Cisco Nexus 2000 Series Hardware Installation Guide

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CONTENTS

Preface

This preface describes the audience, organization, and conventions of the *Cisco Nexus 2000 Series Hardware Installation Guide*. It also provides information on how to obtain related documentation.

This preface includes the following sections:

Audience

To use this installation guide, you must be familiar with electronic circuitry and wiring practices and preferably be an electronic or electromechanical technician.

Organization

This guide is organized as follows:

Chapter and Title	Description
Chapter 1, "Overview"	Provides an overview of the Cisco Nexus 2000 Series Fabric Extenders.
Chapter 2, "Installing a Cisco Nexus Fabric Extender"	Describes how to install the Cisco Nexus 2000 Series Fabric Extenders, and how to install modules, power supplies, and fan assemblies.
Chapter 3, "Connecting a Cisco Nexus Fabric Extender"	Describes how to connect the Cisco Nexus 2000 Series Fabric Extenders, including the modules.
Appendix A, "Cabinet and Rack Installation"	Provides guidelines for selecting an enclosed cabinet, and a procedure for installing a switch using the optional and EIA Shelf Bracket Kit.
Appendix B, "Technical Specifications"	Lists specifications for the Cisco Nexus 2000 Series Fabric Extenders and components including modules, power supplies, and transceivers.

Chapter and Title	Description
Appendix C, "Cable and Port Specifications"	Lists cable and port specifications for the Cisco Nexus 2000 Series Fabric Extenders.
Appendix D, "Troubleshooting Hardware Components"	Describes how to identify and resolve problems that might occur with the hardware components of the Cisco Nexus 2000 Series Fabric Extenders.
Appendix E, "LEDs"	Describes the conditions indicated by the chassis and module LEDs on the Cisco Nexus 2000 Series Fabric Extenders.
Appendix F, "Accessory Kit"	Lists the accessory kit contents for the Cisco Nexus 2000 Series Fabric Extenders.
Appendix G, "Site Preparation and Maintenance Records"	Provides site preparation information for the Cisco Nexus 2000 Series Fabric Extenders.

Conventions

This document uses the following conventions for notes, cautions, and safety warnings.

Notes and Cautions contain important information that you should be aware of.

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

Caution Means *reader be careful*. You are capable of doing something that might result in equipment damage or loss of data.

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, can cause physical injuries. A warning symbol precedes each warning statement.

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Waarschuwing **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus **TÄRKEITÄ TURVALLISUUSOHJEITA**

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

SÄILYTÄ NÄMÄ OHJEET

Attention **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

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

CONSERVEZ CES INFORMATIONS

Warnung **WICHTIGE SICHERHEITSHINWEISE**

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

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

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

CONSERVARE QUESTE ISTRUZIONI

Advarsel **VIKTIGE SIKKERHETSINSTRUKSJONER**

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

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

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

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! **INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

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

GUARDE ESTAS INSTRUCCIONES

Varning! **VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

Figyelem FONTOS BIZTONSÁGI ELOÍRÁSOK

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

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ

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

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

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

请保存这些安全性说明

警告 安全上の重要な注意事項

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

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

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

이 지시 사항을 보관하십시오.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

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

GUARDE ESTAS INSTRUÇÕES

Advarsel VIGTIGE SIKKERHEDSANVISNINGER

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

GEM DISSE ANVISNINGER

تحذير إرشادات الأمان الهامة

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

Upozorenje VAŽNE SIGURNOSNE NAPOMENE

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

SAČUVAJTE OVE UPUTE

Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY

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

USCHOVEJTE TYTO POKYNY

Προειδοποίηση   ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

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

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה   **הוראות בטיחות חשובות**

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

שמור הוראות אלה

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

Ostrzeżenie   **WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

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

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie   **DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY**

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

USCHOVAJTE SI TENTO NÁVOD

Opozorilo   **POMEMBNI VARNOSTNI NAPOTKI**

Ta opozorilni simbol pomeni nevarnost. Nahajate se v situaciji, kjer lahko pride do telesnih poškodb. Preden pričnete z delom na napravi, se morate zavedati nevarnosti udara električnega toka, ter tudi poznati preventivne ukrepe za preprečevanje takšnih nevarnosti. Uporabite obrazložitveno številko na koncu posameznega opozorila, da najdete opis nevarnosti v priloženem varnostnem priročniku.

SHRANITE TE NAPOTKE!

警告   重要安全性指示
此警告符號代表危險，表示可能造成人身傷害。使用任何設備前，請留心電路相關危險，並熟悉避免意外的標準作法。您可以使用每項警告後的聲明編號，查詢本裝置隨附之安全性警告譯文中的翻譯。
請妥善保留此指示

Related Documentation

Documentation for Cisco Nexus 2000 Series Fabric Extenders is available at the following URL:

http://www.cisco.com/c/en/us/support/switches/nexus-2000-series-fabric-extenders/tsd-products-support-series-home.html

Documentation for Cisco Nexus 5000 Series Switches is available at the following URL:

http://www.cisco.com/c/en/us/support/switches/nexus-5000-series-switches/tsd-products-support-series-home.html

Documentation for Cisco Nexus 6000 Series Switches is available at the following URL:

http://www.cisco.com/c/en/us/support/switches/nexus-6000-series-switches/tsd-products-support-series-home.html

Documentation for Cisco Nexus 7000 Series Switches is available at the following URL:

http://www.cisco.com/c/en/us/support/switches/nexus-7000-series-switches/tsd-products-support-series-home.html

Documentation for Cisco Nexus 9000 Series Switches is available at the following URL:

http://www.cisco.com/c/en/us/support/switches/nexus-9000-series-switches/tsd-products-support-series-home.html

Documentation for Cisco NX-OS Software is available at the following URL:

http://www.cisco.com/c/en/us/support/ios-nx-os-software/nx-os-software/tsd-products-support-series-home.html

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at:

http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation as an RSS feed and delivers content directly to your desktop using a reader application. The RSS feeds are a free service.

Overview

The Cisco Nexus Fabric Extenders (FEXs) support 100M/1G/10G Ethernet environments while allowing transparent migration to 10-Gigabit Ethernet virtual machine aware unified fabric technologies. The Cisco Nexus FEXs behave as remote I/O modules for a parent Cisco Nexus switch. The FEX is an extension of the parent Cisco Nexus switch fabric, with the FEX and the parent Cisco Nexus switch together forming a virtual modular system.

A Cisco Nexus FEX forwards all the traffic to the parent Cisco Nexus Switch over 10/40-Gigabit Ethernet uplinks. Passing all traffic to the parent switch allows traffic forwarding to be controlled according to policies established on the parent Cisco Nexus switch with a single point of management.

This chapter describes the Cisco Nexus Fabric Extenders (FEXs) and includes these sections:

Using a Fabric Extender with a Cisco Nexus 5000 Series or Cisco Nexus 6000 Series Switch

This section describes the Cisco Nexus fabric extenders (FEXs) supported by the Cisco Nexus 5000 and 6000 Series switches. For information about supported FEXs provided by other companies (B22 FEXs), see the documentation provided by those companies.

To see which FEXs are supported by the Cisco Nexus 5000 and 6000 Series switches, see Table 1-1.

Table 1-1   FEXs Supported by Cisco Nexus 5000 and 6000 Series Switches

FEX Model	Cisco Nexus 5000 and 6000 Series Switches
Cisco Nexus 2348UPQ	X
Cisco Nexus 2348TQ	X
Cisco Nexus 2348TQ-E	X

Table 1-1   FEXs Supported by Cisco Nexus 5000 and 6000 Series Switches (continued)

FEX Model	Cisco Nexus 5000 and 6000 Series Switches
Cisco Nexus 2332TQ	X
Cisco Nexus 2248TP-E	X
Cisco Nexus 2248TP	X
Cisco Nexus 2248PQ	X
Cisco Nexus 2232TM-E	X
Cisco Nexus 2232TM	X
Cisco Nexus 2232PP	X
Cisco Nexus 2224TP	X
Cisco Nexus 2148T	X
B22IBM	X
B22HP	X
B22F (Fujitsu)	X
B22DELL	X

All of the Cisco Nexus 2000 Series FEXs are 1 RU high and require 19-inch racks for installation. For more information about the dimensions and weights of each FEX chassis, its power supplies, and fan modules, see Physical Specifications, page B-5.

The following sections describe the Cisco Nexus 2000 Series FEXs and their components:

- Power Supply and Fan Modules, page 1-9
- Ports and Connectors, page 1-11
- Chassis Features, page 1-11

Using a Fabric Extender with a Cisco Nexus 7000 Series Switch

This section describes the Cisco Nexus fabric extenders (FEXs) supported by the Cisco Nexus 7000 Series switches. For information about supported FEXs provided by other companies (B22 FEXs), see the documentation provided by those companies.

To see which FEXs are supported by the Cisco Nexus 7000 and 7700 switches, see Table 1-2.

Table 1-2   FEXs Supported by Cisco Nexus 7000 and 7700 Series Switches

Cisco Nexus 7000 Series Module	FEX Module	Minimum Software Release
FEX Modules Supported by Cisco Nexus 7000 Series Modules		
48-port 1-/10-Gigabit Ethernet SFP+ I/O M3 Series module (N7K-M348XP-25L) 24-port 40-Gigabit Ethernet QSFP+ I/O M3 Series module (N7K-M324FQ-25L)	N2K-C2232PP N2K-C2224TP N2K-C2248TP-E N2K-C2248PQ N2K-C2348UPQ N2K-C2348TQ N2K-C2332TQ	8.1(1)
	N2k-C2348TQ-E N2K-B22DELL-P	8.2(1)
12-port 40-Gigabit Ethernet QSFP I/O F3 Series module (N7k-F312FQ-25)	N2K-C2224TP-1GE N2K-C2248TP-1GE N2K-C2232PP-10GE N2K-C2232TM N2K-C2248TP-E N2K-C2232TM-E N2K-C2248PQ N2K-B22HP[1]	6.2(12)
	N2K-C2348UPQ N2K-C2348TQ N2K-B22IBM	7.2(0)D1(1)
	N2K-C2332TQ	8.1(1)
	N2k-C2348TQ-E N2K-B22DELL-P	8.2(1)
6-port 40-Gigabit Ethernet I/O M2 Series module XL (N7K-M206FQ-23L)	N2k-2348UPQ N2k-2348TQ	7.2(0)D1(1)
Breakout (4*10G) mode 40-Gigabit Ethernet I/O M2 Series module XL (N7K-M206FQ-23L)	N2k-2224TP N2k-2232PP N2k-2232TM N2k-2232TM-E N2k-2248PQ N2k-2248TP N2k-2248TP-E	7.2(0)D1(1)

Cisco Nexus 7000 Series Module	FEX Module	Minimum Software Release
24-port 10-Gigabit Ethernet I/O M2 Series module XL (N7K-M224XP-23L)	N2K-C2224TP-1GE N2K-C2248TP-1GE N2K-C2232PP-10GE N2K-C2232TM N2K-C2248TP-E	6.1(1)
	N2K-C2232TM-E N2K-C2248PQ N2K-B22HP	6.2(2)
	N2K-C2348UPQ N2K-C2348TQ N2K-B22IBM	7.2(0)D1(1)
48-port 1/10 Gigabit Ethernet SFP+ I/O F3 Series module (N7K-F348XP-25)	N2K-C2224TP-1GE N2K-C2248TP-1GE N2K-C2232PP-10GE N2K-C2232TM N2K-C2248TP-E N2K-2232TM-E N2K-2248PQ N2K-B22HP	6.2(12)
	N2K-C2348UPQ N2K-C2348TQ N2K-B22IBM	7.2(0)D1(1)
	N2K-C2332TQ	8.1(1)
	N2k-C2348TQ-E N2K-B22DELL-P	8.2(1)

Cisco Nexus 7000 Series Module	FEX Module	Minimum Software Release
Enhanced 48-port 1/10 Gigabit Ethernet SFP+ I/O module (F2E Series) (N7K-F248XP-25E)	N2K-C2224TP-1GE N2K-C2248TP-1GE N2K-C2232PP-10GE N2K-C2232TM N2K-C2248TP-E	6.1(2)
	N2K-2232TM-E N2K-C2248PQ N2K-B22HP	6.2(2)
	N2K-C2348UPQ N2K-C2348TQ N2K-B22IBM	7.2(0)D1(1)
	N2K-C2332TQ	8.1(1)
FEX Modules Supported by Cisco Nexus 7700 Series Modules		
48-port 1/10 Gigabit Ethernet SFP+ I/O module (F2E Series) (N77-F248XP-23E)	N2K-C2224TP-1GE N2K-C2248TP-1GE N2K-C2232PP-10GE N2K-C2232TM N2K-C2232TM-E N2K-C2248PQ N2K-C2248TP-E N2K-B22HP	6.2(2)
	N2K-C2348UPQ N2K-C2348TQ N2K-B22IBM	7.2(0)D1(1)
	N2K-C2332TQ	8.1(1)

Cisco Nexus 7000 Series Module	FEX Module	Minimum Software Release
24-port Cisco Nexus 7700 F3 Series 40-Gigabit Ethernet QSFP I/O module (N77-F324FQ-25)	N2K-C2224TP-1GE N2K-C2248TP-1GE N2K-C2232PP-10GE N2K-C2232TM N2K-C2248TP-E N2K-C2232TM-E N2K-C2248PQ N2K-B22HP[2]	6.2(8)
	N2K-C2348UPQ N2K-C2348TQ N2K-B22IBM	7.2(0)D1(1)
	N2K-C2332TQ	8.1(1)
	N2k-C2348TQ-E N2K-B22DELL-P	8.2(1)
48-port Cisco Nexus 7700 F3 Series 1/10-Gigabit Ethernet SFP+ I/O module (N77-F348XP-23)	N2K-C2224TP-1GE N2K-C2248TP-1GE N2K-C2232PP-10GE N2K-C2232TM N2K-C2248TP-E N2K-C2232TM-E N2K-C2248PQ N2K-B22HP	6.2(6)
	N2K-C2348UPQ N2K-C2348TQ N2K-B22IBM	7.2(0)D1(1)
	N2K-C2332TQ	8.1(1)
	N2k-C2348TQ-E N2K-B22DELL-P	8.2(1)

Cisco Nexus 7000 Series Module	FEX Module	Minimum Software Release
48-Port 1/10 Gigabit Ethernet SFP+ I/O M3 Series module (N77-M348XP-23L) 24-Port 40 Gigabit Ethernet QSFP+ I/O M3 Series module (N77-M324FQ-25L)	N2K-C2232PP N2K-C2224TP N2K-C2248TP-E N2K-C2248PQ N2K-C2348UPQ N2K-C2348TQ N2K-C2332TQ	8.1(1)
	N2k-C2348TQ-E N2K-B22DELL-P	8.2(1)

1. FEX server-facing interfaces should be configured in autonegotiate mode. Do not force a specific data rate.

Note The Cisco Nexus 7000 Enhanced F2 Series 48-port 1/10 GBASE-T RJ-45 Module (N7K-F248XT-25E) does not support Cisco Nexus 2000 FEXs.

Note FEX modules does not support M3 series modules in Cisco NX-OS Release 7.3(0)DX(1), Cisco NX-OS Release 7.3(1)D1, and in Cisco NX-OS Release 8.0(1).

All of the Cisco Nexus 2000 Series FEXs are 1 RU high and require 19-inch racks for installation. For more information about the dimensions and weights of each FEX chassis, its power supplies, and fan modules, see Physical Specifications, page B-5.

The following sections describe the Cisco Nexus 2000 Series FEXs and their components:

- Power Supply and Fan Modules, page 1-9
- Ports and Connectors, page 1-11
- Chassis Features, page 1-11

Using a Fabric Extender with a Cisco Nexus 9000 Series Switch

This section describes the Cisco Nexus fabric extenders (FEXs) supported by the Cisco Nexus 9000 Series switches. For information about supported FEXs provided by other companies (B22 FEXs), see the documentation provided by those companies.

Beginning with Cisco NX-OS Release 6.1(2)I2(3) and Cisco ACI Release 1.1(1j), you can extend the Cisco Nexus 9332PQ, 9372PX, 9372PX-E, 9396PX, and 9500 switch architecture by connecting FEXs as remote I/O modules to the supporting switches. Depending on which FEX model that you connect to the switch, the FEX provides top-of-the-rack connectivity for up to 24, 32, or 48 hosts, and it becomes

an extension of the parent Cisco Nexus 9332PQ, 9372PX, 9372PX-E, 9396PX, or 9500 switch fabric, with the FEX and the switch becoming a virtual modular system. The FEX forwards all 100/1000 Ethernet or 1/10-Gigabit Ethernet traffic from the hosts to the switch over 10- or 40-Gigabit uplinks.

To see which FEXs are supported by the Cisco Nexus 9300 switches, see Table 1-3. To see which FEXs are supported by the Cisco Nexus 9500 switch I/O modules, see Table 1-4.

Table 1-3   FEXs Supported by Cisco Nexus 9300 Switches

FEX Model	Cisco Nexus 9332PQ		Cisco Nexus 9372PX and 9372PX-E		Cisco Nexus 9396PX	
	ACI Mode	NX-OS Mode	ACI Mode	NX-OS Mode	ACI Mode	NX-OS Mode
Cisco Nexus 2348UPQ	X	X	X	X	X	X
Cisco Nexus 2348TQ	X	X	X	X	X	X
Cisco Nexus 2248TP-E	—	—	X	X	X	X
Cisco Nexus 2248TP	—	—	X	X	X	X
Cisco Nexus 2248PQ	—	—	X	X	X	X
Cisco Nexus 2232TM-E	—	—	X	X	X	X
Cisco Nexus 2232TM	—	—	—	X	—	X
Cisco Nexus 2232PP	—	—	X	X	X	X
Cisco Nexus 2224TP	—	—	—	X	—	X
B22IBM	—	—	X	X	X	X
B22HP	—	—	—	X	—	X
B22F (Fujitsu)	—	—	—	X	—	X
B22DELL	—	—	X	X	X	X

Table 1-4   FEXs Supported by Cisco Nexus 9500 I/O Modules

FEX Model	X9736PQ ACI Mode	X9636PQ NX-OS Mode	X9564TX NX-OS Mode	X9564PX NX-OS Mode	X9536PQ NX-OS Mode	X9464TX NX-OS Mode	X9464PX NX-OS Mode	X9432PQ NX-OS Mode
Cisco Nexus 2348UPQ	X	X	X	X	X	X	X	X
Cisco Nexus 2348TQ	—	X	X	X	X	X	X	X
Cisco Nexus 2248TP-E	X	—	—	X	—	—	X	—
Cisco Nexus 2248TP	X	—	—	X	—	—	X	—
Cisco Nexus 2248PQ	X	—	—	X	—	—	X	—
Cisco Nexus 2232TM-E	X	—	—	X	—	—	X	—
Cisco Nexus 2232TM	—	—	—	X	—	—	X	—
Cisco Nexus 2232PP	X	—	—	X	—	—	X	—
Cisco Nexus 2224TP	—	—	—	X	—	—	X	—
B22IBM	—	—	—	X	—	—	X	—
B22HP	—	—	—	X	—	—	X	—

Table 1-4   FEXs Supported by Cisco Nexus 9500 I/O Modules (continued)

FEX Model	X9736PQ ACI Mode	X9636PQ NX-OS Mode	X9564TX NX-OS Mode	X9564PX NX-OS Mode	X9536PQ NX-OS Mode	X9464TX NX-OS Mode	X9464PX NX-OS Mode	X9432PQ NX-OS Mode
B22F (Fujitsu)	—	—	—	X	—	—	X	—
B22DELL	—	—	—	X	—	—	X	—

All of the Cisco Nexus 2000 Series FEXs are 1 RU high and require 19-inch racks for installation. For more information about the dimensions and weights of each FEX chassis, its power supplies, and fan modules, see Physical Specifications, page B-5.

The following sections describe the Cisco Nexus 2000 Series FEXs and their components:

- Power Supply and Fan Modules, page 1-9
- Ports and Connectors, page 1-11
- Chassis Features, page 1-11

Power Supply and Fan Modules

Each FEX chassis supports one or two power modules (one for operations and one for redundancy) and 1, 3, or 4 fan modules (depending on the FEX model). If the chassis has only one power supply, make sure that there is a blank module (N2200-P-BLNK) installed in the unused power supply slot to preserve the designed airflow.

Each FEX chassis supports power supply and fan modules that have either port-side intake or port-side exhaust airflow.

⚠️
Caution   All of the power supply and fan modules in the same chassis must have the same airflow direction and the cold air intake for the chassis must be located in a cold aisle or else the switch can overheat and shut down.

Port-side intake modules have red coloring and port-side exhaust modules have blue coloring. Power supply coloring is displayed on the module release latches, and fan module coloring is displayed as either a stripe on the front of the module or as the color of the module handle.

✎
Note   Some older power supply and fan modules use black stripes for port-side intake airflow and no stripe for port-side exhaust airflow.

You can hot swap a power supply module as long as there is another power supply module functioning in the chassis. You can hot swap a fan module in a chassis with multiple fan modules as long as the other fan modules are installed and functioning. You can hot swap a fan module in a chassis with a single fan module as long as you replace it within 60 seconds.

For the power supplies supported by each FEX chassis, see Table 1-5. For the fan modules supported by each FEX chassis, see Table 1-6.

Table 1-5   *Power Supplies Supported by Cisco Nexus FEX Chassis*

FEX Chassis	Power Supplies		
	N2200-PAC-400W N2200-PAC-400W-B	N2200-PDC-400W N2200-PDC-350W-B	NXA-PHV-500W NXA-PHV-500W-B
Cisco Nexus 2348UPQ	X	X	X
Cisco Nexus 2348TQ	X	X	X
Cisco Nexus 2348TQ-E	X	X	—
Cisco Nexus 2332TQ	X	X	X
Cisco Nexus 2248TP-E	X	X	X
Cisco Nexus 2248TP	X	X	X
Cisco Nexus 2248PQ	X	X	—
Cisco Nexus 2232TM-E	X	X[1]	X
Cisco Nexus 2232TM	X	X[1]	X
Cisco Nexus 2232PP	X	X	X
Cisco Nexus 2224TP	X	X	—

1. The 2232TM-E and 2232TM do not support the N2200-PDC-350W-B.

Table 1-6   *Fan Modules Supported by Cisco Nexus FEX Chassis*

Cisco Nexus FEX Chassis	Quantity	Fan Modules						
		N2K-C2148-FAN	N2K-C2248-FAN	N2K-C2248-FAN-B	N2K-C2232-FAN	N2K-C2232-FAN-B	NXA-FAN-30CFM-F	NXA-FAN-30CFM-B
		Port-Side Exhaust	Port-Side Exhaust (Blue)	Port-Side Intake (Red)	Port-Side Exhaust (Blue)	Port-Side Intake (Red)	Port-Side Exhaust (Blue)	Port-Side Intake (Red)
2348UPQ	3		—	—	—	—	X	X
2348TQ	3		—	—	—	—	X	X
2348TQ-E	3		—	—	—	—	X	X
2332TQ	3		—	—	—	—	X	X
2248TP-E	1		X	X	—	—	—	—
2248TP	1		X	X	—	—	—	—
2248PQ	1	—	—	—	—	—	X	X
2232TM-E	1		—	—	X	X	—	—
2232TM	1		—	—	X	X	—	—
2232PP	1		—	—	X	X	—	—
2224TP	1		X	X	—	—	—	—
2148T	1	X	—	—	—	—	—	—

Ports and Connectors

Host-facing ports are on the left side of the chassis and parent-switch facing fabric ports are on the right side of the chassis. Each set of ports are numbered from top to bottom then left to right.

For more information on the transceivers that you can use with the ports, see the *Cisco Transceiver Modules Compatibility Information* at:
http://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-t-tables-list.html

Chassis Features

The following sections describe the external hardware features used when installing, connecting, or doing maintenance on the Cisco Nexus 2300 and 2000 FEXs:

Cisco Nexus 2348UPQ FEX Features

The Cisco Nexus 2348UPQ (N2K-C2348UPQ) FEX has the following interfaces:

- 48 1/10-Gigabit host-facing unified-capable ports with the following connectivity:
  - 2-/4-/8-/16-Gigabit fiber channel on up to 24 ports (not supported on Cisco Nexus 9000 Series switches)
  - 1/10-Gigabit Ethernet
  - FCoE (not supported on Cisco Nexus 9000 Series switches)
- 6 40-Gigabit parent-switch facing fabric ports (for QSFP+ transceivers and 40-Gigabit QSFP+ to four 10-Gigabit SFP+ breakout cables) that support BiDi optics. Two dedicated uplink ports are color coded yellow and four flexible interface ports are color coded white.
- 1 HDMI management/console port

> **Note** Flex Ports (SIF) are not supported on Cisco Nexus 2348UPQ FEX.

The features on the fan-module side of this FEX chassis are identified in Figure 1-1, and the features on the port side of this chassis are identified in Figure 1-2.

Figure 1-1   *Features on the Fan-Module Side of the Cisco Nexus 2348UPQ FEX Chassis*
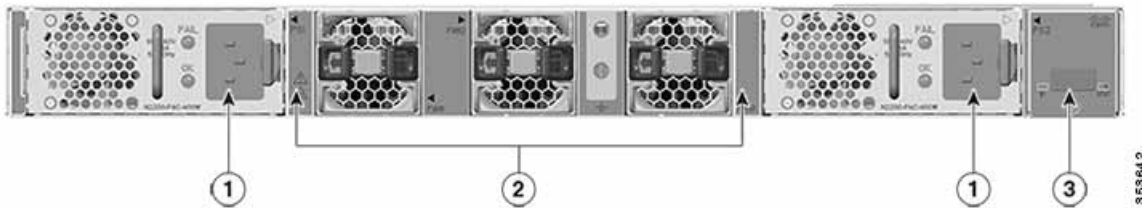
1	Power supply modules (one or two, hot swappable) (AC power supplies shown)	3	Management/Console HDMI port
2	Fan modules (three, hot swappable)		

Figure 1-2   *Features on the Port Side of the Cisco Nexus 2348UPQ FEX Chassis*
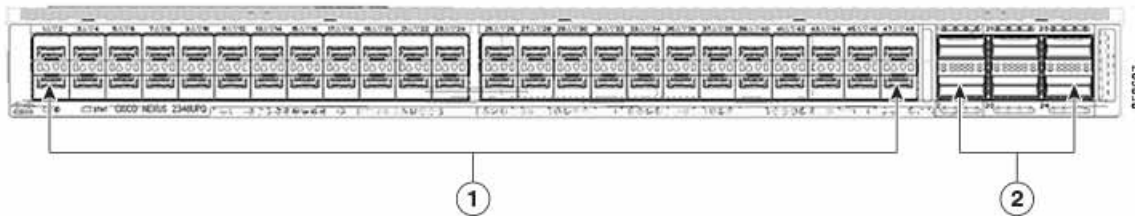
1	Fixed 1- and 10-Gigabit Unified-capable ports (48) for SFP or SFP+ transceivers	2	40-Gigabit ports (six) for QSFP+ transceivers and 40-Gigabit QSFP+ to four 10-Gigabit SFP+ breakout cables

Cisco Nexus 2348TQ and 2348TQ-E FEX Chassis Features

The Cisco Nexus 2348TQ (N2K-C2348TQ) and 2348TQ-E (N2K-C2348TQ-E) FEXs have the following interfaces:

- 48 10GBASE-T host-facing ports that support 100-Megabit and 1/10-Gigabit speeds, and FCoE (FCoE not supported on Cisco Nexus 9000 Series switches)
- 6 40-Gigabit parent-switch facing fabric ports (for QSFP+ transceivers and 40-Gigabit QSFP+ to four 10-Gigabit SFP+ breakout cables) that support BiDi optics. Two dedicated uplink ports are color coded yellow and four flexible interface ports are color coded white.
- 1 HDMI management/console port

The features on the fan-module side of this FEX chassis are identified in Figure 1-3, and the features on the port side of this chassis are identified in Figure 1-4.

Figure 1-3   Features on the Fan-Module Side of the Cisco Nexus 2348TQ and 2348TQ-E FEX Chassis
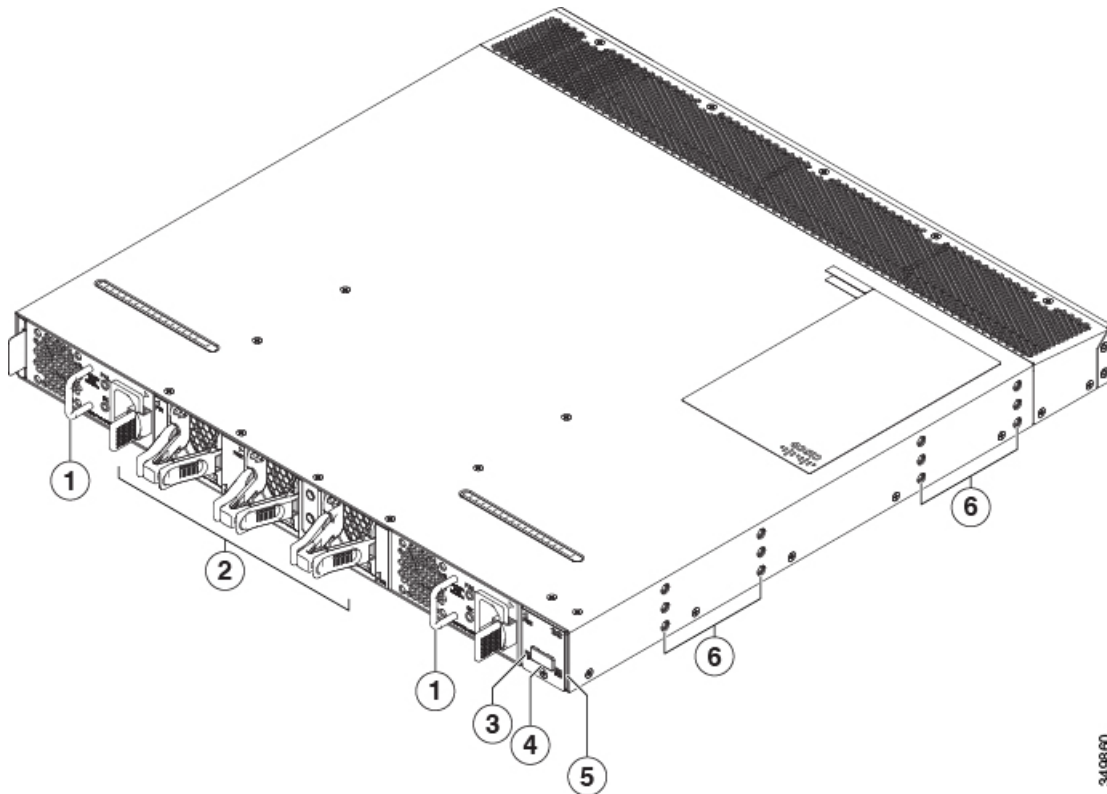
1	Power supply modules (one or two, hot swappable) (AC power supply shown)	4	Management/Console HDMI port
2	Fan modules (three, hot swappable)	5	Status LED
3	ID LED	6	Six screw holes for attaching a mounting bracket

Figure 1-4   *Features on the Port Side of the Cisco Nexus 2348TQ and 2348TQ-E FEX Chassis*
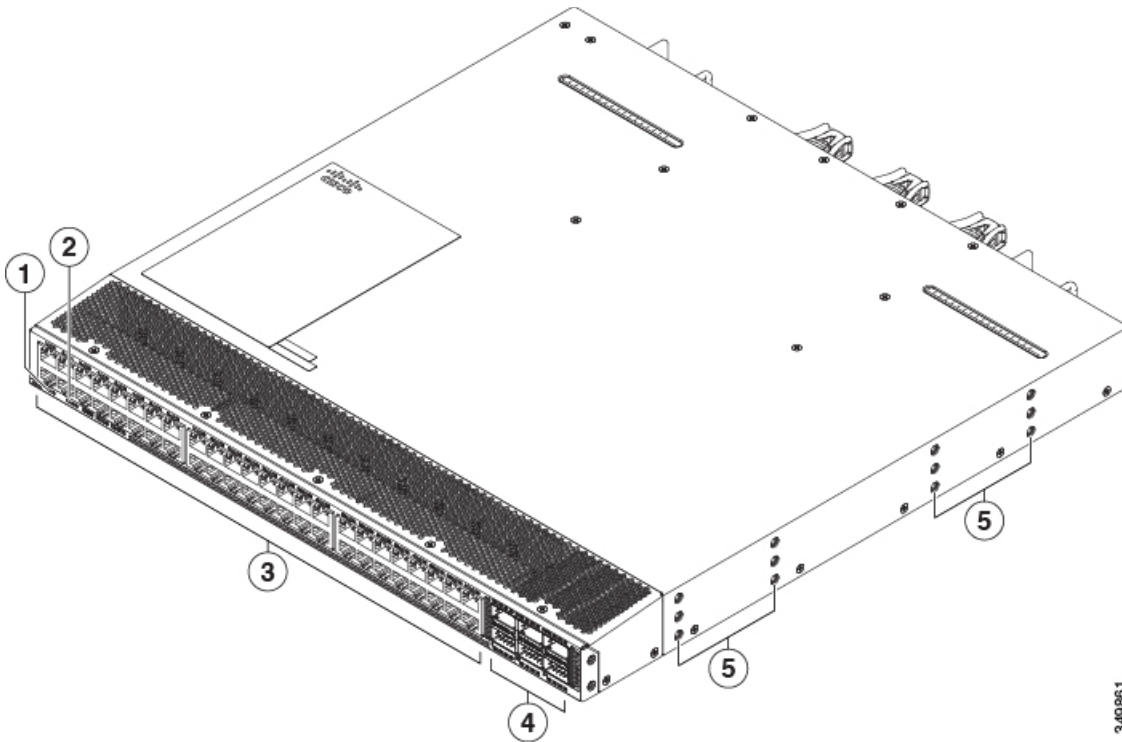
1	ID LED	4	40-Gigabit ports (six) for QSFP+ transceivers and 40-Gigabit QSFP+ to four 10-Gigabit SFP+ breakout cables
2	Status LED	5	Six screw holes for mounting brackets
3	Fixed 100M/1G/10GBASE-T Ports (48)		

Cisco Nexus 2332TQ FEX Chassis Features

The Cisco Nexus 2332TQ (N2K-2332TQ) FEX supports FCoE and has the following interfaces:

- 32 10GBASE-T host-facing ports that support 100-Megabit and 1/10-Gigabit speeds
- 4 40-Gigabit parent-switch facing fabric ports that support BiDi optics.
- 1 HDMI management/console port

The features on the fan-module side of this FEX chassis are identified in Figure 1-5, and the features on the port side of this chassis are identified in Figure 1-6.

Figure 1-5   *Features on the Fan-Module Side of the Cisco Nexus 2332TQ FEX Chassis*

1	Power supply modules (one or two, hot swappable) (AC power supplies shown)	4	Management/Console HDMI port
2	Fan modules (three, hot swappable)	5	Status LED
3	ID LED		

Figure 1-6   Features on the Port Side of the Cisco Nexus 2332TQ FEX Chassis
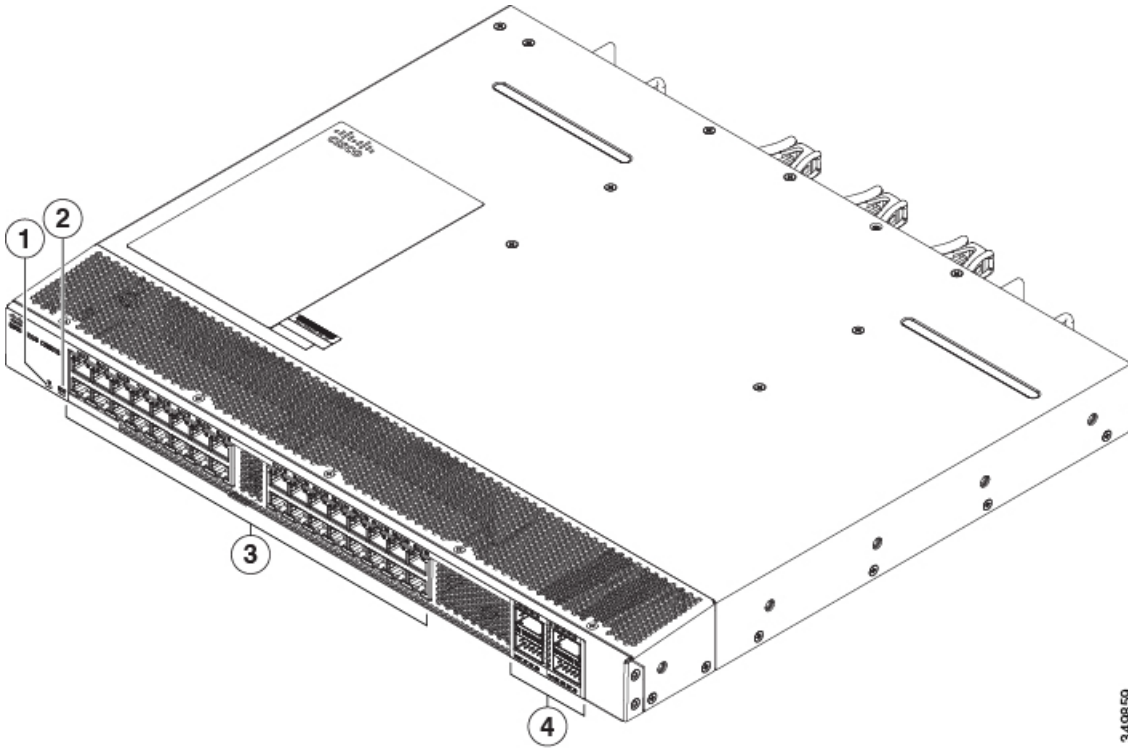
| 1 | ID LED | 3 | Fixed 100M/1G/10GBASE-T Ports (32) |
| 2 | Status LED | 4 | 40-Gigabit ports (4) for QSFP+ transceivers |

Cisco Nexus 2248TP and 2248TP-E FEX Chassis Features

The Cisco Nexus 2248TP (N2K-C2248TP) and 2248TP-E (N2K-C2248TP-E) FEX have the following interfaces:

- 48 100/1000 BASE-T RJ-45 host-facing ports
- 4 10-Gigabit SFP+ parent-switch facing fabric ports
- 1 management or console HDMI port

The features on the fan-module side of this FEX chassis are identified in Figure 1-7, and the features on the port side of this chassis are identified in Figure 1-8.

Figure 1-7   *Features on the Fan-Module Side of the Cisco Nexus 2248TP and 2248TP-E FEX Chassis*
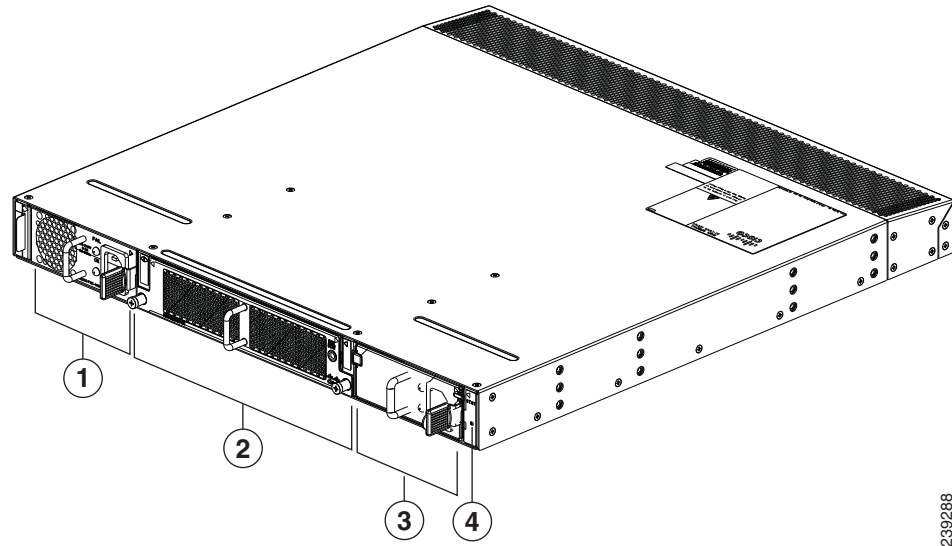
1	Power supply module (one or two, hot swappable) (AC power supplies shown)	3	Power supply (blank shown for installations with only one power supply)
2	Fan tray	4	Status (top) and ID (bottom) LEDs

Figure 1-8   *Features on the Port Side of the Cisco Nexus 2248TP and 2248TP-E FEX Chassis*

1	Status (top) and ID (bottom) LEDs	3	100/1000BASE-T host-facing ports (48) for RJ-45 connectors
2	Management/console HDMI port	4	10-Gigabit parent-switch facing ports (4) for SFP+ transceivers

Note On Cisco Nexus 7000 Series switches, for a fully dedicated 10-Gbps bandwidth through a M1 Series 32-port 10-Gigabit Ethernet I/O module (either the N7K-M132XP-12 or N7K-M132XP-12L), connect each FEX to one port in a set of four shared ports on the module (you connect each set of shared ports to one FEX). If you are using the M2 Series 24-port, 10-Gigabit Ethernet I/O module (N7K-M224XP-23L), you can connect the FEX to any of its ports for a fully dedicated bandwidth. If you are using the F2 Series 48-port, 10-Gigabit Ethernet I/O module (N7K-F248XP-25), use the connectivity rule order (connect the same port numbers for each port group (for example, if you connect ports 1 and 2 of a port-group, then connect the same ports of another port group).

Cisco Nexus 2248PQ FEX Chassis Features

The Cisco Nexus 2248PQ (N2K-C2248PQ) supports FCoE and Data Center Bridging technologies, and it has the following interfaces:

- 48 1- and 10-Gigabit Ethernet (SFP+) host-facing ports
- 4 40-Gigabit (QSFP+) parent-switch facing fabric ports (each port can be split to four 10-Gigabit ports)
- 1 management or console HDMI port

The features on the fan-module side of this FEX chassis are identified in Figure 1-9, and the features on the port side of this chassis are identified in Figure 1-10.

Figure 1-9   Features on the Fan-Module Side of the Cisco Nexus 2248PQ FEX Chassis
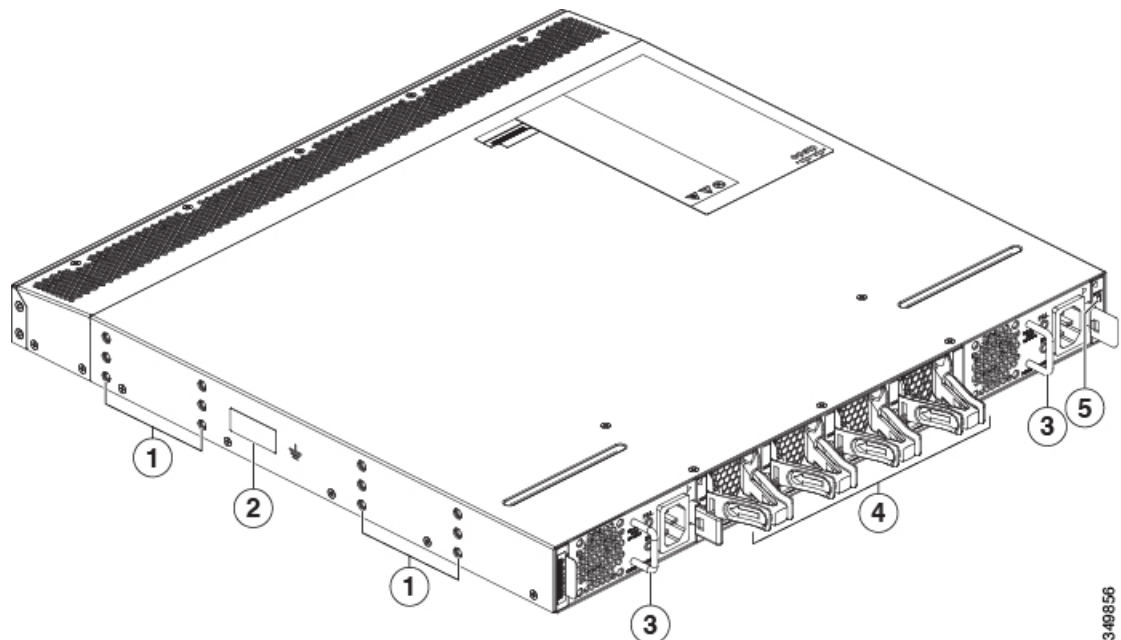
1	Screw holes (6) for attaching a mounting bracket.	4	Fan modules (4)
2	Grounding pad	5	ID and Status LEDs
3	AC or DC power supply (1 or 2) (AC power supply shown)		

Figure 1-10   Features on the Port Side of the Cisco Nexus 2248PQ FEX Chassis
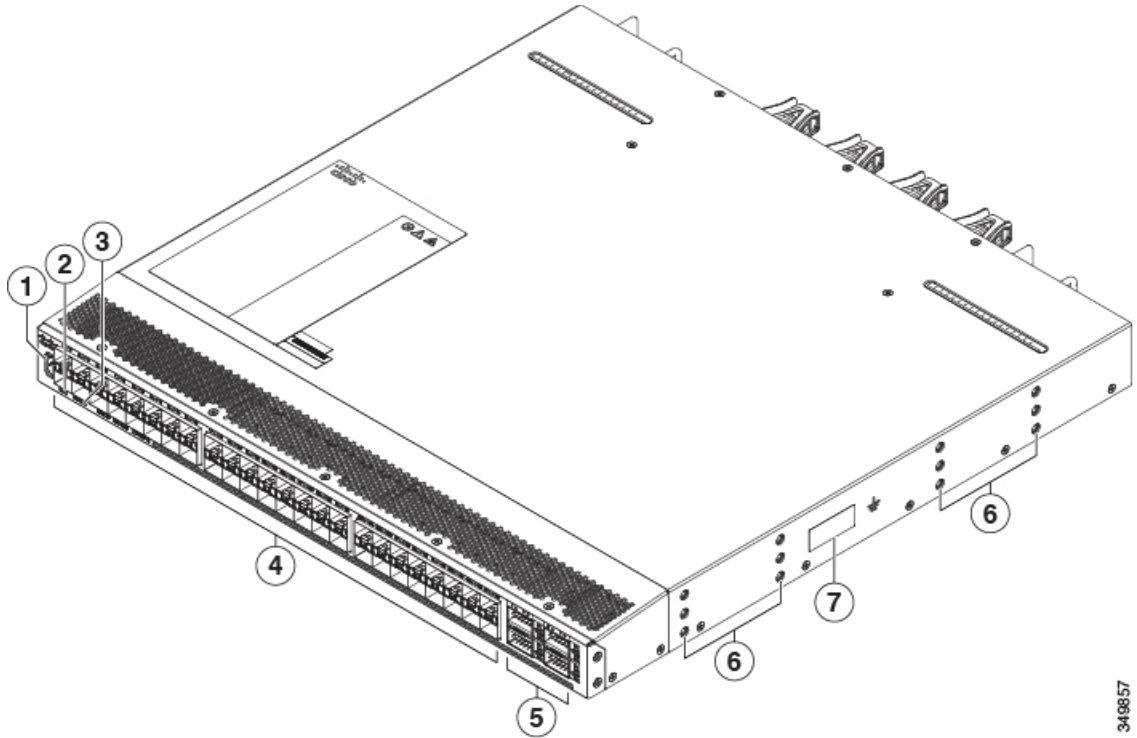
1	Management/console HDMI port	5	40-Gigabit parent-switch facing ports (4) for QSFP+ transceivers
2	ID LED	6	6 screw holes for attaching a mounting bracket
3	Status LED	7	Grounding pad
4	Fixed 1- and 10-Gigabit host-facing ports (48) for SFP or SFP+ transceivers		

Note On Cisco Nexus 5000 and 6000 Series switches, this FEX is supported with the Cisco Nexus 5500 Series and Cisco Nexus 6004 switches as parent switches. The supported software is Cisco Nexus OS Release 6.0(2)N1(1) or later.

Cisco Nexus 2232TM and 2232TM-E FEX Chassis Features

The Cisco Nexus 2232TM (N2K-C2232TM) and 2232TM-E (N2K-C2232TM-E) FEXs have the following interfaces:

- 32 1- and 10-GBASE-T host-facing ports
- 8 10-Gigabit Ethernet (SFP+) parent-switch facing fabric ports on an uplink module
- 1 HDMI port for console or management usage

The features on the fan-module side of this FEX chassis are identified in Figure 1-11, and the features on the port side of this chassis are identified in Figure 1-12.

Figure 1-11   Features on the Fan Module Side of the Cisco Nexus 2232TM and 2232TM-E Chassis
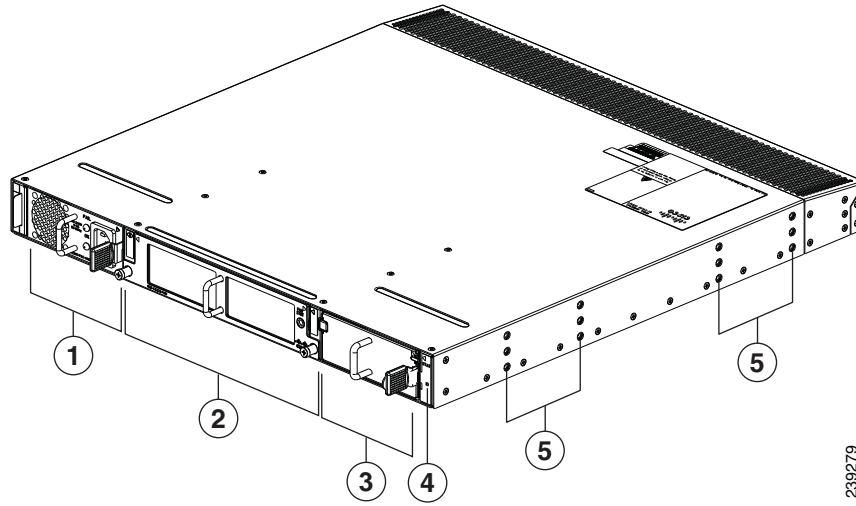
1	Power supply	4	Status (top) and ID (bottom) LEDs
2	Fan tray	5	6 screw holes for attaching a mounting bracket
3	Power supply (blank shown for installations with only one power supply)		

Figure 1-12   Features on the Port Side of the Cisco Nexus 2232TM and 2232TM-E Chassis
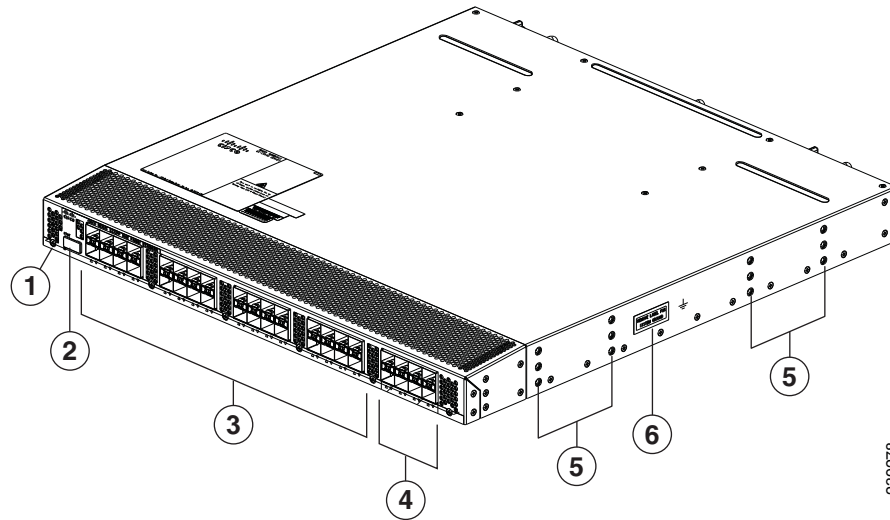
1	Status (top) and ID (bottom) LEDs	4	10-Gigabit Ethernet parent-switch facing fabric ports for SFP+ transceivers (8)
2	Management/console HDMI port	5	6 screw holes for attaching a mounting bracket
3	1- /10-GBASE-T host-facing ports (32) for RJ-45 connectors	6	Grounding pad

Note On the Cisco Nexus 7000 Series switches, for a fully dedicated 10-Gbps bandwidth through a M1 Series 32-port 10-Gigabit Ethernet I/O module (either the N7K-M132XP-12 or N7K-M132XP-12L), connect each FEX to one port in a set of four shared ports on the module (you connect each set of shared ports to one FEX). If you are using the M2 Series 24-port, 10-Gigabit Ethernet I/O module (N7K-M224XP-23L), you can connect the FEX to any of its ports for a fully dedicated bandwidth. If you are using the F2 Series 48-port, 10-Gigabit Ethernet I/O module (N7K-F248XP-25), use the connectivity rule order (connect the same port numbers for each port group, for example, if you connect ports 1 and 2 of a port-group, then connect the same ports of another port group).

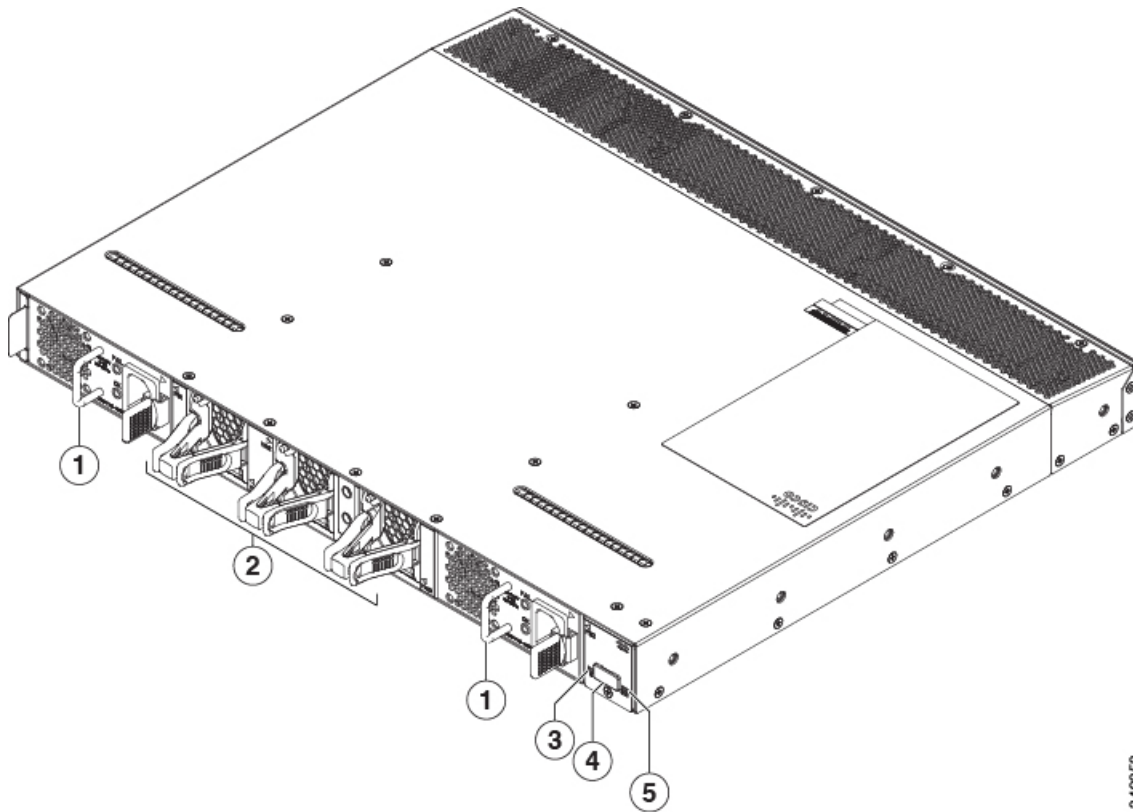# Cisco Nexus 2232PP FEX Chassis Features

The Cisco Nexus 2232PP (N2K-C2232PP) supports FCoE, and it has the following interfaces:

- 32 1- and 10-Gigabit Ethernet host-facing ports for SFP or SFP+ transceivers
- 8 10-Gigabit Ethernet parent-switch facing fabric ports for SFP+ transceivers
- 1 HDMI port for a console or management connection

The features on the fan-module side of this FEX chassis are identified in Figure 1-13, and the features on the port side of this chassis are identified in Figure 1-14.

Figure 1-13   Features on the Fan Module Side of the Cisco Nexus 2232TM and 2232TM-E Chassis
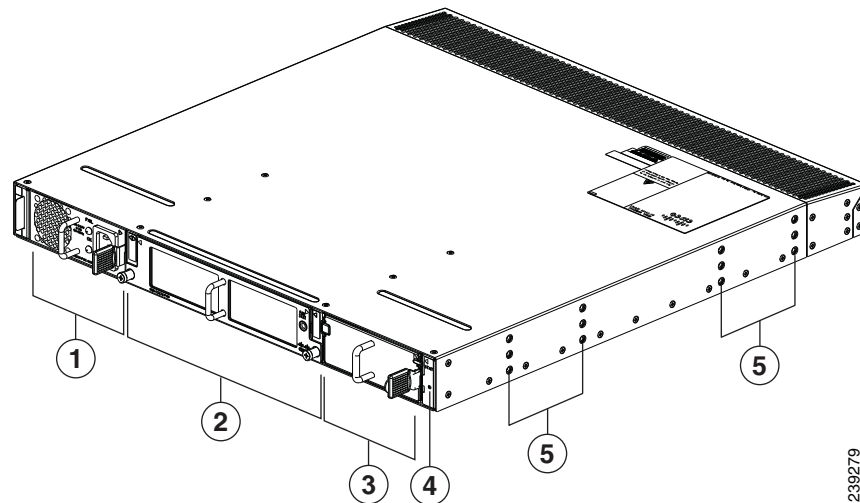
1	Power supply	4	Status (top) and ID (bottom) LEDs
2	Fan tray	5	6 screw holes for attaching a mounting bracket
3	Power supply (blank shown for installations with only one power supply)		

Figure 1-14   Features on the Port Side of the Cisco Nexus 2232TM and 2232TM-E Chassis

1	Status (top) and ID (bottom) LEDs	4	10-Gigabit Ethernet parent-switch facing fabric ports for SFP+ transceivers (8)
2	Management/console HDMI port	5	6 screw holes for attaching a mounting bracket
3	1-/10-GBASE-T host-facing ports (48) for SFP or SFP+ transceivers	6	Grounding pad

Note On the Cisco Nexus 7000 Series switches, for a fully dedicated 10-Gbps bandwidth through a M1 Series 32-port 10-Gigabit Ethernet I/O module (either the N7K-M132XP-12 or N7K-M132XP-12L), connect each FEX to one port in a set of four shared ports on the module (you connect each set of shared ports to one FEX). If you are using the M2 Series 24-port, 10-Gigabit Ethernet I/O module (N7K-M224XP-23L), you can connect the FEX to any of its ports for a fully dedicated bandwidth. If you are using the F2 Series 48-port, 10-Gigabit Ethernet I/O module (N7K-F248XP-25), use the connectivity rule order (connect the same port numbers for each port group (for example, if you connect ports 1 and 2 of a port-group, then connect the same ports of another port group).

Cisco Nexus 2224TP FEX Chassis Features

The Cisco Nexus 2224TP (N2K-C2224TP) has the following interfaces:

- 24 100/1000BASE-T host-facing ports for RJ-45 connectors
- 2 10-Gigabit Ethernet parent-switch facing fabric ports for SFP+ transceivers
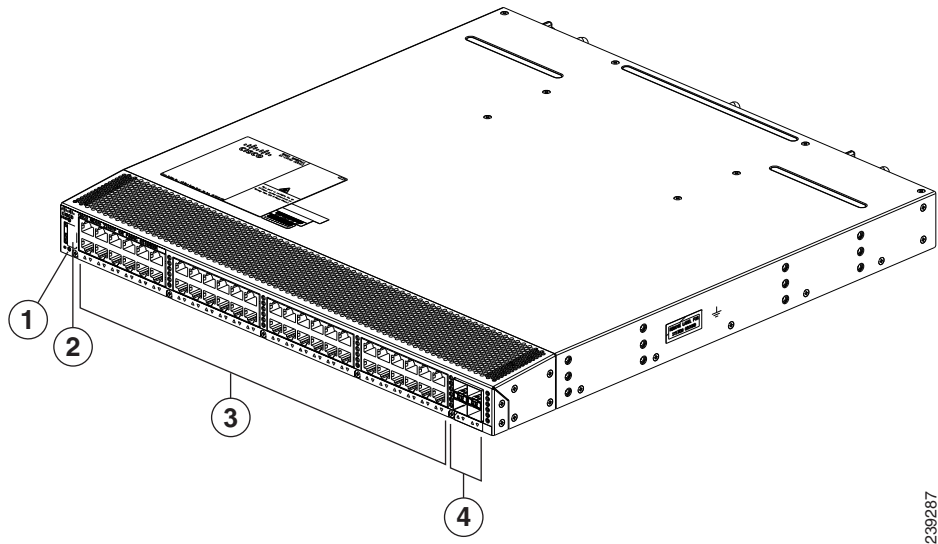- 1 HDMI port for a console or management connection

The features on the fan-module side of this FEX chassis are identified in Figure 1-15, and the features on the port side of this chassis are identified in Figure 1-16.

Figure 1-15   Fan side of the Cisco Nexus 2224TP Chassis
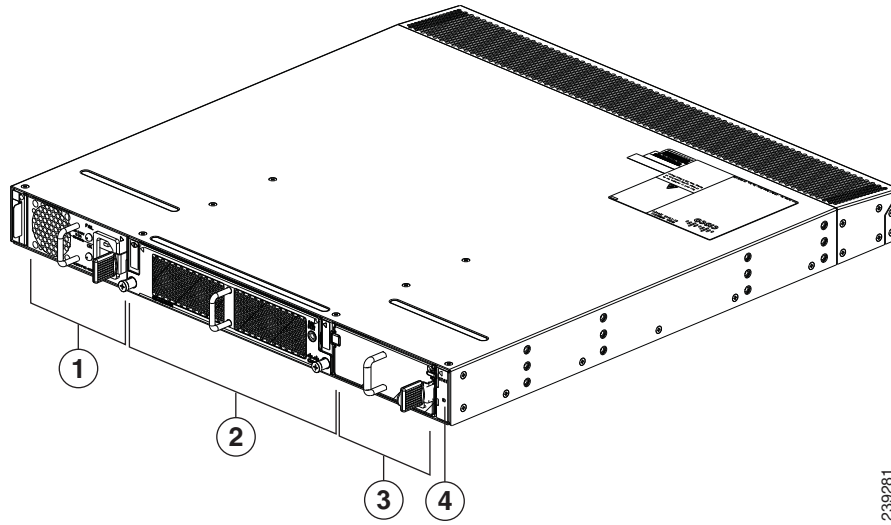
239281

1	Power supply	3	Power supply (blank shown for installations with only one power supply)
2	Fan tray (1)	4	Status (top) and ID (bottom) LEDs

Figure 1-16   Rear View of the Nexus 2224TP Chassis
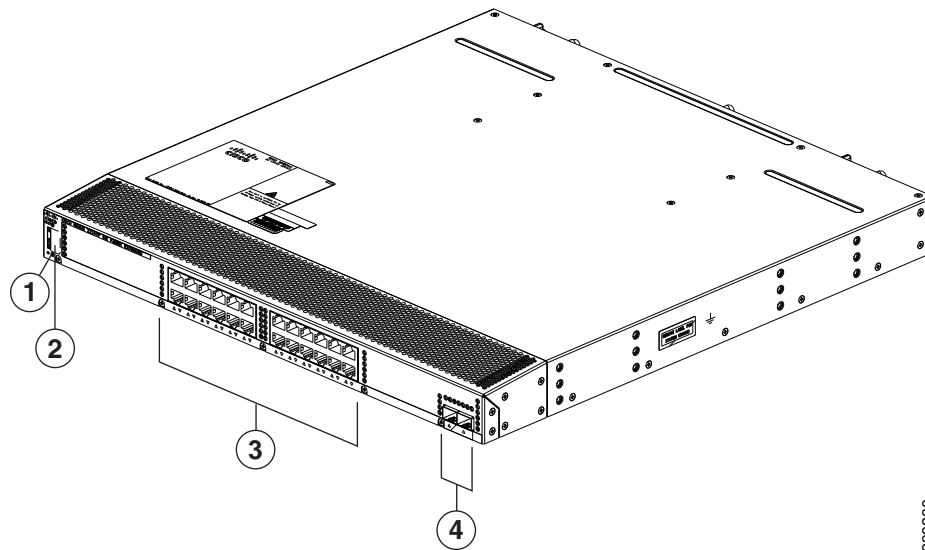
239280

1	Status (top) and ID (bottom) LEDs	3	100/1000BASE-T host-facing ports (24) for RJ-45 connectors
2	HDMI port for a console or management connection	4	10-Gigabit Ethernet parent-switch facing ports (2) for SFP+ transceivers

Note On the Cisco Nexus 7000 Series switches, for a fully dedicated 10-Gbps bandwidth through a M1 Series 32-port 10-Gigabit Ethernet I/O module (either the N7K-M132XP-12 or N7K-M132XP-12L), connect each FEX to one port in a set of four shared ports on the module (you connect each set of shared ports to one FEX). If you are using the M2 Series 24-port, 10-Gigabit Ethernet I/O module (N7K-M224XP-23L), you can connect the FEX to any of its ports for a fully dedicated bandwidth. If you are using the F2 Series 48-port, 10-Gigabit Ethernet I/O module (N7K-F248XP-25), use the connectivity rule order (connect the same port numbers for each port group (for example, if you connect ports 1 and 2 of a port-group, then connect the same ports of another port group).

Cisco Nexus 2148T FEX Chassis Features

The Cisco Nexus 2148T (N2K-C2148T) has the following interfaces:

- 48 1-Gigabit Ethernet host-facing ports
- 4 10-Gigabit Ethernet parent-switch facing fabric ports for SFP+ transceivers
- 1 HDMI port for a console or management connection

The features on the fan-module side of this FEX chassis are identified in Figure 1-17, and the features on the port side of this chassis are identified in Figure 1-18.

Figure 1-17   Fan side of the Cisco Nexus 2148T Chassis
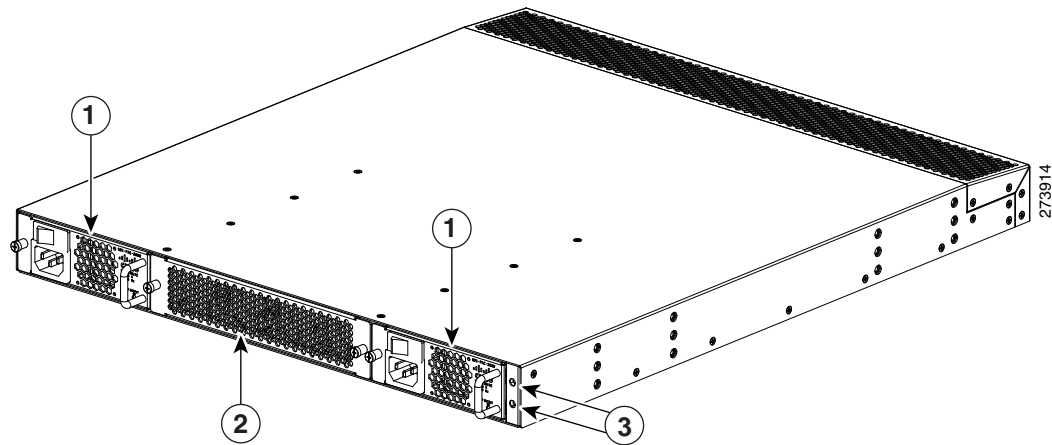
1	Power supply (two)	3	Status (top) and ID (bottom) LEDs
2	Fan tray (1)		

Figure 1-18   *Rear View of the Cisco Nexus 2148T Chassis*
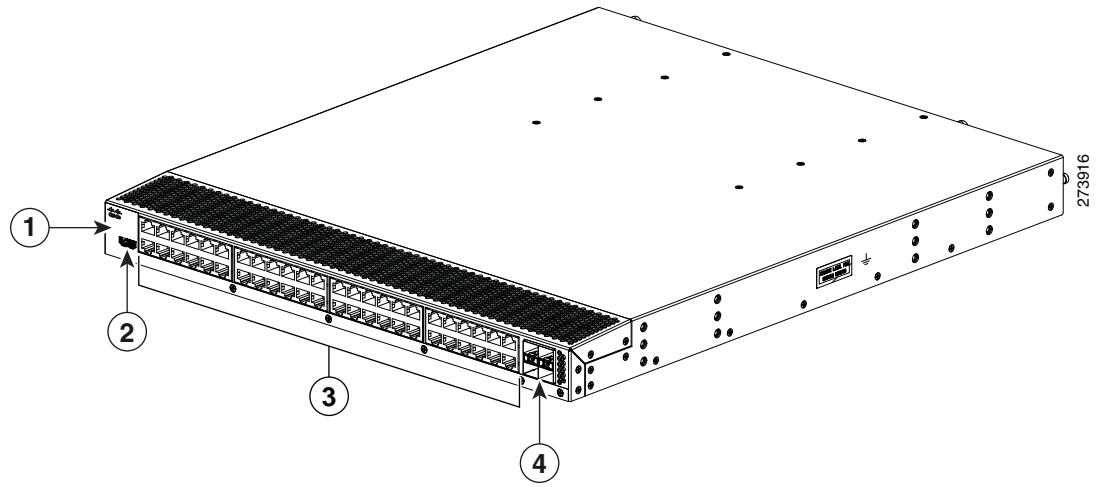
1	System status (top) and Beacon (bottom) LED	3	1-Gigabit Ethernet host-facing ports (48)
2	HDMI port	4	10-Gigabit Ethernet parent-switch facing ports (4) for SFP+ transceivers

C H A P T E R **2**

Installing a Cisco Nexus Fabric Extender

This chapter describes how to install the Cisco Nexus Fabric Extenders (FEXs) and includes the following sections:

Note Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information* for important safety information.

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.
Statement 1071

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

Preparing for Installation

This section includes the following topics:

Installation Options

The Cisco Nexus FEX can be installed using the following methods:

- In an open EIA rack, using the following items:
  - The rack-mount kit shipped with the device
  - The EIA Shelf Bracket Kit (an optional kit, purchased separately)
- In a perforated or solid-walled EIA cabinet, using one of the following:
  - The rack-mount kit shipped with the device
  - The EIA Shelf Bracket Kit (an optional kit, purchased separately)

For instructions on installing the device using the rack-mount kit shipped with the device, see the "Installing the Cisco Nexus Fabric Extender Chassis in a Cabinet or Rack" section on page 2-6.

Note   The optional EIA Shelf Bracket Kit is not provided with the device. To order the kit, contact your device provider.

Airflow Considerations

Airflow through the Cisco Nexus FEX is from the port side exhaust to the back or the back to the port side exhaust. To ensure proper airflow, follow these guidelines:

- Position the chassis so that its air intake side (port side exhaust side for port side exhaust airflow or back side for port side intake airflow) is in a cold aisle. Otherwise, an overtemperature condition can occur and the system can shut down.
- Avoid having the air intake where other systems exhaust air.
- Due to the shallow depth of the Cisco Nexus FEX, it is also possible for air to recirculate across the top and bottom of the chassis in a partially populated rack.
- Make sure that the fan tray and power supply modules all use the same direction of airflow. All of the modules should have no black stripe (port side exhaust airflow) or all of the modules should have a black stripe (port side intake airflow).

Note   If the switch is powered up with modules that have different airflow directions, you need to shut down the switch before replacing the modules with the wrong airflow direction.

- Maintain ambient airflow throughout the data center to ensure normal operation.

- Consider the heat dissipation of all equipment when determining air-conditioning requirements. When evaluating airflow requirements, take into consideration that hot air generated by equipment at the bottom of the rack can be drawn in the intake ports of the equipment above.

- If you mount a chimney type of rack, avoid mounting it in a way that is contrary to the direction of flow in the chimney, where the chimney overpowers the system fans.

Chassis Weight

When lifting the system, follow these guidelines:

- Disconnect all power and external cables before lifting the system.

- Have two people lift the system. The Cisco Nexus FEXs can weigh up to 18.5 pounds (8.4 kg).

- Ensure that your footing is solid and the weight of the system is evenly distributed between your feet.

- Lift the system slowly, keeping your back straight. Lift with your legs, not with your back. Bend at the knees, not at the waist.

Installation Guidelines

When installing the Cisco Nexus FEX, follow these guidelines:

- Plan your site configuration and prepare the site before installing the chassis. Appendix G, "Site Preparation and Maintenance Records," lists the recommended site planning tasks.

- Record the information listed in Appendix G, "Site Preparation and Maintenance Records," as you install and configure the device.

- Ensure that there is adequate space around the device to allow for servicing the device and for adequate airflow (Appendix B, "Technical Specifications," lists airflow requirements).

- Ensure that the air-conditioning meets the heat dissipation requirements listed in Appendix B, "Technical Specifications,"

- Ensure that the chassis air intake will be located in a cold aisle and away from the exhaust of other systems.

- Ensure that all of the fan tray and power supply modules have the same direction of airflow as follows (the switch supports only one airflow direction for all modules):

  - Port-side intake airflow modules have black stripes.

  - Port-side exhaust airflow modules have no colored stripes.

Note   If the switch is powered up with modules that have different airflow directions, you need to shut down the switch before replacing the modules with the wrong airflow direction.

- Ensure that the cabinet or rack meets the requirements listed in Appendix A, "Cabinet and Rack Installation."

> ✎
> **Note**   Jumper power cords are available for use in a cabinet. See the "Jumper Power Cord" section on page C-9.

- Ensure that the chassis is adequately grounded. If the device is not mounted in a grounded rack, we recommend connecting both the system ground on the chassis and the power supply ground to an earth ground.

- Ensure that the site power meets the power requirements listed in Appendix B, "Technical Specifications," If available, you can use an uninterrupted power supply (UPS) to protect against power failures.

> ⚠
> **Caution**   Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems such as the Cisco Nexus FEX, which can have substantial current draw fluctuations because of fluctuating data traffic patterns.

- Ensure that circuits are sized according to local and national codes. For North America, the power supply requires a 15-A or 20-A circuit.

> ⚠
> **Caution**   To prevent loss of input power, ensure the total maximum loads on the circuits supplying power to the device are within the current ratings for the wiring and breakers.

- Use the following screw torques when installing the device:
  - Captive screws: 4 in-lb
  - M3 screws: 4 in-lb
  - M4 screws: 12 in-lb
  - 10-32 screws: 20 in-lb
  - 12-24 screws: 30 in-lb

Required Tools and Equipment

Before beginning the installation, ensure that the following items are ready:

- Number 1 and number 2 Phillips screwdrivers with torque capability
- 3/16-inches flat-blade screwdriver
- Tape measure and level
- ESD wrist strap or other grounding device
- Antistatic mat or antistatic foam

The following additional items (not found in the accessory kit) are required to ground the chassis:

- Grounding cable (6 AWG recommended), sized according to local and national installation requirements; the required length depends on the proximity of the Cisco Nexus FEX to proper grounding facilities
- Crimping tool large enough to accommodate girth of lug

- Wire-stripping tool

Unpacking and Inspecting the Cisco Nexus Fabric Extender

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Caution   When handling device components, wear an ESD wrist strap and handle modules by the carrier edges only. An ESD socket is provided on the chassis. For the ESD socket to be effective, the chassis must be grounded through the power cable, the chassis ground, or the metal-to-metal contact with a grounded rack.

Tip   Keep the shipping container in case the chassis requires shipping in the future.

Note   The device is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, contact your customer service representative immediately.

To inspect the shipment, follow these steps:

Step 1   Compare the shipment to the equipment list provided by your customer service representative and verify that you have received all items, including the following:

- Print documentation
- Grounding lug kit
- Rack-mount kit
- ESD wrist strap
- Cables with connectors
- Any optional items ordered

Step 2   Check for damage and report any discrepancies or damage to your customer service representative. Have the following information ready:

- Invoice number of shipper (see packing slip)
- Model and serial number of the damaged unit
- Description of damage
- Effect of damage on the installation

Step 3   Make sure that the fan tray and power supplies all use the same direction of airflow.

- Port-side exhaust airflow modules do not have a black stripe across the front of the module.
- Port-side intake airflow modules have a black stripe across the front of the module.

Installing the Cisco Nexus Fabric Extender Chassis in a Cabinet or Rack

This section describes how to use the rack-mount kit provided with the device to install the Cisco Nexus Fabric Extender into a cabinet or rack that meets the requirements described in Appendix A, "Cabinet and Rack Installation."

⚠

Caution   If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

Table 2-1 lists the items contained in the rack-mount kit provided with the device.

Table 2-1   Cisco Nexus 2000 Series FEX Rack-Mount Kit

Quantity	Part Description
2	Rack-mount brackets
12	M4x0.7 x 8-mm Phillips countersunk screws
2	Rack-mount guides
10	10-32 rack nuts
10	10-32 x 3/4-inch Phillips pan head screws
2	Slider rails

Table 2-1 lists the items contained in the rack-mount kit provided with the device.

Table 2-2   Cisco Nexus 2300 Series FEX Rack-Mount Kit

Quantity	Part Description
2	Rack-mount brackets
2	M4 8-mm Phillips pan head screws
2	Rack-mount guides
10	M4 x 0.7 x 7 mm rack nuts
10	10-32 x 3/4-inch Phillips pan head screws
2	Slider rails

To install the device in a cabinet or rack using the rack-mount kit provided with the device, follow these steps:

Step 1 Install the front rack-mount brackets as follows:

  a. Position a front rack-mount bracket against the chassis and align the screw holes. Attach the front rack-mount bracket to the chassis with six of the M4 screws.

  b. Repeat with the other front rack-mount bracket on the other side of the device.

Step 2 Install the rack-mount guides on the device as follows:

  a. Position one of the rack-mount brackets against the side of the device and align the screw holes. Attach the bracket to the device with two of the flat-head M4 screws.

  b. Repeat with the other rack-mount bracket on the other side of the device.

Step 3 Attach the slider rails to the rack. Use two 12-24 screws or two 10-32 screws, depending on the rack rail thread type. For racks with square holes, insert the 12-24 cage nuts in position behind the mounting holes in the slider rails.

  a. Repeat with the other slider rail on the other side of the rack.

  b. Use the tape measure and level to verify that the rails are horizontal and at the same height.

Step 4 Insert the device into the rack as follows:

  a. Using both hands, position the device with the back of the device between the port side exhaust posts of the rack.

  b. Align the two rack-mount guides on either side of the device with the slider rails installed in the rack. Slide the rack-mount glides onto the slider rails, and then gently slide the device all the way into the rack. If the device does not slide easily, try realigning the rack-mount glides on the slider rails.

Step 5 Stabilize the device in the rack by attaching the front rack-mount brackets to the front rack-mounting rails as follows:

  a. Insert two screws (12-24 or 10-32, depending on the rack type) through the cage nuts and the holes in one of the front rack-mount brackets and into the threaded holes in the rack-mounting rail.

  b. Repeat for the front rack-mount bracket on the other side of the device.

Grounding the System

This section describes the need for system grounding and explains how to prevent damage from electrostatic discharge.

This section includes the following topics:

Proper Grounding Guidelines

Grounding is one of the most important parts of equipment installation. Proper grounding practices ensure that the buildings and the installed equipment within them have low-impedance connections and low-voltage differentials between chassis. When you properly ground systems during installation, you reduce or prevent shock hazards, equipment damage due to transients, and data corruption. Table 2-3 lists some general grounding practice guidelines.

Table 2-3   Proper Grounding Guidelines

Environment	Electromagnetic Noise Severity Level	Grounding Recommendations
Commercial building is subjected to direct lightning strikes. For example, some places in the United States, such as Florida, are subject to more lightning strikes than other areas.	High	All lightning protection devices must be installed in strict accordance with manufacturer recommendations. Conductors carrying lightning current should be spaced away from power and data lines in accordance with applicable recommendations and codes. Best grounding recommendations must be closely followed.
Commercial building is located in an area where lightning storms frequently occur but is not subject to direct lightning strikes.	High	Grounding recommendations must be closely followed.
Commercial building contains a mix of information technology equipment and industrial equipment, such as welding.	Medium to high	Grounding recommendations must be closely followed.
Existing commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment. This installation has a history of malfunction due to electromagnetic noise.	Medium	Determine source and cause of noise if possible, and mitigate as closely as possible at the noise source or reduce coupling from the noise source to the affected equipment. Grounding recommendations must be closely followed.

Table 2-3   Proper Grounding Guidelines

Environment	Electromagnetic Noise Severity Level	Grounding Recommendations
New commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment.	Low	Electromagnetic noise problems are not anticipated, but installing a grounding system in a new building is often the least expensive route and the best way to plan for the future. Grounding recommendations should be followed as closely as possible.
Existing commercial building is not subject to natural environmental noise or man-made industrial noise. This building contains a standard office environment.	Low	Electromagnetic noise problems are not anticipated, but installing a grounding system is always recommended. Grounding recommendations should be followed as much as possible.

Note   In all situations, grounding practices must comply with local National Electric Code (NEC) requirements or local laws and regulations.

Note   Always ensure that all of the devices are completely installed and that the captive installation screws are fully tightened. In addition, ensure that all I/O cables and power cords are properly seated. These practices are normal installation practices and must be followed in all installations.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when modules or other Field Replaceable Units (FRUs) are improperly handled, results in intermittent or complete failures. Devices consist of printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, always use an ESD grounding strap when handling modules.

For preventing ESD damage, follow these guidelines:

- Always use an ESD wrist strap and ensure that it makes maximum contact with bare skin.

- ESD grounding straps are available with banana plugs, metal spring clips, or alligator clips. All Cisco Nexus 2000 Series FEX chassis are equipped with a banana plug connector (identified by the ground symbol next to the connector) somewhere on the port side exhaust panel. We recommend that you use a personal ESD grounding strap equipped with a banana plug.

- If you choose to use the disposable ESD wrist strap supplied with most FRUs or an ESD wrist strap equipped with an alligator clip, you must attach the system ground lug to the chassis in order to provide a proper grounding point for the ESD wrist strap.

Note This system ground is also referred to as the network equipment building system (NEBS) ground.

- If your chassis does not have the system ground attached, you must install the system ground lug. See the "Establishing the System Ground" section on page 2-13 for installation instructions and location of the chassis system ground pads.

Note You do not need to attach a supplemental system ground wire to the system ground lug; the lug provides a direct path to the bare metal of the chassis.

After you install the system ground lug, follow these steps to correctly attach the ESD wrist strap:

Step 1 Attach the ESD wrist strap to your bare skin as follows:

  a. If you are using the ESD wrist strap supplied with the FRUs, open the wrist strap package and unwrap the ESD wrist strap. Place the black conductive loop over your wrist and tighten the strap so that it makes good contact with your bare skin.

  b. If you are using an ESD wrist strap equipped with an alligator clip, open the package and remove the ESD wrist strap. Locate the end of the wrist strap that attaches to your body and secure it to your bare skin.

Step 2 Grasp the spring or alligator clip on the ESD wrist strap and momentarily touch the clip to a bare metal spot (unpainted surface) on the rack. We recommend that you touch the clip to an unpainted rack rail so that any built-up static charge is then safely dissipated to the entire rack.

Step 3 Attach either the spring clip or the alligator clip to the ground lug screw as follows (see Figure 2-1 and Figure 2-2):

  a. If you are using the ESD wrist strap that is supplied with the FRUs, squeeze the spring clip jaws open, position the spring clip to one side of the system ground lug screw head, and slide the spring clip over the lug screw head so that the spring clip jaws close behind the lug screw head.

  Note The spring clip jaws do not open wide enough to fit directly over the head of the lug screw or the lug barrel.

  b. If you are using an ESD wrist strap that is equipped with an alligator clip, attach the alligator clip directly over the head of the system ground lug screw or to the system ground lug barrel.

Figure 2-1 shows how to attach the ESD wrist strap to the system ground lug screw for the Cisco Nexus 2000 Series FEX.

Figure 2-1   Attaching the ESD Wrist Strap to the System Ground Lug Screw for a Cisco Nexus 2000 Series FEX
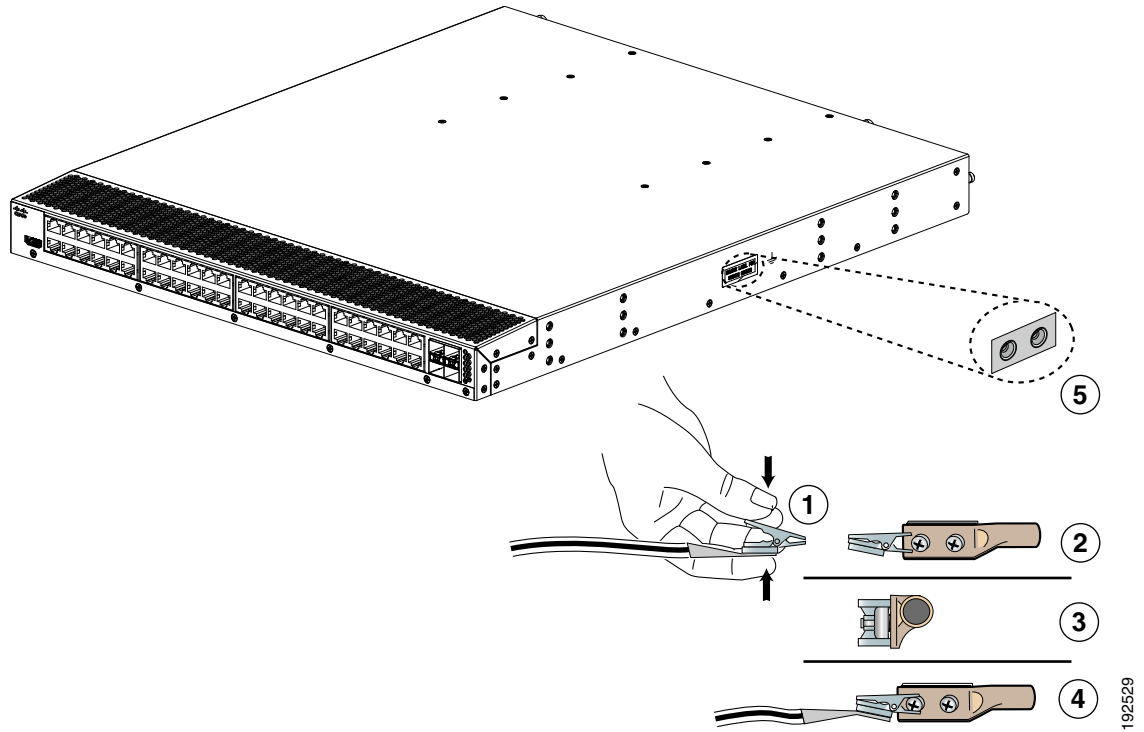
1	ESD ground strap	4	Clip installed (behind screw)
2	Clip and grounding lug	5	System ground connector
3	Side view of grounding lug (clip slid behind screw)		

Note   For the Cisco Nexus 2300 Series FEX, the ground lug holes have been moved from the side to the rear of the system. Figure 2-2. shows the Cisco Nexus 2348UPQ FEX.

Figure 2-2   *Cisco Nexus 2300 Series FEX Ground Lug Location*
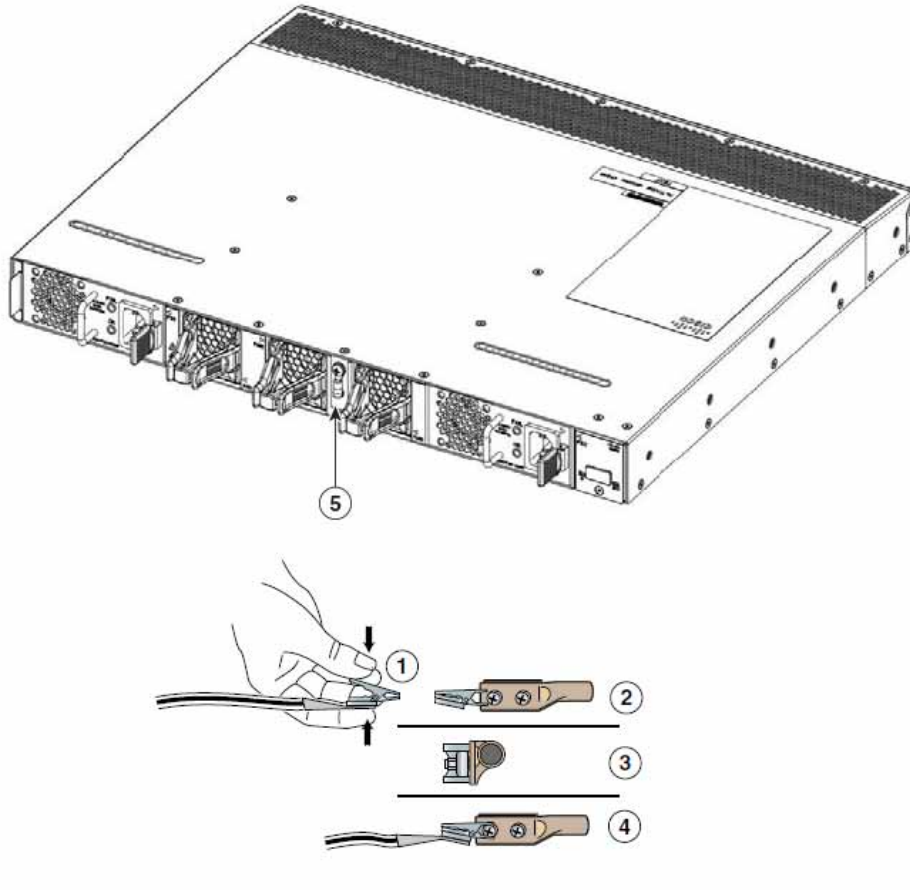
1	ESD ground strap	4	Clip installed (behind screw)
2	Clip and grounding lug	5	Ground Lug
3	Side view of grounding lug (clip slid behind screw)		

In addition, follow these guidelines when handling these devices:

 • Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.

 • Place a removed component board-side-up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.

 • Never attempt to remove the printed circuit board from the metal carrier.

⚠

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

Establishing the System Ground

This section describes how to connect a system ground to the Cisco Nexus 2000 and 2300 Series FEXs.

Note   This system ground is also referred to as the network equipment building system (NEBS) ground.

You must use the system (NEBS) ground on AC-powered systems if you are installing this equipment in a U.S. or European Central Office.

The system (NEBS) ground provides additional grounding for EMI shielding requirements and grounding for the low-voltage supplies (DC-DC converters) on the devices and is intended to satisfy the Telcordia Technologies NEBS requirements for supplemental bonding and grounding connections. You must observe the following system grounding guidelines for your chassis:

- You must install the system (NEBS) ground connection with any other rack or system power ground connections that you make. The system ground connection is required if this equipment is installed in a U.S. or European Central Office.

- You must connect both the system (NEBS) ground connection and the power supply ground connection to an earth ground. The system (NEBS) ground connection is required if this equipment is installed in a U.S. or European Central Office.

- You do not need to power down the chassis because the Cisco Nexus FEX is equipped with AC-input power supplies.

Required Tools and Equipment

To connect the system ground, you need the following tools and materials:

- Grounding lug—A two-hole standard barrel lug that supports up to 6 AWG wire. This lug is supplied as part of accessory kit.

- Grounding screws—Two M4 x 8mm (metric) pan-head screws. The screws are supplied as part of the accessory kit.

- Grounding wire—Not supplied as part of the accessory kit. The grounding wire should be sized according to local and national installation requirements. Depending on the power supply and system, a 12 AWG to 6 AWG copper conductor is required for U.S. installations. Commercially available 6 AWG wire is recommended. The length of the grounding wire depends on the proximity of the device to proper grounding facilities.

- No. 1 Phillips screwdriver.

- Crimping tool to crimp the grounding wire to the grounding lug.

- Wire-stripping tool to remove the insulation from the grounding wire.

Grounding the Chassis

The chassis has a grounding pad with two threaded M4 holes for attaching a grounding lug.

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

Caution We recommend that you ground the chassis, even if the rack is already grounded.

Caution You must ground all power supplies. The receptacles of the AC power cables used to provide power to the chassis must be the grounding type, and the grounding conductors should connect to protective earth ground at the service equipment.

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

Caution Grounding the chassis is required if you are using DC power supplies, even if the rack is already grounded. A grounding pad with two threaded M4 holes is provided on the chassis for attaching a grounding lug. The ground lug must be NRTL listed. In addition, the copper conductor (wires) must be used and the copper conductor must comply with the NEC code.

To attach the grounding lug and cable to the chassis, follow these steps:

Step 1 Use a wire-stripping tool to remove approximately 0.75 inches (19 mm) of the covering from the end of the grounding cable.

Step 2 Insert the stripped end of the grounding cable into the open end of the grounding lug.

Step 3 Use the crimping tool to secure the grounding cable in the grounding lug.

Step 4 Remove the adhesive label from the grounding pad on the chassis.

Step 5 Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two M4 screws with washers through the holes in the grounding lug and into the grounding pad.

Step 6 Ensure that the lug and cable do not interfere with other equipment.

Step 7 Prepare the other end of the grounding cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.

Starting the Cisco Nexus Fabric Extender

This section describes how to power up the device and verify the hardware operation.

Note   Do not connect the Ethernet port to the LAN until the initial device configuration has been performed. For instructions on configuring the device, see the *Cisco Nexus 2300 Series Fabric Extender Software Configuration Guide*. For instructions on connecting to the Ethernet ports, see the "Connecting the Cisco Nexus Fabric Extender" section.

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

To power up the device and verify the hardware operation, follow these steps:

Step 1   Verify that the empty power supply bays have filler panels installed, the faceplates of all modules are flush with the port side exhaust of the chassis, and the captive screws of the power supplies, fan tray, and all expansion modules are tight.

Step 2   Verify that the power supply and the fan trays are installed.

Note   Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the Cisco Nexus 2000 Series FEX to your outlet receptacle. See the "Jumper Power Cord" section on page C-9.

Step 3   Ensure that the device is adequately grounded as described in the "Grounding the System" section on page 2-7.

Step 4   If you are installing an AC power supply, connect the power supply to an AC power source as follows:

    a.   Plug the power cable into the power receptacle on the power supply.

    b.   Attach the other end of the power cable to the AC power source.

    c.   If you are connecting cables to a Cisco Nexus 2148T power supply, flip the switch above the AC receptacle on the power supply to ON.

    d.   Verify that the power supply is functioning by making sure that the OK LED turns green and the FAULT LED is off.

Step 5   If you are installing a DC power supply, connect the power supply to a DC power source as follows:

    a.   Make sure that the DC power source is turned off at the circuit breaker.

    b.   Connect a negative cable from the power source to the left terminal on the power supply and fasten with the screw from that terminal. This terminal is labeled negative (-) on newer power supplies and is labeled incorrectly as positive (+) on the first power supplies sold.

    c.   Connect a positive cable from the power source to the right terminal on the power supply and fasten with the screw from that terminal. This terminal is labeled positive (+) on newer power supplies and is labeled incorrectly as negative (-) on the first power supplies sold.

    d.   Turn on the power at the circuit breaker.

    e.   Verify that the power supply is functioning by making sure that the OK LED turns green and the FAULT LED is off.

Step 6   Listen for the fans; they should begin operating when the power cable is plugged in.

Step 7 After the device boots, verify that the LED operation is as follows:

- Power supply—The system status LED is green.

- After initialization, the system status LED is green, indicating that all chassis environmental monitors are reporting that the system is operational. If this LED is orange or red, one or more environmental monitor is reporting a problem.

- The Link LEDs for the Ethernet connector should not be on unless the cable is connected.

If a component is not operating correctly, remove and reinstall that component. If it still does not operate correctly, contact your customer service representative for a replacement.

> **Note** If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: http://www.cisco.com/c/en/us/support/web/tsd-cisco-worldwide-contacts.html.

Step 8 Verify that the system software has booted and the device has initialized without error messages.

If you cannot resolve an issue, contact your customer service representative.

Step 9 Complete the worksheets provided in "Site Preparation and Maintenance Records" for future reference.

Removing and Installing Components

This section describes how to remove and install components on the Cisco Nexus 2000 and 2300 Series FEXs.

This section includes the following topics:

- Removing and Installing Power Supplies, page 2-16
- Removing and Installing a Fan, page 2-19
- Removing and Installing the Fan Tray, page 2-21
- Removing the Cisco Nexus Fabric Extender, page 2-22

> **Caution** To prevent ESD damage, wear grounding wrist straps during these procedures and handle modules by the carrier edges only.

Removing and Installing Power Supplies

The Cisco Nexus 2000 Series FEX supports two power supplies, but the FEX uses only one power supply for operations. The other power supply is for redundancy.

> **Caution** Whenever you replace a power supply, make sure that it has the same direction of airflow as the rest of the module in the switch (all fan tray and power supply modules must have the same direction of airflow and the same color designation for the airflow direction or else the switch can over heat and shut down.

Note   If you power up a FEX with power supply and fan tray modules that have different directions of airflow, an error condition will occur and the switch can over heat and shut down. With this error condition, you must shut down the switch to replace the modules that do not take in cool air from the cold aisle. After you ensure that all of the modules have the same direction of airflow and that they take in cooling air from the cold aisle, you can power up the FEX.

This section includes the following topics:

Note   You can replace a faulty power supply while the system is operating if the other power supply is functioning.

Removing an AC Power Supply

Caution   If you are using the Cisco Nexus 2000 or 2300 Series FEX with one power supply, removing the power supply causes the device to shut down. If you are using two power supplies and you remove one of them, the device continues to operate.

To remove an AC power supply, follow these steps:

Step 1   Pull the power cord out from the power receptacle on the power supply.

Step 2   Release the power supply from the chassis as follows:

- If you are removing a power supply from a Cisco Nexus 2148T chassis, loosen the captive screw and then pull the power supply part way out of the chassis.
- If you are removing a power supply from a Cisco Nexus 2248T, 2232PP, or 2224TP chassis, push and hold the thumb latch to the left and pull the power supply part way out of the chassis.

Step 3   Place your other hand under the power supply to support it while you slide it out of the chassis.

Step 4   If the power supply bay is to remain empty, install a blank power supply filler panel.

Installing an AC Power Supply

Caution   Be sure that the power supply that you are installing has the same airflow direction as the fan tray module and the other power supply. Either all of the modules must have port-side exhaust airflow (blue or no color on the front of the module) or all of the modules must have port-side intake airflow (red or black color on the front of the module). To prevent over heating, the switch does not support more than one airflow direction for the modules in the chassis.

To install a power supply, follow these steps:

Step 1   Ensure that the system (earth) ground connection has been made for the chassis. For ground connection instructions, see the "Grounding the System" section on page 2-7.

Step 2   If the power supply bay has a filler panel, remove it from the slot as follows:

- If you are removing a filler panel from a Cisco Nexus 2248TP, 2232PP, or 2224TP FEX, push its thumb latch to the left and pull the panel out of the chassis.

- If you are removing a filler panel from a Cisco Nexus 2148T FEX, loosen its captive screw, and then pull the panel out of the power supply bay.

Step 3   Hold the replacement power supply by its handle and position it so that the captive screw is on the left, and then slide it into the power supply bay, ensuring that the power supply is fully seated in the bay.

Step 4   Secure the power supply to the chassis as follows:

- If you are installing a Cisco Nexus 2248TP, 2232PP, or 2224TP FEX, make sure that the thumb latch engages with the chassis so that the power supply is held in the slot.

- If you are installing a Cisco Nexus 2148T, fasten the power supply to the chassis by screwing its captive screw into its hole in the chassis and tightening it.

> **Note**   Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the Cisco Nexus 2000 Series FEX to your outlet receptacle. See the "Jumper Power Cord" section on page C-9.

Step 5   Connect the other end of the power cable to an AC power source.

> **Caution**   In a system with dual power supplies, connect each power supply to a separate power source. If a power source failure occurs, the second source will most likely still be available.

Step 6   Verify power supply operation by checking that the power supply LED is green. For information about what the power supply LEDs indicate, see the "Power Supply Status" section on page E-3.

Removing a DC Power Supply

> **Caution**   If you are using the Cisco Nexus 2200 platform FEX with one DC power supply, removing the power supply causes the device to shut down. If you are using two power supplies and you remove one of them, the device continues to operate.

To remove a DC power supply, follow these steps:

Step 1   Shut off the DC power to the power supply at the circuit breaker. Make sure that both LEDs are off.

Step 2   Unfasten the positive power cable from the right terminal.

Step 3   Unfasten the negative power cable from the left terminal.

Step 4   Press the thumb latch to disengage the power supply from the chassis and use the handle to pull it part way out of the chassis.

Step 5   Place your other hand under the power supply to support it while you slide it out of the chassis. Place the power supply on an antistatic surface.

Step 6   If the power supply bay is to remain empty, install a blank power supply filler panel.

Installing a DC Power Supply

In a system with dual power supplies, connect each power supply to a separate power source. If a power source failure occurs, the second source will most likely still be available.

⚠

Caution   Be sure that the power supply that you are installing has the same airflow direction as the fan tray module and the other power supply. Either all of the modules must have port-side exhaust airflow (blue or no color on the front of the module) or all of the modules must have port-side intake airflow (red or black color on the front of the module). To prevent over heating, the switch does not support more than one airflow direction for the chassis.

To install a power supply, follow these steps:

Step 1   Ensure that the system (earth) ground connection has been made for the chassis. For ground connection instructions, see the "Grounding the System" section on page 2-7.

Step 2   If the power supply bay has a filler panel, push and hold the thumb latch to the left, and then slide the filler panel out of the power supply bay.

Step 3   Hold the replacement power supply by the handle and position it so that the thumb latch is on the right, and then slide it into the power supply bay, ensuring that the power supply is fully seated in the bay.

Step 4   Engage the thumb latch so that the power supply is firmly held in place in its slot.

Step 5   Fasten the positive cable from the power source to the right terminal on the power supply. This terminal is labeled positive (+) on newer power supplies and is labeled incorrectly as negative (-) on the first power supplies sold.

Step 6   Fasten the negative cable from the power source to the left terminal on the power supply. This terminal is labeled negative (-) on newer power supplies and is labeled incorrectly as positive (+) on the first power supplies sold.

Step 7   Turn on the power at the circuit breaker.

Step 8   Verify power supply operation by checking that the power supply LED is green. For information about what the power supply LEDs indicate, see the "Power Supply Status" section on page E-3.

Removing and Installing a Fan

The Cisco Nexus 2300 Series FEXs support three fans, but the FEX needs only two fans for operation. The other fan is for redundancy. Individual fans are designed to be removed and replaced while the system is operating, without causing an electrical hazard or damage to the system.

If you are replacing a fan tray on a Cisco Nexus 2200 Series FEX, or Cisco Nexus 2148T FEX, see the "Removing and Installing the Fan Tray" section on page 2-21.

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Caution   Be sure that the fan that you are installing has the same airflow direction as the other fans and power supply modules in the same chassis. Either all of the modules must have port-side exhaust airflow (a blue or no color on the front of the module) or all of the modules must have port-side intake airflow (red or black color on the front of the module). If the modules have different airflow directions in the same chassis, an error condition occurs, the switch can over heat, and the switch can shut down.

✎

Note   If you power up a FEX with power supply and fan modules that have different directions of airflow, an error condition will occur and the switch can over heat and shut down. With this error condition, you must shut down the switch to replace the modules that do not take in cool air from the cold aisle. After you ensure that all of the modules have the same direction of airflow and take in cooling air from the cold aisle, you can power up the FEX.

This section includes the following topics:

- Removing a Fan, page 2-20
- Installing a Fan, page 2-20

Removing a Fan

⚠️

Warning   **When removing the fan tray, keep your hands and fingers away from the spinning fan blades. Let the fan blades completely stop before you finish removing the fan tray.** Statement 258

To remove a fan, follow these steps:

Step 1   Pinch the two protruding tabs of the fan towards each other to release the latch and pull the fan outward.

Step 2   Pull the fan clear of the chassis and set it on an antistatic surface or repack it in packing materials.

Installing a Fan

To install a fan, follow these steps:

Step 1   Place the fan into the port-side exhaust chassis cavity so it rests on the chassis, and then push the fan into the chassis as far as it can go until it is latched in place.

Step 2   Listen for the fan if the device is powered on. You should immediately hear it operating. If you do not hear it, ensure that the fan is inserted completely in the chassis and the faceplate is flush with the outside surface of the chassis.

Step 3   Verify that the LED is green. If the LED is not green, the fan is faulty. If this problem occurs, contact your customer service representative for a replacement part.

Note If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: http://www.cisco.com/c/en/us/support/web/tsd-cisco-worldwide-contacts.html.

Removing and Installing the Fan Tray

The Cisco Nexus 2200 Series FEXs, and Cisco Nexus 2148T FEX, use a fan tray. The fan tray is designed to be removed and replaced while the system is operating without causing an electrical hazard or damage to the system, if the replacement is performed within 1 minute.

Caution Be sure that the fan tray that you are installing has the same airflow direction as the other fan tray and power supply modules in the same chassis. Either all of the modules must have port-side exhaust airflow (a blue or no color on the front of the module) or all of the modules must have port-side intake airflow (red or black color on the front of the module). If the modules have different airflow directions in the same chassis, an error condition occurs, the switch can over heat, and the switch can shut down.

Note If you power up a FEX with power supply and fan tray modules that have different directions of airflow, an error condition will occur and the switch can over heat and shut down. With this error condition, you must shut down the switch to replace the modules that do not take in cool air from the cold aisle. After you ensure that all of the modules have the same direction of airflow and take in cooling air from the cold aisle, you can power up the FEX.

This section includes the following topics:

- Removing a Fan Tray, page 2-21
- Installing a Fan Tray, page 2-22

Removing a Fan Tray

Warning **When removing the fan tray, keep your hands and fingers away from the spinning fan blades. Let the fan blades completely stop before you finish removing the fan tray.** Statement 258

To remove a fan tray, follow these steps:

Step 1 Loosen the captive screws on the fan tray by turning them counterclockwise, using a flat-blade or number 2 Phillips screwdriver if required.

Step 2 Grasp the captive screws of the fan tray and pull it outward.

Step 3 Pull the fan tray clear of the chassis and set it on an antistatic surface or repack it in packing materials.

> **Note** If you remove a fan tray while the system is running, you must install the new fan tray within 1 minute to prevent overheating.

Installing a Fan Tray

To install a fan tray, follow these steps:

Step 1 Hold the fan tray with the sheet metal flange holding the connector on the bottom.

Step 2 Place the fan tray into the port-side exhaust chassis cavity so it rests on the chassis, and then push the fan tray into the chassis as far as it can go until the captive screw makes contact with the chassis.

Step 3 Tighten the captive screw.

Step 4 Listen for the fans if the device is powered on. You should immediately hear them operating. If you do not hear them, ensure that the fan tray is inserted completely in the chassis and the faceplate is flush with the outside surface of the chassis.

Step 5 Verify that the LED is green. If the LED is not green, one or more fans are faulty. If this problem occurs, contact your customer service representative for a replacement part.

> **Note** If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: http://www.cisco.com/c/en/us/support/web/tsd-cisco-worldwide-contacts.html.

Removing the Cisco Nexus Fabric Extender

> **Caution** The slider rail and port side exhaust rack-mount brackets do not have a stop mechanism when sliding in and out. If the port side exhaust of the chassis is unfastened from the rack and the chassis slides forward on the slider rails, it may slip off the end of the rails and fall out of the rack.

To remove the Cisco Nexus 2000 Series FEX from a rack, follow these steps:

Step 1 Ensure that the weight of the FEX is fully supported and that the device is being held by another person.

Step 2 Turn off the power at the circuit breaker.

Step 3 Disconnect the power cord as follows:

- For AC power supplies, disconnect the power cord and the console cables.

- For DC power supplies, disconnect the positive cable from the negative (-) terminal, and disconnect the negative cable from the positive (+) terminal.

Step 4 Disconnect all ports.

Step 5 Remove the screws that fasten the port side exhaust rack-mount brackets to the mounting rails.

Step 6   Gently slide the chassis toward you, off of the slider rails and out of the rack.

Repacking the Cisco Nexus Fabric Extender for Return Shipment

If you need to return the Cisco Nexus 2000 and 2300 Series FEX, remove the device from the rack by following the steps in the "Removing the Cisco Nexus Fabric Extender" section on page 2-22, and repack it for shipment. If possible, use the original packing materials and container to repack the device. Contact your Cisco customer service representative to arrange for return shipment to Cisco.

Connecting a Cisco Nexus Fabric Extender

This chapter describes how to connect the ports on a Cisco Nexus Fabric Extender (FEX).

Caution When running power and data cables in overhead or subfloor cable trays, we strongly recommend that you have power cables and other potential noise sources as far away as practical from network cabling that terminates on Cisco equipment. In situations where long parallel cable runs cannot be separated by at least 3.3 feet (1 m), we recommend that you shield any potential noise sources by housing them in a grounded metallic conduit.

This chapter includes the following sections:

Preparing for Network Connections

When preparing your site for network connections to the Cisco Nexus FEX, consider the following for each type of interface, and gather all the required equipment before connecting the ports:

- Cabling required for each interface type
- Distance limitations for each signal type
- Additional interface equipment required

Connecting to the 1-Gigabit Ethernet Port

This section describes how to connect a 1-Gigabit Ethernet port to a host.

The 1-Gigabit Ethernet ports have RJ-45 interfaces. There are 48 1-Gigabit Ethernet server ports.

To connect a 1-Gigabit Ethernet port to a host, follow these steps:

Step 1   Connect the appropriate modular cable to the 1-Gigabit Ethernet port.

Step 2   Connect the other end of the cable to the device.

Connecting to a 10-Gigabit and 40-Gigabit Ethernet Port

This section describes how to connect a 10-Gigabit or 40-Gigabit Ethernet port to a host. There are four network facing 10-Gigabit Ethernet ports for the Cisco Nexus 2148T and 2248TP, eight for the Cisco Nexus 2232TM, 2232TM-E, and 2232PP, and two on the Cisco Nexus 2224TP. An SFP+ transceiver is used to connect to a 10-Gigabit Ethernet port. The Cisco Nexus 2300 Series platform FEXs provide six network facing 40-Gigabit uplink ports. A QSFP+ transceiver is used to connect to a 40-Gigabit Ethernet port.

This section includes the following topics:

Removing and Installing SFP+ Transceivers

⚠

Caution   Excessively removing and installing an SFP transceiver can shorten its life. Do not remove and insert SFP+ transceivers more often than is necessary. We recommend that you disconnect cables before installing or removing SFP transceivers to prevent damage to the cable or transceiver.

This section describes how to install and remove an SFP+ transceiver. This section includes the following topics:

Installing an SFP+ Transceiver

To install an SFP+ transceiver, follow these steps:

Step 1   Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2   Remove the dust cover from the port cage.

Step 3   Remove the dust cover from the port end of the transceiver.

Step 4   Insert the transceiver into the port as follows:

- If the transceiver has a Mylar tab latch, position the transceiver with the tab on the bottom, and then gently insert the transceiver into the port until it clicks into place.

- If the transceiver has a bale clasp latch, position the transceiver with the clasp on the bottom, close the clasp by pushing it up over the transceiver, and then gently insert the transceiver into the port until it clicks into place.

⚠️

Caution   If the transceiver does not install easily, ensure that it is correctly positioned and the tab or clasp are in the correct position before continuing.

✎

Note   If you cannot install the cable into the transceiver, insert or leave the dust cover in the cable end of the transceiver.

Removing an SFP+ Transceiver

To remove an SFP+ transceiver, follow these steps:

Step 1   Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2   If a cable is installed in the transceiver, do one of the following:

a.   Record the cable and port connections for later reference.

b.   Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.

c.   Insert a dust plug into the cable end of the transceiver.

⚠️

Caution   If the transceiver does not remove easily in the next step, push the transceiver completely in and then ensure that the latch is in the correct position before continuing.

Step 3   Remove the transceiver from the port as follows:

- If the transceiver has a Mylar tab latch, gently pull the tab straight out (do not twist), and then pull the transceiver out of the port.

- If the transceiver has a bale clasp latch, open the clasp by pressing it downward, and then pull the transceiver out of the port.

✎

Note   If you have difficulty removing a bale clasp SFP+ transceiver, you should reseat it by returning the bale clasp to the up position. Press the SFP+ transceiver inward and upward into the cage. Next, lower the bale clasp and pull the SFP+ transceiver straight out with a slight upward lifting force (see Figure 3-1). Be careful not to damage the port cage during this process.

Figure 3-1   Alternate Removal Method for Bale Clasp SFP+ Transceivers
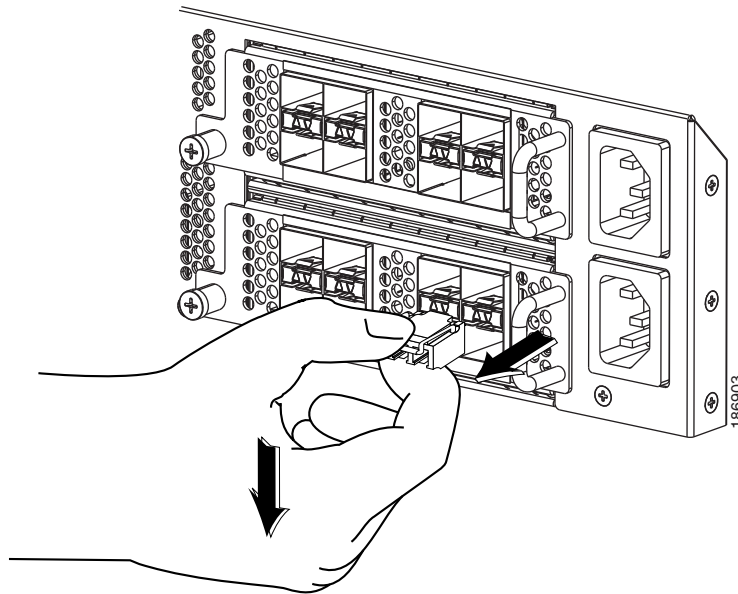
Step 4   Insert a dust cover into the port end of the transceiver and place the transceiver on an antistatic mat or into a static shielding bag if you plan to return it to the factory.

Step 5   If another transceiver is not being installed, protect the optical cage by inserting a clean cover.

Removing and Installing Cables into SFP+ Transceivers

This section describes how to remove and install cables into and from SFP+ transceivers.

⚠

Caution   To prevent damage to the copper cables, do not place more tension on them than the rated limit and do not bend to a radius of less than 1 inch if there is no tension in the cable, or 2 inches if there is tension in the cable.

This section includes the following topics:

Removing a Cable from an SFP+ Transceiver

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Caution   When pulling a cable from a transceiver, grip the body of the connector. Do not pull on the jacket sleeve, because this action can compromise the fiber-optic termination in the connector.

⚠️

Caution   If the cable does not remove easily, ensure that any latch present on the cable has been released before continuing.

To remove the cable, follow these steps:

Step 1   Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2   Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.

Step 3   Insert a dust plug into the cable end of the transceiver.

Step 4   Insert a dust plug onto the end of the cable.

Installing a Cable into an SFP+ Transceiver

⚠️

Caution   To prevent possible damage to the cable or transceiver, install the transceiver in the port before installing the cable in the transceiver.

To install a cable into a transceiver, follow these steps:

Step 1   Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2   Remove the dust cover from the connector on the cable.

Step 3   Remove the dust cover from the cable end of the transceiver.

Step 4   Align the cable connector with the transceiver and insert the connector into the transceiver until it clicks into place.

⚠️

Caution   If the cable does not install easily, ensure that it is correctly positioned before continuing.

For instructions on verifying connectivity, see the *Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide*.

Maintaining SFP+ Transceivers and Cables

You must keep SFP+ transceivers clean and dust free to maintain high signal accuracy and prevent damage to the connectors. Attenuation (loss of light) is increased by contamination and should be below 0.35 dB.

Follow these maintenance guidelines:

- SFP+ transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventive wrist strap that is connected to the chassis.

- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its life.

- Keep all optical connections covered when not in use. If they become dusty, clean before using to prevent dust from scratching the fiber-optic cable ends.

- Do not touch ends of connectors to prevent fingerprints and other contamination.

- Clean regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedure.

- Inspect routinely for dust and damage. If damage is suspected, clean and then inspect fiber ends under a microscope to determine if damage has occurred.

Cabinet and Rack Installation

This appendix provides the requirements for cabinet and rack installation and includes the following sections:

Cabinet and Rack Requirements

This section provides the requirements for the following types of cabinets and racks, assuming an external ambient air temperature range of 0 to 104ºF (0 to 40ºC):

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom to top cooling)
- Standard open racks

Note If you are selecting an enclosed cabinet, we recommend one of the thermally validated types, either standard perforated or solid-walled with a fan tray.

Note Do not use racks that have obstructions (such as power strips), because the obstructions could impair access to field-replaceable units (FRUs).

This section includes the following topics:

General Requirements for Cabinets and Racks

The cabinet or rack must be one of the following types:

- Standard 19-in. (48.3 cm) (four-post EIA cabinet or rack, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992). See the "Requirements Specific to Perforated Cabinets" section on page A-2.

The cabinet or rack must also meet the following requirements:

- The minimum vertical rack space per Cisco Nexus 2000 Series FEX chassis or Cisco Nexus 2300 Series FEX chassis must be one RU (rack units), equal to 1.75 inches (4.4 cm).

- The width between the rack-mounting rails must be at least 17.75 inches (45.0 cm) if the rear of the device is not attached to the rack. For four-post EIA racks, this measurement is the distance between the two port side exhaust rails.

- For four-post EIA cabinets (perforated or solid-walled), the requirements are as follows:

    - The minimum spacing for the bend radius for fiber-optic cables should have the port side exhaust-mounting rails of the cabinet offset from the port side exhaust door by a minimum of 3 inches (7.6 cm).

    - The distance between the outside face of the port side exhaust mounting rail and the outside face of the back mounting rail should be 23.0 to 30.0 inches (58.4 to 76.2 cm) to allow for rear-bracket installation.

    - A minimum of 2.5 inches (6.4 cm) of clear space should exist between the side edge of the chassis and the side wall of the cabinet. No sizable flow obstructions should be immediately in the way of chassis air intake or exhaust vents.

Note   Optional jumper power cords are available for use in a cabinet. See the "Jumper Power Cord" section on page C-9.

Requirements Specific to Perforated Cabinets

A perforated cabinet is defined as a cabinet with perforated port side exhaust and rear doors and solid side walls. In addition to the requirements listed in the "General Requirements for Cabinets and Racks" section on page A-1, perforated cabinets must meet the following requirements:

- The port side exhaust and rear doors must have at least a 60 percent open area perforation pattern with at least 15 square inches (96.774 square cm) of open area per rack unit of door height.

- The roof should be perforated with at least a 20 percent open area.

- The cabinet floor should be open or perforated to enhance cooling.

The Cisco R Series rack conforms to these requirements.

Requirements Specific to Standard Open Racks

In addition to the requirements listed in the "General Requirements for Cabinets and Racks" section on page A-1, if mounting the chassis in an open rack (no side panels or doors), ensure that the rack meets the following requirements:

- The minimum vertical rack space per chassis must be two rack units (RU), equal to 3.47 inches (8.8 cm).

- The horizontal distance between the chassis and any adjacent chassis should be 6 inches (15.2 cm), and the distance between the chassis air vents and any walls should be 2.5 inches (6.4 cm).

Cable Management Guidelines

To help with cable management, you might want to allow additional space in the rack above and below the chassis to make it easier to route as many as 56 fiber or copper cables through the rack.

Technical Specifications

This appendix describes the technical specifications for the Cisco Nexus Fabric Extenders (FEXs) and includes the following sections:

Note Specifications for cables and connectors are provided in Appendix C, "Cable and Port Specifications."

Power Specifications

This section describes the power specifications for the Cisco Nexus Fabric Extenders.

The power supplies connect directly to the system through connectors attached to the baseboard through cables. One connector is on the baseboard for each power supply. AC input is through an IEC connector mounted on the power supply port side exhaust panel. Table B-1 lists the specifications for the FEX power supplies.

Table B-1   *Power Specifications for the Cisco Nexus Fabric Extender*

Cisco Nexus Fabric Extender	Power Supply			
	N2K-PAC-200W	N2200-PAC-400W (Blue) N2200-PAC-400W-B (Red)	N2200-PDC-400W (Blue) N2200-PDC-350W-B	NXA-PHV-500W (Blue) NXA-PHV-500W-B (Red)
FEXs	Cisco Nexus 2148T	Cisco Nexus 2332TQ, 2348TQ, 2348TQ-E, and 2348UPQ, Cisco Nexus 2248TP-E, 2248TP, 2232PP, 2224TP, 2248PQ, 2232TM, 2232TM-E	Cisco Nexus 2332TQ, 2348TQ, 2348TQ-E, and 2348UPQ, Cisco Nexus 2248TP-E, 2248TP, 2232PP, 2224TP, 2248PQ, 2232TM, 2232TM-E **Note** The 2232TM and 2232TM-E do not support the N2200-PDC-350W-B	Cisco Nexus 2332TQ, 2348TQ, and 2348UPQ, Cisco Nexus 2248TP-E, 2248TP, 2232PP, 2232TM, 2232TM-E
Typical and Maximum Input Operating Power	165 W	190W @ 30m, 250W maximum (Cisco Nexus 2332TQ) 280W @ 30m, 350W maximum (Cisco Nexus 2348TQ and 2348TQ-E) 125W, 200W maximum (Cisco Nexus 2348UPQ) 110W, 130W maximum (Cisco Nexus 2248TP-E and 2248TP) 270W (Cisco Nexus 2232PP) 85W, 100W maximum (Cisco Nexus 2224TP) 350W, 386W maximum (Cisco Nexus 2232TM)		
Maximum Output Power	200 W	400 W	400W, 350 W	500W
Input Voltage	90 to 264 VAC	90 to 264 VAC	–40 to –72 VDC	192 to 400 VDC, 90 to 295 VAC
Frequency	50 to 60 Hz	50 to 60 Hz	N/A	50 to 60 Hz

Table B-1   Power Specifications for the Cisco Nexus Fabric Extender (continued)

Cisco Nexus Fabric Extender	Power Supply			
	N2K-PAC-200W	N2200-PAC-400W (Blue) N2200-PAC-400W-B (Red)	N2200-PDC-400W (Blue) N2200-PDC-350W-B	NXA-PHV-500W (Blue) NXA-PHV-500W-B (Red)
Input Current	1.5 A/2.2 A* (typical/maximum) * The Input currents listed for 110 V; divide by two for 220 V	Cisco Nexus 2332TQ: 1.4 A/2.3 A* (typical/maximum) Cisco Nexus 2348TQ and 2348TQ-E: 2.5 A/3.2 A* (typical/maximum) Cisco Nexus 2348UPQ: 1.2 A/1.8 A* (typical/maximum) Cisco Nexus 2248TP-E and 2248TP: 1.0 A/1.2 A* (typical/maximum) Cisco Nexus 2232PP: 2.5 A* (typical) Cisco Nexus 2224TP: 0.7 A/0.9 A* (typical/maximum) Cisco Nexus 2232TM 3.2 A/3.5 A* (typical/maximum) * Input currents listed for 110 V; divide by two for 220 V	Cisco Nexus 2332TQ: 3.8 A/6.2 A* (typical/maximum) Cisco Nexus 2348TQ and 2348TQ-E: 7.0 A/8.7 A* (typical/maximum) Cisco Nexus 2348UPQ: 3.1 A/5.0 A* (typical/maximum) Cisco Nexus 2248TP-E and 2248TP: 2.8 A/3.3 A* (typical/maximum) Cisco Nexus 2232PP: 7.0 A* (typical) Cisco Nexus 2224TP: 2.1 A/2.5 A* (typical/maximum) Cisco Nexus 2232TM 8.8 A/9.6 A* (typical/maximum) * Input currents listed for -40 VDC	Cisco Nexus 2332TQ: 0.6 A/1.1 A* (typical/maximum) Cisco Nexus 2348TQ: 1.2 A/1.5 A* (typical/maximum) Cisco Nexus 2348UPQ: 0.5 A/0.8 A* (typical/maximum) Cisco Nexus 2248TP-E and 2248TP: 0.5 A/0.6 A* (typical/maximum) Cisco Nexus 2232PP: 1.2 A* (typical) Cisco Nexus 2224TP: 0.4 A/0.4 A* (typical/maximum) Cisco Nexus 2232TM 1.4A/1.6 A* (typical/maximum) * Input currents listed for 240 VDC and 277 VAC; divide by 1.6 for 380 VDC
Efficiency	84% typical	88% to 92% (50% to 100% load)	85% to 88% (50% to 100% load)	91% to 94% (50% to 100% load)
RoHS Compliance	RoHS-5 compliant	RoHS-6 compliant	RoHS-6 compliant	RoHS-6 compliant
Hot Swappable	Yes	Yes	Yes	Yes

Table B-1   *Power Specifications for the Cisco Nexus Fabric Extender (continued)*

Cisco Nexus Fabric Extender	Power Supply			
	N2K-PAC-200W	N2200-PAC-400W (Blue) N2200-PAC-400W-B (Red)	N2200-PDC-400W (Blue) N2200-PDC-350W-B	NXA-PHV-500W (Blue) NXA-PHV-500W-B (Red)
Heat Dissipation	560/680 BTU/hr (typical/maximum)	Cisco Nexus 2332TQ: 510/850 BTU/hour (typical/maximum) Cisco Nexus 2348TQ and 2348TQ-E: 952/1190 BTU/hour (typical/maximum) Cisco Nexus 2348UPQ: 425/680 BTU/hour (typical/maximum) Cisco Nexus 2248TP-E and 2248TP: 374/442 BTU/hour (typical/maximum) Cisco Nexus 2232PP: 918BTU/hour (typical) Cisco Nexus 2224TP: 289/340 BTU/hour (typical/maximum) Cisco Nexus 2232TM: 1190/1312 BTU/hour (typical/maximum)		
Power Cord Rating	3 A@100 Vin, 1.5 A@240 Vin	6 A@100 Vin, 3 A@240 Vin	15A@-48Vin, 8A@-60Vin	4A @ 240Vin and 277Vin, 3A@ 380 Vin
Cubic Inches	51 in^3	39 in^3	39 in^3	39 in^3
Power Density	3.9 W/in^3	10.2 W/in^3	10.2 W/in^3	10.2 W/in^3
Operating Temperature	50°C	50°C	50°C	50°C
Cooling	Internal fans to cool the supply	Internal fans to cool the supply	Internal fans to cool the supply	Internal fans to cool the supply
Input connector	AC connector in the power supply face	AC connector in the power supply face	DC connector in the power supply face	HVAC + HVDC connector in the power supply face
Output connector	DC output connector in the back	DC output connector in the back	DC output connector in the back	DC output connector in the back
Supply Indicators	Supply Health: Green indicates the power supply is operational and red indicates a fault. AC good indicator: Solid green indicates that AC is present and is within the supply specifications.	Supply Health: Green indicates the power supply is operational and amber indicates a fault. AC good indicator: Solid green indicates that AC is present and is within the supply specifications.	Supply Health: Green indicates the power supply is operational and amber indicates a fault.	Supply Health: Green indicates the power supply is operational and amber indicates a fault.

Environmental Specifications

Table B-2 lists the environmental specifications for a FEX.

Table B-2   Environmental Specifications for the Cisco Nexus Fabric Extender

Description	Specification
Temperature, operating	32 to 104°F (0 to 40°C); 32 to 131°F (0 to 55°C) for the Cisco Nexus 2348TQ, 2348TQ-E, and 2348UPQ
Temperature, nonoperating	–4 to 158°F (–20 to 70°C); –40 to 158°F (–40 to 70°C) for the Cisco Nexus 2348TQ, 2348TQ-E, and 2348UPQ
Humidity (RH), noncondensing	5 to 95%
Altitude	0 to 10000 ft (0 to 3000 m)

The Cisco Nexus 2332TQ, 2348TQ, 2348TQ-E, 2348UPQ, 2232PP, 2232TM, and 2248TP-ETP FEXs can operate in a horizontal or vertical rack mount configuration.

Physical Specifications

Table B-3 lists the dimensions and weights for the Cisco Nexus Fabric Extenders.

Table B-3   Physical Specifications for Installing the Cisco Nexus Fabric Extender

Cisco Nexus Fabric Extender	Dimensions (Height x Width x Depth)[1]		Weight[2]
	Inches	Centimeters	
Cisco Nexus 2332TQ chassis	1.72 x 17.3 x 14.05 in.	4.37 x 43.94 x 35.69 cm	15.0 lb (6.8 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.4 lb (0.6 kg)
Cisco Nexus 2348TQ chassis	1.72 x 17.3 x 17.07 in.	4.37 x 43.94 x 43.36 cm	17.0 lb (7.7 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.4 lb (0.6 kg)
Cisco Nexus 2348TQ-E chassis	1.72 x 17.3 x 17.07 in.	4.37 x 43.94 x 43.36 cm	17.0 lb (7.7 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.4 lb (0.6 kg)
Cisco Nexus 2348UPQ chassis	1.72 x 17.3 x 14.05 in.	4.37 x 43.94 x 35.69 cm	15.5 lb (7.0 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.4 lb (0.6 kg)
Cisco Nexus 2248TP-E chassis	1.72 x 17.3 x 17.7 in.	4.37 x 43.94 x 44.96 cm	17.7 lb (8.03 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.4 lb (0.6 kg)
Cisco Nexus 2248TP chassis	1.72 x 17.3 x 17.7 in.	4.37 x 43.94 x 44.96 cm	17.7 lb (8.03 kg)

Table B-3   Physical Specifications for Installing the Cisco Nexus Fabric Extender

Cisco Nexus Fabric Extender	Dimensions (Height x Width x Depth)[1]		Weight[2]
	Inches	Centimeters	
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.4 lb (0.6 kg)
Cisco Nexus 2248PQ chassis	1.72 x 17.3 x 17.7 in.	4.37 x 43.94 x 44.96 cm	17.5 lb (8.0 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.8 lb (0.8 kg)
Cisco Nexus 2232PP chassis	1.72 x 17.3 x 17.7 in.	4.37 x 43.94 x 44.96 cm	18.3 lb (8.3 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.8 lb (0.8 kg)
Cisco Nexus 2224TP chassis	1.72 x 17.3 x 17.7 in.	4.37 x 43.94 x 44.96 cm	16.6 lb (1.0 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.4 lb (0.6 kg)
Cisco Nexus 2148T chassis	1.72 x 17.3 x 20.0 in.	4.37 x 43.94 x 50.8 cm	18.0 lb (8.2 kg)
Power supply Fan tray	— —	— —	1.5 lb (0.7 kg) 1.5 lb (0.7 kg)
Cisco Nexus 2232TM chassis	1.72 x 17.3 x 17.7 in.	4.37 x 43.94 x 44.96 cm	18.5 lb (8.4 kg)
Power supply Fan tray	— —	— —	2.2 lb (1.0 kg) 1.8 lb (0.8 kg)

1. Dimensions are presented for only the chassis rack size and service clearance requirements.

2. Combine the chassis, power supply, and fan tray weights for the overall weight of the switch to be installed. Remember to double the power supply weights if there are two power supplies installed in the FEX.

Transceiver Specifications

For information about Cisco transceiver modules, refer to the *Cisco Transceiver Modules Datasheet*.

Airflow Optimization Accessories

This section describes the airflow optimization accessories for the Cisco Nexus FEX.

For the details of the Cisco Nexus airflow extension sleeve and the Cisco Nexus airflow vent, see Table B-4.

Table B-4   Airflow Optimization Accessories

Accessories	Airflow Extension Sleeve	Airflow Vent
PID	NXA-AIRFLOW-SLV (2200 Series) NXA-AIRFLOW-SLV-E (2300 Series)	NXA-ACC-KIT-BAV (applies to all models except the Cisco Nexus 2348UPQ)
Name	Cisco Nexus Airflow Extension Sleeve	Cisco Nexus Airflow Vent

Table B-4   *Airflow Optimization Accessories*

Accessories	Airflow Extension Sleeve	Airflow Vent
Description	Optimizes airflow in port side exhaust airflow deployments (port side exhaust) for alignment of port in back of rack and extension of power supply side of chassis to port side exhaust of rack with airflow sleeve	Optimizes airflow in port side intake top of rack deployments (port side intake). Airflow vent consists of metallic cover to place on the upper exhaust of the FEX port side and mounting rails with snap on holes for airflow vent.
Dimensions (height x width x depth)	1.72" (1RU) x 17.3" x 8.5"(fully retracted)* or 12.9"(fully extended)* *Adjustable depth for the FEX, between 26 and 30 inches	Vent cover is part of the mounting hardware kit and its size is meaningless to overall form factor of the chassis: 0.42" x 17.53" x 2.56"
Weight	5.7 lbs or 2.6 kg	0.42 lbs or 0.19 kg

■   **Airflow Optimization Accessories**

Cable and Port Specifications

This appendix provides cable and port specifications for the Fabric Extender (FEX) and includes the following sections:

- Supported Power Cords and Plugs, page C-1
- Jumper Power Cord, page C-9

Supported Power Cords and Plugs

Each power supply has a separate power cord. Standard power cords or jumper power cords are available for connection to a power distribution unit that has IEC 60320 C19 outlet receptacles. The jumper power cords, for use in cabinets, are available as an optional alternative to the standard power cords.

Note For N2200-PDC-350W-B or N2200-PDC-400W DC power supplies:

- The terminal block that is used (2-position) accepts wire sizes 22AWG-14AWG.

- For the maximum input current of approximately 15A, a 18AWG wire meets minimum requirements. 16AWG adds some margin, and this is recommended.

- There is no earth ground connection on this input terminal block, thus the earth grounding is provided by the system being grounded.

Power Cords

The standard power cords have an IEC C19 connector on the end that plugs into the device. The optional jumper power cords have an IEC C19 connector on the end that plugs into the device and an IEC C20 connector on the end that plugs into an IEC C19 outlet receptacle.

Note Only the regular power cords or jumper power cords provided with the device are supported.

Note   If you do not order the optional power cord with the system, you are responsible for selecting the appropriate power cord for the product. Using a non-compatible power cord with this product may result in electrical safety hazard. Orders delivered to Argentina, Brazil, and Japan must have the appropriate power cord ordered with the system.

Table C-1 lists the AC power cords for the Cisco Nexus Fabric Extender and provides their lengths in feet and meters.

Table C-1   *AC Power Cords for the Cisco Nexus Fabric Extender*

Description	Length		Power Cord Reference Illustration
	Feet	Meters	
CAB-250V-10A-AR Power Cord, 250 VAC 10 A IRAM 2073 Plug Argentina	8.2	2.5	Figure C-1
CAB-9K10A-AU 250 VAC 10 A 3112 Plug, Australia	8.2	2.5	Figure C-2
CAB-250V-10A-CN Power Cord, 250 VAC 10 A GB 2009 Plug China	8.2	2.5	Figure C-3
CAB-9K10A-EU Power Cord, 250 VAC 10 A M 2511 Plug Europe	8.2	2.5	Figure C-4
CAB-250V-10A-ID Power Cord, 250 VAC 16A EL-208 Plug South Africa, United Arab Emirates, India	8.2	2.5	Figure C-5
CAB-250V-10A-IS Power Cord, 250 VAC 10 A SI32 Plug Israel	8.2	2.5	Figure C-6
CAB-9K10A-IT Power Cord, 250 VAC 10 A CEI 23-16 Plug Italy	8.2	2.5	Figure C-7
CAB-9K10A-SW Power Cord, 250 VAC 10 A MP232 Plug Switzerland	8.2	2.5	Figure C-8
CAB-9K10A-UK Power Cord, 250 VAC 10 A BS1363 Plug (13 A fuse) United Kingdom	8.2	2.5	Figure C-9
CAB-AC-250V/13A Power Cord, 250 VAC 13 A IEC60320 Plug North America	6.6	2.0	Figure C-10

Table C-1   AC Power Cords for the Cisco Nexus Fabric Extender (continued)

Description	Length		Power Cord Reference Illustration
	Feet	Meters	
CAB-N5K6A-NA Power Cord, 250 VAC 13 A NEMA 6-15 Plug, North America	8.2	2.5	Figure C-11
CAB-9K12A-NA Power Cord, 125VAC 15A NEMA 5-15 Plug, North America	8.2	2.5	Figure C-12
CAB-C13-CBN Cabinet Jumper Power Cord, 250 VAC 16A, C14-C13 Connectors	2.25	0.686	Figure C-13
CAB-IND-10A(=) 10A Power cable for India	8.2	2.5	Figure C-14
CAB-C13-CBN Cabinet Jumper Power Cord, 250 VAC 16A, C14-C13 Connector	2.25	0.686	Figure C-15
CAB-C13-C14-JMPR Cabinet Jumper Power Cord, 250 VAC 10 A, C14-C15 Connector	2.2	0.7	Figure C-16
CAB-C13-C14-2M(=) Power Cord Jumper, C13-C14 Connectors, 2 Meter Length	6.6	2.0	
CAB-C13-C14-AC(=) Power Cord Jumper, C13-C14 Connectors, 3 Meter Length		3.0	

Figure C-1   CAB-250V-10A-AR
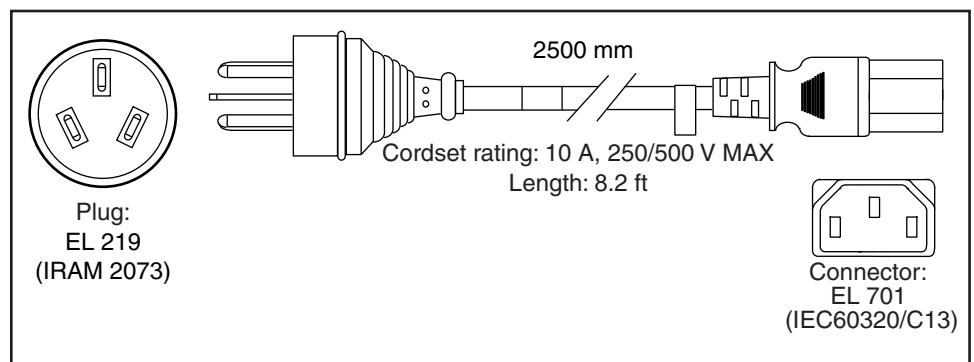
Plug:
EL 219
(IRAM 2073)

2500 mm

Cordset rating: 10 A, 250/500 V MAX
Length: 8.2 ft

Connector:
EL 701
(IEC60320/C13)

186571

Figure C-2   *CAB-9K10A-AU*

Cordset rating: 10 A, 250 V/500V
Length: 2500mm

Plug:
EL 206
A.S. 3112-2000)

Connector:
EL 701C
(IEC 60320/C15)

186581

Figure C-3   *CAB-250V-10A-CN*

Plug:
EL 218
(CCEE GB2009)

Cordset rating 10A, 250V
(2500 mm)

Connector:
EL 701
(IEC60320/C13)

186573

Figure C-4   *CAB-9K10A-EU*

Plug:
M2511

Cordset rating: 10A/16 A, 250 V
Length: 8 ft 2 in. (2.5 m)

Connector:
VSCC15

186576

Figure C-5   *CAB-250V-10A-ID*

Plug:
EL 208

Cordset rating 16A, 250V
(2500mm)

Connector:
EL 701
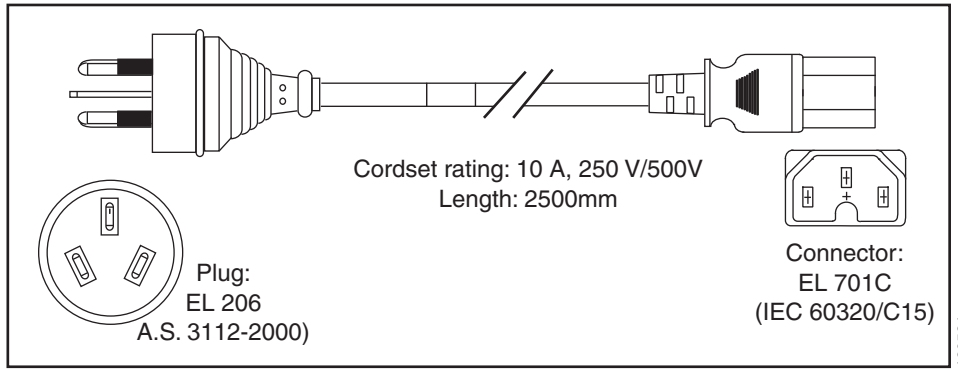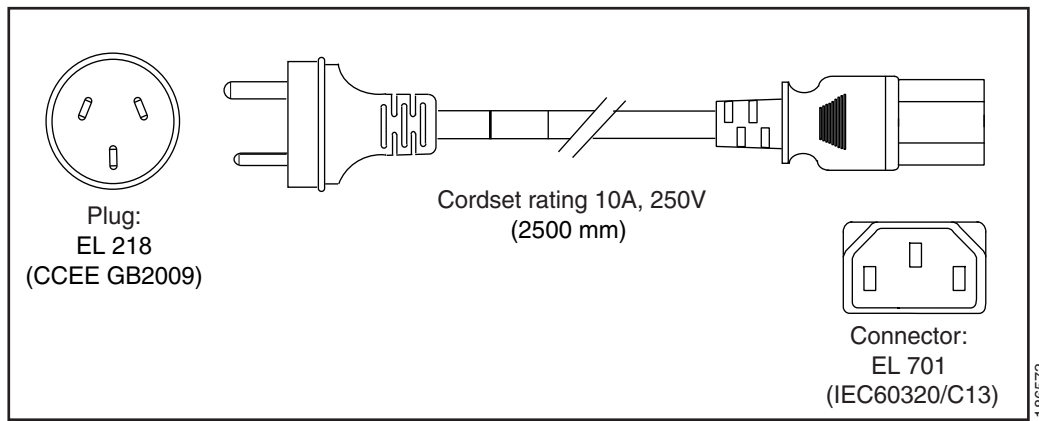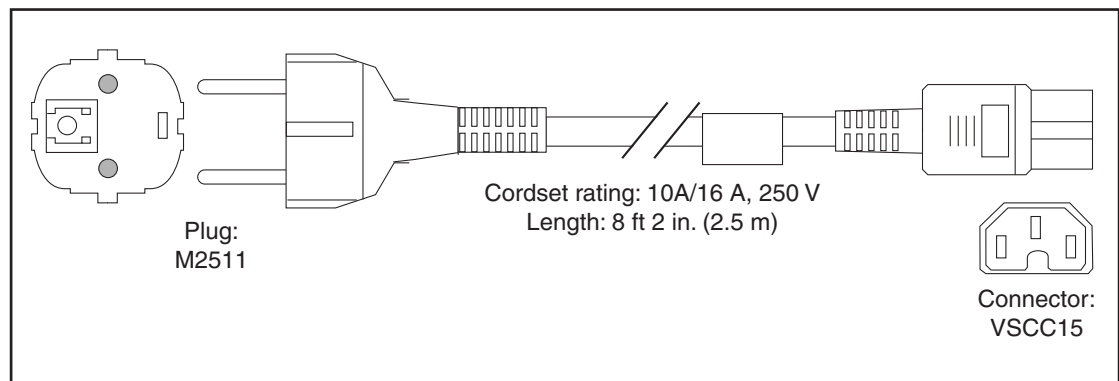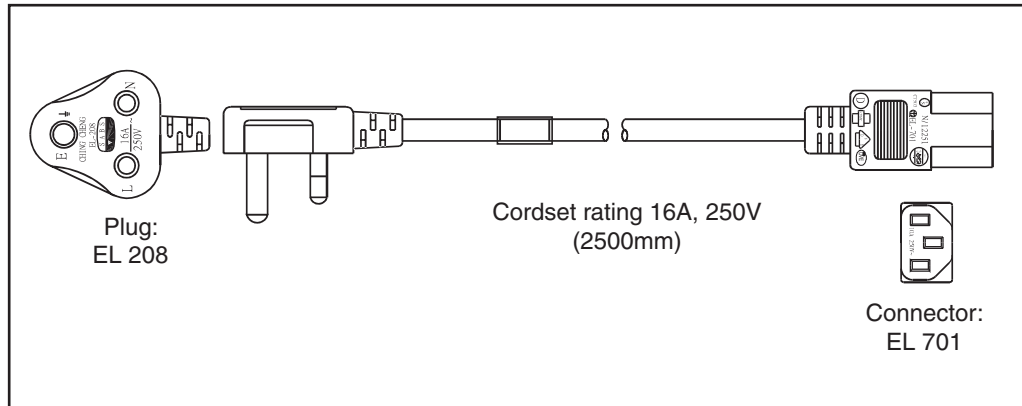
187490

Figure C-6   *CAB-250V-10A-IS*

EL-212
16A
250V

Cordset rating 10A, 250V/500V MAX
(2500 mm)

Connector:
EL 701B
(IEC60320/C13)

Plug:
EL 212
(SI-32)
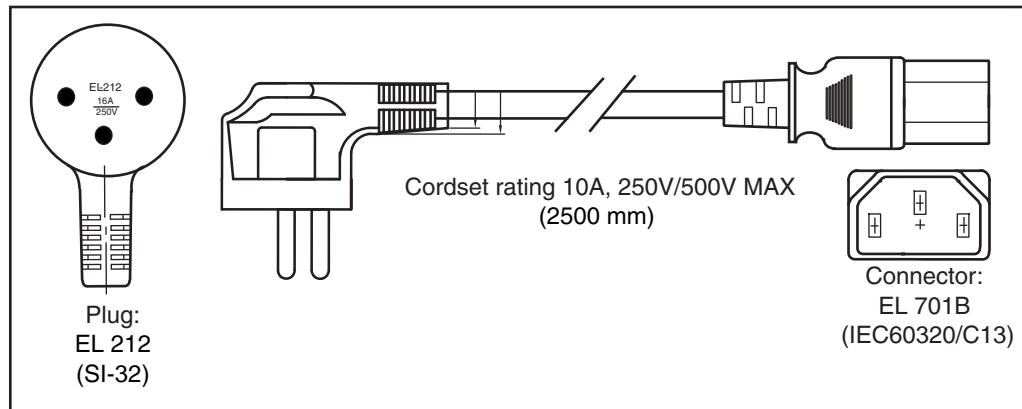
186574

Figure C-7   *CAB-9K10A-IT*

Plug:
I/3G
(CEI 23-16)

Cordset rating: 10 A, 250 V
Length: 8 ft 2 in. (2.5 m)

Connector
C15M
(EN60320/C15)
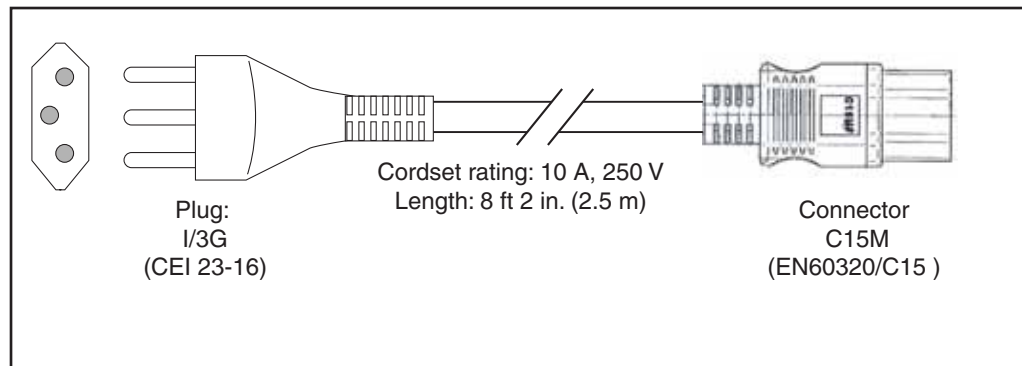
186575

Figure C-8   *CAB-9K10A-SW*

Plug:
MP232-R

Cordset rating: 10 A, 250 V
Length: 8 ft. 2 in (2.5 m)

Connector:
IEC 60320 C15

Figure C-9   *CAB-9K10A-UK*

Cordset rating: 10 A, 250 V/500 V MAX
Length: 2500mm

Plug:
EL 210
(BS 1363A) 13 AMP fuse

Connector:
EL 701C
(EN 60320/C15)
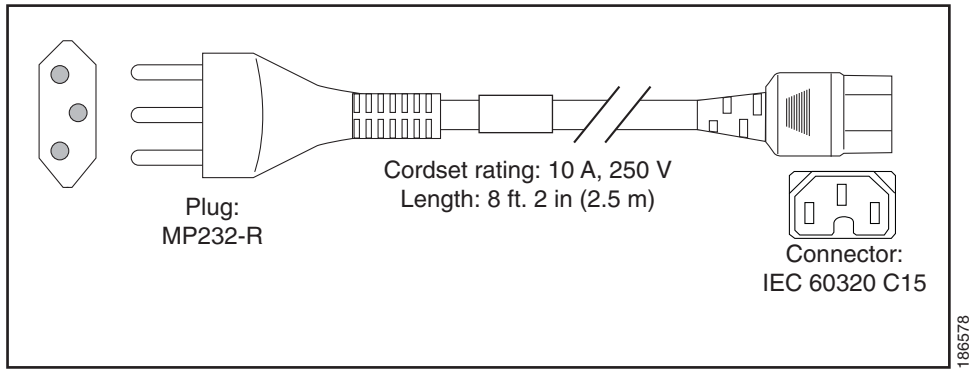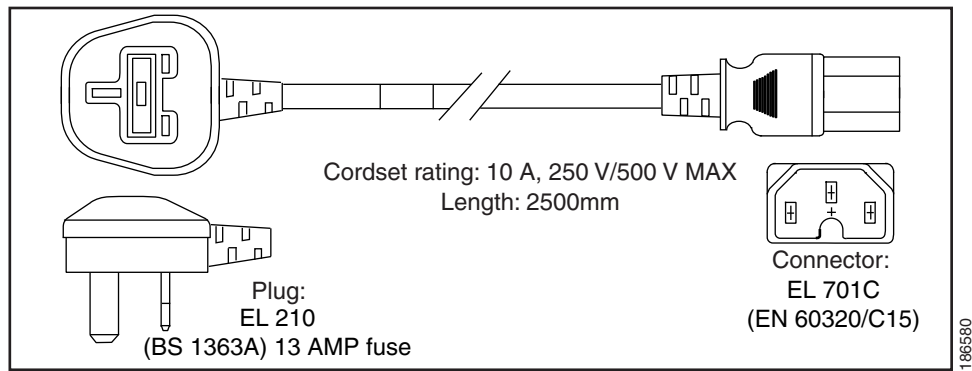
Figure C-10   *CAB-AC-250V/13A*

Cordset rating 13A, 250V
(6.6 feet) (79±2m)

Plug:
EL312MoldedTwistlock
(NEMA L6-20)

Connector:
EL 701
(IEC60320/C13)

Figure C-11   CAB-N5K6A-NA

Plug: NEMA 6-15P

Cordset rating: 10 A, 250 V
Length: 8.2 ft

Connector:
IEC60320/C13

186570

Figure C-12   CAB-9K12A-NA

Cordset rating 13A, 125V
(8.2 feet) (2.5m)

Plug:
NEMA 5-15P

Connector:
IEC60320/C15

192260

Figure C-13   CAB-C13-CBN

Cordset rating 10A, 250V
(686mm)

Plug:
SS10A

Connector:
HS10S

186569
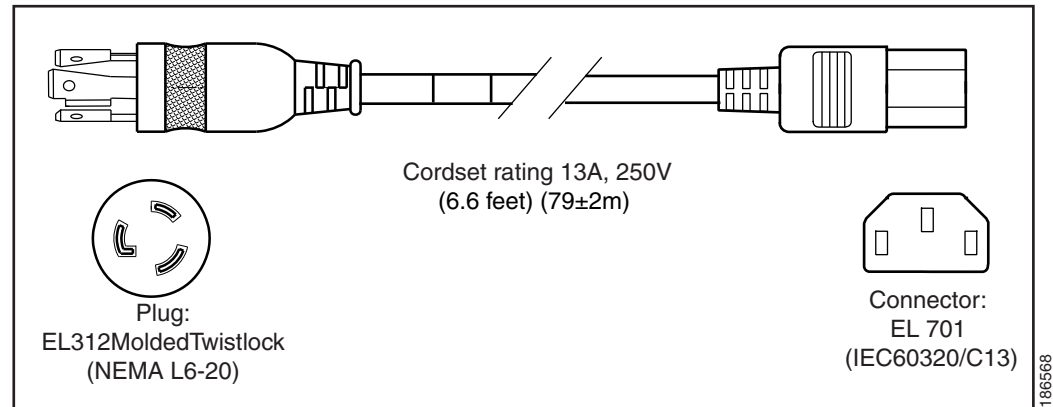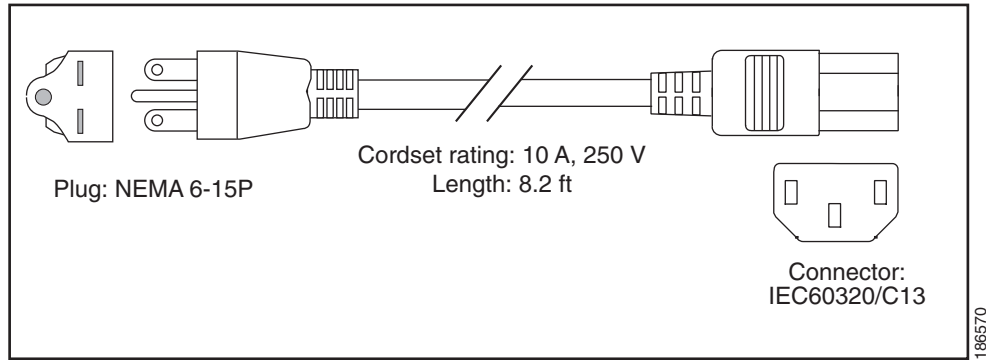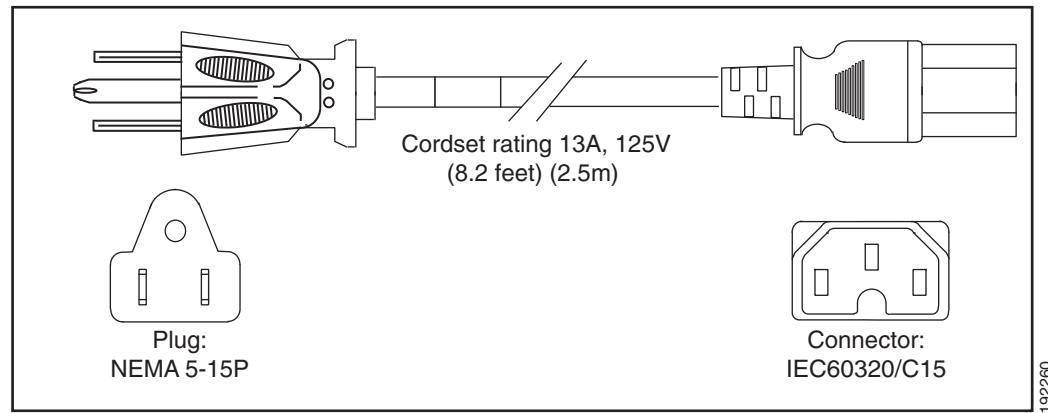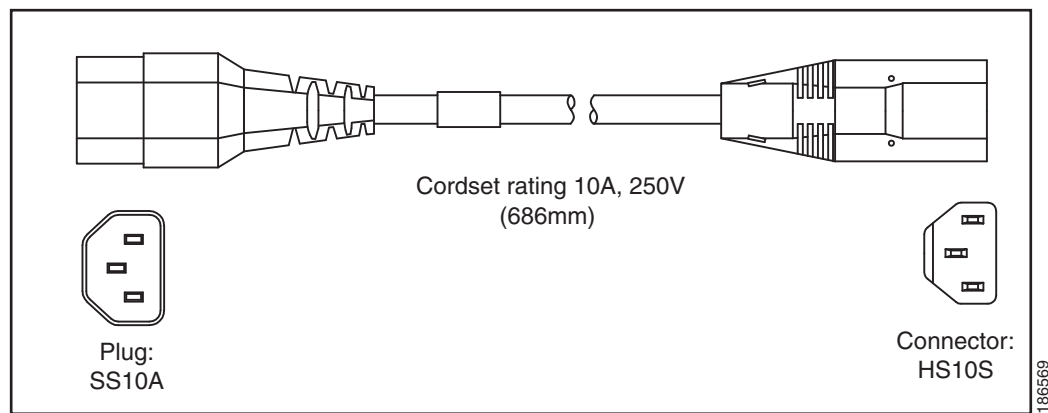
Figure C-14   CAB-IND-10A
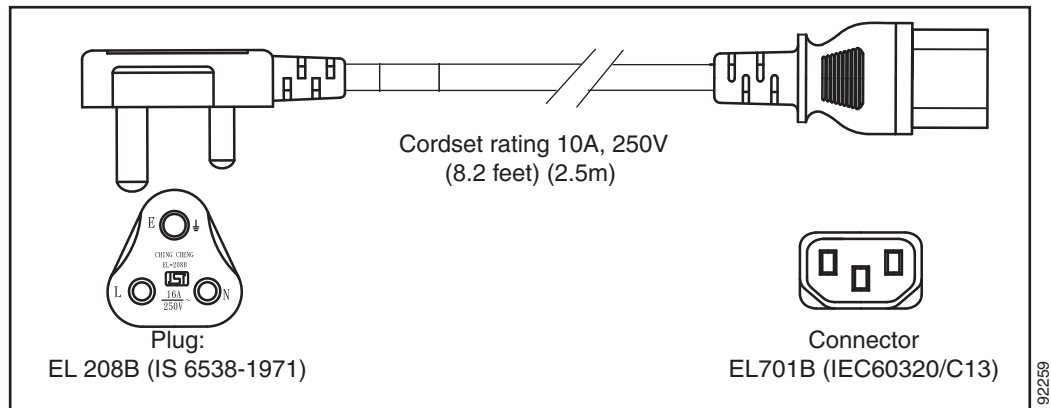
Figure C-15   CAB-C13-CBN
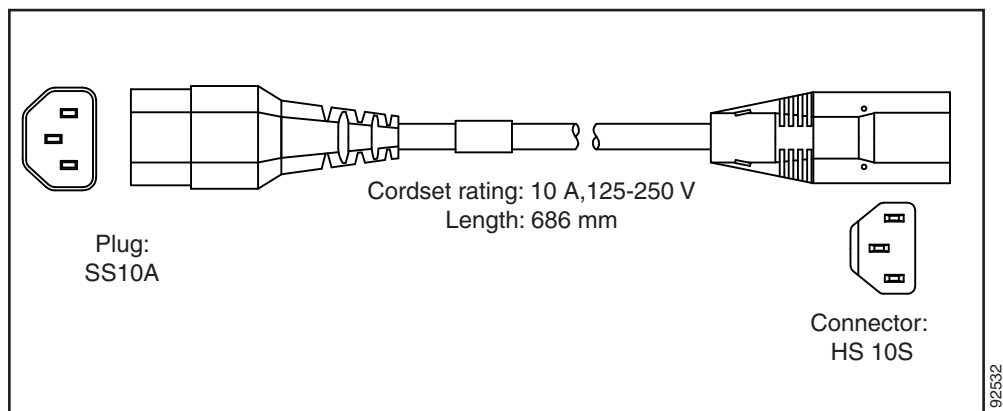
Table C-2 lists the AC power cords for the Cisco Nexus 2232TM.

Table C-2   AC Power Cords for the Cisco Nexus 2232TM

Power Cords	Description
CAB-3KX-AC=	AC power card for North America
CAB-3KX-AC-AP=	AC power card for Australia
CAB-3KX-AC-AR=	AC power card for Argentina
CAB-3KX-AC-SW=	AC power card for Switzerland
CAB-3KX-AC-UK=	AC power card for United Kingdom
CAB-3KX-AC-JP=	AC power card for Japan
CAB-3KX-AC-EU=	AC power card for Europe
CAB-3KX-AC-IT=	AC power card for Italy
CAB-3KX-AC-IN=	AC power card for India

Table C-2   AC Power Cords for the Cisco Nexus 2232TM (continued)

Power Cords	Description
CAB-3KX-AC-CN=	AC power card for China
CAB-3KX-AC-DN=	AC power card for Denmark
CAB-3KX-AC-IS=	AC power card for Israel

Table C-3 lists the power cables for the HVAC/HVDC power supplies (NXA-PHV-500W and NXA-PHV-500W-B).

Table C-3   Power Cable Specifications for HVAC/HVDC Power Supplies

Power Type	Power Cord	Description
HVAC	CAB-HVAC-SD-0.6M	2-foot (0.6 m) cable with Saf-D-Grid and SD connectors (LS-25 straight)
HVAC	CAB-HVAC-C14-2M	6.6-foot (2.0 m) cable with Saf-D-Grid and C14 connector (use for up to 240 V)
HVAC	CAB-HVAC-RT-0.6M	2-foot (0.6 m) cable with Saf-D-Grid and RT connector (LS-25 right angle)
HVDC	CAB-HVDC-3T-2M	6.6-foot (2.0 m) cable with Saf-D-Grid and three terminal connectors

Jumper Power Cord

Figure C-16 shows the plug connector on the optional jumper power cord for the Cisco Nexus Fabric Extender. The plug plugs into the Cisco Nexus Fabric Extender power supply, while the connector plugs into the receptacle of a power distribution unit for a cabinet.

Figure C-16   CAB-C13-C14-JMPR, Jumper Power Cord

Cordset rating 10A, 250V
(686mm)

Plug:
SS10A

Connector:
HS10S

186569

■   **Jumper Power Cord**
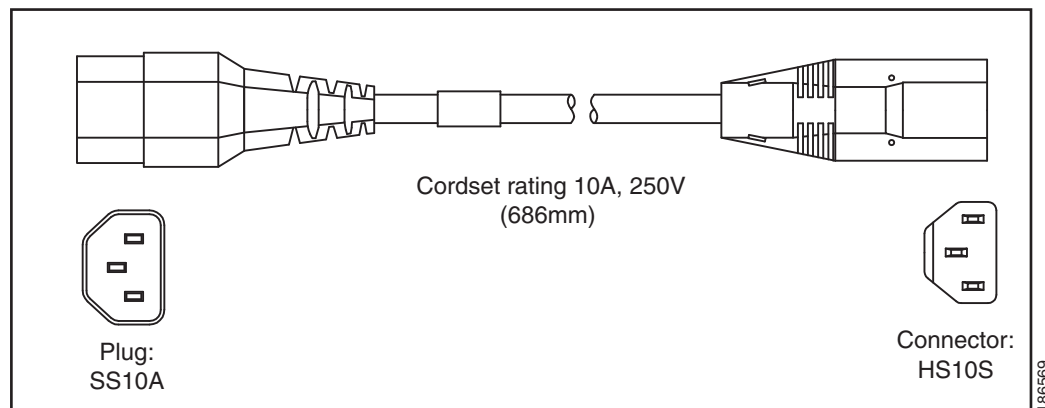
Troubleshooting Hardware Components

This chapter describes how to identify and resolve problems that might occur with the hardware components of the Cisco Nexus 2000 Series Fabric Extender (FEX) or Cisco Nexus 2300 Series FEX. It includes the following sections:

Overview

The key to success when troubleshooting the system hardware is to isolate the problem to a specific system component. The first step is to compare what the system is doing to what it should be doing. Because a startup problem can usually be attributed to a single component, it is more efficient to isolate the problem to a subsystem rather than troubleshoot each separate component in the system.

Problems with the initial power up are often caused by a module that is not firmly connected to the backplane or a power supply that has been disconnected from the power cord connector.

Overheating can also cause problems with the system, though typically only after the system has been operating for an extended period of time. The most common cause of overheating is the failure of a fan tray.

SNMP Traps

You can set SNMP traps to monitor fans, power supplies, and temperature settings, or to test a call home application. Use the following commands to set SNMP traps:

- **test pfmtest-SNMP-trap fan**
- **test pfmtest-SNMP-trap power supply**
- **test pfmtest-SNMP-trap temp-sensor**

Device Hardware Guidelines

Use the recommendations in this section to ensure the proper installation, initialization, and operation of the device. This section includes the following topics:

Installation

When installing the device, follow these best practices:

- Plan your site configuration and prepare the site before installing the chassis.
- Verify that you have the appropriate power supplies and fan trays for your chassis configuration. For each chassis, each module must have the same airflow direction. Either all modules have front-to-back airflow (no black stripe on the front) or all have back-to-front airflow (black stripe on the front). If you have modules that use different airflow directions in the same chassis, you will see an error message.
- Install the chassis following the rack and airflow guidelines in this publication.
- Verify that the chassis and DC power supplies are adequately grounded.

Initialization

When the initial system boot is complete, verify the following:

- Power supplies are supplying power to the system.
- Fan trays are operating normally.
- The system software boots successfully. See the *Cisco Nexus 2000 Series Fabric Extender Software Configuration Guide* for information about booting the system and initial configuration task.

Device Operation

To ensure proper operation of your device, do the following:

- Make a copy of the running configuration to CompactFlash for a safe backup.
- Always enter the **copy running-config startup-config** command after you modify the running configuration and ensure that the system is operating properly.
- Never use the **init system** command unless you understand that you will lose the running and startup configuration as well as the files stored on bootflash:.
- Keep backup copies of the running kickstart and the system images on CompactFlash.

Contacting Customer Service

If you are unable to solve a startup problem after using the troubleshooting suggestions in this chapter, contact a customer service representative for assistance and additional instructions. Before you call, have the following information ready to help your service provider assist you as quickly as possible:

- Date that you received the device
- Chassis serial number (located on a label on the right of the rear panel of the chassis)
- Type of software and release number
- Maintenance agreement or warranty information
- Brief description of the problem
- Brief explanation of the steps that you have already taken to isolate and resolve the problem

To contact Cisco Technical Support, go to:
http://www.cisco.com/c/en/us/support/web/tsd-cisco-worldwide-contacts.html.

Contacting Customer Service

LEDs

This appendix describes the conditions indicated by the chassis and module LEDs on the Cisco Nexus Fabric Extenders (FEXs).

This appendix includes the following sections:

Chassis and Module LEDs for the Cisco Nexus Fabric Extenders

This section includes the following topics:

Chassis and Module LED Descriptions

Table E-1 describes the chassis LEDs for the Cisco Nexus Fabric Extenders.

Table E-1   LEDs for the Cisco Nexus Fabric Extenders

Component	LED	Status	Description
Chassis (port side exhaust and back)	ID	On (blue)	Identifies the chassis receiving the beacon signal.
	Status	Solid on (green)	All diagnostics pass. The module is operational.
		Blinking (green)	The module is cold booting, or is operational but the network interface ports are not connected to a parent switch.
		Off	The module is not receiving power.
		On (amber)	The module is booting or running diagnostics. An overtemperature condition has occurred. The temperature threshold has been exceeded by a small value during environmental monitoring.
		Blinking (amber)	An overtemperature condition has occurred. The temperature threshold has been exceeded by a large value during environmental monitoring. If the module fails during initial reset, the LED continues to blink and the module does not come online. The module has a runtime failure and is brought offline.
Fan and fan tray (port side exhaust of chassis)	Status	Solid on (green)	All diagnostics pass. The module is operational.
		Off	The module is not receiving power.
		Solid on (amber)	The module is booting or running diagnostics.
		Blinking (amber)	If the module fails during initial reset, the LED continues to blink and the module does not come online. The module has a runtime failure and is brought offline.

Table E-1   LEDs for the Cisco Nexus Fabric Extenders (continued)

Component	LED	Status	Description
Power supply (port side exhaust of chassis)	OK (green)	Solid on	Power supply is on and okay.
		Blinking	12 voltage standby (VSB) is on but the power supply unit is not powering the other modules.
		Off	No AC power to the power supply.
	FAULT (amber)	Solid on	Power supply failures, over-voltage, over-current, or over temperature has occurred.
		Blinking	AC is present, 12 VSB on, and the power supply is off.
		Off	Operating normally.
Port LED	Indicates LED status	Off	The port is not active or the link is not connected.
		Solid on (green)	The port is active. The link is connected and operational.
		Solid on (amber)	The module or port is disabled through the CLI command or the module is initializing.
		Blinking (amber)	The port is faulty and has been disabled.

For a description of the two power supply status, see the "Power Supply Status" section on page E-3.

Power Supply Status

This section describes the power supply LED indicators for the Cisco Nexus Fabric Extenders. Table E-2 describes the status indicated by the Cisco Nexus 2332TQ, Cisco Nexus 2348TQ, Cisco Nexus 2348TQ-E, Cisco Nexus 2348UPQ, Cisco Nexus 2248TP-E, Cisco Nexus 2248TP, 2232PP, and 2224TP power supply LEDs. Table E-3 describes the status indicated by the Cisco Nexus 2148T power supply LEDs.

Table E-2   Power Supply LED Indicators for the Cisco Nexus 2332TQ, 2348TQ-E/TQ, 2348UPQ, 2248TP-E/TP, 2232PP, and 2224TP

Condition	OK LED Status (Green)	FAIL LED Status (Amber)
No AC power to the power supplies	Off	Off
Power supply failure (includes overvoltage, overcurrent, overtemperature, and fan failure)	Off	On
Power supply warning events where the power supply continues to operate (high temperature, high power, and slow fan)	Off	1 blinking
AC present /voltage standby (VSB) on, and power supply unit off	blinking	Off
Power supply On and OK	On	Off

Table E-3   Power Supply LED Indicators for the Cisco Nexus 2148T

Condition	INPUT OK LED Status (Green)	OUTPUT OK LED Status (Red)
No AC power to the power supplies	Off	Off
Power supply failure (includes overvoltage, overcurrent, overtemperature, and fan failure)	Off	On
Power supply warning events where the power supply continues to operate (high temperature, high power, and slow fan)	Off	Blinking
AC present and power supply unit off	Blinking	Off
Power supply On and OK	On	Off

Port LEDs

This section includes the following topics:

Ethernet Port LEDs

Table E-4 lists the LED descriptions for the RJ-45 Ethernet port LEDs.

Table E-4   Ethernet Port LED Descriptions

LED	Status	Description
Left	Off	No link
	Solid green	Physical link
Right	Off	No activity
	Solid green (blinking green on the Cisco Nexus 2348TQ-E)	Activity

Ethernet and Fibre Channel LEDs

There are 20 to 26 port activity LEDs on the FEX depending on whether the module is a Fibre Channel or 10-Gigabit Ethernet module. Table E-5 describes the behavior of the port LEDs.

Table E-5   Port-Level LEDs

Link State	LED State	Notes
Link Down	Off	—
POST failed on port	Blinking (Amber)	—

Table E-5   Port-Level LEDs

Link State	LED State	Notes
Administrative disabled	On (Amber)	Depending on the product, the LED could be off, or solid amber
Link Up, port in STP forwarding state	On (Green)	Blinks based on network activity

■   **Port LEDs**

Accessory Kit

This appendix lists the accessory kit contents for the Cisco Nexus Fabric Extenders (FEXs). This appendix includes the following sections:

- Accessory Kit for Cisco Nexus 2300 Series FEXs, page F-7
- Accessory Kit for Cisco Nexus 2248TP-E, 2224TP, 2232PP, 2248TP, 2232TM, and 2148T, page F-7

Accessory Kit for Cisco Nexus 2300 Series FEXs

Accessory kits for the Cisco Nexus 2300 Series FEXs contain the following items:

- 2 slider rails
- 1 rack-mount guide
- 1 rack-mount bracket
- 10 M4 x 0.7 x 7-mm Phillips countersunk screws
- 1 ground lug kit

Table F-2 provides ordering information for the Cisco Nexus 2300 Series FEXs.

Table F-1   Accessory Kit Information for the Cisco Nexus 2300 Series Fabric Extenders

Accessory Kit	Details
N2300-ACC-KIT	Cisco Nexus 2300 FEX accessory kit
N2300-ACC-KIT=	Cisco Nexus 2300 FEX accessory kit, spare

Note   Additional parts can be ordered from your customer service representative.

Accessory Kit for Cisco Nexus 2248TP-E, 2224TP, 2232PP, 2248TP, 2232TM, and 2148T

Accessory kits for the Cisco Nexus 2148T, 2224TP, 2232PP, 2248TP, 2248TP-E, and 2232TM FEXs contain the following items:

- 2 slider rails

- 2 rack-mount guides

- 2 rack-mount brackets

- 16 M4 x 0.7 x 8-mm Phillips countersunk screws

- 1 ground lug kit

Table F-2 provides ordering information for the Cisco Nexus 2148T, 2224TP, 2232PP, 2248TP-ETP, and 2232TM FEXs.

Table F-2   Accessory Kit Information for the Cisco Nexus 2148T, 2224TP, 2232PP, 2248TP, 2248TP-E, and 2232TM Fabric Extenders

Accessory Kit	Details
N2K-C2148T-ACC	Cisco Nexus 2000 FEX 1GE accessory kit, spare
N2200-ACC-KIT	Cisco Nexus 2200 FEX accessory kit, spare

Note   Additional parts can be ordered from your customer service representative.

Site Preparation and Maintenance Records

This appendix includes the following records to use when installing the Cisco Nexus Fabric Extender (FEX):

- Site Preparation Checklist, page G-1
- Contact and Site Information, page G-3
- Chassis and Module Information, page G-3

Note For information about how to query the device for configuration information, see the *Cisco Nexus 2000 Switch Configuration Guide*.

Site Preparation Checklist

Planning the location and layout of your equipment rack or wiring closet is essential for successful device operation, ventilation, and accessibility. Table G-1 lists the site planning tasks that we recommend completing before installing the Cisco Nexus FEX.

Consider heat dissipation when sizing the air-conditioning requirements for an installation. See Table B-2 on page B-5 for the environmental requirements and the "Power Specifications" section on page B-1 for power and heat ratings.

Table G-1   Site Planning Checklist

Task No.	Planning Activity	Verified By	Time	Date
1	Space evaluation: • Space and layout • Floor covering • Impact and vibration • Lighting • Maintenance access			
2	Environmental evaluation: • Ambient temperature • Humidity • Altitude • Atmospheric contamination • Air flow			
3	Power evaluation: • Input power type • Power receptacles[1] • Receptacle proximity to the equipment • Dedicated circuit for power supply • Dedicated (separate) circuits for redundant power supplies • UPS[2] for power failures			
4	Grounding evaluation: • Circuit breaker size • CO ground (AC-powered systems)			
5	Cable and interface equipment evaluation: • Cable type • Connector type • Cable distance limitations • Interface equipment (transceivers)			
6	EMI[3] evaluation: • Distance limitations for signaling • Site wiring • RFI[4] levels			

1.   Verify that the power supply installed in the chassis has a dedicated AC source circuit.

2.   UPS = uninterruptible power supply.

3. EMI = electromagnetic interference.

4. RFI = radio frequency interference.

Contact and Site Information

Use the following worksheet (see Table G-2) to record contact and site information.

Table G-2   Contact and Site Information

Contact person	
Contact phone	
Contact e-mail	
Building/site name	
Data center location	
Floor location	
Address (line 1)	
Address (line 2)	
City	
State	
Zip code	
Country	

Chassis and Module Information

Use the following worksheet (see Table G-3) to record information about the chassis.

Contract Number_____

Chassis Serial Number_____

Product Number_____

Table G-3   Network-Related Information

Device IP address	
Device IP netmask	
Host Name	
Domain name	
IP broadcast address	
Gateway/router address	
DNS address	
Modem telephone number	