack

In an ANSI rack, the air deflectors are mounted only on the 23-inch rack configuration.

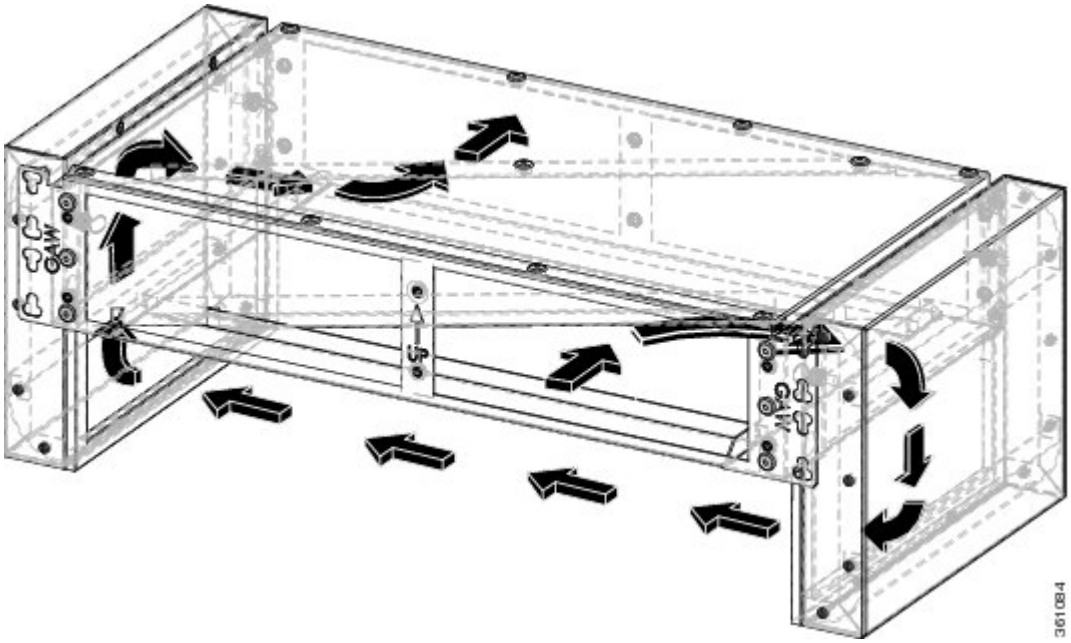
Air Plenum

Air plenum orients the air flow in the front-to-back direction inside the equipment to be compliant with GR-63 issue 4 requirement.

NCS 2002 air plenum kit has one horizontal and two vertical air plenums. The air that flows from the front top inlet are channelized to the right vertical plenum, inside the equipment, and then to the exhaust air channel towards the left vertical air plenum. The air flow is deflected by 90 degrees and exited out in the rear end.

The following figure shows the air flow inside the air plenum.

Figure 14: Air flow within the air plenum



The following figures show the dimensions of the air plenum relative to the cabinet or rack.

Figure 15: Dimension of Cisco NCS 2002 chassis relative to the air plenum

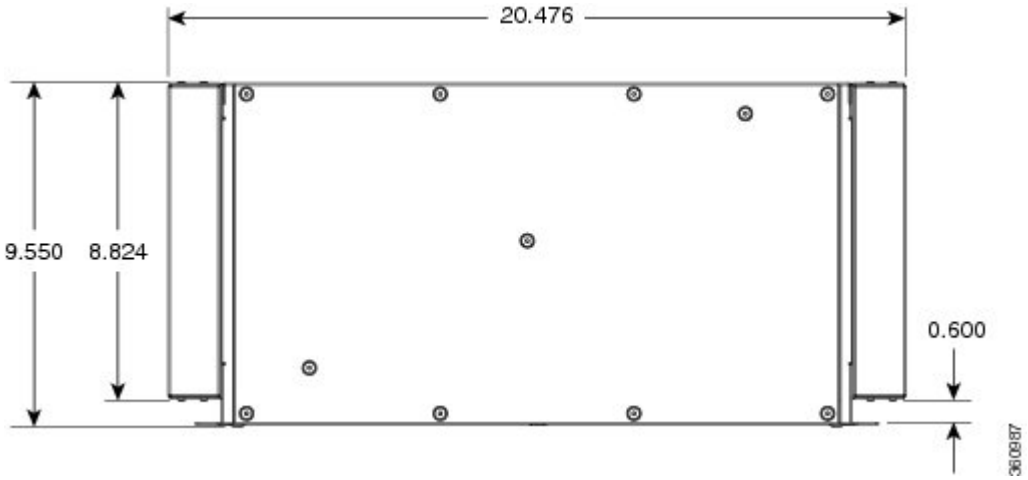
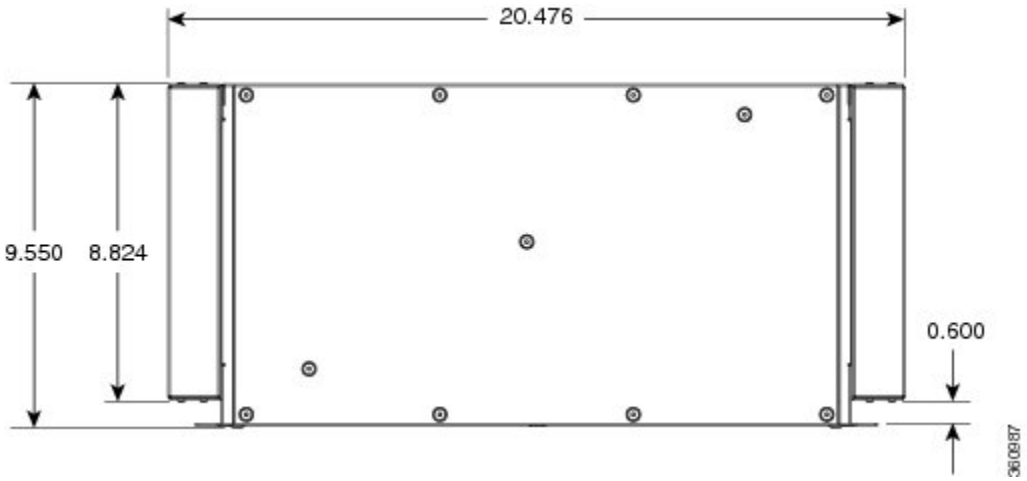


Figure 16: Dimension of Cisco NCS 2002 chassis relative to the air plenum



Air Plenum Rack and Cabinet Compatibility

The table shows the compatibility of air plenum with the ANSI and ETSI racks and cabinets. The chassis can be installed with brackets in front position only.

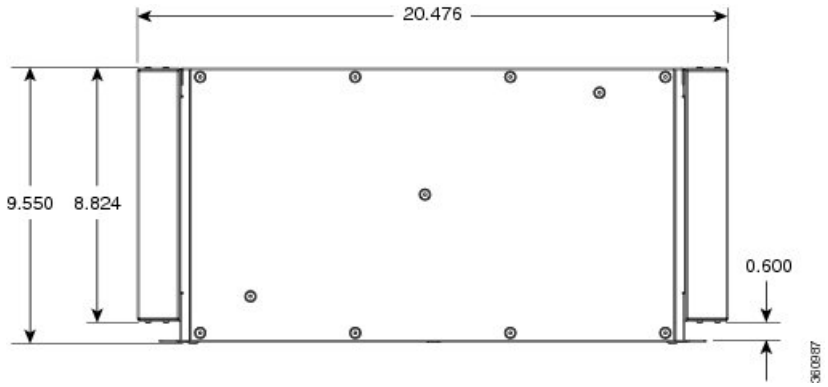
Table 6: Air plenum compatibility with racks and cabinets

Rack / Cabinet	Front-to-back air flow
ANSI 19-inch rack	Supported [1]
ANSI 19-inch cabinet	Supported [1]
ANSI 23-inch rack	Supported
ANSI 23-inch cabinet	Supported
ETSI cabinet	Supported [1]

[1] A minimum opening of 20.600 inches is required to install the vertical air plenum behind the front rails.

Note The ANSI 19-inch two post rack that is compatible with air plenum installation is available from Telect, with part number 12545-301.

Figure 17: Minimum rear opening for ANSI 19-inch and ETSI configuration



NTP-L42 Install the Air Plenum in NCS 2002 Shelf

Purpose	This procedure installs the air plenum to orient the air flow in front-to- back direction in the NCS 2002 shelf.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• Medium slot-head screwdriver
	• Small slot-head screwdriver
	• Screws
	  • ANSI: #12-24 x 0.50 pan-head Phillips screws
	  • ETSI: M6.0 x 20 pan-head Phillips screws
	• Wing head screws (4)
	• Adapter plates
	• One air plenum kit (horizontal and vertical air plenums)

Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit.** Statement 1074

Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units.** Statement 246

Warning **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.** Statement 39

Note For nominal voltage of -60 VDC, the input voltage range is from -40 to -72 VDC.

Note Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **The air plenum is installed on a rack or a cabinet using thread-forming screws that remove any paint or non-conductive coatings inside the hole threads, and establish a metal-to-metal contact. Also, clean both surfaces outside the screw points that come in contact, so that they are free of paint and other nonconductive coating. Apply an appropriate antioxidant compound to the surfaces.**

Procedure

Depending on the rack or cabinet, complete the necessary task:

- DLP-L65 Installing Air Plenum for NCS 2002 Shelf in ANSI 19-inch Configuration, on page 33
- DLP-L69 Installing Air Plenum in NCS 2002 Shelf for ANSI 23-inch Configuration, on page 36
- DLP-L70 Installing Air Plenum for NCS 2002 Shelf in ETSI Configuration, on page 41
- DLP-L71 Installing Pre-assembled Air Plenums in ANSI 23-inch Configuration, on page 40

Stop. You have completed this procedure.

DLP-L65 Installing Air Plenum for NCS 2002 Shelf in ANSI 19-inch Configuration

Purpose	This task installs the air plenum for the NCS 2002 shelf in ANSI 19-inch cabinet or rack configuration.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: #12-24 x 0.50 pan-head Phillips screws (4) • Wing head screws (4) • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

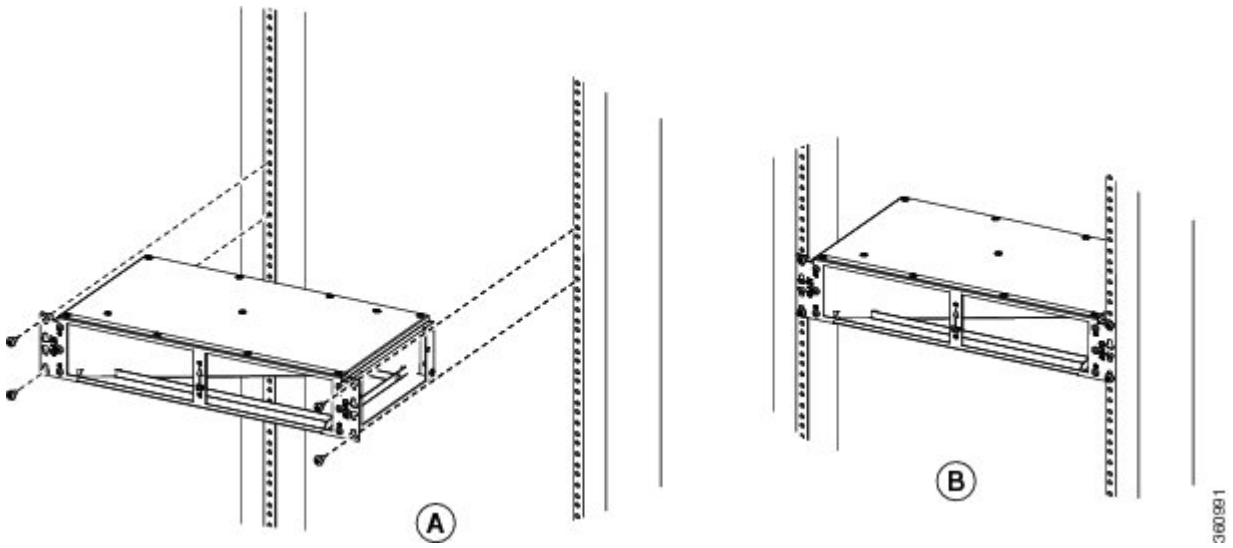
Note In the 19-inch rack and cabinet, the air plenum can be mounted only if the minimum opening is 20.600 inches to install the vertical air plenums behind the front rails.

Procedure

Step 1 Place the horizontal air plenum above the shelf slot in the ANSI 19-inch cabinet or rack.

Step 2 Insert the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

Figure 18: Installing the horizontal air plenum in the ANSI 19-inch configuration



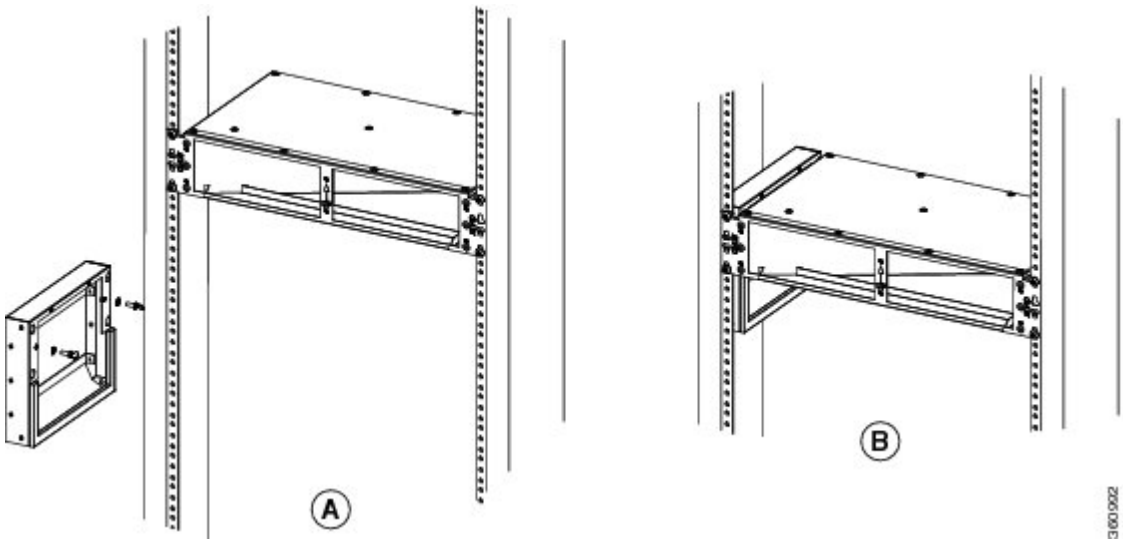
Step 3 Install the vertical air plenum to the left of the horizontal air plenum:

a) Insert the vertical plenum in the free space between the horizontal plenum and cabinet.

b) Install t he wing head screws fom the internal side of the horizontal plenum as shown in the following figure.

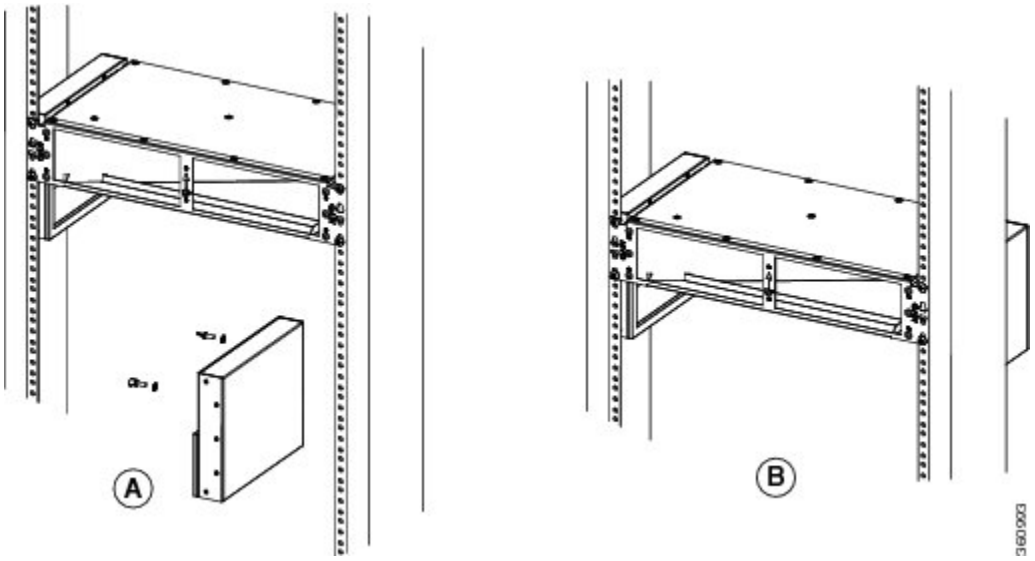
c) Tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

Figure 19: Installing the left vertical air plenum



Step 4 Install the vertical air plenum to the right of the horizontal air plenum. Follow step 3a to 3c.

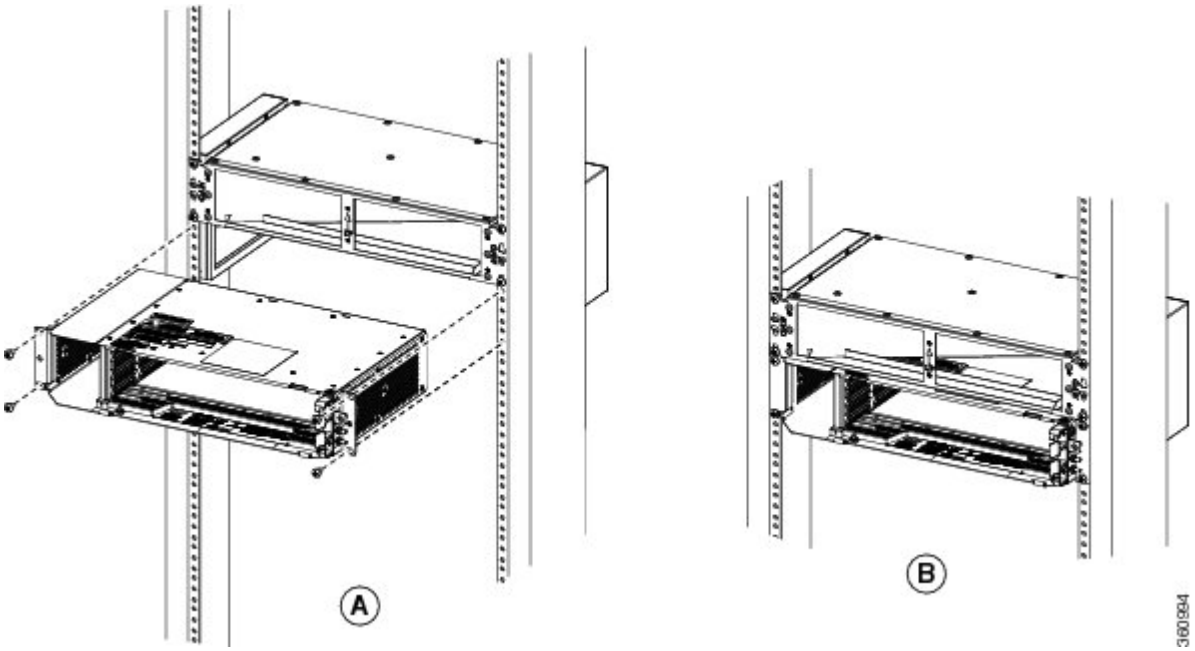
Figure 20: Installing the right vertical air plenum



Step 5 Install the 19-inch standard brackets on both sides of the chassis in the front position. See DLP-L35 Mounting the 19-inch Brackets on the NCS 2002 Shelf for ANSI Rack Configuration, on page 46.

Step 6 Install the NCS 2002 empty chassis below the horizontal plenum.

Figure 21: Installing the NCS 2002 chassis below the horizontal air plenum



Step 7 Return to your originating procedure (NTP).

DLP-L69 Installing Air Plenum in NCS 2002 Shelf for ANSI 23-inch Configuration

Purpose	This task installs the air plenum for the NCS 2002 shelf in the ANSI 23-inch cabinet or rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: #12-24 x 3/4 pan-head Phillips mounting screws (4) • Wing head screws (4) • Adapter plates • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

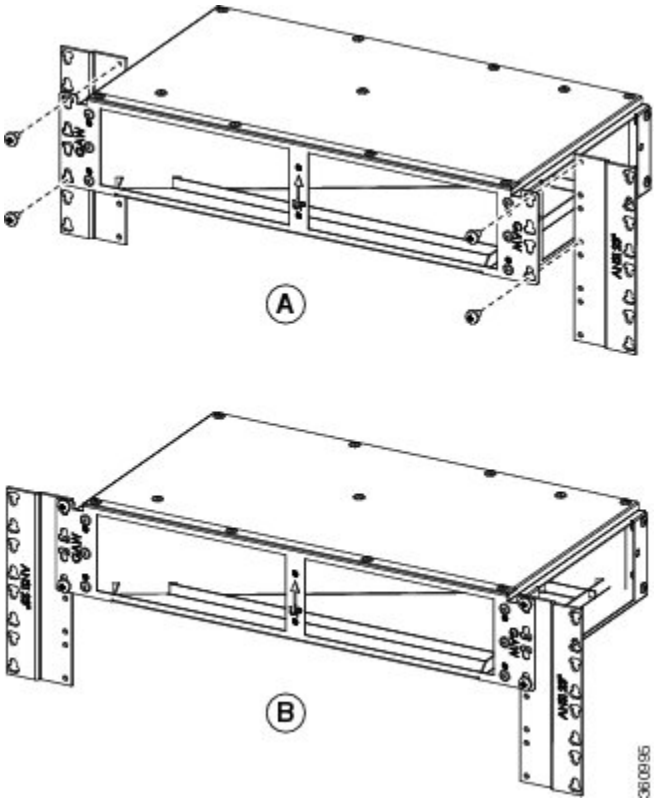
Note The air plenums for ANSI 23-inch configuration can also be pre-assembled outside the cabinet and then installed inside the cabinet. See DLP-L71 Installing Pre-assembled Air Plenums in ANSI 23-inch Configuration, on page 40

Procedure

Step 1 Install the ANSI 23-inch adapter plates on the horizontal air plenum.

Step 2 Align the screws to fix the adapter plates to the shelf. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

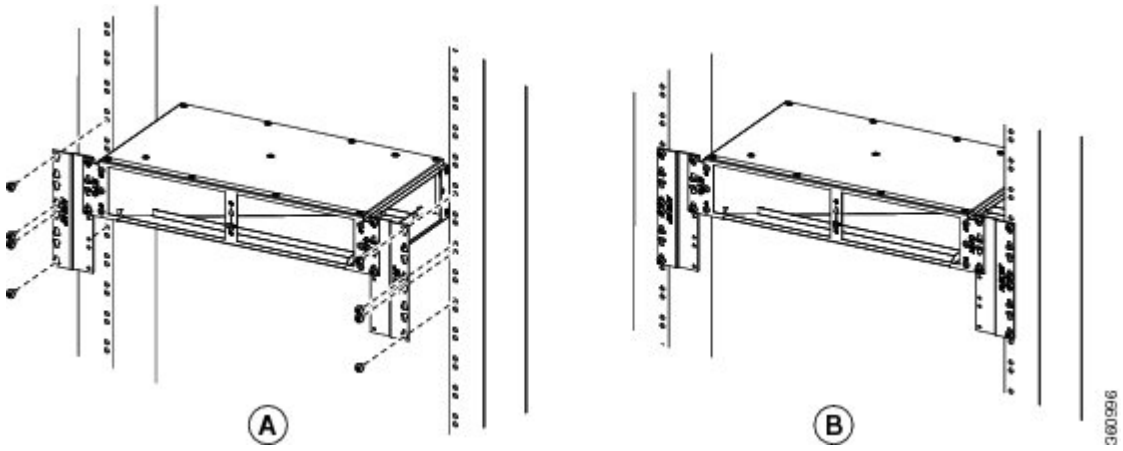
Figure 22: Installing the adapter plates on the horizontal air plenum



Step 3 Place the horizontal air plenum above the shelf slot in the ANSI 23-inch cabinet or rack.

Step 4 Insert the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

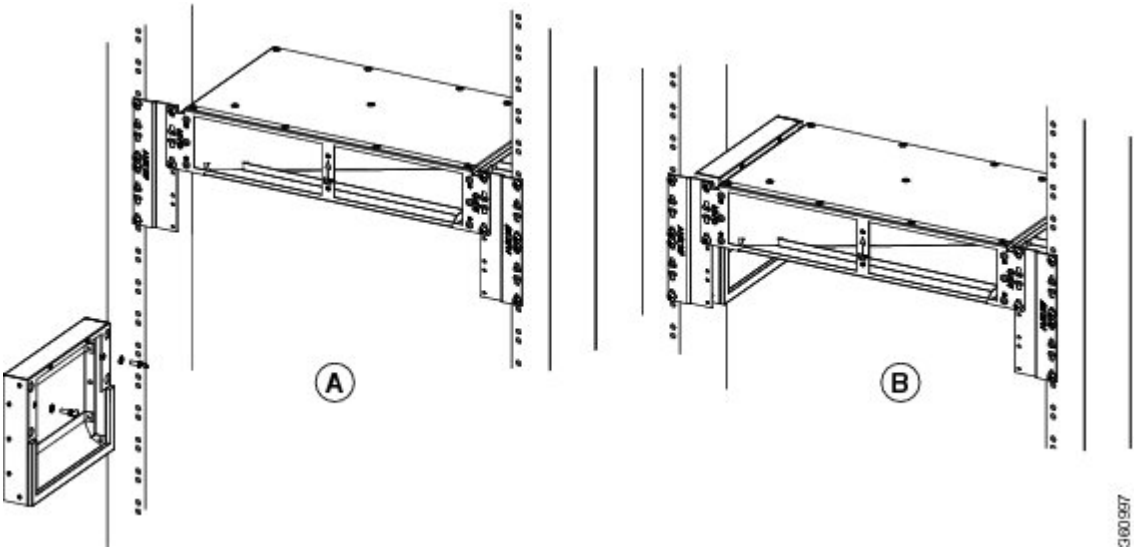
Figure 23: Installing the horizontal air plenum in the ANSI 23-inch configuration



Step 5 Install the vertical air plenum to the left of the horizontal air plenum:

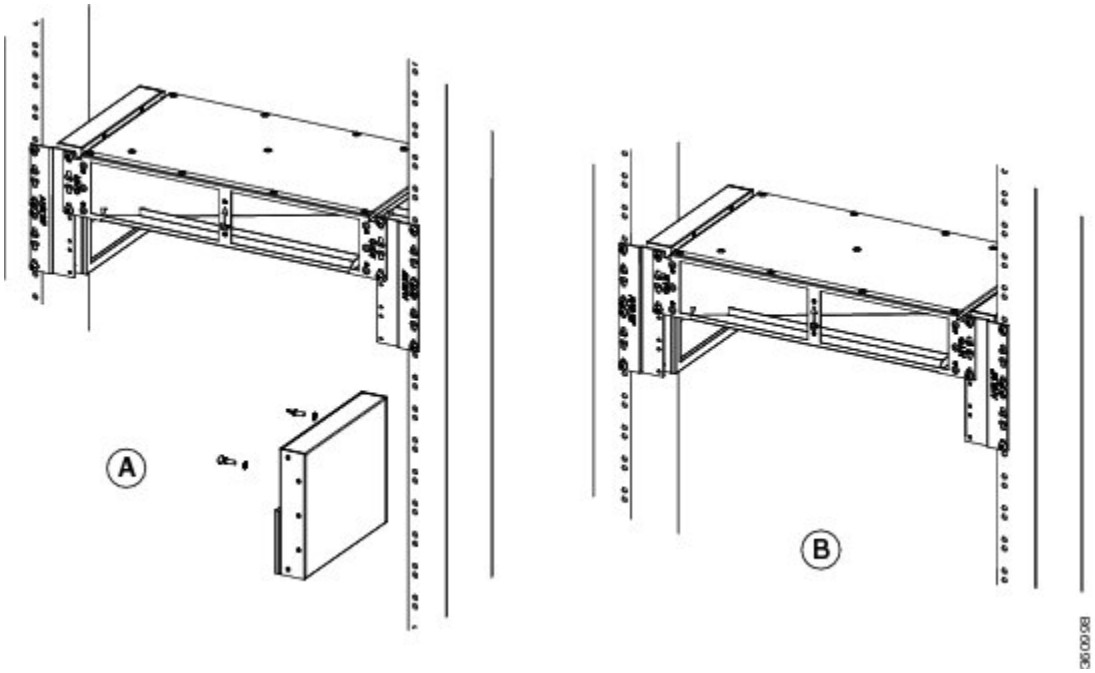
a) Insert the vertical air plenum in the free space between the horizontal air plenum and cabinet.
b) Install the wing head screws from the internal side of the horizontal plenum as shown in the following figure.
c) Tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

Figure 24: Installing the left vertical air plenum



Step 6 Install the vertical plenum to the right of the horizontal air plenum. Follow step 5a to 5c.

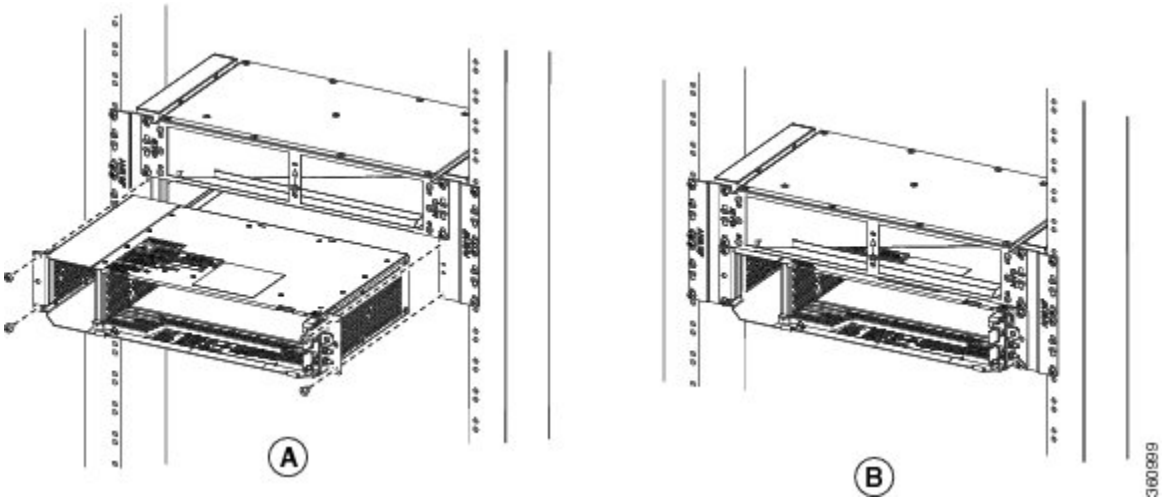
Figure 25: Installing the right vertical air plenum



Step 7 Install ANSI 19-inch standard brackets on both sides of the chassis in front position. See DLP-L35 Mounting the 19-inch Brackets on the NCS 2002 Shelf for ANSI Rack Configuration, on page 46.

Step 8 Install the NCS 2002 empty chassis below the horizontal plenum.

Figure 26: Installing the NCS 2002 chassis below the horizontal air plenum



Step 9 Return to your originating procedure (NTP).

DLP-L71 Installing Pre-assembled Air Plenums in ANSI 23-inch Configuration

Purpose	This task installs pre-assembled air plenums for the NCS 2002 shelf in the ANSI 23-inch configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: #12-24 x 3/4 pan-head Phillips mounting screws (8) • Wing head screws (4) • Adapter plates • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Install the ANSI 23-inch adapter plates on the horizontal air plenum.

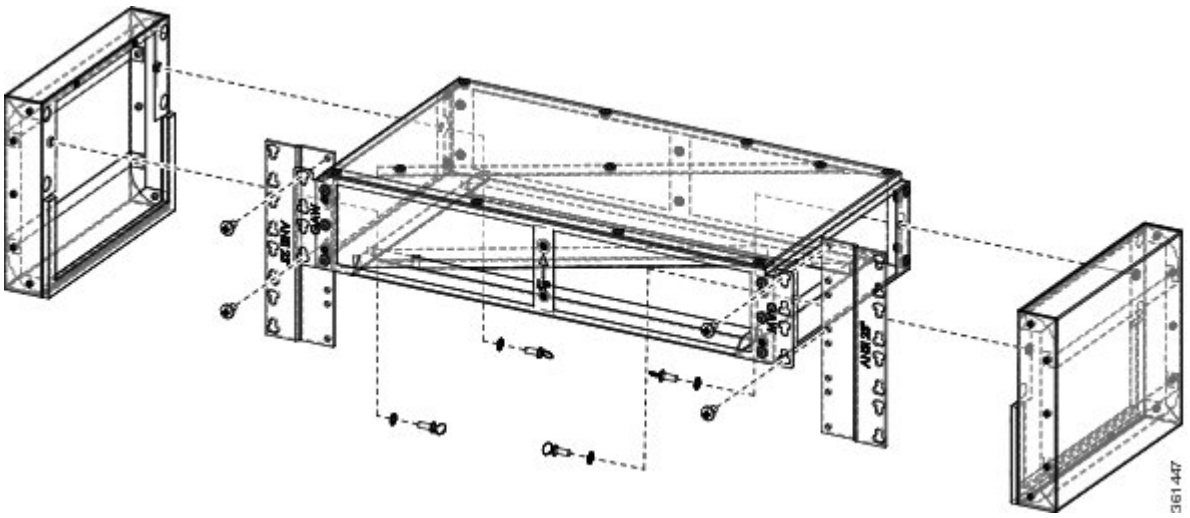
Step 2 Align the screws to fix the adapter plates to the shelf. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 3 Install the vertical air plenum to the right of the horizontal plenum.

Step 4 Install the wing head screws from the internal side of the horizontal plenum and tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

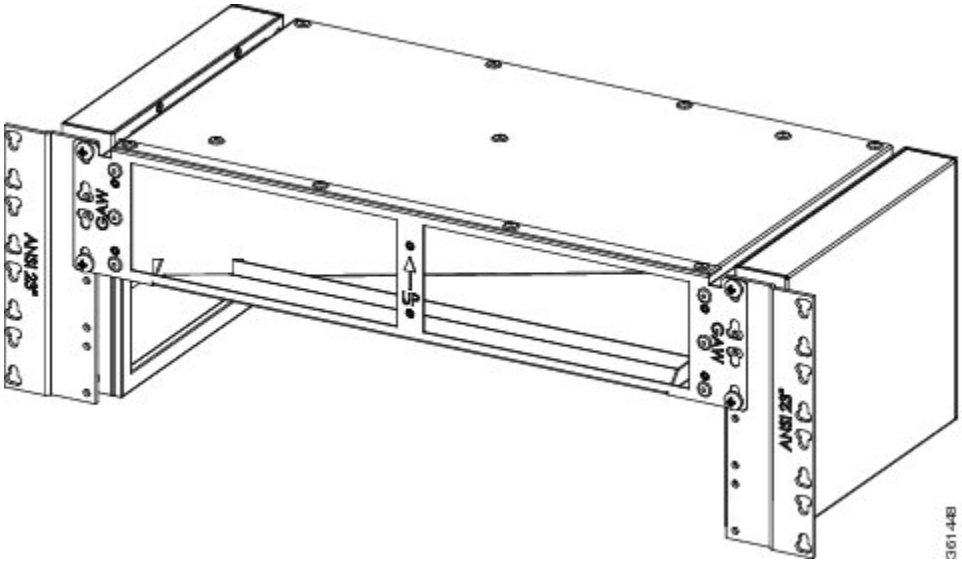
Step 5 Install the vertical air plenum to the left of the horizontal air plenum. Follow step 4.

Figure 27: Pre-assembling the air plenums



Step 6 Install the pre-assembled air plenum for ANSI 23-inch configuration.

Figure 28: Pre-assembled air plenum



Step 7 Install the empty NCS 2002 chassis between the horizontal plenums.

Step 8 Return to your originating procedure (NTP).

DLP-L70 Installing Air Plenum for NCS 2002 Shelf in ETSI Configuration

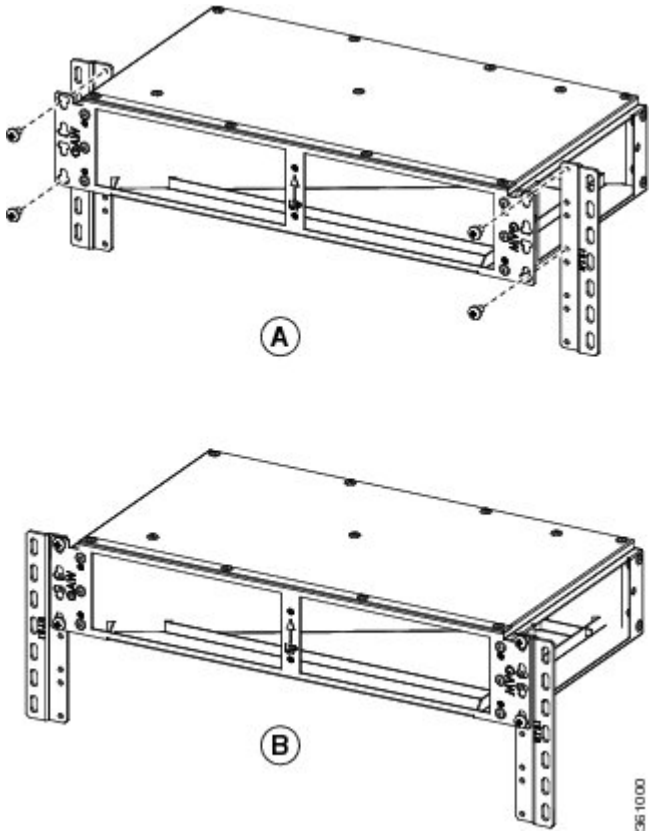
Purpose	This task installs the air plenum for the NCS 2002 shelf in the ETSI configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: M6.0 x 20 pan-head Phillips screws (4) • Wing head screws (4) • Adapter plates • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Install the ETSI adapter plates on the horizontal air plenum.

Step 2 Align the screws to fix the adapter plates to the horizontal air plenum. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m) as shown in the following figure.

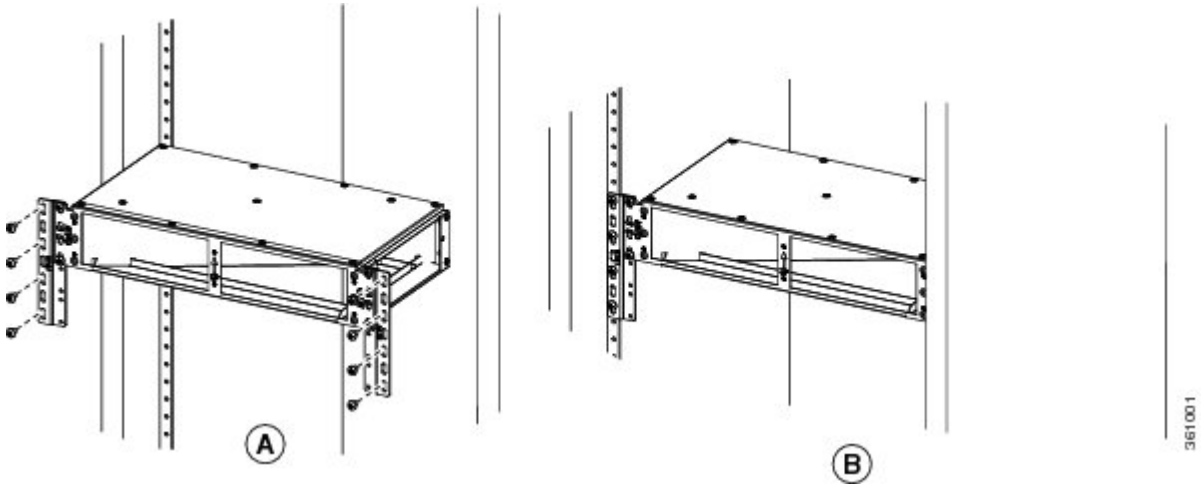
Figure 29: Installing the adapter plates on the horizontal air plenum



Step 3 Place the horizontal plenum above the chassis slot in the ETSI cabinet.

Step 4 Insert the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

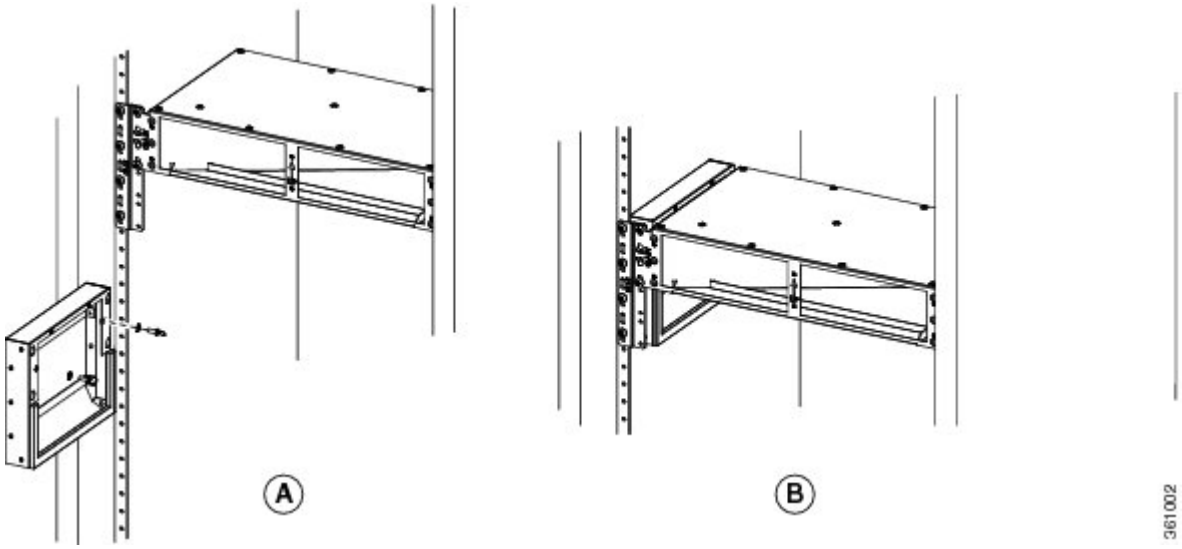
Figure 30: Installing the horizontal air plenum in the ETSI configuration



Step 5 Install the vertical air plenum to the left of the horizontal air plenum:

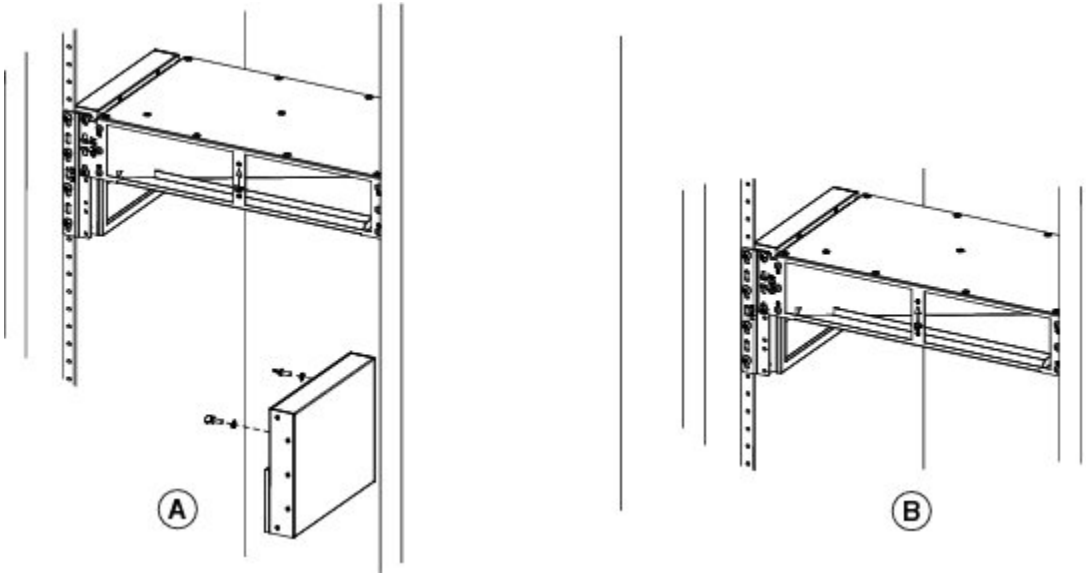
a) Insert the vertical plenum in the free space between the horizontal plenum and cabinet.
b) Install the wing head screws from the internal side of the horizontal plenum as shown in the following figure.
c) Tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

Figure 31: Installing the left vertical air plenum



Step 6 Install the vertical air plenum to the right of the horizontal air plenum. Follow steps 5a to 5c.

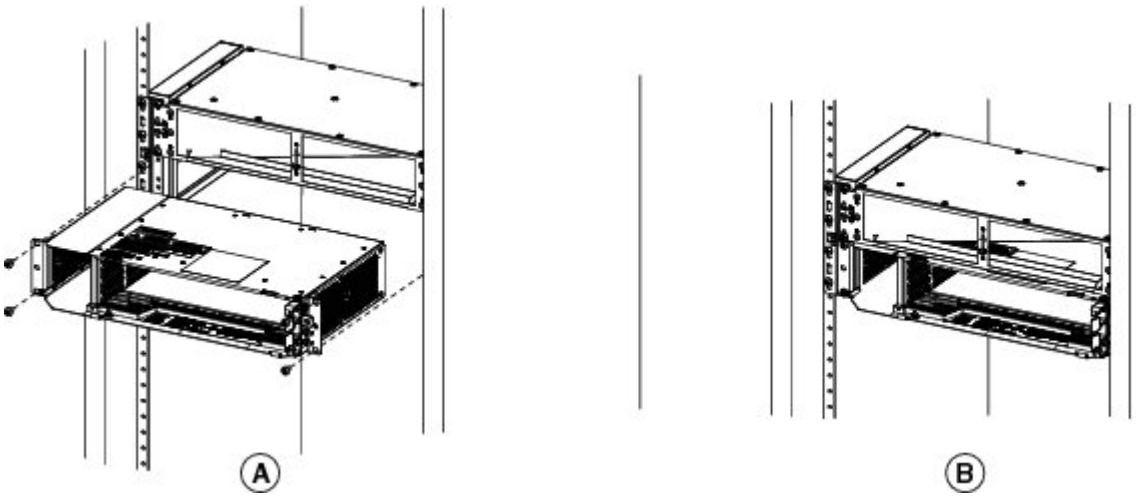
Figure 32: Installing the right vertical air plenum



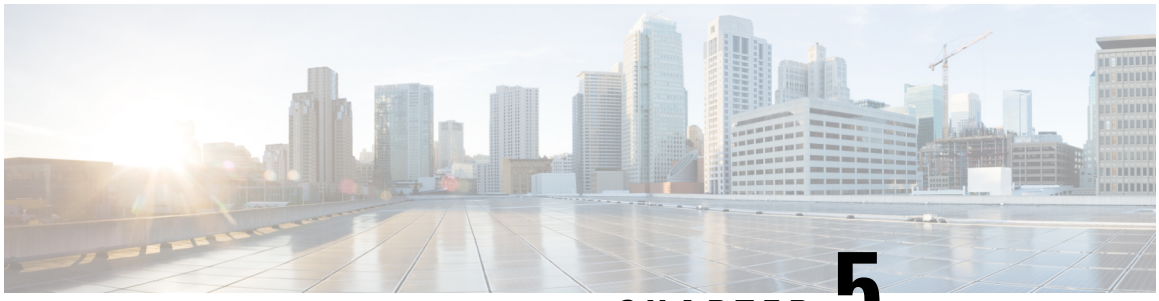
Step 7 Install the ANSI 19-inch standard brackets on both sides of the chassis in front position. See DLP-L35 Mounting the 19-inch Brackets on the NCS 2002 Shelf for ANSI Rack Configuration, on page 46.

Step 8 Install the NCS 2002 empty chassis below the horizontal plenum.

Figure 33: Installing the NCS 2002 chassis below the horizontal air plenum



Step 9 Return to your originating procedure (NTP).



CHAPTER 5

Mounting the Cisco NCS 2002 Brackets

This chapter explains how to install the NCS 2002 brackets

The sections are:

- NTP-L44 Mounting the Brackets in ANSI Configuration, on page 45
- NTP-L45 Mounting the Brackets in ETSI Configuration, on page 51

NTP-L44 Mounting the Brackets in ANSI Configuration

Purpose	This task installs the 19-inch mounting brackets to the NCS 2002 shelf for ANSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Perform these procedures as required:

- DLP-L35 Mounting the 19-inch Brackets on the NCS 2002 Shelf for ANSI Rack Configuration, on page 46
- DLP-L36 Mounting the 23-inch Brackets on the NCS 2002 Shelf for ANSI Rack Configuration, on page 47
- DLP-L37 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2002 Shelf for ANSI Rack Configuration , on page 49

Stop. You have completed this procedure.

DLP-L35 Mounting the 19-inch Brackets on the NCS 2002 Shelf for ANSI Rack Configuration

Purpose	This task installs the 19-inch mounting brackets to the NCS 2002 shelf for ANSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the NCS 2002 in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the NCS 2002 ship kit, or remove the coating from the threads to ensure electrical continuity.

Note The mounting brackets can be installed in the front or the middle position of the chassis.

Procedure

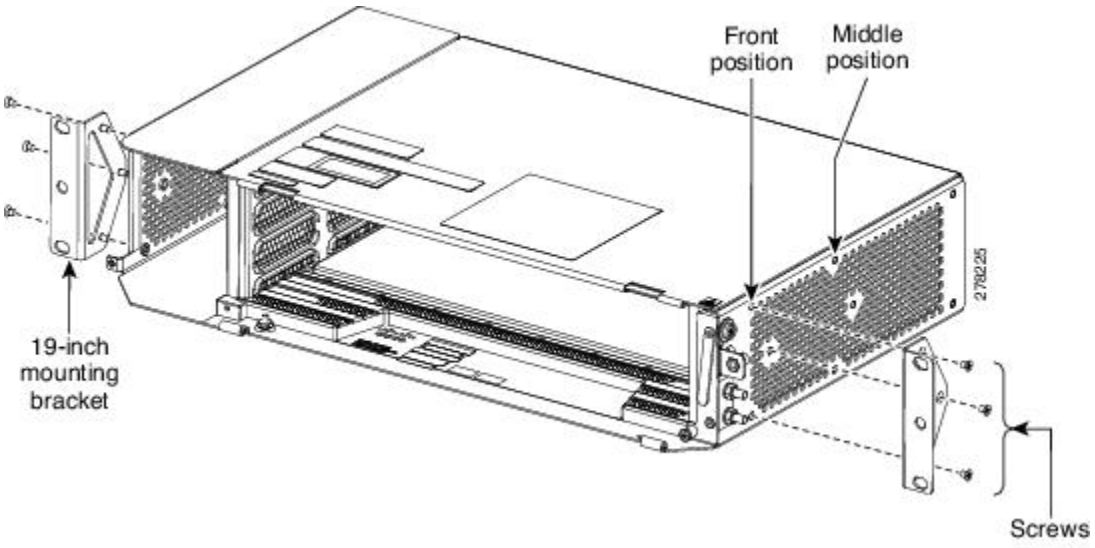
Step 1 Place the wider side of the 19-inch mounting bracket flush against the shelf (see the figure below). The narrow side of the mounting bracket should be towards the front of the shelf.

Step 2 Align the mounting bracket screw holes against the shelf screw holes.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Repeat steps 1 through 3 for the mounting bracket on the opposite side.

Figure 34: Mounting the Brackets on the NCS 2002 shelf for a 19-inch (482.6-mm) ANSI Configuration

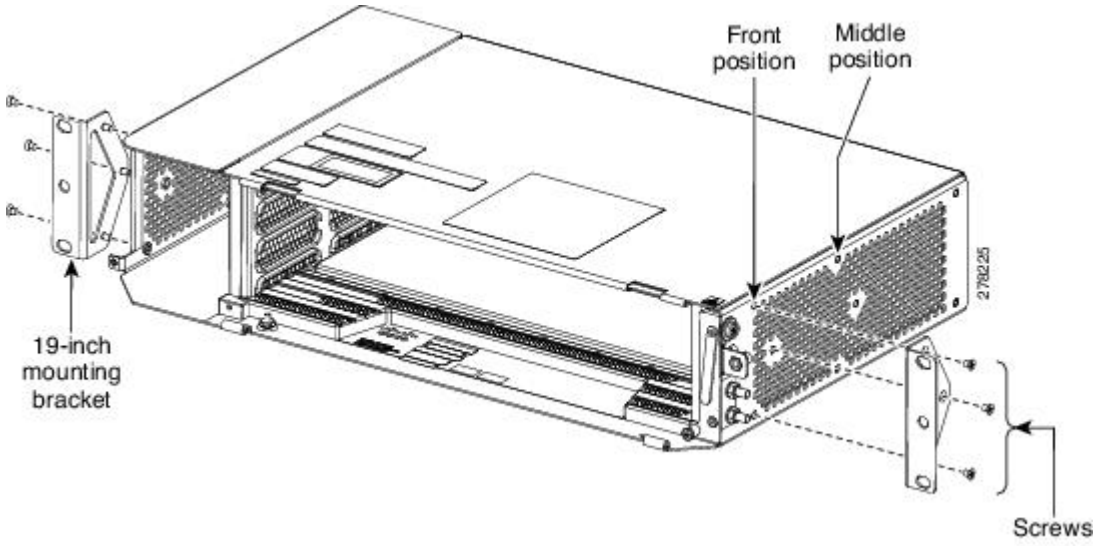


Step 5 Return to your originating procedure (NTP).

DLP-L36 Mounting the 23-inch Brackets on the NCS 2002 Shelf for ANSI Rack Configuration

Purpose	This task installs the 23-inch mounting brackets on the NCS 2002 shelf for ANSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.



Caution When mounting the NCS 2002 in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the NCS 2002 ship kit, or remove the coating from the threads to ensure electrical continuity.

Note The mounting brackets can be installed in the front or the middle position of the chassis.

Procedure

Step 1 Place the narrow side of the 23-inch mounting bracket flush against the shelf. The wider side of the mounting bracket should be towards the front of the shelf.

Step 2 Align the mounting bracket screw holes against the shelf screw holes.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Repeat steps 1 through 3 for mounting the bracket on the opposite side.

Step 5 Return to your originating procedure (NTP).

DLP-L37 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2002 Shelf for ANSI Rack Configuration

Purpose	This task mounts the 23-inch brackets with air deflectors (front-to-back) on the NCS 2002 shelf for ANSI rack configuration. **Note** In an ANSI rack, the air deflectors can be mounted only in the 23-inch rack configuration and in the front position of the chassis.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Procedure

Step 1 Place the right front air deflector flush against the right side of the chassis as shown in Diagram 1 of the following figure.

Step 2 Align the screw holes on the right front air deflector with the screw holes on right side of the chassis.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 2 of the following figure.

Step 4 Place the left back air deflector flush against the chassis as shown in Diagram 1 of the following figure.

Note
If the 100G-LC-C, 10x10G-LC, or CFP-LC cards are to be installed in the NCS 2002 shelf, do not mount the left back deflector (exhaust air deflector). Use the standard brackets directly to mount the NCS 2002 shelf.

Step 5 Align the screw holes on the left back air deflector with the screw holes on the chassis.

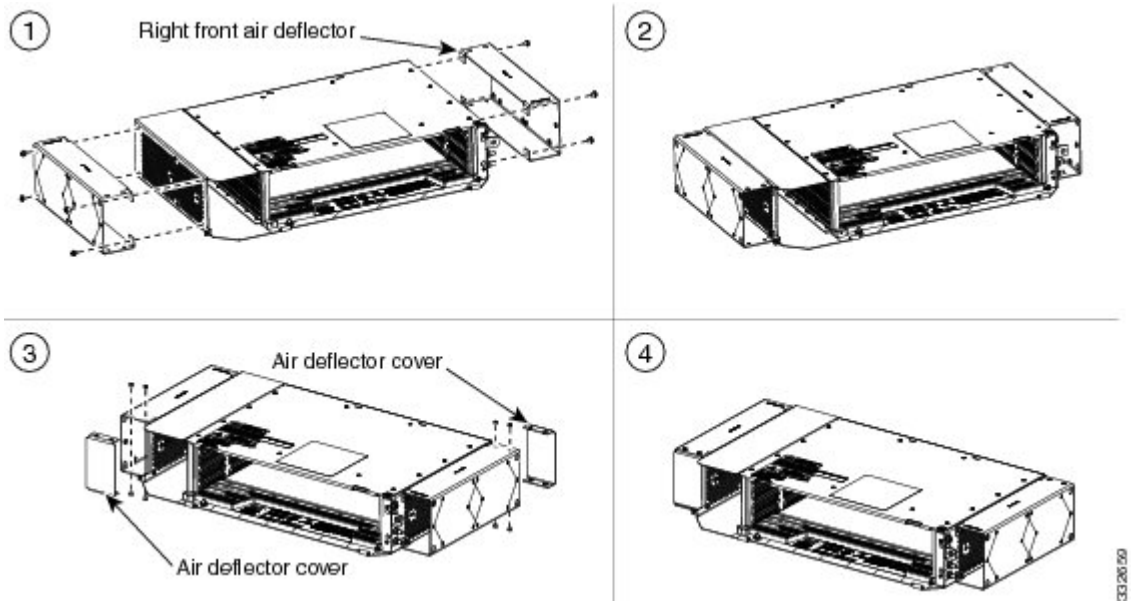
Step 6 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 2 of the following figure.

Step 7 Place the air deflector covers on the front and rear ends of the chassis as shown in Diagram 3 of the following figure.

Step 8 Align the screw holes on the air deflector covers with the screw holes on the chassis.

Step 9 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 4 of the following figure.

Figure 35: Mounting the Air Deflectors (Front-to-Back) on the NCS 2002 Shelf for ANSI Rack Configuration



Step 10 Place the 23-inch mounting bracket flush in the front position (see Diagram 1 of the following figure) or in the middle position (see Diagram 3 of the following figure) against the right side of the chassis.

Step 11 Align the screw holes on the 23-inch mounting bracket with the screw holes on the right side of the chassis.

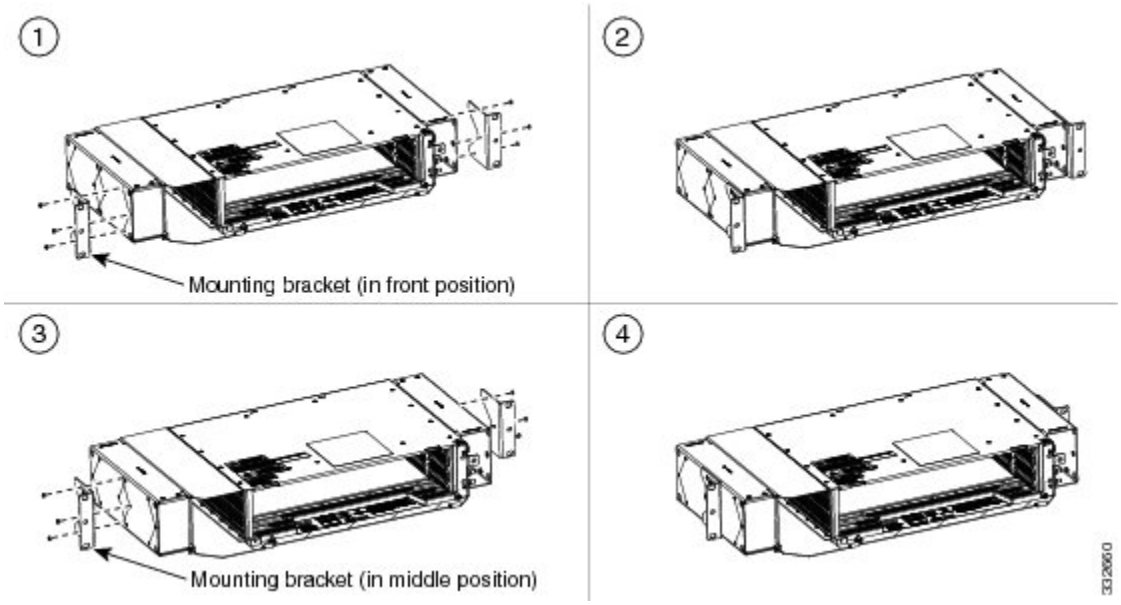
Step 12 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 13 Place the 23-inch mounting bracket flush in the front position (see Diagram 1 of the following figure) or in the middle position (see Diagram 3 of the following figure) against the left side of the chassis.

Step 14 Align the screw holes on the 23-inch mounting bracket with the screw holes on the left side of the chassis.

Step 15 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Figure 36: Mounting the Brackets on the NCS 2002 Shelf for ANSI Rack Configuration



Step 16 Return to your originating procedure (NTP).

NTP-L45 Mounting the Brackets in ETSI Configuration

Purpose	This task installs the 19-inch mounting brackets to the NCS 2002 shelf for ANSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Perform these procedures as required:

- DLP-L38 Mounting the Brackets on the NCS 2002 Shelf for ETSI Rack Configuration, on page 52
- DLP-L39 Mounting the Air Deflectors (Front-to-Front) on the NCS 2002 Shelf for ETSI Rack Configuration, on page 53
- DLP-L40 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2002 Shelf for ETSI Rack Configuration, on page 55

Stop. You have completed this procedure.

DLP-L38 Mounting the Brackets on the NCS 2002 Shelf for ETSI Rack Configuration

Purpose	This task installs the mounting brackets on the NCS 2002 shelf for ETSI rack configuration. **Note** In an ETSI rack, the air deflectors can be mounted only in the front position of the chassis.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the NCS 2002 in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the NCS 2002 ship kit, or remove the coating from the threads to ensure electrical continuity.

Procedure

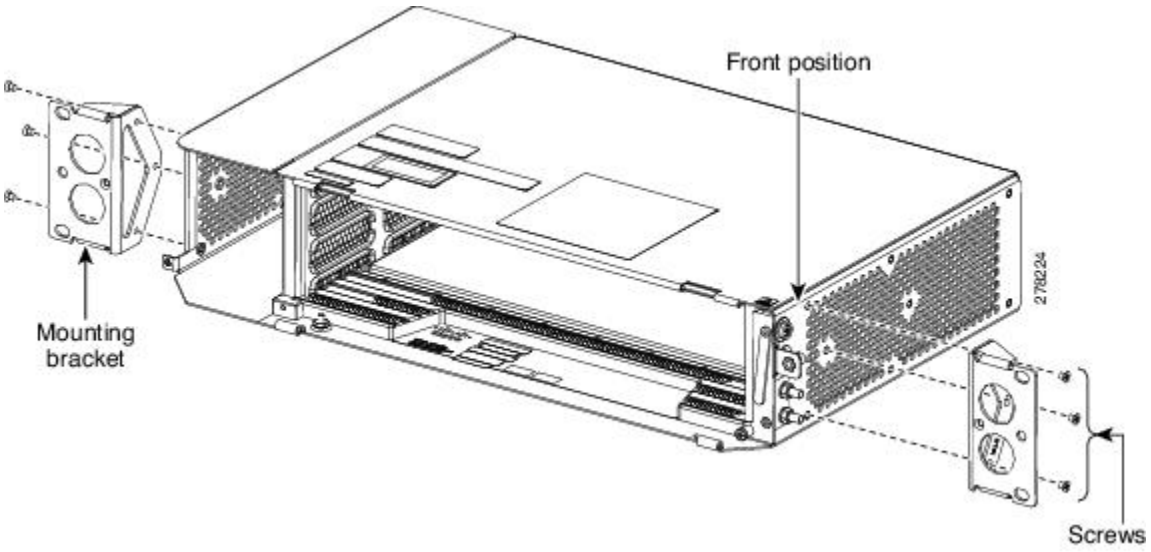
Step 1 Place the mounting bracket flush against the shelf as shown in the figure below.

Step 2 Align the mounting bracket screw holes against the shelf screw holes.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Repeat steps 1 through 3 for the mounting bracket on the opposite side.

Figure 37: Mounting the Brackets on the NCS 2002 Shelf for ETSI Rack Configuration



Step 5 Return to your originating procedure (NTP).

DLP-L39 Mounting the Air Deflectors (Front-to-Front) on the NCS 2002 Shelf for ETSI Rack Configuration

Purpose	This task mounts the air deflectors (front-to-front) on the NCS 2002 shelf for ETSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Note The air deflectors can be installed only in the front position of the chassis.

Procedure

Step 1 Place the right front air deflector flush against the right side of the chassis as shown in Diagram 1 of the figure below.

Step 2 Align the screw holes on the right front air deflector with the screw holes on right side of the chassis.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 1 of the figure below.

Step 4 Place the left front air deflector flush against the chassis as shown in Diagram 1 of the figure below.

Note
If the 100G-LC-C, 10x10G-LC, or CFP-LC cards are to be installed in the NCS 2002 shelf, do not mount the left front deflector (exhaust air deflector). Use the standard brackets directly to mount the NCS 2002s shelf.

Step 5 Align the screw holes on the left back air deflector with the screw holes on the chassis.

Step 6 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 1 of the figure below.

Step 7 Place the air deflector covers on the rear ends of the chassis as shown in Diagram 2 of the figure below.

Step 8 Align the screw holes on the air deflector covers with the screw holes on the chassis.

Step 9 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 10 Place the mounting bracket flush in the front position (see Diagram 3 of the figure below) against the right side of the chassis.

Step 11 Align the screw holes on the mounting bracket with the screw holes on the right side of the chassis.

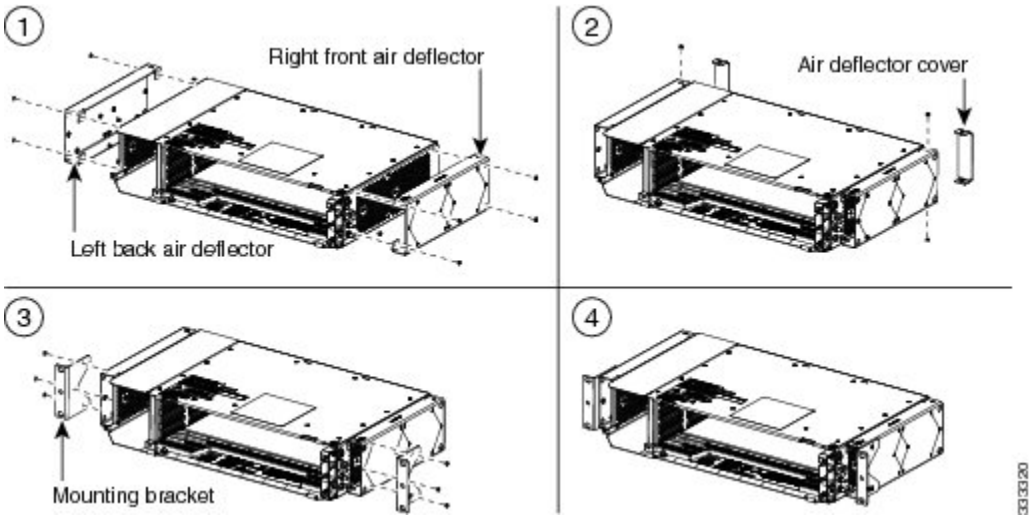
Step 12 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 13 Place the other mounting bracket flush in the front position (see Diagram 3 of the figure below) against the left side of the chassis.

Step 14 Align the screw holes on the mounting bracket with the screw holes on the left side of the chassis.

Step 15 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Figure 38: Mounting the Air Deflectors (Front-to-Front) on the NCS 2002 Shelf for ETSI Rack Configuration



Step 16 Return to your originating procedure (NTP).

DLP-L40 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2002 Shelf for ETSI Rack Configuration

Purpose	This task installs the bracket with air deflectors (front-to-back) on the NCS 2002 shelf for ETSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Note The air deflectors can be installed only in the front position of the chassis.

Procedure

Step 1 Place the right front air deflector flush against the right side of the chassis as shown in Diagram 1 of the following figure.

Step 2 Align the screw holes on the right front air deflector with the screw holes on right side of the chassis.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 2 of the following figure.

Step 4 Place the left back air deflector flush against the chassis as shown in Diagram 1 of the following figure.

Note
If the 100G-LC-C, 10x10G-LC, or CFP-LC cards are to be installed in the NCS 2002 shelf, do not mount the left back deflector (exhaust air deflector). Use the standard brackets directly to mount the NCS 2002 shelf.

Step 5 Align the screw holes on the left back air deflector with the screw holes on the chassis.

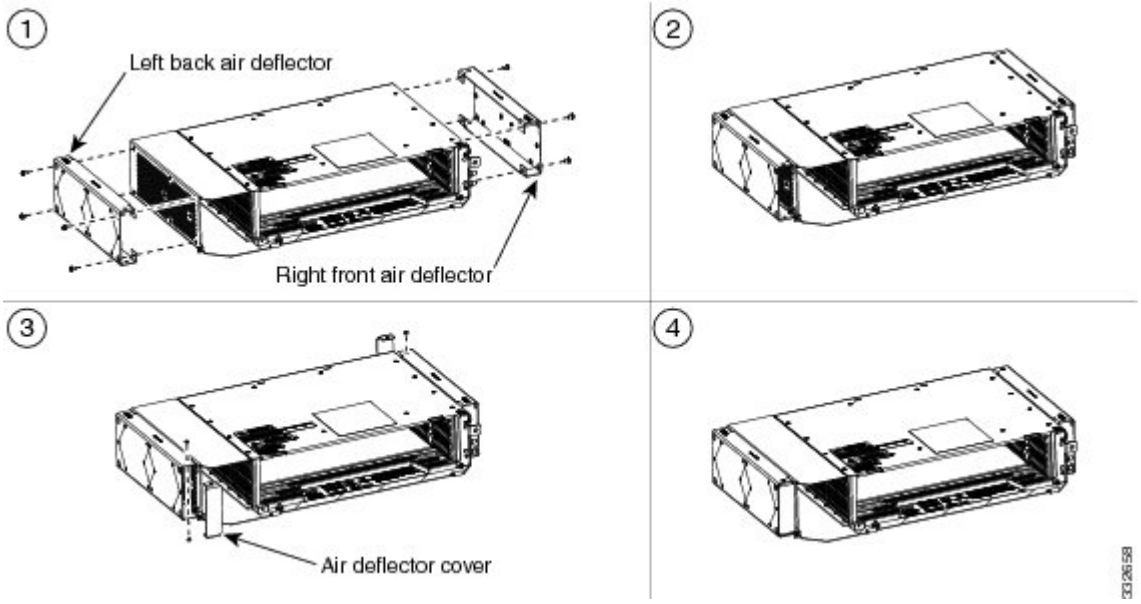
Step 6 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 2 of the following figure.

Step 7 Place the air deflector covers on the front and rear ends of the chassis as shown in Diagram 3 of the following figure.

Step 8 Align the screw holes on the air deflector covers with the screw holes on the chassis.

Step 9 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 4 of the following figure.

Figure 39: Mounting the Air Deflectors (Front-to-Back) on the NCS 2002 Shelf for ETSI Rack Configuration



Step 10 Place the mounting bracket flush in the front position (see Diagram 1 of the following figure) or in the middle position (see Diagram 3 of the following figure) against the right side of the chassis.

Step 11 Align the screw holes on the 23-inch mounting bracket with the screw holes on the right side of the chassis.

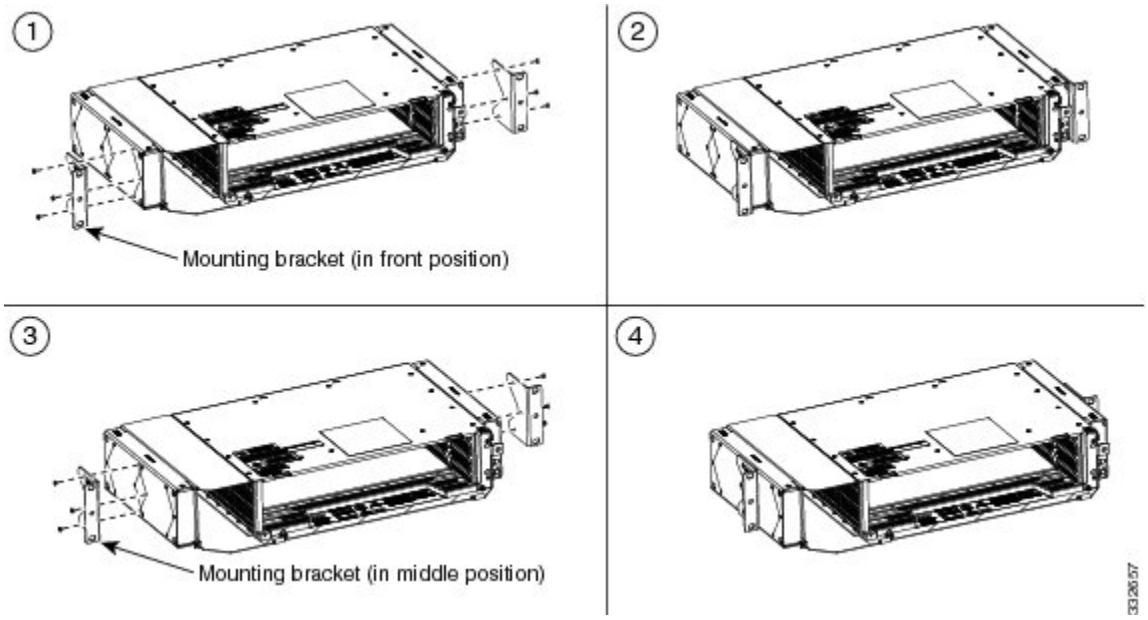
Step 12 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 13 Place the mounting bracket flush in the front position (see Diagram 1 of the following figure) or in the middle position (see Diagram 3 of the following figure) against the left side of the chassis.

Step 14 Align the screw holes on the 23-inch mounting bracket with the screw holes on the left side of the chassis.

Step 15 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Figure 40: Mounting the Brackets with Air Deflectors (Front-to-Back) on the NCS 2002 Shelf for ETSI Rack Configuration



Step 16 Return to your originating procedure (NTP).

DLP-L41 Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2002 Shelf for ETSI Rack Configuration

Purpose	This task installs the bracket with air deflectors (front-to-top configuration) on the NCS 2002 shelf.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2002 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Note The air deflectors can be installed only in the front position of the chassis.

Procedure

Step 1 Place the right front air deflector flush against the right side of the chassis (see Diagram 1 of the following figure).

Step 2 Align the screw holes on the right front air deflector with the screw holes on right side of the chassis.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Place the air deflector cover on the rear end of the chassis.

Step 5 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 2 of the following figure).

Step 6 Place the mounting bracket flush against the left side of the chassis (see Diagram 2 of the following figure).

Step 7 Align the screw holes on the mounting bracket with the screw holes on the left side of the chassis.

Step 8 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 9 Place the mounting bracket flush against the right side of the chassis (see Diagram 2 of the following figure).

Step 10 Align the screw holes on the mounting bracket with the screw holes on the left side of the chassis.

Step 11 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

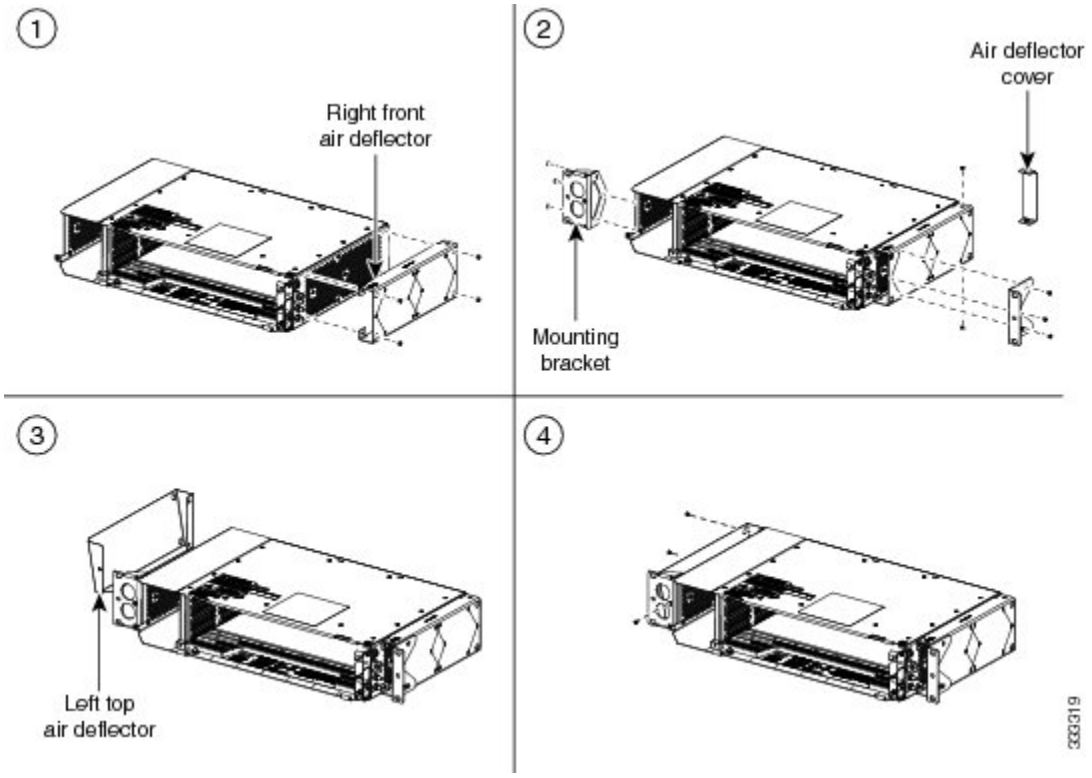
Step 12 Place the left top air deflector flush against the left side of the chassis as shown in Diagram 3 of the following figure.

Note
If the 100G-LC-C, 10x10G-LC, or CFP-LC cards are to be installed in the NCS 2002 shelf, do not mount the left top deflector (exhaust air deflector). Use the standard brackets directly to mount the NCS 2002 shelf.

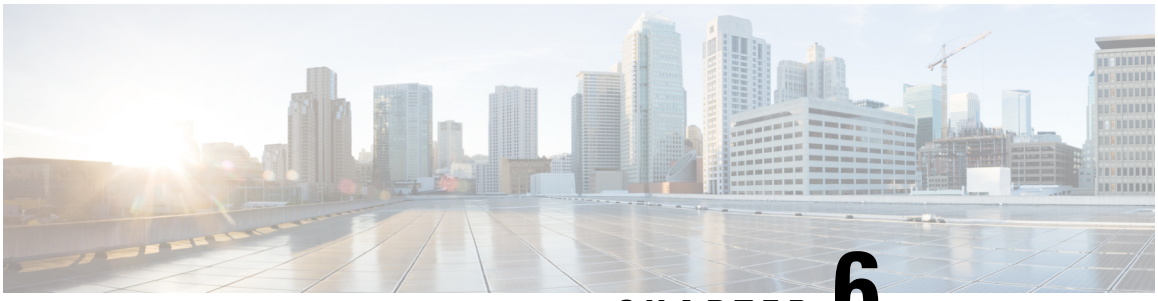
Step 13 Align the screw holes with the screw holes of the mounting bracket and the chassis.

Step 14 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 4 of the following figure.

Figure 41: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2002 Shelf for ETSI Rack Configuration



Step 15 Return to your originating procedure (NTP).



CHAPTER 6

Mounting the Cisco NCS 2002 Shelf

This chapter explains how to mount the the NCS 2002 Shelf.

The sections are:

- ANSI Rack Installation, on page 61
- ETSI Rack Installation, on page 63
- NTP-L42 Installing the NCS 2002 Shelf, on page 65

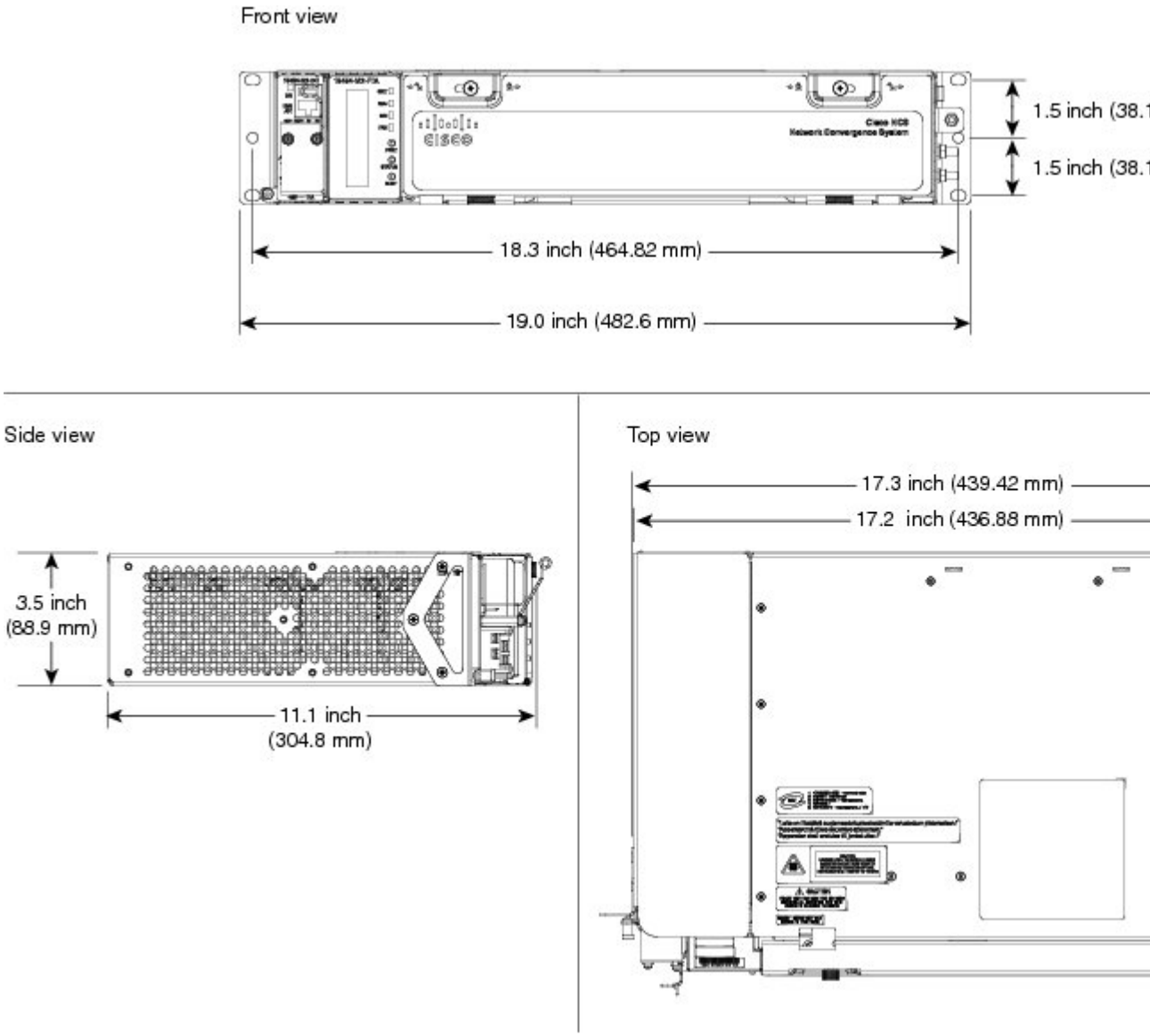
ANSI Rack Installation

The NCS 2002 shelf is mounted on a 19-inch (482.6-mm) or 23-inch (584.2-mm) equipment rack. Make sure that the correct type of 19-inch ANSI rack is used for mounting the NCS 2002 shelf. If the shelf is mounted in the front position, then it projects 1.7 inches (43.18 mm) from the front of the rack. If the shelf is mounted in the middle position, then it projects 5.1 inches (129.54 mm) from the front of the rack. The shelf mounts in both Electronic Industries Alliance (EIA) standard and Telcordia-standard racks. The shelf is a total of 17.2 inches (431.8 mm) wide with no mounting ears attached. Ring runs are not provided by Cisco and might hinder side-by-side installation of shelves where space is limited.

The NCS 2002 shelf measures 3.5 inches (88.9 mm) high, 19 or 23 inches (482.6 or 584.2 mm) wide (depending on which way the mounting ears are attached), and 11.1 inches (304.8 mm) deep.

The figure below shows the dimensions of the NCS 2002 shelf on a 19-inch (482.6 mm) ANSI rack configuration with brackets mounted in the front position.

Figure 42: Cisco NCS 2002 Shelf Dimensions for a 19-inch ANSI Rack Configuration



Mounting a Single Node

Mounting the NCS 2002 shelf on a rack requires a minimum of 3.5 inches (88.9 mm) of vertical rack space. To ensure that the mounting is secure, use two to three #12-24 mounting screws for each side of the shelf. For an ANSI rack, the brackets can be mounted in the front or middle position. The shelf should be empty for easier lifting.

The NCS 2002 shelves can be mounted above each other without any space between the shelves. This method of mounting does not restrict the air flow because the air vents are on either sides of the NCS 2002 shelves.

ETSI Rack Installation

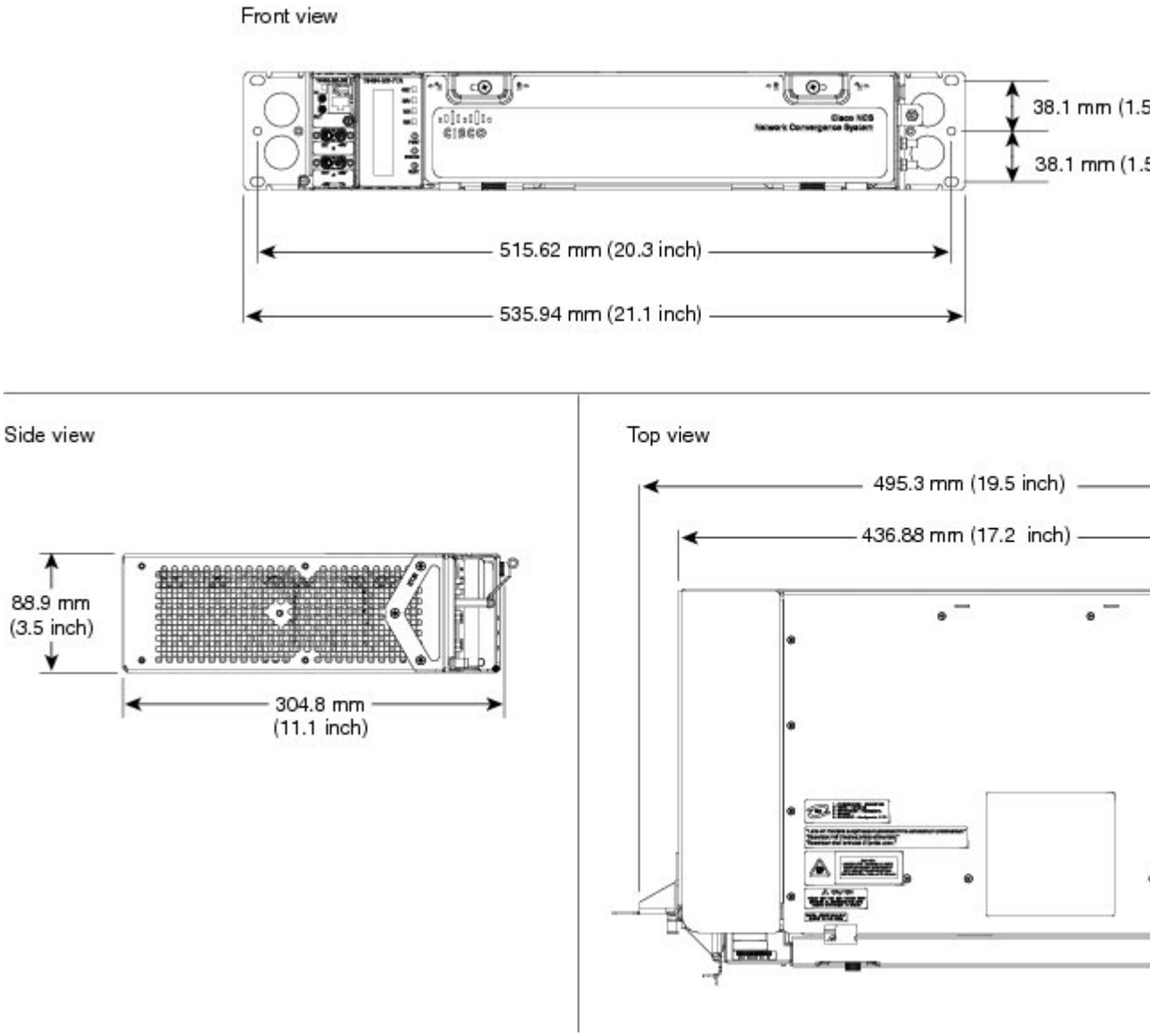
The NCS 2002 shelf is mounted on a 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) ETSI standard equipment rack. In an ETSI rack, the shelf can be mounted only in the front position. The shelf projects 1.7 inch (43.18 mm) from the front of the rack and is a total of 431.8 mm (17 inch) wide with no mounting ears attached. Cisco does not provide ring runs, which might hinder side-by-side installation of shelves where space is limited.

The NCS 2002 shelf measures 88.9 mm (3.5 inches) high, 535 mm (21.06 inches) wide, and 304.8 mm (11.1 inches) deep.

Caution When mounting a shelf in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

The figure below provides the dimensions of the NCS 2002 shelf installed on a 600 x 600-mm (23.6 x 23.6-inch) ETSI standard equipment rack.

Figure 43: Cisco NCS 2002 Shelf Dimensions for an ETSI Rack Configuration



Mounting a Single Node

The NCS 2002 requires 3.5 inches (88.9 mm) minimum of vertical rack space. To ensure the mounting is secure, use two to three 2006 mounting screws for each side of the shelf.

In an ETSI rack, the brackets can be mounted only in the front position.

The NCS 2002 shelves can be mounted above each other without any space between the shelves. This method of mounting does not restrict the air flow because the air vents are on either sides of the NCS 2002 shelves.

NTP-L42 Installing the NCS 2002 Shelf

Purpose	This procedure helps in mounting the NCS 2002 shelf.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• Medium slot-head screwdriver
	• Small slot-head screwdriver
	• ETSI only:
	  • Two M6 x 20 pan-head Phillips mounting screws
	• ANSI only:
	  • Two #12-24 x 3/4 pan-head Phillips mounting screws

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.** Statement 1048

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045

Warning **Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security.** Statement 1072

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005

Warning **To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 131°F (55°C).** Statement 1047

Warning **Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

Warning **To prevent airflow restriction, allow clearance around the ventilation openings to be at least:1 inch (25.4 mm).** Statement 1076

Note Make sure that the correct type of 19-inch ANSI rack is used for mounting the NCS 2002 shelf.

Note During installation, do not use the door to handle the chassis.

Note Remove the door from the NCS 2002 shelf and reinstall it after installing all the other modules.

Procedure

Step 1 Complete the necessary task as applicable:

- NTP-L44 Mounting the Brackets in ANSI Configuration, on page 45
- NTP-L45 Mounting the Brackets in ETSI Configuration, on page 51

Step 2 Complete the following mounting task:

- DLP-L42 Mounting the NCS 2002 Shelf on a Rack (One Person), on page 67

Step 3 Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

Step 4 Continue with NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108.

Stop. You have completed this procedure.

DLP-L42 Mounting the NCS 2002 Shelf on a Rack (One Person)

Purpose	This task allows one person to mount the shelf on a rack.
Tools/Equipment	• # 2 Phillips Dynamometric screwdriver • ANSI —Two #12-24 x ¾ pan-head Phillips mounting screws • ETSI—Two M6 x 20 mounting screws
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Warning The chassis must not be mounted over combustible items. The following label can be found on the chassis:



Note The NCS 2002 requires a minimum of 3.5 inches (88.9 mm) of vertical rack space. To ensure that the mounting is secure, use two to three NCS 2006 mounting screws on each side of the shelf. A shelf should be mounted at the bottom of the rack if it is the only unit in the rack.

Note In an ANSI rack, the chassis can be installed in the front or the middle position. In an ETSI rack, the chassis is installed only in the front position.

Procedure

Step 1 Verify that the proper fuse panel has been installed in the top mounting space. If a fuse panel is not present, you must install one according to manufacturer instructions:

- For a DC power supply, the fuse rating must not exceed 15A.
- For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

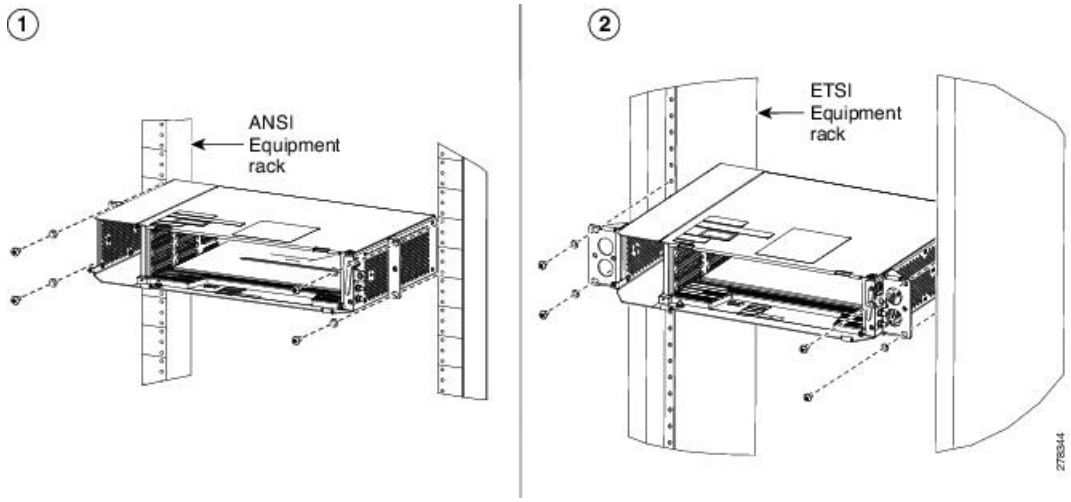
Step 2 Ensure that the shelf is mounted on the appropriate rack equipment:

- 23 inches (584.2 mm) or 19 inches (482.6 mm) for ANSI racks. The recommended 19-inch ANSI rack for the NCS 2002 shelf is shown in the figure below
- 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) for ETSI racks.

Diagram 1 of the figure below shows the NCS 2002 shelf mounted on an ANSI rack in the middle position using 19-inch mounting brackets

Diagram 2 of the figure below shows the NCS 2002 shelf mounted on an ETSI rack in the front position using mounting brackets

Figure 44: Mounting an NCS 2002 in a Rack



Step 3 Return to your originating procedure (NTP).

Step 4 Lift the shelf to the desired position in the rack.

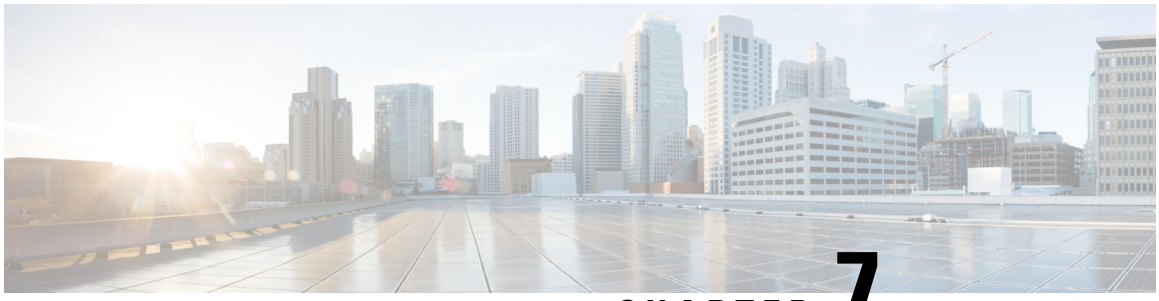
Note
To ensure proper cooling of the NCS 2002 shelf, make sure that the space in front of the air flow vents are free of cables, fibers, and mechanical fixtures for fiber and cable management.

Step 5 Align the screw holes on the mounting brackets with the mounting holes in the rack.

Step 6 Using the Phillips Dynamometric screwdriver, install one mounting screw in each side of the assembly. Tighten the screw to a torque value of 22 in-lb (2.5 N-m).

Step 7 When the shelf is secured to the rack, install the remaining two mounting screws on either sides of the shelf.

Step 8 Return to your originating procedure (NTP).



CHAPTER 7

Connecting Power and Ground

This chapter explains how to connect the power and ground.

The sections are:

- Power and Ground Description, on page 71
- NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf, on page 72

Power and Ground Description

Ground the equipment according to Telcordia standards or local practices.

The grounding configuration is mandatory for ANSI and ETSI chassis for both AC and DC configurations.

The following sections describe power and ground for the NCS 2002 shelves.

For detailed instructions on grounding the NCS 2002 chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

ANSI Power and Ground

For AC power feed, use the power cable shipped with the NCS 2002 and one ground cable. For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For low input voltage ranges, 100V to 127Vac, the branch circuit protection must not be rated more than 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes. The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries. This product is intended for use on the TN and TT power systems.

The NCS 2002 has redundant –48 VDC #12 single-hole lug power terminals. The terminals are labeled RET(A), RET(B), -48V(A), and -48V(B) on the power module.

To install redundant DC power feeds, use four power cables and one ground cable. For a single power feed, only two power cables (#12 AWG or larger, copper conductor, 194 degrees F [90 degrees C] minimum) and one ground cable (#6 AWG or larger) are required. Use a conductor with low impedance to ensure circuit overcurrent protection. However, the conductor must have the capability to safely conduct any faulty current that might be imposed. For a DC power supply, the fuse rating must not exceed 15A. The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is -48 VDC.

Note Functionality is guaranteed at –40 VDC input voltage, as defined in Telcordia GR-1089-CORE, Issue 5.

We recommend the following wiring conventions, but customer conventions prevail:

- Red wire for battery connections (–48 VDC).
- Black wire for battery return connections (RET).
- The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE, Issue 6.

The ground lug must be a dual-hole type, UL Listed, CSA certified and rated to accept the #6 AWG cable. Two ground posts with two M5 nuts are provided on the NCS 2002 to accommodate the dual-hole lug.

ETSI Power and Ground

For AC power feed, use the power cable shipped with the NCS 2002 and one ground cable. For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For low input voltage ranges, 100V to 127Vac, the branch circuit protection must not be rated more than 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes. The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries. This product is intended for use on the TN and TT power systems.

The NCS 2002 for ETSI has redundant –48 VDC power connectors (DSUB for DC power module) on the DC power module. To install redundant power feeds, use the two power cables shipped with the NCS 2002 shelf and one ground cable. For a DC power supply, the fuse rating must not exceed 15A. The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is -48 VDC.

The ground lug must be a dual-hole type, UL Listed, CSA certified and rated to accept the #6 AWG cable. Two ground posts with two M5 nuts are provided on the NCS 2002 to accommodate the dual-hole lug.

Caution Only use the power cables shipped with the NCS 2002 shelf.

NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf

Purpose	This procedure installs power feeds and grounds the NCS 2002 system.

Tools/Equipment	ANSI and ETSI: • #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws • Ground cable 13.3-mm² (#6 AWG) stranded • Listed pressure dual-holes lugs suitable for #6 AWG copper conductors • Wire cutters • Wire strippers • Crimp tool • Fuse panel ANSI only: • Power cable (from fuse panel to assembly), #12 AWG, copper conductors, 194 degrees F [90 degrees C]) • Wire wrapper • Two-hole grounding lug, shipped with the NCS 2002 ANSI ETSI only: • Power cable (from fuse panel to power modules), shipped with the NCS 2002 ETSI • Two-hole grounding lug, shipped with the NCS 2002 ETSI
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389

Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390



Warning **Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, power modules, and faceplates are in place.** Statement 261



Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 1024



Warning **Never install an AC power module and a DC power module in the same chassis.** Statement 1050



Warning **When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.** Statement 1002



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



Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units.** Statement 246



Warning **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.** Statement 39



Warning **Use copper conductors only.** Statement 1025



Warning **Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950-1 based safety standards.** Statement 1033

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022

Warning **This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.** Statement 1028

Caution Always use the supplied ESD wristband when working with a powered NCS. For detailed instructions on how to wear the ESD wristband, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Procedure

Step 1 Verify that the correct fuse panel is installed in the top mounting space:

- For a DC power supply, the fuse rating must not exceed 15A.
- For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For low input voltage ranges, 100V to 127Vac, the branch circuit protection must not be rated more than 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

Step 2 Depending on the shelf and the power module installed, complete the necessary task:

- DLP-L49 Connecting Office Power (AC) to the NCS 2002 Shelf, on page 76
- DLP-L50 Connecting Office Power (DC) to the NCS 2002 Shelf (ANSI Only), on page 79
- DLP-L51 Connecting Office Power (DC) to the NCS 2002 Shelf (ETSI Only), on page 84

Step 3 Connect the office ground to the NCS 2002 shelf. For detailed instructions on grounding, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Step 4 Complete DLP-L53 Turning On and Verifying DC Office Power on the NCS2002Shelf, on page 89.

Step 5 Continue with the NTP-L35 Installing the Fan-Tray Assembly in the NCS 2002 Shelf, on page 134.

Stop. You have completed this procedure.

DLP-L49 Connecting Office Power (AC) to the NCS 2002 Shelf

Purpose	This task connects AC power to the NCS 2002 shelf.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Fuse panel • Ground cable 13.3-mm² (#6 AWG) stranded. The PIDs of the power cables are listed in the table below.
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series • NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note This product is intended for use on the TN and TT power systems.

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **This equipment shall be connected to AC mains provided with a surge protective device (SPD) at the service equipment complying with NFPA 70, the National Electrical Code (NEC).** Statement 7012

Caution The NCS 2002 relies on the protective devices in the building installation to protect against short circuit, overcurrent and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note Not more than 7 feet (2 m) of the power supply cable should be exposed between the equipment and the fiber storage tray.

Caution When terminating the frame ground, do not use soldering lug connectors, screwless (push-in) connectors, quick connect connectors, or other friction-fit connectors.

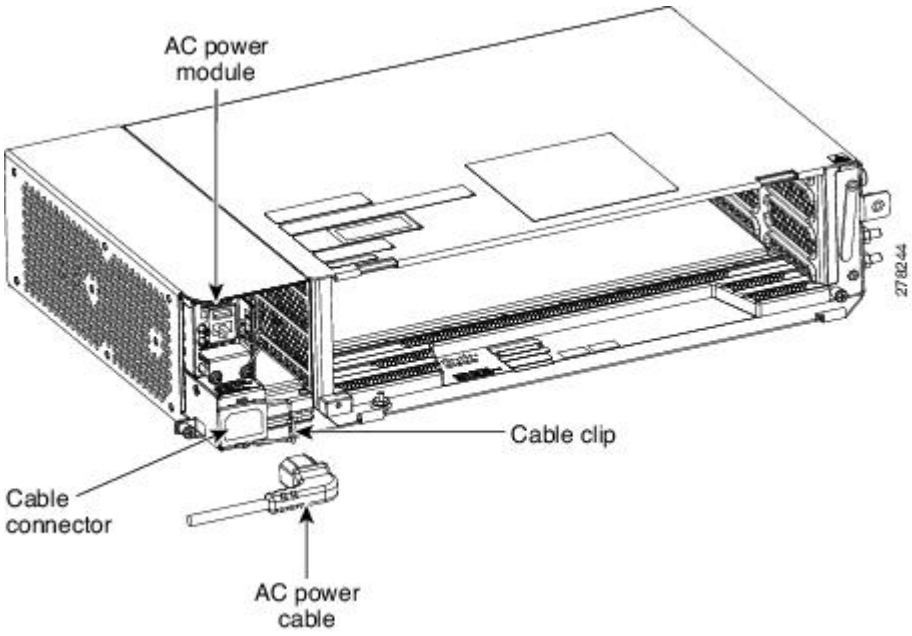
Note If the system loses power or if both TNC, TNCE, TSC, or TSCE cards are reset, you must reset the NCS 2002 clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see NTP-G24 Set Up Name, Date, Time, and Contact Information .

Procedure

Step 1 Verify that the AC power module is installed in Slot A of the NCS 2002.

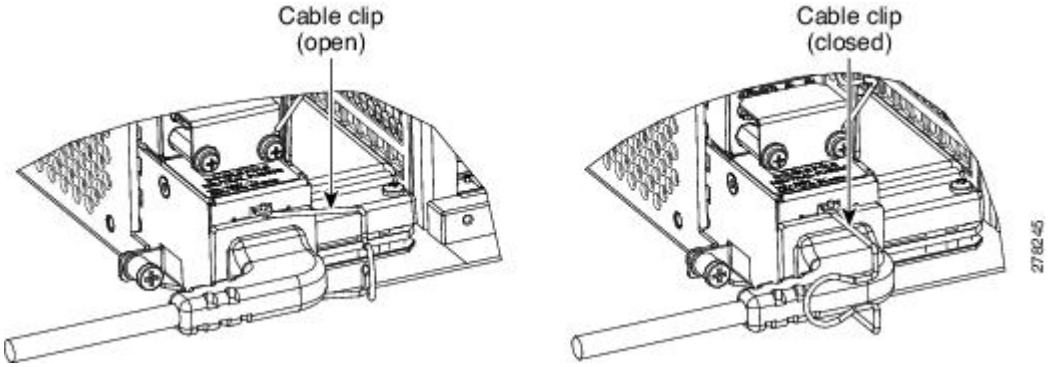
Step 2 Attach the AC power cable to the cable connector in the AC power module (see the figure below).

Figure 45: Connecting Office Power—AC Power Modules



Step 3 Close the cable clip to secure the power cable (see the figure below).

Figure 46: Cable Clip to Secure the Power Cable



Step 4 Connect the power cable to the fuse panel or power source.

Note
The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries.

Note
Turn on the power after installing the power cables.

Step 5 Return to your originating procedure (NTP).

Table 7: PIDs for AC Power Cables

Cable	PID
AC power cable - Japan right exit	15454-M-CBL-R-JPN=
AC power cable - China right exit	15454-M-CBL-R-CHI=
AC power cable - India right exit	15454-M-CBL-R-IND=
AC power cable - EU right exit	15454-M-CBL-R-EU=
AC power cable - ARG right exit	15454-M-CBL-RARG=
AC power cable - AUS right exit	15454-M-CBL-RAUS=
AC power cable - UK right exit	15454-M-CBL-R-UK=
AC power cable - KOR right exit	15454-M-CBL-RKOR=
AC power cable ANSI 110VAC right exit	15454-M-ACCBL-R=
AC power cable ANSI 220VAC right exit	15454-M-ACCBL-R2=
AC power cable for data center right exit	15454-M-ACL6-R=

DLP-L50 Connecting Office Power (DC) to the NCS 2002 Shelf (ANSI Only)

Purpose	This task connects DC power to the NCS 2002 shelf (ANSI Only).
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Open-end wrench or hex tube screw driver • Fuse panel • Power cable (from fuse panel to assembly), #12 AWG, copper conductors, 194 degrees F [90 degrees C]) • Ground cable #6 AWG stranded • Listed pressure dual-holes lugs suitable for #6 AWG copper conductors

Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series • NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place.** Statement 1075

Caution The NCS 2002 relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE Issue 5.

Note If the system loses power or both TNC, TNCE, TSC, or TSCE cards are reset and the system is not provisioned to get the time from a Network Time Protocol/Simple Network Time Protocol (NTP/SNTP) server, you must reset the NCS clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see the NTP-G24 Set Up Name, Date, Time, and Contact Information . If you are using the TNC, TNCE, TSC, or TSCE cards, the system clock runs for up to 3 hours. In this case, no action would be required.

Procedure

Step 1 Connect the return cables of the power supply to the Earth ground located at the power supply side.

Step 2 Connect the office power according to the fuse panel engineering specifications.

Step 3 Measure and cut the cables as needed to reach the NCS 2002 from the fuse panel.

Step 4 Dress the power according to local site practice.

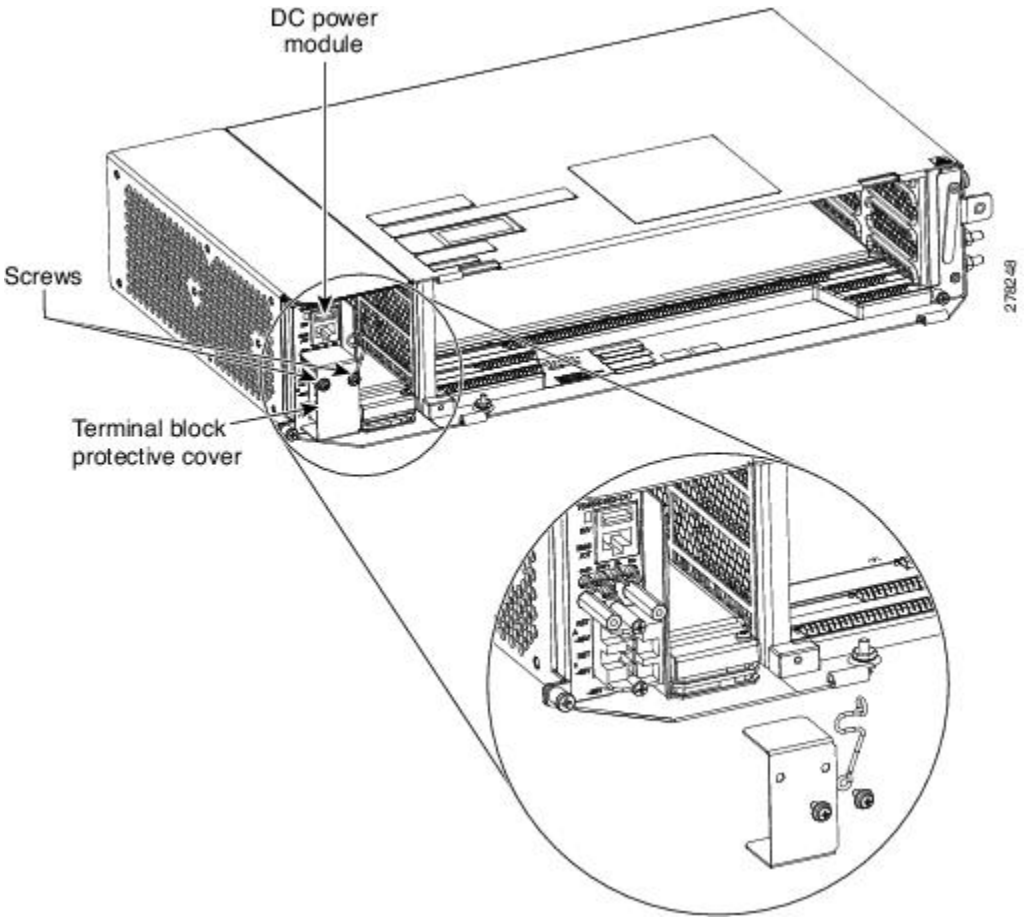
Step 5 Strip 1/2 inch (12.7 mm) of insulation from all power cables that you use.

Step 6 Crimp the lugs onto the ends of all power leads.

Step 7 Verify that the DC power module is installed in Slot A.

Step 8 Remove the screws from the terminal block protective cover from the DC power module (see the figure below).

Figure 47: Connecting Office Power—DC Power Module (ANSI Only)



Step 9 Insert the lugs as shown in the figure below.

Figure 48: Connecting Office Power—DC Power Module (ANSI Only)

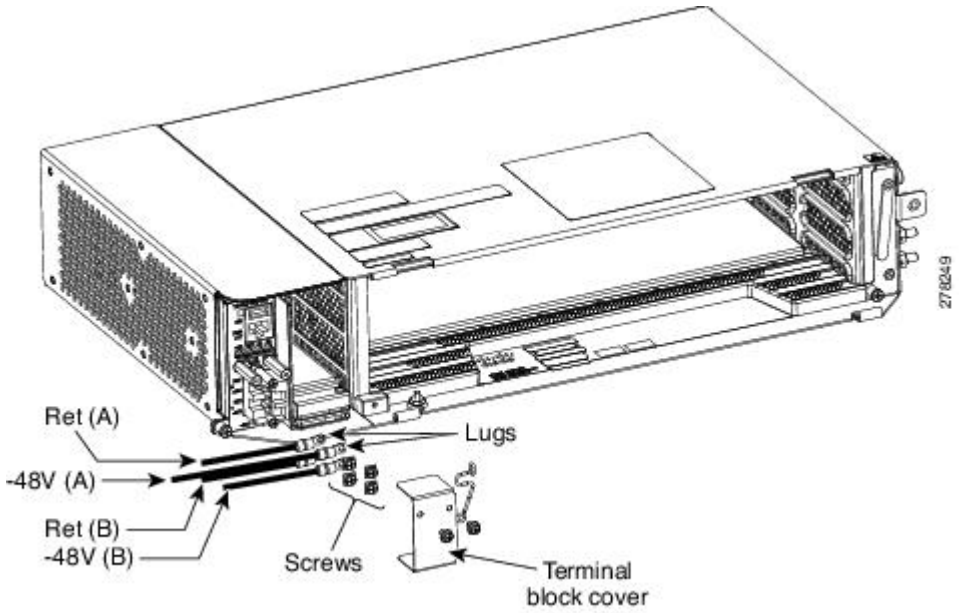
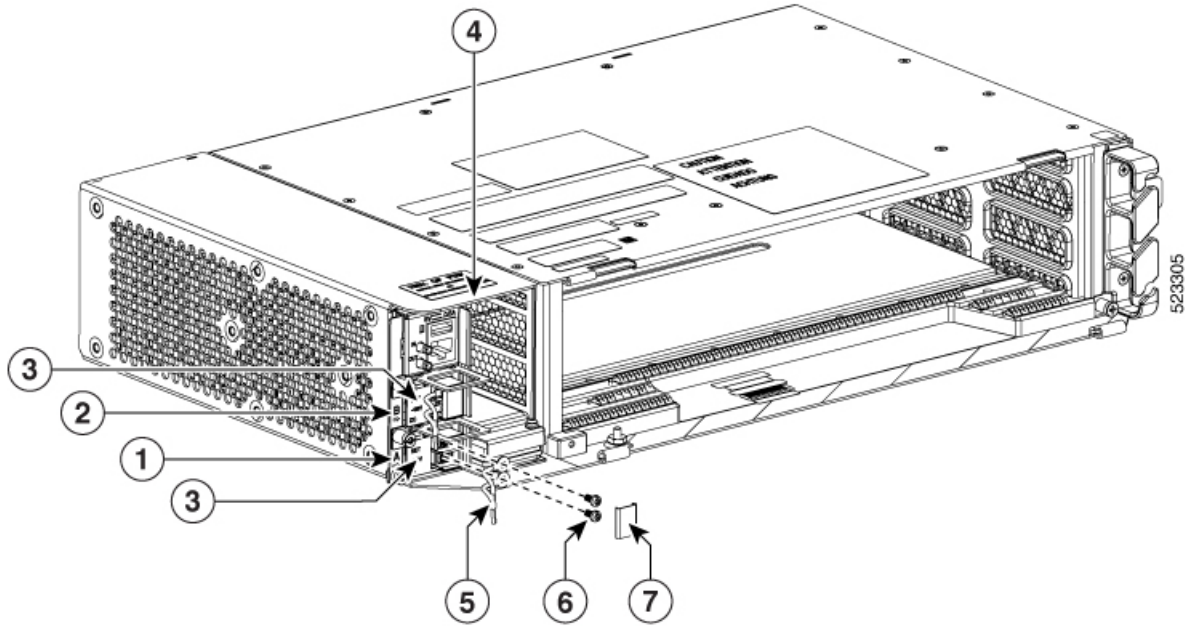


Figure 49: Connecting Office Power—Modular DC Power Module (ANSI Only)



1	PSU A
2	PSU B
3	Terminal block connectors
4	Slot A

5	Lugs
6	Screws
7	Terminal block cover

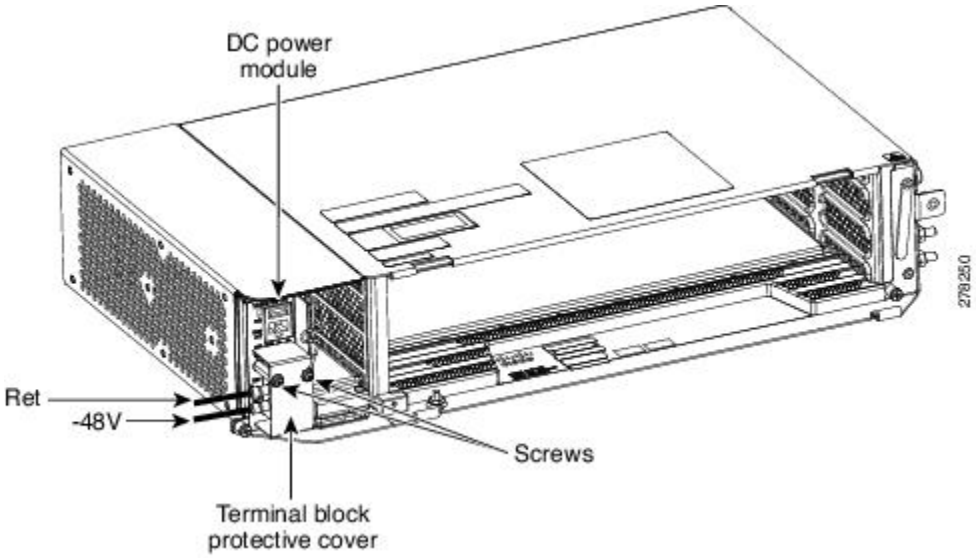
Note
There are two DC power terminals—A and B. Each power terminal is connected with two cables—One for RET and the other for -48V.

Step 10 Tighten the screws to a torque value of 7 in-lb (0.79 N-m) to lock the lugs.

Step 11 Tighten the screws to a torque value of 4 in-lb (0.45 N-m) of the terminal block protective cover on the DC power module (see the figure below).

Note
Use only pressure terminal connectors, such as ring and fork types, when terminating the battery, battery return, and frame ground conductors.

Figure 50: Connecting Office Power—DC Power Modules (ANSI Only)



Caution
Before you make any crimp connections, coat all bare conductors (battery, battery return, and frame ground) with an appropriate antioxidant compound. Bring all unplated connectors, braided strap, and bus bars to a bright finish, then coat with an antioxidant before you connect them. You do not need to prepare tinned, solder-plated, or silver-plated connectors and other plated connection surfaces, but always keep them clean and free of contaminants.

Caution
When terminating power, return (RET), and frame ground, do not use soldering lug, screwless (push-in) connectors, quick-connect, or other friction-fit connectors.

Step 12 Return to your originating procedure (NTP).

DLP-L51 Connecting Office Power (DC) to the NCS 2002 Shelf (ETSI Only)

Purpose	This task connects power to the NCS 2002 shelf (ETSI Only).
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Fuse panel • Ground cable #6 AWG stranded. The PID of the DC power cable for ETSI left exit is NCS2002-DCCBL-LE=.
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series • NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place.** Statement 1075

Note The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE Issue 5.

Caution The NCS 2002 relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note If the system loses power or both TNC, TNCE, TSC, or TSCE cards are reset and the system is not provisioned to get the time from a Network Time Protocol/Simple Network Time Protocol (NTP/SNTP) server, you must reset the NCS clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see the NTP-G24 Set Up Name, Date, Time, and Contact Information . If you are using the TNC, TNCE, TSC, or TSCE cards, the system clock runs for up to 3 hours. In this case, no action would be required.

Procedure

Step 1 Connect the return cables of the power supply to the Earth ground located at the power supply side.

Step 2 Verify that the DC power module is installed in Slot A of the NCS 2002.

Figure 51: Connecting Office Power—DC Power Module (ETSI Only)

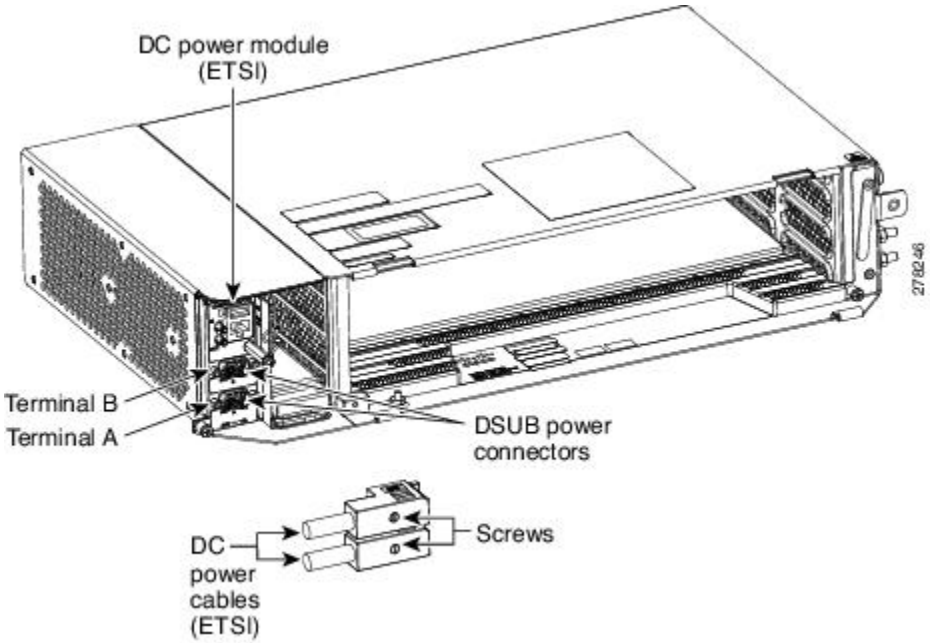
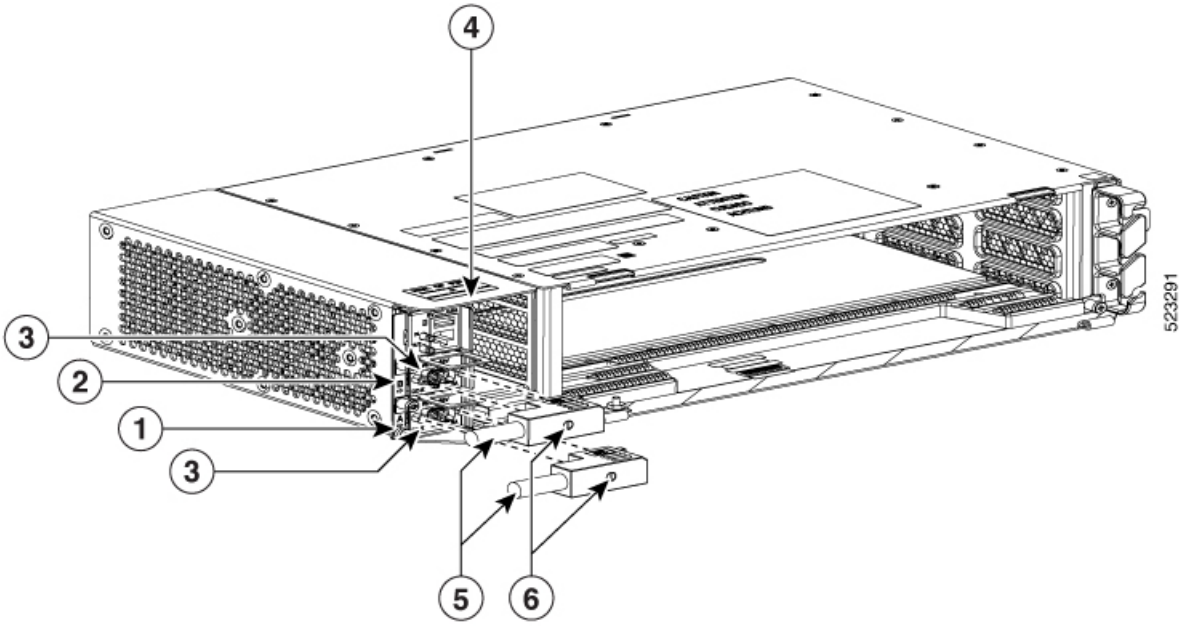


Figure 52: Connecting Office Power—Modular DC Power Module (ETSI Only)



1	PSU A
2	PSU B
3	D-sub connectors
4	Slot A
5	DC power cables
6	Screws

Step 3 Attach the DC ETSI power cables to the D-SUB power connectors of the DC power module (see the figure below).

Step 4 Tighten the screws to a torque value of 4 in-lb (0.45 N-m) to secure the cable.

Figure 53: Connecting Office Power—DC Power Module (ETSI Only)

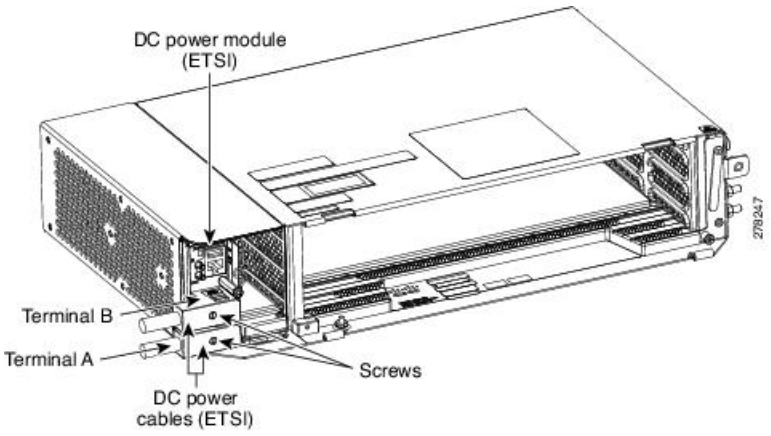
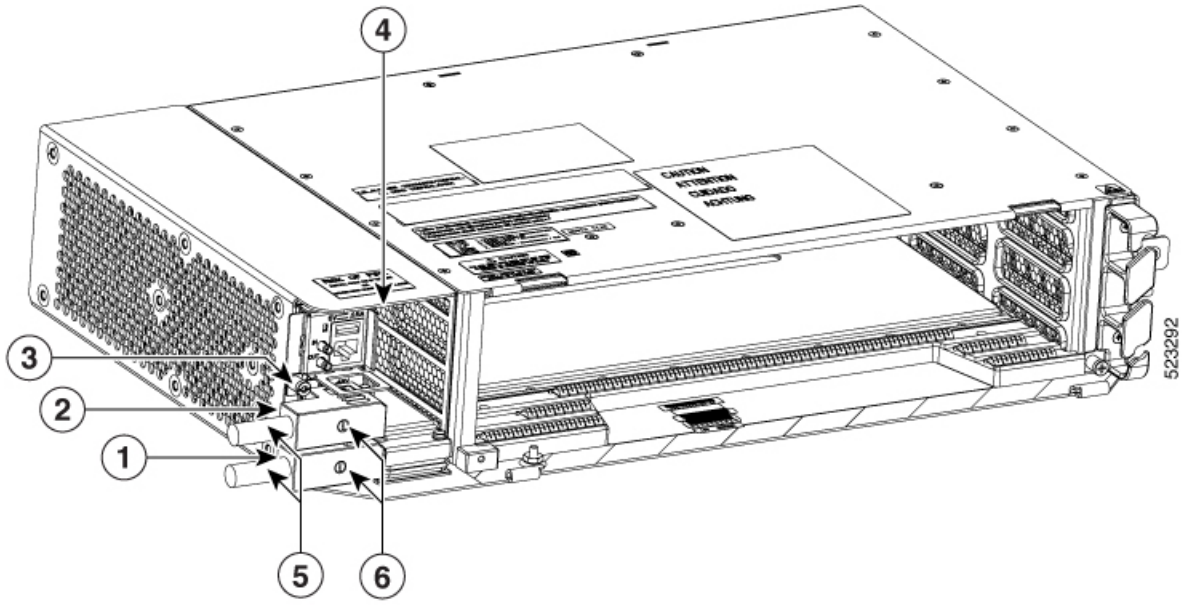


Figure 54: Connecting Office Power—Modular DC Power Module (ETSI Only)



1	PSU A
2	PSU B
3	D-sub connectors
4	Slot A
5	DC power cables
6	Screws

Note
Use only pressure terminal connectors, such as ring and fork types, when terminating the battery, battery return, and frame ground conductors.

Caution
Before you make any crimp connections, coat all bare conductors (battery, battery return, and frame ground) with an appropriate antioxidant compound. Bring all unplated connectors, braided strap, and bus bars to a bright finish, then coat with an antioxidant before you connect them. You do not need to prepare tinned, solder-plated, or silver-plated connectors and other plated connection surfaces, but always keep them clean and free of contaminants.

Caution
When terminating power, return, and frame ground, do not use soldering lug, screwless (push-in) connectors, quick-connect, or other friction-fit connectors.

Step 5 Return to your originating procedure (NTP).

DLP-L52 Turning On and Verifying AC Office Power on the NCS 2002 Shelf

Purpose	This task measures the power to verify correct power and returns for the NCS 2002 shelf.
Tools/Equipment	Voltmeter
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series • NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108 • DLP-L49 Connecting Office Power (AC) to the NCS 2002 Shelf, on page 76
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None



Caution Do not apply power to the shelf until you complete all the installation steps.



Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389



Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390

Procedure

Step 1 To power up the node, insert the fuse into the fuse position according to site practice. The fuse rating must not exceed 15A in case of AC power.

Step 2 If the NCS 2002 does not power up, check the voltage at the power source using a voltmeter. The voltage should be 100 to 240 VAC +/-10 percent.

Step 3 Return to your originating procedure (NTP).

DLP-L53 Turning On and Verifying DC Office Power on the NCS2002Shelf

Purpose	This task measures the power to verify correct power and returns for the NCS 2002 shelf.
Tools/Equipment	Voltmeter
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series • NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108 • DLP-L50 Connecting Office Power (DC) to the NCS 2002 Shelf (ANSI Only), on page 79 • DLP-L51 Connecting Office Power (DC) to the NCS 2002 Shelf (ETSI Only), on page 84
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not apply power to the shelf until you complete all installation steps.

Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389

Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390

Procedure

Step 1 Using a voltmeter, verify the office battery and ground at the following points on the fuse panel:

a) To verify the power, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side connection and verify that it is between –40.5 VDC and –57.6 VDC. Place the red test lead on the B-side connection and verify that it is between –40.5 VDC and –57.6 VDC.

Note
The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis. The nominal steady state voltage is -48 VDC.

b) To verify the ground, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side return ground and verify that no voltage is present. Place the red test lead on the B-side return ground and verify that no voltage is present.

Step 2 To power up the node, insert the fuse into the fuse position according to site practice. The fuse rating must not exceed 15A.

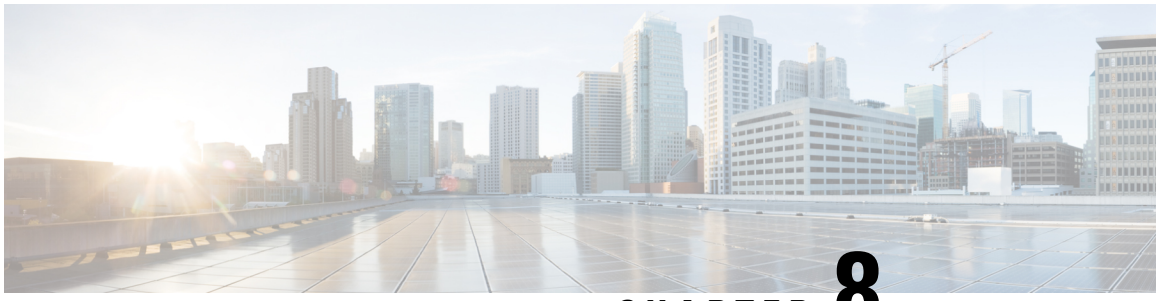
Step 3 Using a voltmeter, verify the NCS 2002 shelf for –48 VDC battery and ground:

a) To verify the A-side of the shelf, place the black lead of the voltmeter to the frame ground. Place the red test lead to the -48V (A-side battery connection) red cable. Verify that it reads between –40.5 VDC and –57.6 VDC. Then place the red test lead of the voltmeter to the RET1 (A-side return ground) black cable and verify that no voltage is present.

Note
The voltages –40.5 VDC and –57.6 VDC are, respectively, the minimum and maximum voltages required to power the chassis.

b) To verify the B-side of the shelf, place the black test lead of the voltmeter to the frame ground. Place the red test lead to the -48V (B-side battery connection) red cable. Verify that it reads between –40.5 VDC and –57.6 VDC. Then place the red test lead of the voltmeter to the RET2 (B-side return ground) black cable and verify that no voltage is present.

Step 4 Return to your originating procedure (NTP).



CHAPTER 8

Connecting and Routing the Cables and Wires

This chapter explains how to install the NCS 2002 shelf.

The sections are:

- NTP-L36 Attaching Wires to Timing, LAN, and Craft Pin Connections in NCS 2002, on page 91

NTP-L36 Attaching Wires to Timing, LAN, and Craft Pin Connections in NCS 2002

Purpose	This procedure attaches wires to the Timing, LAN, and Craft Pin connections in the NCS 2002 shelf.
Tools/Equipment	Twisted #22 or #24 AWG (0.51 mm² or 0.64 mm²) shielded wires for LAN or craft 75-ohm coaxial cable with DIN 1.0/2.3 miniature coax connector.
Prerequisite Procedures	NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf, on page 72
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Always use the supplied Electrostatic Discharge (ESD) wristband when working with a powered NCS 2002. For detailed instructions on how to wear the ESD wristband, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series

Note To route the copper cables from the SFPs or RJ-45 ports in a NCS 2002 shelf, removal of the shelf door is mandatory.

Note The minimum distance between the fiber LC connector and the bulk attenuator must be at least 50 cm. This is the minimum distance required to place the bulk attenuator outside the shelf from any port of a card.

Procedure

Step 1 Complete either DLP-L54 Installing Timing Wires in Cisco NCS 2002 - ANSI, on page 92or DLP-L55 Installing Timing Wires in Cisco NCS 2002- ETSI, on page 94 if you are provisioning external timing.

Step 2 Complete DLP-L56 Installing LAN Wires in Cisco NCS 2002, on page 99 to create an external LAN connection. You must connect a CAT-5 Ethernet cable to the LAN port on the TNC/TNCE/TSC/TSCE card to create an external LAN connection.

Stop. You have completed this procedure.

DLP-L54 Installing Timing Wires in Cisco NCS 2002 - ANSI

Purpose	This task installs the timing wires in the DC-2 or AC-2 Power Module of NCS 2002 (ANSI).
Tools/Equipment	100-ohm wire wrap cable, wire wrap tool
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Locate the timing BITS connectors in the DC-2 or AC-2 Power Module, as shown in the figures below .

Figure 55: DC-2 Power Module ANSI BITS connectors

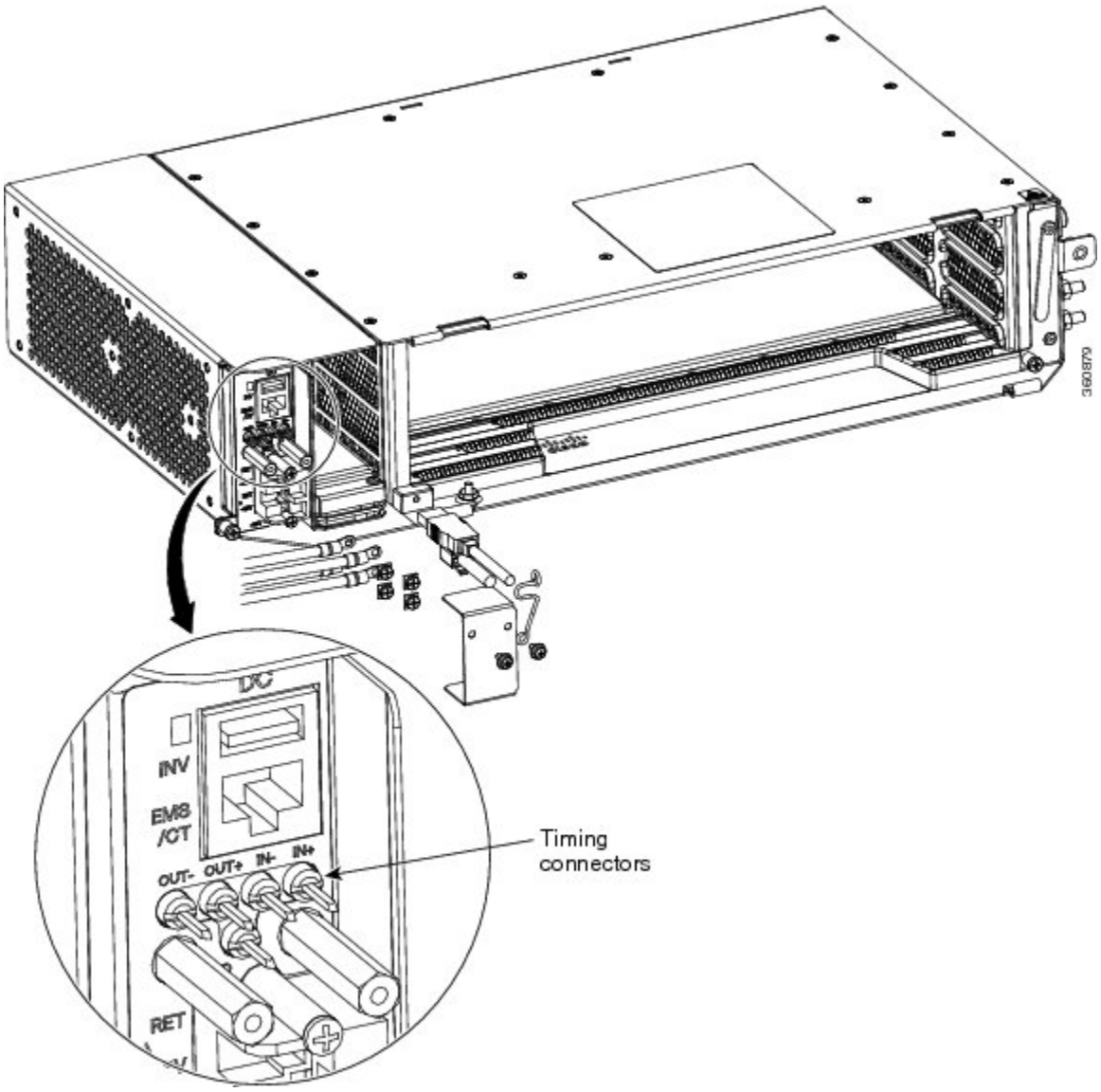
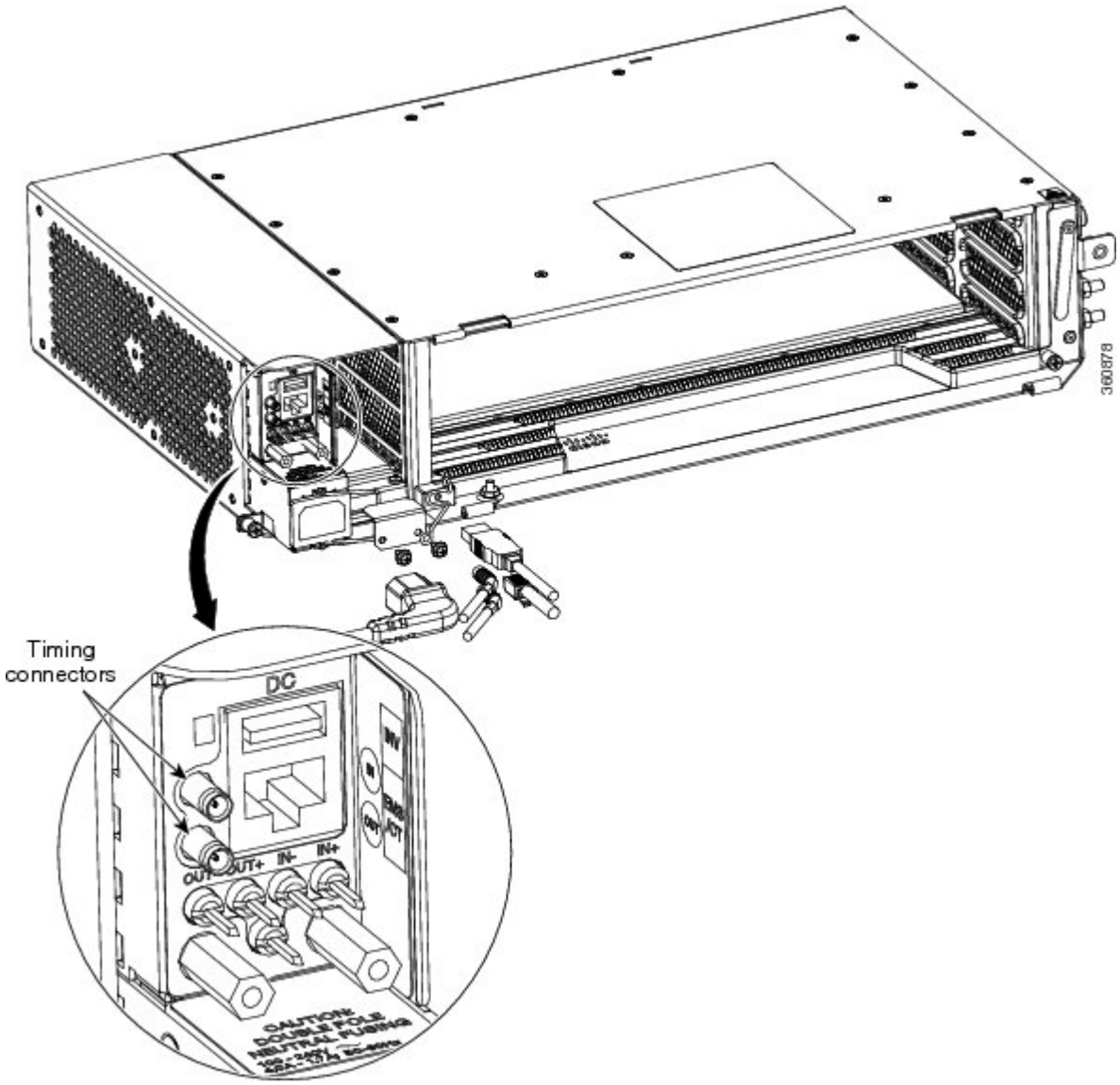


Figure 56: AC-2 Power Module ANSI BITS Connectors



Step 2 Connect the wire wrap cable to the appropriate timing connector in the Power Module.

Step 3 Connect the other end of the cable to the external source of the timing.

Repeat this step for each cable that is needed.

Step 4 Return to your originating procedure (NTP).

DLP-L55 Installing Timing Wires in Cisco NCS 2002- ETSI

Purpose	This task installs the timing wires in the AC-2 or DC-2E Power Module of NCS 2002 (ETSI).

Tools/Equipment	75-ohm coaxial cable with a DIN 1.0/2.3 miniature coax connector. The PID for the BITS IN/OUT cable is 15454-M-TMGCBL=.
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Locate the timing BITS connectors in the DC-2E or AC-2 Power Module, as shown in the figures below.

Figure 57: DC-2E Power Module ETSI BITS Connectors

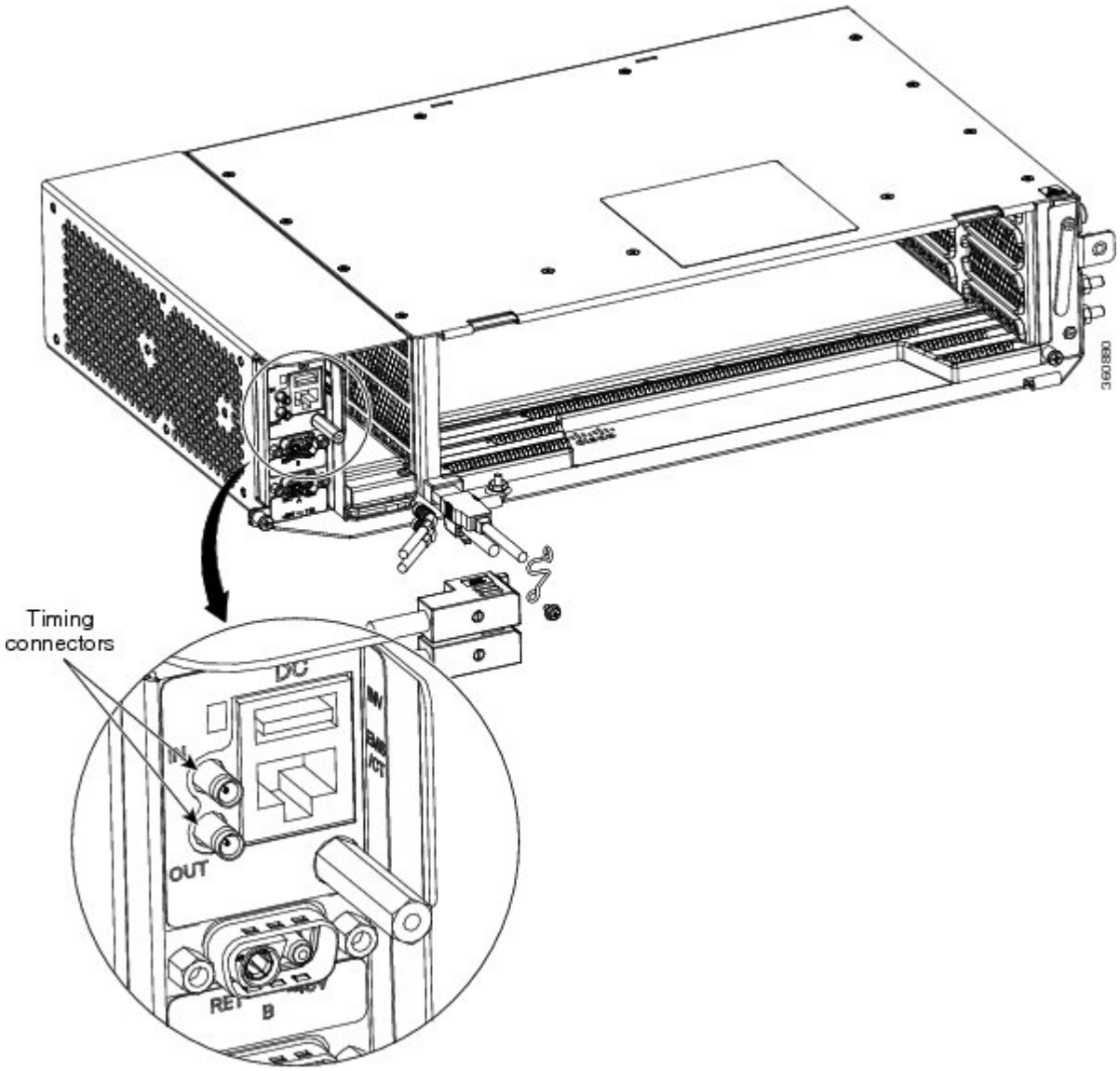
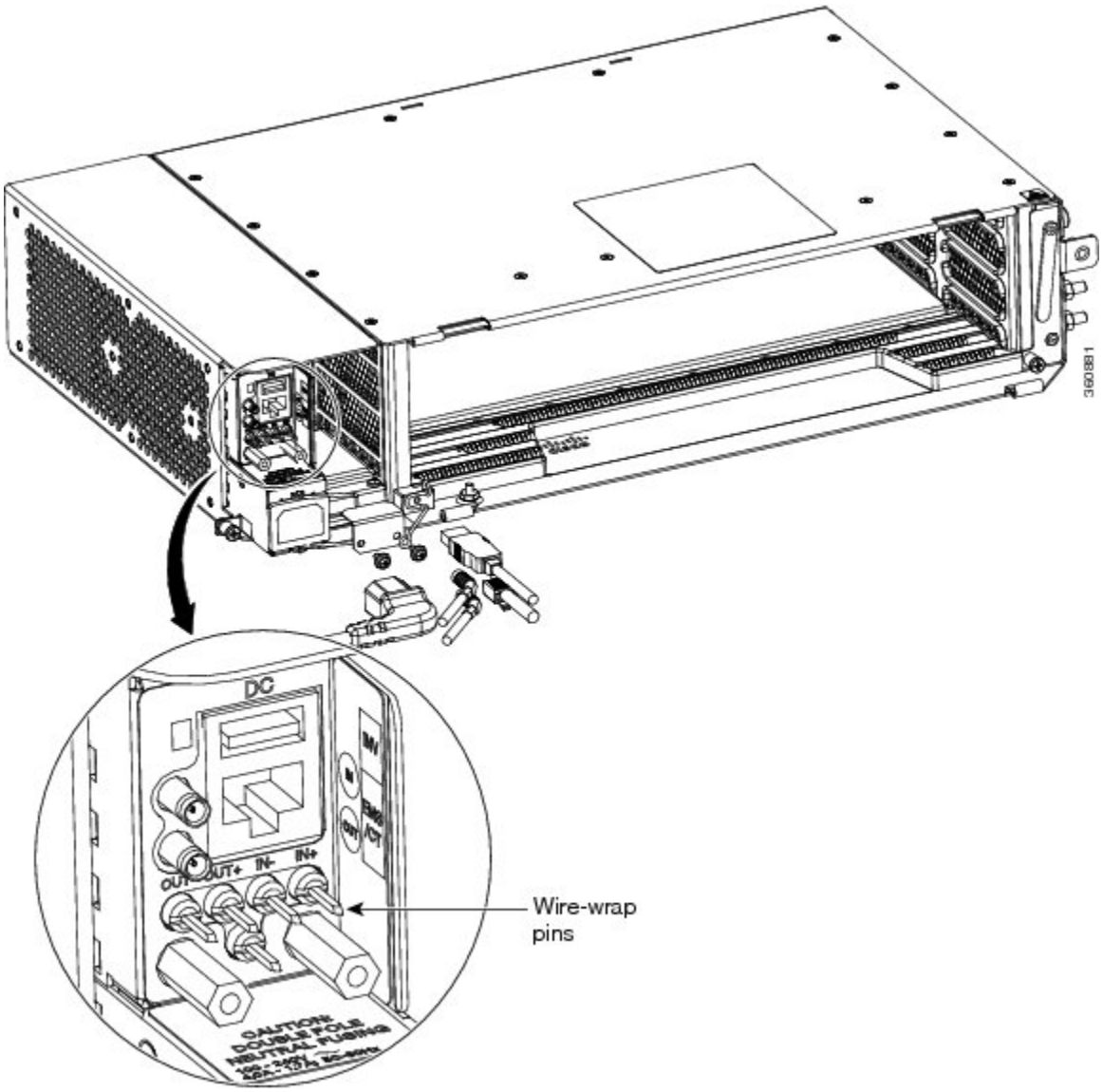


Figure 58: AC-2 Power Module ETSI BITS Connectors



Step 2 Using a coaxial cable with DIN 1.0/2.3 miniature coax connectors, connect the clock cable to the appropriate connector in the Power Module.

Step 3 Gently push the cable with the DIN 1.0/2.3 miniature coax connector down until the cable connector slides into the DIN 1.0/2.3 miniature coax connector on the Power Module with a click. The Power Module provides DIN 1.0/2.3 miniature coax connectors that are used for timing input and output. The input connectors for timing provide a 75-ohm termination. System cables that can convert timing clocks from 75 ohms to 100/120 ohms are available.

Note
See ITU-T G.813 for rules about provisioning timing references.

Step 4 Connect the other end of the cable to the external source of the timing.

Repeat this step for each cable that is needed.

Step 5 Return to your originating procedure (NTP).

Installing Timing Wires in the Modular DC Power Module

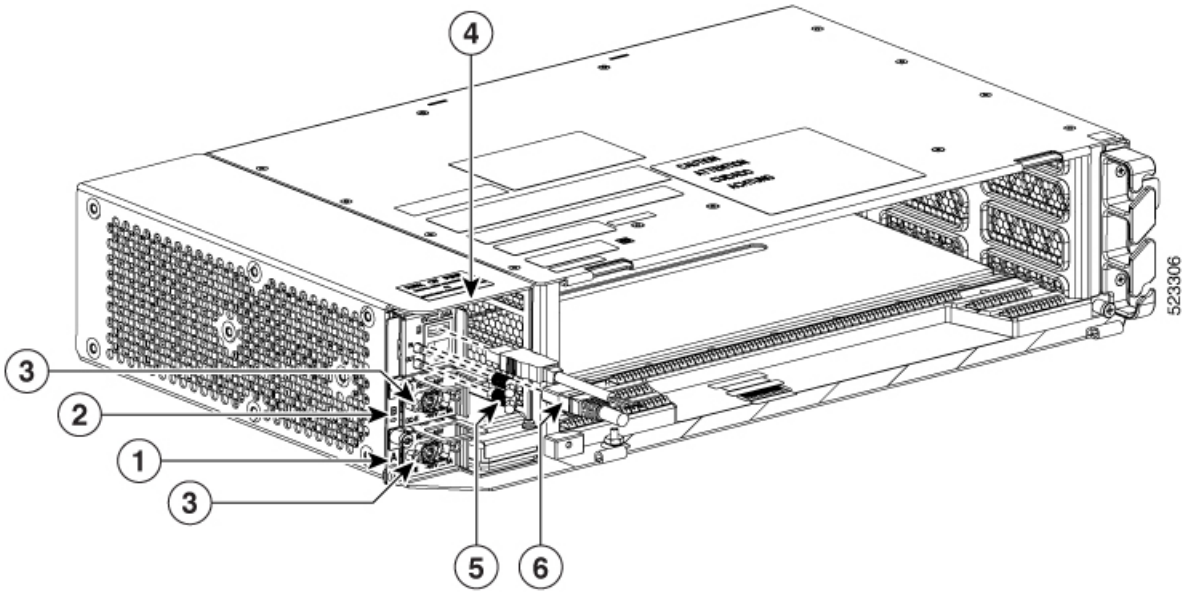
Use this task to install the timing wires in the DC frame of the new DC power module.

Purpose	This task installs the timing wires in the modular DC Power Module of NCS 2002.
Tools/Equipment	75-ohm coaxial cable with a DIN 1.0/2.3 miniature coaxial connector. The PID for the BITS IN/OUT cable is 15454-M-TMGCBL=.
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Locate the timing BITS connectors in the modular DC power module, as shown in the figure below.

Figure 59: Modular DC-2 Power Module BITS Connectors



1	PSU A
2	PSU B
3	ETSI PSUs

4	Captive screws
5	Coaxial cables
6	Ethernet cable

Step 2 Using a coaxial cable with DIN 1.0/2.3 miniature coaxial connectors, connect the clock cable to the appropriate connector in the Power Module.

Step 3 Gently push the cable with the DIN 1.0/2.3 miniature coaxial connector down until the cable connector slides into the DIN 1.0/2.3 miniature coaxial connector on the Power Module with a click. The Power Module provides DIN 1.0/2.3 miniature coaxial connectors that are used for timing input and output. The input connectors for timing provide a 75-ohm termination. System cables that can convert timing clocks from 75 ohms to 100/120 ohms are available.

See ITU-T G.813 for rules about provisioning timing references.

Step 4 Connect the other end of the cable to the external source of the timing.

Repeat this step for each cable that is needed.

Step 5 Return to your originating procedure (NTP).

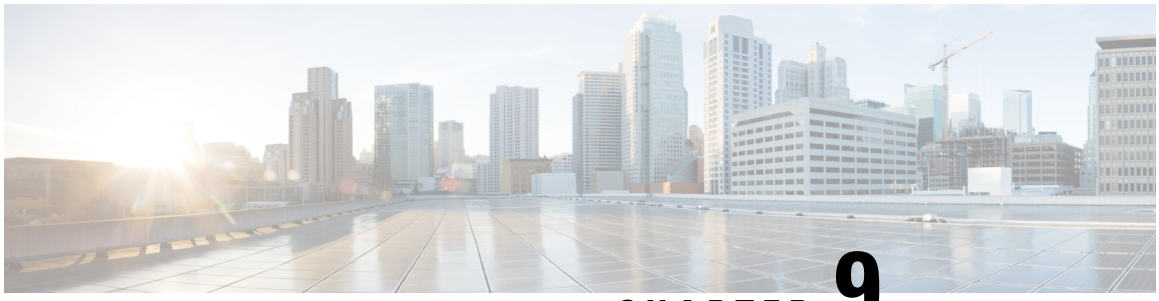
DLP-L56 Installing LAN Wires in Cisco NCS 2002

Purpose	This task installs the LAN wires in NCS 2002.
Tools/Equipment	Standard CAT-5 Ethernet cable straight-through for data terminal equipment (DTE) or crossover for data circuit-terminating equipment (DCE) or RJ-45 connector Crimping tool for RJ-45 connector 0.51 mm² or 0.64 mm² (#22 or #24 AWG) wire, preferably standard CAT-5
Prerequisite Procedures	NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf, on page 72
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Using a 0.51 mm² or 0.64 mm² (#22 or #24 AWG) wire or a standard CAT-5 Ethernet cable, connect the wires to the RJ-45 connector.

Step 2 Return to your originating procedure (NTP).



CHAPTER 9

Cisco NCS 2002 Shelf Installation Acceptance Test

This chapter describes how to perform a shelf acceptance test on Cisco NCS 2002 shelf.

- NTP-L38 Performing the NCS 2002 Shelf Installation Acceptance Test , on page 101

NTP-L38 Performing the NCS 2002 Shelf Installation Acceptance Test

Purpose	Use this procedure to perform a shelf installation acceptance test for the NCS 2002.
Tools/Equipment	Voltmeter
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 If you installed an NCS 2002 shelf, verify each applicable procedure that was completed.

Table 8: NCS 2002 Shelf Installation Task Summary

Description	Completed
NTP-L41 Unpacking and Inspecting the Shelf, on page 23	
Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series	

Description	Completed
NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108	
NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf, on page 72	
NTP-L35 Installing the Fan-Tray Assembly in the NCS 2002 Shelf, on page 134	
DLP-L62 Installing the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card, on page 360	
NTP-L29 Installing the Standard Door of the NCS 2002 Shelf, on page 106	

Step 2 Complete the DLP-L49 Connecting Office Power (AC) to the NCS 2002 Shelf, on page 76.

Step 3 Complete the DLP-L61 Measuring DC Voltage on the NCS 2002 Shelf, on page 102.

Step 4 Continue with Connect the PC and Log into the GUI.

Stop. You have completed this procedure.

DLP-L60 Inspecting the NCS 2002 Shelf Installation and Connections

Purpose	Use this task to inspect the shelf installation and connections and verify that everything is installed and connected properly.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Make sure all external wiring connections (that is, power, ground, alarms, and so on) are secure. If a wire or cable is loose, return to the appropriate procedure in this chapter to correct it.

Step 2 Return to your originating procedure (NTP).

DLP-L61 Measuring DC Voltage on the NCS 2002 Shelf

Purpose	Use this task to measure the power to verify correct power and returns.
Tools/Equipment	Voltmeter

Prerequisite Procedures	Before installing the DC power, check the voltage
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not apply power to the shelf until you complete all the installation steps.

Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389

Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390

Procedure

Step 1 Using a voltmeter, verify the office ground and power:

a) Place the black lead (positive) on the frame ground on the bay. Hold it there while completing substep b.

b) Place the red lead (negative) on the fuse power points on the third-party power distribution panel to verify that they read between –40.5 VDC and –57.6 VDC (power) and 0 (return ground).

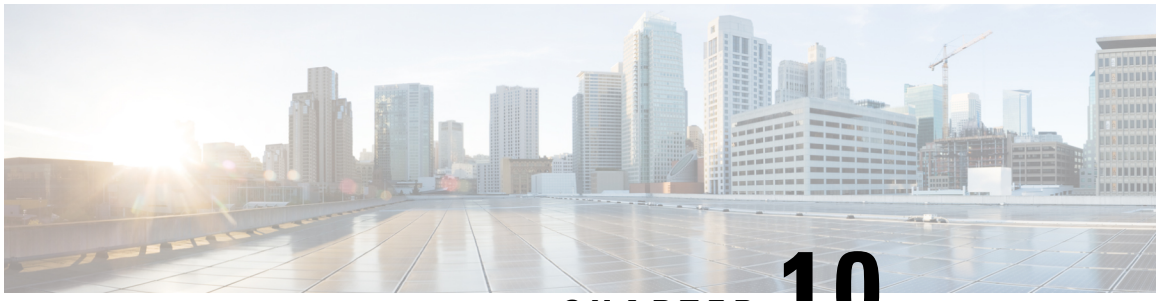
Step 2 Using a voltmeter, verify the shelf ground and power wiring:

a) Place the black lead (positive) on the RET1(A) and the red lead on the -48V (A) point. Verify a reading between –40.5 VDC and –57.6 VDC. If there is no voltage, check the following and correct if necessary:

- Battery and ground are reversed to the shelf.
- Battery is open or missing.
- Return is open or missing.

Step 3 Repeat Steps 1 and 2 for the RET2 (B) and -48V (B) of the redundant power supply input.

Step 4 Return to your originating procedure (NTP).



CHAPTER 10

Installing the Cisco NCS 2002 Door and Other Modules

This chapter describes how to install the NCS 2015 door and other modules.

The sections are:

- Front Door, on page 105
- NTP-L29 Installing the Standard Door of the NCS 2002 Shelf, on page 106
- NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf, on page 108
- NTP-L40 Installing the Deep-Front Panel of the NCS 2002 Shelf, on page 112
- NTP-G331 Removing the Deep-Front Panel of the NCS 2002 Shelf , on page 116
- Power Modules, on page 118
- NTP-L33 Installing the Power Module in the NCS 2002 Shelf, on page 125
- Fan-Tray Assembly, on page 133
- NTP-L35 Installing the Fan-Tray Assembly in the NCS 2002 Shelf, on page 134
- Air Filter , on page 136

Front Door

The front door of the NCS 2002 provides access to the shelf and air-filter.

There are two types of front doors that act as protective panels—standard door and deep-front panel. The deep-front panel provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door. The deep-front panel provides more space for fiber bend radius and to manage the line card connections. The deep-front panel does not have a hinge and cannot be rotated like the standard door.

If a standard front door was ordered, the NCS 2002 is shipped with a preinstalled standard door. If a deep-front panel was ordered, it is shipped in a separate package.

You can remove the door to provide unrestricted access to the front of the shelf.

An erasable label is pasted on the inside of the front door. You can use the label to record slot and port assignments, card types, node ID, rack ID, and serial number of the NCS 2002 shelf.

The following figure shows the erasable label on the NCS 2002 shelf.

Figure 60: NCS 2002 Front-Door Erasable Label



The laser warning label is placed on top of the chassis (see the figure above).

The following figure shows the label placed on the NCS 2002 surface, inside the shelf close to the door hinges, below Slot 1.

Figure 61: NCS 2002 Label



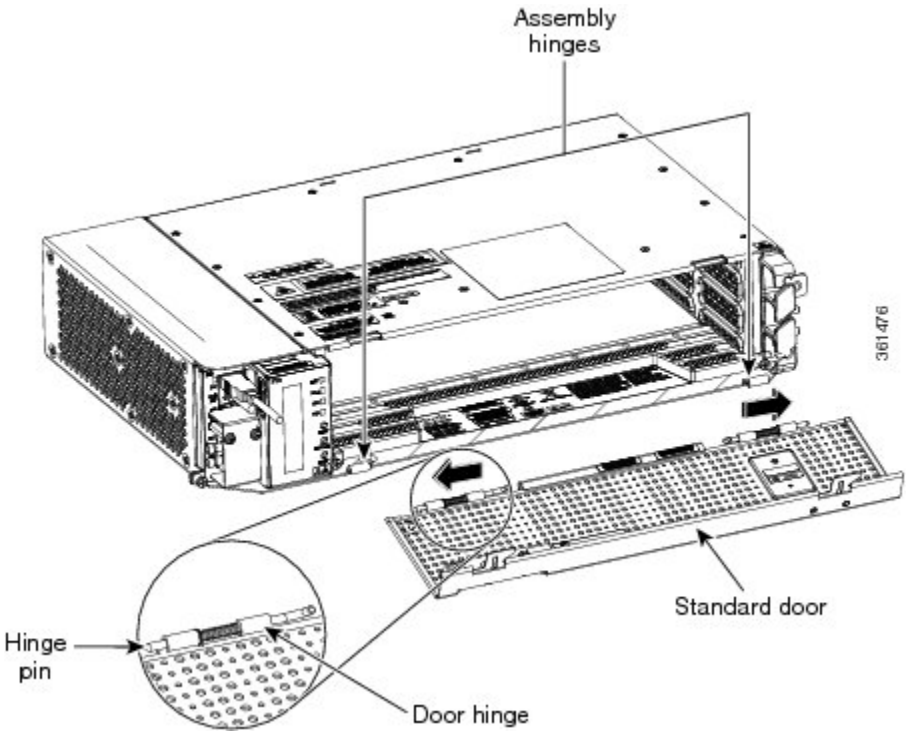
NTP-L29 Installing the Standard Door of the NCS 2002 Shelf

Purpose	This procedure installs the standard door of the NCS 2002
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf, on page 72 • NTP-L35 Installing the Fan-Tray Assembly in the NCS 2002 Shelf, on page 134 • NTP-L36 Attaching Wires to Timing, LAN, and Craft Pin Connections in NCS 2002, on page 91
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Pull the hinge pins on the standard door in the opposite directions (see the figure below).

Figure 62: Installing the Standard Door



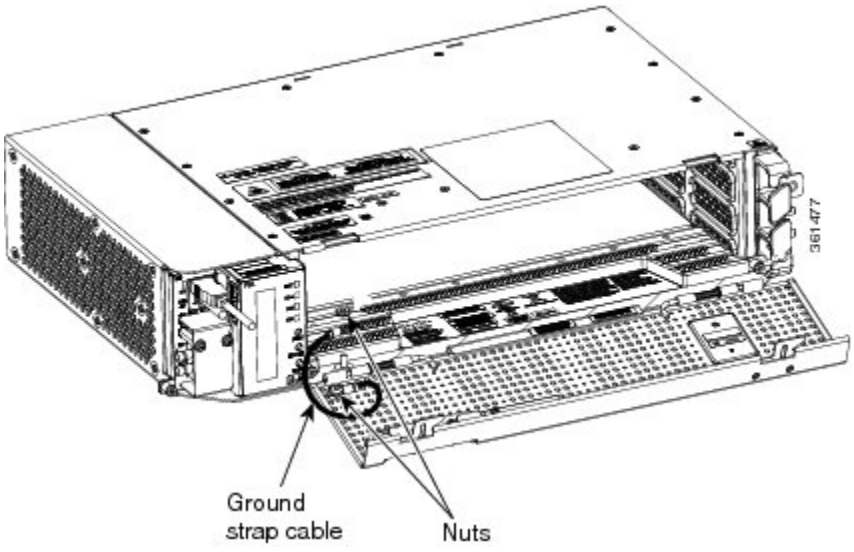
Step 2 Align the standard door hinges with the chassis hinges.

Step 3 Release the hinge pins.

Note
Reinstall the door after installing all the other modules.

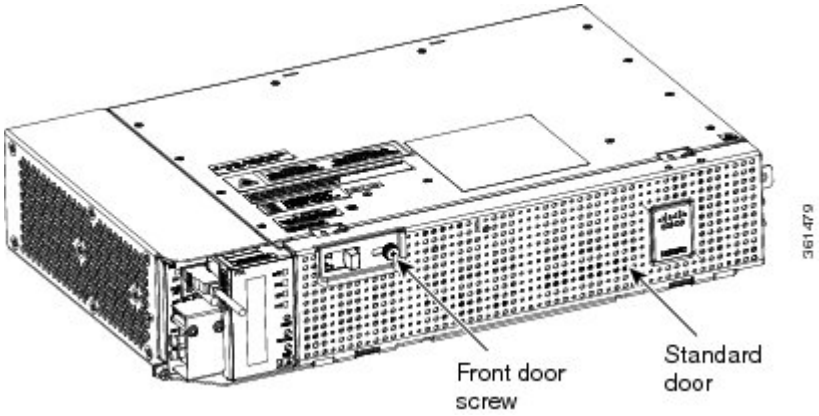
Step 4 Place the ground strap cable (see the figure below) on the door and the chassis and tighten the nuts.

Figure 63: Ground Strap Cable—Standard Door



Step 5 Tighten the door screws to a torque value of 6.5 in-lb (0.75 N-m) to close the standard door as shown in the figure below.

Figure 64: Close the Standard Door of NCS 2002 Shelf



Stop. You have completed this procedure.

NTP-L30 Opening and Removing the Standard Door of the NCS 2002 Shelf

Purpose	This procedure opens and removes the standard door of the NCS 2002.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L29 Installing the Standard Door of the NCS 2002 Shelf, on page 106. • Connect the chassis to the office ground. See Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Complete the DLP-L45 Opening the Standard Door of the NCS 2002 Shelf, on page 109.

Step 2 Complete the DLP-L46 Removing the Standard Door of the NCS 2002 Shelf, on page 110.

Stop. You have completed this procedure.

DLP-L45 Opening the Standard Door of the NCS 2002 Shelf

Purpose	This task opens the standard door of the NCS 2002 system.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L29 Installing the Standard Door of the NCS 2002 Shelf, on page 106. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

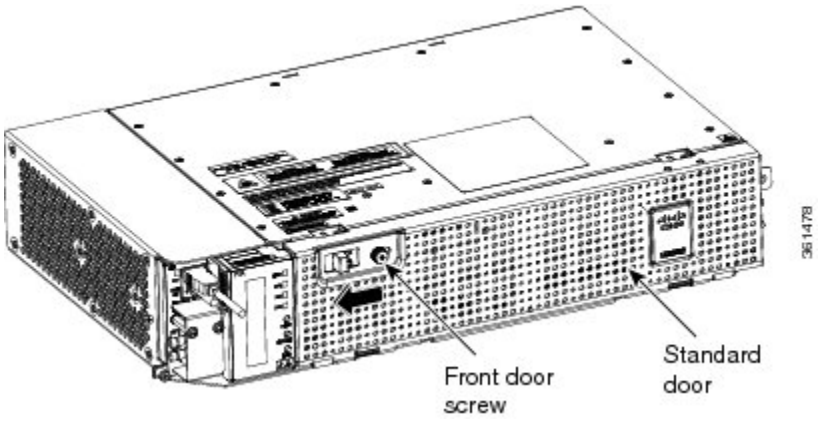
Caution The NCS 2002 shelf has an ESD plug input and is shipped with an ESD wrist strap. The ESD plug input is located on the outside of the shelf on the right side. It is labeled "ESD" on the top and bottom. Always wear an ESD wrist strap and connect the strap to the ESD plug when working on the NCS 2002. For detailed instructions on how to wear the ESD wristband, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Procedure

Step 1 Loosen the standard door screws (see the figure below).

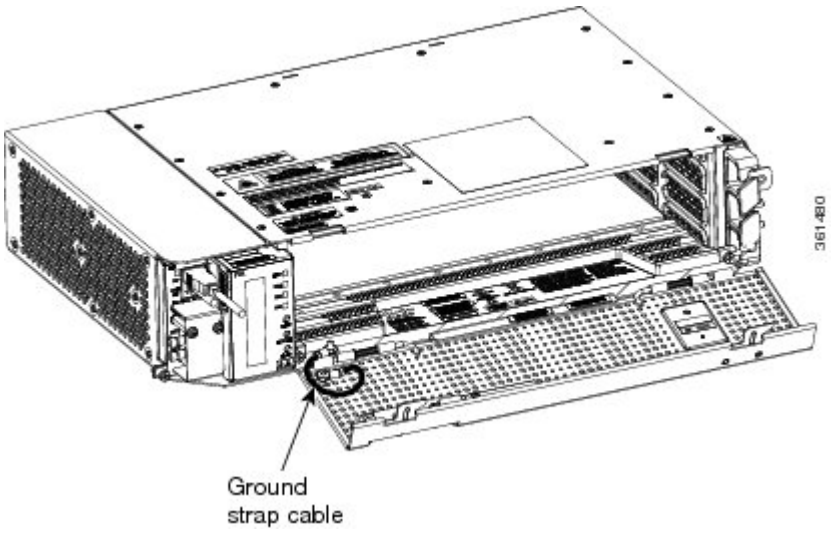
Step 2 Push the latches in the opposite direction as shown in the figure below.

Figure 65: Opening the Standard Door



Step 3 Swing the door open (see the figure below).

Figure 66: Cisco NCS 2002 Standard Door—Opened



Step 4 Return to your originating procedure (NTP).

DLP-L46 Removing the Standard Door of the NCS 2002 Shelf

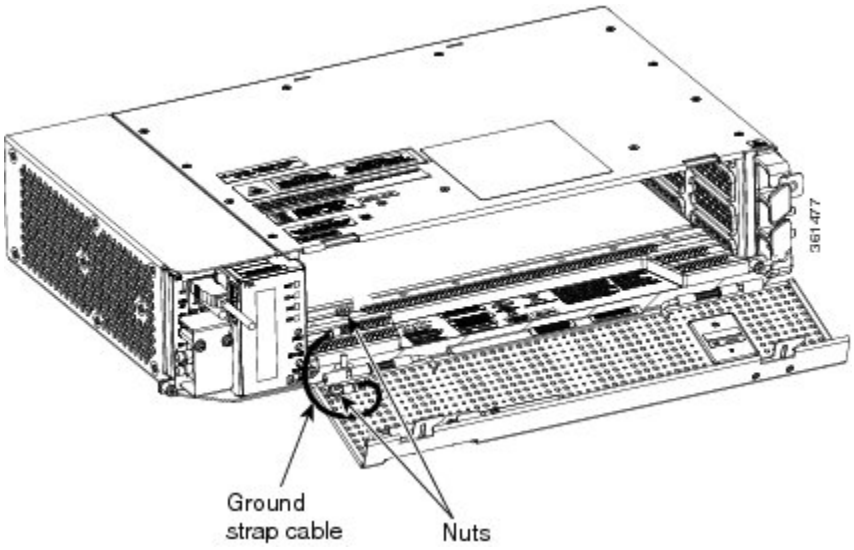
Purpose	This task removes the standard door of the NCS 2002 system.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• DLP-L45 Opening the Standard Door of the NCS 2002 Shelf, on page 109. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Unscrew the nut holding the ground cable to the shelf. Remove the nut.

Step 2 Remove the ground cable from the shelf (see the figure below).

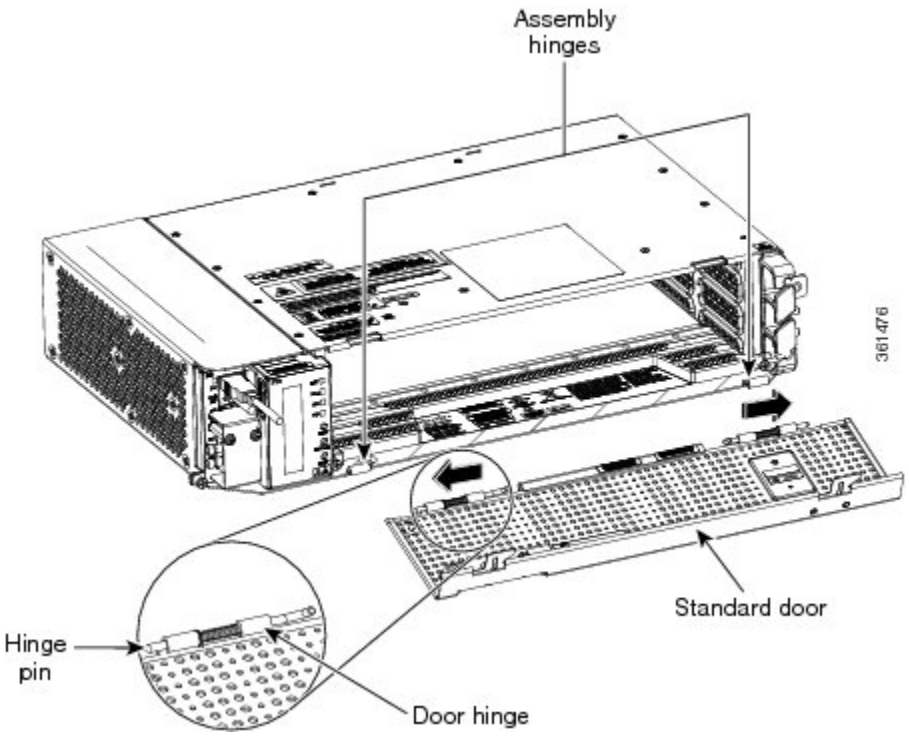
Figure 67: Removing the Standard Door



Step 3 Pull the hinge pins holding the door to the chassis, in the opposite direction (see the figure below).

Step 4 Remove the door from its hinges (see the figure below).

Figure 68: Removing the Standard Door



Step 5 Return to your originating procedure (NTP).

NTP-L40 Installing the Deep-Front Panel of the NCS 2002 Shelf

Purpose	This procedure installs the deep-front panel of the NCS 2002 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • NTP-L33 Installing the Power Module in the NCS 2002 Shelf, on page 125 • NTP-L35 Installing the Fan-Tray Assembly in the NCS 2002 Shelf, on page 134 • NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf, on page 72 • NTP-L36 Attaching Wires to Timing, LAN, and Craft Pin Connections in NCS 2002, on page 91
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note Use the deep front panel when ONS-SC+-10G-C pluggables are installed on a NCS 2002 shelf.

Procedure

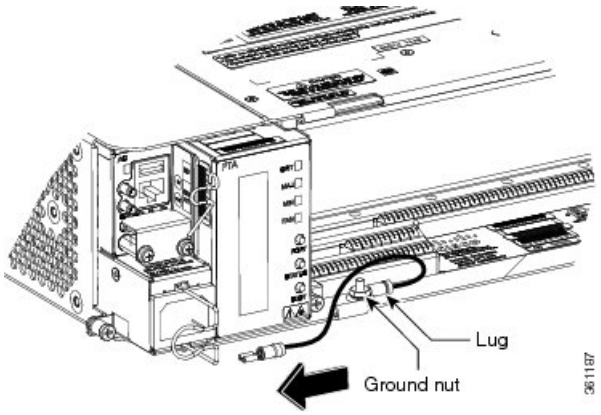
Step 1 Connect the ground strap cable:

a) Loosen the ground nut from the shelf (see the figure below).

b) Insert the lug of the ground strap cable and tighten the nut on the shelf to a torque value of 11.5 in-lb (1.3 N-m) (see the figure below).

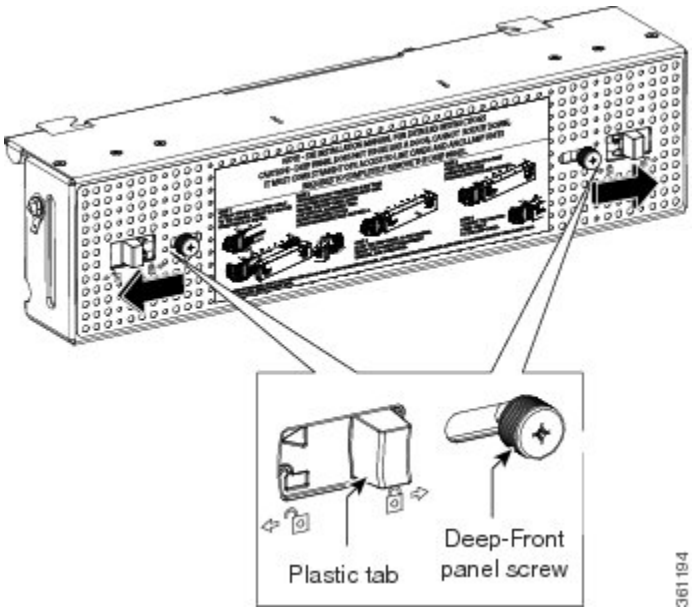
c) Route the other end of the ground strap cable outside the shelf at an angle of 180 degrees towards the left direction.

Figure 69: Inserting the Lug to the Shelf



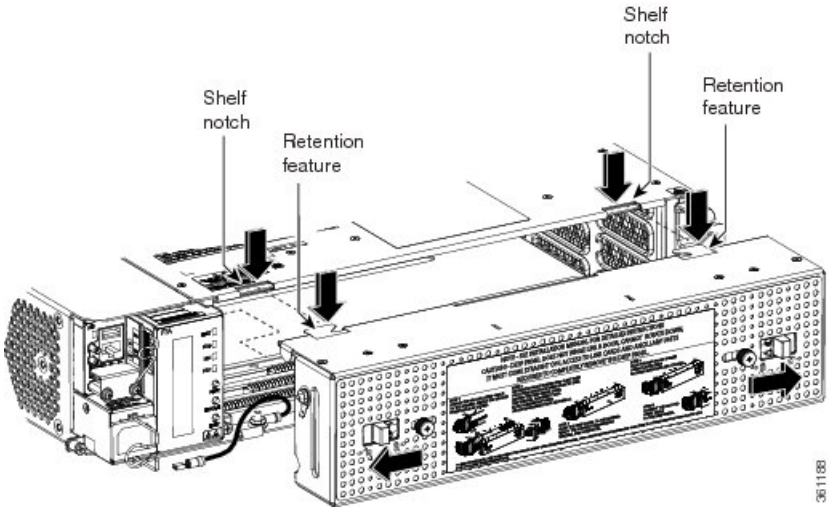
Step 2 Loosen the deep-front panel screws and slide them outwards using the plastic tabs .

Figure 70: Align the Deep-Front Panel and Shelf



Step 3 Place the deep-front panel close to the shelf so that the shelf notches and the deep-front panel retention features are in line (see the figure below).

Figure 71: Deep-Front Panel and Shelf in line

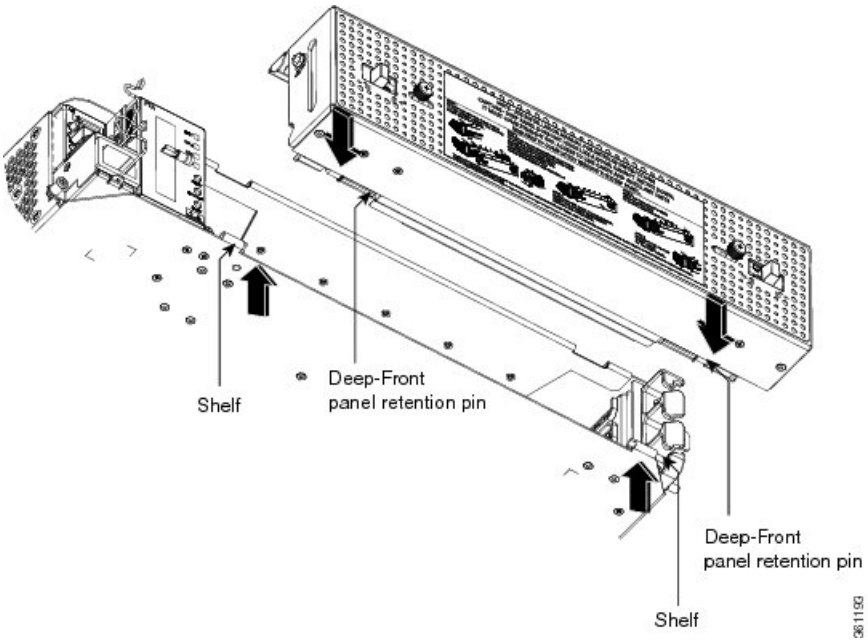


Step 4 Align the deep-front panel with the shelf by performing the following sub-steps at the same time:

a) Align the right and left retention features of the deep-front panel with the right and left notches present on the top of the shelf (see the figure above).

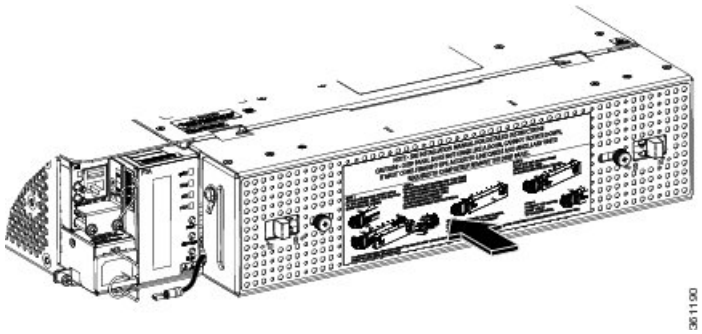
b) Align the deep-front panel pins present at the bottom of the panel with the shelf hinges (see the figure below).

Figure 72: Align the Deep-Front Panel and Shelf



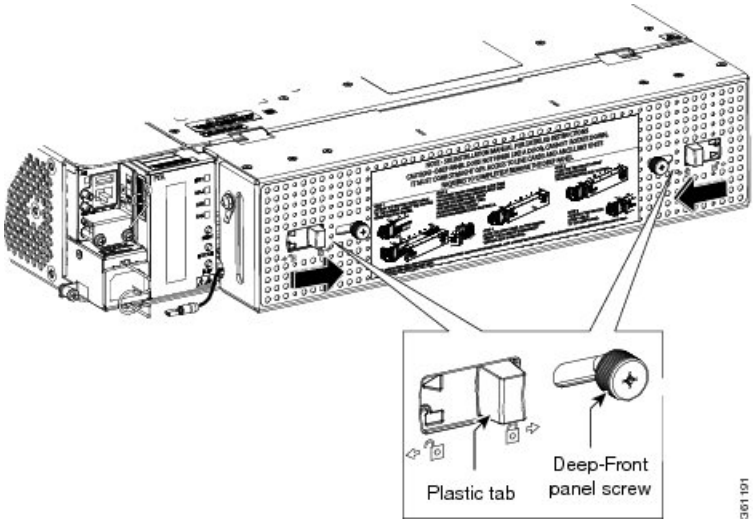
The figure below shows the deep-front panel aligned with the shelf.

Figure 73: Engage the Deep-Front Panel and Shelf



Step 5 Slide the deep-front panel screws inwards using the plastic tabs to engage the retention features and the pins with the shelf notches and hinges (see the figure below). Verify the engagement by gently applying the pressure to the panel outwards.

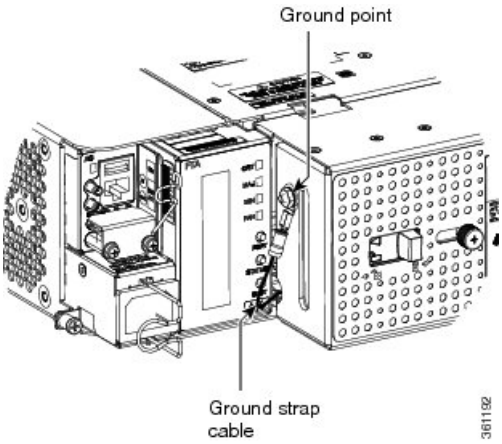
Figure 74: Engage the Deep-Front Panel and Shelf



Step 6 Lock the deep-front panel by tightening the screws to a torque value of 6.5 in-lb (0.75 N-m).

Step 7 Connect the other end of the ground strap cable to the ground point present on the deep-front panel exterior.

Figure 75: Connecting the Ground Strap Cable



Stop. You have completed this procedure.

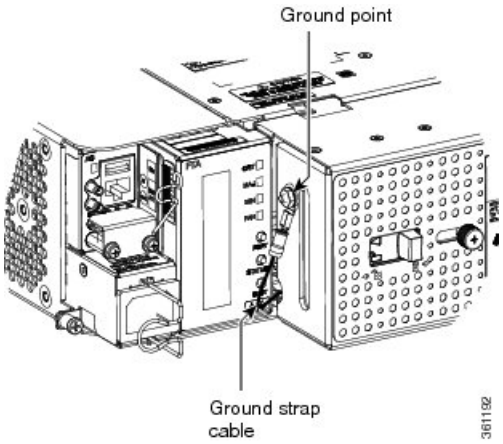
NTP-G331 Removing the Deep-Front Panel of the NCS 2002 Shelf

Purpose	This procedure removes the deep-front panel of the NCS 2002 system.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L40 Installing the Deep-Front Panel of the NCS 2002 Shelf, on page 112 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Remove the end of the ground strap cable that is connected to the exterior of the deep-front panel (see the figure below).

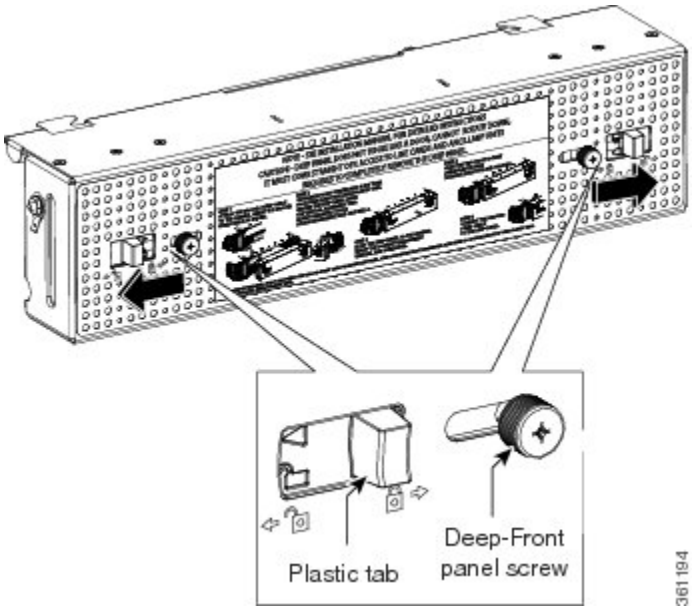
Figure 76: Remove the end of the ground strap cable



Step 2 Loosen the panel screws to open the deep-front panel.

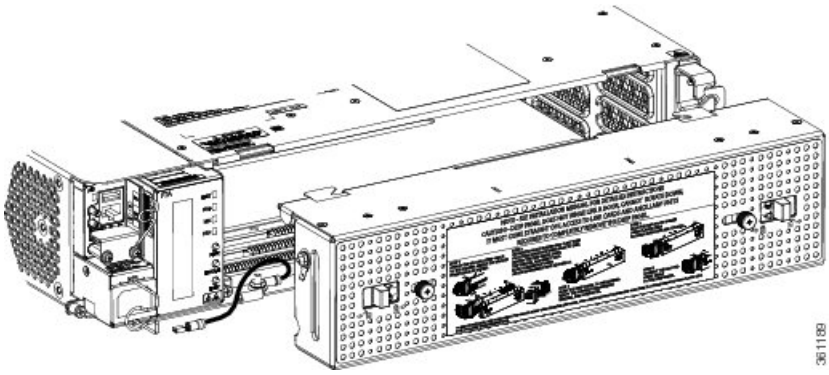
Step 3 Move the deep-front panel screws in the direction as shown in the figure below to disengage the retention features and the pins from the shelf notches and hinges. (see the figure below).

Figure 77: Move the deep-front panel to disengage



Step 4 Move the deep-front panel away from the shelf (see the figure below).

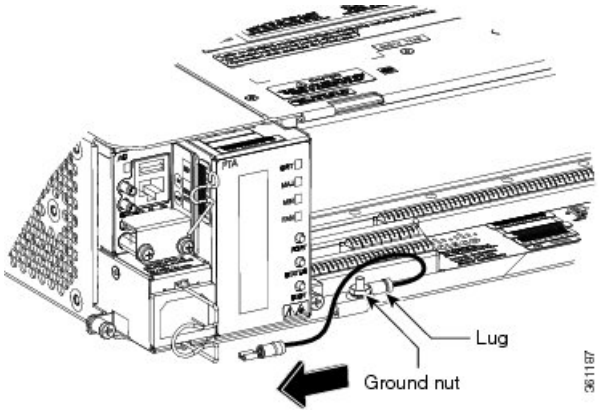
Figure 78: Move the deep-front panel away



Caution
The deep-front panel does not have a hinge and cannot be rotated like a standard door. Rotating the deep front panel can damage the deep-front panel, shelf hinges, other devices and cables placed below the NCS 2002 shelf.

Step 5 Remove the ground strap cable from the shelf (see the figure below):

Figure 79: Remove the ground strap cable



a) Loosen the ground nut on the shelf.
b) Remove the lug and tighten the nut on the shelf to a torque value of 11.5 in-lb (1.3 N-m).

Stop. You have completed this procedure.

Power Modules

The NCS 2002 system contains the following pluggable power modules:

- AC power module
- DC power module

In addition to supplying power to the NCS 2002 shelf, the power modules support the following connections:

- LAN Connection—An Ethernet port (RJ-45) that supports the element manager system (EMS) connection. The RJ-45 port is used to connect the EMS or the craft interface terminal to access the NCS 2002 shelf.
- Passive Unit Inventory Interfaces (USB port)—The passive unit inventory interfaces are used to retrieve inventory information from passive devices such as, fiber trays, FBG DCU, patch panels, passive muxponder and demuxponder and so on. The inventory details are displayed in the **Inventory** tab in CTC.
- Timing Connections—The BITS-IN port receives input from third party external sources called SSU (Synchronization Supply Unit) to synchronize the timing of the NCS 2002 shelf. The BITS-OUT port provides output to external devices (other Cisco or third party shelves) to synchronize the timing signals with the NCS 2006 shelf.

The NCS 2002 shelf has a BITS-IN and BITS-OUT port on the power module. The BITS-IN and BITS-OUT connections are supported by:

-
  - Wire-wrap pins and mini-BNC connectors on the AC power module.
  - Mini-BNC connectors on the ETSI DC power module.
  - Wire-wrap pins on the ANSI DC power module.



Note For timing connection, use 100-ohm shielded BITS clock cable pair #22 or #24 AWG (0.51 mm² [0.020 inch] or 0.64 mm² [0.0252 inch]) twisted-pair T1-type.



Note Refer to Telcordia SR-NWT-002224 for rules about provisioning timing references.

AC Power Module

The AC power module converts the AC input current to DC output current.

Each AC power module has:

- One AC single phase three poles (line L, Neutral N, and Protective Earth PE) input connector
- One RJ-45 port for EMS connection
- One USB port to support passive unit remote inventory connection
- Two BITs connections (IN and OUT) for network synchronization supported by mini BNC
- Two BITs connections (IN and OUT) for network synchronization supported by four wire-wrap pins

The AC power module has a single dual-color (red and green) LED on the faceplate. When the AC power line is not connected, the LED is OFF. Green LED indicates that the AC power line is connected and the power module is functioning properly. Red LED indicates that the AC power line is connected but an alarm is present due to secondary (48 V) fuse break. The shelf controller card controls the conditions that result in triggering the LED. The LED can be overwritten by the shelf controller card (TNC, TNCE, TSC, or TSCE) in all the three states (OFF/red/green). The AC power module supports the lamp test procedure and the LED changes its color or state. The fans in the NCS 2002 shelf cool the AC module and guarantee proper operation across the complete operating temperature or output power range.

DC Power Module

The NCS 2002 system can be powered by redundant DC power lines, however a single power line can power the entire NCS 2002 system. The DC power module draws the power from the batteries to turn on the NCS 2002.

Each ETSI DC power module has:

- Two input battery connectors (two poles): -48V, RET for power terminals A and B.
- One RJ-45 port for EMS connection
- One USB port to support passive unit remote inventory connection
- Two BITS connections (IN and OUT) for network synchronization that is supported by mini BNC

Each ANSI DC power module has:

- Two terminal block connectors with -48V, RET for power terminals A and B
- One RJ-45 port for EMS connection
- One USB port to support passive unit remote inventory connection
- Two BITS connections (IN and OUT) for network synchronization supported by four wire-wrap pins

The DC power module has a single dual-color (red and green) LED on the faceplate. When the battery is not connected, the LED is OFF. Green LED indicates that the battery is connected and the power module functions properly. Red LED indicates that the battery is connected but an alarm is present due to secondary fuse break (48 V). The DC power module does not support the lamp test procedure.

Modular DC Power Module

Table 9: Feature History

Feature Name	Release Information	Feature Description
New Modular DC Power Module on NCS 2002 Chassis	Cisco NCS 2000 Release 11.13	The design of the DC Power module is enhanced to make the power system modular. The modular units comprise a primary frame and two replaceable DC PSUs (available for both ETSI and ANSI variants), each with unique PIDs. The PSUs are field replaceable and provide redundancy to the power system.

The modular Dc Power module has three main components, one primary frame and two field replaceable DC PSUs (PSUA and PSUB). There are two variants of the PSUs, for ETSI and ANSI connectors. The DC Frame is common for both variants of the PSUs.

- Main frame (PID: NCS2002-PSU-DC)—Includes two input slots to insert the PSUs, One RJ-45 port for EMS connection, One USB port to support passive unit remote inventory connection, two BITS connections (IN and OUT) for network synchronization.
- PSUs—Field Replaceable Units (FRU) that can be inserted into the slots of the Main frame. The PSU has

- The ETSI variant (PID: NCS2002-DC2-E) has two input battery connectors (two poles): -48V, RET for power terminals A and B.
- The ANSI variant (PID: NCS2002-DC2-PSU-NA) has two terminal block connectors with -48V, RET for power terminals A and B.

In this modular DC power module, the input connector, DC filter and fuses for each battery are separated into two independent and field replaceable PSUs. In this case, if there is a failure on the protection block of one battery, it can be replaced without interrupting the functioning of the chassis.

Figure 80: Front View of the DC Frame

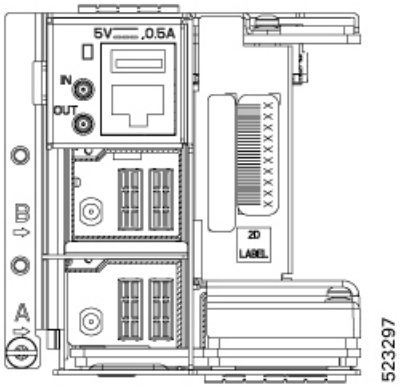


Figure 81: Perspective View of the DC Frame

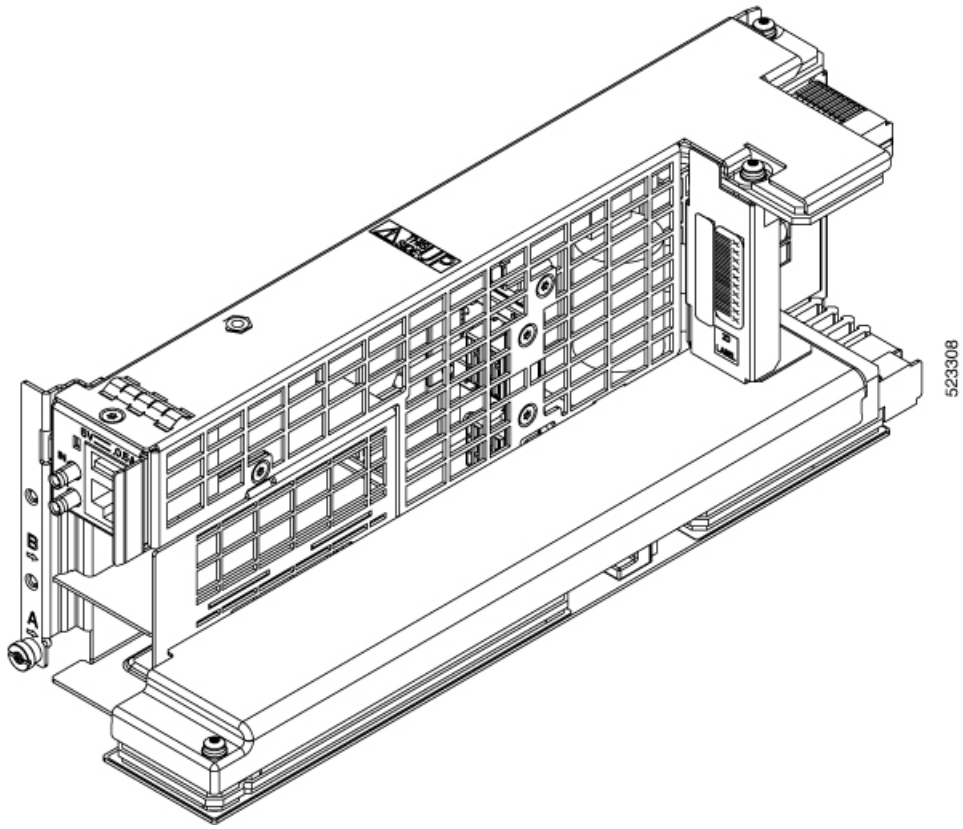


Figure 82: Front View of the ETSI PSU

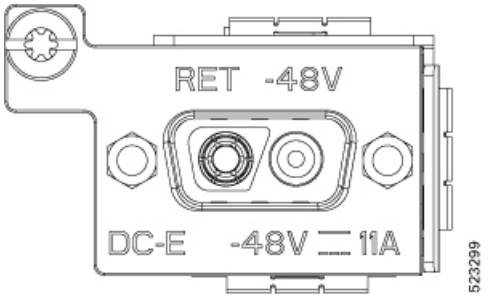


Figure 83: Perspective Views of ETSI PSU

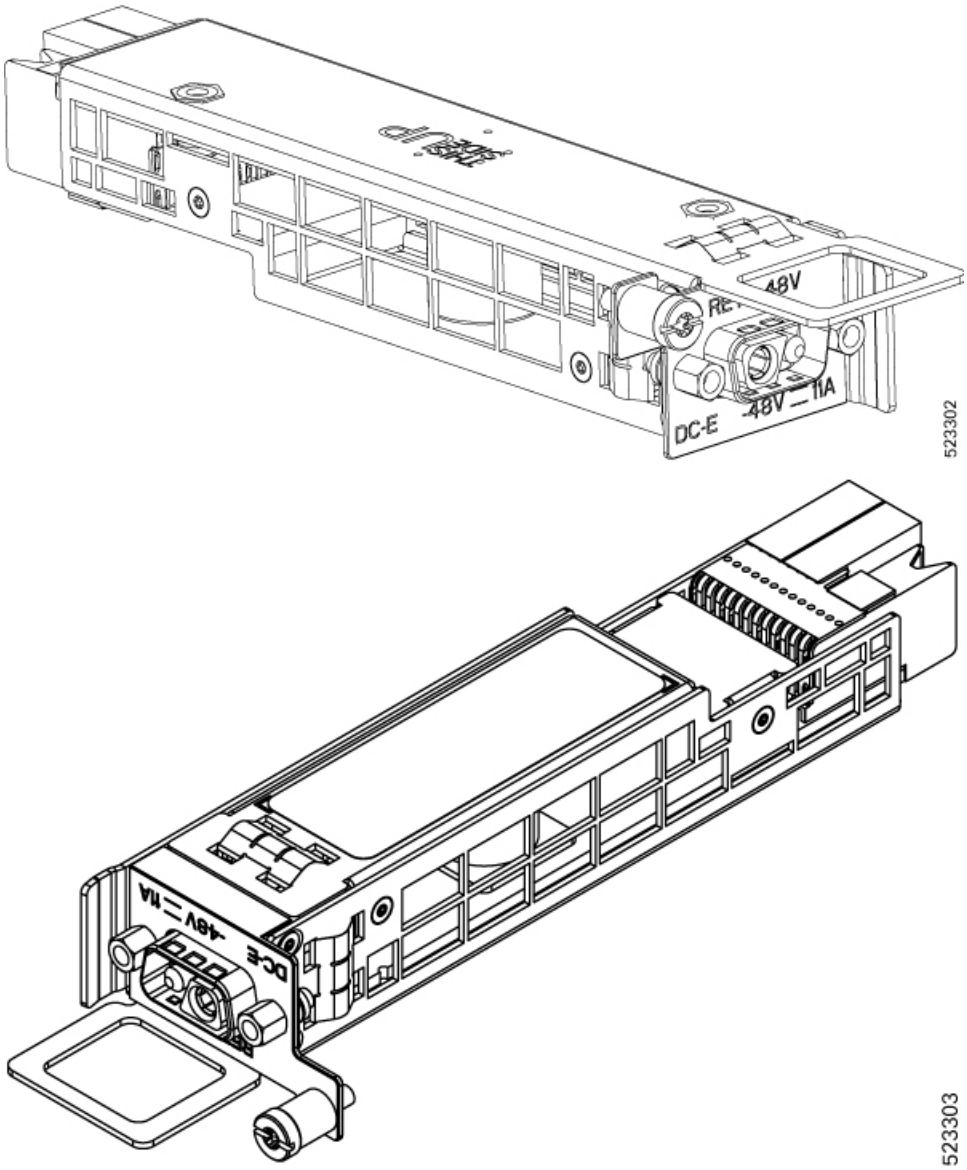


Figure 84: Front View of the ANSI PSU

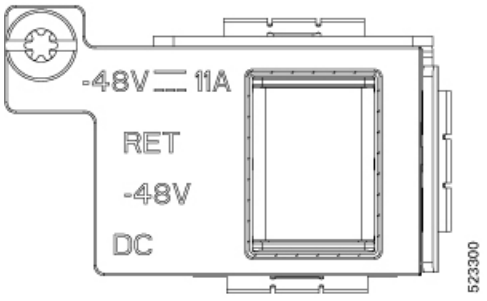
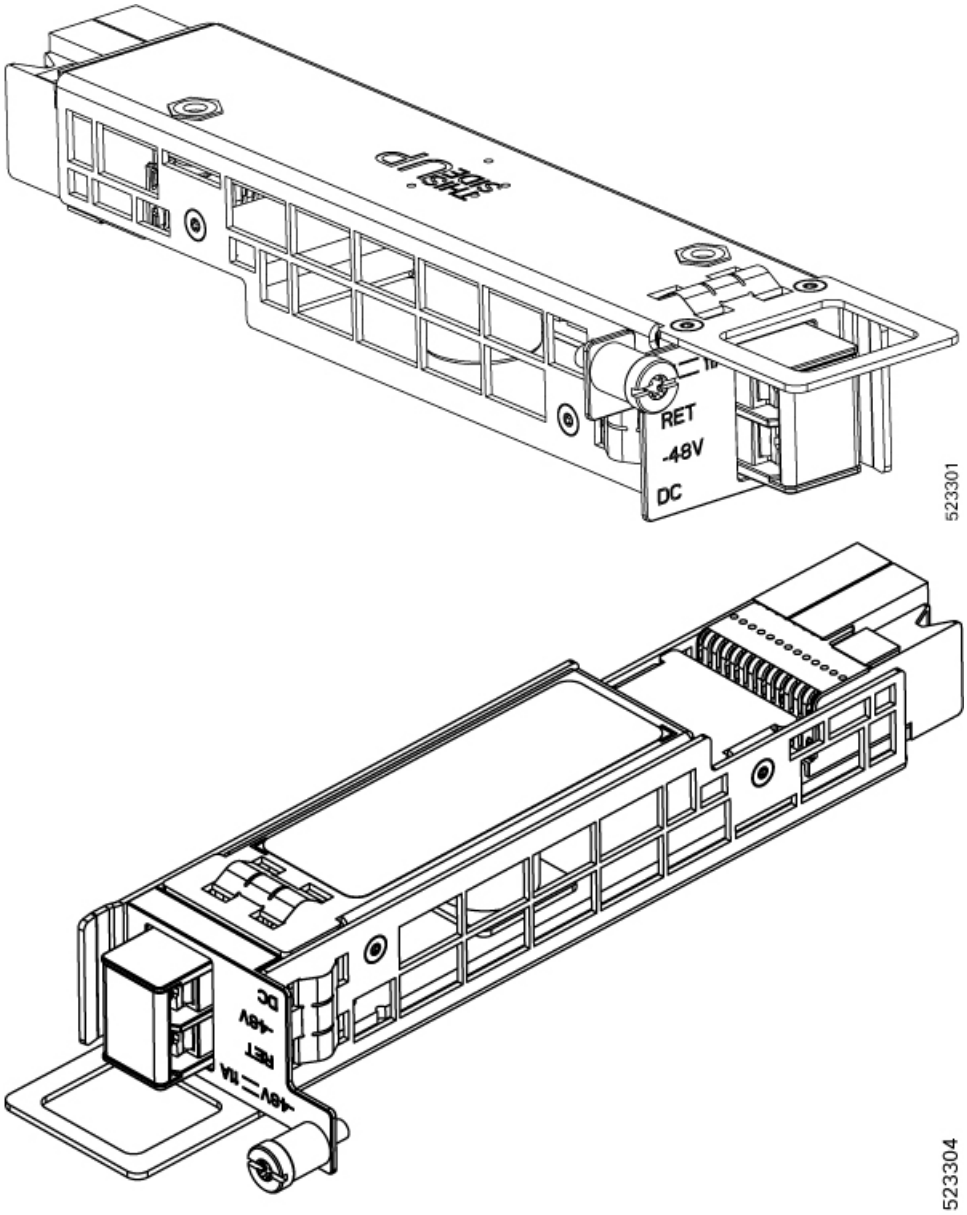


Figure 85: Perspective Views of the ANSI PSU



Note When you plug out the PSU and plug it in again, the control card requires a minimum of five seconds to read the voltage. During this period, although the PSU is in place, the BAT-FAIL (Battery Fail) alarm will be raised followed by the ELWBATVG (Extreme Low Voltage) alarm. These alarms are raised after each plug out and plug in operation. However, these alarms will get cleared one after the other after few minutes.

NTP-L33 Installing the Power Module in the NCS 2002 Shelf

Purpose	This procedure installs the power module in the NCS 2002 system.
Tools/Equipment	#2 Phillips screwdriver
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **The plug-socket combination must be accessible at all times because it serves as the main disconnecting device.** Statement 1019

Note During the system startup or fan-tray replacement, the inventory data of the fan-tray assembly and the power module is displayed in the **Inventory** tab of CTC after a delay of approximately 6 minutes.

Procedure

Step 1 Complete the necessary task as applicable:

- DLP-L47 Installing the AC Power Module in the NCS 2002 Shelf, on page 125
- DLP-L48 Installing the DC Power Module in the NCS 2002 Shelf, on page 127

Step 2 Complete the NTP-L35 Installing the Power and Ground to the NCS 2002 Shelf, on page 72.

Stop. You have completed this procedure.

DLP-L47 Installing the AC Power Module in the NCS 2002 Shelf

Purpose	This procedure installs the AC power module in the NCS 2002 system.
Tools/Equipment	#2 Phillips screwdriver

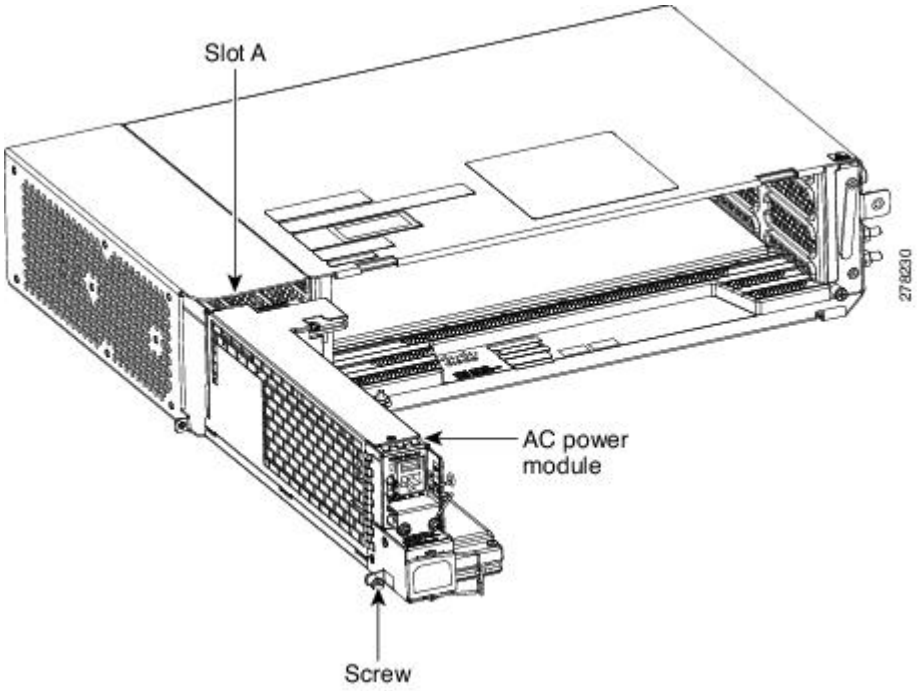
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution The AC power supply has Double Pole/Neutral Fusing.

Procedure

Step 1 Insert the AC power module in Slot A.

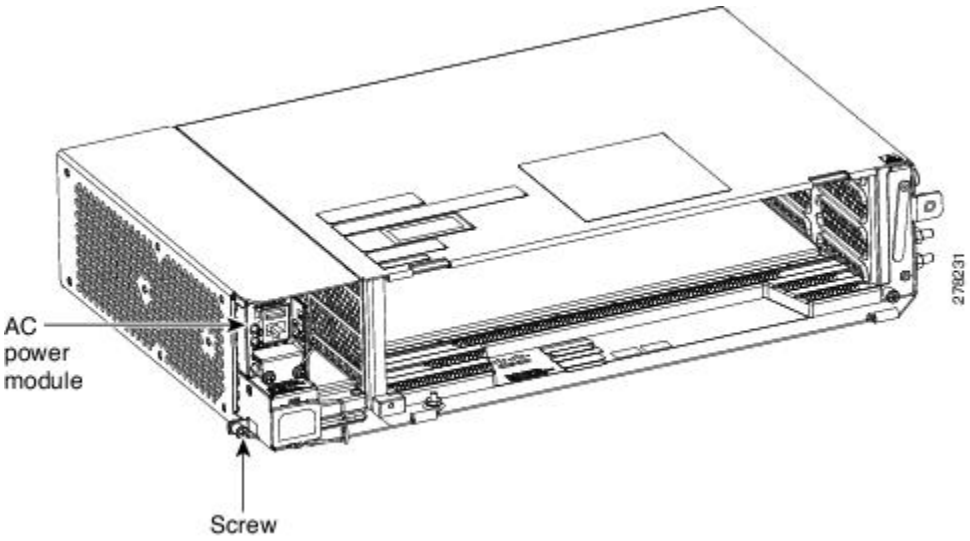
Figure 86: Installing the AC Power Module



Step 2 Plug the AC power module completely into the chassis.

Step 3 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the power module in the chassis (see the figure below).

Figure 87: AC Power Module Installed in the NCS 2002 Shelf



Step 4 Return to your originating procedure.

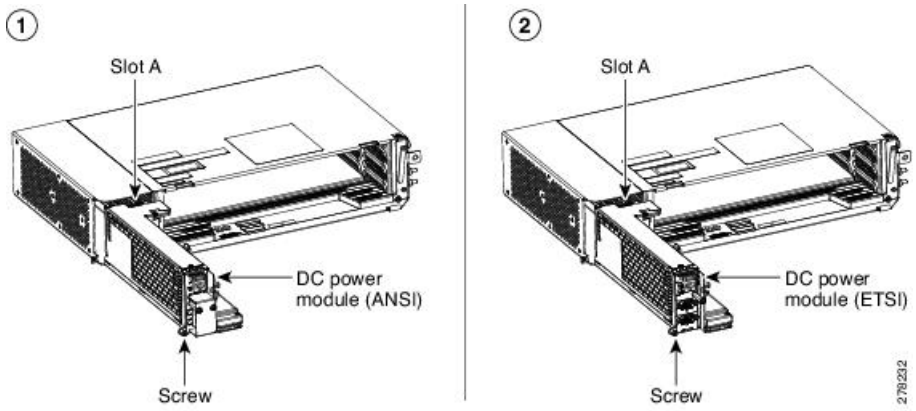
DLP-L48 Installing the DC Power Module in the NCS 2002 Shelf

Purpose	This task installs the DC power module in the NCS 2002 system.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Insert the DC power module in Slot A (see the figure below).

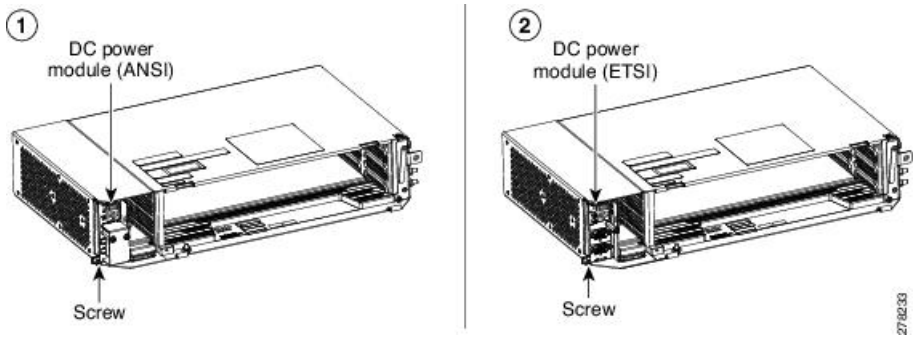
Figure 88: Installing the DC Power Module



Step 2 Plug the DC power module completely into the chassis.

Step 3 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the power module in the chassis (see the figure below).

Figure 89: DC Power Modules Installed in the NCS 2002 Shelf



Step 4 Return to your originating procedure (NTP).

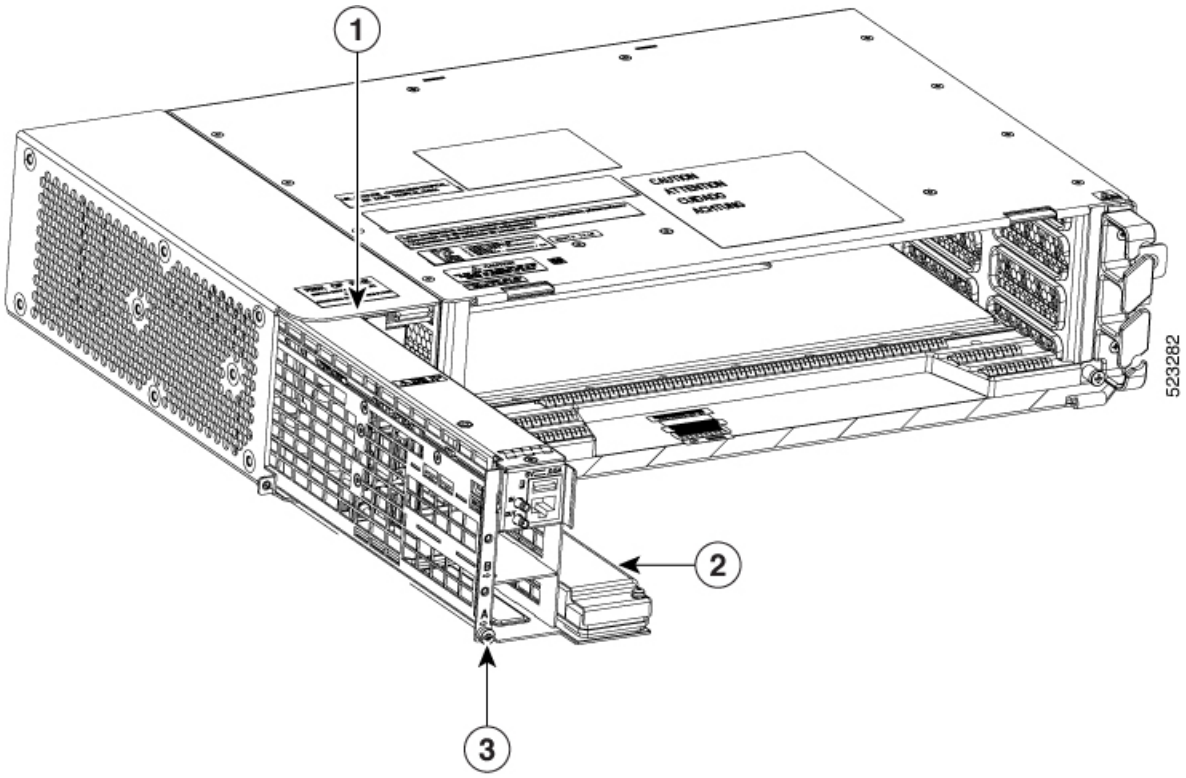
Installing the Modular DC Power Module

Purpose	This task installs the modular DC power module in the NCS 2002 system.
Tools/Equipment	Torque screwdriver or Flat screwdriver
Prerequisite Procedures	Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Insert the DC Frame in Slot A (see the figure below).

Figure 90: Inserting the DC Frame

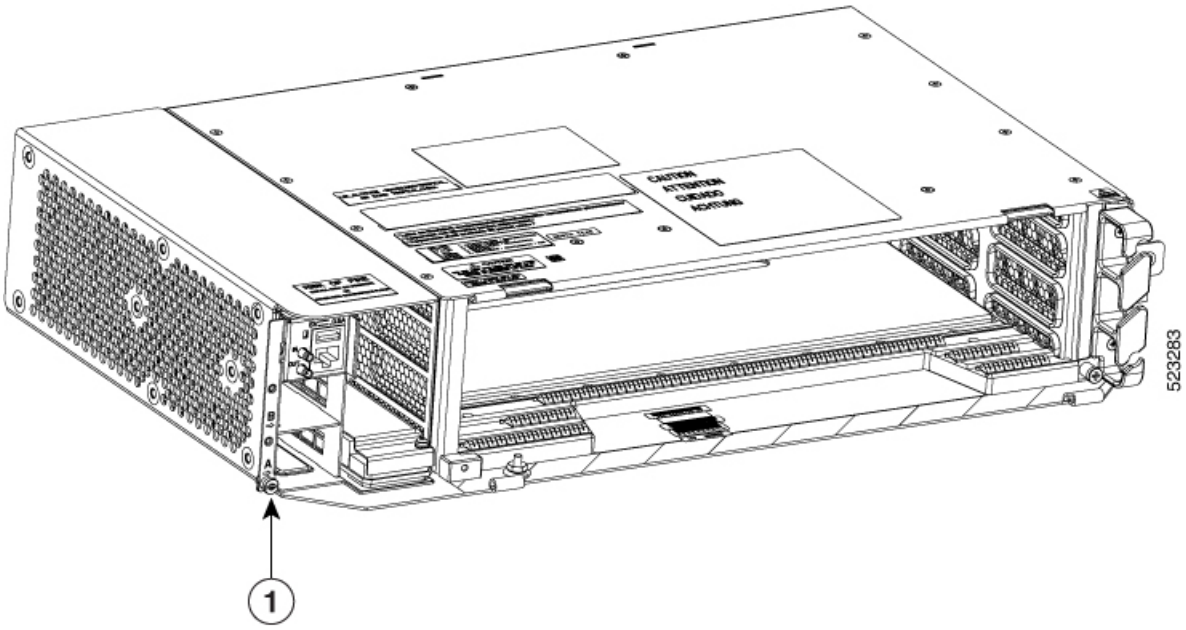


1	Slot A
2	DC Frame
3	Captive screw

Step 2 Plug the DC frame completely into the chassis.

Step 3 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the DC frame in the chassis (see the figure below).

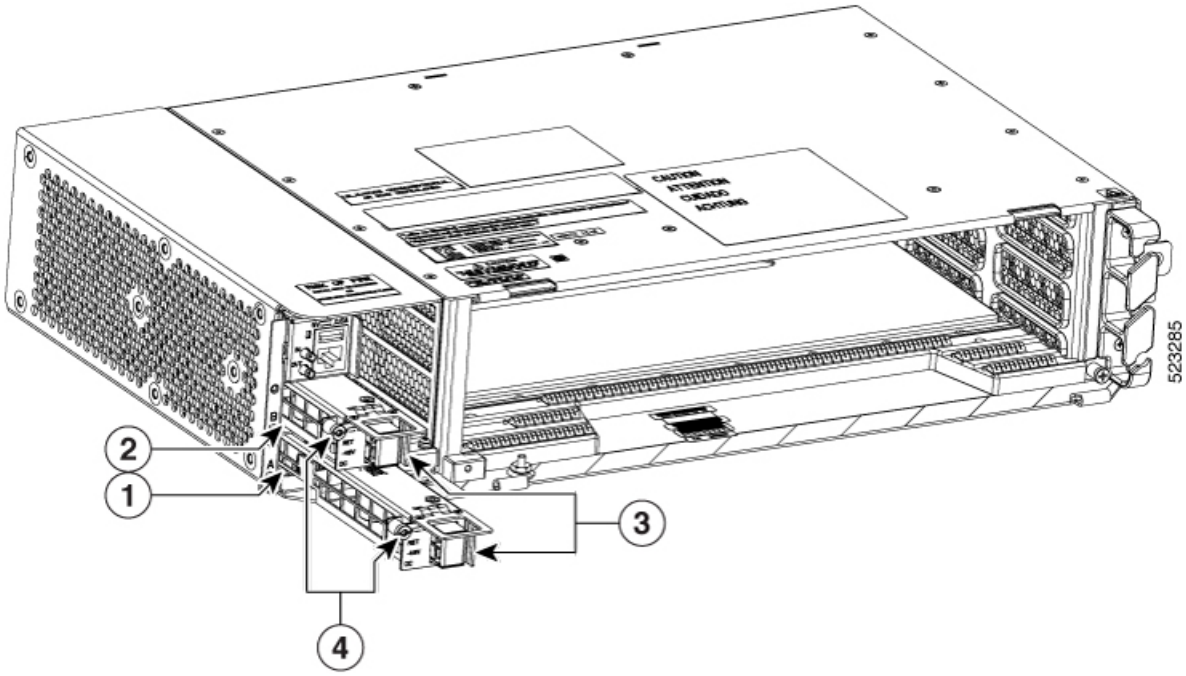
Figure 91: DC Frame Installed in the ONS 15454 M2 Shelf



1	Captive screw

Step 4 Insert the PSU A and PSU B (ETSI or ANSI variant).

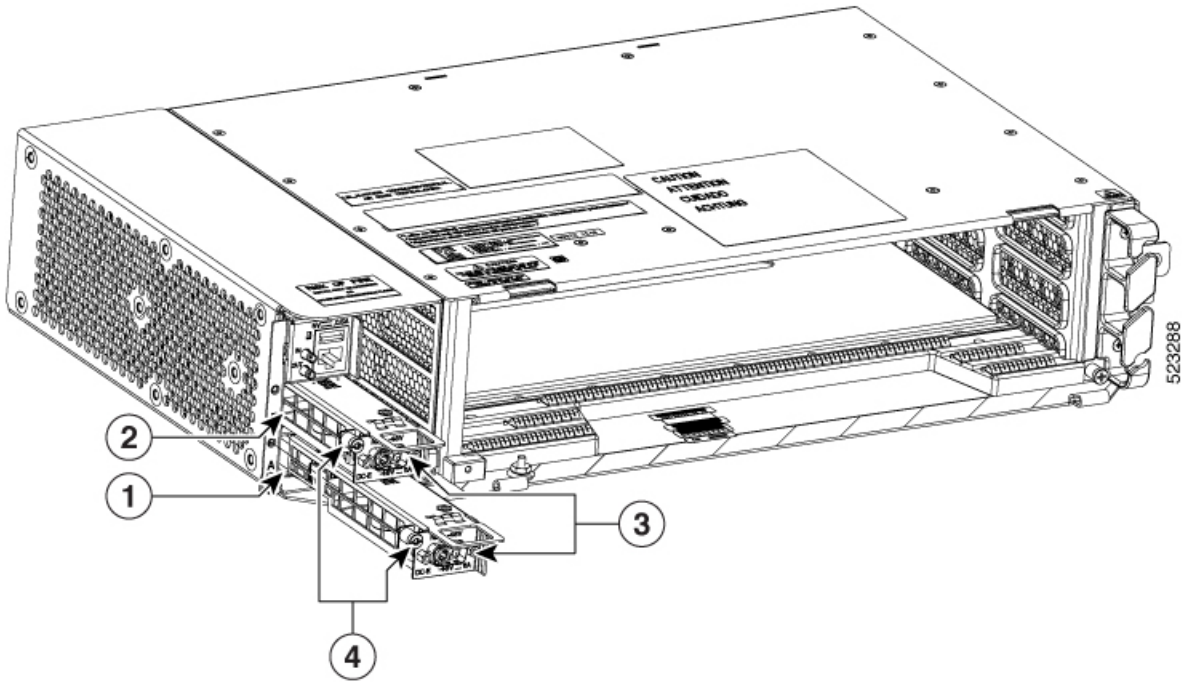
Figure 92: Inserting ANSI PSU in the DC Frame



1	PSU A

2	PSU B
3	Terminal block connectors
4	Captive screw

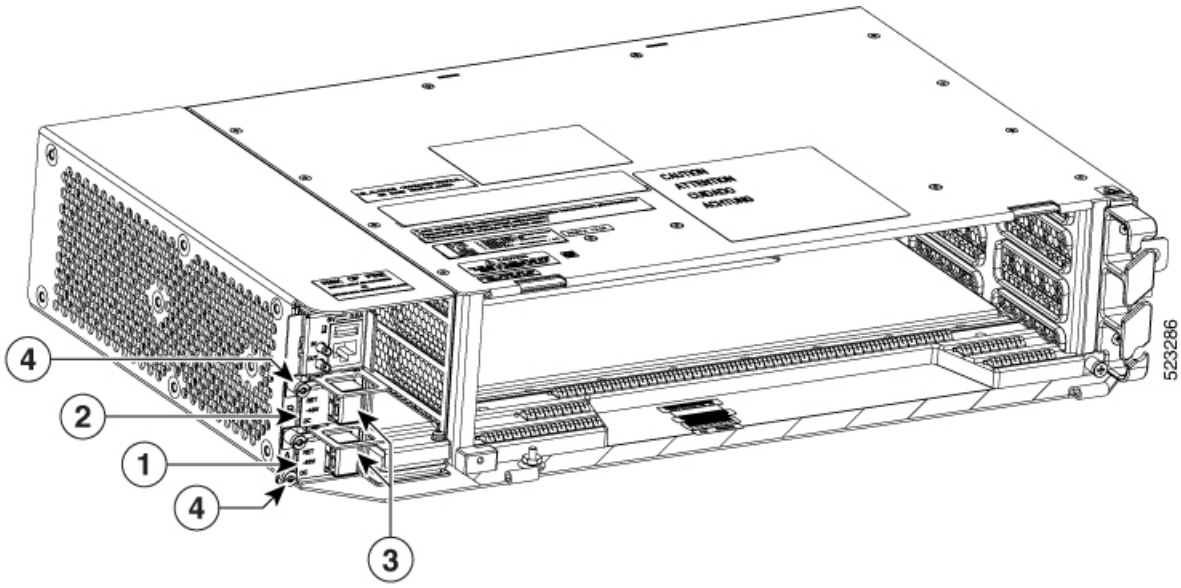
Figure 93: Inserting ETSI PSU in the DC Frame



1	PSU B
2	PSU A
3	D-sub connectors
4	Captive screws

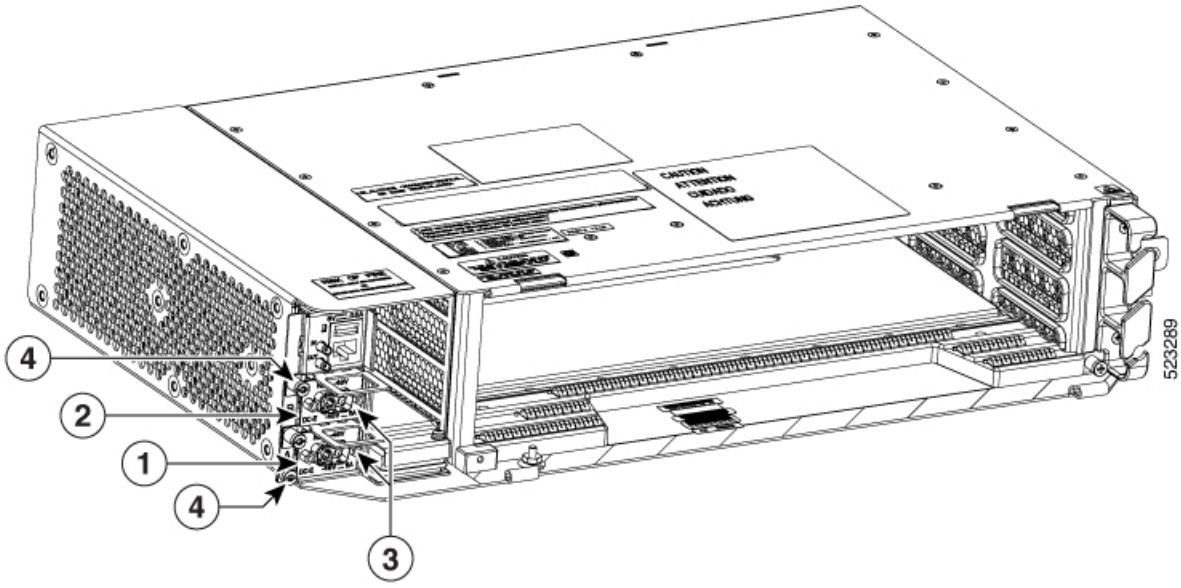
Step 5 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the PSUs into the DC frame (see the figures below).

Figure 94: ANSI PSU Installed into the DC Frame



1	PSU A
2	PSU B
3	Terminal Block Connectors
4	Captive screws

Figure 95: ETSI PSU Installed in the DC Frame



1	PSU A

2	PSU B
3	D-sub connectors
4	Captive screw

Step 6 Return to your originating procedure (NTP).

Fan-Tray Assembly

The fan-tray supported on the Cisco NCS 2002 shelf is FTA

The fan-tray assembly is installed on the left side of the NCS 2002 shelf. The fan-tray assembly is removable and holds the fan-control circuitry and the fans for the NCS 2002 shelf.

There are four LEDs on the fan-tray assembly:

- Three alarm LEDs (CRIT, MAJ, and MIN) that indicate whether a critical, major, or minor alarm is present anywhere on the NCS 2002 shelf.
- One fan fail LED that indicates fan failure.

When the fan-tray assembly is not functioning and the power line is not connected, the LED is OFF. A red LED indicates an alarm in the fan-tray assembly. A green LED indicates that the fan-tray assembly is functioning, the power line is connected, and the power module is functioning properly, the LED is green. When the power line is connected and if there is no TNC, TNCE, TSC, or TSCE card installed in the NCS 2002 shelf, then the LED is OFF.

The shelf controller card controls the conditions that result in triggering the LEDs. The LED can be overwritten by the shelf controller card (TNC, TNCE, TSC, or TSCE) in all the three states (OFF/red/green). The fan-tray assembly supports the lamp test procedure.

The fan-tray assembly has an LCD screen that provides slot and port-level information for all card slots, and the number of critical, major, and minor alarms. The shelf controller card (TSC, TSCE, TNC, or TNCE) drives the 16 X 2 character LCD screen. The LCD screen displays the shelf name, IP address, and software version that is currently used. The display contrast is automatically adjusted for clear view. The three accessible push buttons (SLOT, STATUS, and PORT) on the fan-tray assembly are used to set the slot and port level parameters.

Note The fan-tray assembly should be installed only after installing the power module. During the system startup or fan-tray replacement, the inventory data of the fan-tray assembly and the power module is displayed in the **Inventory** tab of CTC after a delay of approximately 6 minutes.

After you install the fan-tray, you should only access it if a fan failure occurs. To clean and replace the fan-tray assembly, see the “Maintain the Node” chapter in the *Cisco NCS 2000 Series Network Configuration Guide* .

Note If the fan-tray assembly is removed from the shelf, wait for at least 5 seconds before plugging it back into the shelf. In the event the LCD display on the fan-tray assembly appears blank, remove the unit from the shelf, wait for at least 5 seconds and reinsert the unit into the shelf.

A back-up flash memory is fitted into the fan-tray assembly to support the database (DB) and image back-up in the single mode operation of the NCS 2002.

Fan Speed

Fan speed is controlled by the TNC, TNCE, TSC, or TSCE card temperature sensors. The sensors measure the input air temperature at the fan-tray assembly. Fan speed options are low, medium, and high. If the TNC, TNCE, TSC, or TSCE card fails, the fans automatically shift to high speed. The temperature measured by the TNC, TNCE, TSC, or TSCE sensors appears on the LCD screen.

Fan Failure

If one or more fans fail on the fan-tray assembly, replace the entire assembly. You cannot replace individual fans. The red Fan Fail LED on the front of the fan-tray illuminates when one or more fans fail. The red Fan Fail LED clears after you install a working fan-tray.

NTP-L35 Installing the Fan-Tray Assembly in the NCS 2002 Shelf

Purpose	This procedure installs the FTA or FTA2 fan-tray assembly in the NCS 2002 system.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • NTP-L33 Installing the Power Module in the NCS 2002 Shelf, on page 125.
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution  Hazardous moving parts. Keep away from moving fan blades during fan tray replacement.

Caution Do not operate an NCS 2002 shelf without an air filter. For information on the air filter, see Air Filter , on page 136.

Caution Do not force a fan-tray module into place. Doing so can damage either the connectors on the fan-tray or the connectors on the backpanel of the shelf, or both.

Note Error messages appear on the TNC, TNCE, TSC, or TSCE card, the fan-tray LED, and in the Cisco Transport Controller (CTC) when the fan-tray module is removed from the shelf or when one fan is not working.

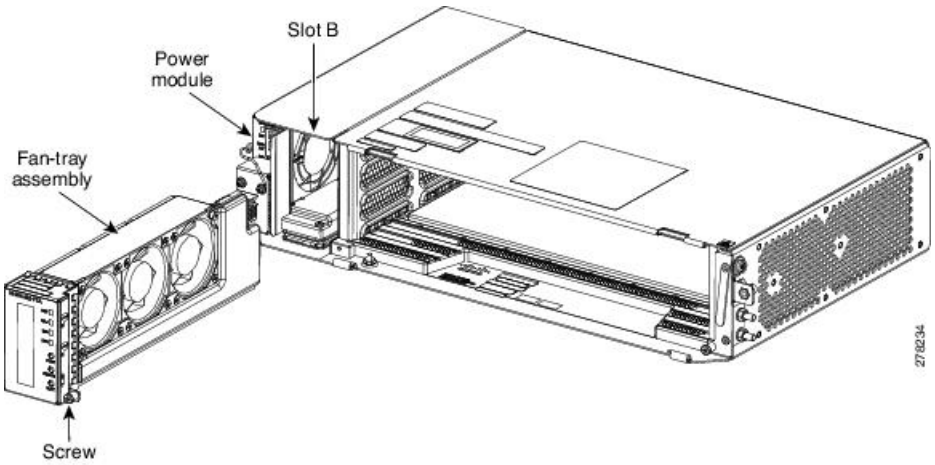
Note During the system startup or fan-tray replacement, the inventory data of the fan-tray assembly and the power module is displayed in the **Inventory** tab of CTC after a delay of approximately 6 minutes.

Note To install the fan-tray assembly, it is not necessary to move any of the fiber-routing facilities.

Procedure

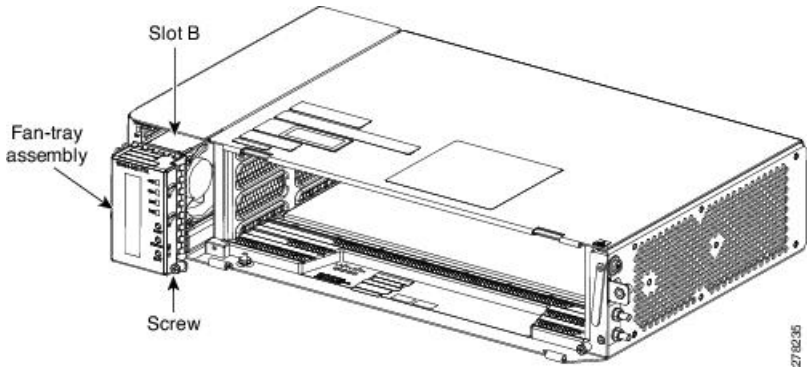
Step 1 Insert the fan-tray assembly in Slot B of the NCS 2002 chassis (see the figure below).

Figure 96: Installing the Fan-Tray Assembly



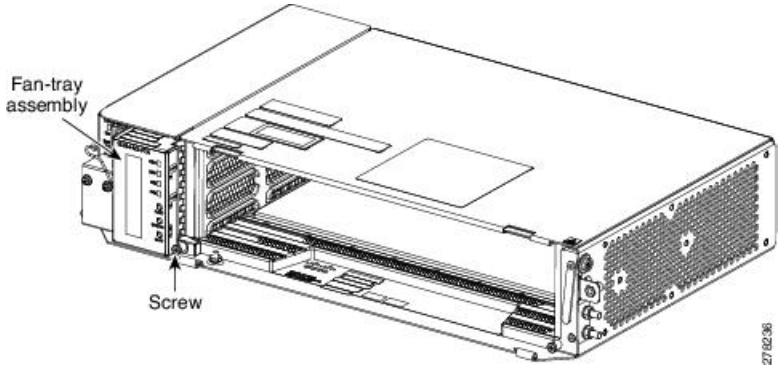
Step 2 Push the fan-tray assembly such that the backplane connector is completely engaged (see the figure below).

Figure 97: Inserting the Fan-Tray Assembly in the NCS 2002 Chassis



Step 3 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the unit (see the figure below).

Figure 98: Fan-Tray Assembly Installed in the NCS 2002 Shelf



Step 4 To verify that the tray has plugged into the assembly, check the fan-tray and listen to determine if the fans are running.

Note
If the fan-tray assembly is removed from the shelf, wait for at least 5 seconds before plugging it back into the shelf. In the event the LCD display on the fan-tray assembly appears blank, remove the unit from the shelf, wait for at least 5 seconds and reinsert the unit into the shelf.

Stop. You have completed this procedure.

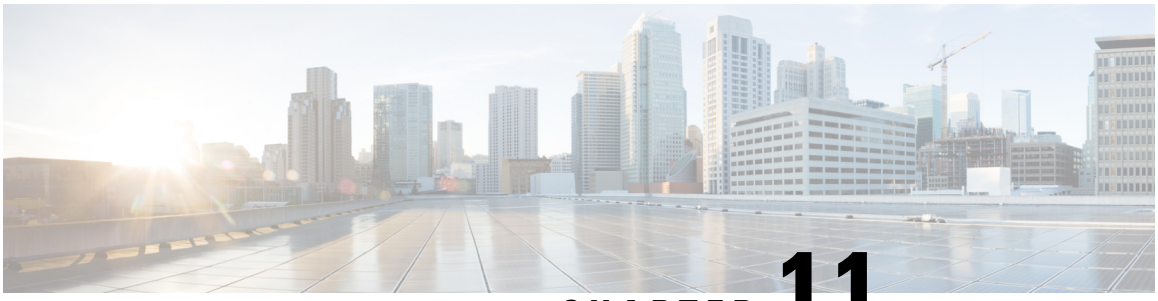
Air Filter

The NCS 2002 contains a preinstalled disposable air filter (NCS2002-FTF) on the right side of the shelf.

The disposable filter is made up of a gray, open-cell, polyurethane foam that is specially coated to provide fire and fungi resistance. Spare filters should be kept in stock. Inspection of the air filter must be performed as specified in your local site practices.

Note Inspect the air filters every three months and replace them as needed. Air filters should be disposed of and replaced when they become dirty. According to NEBS guidelines, washing or cleaning them is not allowed. Make sure to order these consumable items separately and keep a spare stock. For PID identification, contact TAC, as these parts cannot be replaced through the RMA process.

Caution Do not operate an NCS 2002 without the mandatory air filter.



CHAPTER 11

NCS 2006 Installation Overview

This chapter provides an overview of NCS 2006 installation and contains the following section:

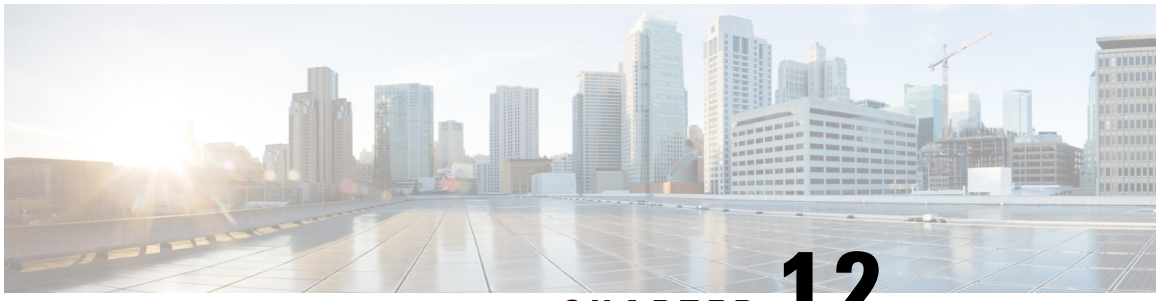
- NCS 2006 Installation Overview, on page 139

NCS 2006 Installation Overview

This chapter includes these sections:

- Installing the Air Flow Regulator
- Mounting the Brackets on NCS 2006 Shelf
- Mounting the Cisco NCS 2006 Shelf
- Installing the Cisco NCS 2006 Door and Other Modules
- Connecting Power and Ground
- Installing and Configuring the Control Card
- NCS 2006 Shelf Installation Acceptance Test

NCS 2006 Installation Overview



CHAPTER 12

Installing the Air Flow Regulator

This chapter explains how to install the regulators to maintain the air flow for ANSI and ETSI configurations in NCS 2006 shelf.

The air flow within the equipment must be maintained at a nominal temperature.

This task can be accomplished using one of these mechanisms:

- Air deflector
- Air plenum

The sections are:

- Air Deflector, on page 141
- Air Plenum, on page 141
- Air Plenum Rack and Cabinet Compatibility, on page 143
- NTP-L43 Install the Air Plenum in NCS 2006 Shelf, on page 144
- Air Flow Performance of NCS 2006, on page 158

Air Deflector

An air deflector is a sheet-metal part that is mounted on the NCS 2006 shelf to orient the air flow in a specific direction.

The air deflectors can be mounted in different positions to control the air flow:

- Front to Front— Only ETSI rack
- Front to Back— For ANSI and ETSI racks
- Front to Top— Only ETSI rack

In an ANSI rack, the air deflectors are mounted only on the 23-inch rack configuration.

Air Plenum

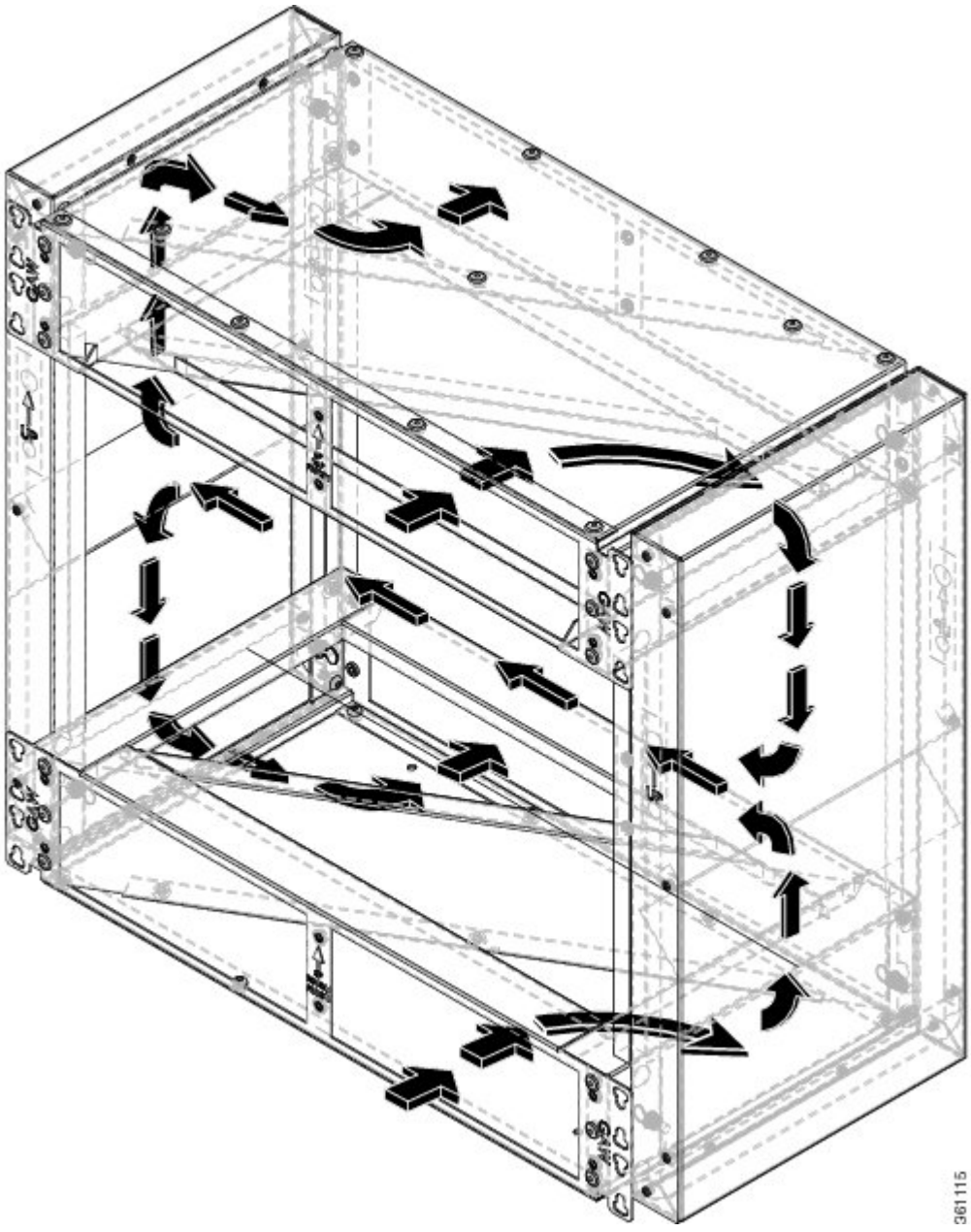
Air plenum orients the air flow in the front-to-back direction inside the equipment to be compliant with GR-63 issue 4 requirement.

NCS 2006 air plenum kit has two horizontal and two vertical air plenums. The air that flows from the front top inlet and the front bottom inlet are channelized to the right vertical plenum, inside the equipment, and

then to the exhaust air channel towards the left vertical air plenum. The air flow is deflected by 90 degrees and exited out in the rear end.

The following figure shows the air flow inside the air plenum.

Figure 99: Air flow within the air plenum



The following figures display the dimensions of the air plenum relative to the cabinet or rack.

Figure 100: Dimension of Cisco NCS 2006 chassis relative to the air plenum

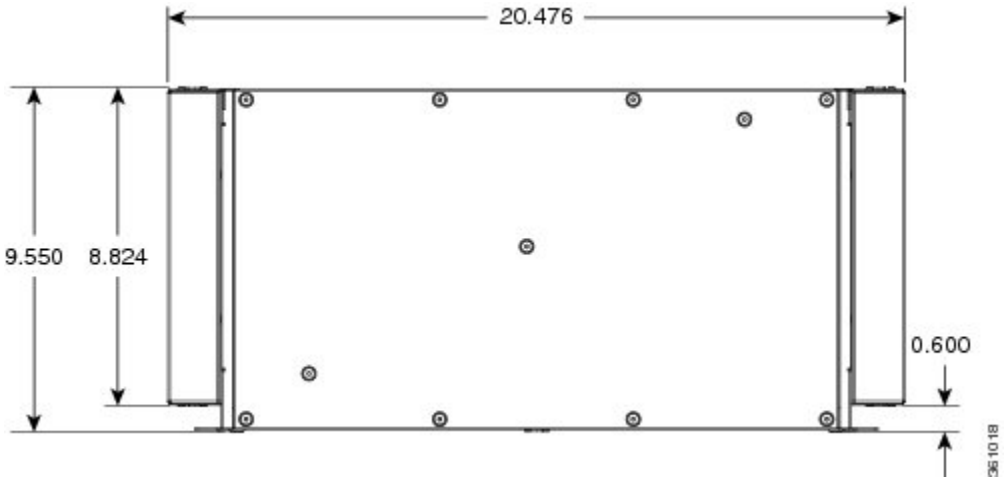
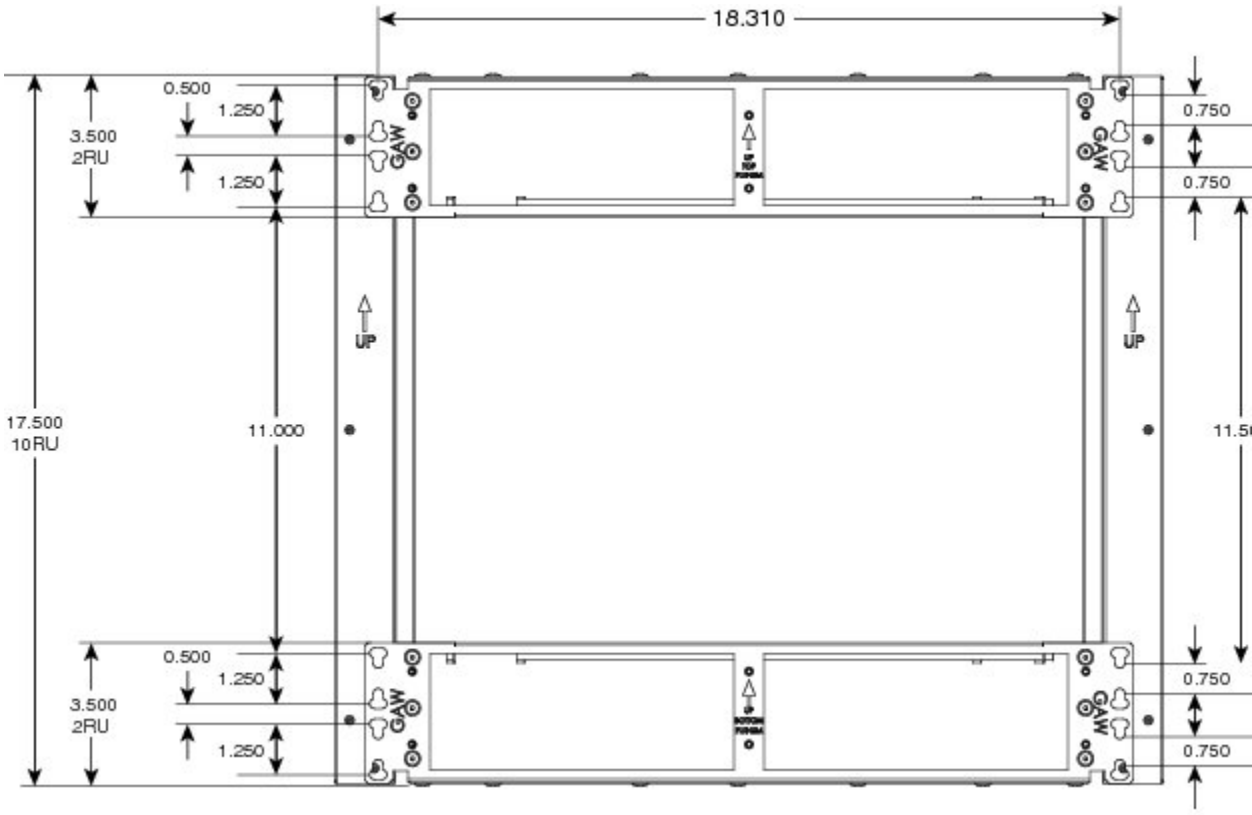


Figure 101: Dimension on Cisco NCS 2006 relative to the air plenum



Air Plenum Rack and Cabinet Compatibility

The table shows the compatibility of air plenum with the ANSI and ETSI racks and cabinets. The chassis can be installed with brackets in front position only.

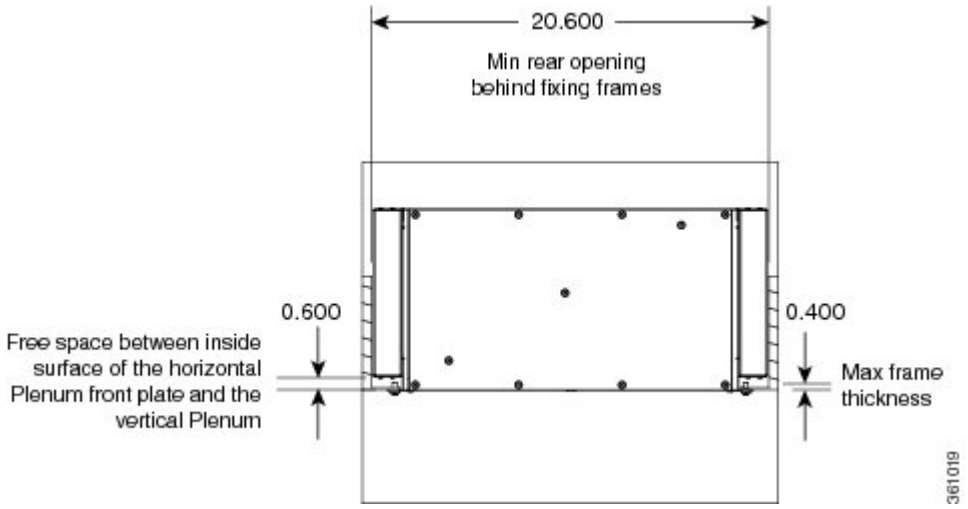
Table 10: Air plenum compatibility with racks and cabinets

Rack / Cabinet	Front-to-back air flow
ANSI 19-inch rack	Supported [2]
ANSI 19-inch cabinet	Supported [1]
ANSI 23-inch rack	Supported
ANSI 23-inch cabinet	Supported
ETSI cabinet	Supported [1]

[2] 1 A minimum opening of 20.600 inches is required to install the vertical air plenum behind the front rails.

Note The ANSI 19-inch two post rack that is compatible with air plenum installation is available from Telect, with part number 12545-301.

Figure 102: Minimum rear opening for ANSI 19-inch and ETSI configuration



NTP-L43 Install the Air Plenum in NCS 2006 Shelf

Purpose	This procedure installs the air plenum to orient the air flow in front-to- back direction in the NCS 2006 shelf.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• Medium slot-head screwdriver
	• Small slot-head screwdriver
	• Screws
	  • ANSI: #12-24 x 0.50 pan-head Phillips screws
	  • ETSI: M6.0 x 20 pan-head Phillips screws
	• Wing head screws (8)
	• Adapter plates
	• One air plenum kit (horizontal and vertical air plenums)

Prerequisite Procedures	NTP-L41 Unpacking and Inspecting the Shelf, on page 23
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit.** Statement 1074

Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units.** Statement 246

Warning **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.** Statement 39

Note For nominal voltage of -60 VDC, the input voltage range is from -40 to -72 VDC.

Note Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **The air plenum is installed on a rack or a cabinet using thread-forming screws that remove any paint or non-conductive coatings inside the hole threads, and establish a metal-to-metal contact. Also, clean both surfaces outside the screw points that come in contact, so that they are free of paint and other nonconductive coating. Apply an appropriate antioxidant compound to the surfaces.**

Procedure

Depending on the rack or cabinet, complete the necessary task:

- DLP-L64 Installing Air Plenum for NCS 2006 Shelf in ANSI 19-inch Cabinet, on page 146
- DLP-L66 Installing Air Plenum in NCS 2006 Shelf for ANSI 23-inch Configuration, on page 150
- DLP-L67 Installing Air Plenum for NCS 2006 Shelf in ETSI Configuration, on page 155
- DLP-L68 Installing Pre-assembled Air Plenums in ANSI 23-inch Configuration, on page 153

Stop. You have completed this procedure.

DLP-L64 Installing Air Plenum for NCS 2006 Shelf in ANSI 19-inch Cabinet

Purpose	This task installs the air plenum for the NCS 2006 shelf in ANSI 19-inch cabinet.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: #12-24 x 0.50 pan-head Phillips screws (8) • Wing head screws (8) • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

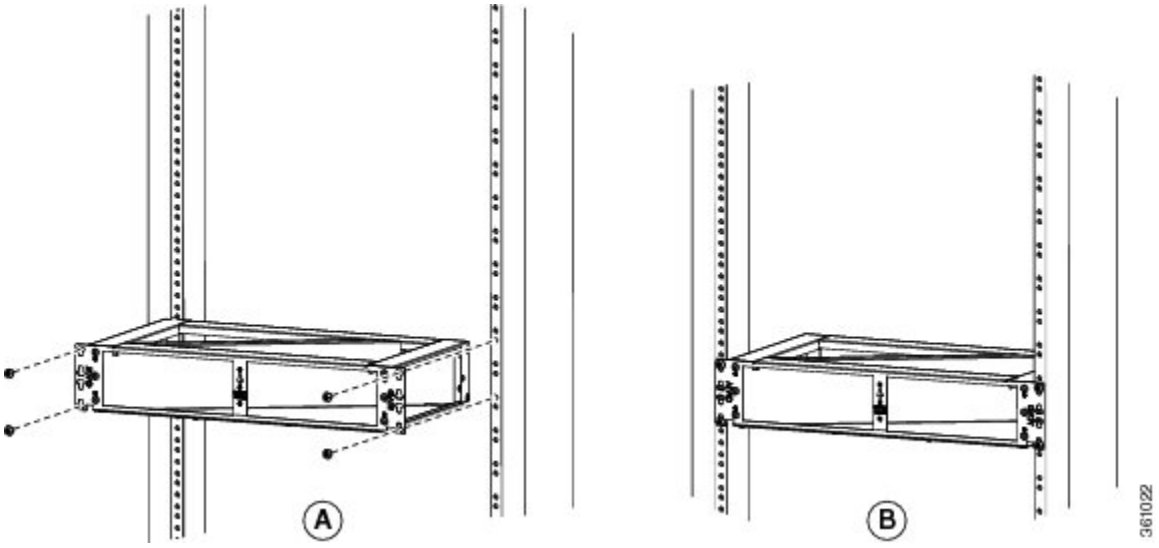
Note In the ANSI 19-inch rack or cabinet, the air plenum can be mounted only if the minimum opening is 20.600 inches to install the vertical air plenums behind the front rails.

Procedure

Step 1 Place the horizontal air plenum at the bottom of the shelf slot in the ANSI 19-inch cabinet.

Step 2 Insert the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m) as shown in the figure below.

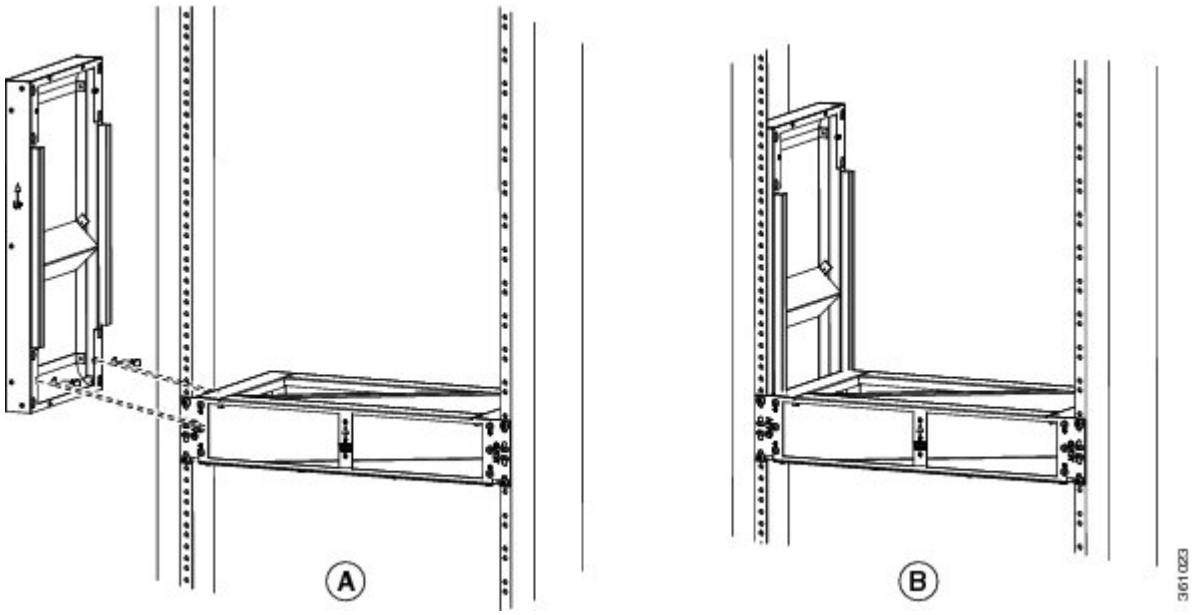
Figure 103: Installing the bottom horizontal air plenum in the ANSI 19-inch cabinet



Step 3 Install the vertical air plenum to the left of the horizontal air plenum:

a) Insert the vertical plenum in the free space between the horizontal plenum and cabinet.
b) Install the wing head screws from the internal side of the horizontal plenum as shown in the figure below.
c) Tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

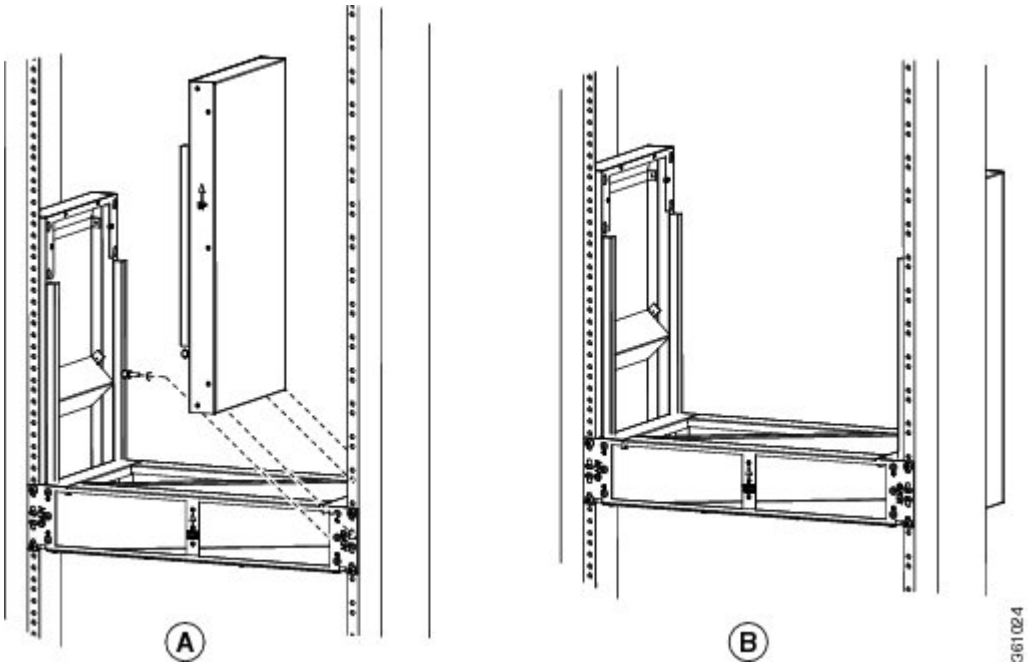
Figure 104: Installing the left vertical air plenum



Step 4 Place the vertical air plenum to the right of the horizontal air plenum.

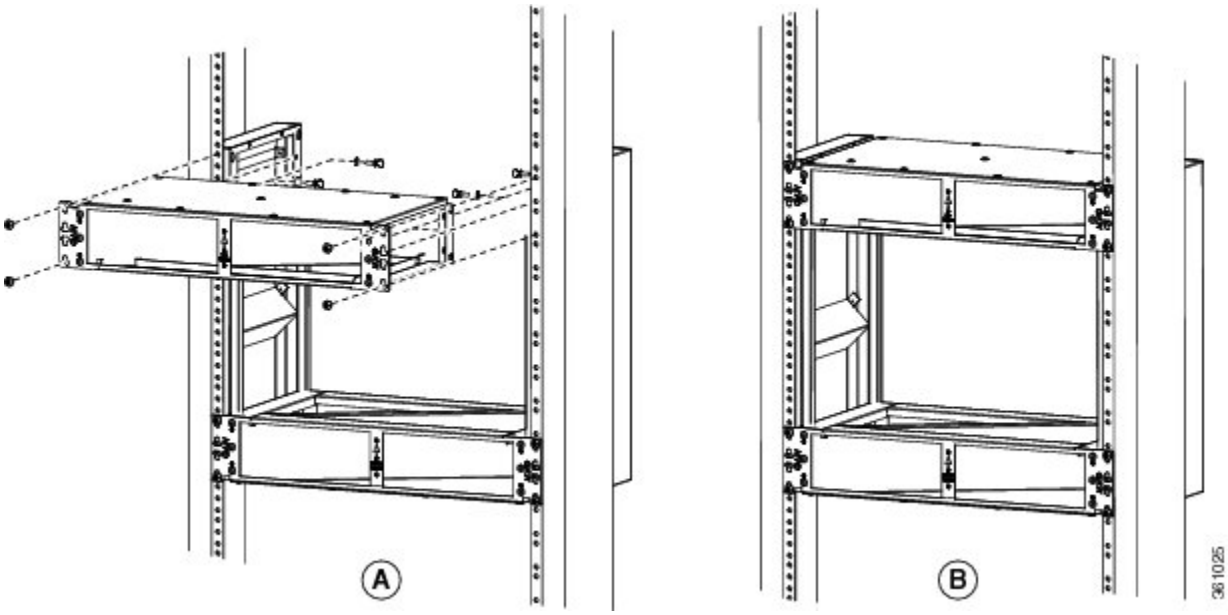
Step 5 Install the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

Figure 105: Installing the right vertical air plenum



Step 6 Install the horizontal air plenum above the vertical plenums. Follow step 3a to step 3c.

Figure 106: Installing the horizontal air plenum above the vertical plenums

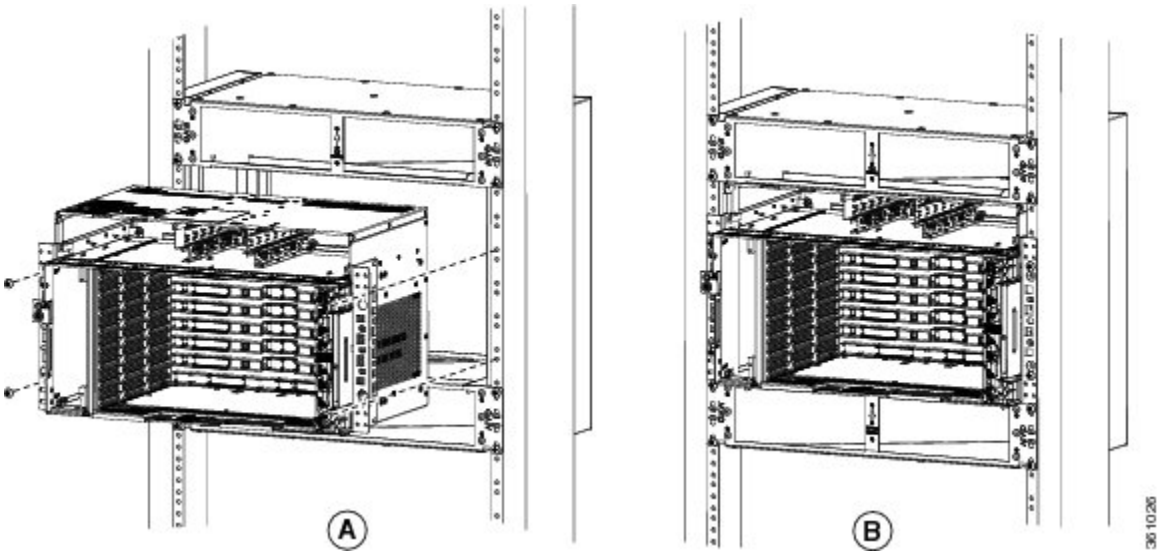


Step 7 Install the 19-inch standard brackets on both sides of the chassis in the front position. See DLP-L3 Mounting the Reversible Brackets on the NCS 2006 Shelf for ANSI Rack Configuration, on page 164.

Step 8 Check the length between the top and bottom horizontal air plenums where the chassis will be installed. The length must be not less than 10.5 inches (267 mm). If the length is less, adjust the position of the top horizontal plenum.

Step 9 Install the NCS 2006 empty chassis between the two horizontal plenums.

Figure 107: Installing the NCS 2006 chassis between the horizontal air plenum



Step 10 Return to your originating procedure (NTP).

DLP-L66 Installing Air Plenum in NCS 2006 Shelf for ANSI 23-inch Configuration

Purpose	This task installs the air plenum for the NCS 2006 shelf in the ANSI 23-inch cabinet or rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: #12-24 x 3/4 pan-head Phillips mounting screws (8) • Wing head screws (8) • Adapter plates • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

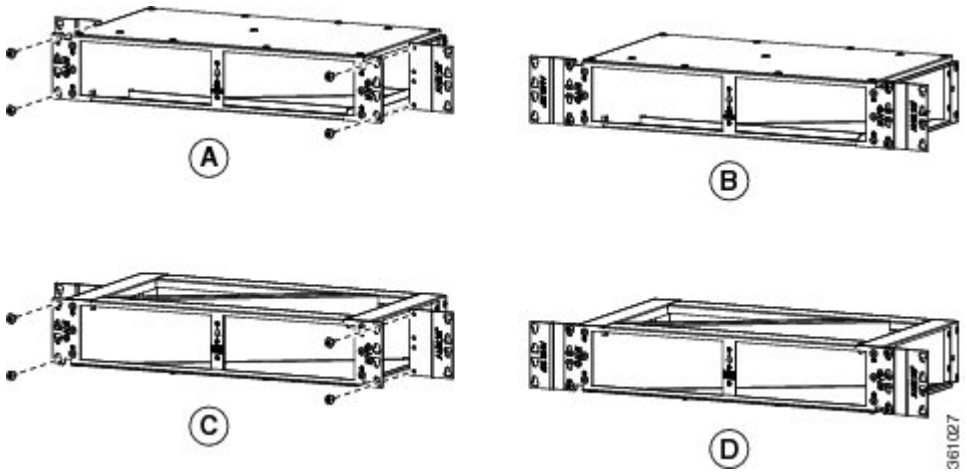
Note The airplenums for ANSI 23-inch configuration can be pre-assembled outside the cabinet and then installed inside the cabinet. See DLP-L68 Installing Pre-assembled Air Plenums in ANSI 23-inch Configuration, on page 153

Procedure

Step 1 Install the ANSI 23-inch adapter plates on the horizontal air plenum.

Step 2 Align the screws to fix the adapter plates to the shelf. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

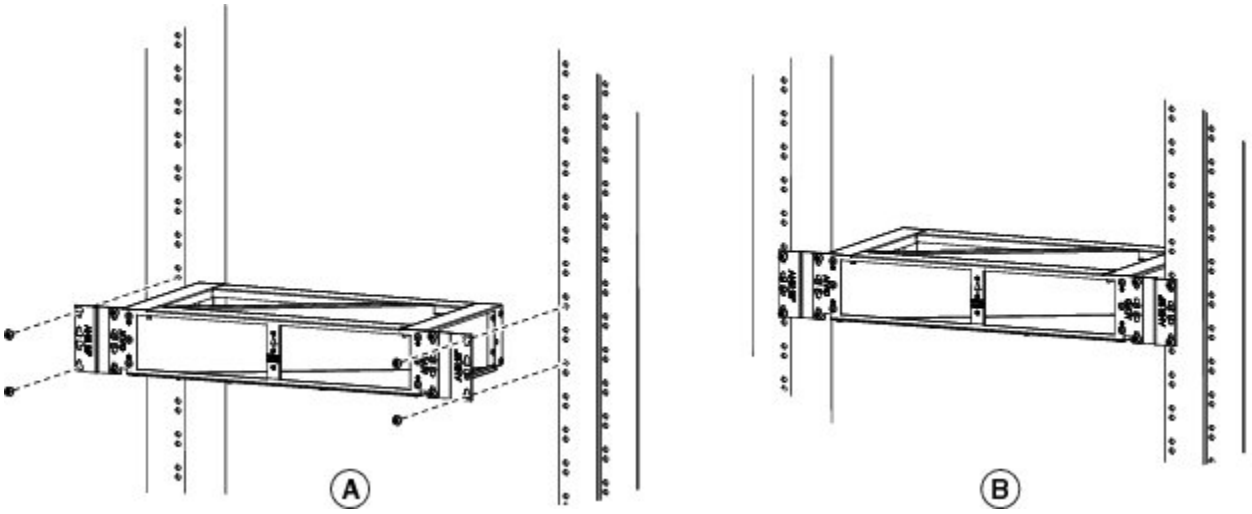
Figure 108: Installing the adapter plates on the horizontal air plenum



Step 3 Place the horizontal air plenum below the shelf slot in the ANSI 23-inch cabinet or rack.

Step 4 Insert the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

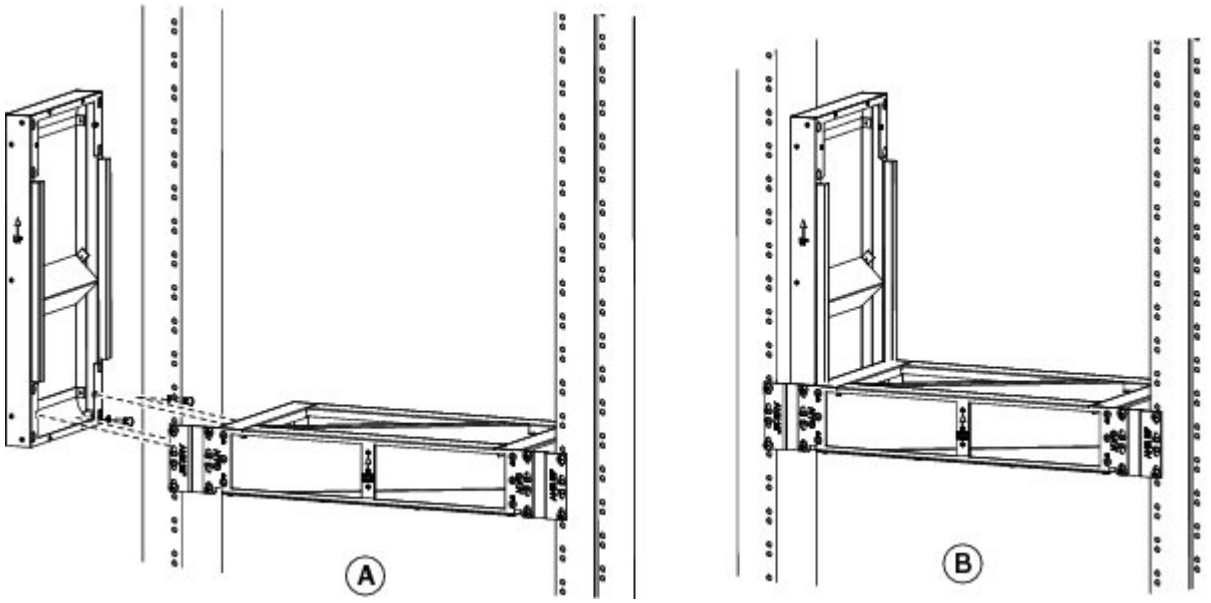
Figure 109: Installing the bottom horizontal air plenum in the ANSI 23-inch configuration



Step 5 Install the vertical air plenum to the left of the horizontal air plenum:

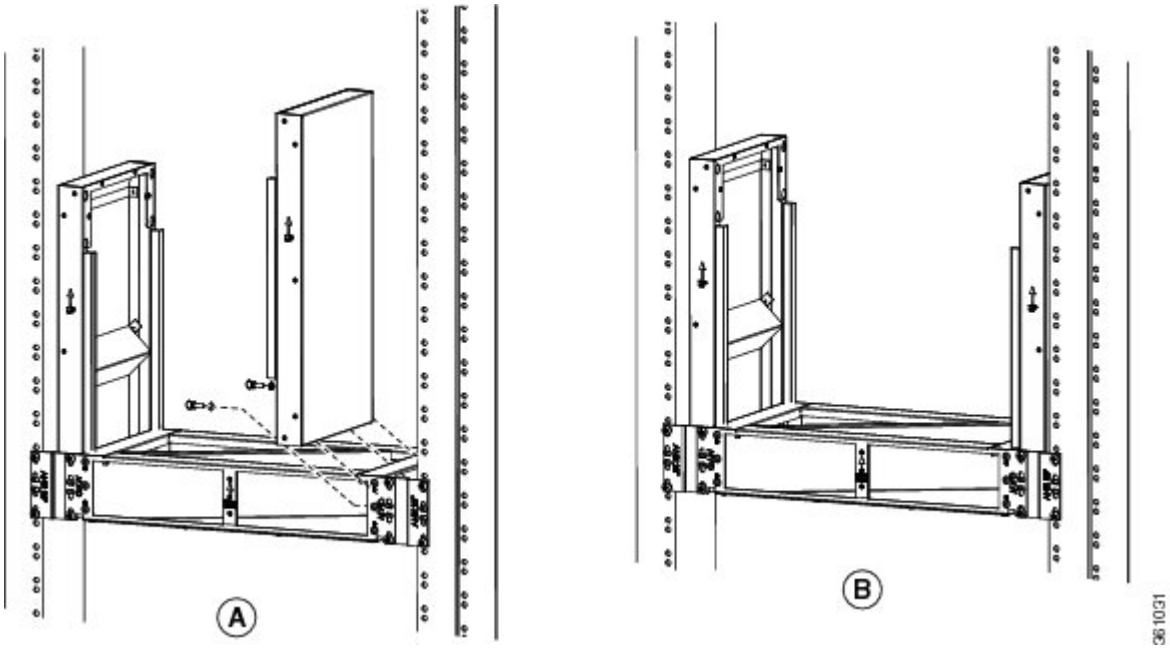
a) Insert the vertical air plenum in the free space between the horizontal air plenum and cabinet.
b) Install the wing head screws from the internal side of the horizontal plenum as shown in the figure below.
c) Tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

Figure 110: Installing the left vertical air plenum



Step 6 Install the vertical plenum to the right of the horizontal air plenum. Follow step 5a to step 5c.

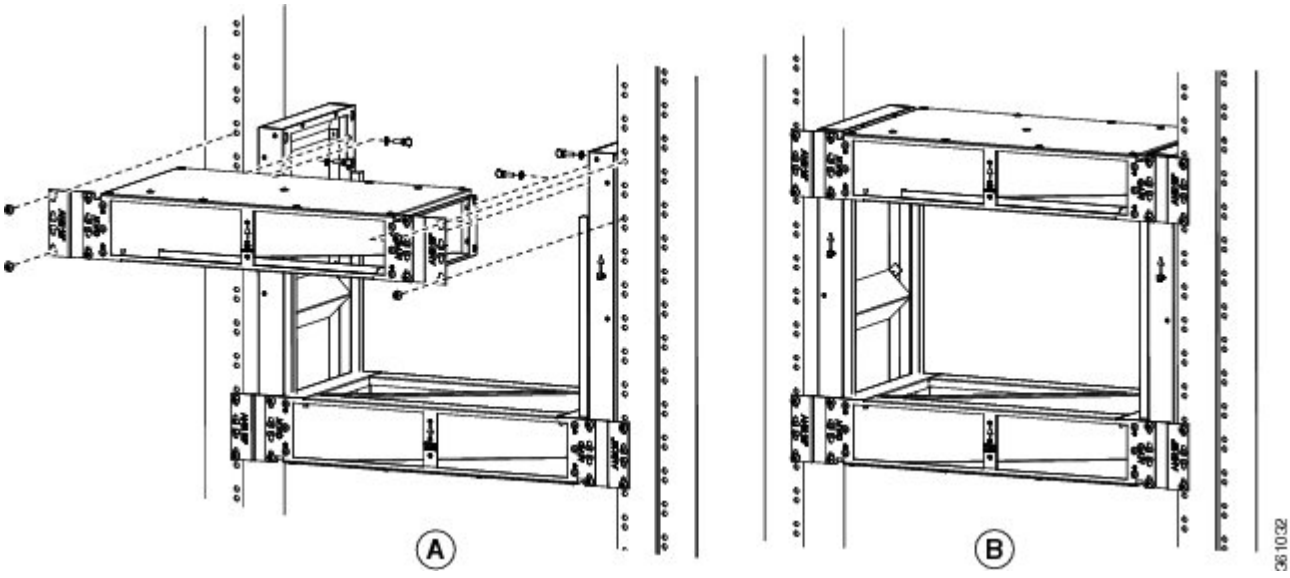
Figure 111: Installing the right vertical air plenum



Step 7 Place the horizontal air plenum above the shelf slot in the ANSI 23-inch cabinet or rack.

Step 8 Install the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

Figure 112: Installing the horizontal plenum above the vertical plenums

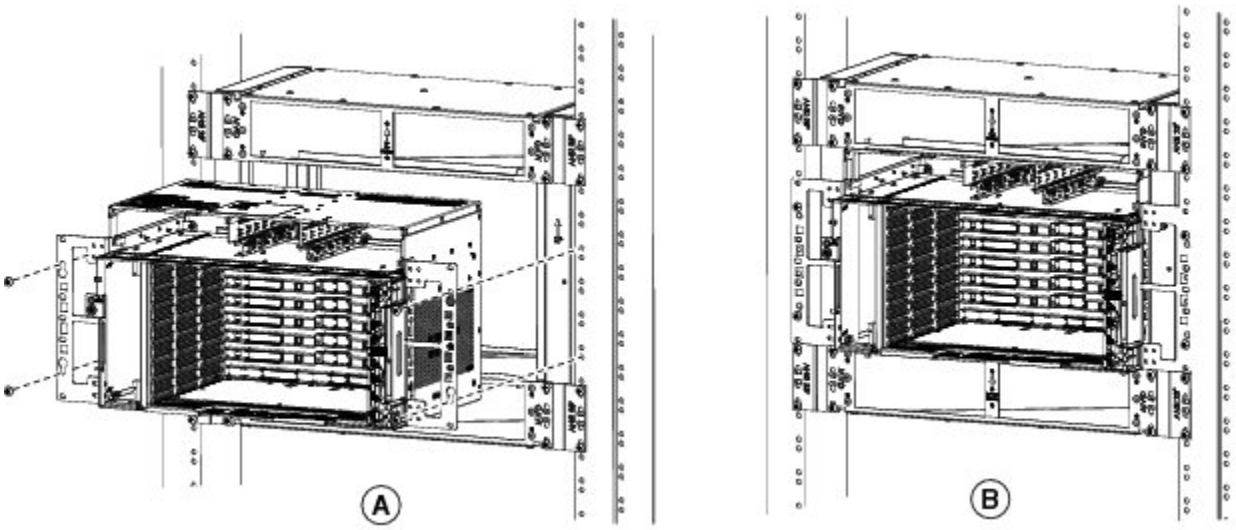


Step 9 Install ANSI 23-inch standard brackets on both sides of the chassis in front position. See DLP-L3 Mounting the Reversible Brackets on the NCS 2006 Shelf for ANSI Rack Configuration, on page 164.

Step 10 Check the length between the top and bottom horizontal air plenums where the chassis will be installed. The length must be not less than 10.5 inches (267 mm). If the length is less, adjust the position of the top horizontal plenum.

Step 11 Install the NCS 2006 empty chassis between the horizontal plenums.

Figure 113: Installing the NCS 2006 chassis between the horizontal air plenum



Step 12 Return to your originating procedure (NTP).

DLP-L68 Installing Pre-assembled Air Plenums in ANSI 23-inch Configuration

Purpose	This task installs pre-assembled air plenums for the NCS 2006 shelf in the ANSI 23-inch configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: #12-24 x 3/4 pan-head Phillips mounting screws (8) • Wing head screws (8) • Adapter plates • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Install the ANSI 23-inch adapter plates on the horizontal air plenums.

Step 2 Align the screws to fix the adapter plates to the shelf. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 3 Place a horizontal air plenum as the base.

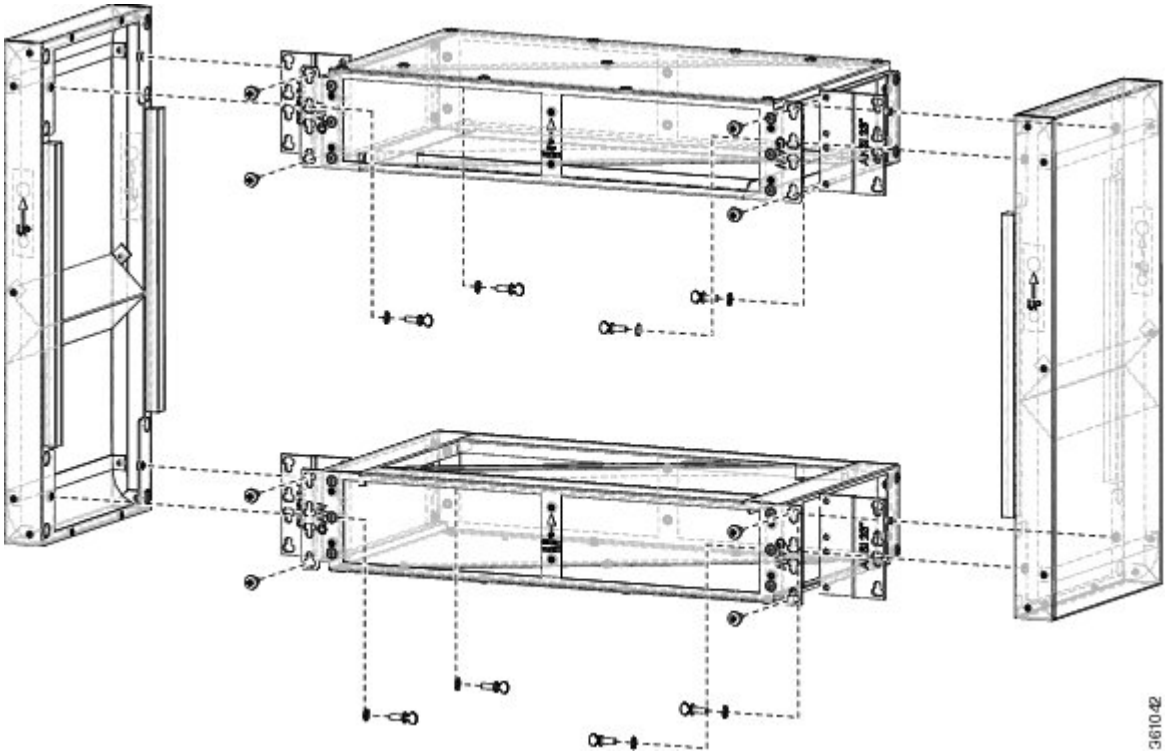
Step 4 Install the vertical air plenum to the left of the bottom horizontal plenum.

Step 5 Install the wing head screws from the internal side of the horizontal plenum and tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

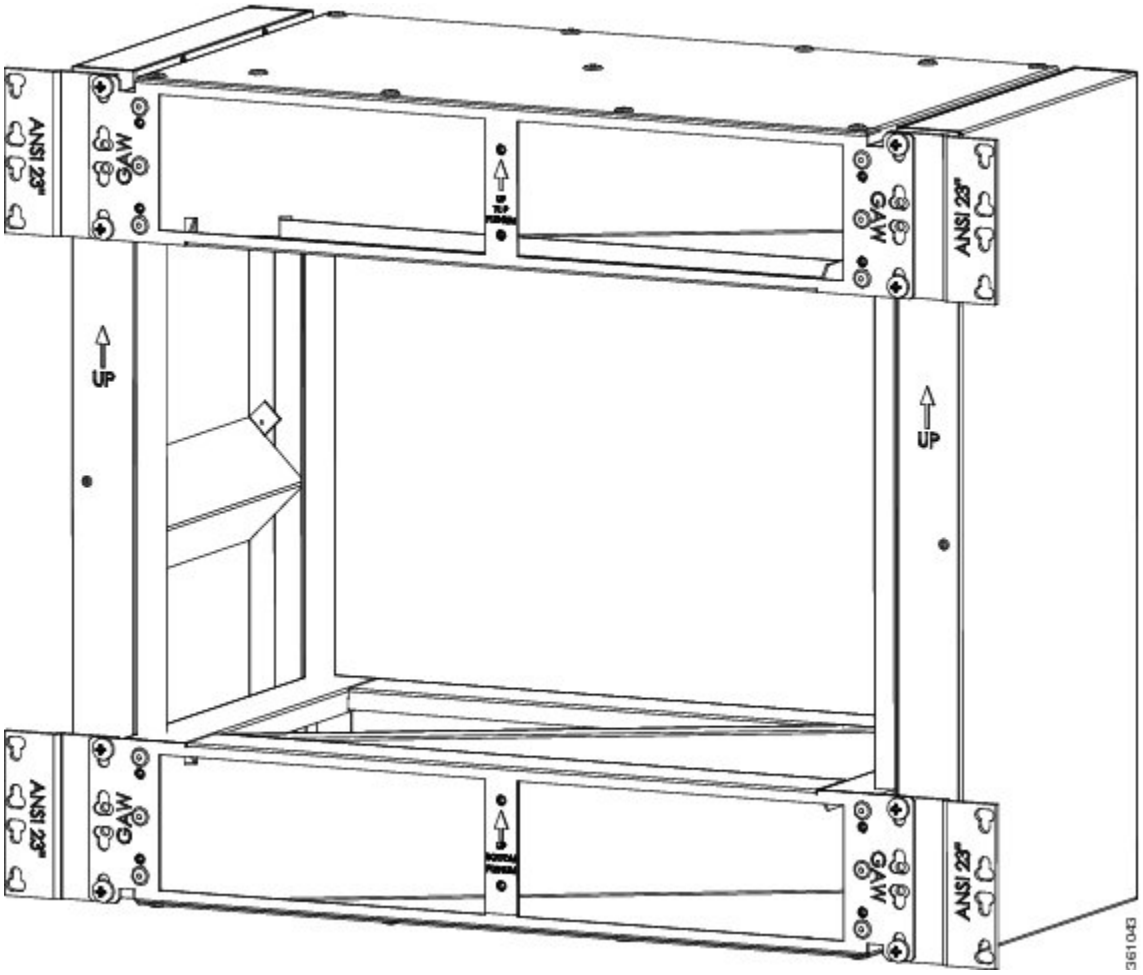
Step 6 Install the vertical air plenum to the right of the horizontal air plenum. Follow step 5.

Step 7 Install the horizontal air plenum above the vertical air plenums. Follow step 5.

Figure 114: Pre-assembling the air plenums



Step 8 Install the pre-assembled air plenum for ANSI 23-inch configuration.



Step 9 Install the pre-assembled air plenums in the ANSI 23-inch rack or cabinet.

Step 10 Check the length between the top and bottom horizontal air plenums where the chassis will be installed. The length must be not less than 10.5 inches (267 mm). If the length is less, adjust the position of the top horizontal plenum.

Step 11 Install the empty NCS 2006 chassis between the horizontal plenums.

Step 12 Return to your originating procedure (NTP).

DLP-L67 Installing Air Plenum for NCS 2006 Shelf in ETSI Configuration

Purpose	This task installs the air plenum for the NCS 2006 shelf in the ETSI configuration.

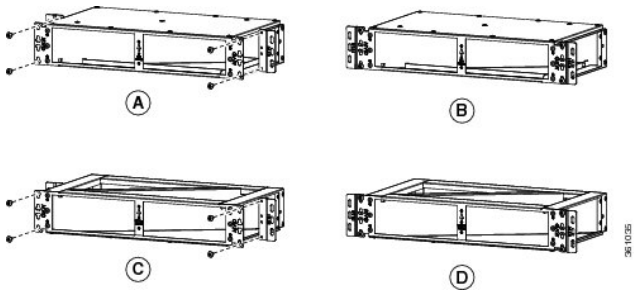
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws: M6.0 x 20 pan-head Phillips screws (8) • Wing head screws (8) • Adapter plates • One air plenum kit (horizontal and vertical air plenum)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Install the ETSI adapter plates on the horizontal air plenums.

Step 2 Align the screws to fix the adapter plates to the shelf. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

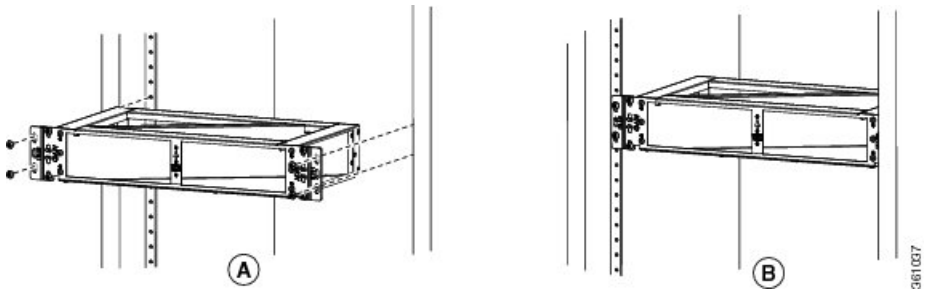
Figure 115: Installing the adapter plates on the horizontal air plenum



Step 3 Place the horizontal plenum below the chassis slot in the ETSI cabinet.

Step 4 Install the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

Figure 116: Installing the horizontal air plenum in the ETSI configuration

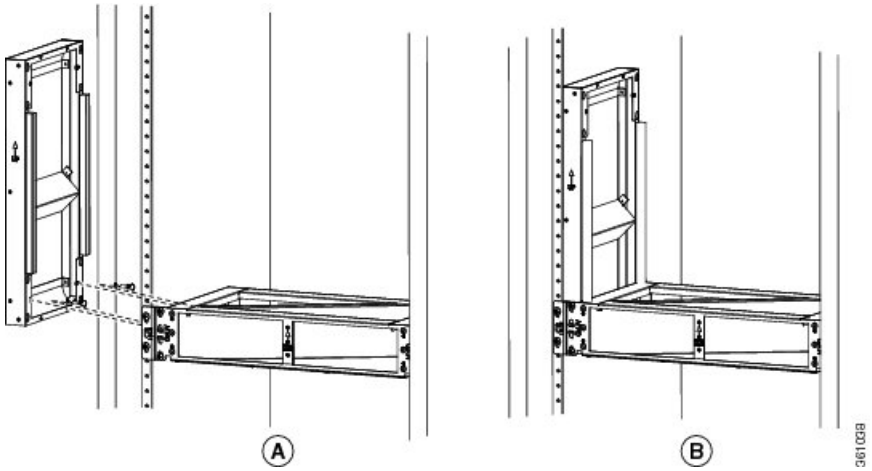


Step 5 Install the vertical air plenum to the left of the horizontal air plenum:

a) Insert the vertical plenum in the free space between the horizontal plenum and cabinet.

b) Install the wing head screws from the internal side of the horizontal plenum as shown in the figure below.
c) Tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).

Figure 117: Installing the left vertical air plenum

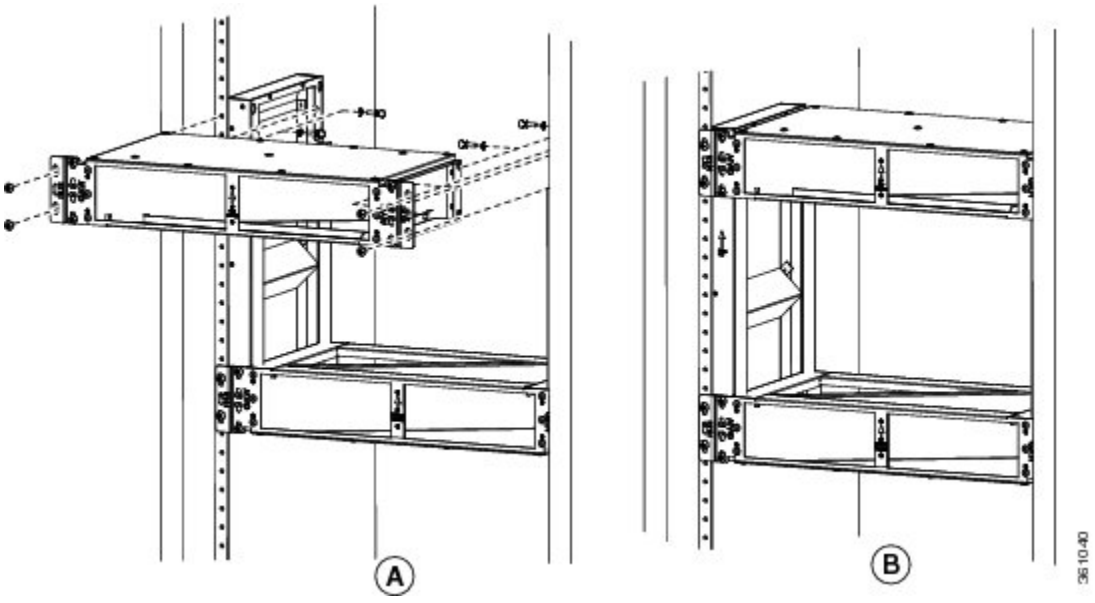


Step 6 Install the vertical air plenum to the right of the horizontal air plenum. Follow step 5a to step 5c.

Step 7 Place the horizontal plenum above the chassis slot in the ETSI cabinet.

Step 8 Install the wing head screws provided with the kit, and tighten to a torque value of 11.5 in-lb (1.3 N-m).

Figure 118: Installing the horizontal air plenum above the vertical plenums

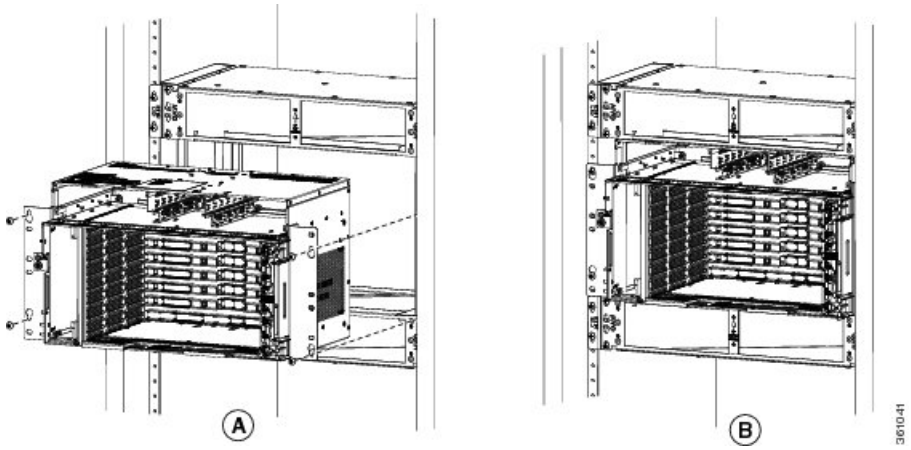


Step 9 Install the standard brackets on both sides of the chassis in front position. See DLP-L5 Mounting the Brackets on the NCS 2006 Shelf for ETSI Rack Configuration, on page 169.

Step 10 Check the length between the top and bottom horizontal air plenums where the chassis will be installed. The length must be not less than 10.5 inches (267 mm). If the length is less, adjust the position of the top horizontal plenum.

Step 11 Install the NCS 2006 empty chassis between the horizontal plenums.

Figure 119: Installing the NCS 2006 chassis below the horizontal air plenum

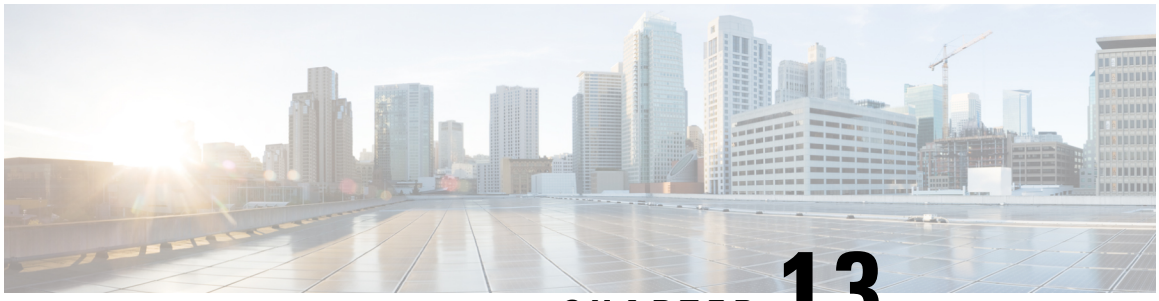


Step 12 Return to your originating procedure (NTP).

Air Flow Performance of NCS 2006

The tables below summarizes the air flow performance of NCS 2006:

Chassis	Deflector PID	Deflector	Flow Direction	Maximum Airflow at 40°C (CFM)
NCS 2006 with NCS2006-FTA=	15454-M6-DEFL21 (ETSI 21-inch deflector)	Air filter side Exhaust side	Front to rear	136
		Air filter side	Front to left side	258
	15454-M6-DEFL23 (ANSI 23-inch deflector)	Air filter side Fan tray side	Front to rear	167
		Air filter side	Front to left side	268
	No deflectors		Right side to left side	295



CHAPTER 13

Mounting the Brackets on NCS 2006 Shelf

This chapter explains how to mount the brackets on Cisco NCS 2006 shelf.

Caution Use only the fastening hardware provided with the NCS 2006 shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the NCS 2006 shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the NCS 2006 shipping kit, or remove the coating from the threads to ensure electrical continuity.

The reversible mounting bracket is used to mount the shelf on a 19-inch or 23-inch (482.6 mm or 584.2 mm) rack.

The sections are:

- NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159
- NTP-L46 Mounting the Brackets in ETSI Configuration , on page 168

NTP-L2 Mounting the Brackets in ANSI Configuration

Purpose	This procedure helps in mounting the brackets on the NCS 2006 shelf.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• Medium slot-head screwdriver
	• Small slot-head screwdriver
	• ETSI only:
	  • Six M6 x 20 pan-head Phillips mounting screws
	• ANSI only:
	  • Six #12-24 x 3/4 pan-head Phillips mounting screws

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None



Warning **Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.** Statement 1048



Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 40A and between -40.5 VDC to -57.6 VDC.** Statement 1005



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005



Warning **To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 131°F (55°C).** Statement 1047



Warning **Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018



Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006



Warning **To prevent airflow restriction, allow clearance around the ventilation openings to be at least:1 inch (25.4 mm).** Statement 1076



Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, a shielded cable must be used to connect to the EMS port. This cable must be less than 30 meters in length and not placed in the 3 meter boundary, as defined in EN50121-4:2006, Table 2, note 1.** Statement 8010



Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, DC power cables must be less than 30 meter long.** Statement 8011

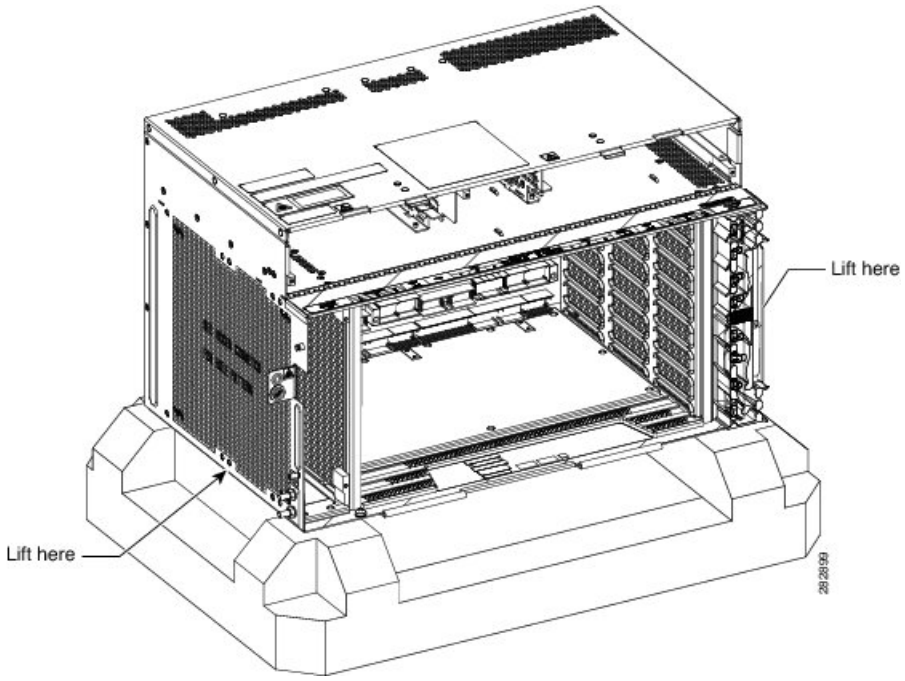


Note During installation, do not use the door to handle the chassis.



Note Remove the door from the NCS 2006 shelf and reinstall it after installing all the other modules.

Figure 120: Handling the Chassis During Installation



Procedure

Step 1 Complete the necessary task as applicable:

- DLP-L1 Verify the NCS 2006 Shelf for AC Power Module Installation, on page 162
- DLP-L2 Verify the NCS 2006 Shelf for DC Power Module Installation, on page 163

Step 2 Complete the necessary task as applicable:

- DLP-L3 Mounting the Reversible Brackets on the NCS 2006 Shelf for ANSI Rack Configuration, on page 164
- DLP-L4 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for ANSI Rack Configuration, on page 166

Stop. You have completed this procedure.

DLP-L1 Verify the NCS 2006 Shelf for AC Power Module Installation

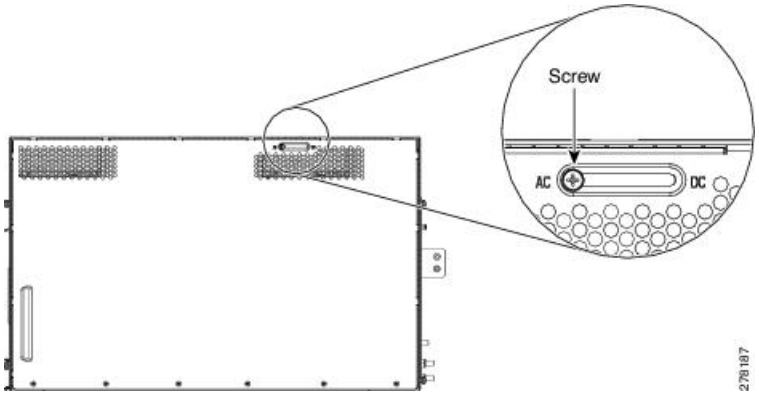
Purpose	This task verifies the shelf for AC power module installation.
Tools/Equipment	None

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Verify the position of the mechanical locking system on the rear side of the chassis. To use the AC power module, the screw must be close to the AC silk-screen text (see the figure below).

Figure 121: AC Power Module Installation—Rear Side of the NCS 2006 Shelf



Step 2 Loosen the screw and move it to the left position (towards the AC silk-screen text).

Step 3 Tighten the screw again to a torque value of 4 in-lb (0.45 N-m).

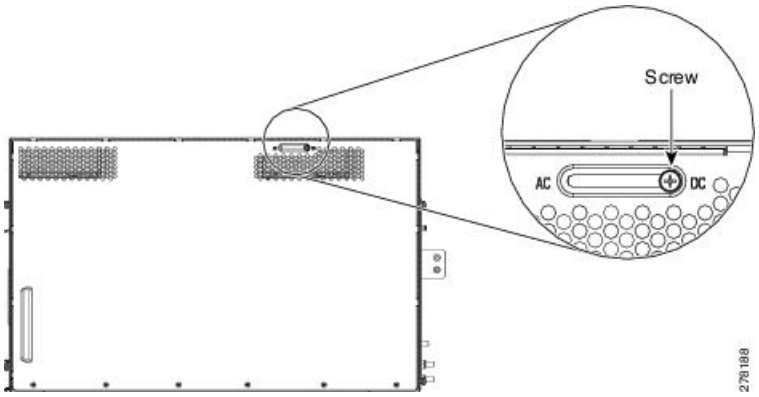
DLP-L2 Verify the NCS 2006 Shelf for DC Power Module Installation

Purpose	This task verifies the NCS 2006 shelf for DC power module installation.
Tools/Equipment	None
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Verify the position of the mechanical locking system on the rear side of the chassis. To use the DC power module the screw must be close to the DC silk-screen text (see the figure below).

Figure 122: DC Power Module Installation—Rear Side of the NCS 2006 Shelf



Step 2 Loosen the screw and move it to the right position (towards the DC silk-screen text).

Step 3 Tighten the screw again to a torque value of 4 in-lb (0.45 N-m).

Step 4 Return to your originating procedure (NTP).

DLP-L3 Mounting the Reversible Brackets on the NCS 2006 Shelf for ANSI Rack Configuration

Purpose	This task installs the reversible mounting brackets on the NCS 2006 shelf for ANSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the NCS 2006 in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the NCS 2006 ship kit, or remove the coating from the threads to ensure electrical continuity.

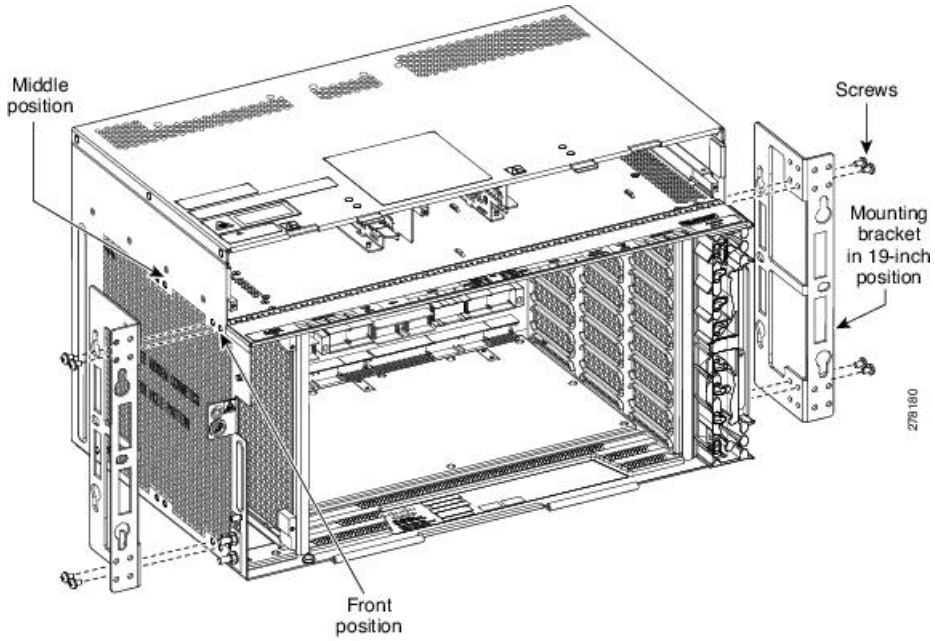
Note In an ANSI rack, reversible mounting brackets (19-inch or 23-inch) are used to install the shelf. The mounting brackets can be installed in the front or the middle position of the chassis.

Procedure

Step 1 To mount the reversible brackets:

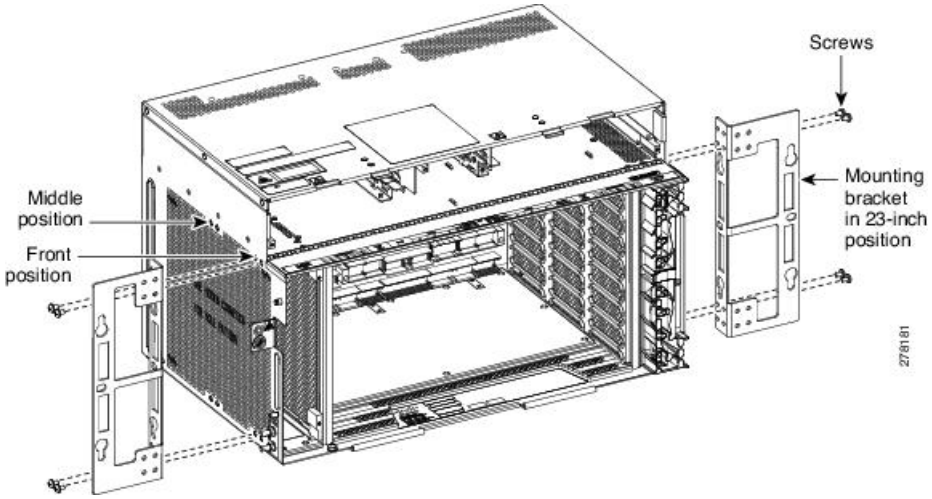
- For a 19-inch (482.6-mm) configuration, place the widest side of the mounting bracket flush against the shelf (see the figure below). The narrow side of the mounting bracket should be towards the front of the shelf.

Figure 123: Mounting the Brackets on the NCS 2006 shelf for a 19-inch (482.6-mm) ANSI Configuration



- For a 23-inch (584.2-mm) configuration, place the narrow side of the mounting bracket flush against the shelf (see the figure below). The widest side of the mounting bracket should be towards the front of the shelf.

Figure 124: Mounting the Brackets on the NCS 2006 shelf for a 23-inch (584.2-mm) ANSI Configuration



Step 2 Align the mounting bracket screw holes against the shelf screw holes.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Repeat steps 1 through 3 for the mounting bracket on the opposite side.

Step 5 Return to your originating procedure (NTP).

DLP-L4 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for ANSI Rack Configuration

Purpose	This task installs the bracket with air deflectors (front-to-back) on the NCS 2006 shelf for ANSI rack configuration. **Note** In an ANSI rack, the air deflectors can be mounted only in the 23-inch rack configuration and in the front position of the chassis.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	As needed
Onsite/Remote	Onsite

Security Level	None

Caution Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Procedure

Step 1 (ANSI only) Place the right front air deflector flush against the right side of the chassis (see Diagram 1 of the figure below).

Step 2 Align the screw holes on the right front air deflector with the screw holes on the right side of the chassis.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

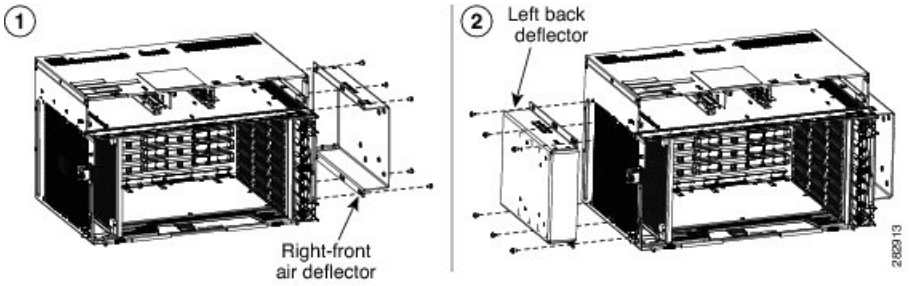
Step 4 Place the left back air deflector flush chassis as shown in Diagram 2 of the figure below.

Do not mount the left back deflector (exhaust air deflector), if these cards are to be installed in the NCS 2006 shelf:

- 100G-LC-C, 10x10G-LC, or CFP-LC
- EDRA1-26, EDRA1-35, EDRA2-26, or EDRA2-35

Use the standard brackets directly to mount the NCS 2006 shelf.

Figure 125: Mounting the Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for the ANSI rack Configuration



Step 5 Align the screw holes on the left back air deflector with the screw holes on the left side of the chassis.

Step 6 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 7 Place the 23-inch mounting bracket flush in the front position (see Diagram 1 of the figure below) or in the middle position (see Diagram 3 of the figure below) against the right side of the chassis.

Step 8 Align the screw holes on the 23-inch mounting bracket with the screw holes on the right side of the chassis.

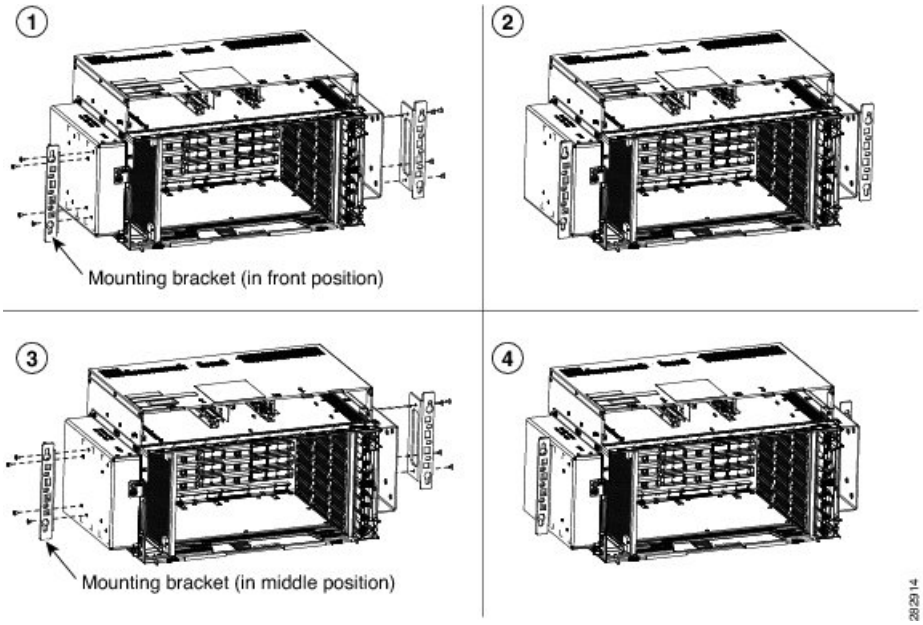
Step 9 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 10 Place the 23-inch mounting bracket flush in the front position (see Diagram 1 of the figure below) or in the middle position (see Diagram 3 of the figure below) against the left side of the chassis.

Step 11 Align the screw holes on the 23-inch mounting bracket with the screw holes on the left side of the chassis.

Step 12 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Figure 126: Mounting the Brackets with Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for ANSI Rack Configuration



Step 13 Return to your originating procedure (NTP).

NTP-L46 Mounting the Brackets in ETSI Configuration

Purpose	This procedure helps in mounting the brackets on the NCS 2006 shelf.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• Medium slot-head screwdriver
	• Small slot-head screwdriver
	• ETSI only:
	  • Six M6 x 20 pan-head Phillips mounting screws
	• ANSI only:
	  • Six #12-24 x 3/4 pan-head Phillips mounting screws

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Complete the necessary task as applicable:

- DLP-L5 Mounting the Brackets on the NCS 2006 Shelf for ETSI Rack Configuration, on page 169
- DLP-L6 Mounting the Air Deflectors (Front-to-Front) on the NCS 2006 Shelf for ETSI Rack Configuration, on page 170
- DLP-L7 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for ETSI Rack Configuration, on page 172
- DLP-L8 Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration, on page 174
- DLP- L81 Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration, on page 177

Stop. You have completed this procedure.

DLP-L5 Mounting the Brackets on the NCS 2006 Shelf for ETSI Rack Configuration

Purpose	This task installs the mounting brackets on the NCS 2006 shelf for ETSI rack configuration. **Note** In an ETSI rack, the mounting brackets are installed only in the front position.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the NCS 2006 in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the NCS 2006 ship kit, or remove the coating from the threads to ensure electrical continuity.

Procedure

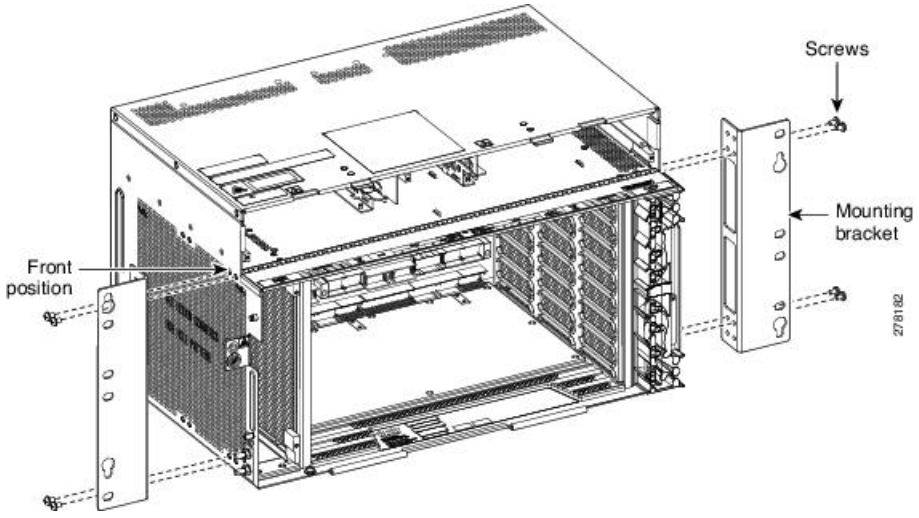
Step 1 Place the mounting bracket flush against the shelf as shown in the figure below.

Step 2 Align the mounting bracket screw holes against the shelf screw holes.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Repeat steps 1 through 3 for the mounting bracket on the opposite side.

Figure 127: Mounting the Brackets on the NCS 2006 Shelf for ETSI Rack Configuration



Step 5 Return to your originating procedure (NTP).

DLP-L6 Mounting the Air Deflectors (Front-to-Front) on the NCS 2006 Shelf for ETSI Rack Configuration

Purpose	This task installs the air deflectors (front-to-front) on the NCS 2006 shelf for ETSI rack configuration. **Note** The air deflectors can be installed only in the front position of the chassis.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

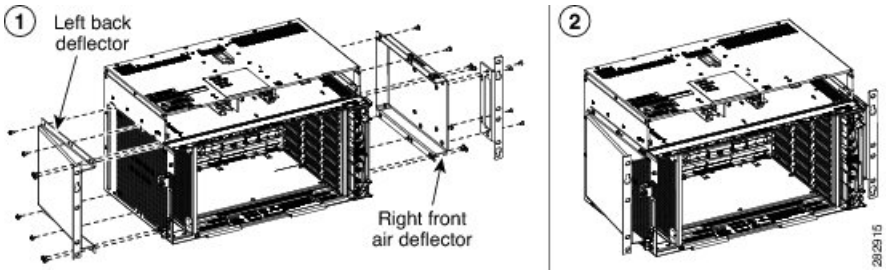
Caution Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Procedure

Step 1 Place the right front air deflector flush against the right side of the chassis (see the figure below).

Step 2 Align the screw holes on the right front air deflector with the screw holes on the right side of the chassis.

Figure 128: Mounting the Air Deflectors (Front-to-Front) on the NCS 2006 Shelf for ETSI Rack Configuration



Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Place the left front air deflector flush against the left side of the chassis.

Do not mount the left front deflector (exhaust air deflector), if these cards are to be installed in the NCS 2006 shelf:

- 100G-LC-C, 10x10G-LC, or CFP-LC
- EDRA1-26, EDRA1-35, EDRA2-26, or EDRA2-35
- MR-MXP

Use the standard brackets directly to mount the NCS 2006 shelf.

Step 5 Align the screw holes on the left front air deflector with the screw holes on the left side of the chassis.

Step 6 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 7 Return to your originating procedure (NTP).

DLP-L7 Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for ETSI Rack Configuration

Purpose	This task installs the bracket with air deflectors (front-to-back) on the NCS 2006 shelf for ETSI rack configuration. **Note** The air deflectors can be installed only in the front position of the chassis.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Procedure

Step 1 Place the right front air deflector flush against the right side of the chassis (see Diagram 1 of the figure below).

Step 2 Align the screw holes on the right front air deflector with the screw holes on the right side of the chassis.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

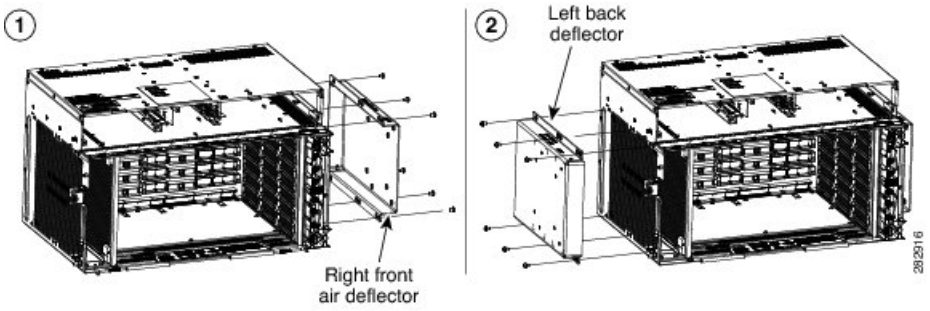
Step 4 Place the left back air deflector flush against the chassis as shown in Diagram 2 of the figure below.

Do not mount the left back deflector (exhaust air deflector), if these cards are to be installed in the NCS 2006 shelf:

- 100G-LC-C, 10x10G-LC, or CFP-LC
- EDRA1-26, EDRA1-35, EDRA2-26, or EDRA2-35

Use the standard brackets directly to mount the NCS 2006 shelf.

Figure 129: Mounting the Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for ETSI Rack Configuration



Step 5 Align the screw holes of the left back air deflector with the screw holes on the left side of the chassis.

Step 6 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 7 Place the mounting bracket flush in the middle position (see Diagram 1 of the figure below) or the front position (see Diagram 3 of the figure below) against the right side of the chassis.

Step 8 Align the screw holes on the mounting bracket with the screw holes on the left side of the chassis.

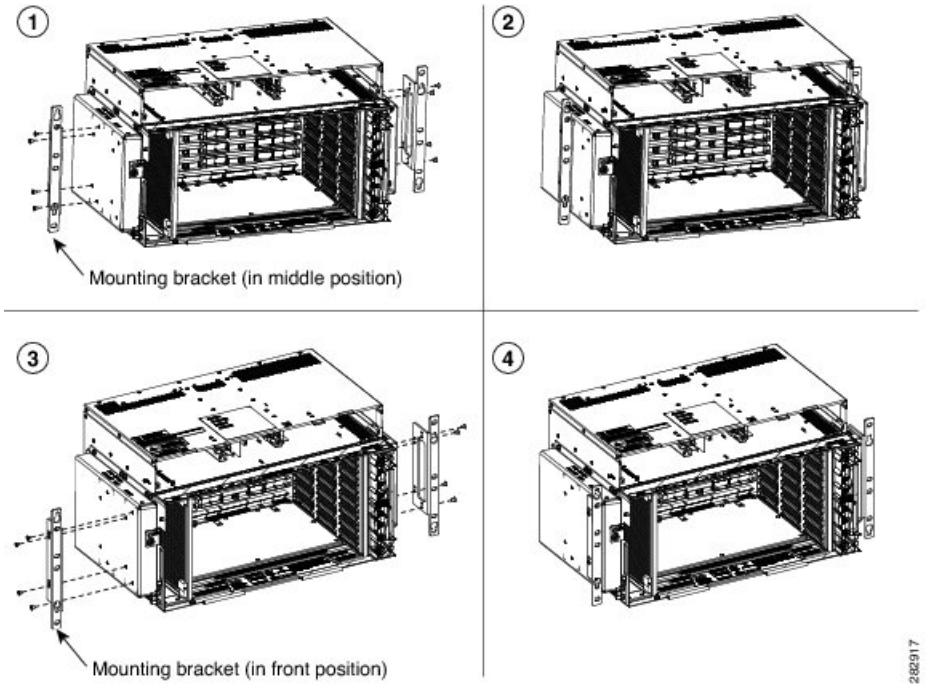
Step 9 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 10 Place the mounting bracket flush in the middle position (see Diagram 1 of the figure below) or the front position (see Diagram 3 of the figure below) against the left side of the chassis.

Step 11 Align the screw holes on the mounting bracket with the screw holes on the left side of the chassis.

Step 12 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Figure 130: Mounting the Bracket with Air Deflectors (Front-to-Back) on the NCS 2006 Shelf for ETSI Rack Configuration



Step 13 Return to your originating procedure (NTP).

DLP-L8 Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration

Purpose	This task installs the bracket with air deflectors (front-to-top) on the NCS 2006 shelf for ETSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Note The front-to-top air deflector configuration must be used only for the bottom most chassis in the rack.

Note Do not install a fan tray (exhaust) side deflector on a chassis that is installed above a chassis with a front-to-top air deflector configuration.

Note The front-to-top deflector configuration can be operated at a maximum of 50C at 1800 m altitude. Only ROADM cards can be installed for this configuration.

Note It is recommended to maintain a space of one RU between two chassis in a rack for cable management.

Note Hot and cold aisle airflow management must be planned for the installation.

Procedure

Step 1 To install the mounting bracket with air deflectors (front-to-top) in the front position, perform Step 3 through Step 11.

Step 2 To install the mounting bracket with air deflectors (front-to-top) in the middle position, perform Step 12 through Step 23.

Step 3 Place the right front air deflector flush against the right side of the chassis (see Diagram 1 of Figure 131: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration- Front Position, on page 176).

Step 4 Align the screw holes on the right front air deflector with the screw holes on right side of the chassis.

Step 5 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 6 Place a mounting bracket flush against the left and right side of the chassis (see Diagram 2 of Figure 131: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration- Front Position, on page 176).

Step 7 Align the screw holes on the mounting bracket with the screw holes on the side of the chassis.

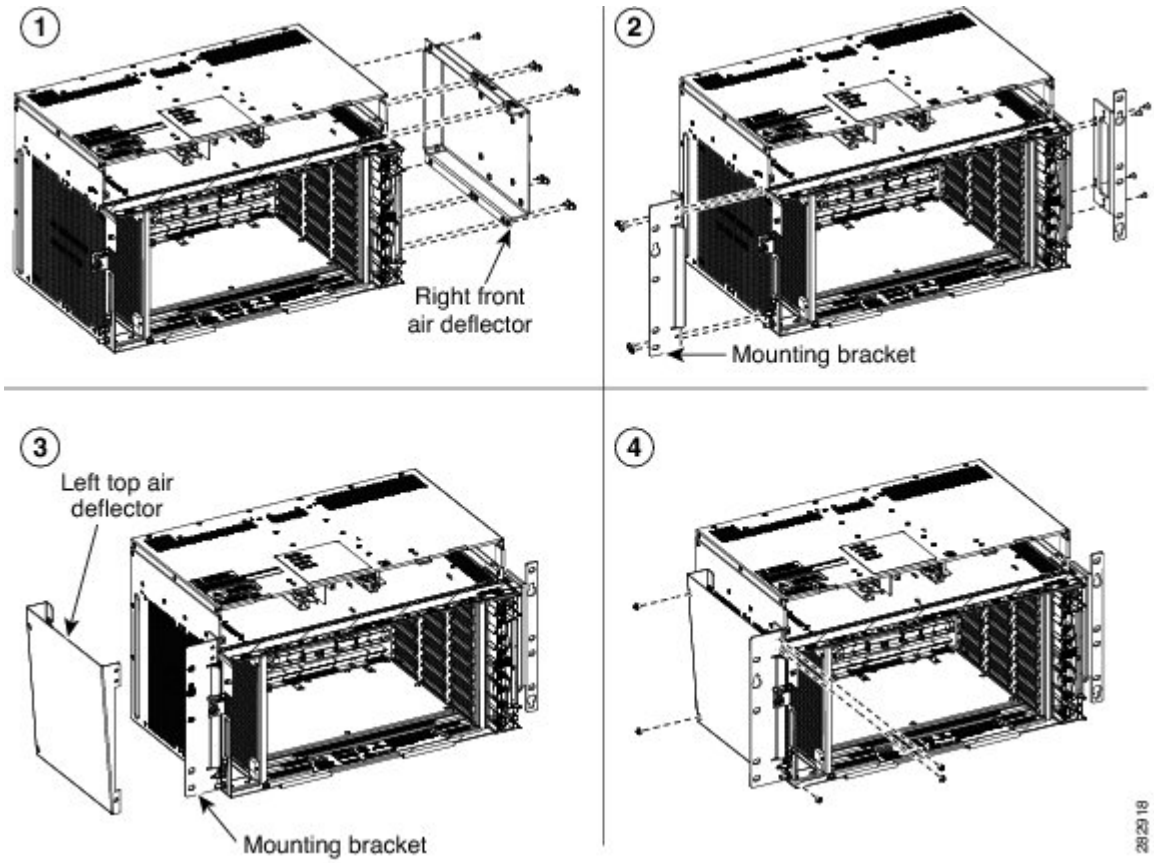
Step 8 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 9 Place the left top air deflector flush against the chassis as shown in Diagram 3 of Figure 131: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration- Front Position, on page 176.

Step 10 Align the screw holes with the screw holes of the left top air deflector and the chassis (see Diagram 4 of Figure 131: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration- Front Position, on page 176).

Step 11 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See Diagram 4 of Figure 131: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration- Front Position, on page 176.

Figure 131: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 Shelf for ETSI Rack Configuration- Front Position



Step 12 Place the right front air deflector flush against the right side of the chassis (see Diagram 1 of Figure 132: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 M6 Shelf for ETSI Rack Configuration - Middle Position , on page 177).

Step 13 Align the screw holes on the right front air deflector with the screw holes on the right side of the chassis.

Step 14 Insert M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 15 Place the mounting bracket flush in the middle position on the right front air deflector (see Diagram 2 of Figure 132: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 M6 Shelf for ETSI Rack Configuration - Middle Position , on page 177).

Step 16 Align the screw holes on the mounting bracket with the screw holes on the right front air deflector .

Step 17 Insert M4 flat-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 18 Place the left top air deflector flush against the left side chassis as shown in Diagram 3 of Figure 132: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 M6 Shelf for ETSI Rack Configuration - Middle Position , on page 177.

Step 19 Align the screw holes on the left top air deflector with the screw holes on the left side of the chassis.

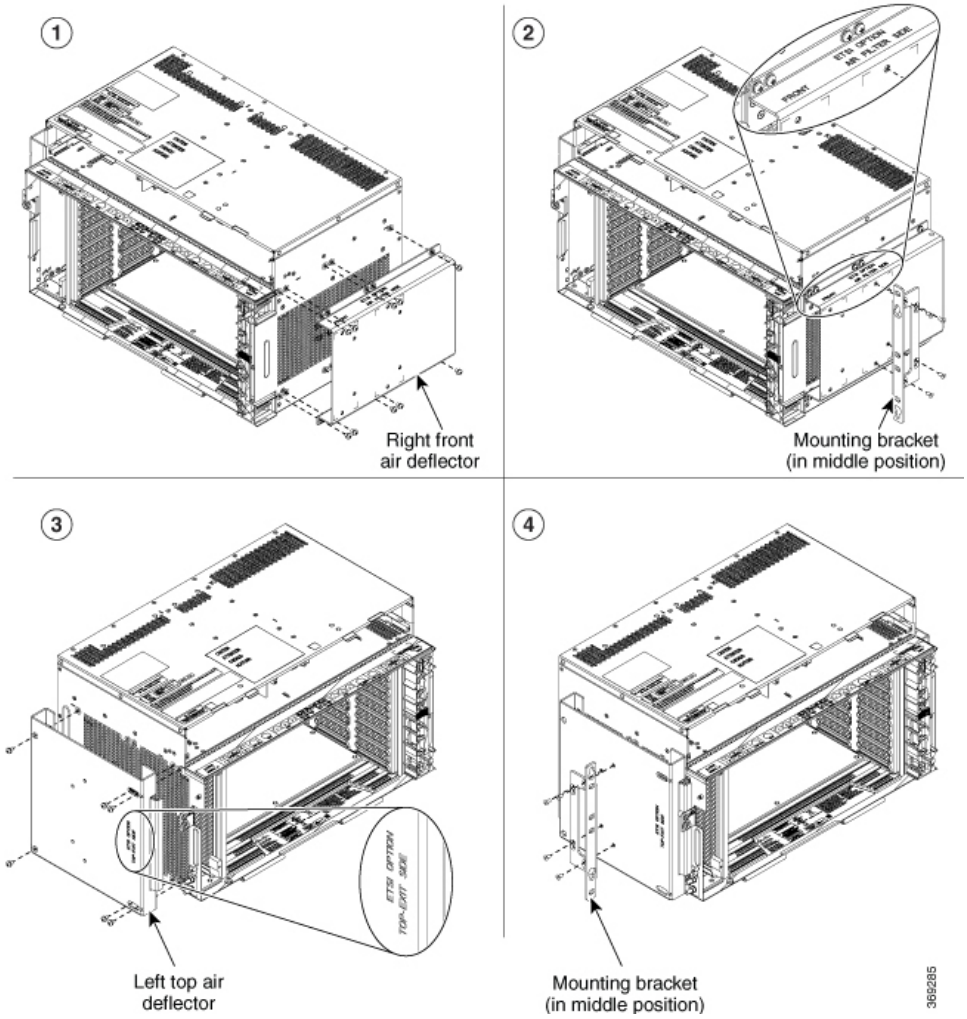
Step 20 Insert M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 21 Place the mounting bracket flush in the middle position on the left top air deflector (see Diagram 4 ofFigure 132: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 M6 Shelf for ETSI Rack Configuration - Middle Position , on page 177).

Step 22 Align the screw holes on the mounting bracket with the screw holes on the left top air deflector.

Step 23 Insert M4 flat-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Figure 132: Mounting the Bracket with Air Deflectors (Front-to-Top) on the NCS 2006 M6 Shelf for ETSI Rack Configuration - Middle Position



Step 24 Return to your originating procedure. (NTP).

DLP- L81 Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration

Purpose	This task installs the bracket with air deflectors (front-to-side) on the NCS2006 shelf for ETSI rack configuration.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the NCS 2006 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

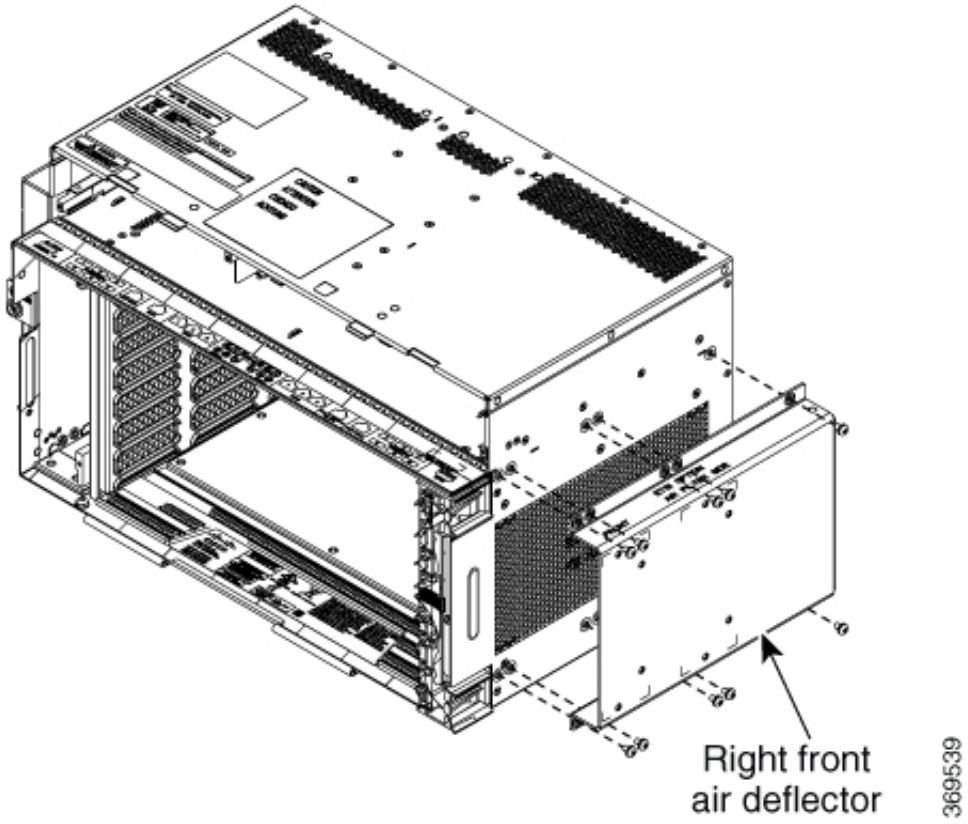
Note It is recommended to maintain a space of one RU between two chassis in a rack for cable management

Note Hot and cold aisle airflow management must be planned for the installation.

Procedure

Step 1 Place the right front air deflector flush against the right side of the chassis (see diagram below).

Figure 133: Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration



Step 2 Align the screw holes on the right front air deflector with the screw holes on the right side of the chassis.

Step 3 Insert M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 4 Place the mounting bracket flush in the middle or front position of the right front air deflector (see Diagram 1 of Figure 134: Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration - Middle Position, on page 180 or Figure 135: Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration - Front Position, on page 180).

Step 5 Align the screw holes on the mounting bracket with the screw holes on the right front air deflector .

Step 6 Insert M4 flat-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 7 Place the mounting bracket flush in the middle or front position on the left side of the chassis (see Diagram 2 of Figure 134: Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration - Middle Position, on page 180 or Figure 135: Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration - Front Position, on page 180).

Step 8 Align the screw holes on the mounting bracket with the screw holes on the left side of the chassis.

Step 9 Insert M4 pan-head screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Figure 134: Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration - Middle Position

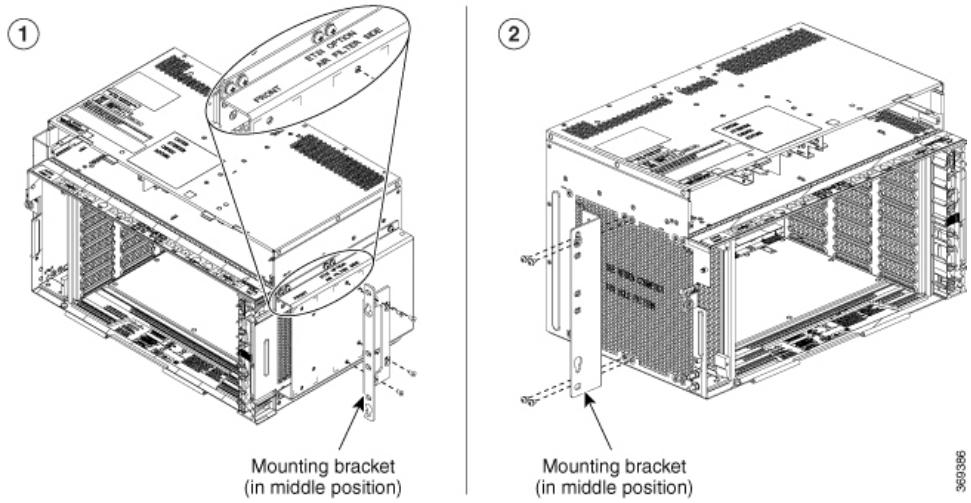
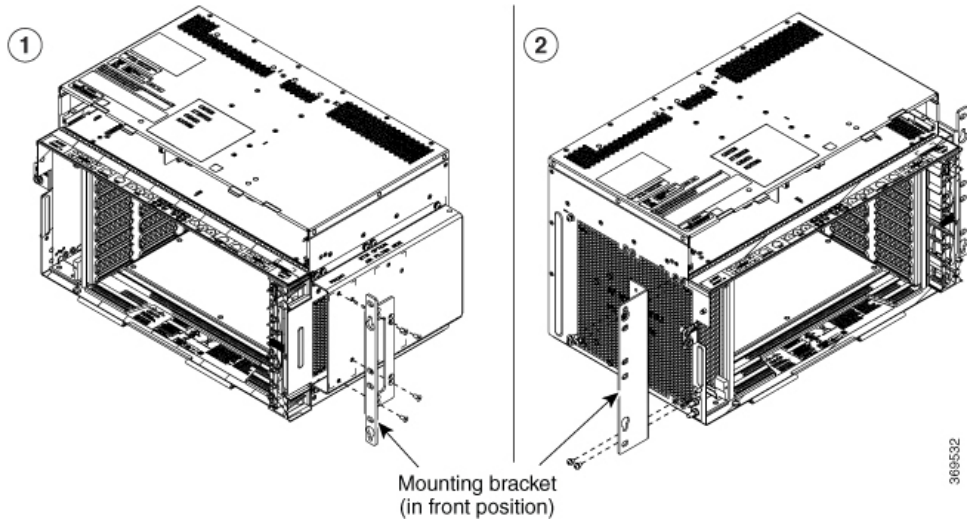
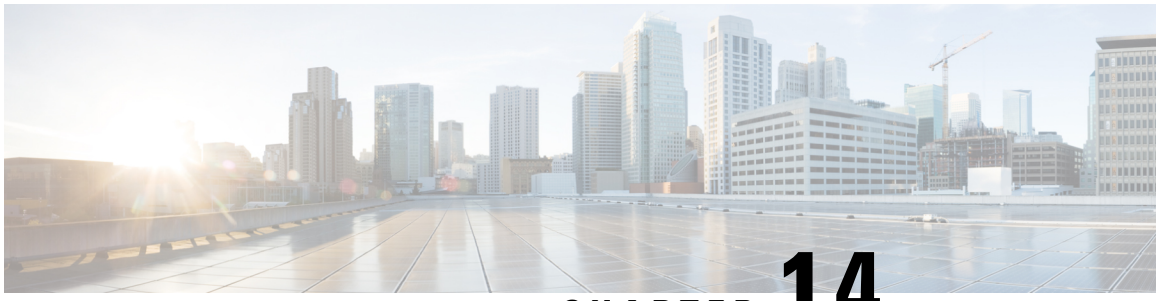


Figure 135: Mounting the Bracket with Air Deflectors (Front-to-Side) on the NCS 2006 Shelf for ETSI Rack Configuration - Front Position



Step 10 Return to your originating procedure (NTP).



CHAPTER 14

Mounting the Cisco NCS 2006 Shelf

This chapter explains how to mount the Cisco NCS 2006 shelf.

The sections are:

- ANSI Rack Installation, on page 181
- ETSI Rack Installation, on page 183
- NTP-L3 Mounting the NCS 2006 Shelf, on page 184

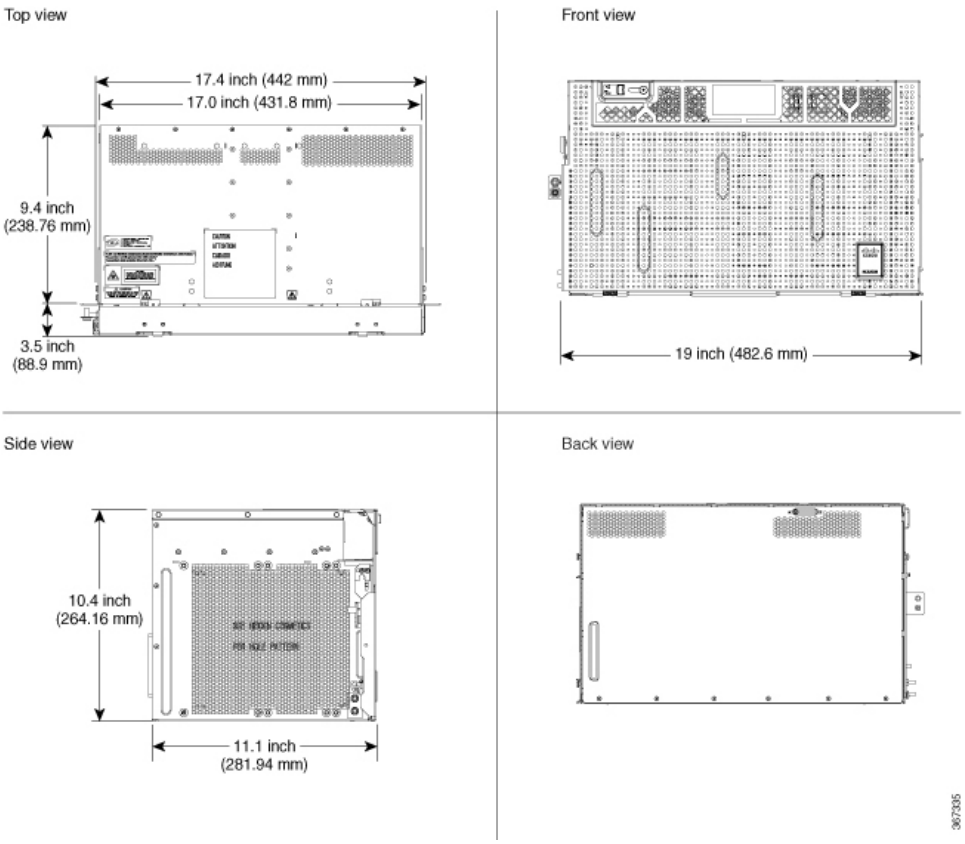
ANSI Rack Installation

The NCS 2006 shelf is mounted on a 19-inch (482.6-mm) or 23-inch (584.2-mm) equipment rack. Make sure that the correct type of 19-inch ANSI rack is used for mounting the NCS 2006 shelf. If the shelf is mounted in the front position, then it projects 1.7 inches (43.18 mm) from the front of the rack. If the shelf is mounted in the middle position, then it projects 5.1 inches (129.54 mm) from the front of the rack. The shelf mounts in both Electronic Industries Alliance (EIA) standard and Telcordia-standard racks. The shelf is a total of 17 inches (431.8 mm) wide with no mounting ears attached. Ring runs are not provided by Cisco and might hinder side-by-side installation of shelves where space is limited.

The NCS 2006 shelf measures 10.4 inches (264.16 mm) high, 19 or 23 inches (482.6 or 584.2 mm) wide (depending on which way the mounting ears are attached), and 11.1 inches (304.8 mm) deep. You can install up to seven NCS 2006 shelves in a 7-foot (2133.6 mm) equipment rack.

The figure below shows the dimensions of the NCS 2006 shelf on a 19-inch (482.6 mm) ANSI rack configuration with brackets mounted in the front position.

Figure 136: Cisco NCS 2006 Shelf Dimensions for a 19-inch ANSI Rack Configuration



Mounting a Single Shelf

Mounting the NCS 2006 shelf on a rack requires a minimum of 10.4-inches (265 mm) of vertical rack space. To ensure that the mounting is secure, use two to three #12-24 mounting screws for each side of the shelf. For an ANSI rack, the brackets can be mounted in the front or middle position.

If the NCS 2006 shelf is fully loaded, then two people should install it. However, it is possible for one person to install an empty shelf. The shelf should be empty for easier lifting.

Mounting Multiple Nodes

Most standard (Telcordia GR-63-CORE, 19-inch (482.6-mm) or 23-inch (584.2-mm) 7-foot (2.133-m) racks can hold seven NCS 2006 shelves and a fuse and alarm panel. However, unequal flange racks are limited to six NCS 2006 shelves and a fuse and alarm panel, or seven NCS 2006 shelves using a fuse and alarm panel from an adjacent rack. In an ANSI shelf, the brackets can be mounted in the front or middle position.

The NCS 2006 shelves can be mounted above each other without any space between the shelves. This method of mounting does not restrict the air flow because the air vents are on either sides of the NCS 2006 shelves.

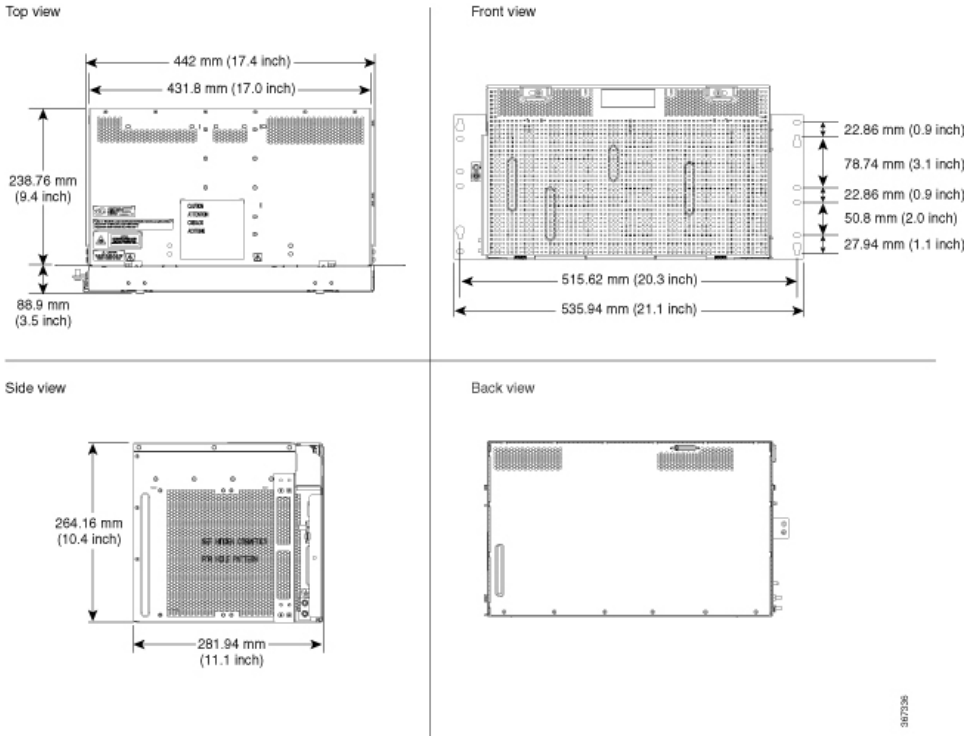
ETSI Rack Installation

The NCS 2006 shelf is mounted on a 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) ETSI standard equipment rack. In an ETSI rack, the shelf can be mounted only in the front position. The shelf projects 1.7 inch (43.18 mm) from the front of the rack and is a total of 431.8 mm (17 inch) wide with no mounting ears attached. Cisco does not provide ring runs, which might hinder side-by-side installation of shelves where space is limited.

The NCS 2006 shelf measures 264.16 mm (10.4 inches) high, 535 mm (21.06 inches) wide, and 304.8 mm (11.1 inches) deep. You can install up to seven NCS 2006 shelves in a 7-foot (2133.6-mm) equipment rack.

The figure below provides the dimensions of the NCS 2006 shelf installed on a 600 x 600-mm (23.6 x 23.6-inch) ETSI standard equipment rack.

Figure 137: Cisco NCS 2006 Shelf Dimensions for an ETSI Rack Configuration



Caution The standard ETSI racks can hold seven NCS 2006 shelves. When mounting a shelf in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Mounting a Single Node

The NCS 2006 requires 264.16 mm (10.4-inches) minimum of vertical rack space. To ensure the mounting is secure, use two to three mounting screws for each side of the shelf. A shelf should be mounted at the bottom of the rack if it is the only unit in the rack.

In an ETSI rack, the brackets are mounted only in the front position.

If the NCS 2006 shelf is fully loaded, then two people should install it. However, it is possible for one person to install an empty shelf. The shelf should be empty for easier lifting. For information on the NCS 2006 shelf weight, see the "A.3.14 Dimensions" section on page A-14.

NTP-L3 Mounting the NCS 2006 Shelf

Purpose	This procedure helps in mounting the NCS 2006 shelf.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• Medium slot-head screwdriver
	• Small slot-head screwdriver
	• ETSI only:
	  • Six M6 x 20 pan-head Phillips mounting screws
	• ANSI only:
	  • Six #12-24 x 3/4 pan-head Phillips mounting screws

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26 NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None



Warning **Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.** Statement 1048



Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 40A and between -40.5 VDC to -57.6 VDC.** Statement 1005



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005



Warning **To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 131°F (55°C).** Statement 1047



Warning **Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018



Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006



Warning **To prevent airflow restriction, allow clearance around the ventilation openings to be at least:1 inch (25.4 mm).** Statement 1076



Note Make sure that the correct type of 19-inch ANSI rack is used for mounting the NCS 2006 shelf.



Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, a shielded cable must be used to connect to the EMS port. This cable must be less than 30 meters in length and not placed in the 3 meter boundary, as defined in EN50121-4:2006, Table 2, note 1.** Statement 8010

Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, DC power cables must be less than 30 meter long.** Statement 8011

Note During installation, do not use the door to handle the chassis.

Note Remove the door from the NCS 2006 shelf and reinstall it after installing all the other modules.

Procedure

Complete the necessary task as applicable:

- DLP-L9 Mounting the NCS 2006 Shelf on a Rack (One Person) , on page 186
- DLP-L10 Mounting the NCS 2006 Shelf on a Rack (Two People) , on page 188
- DLP-L11 Mounting Multiple NCS 2006 Shelves on a Rack , on page 189

Stop. You have completed this procedure.

DLP-L9 Mounting the NCS 2006 Shelf on a Rack (One Person)

Purpose	This task allows one person to mount the shelf on a rack. **Note** When the chassis is installed in the middle position, in an ETSI rack, the cabinet doors must be kept open (if present).
Tools/Equipment	• # 2 Phillips Dynamometric screwdriver • ANSI —Six #12-24 x ¾ pan-head Phillips mounting screws • ETSI—Six M6 mounting screws
Prerequisite Procedures	NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note The NCS 2006 requires a minimum of six RU of vertical rack space. To ensure that the mounting is secure, use two to three M6 mounting screws on each side of the shelf. A shelf should be mounted at the bottom of the rack if it is the only unit in the rack.

Procedure

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel is not present, you must install one according to manufacturer instructions:

- For a DC power supply, the fuse rating must not exceed 40A.
- For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

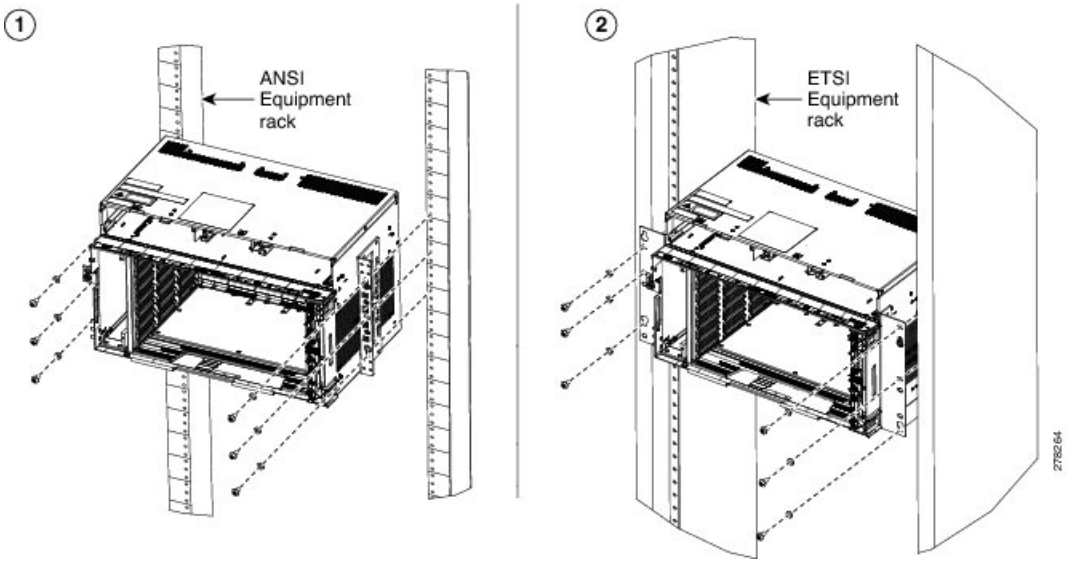
Step 2 Ensure that the shelf is mounted on the appropriate rack equipment:

- 23-inches (584.2 mm) or 19-inches (482.6 mm) for racks.
- 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) for ETSI racks.

Diagram 1 of the figure below shows the NCS 2006 shelf mounted on an rack in the middle position using 19-inch mounting brackets.

Diagram 2 of the figure below shows the NCS 2006 shelf mounted on an ETSI rack in the front position.

Figure 138: Mounting an NCS 2006 on a Rack



Step 3 Lift the shelf to the desired position in the rack. If the rack is empty, place the shelf at the bottom of the rack. The placement of the shelf is dependent on where you want to install the new equipment in the rack.

Note

To ensure proper cooling of the NCS 2006 shelf, make sure that the space in front of the air flow vents are free of cables, fibers, and mechanical fixtures for fiber and cable management.

Step 4 Align the screw holes on the mounting brackets with the mounting holes in the rack.

Step 5 Using the Phillips Dynamometric screwdriver, install one mounting screw in each side of the assembly. Tighten the screw to a torque value of 22 in-lb (2.5 N-m).

Step 6 When the shelf is secured to the rack, install the remaining two mounting screws on either sides.

Note
Use at least one set of the horizontal screw slots on the shelf to prevent slippage.

Step 7 Return to your originating procedure (NTP).

DLP-L10 Mounting the NCS 2006 Shelf on a Rack (Two People)

Purpose	This task allows two people to mount the shelf on a rack. **Note** When the chassis is installed in the middle position, in an ETSI rack, the cabinet doors must be kept open (if present).

Tools/Equipment	• # 2 Phillips Dynamometric screwdriver
	• ETSI only:
	  • Six M6 x 20 pan-head Phillips mounting screws
	• only:
	  • Six #12-24 x 3/4 pan-head Phillips mounting screws

Prerequisite Procedures	NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note The NCS 2006 shelf requires a minimum of six RU of vertical rack space. To ensure that the mounting is secure, use two to three M6 mounting screws on each side of the shelf. A shelf should be mounted at the bottom of the rack if it is the only unit in the rack.

Procedure

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel is not present, you must install one as per the instructions of the manufacturer:

- For a a DC power supply, the fuse rating must not exceed 40A.
- For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

Step 2 Ensure that the shelf is mounted on the appropriate rack equipment:

- 23-inches (584.2 mm) or 19-inches (482.6 mm) for racks.
- 600 x 600-mm (23.6 x 23.6-inch) or 600 x 300-mm (23.6 x 11.8-inch) for ETSI racks.

Step 3 Lift the shelf to the desired position in the rack. If the rack is empty, place the shelf at the bottom of the rack. The placement of the shelf is dependent on where you want to install the new equipment in the rack.

Note
To ensure proper cooling of the NCS 2006 shelf, make sure that the space in front of the air flow vents are free of cables, fibers, and mechanical fixtures for fiber and cable management.

Step 4 Align the screw holes on the mounting brackets with the mounting holes in the rack.

Step 5 Have one person hold the shelf in place while the other person uses the Phillips Dynamometric screwdriver to install one mounting screw in each side of the assembly. Tighten the screw to a torque value of 22 in-lb (2.5 N-m).

Step 6 When the shelf is secured to the rack, install the remaining mounting screws.

Note
Use at least one set of the horizontal screw slots on the shelf to prevent slippage.

Step 7 Return to your originating procedure (NTP).

DLP-L11 Mounting Multiple NCS 2006 Shelves on a Rack

Purpose	This task installs multiple shelves in a rack.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• ETSI only:
	  • Six M6 x 20 pan-head Phillips mounting screws, per shelf
	• only:
	  • Six #12-24 x 3/4 pan-head Phillips mounting screws, per shelf

Prerequisite Procedures	NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note A standard rack can hold six or seven NCS 2006 shelves. When mounting a shelf in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Note The NCS 2006 shelf requires a minimum of six RU of vertical rack space.

Procedure

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel is not present, you must install one according to manufacturer's instructions:

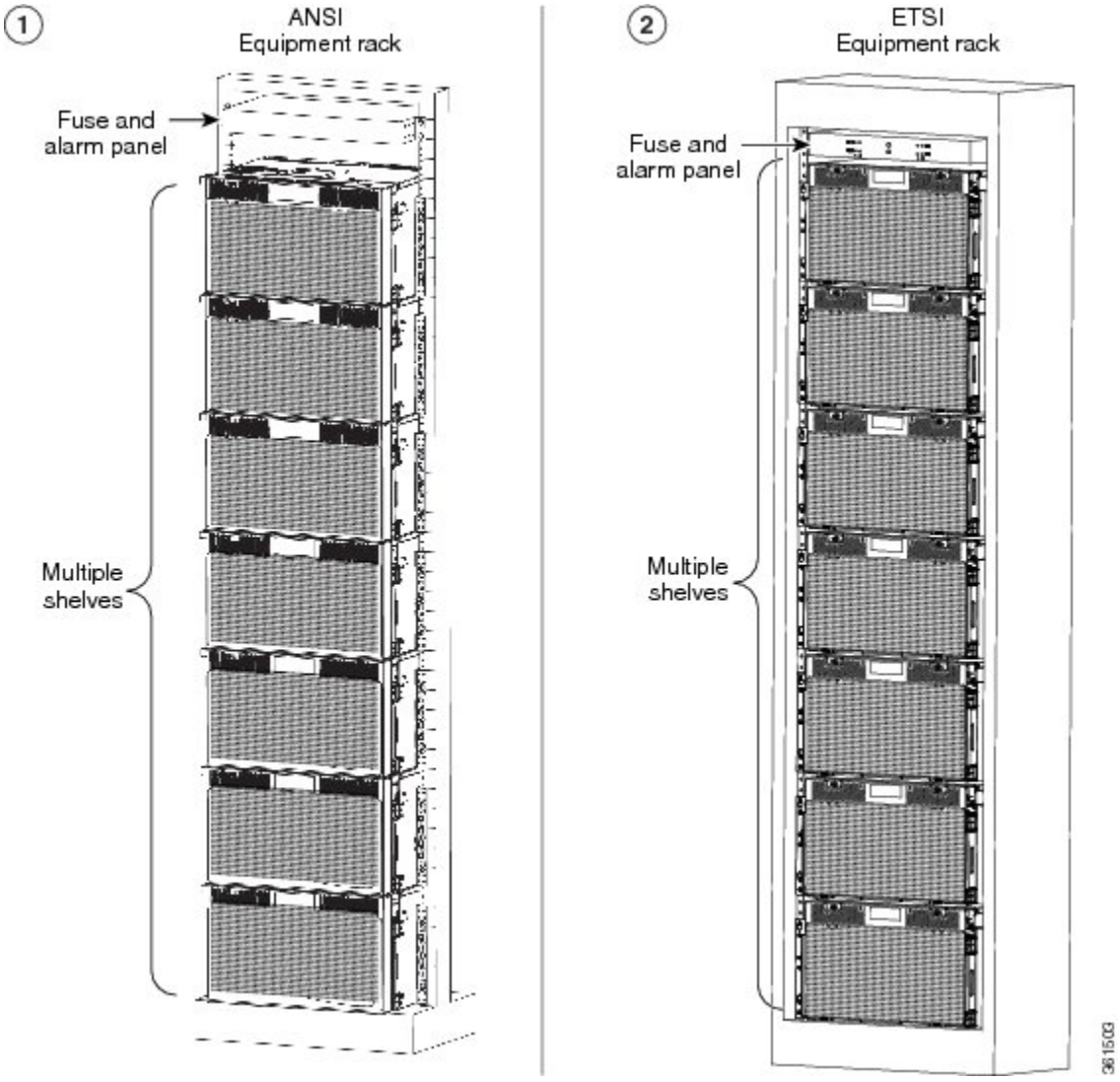
- For a DC power supply, the fuse rating must not exceed 40A.
- For AC power supply, the fuse rating must not exceed 20A.

Step 2 Mount the first shelf in the bottom of the rack usingDLP-L9 Mounting the NCS 2006 Shelf on a Rack (One Person) , on page 186 or DLP-L10 Mounting the NCS 2006 Shelf on a Rack (Two People) , on page 188.

Diagram 1 of the figure below shows multiple NCS 2006 shelf assemblies mounted on the rack.

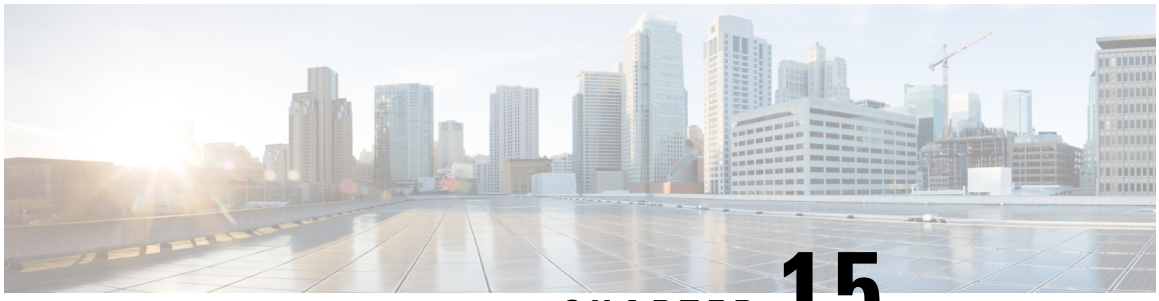
Diagram 2 of the figure below shows multiple NCS 2006 shelf assemblies mounted on the ETSI rack.

Figure 139: Multiple NCS 2006 Shelves Mounted on the Rack



Step 3 Repeat Step 2 for every shelf you need to install.

Step 4 Return to your originating procedure (NTP).



CHAPTER 15

Connecting Power and Ground

This chapter explains how to connect the power and ground for NCS 2006 shelf.

The sections are:

- Power and Ground Description, on page 193
- NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194

Power and Ground Description

Ground the equipment according to Telcordia standards or local practices. The following sections describe power and ground for the NCS 2006 shelves.

Note For detailed instructions on grounding the NCS 2006 chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

ANSI Power and Ground

The NCS 2006 has redundant AC and DC power modules.

For redundant AC power feeds, install both the AC power modules and use the two power cables (right and left cables) shipped with the NCS 2006 and one ground cable. For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes. The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries. This product is intended for use on the TN and TT power systems.

For redundant DC power feeds, install both the DC power modules and use four power cables and one ground cable. For a single power feed, only two power cables (#8 AWG or larger, copper conductor, 194 degrees F [90 degrees C] minimum) and one ground cable (#6 AWG or larger) are required. Use a conductor with low impedance to ensure circuit overcurrent protection. However, the conductor must have the capability to safely conduct any faulty current that might be imposed. See DC Power Specifications, on page 429 for the fuse ratings applicable for different DC power modules.

The DC power modules have –48 VDC or –60 VDC #8 dual-hole lug power terminals for. The terminals are labeled RET and –48 V or –60 V on the DC power modules.

Note When the NCS 2006 shelf is powered at –60 VDC (nominal), only the TNC, OPT-AMP-C, OPT-AMP-17-C, OPT-EDFA-17, and OPT-EDFA-24 cards, and the NCS2006-ECU-60 can be installed.

We recommend the following wiring conventions, but customer conventions prevail:

- Red wire for battery connections (–48 VDC or –60 VDC).
- Black wire for battery return connections (RET).
- The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE, Issue 6.

The ground lug must be a dual-hole type, UL Listed, CSA certified and rated to accept the #6 AWG cable. Two ground posts with two M5 nuts are provided on the NCS 2006 to accommodate the dual-hole lug.

Note Only use the power cables shipped with the NCS 2006 shelf.

ETSI Power and Ground

The NCS 2006 for ETSI has –48 VDC or –60 VDC power connectors (DSUB for DC power module) on the DC power module. For redundant DC power feeds, install both the DC power modules and use the two power cables shipped with the NCS 2006 and one ground cable. For a a DC power supply, the fuse rating must not exceed 40A.

For redundant AC power feeds, install both the AC power modules and use the two power cables (right and left cables) shipped with the NCS 2006 and one ground cable. For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes. The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries. This product is intended for use on the TN and TT power systems.

Caution Only use the power cables shipped with the NCS 2006 shelf.

NTP-L12 Installing Power and Ground to the NCS 2006 Shelf

Purpose	This procedure installs power feeds and grounds the NCS 2006 system.

Tools/Equipment	and ETSI: • #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws • Ground cable 13.3-mm² (#6 AWG) stranded • Listed pressure dual-holes lugs suitable for #8 AWG copper conductors • Wire cutters • Wire strippers • Crimp tool • Fuse panel only: • Power cable (from fuse and alarm panel to assembly), #8 AWG, copper conductors, 194 degrees F [90 degrees C]) • Wire wrapper ETSI only: • Power cable (from fuse panel to power modules), shipped with the NCS 2006 • Two-hole grounding lug, shipped with the NCS 2006
Prerequisite Procedures	• NTP-L9 Installing the Power Modules in the NCS 2006 Shelf , on page 263. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389

Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390



Warning **Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, power modules, and faceplates are in place.** Statement 261



Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 1024



Warning **Never install an AC power module and a DC power module in the same chassis.** Statement 1050



Warning **When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.** Statement 1002



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



Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units.** Statement 246



Warning **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.** Statement 39



Warning **Use copper conductors only.** Statement 1025



Warning **Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950-1 based safety standards.** Statement 1033



Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 40A and between -40.5 VDC to -57.6 VDC.** Statement 1005



Note For nominal voltage of –60 VDC, the input voltage range is from -50 to -72 VDC.



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005



Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022



Warning **This unit might have more than one power supply connection; all connections must be removed to de-energize the unit.** Statement 1028



Caution Always use the supplied ESD wristband when working with a powered NCS 2006. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

Procedure

Step 1 Verify that the correct fuse and alarm panel is installed in the top mounting space:

- For a a DC power supply, the fuse rating must not exceed 40A.
- For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

Step 2 Depending on the shelf and the power module installed, complete the necessary task:

Step 3 Connect the office ground to the NCS 2006 shelf. For detailed instructions on grounding, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

Step 4 Complete the DLP-L22 Turning On and Verifying DC Office Power on the NCS 2006 Shelf, on page 210.

Step 5 Continue with the NTP-L11 Installing the Fan-Tray Assembly in the NCS 2006 Shelf, on page 274.

Stop. You have completed this procedure.

DLP-L18 Connecting Office Power (AC) to the NCS 2006 Shelf

Purpose	This task connects AC power to the NCS 2006 shelf.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Fuse panel • Ground cable 13.3-mm² (#6 AWG) stranded.
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note This product is intended for use on the TN and TT power systems.

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **This equipment shall be connected to AC mains provided with a surge protective device (SPD) at the service equipment complying with NFPA 70, the National Electrical Code (NEC).** Statement 7012

Caution The NCS 2006 relies on the protective devices in the building installation to protect against short circuit, overcurrent and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note Not more than 7 feet (2 m) of the power supply cable should be exposed between the equipment and the fiber storage tray.

Caution When terminating the frame ground, do not use soldering lug connectors, screwless (push-in) connectors, quick connect connectors, or other friction-fit connectors.

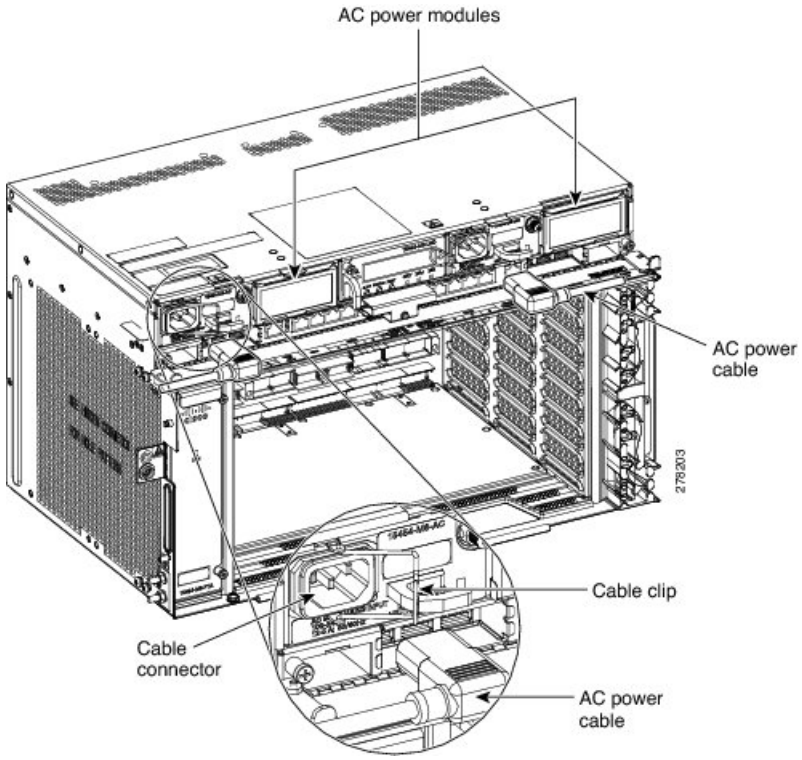
Note If the system loses power or if both the TNC, TNCE, TSC, or TSCE cards are reset, you must reset the NCS 2006 clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see the "NTP-G24 Set Up Name, Date, Time, and Contact Information" procedure of the "Turn Up a Node" chapter in the *Cisco NCS 2000 Series Network Configuration Guide* .

Procedure

Step 1 Verify that the AC power module is installed in Slot A or Slot B (or both) of the NCS 2006.

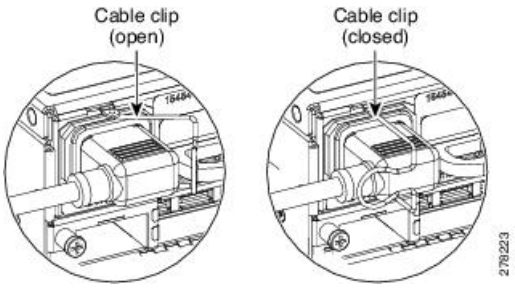
Step 2 Attach the AC power cable to the cable connector in the AC power module (see the figure below).

Figure 140: Connecting Office Power—AC Power Modules



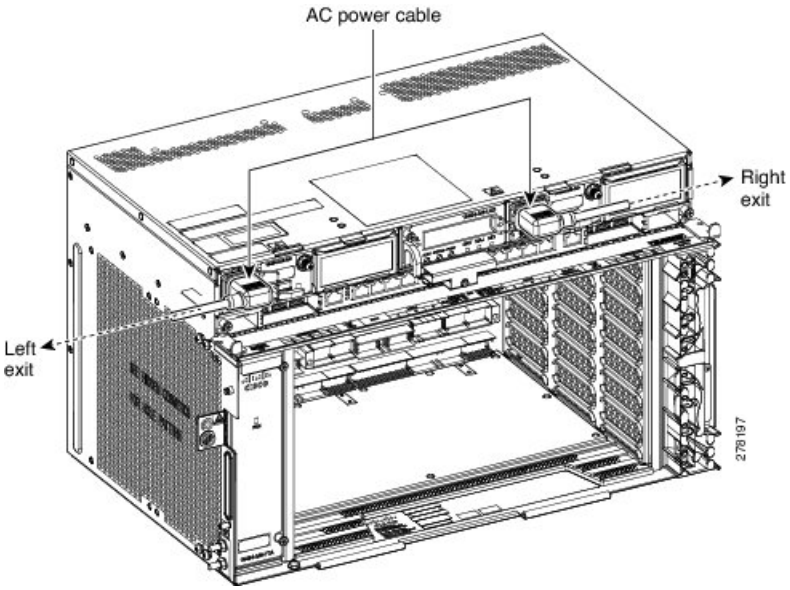
Step 3 Close the cable clip to secure the power cable (see the figure below).

Figure 141: Cable Clip to Secure the Power Cable



Note
For Slot A power module, the power cable exits from the left side. For Slot B power module, the power cable exits from the right side (see the figure below).

Figure 142: Power Cable Exit



Step 4 Connect the power cable to the fuse panel or power source.

Note
The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards in various countries.

Note
Turn on the power after installing the power cables.

Step 5 Return to your originating procedure (NTP).

Table 11: PIDs for AC Power Cables

Cable	PID
AC power cable - Japan left exit	15454-M-CBL-L-JPN=
AC power cable - Japan right exit	15454-M-CBL-R-JPN=
AC power cable - China left exit	15454-M-CBL-L-CHI=
AC power cable - China right exit	15454-M-CBL-R-CHI=
AC power cable - India left exit	15454-M-CBL-L-IND=
AC power cable - India right exit	15454-M-CBL-R-IND=
AC power cable - EU left exit	15454-M-CBL-L-EU=
AC power cable - EU right exit	15454-M-CBL-R-EU=
AC power cable - ARG left exit	15454-M-CBL-LARG=
AC power cable - ARG right exit	15454-M-CBL-RARG=

Cable	PID
AC power cable - AUS left exit	15454-M-CBL-LAUS=
AC power cable - AUS right exit	15454-M-CBL-RAUS=
AC power cable - UK left exit	15454-M-CBL-L-UK=
AC power cable - UK right exit	15454-M-CBL-R-UK=
AC power cable - KOR left exit	15454-M-CBL-LKOR=
AC power cable - KOR right exit	15454-M-CBL-RKOR=
AC2 power cable 110VAC left exit	15454-M-ACCBL2-L=
AC2 power cable 110VAC right exit	15454-M-ACCBL2-R=
AC2 power cable 220VAC left exit	15454-M-ACCBL2-L2=
AC2 power cable 220VAC right exit	15454-M-ACCBL2-R2=
AC power cable for data center left exit	15454-M-ACL6-L=
AC power cable for data center right exit	15454-M-ACL6-R=

DLP-L19 Connecting Office Power (DC) to the NCS 2006 Shelf (Only)

Purpose	This task connects DC power to the NCS 2006 (Only).
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Open-end wrench or hex tube screw driver • Fuse panel • Power cable (from fuse and alarm panel to assembly), #8 AWG, copper conductors, 194 degrees F (90 degrees C) • Ground cable #6 AWG stranded • Listed pressure dual-holes lugs suitable for #8 AWG copper conductors

Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning Statement 1046

Warning **Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place.** Statement 1075

Caution The NCS 2006 relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE Issue 5.

Note If the system loses power or both the TNC, TNCE, TSC, or TSCE cards are reset, and the system is not provisioned to get the time from a Network Time Protocol/Simple Network Time Protocol (NTP/SNTP) server, you must reset the NCS 2006 clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see the "NTP-G24 Set Up Name, Date, Time, and Contact Information" procedure of the "Turn Up a Node" chapter in the Cisco NCS 2002 and NCS 2006 Configuration Guide. If you are using the TNC, TNCE, TSC, or TSCE cards, the system clock will run for up to three hours. In this case, no action would be required.

Procedure

Step 1 Connect the return cables of the power supply to the Earth ground located at the power supply side.

Step 2 Connect the office power according to the fuse panel engineering specifications.

Step 3 Measure and cut the cables as needed to reach the NCS 2006 from the fuse panel.

Step 4 Address the power according to local site practice.

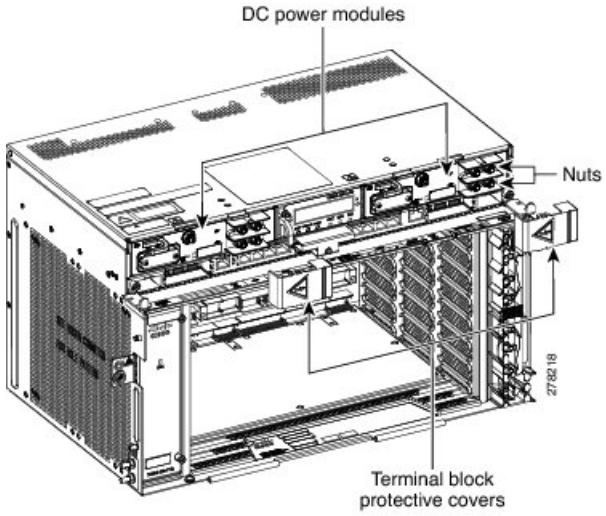
Step 5 Strip 1/2 inch (12.7 mm) of insulation from all power cables that you will use.

Step 6 Crimp the lugs onto the ends of all the power leads.

Step 7 Verify that the DC power module is installed in Slot A or Slot B (or both) of the NCS 2006 shelf.

Step 8 Remove the terminal block protective covers from the DC power modules (see the figure below).

Figure 143: Connecting Office Power—DC Power Modules (ANSI Only)

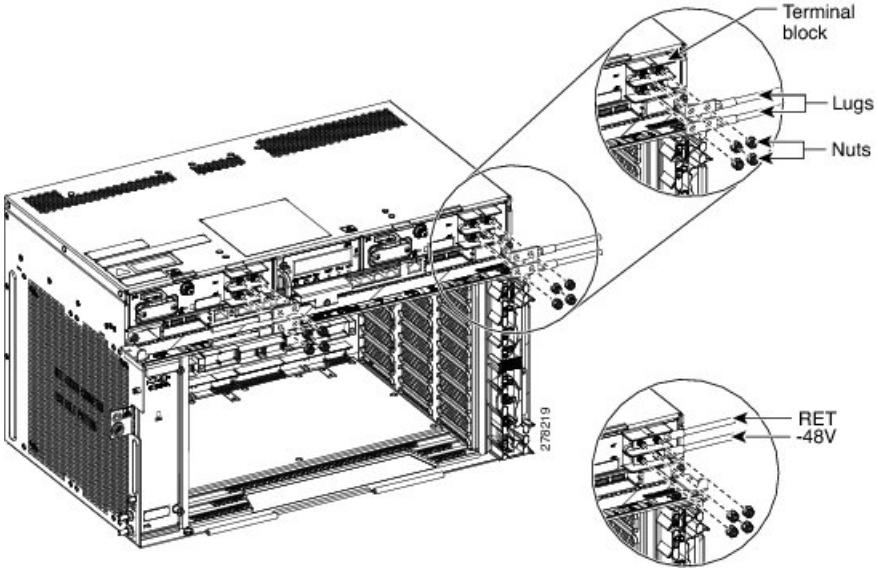


Step 9 Unscrew the nuts from the terminal block (see the figure below).

Step 10 Insert the lugs as shown in the figure below. The top cable is for RET and the bottom cable is for –48 V/–60 V.

Step 11 Insert the lock washers and nuts to the terminal block (see the figure below). Tighten the nuts to a torque value of 20 in-lb (2.25 N-m).

Figure 144: Connecting Office Power—DC Power Modules (ANSI Only)

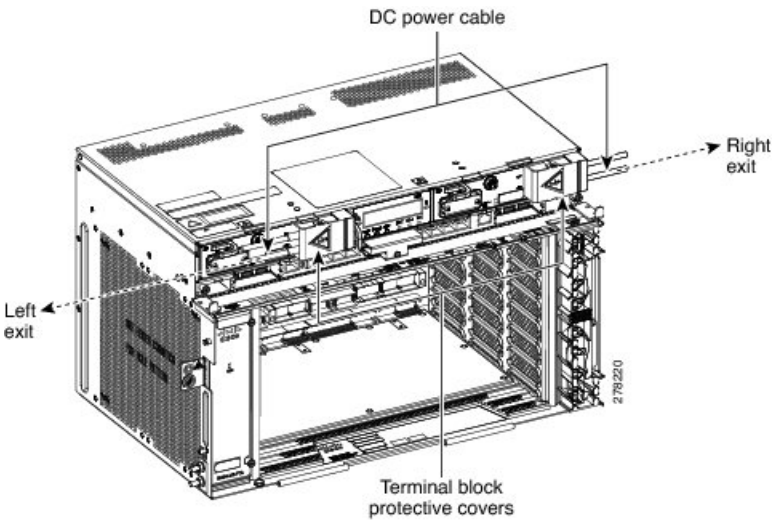


Step 12 Mount the terminal block protective covers on the DC power modules (see the figure below).

Note
For Slot A power module, the power cable exits from the left side. For Slot B power module, the power cable exits from the right side

Note
Use only pressure terminal connectors, such as ring and fork types, when terminating the battery, battery return, and frame ground conductors.

Figure 145: Connecting Office Power—DC Power Modules (ANSI Only)



Caution
Before you make any crimp connections, coat all bare conductors (battery, battery return, and frame ground) with an appropriate antioxidant compound. Bring all unplated connectors, braided strap, and bus bars to a bright finish, then coat with an antioxidant before you connect them. You do not need to prepare tinned,

solder-plated, or silver-plated connectors and other plated connection surfaces, but always keep them clean and free of contaminants.

Caution
When terminating power, return (RET), and frame ground, do not use soldering lug, screwless (push-in) connectors, quick-connect, or other friction-fit connectors.

Step 13 Return to your originating procedure (NTP).

DLP-L20 Connecting Office Power (DC) to the NCS 2006 Shelf (ETSI Only)

Purpose	This task connects power to the NCS 2006 shelf (ETSI Only).
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Fuse panel • Ground cable #6 AWG stranded. The PIDs of the power cables are listed in Table 12: PIDs for DC Power Cables, on page 208.
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place.** Statement 1075

Note The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE Issue 5.

Caution The NCS 2006 relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note If the system loses power or both TNC, TNCE, TSC, or TSCE cards are reset and the system is not provisioned to get the time from a Network Time Protocol/Simple Network Time Protocol (NTP/SNTP) server, you must reset the NCS2006 clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see the "NTP-G24 Set Up Name, Date, Time, and Contact Information" procedure of the "Turn Up a Node" chapter in the Cisco 2002 and Cisco 2006 Configuration Guide. If you are using the TNC, TNCE, TSC, or TSCE cards, the system clock will run for up to three hours. In this case, no action would be required.

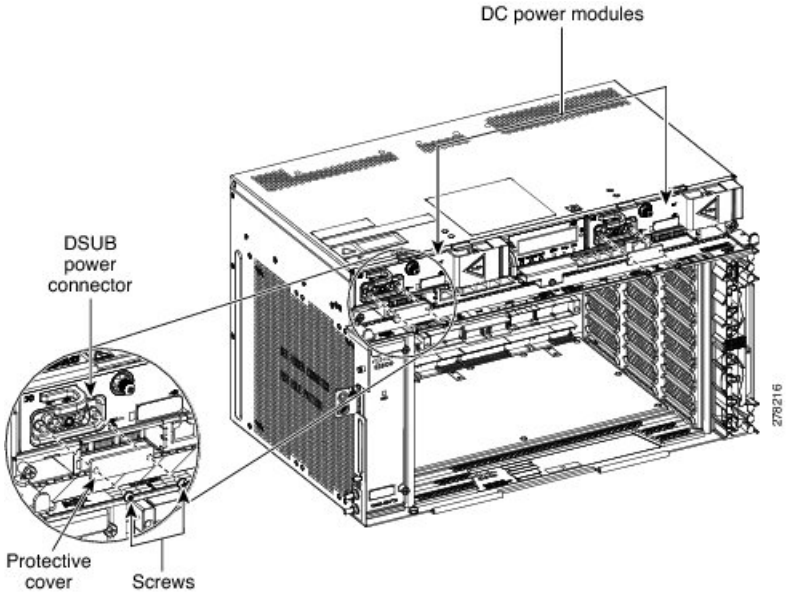
Procedure

Step 1 Connect the return cables of the power supply to the Earth ground located at the power supply side.

Step 2 Verify that the DC power module is installed in Slot A or Slot B (or both slots) of the NCS 2006.

Step 3 Unscrew the screws to a torque value of 4 in-lb (0.45 N-m) to remove the protective covers from the DSUB power connector of the DC power modules (see the figure below).

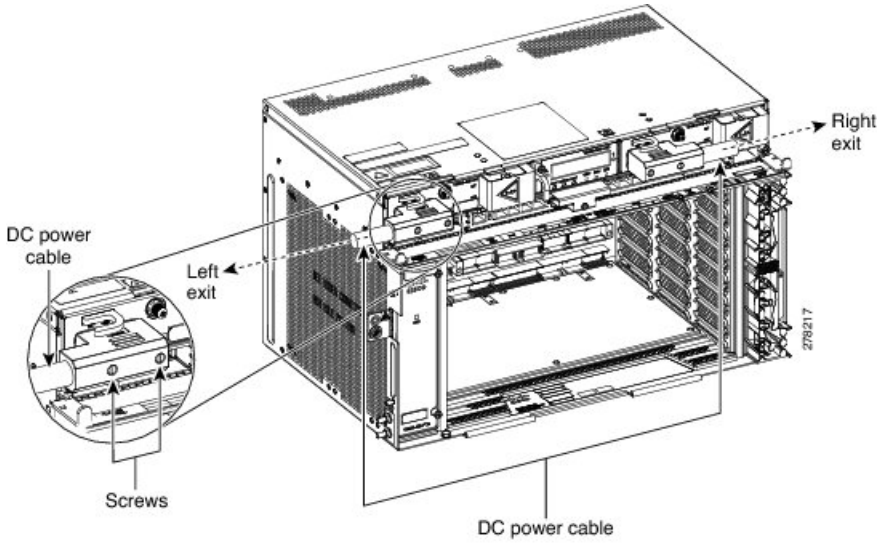
Figure 146: Connecting Office Power—DC Power Modules (ETSI Only)



Step 4 Attach the DC ETSI power cable to the cable connector in the DC power module (see the figure below).

Step 5 Tighten the screws to a torque value of 4 in-lb (0.45 N-m) to secure the cable (see the figure below).

Figure 147: Connecting Office Power—DC Power Modules (ETSI Only)



Note
For slot A power module, use the left power cable NCS2006-DCCBL2-L, and for slot B use the right power cable NCS2006-DCCBL2-R. For slot A power module, the power cable exits from the left side. For slot B power module, the power cable exits from the right side

Note
Use only pressure terminal connectors, such as ring and fork types, when terminating the battery, battery return, and frame ground conductors.

Caution
Before you make any crimp connections, coat all bare conductors (battery, battery return, and frame ground) with an appropriate antioxidant compound. Bring all unplated connectors, braided strap, and bus bars to a bright finish, then coat with an antioxidant before you connect them. You do not need to prepare tinned, solder-plated, or silver-plated connectors and other plated connection surfaces, but always keep them clean and free of contaminants.

Caution
When terminating power, return, and frame ground, do not use soldering lug, screwless (push-in) connectors, quick-connect, or other friction-fit connectors.

Step 6 Return to your originating procedure (NTP).

Table 12: PIDs for DC Power Cables

Cable	PID
DC power cable for ETSI left exit	NCS2006-DCCBL2-L=

Cable	PID
DC power cable for ETSI right exit	NCS2006-DCCBL2-R=

DLP-L21 Turning On and Verifying AC Office Power on the NCS 2006 Shelf

Purpose	This task turns on and verifies AC office power on the NCS 2006 shelf.
Tools/Equipment	Voltmeter
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • DLP-L18 Connecting Office Power (AC) to the NCS 2006 Shelf, on page 198
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not apply power to the shelf until you complete all the installation steps.

Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389

Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390

Procedure

Step 1 To power up the node, insert the fuse into the fuse position according to site practice. The fuse rating must not exceed 20A.

Step 2 If the NCS 2006 does not power up, check the voltage at the power source using a voltmeter. The voltage should be 100 to 240 VAC +/-10 percent.

Step 3 Return to your originating procedure (NTP).

DLP-L22 Turning On and Verifying DC Office Power on the NCS 2006 Shelf

Purpose	This task turns on the power and verifies correct power and returns on the NCS 2006 shelf.
Tools/Equipment	Voltmeter
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • DLP-L19 Connecting Office Power (DC) to the NCS 2006 Shelf (Only), on page 202 • DLP-L20 Connecting Office Power (DC) to the NCS 2006 Shelf (ETSI Only), on page 206
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not apply power to the shelf until you complete all the installation steps.

Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389

Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390

Procedure

Step 1 Using a voltmeter, verify the office battery and ground at the following points on the fuse and alarm panel:

a) To verify the power, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side connection and verify that it is between –40.5 VDC and –72.0 VDC. Place the red test lead on the B-side connection and verify that it is between –40.5 VDC and –72.0 VDC.

Note
For nominal steady state voltage of –48 VDC, the operating voltage range for the chassis is –40.5 VDC (minimum) to –57.6 VDC (maximum).For nominal steady state voltage of –60 VDC, the operating voltage range for the chassis is –50.0 VDC (minimum) to –72.0 VDC (maximum).

b) To verify the ground, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side return ground and verify that no voltage is present. Place the red test lead on the B-side return ground and verify that no voltage is present.

Step 2 To power up the node, insert the fuse into the fuse position according to site practice. The fuse rating must not exceed 40 A.

Step 3 Using a voltmeter, verify the NCS 2006 shelf for –48 VDC or –60 VDC battery and ground:

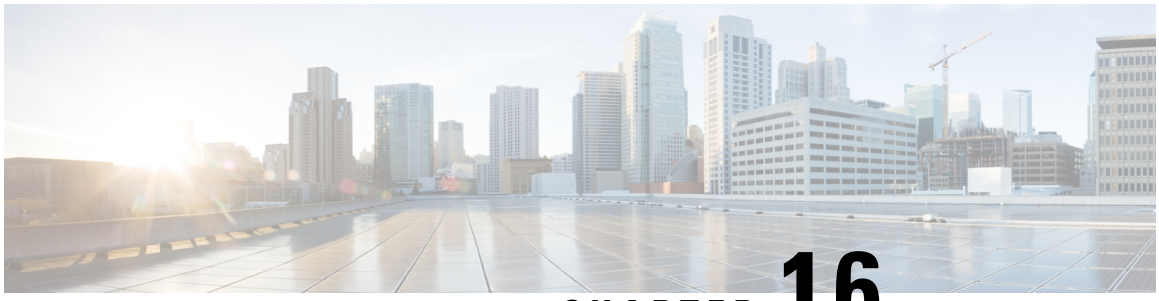
a) To verify the A-side of the shelf, place the black lead of the voltmeter to the frame ground. Place the red test lead to the –48 V or –60 V (A-side battery connection) red cable. Verify that it reads between –40.5 VDC and –72.0 VDC. Then place the red test lead of the voltmeter to the RET1 (A-side return ground) black cable and verify that no voltage is present.

Note
For nominal steady state voltage of –48 VDC, the operating voltage range for the chassis is –40.5 VDC (minimum) to –57.6 VDC (maximum).For nominal steady state voltage of –60 VDC, the operating voltage range for the chassis is –50.0 VDC (minimum) to –72.0 VDC (maximum).

b) To verify the B-side of the shelf, place the black test lead of the voltmeter to the frame ground. Place the red test lead to the –48 V (B-side battery connection) red cable. Verify that it reads between –40.5 VDC and –72.0 VDC. Then place the red test lead of the voltmeter to the RET2 (B-side return ground) black cable and verify that no voltage is present.

Note
If the NCS 2006 shelf is being powered at –60 VDC nominal voltage, the door must be kept closed during regular operation.

Step 4 Return to your originating procedure (NTP).



CHAPTER 16

Connecting and Routing the Cables

This chapter explains how to connect and route the cables for NCS 2006.

The sections are:

- Cable Routing and Management, on page 213
- NTP-L13 Installing the Cable and Fiber Modules, on page 214
- NTP-L14 Attaching Wires to Alarm, Timing, LAN, and Craft Pin Connections, on page 220

Cable Routing and Management

The NCS 2006 shelf has interchangeable fiber and cable modules. Because the NCS 2006 shelf is designed to be compliant with and ETSI 600x300 standards, all the wiring and cable connections are available on the front side.

Default Module

The NCS 2006 chassis is shipped with the fiber module installed. If you need to use CAT5 cables instead of optical fibers, you can replace the fiber module with the cable module.

Fiber Module

The minimum fiber bend radius is 1.5 inches. The fiber guide can be replaced with a cable guide to route the CAT-5 Ethernet cables. The maximum number of 2 mm diameter patch cords that can be managed is 144, or alternatively, 72 CAT5 cables. To manage extra length fiber and fan out, a dedicated fiber storage unit and patch panel unit can be installed inside the rack. The maximum capacity of the fiber channel for one side of the shelf depends on the fiber size and number of Ethernet cables running through that fiber channel. The details of the fibers are:

- 24 fiber x 6 line cards = 144 fibers (72 fibers for each exit point) or 12 CAT5 cables x 6 line cards = 72 RJ45 cables (36 CAT5 cables for each exit point)
- 4 fibers and 1 RJ45 cable x 2 TNC or TNCE = 8 fibers (4 fibers for each exit point) + 2 CAT5 cables (1 CAT5 cable for each exit point)

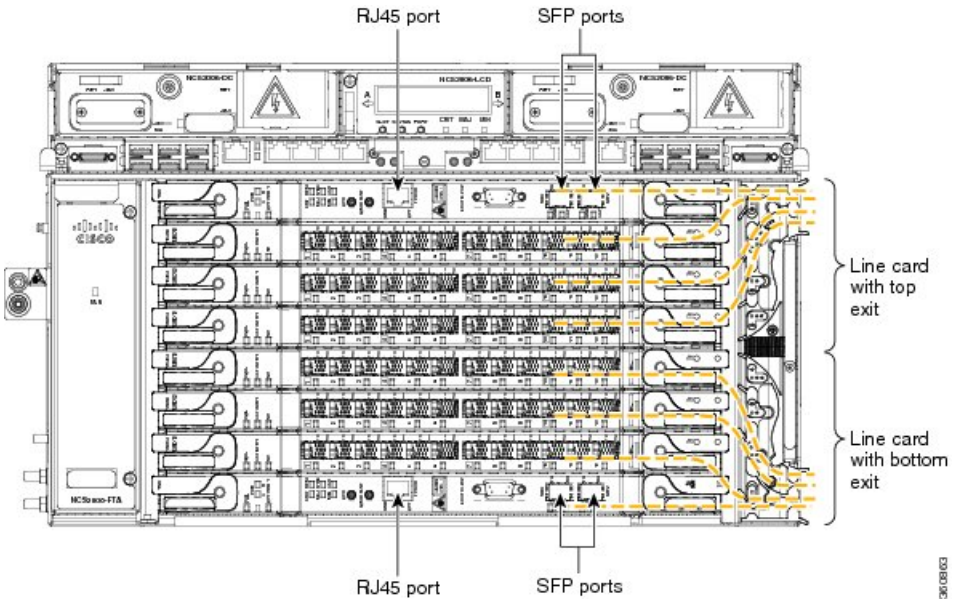
The fiber diameter is a maximum of 2 mm and the CAT5 cable diameter is a maximum of 5 to 6 mm. You need to determine your fiber size according to the number of cards and ports installed on each side of the shelf. For example, if your port combination requires 36 fibers, 3-mm (0.11-inch) fiber is adequate. If your port combination requires 68 fibers, you must use 2-mm (0.7-inch) or smaller fibers.

Note The minimum distance between the fiber LC connector and the bulk attenuator must be at least 50 cm. This is the minimum distance required to place the bulk attenuator outside the shelf from any port of a card.

Cable and Fiber Routing

Cable and fiber routing accommodates all the high-density cards for line card connections in NCS 2006. The exit of the fibers and cables is split into two channels. The line card from slot 1 to 4 exits from the lower right side, and the line card from 5 to 8 exit from the upper right side. (See the figure below .)

Figure 148: Cable and fiber routing



NTP-L13 Installing the Cable and Fiber Modules

Purpose	This procedure installs the cable and fiber modules in the NCS 2006 system.
Tools/Equipment	#1 Phillips cross-head PH screwdriver
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Complete DLP-L23 Removing the Fiber Module, on page 215.

Step 2 Complete DLP-L24 Installing the Cable Module, on page 216.

Step 3 Complete DLP-L25 Routing and Locking Cables, on page 217.

Stop. You have completed this procedure.

DLP-L23 Removing the Fiber Module

Purpose	This procedure removes the default fiber module in the NCS 2006 system.
Tools/Equipment	#1 Phillips cross-head PH screwdriver
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

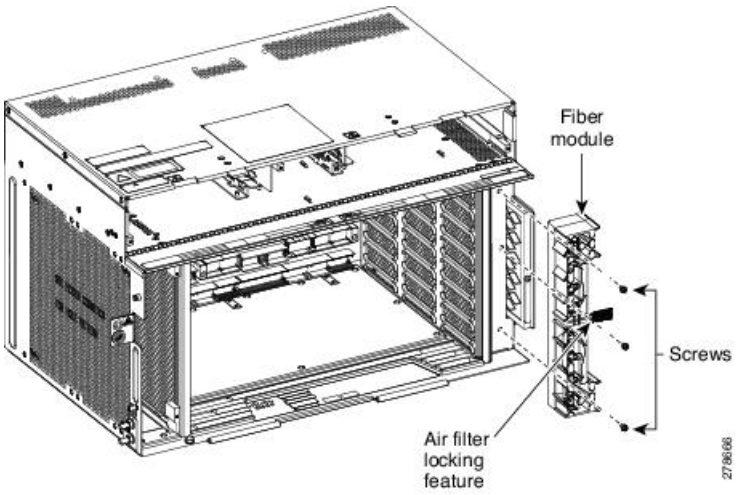
Step 1 Loosen the screws on the fiber module present on the right side of the NCS 2006 assembly. (See the figure below)

Step 2 Loosen the screw present on the air filter locking feature of the NCS 2006 shelf.

Step 3 Remove the air filter locking feature by holding the air filter and gently pulling the air filter locking feature away from the shelf.

Step 4 Extract the fiber module by gently removing it from the NCS 2006 shelf.

Figure 149: Removing the Fiber module



Step 5 Return to your originating procedure (NTP).

DLP-L24 Installing the Cable Module

Purpose	This procedure installs the cable module in the NCS 2006 system.
Tools/Equipment	Phillips cross-head PH screwdriver #1
Prerequisite Procedures	DLP-L23 Removing the Fiber Module, on page 215
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

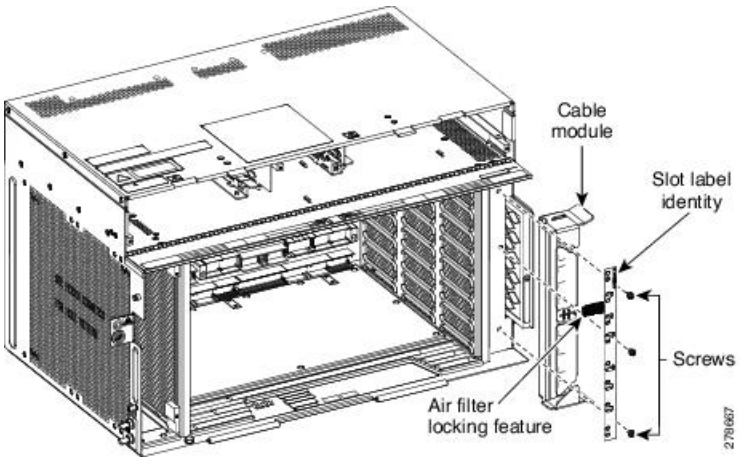
Procedure

Step 1 Insert the air filter locking feature on the cable module. (See the figure below)

Step 2 Attach the slot label identity on the cable module, with screws.

Step 3 Mount the cable module on the chassis, and tighten the screws to a torque value of 4 in-lb (0.45 N-m) to attach the cable module to the NCS 2006 shelf.

Figure 150: Installing the Cable Module



Step 4 Return to your originating procedure (NTP).

DLP-L25 Routing and Locking Cables

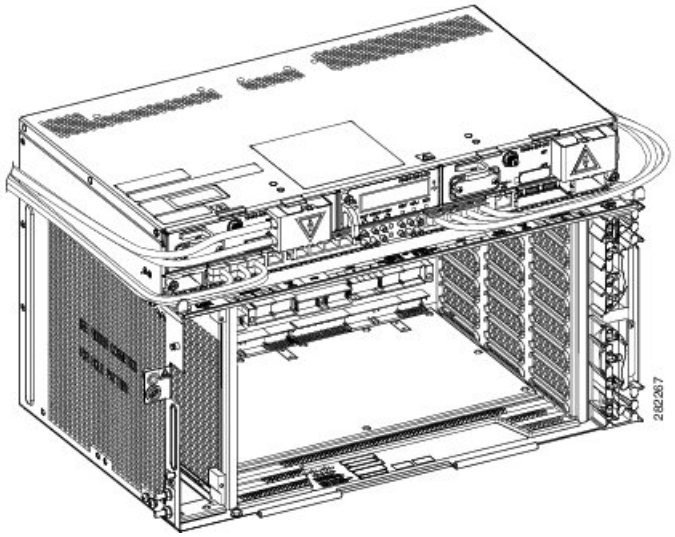
Purpose	This task routes and locks the cables on the NCS 2006 system.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Route the ECU cables on both the ECU ejectors.

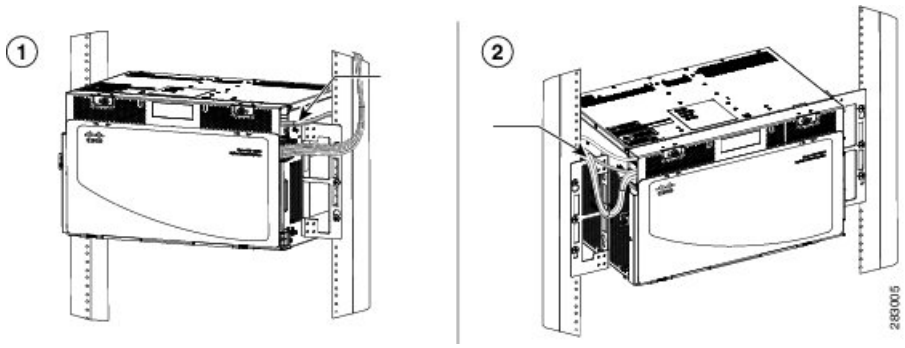
The following figure shows an example of ECU cable routing. This allows you to close the front door. Ensure an extra length of ECU cable is available to allow cable management during extraction of the power module.

Figure 151: ECU module Cable Routing



It is also possible to manage the extraction of the power module without adding the extra length of ECU cable by reducing the number of cables in the right exit area (see Diagram 1 of the figure below). An extra length of ECU cable is required in the left exit area to manage the USB connections (see Diagram 2 of the figure below).

Figure 152: Cable Management

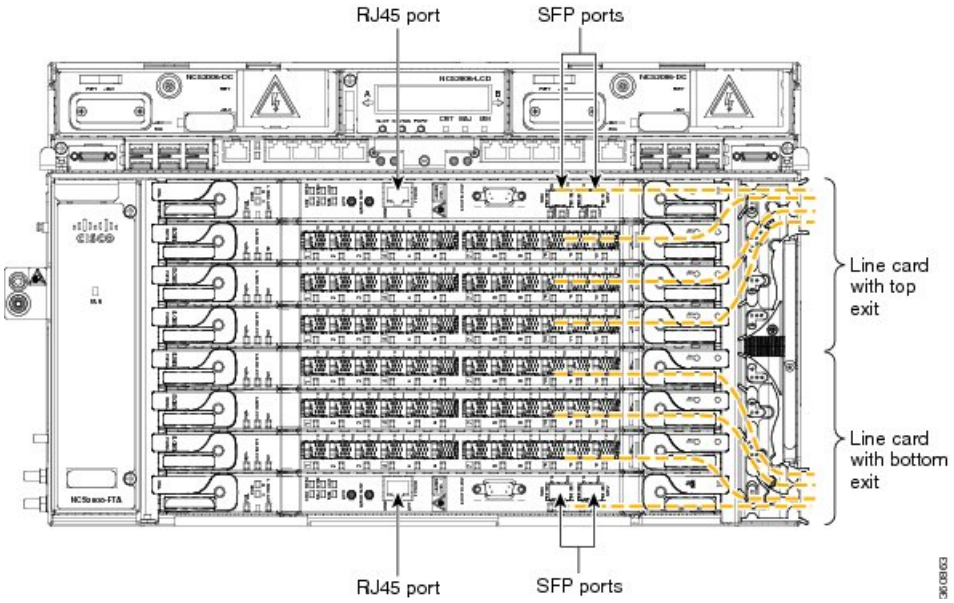


Step 2 Fix the cables using the tie-wrap provided in the accessories kit.

Step 3 To route the optical patch cords or copper cables, do the following as necessary:

a) Route the optical patch cords from the line cards through the fiber or cable module as shown in the figure below .

Figure 153: Cable Routing



b) Remove the front door and connect the copper cables to the SFP or RJ-45 ports of the cards. Do not route the copper cables from the SFPs or RJ-45 ports through the fiber or cable module.

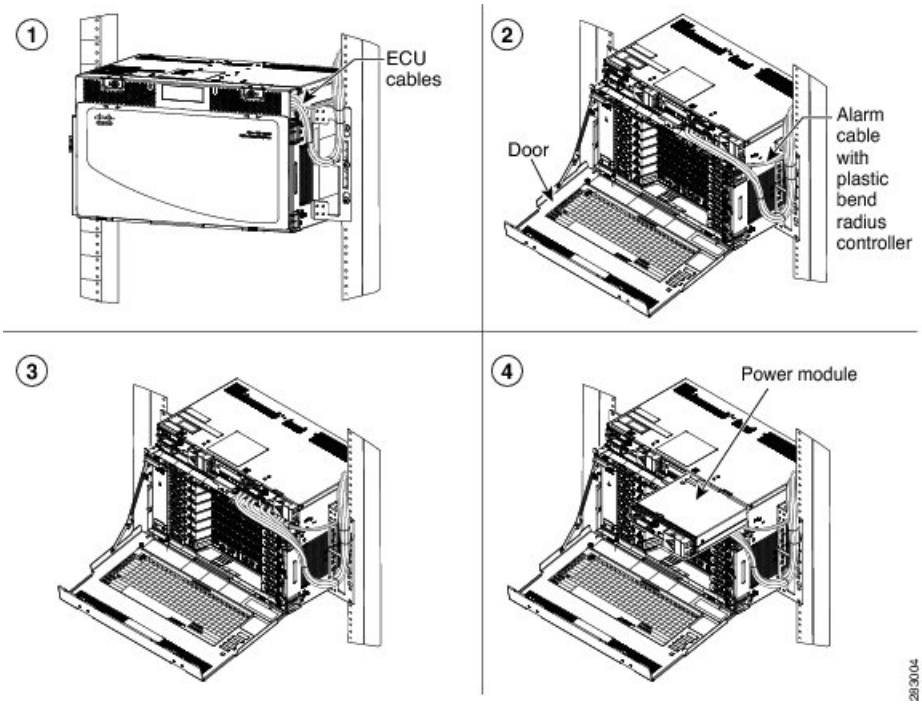
Step 4 To extract the power module, do the following:

a) Open the door of the chassis. See Diagram 2 of the figure below .

b) Move the ECU cables away from the chassis. Ensure that the alarm cable with the plastic bend radius controller is not moved. See Diagram 3 of the figure below .

c) Remove the power module. See Diagram 4 of the figure below .

Figure 154: Sequence to Remove the Power Module



Step 5 Return to your originating procedure (NTP).

NTP-L14 Attaching Wires to Alarm, Timing, LAN, and Craft Pin Connections

Purpose	Use this procedure to attach alarm, timing, LAN, and craft wires in the NCS 2006 shelf.
Tools/Equipment	Twisted #22 or #24 AWG (0.51 mm² or 0.64 mm²) shielded wires for LAN or craft 75-ohm coaxial cable with DIN-1.0/2.3 miniature coaxial connector, Alarm 26 pins SCSI cable.
Prerequisite Procedures	NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Always use the supplied ESD wristband when working with a powered NCS 2006. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

Procedure

Step 1 Complete DLP-L26 Installing Alarm Wires in NCS 2006, on page 221 if you are provisioning external alarms.

Step 2 Complete DLP-L27 Installing Timing Wires on NCS 2006 - ANSI, on page 225 if you are provisioning external timing in .

Step 3 Complete DLP-L28 Installing Timing Wires in NCS 2006 - ETSI, on page 227 if you are provisioning external timing in ETSI.

Step 4 Complete DLP-L29 Installing LAN Wires in NCS 2006, on page 229 to create an external LAN connection.

Table 13: PIDs for SCSI Cables

Cable	PID	Length	Wire Dimension
SCSI alarm cable	15454-M-ALMCBL=	20 Meter	28 AWG
SCSI alarm patch cable	15454-M-AEXPCBL=	1 Meter	28 AWG
SCSI alarm wire-wrap cable	15454-M-ALMCBL2=	20 Meter	24 AWG

Note
Some wire-wrap tools require a minimum of 24 AWG wires to prevent breakage. Ensure that the SCSI alarm wire-wrap cable is used for 24 AWG wires. When the SCSI alarm wire-wrap cable is used, the number of alarms is reduced as fewer strands of wire are supported compared to the SCSI alarm and SCSI alarm patch cables. Table 5-5 lists alarm connector pin details for SCSI alarm wire-wrap cable.

Stop. You have completed this procedure.

DLP-L26 Installing Alarm Wires in NCS 2006

Purpose	This task installs alarm cables on the ECU module of the NCS 2006 to provision external (environmental) alarms and controls.
Tools/Equipment	Alarm SCSI 26-pin cable Wire-wrap tool for BITS Screw for the alarm cable
Prerequisite Procedures	NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258
Required/As Needed	As needed

Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Connect one end of the SCSI cable to the input alarms or input/output alarms, and the other end to the alarm source (See Diagram 1 of the figures below).

Note
These alarms are generic signals that the operator assigns to a definite wire (color) and name through the Craft Terminal.

Step 2 Tighten the screws of the SCSI connector to a torque value of 4 in-lb (0.45 N-m) using #2 Philips Dynamometric screwdriver. See Diagram 2 of the figures below.

Step 3 Bend the cable at an angle of 90° to exit from the left side or the right side (see the figures below).

Step 4 Snap the cable bend controller on the cable. See Diagram 4 of the figures below.

Step 5 Return to your originating procedure (NTP).

Figure 155: Installing the ECU Alarm Cable—Left Exit Option

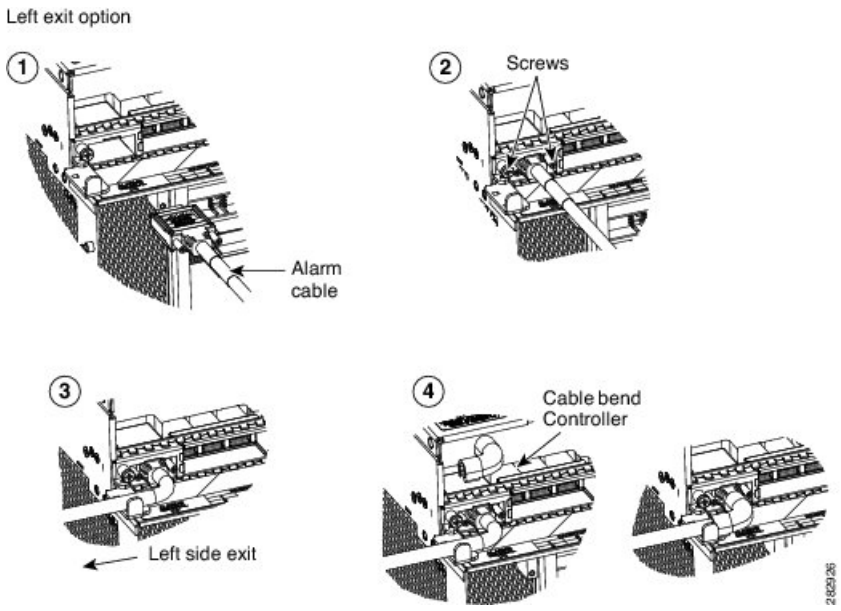


Figure 156: Installing the ECU Alarm Cable—Right Exit Option

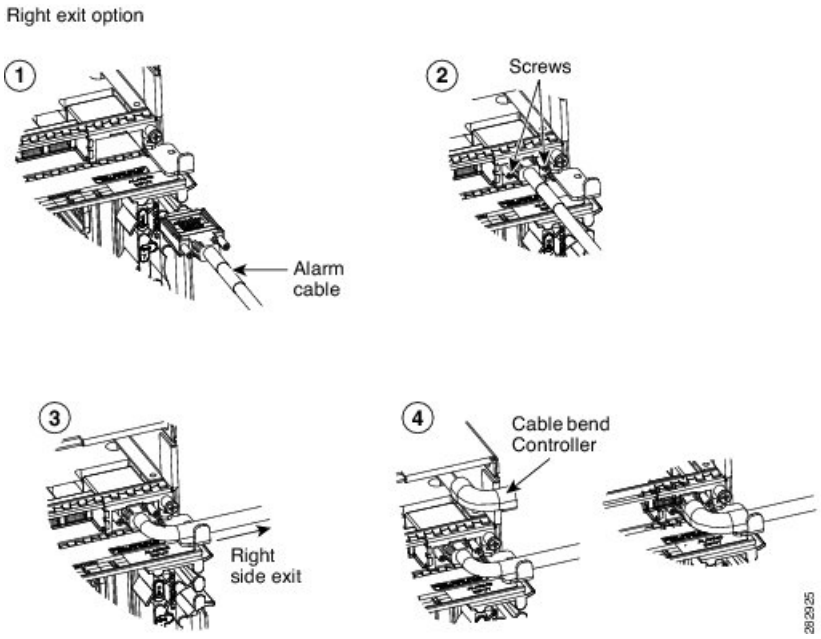


Table 14: SCSI Alarm Cable (15454-M-ALMCBL) and SCSI Alarm Patch Cable (15454-M-AEXPCBL) Connector Details

Pin Number	Color Code	Input Alarms - Right Alarm Connector	Input-Output Alarms - Left Connector
1	Black/Brown	Input Pair #1 +	Minor Audible Alarm +
2	Black/Red	Input Pair #2 +	Major Audible Alarm +
3	Black/Orange	Input Pair #3 +	Critical Audible Alarm +
4	Black/Yellow	Input Pair #4 +	Remote Audible Alarm +
5	Black/Green	Input Pair #5 +	Minor Visual Alarm +
6	Black/Blue	Input Pair #6 +	Major Visual Alarm +
7	White/Blue	Input Pair #7 +	Critical Visual Alarm +
8	White/Orange	Input Pair #8 +	Remote Visual Alarm +
9	White/Green	Input Pair #9 +	—
10	White/Brown	Input Pair #10 +	Alarm Cutoff (ACO) +
11	—	—	—
12	White/Gray	Output Pair #3 + or Input Pair #13 +	Output Pair #1 + or Input Pair #11 +
13	Black/Gray	Output Pair #4 + or Input Pair #14 +	Output Pair #2 + or Input Pair #12 +
14	Brown/Black	Input Pair #1 -	Minor Audible Alarm -

Pin Number	Color Code	Input Alarms - Right Alarm Connector	Input-Output Alarms - Left Connector
15	Red/Black	Input Pair #2 -	Major Audible Alarm -
16	Orange/Black	Input Pair #3 -	Critical Audible Alarm -
17	Yellow/Black	Input Pair #4 -	Remote Audible Alarm -
18	Green/Black	Input Pair #5 -	Minor Visual Alarm -
19	Blue/Black	Input Pair #6 -	Major Visual Alarm -
20	Blue/White	Input Pair #7 -	Critical Visual Alarm -
21	Orange/White	Input Pair #8 -	Remote Visual Alarm -
22	Green/White	Input Pair #9 -	—
23	Brown/White	Input Pair #10 -	Alarm Cutoff (ACO) -
24	—	—	—
25	Gray/White	Output Pair #3 - or Input Pair #13 -	Output Pair #1 - or Input Pair #11-
26	Gray/Black	Output Pair #4 - or Input Pair #14 -	Output Pair #2 - or Input Pair #12 -

Table 15: SCSI Alarm Wire-Wrap Cable (15454-M-ALMCBL2) Connector Details

Pin Number	Color Code	Input Alarms - Right Alarm Connector	Input-Output Alarms - Left Connector
1	Black/Brown	Input Pair #1 +	Minor Audible Alarm +
2	Black/Red	Input Pair #2 +	Major Audible Alarm +
3	—	—	—
4	Black/Yellow	Input Pair #4 +	Remote Audible Alarm +
5	Black/Green	Input Pair #5 +	Minor Visual Alarm +
6	Black/Blue	Input Pair #6 +	Major Visual Alarm +
7	White/Blue	—	—
8	White/Orange	Input Pair #8 +	Remote Visual Alarm +
9	White/Green	Input Pair #9 +	—
10	White/Brown	Input Pair #10 +	Alarm Cutoff (ACO) +
11	—	—	—
12	—	—	—
13	—	—	—

Pin Number	Color Code	Input Alarms - Right Alarm Connector	Input-Output Alarms - Left Connector
14	Brown/Black	Input Pair #1 -	Minor Audible Alarm -
15	Red/Black	Input Pair #2 -	Major Audible Alarm -
16	—	—	—
17	Yellow/Black	Input Pair #4 -	Remote Audible Alarm -
18	Green/Black	Input Pair #5 -	Minor Visual Alarm -
19	Blue/Black	Input Pair #6 -	Major Visual Alarm -
20	—	—	—
21	Orange/White	Input Pair #8 -	Remote Visual Alarm -
22	Green/White	Input Pair #9 -	—
23	Brown/White	Input Pair #10 -	Alarm Cutoff (ACO) -
24	—	—	—
25	—	—	—
26	—	—	—

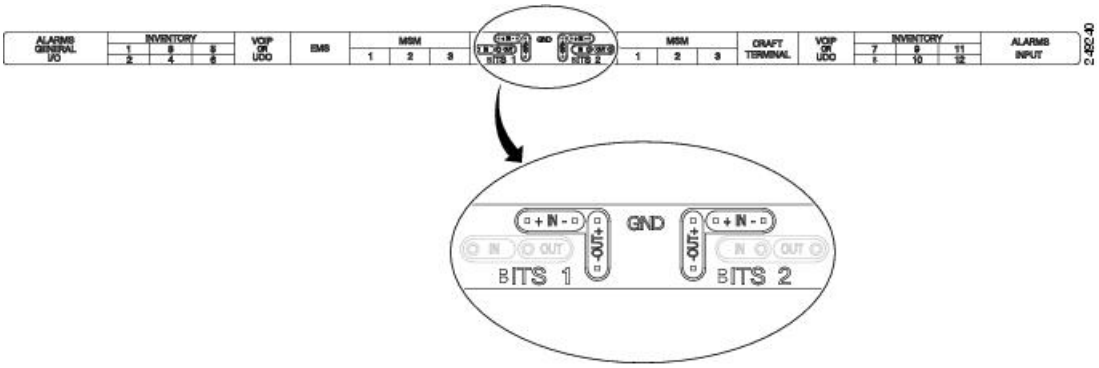
DLP-L27 Installing Timing Wires on NCS 2006 - ANSI

Purpose	This task installs the timing cables on the NCS 2006 ECU module for ANSI.
Tools/Equipment	Wire-wrap tool and 100-ohm wire-wrap cable.
Prerequisite Procedures	NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Locate the timing connector on the ECU module (BITS-1 or BITS-2 In/Out). The following figure shows ECU module wire-wrap pins.

Figure 157: ECU module Wire-wrap Pins



The following table lists the ECU module pin assignments for ANSI.

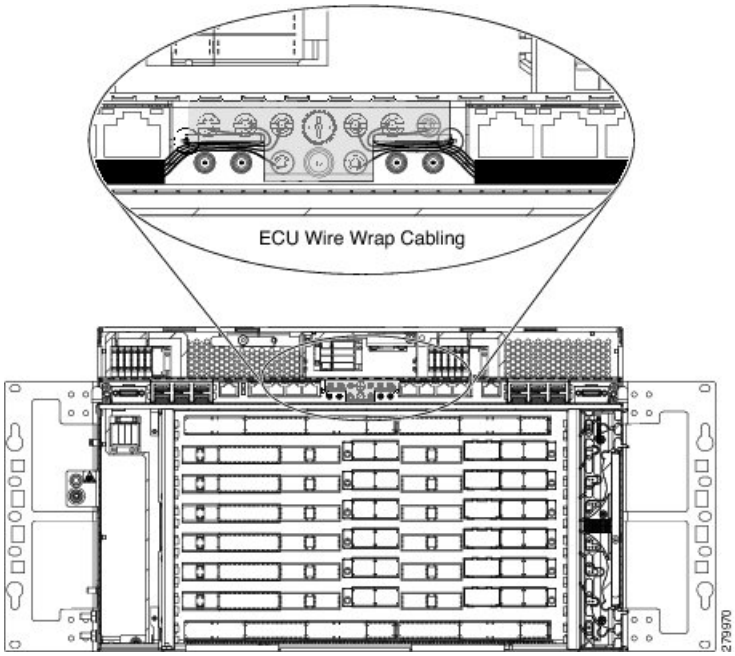
Table 16: ECU module Pin Assignments - ANSI

Pin	Function
IN 1	Input from external drive
OUT 1	Output to external drive
IN 2	Input from external drive
OUT 2	Output to external drive

Step 2 Connect one end of the wire-wrap clock cable to the corresponding wire-wrap connector on the ECU module, and the other end to the external source of the timing. Change the timing input to high-impedance (lesser or greater than 3 ohms) using a jumper on the ECU module. Remove the P1 jumper of the BITS-1 to change the top timing input, and the P2 Jumper of the BITS-2 to change the bottom timing input.

Note
Route the wire-wrap connections as shown in the figure below to prevent interference with the MSM ports.

Figure 158: ECU module Wire-wrap Cabling— ANSI



Step 3 Repeat for each cable. Refer to ITU-T G.813 for rules about provisioning timing references.

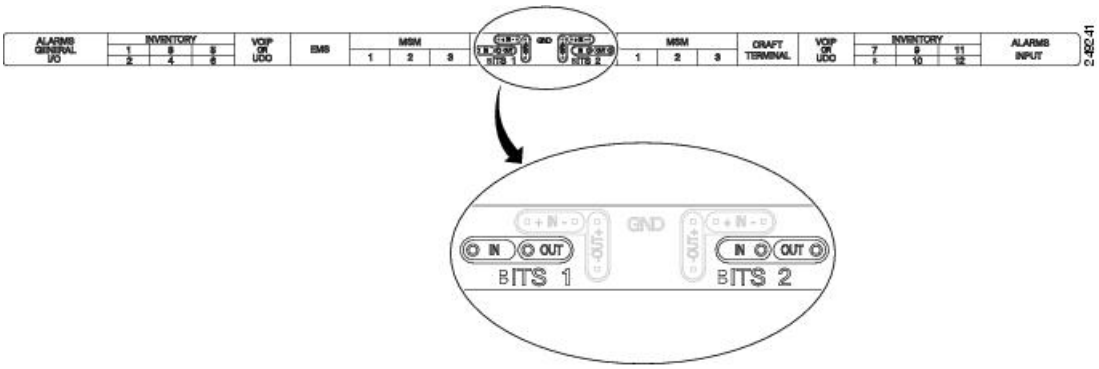
Step 4 Return to your originating procedure (NTP).

DLP-L28 Installing Timing Wires in NCS 2006 - ETSI

Purpose	This task installs the timing cables on the NCS 2006 ECU module for ETSI.
Tools/Equipment	75-ohm coaxial cable with a DIN-1.0/2.3 miniature coaxial connector. The PID for the BITS IN/OUT cable is 15454-M-TMGCBL=
Prerequisite Procedures	NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

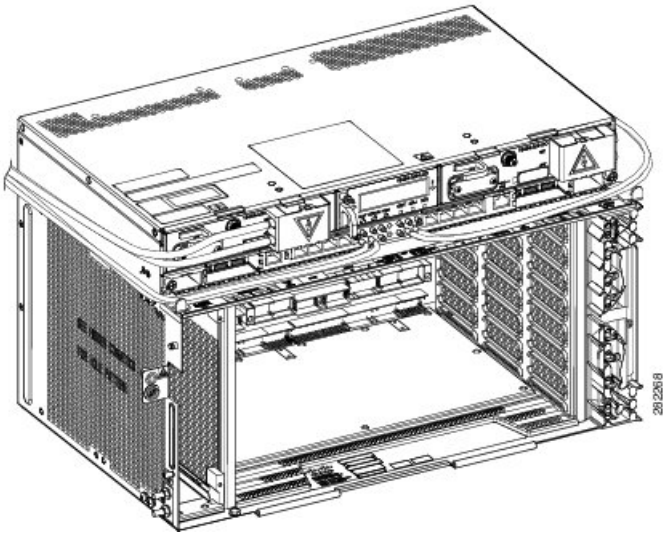
Procedure

Step 1 Connect the clock cable to the corresponding ECU module connector using a coaxial cable with DIN-1.0/2.3 miniature coaxial connectors. The following figure shows the ECU module ETSI BITS connectors.



The following figure shows cable routing of ECU module ETSI BITS connectors.

Figure 159: ECU module ETSI BITS Connectors Cabling

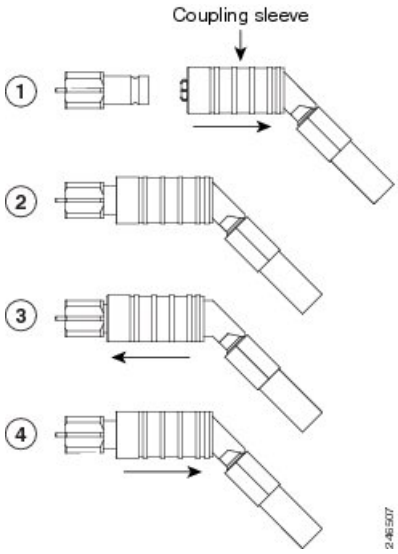


Step 2 Gently push the cable connector into the ECU module connector until you hear a click. Perform the following steps to mate the connectors:

a) Slide the coupling sleeve of the coaxial cable backward. See diagram1 of the figure below.
b) Connect the cable to the ECU module connector. See diagram2 of the figure below.
c) Slide the coupling sleeve forward to lock the cable connector to the ECU module connector. See diagram3 of the figure below.

Note
To unlock the cable connector from the ECU module connector, hold the connector and slide the coupling sleeve backward. See diagram 4 of the figure below.

Figure 160: Sequence to Attach the Connectors



Note
The ECU modules provides 1.0/2.3 miniature coaxial connectors used for timing input and output. The top connectors are for "A" (BITS-1) timing, and the bottom connectors are for "B" (BITS-2) timing. In each case, the left connector is the input and the right connector is the output. The input connectors for timing provide a 75-ohm termination.

Step 3 Connect the other end of the cable to the external source of the timing signal according to the table below . Repeat for each cable.

Table 17: ECU module Pin Assignments - ETSI

Pin	Function
IN 1	Input from external drive
OUT 1	Output to external drive
IN 2	Input from external drive
OUT 2	Output to external drive

Step 4 Change the timing input to high-impedance (lesser or greater than 3 ohms) using a jumper on the ECU module. Remove the P1 jumper of the BITS-1 to change the top timing input, and the P2 Jumper of the BITS-2 to change the bottom timing input. Refer to ITU-T G.813 for rules about provisioning timing references.

Step 5 Return to your originating procedure (NTP).

DLP-L29 Installing LAN Wires in NCS 2006

Purpose	This task installs LAN wires on the ECU module of the NCS 2006.

Tools/Equipment	Standard CAT-5 Ethernet cable (straight-through for data terminating equipment [DTE] or cross-over for data circuit-terminating equipment [DCE]) or RJ-45 connector Crimping tool for RJ-45 connector 0.51 mm² or 0.64 mm² (#22 or #24 AWG) wire, preferably CAT-5
Prerequisite Procedures	NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

We recommend the use of RJ-45 port (craft terminal port or the EMS port) on the ECU module to establish LAN connectivity. The advantages of using the RJ-45 ports on the ECU module include:

- CAT-5 Ethernet cable connections can be managed better by routing the cable through the ECU module cable exit area.
- If the TNC, TNCE, TSC, or TSCE card fails, the LAN connection is not lost during the TNC, TNCE, TSC, or TSCE card switch over.

If the ECU module is absent, you can connect a CAT-5 Ethernet cable to the LAN port on the TNC/TNCE/TSC/TSCE card to create an external LAN connection.

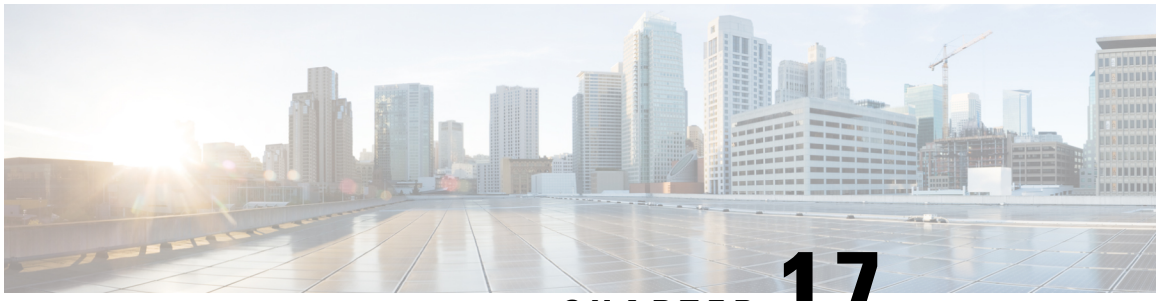
Note You can use the same procedure to connect Multishelf Management ports of several chassis in MSM configurations.

Note To avoid duplex mismatch between EMS or craft terminal port and external LAN switch port, auto negotiation must be enabled on the external LAN switch port.

Procedure

Step 1 Using 0.51 mm² or 0.64 mm² (#22 or #24 AWG) wire or a standard CAT-5 Ethernet cable, connect the wires to the RJ-45 connector.

Step 2 Return to your originating procedure (NTP).



CHAPTER 17

NCS 2006 Shelf Installation Acceptance Test

This chapter explains how to mount the brackets on Cisco NCS 2006 shelf.

- NTP-L18 Performing NCS 2006 Shelf Installation Acceptance Test, on page 231

NTP-L18 Performing NCS 2006 Shelf Installation Acceptance Test

Purpose	Use this procedure to perform a shelf installation acceptance test for the NCS 2006 shelf.
Tools/Equipment	Voltmeter
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 If you installed an NCS 2006 shelf, complete the table below by verifying that each applicable procedure was completed.

Table 18: NCS 2006 Shelf Installation Task Summary

Description	Completed
NTP-L41 Unpacking and Inspecting the Shelf, on page 23	
NTP-L3 Mounting the NCS 2006 Shelf, on page 184	
Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series	

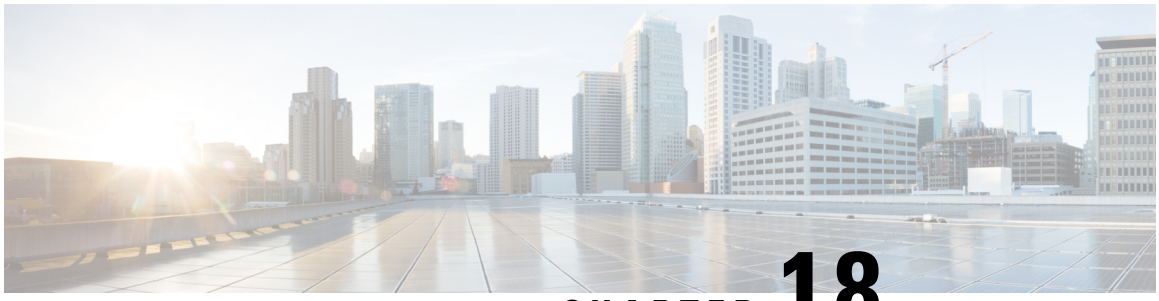
Description	Completed
NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239	
NTP-L9 Installing the Power Modules in the NCS 2006 Shelf , on page 263	
NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194	
NTP-L11 Installing the Fan-Tray Assembly in the NCS 2006 Shelf, on page 274	
DLP-L62 Installing the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card, on page 360	
NTP-L4 Installing the Standard Door of the NCS 2006 Shelf , on page 235	

Step 2 Complete the DLP-L63 Inspecting the Shelf, on page 26.

Step 3 Complete the DLP-L61 Measuring DC Voltage on the NCS 2002 Shelf, on page 102.

Step 4 Continue with Connect the PC and Log into the GUI

Stop. You have completed this procedure.



CHAPTER 18

Installing the Cisco NCS 2006 Door and Other Modules

This chapter explains how to install the NCS 2006 door and other modules.

The sections are:

- Front Door, on page 233
- NTP-L4 Installing the Standard Door of the NCS 2006 Shelf , on page 235
- NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239
- NTP-L39 Install the Deep-Front Panel of the NCS 2006 , on page 243
- NTP-L40 Remove the Deep-Front Panel of the NCS 2006 Shelf , on page 249
- External Connection Units, on page 252
- NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258
- NTP-L66 Upgrading to NCS 2006 ECU60-S Module, on page 260
- Power Modules, on page 261
- NTP-L9 Installing the Power Modules in the NCS 2006 Shelf , on page 263
- LCD Unit, on page 271
- NTP-L10 Installing the LCD Module in the NCS 2006 Shelf, on page 272
- Fan-Tray Assembly , on page 274
- NTP-L11 Installing the Fan-Tray Assembly in the NCS 2006 Shelf, on page 274
- Air Filter , on page 276

Front Door

The front door of NCS 2006 provides access to the shelf, fiber-routing tray, fan-tray assembly, and LCD screen.

There are two types of front doors that act as protective panels—standard door and deep door. The deep door provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door. The deep door does not have a hinge and cannot be rotated like the standard door.

If a standard front door was ordered, the NCS 2006 is shipped with a preinstalled standard door. If a deep door was ordered, a temporary front door is preinstalled on the shelf and the deep door ies present in a separate package. If no door was ordered, a temporary front door is preinstalled on the shelf.

Note The temporary door is used only for shipping purpose and must not be used in the chassis. The temporary door can be opened by removing the tape that is present on top of the door.

You must remove the door before proceeding with the shelf installation.

The NCS 2006 door can be opened by loosening the front screws and pushing the latch in the opposite direction. You can remove the front door to provide unrestricted access to the front of the shelf.

The laser warning label is placed on top of the chassis.

The figure below shows the NCS 2006 laser warning.

Figure 161: Laser Warning on the NCS 2006

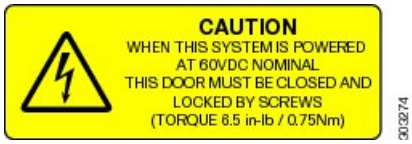


The figure below shows the label that is placed on top of NCS 2006:

Figure 162: NCS 2006 Label



Figure 163: NCS 2006 Front Door Label



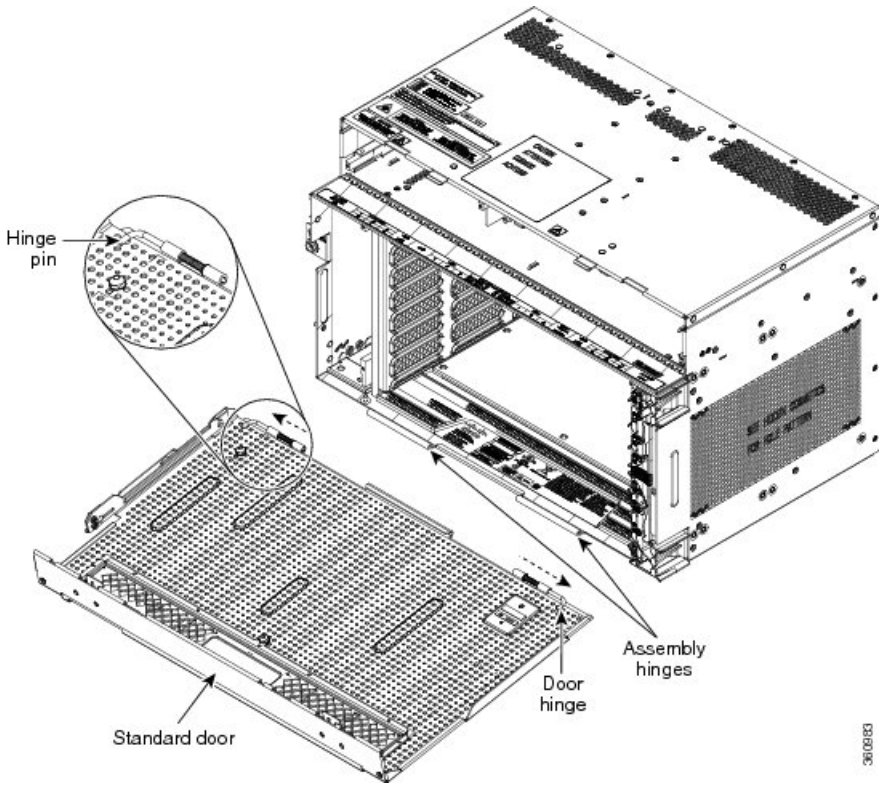
NTP-L4 Installing the Standard Door of the NCS 2006 Shelf

Purpose	This procedure installs the standard door of the NCS 2006 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239 • NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258 • NTP-L9 Installing the Power Modules in the NCS 2006 Shelf , on page 263 • NTP-L10 Installing the LCD Module in the NCS 2006 Shelf, on page 272 • NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194 • NTP-L11 Installing the Fan-Tray Assembly in the NCS 2006 Shelf, on page 274 • NTP-L13 Installing the Cable and Fiber Modules, on page 214 • NTP-L14 Attaching Wires to Alarm, Timing, LAN, and Craft Pin Connections, on page 220
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Pull the hinge pins on the standard door in the opposite directions (see the figure below).

Figure 164: Installing the Standard Door



Step 2 Align the standard door hinges with the chassis hinges.

Step 3 Release the hinge pins.

Step 4 Pull the retention feature from the door (see the figure below).

Step 5 Loosen the screws and place the mechanical stop on the retention feature. (See Diagram 1 of the figure below.)

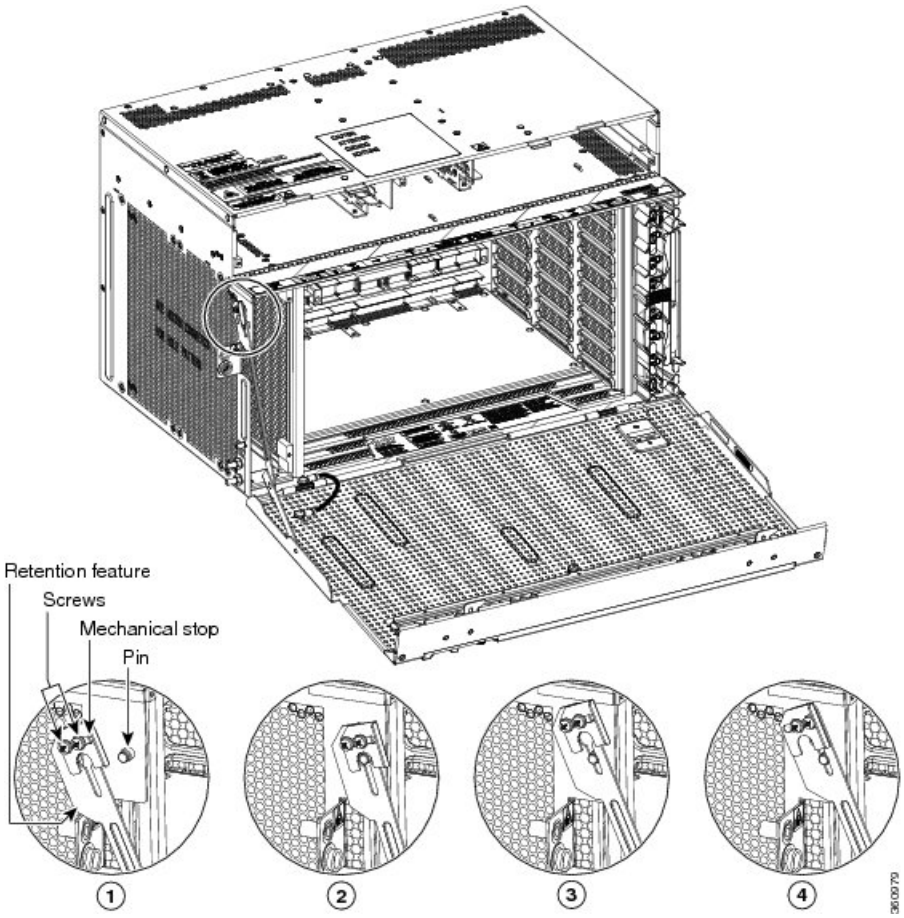
Step 6 Place the retention feature on the pin present on the chassis. (See Diagram 2 of the figure below.)

Step 7 Raise the door to slide the pin. (See Diagram 3 of the figure below.)

Step 8 Slide the mechanical stop to lock the door position and tighten the screws. (See Diagram 4 of the figure below.)

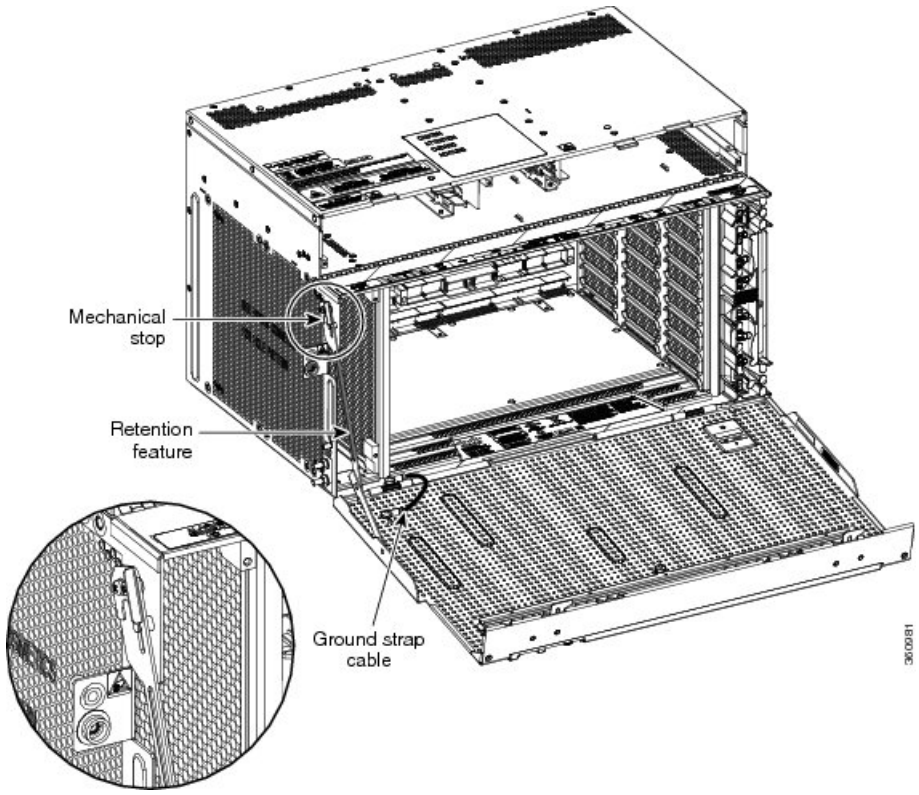
Note
Reinstall the door after installing all the other modules.

Figure 165: Mounting the Mechanical Stop



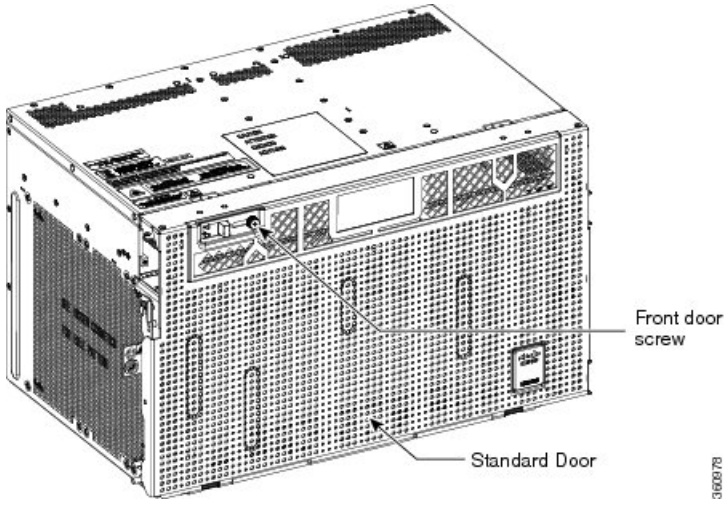
Step 9 Place the ground strap cable (see the figure below) on the door and the chassis and tighten the nuts to a torque value of 11.5 in-lb (1.3 N-m) to lock the cable.

Figure 166: Retention Feature and Ground Strap Cable—Standard Door



Step 10 Tighten the door screws to a torque value of 6.5 in-lb (0.75 N-m) to close the standard door as shown in the figure below.

Figure 167: Closing the Standard Door of the NS 2006 Shelf



Stop. You have completed this procedure.

NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf

Purpose	This procedure opens and removes the standard door of the NCS 2006 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Complete DLP-L12 Opening the Standard Door of the NCS 2006 Shelf , on page 239.

Step 2 Complete the DLP-L13 Removing the Standard Door of the NCS 2006 Shelf , on page 241.

Stop. You have completed this procedure.

DLP-L12 Opening the Standard Door of the NCS 2006 Shelf

Purpose	This task opens the standard door of the NCS 2006 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

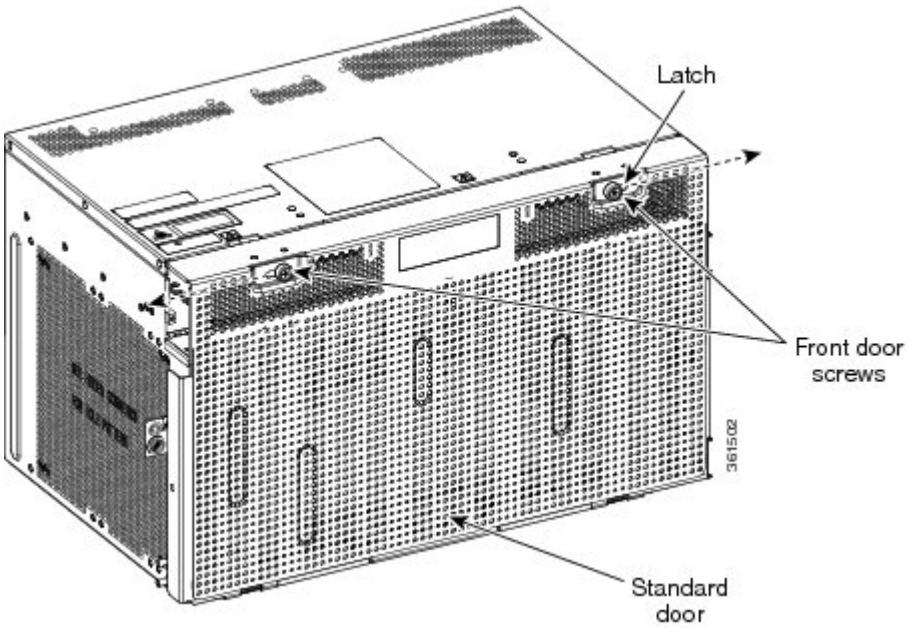
Note The NCS 2006 shelf has an ESD plug input and is shipped with an ESD wrist strap. The ESD plug input is located on the outside of the shelf on the left side. It is labeled "ESD" on the top and bottom. Always wear an ESD wrist strap and connect the strap to the ESD plug when working on the NCS. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Procedure

Step 1 Loosen the standard door screws to a torque value of 6.5 in-lb (0.75 N-m).

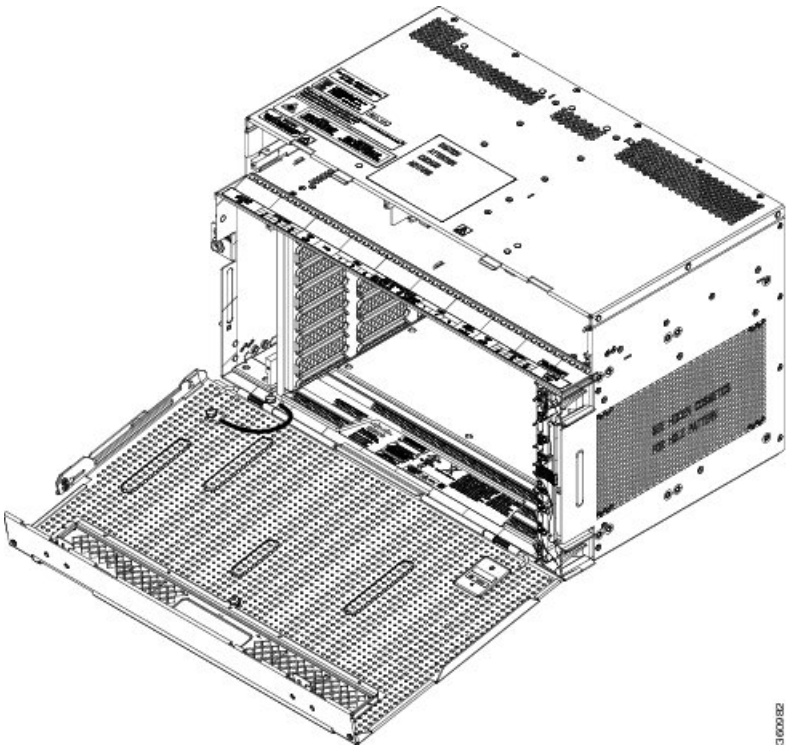
Step 2 Push the latches in the opposite direction.

Figure 168: Opening the Standard Door



Step 3 Swing the door open. The retention feature maintains the door in the horizontal position for line card insertion (see the figure below).

Figure 169: Cisco NCS 2006 Standard Door—Opened



Step 4 Return to your originating procedure (NTP).

DLP-L13 Removing the Standard Door of the NCS 2006 Shelf

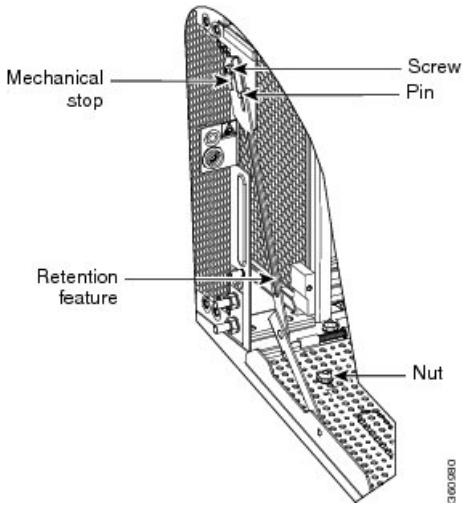
Purpose	This task removes the standard door of the NCS 2006 shelf.
Tools/Equipment	None
Prerequisite Procedures	DLP-L12 Opening the Standard Door of the NCS 2006 Shelf , on page 239
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Unscrew the nut holding the ground cable to the shelf. Remove the nut.

Step 2 Remove the ground cable from the shelf (see the figure below).

Figure 170: Removing the NCS 2006 Standard Door



Step 3 Loosen the screws and slide the mechanical stop to unlock the door.

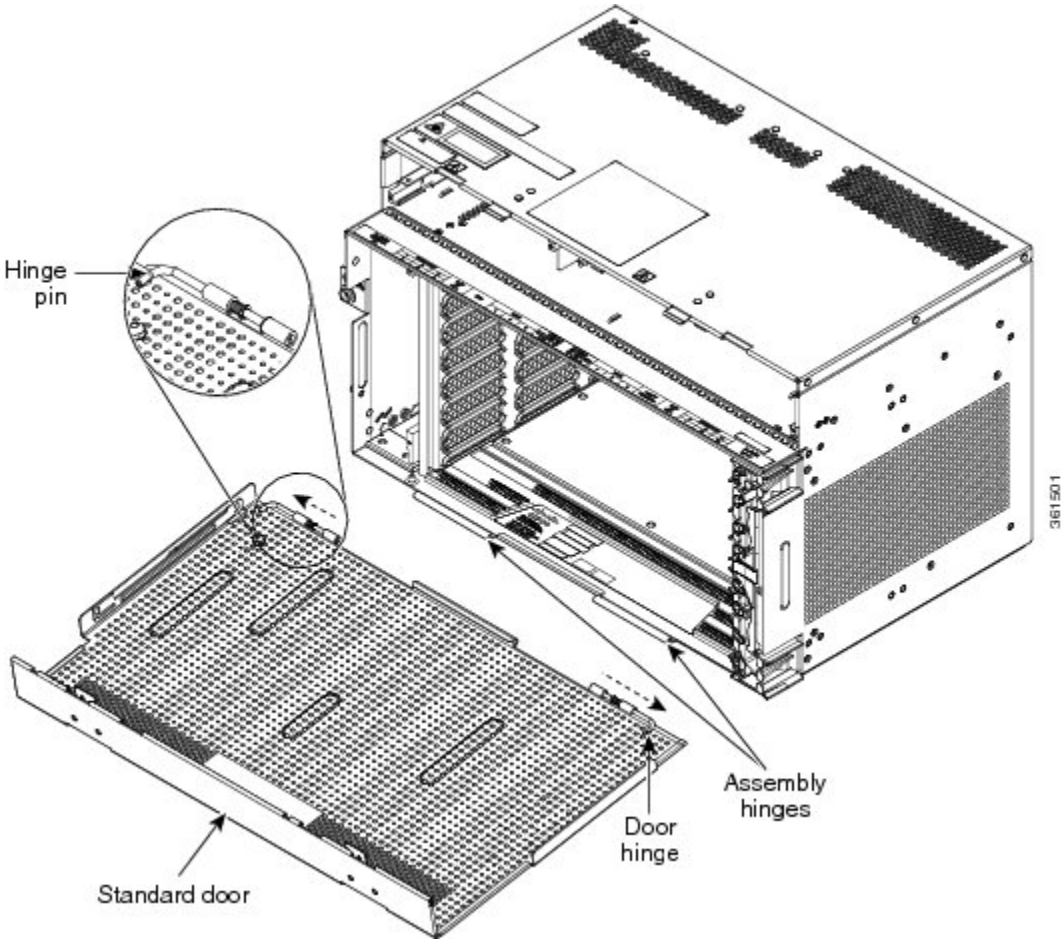
Step 4 Lower the door to slide the pin.

Step 5 Remove the retention feature from the pin present on the chassis.

Step 6 Pull the hinge pins holding the door to the chassis, in the opposite direction (see the figure below).

Step 7 Remove the door from its hinges (see the figure below).

Figure 171: Removing the NCS 2006 Standard Door



Step 8 Return to your originating procedure (NTP).

NTP-L39 Install the Deep-Front Panel of the NCS 2006

Purpose	This procedure installs the deep-front panel of the NCS.
Tools/Equipment	#2 Phillips Dynamometric screwdriver

Prerequisite Procedures	• Remove the temporary door by removing the tape that is present on top of the door. • NTP-L3 Mounting the NCS 2006 Shelf, on page 184. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258 • NTP-L9 Installing the Power Modules in the NCS 2006 Shelf , on page 263 • NTP-L10 Installing the LCD Module in the NCS 2006 Shelf, on page 272 • NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194 • NTP-L11 Installing the Fan-Tray Assembly in the NCS 2006 Shelf, on page 274 • NTP-L13 Installing the Cable and Fiber Modules, on page 214 • NTP-L14 Attaching Wires to Alarm, Timing, LAN, and Craft Pin Connections, on page 220
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note Use the deep-front panel when ONS-SC+-10G-C pluggables are installed on a NCS2006 shelf.

Note When the deep front-panel is installed, the total chassis depth is 12.9 inches. The deep front-panel extends from the rack by 1.8 inches.

Procedure

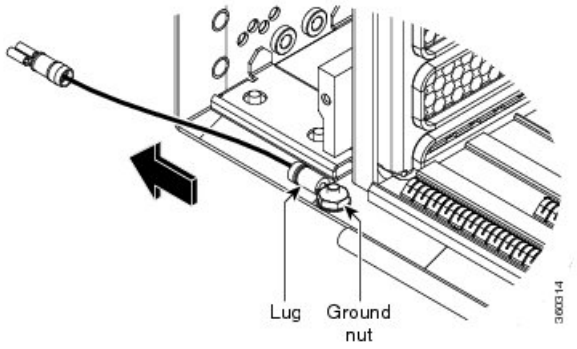
Step 1 Connect the ground strap cable to the shelf:

a) Loosen and remove the ground nut from the shelf. See the figure below.

b) Insert the lug of the ground strap cable and tighten the nut on the shelf to a torque value of 11.5 in-lb (1.3 N-m).

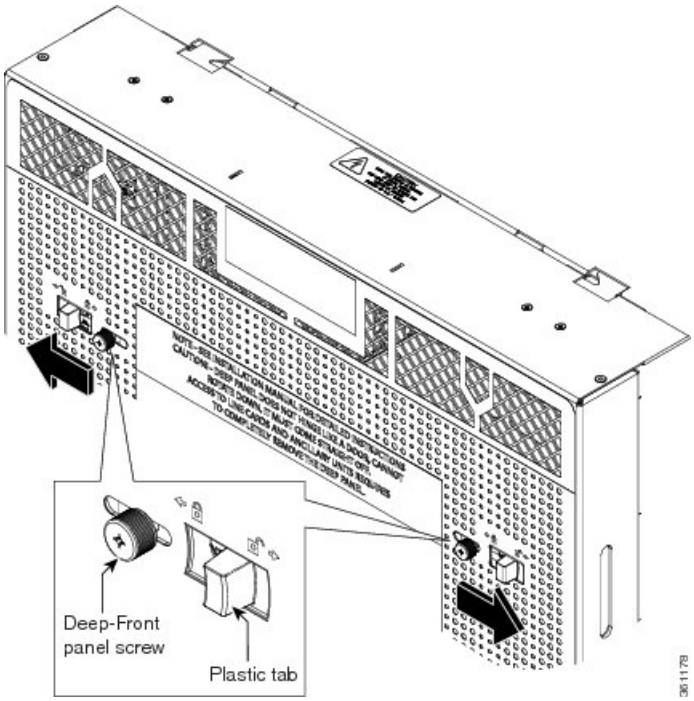
c) Route the other end of the ground strap cable outside the shelf at an angle of 180 degrees towards the left direction.

Figure 172: Inserting the Lug to the Shelf



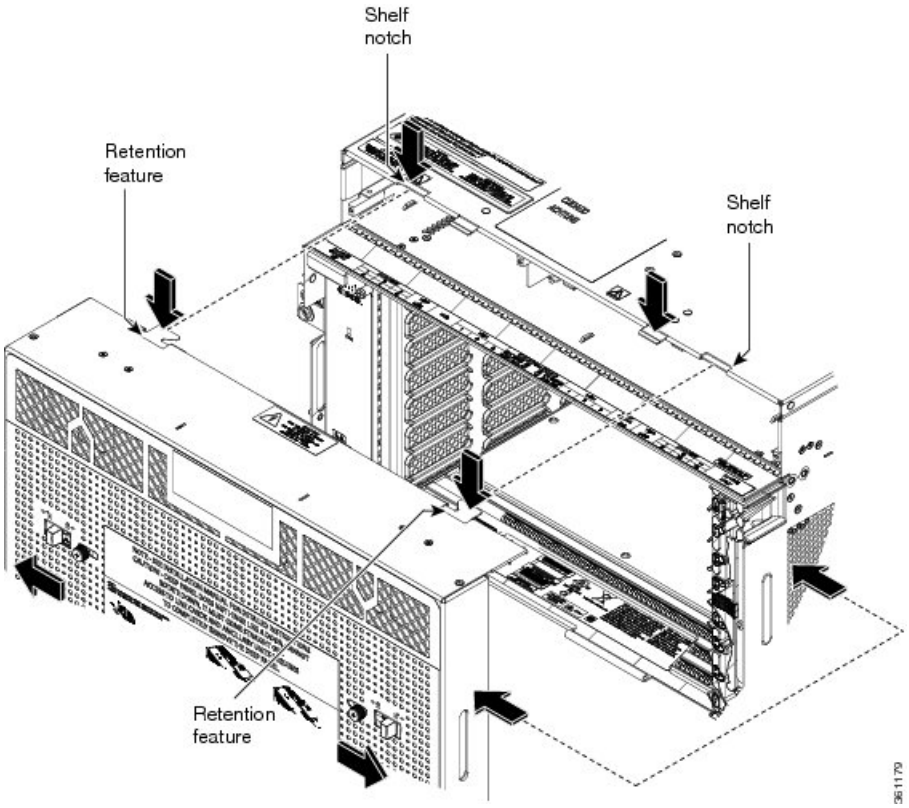
Step 2 Loosen the deep-front panel screws and slide them outwards using the plastic tabs (see the figure below).

Figure 173: Loosening the deep-front panel screws



Step 3 Place the deep-front panel close to the shelf so that the shelf notches and the deep-front panel retention features are in line, as shown in the figure below.

Figure 174: Placing Deep-Front Panel and Shelf in line

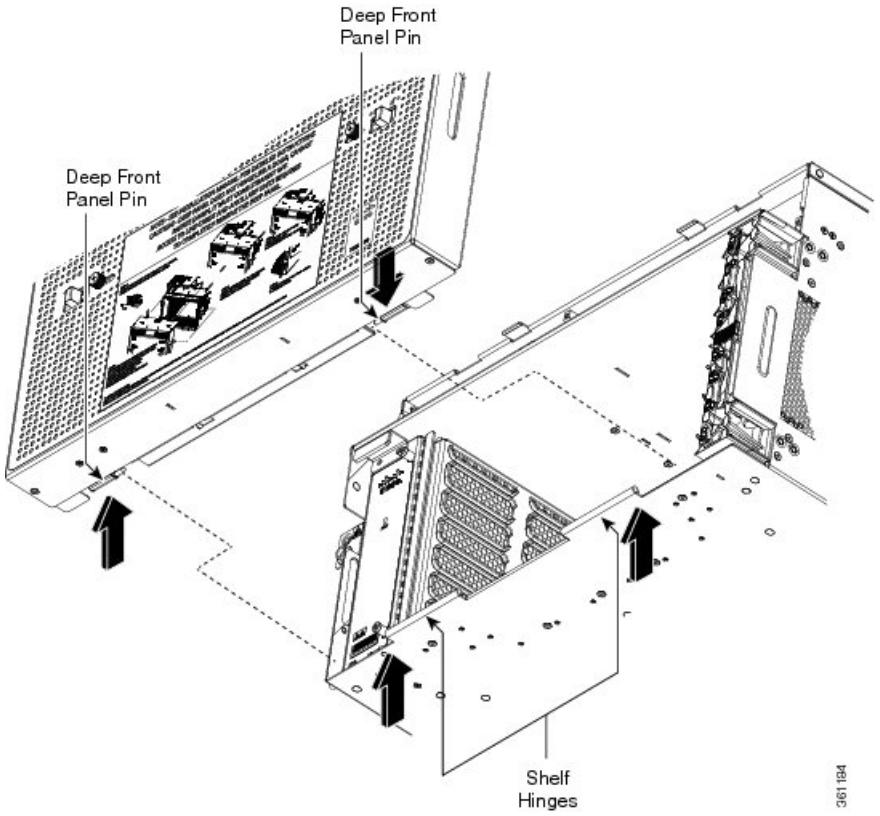


Step 4 Align the deep-front panel with the shelf by performing the following sub-steps at the same time.

a) Align the right and left retention features of the deep-front panel with the right and left notches present on the top of the shelf. See the above figure.

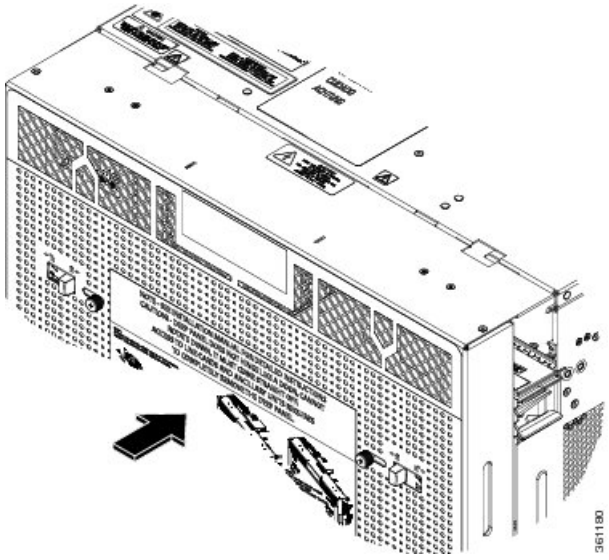
b) Align the deep-front panel pins present at the bottom of the panel with the shelf hinges. See the figure below.

Figure 175: Align the Deep-Front Panel Pins and Shelf Hinges



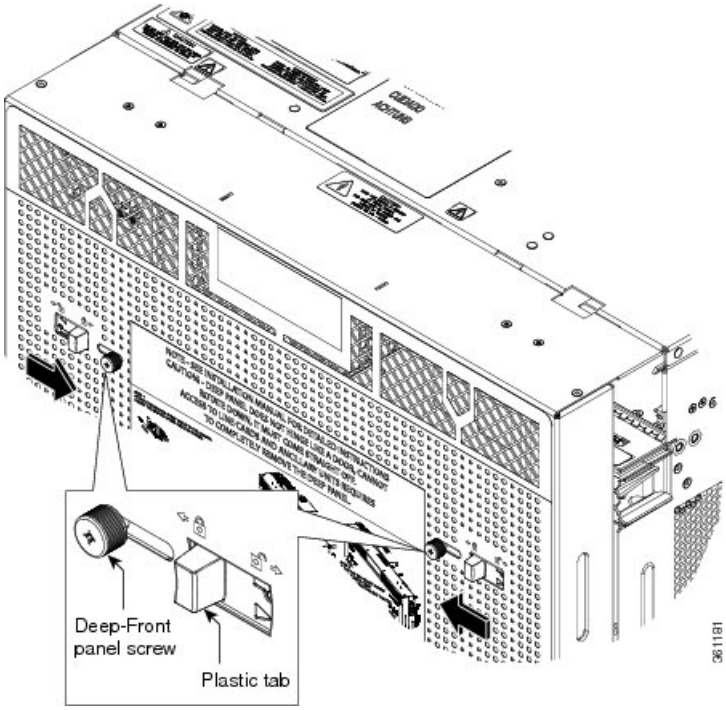
The following figure shows the deep-front panel aligned with the shelf.

Figure 176: Align the Deep-Front Panel and Shelf



Step 5 Slide the deep-front panel screws inwards using the plastic tabs to engage the retention features and the pins with the shelf notches and hinges. See the figure below. Verify the engagement by gently applying the pressure to the panel outwards.

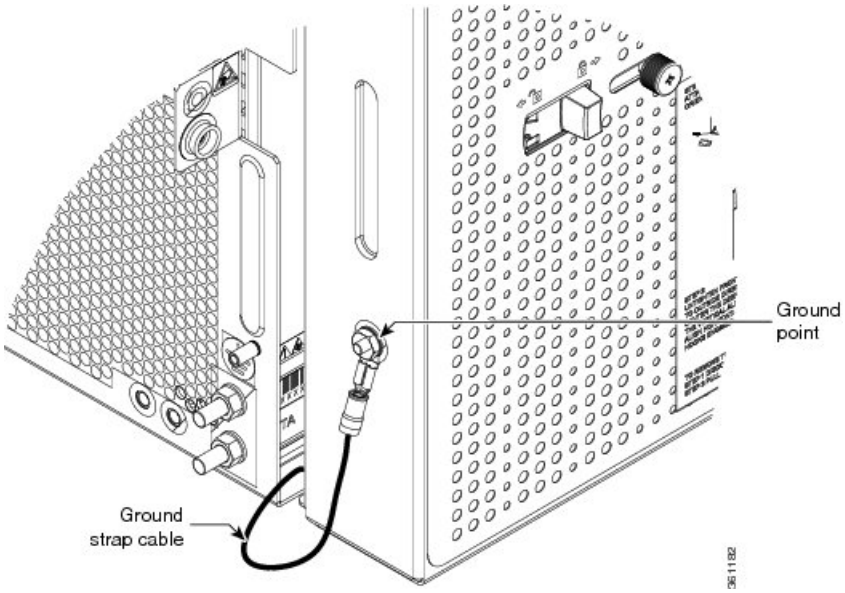
Figure 177: Engage the Deep-Front Panel and Shelf



Step 6 Lock the deep-front panel by tightening the screws to a torque value of 6.5 in-lb (0.75 N-m).

Step 7 Connect the other end of the ground strap cable to the ground point present on the deep-front panel exterior.

Figure 178: Connect ground strap cable to the ground point



Stop. You have completed this procedure.

NTP-L40 Remove the Deep-Front Panel of the NCS 2006 Shelf

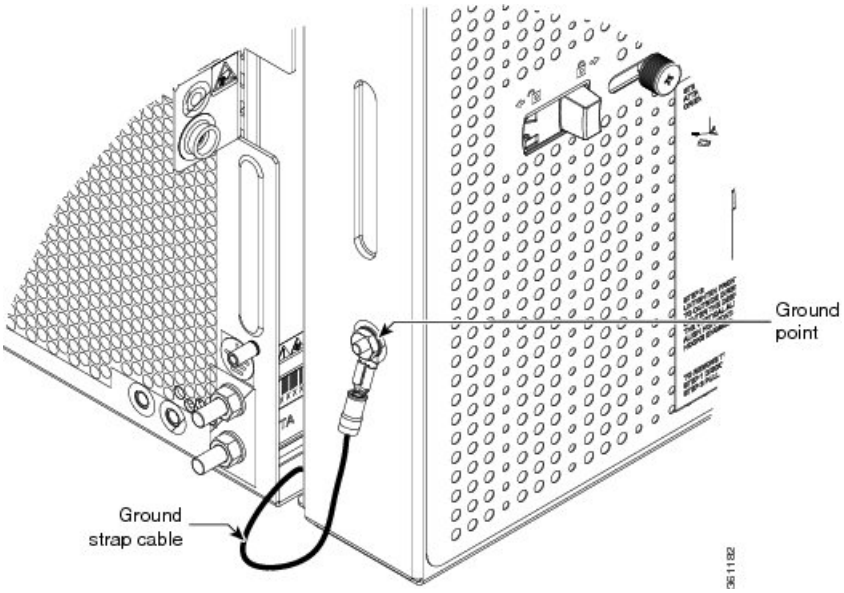
Purpose	This procedure removes the deep-front panel of the NCS 2006 system.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L3 Mounting the NCS 2006 Shelf, on page 184 • NTP-L39 Install the Deep-Front Panel of the NCS 2006 , on page 243 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note When the deep front-panel is installed, the total chassis depth is 12.9 inches. The deep front-panel extends from the rack by 1.8 inches.

Procedure

Step 1 Remove the end of the ground strap cable that is connected to the exterior of the deep-front panel.

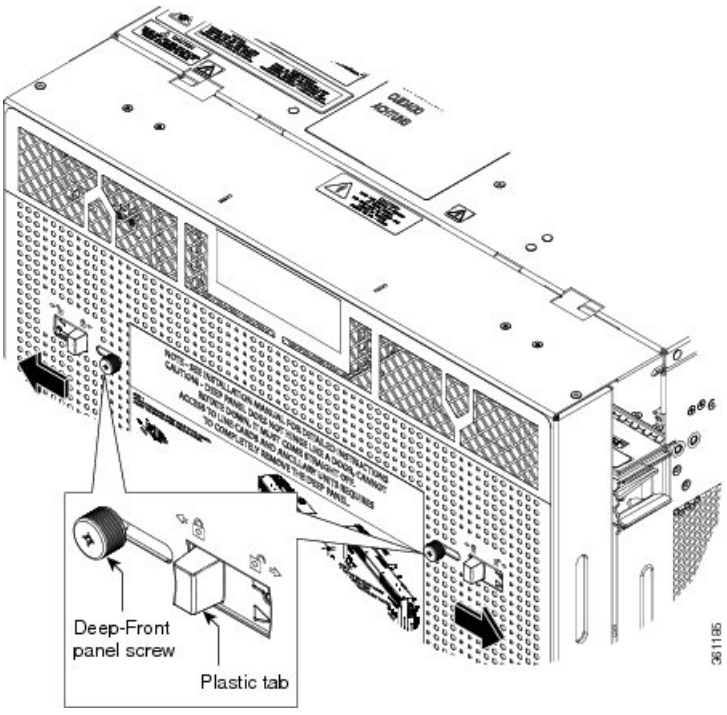
Figure 179: Removing the end of the ground strap cable



Step 2 Loosen the panel screws to open the deep-front panel.

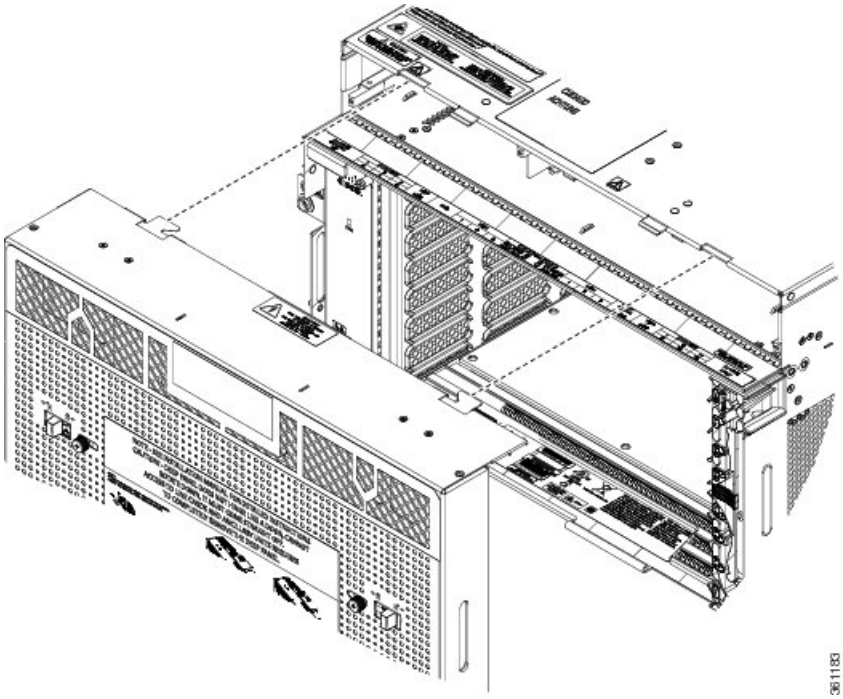
Step 3 Move the deep-front panel screws in the direction as shown in the figure below to disengage the retention features and the pins from the shelf notches and hinges. See the figure below.

Figure 180: Move the Deep-Front Panel to Disengage



Step 4 Move the deep-front panel away from the shelf. See the figure below.

Figure 181: Move the Deep-Front Panel Away

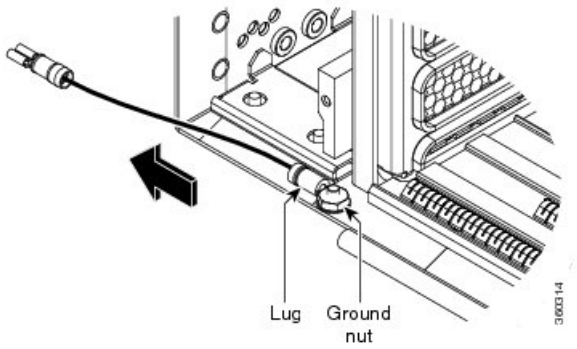


Caution
The deep-front panel does not have a hinge and cannot be rotated like a standard door. Rotating the deep-front panel can damage the deep-front panel, shelf hinges, other devices and cables placed below the NCS 2006 shelf.

Step 5 Remove the ground strap cable from the shelf. See the figure below:

a) Loosen the ground nut on the shelf.
b) Remove the lug and tighten the nut on the shelf to a torque value of 11.5 in-lb (1.3 N-m).

Figure 182: Remove the Ground Strap Cable



Stop. You have completed this procedure.

External Connection Units

NCS 2006 ECU

The external connection unit (ECU) is a replaceable module placed on top of the NCS 2006 shelf. This ECU module discovers and manages the inventory of the external shelf units. It also handles the multishelf management connections and timing synchronizations. The ECU module available for the NCS 2006 shelf is ECU (PN: NCS2006-ECU=).

The following figure is an example of the ECU module label.

Figure 183: Connector Label for ECU Module



Note The NCS 2006 ECU should not be used when the shelf is powered at –60V DC nominal input voltage.

The following figure shows the NCS 2006 ECU connectors.

Figure 184: Connectors on the NCS 2006 ECU Faceplate



The NCS 2006 ECU is hardware-ready to support IEEE1588v2 PTP, time-of-day (ToD), and pulse-per-second (PPS) inputs. To support high power USB devices, NCS 2006 ECU provides a current of 500 mA to each of the ports.

The external connections present on the NCS 2006 ECU are:

- 12 remote inventory standard USB connections
- 2 BITS-OUT connections (2 subminiature version B [SMB] connectors for ETSI and 4 wire-wrap pins for ANSI)
- 10 MHz IN and OUT and PPS IN and OUT (hardware-ready)
- 2 BITS-IN connections (2 SMB connectors for ETSI and 4 wire-wrap pins for ANSI)
- 6 multishelf connections
- 1 element management system (EMS) connection
- 1 craft terminal connection
- 1 time-of-day (ToD) connection (hardware-ready)
- 2 VoIP or 2 user data channel (UDC) connections, or one each of VoIP and UDC connections
- 1 SCSI with 26 poles for TNC relay contact, including alarm cut-off (ACO) signal and digital I/O (D-I/O) signals (on the left-side connector)
- 1 SCSI with 26 poles for digital I/O signals (on the right-side connector)

Note When no VOIP/UDC port or a single VOIP/UDC port is in use, the NCS 2006 ECU supports 12 USB ports. However, when both VOIP/UDC ports are in use, the NCS 2006 ECU supports only 6 USB ports.

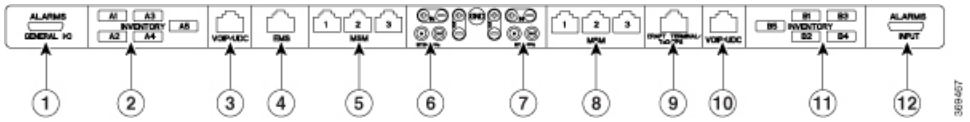
NCS 2006 ECU-S

ECU-S is a new type of ECU introduced for the NCS 2006 in Release 10.5.2. The ECU-S module also discovers and manages the inventory of the external shelf units. It also handles the multishelf management connections and timing synchronizations. The ECU-S module available for the NCS 2006 shelf is NCS2006-ECU-S=. The NCS 2006 ECU-S is backward-compatible with Release 10.1, 10.3, and 10.5. However, there is a small difference in the port numbers detected. The details are listed in the section below.

Note The NCS 2006 ECU-S should not be used when the shelf is powered at –60V DC nominal input voltage.

The following figure shows the NCS 2006 ECU-S connectors.

Figure 185: Connectors on the NCS 2006 ECU-S Faceplate



1	1 SCSI with 26 poles for TNC relay contact, including ACO signal and digital I/O signals
2	USB 2.0 ports (Ports A1, A2, A3, A4) and USB 3.0 port (Port A5)
3	VOIP/UDC port (RJ-45 port)
4	EMS port (RJ-45 port)
5	Three MSM ports
6	BITS1 input and output ports
7	BITS2 input and output ports
8	Three MSM ports
9	Craft terminal port
0	VOIP/UDC port (RJ-45 port)
1	USB 2.0 ports (Ports B1, B2, B3, B4) and USB 3.0 port (Port B5)
2	1 SCSI with 26 poles for digital I/O signal

The NCS 2006 ECU-S supports IEEE1588v2 PTP, time-of-day (ToD), and pulse-per-second (PPS) inputs. To support high power USB devices, NCS 2006 ECU-S provides a current of 500 mA to each of the ports. The IMPROPRMVL alarm is raised in CTC when the ECU-S is removed from the NCS 2006 shelf.

Note When NCS 2006 is pre-provisioned, or plugged in without the ECU-S unit, by default, CTC uses the ECU module with the 12 USB 2.0 ports.

The fiber shuffle unit or the NCS2K-MF-6RU unit, which can be used to interface 14 single slot passive optical modules can be connected to the NCS 2006 ECU-S using the USB 3.0 port.

The MPO-fan-out unit or the NCS2K-MF10-6RU unit, which can be used to interface 10 double slot passive optical modules can be connected to the NCS 2006 ECU-S using the USB 3.0 port.

The external connections present on the NCS 2006 ECU-S are:

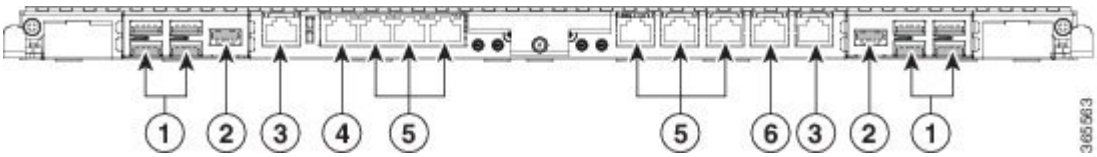
- 2 USB 3.0 connections
  - The USB 3.0 port on the left of the faceplate is detected as A5.
  - The USB 3.0 port on the left of the faceplate is detected as B5.
- 8 USB 2.0 connections
  - 4 USB 2.0 on the left of the faceplate are detected as A1, A2, A3, A4.
  - 4 USB 2.0 ports on the right of the faceplate are detected as B1, B2, B3, B4. In Release 10.1, 10.3, and 10.5, these ports are detected as A5, A6, B1, B2 respectively.
- 2 BITS-OUT connections (2 subminiature version B [SMB] connectors for ETSI and 4 wire-wrap pins for ANSI)
- 10 MHz IN and OUT and PPS IN and OUT (hardware-ready)
- 2 BITS-IN connections (2 SMB connectors for ETSI and 4 wire-wrap pins for ANSI)
- 6 multishelf connections
- 1 element management system (EMS) connection
- 1 craft terminal connection
- 1 time-of-day (ToD) connection (hardware-ready)
- 2 VoIP or 2 user data channel (UDC) connections, or one each of VoIP and UDC connections
- 1 SCSI with 26 poles for TNC relay contact, including alarm cut-off (ACO) signal and digital I/O (D-I/O) signals (on the left-side connector)
- 1 SCSI with 26 poles for digital I/O signals (on the right-side connector)

NCS 2006 ECU60-S

ECU60-S is a new type of ECU-S introduced for the NCS 2006 when the shelf is powered at –60 VDC nominal input voltage. The ECU60-S module available for the NCS 2006 shelf is NCS2006-ECU60-S=.

The following figure shows the NCS 2006 ECU60-S connectors.

Figure 186: Connectors on the NCS 2006 ECU60-S Faceplate



1	USB 2.0 ports (Ports 1 through 4 and ports 7 through 10)

2	USB 3.0 ports (Ports 5 and 11)
3	VOIP/UDC ports (RJ-45 port)
4	EMS port (RJ-45 port)
5	MSM ports
6	Craft terminal connection

The NCS 2006 ECU60-S supports IEEE1588v2 PTP, time-of-day (ToD), and pulse-per-second (PPS) inputs. The IMPROPRMVL alarm is raised in CTC when the ECU60-S is removed from the NCS 2006 shelf.



Note When NCS 2006 is pre-provisioned, or plugged in without the ECU60-S unit, by default, CTC uses the ECU module with the 12 USB 2.0 ports.

The fiber shuffle unit or the NCS2K-MF-6RU unit, which can be used to interface 14 single slot passive optical modules can be connected to the NCS 2006 ECU60-S using the USB 3.0 port.

The MPO-fan-out unit or the NCS2K-MF10-6RU unit, which can be used to interface 10 double slot passive optical modules can be connected to the NCS 2006 ECU60-S using the USB 3.0 port.

The NCS 2006 ECU60-S is backward-compatible with releases prior to 10.5.2.

The external connections present on the NCS 2006 ECU60-S are:

- 2 USB 3.0 connections
  - The USB 3.0 port on the left of the faceplate is detected as A5.
  - The USB 3.0 port on the left of the faceplate is detected as B5.
- 8 USB 2.0 connections
  - 4 USB 2.0 on the left of the faceplate are detected as A1, A2, A3, A4.
  - 4 USB 2.0 ports on the right of the faceplate are detected as B1, B2, B3, B4. In releases prior to 10.5.2, these ports are detected as A5, A6, B1, B2 respectively.
- 2 BITS-OUT connections (2 subminiature version B [SMB] connectors for ETSI and 4 wire-wrap pins for ANSI)
- 10 MHz IN and OUT and PPS IN and OUT (hardware-ready)
- 2 BITS-IN connections (2 SMB connectors for ETSI and 4 wire-wrap pins for ANSI)
- 6 multishelf connections
- 1 element management system (EMS) connection
- 1 craft terminal connection
- 1 time-of-day (ToD) connection (hardware-ready)
- 2 VoIP or 2 user data channel (UDC) connections, or one each of VoIP and UDC connections



Note POE functionality is not available for the VOIP ports.

You can upgrade to the NCS2006 ECU60-S from an older ECU (ECU/ECU-2/ECU-S) in the NCS 2006 shelf. For more information, see NTP-L66 Upgrading to NCS 2006 ECU60-S Module, on page 260.

Alarm Connectors

The NCS 2006 ECU and ECU-S modules have two SCSI alarm connectors that are used to connect NCS 2006 to support external alarms. The alarm connectors provide dry alarm contacts and are similar to the AIC-I card of the ONS 15454 M12. shelf. The left alarm connector is used for TNC and TNCE relay contact, including Alarm Cut Off (ACO) signal and Digital Input/Output (D-I/O) signals. The right alarm connector is used for Digital Input/Output (D-I/O) signals. To export alarms from the NCS 2006 shelf to a third party device, use the output pins of either the right alarm connector or the left alarm connector.

When external controls are not provisioned, 14 external input alarms are available. Input alarm 11 and input alarm 12 are available on the left side connector; input alarm 13 and input alarm 14 are available on the right side connector.

When external controls are provisioned, only 10 external input alarms are available.

Note In a multishelf configuration, alarms on the subtended shelves cannot be extended through the node controller.

See Table 6-2 and Table 6-3 for pin details of the alarm connectors.

Note ECU60-S does not support alarm connections.

Passive Unit Inventory Interfaces

The passive unit inventory interfaces (USB ports) are used to retrieve inventory information from passive devices such as fiber trays, FBG DCU, patch panels, passive multiplexer or demultiplexer, and so on. There are 12 USB ports on the NCS 2006 ECU module. The inventory details are displayed in the Inventory tab in CTC.

The USB 3.0 port delivers power to the NCS2K-MF-6RU or the NCS2K-MF10-6RU unit when they are connected to the NCS 2006 ECU-S.

Note The 12 passive inventory ports on the NCS 2006 ECU module are labeled 1 to 12. However, CTC represents the passive inventory ports as USBP_SIDE_PORT, where SIDE can be A or B, and PORT can be any value from 1 to 12. For example, Port 1 on the left side of the ECU module is represented as USBP_A_1 and Port 1 on the right side of the NCS 2006 ECU module is represented as USBP_B_ 1. The left side of the NCS 2006 ECU module is Side A and the right side of the NCS 2006 ECU module is Side B.

Note The 8 passive inventory USB 2.0 ports on the NCS 2006 ECU-S module are labeled 1 through 4 and 7 through 10. The USB 3.0 port on the left of the faceplate is detected as A5. The USB 3.0 port on the left of the faceplate is detected as B5. However, CTC represents the passive inventory ports as USBP_SIDE_PORT, where SIDE can be A or B, and PORT can be any value from 1 to 5. For example, Port 1 on the left side of the ECU-S module is represented as USBP_A_1 and Port 1 on the right side of the NCS 2006 ECU-S module is represented as USBP_B_ 1. The left side of the NCS 2006 ECU-S module is Side A and the right side of the NCS 2006 ECU-S module is Side B.

VoIP or UDC

VoIP or UDC is an RJ45 port that can be configured to support UDC or VoIP service on an NCS 2006 shelf. There are two VoIP or UDC ports on the NCS 2006 ECU and ECU-S modules. The VoIP or UDC port on the left side is connected to the TNC or TNCE card in Slot 1 and the port on the right side is connected to the TNC or TNCE card in Slot 8. The VoIP or UDC port also supports Power over Ethernet for connecting VoIP equipments.

Note POE functionality is not available for the VOIP ports of ECU60-S.

MSM

The multishelf management (MSM) port is an RJ-45 port that is used to connect the NCS 2006 shelf to other NCS 2006 or NCS 2006 shelves that are a part of the multishelf configuration. There are six MSM ports on the NCS 2006 ECU and ECU-S modules—three ports on the left side and three ports on the right side. The MSM ports on the left side correspond to the TNC/TNCE/TSC/TSCE card in Slot 1, and those on the right side correspond to the TNC/TNCE/TSC/TSCE card in Slot 8. Three MSM ports are used as working ports, and the remaining three are used as standby ports.

Timing Connections

The NCS 2006 ECU and ECU-S modules have four Building Integrated Timing Supply (BITS) connections that support both ETSI and ANSI connections. There are two BITS-IN and two BITS-OUT connections that can either be SMB connectors for ETSI connection or wire-wrap pins for ANSI connection, based on customer requirements. The BITS-IN ports receive input from third-party external sources called Synchronization Supply Unit (SSU) to synchronize the timing of the NCS 2006 shelf. The BITS-OUT ports provide output to external devices (other Cisco or third-party shelves) to synchronize the timing signals with the NCS 2006 shelf.

Note For timing connection, use 100 ohm shielded BITS clock cable pair #22 or #24 AWG (0.51 mm^2 [0.020 inch] or 0.64 mm^2 [0.0252 inch]), twisted-pair T1-type.

Note See Telcordia SR-NWT-002224 for rules about provisioning timing references.

NTP-L8 Install the NCS 2006 ECU and ECU-S Modules

Purpose	This procedure installs the ECU and ECU-S modules (ECU, ECU2, ECU-S, or ECU60-S) in the NCS 2006 shelf.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution **The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT metallically connect to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.** Statement 7005

Warning **To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the serial high-speed WAN interface ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.** Statement 7003

Warning **The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT metallically connect to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.** Statement 7018

Warning **Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security.** Statement 1072

Caution Always use the supplied ESD wristband when working Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Note If the USB device connected to the NCS 2006 ECU or ECU-S module is not detected when the NCS 2006 shelf assembly is powered on, plug out (remove) the NCS 2006 ECU or ECU-S module and insert it again.

Procedure

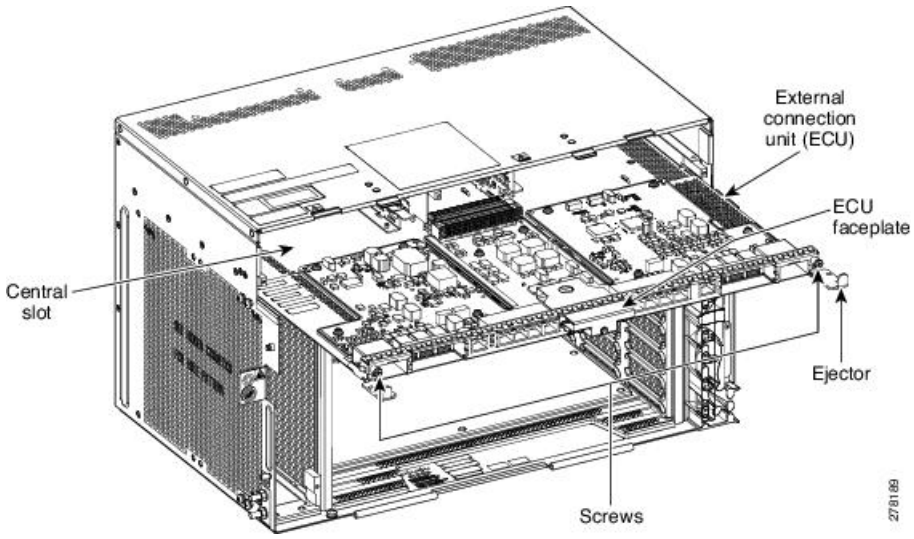
Step 1 Insert the NCS 2006 ECU or ECU-S module in the central slot of the chassis (see the figure below).

Step 2 Push the NCS 2006 ECU or ECU-S module such that the backplane connector is completely engaged and the faceplate of the NCS 2006 ECU or ECU-S module aligns with the edge of the chassis side wall.

Step 3 Tighten the screws to a torque value of 4 in-lb (0.45 N-m).

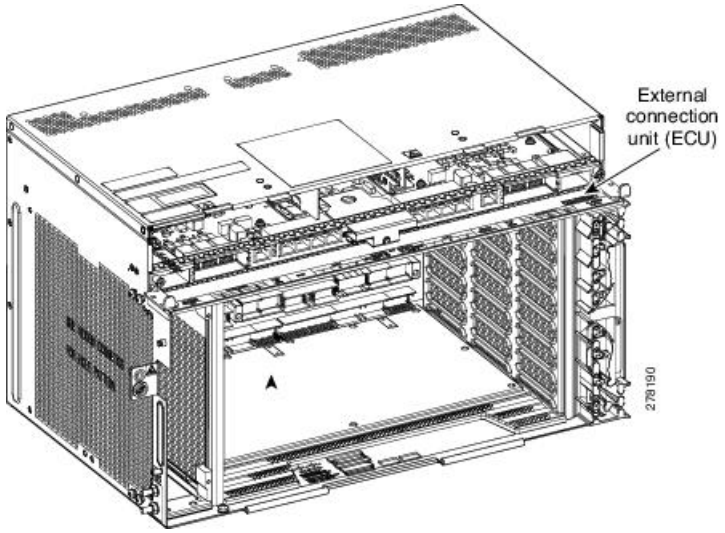
Stop. You have completed this procedure.

Figure 187: Installing the NCS 2006 ECU module



The following figure shows the ECU module installed in the NCS 2006 shelf.

Figure 188: NCS 2006 Shelf with ECU module Installed



NTP-L66 Upgrading to NCS 2006 ECU60-S Module

Caution Always use the supplied ESD wristband when working with a powered NCS 2006. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Note Do not replace the NCS2006-DC20, or NCS2006-DC40 power modules with the NCS2006-DC V03 power module if the NCS2006 shelf is consuming more than 960 W of power. Refer to table A-4 to ascertain the power consumption of the shelf.

Procedure

Step 1 Power down the NCS 2006 shelf.

Step 2 Remove the NCS2006-DC20 or NCS2006-DC40 DC power module from the NCS 2006 shelf.

Step 3 Install the NCS2006-DC V03 DC Power Module in the NCS 2006 shelf as described in DLP-L15 Installing the DC Power Module in the NCS 2006 Shelf, on page 266.

Step 4 Remove the ECU module (ECU/ECU-2/ECU-S) from the NCS 2006 shelf.

Step 5 Install the ECU60-S module in the NCS 2006 shelf as described in NTP-L8 Install the NCS 2006 ECU and ECU-S Modules, on page 258 .

Step 6 Power on the NCS2006-DC V03 power module as described in NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194 .

Stop. You have completed this procedure.

Power Modules

The NCS 2006 system contains pluggable and redundant power modules for AC and DC power. The AC and DC power modules cannot be used simultaneously to power the NCS 2006 system. Before installing the power module, verify the position of the mechanical locking system on the rear side of the chassis. To insert the AC power module, the screw must be close to the AC silk-screen text; to insert the DC power module the screw must be close to the DC silk-screen text.

AC Power Module

The NCS 2006 system can be powered by redundant AC power lines

The AC power module converts the AC-input current to DC-output current. There are two separate AC power modules, however a single AC power module can power the entire NCS 2006 system.

Each AC power module has one AC single-phase 3 poles (line L, Neutral N, and Protective Earth PE) input connector.

The AC power module has a dual color (red and green) LED on the faceplate. When the AC power line is not connected, the LED is OFF. Green LED indicates that the AC power line is connected and the power module is functioning properly. Red LED indicates that the AC power line is connected but an alarm is present due to a secondary fuse break (48 V DC) or AC module fan failure. The shelf controller card controls the conditions that result in triggering the LEDs. The LED can be overwritten by the shelf controller card (TNC, TNCE, TSC, or TSCE) in all the three states (OFF/red/green). The AC power module supports the lamp test procedure. The AC power module has fans that are directly powered by the module. The fans cool the module and

guarantees proper operation across the complete operating temperature or output power range. These fans contain replaceable air-filters

DC Power Module

The NCS 2006 system can be powered by redundant DC power modules or a single DC power module. The supported DC power modules on the NCS 2006 shelf are NCS2006-DC, NCS2006-DC20, and NCS2006-DC40. The DC power module draws power from the batteries to turn on the NCS 2006 shelf.

Note When the NCS 2006 shelf is powered at –60 VDC (nominal), only the TNC, OPT-AMP-C, OPT-AMP-17-C, OPT-EDFA-17, OPT-EDFA-24, 17 SMR9 FS, 24 SMR9 FS, 34 SMR9 FS, SMR20 FS, SMR20 FS CV, 12-AD-FS, 16-AD-FS, 100GS-CK-LC, and MR-MXP cards, and the NCS2006-ECU-60 can be installed.

The NCS2006-DC40 power module is required to accommodate up to four 100GS-CK-LC cards in a NCS 2006 shelf.

For the NCS2006-DC20 power module, the power consumption of the NCS 2006 shelf (including ancillaries, controller cards, and line cards) is limited to 960 W. A new line card will not boot up when it is installed in the NCS 2006 shelf, if it causes the power consumption of the shelf to exceed 960 W. The PWR-CON-LMT alarm is raised in the Alarms tab in CTC when the installation or pre-provisioning of a card causes the power consumption to exceed the limit of 960 W.

For the NCS2006-DC40 power module, the power consumption of the NCS 2006 shelf (including ancillaries, controller cards, and line cards) is limited to 1920 W. A new line card will not boot up when it is installed in the NCS 2006 shelf, if it causes the power consumption of the shelf to exceed 1920 W. The PWR-CON-LMT alarm is raised in the Alarms tab in CTC when the installation or pre-provisioning of a card causes the power consumption to exceed the limit of 1920 W.

Note The total power consumption of the shelf is calculated by the controller card and displayed in CTC in the Provisioning > Power Monitor tab. For details about power calculation, see the .

Each DC power module has:

- One input battery connector (three poles) —VBAT, VRET, and FGnd for ETSI installation
- Terminal block connector with VBAT and VRET for installation

The DC power module has a dual color (red and green) LED on the faceplate. When the battery is not connected, the LED is OFF. Green LED indicates that the battery is connected and the power module functions properly. Red LED indicates that the battery is connected but an alarm is present due to secondary fuse break (48 V). The DC power module does not support the lamp test procedure.

Changing the DC Power Module

It is possible to change the power modules from NCS2006-DC20 to NCS2006-DC and vice-versa, without powering down the NCS 2006 system. While changing the power modules, ensure that only one power module is replaced at a time and the other power module continues to supply power to the shelf. However, during regular operation of the node, the NCS 2006 shelf must have the NCS2006-DC20, NCS2006-DC, or NCS2006-DC40 power module. See DLP-L16 Replacing NCS2006-DC With NCS2006-DC20 Power Module,

on page 269 and DLP-L17 Replacing NCS2006-DC20 With NCS2006-DC Power Module, on page 270 for changing the power modules.

Power Filler Module

For redundant power supplies, two AC or DC power modules can be installed in Slot A and Slot B of the NS 2006 shelf. However, only one power module can sustain the functioning of the entire NCS 2006 system. In that case, insert a power filler module in the empty slot.

NTP-L9 Installing the Power Modules in the NCS 2006 Shelf

Purpose	This procedure installs the power modules in the NCS 2006 system.
Tools/Equipment	#2 Phillips screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **The plug-socket combination must be accessible at all times because it serves as the main disconnecting device.** Statement 1019

Procedure

Step 1 Complete the necessary task as applicable:

- DLP-L14 Installing the AC Power Module in the NCS 2006 Shelf, on page 264
- DLP-L15 Installing the DC Power Module in the NCS 2006 Shelf, on page 266
- DLP-L16 Replacing NCS2006-DC With NCS2006-DC20 Power Module, on page 269
- DLP-L17 Replacing NCS2006-DC20 With NCS2006-DC Power Module, on page 270

Step 2 Complete NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194.

Stop. You have completed this procedure.

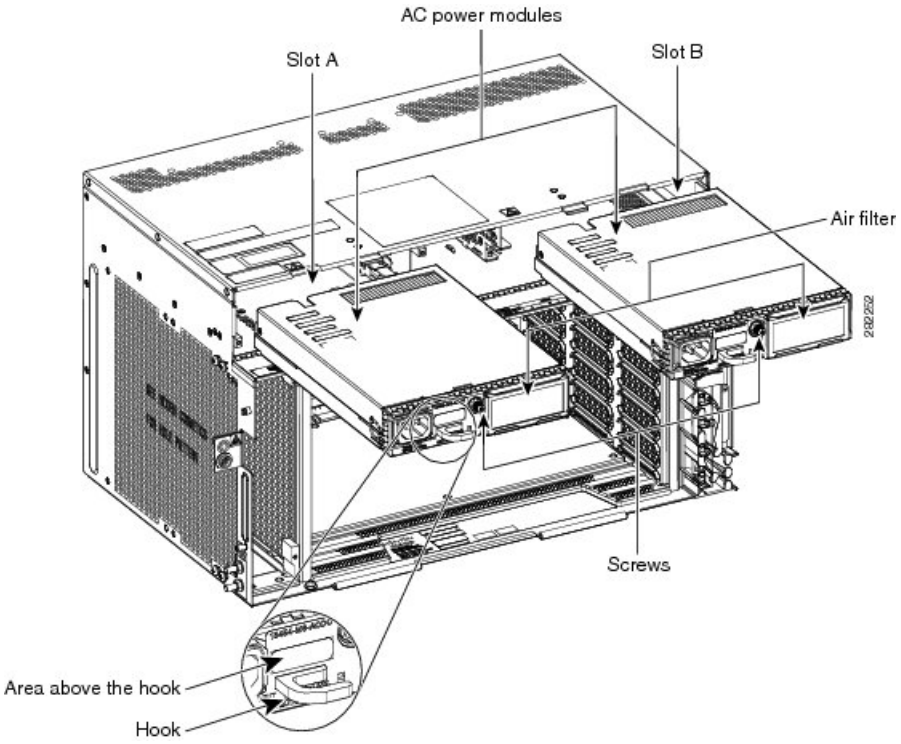
DLP-L14 Installing the AC Power Module in the NCS 2006 Shelf

Purpose	This task installs the NCS2006-AC or 15454-M6-AC2 power module in the NCS 2006 system.
Tools/Equipment	#2 Phillips screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Tip Insert the AC power module in Slot A or Slot B, or both (see the figure below).

Note While inserting the AC power module, apply insertion force only above the hook and not on the air filter (see the figure below).

Figure 189: Installing the AC Power Modules



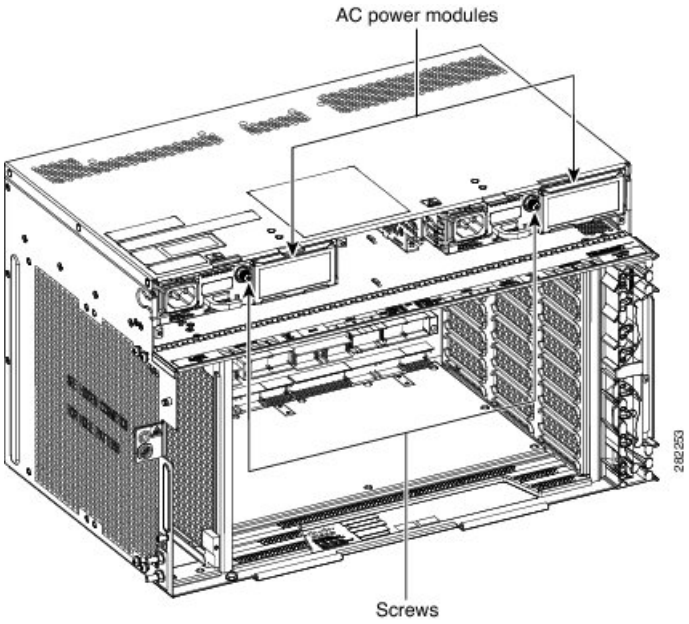
Procedure

Step 1 Plug the AC power module completely into the chassis.

Step 2 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the power module in the chassis (see the figure below).

Note
For redundant power supplies, two AC power modules can be installed in Slot A and Slot B. However, only one power module can sustain the functioning of the entire NCS 2006 system. In that case, insert a power filler module in the empty slot (for example, see the figure below).

Figure 190: AC Power Modules Installed in the NCS 2006 Shelf



Step 3 Return to your originating procedure (NTP).

DLP-L15 Installing the DC Power Module in the NCS 2006 Shelf

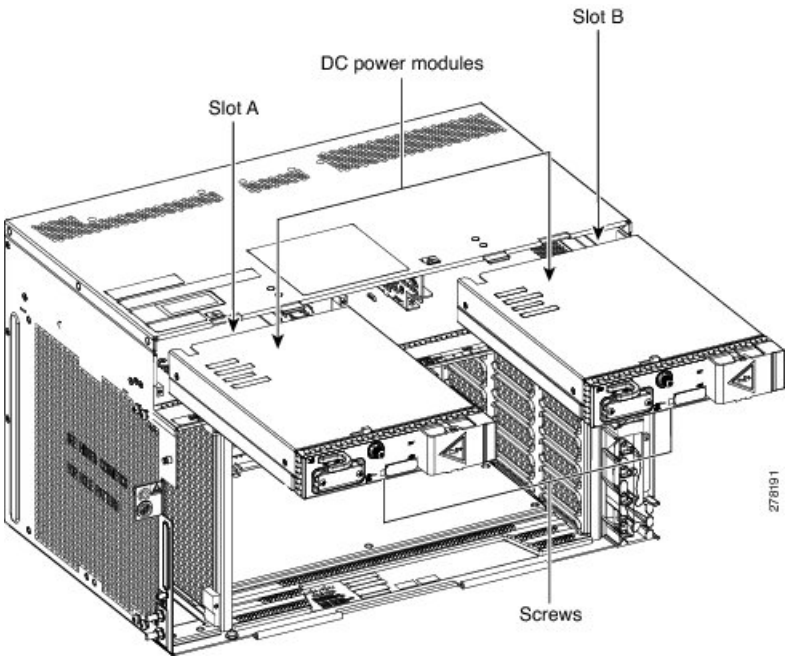
Purpose	This procedure installs the NCS2006-DC, NCS2006-DC20, or NCS2006-DC40 DC power module in the NCS2006 system.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution While changing the power modules from NCS2006-DC20 to NCS2006-DC and vice-versa, the NCS 2006 shelf can temporarily work with both NCS2006-DC and NCS2006-DC20 power modules installed. However, during regular operation, the shelf must either have the NCS2006-DC or NCS2006-DC20 power module, but not both.

Procedure

Step 1 Insert the DC power module in Slot A or Slot B (or both) (see the figure below).

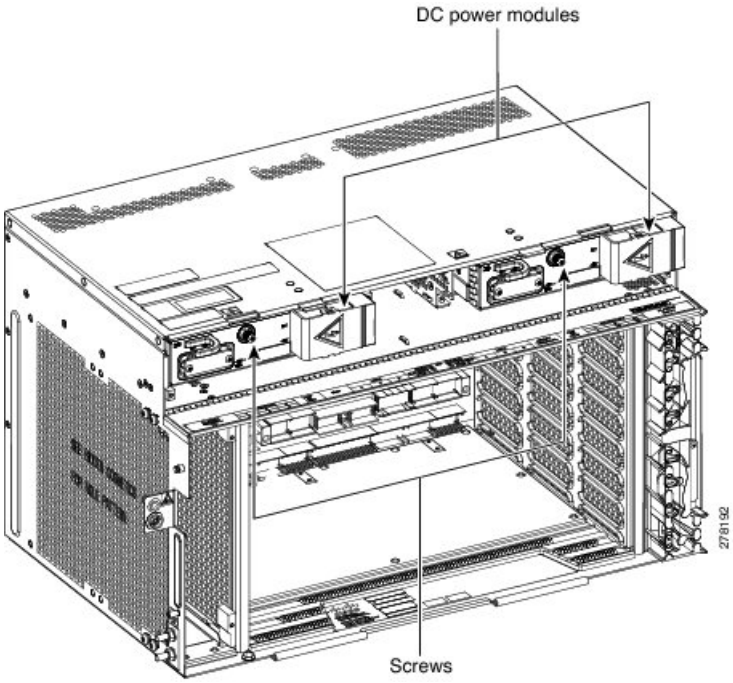
Figure 191: Installing the DC power module



Step 2 Plug the DC power module completely into the chassis.

Step 3 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the power module in the chassis (see Figure 4-30).

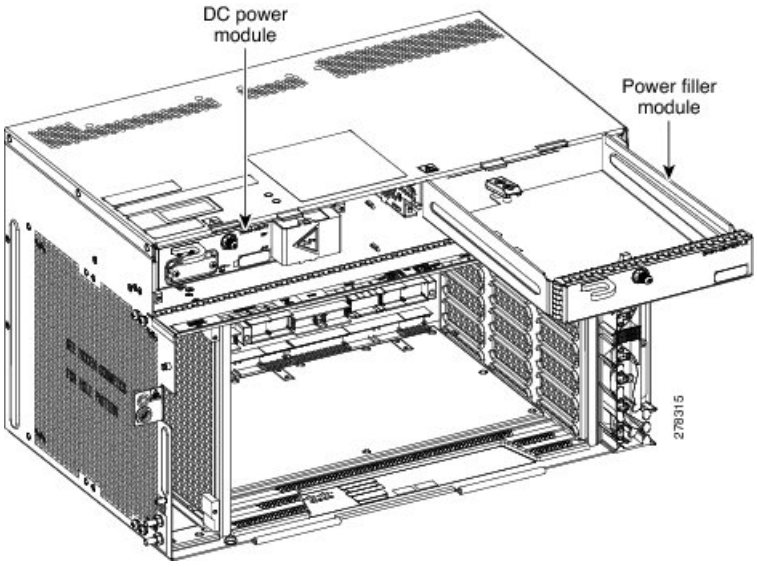
Figure 192: DC Power Modules Installed in the NCS 2006 Shelf



Note
For redundant power supplies, two DC power modules can be installed in Slot A and Slot B. However, only one power module can sustain the functioning of the entire NCS 2006 system. In that case, insert a power filler module in the empty slot.

The following figure shows a DC power module installed in Slot A and a power filler module installed in Slot B.

Figure 193: Installing a Power Filler Module



Step 4 Return to your originating procedure (NTP).

Note
When the NCS 2006 shelf is powered at –60 VDC (nominal), only the TNC, OPT-AMP-C, OPT-AMP-17-C, OPT-EDFA-17, and OPT-EDFA-24 cards, and the NCS2006-ECU-60 can be installed.

DLP-L16 Replacing NCS2006-DC With NCS2006-DC20 Power Module

Purpose	This procedure replaces the NCS2006-DC with NCS2006-DC20 power module.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note The procedure to replace the NCS2006-DC power module with NCS2006-DC40 power module is the same as this procedure. The NCS2006-DC40 power module uses NCS2006-DCCBL2-L= and NCS2006-DCCBL2-R= cables.

Note Do not replace the NCS2006-DC with the NCS2006-DC20 power module if the NCS2006 shelf is consuming more than 960 W of power. Refer to table A-4 to ascertain the power consumption of the shelf.

Caution While changing the power modules from NCS2006-DC20 to NCS2006-DC and vice-versa, the NCS 2006 shelf can temporarily work with both NCS2006-DC and NCS2006-DC20 power modules installed. However, during regular operation, the shelf must either have the NCS2006-DC or NCS2006-DC20 power module, but not both.

Caution Always use the supplied ESD wristband when working with a powered NCS 2006. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Procedure

Step 1 Disconnect the power source and remove the power connections from the standby power module (installed in slot B).

Step 2 Unscrew the holding screw that secures the NCS2006-DC power module.

Step 3 Pull the NCS2006-DC power module clear from the NCS 2006 chassis.

Step 4 Install the NCS2006-DC20 power module as described in the DLP-L15 Installing the DC Power Module in the NCS 2006 Shelf, on page 266.

Step 5 Install power on the NCS2006-DC20 power module as described in the NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194.

Note
While replacing the power modules, do not provision or install any line cards when the NCS 2006 chassis is in the mixed power mode. Card provisioning and installation must be done only after both the slots have the same type of power modules.

Step 6 Perform the Steps 1 to 5 for the active power module (installed in slot A).

Note
To ensure that the controller card is calculating the shelf power consumption correctly, reset the controller card. For details about performing card reset, see the "NTP-G106 Reset Cards Using CTC" procedure in the *Cisco NCS 2000 Series Network Configuration Guide*. If the power consumption of the shelf is exceeding 960 W, the PWR-CON-LMT alarm is raised. Either revert to the NCS2006-DC power module or remove and deprovision the existing line cards to reduce the load.

Step 7 Return to your originating procedure (NTP).

DLP-L17 Replacing NCS2006-DC20 With NCS2006-DC Power Module

Purpose	This procedure replaces the NCS2006-DC20 with NCS2006-DC power module.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239.
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note The procedure to replace the NCS2006-DC20 power module with NCS2006-DC40 power module is the same as this procedure. The NCS2006-DC40 power module uses NCS2006-DCCBL2-L= and NCS2006-DCCBL2-R= cables.

Caution While changing the power modules from NCS2006-DC20 to NCS2006-DC and vice-versa, the NCS 2006 shelf can temporarily work with both NCS2006-DC and NCS2006-DC20 power modules installed. However, during regular operation, the shelf must either have the NCS2006-DC or NCS2006-DC20 power module, but not both.

Caution Always use the supplied ESD wristband when working with a powered NCS 2006. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Procedure

Step 1 Disconnect the power source and remove the power connections from the standby power module (installed in slot B).

Step 2 Unscrew the holding screw that secures the NCS2006-DC20 power module.

Step 3 Pull the NCS2006-DC20 power module clear from the NCS2006 chassis.

Step 4 Install the NCS2006-DC power module as described in the DLP-L15 Installing the DC Power Module in the NCS 2006 Shelf, on page 266.

Step 5 Install power on the NCS2006-DC power module as described in the NTP-L12 Installing Power and Ground to the NCS 2006 Shelf , on page 194.

Note
While replacing the power modules, do not provision or install any line cards when the NCS 2006 chassis is in the mixed power mode. Card provisioning and installation must be done only after both the slots have the same type of power modules.

Step 6 Perform Steps 1 to 5 for the active power module (installed in slot A).

Step 7 Return to your originating procedure (NTP).

LCD Unit

The LCD unit consists of an LCD display panel, push button, and shelf-level LED indicators on the NCS 2006 system. A backup flash memory is fitted into the LCD unit to support the database (DB) and image backup in the operation of the NCS 2006.

The shelf controller card (TSC, TSCE, TNC, or TNCE) powers the 16 x 2 character LCD screen. The LCD screen displays the shelf name, shelf IP address, and software version currently used. The LCD screen also provides slot-level and port-level information of all card slots, including the number of critical, major, and minor alarms. The display contrast is automatically adjusted for a clearer view. The three accessible push buttons (SLOT, STATUS, and PORT) on the LCD unit are used to set parameters at the slot-level and port-level. There are three alarm LEDs (CRIT, MAJ, and MIN) on the LCD unit that indicate whether a critical, major, or minor alarm is present anywhere on the NCS 2006 shelf. The shelf controller card controls the conditions

that result in triggering the LEDs. The LEDs can be overwritten by the shelf controller card (TNC, TNCE, TSC, or TSCE) in all the three states (OFF/red/green). The LCD unit supports the lamp test procedure and the LEDs changes its color or state.

Note If the LCD unit is removed from the shelf, wait for at least 5 seconds before plugging it back into the shelf. In the event the LCD display appears blank, remove the unit from the shelf, wait for at least 5 seconds and reinsert the unit into the shelf.

The LCD module must be present in the NCS 2006 shelf to:

- Provision the ECU module, fan-tray assembly, or power modules.
- Retrieve alarms from the ECU module, fan-tray assembly, or power modules.

NTP-L10 Installing the LCD Module in the NCS 2006 Shelf

Purpose	This procedure installs the LCD module in the NCS 2006 system.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

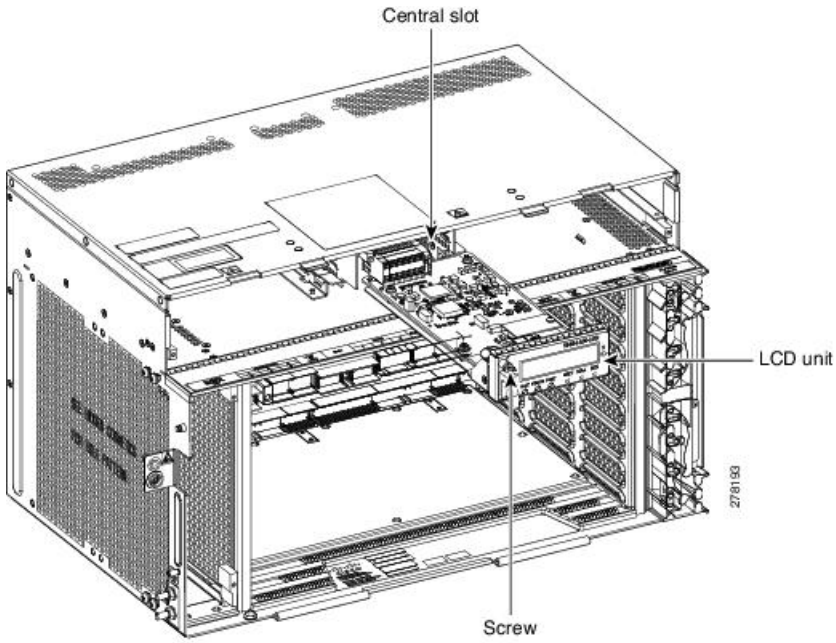
Note If the LCD unit is removed from the shelf, wait for at least 5 seconds before plugging it back into the shelf. In the event the LCD display appears blank, remove the unit from the shelf, wait for at least 5 seconds and reinsert the unit into the shelf.

Procedure

Step 1 Insert the LCD module in the central slot (between the power slots) of the chassis (see the figure below).

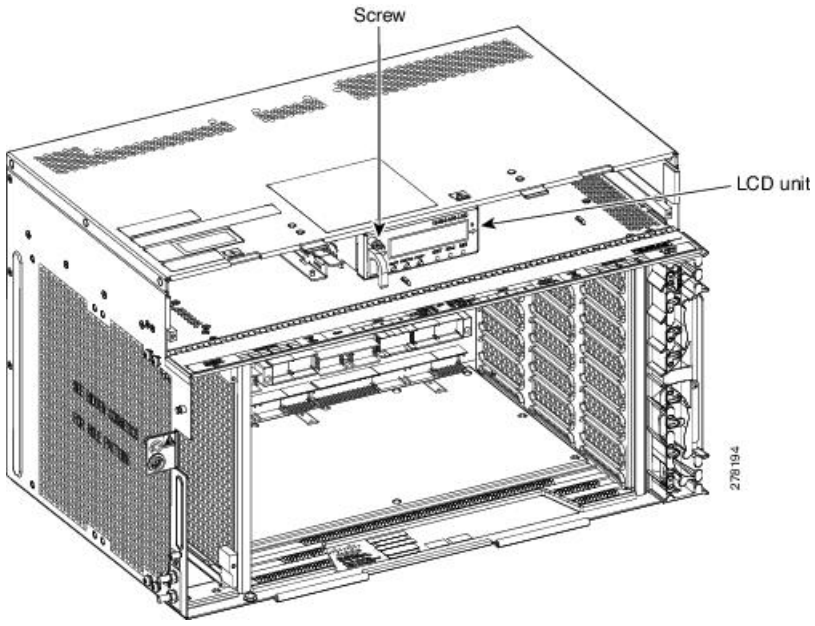
Step 2 Push the LCD module into the chassis such that the backplane connector is completely engaged (see the figure below).

Figure 194: Installing the LCD Module



Step 3 Tighten the screw to a torque value of 4 in-lb (0.45 N-m) to lock the unit (see the figure below).

Figure 195: LCD Module Installed in the NCS 2006 Shelf



Stop. You have completed this procedure.

Fan-Tray Assembly

The fan-tray supported on the NCS 2006 shelf is NCS2006-FTA.

The fan-tray assembly is located on the left side of the NCS 2006 shelf. The fan-tray is removable and holds the fan-control circuitry and the fans for the NCS 2006 shelf. It has a single dual-color LED on the faceplate. When the fan-tray assembly is not functioning or when the power line is not connected, the LED is OFF. When the power line is connected and if there is no TNC, TNCE, TSC, or TSCE card installed in the NCS2006 shelf, then the LED is OFF. A red LED indicates an alarm in the fan-tray assembly. A green LED indicates that the fan-tray assembly is functioning, the power line is connected, and the power module is functioning properly. The shelf controller card controls the conditions that result in triggering the LEDs. The LED can be overwritten by the shelf controller card (TNC, TNCE, TSC, or TSCE) in all the three states (OFF/red/green). The fan-tray assembly supports the lamp test procedure. After you install the fan tray, you should only access it if a fan failure occurs.

Fan Speed

The fan speed is controlled by the TNC, TNCE, TSC, or TSCE card temperature sensors. The sensors measure the input air temperature at the fan-tray assembly. Fan speed options are low, medium, and high. If the TNC, TNCE, TSC, or TSCE card fails, the fans automatically shift to high speed. The temperature that the TNC, TNCE, TSC, or TSCE sensors measure appear on the LCD screen.

Fan Failure

If one or more fans fail on the fan-tray assembly, replace the entire assembly. You cannot replace individual fans. The red Fan Fail LED on the front of the fan-tray illuminates when one or more fans fail. The red Fan Fail LED clears after you install a working fan-tray.

NTP-L11 Installing the Fan-Tray Assembly in the NCS 2006 Shelf

Purpose	This procedure installs the NCS2006-FTA fan-tray assembly in the NCS 2006 system.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	• NTP-L2 Mounting the Brackets in ANSI Configuration , on page 159. • NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not operate an NCS 2006 without an air filter.

Caution Do not force a fan-tray assembly into place. Doing so can damage either the connectors on the fan tray or the connectors on the backpanel of the shelf, or both.

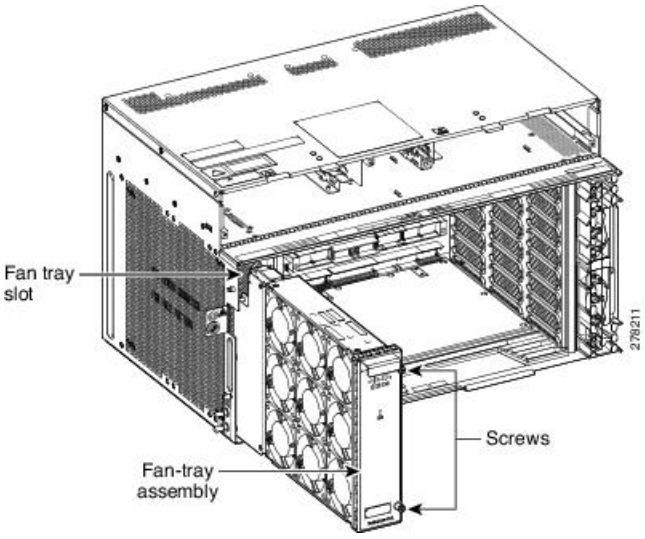
Note Error messages appear on the TNC, TNCE, TSC, or TSCE card, the fan-tray LED, and in the Cisco Transport Controller (CTC) when the fan-tray assembly is removed from the shelf or when one fan is not working.

Note To install the fan-tray assembly, it is not necessary to move any of the fiber-routing facilities.

Procedure

Step 1 Insert the fan-tray assembly inside the left slot (fan tray slot) of the NCS 2006 chassis (see the figure below).

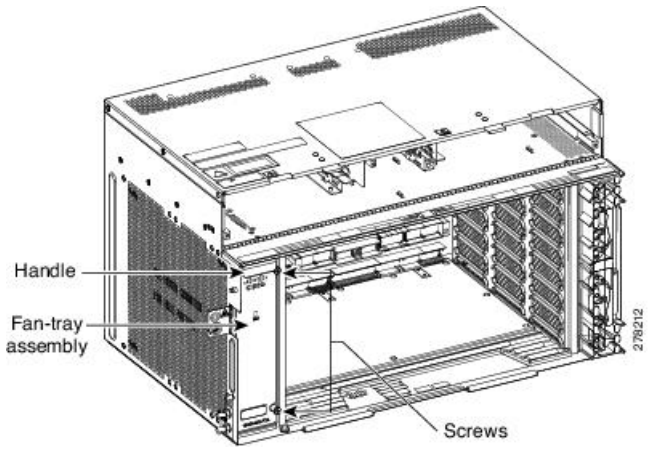
Figure 196: Installing the Fan-Tray Assembly



Step 2 Push the fan-tray assembly such that the backplane connector is engaged completely.

Step 3 Tighten the screws to a torque value of 4 in-lb (0.45 N-m) to lock the fan-tray assembly into the chassis (see the figure below).

Figure 197: Fan Tray Assembly Installed



Step 4 To verify that the tray has plugged into the assembly, check the fan tray and listen to determine if the fans are running.

Stop. You have completed this procedure.

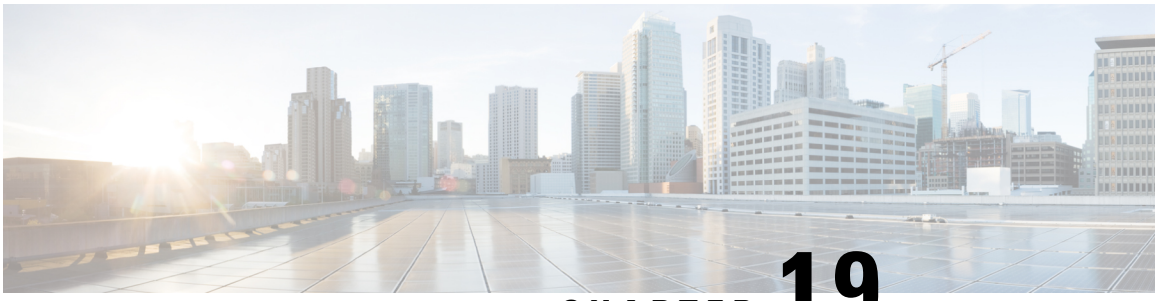
Air Filter

The NCS 2006 contains a preinstalled disposable air filter (15454-M6-FTF=) on the right side of the shelf.

The disposable filter is made up of a gray, open-cell, polyurethane foam that is specially coated to provide fire and fungi resistance. Spare filters should be kept in stock. Inspection of the air filter must be performed as specified in your local site practices.

Note Inspect the air filters every three months and replace them as needed. Air filters should be disposed of and replaced when they become dirty. According to NEBS guidelines, washing or cleaning them is not allowed. Make sure to order these consumable items separately and keep a spare stock. For PID identification, contact TAC, as these parts cannot be replaced through the RMA process.

Caution Do not operate an NCS 2006 without the mandatory air filter.



CHAPTER 19

NCS 2015 Installation Overview

This chapter provides an overview of NCS 2015 installation.

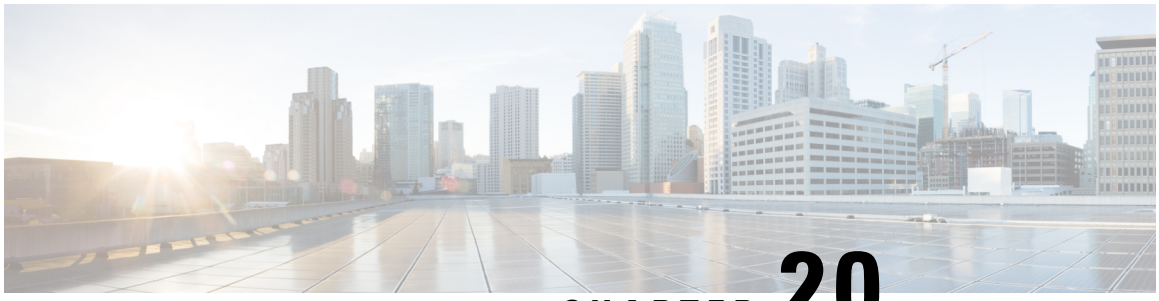
- NCS 2015 Installation Overview, on page 277

NCS 2015 Installation Overview

This chapter includes these sections:

- Mounting the Brackets on the NCS 2015 Shelf
- Mounting the Cisco NCS 2015 Shelf
- Connecting Power and Ground
- Connecting and Routing the Cables
- NCS 2015 Shelf Installation Acceptance Test
- Installing the Cisco NCS 2015 Door and Other Modules
- Installing and Configuring the Control Card

NCS 2015 Installation Overview



CHAPTER 20

Mounting the Brackets on the NCS 2015 Shelf

This chapter describes how to mount the brackets on Cisco NCS 2015 shelf.

Caution Use only the fastening hardware provided with the NCS 2015 shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the NCS 2015 shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the NCS 2015 shipping kit, or remove the coating from the threads to ensure electrical continuity.

Warning **Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.** Statement 1048

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 40A and between -40.5 VDC to -57.6 VDC.** Statement 1005

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005

Warning **To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 131°F (55°C).** Statement 1047

Warning **Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

Warning **To prevent airflow restriction, allow clearance around the ventilation openings to be at least:1 inch (25.4 mm)** Statement 1076

Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, a shielded cable must be used to connect to the EMS port. This cable must be less than 30 meters in length and not placed in the 3 meter boundary, as defined in EN50121-4:2006, Table 2, note 1.** Statement 8010

Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, DC power cables must be less than 30 meter long.** Statement 8011

The sections are:

- NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281
- NTP-L49 Mounting Brackets on NCS 2015 Shelf for ETSI Rack Configuration, on page 285

NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration

Purpose	This procedure helps in mounting the brackets on the NCS 2015 shelf for ANSI rack configuration. The mounting brackets can be installed in the middle position of the chassis.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • 10 M4 x 6mm flat-head Phillips screws
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

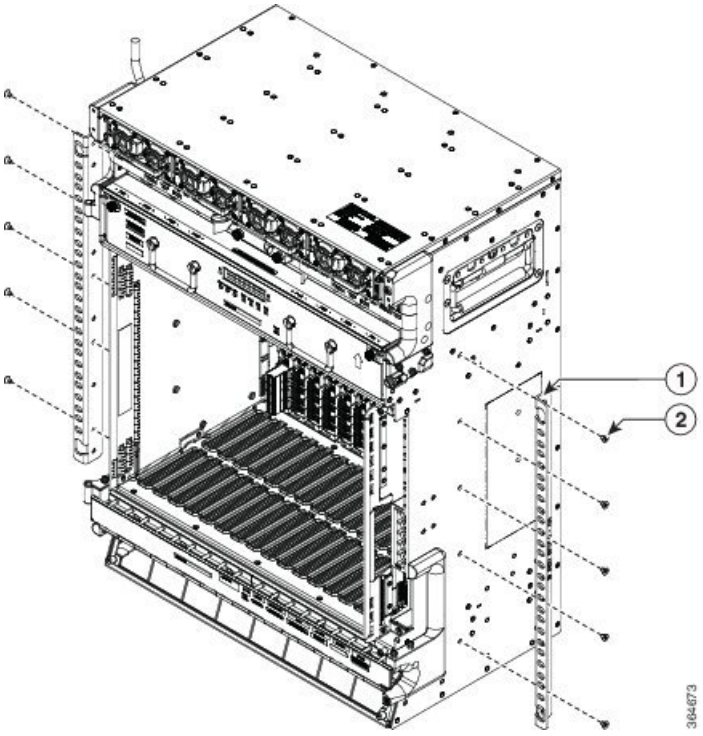
Step 1 Align the mounting bracket screw holes against the shelf screw holes.

Step 2 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

Step 3 Repeat steps 1 and 2 for the mounting bracket on the opposite side.

The following figure shows the mounting of brackets for a 19-inch (482.6-mm) configuration.

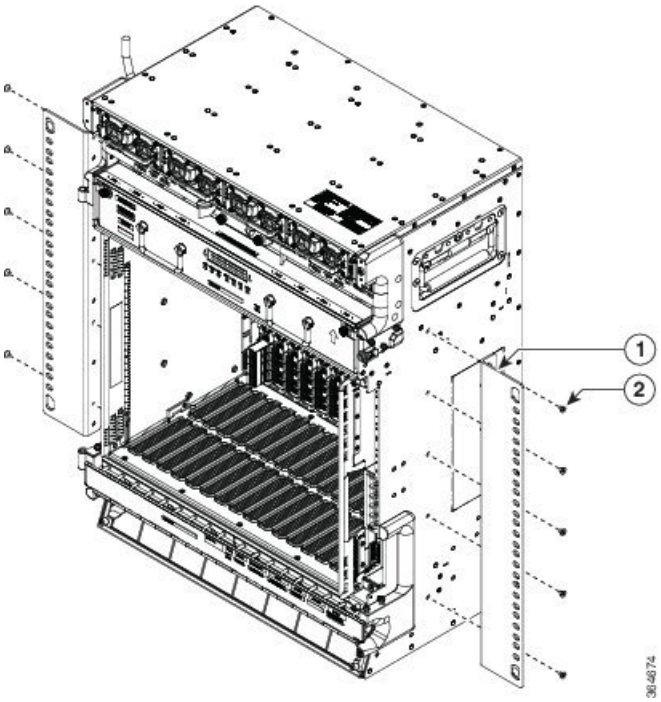
Figure 198: Mounting the Brackets on the NCS 2015 DC Shelf for a 19-inch (482.6-mm) ANSI Configuration



1	Mounting bracket in 19-inch position	2	Screw

The following figure shows the mounting of brackets for a 23-inch (584.2-mm) configuration.

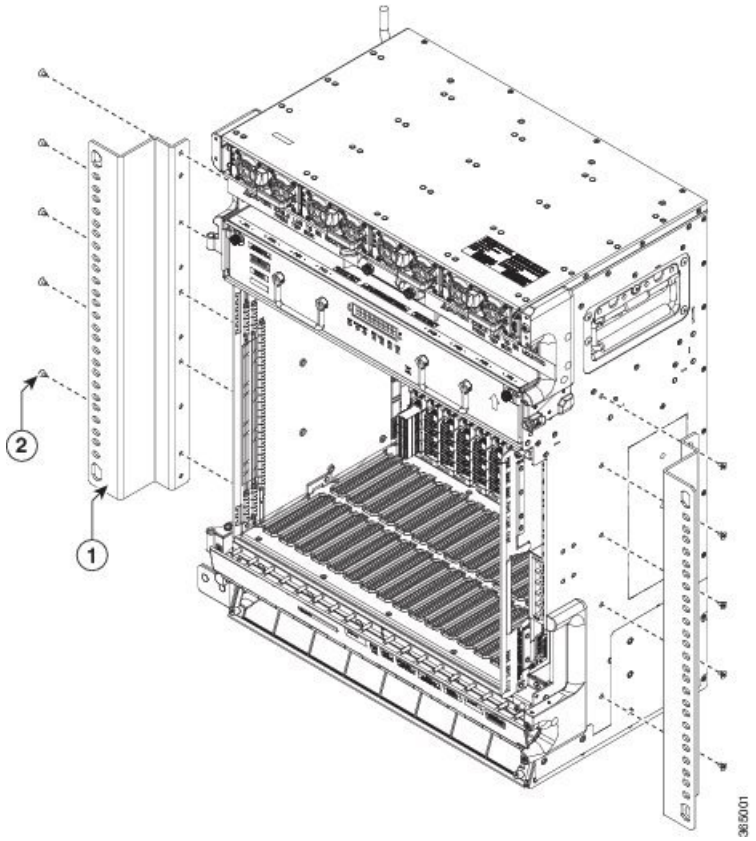
Figure 199: Mounting the Brackets on the NCS 2015 DC Shelf for a 23-inch (584.2-mm) ANSI Configuration



1	Mounting bracket in 23-inch position	2	Screw

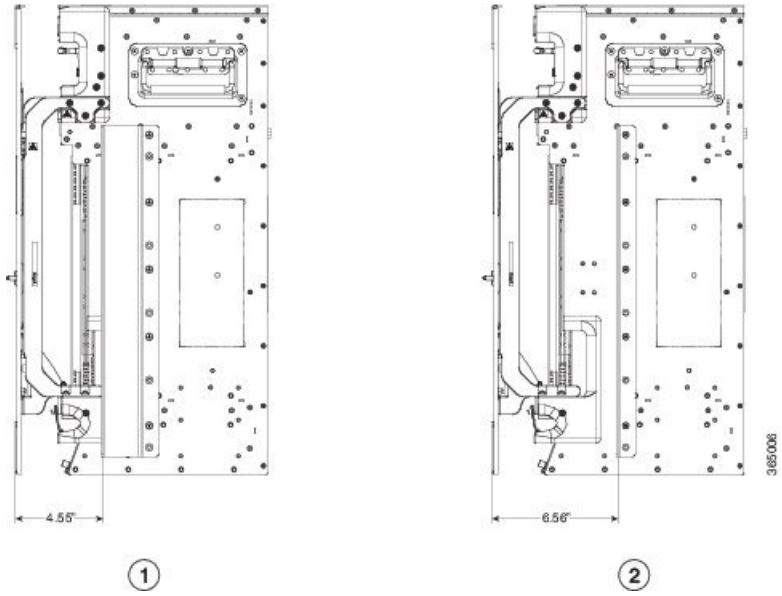
The following figure shows the mounting of Z-brackets for a 23-inch (584.2-mm) configuration.

Figure 200: Mounting the Z-Brackets on the NCS 2015 DC Shelf for a 23-inch (584.2-mm) ANSI Configuration



1	Z-bracket in 23-inch position	2	Screw

Figure 201: Comparison of the Deep Door Extension



1	Deep door extension of 4.55 inches when a 23-inch Z-bracket is used	2	Deep door extension of 6.56 inches when a 23-inch standard bracket is used

Stop. You have completed this procedure.

NTP-L49 Mounting Brackets on NCS 2015 Shelf for ETSI Rack Configuration

Purpose	This procedure helps in mounting the brackets on the NCS 2015 shelf for ETSI rack configuration. The mounting brackets can be installed in the middle position of the chassis.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • 10 M4 x 6 flat-head Phillips mounting screws
Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

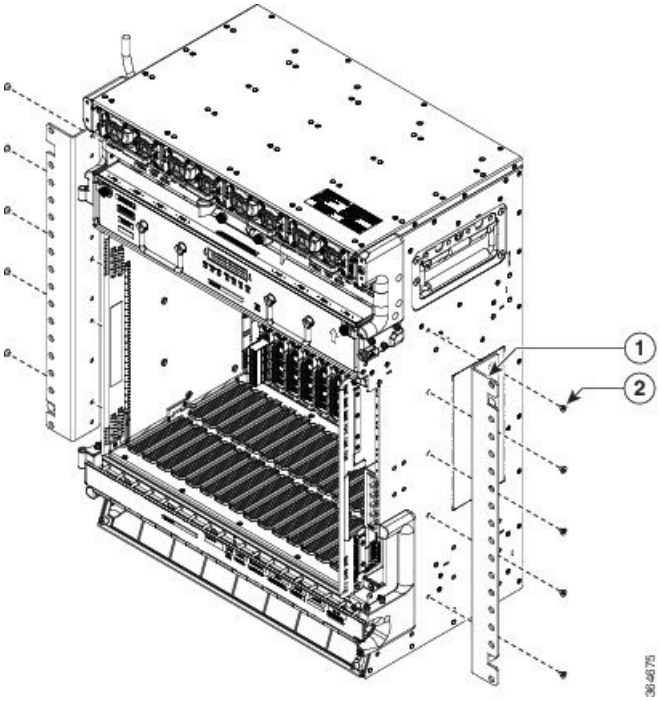
Step 1 Place the mounting bracket flush against the shelf as shown in the figure below.

Step 2 Align the mounting bracket screw holes against the shelf screw holes.

Step 3 Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).

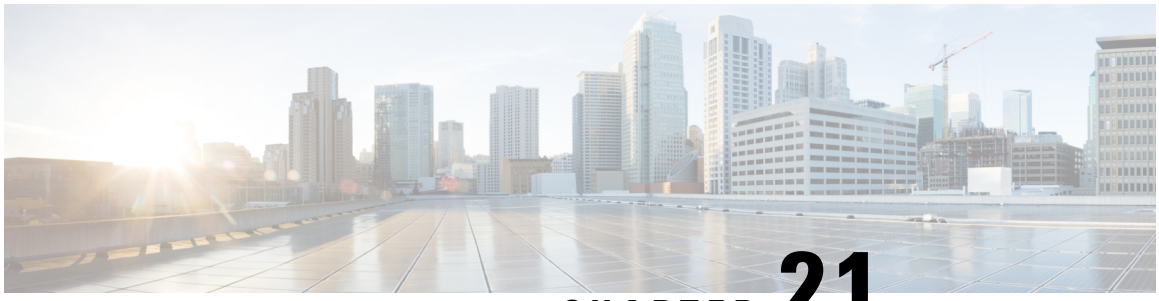
Step 4 Repeat steps 1 through 3 for the mounting bracket on the opposite side.

Figure 202: Mounting the Brackets on the NCS 2015 DC Shelf for ETSI Rack Configuration



1	Mounting bracket	2	Screw

Stop. You have completed this procedure.



CHAPTER 21

Mounting the Cisco NCS 2015 Shelf

This chapter describes how to mount the Cisco NCS 2015 shelf.

The sections are:

- ANSI Rack Installation, on page 287
- ETSI Rack Installation, on page 289
- NTP-L47 Mounting NCS 2015 Shelf, on page 292

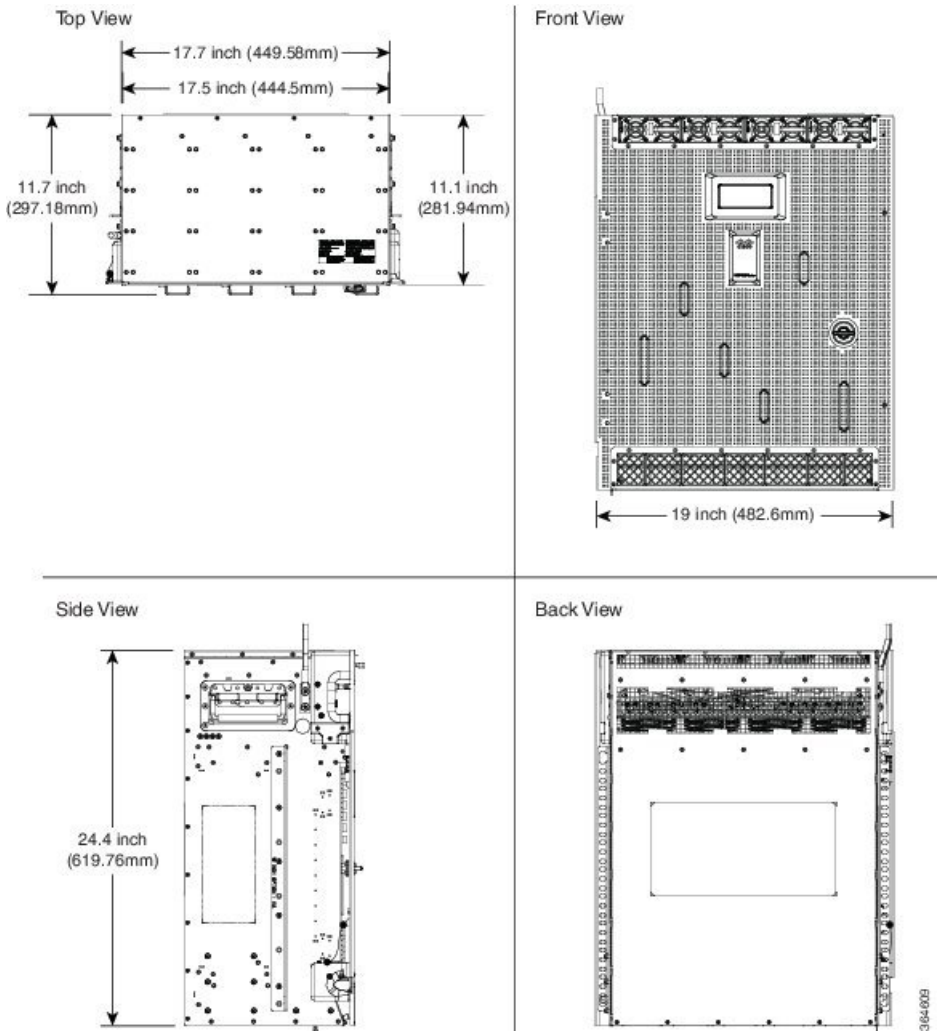
ANSI Rack Installation

The NCS 2015 shelf is mounted on a 19-inch (482.6-mm) or 23-inch (584.2-mm) equipment rack. Make sure that the correct type of 19-inch ANSI rack is used for mounting the NCS 2015 shelf. When the shelf is mounted in the middle position, it projects 4.5 inches (114.3 mm) from the front of the ANSI rack and 4.0 inches (101.6 mm) from the front of the ETSI rack. The shelf mounts in both Electronic Industries Alliance (EIA) standard and Telcordia-standard racks. The shelf is a total of 17.5 inches (431.8 mm) wide with no mounting ears attached.

The NCS 2015 shelf measures 24.4 inches (619.76 mm) high, 17.5 inches (444.5 mm) wide, and 11.7 inches (297.18 mm) deep. You can install up to three NCS 2015 shelves in a 7-foot (2133.6 mm) equipment rack.

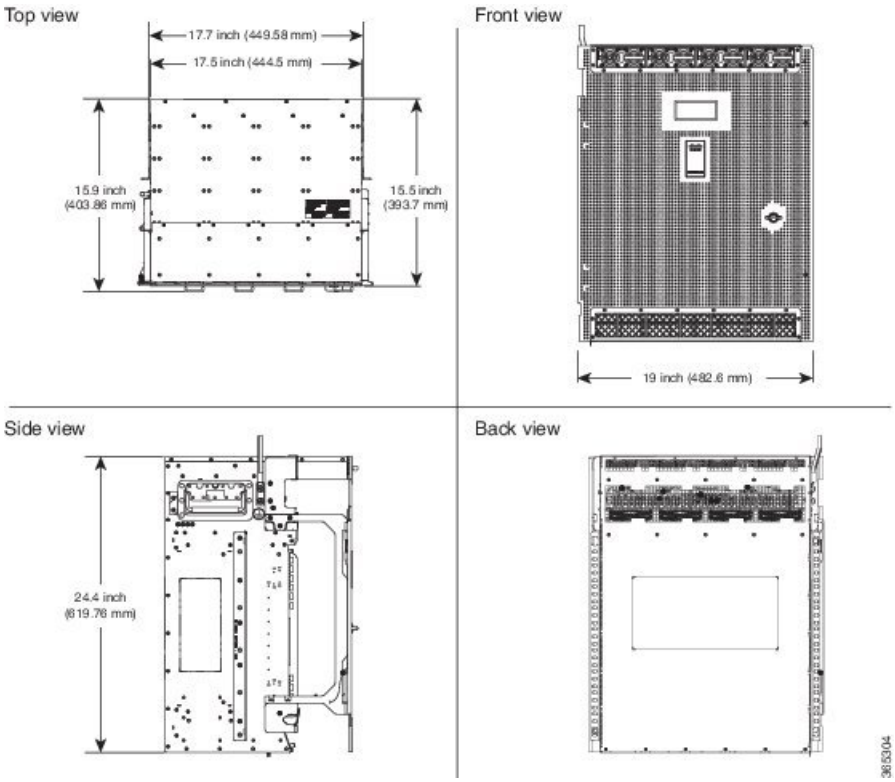
The following figure shows the dimensions of the NCS 2015 DC shelf on a 19-inch (482.6 mm) ANSI rack configuration with brackets mounted in the middle position.

Figure 203: Cisco NCS 2015 DC Shelf Dimensions for a 19-inch ANSI Rack Configuration



The following figure shows the dimensions of the NCS 2015 AC shelf on a 19-inch (482.6 mm) ANSI rack configuration with brackets mounted in the middle position.

Figure 204: Cisco NCS 2015 AC Shelf Dimensions for a 19-inch ANSI Rack Configuration



Mounting a Single Shelf

Mounting the NCS 2015 shelf on a rack requires a minimum of 24.4 inches (619.76 mm) of vertical rack space. To ensure that the mounting is secure, use eight mounting screws for each side of the shelf. For an ANSI rack, the brackets can be mounted in the middle position.

If the NCS 2015 shelf is fully loaded, then two people should install it. For ease of lifting, it is recommended that the shelf be empty.

Mounting Multiple Nodes

Most standard (Telcordia GR-63-CORE, 19-inch (482.6-mm) or 23-inch (584.2-mm) 7-foot (2.133-m) racks can hold three NCS 2015 shelves and a fuse and alarm panel. In an ANSI rack, the brackets can be mounted in the middle position.

The NCS 2015 shelves can be mounted above each other without any space between the shelves.

ETSI Rack Installation

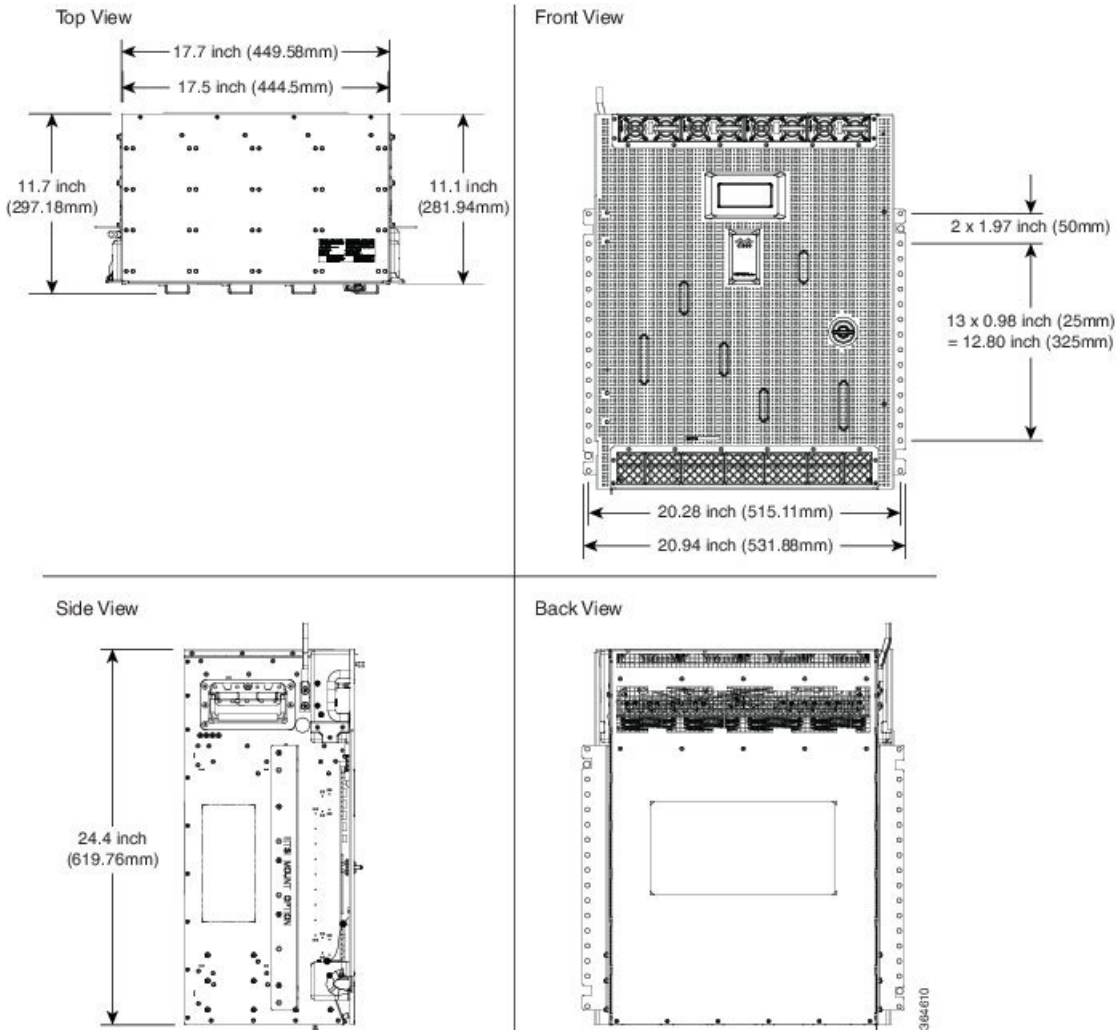
The NCS 2015 shelf can be mounted on a 600 x 300-mm (23.6 x 11.8-inch) or 600 x 600-mm (23.6 x 23.6-inch) ETSI standard equipment rack. In an ETSI rack, the shelf can be mounted in the middle position. The shelf

projects 4.0 inches (101.6 mm) from the front of the rack and is a total of 444.5 mm (17.5 inch) wide with no mounting ears attached.

The NCS 2015 shelf measures 24.44 inches (620.776 mm) high, 17.67 inches (448.81 mm) wide, and 11.10 inches (281.94 mm) deep. You can install up to three NCS 2015 shelves in a 7-foot (2133.6 mm) equipment rack.

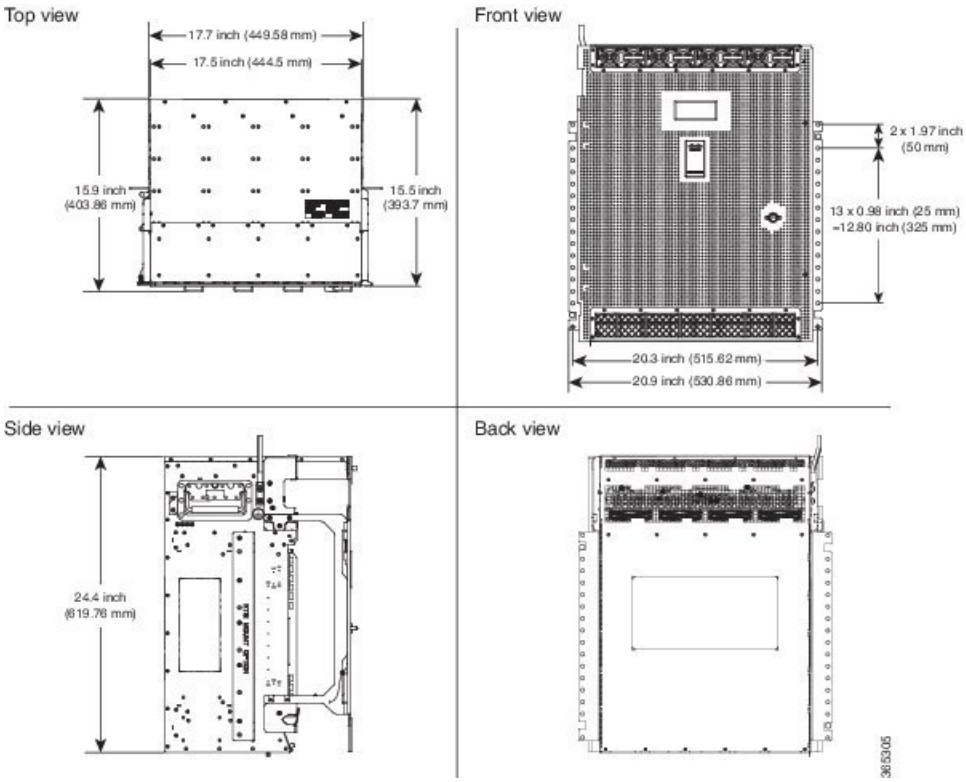
The following figure provides the dimensions of the NCS 2015 shelf installed on a 600 x 300-mm (23.6 x 11.8-inch) or 600 x 600-mm (23.6 x 23.6-inch) ETSI standard equipment rack.

Figure 205: Cisco NCS 2015 DC Shelf Dimensions for an ETSI Rack Configuration



The following figure provides the dimensions of the NCS 2015 shelf installed on a 600 x 300-mm (23.6 x 11.8-inch) or 600 x 600-mm (23.6 x 23.6-inch) ETSI standard equipment rack.

Figure 206: Cisco NCS 2015 AC Shelf Dimensions for an ETSI Rack Configuration



Caution The standard ETSI racks can hold three NCS 2015 shelves. When mounting a shelf in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Important Notes for ETSI Rack Installation

- The NCS 2015 shelf can only be installed in an ETSI 300 mm deep open rack.
- If an ETSI 600 mm deep closed cabinet is used, it must have proper thermal management to dissipate the total heat load from the equipment.
- A minimum of six inches (152.5 mm) of clearance must be maintained for the air exhaust.
- The exhaust side of the NCS 2015 shelf must not be exposed to the exhaust of any other equipment in a back to back installation.

Mounting a Single Shelf

The NCS 2015 requires 24.4 inches (619.76 mm) minimum of vertical rack space. To ensure the mounting is secure, use eight mounting screws for each side of the shelf. If a shelf is the only unit in the rack, it should be mounted at the bottom of the rack.

In an ETSI rack, the brackets are mounted in the middle position.

While it is possible for one person to install an empty NCS 2015 shelf, if the NCS 2015 shelf is fully loaded, then two people should install it. For ease of lifting, it is recommended that the shelf be empty. For information on the NCS 2015 shelf weight, see the NCS 2015 Shelf Specifications, on page 432.

Mounting Multiple Shelves

Most standard 600 x 300 x 2200 mm racks can hold three NCS 2015 shelves, and a fuse and alarm panel. In an ETSI rack, the brackets are mounted only in the middle position.

The NCS 2015 shelves can be mounted above each other without any space between the shelves.

NTP-L47 Mounting NCS 2015 Shelf

Purpose	This procedure helps in mounting the NCS 2015 shelf. **Note** In an ANSI and ETSI rack, the chassis can be installed in the middle position.

Tools/Equipment	• #2 Phillips Dynamometric screwdriver
	• Medium slot-head screwdriver
	• Small slot-head screwdriver
	• ETSI only:
	  • 16 M6 x 20 mm pan-head Phillips mounting screws
	• ANSI only:
	  • 16 #12-24 x 0.50 inch pan-head Phillips mounting screws

Prerequisite Procedures	DLP-L62 Unpacking and Verifying the Shelf , on page 23 DLP-L63 Inspecting the Shelf, on page 26 NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None



Warning **Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.** Statement 1048



Warning T**his product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 40A and between -40.5 VDC to -57.6 VDC.** Statement 1005



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005



Warning **To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 131°F (55°C).** Statement 1047



Warning **Take care when connecting units to the supply circuit so that wiring is not overloaded.** Statement 1018



Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006



Warning **To prevent airflow restriction, allow clearance around the ventilation openings to be at least:1 inch (25.4 mm)** Statement 1076



Note Make sure that the correct type of 19-inch ANSI rack is used for mounting the NCS 2015 shelf.

Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, a shielded cable must be used to connect to the EMS port. This cable must be less than 30 meters in length and not placed in the 3 meter boundary, as defined in EN50121-4:2006, Table 2, note 1.** Statement 8010

Warning **To comply with EN50121-4:2006 - Railway applications, Electromagnetic compatibility, DC power cables must be less than 30 meter long**. Statement 8011

Procedure

Complete the necessary task as applicable:

- DLP-L72 Mounting NCS 2015 Shelf on a Rack (One Person), on page 294
- DLP-L73 Mounting NCS 2015 Shelf on a Rack (Two People) , on page 296
- DLP-L74 Mounting Multiple NCS 2015 Shelves on a Rack , on page 297

Stop. You have completed this procedure.

DLP-L72 Mounting NCS 2015 Shelf on a Rack (One Person)

Purpose	This task allows one person to mount the shelf on a rack.
Tools/Equipment	• # 2 Phillips Dynamometric screwdriver • ETSI: 16 M6 x 20 mm pan-head Phillips mounting screws • ANSI: 16 #12-24 x 0.50 inch pan-head Phillips mounting screws
Prerequisite Procedures	none
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note The NCS 2015 requires a minimum of 24.4 inches (619.76 mm) high vertical rack space. To ensure that the mounting is secure, use eight mounting screws on each side of the shelf. A shelf should be mounted at the bottom of the rack if it is the only unit in the rack.

Procedure

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel is not present, you must install one according to manufacturer instructions:

- For a DC power supply, the fuse rating must not exceed 60 A.
- For an AC power supply, the fuse rating must not exceed 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

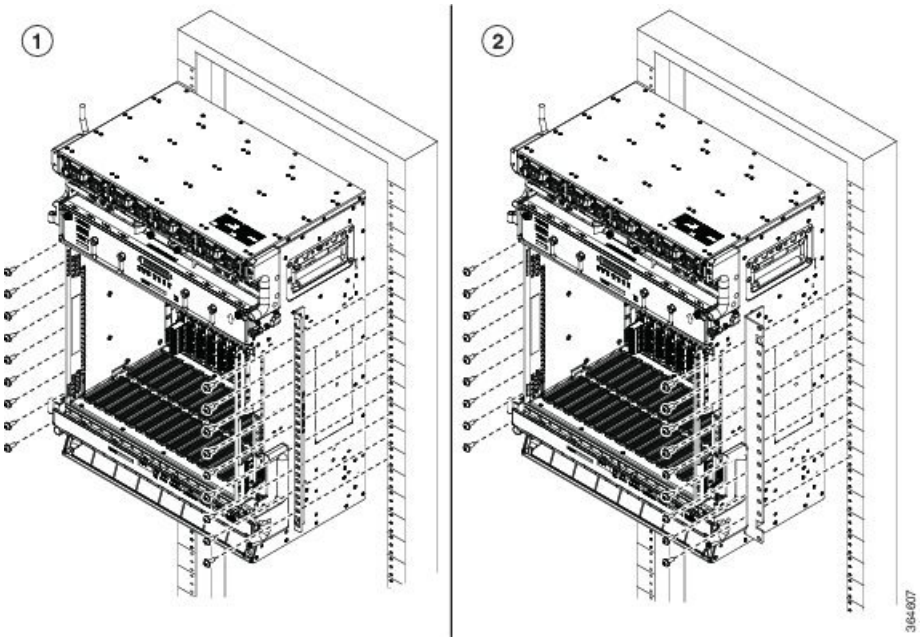
Step 2 Ensure that the shelf is mounted on the appropriate rack equipment:

- 23-inches (584.2 mm) or 19-inches (482.6 mm) for ANSI racks.
- 600 x 300-mm (23.6 x 11.8-inch) for ETSI racks.

Diagram 1 of the figure below shows the NCS 2015 DC shelf mounted on an ANSI rack in the middle position using 19-inch mounting brackets.

Diagram 2 of the figure below shows the NCS 2015 DC shelf mounted on an ETSI rack in the middle position.

Figure 207: Mounting an NCS 2015 DC Shelf on a Rack



1	ANSI equipment rack	2	ETSI equipment rack

Step 3 Lift the shelf to the desired position in the rack. If the rack is empty, place the shelf at the bottom of the rack. The placement of the shelf depends on where you want to install the new equipment in the rack.

Note
To ensure proper cooling of the NCS 2015 shelf, make sure that the space in front of the air flow vents are free of cables, fibers, and mechanical fixtures for fiber and cable management.

Step 4 Align the screw holes on the mounting brackets with the mounting holes in the rack.

Step 5 Using the Phillips Dynamometric screwdriver, install one mounting screw in each side of the assembly. Tighten the screw to a torque value of 22 in-lb (2.5 N-m).

Step 6 When the shelf is secured to the rack, install the remaining mounting screws.

Step 7 Return to your originating procedure (NTP).

DLP-L73 Mounting NCS 2015 Shelf on a Rack (Two People)

Purpose	This task allows two people to mount the shelf on a rack when the shelf is installed with all the ancillaries.
Tools/Equipment	• # 2 Phillips Dynamometric screwdriver • ETSI: 16 M6 x 20 mm pan-head Phillips mounting screws • ANSI: 16 #12-24 x 0.50 inch pan-head Phillips mounting screws
Prerequisite Procedures	none
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note The NCS 2015 shelf requires a minimum of 24.4 inches (619.76 mm) vertical rack space. To ensure that the mounting is secure, use eight mounting screws on each side of the shelf. If the shelf is the only unit in the rack, it should be mounted at the bottom of the rack.

Procedure

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel is not present, you must install one as per the instructions of the manufacturer:

- For a DC power supply, the fuse rating must not exceed 60 A.
- For an AC power supply, the fuse rating must not exceed 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

Step 2 Ensure that the shelf is mounted on the appropriate rack equipment:

- 23-inches (584.2 mm) or 19-inches (482.6 mm) for racks.
- 600 x 300-mm (23.6 x 11.8-inch) for ETSI racks.

Step 3 Lift the shelf to the desired position in the rack. If the rack is empty, place the shelf at the bottom of the rack. The placement of the shelf is dependent on where you want to install the new equipment in the rack.

Note To ensure proper cooling of the NCS 2015 shelf, make sure that the space in front of the air flow vents are free of cables, fibers, and mechanical fixtures for fiber and cable management.

Step 4 Align the screw holes on the mounting brackets with the mounting holes in the rack.

Step 5 Have one person hold the shelf in place while the other person uses the Phillips Dynamometric screwdriver to install one mounting screw in each side of the assembly. Tighten the screw to a torque value of 22 in-lb (2.5 N-m).

Step 6 When the shelf is secured to the rack, install the remaining mounting screws.

Step 7 Return to your originating procedure (NTP).

DLP-L74 Mounting Multiple NCS 2015 Shelves on a Rack

Purpose	This task installs multiple shelves in a rack.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • ETSI: 16 M6 x 20 mm pan-head Phillips mounting screws • ANSI: 16 #12-24 x 0.50 inch pan-head Phillips mounting screws
Prerequisite Procedures	NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note A standard rack can hold three NCS 2015 shelves. When mounting a shelf in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Note The NCS 2015 shelf requires 24.4 inches (619.76 mm) minimum of vertical rack space.

Procedure

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel is not present, you must install one according to manufacturer's instructions:

- For a DC power supply, the fuse rating must not exceed 60 A.

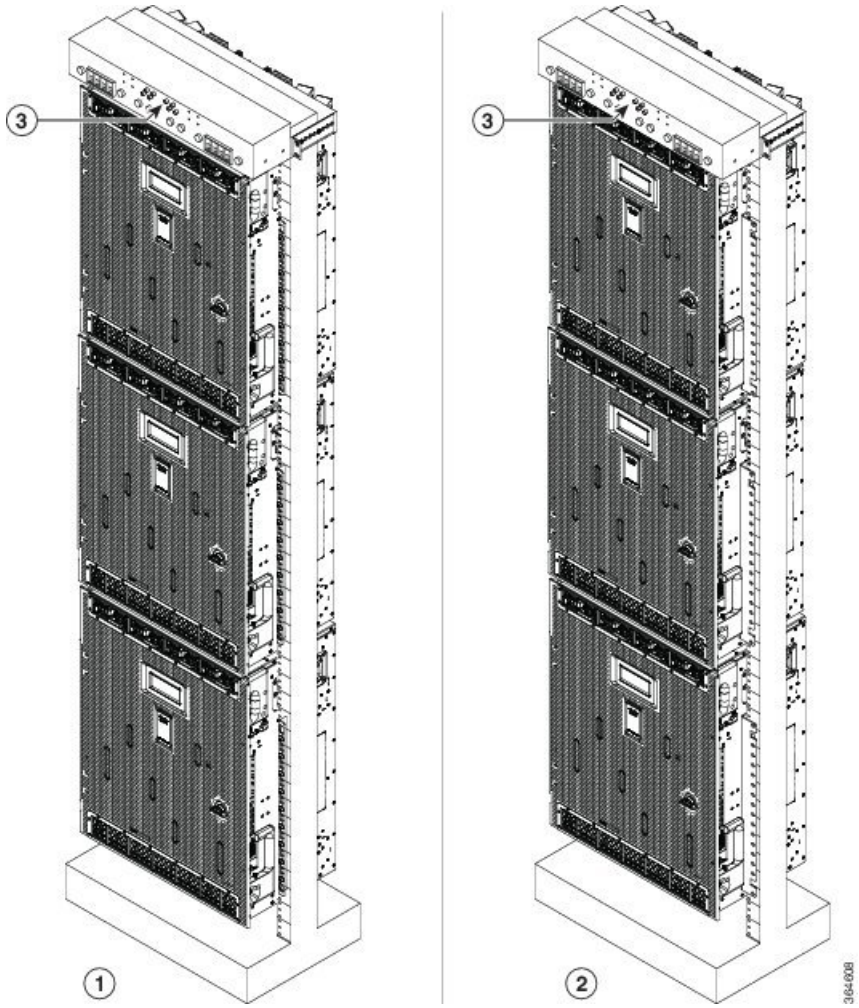
- For an AC power supply, the fuse rating must not exceed 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

Step 2 Mount the first shelf in the bottom of the rack using DLP-L72 Mounting NCS 2015 Shelf on a Rack (One Person), on page 294 or DLP-L73 Mounting NCS 2015 Shelf on a Rack (Two People) , on page 296.

Diagram 1 of the figure below shows multiple NCS 2015 DC shelf assemblies mounted on the ANSI rack.

Diagram 2 of the figure below shows multiple NCS 2015 DC shelf assemblies mounted on the ETSI rack.

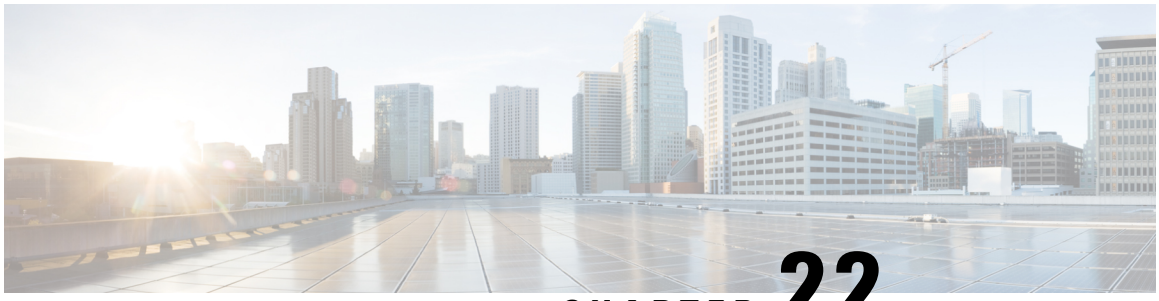
Figure 208: Multiple NCS 2015 DC Shelves Mounted on the Rack



1	ANSI equipment rack	2	ETSI equipment rack
3	Fuse and alarm panel		

Step 3 Repeat 2 for every shelf you need to install.

Step 4 Return to your originating procedure (NTP).



CHAPTER 22

Connecting Power and Ground

This chapter describes how to connect the power and ground for the NCS 2015 shelf.

The sections are:

- Power and Ground Description, on page 299
- Cabling Guidelines for NCS 2015 DC Shelf, on page 302
- NTP-L57 Installing Power and Ground to the NCS 2015 Shelf , on page 304

Power and Ground Description

Ground the equipment according to the Telcordia standards or local practices. The following sections describe power and ground for the NCS 2015 shelves.

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 1024

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

Note For detailed instructions on grounding the NCS 2015 chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Power and Ground

The NCS 2015 has redundant AC and DC power modules.

For redundant AC power feeds, install the four AC power modules, and use the four power cables (right and left cables) and one ground cable.

Note The ground lug of the NCS 2015 AC shelf must be permanently connected to ground. The single ground lug must be a dual-hole type, UL Listed, CSA certified and rated to accept the #4 AWG cable. The grounding lug must be assembled on the chassis with two screws and washers.

For the NCS 2015 AC shelf:

- The building installation must provide a means for connection to protective earthing.
- The equipment must be soundly earthed.
- Service personnel must check whether the socket outlet from which the equipment is to be powered provides a connection to the building's protective earthing. If there is no connection, the service personnel must arrange for the installation of a protective earthing conductor from a separate earthing terminal to the protective earthing wire in the building.

For an AC power supply, the fuse rating must not exceed 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent or short circuit protection must be in accordance with local and national electrical codes. The voltage rating value for AC power ranges between 200 VAC to 240 VAC depending on the standards of various countries. This product is intended for use on the TN and TT power systems.

The CTC display of protect voltage must be ignored for NCS 2015 AC shelf.

For redundant DC power feeds, install four DC power modules and use eight power cables and one ground cable. For a single power feed, only two power cables (#6 AWG, copper conductor, 194 degrees F [90 degrees C] minimum) and one ground cable (#4 AWG) are required. Use a conductor with low impedance to ensure circuit overcurrent protection. However, the conductor must have the capability to safely conduct any faulty current that might be imposed. For a DC power supply, the fuse rating must not exceed 60 A.

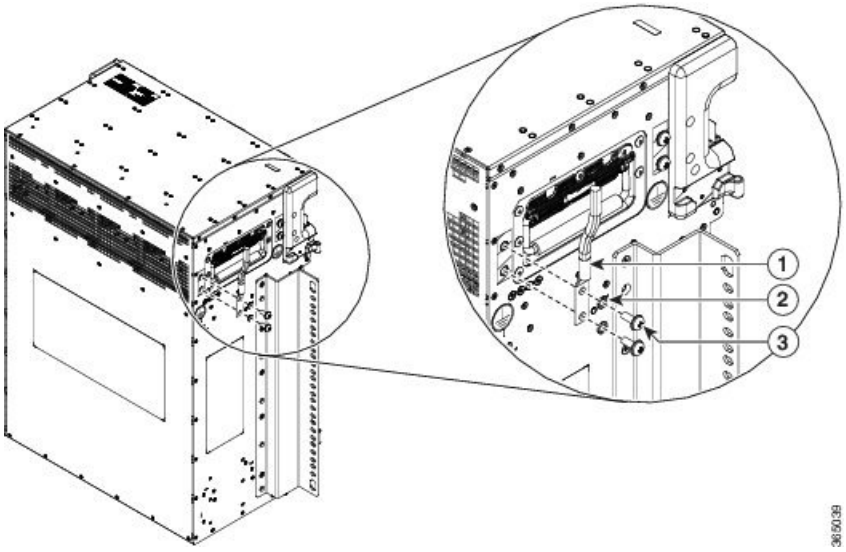
The DC power modules have –48 VDC or –60 VDC #6 AWG dual-hole lug power terminals.

We recommend the following wiring conventions, but customer conventions prevail:

- Red wire for battery connections (–48 VDC or –60 VDC).
- Black wire for battery return connections (RET).
- The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE, Issue 6.

The single ground lug must be a dual-hole type, UL Listed, CSA certified and rated to accept the #4 AWG cable. The grounding lug must be assembled on the chassis with two screws and washers. (See the figure below).

Figure 209: Ground Lug on the NCS 2015 DC Shelf



1	Ground lug	2	Washer
3	Screw		

The rating labels are shown in the figures below

Figure 210: Rating Label for NCS 2015 AC Chassis



Figure 211: Rating Label for NCS 2015 DC Chassis



Cabling Guidelines for NCS 2015 DC Shelf

The following figures display the cable distribution in the NCS 2015 DC shelf. It is recommended to use the 23 inch rack.

Figure 212: Cabling for NCS 2015 DC Shelf

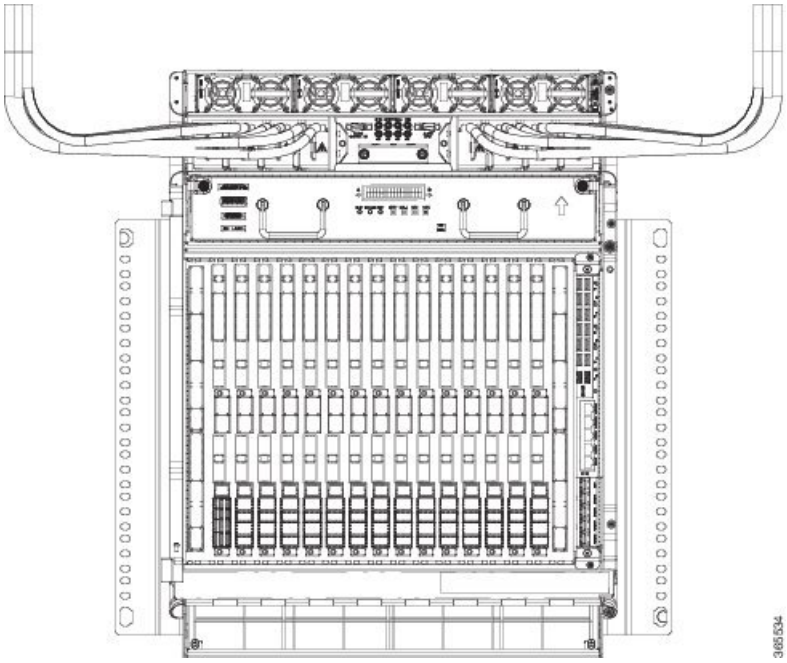
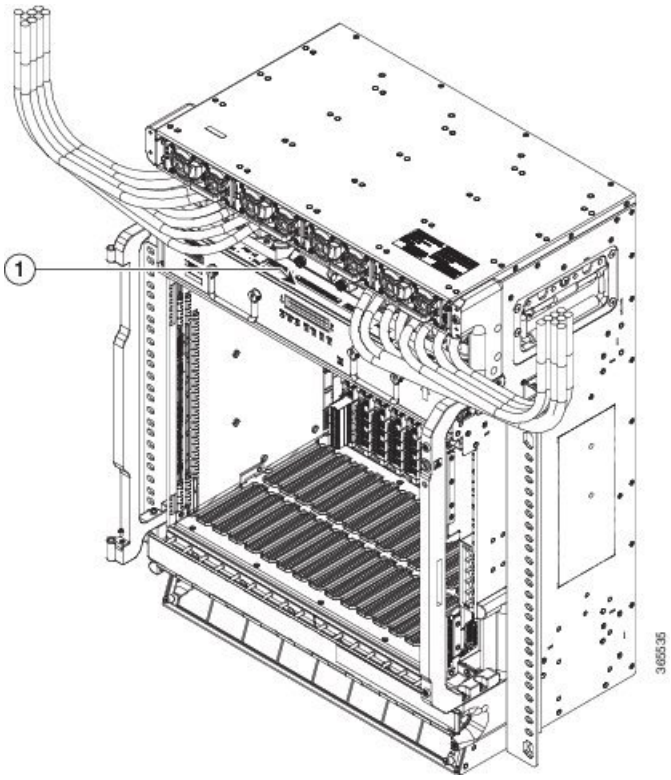


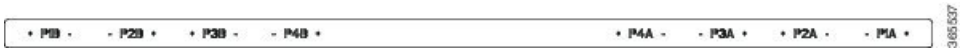
Figure 213: Cabling for NCS 2015 DC Shelf



1	Power distribution label

To install the DC distribution using the figure below:

Figure 214: Power Distribution Label - Old Version



- First, route the P1B cable to the left of the chassis against the top of the power tray.
- Second, route the P2B cable under the P1B cable.
- Third, route the P3B cable under the P2B cable.
- Fourth, route the P4B cable under the P3B cable.
- Fifth, route the P1A cable to the right of the chassis against the top of the power tray.
- Sixth, route the P2A cable under the P1A cable.
- Seventh, route the P3A cable under the P2A cable.
- Eighth, route the P4A cable under the P3A cable.

To install the DC distribution using the figure below :

Figure 215: Power Distribution Label - New Version



- First, route the P1A cable to the left of the chassis against the top of the power tray.
- Second, route the P2A cable under the P1A cable.

- Third, route the P3A cable under the P2A cable.
- Fourth, route the P4A cable under the P3A cable.
- Fifth, route the P1B cable to the right of the chassis against the top of the power tray.
- Sixth, route the P2B cable under the P1B cable.
- Seventh, route the P3B cable under the P2B cable.
- Eighth, route the P4B cable under the P3B cable.

Note This arrangement allows the management of cables within the boundaries of the chassis.

Note When transitioning to the rack, ensure that you maintain a two inch bend radius.

NTP-L57 Installing Power and Ground to the NCS 2015 Shelf

Purpose	This procedure installs power feeds and grounds the NCS 2015 system.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Screws • Ground cable 21.2-mm² (#4 AWG) stranded • Listed pressure dual-holes lugs suitable for #8 AWG copper conductors • Wire cutters • Wire strippers • Crimp tool • Fuse panel • Power cable (from fuse panel to power modules) • Two-hole grounding lug • Wire wrapper
Prerequisite Procedures	• NTP-L53 Installing the Power Modules in NCS 2015 Shelf , on page 349. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None



Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389



Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390



Warning **Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, power modules, and faceplates are in place.** Statement 261



Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 1024



Warning **Never install an AC power module and a DC power module in the same chassis.** Statement 1050



Warning **When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.** Statement 1002



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



Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units.** Statement 246



Warning **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.** Statement 39



Warning **Use copper conductors only.** Statement 1025



Warning **Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950-1 based safety standards.** Statement 1033



Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045



Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 10A-20A, 100-240 VAC~.** Statement 1005



Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022



Warning **This unit might have more than one power supply connection; all connections must be removed to de-energize the unit.** Statement 1028



Caution Always use an ESD wristband when working with a powered NCS 2015. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

Procedure

Step 1 Verify that the correct fuse and alarm panel is installed in the top mounting space.

- For a DC power supply, the fuse rating must not exceed 60 A.

- For an AC power supply, the fuse rating must not exceed 20A. For North America, the branch circuit protection must be rated 20A. The overcurrent/short circuit protection must be in accordance with local and national electrical codes.

Step 2 Connect the office ground to the NCS 2015 shelf. For detailed instructions on grounding, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Step 3 Depending on the shelf and the power module installed, complete the necessary task:

Step 4 Complete the DLP-L80 Turning On and Verifying DC Office Power on the NCS 2015 Shelf, on page 313

Step 5 Continue with NTP-L54 Installing Fan-Tray Assembly in NCS 2015 Shelf, on page 353 .

Stop. You have completed this procedure.

DLP-L81 Connecting Office Power (AC) to the NCS 2015 Shelf

Purpose	This task connects AC power to the NCS 2015 shelf.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Fuse panel • Ground cable #4 AWG stranded.
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note This product is intended for use on the TN and TT power systems.

Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

Warning **This equipment shall be connected to AC mains provided with a surge protective device (SPD) at the service equipment complying with NFPA 70, the National Electrical Code (NEC).** Statement 7012

Caution The NCS 2015 relies on the protective devices in the building installation to protect against short circuit, overcurrent and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note Not more than 7 feet (2 m) of the power supply cable should be exposed between the equipment and the fiber storage tray.

Caution When terminating the frame ground, do not use soldering lug connectors, screwless (push-in) connectors, quick connect connectors, or other friction-fit connectors.

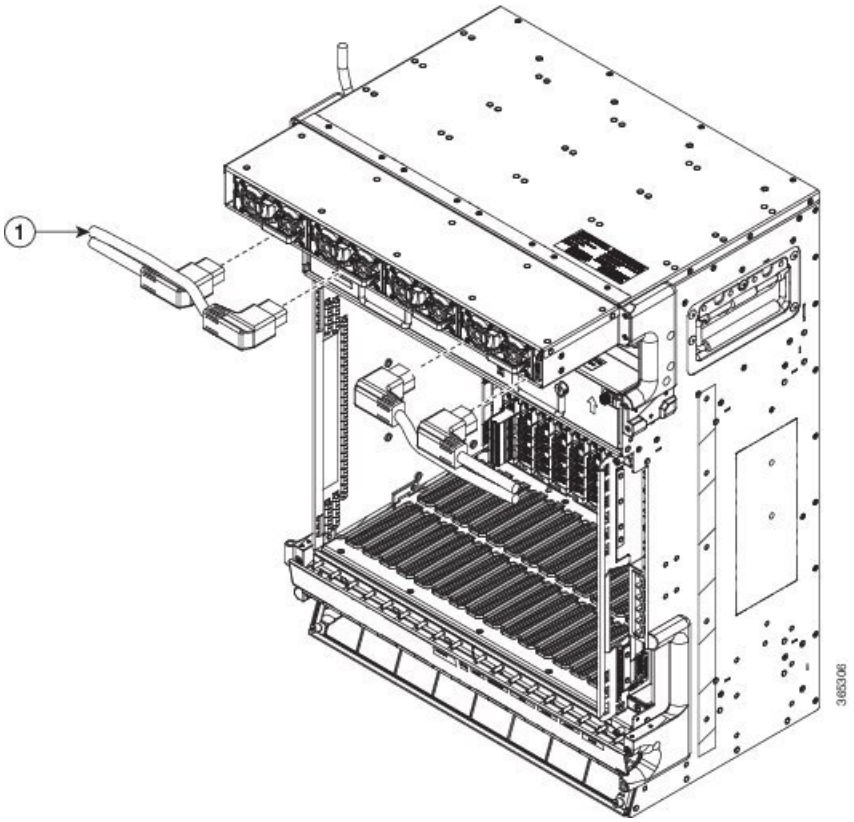
Note If the system loses power or both the TNCS or TNCS-O cards are reset, and the system is not provisioned to get the time from a Network Time Protocol/Simple Network Time Protocol (NTP/SNTP) server, you must reset the NCS 2015 clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see the "NTP-G24 Set Up Name, Date, Time, and Contact Information" procedure in the "Managing the Shelf" chapter of the *Cisco NCS 2000 Series Control Card and Node Configuration Guide*. If you use the TNCS or TNCS-O cards, the system clock runs for up to three hours. In this case, no action is required.

Procedure

Step 1 Verify that the AC power modules are installed in the four slots of NCS 2015.

Step 2 Attach the AC power cable to the cable connector in the power input panel. (See the figure below.)

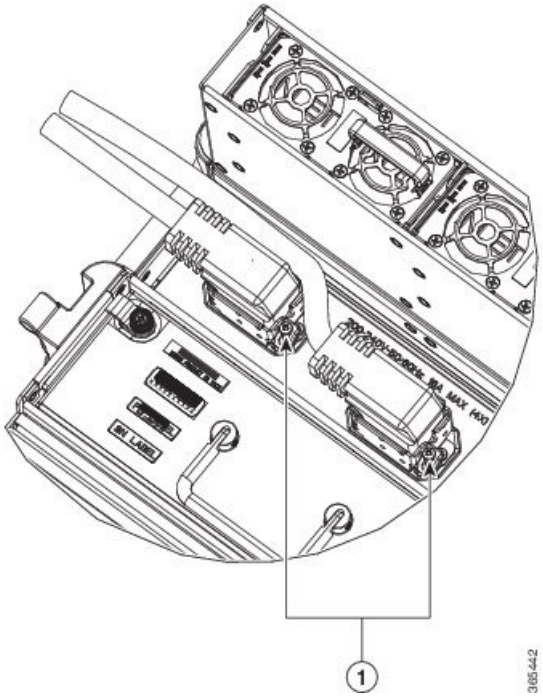
Figure 216: Connecting Office Power—AC Power Modules



1	AC power cables

Step 3 Tighten the bail latch screws to firmly hold the AC power cable with the connector in the power in the figure below.

Figure 217: Connecting Office Power—AC Power Modules



1	Bail latch screws

Step 4 Connect the power cable to the fuse panel or power source.

Note
The voltage rating value for AC power ranges between 100 VAC to 240 VAC depending on the standards of various countries.

Note
Turn on the power using the power switch on the NCS 2015 shelf after installing the power cables.

Step 5 Return to your originating procedure (NTP).

Table 19: PIDs for AC Power Cables

Cable	PID
North America	CRS-AC-CAB-NA
Australia	CRS-AC-CAB-AU
EU	CRS-AC-CAB-EU

DLP-L79 Connecting Office Power (DC) to the NCS 2015 Shelf

Purpose	This task connects DC power to the NCS 2015 shelf.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • Medium slot-head screwdriver • Small slot-head screwdriver • Wire wrapper • Wire cutters • Wire strippers • Crimp tool • Open-end wrench or hex tube screw driver • Torque wrench • 1/4” socket wrench • Sockets • Manufacturer’s die for power lug • Fuse panel • Power cable (from fuse and alarm panel to assembly), #6 AWG, copper conductors, 194 degrees F (90 degrees C) • Ground cable #4 AWG stranded • Listed pressure dual-holes lugs suitable for #6 AWG copper conductors
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None



Warning **When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046



Warning **Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place.** Statement 1075



Warning **To ensure that power remains off while you are performing this procedure, lock-out/tag-out the DC circuit breaker switch in the OFF (0) position until you are ready to turn it on.**

Caution The NCS 2015 relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices are properly rated and comply with national and local codes.

Note If the system loses power or both the TNCS or TNCS-O cards are reset, and the system is not provisioned to get the time from a Network Time Protocol/Simple Network Time Protocol (NTP/SNTP) server, you must reset the NCS 2015 clock. After powering down, the date defaults to January 1, 1970, 00:04:15. To reset the clock, see the "NTP-G24 Set Up Name, Date, Time, and Contact Information" procedure of the "Managing the Shelf" chapter in the *Cisco NCS 2000 Series Control Card and Node Configuration Guide*. If you use the TNCS or TNCS-O cards, the system clock runs for up to three hours. In this case, no action would be required.

Note Follow your local practices and requirements when installing power.

Procedure

Step 1 Verify that the correct fuse and alarm panel is installed.

Step 2 Connect each of the distribution cables according to the fuse panel engineering specifications.

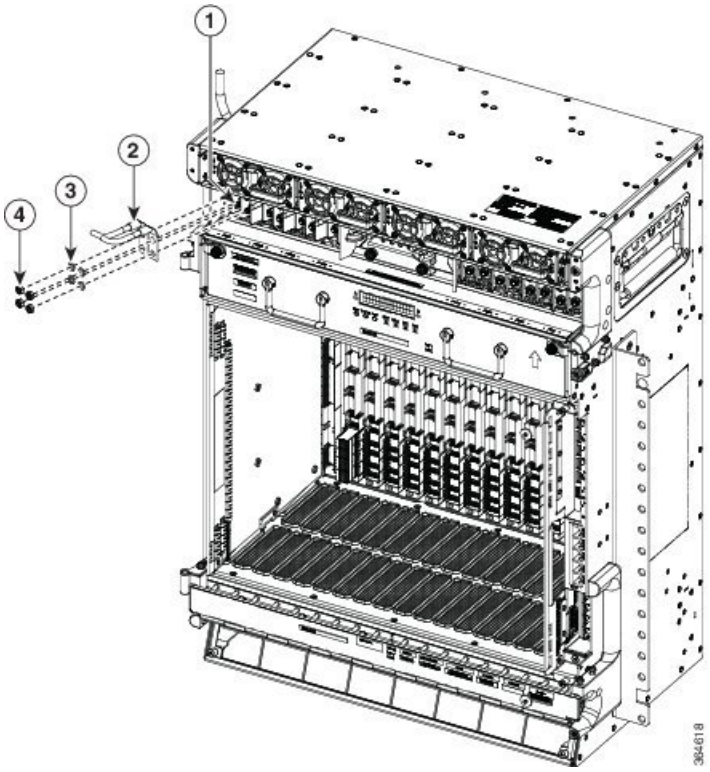
Step 3 Measure and cut the cables as needed to reach the NCS 2015 from the fuse panel.

Step 4 Strip 1/2 inch (12.7 mm) of insulation from all power cables that you will use.

Step 5 Crimp the lugs onto the ends of all the power distribution cables using the manufacturer's suggested die for the lug.

Step 6 Remove the terminal block protective covers from the power distribution lugs.

Figure 218: Connecting Office Power—DC Power Modules



1	Terminal block	2	Power lug
3	Lock washers	4	Nuts

Step 7 Unscrew the nuts from the terminal block.

Step 8 Insert the lugs as shown in the figure above. Follow the fuse assignments to ensure the correct cabling of the battery and return to the shelf.

Note
The power lugs must be crimped horizontally with the power cables.

Step 9 Insert the lock washers and nuts to the terminal block (see the figure above). Tighten the nuts to a torque value of 20 in-lb (2.25 N-m).

Step 10 Reinstall the terminal block protective covers over the DC distribution lugs.

Step 11 Install the DC power modules in the NCS 2015 shelf.

Step 12 Return to your originating procedure (NTP).

DLP-L80 Turning On and Verifying DC Office Power on the NCS 2015 Shelf

Purpose	This task turns on the power and verifies correct power and returns on the NCS 2015 shelf.

Tools/Equipment	Voltmeter
Prerequisite Procedures	DLP-L79 Connecting Office Power (DC) to the NCS 2015 Shelf, on page 311
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not apply power to the shelf until you complete all the installation steps.

Warning **To ensure safety of personnel and equipment, do not connect any power cables into the power module until the module is completely installed into the chassis.** Statement 389

Warning **To reduce the risk of electric shock, switch on the power only after the power cord is completely installed into the power module.** Statement 390

Procedure

Step 1 Using a voltmeter, verify the office battery and return at the following points on the fuse and alarm panel:

a) To verify the power, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side connection and verify that it is between –40.5 VDC and –72.0 VDC. Place the red test lead on the B-side connection and verify that it is between –40.5 VDC and –72.0 VDC.

Note
For nominal steady state voltage of –48 VDC, the operating voltage range for the chassis is –40.5 VDC (minimum) to –57.6 VDC (maximum).For nominal steady state voltage of –60 VDC, the operating voltage range for the chassis is –50.0 VDC (minimum) to –72.0 VDC (maximum).

b) To verify the ground, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side return ground and verify that no voltage is present. Place the red test lead on the B-side return ground and verify that no voltage is present.

Step 2 To power up the shelf, insert the fuse into the fuse position according to site practice. The fuse rating must not exceed 60 A.

Step 3 Using a voltmeter, verify the NCS 2015 shelf for –48 VDC or –60 VDC battery and return:

a) To verify the A-side of the shelf, place the black lead of the voltmeter to the frame ground. Place the red test lead to the –48 V or –60 V (A-side battery connection) red cable. Verify that it reads between –40.5 VDC and –72.0 VDC. Then place the red test lead of the voltmeter to the RET1 (A-side return ground) black cable and verify that no voltage is present.

Note

For nominal steady state voltage of –48 VDC, the operating voltage range for the chassis is –40.5 VDC (minimum) to –57.6 VDC (maximum).For nominal steady state voltage of –60 VDC, the operating voltage range for the chassis is –50.0 VDC (minimum) to –72.0 VDC (maximum).

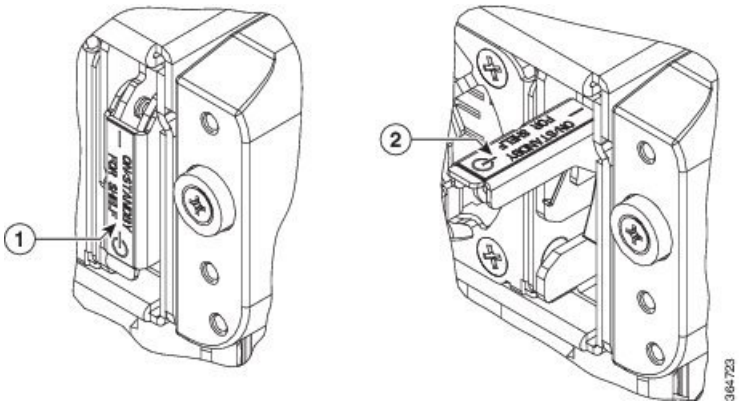
b) To verify the B-side of the shelf, place the black test lead of the voltmeter to the frame ground. Place the red test lead to the –48 V (B-side battery connection) red cable. Verify that it reads between –40.5 VDC and –72.0 VDC. Then place the red test lead of the voltmeter to the RET2 (B-side return ground) black cable and verify that no voltage is present.

Note
If the NCS 2015 shelf is being powered at –60 VDC nominal voltage, the door must be kept closed during regular operations.

Step 4 Repeat Steps 2 and 3 for each power module that is to be powered up.

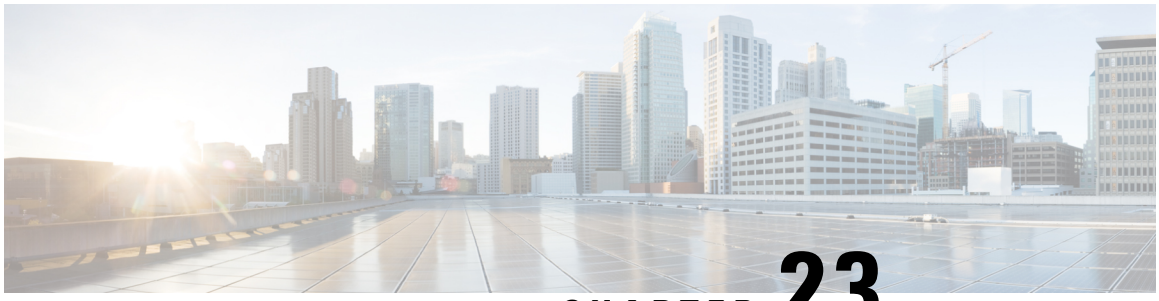
Step 5 Set the power switch to ON position after lifting its cover. The power switch is present at the top right corner of the chassis, next to the power modules. See the figure below.

Figure 219: Power Switch on the NCS 2015 Shelf



1	Cover on the power switch	2	Cover lifted to access the power switch

Step 6 Return to your originating procedure (NTP).



CHAPTER 23

Connecting and Routing the Cables

This chapter describes how to connect and route the cables for NCS 2015.

The sections are:

- Cable Routing and Management, on page 317
- NTP-L55 Routing and Locking Cable and Fiber Modules, on page 318
- NTP-L56 Attaching Wires to Alarm, Timing, LAN, and Craft Pin Connections, on page 319

Cable Routing and Management

The NCS 2015 shelf has interchangeable fiber and cable modules. Because the NCS 2015 shelf is designed to be compliant with ETSI 600x300 standards, all wiring and cable connections are available on the front side.

Default Module

The NCS 2015 chassis is shipped with the fiber module installed. If you need to use CAT5 cables instead of optical fibers, replace the fiber module with the cable module.

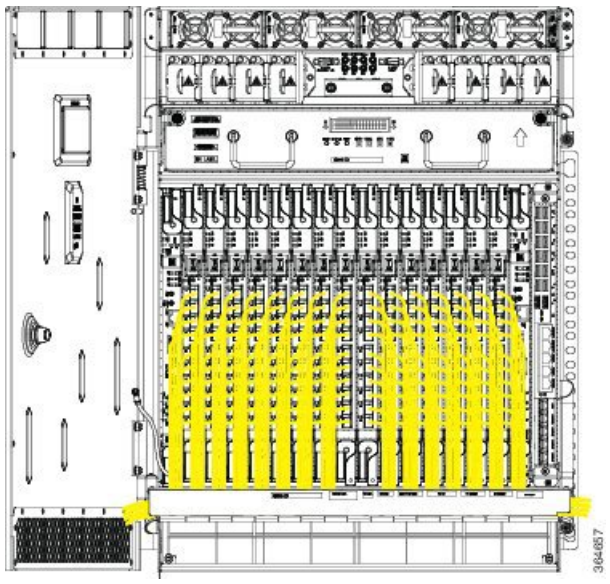
Fiber Module

The fiber module can hold 160 fibers per exit point. The fiber diameter is a maximum of 1.8 mm. You need to determine your fiber size according to the number of cards and ports installed on each side of the shelf.

Cable and Fiber Routing

Cable and fiber routing accommodates all the high-density cards for line card connections in NCS 2015. The exit of the fibers and cables is split into two channels. The line card from slot 1 to 8 exits from the lower left side, and the line card from 9 to 17 exit from the lower right side. (See the figure below)

Figure 220: Cable and Fiber Routing in NCS 2015 DC Shelf



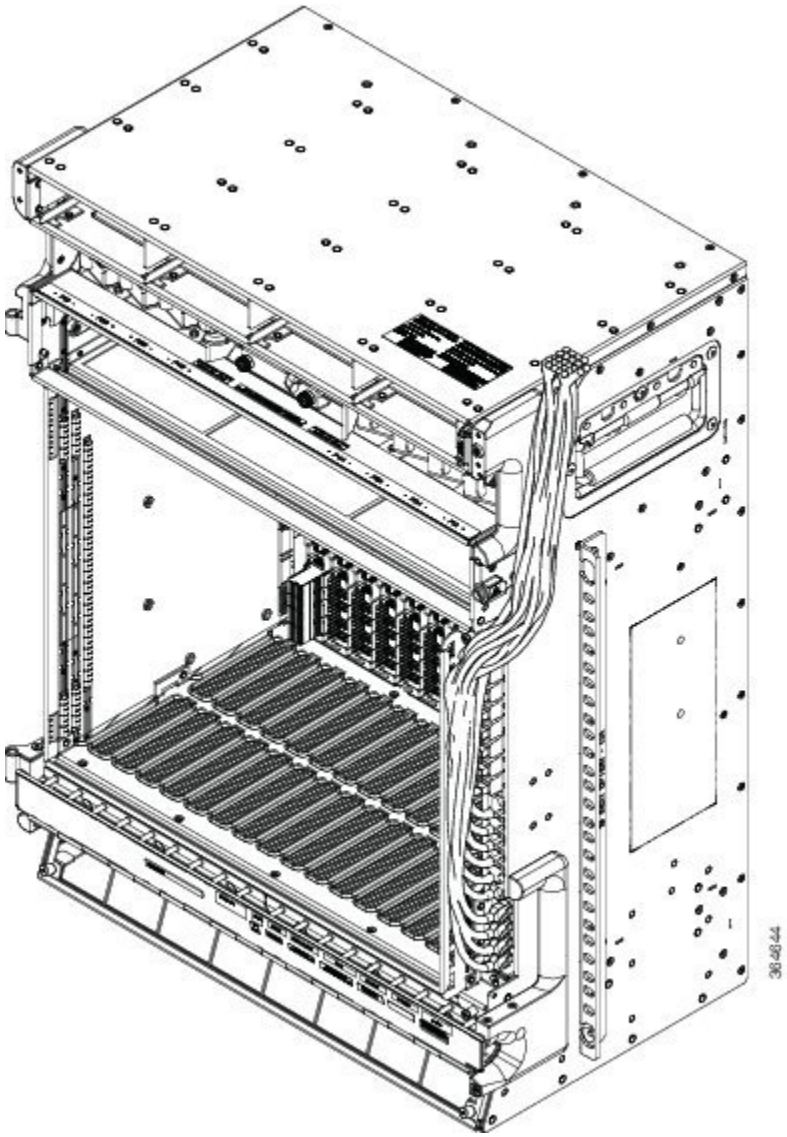
NTP-L55 Routing and Locking Cable and Fiber Modules

Purpose	TThis procedure routes and locks the cables on the NCS 2015 system.
Tools/Equipment	#1 Phillips cross-head PH screwdriver
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Route the ECU cables on the ECU handle and fix the cables using tie-wrap. The following figure shows an example of ECU cable routing. This allows you to close the front door.

Figure 221: ECU module Cable Routing in NCS 2015 DC Shelf



Step 2 Route the optical cables from the line cards through the cable module as shown in the figure above.

Stop. You have completed this procedure.

NTP-L56 Attaching Wires to Alarm, Timing, LAN, and Craft Pin Connections

Purpose	Use this procedure to attach alarm, timing, LAN, and craft wires in the NCS 2015 shelf.

Tools/Equipment	Twisted #22 or #24 AWG (0.51 mm² or 0.64 mm²) shielded wires for LAN or craft 75-ohm coaxial cable with DIN-1.0/2.3 miniature coaxial connector, Alarm 26 pins SCSI cable.
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Always use the supplied ESD wristband when working with a powered NCS 2006. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

Procedure

Step 1 Complete DLP-L76 Installing Alarm Wires in NCS 2015, on page 320 if you are provisioning external alarms.

Step 2 Complete DLP-L77 Installing Timing Wires on NCS 2015, on page 322 if you are provisioning external timing.

Step 3 Complete DLP-L78 Installing LAN Wires in NCS 2015, on page 325 to create an external LAN connection.

Stop. You have completed this procedure.

DLP-L76 Installing Alarm Wires in NCS 2015

Purpose	This task installs alarm cables on the power input panel of the NCS 2015 shelf to provision external (environmental) alarms and controls.
Tools/Equipment	Alarm SCSI 26-pin cable Wire-wrap tool for BITS Screw for the alarm cable
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Connect one end of the SCSI cable to the input alarms or input/output alarms, and the other end to the alarm source (See the figure below).

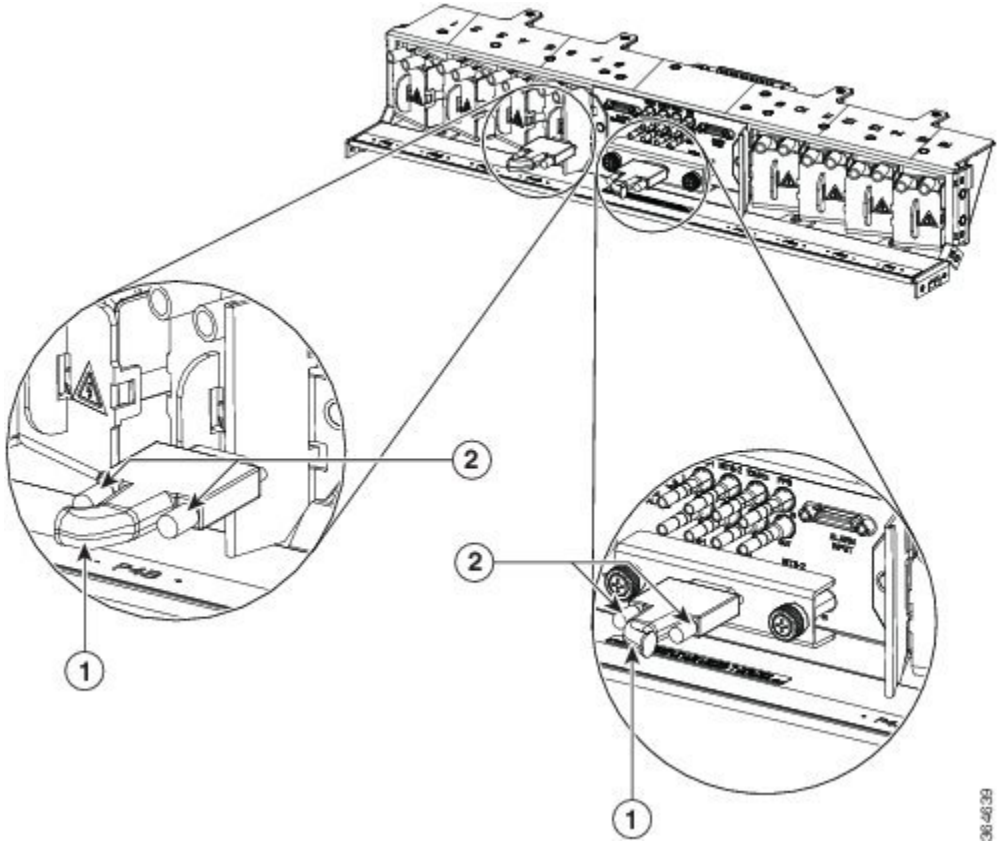
Note
These alarms are generic signals that the operator assigns to a definite wire (color) and name through the Craft Terminal.

Step 2 Tighten the screws of the SCSI connector to a torque value of 4 in-lb (0.45 N-m) using #2 Philips Dynamometric screwdriver.

Step 3 Bend the cable at an angle of 90° to exit from the left side or the right side (see the figures below).

Step 4 Return to your originating procedure (NTP).

Figure 222: Installing the Alarm Cable—Left and Right Exit



1	Alarm cable	2	Screws

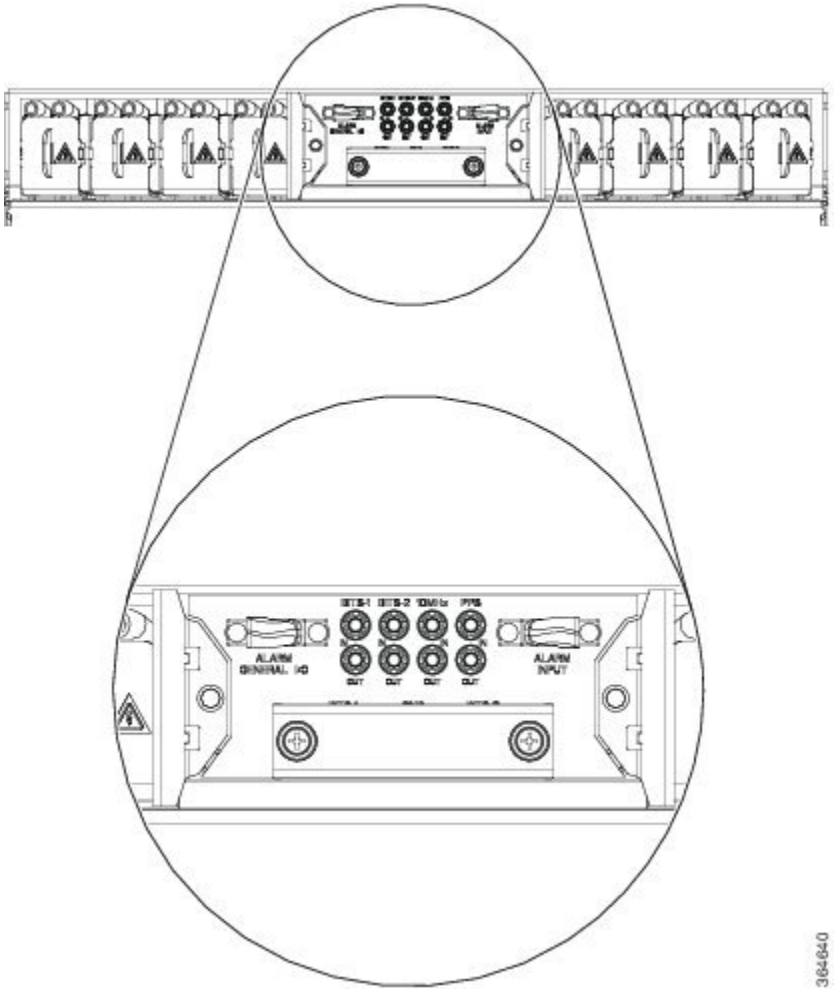
DLP-L77 Installing Timing Wires on NCS 2015

Purpose	This task installs the timing cables on the power input panel.
Tools/Equipment	Wire-wrap tool . • ANSI - 100-ohm shielded building integrated timing supply (BITS) clock cable pair #22 or #24 AWG (0.51 mm² or 0.64 mm²), twisted-pair T1-type • ETSI - 75-ohm coaxial cable with a DIN-1.0/2.3 miniature coaxial connector.
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

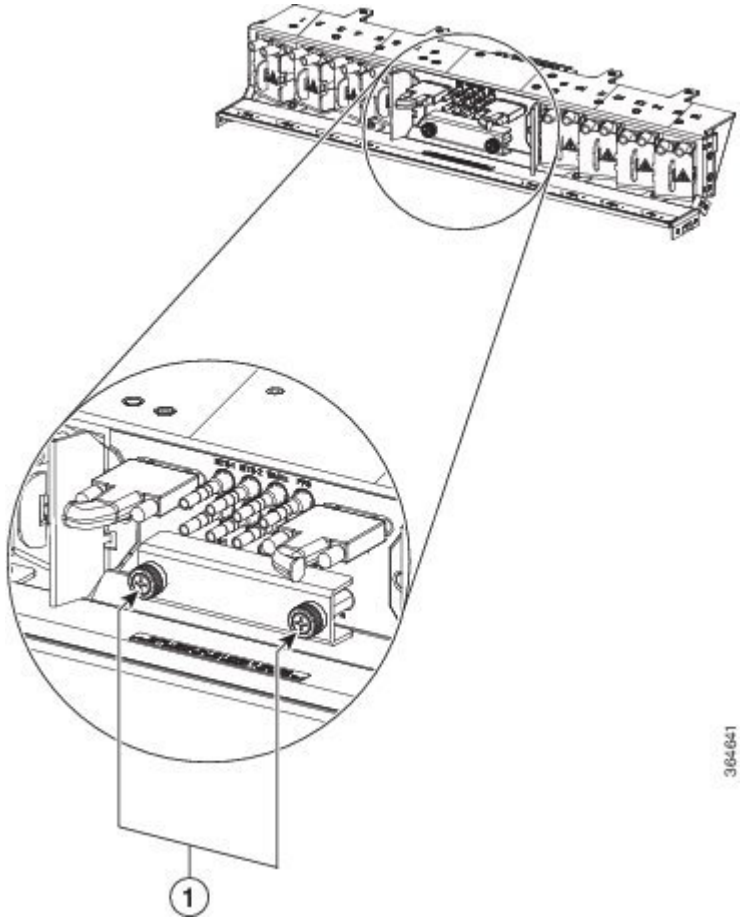
Step 1 Locate the timing connectors on the power input panel (BITS-1 or BITS-2 In/Out). See the figure below.

Figure 223: Timing Connectors on the Power Input Panel



Step 2 Loosen the screws on the protective cover as shown in the figure below.

Figure 224: Wire-wrap Cabling

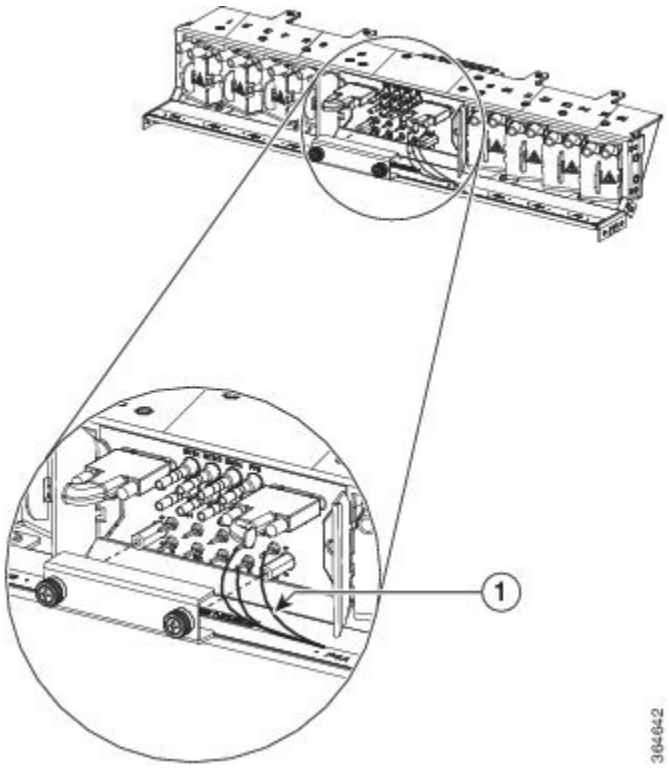


1	Screws

Step 3 Connect one end of the wire-wrap clock cable to the corresponding wire-wrap connector on the power input panel and the other end to the external source of the timing. Change the timing input to high-impedance (lesser or greater than 3 ohms) using a jumper on the power input panel. To change the top timing input, remove the P1 jumper of the BITS-1, and to change the bottom timing input, remove the P2 Jumper of the BITS-2.

Note
Route the wire-wrap connections as shown in the figure below

Figure 225: Wire-wrap Cabling



1	Wire wrap cables

Step 4 Repeat for each cable. Refer to ITU-T G.813 for rules about provisioning timing references.

Step 5 Secure the wire wrap cables on either side with a tie-wrap.

Step 6 Return to your originating procedure (NTP).

DLP-L78 Installing LAN Wires in NCS 2015

Purpose	This task installs LAN wires on the ECU module of the NCS 2015.
Tools/Equipment	Standard CAT-5 Ethernet cable (straight-through for data terminating equipment [DTE] or cross-over for data circuit-terminating equipment [DCE]) or RJ-45 connector Crimping tool for RJ-45 connector 0.51 mm² or 0.64 mm² (#22 or #24 AWG) wire, preferably CAT-5
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

We recommend the use of RJ-45 port (craft terminal port or the EMS port) on the ECU module to establish LAN connectivity. The advantages of using the RJ-45 ports on the ECU module include:

- CAT-5 Ethernet cable connections can be managed better by routing the cable through the ECU module cable exit area.
- If the TNCS card fails, the LAN connection is not lost during the TNCS card switch over.

If the ECU module is absent, you can connect a CAT-5 Ethernet cable to the LAN port on the TNCS card to create an external LAN connection.

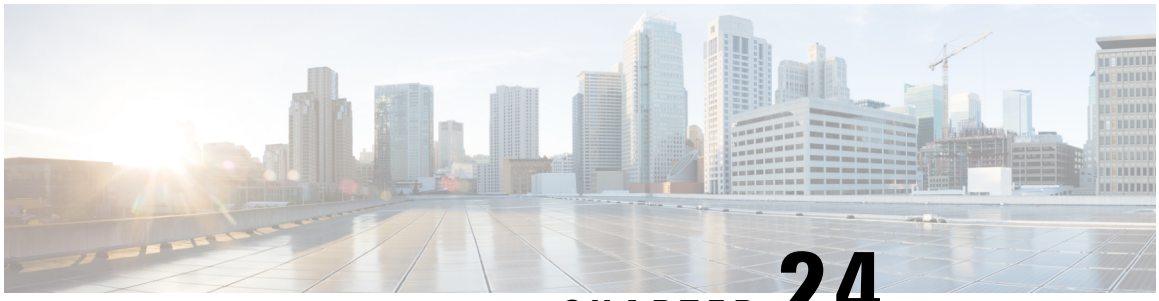
Note You can use the same procedure to connect Multishelf Management ports of several chassis in MSM configurations.

Note To avoid duplex mismatch between CT/EMS and external LAN switch ports, auto negotiation must be enabled on the external LAN switch port.

Procedure

Step 1 Using 0.51 mm² or 0.64 mm² (#22 or #24 AWG) wire or a standard CAT-5 Ethernet cable, connect the wires to the RJ-45 connector.

Step 2 Return to your originating procedure (NTP).



CHAPTER 24

NCS 2015 Shelf Installation Acceptance Test

This chapter describes how to perform a shelf acceptance test on Cisco NCS 2015 shelf.

- NTP-L60 Performing NCS 2015 Shelf Installation Acceptance Test, on page 327

NTP-L60 Performing NCS 2015 Shelf Installation Acceptance Test

Purpose	Use this procedure to perform a shelf installation acceptance test for the NCS 2015 shelf.
Tools/Equipment	Voltmeter
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 If you installed an NCS 2015 shelf, complete the table below by verifying that each applicable procedure was completed.

Table 20: NCS 2015 Shelf Installation Task Summary

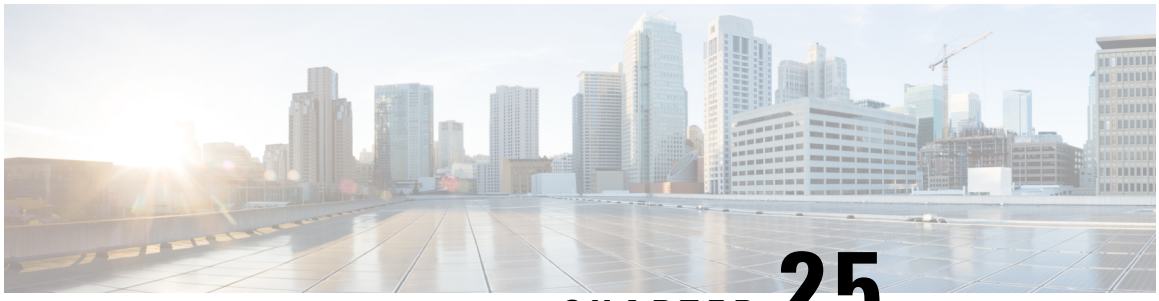
Description	Completed
NTP-L41 Unpacking and Inspecting the Shelf, on page 23	
NTP-L47 Mounting NCS 2015 Shelf, on page 292	
Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .	

Description	Completed
NTP-L51 Opening and Removing the Door of the NCS 2015 Shelf , on page 342	
NTP-L53 Installing the Power Modules in NCS 2015 Shelf , on page 349	
NTP-L57 Installing Power and Ground to the NCS 2015 Shelf , on page 304	
NTP-L54 Installing Fan-Tray Assembly in NCS 2015 Shelf, on page 353	
DLP-L62 Installing the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card, on page 360	
NTP-L50 Installing Standard Door of NCS 2015 Shelf , on page 333	

Step 2 Complete the DLP-L63 Inspecting the Shelf, on page 26.

Step 3 Continue with Connect the PC and Log into the GUI.

Stop. You have completed this procedure.



CHAPTER 25

Installing the Cisco NCS 2015 Door and Other Modules

This chapter describes how to install the NCS 2015 door and other modules.

The sections are:

- Front Door, on page 329
- NTP-L67 Installing Fiber Tray of NCS 2015 Shelf , on page 330
- NTP-L50 Installing Standard Door of NCS 2015 Shelf , on page 333
- NTP-L61 Installing Deep Door of NCS 2015 Shelf , on page 337
- NTP-L51 Opening and Removing the Door of the NCS 2015 Shelf , on page 342
- External Connection Units, on page 343
- NTP-L52 Install NCS 2015 ECU Module, on page 345
- Power Modules, on page 347
- NTP-L53 Installing the Power Modules in NCS 2015 Shelf , on page 349
- LCD Unit, on page 352
- Fan-Tray Assembly , on page 352
- NTP-L54 Installing Fan-Tray Assembly in NCS 2015 Shelf, on page 353
- Air Filter , on page 356

Front Door

The front door of NCS 2015 provides access to the shelf, fiber-routing tray, fan-tray assembly, and LCD screen.

There are two types of front doors that act as protective panels—standard door and deep door. The deep door provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door. The deep door has a hinge and can be rotated like the standard door.

The laser warning label is placed on the rear of the chassis.

The following figure shows the NCS 2015 laser warning.

Figure 226: Laser Warning on the NCS 2015



364676

NTP-L67 Installing Fiber Tray of NCS 2015 Shelf

Purpose	This procedure installs the standard or extended fiber tray of the NCS 2015 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note The standard fiber tray is included in the standard door PID and the extended fiber tray is included in the deep door PID.

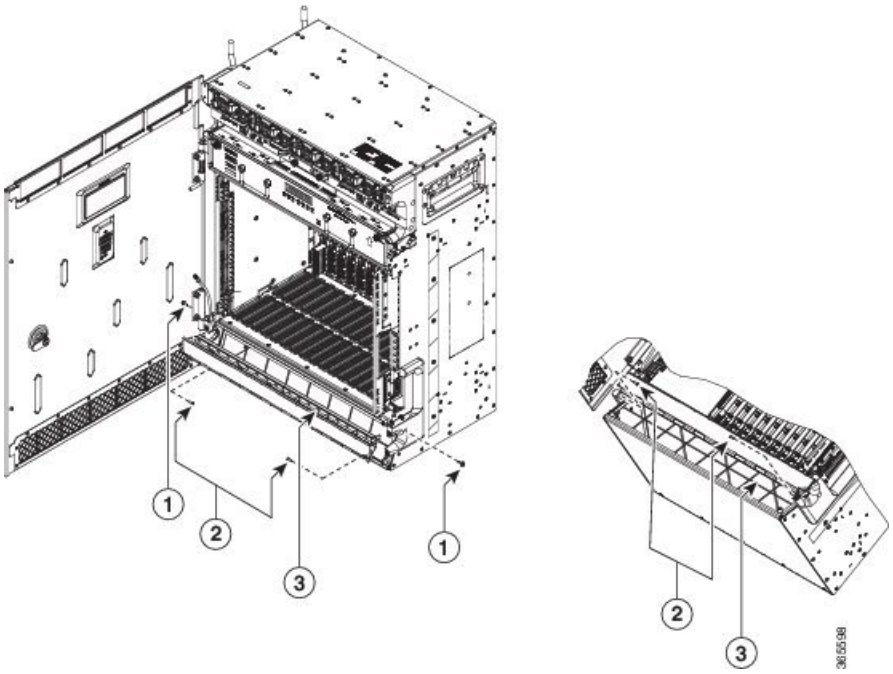
Procedure

Step 1 Align the fiber tray screw holes against the shelf screw holes.

Step 2 Insert the M3 x 10 mm screws (one screw on each side and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See figures below.

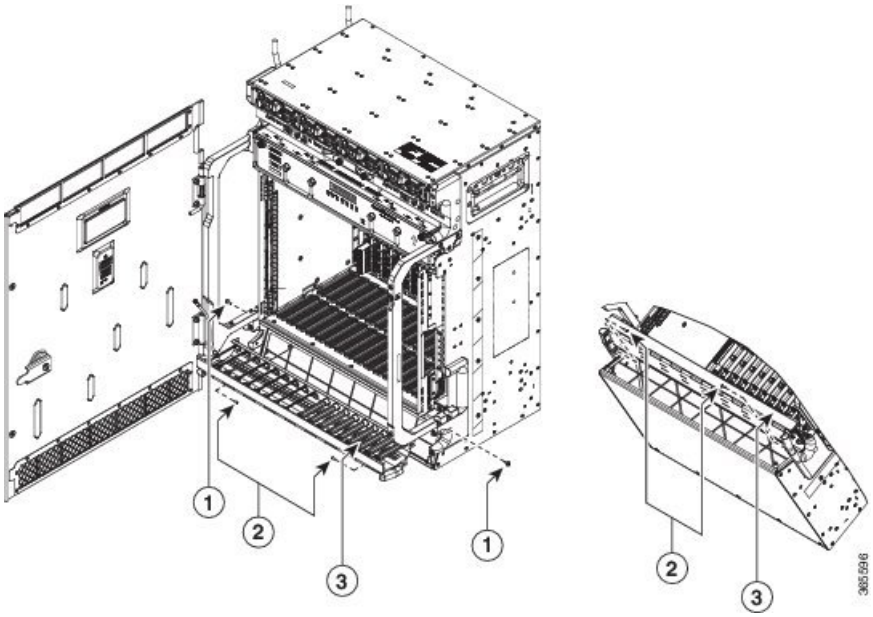
Step 3 Insert the M3 x 8mm screws (two screws on the bottom of the fiber tray) and tighten them to a torque value of 11.5 in-lb (1.3 N-m). See figures below.

Figure 227: Installing the Standard Fiber Tray



1	M3 x10 mm screws	2	M3 x8 mm screws
3	Standard fiber tray		

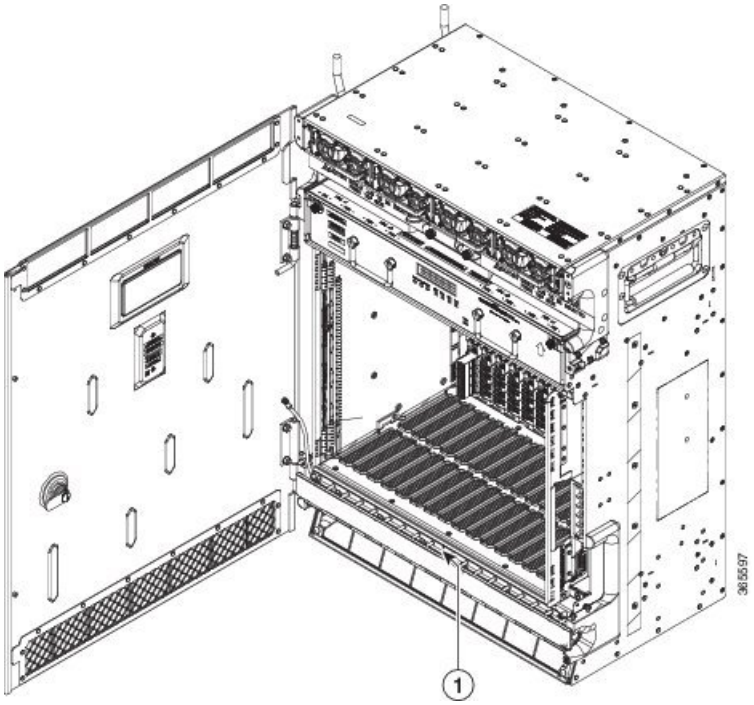
Figure 228: Installing the Extended Fiber Tray



1	M3 x10 mm screws	2	M3 x8 mm screws
3	Extended fiber tray		

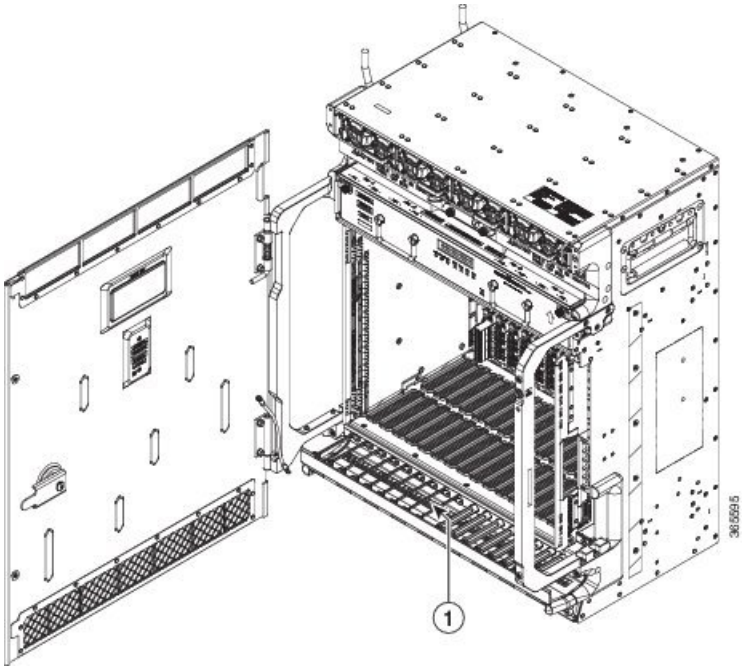
The installed fiber tray is shown in the figures below.

Figure 229: Installed Standard Fiber Tray



1	Standard fiber tray

Figure 230: Installed Extended Fiber Tray



1	Extended fiber tray

Stop. You have completed this procedure.

NTP-L50 Installing Standard Door of NCS 2015 Shelf

Purpose	This procedure installs the standard door of the NCS 2015 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • NTP-L52 Install NCS 2015 ECU Module, on page 345 • NTP-L57 Installing Power and Ground to the NCS 2015 Shelf , on page 304 • NTP-L54 Installing Fan-Tray Assembly in NCS 2015 Shelf, on page 353 • NTP-L67 Installing Fiber Tray of NCS 2015 Shelf , on page 330
Required/As Needed	As needed

Onsite/Remote	Onsite
Security Level	None

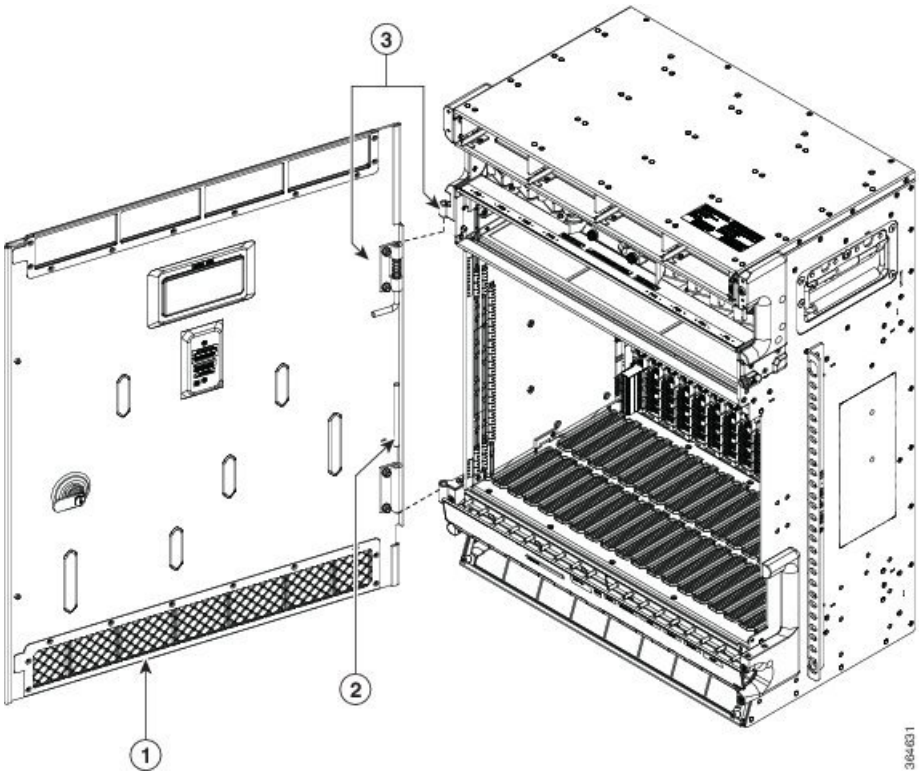
Procedure

Step 1 Pull the top hinge pin down on the standard door.

Note
The bottom hinge pin is fixed.

Step 2 Align the standard door hinges with the chassis hinges (see the figure below).

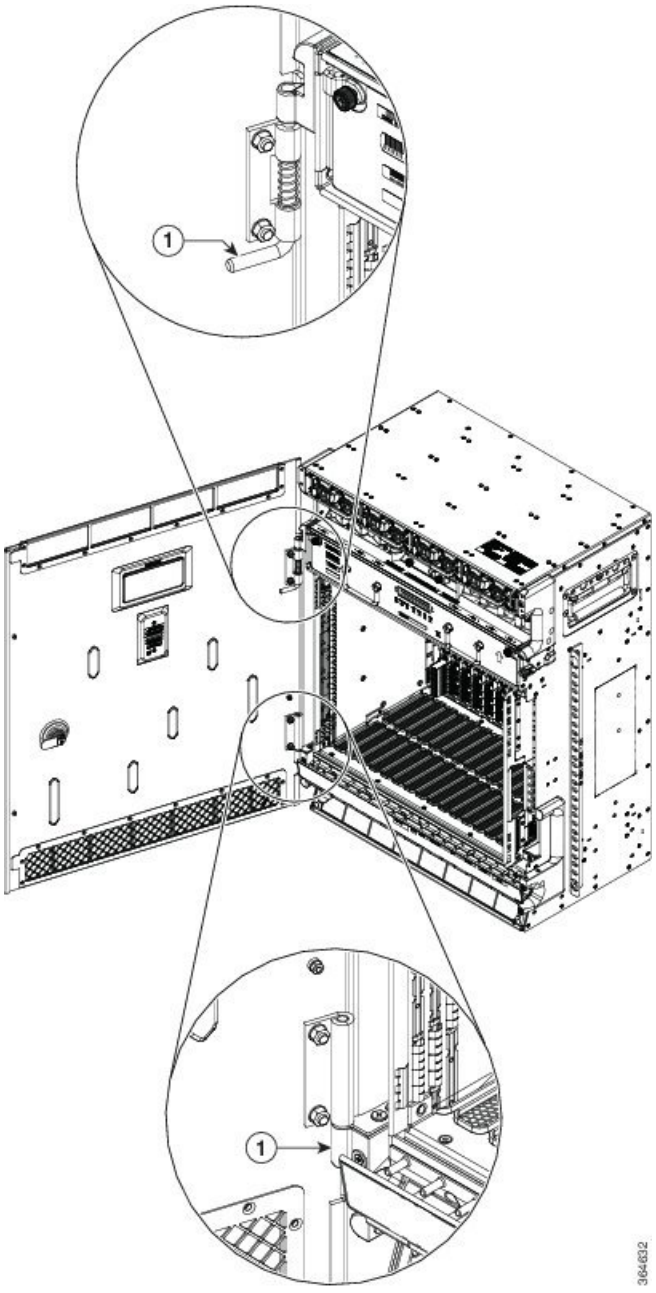
Figure 231: Installing the Standard Door of NCS 2015 DC Shelf



1	Standard door	2	Hinge pin
3	Align door hinge with the chassis hinge		

Step 3 Slide the bottom hinge pin into the chassis hinge and move the top hinge pin in the upward direction (see the figure below).

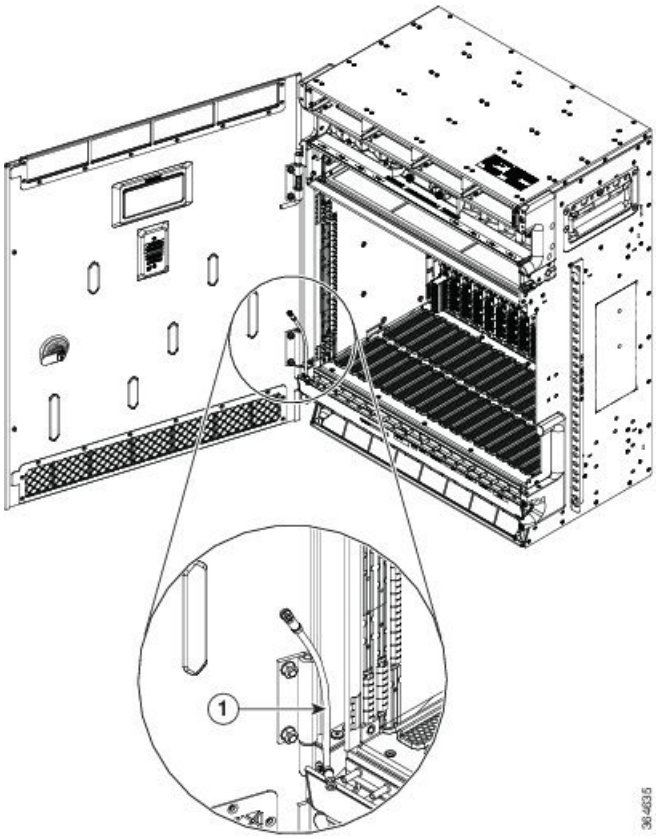
Figure 232: Hinge Pins



1	Hinge pins

Note
The ground strap cable is pre-installed on the standard door. See the figure below.

Figure 233: Ground Strap Cable



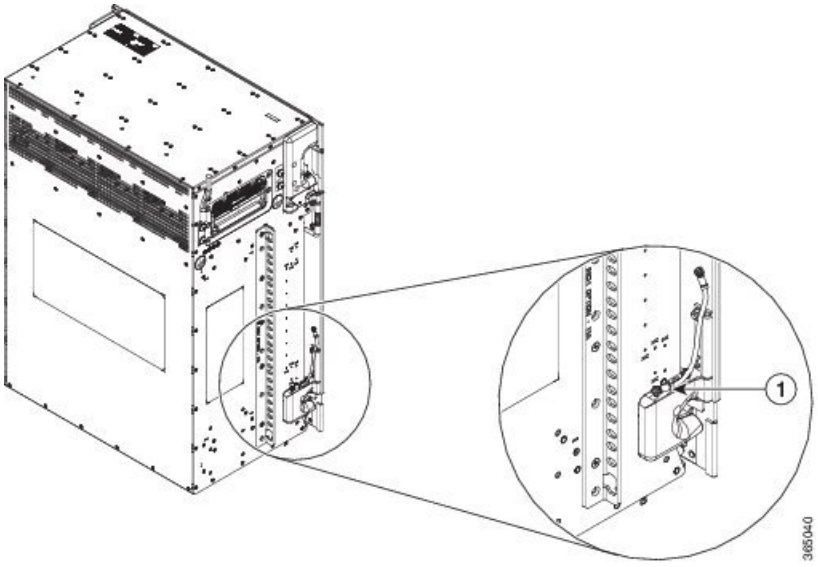
1	Ground strap cable

Step 4 Swing the door closed and turn the knob to lock.

Note
To lock the door, it is mandatory for the ECU module to be installed and secured with captive screws.

Step 5 Connect the other end of the ground strap cable to a grounding point on the chassis (see the figure below).

Figure 234: Installing the Ground Strap Cable on the NCS 2015 DC Shelf



1	Grounding point on the chassis

Stop. You have completed this procedure.

NTP-L61 Installing Deep Door of NCS 2015 Shelf

Purpose	This procedure installs the deep door of the NCS 2015 shelf.
Tools/Equipment	• #2 Phillips Dynamometric screwdriver • 10 M3 x 10 mm pan-head screws • One M3 x 8 mm pan-head screw • One M3 x 6 mm pan-head screw
Prerequisite Procedures	• NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • NTP-L52 Install NCS 2015 ECU Module, on page 345 • NTP-L57 Installing Power and Ground to the NCS 2015 Shelf , on page 304 • NTP-L54 Installing Fan-Tray Assembly in NCS 2015 Shelf, on page 353 • NTP-L67 Installing Fiber Tray of NCS 2015 Shelf , on page 330
Required/As Needed	As needed
Onsite/Remote	Onsite

Security Level	None

Procedure

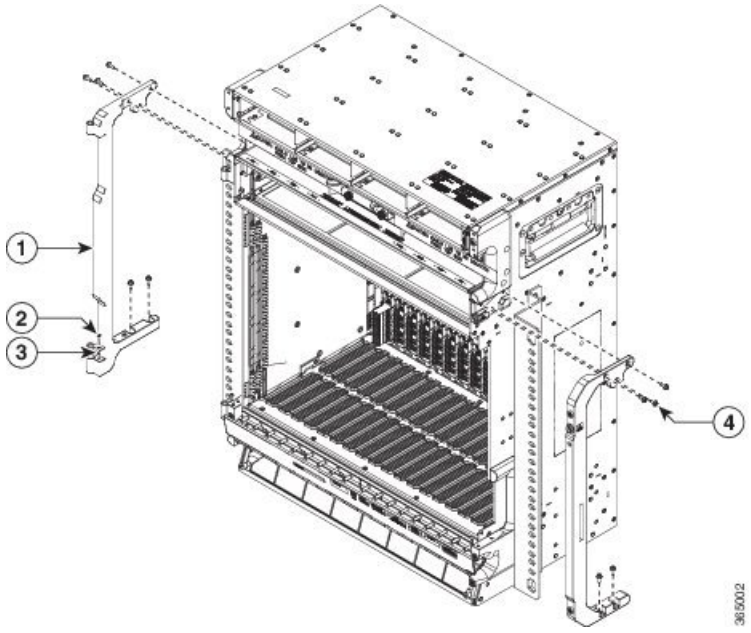
Step 1 Align the left deep door bracket screw holes against the shelf screw holes.

Step 2 Insert the M3 x 10 mm screws (three screws on the side and two screws on the bottom of the deep door bracket) and tighten them to a torque value of 11.5 in-lb (1.3 N-m). (See the figures below.)

Step 3 Place a safety washer on the front bottom of the deep door bracket and fasten it with a M3 x 8 mm screw. (See the figures below.)

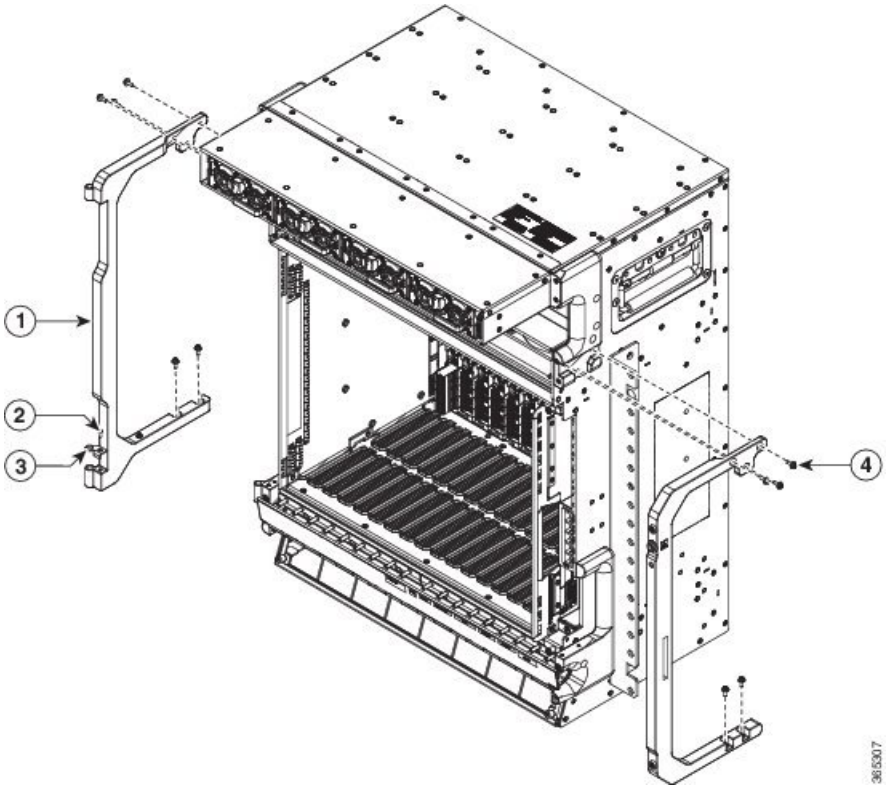
Step 4 Repeat steps 1 and 2 for the deep door bracket on the opposite side. (See the figures below.)

Figure 235: Installing the Deep Door Bracket of NCS 2015 DC Shelf



1	Deep door bracket	2	M3 x 8 mm screw
3	Safety washer	4	M3 x 10 mm screw

Figure 236: Installing the Deep Door Bracket of NCS 2015 AC Shelf



1	Deep door bracket	2	M3 x 8 mm screw
3	Safety washer	4	M3 x 10 mm screw

Step 5 Pull the top hinge pin down on the deep door. (See the figures below.)

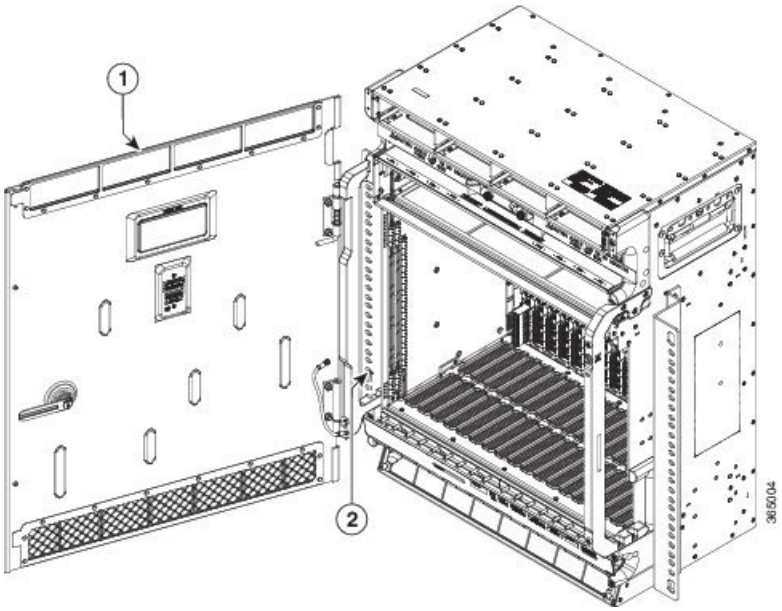
Note
The bottom hinge pin is fixed.

Step 6 Align the deep door hinges with the bracket hinges. (See the figures below.)

Step 7 Slide the bottom hinge pin into the bracket hinge and move the top hinge pin in the upward direction.

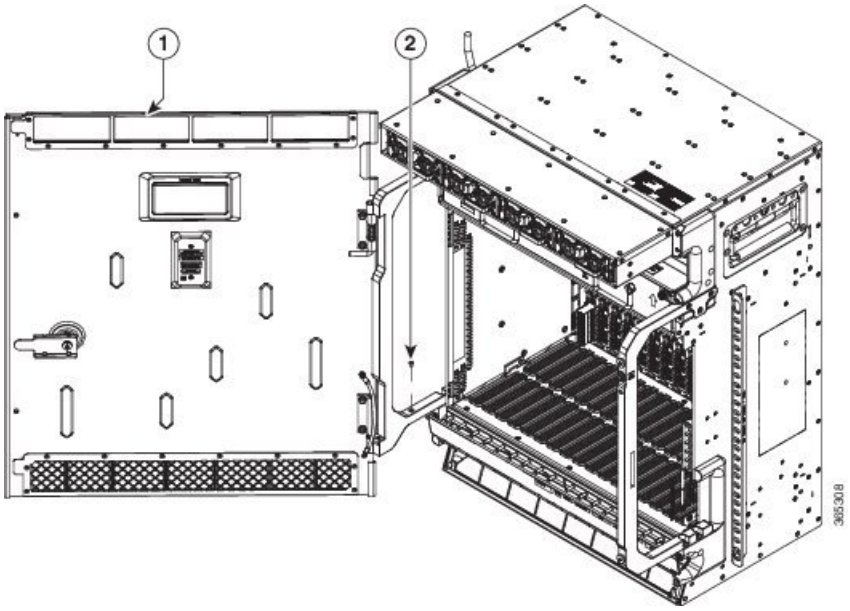
Note
The ground strap cable is pre-installed on the deep door. (See the figures below.)

Figure 237: Installing the Deep Door and Ground Strap Cable to the NCS 2015 DC Shelf



1	Deep door	2	M3 x 6 mm screw

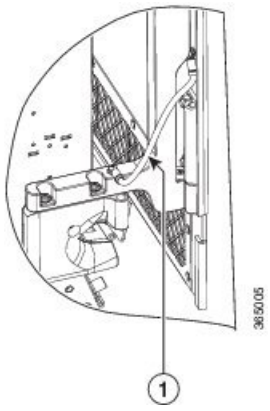
Figure 238: Installing the Deep Door and Ground Strap Cable to the NCS 2015 AC Shelf



1	Deep door	2	M3 x 6 mm screw

Step 8 Connect the other end of the ground strap cable to a grounding point on the deep door bracket using a M3 x 6 mm screw. (See the figure below.)

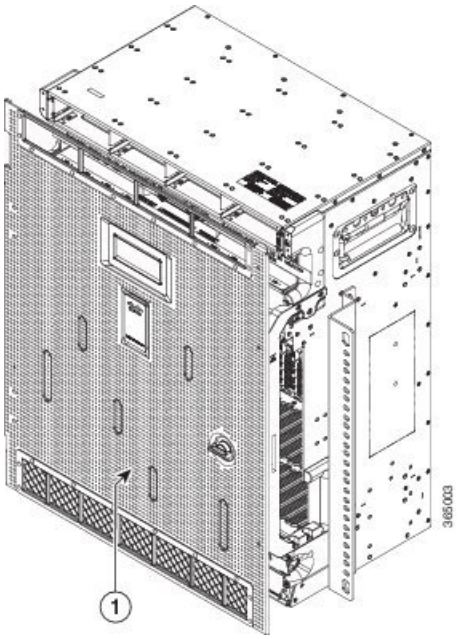
Figure 239: Ground Strap Cable



1	Ground strap cable

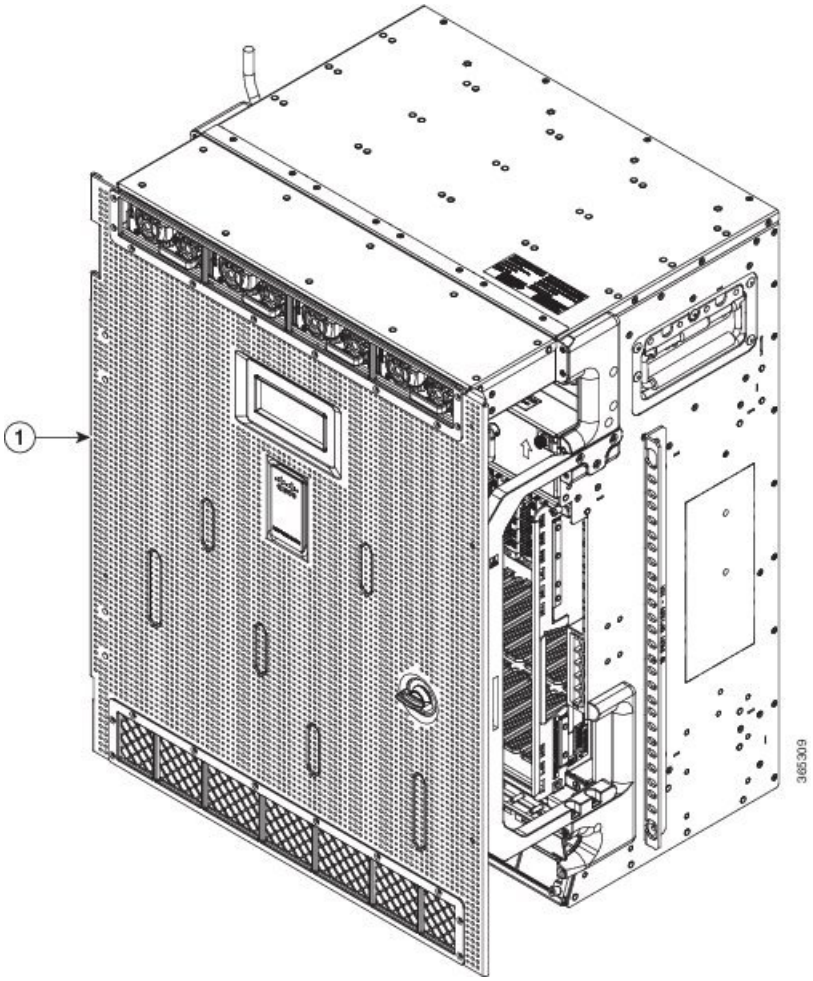
Step 9 Swing the door closed and turn the knob to lock. (See the figures below.)

Figure 240: Installed Deep Door in NCS 2015 DC Shelf



1	Deep door

Figure 241: Installed Deep Door in NCS 2015 AC Shelf



1	Deep door

Stop. You have completed this procedure.

NTP-L51 Opening and Removing the Door of the NCS 2015 Shelf

Purpose	This procedure opens and removes the door of the NCS 2015 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	• NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note The NCS 2015 shelf has an ESD plug input and is shipped with an ESD wrist strap. The ESD plug input is located on the outside of the shelf on the right side. It is labeled "ESD" on the top and bottom. Always wear an ESD wrist strap and connect the strap to the ESD plug when working on the NCS shelf. For detailed instructions on how to wear the ESD wristband, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .

Procedure

Step 1 Turn the knob to unlock the door.

Step 2 Swing the door open.

Step 3 Remove the ground cable from the shelf by removing the screw.

Step 4 Pull the top hinge pin holding the door to the chassis, in the downward direction.

Step 5 Lift the door out of the bottom hinge pin to remove the door from its hinges.

Stop. You have completed this procedure.

External Connection Units

The NCS 2015 external connection unit (ECU) is a replaceable module that provides interfaces for passive device inventory and management, multishelf management, and element management. The ECU module available for the NCS 2015 shelf is NCS2015-ECU and is installed in slot 18 of the NCS 2015 shelf.

The ECU contains RJ-45 and SFP interfaces or multishelf and element management. Fourteen USB ports connect to passive devices, two of which are USB 3.0 ports. A backup flash memory is fitted into the ECU to support the database (DB) and image backup in the operation of the NCS 2015.

The ECU contains two LEDs that indicate the link and activity status of the optical EMS SFP port.

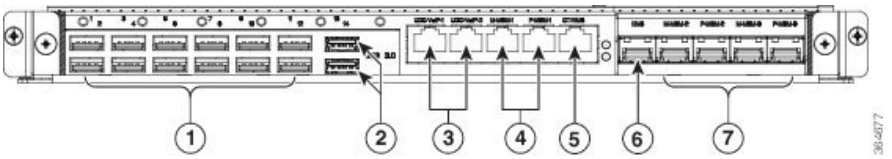
Table 21: ECU LED Status Indicator Lights

LED Name	Color	Description
Link Speed	Green	The LED is on when there is a link connection; otherwise, the LED is off.

LED Name	Color	Description
Activity	Yellow	The LED is flashing when there is activity on the link; otherwise, the LED is off.

The following figure shows the NCS 2015 ECU connectors.

Figure 242: Connectors on the NCS 2015 ECU Faceplate



1	USB 2.0 ports (Ports 1 through 12)	2	USB 3.0 ports (Ports 13 and 14)
3	VOIP/UDC ports (RJ-45 port)	4	MSM port (RJ-45 port)
5	EMS port (RJ-45 port)	6	EMS port (SFP port)
7	MSM ports (SFP ports)		

The following table lists the external connections present on the NCS 2015 ECU :

Table 22: NCS 2015 ECU Interfaces

Interface	Connector Type	Quantity
Passive inventory and management	USB 2.0	12
	USB 3.0	2
Multishelf management	RJ-45 (10BASE-T)	2
	SFP (100BASE-FX)[3]	4
Element management system (EMS) or craft terminal	RJ-45 (10BASE-T)	1
	SFP (100BASE-FX)	1
User data channel (UDC)	RJ-45	2

[3] The supported SFP is ONS-S1-100-FX

The ECU cannot be pre-provisioned in CTC. After the ECU is physically plugged into Slot 18 of the NCS 2015 shelf, the unit is detected by CTC and all the entities of the ECU such as the USB ports, RJ-45 ports, and the optical pluggable ports are created in CTC. In the ECU card view in CTC, only the pluggable ports are visible. The ECU card view displays the Alarms, Conditions, History, Provisioning and Maintenance sub-tabs. All the values in these sub-tabs, except for the port name, are display only. Performance monitoring is not supported on the pluggable FE ports of the ECU. The MS-ISC (RJ-45) ports are displayed in the CTC ECU card view > Provisioning > Alarm Profiles > Alarm Behavior tab. The IMPROPRMVL alarm is raised in CTC when the ECU is removed from the NCS 2015 shelf. The ECU entities and the ECU card view in

CTC remain as they are, even though the ECU has been removed from the NCS 2015 shelf. The ECU cannot be deleted in CTC.

The Fiber Shuffle or the CDC fan out unit can be connected to the NCS 2015 ECU using the USB 3.0 port.

Passive Unit Inventory Interfaces

The passive unit inventory interfaces (USB ports) are used to retrieve inventory information from passive devices such as fiber trays, FBG DCU, patch panels, passive multiplexer or demultiplexer, and so on. There are 14 USB (12 USB 2.0 ports and two USB 3.0 ports.) ports on the NCS 2015 ECU. The inventory details are displayed in the Inventory tab in CTC.

MSM

The multishelf management (MSM) port is an RJ-45 or SFP port that is used to connect the NCS 2015 shelf to other NCS 2015 or NCS 2015 shelves that are a part of the multishelf configuration. There are six MSM ports on the NCS 2015 ECU module.

Three MSM ports (one RJ-45 port and two SFP ports) are prefixed with M and correspond to the TNCS card in Slot 1. The other three MSM ports (one RJ-45 port and two SFP ports) are prefixed with P and correspond to the TNCS card in slot 17. The SFP modules must be plugged in for using the optical MSM ports. MSM connections between the NC and SSC can be done using RJ-45 ports, SFP ports, or both. The MSM cable connections can be created between two M-MSM-x ports or two P-MSM-x ports.

VoIP or UDC

VoIP or UDC is an RJ45 port that can be configured to support UDC or VoIP service on an NCS 2015 shelf. There are two VoIP or UDC ports on the NCS 2015 ECU module. The UDC/VoIP-1 port is connected to the TNCS card in Slot 1 and the UDC/VoIP-2 port is connected to the TNCS card in Slot 17. The VoIP or UDC port also supports Power over Ethernet for connecting VoIP equipments.

NTP-L52 Install NCS 2015 ECU Module

Purpose	This procedure installs the external connection unit (ECU) in the NCS 2015 shelf.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	• NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT metallically connect to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.** Statement 7005

Warning **To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the serial high-speed WAN interface ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.** Statement 7003

Warning **The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly MUST NOT metallically connect to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.** Statement 7018

Warning **Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security.** Statement 1072

Caution Always use the ESD wristband when working. See Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

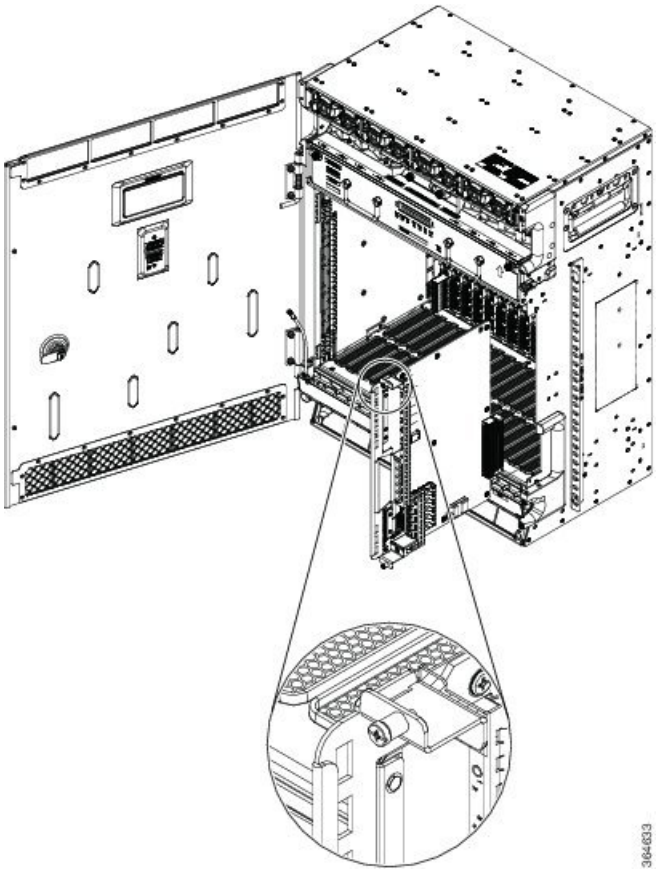
Procedure

Step 1 Insert the NCS 2015 ECU module in slot 18 of the chassis (see the figure below).

Step 2 Push the NCS 2015 ECU module such that the backplane connector is completely engaged and the faceplate of the NCS 2015 ECU module aligns with the edge of the chassis side wall.

Step 3 Tighten the captive screw to a torque value of 4 in-lb (0.45 N-m).

Figure 243: Installing the NCS 2015 ECU Module



Stop. You have completed this procedure.

Power Modules

The NCS 2015 system contains pluggable and redundant power modules for AC and DC power. The AC and DC power modules cannot be used simultaneously to power the NCS 2015 system. Each power module has three status LEDs located on the front left side of its faceplate.

Note At least one power module must be present in the chassis to boot up the system. The available power module is automatically configured as the Working module. You must configure a Protection module to avoid power shortage in the chassis. Before configuring a Protection module, ensure that the Protection module is available in the chassis.

If the Working module fails, the Protection module takes care of the shelf. If both the Protection and Working modules fail, line cards may shut down due to power shortage and traffic is affected.

Table 23: Power Module LED Status Indicator Lights

LED Name	Color	Description
Input OK	Green	• On: The input voltage is present and within regulation range. • Blinking: The input voltage is present but out of regulation range. • Off: The input voltage is not present.
Output OK	Green	• On: The output voltage is on. • Blinking: The power module is in a power limit or over current condition. • Off: The output voltage is off.
Fault	Red	• On: An internal fault is detected within the power module. • Off: No internal faults detected on the power module.

AC Power Modules

The NCS 2015 system is powered by AC power modules with 1+0, 1+1, 2+0, and 2+2 redundancy. The supported AC power module on the NCS 2015 shelf is NCS4K-AC-PSU. The AC power module converts the AC-input current to DC-output current. Each AC power module has one AC single-phase 3 poles (line L, Neutral N, and Protective Earth PE) input connector.

DC Power Module

The NCS 2015 system is powered by DC power modules with 3+1, 2+2, 2+1, and 1+1 redundancy. The supported DC power module on the NCS 2015 shelf is NCS4K-DC-PSU-V1. The DC power module draws power from the power plant to turn on the NCS 2015 shelf.

The PWR-CON-LMT alarm is raised in the Alarms tab in CTC when the installation or pre-provisioning of a card causes the power consumption to exceed the power limit.

The PWR-CON-LMT alarm is raised on the NCS2015 shelf when the power consumption of the shelf exceeds the maximum power limit. A database backup is performed on the shelf. Additional power modules are installed to increase the power limit. A database restore is then performed on the shelf. The PWR-CON-LMT alarm still persists even though the power consumption is within the power limit.

Note The total power consumption of the shelf is calculated by the controller card and displayed in CTC in the Provisioning > Power Monitor tab.

Power Filler Module

For redundant power supplies, four AC or DC power modules can be installed in the NCS 2015 shelf. However, only one power module can sustain the functioning of the entire NCS 2015 system. You can install power filler modules in the empty slots.

NTP-L53 Installing the Power Modules in NCS 2015 Shelf

Purpose	This procedure installs the power modules in the NCS 2015 system.
Tools/Equipment	#2 Phillips screwdriver
Prerequisite Procedures	• NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281 or NTP-L49 Mounting Brackets on NCS 2015 Shelf for ETSI Rack Configuration, on page 285 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, see the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **The plug-socket combination must be accessible at all times because it serves as the main disconnecting device.** Statement 1019

Procedure

Step 1 Complete DLP-L82 Installing AC Power Module in NCS 2015 Shelf, on page 350

Step 2 Complete DLP-L75 Installing DC Power Module in NCS 2015 Shelf, on page 351

Step 3 Complete the NTP-L57 Installing Power and Ground to the NCS 2015 Shelf , on page 304.

Stop. You have completed this procedure.

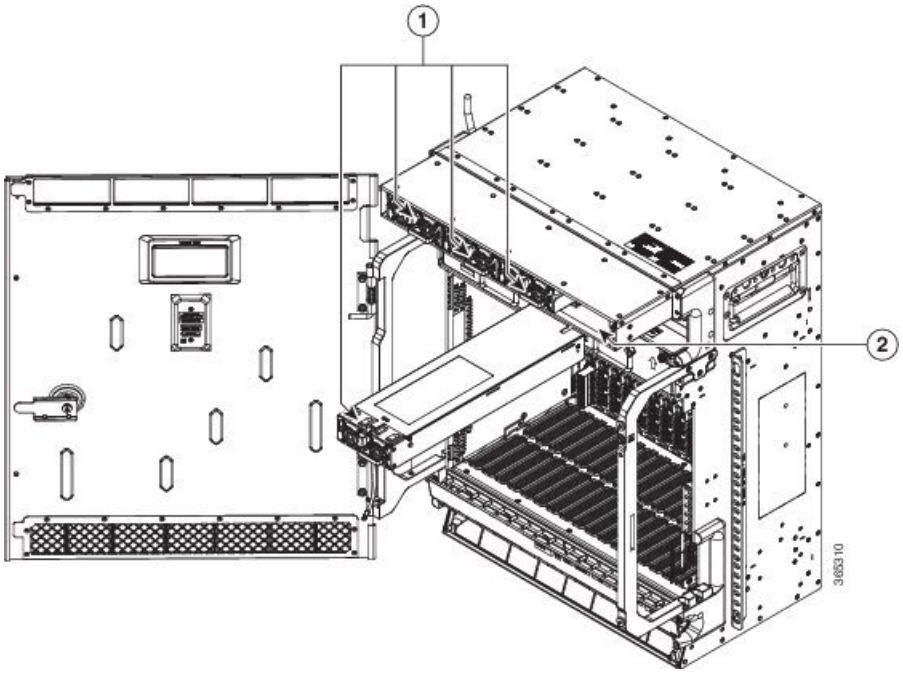
DLP-L82 Installing AC Power Module in NCS 2015 Shelf

Purpose	This procedure installs the NCS4K-AC-PSU power module in the NCS 2015 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	none
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Remove the filler caps from the slots where you want to install the power modules.

Figure 244: Installing the AC power module



1	AC power module	2	Power tray

Step 2 Using both hands to support the power module, slide it into the power slot (See figure above).

Step 3 Secure the power module into the power tray using the snap hook.

Step 4 Repeat Steps 1 through 3 for the other AC power modules.

Step 5 Return to your originating procedure (NTP).

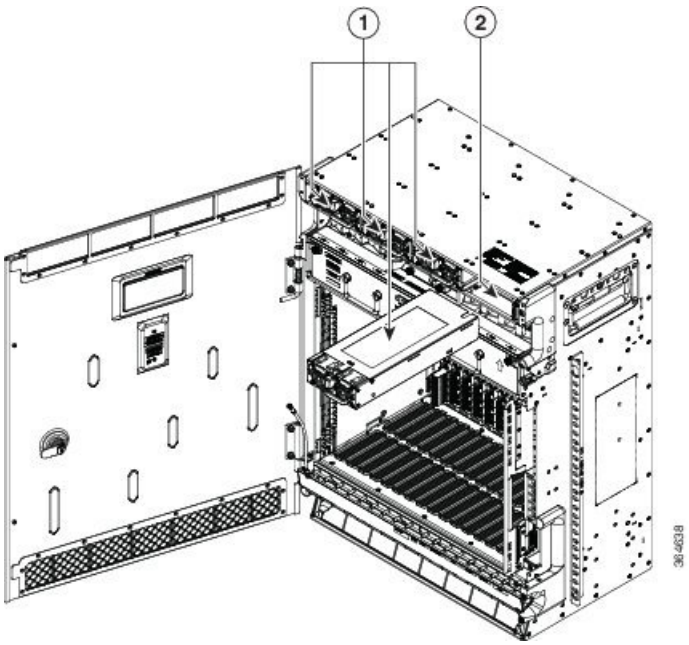
DLP-L75 Installing DC Power Module in NCS 2015 Shelf

Purpose	This procedure installs the NCS4K-DC-PSU-V1 power module in the NCS 2015 shelf.
Tools/Equipment	#2 Phillips Dynamometric screwdriver
Prerequisite Procedures	none
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Remove the filler caps from the slots where you want to install the power modules.

Figure 245: Installing the DC power module



1	DC power module	2	Power tray

Step 2 Using two hands to support the power module, slide it into the power slot (see the figure above).

Step 3 Secure the power module into the power tray using the snap hook.

Step 4 Repeat the above steps for the other DC power modules.

Step 5 Return to your originating procedure (NTP).

LCD Unit

The LCD unit is integrated with the fan tray assembly and consists of an LCD display panel, push button, and shelf-level LED indicators on the NCS 2015 system.

The shelf controller card (TNCS) powers the 16 x 2 character LCD screen. The LCD screen displays the shelf name, shelf IP address, and software version currently used. The LCD screen also provides slot-level and port-level information of all card slots, including the number of critical, major, and minor alarms. The display contrast is automatically adjusted for a clearer view. The three accessible push buttons (SLOT, STATUS, and PORT) on the LCD unit are used to set parameters at the slot-level and port-level. There are three alarm LEDs (CRIT, MAJ, and MIN) on the LCD unit that indicate whether a critical, major, or minor alarm is present anywhere on the NCS 2015 shelf. There is also a Fan Fail LED. When the fan-tray assembly is not functioning or when the power line is not connected, the LED is OFF. When the power line is connected and if there is no TNCS card installed in the NCS2015 shelf, then the LED is OFF. A red LED indicates an alarm in the fan-tray assembly. A green LED indicates that the fan-tray assembly is functioning, the power line is connected, and the power module is functioning properly. The shelf controller card controls the conditions that result in triggering the LEDs. The LEDs can be overwritten by the shelf controller card (TNCS) in all the three states (OFF/red/green). The LCD unit supports the lamp test procedure and the LEDs changes its color or state.

Fan-Tray Assembly

The fan-tray supported on the NCS 2015 shelf is NCS2015-FTA.

The fan-tray assembly is located on the front side of the NCS 2015 shelf. The fan-tray is removable and holds the fan-control circuitry and the fans for the NCS 2015 shelf. The fan tray has 9 x 92mm x 48mm fans that are capable of pulling enough air to cool up to 300 W per LC with optimum placement and components at both 27C NEBS acoustic level and 55C NEBS extended temperature range. The fan tray also accommodates LCD panel and its circuitry. The fan-tray assembly supports the lamp test procedure. After you install the fan tray, you should only access it when a fan failure occurs.

Fan Speed

The fan speed is controlled by the TNCS card temperature sensors. The sensors measure the input air temperature at the fan-tray assembly. If the TNCS card fails, the fans automatically shift to high speed. The temperature that the TNCS sensors measure appears on the LCD screen.

Fan Failure

If one or more fans fail on the fan-tray assembly, replace the entire assembly. You cannot replace individual fans. The FAN-DEGRADE alarm is raised when one fan fails and the Fan Fail LED in the LCD unit glows with amber color. The FAN-FAIL alarm is raised when two or more fans fail and the Fan Fail LED glows with red color. The Fan Fail LED clears after you install a working fan-tray.

NTP-L54 Installing Fan-Tray Assembly in NCS 2015 Shelf

Purpose	This procedure installs the NCS2015-FTA fan-tray assembly in the NCS 2015 system.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	• NTP-L48 Mounting Brackets on NCS 2015 Shelf for ANSI Rack Configuration, on page 281. • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not operate an NCS 2015 chassis without the fan tray for more than two minutes.

Warning **Do not reach into a vacant slot when installing or removing the fan tray. Exposed circuitry is an energy hazard.** Statement 206

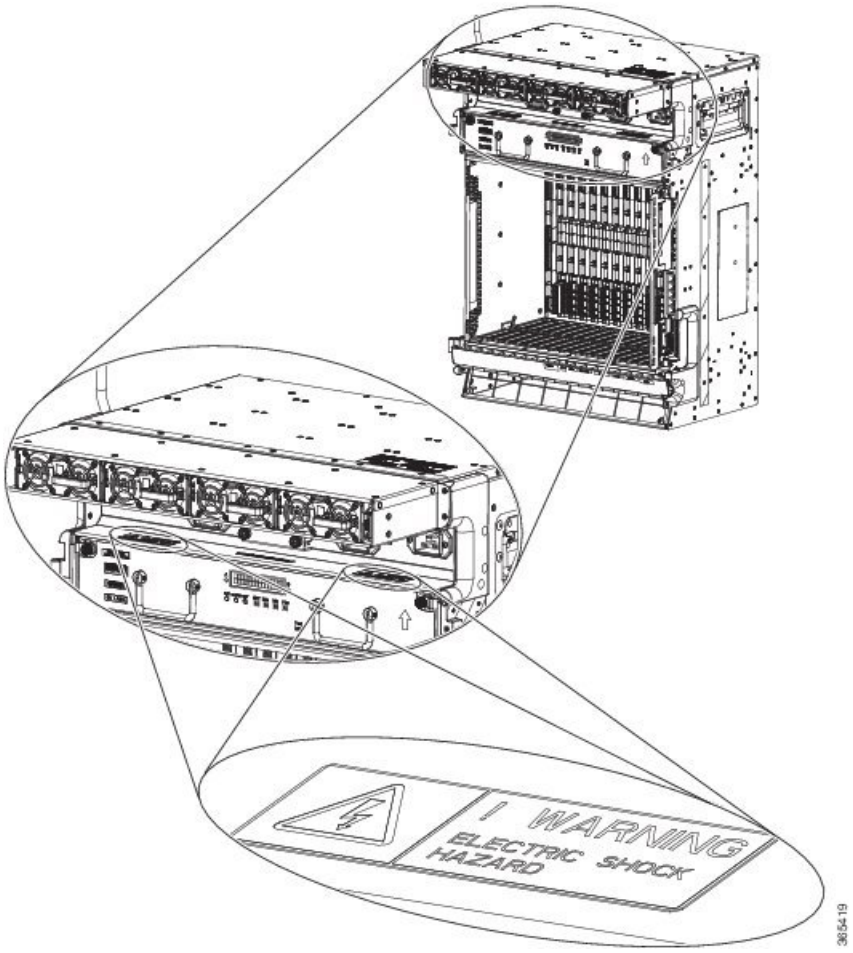
Caution When the fan tray is removed, shock hazard is possible. Do not introduce any object into the fan tray slot nor touch the empty slot. Install the fan tray immediately.

Caution Do not force a fan-tray assembly into place. Doing so can damage either the connectors on the fan tray or the connectors on the back panel of the shelf, or both.

Note Error messages appear on the TNCS/TNCS-O card, the fan-tray LED, and in the Cisco Transport Controller (CTC) when the fan-tray assembly is removed from the shelf or when a fan is not working.

Note To install the fan-tray assembly, it is not necessary to move any of the fiber-routing facilities.

Figure 246: Shock Hazard Label - NCS 2015 AC Shelf



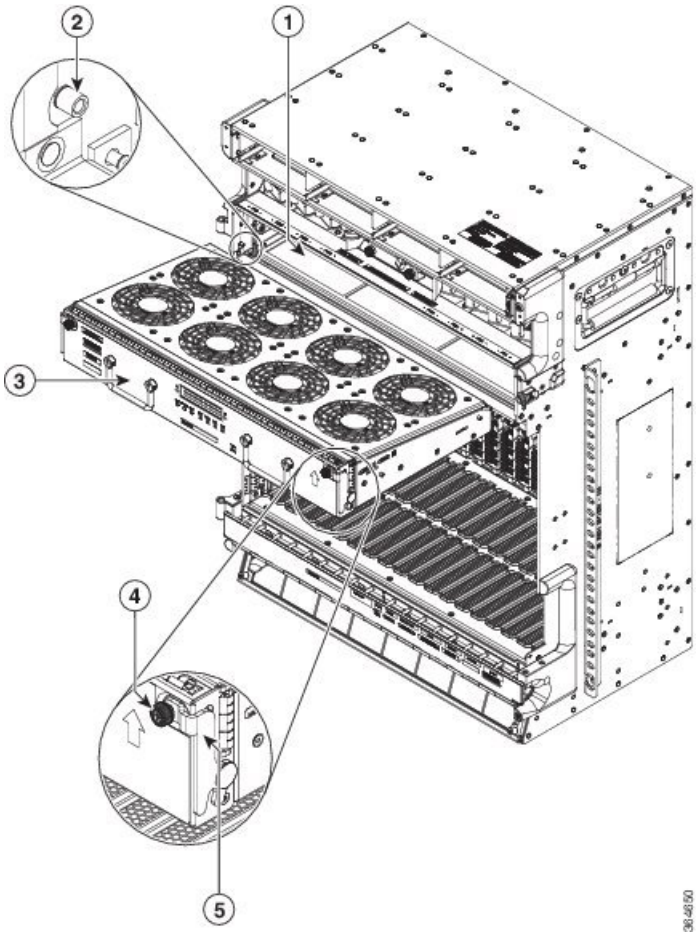
Procedure

Step 1 Orient the fan tray as specified on front label.

Step 2 Move the ejectors down into the stop or block position.

Step 3 Slide the fan tray into the chassis slot. (see the figure below).

Figure 247: Installing the Fan-Tray Assembly in NCS 2015 DC Shelf

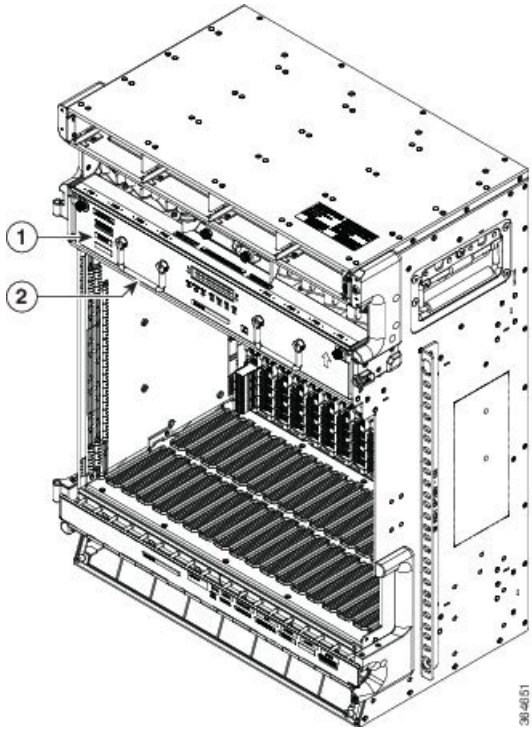


1	Fan tray slot	2	Fan tray guide and lock pin
3	Fan tray	4	Screw
5	Fan tray guide and lock plate		

Step 4 Push the fan-tray assembly such that the backplane connector is engaged completely.

Step 5 Tighten the captive screws to a torque value of 4 in-lb (0.45 N-m) to lock the fan-tray assembly into the chassis (see the figure below).

Figure 248: Fan Tray Assembly Installed in NCS 2015 DC Shelf



1	Fan tray	2	Fan tray handle

Step 6 To verify that the tray has plugged into the assembly, check the fan tray and listen to determine if the fans are running. When the power line is connected, a green LED indicates that the fan-tray assembly is functioning. If power has not yet been turned on, verify that the fan tray is seated and secured with the captive screws.

Stop. You have completed this procedure.

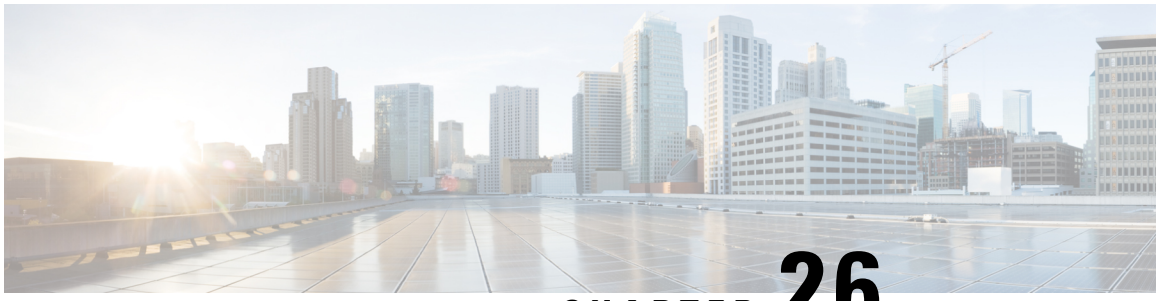
Air Filter

The NCS 2015 contains a preinstalled disposable air filter (NCS2015-FTF) on the bottom side of the shelf.

The disposable filter is made up of a gray, open-cell, polyurethane foam that is specially coated to provide fire and fungi resistance. Spare filters should be kept in stock. Inspection of the air filter must be performed as specified in your local site practices.

Note Inspect the air filters every three months and replace them as needed. Air filters should be disposed of and replaced when they become dirty. According to NEBS guidelines, washing or cleaning them is not allowed. Make sure to order these consumable items separately and keep a spare stock. For PID identification, contact TAC, as these parts cannot be replaced through the RMA process.

Caution Do not operate an NCS 2015 without the mandatory air filter.



CHAPTER 26

Installing and Configuring the Control Card

This chapters describes the procedures for installing and configuring control cards.

The sections are:

- NTP-L41 Installing and Configuring the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card, on page 359
- Filler and Blank Cards, on page 365

NTP-L41 Installing and Configuring the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card

Purpose	This procedure describes how to install and configure the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O card.
Tools/Equipment	Redundant TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards on Cisco NCS 2006 shelf (required) Stand-alone TNC/TNCE/TSC/TSCE card on Cisco NCS 2002 shelf (required) Redundant TNCS/TNCS-O cards on the Cisco NCS 2015 shelf (required)
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

Caution Always use the supplied ESD wristband when working with a powered NCS 2002, NCS 2006, or NCS 2015 shelf assemblies. For detailed instructions on how to wear the ESD wristband, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.

Note If you install a card incorrectly, the FAIL LED flashes continuously.

Procedure

Step 1 Complete DLP-L62 Installing the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card, on page 360.

Step 2 Complete DLP-L63 Provisioning PPM and Port for the TNC,TNCE, and TNCS Cards, on page 363 .

Step 3 Complete DLP-L64 Configuring UDC and VoIP for the TNC, TNCE, TNCS, and TNCS-O Cards, on page 364 .

Stop. You have completed this procedure.

DLP-L62 Installing the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card

Purpose	This task installs redundant TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards on the NCS 2006 shelf, a stand-alone TNC/TNCE/TSC/TSCE card on the NCS 2002 shelf, and redundant TNCS/TNCS-O cards on the NCS 2015 shelf. Install and initialize the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card before installing any other line cards into the shelf assemblies. On the NCS 2006 shelf, install the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards in slots 1 and 8 for redundancy. On the NCS 2002 shelf, install the stand-alone TNC/TNCE/TSC/TSCE card in slot 1. On the NCS 2015 shelf, install the TNCS/TNCS-O cards in slots 1 and 17 for redundancy.
Tools/Equipment	• Two TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards for the NCS 2006 shelf • One TNC/TNCE/TSC/TSCE card for the NCS 2002 shelf • Two TNCS/TNCS-O cards for the NCS 2015 shelf
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not remove the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards during the software installation process, which is indicated by alternate flashing FAIL and ACT/STBY LEDs. Removing the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards during the software installation process will corrupt the system memory.

Note Allow each TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card to boot completely before installing the redundant TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card.

Note On the NCS 2006 shelf, install the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards in slots 1 and 8 for redundancy. On the NCS 2002 shelf, install the stand-alone TNC/TNCE/TSC/TSCE card in slot 1. On the NCS 2015 shelf, install the TNCS/TNCS-O cards in slots 1 and 17 for redundancy.

Note You cannot insert the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards in other slots due to mechanical constraints. To identify the card slot, match the symbol placed on the lower side of the card front panel with the symbol in the shelf.

Note The firmware upgrade of the OTDR functionality of the TNCS-O card might take up to 1 hour and 15 minutes, depending on the node configuration. An automatic retry mechanism is available in case of any issues during the upgrade. The TNCS-O card is fully functional during the firmware upgrade except for the OTDR feature, which is available only after the completion of the firmware upgrade.

Caution To achieve redundancy, two TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards must be installed in the NCS 2006 shelf or two TNCS/TNCS-O cards must be installed in the NCS 2015 shelf.

Procedure

Step 1 Open the latches/ejectors of the first TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card that you will install.

Step 2 Use the latches/ejectors to firmly slide the card horizontally along the guide rails until the card plugs into the receptacle at the back of the slot (slot 1 or 8 in the NCS 2006 shelf, slot 1 in the NCS 2002 shelf, and slot 1 or 17 in the NCS 2015 shelf).

Step 3 Verify that the card is inserted correctly, and close the latches/ejectors on the card.

If you insert a card into a slot assigned for a different card, all LEDs turn off.

Step 4 As needed, verify the LED activity on the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card.

- The red FAIL LED, PWR LED turn on briefly.
- The red FAIL LED turns on for about 10 seconds.
- The red FAIL LED and the amber ACT/STBY LED turn on for about 30 seconds.
- The red FAIL LED blinks for about 10 seconds.
- The red FAIL LED turns on for about 15 seconds.
- All the LEDs including the CRIT, MAJ, MIN, REM, SYNC, and ACO LEDs blink once and turn off for about 10 seconds.
- ACT/STBY LED blinks for about 1 second.
- All the LEDs including the CRIT, MAJ, MIN, REM, SYNC, and ACO LEDs turn off for about 10 seconds.
- The ACT/STBY, ACO, and PWR LEDs turn on.
- The boot-up process is complete when the PWR LEDs turn green and the amber ACT/STBY remains on. The ACT/STBY LED turns green if this is the first TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card installed, and amber if this is the second TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card installed.

Note
It might take up to four minutes for the power alarms to clear.

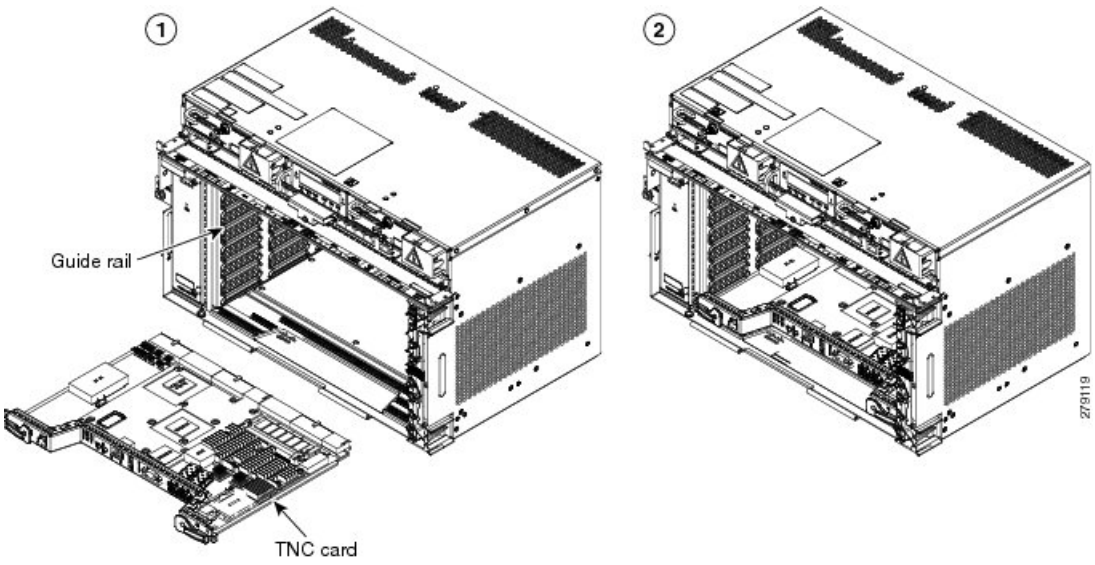
Note
Alarm LEDs might be on. After completing the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card installation, log in to CTC and click the Alarms tab to display the alarms raised on the card. For procedure to clear the alarm, see the *Cisco NCS 2000 Series Troubleshooting Guide*.

Note
During the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card initialization, the SFTWDOWN alarm appears twice. The alarm clears after the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card boots completely.

Note
If the FAIL LED is on continuously, see the tip in Step 9 about the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card automatic upload.

The following figure illustrates the installation of TNC and TNCE cards on NCS 2006 shelf.

Figure 249: Installing TNC and TNCE cards on NCS 2006 Shelf



Step 5 Verify that the ACT/STBY LED is green if this is the first powered-up TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card installed or amber if this is the second powered-up TNC/TNCE/TSC/TSCE/TNCS/TNCS-O. The IP address, temperature of the shelf, and time of day appear on the LCD. The default time and date is 12:00 AM, January 1, 1970.

Step 6 The LCD cycles through the IP address (the default is 192.1.0.2), shelf name, and software version. Verify that the correct software version is shown on the LCD. The software text string indicates the shelf type (SDH or SONET) and software release. The numbers following the release number do not have any significance.)

Step 7 If the LCD shows the correct software version, continue with Step 8. If the LCD does not show the correct software version, refer to your next level of technical support, upgrade the software, or remove the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card and install a replacement card. Refer to the release-specific software upgrade document to replace the software.

Step 8 (NCS 2006 shelf only) Repeat Steps 1 through 7 for the redundant TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card.

Step 9 (NCS 2015 shelf only) Repeat Steps 1 through 7 for the redundant TNCS/TNCS-O card.

Tip
If you install a standby TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card that has a different software version than the active TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card, the standby TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card copies the software version from the active TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card. When the standby card is first inserted, the LEDs follow the normal boot-up sequence. However, after the red FAIL LED turns on for about 5 seconds, the FAIL LED and the ACT/STBY LED begin to flash alternately for up to 30 minutes. After loading the new software, the upgraded TNC/TNCE/TSC/TSCE/TNCS/TNCS-O cards LEDs repeat the appropriate bootup sequence, and the amber ACT/STBY LED turns on.

Step 10 Return to your originating procedure (NTP).

DLP-L63 Provisioning PPM and Port for the TNC,TNCE, and TNCS Cards

Purpose	This task provisions a PPM and port on a TNC, TNCE, and TNCS cards. PPMs are created to support the OSC function.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	None

Procedure

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TNC, TNCE, and TNCS cards where you want to provision PPM and port settings.

Step 2 Click the **Provisioning** > **Pluggable Port Modules** tabs.

Step 3 In the Pluggable Port Modules area, click Create. The Create PPM dialog box appears.

Step 4 In the Create PPM dialog box, complete the following:

- PPM—Choose 1 or 2 from the PPM drop-down list.
- PPM Type—Displays the PPM associated with the chosen PPM in the above step.

Step 5 Click **OK**. The newly created PPM appears in the Pluggable Port Modules area. The row in the Pluggable Port Modules area becomes white when the PPM is inserted and the Actual Equipment Type column lists the name of PPM.

Step 6 In the Pluggable Ports area, click Create. The Create Port dialog box appears.

Step 7 In the Create Ports dialog box, complete the following:

- Port—Choose the port you want to configure from the Port drop-down list.
- Port Type—Choose the port type, such as OC-3, FE, or ONE-GE from the Port Type drop-down list.

Note
OC-3 can be configured only on PPM port 1. FE and ONE-GE can be configured on both the ports.

Step 8 Click **OK**. The newly created port appears in the Pluggable Ports area. The port type you provisioned is listed in the Rate column.

Step 9 Repeat Steps 3 through 8 to provision another PPM and port on the TNC and TNCE cards.

Step 10 Return to your originating procedure (NTP).

DLP-L64 Configuring UDC and VoIP for the TNC, TNCE, TNCS, and TNCS-O Cards

Purpose	This task configures UDC and VoIP traffic for the TNC, TNCE, TNCS, and TNCS-O cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC NTP-G38 Provision OSC Terminations DLP-L63 Provisioning PPM and Port for the TNC,TNCE, and TNCS Cards, on page 363
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	None

Note Each TNC,TNCE, TNCS, and TNCS-O card support UDC/VoIP configuration. You can configure UDC or VoIP on the SFP ports present on the TNC, TNCE, and TNCS cards. The TNC, TNCE, and TNCS cards support the UDC/VoIP configuration only when OSC is provisioned on the SFP ports.

Note If two shelves are connected through the fiber and if the TNC and TNCE cards in one shelf has UDC configuration, the TNC and TNCE cards in the other shelf must also have UDC configuration. The same rule applies to VoIP configuration.

Procedure

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TNC, TNCE, or TNCS/TNCS-O cards where you want to configure UDC and VoIP.

Step 2 Click the **Provisioning > UDC / VOIP** tabs.

Step 3 From the Service Type drop-drop list, choose UDC or VOIP.

Note
You can configure UDC or VoIP on only one SFP port at a time per TNC, TNCE, and TNCS cards. If you want to configure UDC or VoIP on another SFP port, choose NONE from the Service Type drop-down list for the first port and then choose UDC or VoIP for the second port.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

Filler and Blank Cards

Filler cards must be installed in unused and empty slots to ensure proper air flow and electromagnetic interference (EMI) requirements during the Cisco NCS 2002, Cisco NCS 2006, and Cisco NCS 2015 operation. CTC detects filler cards from R10.6 onwards.

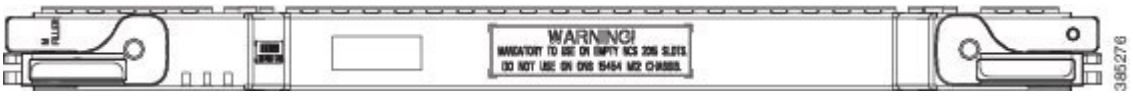
Note It is mandatory to use filler or blank cards in the empty slots of the NCS 2015 shelf.

There are two types of card fillers:

- Line card fillers (15454-M-FILLER)

These filler cards operate in slot 2 and 3 in NCS 2002, slots 2 through 7 in NCS 2006, and slots 2 through 16 in NCS 2015. These card fillers do not have card-level LED indicators. The following figure shows the faceplate of line card filler.

Figure 250: Line Card Filler - Faceplate



- Timing and Control Card fillers (15454-M-T-FILLER)

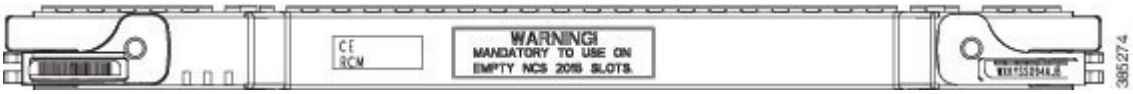
These filler cards are for control cards and operate in Slot 1in NCS 2002, Slots 1 and 8 in NCS 2006, and Slots 1 through 17 in NCS 2015. The following figure shows the faceplate of timing and control card filler.

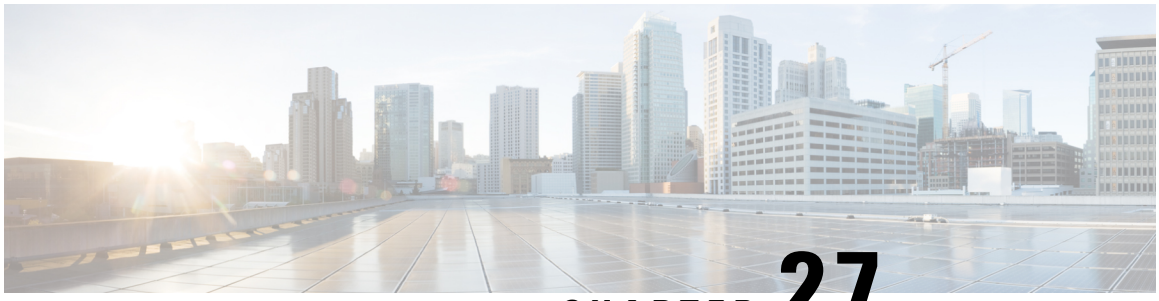
Figure 251: Timing and Control Card Fillers - Faceplate



Blank cards (15454-BLANK) can be installed in any empty slot in the shelf. CTC does not detect blank cards. The following figure shows the faceplate of blank card filler.

Figure 252: Blank Card Filler - Faceplate





CHAPTER 27

Multishelf Management

This chapter explains how to manage multishelves for NCS 2006 and NCS 2015.

The sections are:

- NTP-L15 Connecting the NCS 2006 Multishelf Node and the NCS 2006 Subtending Shelves, on page 367
- NTP-G318 Connecting the NCS 2006 Multishelf Node and the NCS 2006 Subtending Shelves in a Ring Topology, on page 369
- Multishelf Management in Cisco NCS 2015, on page 371
- NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371
- NTP-L63 Configure a Cisco Catalyst 3560 (Active and Standby) for a Multishelf Node, on page 372
- NTP-L64 Connect the ONS 15454 Node Controller to an MS-ISC-100T Card, on page 375
- NTP-L65 Configure the MS-ISC-100T Card for a ONS 15454 Multishelf Node for Non-Default Public and Private VLAN IDs, on page 376
- Shelf Voltage and Temperature, on page 397
- Cooling Profile, on page 397

NTP-L15 Connecting the NCS 2006 Multishelf Node and the NCS 2006 Subtending Shelves

Purpose	Use this procedure to connect the NCS 2006 multishelf node and the NCS 2006 subtending shelves.
Tools/Equipment	Cross-over (CAT-5) LAN cables
Prerequisite Procedures	NTP-L41 Installing and Configuring the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card, on page 359.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note The multishelf management (MSM) ports are present on the ECU module. The MSM ports located on the left side of the ECU module correspond to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 1, and the MSM ports located on the right side correspond to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 8. For more information about the ECU module and MSM ports, see the External Connection Units, on page 252.

Note If a standalone node has unsupported cards, the node cannot be converted to a node controller or a subtended shelf controller.

Note Cisco NCS multi-shelf node does not support connecting to Cisco ONS 15454 M12 subtended shelf.

Procedure

Step 1 Using a cross-over (CAT-5) LAN cable:

a) Plug one connector into the MSM port that corresponds to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 1 of the NCS 2006 shelf used as the node controller.

b) Plug the other connector into the MSM port that corresponds to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 1 of the NCS 2006 shelf used as subtending shelf.

Step 2 Using a cross-over (CAT-5) LAN cable:

a) Plug one connector into the MSM port that corresponds to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 8 of the NCS 2006 shelf used as the node controller.

b) Plug the other connector into the MSM port that corresponds to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 8 of the NCS 2006 shelf used as subtending shelf.

Step 3 Repeat Steps 1 and 2 to connect the remaining two MSM ports of the NCS 2006 shelf, used as the node controller, to the subsequent subtending NCS 2006 shelf assemblies.

Note
The node controller can support up to three subtended shelves, while each of the subtended shelf can support only two more SSCs.

Step 4 To extend the number of SSCs, using a cross-over (CAT-5) LAN cable:

a) Plug one connector to any one of the remaining MSM ports of the NCS 2006 SSCs in the first layer.

b) Plug the other connector to any one of the MSM ports of the NCS 2006 SSCs in the next layer.

c) Repeat a and b to connect the remaining MSM ports of the NCS 2006 in the first layer to the next layer.

Stop. You have completed this procedure.

NTP-G318 Connecting the NCS 2006 Multishelf Node and the NCS 2006 Subtending Shelves in a Ring Topology

Purpose	Use this procedure to connect the NCS 2006 multishelf node and the NCS 2006 subtending shelves in a ring topology.
Tools/Equipment	Cross-over (CAT-5) LAN cables
Prerequisite Procedures	NTP-L41 Installing and Configuring the TNC, TNCE, TSC, TSCE, TNCS, or TNCS-O Card, on page 359.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Using a cross-over (CAT-5) LAN cable:

a) Plug one connector into the MSM port that corresponds to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 1 of the NCS 2006 shelf used as the node controller.

b) Plug the other connector into the MSM port that corresponds to the TNC/TNCE/TSC/TSCE/TNCS/TNCS-O card in Slot 1 of the NCS 2006 shelf used as subtending shelf.

Note
When connecting two shelves using the cross-over cables, it is possible to have shelves not having controller cards in same slots. Use corresponding MSM ports according to the controller card slots.

Step 2 Using a cross-over (CAT-5) LAN cable:

a) Plug one connector to any one of the remaining MSM ports of the NCS 2006 SSCs in the first layer.

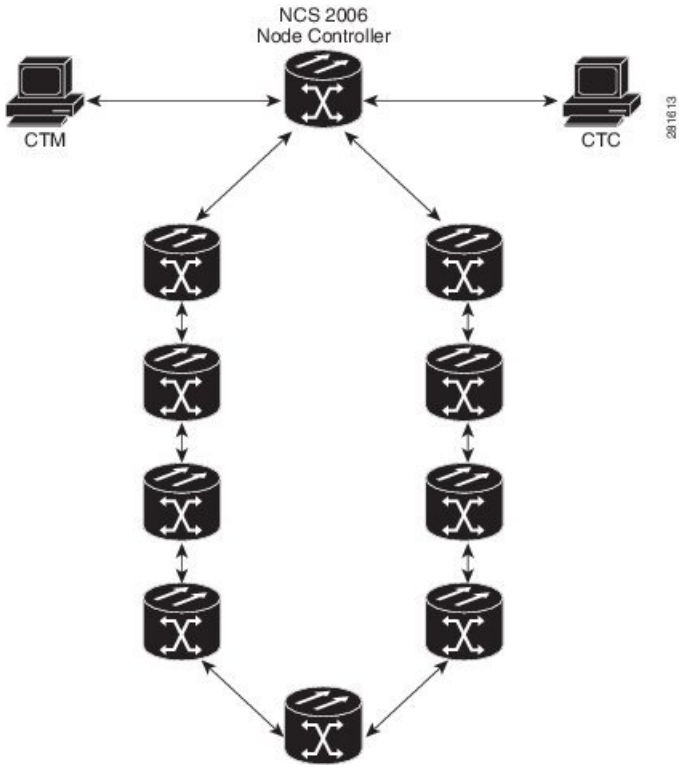
b) Plug the other connector to any one of the MSM ports of the NCS 2006 SSCs in the next layer.

c) Repeat a and b to connect the remaining MSM ports of the NCS 2006 SSCs.

After connecting all the SSCs as per Step 2, connect the last NCS 2006 SSC to the NCS 2006 node controller to complete the ring.

Note
You can connect up to a maximum of 9 SSCs in the ring topology.

Figure 253: Connecting the NCS 2006 Multishelf Node and the NCS 2006 Subtending Shelves in a Ring Topology



Stop. You have completed this procedure.

DLP-G795 Change System Mode Using LCD

For NCS 2002, NCS 2006 and NCS 2015, the system mode can be changed from ANSI (SONET) to ETSI (SDH) or vice-versa. Changing the system mode removes the provisioned data and the system reverts to the default configuration.

This is available on the single controller and dual controller cards. The node can be in a standalone or multishelf configuration.

The system mode cannot be changed under the following conditions:

- "SHELF-COMM-FAIL" alarm is present - if this alarm does occur, the user can still proceed with the mode conversion after resetting the active controller (TNCS).
- any SSC is in limited state

Purpose	This task enables the user to change the system mode using the LCD module.
Tools/ Equipment	None
Required/ As Needed	As needed
Onsite/ Remote	Onsite

Security Level	Superuser only

Procedure

Step 1 On the front panel, just below the LCD display, are three buttons, marked **Slot**, **Status** and **Port**.

Step 2 Repeatedly press the **Port** button to reach the **Mode Change Configuration** option from the main menu.

Step 3 Press the **Status** button to enter the **Mode Change Configuration** option.

Controller

Status = Mode cfg

Step 4 On the left hand side of the LCD display (the **Slot** button), the ANSI option is displayed. On the right hand side of the LCD display, (the **Port** button) , the ETSI option is displayed.

Step 5 Select the required mode, either by pressing the **Slot** or **Port** button. If the user by mistake, chooses the current mode, a relevant error message is displayed.

Step 6 On successful mode change, the LCD display reads:

Changing mode...

TNC may reset

Step 7 After successful mode change, the control card automatically reboots. In case of multishelf configuration, all the control cards reboot simultaneously.

Step 8 To verify mode change, go to the **System Mode** area in the **General** tab of CTC and confirm the current mode. Alternatively, use the **rtrv-ne-gen** TL1 command to check the current mode.

Multishelf Management in Cisco NCS 2015

The following sections describe the various multishelf LAN topologies supported in Cisco NCS 2015.

NTP-L62 Installing the SFP Module on the NCS 2015 ECU

Purpose	Use this procedure to install the SFP module in the SFP ports (M-MSM-2, P-MSM-2, M-MSM-3, and P-MSM-3 ports) of the NCS 2015 ECU. **Note** The only supported SFP is ONS-S1-100-FX.
Tools/Equipment	• Wrist strap or other personal grounding device to prevent electro-static discharge (ESD) occurrences. • Antistatic mat or antistatic foam to set the SFP on. • Fiber-optic end-face cleaning tools and inspection equipment. • Multi-mode optical fiber • ONS-S1-100-FX pluggable

Prerequisite Procedures	None.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None



Warning **SFP modules are Class I laser products.** Statement 1008



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.** Statement 70



Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040



Warning **Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure.** Statement 1057

Procedure

Step 1 Grip the sides of the SFP with your thumb and forefinger and insert the SFP into the SFP port on the ECU.

Step 2 Slide the SFP through the slot until you hear a click. The click indicates that the SFP is locked into the slot.

Step 3 To connect the multi-mode optical fiber, attach the appropriate optical fiber cable directly to the LC-type connector of the SFP.

Stop. You have completed this procedure.

NTP-L63 Configure a Cisco Catalyst 3560 (Active and Standby) for a Multishelf Node

Purpose	This procedure uses Cisco IOS to configure the Cisco Catalyst 3560 for a multishelf node configuration. For more information about the Catalyst 3560, refer to the Catalyst 3560 product documentation.

Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser

Note When Cisco Catalysts are used in a multishelf node configuration, the Cisco Catalysts can be used for other applications as long as they do not interfere with the VLAN settings of the multishelf node configuration.

Procedure

Step 1 At the Cisco IOS command line interface (CLI) for the Catalyst switch, enter the following spanning tree commands:

Example:

```
Switch(config)#spanning-tree mode rapid-pvst
Switch(config)#no spanning-tree optimize bpdu transmission
Switch(config)#spanning-tree extend system-id
```

Step 2 For a 24-port catalyst switch, enter the following commands to configure Ports 1 through 23. Replace *port* with the port number (1 through 23) and repeat for each port:

Example:

```
Switch(config)#interface FastEthernet0/
port
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 2
```

Step 3 For a 24-port catalyst switch, enter the following commands to configure Port 24. Replace *port* with the port number.

Example:

```
Switch(config)#interface FastEthernet0/
port
Switch(config-if)#switchport mode access
```

Step 4 Enter the following interface commands:

Example:

```
Switch(config)#interface GigabitEthernet0/1
Switch(config)#no ip address
Switch(config)#ip http server
Switch(config)#interface GigabitEthernet0/2
Switch(config)#no ip address
```

```
Switch(config)#ip http server
Switch(config)#interface Vlan 1
Switch(config)#no ip address
Switch(config)#no ip route-cache
Switch(config)#ip http server
```

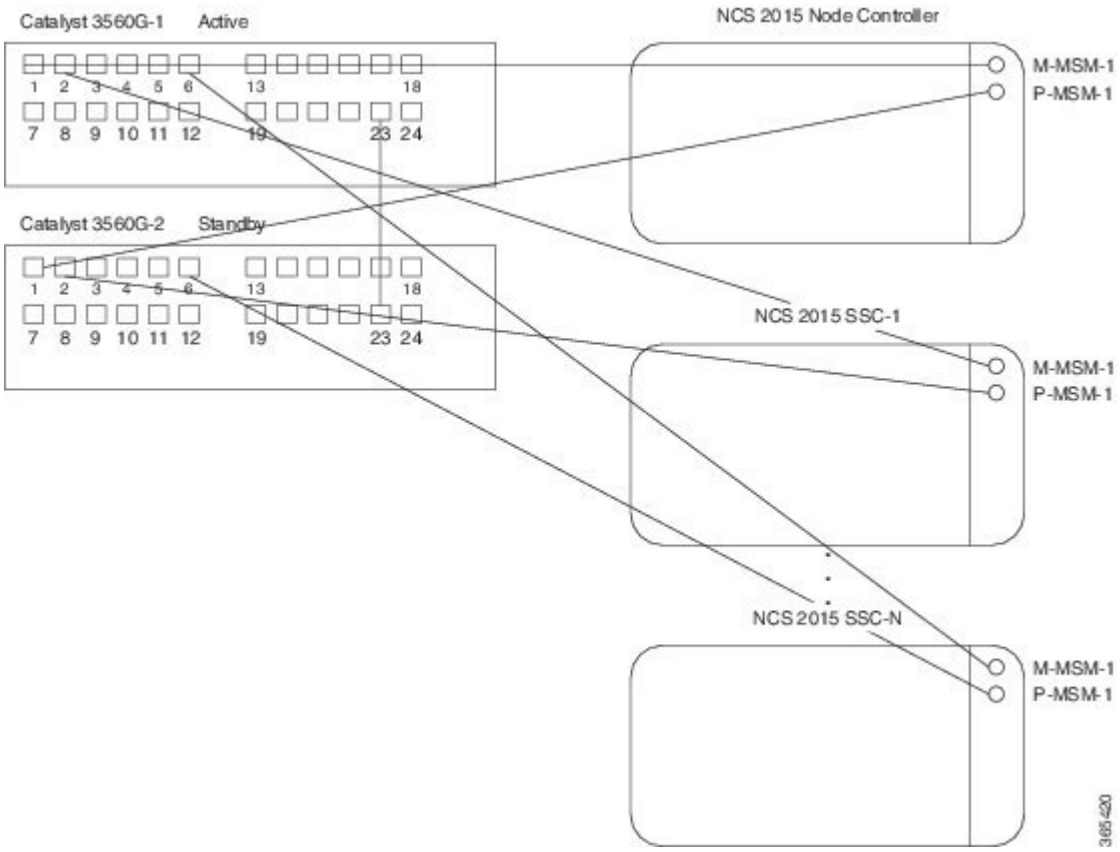
Step 5 Enter the following commands to configure authentication:

Example:

```
Switch(config)#line con 0
Switch(config)#line vty 0 4
Switch(config-line)#password yyyyyy
Switch(config-line)#login
Switch(config-line)#line vty 5 15
Switch(config-line)#password yyyyyy
Switch(config-line)#login
Switch(config-line)#end
```

Stop. You have completed this procedure.

Figure 254: Cisco Catalyst Switch 3560 for NCS 2015 Multishelf Node



NTP-L64 Connect the ONS 15454 Node Controller to an MS-ISC-100T Card

Purpose	Use this procedure to connect a ONS 15454 node controller to two MS-ISC-100T cards.
Tools/Equipment	5.9 in. (0.15 m) CAT-5 LAN cable (2) 19.69 in. (0.5 m) CAT-5 LAN cable (1) 84 in. (2.13 m) EAP cables (2)
Prerequisite Procedures	"NTP-G15 Install the Common Control Cards" in the "Cisco ONS 15454 Hardware Installation Guide". "DLP-G371 Install the Ethernet Adapter Panel" in the "Cisco ONS 15454 Hardware Installation Guide".
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Procedure

To connect the MS-ISC-100T cards to the node controller shelf and set up protection, complete the following substeps (see the figure below).

a) Using the 5.9 in. (0.15 m) CAT-5 LAN cable, plug one connector into the NC port of the MS-ISC-100T card located on the left side of the node controller shelf (Slots 1 to 6) and plug the other connector into the front panel (RJ-45 connector) of the TCC3 card in Slot 7.

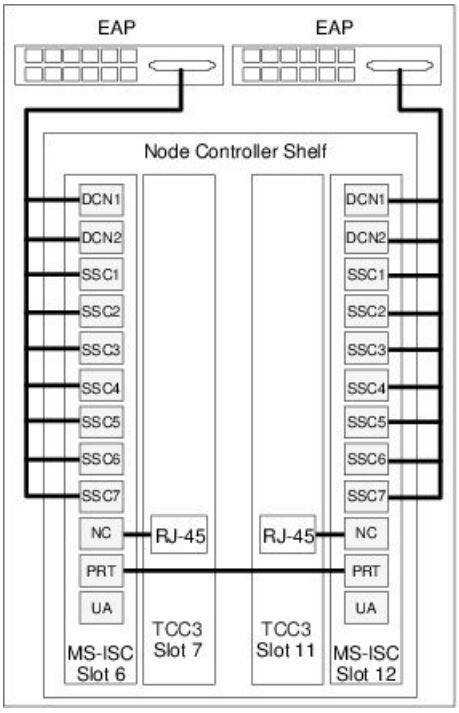
b) Using the 5.9 in. (0.15 m) CAT-5 LAN cable, plug one connector into the NC port of the MS-ISC-100T card located on the right side of the node controller shelf (Slots 12 to 17) and the other end into the front panel (RJ-45 connector) of the TCC3 card in Slot 11.

c) Using the 19.69 in. (0.5 m) CAT-5 LAN cable, plug one connector into the PRT port of the MS-ISC-100T card located on the left side of the node controller shelf (Slots 1 to 6) and plug the other connector into the PRT port of the MS-ISC-100T card located on the right side of the node controller shelf (Slots 12 to 17).

d) Plug the nine connectors on one end of the EAP cable into the two DCN ports and the seven subtending shelf controller (SSC) ports of the MS-ISC-100T card located on the left side of the node controller shelf (Slots 1 to 6). Plug the other end of the EAP cable into the multishelf port on the left EAP.

e) Plug the nine connectors on one end of the EAP cable into the two DCN ports and the seven SSC ports of the MS-ISC-100T card in the right side of the NC shelf (Slots 12 to 17). Plug the other end of the EAP cable into the multishelf port on the right EAP.

Figure 255: Connecting the EAP to the Node Controller



Stop. You have completed this procedure.

NTP-L65 Configure the MS-ISC-100T Card for a ONS 15454 Multishelf Node for Non-Default Public and Private VLAN IDs

Purpose	Use this procedure to configure the MS-ISC-100T Card for a multi-shelf node for non-default public and private VLAN IDs.
Tools/Equipment	Voltmeter
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 At the Cisco IOS command line interface (CLI) for the MS-ISC-100T card, enter the following spanning tree commands:

Example:

```
Router(config)# bridge
public VLAN ID
 protocol rstp
Router(config)# bridge public VLAN ID
 forward-time 5
Router(config)# bridge
public VLAN ID
 max-age 10
Router(config)# bridge
private VLAN ID
 protocol rstp
Router(config)# bridge
private VLAN ID
 forward-time 5
Router(config)# bridge
private VLAN ID
 max-age 10
```

Step 2 Enter the following commands to configure the ports DCN 1 and DCN 2:

Example:

```
(Router(config)#interface FastEthernet0
(Router(config-if)# no ip address
(Router(config-if)# no ip route-cache
(Router(config-if)# bridge-group
public VLAN ID
(Router(config)#interface FastEthernet1
(Router(config-if)# no ip address
(Router(config-if)# no ip route-cache
(Router(config-if)# bridge-group
public VLAN ID
```

Step 3 Enter the following commands to configure ports SSC 1 through SSC 7. Replace *port* with the port number (2 to 8) and repeat for each port.

Example:

```
(Router(config)#interface FastEthernet
port
(Router(config-if)# no ip address
(Router(config-if)# no ip route-cache
 (Router(config-if)# bridge-group
private VLAN ID
```

Step 4 Enter the following commands to configure port NC (port 9):

Example:

```
Router(config)#interface FastEthernet9
```

```
(Router(config-if)no ip address
(Router(config-if)no ip route-cache
Router(config)#interface FastEthernet9.2
(Router(config-if)dot1Q
public VLAN ID
 native
(Router(config-if)no ip route-cache
(Router(config-if)no snmp trap link-status
(Router(config-if)bridge-group
public VLAN ID
Router(config)#interface FastEthernet9.2
(Router(config-if)encapsulation dot1Q
private VLAN ID
(Router(config-if)no ip route-cache
(Router(config-if)no snmp trap link-status
(Router(config-if) bridge-group
private VLAN ID
```

Step 5 Enter the following commands to configure port PRT (port 10):

Example:

```
Router(config)# interface FastEthernet10
(Router(config-if)no ip address
(Router(config-if)no ip route-cache
Router(config)#interface FastEthernet10.1
(Router(config-if)encapsulation dot1Q
public VLAN ID
 native
(Router(config-if)no ip route-cache
(Router(config-if)no snmp trap link-status
(Router(config-if)bridge-group
public VLAN ID
(Router(config-if)bridge-group public VLAN ID priority 0
!
Router(config)#interface FastEthernet10.2
(Router(config-if)encapsulation dot1Q
private VLAN ID

(Router(config-if)no ip route-cache
(Router(config-if)no snmp trap link-status
(Router(config-if)bridge-group
private VLAN ID
(Router(config-if)bridge-group
private VLAN ID
 priority 0
Router(config)#interface FastEthernet11
Router(config)# no ip address
Router(config)#no ip route-cache
Router(config)# shutdown
```

Step 6 Enter the following interface commands:

Example:

```
(Router(config)# interface POS0
(Router(config)# no ip address
(Router(config)# no ip route-cache
(Router(config)# shutdown
(Router(config)# crc 32
(Router(config)# interface POS1
(Router(config)# no ip address
```

```
(Router(config)# no ip route-cache
(Router(config)# shutdown
(Router(config)# crc 32
(Router(config)# ip classless
(Router(config)# no ip http server
```

Stop. You have completed this procedure.

Cisco NCS 2015 Node Controller (NC) and NCS 2015 Subtending Shelves (SSC)

When the NCS 2015 shelf is used as the NC, up to 10 NCS 2015 shelves can be subtended. The control cards supported on the NCS 2015 shelf are TNCS and TNCS-O.

Scenario 1 : Using Only RJ-45 Ports, Only One NCS 2015 SSC Can Be Connected to the NCS 2015 NC

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port that corresponds to the control card in Slot 1 of the NC.
   b. Plug the other connector into the M-MSM-1 port that corresponds to the control card in Slot 1 of the SSC.
2. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the P-MSM-1 port that corresponds to the control card in Slot 17 of the NC.
   b. Plug the other connector into the P-MSM-1 port that corresponds to the control card in Slot 17 of the SSC.

Scenario 2 : Using RJ-45 and SFP MSM-M and MSM-P Ports, Up to 10 NCS 2015 SSCs Can Be Connected To the NCS 2015 NC

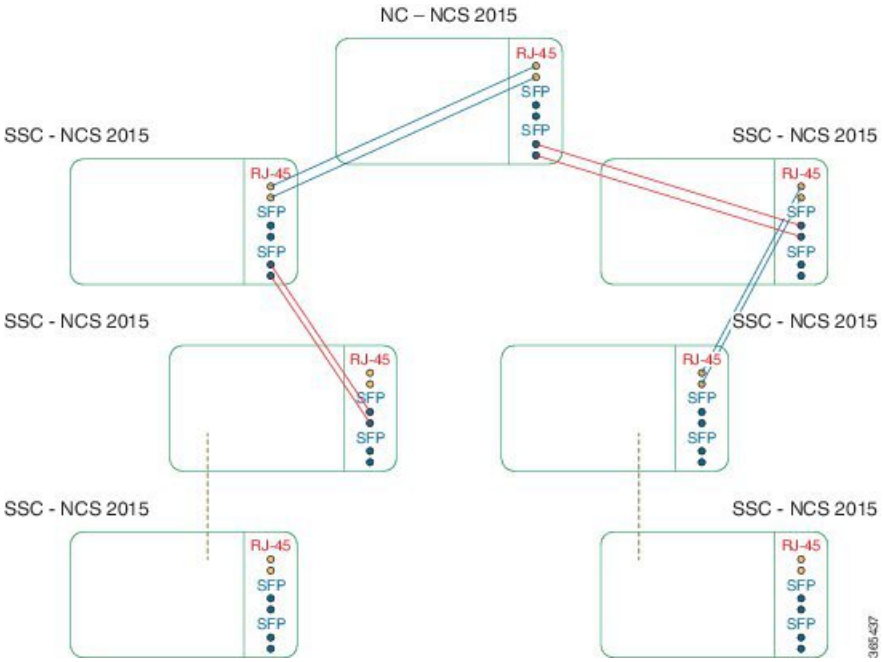
1. Install the SFP module in the SFP ports of the NCS 2015 ECU. For more information, see NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port that corresponds to the control card in Slot1 of the NC.
   b. Plug the other connector into the M-MSM-1 port that corresponds to the control card in Slot 1 of the SSC 1.
3. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the P-MSM-1 port that corresponds to the control Slot 17 of the NC.
   b. Plug the other connector into the P-MSM-1 port that corresponds to the control in Slot 17 of the SSC 1.
4. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-3 port that corresponds to the control card in Slot 1 of the NC.
   b. Plug the other connector into the M-MSM-2 port that corresponds to the control card in Slot 1 of the SSC 2.
5. Using another multi-mode fiber optic cable:

a. Plug one connector into the P-MSM-3 port that corresponds to the control card in Slot 17 of the NC.
b. Plug the other connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the SSC 2.

6. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-3 port that corresponds to the control card in Slot 1 of SSC 1.
   b. Plug the other connector into the M-MSM-2 port that corresponds to the control card in Slot 1 of the SSC 3.
7. Using another multi-mode fiber optic cable:
   a. Plug one connector into the P-MSM-3 port that corresponds to the control card in Slot 17 of SSC 1.
   b. Plug the other connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the SSC 3.
8. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port that corresponds to the control card in Slot1 of SSC 2.
   b. Plug the other connector into the M-MSM-1 port that corresponds to the control card in Slot 1 of the SSC 4.
9. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the P-MSM-1 port that corresponds to the control card in Slot 17 of SSC 2.
   b. Plug the other connector into the P-MSM-1 port that corresponds to the control card in Slot 17 of the SSC 4.
10. Connect the remaining SSCs by repeating Steps 6 through 9.

The scenario is illustrated in the figure below.

Figure 256: NCS 2015 SSCs Connected to NCS 2015 NC Using RJ-45 and SFP Ports



Scenario 3: Using SFP MSM-M and MSM-P Ports, Up to 10 NCS 2015 SSCs Can Be Connected To the NCS 2015 NC

1. Install the SFP module in the SFP ports of the NCS 2015 ECU. For more information, see NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371
2. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-2 port that corresponds to the control card in Slot1 of the NC.
   b. Plug the other connector into the M-MSM-2 port that corresponds to the control card in Slot 1 of the SSC 1.
3. Using another multi-mode fiber optic cable:
   a. Plug one connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the NC.
   b. Plug the other connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the SSC 1.
4. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-3 port that corresponds to the control card in Slot 1 of the NC.
   b. Plug the other connector into the M-MSM-2 port that corresponds to the control card in Slot 1 of the SSC 2.
5. Using another multi-mode fiber optic cable:
   a. Plug one connector into the P-MSM-3 port that corresponds to the control card in Slot 17 of the NC.
   b. Plug the other connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the SSC 2.

6. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-3 port that corresponds to the control card in Slot 1 of SSC 1.
   b. Plug the other connector into the M-MSM-2 port that corresponds to the control card in Slot 1 of the SSC 3.
7. Using another multi-mode fiber optic cable:
   a. Plug one connector into the P-MSM-3 port that corresponds to the control card in Slot 17 of SSC 1.
   b. Plug the other connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the SSC 3.
8. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-3 port that corresponds to the control card in Slot 1 of SSC 2.
   b. Plug the other connector into the M-MSM-2 port that corresponds to the control card in Slot 1 of the SSC 4.
9. Using another multi-mode fiber optic cable:
   a. Plug one connector into the P-MSM-3 port that corresponds to the control card in Slot 17 of SSC 2.
   b. Plug the other connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the SSC 4.
10. Connect the remaining SSCs by repeating Steps 6 through 9.

Scenario 4: Using Cisco Catalyst Switch 3650, Up to 10 NCS 2015 SSCs Can Be Connected To the NCS 2015 NC

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the active Catalyst 3560.
   b. Plug the other connector into the M-MSM-1 port of the NC.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the standby Catalyst 3560.
   b. Plug the other connector into the P-MSM-1 port of the NC.
3. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 23 of the active Catalyst 3560.
   b. Plug the other end into Port 23 of the standby Catalyst 3560.
4. To connect a SSC to the Catalyst 3560 switches, use a cross-over (CAT-5) LAN cable.
   a. Plug one connector into the M-MSM-1 port of the SSC.
   b. Plug the other end into Port 2 of the active Catalyst 3560.
   c. Using a cross-over (CAT-5) LAN cable, plug one connector into the P-MSM-1 port of the SSC.
   d. Plug the other end into Port 2 of the standby Catalyst 3560.
5. Repeat Step 4 to connect the remaining SSCs using ports 3 through 11on the Catalyst 3560 switches.

6. To configure the active and standby Catalyst 3560, complete the NTP-L63 Configure a Cisco Catalyst 3560 (Active and Standby) for a Multishelf Node, on page 372

Cisco NCS 2015 Node Controller, ONS 15454, NCS 2006, and NCS 2015 as Subtending Shelves

When a Cisco NCS 2015 shelf is used as the node controller, a mix of 15 ONS 15454, NCS 2006, and NCS 2015 shelves can be subtended. The maximum number of NCS 2015 shelves that can be subtended is 10.

The control cards supported are:

- NCS 2015 shelf: TNCS, TNCS-O
- NCS 2006 shelf: TNCE, TSCE, TNCS, TNCS-O
- ONS 15454 shelf: TCC3

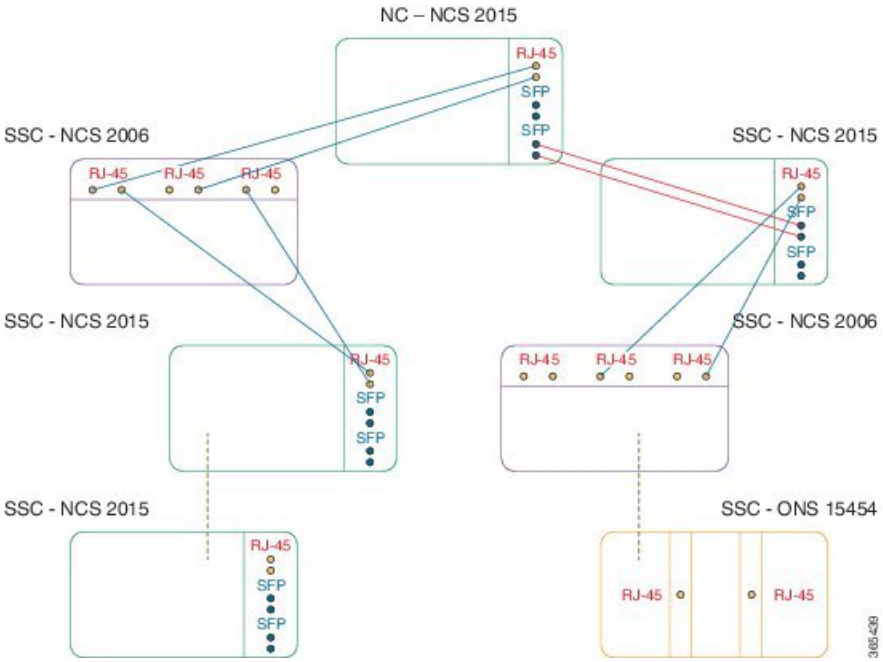
Scenario 1: Using RJ-45 and SFP MSM-M and MSM-P Ports, ONS 15454, NCS 2006, and NCS 2015 SSCs Can Be Connected to the NCS 2015 NC

1. Install the SFP module in the SFP ports of the ECU in NCS 2015 SSCs. For more information, see NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NCS 2015 NC that corresponds to the control card in Slot 1.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.
3. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the P-MSM-1 port of the NCS 2015 NC that corresponds to the control card in Slot 17.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.
4. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-3 port that corresponds to the control card in Slot 1 of the NC.
   b. Plug the other connector into the M-MSM-2 port that corresponds to the control card in Slot 1 of the SSC 2.
5. Using another multi-mode fiber optic cable:
   a. Plug one connector into the P-MSM-3 port that corresponds to the control card in Slot 17 of the NC.
   b. Plug the other connector into the P-MSM-2 port that corresponds to the control card in Slot 17 of the SSC 2.
6. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.
   b. Plug the other end into the M-MSM-1 port of the NCS 2015 SSC 3 that corresponds to the control card in Slot 1.

7. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.
   b. Plug the other end into the P-MSM-1 port of the NCS 2015 SSC 3 that corresponds to the control card in Slot 17.
8. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 4 that corresponds to the control card in Slot 1.
9. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the P-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 4 that corresponds to the control card in Slot 8.
10. To connect a NCS 2015 or NCS 2006 SSC to a ONS 15454 SSC:
    a. Using a cross-over (CAT-5) LAN cable, plug one connector into the M-MSM-1 port of NCS 2015 SSC or the MSM port of the NCS 2006 SSC that corresponds to the control card in Slot 1.
    b. Plug the other end into the RJ-45 port of the control card in Slot 7 of ONS 15454 SSC.
    c. Using another cross-over (CAT-5) LAN cable, plug one connector into the P-MSM-1 port of NCS 2015 SSC or the MSM port of the NCS 2006 SSC that corresponds to the control card in Slot 17 or Slot 8 respectively.
    d. Plug the other end into the RJ-45 port of the control card in Slot 11 of ONS 15454 SSC.
11. Repeat the above steps to connect the remaining SSCs in a daisy chain.

The scenario is illustrated in the figure below.

Figure 257: NCS 2015, NCS 2006, and ONS 15454 SSCs Connected to NCS 2015 NC Using RJ-45 and SFP Ports



Scenario 2: Using Cisco Catalyst Switch 3650, Up to 15 ONS 15454, NCS 2006, and NCS 2015 SSCs Can Be Connected To the NCS 2015 NC Through RJ-45 Ports

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the active Catalyst 3560.
   b. Plug the other connector into the M-MSM-1 port of the NC.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the standby Catalyst 3560.
   b. Plug the other connector into the P-MSM-1 port of the NC.
3. Plug the other connector into the P-MSM-1 port of the NC.
   a. Plug one connector into Port 23 of the active Catalyst 3560.
   b. Plug the other end into Port 23 of the standby Catalyst 3560.
4. To connect all the SSCs to the Catalyst 3560 switches, use a cross-over (CAT-5) LAN cable.
   a. Plug one connector into:
      1. M-MSM-1 port of NCS 2015 SSC that corresponds to the control card in Slot 1
      2. MSM port of NCS 2006 SSC that corresponds to the control card in Slot 1.
      3. RJ-45 port of the control card in Slot 7 of ONS 15454 SSC.
   b. Plug the other end into Port 2 of the active Catalyst 3560.

c. Using a cross-over (CAT-5) LAN cable, plug one connector into:
   1. P-MSM-1 port of NCS 2015 SSC that corresponds to the control card in Slot 17
   2. MSM port of NCS 2006 SSC that corresponds to the control card in Slot 8.
   3. RJ-45 port of control card in Slot 11 of ONS 15454 SSC.

d. Plug the other end into Port 2 of the standby Catalyst 3560.

5. To configure the active and standby Catalyst 3560, complete the NTP-L63 Configure a Cisco Catalyst 3560 (Active and Standby) for a Multishelf Node, on page 372

Cisco NCS 2006 Node Controller, and ONS 15454, NCS 2006, and NCS 2015 Subtending Shelves

When a Cisco NCS 2006 shelf is used as the node controller, a mix of 15 ONS 15454, NCS 2006, and NCS 2015 shelves can be subtended. The maximum number of NCS 2015 shelves that can be subtended is 10.

Scenario 1: Using RJ-45 and SFP MSM-M and MSM-P Ports, ONS 15454, NCS 2006, and NCS 2015 SSCs Can Be Connected To the NCS 2006 NC.

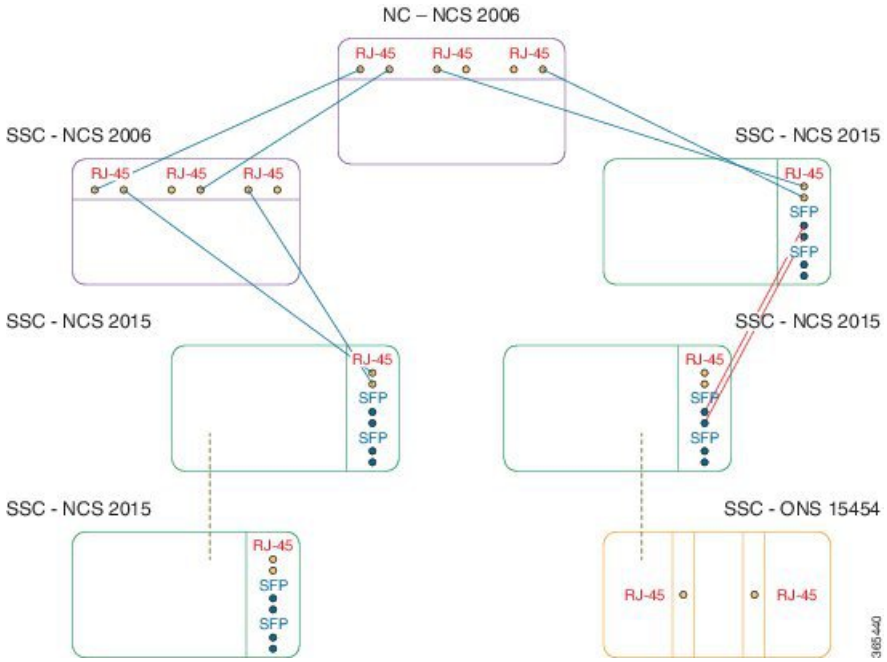
1. Install the SFP module in the SFP ports of the ECU in NCS 2015 SSCs. For more information, see NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 NC that corresponds to the control card in Slot 1.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.
3. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 NC that corresponds to the control card in Slot 8.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.
4. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 NC that corresponds to the control card in Slot 1.
   b. Plug the other end into the M-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.
5. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 NC that corresponds to the control card in Slot 8.
   b. Plug the other end into the P-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.
6. Using a cross-over (CAT-5) LAN cable:

a. Plug one connector into the MSM port of the NCS 2006 SSC1 that corresponds to the control card in Slot 1.
b. Plug the other end into the M-MSM-1 port of the NCS 2015 SSC 3 that corresponds to the control card in Slot 1.

7. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.
   b. Plug the other end into the P-MSM-1 port of the NCS 2015 SSC 3 that corresponds to the control card in Slot 17.
8. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-2 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.
   b. Plug the other connector into the M-MSM-2 port of the NCS 2015 SSC 4 that corresponds to the control card in Slot 1.
9. Using another multi-mode fiber optic cable:
   a. Plug one connector into the P-MSM-2 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.
   b. Plug the other connector into the P-MSM-2 port of the NCS 2015 SSC 4 that corresponds to the control card in Slot 17.
10. To connect a NCS 2015 or NCS 2006 SSC to a ONS 15454 SSC, use a cross-over (CAT-5) LAN cable:
    a. Plug one connector into the M-MSM-1 port of NCS 2015 SSC or the MSM port of the NCS 2006 SSC that corresponds to the control card in Slot 1.
    b. Plug the other end into the RJ-45 port of the control card in Slot 7 of ONS 15454 SSC.
11. Using another cross-over (CAT-5) LAN cable:
    a. Plug one connector into the P-MSM-1 port of NCS 2015 SSC or the MSM port of the NCS 2006 SSC that corresponds to the control card in Slot 17 or Slot 8 respectively.
    b. Plug the other end into the RJ-45 port of the control card in Slot 11 of ONS 15454 SSC.
12. Repeat Steps 6 through 11 to connect the remaining SSCs.

The scenario is illustrated in the figure below.

Figure 258: NCS 2015, NCS 2006, and ONS 15454 SSCs Connected to NCS 2006 NC Using RJ-45 and SFP Ports



Scenario 2: Using Cisco Catalyst Switch 3650, ONS 15454, NCS 2006, and NCS 2015 SSCs Can Be Connected To the NCS 2006 NC

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the active Catalyst 3560.
   b. Plug the other connector into the MSM port of the NC corresponding to the control card in Slot 1.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the standby Catalyst 3560.
   b. Plug the other connector into the MSM port of the NC corresponding to Slot 8.
3. Using a cross-over (CAT-5) LAN cable, plug one connector into Port 23 of the active Catalyst 3560. Plug the other end into Port 23 of the standby Catalyst 3560.
4. To connect all the SSCs to the Catalyst 3560 switches, use a cross-over (CAT-5) LAN cable.
   a. Plug one connector into:
   b. M-MSM-1 port of NCS 2015 SSC that corresponds to the control card in Slot 1
   c. MSM port of NCS 2006 SSC that corresponds to the control card in Slot 1.
   d. RJ-45 port of the control card in Slot 7 of ONS 15454 SSC.
   e. Plug the other end into Port 2 of the active Catalyst 3560.
   f. Using a cross-over (CAT-5) LAN cable, plug one connector into:
   g. P-MSM-1 port of NCS 2015 SSC that corresponds to the control card in Slot 17
   h. MSM port of NCS 2006 SSC that corresponds to the control card in Slot 8.
   i. RJ-45 port of the control card in Slot 11 of ONS 15454 SSC.
   j. Plug the other end into Port 2 of the standby Catalyst 3560.

5. To configure the active and standby Catalyst 3560, complete the NTP-L63 Configure a Cisco Catalyst 3560 (Active and Standby) for a Multishelf Node, on page 372.

Cisco ONS 15454 Node Controller, and ONS 15454, NCS 2006, and NCS 2015 Subtending Shelves

When a Cisco ONS 15454 shelf is used as the node controller, a mix of 15 ONS 15454, NCS 2006, and NCS 2015 shelves can be subtended. The maximum number of NCS 2015 shelves that can be subtended is 10.

The control cards supported are:

- NCS 2015 shelf: TNCS, TNCS-O
- NCS 2006 shelf: TNCE, TSCE, TNCS, TNCS-O
- ONS 15454 shelf: TCC3



Note Usage of TCC3 card as the node controller is recommended.

- The software package supported in this topology is the Cisco ONS 15454 DWDM package.

Scenario 1: Using RJ-45 and SFP MSM-M and MSM-P Ports, ONS 15454, NCS 2006 and NCS 2015 SSCs Can Be Connected to the ONS 15454 NC.

When an ONS 15454 is used as the node controller, a mix of 15 ONS 15454, NCS 2006, and NCS 2015 shelves can be subtended through the MS-ISC-100T card connected to the node controller.

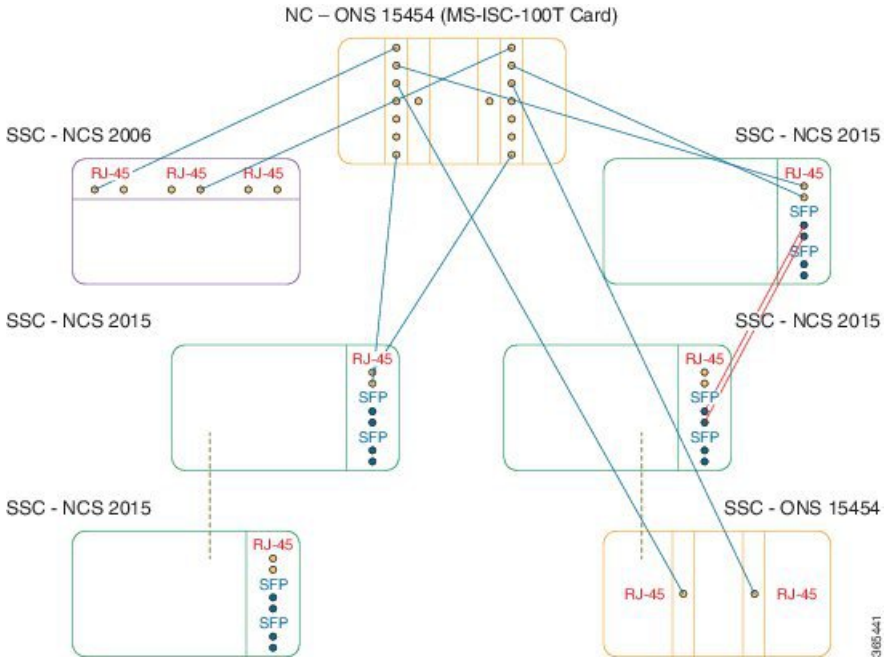
1. To connect the ONS 15454 NC to two MS-ISC-100T cards, complete the NTP-L64 Connect the ONS 15454 Node Controller to an MS-ISC-100T Card, on page 375.
2. To configure the MS-ISC-100T cards, complete the NTP-L65 Configure the MS-ISC-100T Card for a ONS 15454 Multishelf Node for Non-Default Public and Private VLAN IDs, on page 376.
3. To install the SFP module in the SFP ports of the ECU in NCS 2015 SSCs, complete the NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371.
4. Using a cross-over (CAT-5) LAN cable:.
   a. Plug one connector into the SSC1 port on the left EAP.
   b. Plug the other end of the connector into one of the following:
   c. MSM port of the NCS 2006 SSC that corresponds to the control card in Slot 1.
   d. RJ-45 port of the control card in Slot 1 of ONS 15454 SSC.
   e. M-MSM-1 port of the NCS 2015 SSC that corresponds to the control card in Slot 1.
5. Using another cross-over (CAT-5) LAN cable:
   a. Plug one connector into the SSC1 port on the right EAP.
   b. Plug the other end of the connector into one of the following:
   c. MSM port of the NCS 2006 SSC that corresponds to the control card in Slot 8.
   d. RJ-45 port of the control card in Slot 11 of ONS 15454 SSC.
   e. P-MSM-1 port of the NCS 2015 SSC that corresponds to the control card in Slot 17.
6. Connect two NCS 2015 SSCs by:

a. Using a multi-mode fiber optic cable, plug one connector into the M-MSM-2 port of NCS 2015 SSC x that corresponds to the control card in Slot 1.
b. Plug the other connector into the M-MSM-2 port of another NCS 2015 SSC y that corresponds to the control card in Slot 1.
c. Using another multi-mode fiber optic cable, plug one connector into the P-MSM-2 port of NCS 2015 SSC x that corresponds to the control card in Slot 17.
d. Plug the other connector into the P-MSM-2 port of NCS 2015 SSC y that corresponds to the control card in Slot 17.

7. Repeat Steps 4 through 6 to connect the remaining SSCs.

The scenario is illustrated in the figure below.

Figure 259: NCS 2015, NCS 2006, and ONS 15454 SSCs Connected to ONS 15454 NC Using RJ-45 and SFP Ports



Scenario 2: Using Cisco Catalyst Switch 3650, ONS 15454, NCS 2006, and NCS 2015 SSCs Can Be Connected to the ONS 15454 NC

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the active Catalyst 3560.
   b. Plug the other connector into the MSM port of the NC corresponding to the control card in Slot 7.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into Port 1 of the standby Catalyst 3560.
   b. Plug the other connector into the MSM port of the NC corresponding to Slot 11.
3. Using a cross-over (CAT-5) LAN cable, plug one connector into Port 23 of the active Catalyst 3560. Plug the other end into Port 23 of the standby Catalyst 3560.
4. To connect all the SSCs to the Catalyst 3560 switches, use a cross-over (CAT-5) LAN cable.
   a. Plug one connector into:

b. M-MSM-1 port of NCS 2015 SSC that corresponds to the control card in Slot 1
c. MSM port of NCS 2006 SSC that corresponds to the control card in Slot 1.
d. RJ-45 port of the control card in Slot 7 of ONS 15454 SSC.
e. Plug the other end into Port 2 of the active Catalyst 3560.
f. Using a cross-over (CAT-5) LAN cable, plug one connector into:
g. P-MSM-1 port of NCS 2015 SSC that corresponds to the control card in Slot 17
h. MSM port of NCS 2006 SSC that corresponds to the control card in Slot 8.
i. RJ-45 port of the control card in Slot 11 of ONS 15454 SSC.
j. Plug the other end into Port 2 of the standby Catalyst 3560.

5. To configure the active and standby Catalyst 3560, complete the NTP-L63 Configure a Cisco Catalyst 3560 (Active and Standby) for a Multishelf Node, on page 372

Ring Topology

The control cards supported are:

- NCS 2015 shelf: TNCS, TNCS-O
- NCS 2006 shelf: TNCE, TSCE, TNCS, TNCS-O
- ONS 15454 shelf: TCC3

The following ring topologies are supported:

Scenario 1: Cisco NCS 2015 Node Controller and NCS 2015 Subtending Shelves in a Ring Topology

The ring topology can be created using only RJ-45 MSM ports, only SFP MSM ports, or a mix of RJ-45 and SFP MSM ports.You can connect up to a maximum of 9 SSCs in the ring topology.

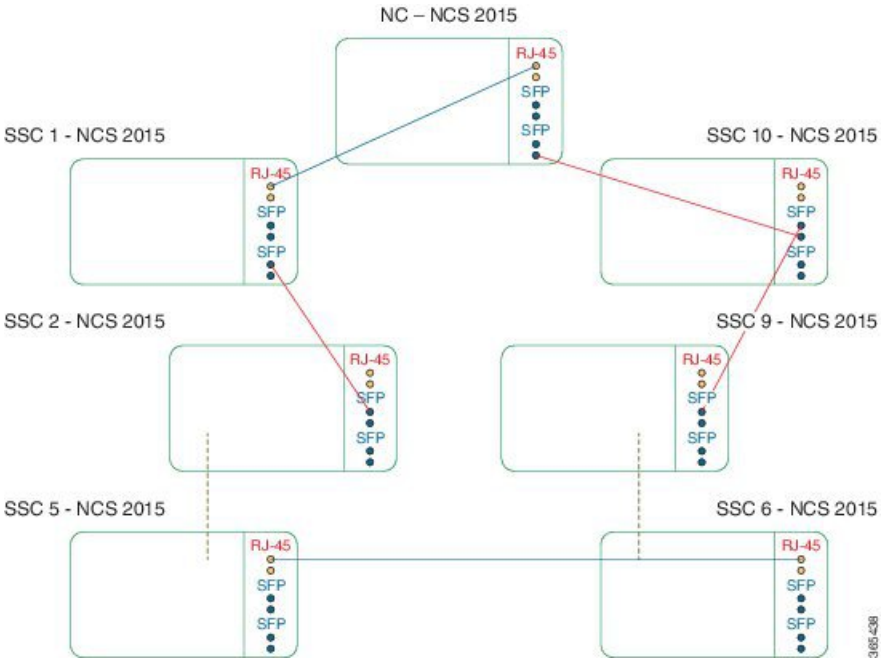
1. To create a ring topology using only RJ-45 MSM ports, perform Steps 4 through 7.
2. To create a ring topology using only SFP MSM ports, perform Steps 8 through 14.
3. To create a ring topology using a mix of RJ-45 MSM ports and SFP ports, perform Steps 15 through 18.
4. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NC.
   b. Plug the other connector into the M-MSM-1 port of the SSC 1.
5. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into P-MSM-1 port of SSC 1.
   b. Plug the other connector into the P-MSM-1 port of the SSC 2.
6. Repeat Step 3 to connect the remaining SSCs.
7. To complete the ring, plug one connector of a cross-over (CAT-5) LAN cable into P-MSM-1 port of SSC 9. Plug the other connector into the P-MSM-1 port of the NC.
8. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-2 port of the NC that corresponds to the control card in Slot 1.
   b. Plug the other connector into the M-MSM-2 port of SSC 1 that corresponds to the control card in Slot 1.
9. Using another multi-mode fiber optic cable:

a. Plug one connector into the P-MSM-2 port of the NC that corresponds to the control card in Slot 17.
b. Plug the other connector into the P-MSM-2 port of the SSC 1 that corresponds to the control card in Slot 17.

10. Using another multi-mode fiber optic cable:
    a. Plug one connector into the M-MSM-3 port of the SSC 1 that corresponds to the control card in Slot 1.
    b. Plug the other connector into the M-MSM-2 port of the SSC 2 that corresponds to the control card in Slot 1.
11. Using another multi-mode fiber optic cable:
    a. Plug one connector into the P-MSM-3 port of the SSC 1 that corresponds to the control card in Slot 17.
    b. Plug the other connector into the P-MSM-2 port of the SSC 2 that corresponds to the control card in Slot 17.
12. Repeat Steps 10 and 11 to connect all the SSCs.
13. To complete the ring, using a multi-mode fiber optic cable:
    a. Plug one connector into the M-MSM-2 port of SSC 9 that corresponds to the control card in Slot 1.
    b. Plug the other connector into the M-MSM-3 port of the NC that corresponds to the control card in Slot 1.
14. Using another multi-mode fiber optic cable:
    a. Plug one connector into the P-MSM-2 port of the SSC 9 that corresponds to the control card in Slot 17.
    b. Plug the other connector into the P-MSM-3 port of the NC that corresponds to the control card in Slot 17.
15. Using a cross-over (CAT-5) LAN cable:
    a. Plug one connector into the M-MSM-1 port of the NC.
    b. Plug the other connector into the M-MSM-1 port of the SSC 1.
16. Using a multi-mode fiber optic cable:
    a. Plug one connector into the M-MSM-2 port of the SSC 1 that corresponds to the control card in Slot 1.
    b. Plug the other connector into the M-MSM-2 port of the SSC 2 that corresponds to the control card in Slot 1.
17. Repeat Steps 15 and 16 to connect the remaining SSCs.
18. To complete the ring, plug one connector of a multi-mode fiber optic cable into P-MSM-2 port of SSC 9. Plug the other connector into the P-MSM-3 port of the NC.

The scenario is illustrated in the figure below.

Figure 260: NCS 2015 NC and NCS 2015 SSCs in Ring Topology



Scenario 2: Using RJ-45 Ports Connect Cisco NCS 2015 Node Controller, and ONS 15454, NCS 2006, and NCS 2015 Subtending Shelves in a Ring Topology

The maximum number of NCS 2015 shelves that can be subtended is 10.

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NCS 2015 NC that corresponds to the control card in Slot 1.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.
   b. Plug the other end into the P-MSM port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.
3. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.
   b. Plug the other end into the RJ-45 port of the control card in Slot 7 of ONS 15454 SSC 3.
4. Repeat Steps 2 and 3 to connect the remaining SSCs.

5. To complete the ring, plug one connector of a cross-over (CAT-5) LAN cable into P-MSM-1 port of NCS 2015 SSC 15. Plug the other connector into the P-MSM-1 port of the NC.

Scenario 3: Using RJ-45 Ports Connect Cisco NCS 2006 Node Controller, and ONS 15454, NCS 2006, and NCS 2015 Subtending Shelves in a Ring Topology

The maximum number of NCS 2015 shelves that can be subtended is 10.

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 NC that corresponds to the control card in Slot 1.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.
   b. Plug the other end into the P-MSM port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.
3. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.
   b. Plug the other end into the RJ-45 port of the control card in Slot 7of ONS 15454 SSC 3.
4. Repeat Steps 2 and 3 to connect the remaining SSCs.
5. To complete the ring, plug one connector of a cross-over (CAT-5) LAN cable into P-MSM-1 port of NCS 2015 SSC 15. Plug the other connector into the P-MSM-1 port of the NC.

Scenario 4: Using RJ-45 and SFP MSM-M and MSM-P Ports Connect Cisco NCS 2015 Node Controller, and ONS 15454, NCS 2006, and NCS 2015 as Subtending Shelves in a Ring Topology

The maximum number of NCS 2015 shelves that can be subtended is 10.

1. Install the SFP module in the SFP ports of the ECU in NCS 2015 SSCs. For more information, see NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NCS 2015 NC that corresponds to the control card in Slot 1.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.
3. Using a cross-over (CAT-5) LAN cable:

a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.

b. Plug the other end into the P-MSM port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.

4. Using a cross-over (CAT-5) LAN cable:

   a. Plug one connector into the M-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.

   b. Plug the other end into the RJ-45 port of the control card in Slot 7 of ONS 15454 SSC 3.

5. Repeat Steps 2 and 3 to connect the remaining SSCs.

6. To complete the ring, plug one connector of a multi-mode fiber optic cable into P-MSM-2 port of NCS 2015 SSC 15. Plug the other connector into the P-MSM-2 port of the NC.

Scenario 5: Using RJ-45 and SFP MSM-M and MSM-P Ports Connect Cisco NCS 2006 Node Controller, and ONS 15454, NCS 2006, and NCS 2015 as Subtending Shelves in a Ring Topology

The maximum number of NCS 2015 shelves that can be subtended is 10.

1. Install the SFP module in the SFP ports of the ECU in NCS 2015 SSCs. For more information, see NTP-L62 Installing the SFP Module on the NCS 2015 ECU, on page 371

2. Using a cross-over (CAT-5) LAN cable:

   a. Plug one connector into the MSM port of the NCS 2006 NC that corresponds to the control card in Slot 1.

   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.

3. Using a cross-over (CAT-5) LAN cable:

   a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.

   b. Plug the other end into the P-MSM port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.

4. Using a cross-over (CAT-5) LAN cable:

   a. Plug one connector into the M-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.

   b. Plug the other end into the RJ-45 port of the control card in Slot 7 of ONS 15454 SSC 3.

5. Using a cross-over (CAT-5) LAN cable:

   a. Plug one connector into the RJ-45 port of the control card in Slot 11 of ONS 15454 SSC 3.

   b. Plug the other end into the P-MSM-1 port of the NCS 2015 SSC 4 that corresponds to the control card in Slot 17.

6. Using a multi-mode fiber optic cable:
   a. Plug one connector into the M-MSM-2 port of NCS 2015 SSC 4 that corresponds to the control in Slot 1.
   b. Plug the other connector into the M-MSM-2 port of NCS 2015 SSC 5 that corresponds to the control in Slot 1.
7. Repeat Steps 3 through 6 to connect the remaining SSCs.
8. To complete the ring, plug one connector of a cross-over (CAT-5) LAN cable into P-MSM-1 port of NCS 2015 SSC 15. Plug the other connector into the MSM port of the NCS 2006 NC that corresponds to the control card in Slot 8.

Scenario 6: Using RJ-45 Ports Connect Cisco ONS 15454 Node Controller, and ONS 15454, NCS 2006, and NCS 2015 Subtending Shelves in a Ring Topology



Note Usage of TCC3 card as the node controller is recommended.

- Usage of TCC3 card as the node controller is recommended.
- The maximum number of NCS 2015 shelves that can be subtended is 10.

1. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the RJ-45 port of the control card in Slot 7 of the ONS 15454 NC.
   b. Plug the other end into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 1.
2. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the MSM port of the NCS 2006 SSC 1 that corresponds to the control card in Slot 8.
   b. Plug the other end into the P-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 17.
3. Using a cross-over (CAT-5) LAN cable:
   a. Plug one connector into the M-MSM-1 port of the NCS 2015 SSC 2 that corresponds to the control card in Slot 1.
   b. Plug the other end into the RJ-45 port of the control card in Slot 7 of ONS 15454 SSC 3.
4. Repeat Steps 2 and 3 to connect the remaining SSCs.
5. To complete the ring, plug one connector of a cross-over (CAT-5) LAN cable into P-MSM-1 port of NCS 2015 SSC 15. Plug the other connector into the RJ-45 port of the control card in Slot 11 of ONS 15454 NC.

Shelf Voltage and Temperature

Note The temperature that the TNC, TNCE, TSC, or TSCE sensors measure appear on the LCD screen in the NCS 2006 chassis.

The input voltages and temperature of the NCS 2006 chassis are displayed in the **Shelf view** > **Provisioning** > **General** > **Voltage/Temperature** pane in CTC. The voltage supplied to the shelf (in millivolts) is displayed in the Voltage area of the Voltage/Temperature pane. The temperature of the shelf (in degree Celsius) is displayed in the Temperature area of the pane.

The Voltage/Temperature pane retrieves the following values for the NCS 2006 chassis:

- Voltage A—Voltage of the shelf that corresponds to power supply A, in millivolts.
- Voltage B—Voltage of the shelf that corresponds to power supply B, in millivolts.
- Chassis Temperature—Temperature of the shelf, in degrees Celsius.

In a multishelf configuration, the voltage and temperature of each shelf is displayed in the **Shelf view** > **Provisioning** > **General** > **Voltage/Temperature** pane.

Cooling Profile

The cooling profile feature allows you to control the speed of the fans in the NCS 2006 shelf depending on the I/O cards used.

Note The cooling profile feature is not supported for the NCS 2015 shelf.

CTC allows you to choose a cooling profile for NCS 2006 shelf. You can change the cooling profile in **Shelf view** > **Provisioning** > **General** > **Voltage/Temperature** pane in CTC. The supported cooling profile values are Low, Medium, and High. The default cooling profile value is High. You can change the cooling profile depending on the cards used in the shelf.

If there are multiple cards in the shelf, you must choose the cooling profile of the card that requires the highest cooling profile. For example, if the shelf has two cards with low cooling profile, three cards with medium cooling profile, and one card with high cooling profile, you must choose a high cooling profile for the shelf.

Caution The wrong cooling profile chosen for the shelf might harm the cards present in the shelf.

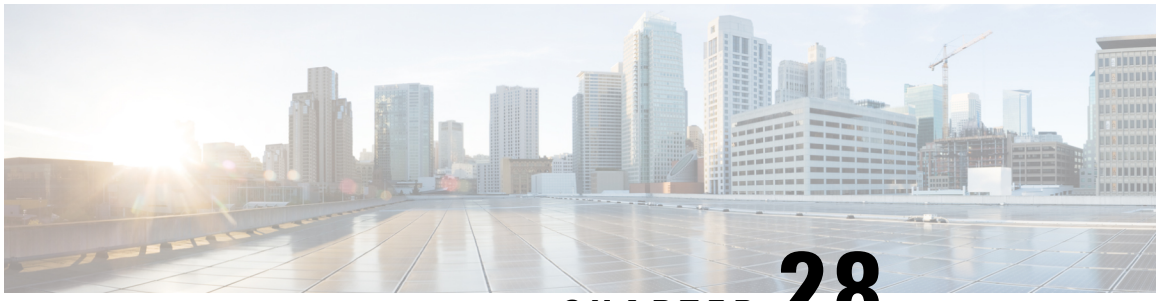
If a wrong cooling profile is chosen for the shelf, the COOL-MISM condition is raised on the shelf. For more information on the alarm, see the “COOL-MISM” alarm in Chapter 2, Alarm Troubleshooting of *Cisco NCS 2002 and 2006 Troubleshooting Guide.*

The following table shows the cards that require high, medium, and low cooling profile.

Table 24: Cooling Profile Values for NCS 2006 Cards

Cards with Low Cooling Profile	Cards with Medium Cooling Profile	Cards with High Cooling Profile
• 32-WSS • 32-WSS-L • 32-DMX • 32-DMX-L • 32-DMX-O	• 10GE-XP • 40-SMR1-C • 40-SMR2-C • 40-WSS-C • 40-WSS-L	• 100G-LC-C • 10X10G-LC • CFP-LC
• 40-DMX-C • 40-DMX-L • 32-MUX-O • 40-MUX-C • 40-MUX-L	• 40E-MXP-C • 40E-TXP-C • 40G-MXP-C • 40G-TXP-C • ADM-10G	

Cards with Low Cooling Profile	Cards with Medium Cooling Profile	Cards with High Cooling Profile
• 40-WXC-C • 40-WXC-L • 80-WXC-C • AD-1B • AD-1C	• AR_MXP • AR_XP • GE-XP • MXP_2.5G_10E • MXP_2.5G_10G	
• AD-2C • AD-4B • AD-4C • MD-4 • MMU	• MXP_2.5G_10X • MXP_MR_10DME • MXP_MR_10DMEX • MXP_MR_2.5G • MXPP_MR_2.5G	
• OPT-AMP-17-C • OPT-AMP-C • OPT-AMP-L • OPT-BST • OPT-BST-E • OPT-BST-L • OPT-EDFA-17 • OPT-EDFA-24 • OPT-PRE • OSCM • OSC-CSM • PSM • TDC-CC • TDC-FC • TXP_MR_10E • TXP_MR_10EX • TXP_MR_10G • TXP_MR_2.5G • TXPP_MR_2.5G	• OPT-RAMP-C • OPT-RAMP-CE • OTU2_XP • RAMAN-COP • RAMAN-CTP	



CHAPTER 28

Maintaining the NCS 2002, NCS 2006, and NCS 2015 Shelves

This chapter explains how to maintain the NCS 2002, NCS 2006, and NCS 2015 shelf installations.

The sections are:

- NTP-L19 Replacing the Air Filter of the NCS 2002 Shelf Assembly, on page 401
- NTP-L20 Replacing the Air Filter of the NCS 2006 Shelf Assembly, on page 403
- NTP-L21 Replacing the Air Filter of the AC Power Module in the NCS 2006 Shelf Assembly, on page 405
- NTP-L58 Replacing the Air Filter of the NCS 2015 Shelf Assembly, on page 407
- NTP-L22 Cleaning Fiber Connectors, on page 409
- NTP-L25 Replacing the Fan-Tray Assembly of the NCS 2002 Shelf Assembly, on page 412
- NTP-L26 Replacing the Fan-Tray Assembly of the NCS 2006 Shelf Assembly, on page 414
- NTP-L59 Replacing Fan-Tray Assembly of NCS 2015 Shelf Assembly, on page 416

NTP-L19 Replacing the Air Filter of the NCS 2002 Shelf Assembly

Purpose	This procedure replaces the air filter of the NCS 2002 shelf assembly.
Tools/Equipment	New air filter
Prerequisite Procedures	• Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series .
Required/As Needed	As Needed
Onsite/Remote	Remote
Security Level	Provisioning or higher

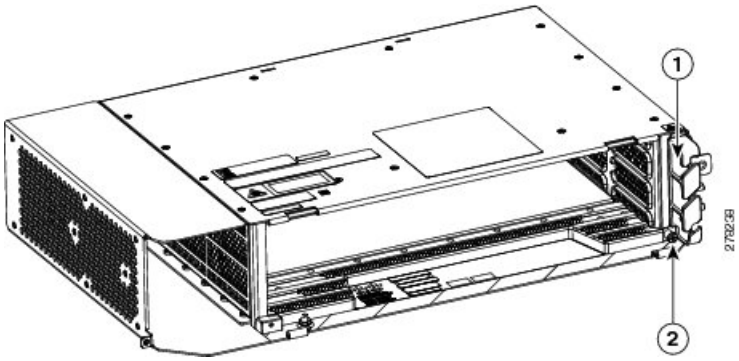
Note The air filters are single-use only. They must not be cleaned and reused. This is a Telcordia NEBS requirement, GR-63-CORE Issue 4.

Note Air filters must be inspected every quarter after the initial six month inspection. If they are dirty or clogged with dust, they must be replaced with a new air filter. Air filters are consumable items and replacement air filters must be ordered separately. You may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

Procedure

Step 1 Untighten the screw on the air-filter (see the figure below).

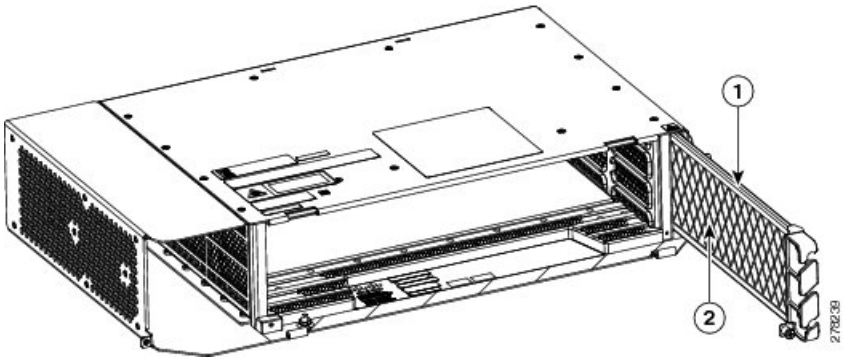
Figure 261: Replacing the Air Filter



1	Air filter	2	Screw

Step 2 Extract the air filter from the shelf assembly as shown in the figure below.

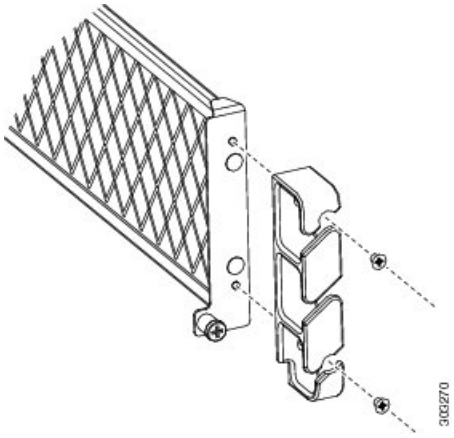
Figure 262: Replacing the Air Filter



1	Air filter	2	Filter grid

Step 3 Separate the cable guides from the air filter as shown in the figure below.

Figure 263: Replacing the Air Filter



Step 4 Replace the air filter with a new one if the air filter is dirty or clogged with dust.

Step 5 Attach the cable guide and insert the air filter into the shelf assembly.

Note
The air filter must be inserted with the grid facing the shelf assembly as shown in the figure above.

Step 6 Tighten the screw on the air-filter.

Stop. You have completed this procedure.

NTP-L20 Replacing the Air Filter of the NCS 2006 Shelf Assembly

Purpose	This procedure replaces the air filter of the NCS 2006 shelf assembly.
Tools/Equipment	New air filter
Prerequisite Procedures	• NTP-L3 Mounting the NCS 2006 Shelf, on page 184 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series.
Required/As Needed	As Needed
Onsite/Remote	Remote
Security Level	Provisioning or higher

Note The air filters are single-use only. They must not be cleaned and reused. This is a Telcordia NEBS requirement, GR-63-CORE Issue 4.

Note Air filters must be inspected every quarter after the initial six month inspection. If they are dirty or clogged with dust, they must be replaced with a new air filter. Air filters are consumable items and replacement air filters must be ordered separately. You may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

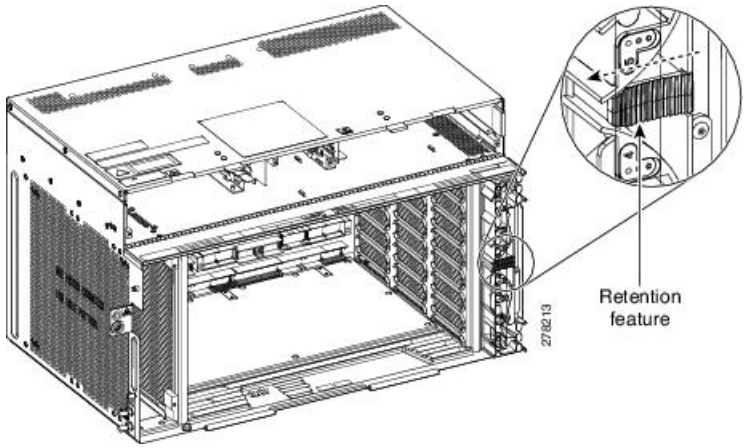
Procedure

Step 1 Open the front door of the shelf assembly (see NTP-L5 Opening and Removing the Standard Door of the NCS 2006 Shelf , on page 239). If the shelf assembly does not have a front door, continue with Step 3.

Step 2 (Optional) Complete the DLP-L13 Removing the Standard Door of the NCS 2006 Shelf , on page 241 to remove the front door. If you do not want to remove the door, proceed to Step 3.

Step 3 Push the retention feature present on the right side of the shelf assembly to the left side (see the figure below).

Figure 264: Replacing the Air Filter



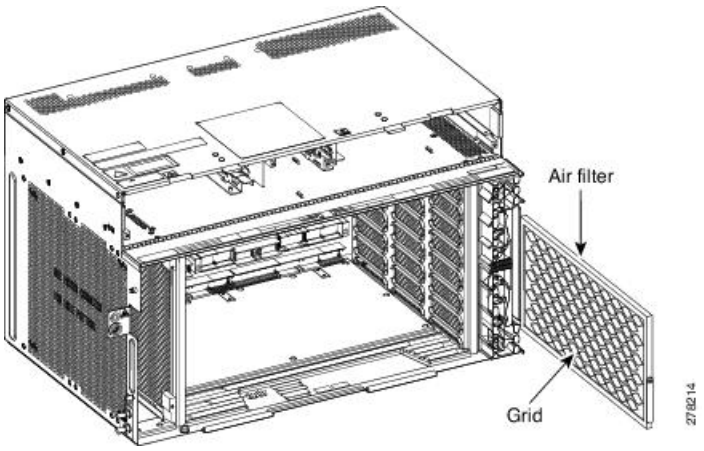
Step 4 Extract the air filter from the shelf assembly (see the figure below).

Step 5 Replace the air filter with a new one if the air filter is dirty or clogged with dust.

Step 6 Insert the air filter into the shelf assembly (see the figure below).

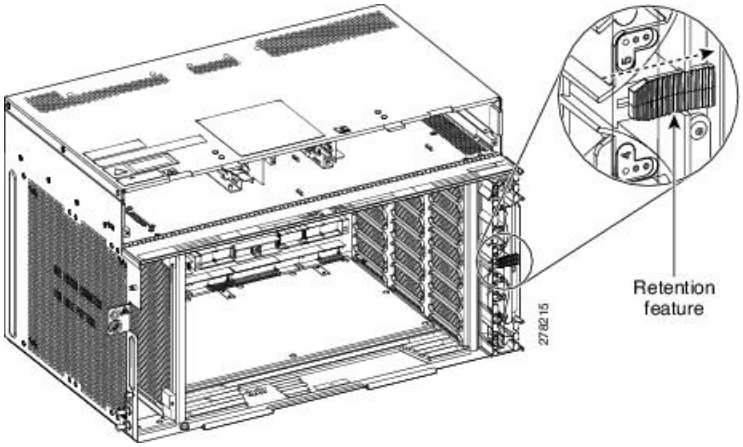
Note
The air filter must be inserted with the grid facing the shelf assembly as shown in the figure below.

Figure 265: Extracting the Air Filter



Step 7 Push the retention feature to the right side (see the figure below).

Figure 266: Replacing the Air Filter



Step 8 Close the front door. If you removed the door, complete the NTP-L4 Installing the Standard Door of the NCS 2006 Shelf , on page 235.

Stop. You have completed this procedure.

NTP-L21 Replacing the Air Filter of the AC Power Module in the NCS 2006 Shelf Assembly

Purpose	This procedure replaces the air filter of the AC power module in the NCS 2006 shelf assembly.
Tools/Equipment	New air filter

Prerequisite Procedures	• NTP-L3 Mounting the NCS 2006 Shelf, on page 184 • Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . • DLP-L14 Installing the AC Power Module in the NCS 2006 Shelf, on page 264.
Required/As Needed	As Needed
Onsite/Remote	Remote
Security Level	Provisioning or higher

Note The air filters are single-use only. They must not be cleaned and reused. This is a Telcordia NEBS requirement, GR-63-CORE Issue 4.

Note Air filters must be inspected every quarter after the initial six month inspection. If they are dirty or clogged with dust, they must be replaced with a new air filter. Air filters are consumable items and replacement air filters must be ordered separately. You may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

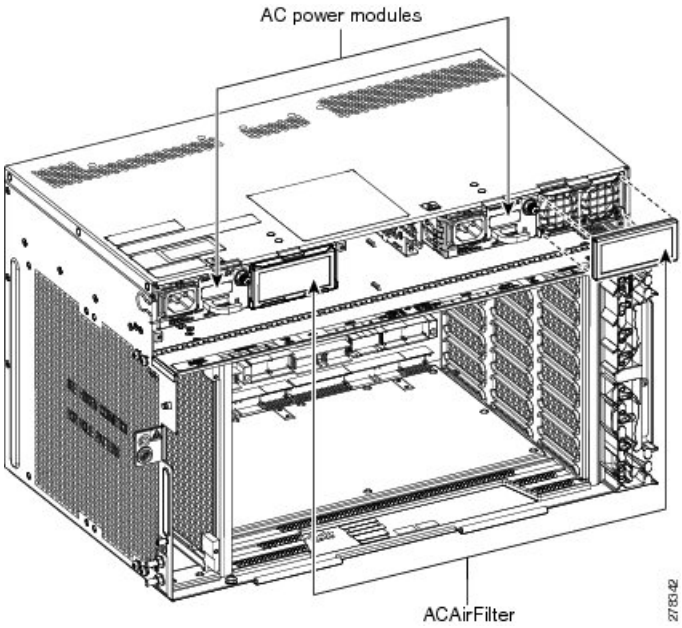
Procedure

Step 1 Open the front door of the shelf assembly (see DLP-L12 Opening the Standard Door of the NCS 2006 Shelf , on page 239). If the shelf assembly does not have a front door, continue with Step 3.

Step 2 (Optional) Complete the DLP-L13 Removing the Standard Door of the NCS 2006 Shelf , on page 241 to remove the front door. If you do not want to remove the door, proceed to Step 3.

Step 3 Remove the air filter on the AC power module (see the figure below).

Figure 267: Replacing the Air Filter—AC Power Module



Step 4 Replace the air filter with a new one if the air filter is dirty or clogged with dust.

Step 5 Close the front door. If you removed the door, complete the NTP-L4 Installing the Standard Door of the NCS 2006 Shelf , on page 235.

Stop. You have completed this procedure.

NTP-L58 Replacing the Air Filter of the NCS 2015 Shelf Assembly

Purpose	This procedure replaces the air filter of the NCS 2015 shelf assembly.
Tools/Equipment	New air filter
Prerequisite Procedures	Connect the chassis to the office ground. For detailed instructions on how to ground the chassis, refer to the Electrostatic Discharge and Grounding Guide for Cisco NCS 2000 Series . .
Required/As Needed	As Needed
Onsite/Remote	Remote
Security Level	Provisioning or higher

Note The air filters are single-use only. They must not be cleaned and reused. This is a Telcordia NEBS requirement, GR-63-CORE Issue 4.

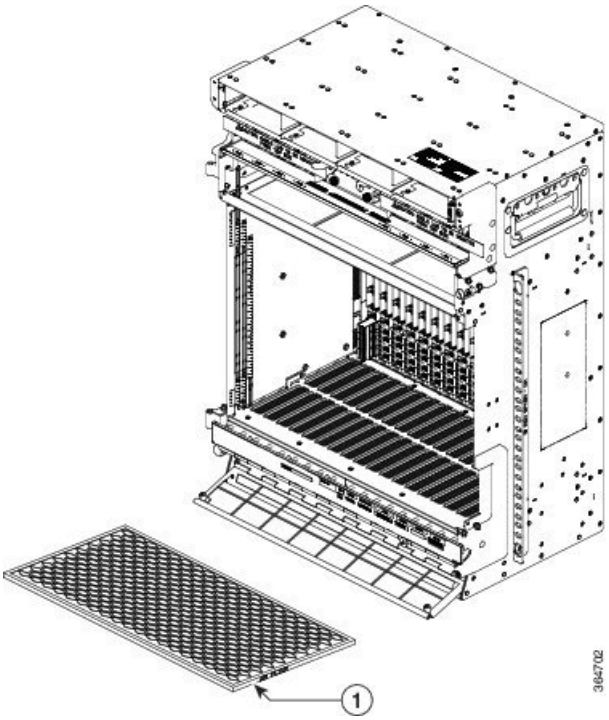
Note Air filters must be inspected every quarter after the initial six month inspection. If they are dirty or clogged with dust, they must be replaced with a new air filter. Air filters are consumable items and replacement air filters must be ordered separately. You may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

Procedure

Step 1 Open the front door of the shelf assembly (see NTP-L51 Opening and Removing the Door of the NCS 2015 Shelf , on page 342).

Step 2 Extract the air filter from the shelf assembly. See the figure below.

Figure 268: Extracting the Air Filter in the NCS 2015 DC Shelf



1	Air filter

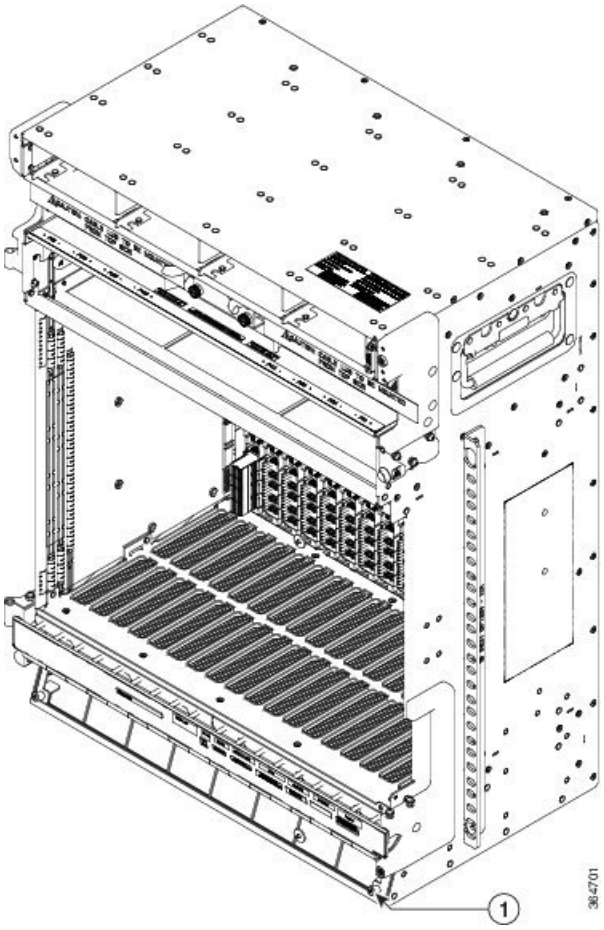
Step 3 Replace the air filter in the air filter holder assembly with a new one if the air filter is dirty or clogged with dust.

Step 4 Insert the air filter assembly into the shelf assembly.

Note
The air filter must be inserted with the grid facing the shelf assembly.

Step 5 Tighten the screws on the air filter assembly to secure it to the chassis. See the figure below.

Figure 269: NCS 2015 DC Shelf with Replaced Air Filter



1	Screw

Step 6 Swing the door closed and turn the knob to lock.

Stop. You have completed this procedure.

NTP-L22 Cleaning Fiber Connectors

Purpose	This procedure cleans the fiber connectors.
Tools/Equipment	Inspection microscope Type A Fiber Optic Connector Cleaner (CLETOP reel) Optical swab Optical receiver cleaning stick

Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Procedure

Step 1 Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.

Step 2 Replace any damaged fiber connectors.

Note
Replace all dust caps whenever the equipment is unused for 30 minutes or more.

Step 3 Complete DLP-G262 Cleaning Fiber Connectors with CLETOP, on page 411 as necessary.

Step 4 Complete DLP-G263 Cleaning the Fiber Adapters, on page 412 as necessary.

Note
To clean multi-fiber optic connectors, complete the DLP-G261 Cleaning Multi Fiber-Optic Cable Connectors, on page 410 as necessary.

Stop. You have completed this procedure.

DLP-G261 Cleaning Multi Fiber-Optic Cable Connectors

Purpose	This task cleans the multi fiber optic connectors
Tools/Equipment	Cleaning Cartridge for multi fiber optic connectors
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051

Procedure

Step 1 Remove the protective cap on the optical fiber cable connector.

Step 2 Read the manufacturer (cleaning cartridge) instructions to insert the connector into the cleaning cartridge.

Step 3 Slide the lever on the cartridge to swipe the connector surface.

Step 4 Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note If you must replace a dust cap on a connector, first verify that the dust cap is clean.

Step 5 Return to your originating procedure (NTP).

DLP-G262 Cleaning Fiber Connectors with CLETOP

Purpose	This task cleans the fiber connectors with CLETOP.
Tools/Equipment	Type A Fiber Optic Connector Cleaner (CLETOP reel) Optical receiver cleaning stick
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Remove the dust cap from the fiber connector.

Step 2 Press the lever up to open the shutter door. Each time you press the lever, you expose a clean wiping surface.

Step 3 Insert the connector into the CLETOP cleaning cassette slot, rotate one quarter turn, and gently swipe downwards.

Step 4 Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat Steps 1 to 3.

Step 5 Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note

If you must replace a dust cap on a connector, first verify that the dust cap is clean. To clean the dust cap, wipe the outside of the cap using a dry, lint-free wipe and the inside of the dust cap using a CLETOP stick swab (14100400).

Step 6 Return to your originating procedure (NTP).

DLP-G263 Cleaning the Fiber Adapters

Purpose	This task cleans the fiber adapters.
Tools/Equipment	CLETOP stick swab
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Procedure

Step 1 Remove the dust plug from the fiber adapter.
Step 2 Insert a CLETOP stick swab (14100400) into the adapter opening and rotate the swab.
Step 3 Place dust plugs on the fiber adapters when not in use.
Step 4 Return to your originating procedure (NTP).

NTP-L25 Replacing the Fan-Tray Assembly of the NCS 2002 Shelf Assembly

Purpose	This procedure replaces the fan-tray assembly of the NCS 2002 shelf assembly.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	NTP-L35 Installing the Fan-Tray Assembly in the NCS 2002 Shelf, on page 134
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

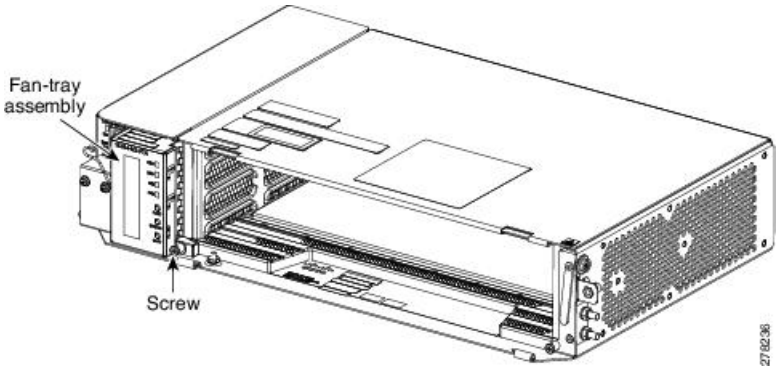
Caution Do not force a fan-tray assembly into place. Doing so can damage either the connectors on the fan tray or the connectors on the back panel of the shelf assembly, or both.

Note The estimated time required to change a fan-tray assembly is 2 minutes.

Procedure

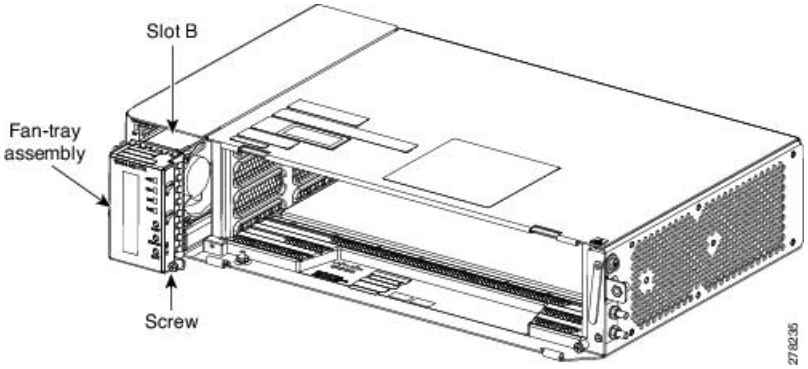
Step 1 Loosen the screw on the fan-tray assembly (see the figure below).

Figure 270: Fan-Tray Assembly installed in the NCS 2002 Shelf Assembly



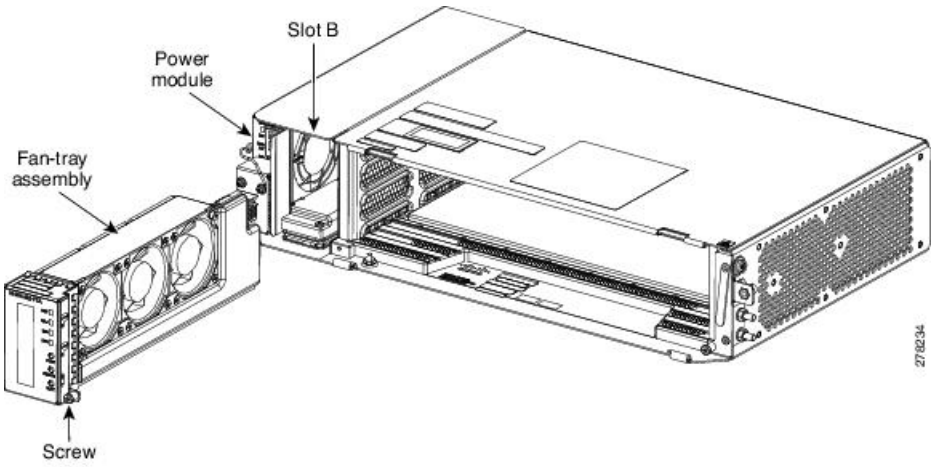
Step 2 Extract the fan-tray assembly partially to disconnect the backplane connector and wait until the fan stops (see the figure below)

Figure 271: Fan -Tray Extracted Partially with Power Connector Disconnected



Step 3 When the fans have stopped, pull the fan-tray assembly completely out of the shelf assembly (see the figure below).

Figure 272: Fan-Tray Extracted



Step 4 Slide the new fan-tray assembly into the shelf assembly until the electrical plug at the rear of the tray plugs into the corresponding receptacle on the backplane.

Step 5 To verify that the tray has plugged into the backplane, ensure that the LCD on the front of the fan-tray is activated.

Stop. You have completed this procedure.

NTP-L26 Replacing the Fan-Tray Assembly of the NCS 2006 Shelf Assembly

Purpose	This procedure replaces the fan-tray assembly of the NCS 2006 shelf assembly.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	NTP-L11 Installing the Fan-Tray Assembly in the NCS 2006 Shelf, on page 274
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not force a fan-tray assembly into place. Doing so can damage either the connectors on the fan tray or the connectors on the back panel of the shelf assembly, or both.

Note The estimated time required to change a fan-tray assembly is 2 minutes.

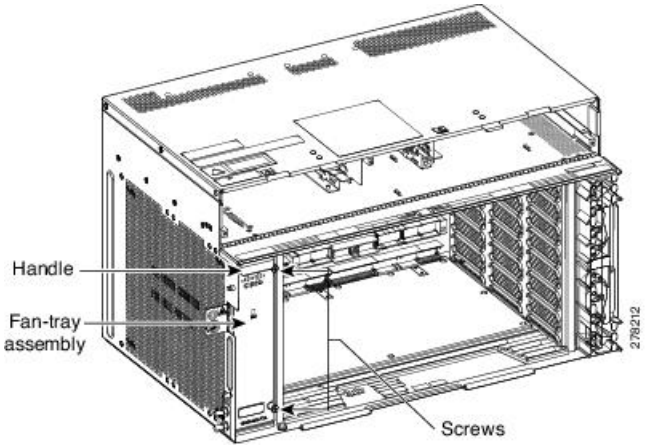
Procedure

Step 1 Open the front door of the shelf assembly (see DLP-L12 Opening the Standard Door of the NCS 2006 Shelf , on page 239). If the shelf assembly does not have a front door, continue with Step 3.

Step 2 (Optional) Complete the DLP-L13 Removing the Standard Door of the NCS 2006 Shelf , on page 241 to remove the front door. If you do not want to remove the door, proceed to Step 3.

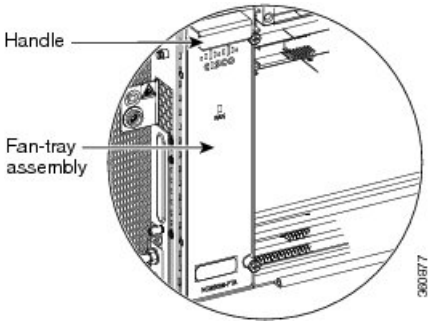
Step 3 Untighten the screws on the fan-tray assembly (see the figure below).

Figure 273: Extract the Fan-Tray Assembly



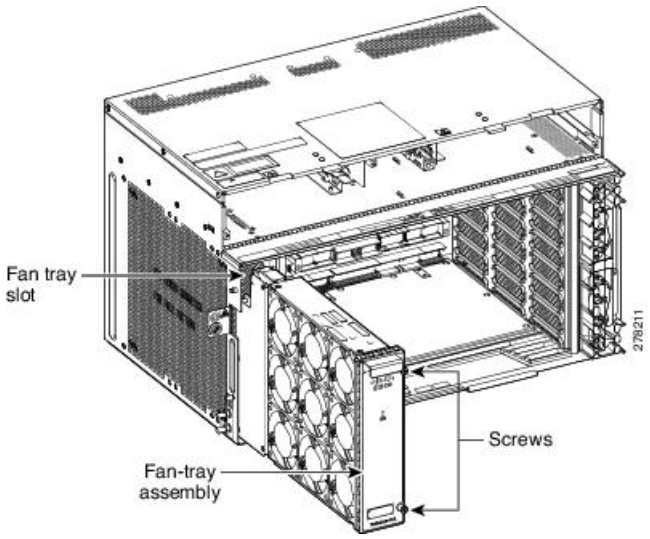
Step 4 Extract the fan tray partially using the handle in order to disconnect the backplane connector and wait until the fan stops (see the figure below)

Figure 274: Fan-Tray Assembly Extracted Partially with Power Connector Disconnected



Step 5 When the fans have stopped, pull the fan-tray assembly completely out of the shelf assembly (see the figure below).

Figure 275: Fan-Tray Extracted



Step 6 Slide the new fan-tray into the shelf assembly until the electrical plug at the rear of the tray plugs into the corresponding receptacle on the backplane.

Step 7 To verify that the tray has plugged into the backplane, ensure that the LED on the front of the fan-tray is activated.

If you removed the door, complete the NTP-L4 Installing the Standard Door of the NCS 2006 Shelf , on page 235.

Stop. You have completed this procedure.

NTP-L59 Replacing Fan-Tray Assembly of NCS 2015 Shelf Assembly

Purpose	This procedure replaces the fan-tray assembly of the NCS 2015 shelf assembly.
Tools/Equipment	Small slot-head screwdriver
Prerequisite Procedures	NTP-L54 Installing Fan-Tray Assembly in NCS 2015 Shelf, on page 353
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not force a fan-tray assembly into place. Doing so can damage either the connectors on the fan tray or the connectors on the back panel of the shelf assembly, or both.

Note The estimated time required to change a fan-tray assembly is 2 minutes.

Procedure

Step 1 Open the front door of the shelf assembly (see NTP-L51 Opening and Removing the Door of the NCS 2015 Shelf , on page 342). If the shelf assembly does not have a front door, continue with the next step.

Step 2 Untighten the captive screws on the fan-tray assembly.

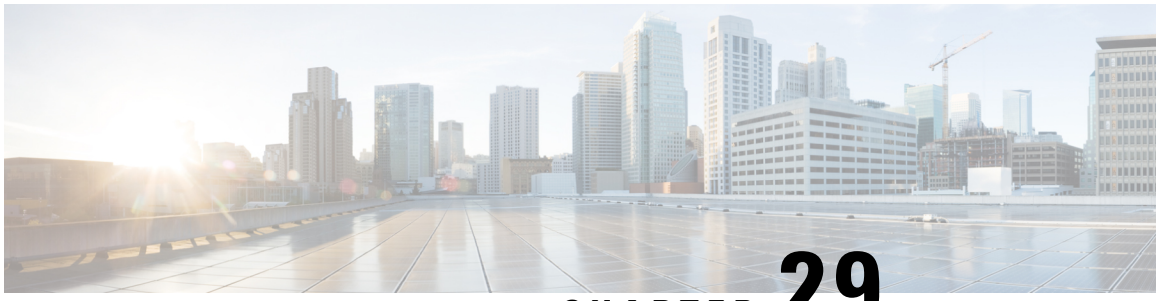
Step 3 Extract the fan tray partially using the handle in order to disconnect the backplane connector and wait until the fan stops.

Step 4 When the fans have stopped, pull the fan-tray assembly completely out of the shelf assembly.

Step 5 Slide the new fan-tray into the shelf assembly until the electrical plug at the rear of the tray plugs into the corresponding receptacle on the backplane.

Step 6 Swing the door closed and turn the knob to lock.

Stop. You have completed this procedure.



CHAPTER 29

Installing and Configuring NCS 2000 SVO line card

- Install the SVO line card, on page 419
- Remove and replace the SVO line card RTC battery, on page 420

Install the SVO line card

Use this task to install the SVO card.

Before you begin

Ensure recommended resources are met:

Procedure

Step 1 Plug in the SVO line card into the NCS 2000 chassis.

Step 2 Connect the SVO line card to other cards in the NCS 2000 chassis. For common real cabling scenarios, see HA deployment modes for NCS 2000.

Warning
Any different cabling must be reported to Cisco engineering for an official validation.

Step 3 Power up the SVO line card.

The SVO line card is successfully installed.

What to do next

Run the Cisco Optical Site Manager installation tool. See Install Cisco Optical Site Manager on NCS 2000 SVO-LC.

Remove and replace the SVO line card RTC battery

Use this procedure to remove and replace the SVO line card RTC battery.

Before you begin

Ensure you have these tools and equipment.

- Plastic spudger/pry tool
- Plastic or ceramic tweezers
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat
- Replacement battery – Choose any one from the options:
  - CR-2032L/BN — Panasonic
  - CR-2032L/BNDD — Panasonic
  - 100272 — Renata



Caution Handle all components only by the carrier edges. Always use an ESD wrist-strap or grounding device to avoid damaging static-sensitive components.



Warning Ensure the system is shut down and power is removed before you begin.

There is danger of explosion if the RTC battery is replaced incorrectly. Replace the RTC battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Follow these steps to remove and replace the SVO line card RTC battery.

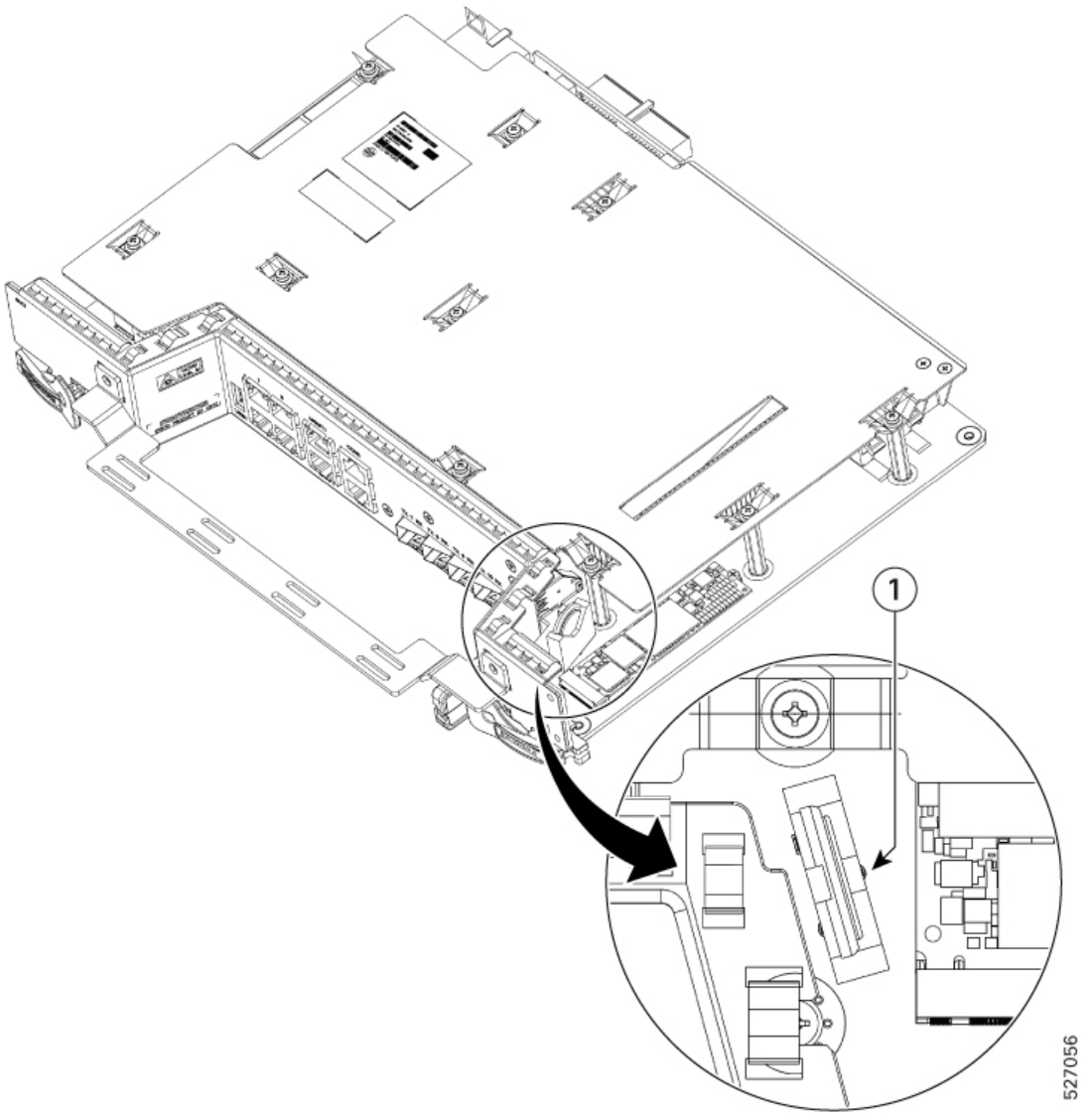
Procedure

Step 1 Remove the SVO line card faceplate.

Step 2 Remove the RTC battery.

a) Locate the vertical RTC battery socket on the system board.

Figure 276: Exploded view of the RTC battery in the SVO line card



1	Vertical RTC battery

b) Use a plastic spudger to gently push against the spring and release the battery from the socket.

Step 3 Install the new RTC battery.

a) Identify the battery polarity.

The positive side has the "CR2032" text and a plus sign (+). The negative side is flat.

b) Insert the battery at a slight angle around 30-degrees to the holder's opening, with the flat negative side facing the internal lower spring contact.

c) Gently push the battery inward toward the spring, then press down until it clicks securely under the retaining tabs.

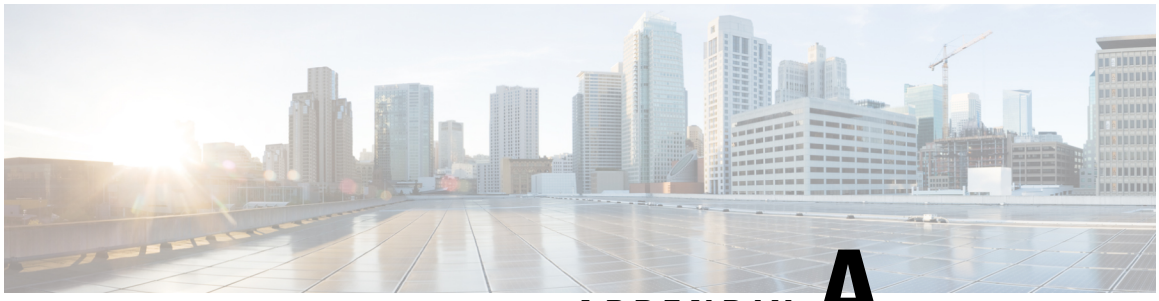
d) Ensure the battery is seated snugly and correctly. The positive side of the battery should face the retainer clip/tab when installed in the vertical holder.

Step 4 Reattach the faceplate.

The RTC battery is securely replaced and the controller can be safely powered on.

What to do next

- Power on the SVO line card and verify that it recognizes the new RTC battery and no battery errors are reported.
- Safely dispose the old battery according to local practices.



APPENDIX A

Hardware Specifications

This appendix contains hardware and software specifications of the NCS 2002, NCS 2006, NCS 2015 shelves.

The sections are:

- NCS 2002 Shelf Specifications, on page 423
- NCS 2006 Shelf Specifications, on page 426
- NCS 2015 Shelf Specifications, on page 432

NCS 2002 Shelf Specifications

This section provides specifications for shelf bandwidth; a list of topologies; Cisco Transport Controller (CTC) specifications; the LAN, Transaction Language One (TL1), modem, and alarm specifications; timing, power, and environmental specifications; and shelf dimensions.

Bandwidth

The NCS 2002 has these bandwidth specifications (depending on the applications):

- Total bandwidth: 200 Gbps
- Data plane bandwidth: 100 Gbps per slot

Configurations

The NCS 2002 can be configured for these dense wavelength division multiplexing (DWDM) topologies:

- Hubbed rings
- Multihubbed rings
- Point-to-point
- Linear
- Linear with optical add/drop multiplexing (OADM)
- Line amplifier node
- Transponder Shelf
- Layer 2 aggregation shelf

Cisco Transport Controller

CTC, the NCS 2002 craft interface software, has these specifications:

- 10/100BaseT Ethernet
- TNC/TNCE/TSC/TSCE card access: RJ-45 LAN connector on the controller front plate

External LAN Interface for EMS

The NCS 2002 external LAN interface has these specifications:

- 10/100BaseT Ethernet located on the power module

TL1 Craft Interface

The NCS 2002 TL1 craft interface has these specifications:

- TNC/TNCE/TSC/TSCE access: EIA/TIA-232 DB-9 type connector

Modem Interface

The NCS 2002 modem interface has these specifications:

- Hardware flow control
- TNC/TNCE/TSC/TSCE: EIA/TIA-232 DB-9 type connector

Alarm Interface

The NCS 2002 does not support alarm interface.

Passive Unit Remote Inventory

The NCS 2002 provides 1 standard USB port located on the power module to retrieve the passive units inventory data.

BITS Interface

The NCS 2002 building integrated timing supply (BITS) interface has these specifications:

- 1 DS-1 BITS inputs wire wrap for ANSI applications
- 1 derived DS-1 outputs wire wrap for ANSI applications
- 1 E1 BITS input DIN-1.0/2.3 for ETSI applications
- 1 E1 BITS output DIN-1.0/2.3 for ETSI applications

System Timing

The NCS 2002 for ANSI has these timing specifications:

- Stratum 3 per Telcordia GR-253-CORE

- Free running accuracy: +/- 4.6 ppm
- Holdover stability: 3.7 x 10-7 per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

The NCS 2002 for ETSI has the following system timing specifications:

- Stratum 3, per ITU-T G.813
- Free running accuracy: +/- 4.6 ppm
- Holdover stability: 3.7 exp -7 per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

System Power

The NCS 2002 has these AC power specifications:

- Input Voltage: 100V - 240V AC (+/- 10%)
- Power consumption: Configuration dependent; 35 W (Fan Tray and LCD)
- Power terminals standard 3 pole AC connector
- For an AC power supply, the fuse rating must not exceed 10A, 15A, or 20A depending on the standard in various countries. For North America, the branch circuit protection must be rated 20A
- Total maximum power consumption of 350W with ancillaries, controllers and linecards

The NCS 2002 has these DC power specifications:

- Nominal Input Voltage: –48 VDC
- Power consumption: Configuration dependent; 35 W (Fan Tray and LCD)
- Power requirements:
  - Nominal: –48 VDC
  - Input Voltage Range: -40.5 to -57.6 VDC
- Power terminals: DSUB 2 poles for ETSI applications and terminal block double pole for applications
- External fuse must not exceed 15A
- Total maximum power consumption of 450W with ancillaries, controllers and linecards

Fan Tray

The following table lists power requirements for the fan-tray assembly.

Table 25: Fan-Tray Assembly Power Requirements

Fan Tray Assembly	Watts	Amps	BTU/Hr
NCS2002-FTA	35	1	120

System Environmental Specifications

The NCS 2002 for ANSI environment has these specifications:

- Operating temperature: 23 to +131 degrees Farenheit (-5 to +55 degrees Celsius)
- Operating humidity: 5 to 95 percent, noncondensing

The NCS 2002 for ETSI environment has the following specifications:

- Operating temperature: 23 to 131 degrees Fahrenheit (-5 to +55 degrees Celsius)
- Operating humidity: 5 to 95 percent, noncondensing

Dimensions

The NCS 2002 shelf assembly has these dimensions:

- Height: 3.5 inches (88.9 mm)
- Width: 19 or 23 inches (482.6 or 584.2 mm) with mounting ears attached
- Depth: 11.1 inches (281.94 mm)
- Weight:
  - 11.02 pounds (5 kg) with preinstalled air filter and no cards installed
  - 15.40 pounds (6.82 kg) with the power module, fan-tray assembly and air filter installed but with no cards.

NCS 2006 Shelf Specifications

This section provides specifications for shelf bandwidth; a list of topologies; Cisco Transport Controller (CTC) specifications; the LAN, Transaction Language One (TL1), modem, and alarm specifications; timing, power, and environmental specifications; and NCS 2006 shelf dimensions.

Bandwidth

The NCS 2006 has the following bandwidth specifications (depending on the applications):

- Total bandwidth: 600 Gbps
- Data plane bandwidth: 100 Gbps per slot

Configurations

The NCS 2006 can be configured for the following dense wavelength division multiplexing (DWDM) topologies:

- Hubbed rings
- Multihubbed rings
- Point-to-point
- Linear
- Linear with optical add/drop multiplexing (OADM)
- Hybrid terminal node
- Hybrid OADM node
- Hybrid line amplifier node
- Transponder Shelf
- Layer 2 aggregation shelf

Cisco Transport Controller

CTC, the NCS 2006 craft interface software, has the following specifications:

- 10/100BaseT Ethernet
- TNC/TNCE/TSC/TSCE card access: RJ-45 LAN connector on the controller front plate
- Shelf access: RJ-45 LAN Connector located on the ECU or ECU2

External LAN Interface for EMS

The NCS 2006 external LAN interface has the following specification:

- 10/100BaseT Ethernet located on the ECU or ECU2 and supports:

TL1 Craft Interface

The NCS 2006 TL1 craft interface has the following specifications:

- Speed: 9600 bps
- TNC/TNCE/TSC/TSCE access: EIA/TIA-232 DB-9 type connector
- An alternative RJ-45 LAN connector on TNC/TNCE/TSC/TSCE or ECU or ECU2

Modem Interface

The NCS 2006 modem interface has the following specifications:

- Hardware flow control
- TNC/TNCE/TSC/TSCE: EIA/TIA-232 DB-9 type connector

Alarm Interface

The NCS 2006 alarm interface has the following specifications:

- 2 SCSI Connectors located on the ECU or ECU2
- Visual: Critical, Major, Minor, Remote
- Audible: Critical, Major, Minor, Remote
- Alarm inputs: Common 32-VDC output for all alarm-inputs, closed contact limited to 2 mA
- Control outputs: Open contact maximum 60 VDC, closed contact maximum 100 mA

Passive Unit Remote Inventory

The NCS 2006 provide 12 standard USB ports located on the ECU or ECU2 to retrieve the inventory data from the passive units.

BITS Interface

The NCS 2006 building integrated timing supply (BITS) interface has the following specifications:

- 2 T1 BITS inputs wire wrap for applications

- 2 derived T1 outputs wire wrap for applications
- 2 E1 BITS input DIN-1.0/2.3 for ETSI applications
- 2 E1 BITS output DIN-1.0/2.3 for ETSI applications

System Timing

The NCS 2006 for ANSI has the following system timing specifications:

- Stratum 3 per Telcordia GR-253-CORE
- Free running accuracy: +/- 4.6 ppm
- Holdover stability: 3.7 x 10-7 per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

The NCS 2006 for ETSI has the following system timing specifications:

- Stratum 3, per ITU-T G.813
- Free running accuracy: +/- 4.6 ppm
- Holdover stability: 3.7 exp -7 per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

System Power

AC Power Specifications

The NCS 2006 has these AC power specifications:

- Shelf power consumption: Configuration dependent; 130 W (Fan Tray, LCD, and ECU module).
- Power terminals standard 3-pole AC connector.
- Fuse rating for an AC power supply must not exceed 10 A, 15 A, or 20 A depending on the standard in various countries. For North America, the branch circuit protection must be rated 20 A.

The following table lists power specifications of the AC power modules for the NCS 2006 shelf.

Table 26: NCS 2006 AC Power Specifications

AC Power Module	Input Voltage Range	Output Voltage	Load
NCS2006-AC	100–120 V AC (US nominal range), 60Hz	-48.0 V DC	1200 W
	200–240 V AC (Europe nominal range), 50Hz	-48.0 V DC	1500 W

Note The NCS2006-AC supports the same specifications as the 15454-M6-AC2.

DC Power Specifications

The following table lists power specifications of the DC power modules for the NCS 2006 shelf.

Table 27: NCS 2006 DC Power Specifications

DC Power Module	Rating	Nominal Voltage	Current	External Fuse Rating	Input Voltage Range	Maximum Load
NCS 2006-DC	30 Amp	–48 VDC	30 Amp	40 Amp	–40.5 to –57.6 VDC	1440 W
		–60 VDC	24 Amp		–50 to –72 VDC	
NCS2006-DC20	20 Amp	–48 VDC	20 Amp	30 Amp	–40.5 to –57.6 VDC	960 W
		–60 VDC	16 Amp		–50 to –72 VDC	
NCS2006-DC40	40 Amp	-48 VDC	40 Amp	60 Amp	–40.5 to –57.6 VDC	1920 W
		-60 VDC	32 Amp		–50 to –72 VDC	

Note When the NCS 2006 shelf is powered at –60 VDC (nominal), only these cards can be installed: TNC, OPT-AMP-C, OPT-AMP-17-C, OPT-EDFA-17, OPT-EDFA-24, 17 SMR9 FS, 24 SMR9 FS, 34 SMR9 FS, SMR20 FS, SMR20 FS CV, 12-AD-FS, 16-AD-FS, 100GS-CK-LC, and MR-MXP cards, and the NCS2006-ECU-60 card.

- When you use the 60V DC power module for NCS 2006, you must go to CTC (shelf-view) **Provisioning > General > Power Monitor** and set the following threshold values:
  - ELWBATVG (Extreme Low Battery Voltage)=-50 Vdc
  - LWBATVG (Low Battery Voltage)=-50 Vdc
  - HIBATVG (High Battery Voltage)=-72 Vdc
  - EHIBATVG (Extreme High Battery Voltage)=-72 Vdc
- NCS2006-DC, NCS2006-DC20, and NCS 2006-DC40 shelf power consumption (configuration dependent):
  - 130 W with NCS2006-FTA Fan Tray, LCD, and ECU module
- Power terminals—DSUB 3 poles for ETSI applications and terminal block, double pole for applications.

Power Supply Modules Supported by NCS 2006 ECU-S

The following table lists the power supply modules Supported by NCS 2006 ECU-S.

Table 28: Power Supply Modules Supported by NCS 2006 ECU-S

Model	PID
NCS2006-DC	• NCS2006-DC= • NCS2006-DC20=
NCS2006-DC6-40A	NCS2006-DC40=
NCS2006-AC	NCS2006-AC=

Power Calculation

For the NCS 2006 shelf that is powered by the NCS2006-DC20 power module, the controller card calculates the total power consumption of the shelf, which is displayed in the Provisioning > General > Power Monitor tab in CTC. For the power calculation to function properly ensure that:

- There is no MEA alarm on any card.
- The LCD module is properly plugged-in.

The total power consumption value for the shelf is computed by aggregating the power consumption values of individual cards and ancillary units installed or pre-provisioned in the shelf. Refer to the Individual Card Power Requirements table for the power consumption values of the line cards that are considered for power calculation.

The Actual Power is the power consumed by a line card once it has boot-up. The Typical Power is the power consumed by a line card when it is physically present in the shelf but deleted in CTC, or when it has not boot-up due to PWR-CON-LMT alarm after installation or pre-provisioning.

During power calculation, certain wattage is always reserved for ancillary units like the ECU, fan tray, and standby controller card, irrespective of whether they are present in the shelf or not. The reserved power for the NCS 2006 shelf with a TNC or TNC-E controller card is 284 W, and for the TSC or TSC-E controller card it is 270 W.

Note Do not use 16WXC-FS, EDRA-1-xx, EDRA-2-xx cards in NCS 2006 having the 15454-M6-AC2 and 15454-M6-DC20 power modules.

Note In the shelf powered by the NCS2006-DC20 power module, a new line card will not boot if it causes the power consumption of the shelf to exceed 960 W. The PWR-CON-LMT alarm is raised in the Alarms tab in CTC when the installation or pre-provisioning of a card causes the power consumption to exceed 960 W. You must uninstall and deprovision the card that causes the PWR-CON-LMT alarm.

Note In the shelf powered by the NCS2006-DC40 power module, a new line card will not boot if it causes the power consumption of the shelf to exceed 1920 W. The PWR-CON-LMT alarm is raised in the Alarms tab in CTC when the installation or pre-provisioning of a card causes the power consumption to exceed 1920W. You must uninstall and deprovision the card that causes the PWR-CON-LMT alarm.

Note When the node is upgraded to R11.1 with specific cards, the total power consumption value changes. Refer to the Individual Card Power Requirements table for the power consumption values of the line cards that are considered for power calculation.

Fan Tray

The following table lists power requirements for the fan-tray assembly.

Table 29: Fan-Tray Assembly Power Requirements

Fan Tray Assembly	Watts	Amps	BTU/Hr
NCS2006-FTA	120	3	410

System Environmental Specifications

The NCS 2006 for ANSI environment has these specifications:

- Operating temperature: 23 to +131 degrees Farenheit (-5 to +55 degrees Celsius)
- Operating humidity: 5 to 95 percent, noncondensing

The NCS 2006 for ETSI environment has these specifications:

- Operating temperature: 23 to 131 degrees Fahrenheit (-5 to +55 degrees Celsius)
- Operating humidity: 5 to 95 percent, noncondensing

Dimensions

The NCS 2006 shelf assembly has these dimensions:

- Height: 10.4 inches (264.16 mm)
- Width: 19 or 23 inches (482.6 or 584.2 mm) with mounting ears attached
- Depth: 11.1 inches (281.94 mm)
- Weight:
  - 23.55 pounds (10.680 kg) with preinstalled air filter and no cards installed
  - 40.12 pounds (18.2 kg) with all the ancillary units (2 DC power modules, ECU or ECU2, fan-tray assembly and air filter) installed but with no cards.

NCS 2015 Shelf Specifications

This section provides specifications for shelf bandwidth; Cisco Transport Controller (CTC) specifications; the LAN, Transaction Language One (TL1), modem, and alarm specifications; timing, power, and environmental specifications; and NCS 2015 shelf dimensions.

The NCS 2015 shelf is compliant with the ETS 300-119-4 standard.

Bandwidth

The per slot interconnection on NCS 2015 can be 250Gbps or 500 Gbps.

Cisco Transport Controller

CTC, the NCS 2015 craft interface software, has the following specifications:

- 10/100BaseT Ethernet
- TNCS/TNCS-O card access: RJ-45 LAN connector on the controller front plate
- Shelf access: RJ-45 LAN connector and optical EMS port located on the ECU. The CT/EMS copper port functions as the craft port only in the secure mode.

External LAN Interface for EMS

The NCS 2015 external LAN interface has the following specification:

- 10/100BaseT Ethernet located on the ECU and supports:
  - 10/100 Mbps full duplex
  - Auto detection
- 100 Mbps (FX) optical port located on the ECU and supports:
  - 100 Mbps full duplex
  - Auto detection

TL1 Craft Interface

The NCS 2015 TL1 craft interface has the following specifications:

- Speed: 9600 bps
- TNCS/TNCS-O access: EIA/TIA-232 DB-9 type connector
- An alternative RJ-45 LAN connector on TNCS/TNCS-O or ECU
- An alternative EMS optical connector on ECU

Modem Interface

The NCS 2015 modem interface has the following specifications:

- Hardware flow control

- TNCS/TNCS-O: EIA/TIA-232 DB-9 type connector

Alarm Interface

The NCS 2015 alarm interface has the following specifications:

- 2 SCSI Connectors located on the power input panel
- Visual: Critical, Major, Minor, Remote
- Audible: Critical, Major, Minor, Remote
- Alarm inputs: Common 32-VDC output for all alarm-inputs, closed contact limited to 2 mA
- Control outputs: Open contact maximum 60 VDC, closed contact maximum 100 mA

Passive Unit Remote Inventory

The NCS 2015 provides 12 USB 2.0 ports and two USB 3.0 ports located on the ECU to retrieve the inventory data from the passive units.

BITS Interface

The NCS 2015 building integrated timing supply (BITS) interface has the following specifications:

- 2 T1 BITS inputs wire wrap for applications
- 2 derived T1 outputs wire wrap for applications
- 2 E1 BITS input DIN-1.0/2.3 for ETSI applications
- 2 E1 BITS output DIN-1.0/2.3 for ETSI applications

System Timing

The NCS 2015 for ANSI has the following system timing specifications:

- Stratum 3 per Telcordia GR-253-CORE
- Free running accuracy: +/- 4.6 ppm
- Holdover stability: 3.7 x 10-7 per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

The NCS 2015 for ETSI has the following system timing specifications:

- Stratum 3, per ITU-T G.813
- Free running accuracy: +/- 4.6 ppm
- Holdover stability: 3.7 exp -7 per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

System Power

The following table lists power specifications for the NCS 2015 shelf.

Table 30: Cisco NCS 2015 Power Specifications

Power Redundancy (N+N)	
AC	Up to four power modules can be installed. This allows support for 1+0, 1+1, 2+0, and 2+2 power redundancy.
DC	Up to four power modules can be installed. This allows support for 3+1, 2+2, 2+1, and 1+1 power redundancy and A and B battery plant dual feeds redundancy.
AC Input	
Nominal input voltage	200 to 240 VAC (range 180 to 264 VAC)
Nominal line frequency	50/60 Hz (range 47 to 63 Hz)
Recommended AC service	30-A (North America) dedicated branch circuit 30-A (International) dedicated branch circuit
DC Input	
Nominal input voltage	–48 VDC or –60 VDC(tolerance range: –40.5 to –72 VDC)
Input current	36 A max at –48 VDC28.8 A max per feed at –60 VDC42.7 A at –40 VDC (maximum)

You can configure the power redundancy mode of an NCS 2015 chassis using CTC or TL1 commands. For more information, see the section, “Power Redundancy” in the chapter, “Maintaining the Node” in the *Cisco NCS 2000 Series Network Configuration Guide, Release 10.x.x* .

Power Calculation

For the NCS 2015 shelf that is powered by the NCS4K-DC-PSU-V1 power module, the controller card calculates the total power consumption of the shelf, which is displayed in the Provisioning > General > Power Monitor tab in CTC. For the power calculation to function properly ensure that there is no MEA alarm on any card.

The total power consumption value for the shelf is computed by aggregating the power consumption values of individual cards and ancillary units installed or pre-provisioned in the shelf. During power calculation, certain wattage is always reserved for ancillary units like the ECU, fan tray, and standby controller card, irrespective of whether they are present in the shelf or not. The reserved power for the NCS 2015 DC shelf with a TNCS controller card is 720 W.

Note When the node is upgraded to R11.1 with specific cards, the total power consumption value changes. Refer to the Individual Card Power Requirements table for the power consumption values of the line cards that are considered for power calculation.

Fan Tray

The following table lists power requirements for the fan-tray assembly.

Table 31: Fan-Tray Assembly Power Requirements

Fan Tray Assembly	Watts	Amps	BTU/Hr
NCS2015-FTA	560	10.4	1910.72

System Environmental Specifications

The following table describes the environmental specifications for the NCS 2015 shelf:

Table 32: Cisco NCS 2015 Environmental Specifications

Temperature	Operating, nominal: 41 to 104°F (5° to 40°C)Operating, short-term: 23 to 131°F (-5° to 55°C)Non operating: -40 to 158°F (-40° to 70°C)
Humidity	Normal: 5 to 85%, noncondensingShort-term: 5 to 90% but not to exceed 0.024 kg water/kg of dry air
Chassis airflow	Up to 27,609 liters per minute
Power system airflow	Up to 6800 liters per minute
Air exhaust temperature	106°F (41°C)-at room temperatures of 77 to 84°F (25 to 29°C)118°F (48°C)-at room temperatures of 95 to 102°F (35 to 39°C)153°F (67°C)-maximum exhaust temperature on a fully loaded system during worst-case operating conditions (55°C and 6000 ft altitude) **Note** Air temperature rise is 54°F (12°C) on a fully loaded system with fans running at maximum speed.
Air velocity	2000 ft/min (10 m/s) under typical conditions 27°C4000 ft/min (20 m/s) at maximum speed. **Note** Software controls the speed of the fans based on measurements from the chassis thermal sensors.
Sound power level (DC power)	Fan speed 6300 RPM, temperature 80°F (27°C):70.7 dB-modular configuration power

Dimensions

The NCS 2015 shelf assembly has these dimensions:

- Height: 24.44 inches (620.776 mm)
- Width: 17.67 inches (448.81 mm)
- Depth: 11.10 inches (281.94 mm)
- Weight:
  - Empty chassis: 69.225 pounds (31.4 kg)
  - Chassis with ancillary units and line cards: 99.20 pounds (45 kg)



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