Cisco 4710 Application Control Engine Appliance Hardware Installation Guide

November 2007

C O N T E N T S

Preface

This guide is intended to help you install your Cisco 4710 Application Control Engine (ACE) appliance and get it ready for operation. It describes how to prepare your site for installation, how to install the ACE in an equipment rack, and how to maintain and troubleshoot the ACE hardware.

This preface contains the following major sections:

- Audience
- How to Use This Guide
- Conventions
- Statement 1071—Warning Definition
- Obtaining Documentation, Obtaining Support, and Security Guidelines
- Open Source License Acknowledgements

You can configure the ACE by using the following interfaces:

- The command-line interface (CLI), a line-oriented user interface that provides commands for configuring, managing, and monitoring the ACE.
- Device Manager GUI, a Web browser-based GUI interface that provides a graphical user interface for configuring, managing, and monitoring the ACE.

Audience

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

This guide is intended for the following trained and qualified service personnel who are responsible for installing and operating the ACE:

- System installer
- Hardware technician
- System operator

You should be familiar with networking equipment and cabling and have a basic knowledge of electronic circuitry and wiring practices.

To complete the installation, including the software configuration for the ACE, you should be familiar with basic networking principles and configurations, especially web page protocols.

How to Use This Guide

This section describes the chapters and contents in this guide.

Chapter/Appendix	Description
Chapter 1, Product Overview	Describes the physical properties and provides a functional overview of the ACE.
Chapter 2, Preparing for Installation	Describes safety considerations and provides an overview of the installation and procedures that you should perform before the actual installation.
Chapter 3, Installing the ACE	Describes how to install the hardware and connect the external network interface cables.
Chapter 4, Troubleshooting the ACE Hardware	Describes troubleshooting procedures for the hardware installation.
Chapter 5, Maintaining Your ACE	Contains the procedures for maintaining your ACE in proper operating condition.
Appendix A, Specifications	Lists the hardware specifications for the ACE.

Related Documentation

In addition to this document, the ACE documentation set includes the following:

Document Title	Description
Regulatory Compliance and Safety Information for the Cisco 4710 Application Control Engine Appliance	Regulatory compliance and safety information for the ACE.
Release Note for the Cisco 4700 Series Application Control Engine Appliance	Provides information about operating considerations, caveats, and command-line interface (CLI) commands for the ACE.
Cisco ACE 4700 Series Application Control Engine Appliance CLI Quick Configuration Note	Describes how to use the ACE CLI to perform the initial setup and VIP load-balancing configuration tasks.
Cisco 4700 Series Application Control Engine Appliance Device Manager GUI Quick Configuration Note	Describes how to use the ACE Device Manager GUI to perform the initial setup and VIP load-balancing configuration tasks.

Document Title	Description
Cisco 4700 Series Application Control Engine Appliance Administration Guide	Describes how to perform the following administration tasks on the ACE: • Setting up the ACE • Establishing remote access • Managing software licenses • Configuring class maps and policy maps • Managing the ACE software • Configuring SNMP • Configuring redundancy • Configuring the XML interface • Upgrading the ACE software
Cisco 4700 Series Application Control Engine Appliance Virtualization Configuration Guide	Describes how to operate your ACE in a single context or in multiple contexts.
Cisco 4700 Series Application Control Engine Appliance Routing and Bridging Configuration Guide	Describes how to configure the following routing and bridging tasks on the ACE: • Ethernet ports • VLAN interfaces • Routing • Bridging • Dynamic Host Configuration Protocol (DHCP)
Cisco 4700 Series Application Control Engine Appliance Server Load-Balancing Guide	Describes how to configure the following server load-balancing tasks on the ACE: • Real servers and server farms • Class maps and policy maps to load balance traffic to real servers in server farms • Server health monitoring (probes) • Stickiness • Firewall load balancing • TCL scripts
Cisco 4700 Series Application Control Engine Appliance Application Acceleration and Optimization Configuration Guide	Describes the configuration of the application acceleration and optimization features of the ACE. It also provides an overview and description of those features.

Document Title	Description
Cisco 4700 Series Application Control Engine Appliance Security Configuration Guide	Describes how to perform the following ACE security configuration tasks: • Security access control lists (ACLs) • User authentication and accounting using a Terminal Access Controller Access Control System + (TACACS+), Remote Authentication Dial-In User Service (RADIUS), or Lightweight Directory Access Protocol (LDAP) server • Application protocol and HTTP deep packet inspection • TCP/IP normalization and termination parameters • Network address translation (NAT)
Cisco 4700 Series Application Control Engine Appliance SSL Configuration Guide	Describes how to configure the following Secure Sockets Layer (SSL) tasks on the ACE: • SSL certificates and keys • SSL initiation • SSL termination • End-to-end SSL
Cisco 4700 Series Application Control Engine Appliance System Message Guide	Describes how to configure system message logging on the ACE. This guide also lists and describes the system log (syslog) messages generated by the ACE.
Cisco 4700 Series Application Control Engine Appliance Command Reference	Provides an alphabetical list and descriptions of all CLI commands by mode, including syntax, options, and related commands.
Cisco 4700 Series Application Control Engine Appliance Device Manager GUI Configuration Guide	Describes how to use the Device Manager GUI, which resides in flash memory on the ACE, to provide a browser-based interface for configuring and managing the appliance.
Cisco CSS-to-ACE Conversion Tool User Guide	Describes how to use the CSS-to-ACE conversion tool to migrate Cisco Content Services Switches (CSS) running-configuration or startup-configuration files to the ACE.

Conventions

Graphical user interface elements use the following conventions:

- **Bold text** indicates a command in a paragraph.
- `Courier text` indicates text that appears in a command line, including the CLI prompt.
- **`Courier bold text`** indicates commands and text you enter in a command line.
- *Italic text* indicates the first occurrence of a new term, book title, and emphasized text.

Lists use the following conventions:

Notes, cautionary statements, and safety warnings use these conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

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

Statement 1071—Warning Definition

Warning **IMPORTANT SAFETY INSTRUCTIONS**

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

SAVE THESE INSTRUCTIONS

Waarschuwing **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

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

BEWAAR DEZE INSTRUCTIES

Varoitus   **TÄRKEITÄ TURVALLISUUSOHJEITA**

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

SÄILYTÄ NÄMÄ OHJEET

Attention   **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

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

CONSERVEZ CES INFORMATIONS

Warnung   **WICHTIGE SICHERHEITSHINWEISE**

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

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza   **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

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

CONSERVARE QUESTE ISTRUZIONI

Advarsel   **VIKTIGE SIKKERHETSINSTRUKSJONER**

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

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

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

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! **INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

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

GUARDE ESTAS INSTRUCCIONES

Varning! **VIKTIGA SÄKERHETSANVISNINGAR**

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

SPARA DESSA ANVISNINGAR

Figyelem **FONTOS BIZTONSÁGI ELOÍRÁSOK**

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

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение **ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

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

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

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

请保存这些安全性说明

警告 安全上の重要な注意事項

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

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

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

이 지시 사항을 보관하십시오.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

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

GUARDE ESTAS INSTRUÇÕES

Advarsel VIGTIGE SIKKERHEDSANVISNINGER

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

GEM DISSE ANVISNINGER

تحذير إرشادات الأمان الهامة

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

Upozorenje VAŽNE SIGURNOSNE NAPOMENE

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

SAČUVAJTE OVE UPUTE

Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY

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

USCHOVEJTE TYTO POKYNY

Προειδοποίηση ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

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

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה הוראות בטיחות חשובות

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

שמור הוראות אלה

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

Ostrzeżenie
WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA

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

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie
DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY

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

USCHOVAJTE SI TENTO NÁVOD

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

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

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

Open Source License Acknowledgements

The following acknowledgements pertain to this software license.

OpenSSL/Open SSL Project

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/).

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).

This product includes software written by Tim Hudson (tjh@cryptsoft.com).

License Issues

The OpenSSL toolkit stays under a dual license, i.e. both the conditions of the OpenSSL License and the original SSLeay license apply to the toolkit. See below for the actual license texts. Actually both licenses are BSD-style Open Source licenses. In case of any license issues related to OpenSSL please contact openssl-core@openssl.org.

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This product includes cryptographic software written by Eric Young (eay@cryptsoft.com). This product includes software written by Tim Hudson (tjh@cryptsoft.com).

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The implementation was written so as to conform with Netscapes SSL.

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C H A P T E R **1**

Product Overview

The Cisco 4710 Application Control Engine (ACE) appliance performs high-performance server load balancing (SLB) among groups of servers, server farms, firewalls, and other network devices, based on Layer 3 and Layer 4 through Layer 7 packet information. The ACE can terminate and initiate Secure Sockets Layer (SSL)-encrypted traffic to allow intelligent load balancing while ensuring secure end-to-end encryption. The ACE also offers application acceleration to accelerate web application performance and optimize network performance.

Note Throughout this publication, the term *ACE* is used to refer to the Cisco 4710 ACE appliance. For a detailed overview on the capabilities of the ACE, see the *Cisco ACE 4700 Series Application Control Engine Appliance CLI Quick Configuration Note* and the *Cisco 4700 Series Application Control Engine Appliance Device Manager GUI Quick Configuration Note*.

This chapter provides an overview of the ACE and describes the hardware, major components, and front and rear panel indicators and controls. It contains the following major sections:

- System Hardware Features
- Ports and Connectors

System Hardware Features

The ACE is designed for AC-input power and has a single AC-input power supply. The ACE includes the following components:

- Intel 3.4-GHz Pentium 4 CPU.
- PCI-X four-port daughter card that provides four Layer 2 Ethernet ports for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks. Each Layer 2 Ethernet port supports autonegotiate, full-duplex, or half-duplex operation on an Ethernet LAN and can carry traffic within a designated VLAN. The Ethernet ports include RJ-45 receptacles.
- Serial port.

This section contains the following topics:

- Front Panel Features
- Rear Panel Features

Front Panel Features

The ACE front panel contains LED indicators and a power button. Figure 1-1 shows the ACE front panel.

Figure 1-1   *Front Panel View*

1	Power button with built-in power indicator. If the indicator is lit, turn the chassis power off by pressing this button. Green = Power On Amber = Standby Mode Off = Power Off	4	System ID button. This button allows you to identify the unit from its other side when it is installed in a rack with multiple devices. When pressed, the blue System ID indicator flashes on the front and rear panels of the unit. Press the front System ID button to activate the blue flashing indicator on the rear panel. Press the rear System ID button to turn off the flashing indicator.
2	Nonmaskable Interrupt (NMI) button. You do not need to use this recessed push button to trigger an NMI in normal operation. It is used for debugging.		
3	Hard drive indicator (not supported).	5	System ID indicator. When the System ID button on the front or back panel is pressed, the blue System ID indicator flashes. Press the System ID button again to stop the indicator from flashing and remain on. **Note** If the System ID button turns amber, this may be an indication of a system fault. In some cases, this may be a result of an internal fan failure.
		6	USB port (not supported)

Rear Panel Features

The rear panel contains the AC power receptacle, Ethernet connectors, and the console/serial connector. Figure 1-2 shows the rear panel ports and connectors.

Figure 1-2   *Rear Panel View*

1	AC power receptacle.	12	System ID button/System status indicator. This button allows you to identify the unit from its other side when it is installed in a rack with multiple devices. When pressed, the blue System ID indicator flashes on the front and rear panels of the unit.
2	PS/2 mouse port (not supported).		
3	USB ports (not supported).		
4	Console/serial connector (see Figure 1-4).		
5	VGA port.		Press the rear System ID button to activate the blue flashing indicator on the front panel. Press the front System ID button to turn off the flashing indicator.
6, 7	RJ-45 Ethernet 1 and 2 port connectors (For Future Use).		
			Note If the System ID button turns amber, this may be an indication of a system fault. In some cases, this may be a result of an internal fan failure.
8 to 11	RJ-45 Ethernet port connectors (numbered 4 through 1 from left to right) with 10/100/1000-Mbps operation and status LEDs.	13	PS/2 keyboard port (not supported).

Ports and Connectors

The ACE supports the following port connectors on the rear of the chassis:

- Ethernet Port Connectors
- Console Port

Warning   **To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.** Statement 1021

Ethernet Port Connectors

The ACE provides physical Ethernet ports to connect servers, PCs, routers, and other devices to the ACE. The ACE supports four Layer 2 Ethernet ports for performing Layer 2 switching.

The four Layer 2 Ethernet ports can be configured to provide an interface for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks. Each Layer 2 Ethernet port supports autonegotiate, full-duplex, or half-duplex operation on an Ethernet LAN and can carry traffic within a designated VLAN.

To access the Ethernet port, connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to each RJ-45 connector on the back of the chassis.

Note   The 100BASE-TX/1000BASE-TX Ethernet standard requires that you use standard four twisted-pair Category 5e cable at lengths up to 328.08 feet (100 meters).

Figure 1-3 shows the LED link indicators for the Ethernet port and the pin number assignments for the RJ-45 port. As shown in Figure 1-3 for Ethernet port 4, the link LED in the lower right below each Ethernet port serves as the indicator for the associated port. The states of each Ethernet port link LED is as follows:

- Off when the 10-Mbps Ethernet link is connected or when there is no link.
- Glows steady green when the 100-Mbps Ethernet link is connected.
- Glows steady orange when the 1000-Mbps GigabitEthernet link is connected.

The second LED flashes yellow when there is activity.

Figure 1-3   Ethernet Port Link Connectors
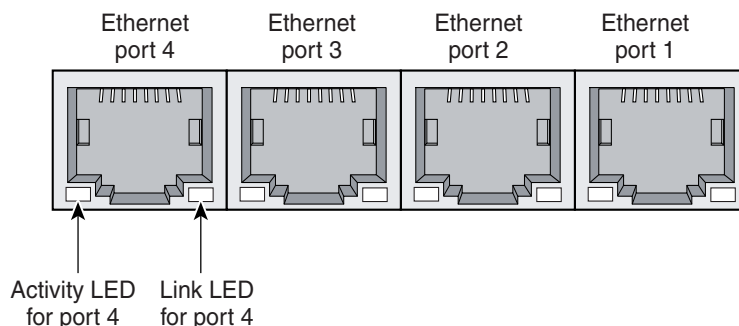
Console Port

The ACE has one standard RS-232 serial port located on the rear panel that operates as the console port. The integrated serial port uses a 9-pin male D-shell connector. Figure 1-4 shows the pin number assignments for the 9-pin port.

See Table 1-1 for the console port connector pinouts.

Figure 1-4   Console Port Connector Pin Numbers
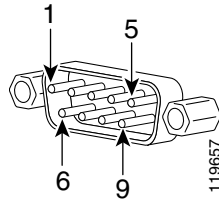
Table 1-1   Console Port Connector Pinouts

Pin	Signal	I/O	Definition
1	DCD	I	Data carrier detect
2	SIN	I	Serial input
3	SOUT	O	Serial output
4	DTR	O	Data terminal ready
5	GND	N/A	Signal ground
6	DSR	I	Data set ready
7	RTS	O	Request to send
8	CTS	I	Clear to send
9	RI	I	Ring indicator
Shell	N/A	N/A	Chassis ground

The console port operates at the factory-default settings outlined in Table 1-2. You cannot modify these settings.

Table 1-2   ACE Console Port Settings

Parameters	Settings
Baud	9600
Data Bits	8
Parity	None
Stop Bits	1
Terminal Type	VT100/ANSI
Hardware Flow Control	On

RJ-45 to DB-9 or DB-25 Adapter

Table 1-3 lists the cable pinouts for the RJ-45 to DB-9 or DB-25 adapter. The DB-9 adapter is used to connect a rolled RJ-45 cable to the console serial port. The DB-9 or DB-25 adapter is used to connect the other end of the rolled RJ-45 cable to a PC or terminal serial port.

Table 1-3   Cable Pinouts for RJ-45 to DB-9 or DB-25

Signal	RJ-45 Pin	DB-9/DB-25 Pin
RTS	8	8
DTR	7	6
TxD	6	2
GND	5	5
GND	4	5
RxD	3	3
DSR	2	4
CTS	1	7

C H A P T E R 2

Preparing for Installation

This chapter contains important safety information that you should review before working with the Cisco 4710 Application Control Engine (ACE) appliance. Use the following guidelines to ensure your own personal safety and to help protect your ACE from potential damage.

Read the *Regulatory Compliance and Safety Information for the Cisco 4710 Application Control Engine Appliance* before you prepare the ACE for installation. This document is included in the ACE accessory kit.

This chapter contains the following major sections:

- Safety
- Preparing Your Site for Installation
- Precautions for Rack-Mounting
- Precautions for Products with Modems, Telecommunications, or Local Area Network Options
- Required Tools and Equipment

Safety

This section provides safety information for installing the ACE. It contains the following topics:

- Warnings and Cautions
- General Precautions
- Maintaining Safety with Electricity
- Protecting Against Electrostatic Discharge

Warnings and Cautions

Read the installation instructions in this document before you connect the ACE to its power source. Failure to read and follow these guidelines may lead to an unsuccessful installation and possibly damage the ACE and components.

You must observe the following safety guidelines when working with any equipment that connects to electrical power or telephone wiring so that you can avoid injuring yourself or damaging the ACE.

Note The English warnings in this document are followed by a statement number. To see the translations of a warning into other languages, look up its statement number in the *Regulatory Compliance and Safety Information for the Cisco 4710 Application Control Engine Appliance*.

The following warnings and cautions are provided to help you prevent injury to yourself or damage to the devices:

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

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 120 VAC, 15A (U.S./CAN); 240 VAC, 10A (INTERNATIONAL).** Statement 1005

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

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**

- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**

- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

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

Warning **To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.** Statement 1021

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

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

Warning   **The safety cover is an integral part of the product. Do not operate the unit without the safety cover installed. Operating the unit without the cover in place will invalidate the safety approvals and pose a risk of fire and electrical hazards.** Statement 117

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

Warning   **Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.** Statement 12

Warning   **Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages.** Statement 1041

Warning   **This unit might have more than one power cord. To reduce the risk of electrical shock, disconnect all power supply cords before servicing the unit.** Statement 106

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

Warning   **This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use.** Statement 1064

Warning   **Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.** Statement 1029

Warning   **Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

Warning   **The power supply circuitry for the equipment can constitute an energy hazard. Before you install or replace the equipment, remove all jewelry (including rings, necklaces, and watches). Metal objects can come into contact with exposed power supply wiring or circuitry inside the equipment. This could cause the metal objects to heat up and cause serious burns or weld the metal object to the equipment.** Statement 207

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

Warning   **Before working on a system that has an On/Off switch, turn OFF the power and unplug the power cord.** Statement 1

Warning   **Read the installation instructions before you connect the system to its power source.** Statement 1004

Warning   **There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** Statement 1015

General Precautions

Observe the following general precautions when using and working with your ACE:

- Keep your ACE components away from radiators and heat sources, and do not block cooling vents.
- Do not spill food or liquids on your ACE components, and never operate the product in a wet environment. If the ACE gets wet, see Chapter 4, Troubleshooting the ACE Hardware or contact the Cisco Technical Assistance Center. For instructions on contacting the Technical Assistance Center, see the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section.
- Do not push any objects into the openings of your ACE components. Doing so can cause fire or electric shock by shorting out interior components.
- Position cables and power cables carefully; route all cables and the power cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing rests on your ACE cables or the power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local/national wiring rules.
- To help avoid possible damage to the system board, wait 5 seconds after turning off the ACE before removing a component from the system board or disconnecting a peripheral device from the ACE.

Maintaining Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:

- Do not work alone if potentially hazardous conditions exist anywhere in your work space.
- Never assume that power is disconnected from a circuit; always check the circuit.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Disconnect power from the system.
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim, and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.
- Use the product within its marked electrical ratings and product usage instructions.
- Install the product in compliance with local and national electrical codes.
- If any of the following conditions occur, contact the Cisco Technical Assistance Center:
  - The power cable or plug is damaged.
  - An object has fallen into the product.
  - The product has been exposed to water.
  - The product has been dropped or damaged.
  - The product does not operate correctly when you follow the operating instructions.

- Use the correct external power source. Operate the product only from the type of power source indicated on the electrical ratings label. If you are not sure of the type of power source required, consult the Cisco Technical Assistance Center or a local power company.

- Use approved power cable(s) only. You have been provided with a power cable for your ACE that is intended for its use (approved for use in your country, based on the shipping location). Should you have to purchase a power cable, ensure that it is rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cable should be greater than the ratings marked on the product.

- Prevent electric shock by plugging the ACE, components, and peripheral power cables into properly grounded electrical outlets. These cables are equipped with three-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable.

- Observe power strip ratings. Make sure that the total ampere rating of all products plugged into the power strip does not exceed 80 percent of the rating.

- To help protect your ACE and components from sudden, transient increases and decreases in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).

- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your product. To prevent static damage, discharge static electricity from your body before you touch any of your product's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface on the equipment chassis.

As you continue to work inside the product, periodically touch an unpainted metal surface to remove any static charge that your body may have accumulated.

Work on ESD-sensitive parts only at an approved static-safe station on a grounded static dissipative work surface, for example, an ESD workbench or static dissipative mat.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.

- When transporting a sensitive component, first place it in an antistatic container or packaging.

- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

Preparing Your Site for Installation

This section describes the requirements your site must meet for safe installation and operation of your ACE. Before you select an installation site for the ACE, read the electrical, environmental, and physical requirements as described in Appendix A, Specifications. Ensure that your site is properly prepared before beginning the installation.

This section contains the following topics:

- Environmental
- Choosing a Site for Installation
- Ensuring Overcurrent Protection
- Grounding the ACE
- Creating a Safe Environment
- AC Power
- Cabling

Environmental

When planning your site layout and equipment locations, remember the precautions described in this section to help avoid equipment failures and reduce the possibility of environmentally caused shutdowns. If you are experiencing shutdowns or unusually high errors with your existing equipment, these precautions will help you isolate the cause of failures and prevent future problems.

Use the following precautions when planning the operating environment for your ACE:

- Always follow the ESD-prevention procedures described in the "Protecting Against Electrostatic Discharge" section to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Make sure that the chassis cover is secure. The chassis allows cooling air to flow effectively within it. An open chassis allows air leaks, which could interrupt and redirect the flow of cooling air from internal components.
- Electrical equipment generates heat. Ambient air temperature might not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Make sure that the room in which you operate has adequate air circulation.

Choosing a Site for Installation

⚠️

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

Follow these guidelines when choosing a site for installation:

- Choose a dry, clean, well-ventilated, and air-conditioned area.
- Choose a site that maintains an ambient temperature of 0° to 40°C (32° to 104°F).

Ensuring Overcurrent Protection

The ACE relies on the protective devices in the building installation for protection against short-circuit, overcurrent, and earth (grounding) fault. Ensure that the protective devices in the building installation are properly rated to protect the ACE and that they comply with national and local codes.

Grounding the ACE

⚠️

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

Creating a Safe Environment

Follow these guidelines to create a safe operating environment:

- Keep tools and chassis components off the floor and away from foot traffic.
- Clear the area of possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Keep the area around the chassis free from dust and foreign conductive material (such as metal flakes from a nearby construction activity).

AC Power

Ensure that the plug-socket combination is accessible at all times, because it serves as the main disconnecting device. See Appendix A, Specifications, for the ACE power requirements.

⚠️

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

Power Supply Guidelines

Follow these guidelines for power supplies:

- Check the power at the site before installing the chassis to ensure that the power is free of spikes and noise. Install a power conditioner, if necessary, to ensure proper voltages and power levels in the source voltage.
- Install proper grounding for the site to avoid damage from lightning and power surges.
- The chassis does not have a user-selectable operating range. See the label on the chassis for the correct AC-input power requirement.
- Make sure that you have the correct type of AC-input power supply cords for your site.
- Install a UPS for your site.

Cabling

Use the cables in the accessory kit to connect the ACE console port to a console or computer that is running a console program. In addition to using the console cable, use the provided standard Ethernet cable to connect the ACE to your network. See Chapter 1, Product Overview, for information on cable requirements.

Precautions for Rack-Mounting

⚠️

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

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**

- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**

- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

✏️

Note   A component refers to any server, storage system, or appliance and to various peripherals or supporting hardware.

Observe the following precautions for rack stability and safety. In addition, you should refer to the rack installation documentation that was provided with the rack for specific warnings and caution statements and procedures.

- Do not move large racks by yourself. Due to the height and weight of the rack, you should have a minimum of two people to accomplish this task.

- Ensure that the rack is level and stable before extending a component from the rack.

- Do not overload the AC supply branch circuit that provides power to the rack. The total rack load should not exceed 80 percent of the branch circuit rating.

- Do not step or stand on any system or component when servicing other systems and components in a rack.

- You should mount this unit 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.

- Make sure that your enclosed racks have adequate ventilation. An enclosed rack should have louvered sides and a fan to provide cool air.

- When mounting a chassis in an open rack, make sure that the rack frame does not block the intake or exhaust ports. If the chassis is installed on slides, check the position of the chassis when it is seated all the way into the rack.

- In an enclosed rack with a ventilation fan in the top, you can draw the excessive heat generated by the equipment near the bottom of the rack upward and into the intake ports of the equipment above it in the rack. Make sure that you provide adequate ventilation for the equipment at the bottom of the rack.

- Use baffles to isolate the exhaust air from the intake air and to draw the cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack. Experiment with different arrangements to position the baffles effectively.

Precautions for Products with Modems, Telecommunications, or Local Area Network Options

Follow these guidelines when working with these components:

- Do not connect or use a modem or telephone during a lighting storm. You might risk an electrical shock from the lightning.

- Never connect or use a modem or telephone in a wet environment.

- Do not plug a modem or telephone cable into the Ethernet connector.

- Disconnect the modem cable before opening a product enclosure, touching or installing internal components, or touching an uninsulated modem cable or jack.

- Do not use a telephone line to report a gas leak while you are in the vicinity of the leak.

Required Tools and Equipment

You need the following tools and equipment to install the Cisco 4710 Application Control Engine (ACE) appliance:

- Number 2 Phillips screwdriver

- Tape measure and level

- Antistatic mat or antistatic foam

- ESD grounding strap with an alligator termination clip

C H A P T E R 3

Installing the ACE

This chapter explains how to install the Cisco 4710 Application Control Engine (ACE) appliance in an equipment rack. This chapter also provides instructions for connecting cables, AC power, and for booting the ACE.

⚠️ **Warning**   **Read the installation instructions before connecting the system to the power source.** Statement 1004

This chapter contains the following major sections:

- Unpacking and Inspecting the ACE
- Installing Your ACE
- Connecting Cables
- Connecting AC Power
- Booting the ACE
- Checking the Front Panel LEDs
- Establishing a Serial Console Connection
- Removing or Replacing an ACE

Before you begin the installation, be sure you have read:

- Chapter 2, Preparing for Installation
- *Regulatory Compliance and Safety Information for the Cisco 4710 Application Control Engine Appliance*

Also, you may want to familiarize yourself with the ACE software by reading the following related documents, which you can obtain from Cisco.com:

- *Release Note for the Cisco 4700 Series Application Control Engine Appliance*
- *Cisco ACE 4700 Series Application Control Engine Appliance CLI Quick Configuration Note*
- *Cisco 4700 Series Application Control Engine Appliance Device Manager GUI Quick Configuration Note*

For detailed configuration information on the ACE command-line interface (CLI), see the following software documents:

- *Cisco 4700 Series Application Control Engine Appliance Administration Guide*
- *Cisco 4700 Series Application Control Engine Appliance Application Acceleration and Optimization Configuration Guide*

- *Cisco 4700 Series Application Control Engine Appliance Command Reference*
- *Cisco 4700 Series Application Control Engine Appliance Routing and Bridging Configuration Guide*
- *Cisco 4700 Series Application Control Engine Appliance Security Configuration Guide*
- *Cisco 4700 Series Application Control Engine Appliance Server Load-Balancing Guide*
- *Cisco 4700 Series Application Control Engine Appliance SSL Configuration Guide*
- *Cisco 4700 Series Application Control Engine Appliance System Message Guide*
- *Cisco 4700 Series Application Control Engine Appliance Virtualization Configuration Guide*
- *Cisco CSS-to-ACE Conversion Tool User Guide*

For detailed configuration information on the ACE Device Manager GUI, see the *Cisco 4700 Series Application Control Engine Appliance Device Manager GUI Configuration Guide.*

Unpacking and Inspecting the ACE

The ACE shipment contains the following items:

- One RJ-45 to female 25-pin sub-D connector
- Two RJ-45 to female 9-pin sub-D connectors
- One RJ-45 rolled (console) cable
- One four-post rack mount kit
- Cisco Product Documentation CD-ROM and Warranty Package
- *Regulatory Compliance and Safety Information for the Cisco 4710 Application Control Engine Appliance*

The ACE is shipped in a protective shipping carton. It is shipped as a self-contained chassis; you cannot add to or remove components from the ACE.

Follow these steps to unpack the ACE:

1. Remove the ACE accessories from the shipping carton. Save the packing materials in case you need to repack the ACE later.

2. Check the configuration of the ACE and the accessories against the items listed on the packing slip. Report any discrepancies as described in the "If the Product is Damaged" section.

3. Before installing the ACE, review the information outlined in Chapter 2, Preparing for Installation.

If the Product is Damaged

If any portion of the unit or component is damaged in transit, forward an immediate request to the delivering carrier to perform an inspection of the product and to prepare a damage report. Save the container and all packing materials until the contents are verified.

Concurrently, report the nature and extent of the damage to TAC. Report the problem or deficiency to TAC along with the model number and serial number, and you will be provided with service instructions, or a Return Material Authorization (RMA) number and shipping information. To obtain assistance, see the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section.

Installing Your ACE

This section provides instructions for installing the ACE in a four-post rack. The rack must be properly secured to the floor, ceiling, or upper wall, and where applicable, to adjacent racks. The rack should be secured using floor and wall fasteners and bracing as specified by industry standards.

Racks are marked in vertical increments of 1.75 inches (4.44 cm). Each increment is referred to as a rack unit (RU). A 1-RU device is 1.75 inches (4.44 cm) tall.

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

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

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

Before you install the ACE, be sure that you have read Chapter 2, Preparing for Installation, to familiarize yourself with the proper site and environmental conditions. Failure to read and follow these guidelines may lead to an unsuccessful installation and possible damage to the ACE and its components. Perform the steps below when installing and servicing the ACE.

When installing and servicing the ACE, you must do the following tasks:

- Disconnect all power and external cables before installing the ACE.
- Install the ACE in compliance with your local and national electrical codes:
  - United States: National Fire Protection Association (NFPA) 70; United States National Electrical Code.
  - Canada: Canadian Electrical Code, Part, I, CSA C22.1.
  - Other countries: If local and national electrical codes are not available, see IEC 364, Part 1 through Part 7.
- Do not work alone under potentially hazardous conditions.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Do not attempt to install the ACE in a rack that has not been securely anchored in place. Damage to the ACE and personal injury may result.
- Due to the size and weight of the ACE, do not attempt to install it by yourself.

See Chapter 2, Preparing for Installation and the "Precautions for Rack-Mounting" section for additional safety information on the rack installation.

The ACE can be installed in a system 1U rack. Figure 3-1 illustrates the rack rail components.

Figure 3-1   Rack Rail Components
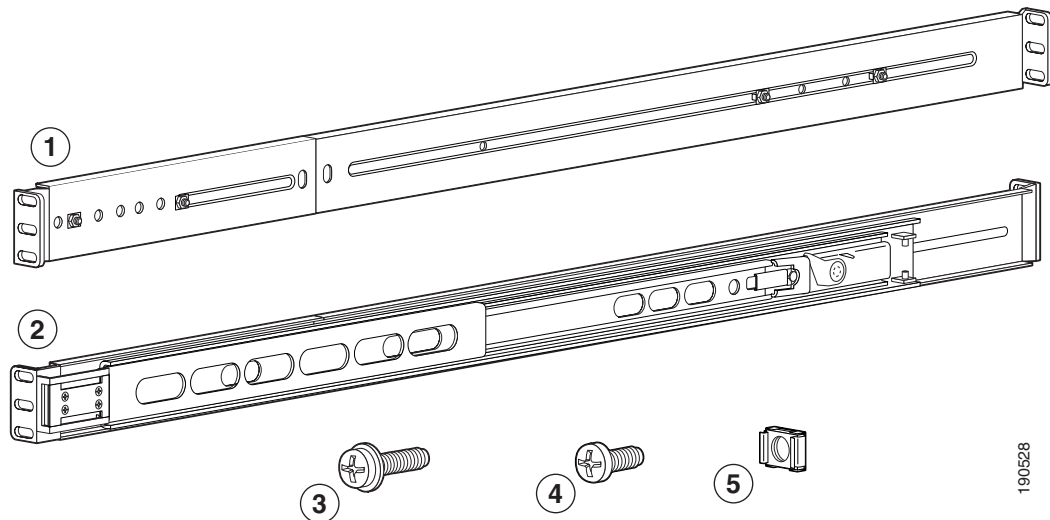
1	Right side telescopic rail	4	Round head screws (2)
2	Left side telescopic rail	5	Cage nuts (10)
3	Round head screws with washer (8)		

The procedure to install the ACE into a four-post rack consists of three parts:

- Attaching the Chassis Rail Mount
- Attaching the Server Rail
- Sliding the Chassis on the Rack

Attaching the Chassis Rail Mount

To attach the chassis rail mount, follow these steps:

Note   You must first remove the chassis rail mount section from the server rail and attach it to the chassis as shown in the following steps.

Step 1   Extend the server rail as far as it will go. See Figure 3-2. When fully extended, the server rail locks into the extended position.

Figure 3-2   *Removing the Chassis Rail Mount*
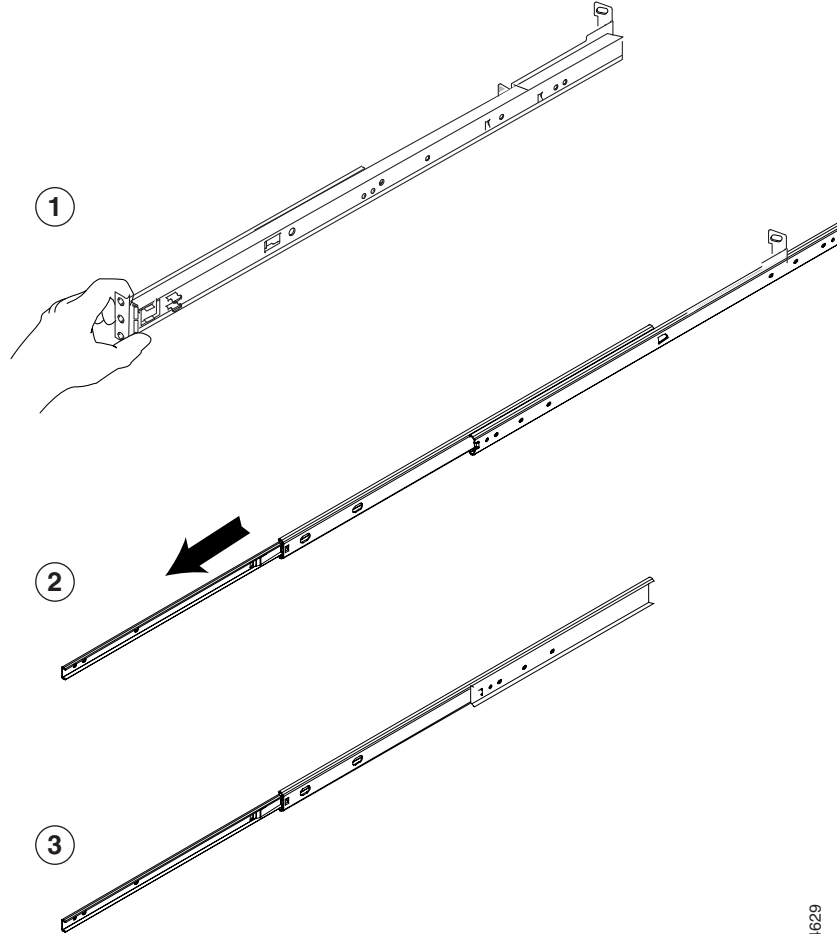
Step 2   Slide the white tab (labeled 1 in Figure 3-3) in the direction of its arrow and slide out the chassis rail mount part. (Set it aside for attaching to the chassis in the next step.)

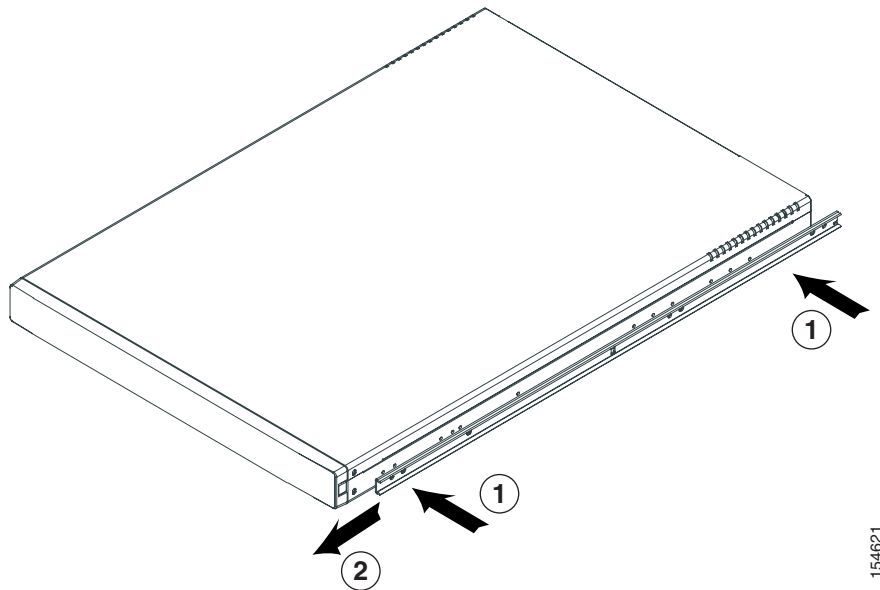*Figure 3-3*   *Sliding the Chassis Rail Mount Release Tab*
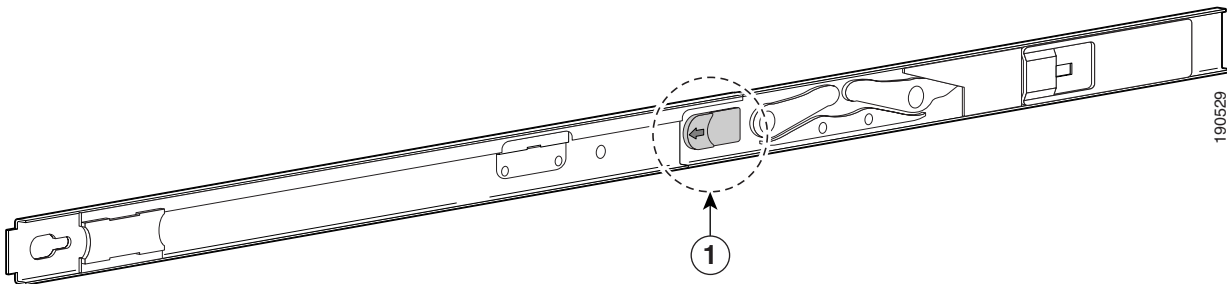
Step 3   Align the holes in the chassis rail mount to the pegs on the chassis (labeled 1 and 2 in Figure 3-4).
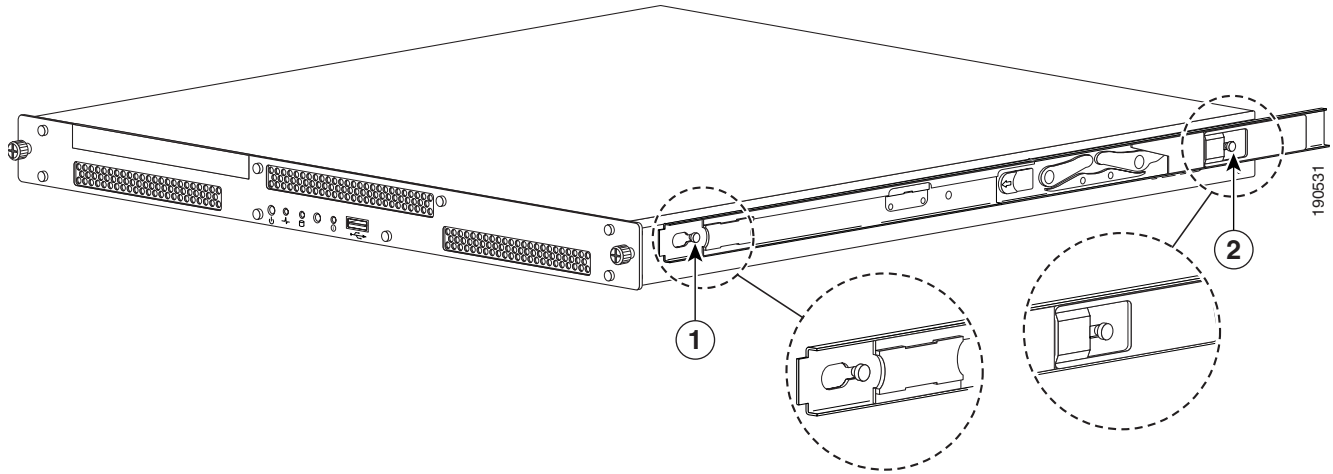
Figure 3-4   Positioning the Chassis Rail Mount on the Chassis
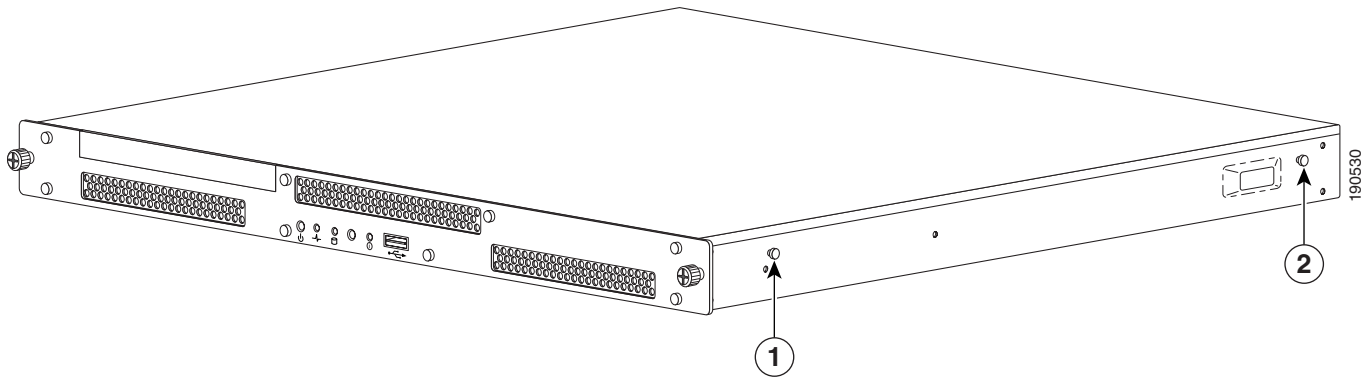
Step 4   Align the holes (labeled 1 in Figure 3-5) and then slide the rail until it locks into place (labeled 2 in Figure 3-5).

Figure 3-5   Attaching the Chassis Rail Mount to the Chassis

Figure 3-6 shows the chassis rail mount locked into place.

Figure 3-6   Chassis Rail Mount in the Locked Position

Attaching the Server Rail

Now that you have mounted the chassis rail mount, you need to retract the server rail that you previously extended and then attach it to the rack. If you have already retracted the server rail, go to Step 2.

To attach the server rail, follow these steps:

Step 1   To retract the arm of the server rail, push the tab shown in Figure 3-7. Then slide the arm back in.
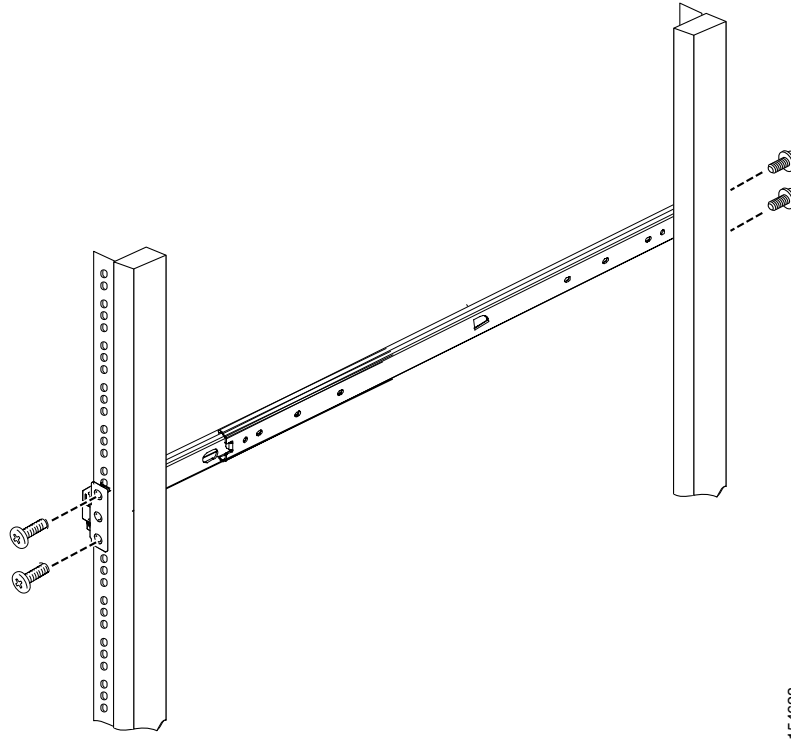
Figure 3-7   Retracting the Server Rail
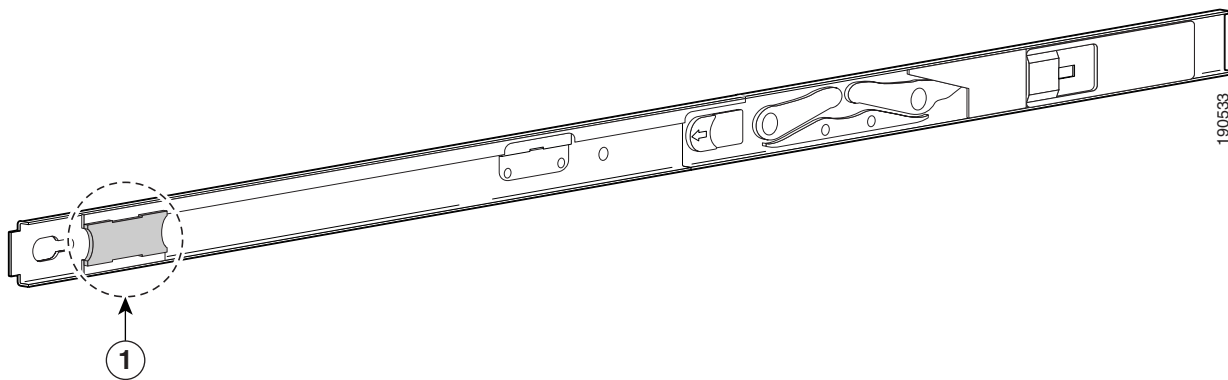
Step 2   Attach the server rail to the rack using a round head screw and cage nut as shown in the figure that corresponds to your rack:

- For a square-peg rack, see Figure 3-8.

- For a circular-peg rack, see Figure 3-9.

Figure 3-8   Attaching the Rail to a Square-Peg Rack
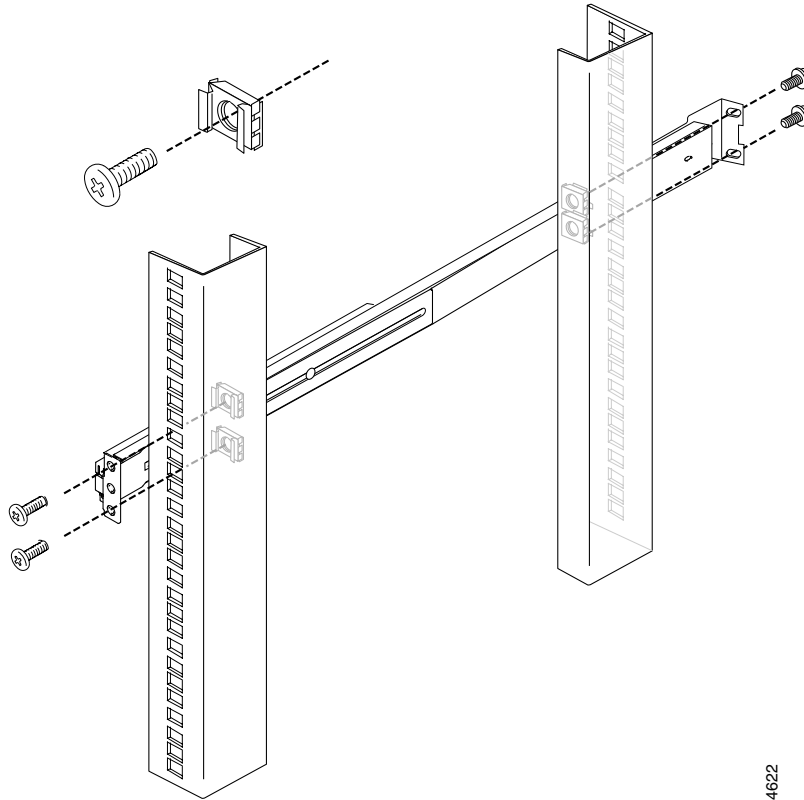
Figure 3-9   Attaching the Rail to a Circular-Peg Rack

154623

Step 3   Repeat Step 1 and Step 2 to repeat this process for the other rail and rack assembly.

> **Note**   Do not tighten the screws between the bracket and the rail until you install the rail into the rack.
> This step allows you to attach the rail to the rack easier. After the rail is attached to the rack, you
> can tighten the screws.

Sliding the Chassis on the Rack

Follow this procedure to slide the chassis onto the rack.

> **Note**   The EIA-310 specification states a minimum horizontal span internal dimension of 17.72 inches
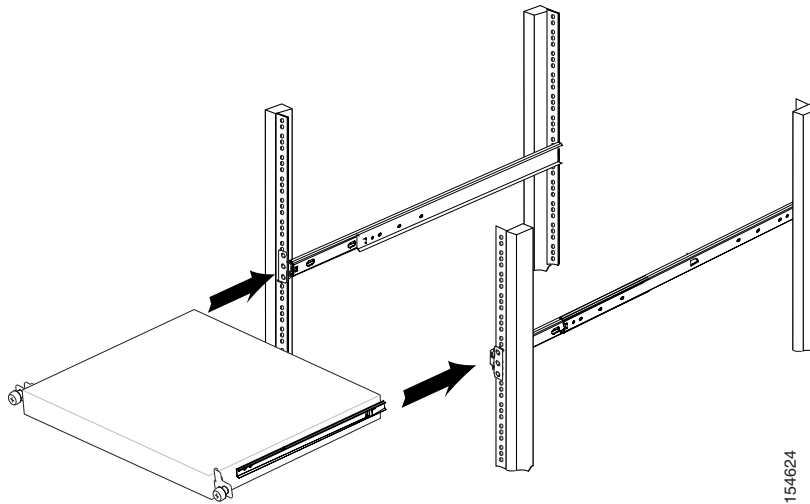> (450 mm) between rack flanges.

Step 1   On the chassis rail mount, slide and hold the blue plastic tab (labeled 1 in Figure 3-10) in the direction
of the arrow. This step allows the chassis rail mount to slide on to the rail.

Figure 3-10   *Sliding the Chassis Rail Mount Extended Tab*
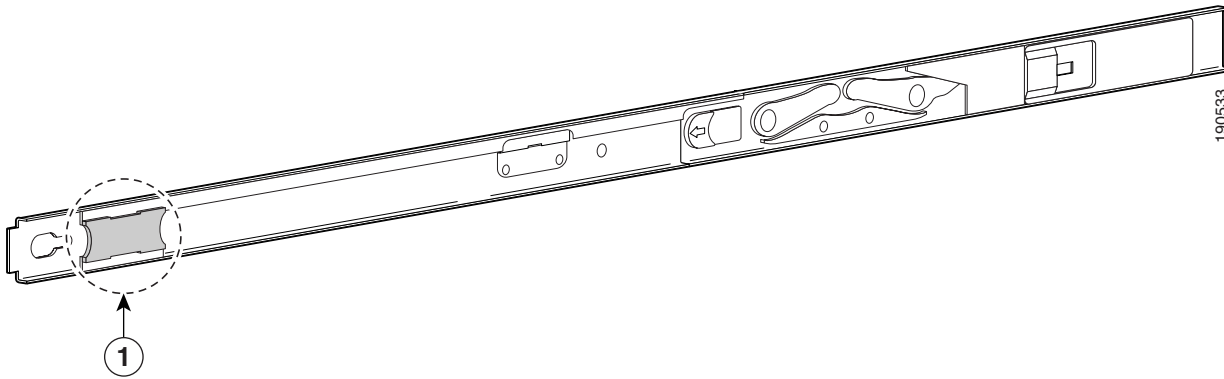
Step 2   Insert the chassis in the rack. See Figure 3-11.

Figure 3-11   *Sliding Chassis onto Rack*

Slide the chassis backward and forward in the telescopic rails a few times to ensure a smooth movement of the chassis in the rack.

⚠

Warning   **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 120 VAC, 15A (U.S./CAN); 240 VAC, 10A (INTERNATIONAL).** Statement 1005

Connecting Cables

⚠
Warning   **Do not work on the system or connect or disconnect cables during periods of lightning activity.**
Statement 1001

To connect network and console cables to your ACE, follow these steps:

Step 1   For network connections, connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to the Ethernet connectors on the ACE back panel (see Figure 1-2). The ACE back panel has two Ethernet management ports and four Ethernet data ports.

✎
Note   The 100BASE-T/1000BASE-T Ethernet standard requires that you use standard four twisted-pair Category 5e cable at lengths up to 328.08 feet (100 meters).

Step 2   Connect the other end of the network cable to a hub or switch in your network.

Step 3   Connect the console cable as shown in Figure 3-12 so that you have either a DB-9 or DB-25 connector on one end, as required by the serial port for your console/computer, and on the other end, you have a DB-9 connector for the ACE console serial port. Connect the RJ-45 rolled (console) cable between the two D-sub adapters.

✎
Note   Use the console port to connect to a computer, console, or communications server to enter configuration commands. Locate the serial cable from the accessory kit. The serial cable assembly consists of a rolled (console) cable with RJ-45 connectors, two DB-9 connector adapters PN 74-0495-01, and a DB-25 connector adapter PN 29-0810-01.

Figure 3-12   Console Connection
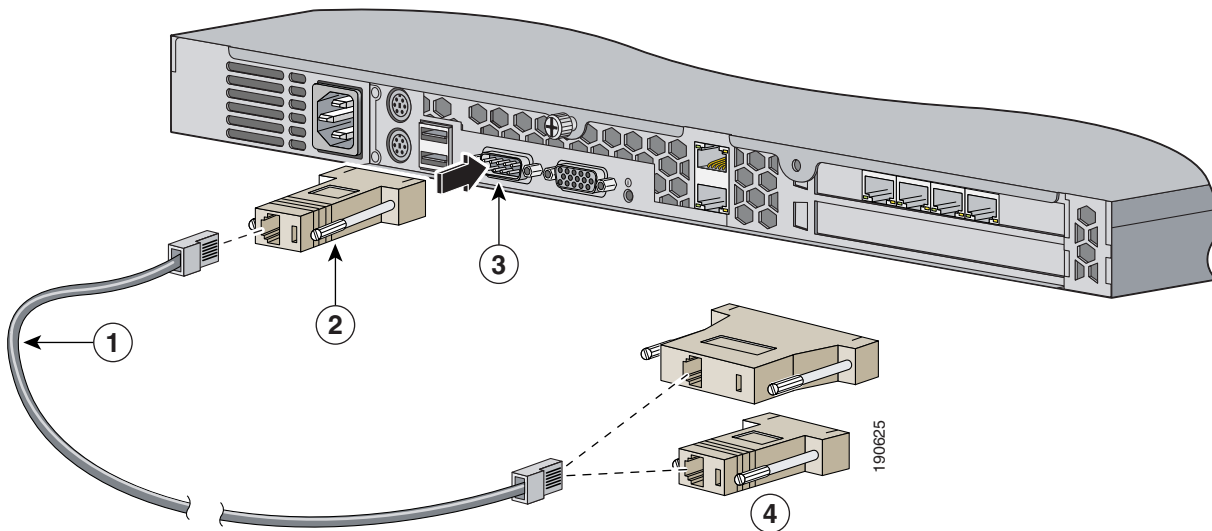
| **1** | RJ-45 rolled serial cable (null-modem) | **3** | Console serial port |
| **2** | DB-9 adapter to the ACE console serial port | **4** | DB-25 or DB-9 adapter to computer/console serial port |

Connecting AC Power

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

To connect AC power to your ACE, follow these steps:

Step 1   Ensure that you have reviewed the safety information outlined in Chapter 2, Preparing for Installation.

Step 2   Plug the AC power cord into the power cord receptacle at the rear of the ACE (see Figure 1-2).

Step 3   Connect the other end of the power cord to a power source.

Step 4   Power up all externally connected devices.

Step 5   Press the power control button on the front of the ACE.

Booting the ACE

When you power up the ACE, the ACE does the following tasks during the boot process:

- Performs hardware initialization and power-on self tests.
- Initializes the BIOS.
- Loads the rommon.
- Displays the boot menu (only if a console is connected). (See the "Establishing a Serial Console Connection" section on page 3-13.)
- Boots the ACE image (kernel and software).

Note   During power-up, the green power LED on the front of the ACE is on.

At this point, you are ready to configure and use the ACE. See the *Cisco ACE 4700 Series Application Control Engine Appliance CLI Quick Configuration Note* and the *Cisco 4700 Series Application Control Engine Appliance Device Manager GUI Quick Configuration Note* for the initial setup and configuration tasks for the ACE.

By completing the quick configuration procedures using either the CLI or the Device Manager GUI, your ACE will be able to perform the following tasks:

- Receive network traffic
- Allow network connectivity
- Match VIP-destined traffic flows
- Load balance these flows to real servers on the network

Checking the Front Panel LEDs

When the ACE is up and running, observe the front panel LEDs to monitor the ACE operating status. Figure 1-1 shows the location of the front panel LEDs and describes their functions.

Establishing a Serial Console Connection

Before you configure the ACE, you must establish a serial console connection to it. This step requires that you have a PC, two DB-9 to RJ-45 adapters (provided), a rolled RJ-45 cable (provided), and terminal emulation communication software (HyperTerminal or equivalent). You may also use a serial concentrator connection, if desired.

To establish a serial console connection, follow these steps:

Step 1   Connect a console to the serial console port on the rear panel as follows:

    a. Attach a DB-9 to RJ-45 adapter to the serial port of the console.

    b. Attach a DB-9 to RJ-45 adapter to the serial port of the ACE. For the location of the serial port, see Figure 1-2.

    c. Use the rolled RJ-45 cable to connect the console to the ACE.

Step 2   If you have not already done so, power up the ACE as described in the "Booting the ACE" section.

Step 3   Open your terminal emulation application on your PC to access the ACE CLI. The following procedure uses HyperTerminal for Windows:

    a. Launch HyperTerminal. The Connection Description window appears.

    b. Enter a name for your session in the Name field.

    c. Click **OK**. The Connect To window appears.

    d. From the drop-down list, choose the COM port to which the device is connected.

    e. Click **OK**. The Port Properties window appears.

    f. Set the port properties:

       Baud Rate = 9600

       Data Bits = 8

       Hardware Flow Control = On

       Parity = none

       Stop Bits = 1

    g. Click **OK** to connect.

    h. Press **Enter** to display the CLI prompt.

Step 4   Once you create a session, choose **Save As** from the File menu to save the connection description. Saving the connection description has the following two advantages:

- The next time that you launch HyperTerminal, the session is listed as an option under **Start** > **Programs** > **Accessories** > **HyperTerminal** > **Name_of_session**. This option lets you reach the CLI prompt directly without repeating the configuration steps.

- You can connect your cable to a different device without configuring a new HyperTerminal session. If you use this option, ensure that you connect to the same port on the new device as was configured in the saved HyperTerminal session. Otherwise, a blank screen appears without a prompt.

Removing or Replacing an ACE

⚠ **Warning**   **Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord.** Statement 1

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

To physically remove an ACE from your network, follow these steps:

Step 1   Power down the ACE by pressing the power button on the front panel of the ACE.

Step 2   Disconnect the power cords and network cables.

Step 3   Remove the chassis from the rack.

Step 4   To physically replace an ACE, install the new ACE in the rack and configure it using the same configuration parameters (such as the IP address) that you used for the removed ACE.

See the *Cisco 4700 Series Application Control Engine Appliance Administration Guide* and the *Cisco 4700 Series Application Control Engine Appliance Routing and Bridging Configuration Guide* for details.

CHAPTER 4

Troubleshooting the ACE Hardware

If your Cisco 4710 Application Control Engine (ACE) appliance is not working as expected, begin troubleshooting using the procedures in this chapter. This chapter guides you through some initial checks and procedures that can solve basic ACE problems.

This chapter contains the following major sections:

- Checking the Basics
- Checking Connections

Checking the Basics

To solve some basic ACE problems, follow these steps:

Step 1 Check if an alert message (or any other system message) was issued by the ACE software. All ACE system messages are listed in the *Cisco 4700 Series Application Control Engine Appliance System Message Guide*.

- If a message was issued, check the component named in the alert message.
- If a message was not issued, go to Step 2.

Step 2 Visually inspect the ACE for damage.

- If the ACE is wet or damaged, see the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section and then contact TAC for instructions.

✎
Note Liquid spills, splashes, and excessive humidity can cause damage to the ACE.

If the ACE was dropped or damaged while being moved, you should check it to see if it functions properly. If an external device attached to the ACE is dropped or damaged, see the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section and then contact TAC for instructions.

- If the ACE is not damaged or wet, go to Step 3.

Step 3 Perform the steps in the "Checking Connections" section and then check if the problem was resolved.

- If the problem was resolved, the power to the ACE was faulty, or the connections were loose. You have fixed the problem.
- If the problem was not resolved, go to Step 4.

Step 4   Check that the ACE completed its boot routine.

- If the ACE completed its boot routine, then the ACE configuration information was correct.
- If the ACE did not complete its boot routine, see the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section and then contact TAC.

Checking Connections

Loose, incorrect, or improperly connected cables are the most common source of problems for the ACE or other external equipment. A quick check of all the cable connections can solve most problems. See Chapter 1, Product Overview, for the location of the front and back panel controls and connections on the ACE.

To check all the connections, follow these steps:

Step 1   Power down the ACE. Disconnect all the power cables from their electrical outlets.

Step 2   If the ACE is connected to a power strip or power distribution unit, turn the power strip off and then on again.

Step 3   Check that the power strip is receiving power.

- If the power strip is receiveing power, go to Step 5.
- If the power strip is not receiveing power, go to Step 3.

Step 4   Plug the power strip into another electrical outlet, and check that the power strip is receiving power.

- If the power strip is receiving power, the original electrical outlet probably does not function. Use a different electrical outlet.
- If the power strip is not receiving power, go to Step 4.

Step 5   Connect a known working ACE directly to the electrical outlet, and check if the ACE is receiving power.

- If the ACE is receiving power, the power strip is probably not functioning properly. Use another power strip.
- If the ACE is not receiving power, go to Step 5.

Step 6   Reconnect the ACE to the electrical outlet or power strip, and make sure that all connections fit tightly together. Ensure that the Ethernet and Console cables are correct for use with the ACE. (See Chapter 1, Product Overview.)

Step 7   Power up the ACE, and check if the problem has been resolved.

- If the problem was resolved, the connections were loose. You have fixed the problem.
- If the problem was not resolved, see the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section and then contact TAC.

C H A P T E R **5**

Maintaining Your ACE

Proper use of preventive maintenance procedures can ensure that the Cisco 4710 Application Control Engine (ACE) appliance operates properly and can minimize the need for time-consuming service procedures. This chapter contains maintenance procedures that you should perform regularly.

This chapter includes the following major sections:

- Maintaining Your Site Environment
- Using Power Protection Devices

Maintaining Your Site Environment

An exhaust fan in the power supply cools the power supply and the ACE by drawing in air through various openings and blowing it out through the back panel. However, the fan may also draw dust and other particles into the ACE, causing contaminant buildup, which increases the chassis internal temperature and interferes with the operation of various ACE components.

To avoid these conditions, we recommend keeping your work environment clean to reduce the amount of dust and dirt around the ACE, so that you can reduce the amount of contaminants drawn into it by the power supply fan.

This section contains the following topics about various environmental factors that can adversely affect ACE performance and longevity:

- Temperature
- Humidity
- Altitude
- Dust and Particles
- Corrosion
- Electrostatic Discharge
- Electromagnetic and Radio Frequency Interference
- Power Source Interruptions

Temperature

Temperature extremes can cause a variety of problems, including premature aging and failure of chips or mechanical failure of devices. Extreme temperature fluctuations can cause chips to become loose in their sockets and cause expansion and contraction of disk drive platters, resulting in read or write data errors.

To minimize the negative effects of temperature on ACE performance, follow these guidelines:

*   Ensure that the ACE is operated in an environment no colder than 32°F (0°C) or hotter than 104°F (40°C).

*   Ensure that the ACE has adequate ventilation. Do not place it within a closed-in wall unit or on top of cloth, which can act as insulation. Do not place it in direct sunlight. Do not place it next to a heat source of any kind, including heating vents during winter.

Adequate ventilation is particularly important at high altitudes. ACE performance may not be optimum when operating at high temperatures as well as high altitudes. You should do the following:

*   Ensure that all slots and openings on the ACE remain unobstructed, especially the fan vent on the back of the ACE.

*   Clean the ACE at regular intervals to avoid any buildup of dust and debris, which can cause it to overheat.

*   If the ACE has been exposed to abnormally cold temperatures, allow a 2-hour warm-up period to bring it up to normal operating temperature before turning it on. Failure to do so may cause damage to internal components.

Humidity

High-humidity conditions can cause moisture in the ACE. This moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. Extreme moisture buildup inside the ACE can result in electrical shorts, which can cause serious damage.

Each ACE is rated to operate at 8 to 80 percent relative humidity, with a humidity gradation of 10 percent per hour. Buildings in which climate is controlled by air conditioning in the warmer months and by heat during the colder months usually maintain an acceptable level of humidity for the ACE. However, if a ACE is located in an unusually humid location, use a dehumidifier to maintain the humidity within an acceptable range.

Altitude

Operating a ACE at high altitude (low pressure) reduces the efficiency of forced and convection cooling and can result in electrical problems related to arcing and corona effects. This condition can also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or perform at reduced efficiency.

The ACE is for use at a maximum altitude of 6500 feet (2000 meters).

Dust and Particles

A clean operating environment can greatly negate the effects of dust and other particles, which act as insulators and interfere with the operation of mechanical components. Also, in addition to regular cleaning, follow these guidelines to deter contamination of the ACE equipment:

- Do not permit smoking anywhere near the ACE.
- Do not permit food or drink near the ACE.
- Use dust covers when the ACE is not in use.
- Close windows and outside doors to keep out airborne particles.

Corrosion

The oil from a person's fingers or prolonged exposure to high temperature or humidity can corrode the gold-plated edge connectors and pin connectors on various devices in the ACE. This corrosion on ACE connectors is a gradual process that can eventually lead to intermittent failures of electrical circuits.

To prevent corrosion, avoid touching contacts on boards and cards. Protecting the ACE from corrosive elements is especially important in moist and salty environments, which tend to promote corrosion. Also, as a further deterrent to corrosion, the ACE should not be used in extreme temperatures, as explained in the "Temperature" section.

Electrostatic Discharge

Electrostatic discharge (ESD) results from the buildup of static electricity on the human body and certain other objects. Static electricity is often produced by simple movements such as walking across a carpet. ESD is a discharge of a static electrical charge that occurs when a person whose body contains such a charge touches a component in the ACE, especially chips, and causes the component to fail.

ESD is a problem particularly in dry environments where the relative humidity is below 50 percent.

To reduce the effects of ESD, observe the following guidelines:

- Wear a grounding wrist strap. If a grounding wrist strap is unavailable, touch an unpainted metal surface on the chassis periodically to neutralize any static charge.
- Keep components in their antistatic packaging until they are installed.
- Avoid wearing clothing made of wool or synthetic materials.

Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) can adversely affect devices such as radio and television (TV) receivers operating near the ACE. Radio frequencies emanating from the ACE can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on a monitor screen.

RFI is defined as any EMI with a frequency above 10 kHz. This type of interference can travel from the ACE to other devices through the power cable and power source or through the air like transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of EMI and RFI emitted by computing equipment. Each ACE meets these FCC regulations.

To reduce the possibility of EMI and RFI, follow these guidelines:

- Operate the ACE only with its cover installed.

- Ensure that the screws on all peripheral cable connectors are securely fastened to their corresponding connectors on the back of the ACE.

- Always use shielded cables with metal connector shells for attaching peripherals to the ACE.

Power Source Interruptions

The ACE is especially sensitive to variations in voltage supplied by the AC power source. Overvoltage, undervoltage, and transients (or spikes) can erase data from memory or even cause components to fail. To protect against these types of problems, always properly ground power cables. Use one or both of the following methods:

- Use one of the power protection devices described in the "Using Power Protection Devices" section.

- Place the ACE on a dedicated power circuit (rather than sharing a circuit with other heavy electrical equipment). In general, do not allow the ACE to share a circuit with any of the following equipment:

    - Copier machines

    - Air conditioners

    - Vacuum cleaners

    - Space heaters

    - Power tools

    - Teletype machines

    - Adding machines

    - Laser printers

    - Facsimile machines

    - Any other motorized equipment

In addition to these appliances, the greatest threats to the ACE power supply are surges or blackouts caused by electrical storms. Whenever possible, turn off the ACE and any peripherals and unplug them from their power sources during thunderstorms.

If a blackout occurs—even a temporary one—while the ACE is turned on, turn it off immediately and disconnect it from the electrical outlet. Leaving the ACE on may cause problems when the power is restored; all other appliances left on in the area can create large voltage spikes that can damage the ACE.

Using Power Protection Devices

A number of devices are available that protect against power problems such as power surges, transients, and power failures. The following subsections describe some of these devices.

Surge Protectors

Surge protectors are available in a variety of types and usually provide a level of protection commensurate with the cost of the device. Surge protectors prevent voltage spikes, such as those caused during an electrical storm, from entering a ACE through the electrical outlet. Surge protectors, however, do not offer protection against brownouts, which occur when the voltage drops more than 20 percent below the normal AC line voltage level.

Line Conditioners

Line conditioners go beyond the overvoltage protection of surge protectors. Line conditioners keep the ACE AC power source voltage at a fairly constant level and therefore can handle brownouts. Because of this added protection, line conditioners cost more than surge protectors—up to several hundred dollars. However, these devices cannot protect against a complete loss of power.

Uninterruptible Power Supplies

Uninterruptible power supply (UPS) systems offer the most complete protection against variations in power because they use battery power to keep the ACE running when the AC power is lost. The battery is charged by the AC power while it is available, so once AC power is lost, the battery can provide power to the ACE for a limited amount of time—from 15 minutes to an hour or so—depending on the UPS system.

Surge protectors should be used with all UPS systems, and the UPS system should be Underwriters Laboratories (UL) safety-approved.

■ **Using Power Protection Devices**

Specifications

This appendix contains the following sections that list the specifications for the Cisco 4710 Application Control Engine (ACE) appliance:

- Electrical Specifications
- Environmental Specifications
- Physical Specifications
- Port Specifications

Electrical Specifications

Table A-1 describes the ACE AC electrical specifications.

Table A-1   AC Electrical Specifications

AC Specification	Operational
Input Voltage (V)	100 to 240 VAC
Input Voltage (F)	50 to 60 Hz
Current Draw	3.5 A
Typical Operating Power	128 W
Power Consumption (Max. Power)	345 W
Heat Dissipation	1314 BTU/hr

Environmental Specifications

Table A-2 describes the ACE environmental specifications.

Table A-2   Environmental Specifications

Specification	Operational	Non-operational
Temperature	32°F to 104°F (0° to 40°C)	-4°F to 140°F (-20° to 60°C)
Humidity	90% at 104°F (40°C) (noncondensing)	90% at 140°F (60°C) (noncondensing)
Shock	31 G halfsine	71 G halfsine, 20 G square
Vibration	0.25 G from 3 to 200 Hz	0.5 G from 3 to 200 Hz
Acoustic Noise	50 dBa (maximum)	Not applicable

Note   G is the unit of acceleration due to gravity, where 1 G equals 32.17 feet per second^2 (9.81 meters per second^2).

Physical Specifications

Table A-3 describes the ACE physical specifications.

Table A-3   Physical Specifications

Description	Specification
Chassis Dimensions (H x W x D)	1.50 in x 16.92 in x 20.04 in (42.4 mm x 430 mm x 509 mm)
Chassis Shipping Weight	40.0 lbs (18.2 kg)
Chassis Weight	30.8 lbs (14 kg)

Port Specifications

Table A-4 describes the ACE port specifications.

Table A-4   Port Specifications

Description	Specification
Ports	• Four 1000BASE-T, 100BASE-T, 10BASE-T Ethernet ports (RJ-45 connector) • One console serial port (9-pin male D-shell connector)

■ **Port Specifications**

INDEX

W

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