Cornelis™ Omni-Path Express™ Gateway

Installation and Setup Guide

November 2022
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Revision History

Date	Rev	Description
Nov 2022	2.0	Minor updates throughout
Oct 2021	1.0	Initial release

1. Preface

This guide is part of the documentation set for the Cornelis Omni-Path Express (OPX) Fabric, which is an end-to-end solution consisting of Cornelis Omni-Path Express Host Fabric Interface Adapters (HFIs), OPX Switches, and fabric management and development tools.

The Cornelis Omni-Path Express Fabric delivers the next generation, High Performance Computing (HPC) network solution that is designed to cost-effectively meet the growth, density, and reliability requirements of large-scale HPC clusters.

Both the OPX Fabric and standard InfiniBand (IB) can send Internet Protocol (IP) traffic over the fabric, or *IPoFabric*. In this document it may also be referred to as *IP over IB* or *IPoIB*. From a software point of view, IPoFabric behaves the same way as IPoIB, and in fact uses an ib_ipoib driver to send IP traffic over the ib0/ib1 ports.

1.1. Intended Audience

The intended audience for the OPX document set is network administrators and other qualified personnel.

1.2. Documentation Library

Go to the Cornelis Customer Center to download the publications from the Release Library.

Use the tasks listed in this table to find the corresponding document.

Task	Document Title	Description
Using the OPX documentation set	*Cornelis Omni-Path Express Fabric Quick Start Guide*	A roadmap to Cornelis' comprehensive library of publications describing all aspects of the product family. This document outlines the basic steps for installing your OPX cluster and ensuring it is operational.
Setting up an OPX cluster	*Cornelis Omni-Path Express Fabric Setup Guide*	Provides a high-level overview of the steps required to stage a customer-based installation of the OPX Fabric. Procedures and key reference documents, such as OPX user and installation guides, are provided to clarify the process. Additional commands and best known methods are defined to facilitate the installation process and troubleshooting.
Installing hardware	*Cornelis Omni-Path Express Fabric Switches Hardware Installation Guide*	Describes the hardware installation and initial configuration tasks for OPX Director Class Switches and OPX Edge Switches.
	Cornelis Omni-Path Express Host Fabric Interface Installation Guide	Contains instructions for installing the OPX HFI in an OPX cluster.

Task	Document Title	Description
	Cornelis Omni-Path Express Gateway Installation and Setup Guide	Describes the hardware installation and set up tasks for the OPX Gateways.
Installing Host Software Installing HFI firmware Installing switch firmware (externally-managed switches)	*Cornelis Omni-Path Express Fabric Software Installation Guide*	Describes using a Text-based User Interface (TUI) to guide you through the installation process. You have the option of using command line interface (CLI) commands to perform the installation or install using the Linux distribution software.
Managing a switch using Chassis Viewer GUI Installing switch firmware (managed switches)	*Cornelis Omni-Path Express Fabric Switches GUI User Guide*	Describes the graphical user interface (GUI) of the OPX Chassis Viewer GUI. This document provides task-oriented procedures for configuring and managing the OPX Switch family. Help: GUI embedded help files
Managing a switch using the CLI Installing switch firmware (managed switches)	*Cornelis Omni-Path Express Fabric Switches Command Line Interface Reference Guide*	Describes the CLI task information for the OPX Switch family. Help: -help for each CLI
Managing a fabric using FastFabric	*Cornelis Omni-Path Express Fabric Suite FastFabric User Guide*	Provides instructions for using the set of fabric management tools designed to simplify and optimize common fabric management tasks. The management tools consist of TUI menus and CLI commands. Help: -help and man pages for each CLI. Also, all host CLI commands can be accessed as console help in the Fabric Manager GUI.
Managing a fabric using Fabric Manager	*Cornelis Omni-Path Express Fabric Suite Fabric Manager User Guide*	The Fabric Manager uses a well-defined management protocol to communicate with management agents in every OPX HFI and switch. Through these interfaces the Fabric Manager can discover, configure, and monitor the fabric.
	Cornelis Omni-Path Express Fabric Suite Fabric Manager GUI User Guide	Provides an intuitive, scalable dashboard and set of analysis tools for graphically monitoring fabric status and configuration. This document is a user-friendly alternative to traditional command-line tools for day-to-day monitoring of fabric health. Help: Fabric Manager GUI embedded help files
Configuring and administering HFI and IPoIB driver Running MPI applications on OPX	*Cornelis Omni-Path Express Fabric Host Software User Guide*	Describes how to set up and administer the OPX HFI after the software has been installed. This document is for cluster administrators and Message-Passing Interface (MPI) application programmers.

Task	Document Title	Description
Writing and running middleware that uses OPX software	*Cornelis Performance Scaled Messaging 2 (PSM2) Programmer's Guide*	Provides a reference for programmers working with the PSM2 Application Programming Interface (API). The Performance Scaled Messaging 2 API (PSM2 API) is a low-level user-level communications interface.
	Cornelis Omni-Path Express OPX_Provider Installation and Setup Application Note	Provides a reference for programmers working with the OPX provider.
Optimizing system performance	*Cornelis Omni-Path Express Fabric Performance Tuning User Guide*	Describes BIOS settings and parameters that have been shown to ensure best performance, or make performance more consistent, on the OPX Architecture. If you are interested in benchmarking the performance of your system, these tips may help you obtain better performance.
Designing an IP or LNet router on OPX	*Cornelis Omni-Path Express IP and LNet Router Design Guide*	Describes how to install, configure, and administer an IPoIB router solution (Linux IP or LNet) for inter-operating between an OPX Fabric and a legacy InfiniBand fabric.
Building Containers for OPX Fabrics	*Building Containers for Cornelis Omni-Path Express Fabrics using Docker and Singularity Application Note*	Provides basic information for building and running Docker and Singularity containers on Linux-based computer platforms that incorporate OPX networking technology.
Writing management applications that interface with OPX	*Cornelis Omni-Path Express Management API Programmer's Guide*	Contains a reference for programmers working with the OPX Architecture Management (OPAMGT) Application Programming Interface (API). The OPAMGT API is a C-API permitting in-band and out-of-band queries of the FM's Subnet Administrator and Performance Administrator.
Using NVM over Fabrics on OPX	*Configuring Non-Volatile Memory Express (NVMe) over Fabrics on Cornelis Omni-Path Express Application Note*	Describes how to implement a simple OPX Architecture-based point-to-point configuration with one target and one host server.
Learning about new release features, open issues, and resolved issues for a particular release	*Cornelis Omni-Path Express Fabric Software Release Notes*	
	Cornelis Omni-Path Express Fabric Manager GUI Software Release Notes	
	Cornelis Omni-Path Express Fabric Switches Release Notes (includes managed and externally-managed switches)	
	Cornelis Omni-Path Express Fabric Unified Extensible Firmware Interface (UEFI) Release Notes	
	Cornelis Omni-Path Express Fabric Thermal Management Microchip (TMM) Release Notes	
	Cornelis Omni-Path Express Fabric Firmware Tools Release Notes	

1.2.1. How to Search the Cornelis Omni-Path Express Documentation Set

Many PDF readers, such as Adobe Reader and Foxit Reader, allow you to search across multiple PDFs in a folder.

Follow these steps:

1. Download and unzip all the publications into a single folder.
2. Open Acrobat Reader and use **CTRL-SHIFT-F** to open the Advanced Search window.
3. Select **All PDF documents in...**
4. Select **Browse for Location** in the dropdown menu and navigate to the folder containing the PDFs.
5. Enter the string you are looking for and click **Search**.

Use advanced features to further refine your search criteria. Refer to your PDF reader Help for details.

1.3. Document Conventions

The following conventions are standard for Cornelis Omni-Path Express documentation:

- **Note:** provides additional information.
- **Caution:** indicates the presence of a hazard that has the potential of causing damage to data or equipment.
- **Warning:** indicates the presence of a hazard that has the potential of causing personal injury.
- Text in blue font indicates a hyperlink (jump) to a figure, table, or section in this guide. Links to websites are also shown in blue. For example:

  See Section 1.8 "License Agreements" for more information.

  For more information, visit www.cornelisnetworks.com.

- Text in **bold** font indicates user interface elements such as menu items, buttons, check boxes, key names, keystrokes, or column headings. For example:

  Click the **Start** button, point to **Programs**, point to **Accessories**, and then click **Command Prompt**.

  Press **CTRL+P** and then press the **UP ARROW** key.

- Text in `Courier` font indicates a file name, directory path, or command line text. For example:

  Enter the following command: `sh ./install.bin`

- Text in *italics* indicates terms, emphasis, variables, or document titles. For example:

  Refer to *Cornelis Omni-Path Express Fabric Software Installation Guide* for details.

In this document, the term *chassis* refers to a managed switch.

Procedures and information may be marked with one of the following qualifiers:

- **(Linux)** – Tasks are only applicable when Linux is being used.
- **(Host)** – Tasks are only applicable when OPX Host Software or OPXS is being used on the hosts.
- **(Switch)** – Tasks are applicable only when OPX Switches or Chassis are being used.
- Tasks that are generally applicable to all environments are not marked.

1.4. Best Practices

Note the following Cornelis recommendations:

- Update to the latest versions of OPX firmware and software to obtain the most recent functional and security updates.
- To improve security:
  - administrators should log out users and disable multi-user logins prior to performing provisioning and similar tasks.
  - update the default HTTPS certificate (refer to the *Cornelis Omni-Path Express Fabric Switches GUI User Guide*, "Updating the Certificate" for details).
  - using 48-bit CRC when the peak bandwidth is not critical in the fabric. 10.8.2.0 firmware introduced a feature to improve the detection of failing cables while also providing avoidance of possible downstream issues.

    Due to the improved detection of failing cables provided by 10.8.2.0 firmware, it is possible that failing cables that were not previously detected by earlier firmware will now be detected by the 10.8.2.0 firmware. It is expected that the 48-bit CRC and the 10.8.2.0 firmware detection methods will have similar detection robustness. When a failing cable is identified, it is important to replace the cable at the earliest possible convenience.
- To improve security, Cornelis recommends configuring the `MgmtAllowed` setting and consider limiting access to port configuration changes by limiting access to Userspace Management Datagrams (UMADs). Refer to the *Cornelis Omni-Path Express Fabric Software Installation Guide*, "About User Queries Settings" for more information.
- Ensure all fabrics contain at least one managed switch to troubleshoot potential issues with externally-managed edge switches.

1.5. Laser Safety Information

This product may use Class 1 laser optical transceivers to communicate over the fiber optic conductors. The U.S. Department of Health and Human Services (DHHS) does not consider Class 1 lasers to be hazardous. The International Electrotechnical Commission (IEC) 825 Laser Safety Standard requires labeling in English, German, Finnish, and French stating

that the product uses Class 1 lasers. Because it is impractical to label the transceivers, the following label is provided in this manual.

1.6. Electrostatic Discharge Sensitivity Precautions

The assemblies used in the switch chassis are ESD sensitive. Observe ESD handling procedures when handling any assembly used in the switch chassis.

1.7. Cornelis Omni-Path Express Fabric Design Generator for Cornelis Omni-Path Express Fabric

The Fabric Design Generator generates sample cluster configurations based on key cluster attributes, including a side-by-side comparison of up to four cluster configurations. The tool also generates parts lists and cluster diagrams.

To access the Fabric Design Generator for OPX Fabric, go to Go to Cornelis™ Omni-Path Express™ Fabric Design Generator.

1.8. License Agreements

This software is provided under one or more license agreements. Please refer to the license agreement(s) provided with the software for specific detail. Do not install or use the software until you have carefully read and agree to the terms and conditions of the license agreement(s). By loading or using the software, you agree to the terms of the license agreement(s). If you do not wish to so agree, do not install or use the software.

1.9. Technical Support

Technical support for Cornelis Omni-Path Express products is available 24 hours a day, 365 days a year. Please contact Cornelis Networks Customer Support by visiting www.cornelisnetworks.com or send your request directly to support@cornelisnetworks.com.

2. Introduction

This guide provides instructions for the hardware installation and initial configuration tasks for the Cornelis Omni-Path Express Gateways listed in the following table.

Table 1. Cornelis Omni-Path Express Gateways

Item Name	Item Number	Description
100GWYBEB02	99AJ7P	Cornelis Omni-Path Express 200 Gb/s InfiniBand EDR Gateway
100GWYBHD02	99AJ6C	Cornelis Omni-Path Express 200 Gb/s InfiniBand HDR Gateway
100GWYE2G02	99AJ6F	Cornelis Omni-Path Express 200 Gb/s Ethernet Gateway

For details about the other documents for the Cornelis Omni-Path Express product line, refer to the Documentation Library.

2.1. Overview

The Cornelis Omni-Path Express Gateway enables the Cornelis Omni-Path Express Fabric nodes to communicate with either an Ethernet network or InfiniBand fabric. In many cases, this bridging solution is required to enable communication with legacy storage systems implemented with Ethernet or InfiniBand interfaces.

Refer to the *Cornelis Omni-Path Express Gateway Release Notes* for more information.

2.2. Before You Begin

- Familiarize yourself with the available documentation by referring to Section 1.2 "Documentation Library" in this document.
- Download other OPX Fabric Software (not required for OPX Gateway installation):

  Go to the Cornelis Customer Center. Select the **Release Library** to download the software you need:
  - OPXS Software package for management nodes.
  - OPX Host Software package for compute nodes.
  - OPX Switch Firmware package (*.emfw) for externally-managed switches.
  - OPX Switch Firmware package (*.spkg) for managed switches.
  - OPX HFI Platform Firmware for UEFI, TMM, and Firmware Tools
  - OPXS Fabric Manager GUI software.
- Make sure you have access to OS packages and some extended packages that are prerequisites for installing the Cornelis Omni-Path Express Fabric Suite software, as described in the *Cornelis Omni-Path Express Fabric Software Release Notes*, "OS RPMs Installation Prerequisites".
- Ensure that your fabric is set up before executing any of the configuration steps.

2.3. Product Documentation, Software, and Drivers

The OPX Gateway comes pre-installed with an operating system. The OPX Fabric Software is available on the Gateway for easy installation. In the event an update is required, Cornelis recommends contacting the Cornelis Networks Customer Support for assistance. In addition, go to the Cornelis Customer Center to access all OPX Fabric Software and Publications.

NOTE

This manual may be periodically updated without notice. Please check the Cornelis Customer Center website for possible updates to the manual revision level.

2.4. Warnings

Special attention should be given to the following symbols used in this manual.

Warning! Indicates important information given to prevent equipment/property damage or personal injury.

Warning! Indicates high voltage may be encountered when performing a procedure.

2.5. Safety Information

2.5.1. Statement 1

Disconnect Device: This unit may have more than one power cord. To reduce the risk of electrical shock, disconnect all power cords before servicing unit.

Apparaat loskoppelen: Deze eenheid heeft mogelijk meer dan een stroomkabel. Verminder het risico op een elektrische schok door alle stroomkabels los te koppelen voordat u onderhoud pleegt aan de eenheid.

Irrota laite. Yksikössä saattaa olla useampia kuin yksi virtajohto. Irrota kaikki virtajohdot ennen yksikön huoltamista, niin sähköiskun vaara pienenee.

Déconnecter l'appareil: Cette unité peut disposer de plusieurs cordons d'alimentation. Déconnectez tous les cordons d'alimentation avant son entretien pour réduire le risque d'électrocution.

Gerät trennen: Diese Komponente verfügt möglicherweise über mehrere Netzkabel. Trennen Sie alle Netzkabel bevor Sie die Komponente warten, um die Gefahr eines elektrischen Schlags zu vermeiden.

Scollegare il dispositivo: L'unità potrebbe avere più di un cavo di alimentazione. Per ridurre il rischio di scosse elettriche, scollegare tutti i cavi di alimentazione prima di intervenire sull'unità.

Frakobling av enheten: denne enheten kan ha mer enn én strømledning. For å redusere faren for elektrisk sjokk, må alle strømkablene trekkes ut før enheten vedlikeholdes.

Desligar dispositivo: Esta unidade pode ter mais de um cabo de alimentação. Para reduzir o risco de choque eléctrico, desligue todos os cabos de alimentação antes de fazer a manutenção da unidade.

Desconexión de dispositivo: Esta unidad puede tener más de un cable de alimentación eléctrica. Para reducir el riesgo de electrocución, desconecte todos los cables antes de realizar cualquier servicio técnico en la unidad.

Koppla bort enhet. Den här enheten kan ha mer än en strömsladd. Reducera risken för elektrisk stöt genom att koppla bort alla strömsladdar innan enheten underhålls.

Szüntesse meg az eszköz tápellátását: Ez az egység egynél több tápvezetékkel rendelkezhet. Az áramütés kockázatának csökkentése érdekében minden tápvezetéket húzzon ki az egység szervizelése elott.

Отключите устройство: В данном устройстве может быть более одного сетевого шнура. Во избежание поражения электрическим током отсоедините все сетевые шнуры до проведения технического обслуживания устройства.

断开装置-此装置可能有一个以上电源电缆。为了减少电击风险，请在维修该装置前断开所有电源电缆。

デバイスを外してください - このユニットには複数の電源ユニットが接続されている可能性があります。感電のリスクを軽減するため、ユニットを修理する前にすべての電源コードを外してください。

Desconectar dispositivo: esta unidade pode ter mais de um cabo de energia. Para reduzir o risco de choque elétrico, desconecte todos os cabos de energia antes de salvar a unidade.

장치 연결 해제: 이 장치에는 2개 이상의 전원 코드가 있을 수 있습니다. 감전 사고의 위험을 줄이기 위해 장치 서비스 전에 모든 전원 코드의 연결을 해제하십시오.

斷開裝置：此裝置可能有多根電源線。為降低電擊的風險，請在維修裝置前中斷所有電源線的連接。

ניתוק ההתקן: ייתכן שליחידה זו יש יותר מכבל חשמל אחד. כדי להפחית את הסיכון להתחשמלות, נתק את כל כבלי החשמל לפני ביצוע טיפולים ביחידה.

Odłączanie: urządzenie może być wyposażone w więcej niż jeden przewód zasilający. Aby ograniczyć ryzyko porażenia prądem elektrycznym, przed przystąpieniem do serwisowania urządzenia należy odłączyć wszystkie przewody zasilające.

Odpojení zařízení: tato jednotka může mít více napájecích kabelů. Aby se snížilo nebezpečí úrazu elektrickým proudem, před servisem a údržbou jednotky odpojte všechny napájecí kabely.

Αποσύνδεση συσκευής: αυτή η μονάδα ενδέχεται να έχει περισσότερα από ένα καλώδια τροφοδοσίας. Για να μειωθεί ο κίνδυνος ηλεκτροπληξίας, αποσυνδέστε όλα τα καλώδια τροφοδοσίας πριν από τη συντήρηση της μονάδας.

Memutuskan Hubungan Perangkat: Unit ini mungkin memiliki lebih dari satu kabel daya. Untuk mengurangi risiko sengatan listrik, putuskan semua hubungan kabel daya sebelum menyervis unit.

Cihaz Bağlantısını Kesin: Bu ünite birden fazla güç kablosuna sahip olabilir. Elektrik çarpması riskini engellemek için, üniteyi hizmete sokmadan önce tüm güç kablolarının bağlantısını kesin.

Одвојте уређај: Ова јединица може имати више од једног кабла за напајање. Да бисте смањили ризик од струјног удара, одвојте све каблове за напајање пре сервисирања јединице.

2.5.2. Statement 2

Chassis Lifting: Use safe practices when lifting.

Note: Use a team of people appropriate to the weight of each specified product and in conjunction with applicable guidelines. Whenever possible, use a mechanical lift.

Chassis optillen: Volg de veiligheidsinstructies bij het optillen.

ANMERKUNG: Gebruik genoeg mensen voor het gewicht van elk gespecificeerd product en hanteer de toepasselijke richtlijnen. Gebruik waar mogelijk een mechanisch tilapparaat.

Kotelon nostaminen. Noudata nostaessasi turvaohjeita.

HUOMAUTUS: Varaa nostamista varten laitteen painoon nähden sopiva ja sovellettavien ohjeiden mukainen määrä henkilöitä. Käytä mekaanista nosturia aina, kun se on mahdollista.

Soulever le châssis: Employez des mesures de sécurité pour soulever.

REMARQUE: Faites appel au nombre de personnes approprié en fonction du poids de chaque produit spécifique et en conjonction avec les directives applicables. Utilisez un relevage mécanique, si possible.

Anheben des Gehäuses: Lassen Sie Sicherheit beim Anheben des Gehäuses walten.

ANMERKUNG: Setzen Sie jeweils dem Gewicht jedes angegebenen Produkts und den Richtlinien entsprechend genügend Leute ein. Verwenden Sie, wenn möglich, einen mechanischen Aufzug.

Sollevamento del telaio: Durante il sollevamento, seguire le procedure di sicurezza.

NOTA: utilizzare un gruppo di persone adeguato al peso di ogni prodotto specifico e insieme alle indicazioni applicabili. Se possibile, usare un sollevatore meccanico.

Løfting av kabinettet: utvis varsomhet ved løfting.

MERK: Bruk flere personer til bæring, avhengig av vekten til hvert enkelt produkt og i samsvar med gjeldende retningslinjer. Bruk mekaniske løftemekanismer når mulig.

Levantar o chassi: Utilize práticas seguras ao levantar o chassi.

AVISO: Utilize um grupo de pessoas adequado ao peso de cada produto especificado, em conjunto com as directivas aplicáveis. Sempre que possível, utilize um dispositivo mecânico de levantamento.

Elevación del chasis: Observe las prácticas de seguridad cuando quiera elevar el chasis.

NOTA: utilice un grupo de gente apropiado al peso de cada producto especificado junto con las pautas que correspondan. Siempre que sea posible, utilice un elevador mecánico.

Lyftning av chassi. Iakttag säkerhetsanvisningar vid lyft.

OBS! Använd ett team personer lämpade för vikten på varje specificerad produkt och i samband med gällande riktlinjer. Använd en mekanisk lyftanordning närhelst det är möjligt.

A burkolat emelése – Biztonságos eljárásokat alkalmazzon az emelés során.

MERK: Az egyes termékek súlyának megfelelo fobol álló csoportot alkalmazzon, a vonatkozó irányelvek betartása mellett. Lehetoség szerint mindig használjon mechanikus emeloszerkezetet.

Подъем корпуса – Соблюдайте технику безопасности при подъеме.

ПРИМЕЧАНИЕ: Подъем каждого конкретного устройства исходя из его веса должен осуществляться несколькими лицами и в соответствии с надлежащим инструкциям. Везде, где это возможно, следует применять механические грузоподъемные устройства.

提起机箱-提起机箱时请采取安全措施。

注： 请按照每个具体产品的重量来使用一定的人数，并遵照适当的说明。可能的话，使用机械起重器。

シャーシの持ち上げ - シャーシを持ち上げる際は安全に配慮してください。

メモ: 各製品の重量に見合った人数で、適切なガイドラインに従って持ち上げてください。可能な場合は、リフト機を使用してください。

Suspensão do chassi: use práticas seguras ao levantá-lo.

Observação: Use uma equipe de pessoas apropriada para o peso de cada produto especificado e em conjunto com as diretrizes aplicáveis. Sempre que possível, use um elevador mecânico.

섀시 올리기: 안전 조작법을 따르십시오.

참고: 각 제품의 무게에 적절한 수의 사람과 함께 적절한 지침에 따라 작업하십시오. 가능한 경우 기계 리프트 장치를 사용하십시오.

底座抬升：抬升時請使用安全做法。

注意：請針對每種指定產品的重量選擇一組適當的人員，並結合適用的指引進行作業。請盡可能使用機械抬升。

הרמת המארז: יש לנקוט באמצעי בטיחות בעת הרמה.

הערה: היעזר בכמה אנשים, בהתאם למשקל של כל מוצר מפורט, ובהתאם להנחיות הרלוונטיות. השתמש במנוף מכני במידת האפשר.

Podnoszenie obudowy: podczas podnoszenia należy postępować zgodnie z procedurami bezpieczeństwa.

Uwaga: Poszczególne produkty powinna przenosić grupa osób odpowiednia do masy ładunku zgodnie ze stosownymi wytycznymi. Jeśli to możliwe, należy użyć podnośnika mechanicznego.

Snímání skříně: při snímání dodržujte bezpečné postupy.

Poznámka: Postupy musí provádět dostatečný počet osob podle hmotnosti každého produktu a vždy je třeba postupovat podle platných zásad. Bude-li to možné, používejte mechanický zvedák.

Ανύψωση του περιβλήματος: ακολουθείτε ασφαλείς πρακτικές κατά την ανύψωση.

Σημείωση: Χρησιμοποιείτε ομάδα ατόμων ανάλογα με το βάρος του κάθε προϊόντος και σύμφωνα με τις ισχύουσες οδηγίες. Όταν είναι εφικτό, χρησιμοποιήστε μηχανικό ανυψωτικό.

Mengangkat Kerangka: Gunakan praktik aman saat mengangkat.

Catatan: Gunakan satu kelompok orang yang sesuai dengan berat dari masing-masing produk khusus dan setara dengan pedoman yang berlaku. Ketika dimungkinkan, gunakan lift mekanis.

Şasi Kaldırma: Kaldırma sırasında güvenlik uygulamlarını kullanın.

Not: Belirtilen her bir ürün ağırlığına uygun sayıda kişi içeren bir ekiple birlikte geçerli yönergeleri kullanın. Eğer mümkünse mekanik kaldırma kullanın.

Подизање шасије: Примените безбедносне мере приликом подизања.

Напомена: Користите број људи који одговара тежини сваког наведеног производа, а који је у вези са применљивим смерницама. Кад год је могуће, користите механички подизач.

2.5.3. Statement 3

Energy Hazard: To reduce risk of electric shock, keep hands and fingers out of the power supply bays and backplane areas.

Stroomgevaar: Reduceer het risico op een elektrische schok door handen en vingers weg te houden bij de voedingscompartimenten en de gebieden rond de centrale printplaat.

Sähköiskun vaara. Voit vähentää sähköiskuille altistumista, kun vältät koskettamasta virtalähdepaikkoja ja keskuspiirilevyä.

Danger électrique: Pour réduire le risque d'électrocution, gardez vos mains hors des baies d'alimentation et des zones destinées aux cartes de circuits imprimés.

Gefahr vor elektrischem Schock: Um der Gefahr vor elektrischem Schock vorzubeugen, halten Sie Hände und Finger den Netzteilschächten und der Rückwand fern.

Pericolo di scosse: Per ridurre il rischio di scosse elettriche, allontanare le mani e le dita dagli alloggiamenti degli alimentatori e dalle aree della piastra base.

Strømfare: hold fingre og hender unna strømforsyningsrom og kretskort for å unngå elektrisk sjokk.

Risco de choque eléctrico: Para reduzir o risco de choque eléctrico, mantenha as mãos e os dedos fora dos compartimentos da fonte de alimentação e das áreas de backplane.

Peligro de energía: Para reducir el riesgo de electrocución, mantenga las manos y los dedos alejados de los compartimentos de la fuente de alimentación eléctrica y del circuito impreso central.

Risk för elektrisk stöt. Reducera risken för elektrisk stöt genom att hålla händer och fingrar borta från strömförsörjningsfack och bakpanelsområden.

Áramütés veszélye – Az áramütés kockázatának csökkentése érdekében kezeit és ujjait tartsa távol a tápcsatlakozóktól és a hátsó területektol.

Опасное напряжение – Во избежание поражения электрическим током, не прикасайтесь к клеммам электропитания и к центральной электронной плате.

电能危害-为了减少电击风险，手和指应远离电源架和印刷电路板区域。

エネルギーの危険 - 感電のリスクを軽減するため、電源装置ベイおよびバックプレーン周辺に手や指を近づけないでください。

Perigo de energia: para reduzir o risco de choque elétrico, mantenha as mãos e os dedos longe dos compartimentos de alimentação e das áreas de backplane.

에너지 위험: 감전 사고의 위험을 줄이기 위해 손과 손가락을 전원 공급 장치 베이 및 뒷판 영역에 대지 마십시오.

能量危害：為降低電擊的風險，請不要用雙手與手指觸碰電源架及底板區域。

סכנת אנרגיה: כדי להפחית את הסיכון להתחשמלות, הרחק כפות ידיים ואצבעות מהאזורים של מפרצי ספק הכוח וממשטח התחמרה.

Zagrożenie elektryczne: aby ograniczyć ryzyko porażenia prądem elektrycznym, należy trzymać ręce i palce z dala od wnęk na zasilacze i płyty montażowej.

Nebezpečí zásahu elektrickým proudem: aby se snížilo nebezpečí úrazu elektrickým proudem, nevkládejte prsty do prostoru zdroje napájení a nedotýkejte se částí propojovacího rozhraní.

Ενεργειακός κίνδυνος: για τη μείωση του κινδύνου ηλεκτροπληξίας, μην αγγίζετε τις εσοχές τροφοδοσίας και τη βασική πλακέτα.

Bahaya Energi: Untuk mengurangi risiko sengatan listrik, jauhi tangan dan jari dari siku catu listrik dan area belakang mesin.

Elektrik Tehlikesi: Elektrik çarpma riskini indirgemek için, ellerinizi ve parmaklarınızı güç kablosu girişleri ve arka düzlem alanlarından uzak tutunuz.

Опасност од струје: Да бисте смањили ризик од струјног удара, држите руке и прсте ван отвора за напонску јединицу и ван области основне плоче.

2.5.4. Statement 4

Laser Radiation: certain optical products may emit laser radiation. Removing covers could result in exposure to hazardous laser radiation. Radiation may be emitted from connectors or fiber optic cables.

Laserstraling: bepaalde optische producten kunnen laserstraling verspreiden. Het verwijderen van dekplaten kan resulteren in blootstelling aan schadelijke laserstraling. Straling kan worden afgegeven door connectoren of glasvezelkabels.

Lasersäteily. Jotkut optiset laitteet saattavat päästää lasersäteilyä. Niiden suojusten poistaminen saattaa altistaa vaaralliselle lasersäteilylle. Säteily voi tulla liittimistä tai optisista kuitukaapeleista.

Rayonnement laser: Certains produits optiques peuvent produire un rayonnement laser. Le retrait de capots peut engendrer une exposition à un rayonnement laser dangereux. Ce rayonnement peut provenir des connecteurs ou des câbles en fibre optique.

Laserstrahlung: manche optischen Produkte geben Laserstrahlung ab. Beim Entfernen der Abdeckungen können Sie möglicherweise gefährlicher Laserstrahlung ausgesetzt werden. Laserstrahlung kann von Anschlüssen oder Faseroptikkabeln abgegeben werden.

Radiazione laser: Alcuni prodotti ottici potrebbero emettere la radiazione laser.

La rimozione delle coperture potrebbe causare l'esposizione alla radiazione laser pericolosa. I connettori o i cavi in fibra ottica potrebbero emettere radiazioni.

Laserstråling: visse optiske produkter kan gi fra seg laserstråling. Dersom dekslene tas av, kan dette medføre utsettelse for farlig laserstråling. Strålingen kan komme fra kontakter eller fiberoptiske kabler.

Radiação laser: Certos produtos ópticos podem emitir radiação laser. A remoção de tampas pode resultar na exposição a níveis perigosos de radiação laser. A radiação pode ser emitida de conectores ou de cabos de fibra óptica.

Radiación de láser: Ciertos productos ópticos pueden emitir radiación de láser. Quitar las cubiertas podría resultar en la exposición peligrosa a radiación de láser. La radiación se puede emitir de conectores o cables de fibra óptica.

Laserstrålning. Vissa optiska produkter kan utsända laserstrålning. Borttagning av skydd kan resultera i exponering för riskfylld laserstrålning. Strålning kan utsändas från kopplingsdetaljer eller fiberoptiska kablar.

Lézersugárzás – Bizonyos optikai termékek lézersugárzást bocsátanak ki. A burkolatok eltávolításával veszélyes lézersugárzásnak tehetik ki magukat. Sugárzást csatlakozók vagy üvegszálas optikai kábelek bocsáthatnak ki.

Лазерное излучение! – некоторые оптические устройства являются источником лазерного излучения. При снятии крышки существует опасность воздействия лазерного излучения на персонал. Лазерное излучение может испускаться соединительными гнездами волоконно-оптических кабелей.

激光辐射-某些光学产品会发出激光辐射。移开盖板时会使人暴露于有害激光辐射。连接器或光纤电缆都可能发出辐射。

レーザー光線 - 特定の光学製品からレーザー光線が放射される可能性があります。カバーを取り除くと、危険なレーザー光線を被爆する場合があります。光線はコネクタまたは光ファイバーケーブルから放射されることがあります。

Radiação a laser: certos produtos óticos podem emitir radiação a laser. A remoção dos revestimentos pode resultar em exposição à radiação a laser. A radiação pode ser emitida de conectores para cabos de fibra óptica.

레이저 방사: 특정 광학 제품에서는 레이저 방사가 방출될 수 있습니다. 덮개를 제거하면 위험한 레이저 방사에 노출될 수 있습니다. 방사는 커넥터나 광섬유 케이블에서 방출될 수 있습니다.

雷射輻射：某些光學產品可能會散發雷射輻射。移除蓋板可能會使您暴露在危險的雷射輻射中。連接器或是光纖纜線都可能會散發輻射。

קרינת לייזר: מוצרים אופטיים מסוימים עשויים לפלוט קרינת לייזר. הסרת כיסויים עלולה להוביל לחשיפה לקרינת לייזר מסוכנת. קרינה עשויה להיפלט ממחברים או מכבלי סיבים אופטיים.

Promieniowanie laserowe: niektóre produkty optyczne mogą emitować promienie lasera. Zdjęcie osłon może grozić wystawieniem się na niebezpieczne promieniowanie laserowe. Złącza i kable światłowodowe mogą emitować promieniowanie.

Laserové záření: jistá optická zařízení mohou vyzařovat laserové záření. Po odstranění krytů proto můžete být vystaveni nebezpečnému laserovému záření. Záření může vycházet z konektorů nebo optických kabelů.

Ακτινοβολία λέιζερ: ορισμένα οπτικά προϊόντα ενδέχεται να εκπέμπουν ακτινοβολία λέιζερ. Η αφαίρεση των καλυμμάτων ενδέχεται να προκαλέσει έκθεση σε επικίνδυνη ακτινοβολία λέιζερ. Η ακτινοβολία ενδέχεται να εκπέμπεται από συνδέσμους ή καλώδια οπτικών ινών.

Radiasi Laser: produk optik tertentu mungkin menghasilkan radiasi laser. Melepas penutup mungkin menyebabkan terpaparnya radiasi laser yang berbahaya. Radiasi mungkin dipancarkan dari konektor atau kabel optik fiber.

Lazer Radyasyon: belirli optik ürünler lazer radyasyon yayabilir. Kapakların çıkarılması tehlikeli lazer radyasyonuna maruz kalmaya neden olabilir. Radyasyon, konektörler veya fiber optik kablolardan yayılabilir.

Ласерско зрачење: Неки оптички производи могу емитовати ласерско зрачење. Уклањање поклопаца може довести до излагања опасном ласерском зрачењу. Зрачење се може емитовати са конектора или каблова са оптичким влакнима.

2.5.5. Statement 5

No user-serviceable parts: Hazardous energy levels may be present inside power supplies and circuit card modules. Do not remove covers.

Onderdelen die niet door de gebruiker mogen worden onderhouden: Er kunnen gevaarlijke energieniveaus aanwezig zijn binnen voedingen en printplaten. Verwijder in geen geval dekplaten.

Ei osia, jotka käyttäjä voisi vaihtaa. Virtalähteiden ja piirikorttimoduulien sisällä saattaa olla vaarallisen suuri virta tai jännite. Älä poista niiden suojuksia.

Pièces non entretenues par l'utilisateur: Des niveaux d'électricité dangereux peuvent résider à l'intérieur des sources d'alimentation et des modules de carte de circuits imprimés. Ne retirez pas les capots.

Wartung nur durch Fachmann möglich: Gefährlich hohe Stromstärken sind in Netzteilen und in den Modulen der Busleiterplatte vorhanden. Entfernen Sie die Abdeckungen nicht.

Non sono presenti componenti riparabili dall'utente: Livelli pericolosi di energia potrebbero essere presenti all'interno degli alimentatori e dei moduli delle schede dei circuiti. Non rimuovere le coperture.

Ingen deler som kan vedlikeholdes av brukeren: farlig strømmengde kan finnes inni strømforsynings- og kretskortmoduler. Fjern ikke dekslene.

Não há peças a serem consertadas pelo utilizador: Níveis perigosos de energia podem estar presentes em fontes de alimentação e em módulos de placas de circuito. Não remova as tampas.

No hay piezas técnicas: Niveles peligrosos de energía pueden hacerse presentes en las fuentes de alimentación eléctrica. No quite las cubiertas.

Inga delar kan underhållas av användaren. Farliga energinivåer kan finnas i strömförsörjningsenheter kretskortmoduler. Ta inte bort skydd.

A berendezés nem tartalmaz felhasználó által javítható alkatrészeket – Veszélyes energiaszint lehet a tápegységeken és az áramköri kártyamodulokon belül. Ne távolítsa el a burkolatokat.

Устройство не содержит деталей, предназначенных для обслуживания пользователем – Блоки питания и электрические платы устройства являются источником опасного электрического напряжения. Снимать крышки запрещено.

禁止用户维修部件-电源和电路卡模块内部可能存在一定水平的有害能。切勿移除盖板。

ユーザー修理可能部品なし - 電源装置および回路カードモジュール内のエネルギーが危険なレベルに達している場合があります。カバーを外さないでください。

Não é nenhuma peça que possa ser reparada pelo usuário, não é? Os níveis de energia perigosos podem estar presentes dentro de fontes de alimentação e em módulos de cartões de circuito. Não remova os revestimentos.

사용자 교체 가능 부품 없음: 전원 공급 장치 및 회로 카드 모듈 내에는 위험한 에너지 수준이 존재할 수 있습니다. 덮개를 제거하지 마십시오.

非使用者可維修零件：電源及電路卡模組內可能存在危害能量位準。請不要移除蓋板。

המוצר אינו מכיל חלקים הניתנים לטיפול על ידי המשתמש: רמות אנרגיה מסוכנות עלולות להימצא בתוך ספקי כוח ומודולי כרטיסי המעגלים. אין להסיר כיסויים.

Brak części serwisowanych przez użytkownika: wewnątrz zasilaczy i modułów kart może występować niebezpieczny poziom energii. Nie zdejmować osłon.

Zařízení neobsahuje žádné součásti, jejichž údržbu by mohl provádět sám uživatel: uvnitř zdrojů napájení a modulů s kartami s tištěnými spoji se může nacházet nebezpečné napětí. Neodstraňujte kryty.

Δεν υπάρχουν εξαρτήματα με δυνατότητα επισκευής από το χρήστη: ενδέχεται να υφίστανται επικίνδυνα επίπεδα ενέργειας εντός μονάδων τροφοδοτικού και μονάδων κάρτας κυκλώματος. Μην αφαιρείτε τα καλύμματα.

Tidak ada bagian yang dapat diservis pelanggan: Tingkat energi berbahaya mungkin terjadi di dalam catu daya dan modul kartu sirkuit. Jangan melepaskan penutup.

Kullanıcı tarafından kullanılamaz parçalar: Güç kaynakları ve devre kart modülleri içinde tehlikeli seviyede elektrik mevcut olabilir. Kapakları çıkarmayın.

Делови које корисници не могу сервисирати: Опасни нивои напона могу бити присутни унутар напонских јединица и модула штампаних картица. Немојте уклањати поклопце.

2.5.6. Statement 6

Equipment Installation: Only qualified personnel should be allowed to install, remove or replace chassis or modules.

Installatie apparatuur: Voor het installeren, verwijderen of vervangen van chassis of modules mag alleen gekwalificeerd personeel worden gebruikt.

Laitteiston asentaminen. Vain pätevä asentaja saa asentaa, poistaa ja vaihtaa koteloita tai moduuleja.

Installation de l'équipement: Seul un personnel qualifié est autorisé à installer, retirer ou remplacer des châssis ou modules.

Geräteinstallation: Die Installation, Entfernung oder Erneuerung von Gehäuse und Modulen sollte nur durch Fachpersonal erfolgen.

Installazione dell'apparecchiatura: Solo il personale qualificato è autorizzato ad installare, rimuovere o ricollocare il telaio o i moduli.

Utstyrsinstallasjon: kun kvalifisert personell kan installere, fjerne eller skifte ut kabinetter eller moduler.

Instalação do equipamento: A instalação, troca ou remoção de chassis ou módulos só deve ser feita por técnicos qualificados.

Instalación del equipo: Solamente se permite personal cualificado para realizar la instalación, quitar o sustituir módulos o chasis.

Installation av utrustning. Enbart kvalificerad personal får installera, ta bort eller byta ut chassin eller moduler.

Berendezés telepítése – Kizárólag szakképzett személyzet számára megengedett a burkolat vagy a modulok telepítése, eltávolítása vagy cseréje.

Установка оборудования – Установка, удаление и замена корпуса или модулей устройства должна производиться только квалифицированным техническим персоналом.

设备安装-只有有资格的技术人员才允许安装、卸下或装回机箱或模块。

装置の取り付け - シャーシまたはモジュールの取り付け、取り外しまたは取替えは、有資格者のみが行うようにしてください。

Instalação de equipamento: somente funcionários qualificados devem ter permissão para instalar, remover ou substituir chassi ou módulos.

장치 설치: 자격이 있는 인원만 섀시 또는 모듈을 설치, 제거 또는 교체할 수 있습니다.

設備安裝：只有符合資格的人員才允許安裝、移除或更換底座或模組。

התקנת הציוד: יש לאפשר לעובדים מיומנים בלבד להתקין, להסיר או להחליף מארז או מודולים.

Montaż sprzętu: tylko wykwalifikowany personel może być upoważniony do montażu, demontażu lub wymiany obudowy i modułów.

Instalace vybavení: instalaci, odinstalování nebo výměnu skříně či modulů smí provádět pouze kvalifikovaní pracovníci.

Τοποθέτηση εξοπλισμού: η τοποθέτηση, αφαίρεση ή αντικατάσταση περιβλημάτων ή μονάδων πρέπει να επιτρέπεται μόνο σε εξειδικευμένο προσωπικό.

Instalasi Peralatan: Hanya staf berpengalaman yang boleh memasang, melepaskan, atau mengganti kerangka atau modul.

Ekipman Kurulumu: Şasi ve modüllerin yalnızca nitelikli personel tarafından kurulumuna, çıkarılmasına veya değiştirilmesine izin verilir.

Инсталирање опреме: Само квалификованом особљу треба дозволити да инсталира, уклања или замењује шасију или модуле.

2.5.7. Statement 7

Adding or Replacing Modules: These modules are intended only for installation in Cornelis Omni-Path Fabric base units. Always install blanks when removing an active module. They prevent exposure to energy hazards inside the unit, contain EMI, and maintain cooling air balance in the chassis.

Toevoegen of vervangen van modules: deze modules zijn alleen bedoeld voor installatie in basiseenheden uit de Cornelis Omni-Path-reeks. Installeer altijd plaatshouders wanneer u een actieve module verwijdert. Deze voorkomen blootstelling aan energierisico's binnen de eenheid, bevatten EMI en handhaven de koelluchtbalans in het chassis.

Moduulien lisääminen ja vaihtaminen. Moduulit on tarkoitettu asennettavaksi vain Cornelis Omni-Path -sarjan perusyksikköihin. Kun olet poistanut aktiivisen moduulin, muista aina asentaa tyhjä kappale sen paikalle. Ne estävät sähköiskuille altistumista yksikön sisällä, hillitsevät sähkömagneettisia häiriöitä (EMI) ja pitävät yllä jäähdytysilman tasaista jakautumista koteloon.

Ajouter ou remplacer des modules: Ces modules sont conçus exclusivement pour une installation avec des unités de base Cornelis Omni-Path series. Installez toujours des caches de protection lors du retrait d'un module actif. Ils protègent contre les dangers électriques à l'intérieur de l'unité, limitent l'interférence électromagnétique et maintiennent un volume d’air refroidissant approprié au sein du châssis.

Hinzufügen oder Austauschen von Modulen: Diese Module sind für die Installation in Grundeinheiten der Cornelis Omni-Path Serie vorgesehen. Installieren Sie stets leere Module, wenn Sie ein aktives Modul entfernen. Diese verhindern, dass Stromgefahr im Innern der Einheit entsteht, enthalten Störstrahlung und sorgen für den Kühlungsausgleich im Gehäuse.

Aggiunta o sostituzione dei moduli: I moduli sono concepiti solo per l'installazione nelle unità di base Cornelis Omni-Path Serie. Quando si rimuove un modulo attivo, installare sempre le protezioni, poiché impediscono l'esposizione ai pericoli di scosse all'interno dell'unità, contengono le IEM e mantengono un equilibrio dell'aria di raffreddamento nel telaio.

Tillegging eller utskifting av moduler: disse modulene skal kun installeres i baseenhetene på Cornelis Omni-Path-serien. Installer alltid tomme enheter når en aktiv modul fjernes. De forhindrer utsettelse for strømfare inni enheten, inneholder EMI og opprettholder kjølebalansen i kabinettet.

Adição ou troca de módulos: Estes módulos foram projectados para serem instalados apenas nas unidades de base Cornelis Omni-Path série. Instale sempre módulos de preenchimento ("blanks") ao remover módulos activos. Eles diminuem os riscos de choque eléctrico no interior da unidade, contêm dispositivos de protecção contra interferência eletromagnética e mantêm o equilíbrio de resfriamento por ar no interior do chassi.

Agregar o sustituir módulos: Estos módulos solamente se pueden instalar en unidades de base de la serie Cornelis Omni-Path. Siempre instale protectores al retirar un módulo activo. Los protectores previenen la exposición a peligros de energía dentro de la unidad, contienen EMI y mantienen el balance de enfriamiento de aire en el chasis.

Lägga till eller byta ut moduler. De här modulerna är enbart avsedda för installation i Cornelis Omni-Path-seriens basenheter. Installera alltid tomenheter vid borttagning av en aktiv modul. De förhindrar exponering för energirisker på enhetens insida, hindrar EMI och upprätthåller kylluftbalansen i chassin.

Modulok hozzáadása vagy cseréje – Ezek a modulok kizárólag Cornelis Omni-Path-es sorozatú bázisegységekbe építhetoek be. Aktív modul cseréjekor mindig szereljen be üres helyeket. Ezek megakadályozzák az egységen belüli energiaveszélyek kialakulását, tartalmaznak EMI-t, és fenntartják a hutolevego egyensúlyát a borításon belül.

Установка и замена модулей – Модули предназначены только для установки внутрь базовых блоков Cornelis серии Omni-Path. После замены действующих модулей следует всегда устанавливать заглушки с крышками. Это обеспечивает защиту от опасного напряжения, электромагнитного излучения и надлежащий тепловой баланс внутри корпуса.

添加或装回模块-这些模块仅用于安装在 Cornelis Omni-Path Series 基座装置。请在移除活动模块时安装空白的。它们能预防装置内部的有害能的暴露，包含 EMI, 并在机箱内保持冷却空气平衡。

モジュールの追加または取替え - これらのモジュールは Cornelis Omni-Path シリーズ MPFD ベースユニットへの取り付け専用です。アクティブなモジュールを取り除く際は、常にダミーを取り付けてください。これはユニット内の危険なエネルギーの露出を防止し、EMI を阻止、およびシャーシ内の空冷バランスを維持します。

Adicionando ou substituindo módulos: estes módulos destinam-se a instalação somente leitura nas unidades base do Cornelis Omni-Path Fabric. Sempre instale vazios ao remover um módulo ativo. Eles impedem a exposição aos níveis perigosos de energia dentro da unidade, contêm EMI e mantêm a o balanço de ar refrigerado.

모듈 추가 또는 교체: 이러한 모듈은 Cornelis Omni-Path Fabric 기반 장치에만 설치될 수 있습니다. 활성 모듈 제거 시 항상 블랭크를 장착해야 합니다. 블랭크는 장치 내부의 위험한 에너지가 노출되는 것을 방지하며 EMI를 차폐하고 섀시의 냉각 공기 밸런스를 유지합니다.

新增或更換模組：這些模組僅供安裝於 Cornelis Omni-Path 架構基本裝置中。移除現行模組後，請始終安裝空模組。它們可阻止裝置內的能量危害外洩、抑制 EMI，並保持底座中的冷卻空氣平衡。

הוספה או החלפה של מודולים: מודולים אלה נועדו להתקנה ביחידות בסיס מסוג Cornelis Omni-Path Fabric בלבד.
בעת הסרה של מודול פעיל, יש להתקין תמיד מודולים ריקים. מודולים ריקים מונעים חשיפה לסכנות אנרגיה בתוך היחידה, חוסמים הפרעות אלקטרו-מגנטיות ושומרים על איזון אוויר הצינון בתוך המארז.

Dodawanie i wymiana modułów: moduły są przeznaczone do montażu tylko w urządzeniach podstawowych Cornelis Omni-Path Fabric. Przy wyjmowaniu aktywnego modułu należy zamontować pusty moduł zastępczy (wypełniacz). Moduły takie zapobiegają zagrożeniom elektrycznym wewnątrz urządzenia, ograniczają ilość zakłóceń elektromagnetycznych, a także ułatwiają utrzymanie odpowiedniej ilości powietrza chłodzącego w obudowie.

Přidávání nebo výměna modulů: tyto moduly jsou určeny pouze pro instalaci do základnových jednotek Cornelis Omni-Path Fabric. Po vyjmutí aktivního modulu vždy

nainstalujte rezervní výplně. Tyto výplně zabraňují kontaktu s nebezpečným napětím uvnitř jednotky, obsahují EMI a udržují rovnováhu vzduchového chlazení ve skříni.

Προσθήκη ή αντικατάσταση μονάδων: αυτές οι μονάδες προορίζονται μόνο για τοποθέτηση σε βασικές μονάδες Cornelis Omni-Path Fabric. Τοποθετείτε πάντοτε καλύμματα, όταν αφαιρείτε μια ενεργή μονάδα. Αυτά εμποδίζουν την έκθεση σε ενεργειακούς κινδύνους εντός της μονάδας, περιορίζουν τις ηλεκτρομαγνητικές παρεμβολές και διατηρούν την ισορροπία στον αέρα ψύξης εντός του περιβλήματος.

Menambah atau Mengganti Modul: Modul-modul ini ditujukan untuk instalasi dalam unit dasar Cornelis Omni-Path Fabric. Selalu pasang modul kosong saat mengeluarkan modul aktif. Modul kosong akan mencegah terpaparnya energi berbahaya di dalam unit, termasuk EMI, dan memelihara keseimbangan udara penyejuk di dalam kerangka.

Modüllerin Takılması veya Değiştirilmesi: Bu modüller yalnızca Cornelis Omni-Path Fabric sistem biriminde kullanım içindir. Aktif modülleri çıkarırken daima boşluk modüllerini kurunuz. Bu boşluk modülleri, ünite içindeki elektrik tehlikelerine maruz kalmayı önlerler, EMI içerirler ve şasi içindeki hava balans soğutmasını korurlar.

Додавање или замена модула: Ови модули су предвиђени само за инсталацију у Cornelis Omni-Path Fabric основне јединице. Увек инсталирајте празне модуле када уклањате неки активни модул. То спречава излагање опасности од струје, садржи EMI и одржава равнотежу расхлађеног ваздуха у шасији.

3. Getting Started

This chapter provides a brief outline of the functions and features of the OPX Gateway products.

3.1. Unpacking the System

Inspect the box the OPX Gateway was shipped in and note if it was damaged in any way. If any equipment appears damaged, please file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold the server. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise, and electromagnetic fields are generated. It will also require a grounded AC power outlet nearby. Be sure to read the precautions and considerations noted in Section 2.5 "Safety Information".

3.2. System Features

The following table provides you with an overview of the main features common to each of the Gateway servers. Please refer to the System Specifications for additional specifications.

Table 2. System Features

Power
500W redundant power supplies, Platinum Level (94%) (Full redundancy based on configuration and application load)
Form Factor
1U rackmount
Dimensions
(WxHxD) 17.25 x 1.72 x 25.58 in. (438.4 x 43.6 x 649.9 mm)

3.3. Server Chassis Features

3.3.1. Control Panel

The switches and LEDs located on the control panel are described below.

Figure 1. Control Panel View

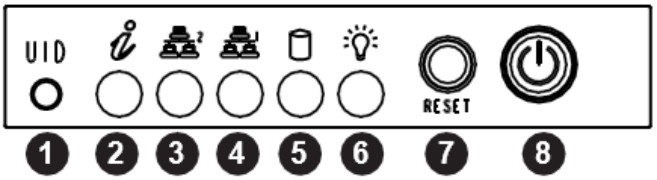


Table 3. Control Panel Features

Item	Feature	Description
1	UID Button	Depressing the UID (unit identifier) button illuminates an LED on both the front and rear of the chassis for easy system location in large stack configurations. The LED will remain on until the button is pushed a second time.
2	Information LED	See Table 4 "Information LED" below for details.
3	NIC2 LED	Indicates network activity on LAN port 2 when flashing.
4	NIC1 LED	Indicates network activity on LAN port 1 when flashing.
5	HDD LED	Indicates activity on a hard drive when flashing.
6	Power LED	Indicates power is being supplied to the system power supply. This LED should normally be illuminated when the system is operating.
7	Reset Button	The reset button is used to reboot the system.
8	Power Button	The main power button is used to apply or remove power from the power supply to the server. Turning off system power with this button removes the main power but maintains standby power. To perform many maintenance tasks, you must also unplug the system before servicing.

Table 4. Information LED

Status	Description
Continuously on and red	An overheat condition has occurred. (This may be caused by cable congestion.)
Blinking red (1Hz)	Fan failure, check for an inoperative fan.
Solid blue	UID has been activated locally to locate the server in a rack environment.
Blinking blue	UID has been activated using IPMI to locate the server in a rack environment.

3.3.2. Front Features

The OPX Gateway is a 1U system. See the illustration below for the features included on the front of the chassis.

Figure 2. Control Panel View

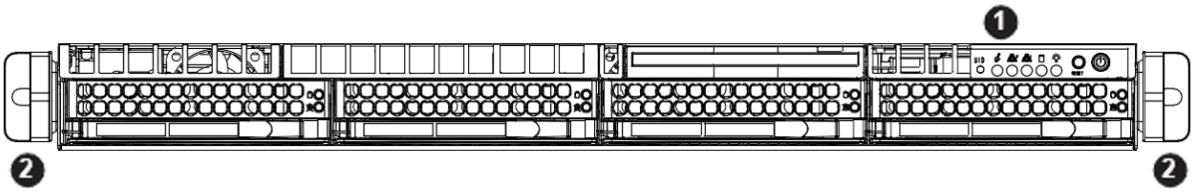


Table 5. Front Chassis Features

Item	Feature	Description
1	Control Panel	Front control panel with LEDs and buttons
2	Rack Ear Brackets	Secures the server chassis to the rack

3.3.3. Rear Features

The illustration below shows the features included on the rear of the chassis.

Figure 3. Chassis Rear View

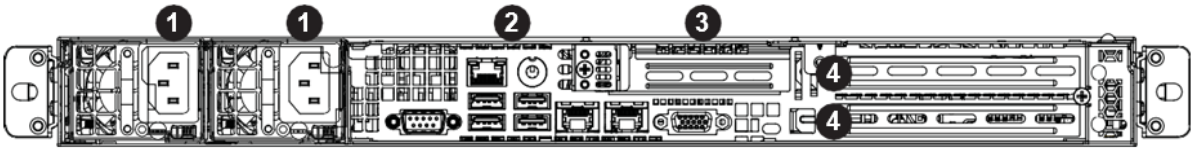


Table 6. Rear Chassis Features

Item	Feature	Description
1	Power Supply	Redundant power supply modules
2	I/O Backpanel	Rear I/O ports (see "Rear I/O Ports")
3	Expansion Card Slot	Slot for low-profile expansion (add-on) card (requires pre-installed riser card) up to 6.6"
4	Expansion Card Slot	Slot for FHFL expansion card (requires pre-installed riser card) up to 10.5"

Rear I/O Ports

See the figure below for the locations and descriptions of the various I/O ports on the rear of the motherboard.

Figure 4. Rear I/O Ports

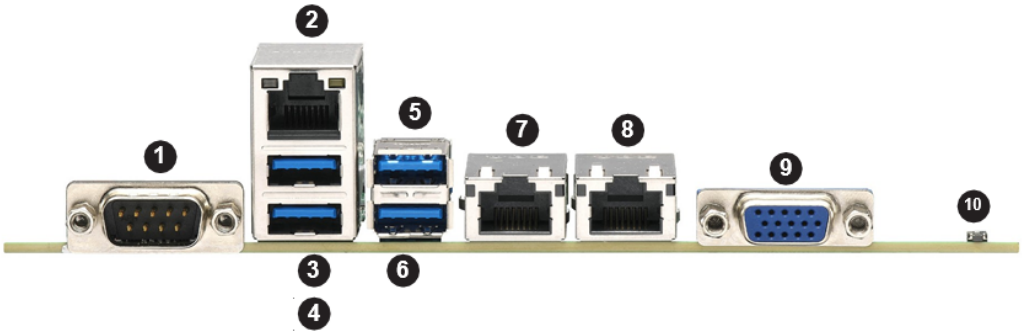


Table 7. Rear I/O Ports

#	Description	#	Description	#	Description
1	COM Port	5	USB 2 (3.1)	9	VGA Port
2	IPMI LAN Port	6	USB 3 (3.1)	10	UID Switch & UID LED
3	USB 0 (3.1)	7	LAN Port #1		
4	USB 1 (3.1)	8	LAN Port #2		

4. Install the Server

This chapter provides advice and instructions for mounting your system in a server rack.

Electrostatic Discharge (ESD) can damage electronic components. To prevent such damage to PCBs (printed circuit boards), it is important to use a grounded wrist strap, handle all PCBs by their edges and keep them in anti-static bags when not in use.

4.1. Preparing for Setup

The box in which the system was shipped should include the rackmount hardware needed to install it into the rack. Please read this section in its entirety before you begin the installation.

4.1.1. Choosing a Setup Location

- The system should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise, and electromagnetic fields are generated.
- Leave enough clearance in front of the rack so that you can open the front door completely (~25 inches) and approximately 30 inches of clearance in the back of the rack to allow sufficient space for airflow and access when servicing.
- This product should be installed only in a Restricted Access Location (dedicated equipment rooms, service closets, etc.).
- This product is not suitable for use with visual display workplace devices according to §2 of the German Ordinance for Work with Visual Display Units.

4.1.2. Rack Precautions

- Ensure that the leveling jacks on the bottom of the rack are extended to the floor so that the full weight of the rack rests on them.
- In single-rack installations, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a server or other component from the rack.
- You should extend only one server or component at a time. Extending two or more simultaneously may cause the rack to become unstable.

4.1.3. Server Precautions

- Review the electrical and general safety precautions in Safety Information.
- Determine the placement of each component in the rack before you install the rails.

- Install the heaviest server components at the bottom of the rack first and then work your way up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges and voltage spikes and to keep your system operating in case of a power failure.
- Allow any drives and power supply modules to cool before touching them.
- When not servicing, always keep the front door of the rack and all covers/panels on the servers closed to maintain proper cooling.

4.1.4. Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the room's ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer’s maximum rated ambient temperature (TMRA).

Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e., the use of power strips, etc.).

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

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

4.2. Installing the Rails

There are a variety of rack units on the market that may require a slightly different assembly procedure. This rail set fits a rack between 25.6" and 33" deep.

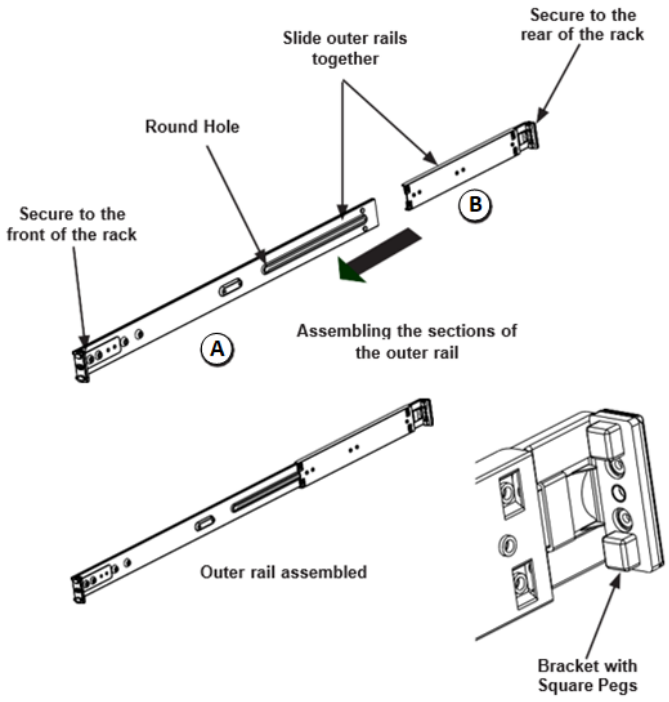
The following is a basic guideline for installing the system into a rack with the rack mounting hardware provided. You should also refer to the installation instructions that came with the specific rack you are using.

4.2.1. Assembling the Outer Rails

Each outer rail comes in two sections that must be assembled before mounting onto the rack.

1. Identify the left and right outer rails by examining the ends, which bend outward. Match the left front outer rail with the left rear outer rail and the same for the right rails.
2. Align the round post in the rear rail (B) with the round hole at the end of the slot in the front rail (A), and slide the front section into the rear section.

Figure 5. Assembling the Outer Rails



Slide rail mounted equipment is not to be used as a shelf or a work space.

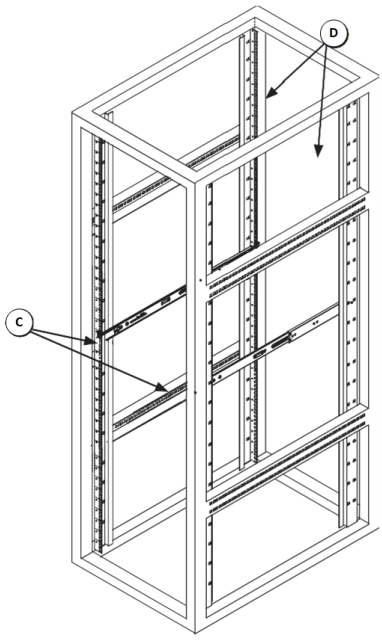
Warning: Do not pick up the server with the front handles. They are designed to pull the system from a rack only.

4.2.2. Installing the Outer Rails

Each end of the assembled outer rail includes a bracket with square pegs to fit into your rack holes. If you have an older rack with round holes, these brackets must be removed, and you must use screws to secure the rail to the rack.

1. Align the square pegs on the front end of the rail with the square holes on the front of the rack (C). Push the rail into the rack until the quick-release bracket snaps into place, securing the rail to the rack. Keep the rail horizontal.
3. Adjust the rail to reach just past the full depth of your rack.
4. Align the square pegs on the rear end of the rail to the holes on the rack (D) and push the rail into the rack until the quick-release bracket snaps into place, securing the rail to the rack.
5. Repeat the procedure for the other outer rail assembly.

Figure 6. Installing the Outer Rails to the Rack



NOTE

The figure above is for illustrative purposes only. Always install servers at the bottom of the rack first.

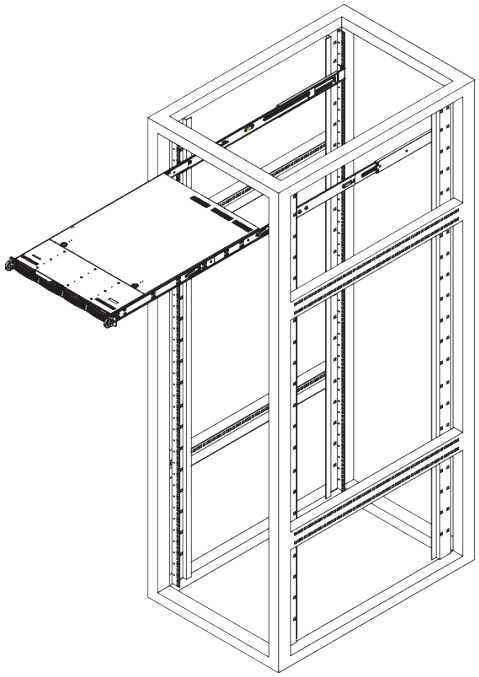
Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.

4.3. Installing the Server into a Rack

You should now have rails attached to both the chassis and the rack. The next step is to install the server into the rack.

1. Confirm that the server includes the inner rails and inner rail extensions. Also, confirm that the outer rails are installed on the rack.
2. Align the server inner rails with the front of the out rails on the rack.
3. Slide the server rails into the rack rails, keeping the pressure even on both sides (you may have to depress the locking tabs when inserting). When the server has been pushed completely into the rack, you should hear the locking tabs click into position.
4. Insert and tighten the thumbscrews that hold the front of the server to the rack.
5. Install the included OPX Gateway bezel.

Figure 7. Installing the Server into a Rack



NOTE

Figure is for illustrative purposes only. Always install servers to the bottom of a rack first.

5. Set Up the Gateway

This section provides instructions for setting up either an OPX IP Gateway or OPX LNET Gateway. Refer to the *Cornelis Omni-Path Express IP and LNet Router Design Guide* for additional information and guidance.

5.1. Pre-installation Notes and Tasks

The Operating System is pre-installed on the OPX Gateway. In addition, the BIOS settings are pre-configured in manufacturing. These settings may be confirmed by comparing them to the settings noted in Appendix A, Gateway BIOS Settings, for your particular gateway.

5.1.1. Ethernet Gateway Driver Installation

Perform the following steps for Ethernet Gateway deployment:

1. Download the Ethernet adapter driver from: https://www.supermicro.com/wdl/Networking_Drivers/CDR-NIC_1.70_for_Add-on_NIC_Cards/Broadcom/Linux/Linux_Driver/netxtreme-bnxt_en-1.10.2-218.0.67.0.tar.gz.
2. Download the installer scripts from: https://www.supermicro.com/wdl/Networking_Drivers/CDR-NIC_1.70_for_Add-on_NIC_Cards/Broadcom/Linux/Linux_Installer/.
3. Follow the procedure for "Building bnxt_en from source" in the `linux_installer_readme.txt` file.
4. After the installation is complete, run `modinfo bnxt_en | grep version` to confirm the driver installed correctly. 218.0.67.0 should be displayed in the output.

5.2. Software Installation and Configuration

The OPX Gateway has a unique configuration script preloaded on the server in manufacturing. In addition, the OPX Host Software package is available on the OPX Gateway and ready for installation.

The configuration script will execute the OPX Host Software installation, then implement optimized settings for either IP or LNET protocol, depending on the option selected. Perform the following steps to install the software and configure the server as an IP or LNET OPX Gateway.

1. Log in to the server:

   User: **`root`**

   Password: **`password`**
2. Change the directory to the script location:

   `cd /usr/local/cn-gateway/`

3. Configure for IP or LNET:

   ./cngw-install-config.sh IP|LNET

   NOTE

   If LNET is selected, perform the procedures in the *Cornelis Omni-Path Express IP and LNet Router Design Guide*, section "LNET Router," including sub-section "Practical Implementations," and "Example 1: Legacy Storage with InfiniBand Card Connected to New Compute Nodes Using OPX" before continuing to the next step.

4. Reboot the server to activate the configuration.
5. Verify the OPX Host Software installation was successful:

   opaconfig -V

   Ensure the output matches the OPX version noted in the *Cornelis Omni-Path Express Gateway Release Notes*.

6. Check the OPX Gateway connectivity:

   opainfo | grep -i portstate

   The following output should be reported:

   ```
   PortState:  Active
   ```

7. Check for available network interfaces:

   ip a | grep -i mtu

   Ensure the ib*x* interfaces have an MTU of 10k as shown in the following output.

   ```
   # ip a | grep mtu
   1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
   qlen 1000
   2: eno1np0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group
   default qlen 1000
   3: eno2np1: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc mq state DOWN group
   default qlen 1000
   4: enp1s0f0np0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 9000 qdisc mq state UP group
   default qlen 1000
   5: enp1s0f1np1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 9000 qdisc mq state UP group
   default qlen 1000
   6: ib0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 10236 qdisc fq_codel state UP group
   default qlen 16384
   7: ib1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 10236 qdisc fq_codel state UP group
   default qlen 16384
   [root@ioperf-eth-gw-2 ~]#
   ```

8. Configure the Ethernet or IB IP addresses as needed to connect the OPX Gateway to the OPX Fabric. Refer to the *Cornelis Omni-Path Express IP and LNet Router Design*

Guide to set up the addressing and routes as appropriate for your system. For an IP configuration refer to the "Router Configuration" and "Client Configuration" sections.

9. Verify the configuration of interfaces in the `/etc/sysconfig/network-scripts/ifcfg-interface` file and set appropriate IP addresses and routes for your network.
10. Ensure the interfaces are set correctly:

    `ip a | grep -i mtu`

11. Ping the neighboring nodes on the Ethernet or IB interfaces to ensure functional connectivity.

5.3. Additional Setup Tasks

5.3.1. Ethernet Gateway Configured for LNET

In order to maximize performance on the Ethernet Gateways configured with LNET, the creation of multiple virtual interfaces is recommended on both the Gateway and the clients.

Use the following commands to create virtual interfaces:

`ifconfig interface:<n> <IP_ADDRESS>`

The following example shows the commands employed on a gateway interface to create four virtual interfaces (<n>=3):

```
enp1s0f0np0: flags=4163 UP,BROADCAST,RUNNING,MULTICAST mtu 9000
inet 192.168.25.19 netmask 255.255.255.0 broadcast 192.168.25.255
enp1s0f0np0:0: flags=4163 UP,BROADCAST,RUNNING,MULTICAST mtu 9000
inet 192.168.25.190 netmask 255.255.255.0 broadcast 192.168.25.255
enp1s0f0np0:1: flags=4163 UP,BROADCAST,RUNNING,MULTICAST mtu 9000
inet 192.168.25.191 netmask 255.255.255.0 broadcast 192.168.25.255
enp1s0f0np0:2: flags=4163 UP,BROADCAST,RUNNING,MULTICAST mtu 9000
inet 192.168.25.192 netmask 255.255.255.0 broadcast 192.168.25.255
enp1s0f0np0:3: flags=4163 UP,BROADCAST,RUNNING,MULTICAST mtu 9000
inet 192.168.25.193 netmask 255.255.255.0 broadcast 192.168.25.255
```

After the commands are run, update the `/etc/modprobe.d/lustre.conf` file by adding the virtual IP address to the Lustre network. This takes advantage of the default Multi-Rail functionality in LNET as shown in the following example.

```
options lnet
networks="tcp1(enp1s0f0np0,enp1s0f0np0:0,enp1s0f0np0:1,enp1s0f0np0:2,enp1s0f0np0:3),,o2ib1(
ib0)" "forwarding=enabled")
```

5.3.2. Fault Tolerance and Load Balancing Configuration

For fault-tolerance and load-balancing configuration and examples, please refer to the *Cornelis Omni-Path Express IP and LNet Router Design Guide*, Section "Router Redundancy/ Failover with VRRP v3."

6. Benchmark Testing

To ensure the OPX Gateway is configured properly and performing as expected, Cornelis recommends running standard network benchmarks suited to the chosen system protocol, `iperf2` for IP networks or `lnet_selftest` for Lustre/LNET. The following sections provide recommended options to test as a baseline.

6.1. IP Gateway Benchmark (`iperf2`)

Run the `iperf2` benchmark applicable to the non-OPX interface of your system.

For either gateway with an InfiniBand interface, run the following commands as noted for the client and server:

- Client:

  `./iperf2 -c <server IP address> -w 512K -t 30 -P16 --len 1M | grep SUM`

- Server:

  `./iperf2 -s -fg -w 512K`

For the Ethernet gateway, run the following commands as noted for the client and server:

- Client:

  `./iperf2 -c <server IP address> -t $T -P8 --len 1M | grep SUM`

- Server:

  `./iperf2 -s -fg`

6.2. LNET Gateway Benchmark (`lnet_selftest`)

Refer to the LNET Selftest wiki page for details to configure and run `lnet_selftest`:

https://wiki.lustre.org/LNET_Selftest

The wiki provides an example `lnet_selftest` wrapper script that can be used to run the test. Ensure `LTO` and `LFROM` addresses are set appropriately for the desired client(s) and server(s). In addition, use the `-distribute LTO:LFROM` option when running `lnet_selftest` from Many to 1 testing.

6.3. Tuning

Refer to the *Cornelis Omni-Path Express IP and LNet Router Design Guide* and *Cornelis Omni-Path Express Fabric Performance Tuning User Guide* for additional information. For further assistance, contact Cornelis Networks Customer Support at:

http://www.cornelisnetworks.com/support

support@cornelisnetworks.com

Appendix A. Gateway BIOS Settings

The following tables include common BIOS settings and specific Gateway BIOS settings that are applied in manufacturing.

Table A.1. Common Settings (All Gateways)

Parameter	Values
# ACPI Settings	
PCI AER Support	Disabled
High Precision Event Timer	Enabled
NUMA Nodes Per Socket	NPS4
ACPI SRAT L3 Cache As NUMA Domain	Disabled
#CPU Configuration	
SMT Control	Disabled
Core Performance Boost	Auto
Global C-state Control	Auto
Local APIC Mode	x2APIC
CCD Control	Auto
Core Control	Auto
L1 Stream HW Prefetcher	Enabled
L2 Stream HW Prefetcher	Enabled
SEV ASID Count	Auto
SEV-ES ASID Space Limit Control	Auto
SVM Mode	Disabled
#North Bridge Configuration	
Determinism Control	Manual
Determinism Slider	Performance
cTDP Control	Manual
cTDP	255
IOMMU	Disabled
ACS Enable	Auto
Package Power Limit Control	Manual
Package Power Limit	255
APBDIS	1
Fixed SOC Pstate	P0

Parameter	Values
DF Cstates	Disabled
#Memory Configuration	
Memory Clock	3200MHz
Memory interleaving	Auto
Memory interleaving size	Auto
Chipselect Interleaving	Auto
BankGroupSwap	Auto
DRAM Scrub Time	Auto
TSME	Disable
DDR Power Down Enable	Disabled
#PCI Device Common Settings	
SR-IOV Support	Disabled
PCIe Ten Bit Tag Support	Enabled

Table A.2. IB HDR Gateway Settings

Parameter	Values
#North Bridge Configuration	
Preferred IO	Manual
Preferred IO Bus	1
#PCI Devices Common Settings	
Relaxed Ordering	Enabled

Table A.3. IB 2XEDR Gateway Settings

Parameter	Values
Preferred IO	Manual
Preferred IO Bus	81

Table A.4. 2x100 GbE Ethernet Gateway Settings

Parameter	Values
Preferred IO	Manual
Preferred IO Bus	1