CISCO™

Factory Staging Application
User Guide

Please Read

Important

Please read this entire guide. If this guide provides installation or operation instructions, give particular attention to all safety statements included in this guide.

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About This Guide

Introduction

This guide provides procedures for staging Cisco® Next Generation Platform (NGP) Linux OS based Explorer® Digital Home Communications Terminals (DHCTs) and CableCARD™ modules in a Common Download (CDL) environment using the Cisco Factory Staging Application (FSA). This staging process configures these DHCTs for use in the Cisco Digital Broadband Delivery System (DBDS).

Scope

This guide provides an overview of the FSA and its various components and includes common troubleshooting steps.

Notes:

■ This guide does not include procedures for installing client release software. Refer to *Downloading New Client Application Platform Installation Instructions* (part number 4003052) for information regarding installing client release software.

■ This guide does not include procedures for staging legacy set-tops and non-CableCARD DHCTs. Refer to the *Explorer Digital Home Communications Terminal Staging Guide* (part number 734375).

■ This guide does not include procedures for staging Separable Security Host with CableCARD™ module (SSC) DHCTs. Refer to one of the following guides (based on the Digital Network Control System (DNCS) system release you are using) for information regarding staging SSC DHCTs:

  – *Separable Security Host Staging Guide for System Release 4.2.1 and Earlier* (part number 736107)

  – *Separable Security Host Staging Guide for System Release 4.3 and Later* (part number 4024836)

■ See *Related Publications* for information on obtaining the documents mentioned above.

Audience

This guide is written for staging area personnel responsible for staging DHCTs, DHCT installation personnel, and system operators of the DNCS.

Document Version

This is the first release of this guide.

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Introducing the Factory Staging Application

Introduction

The Factory Staging Application (FSA) is a new application that is installed on a DHCT at the factory and is activated the first time the DHCT is staged. FSA is a staging method by which service providers stage a factory-fresh DHCT using CDL to prepare it for services on the Cisco DBDS.

FSA is primarily focused on CDL as it listens for CDL triggers and responds to CDL requests.

In This Chapter

Overview

Many service providers are moving to the use of CDL as a method for downloading software images into set-tops. The advantage of CDL is that it is an industry standard methodology that also provides for more efficient and faster code downloads. This is important given the ever-increasing size of software image files. During the staging of new set-tops, staging personnel need real-time status information as well as detailed diagnostic information in the event of a download failure. Unfortunately, there is not a standardized method defined by which the set-top can convey this status and diagnostic information to staging personnel

The FSA is Cisco's answer to the issues noted above. The FSA comes pre-loaded from the factory on new set-tops for customers that desire to use the FSA. The FSA provides a standard way of ensuring that CDL triggers are recognized and acted upon for software image download into set-tops. In addition, the FSA provides real-time status information to the staging operator via a combination of LED blinking patterns and simple text messages on set-tops equipped with a Front Panel Display (FPD). Finally, in the case of an error condition, the FSA provides LED and FPD error code indicators as well as a subset of detailed diagnostic pages accessible to the operator using a display device connected to any video output.

In summary, the FSA from Cisco includes the following benefits:

- A useful tool that gives service provider staging personnel a way to leverage CDL for downloading software images into set-tops

- Ships pre-loaded from the factory for ease of use

- Provides the real-time status information that staging personnel need to assess the condition of a download in progress as well as detailed diagnostic information using LEDs, FPDs, and diagnostic screens

What Knowledge and Skills Do You Need?

Before you stage set-tops and CableCARD modules, you must be familiar with the basic operation of the devices and the features that are available to subscribers.

Overall Staging Knowledge

Before you stage devices, you should be familiar with these processes:

- Operation of the DNCS (particularly set-top and CableCARD module loading and activation)

- Configuration of your cable headend system

- Knowledge of basic UNIX commands

- Basic FSA operation (this guide)

- Knowledge of CDL, CDL triggers, and CDL download methods

- Knowledge of File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP), Simple Network Management Protocol (SNMP), and the ability to use these methods

For more information, refer to the *Scope* topic in **About This Guide**.

Set-Top Staging Knowledge

To stage the set-tops using FSA, you should become familiar with the following features of the set-top:

- Front and back panels of the Explorer set-tops

- Explorer set-top FSA and CDL diagnostic screens

- Configuration settings that define the operating characteristics for set-tops

- Remote control operation

- LED indicators that indicate set-top status

Staging involves two main tasks:

- Installing the current operating system (OS) and device drivers onto the set-top

- Installing CableCARD module and host software onto the set-top

Common Download Triggers and Methods

This section lists the various triggers and download methods that comprise CDL.

Important: These triggers and methods are not mutually exclusive and can operate and function together in a variety of combinations depending on system configuration.

CDL Triggers

- TFTP
- SNMP
- DOCSIS® Configuration FILE
- CVT (via CableCARD or DSG)

CDL Download Methods

- TFTP
- DSG Carousel (DSM-CC)
- FAT Carousel (DSM-CC)

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Using the Factory Staging Application

Introduction

This chapter provides descriptions of front panel display behaviors and LED blinking patterns that occur during the FSA. This chapter also contains examples of the FSA screens that display on the monitor during the code download. In addition, this chapter also contains a table that lists the CDL errors that may occur and a description of each error.

In This Chapter

Overview

This section provides descriptions of front panel display behaviors and LED blinking patterns that occur during the FSA. This section also contains a table that lists the CDL errors that may occur and a description of each error.

Starting FSA

The FSA loads and operates automatically after you complete the following steps.

1   Place the set-top in the staging area.

2   Connect the set-top to an active RF signal.

3   Connect the set-top to AC power. The FSA loads and looks for a code download trigger and associated download method. See *Common Download Triggers and Methods* (on page 4) for detailed information.

FSA Screens

The screens in this section appear on the monitor during downloads.

FSA Opening Screens

The following screens display on the monitor during initial bootup.
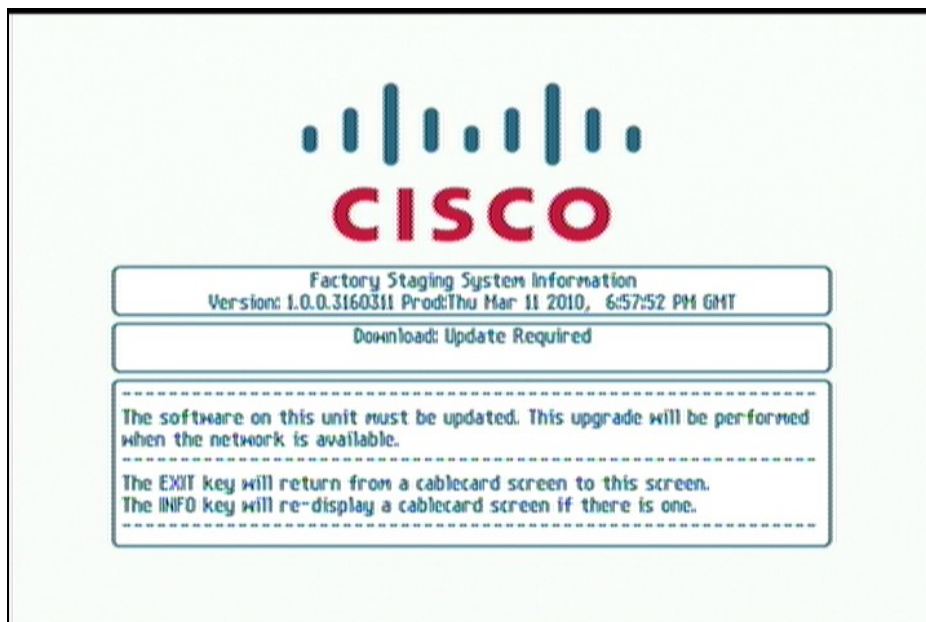
Screen 1

Screen 2

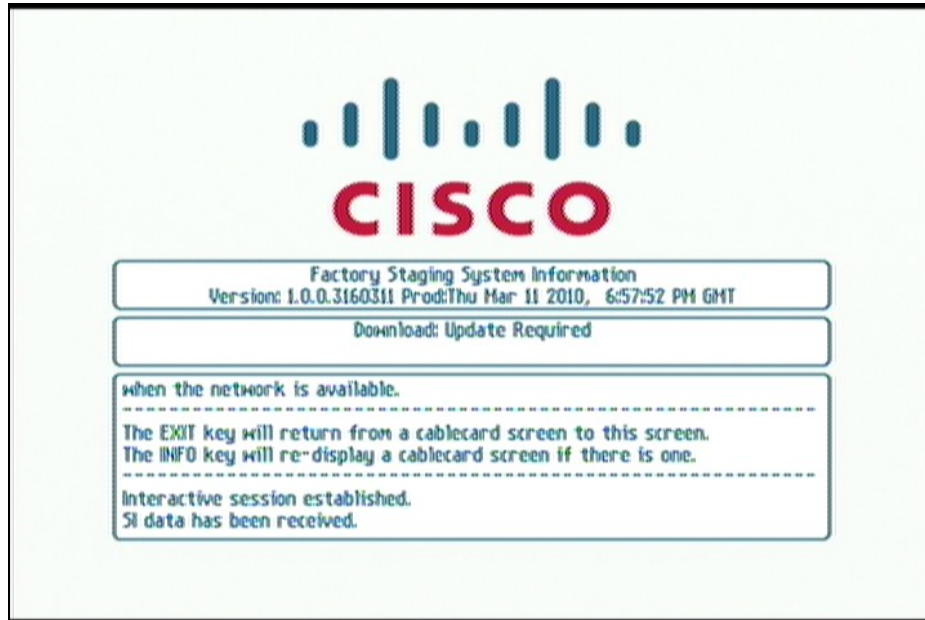When the monitor displays the following screen, the set-top front panel display shows `Co:nn`.

Screen 3

FSA Interactive Session Screen

The following screen displays on the monitor when the set-top establishes two-way connectivity. The front panel display on the set-top shows ▐▛▛▐
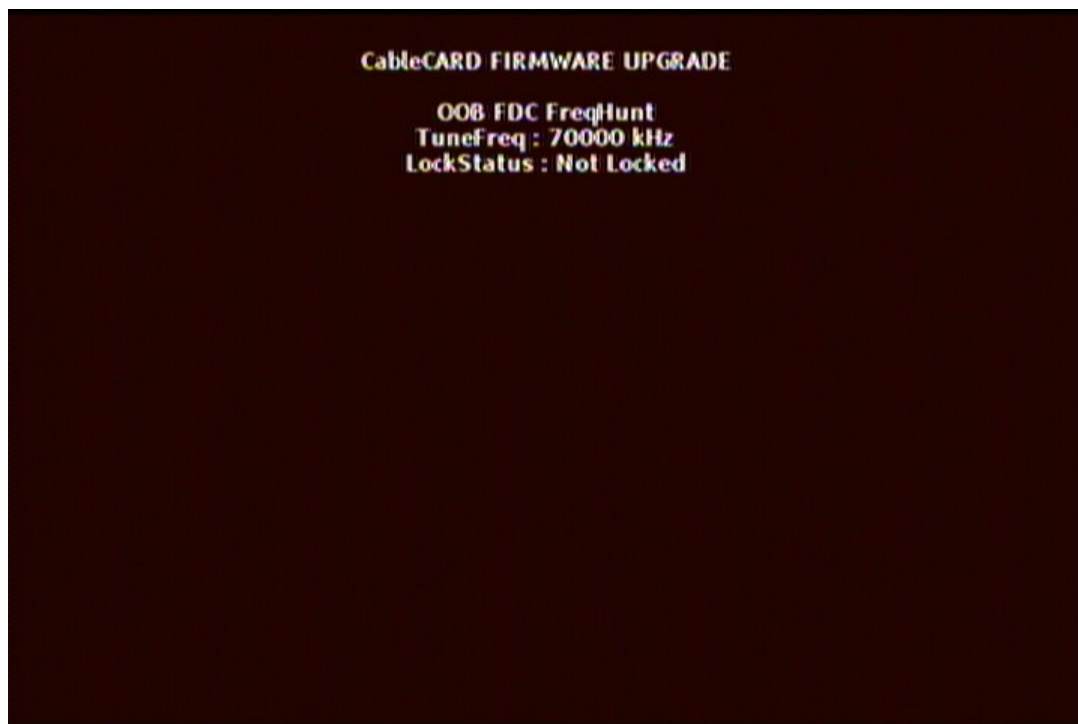
Screen 4

CableCARD Download Screens

The following screens appear during CableCARD module software download.

Important: These screens only appear on the monitor during a CableCARD module software download from the DNCS. If a CableCARD module software download does not occur, the CableCARD ID/Host ID screen displays.

Note: During the download, the set-top front panel display alternates between `dnLd` and `CArd`. The CableCARD module software download takes several minutes.
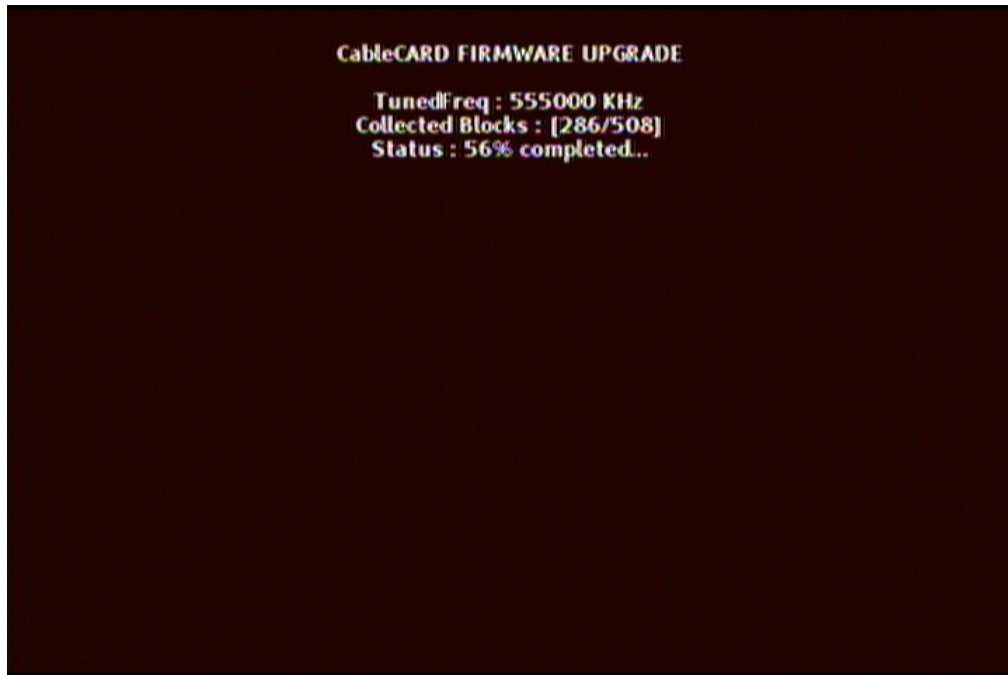
Screen 1

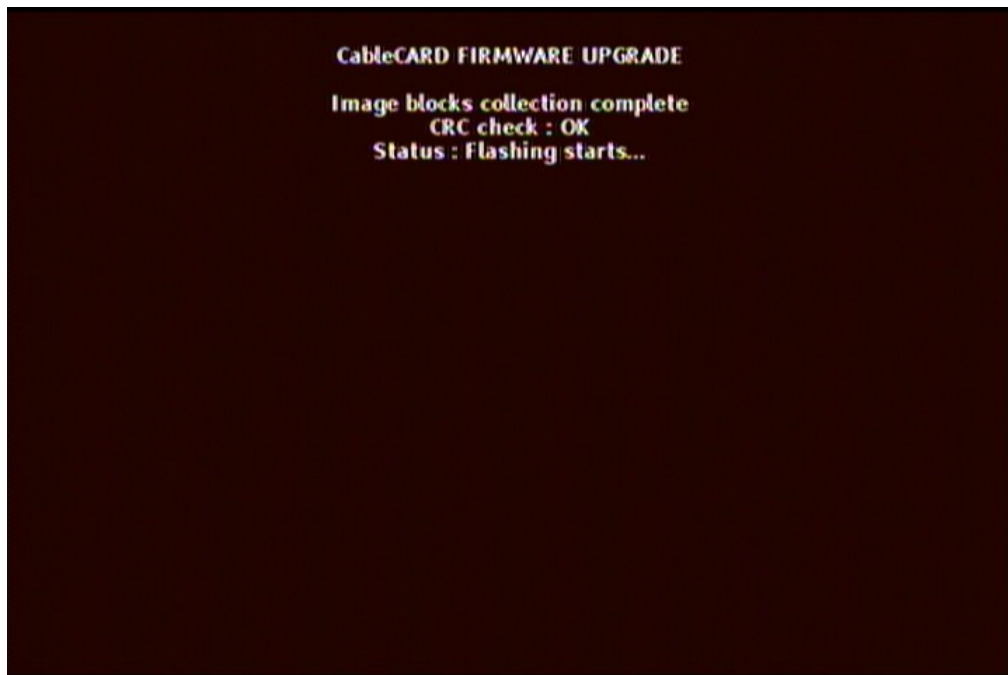CableCARD download screen showing percent (%) completed to this point.

Screen 2

CableCARD FIRMWARE UPGRADE

TunedFreq : 555000 KHz
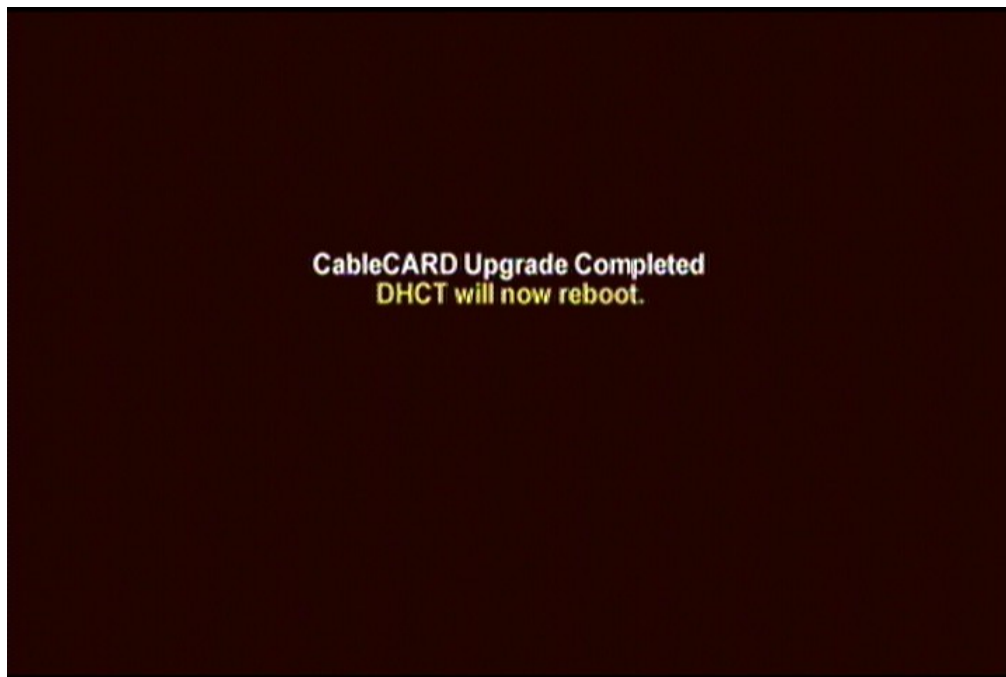Collected Blocks : [286/508]
Status : 56% completed...

The CableCARD download has reached 100%, passed the CRC check, and is now flashing the code.

Screen 3

CableCARD FIRMWARE UPGRADE

Image blocks collection complete
CRC check : OK
Status : Flashing starts...

The CableCARD upgrade is now complete and the DHCT will reboot and display the FSA screens once again.

Screen 4

Host Code Download Screens

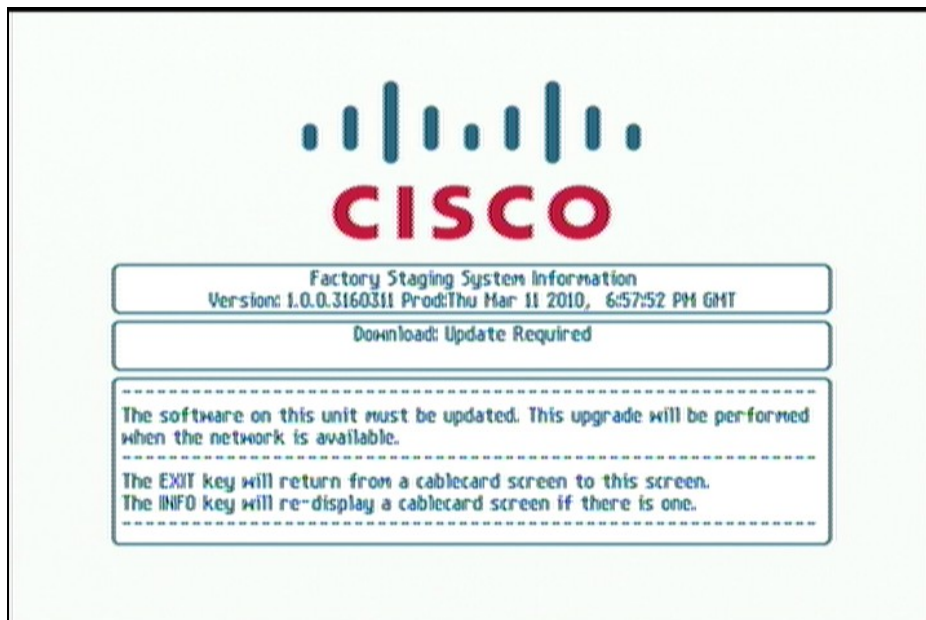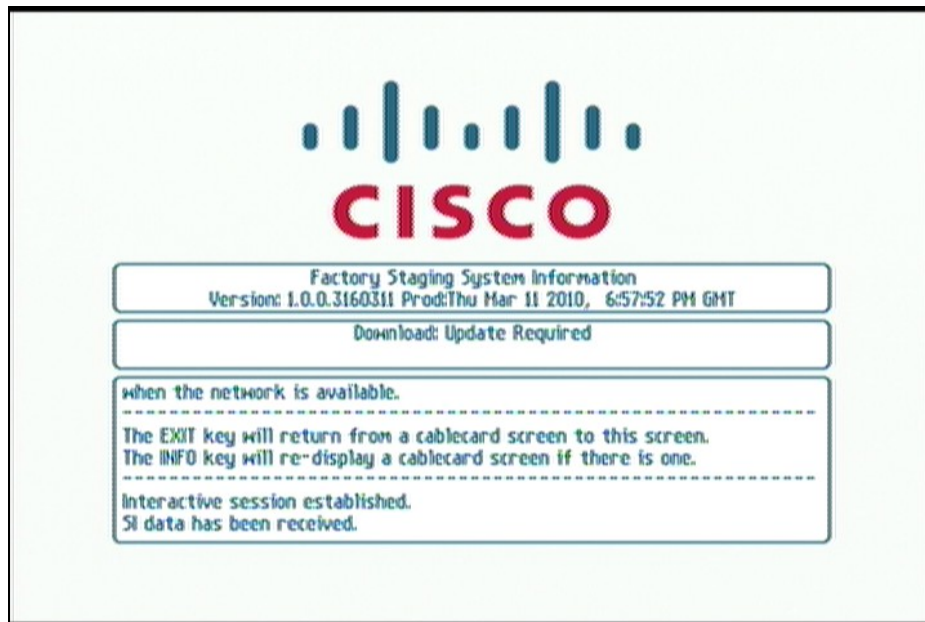The following screens display during initial bootup.

Screen 1

Screen 2

When this screen displays on the monitor, the front panel display on the set-top shows **Co:nn**.
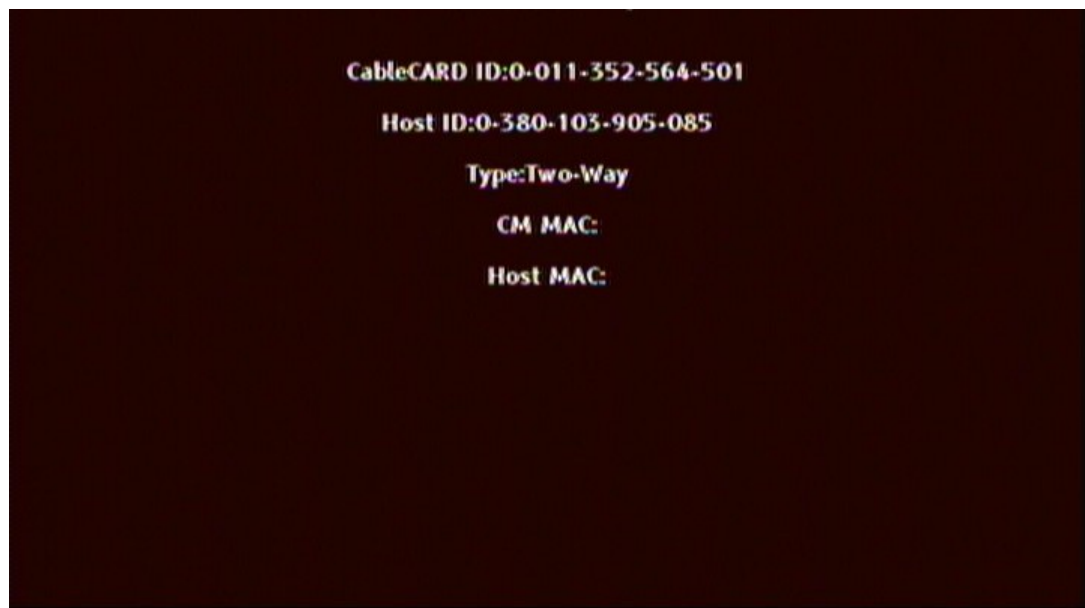
Screen 3

When this screen displays on the monitor, the front panel display on the set-top shows **22:nn**.

Screen 4

The following screen then appears to indicate that the set-top is not provisioned in the billing system. This screen also appears when there is no CableCARD module software download from the DNCS. To exit this screen, press the **Exit** button on the front panel of the set-top.
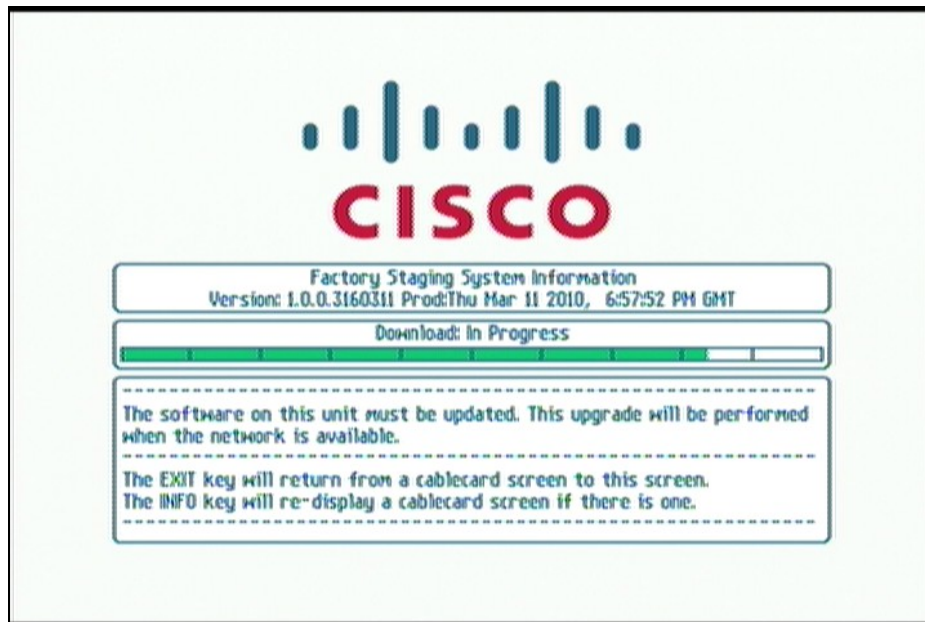
Screen 5

The following Download In Progress screen appears. The horizontal green bar increments to the right and when the horizontal boxes are full, the download is complete.

Important: During the download, **Cd00** appears on the front panel display of the set-top and counts up to **Cd99**.

Note: You must press the **Exit** button on the front panel of the set-top to view this screen on the monitor.

Screen 6

Note: During the download, the set-top will go into screen saver mode and one of the following will display on the monitor:

- **Cdxx** where xx equals a number from 0 (zero) to 99.

- **PEnd**

- **Conn**

To exit screen saver mode, press the **Exit** button on the front panel of the set-top.

Axiom Tru2way Download

After the FSA is complete, the following screens display during the host code (middleware) download and when the set-top is initializing the Card/Host interface.
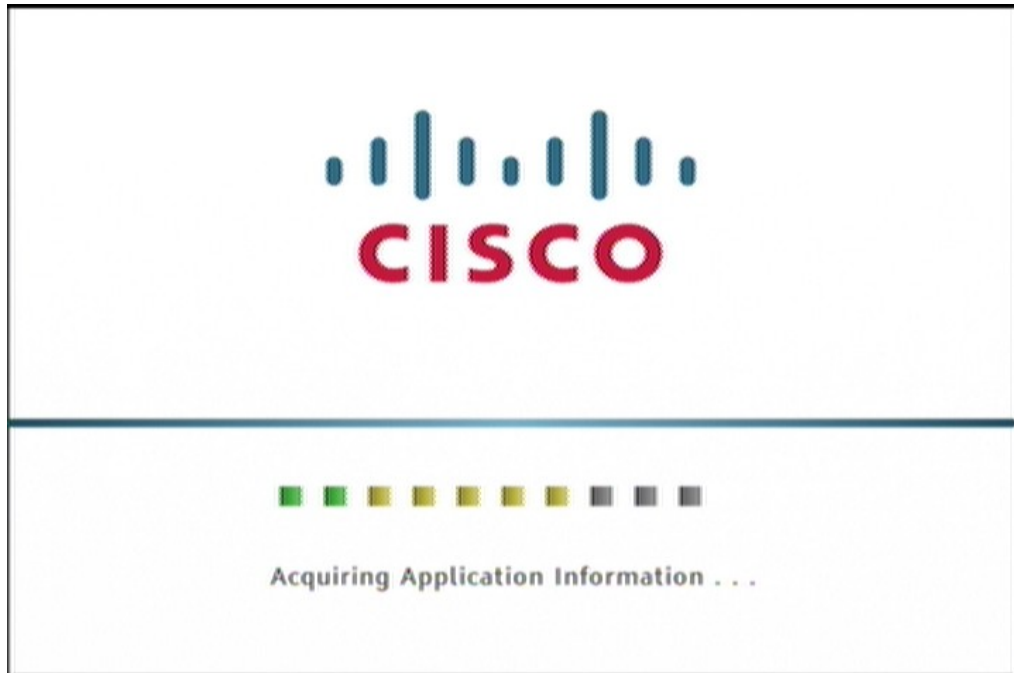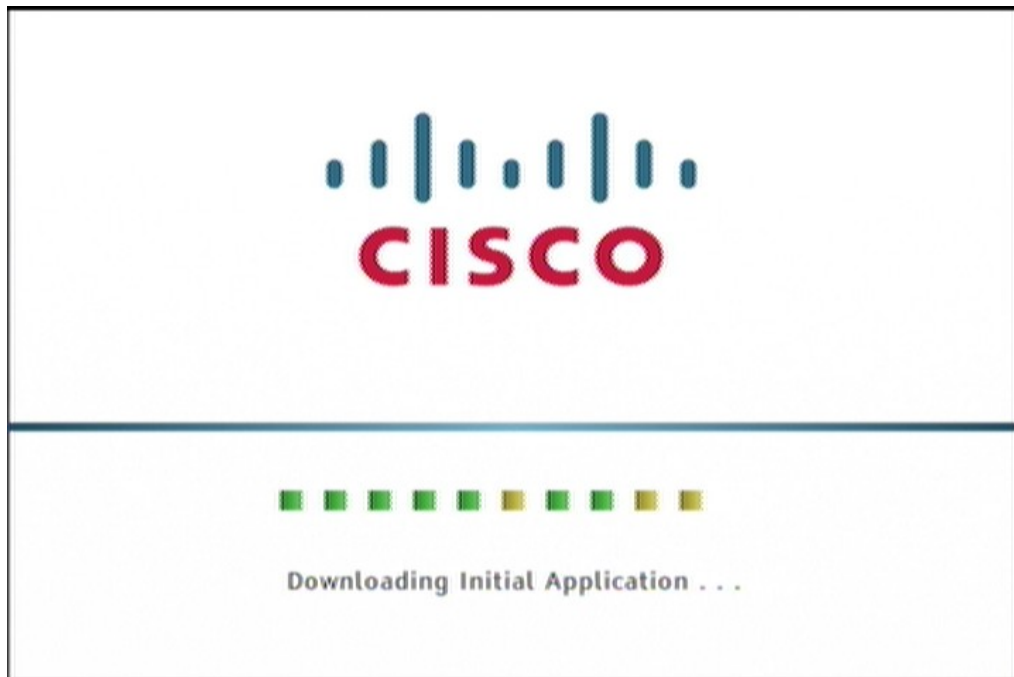
Screen 1

Screen 2

Screen 3

Screen 4

LED Blinking Patterns

This section contains explanations of what the front panel Light-Emitting Diode (LED) displays on the Explorer DHCTs mean. It also contains examples of the front panel LED displays, TV screen sequences, and POWER LED flash codes that might appear during DHCT software downloads

The table below provides the display behaviors for LED indicators based on the number of LEDs available on the set-top model.

State	3 LED Version	1 LED version	Comments
Boot	Bootloader flashes LEDs from left to right in sequence	Bootloader turns power LED on solid	The bootloader has control of the set-top
Transition to FSA (Connecting)	Power LED flashes on/off in one-second intervals	Power LED flashes on/off in one-second intervals	The OS (FSA) has control of the set-top
Hunting for CDL Trigger	Three slow blinks between a pause of one second (800ms on, 800ms off repeated three times followed by a 1000ms pause, repeat)	Three slow blinks between a pause of one second (800ms on, 800ms off repeated three times followed by a 1000ms pause, repeat)	Power LED is to be used
OCAP™ and CableCARD Image Downloading	Two fast blinks between a pause of one second (400ms on, 400ms off repeated two times followed by a 1000ms pause, repeat)	Two fast blinks between a pause of one second (400ms on, 400ms off repeated two times followed by a 1000ms pause, repeat)	Power LED is to be used This sequence is in sync with CableCARD download under SARA for consistency
Download Failed	Four fast blinks between a pause of one second (400ms on, 400ms off repeated four times followed by a 1000ms pause, repeat)	Four fast blinks between a pause of one second (400ms on, 400ms off repeated four times followed by a 1000ms pause, repeat)	Power LED is to be used
Download Success	Customer Application Specific	Customer Application Specific	The platform software will not be responsible for the final state of the LEDs upon success

Front Panel Display Behaviors

For set-tops with a front panel display (FPD), the following LED behaviors apply.

Note: The actual sequence of these display behaviors may change depending on the timing of the CableCARD download. The order described in the following table is not meant to be fixed. Rather, each state is identified and is displayed in the appropriate order based on the status of the set-top boot sequence.

State	Front Panel Display (FPD)	Video Out Display	Comments
Boot	boot	Blank	The bootloader has control of the set-top Bootloader errors display in the format of **Erxx**.
Transition to FSA (Connecting)	Conn	FSA Splash screen Diagnostics can be displayed with the proper button press sequence (see *Diagnostics* (on page 22))	The OS (FSA) has control of the set-top
Hunting for CDL Trigger	PEnd	FSA Splash screen Diagnostics can be displayed with proper button press sequence (see *Diagnostics* (on page 22))	
OCAP image downloading	Cd%%	FSA Splash screen Diagnostics can be displayed with the proper button press sequence (see *Diagnostics* (on page 22))	FPD displays **Cd** followed by digits representing the percentage complete of the image download starting at 00 and ending at 99 Jumps in the counter sequencing are acceptable
CableCARD image downloading	Alternate "dnLd" and "CArd"	CableCARD MMI Screen Diagnostics can be displayed with the proper button press sequence (see *Diagnostics* (on page 22))	If an error code is being displayed on the FPD, this sequence shall not be displayed and the error code shall be displayed constantly

State	Front Panel Display (FPD)	Video Out Display	Comments
Download failed	Edxx	FSA splash screen Diagnostics can be displayed with proper button press sequence (see *Diagnostics* (on page 22))	The complete list of error conditions and corresponding error codes that shall be supported are listed in a separate table later in this section
Download success	Customer Application Specific	Customer Application Specific	The platform software will not be responsible for the final state of the FPD upon success

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Troubleshooting

Introduction

This chapter provides a listing of the diagnostic screens that are available and the CDL error code descriptions for assistance in troubleshooting errors that may occur during code download when using the FSA.

In This Chapter

Overview

Diagnostics

In addition to the LED and FPD indicators, a subset of the Axiom tru2way™ (OCAP) diagnostic screens is available on the FSA. This enables staging personnel to connect a video display to a set-top experiencing an error condition to gather additional details about the fault. The set-top displays the appropriate diagnostics on all video outputs as a result of the following standard key-press sequences being initiated:

■ To access standard diagnostic screens, press **Power** until the Power indicator flashes, release, press **Power** again.

■ To access tru2way diagnostics, press **Vol+** and **Info**

The following diagnostic screens are available in the FSA:

■ Host Status Summary

■ Host Boot Status Results

■ Host Bootloader Information

■ Host Component Information

■ Opencable - Common Download
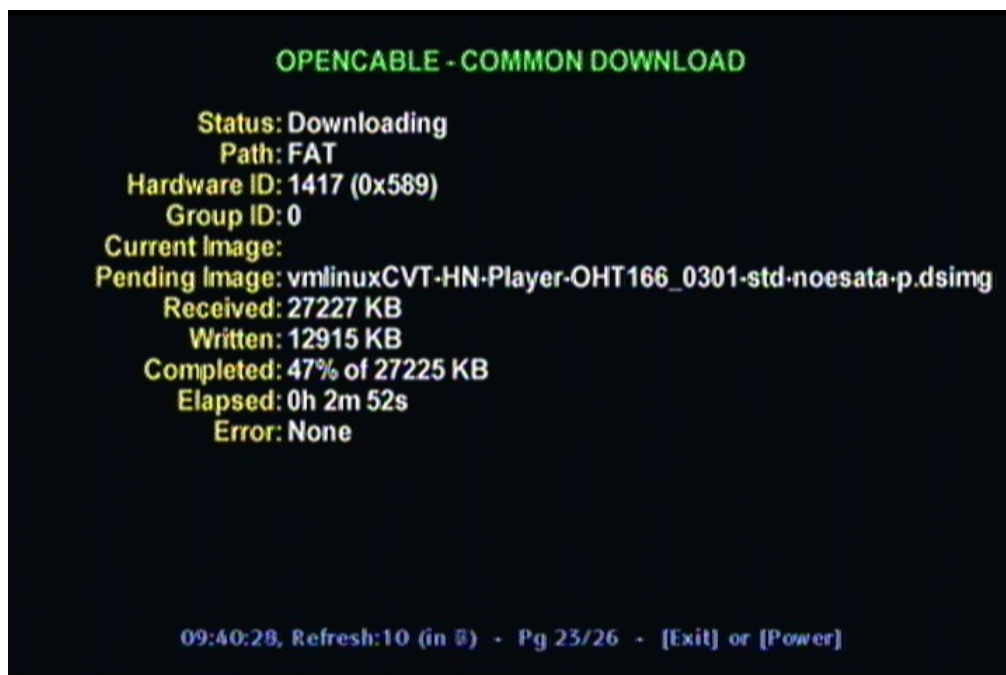
■ Linux - Memory Information

■ CableCARD Conditional Access Application

- CableCARD Binding Information Application

- CableCARD IP Service Application

- CableCARD Network Interface [SCTE55-2] Application

- CableCARD Network Interface [SCTE55-1] Application

- CableCARD Copy Protection Application

- CableCARD Diagnostic Application

- CableCARD Network Interface (DSG) Application

- CableCARD CA Network Handler (CANH) Application

Note: CableCARD pages will vary when a set-top contains a Motorola CableCARD.

CDL Errors and Descriptions

The following table provides a listing of CDL errors, the error that displays on the front panel of the set-top, and a description of each error.

CDL Error #	Displayed Error	Description
kBlm_CdlErr1	Ed01	No Failure
kBlm_CdlErr2	Ed02	Improper code file controls - CVC subject organizationName for manufacturer does not match the Host device manufacturer name
kBlm_CdlErr3	Ed03	Improper code file controls - CVC subject organizationName for code cosigning agent does not match the Host device current code cosigning agent
kBlm_CdlErr4	Ed04	Improper code file controls – The manufacturer's PKCS #7 signingTime value is equal-to or less-than the codeAccessStart value currently held in the Host device
kBlm_CdlErr5	Ed05	Improper code file controls – The manufacturer's PKCS #7 validity start time value is less-than the cvcAccessStart value currently held in the Host device
kBlm_CdlErr6	Ed06	Improper code file controls - The manufacturer's CVC validity start time is less-than the cvcAccessStart value currently held in the Host device
kBlm_CdlErr7	Ed07	Improper code file controls - The manufacturer's PKCS #7 signingTime value is less-than the CVC validity start time

CDL Error #	Displayed Error	Description
kBlm_CdlErr8	Ed08	Improper code file controls - Missing or improper extendedKeyUsage extension in the manufacturer CVC
kBlm_CdlErr9	Ed09	Improper code file controls - The cosigner's PKCS #7 signingTime value is equal-to or less-than the codeAccessStart value currently held in the Host device
kBlm_CdlErr10	Ed10	Improper code file controls - The cosigner's PKCS #7 validity start time value is less-than the cvcAccessStart value currently held in the Host device
kBlm_CdlErr11	Ed11	Improper code file controls - The cosigner's CVC validity start time is less-than the cvcAccessStart value currently held in the Host device
kBlm_CdlErr12	Ed12	Improper code file controls - The cosigner's PKCS #7 signingTime value is less-than the CVC validity start time
kBlm_CdlErr13	Ed13	Improper code file controls - Missing or improper extended key-usage extension in the cosigner's CVC
kBlm_CdlErr14	Ed14	Code file manufacturer CVC validation failure
kBlm_CdlErr15	Ed15	Code file manufacturer CVS validation failure
kBlm_CdlErr16	Ed16	Code file cosigner CVC validation failure
kBlm_CdlErr17	Ed17	Code file cosigner CVS validation failure
kBlm_CdlErr18	Ed18	Improper eCM configuration file CVC format (e.g. missing or improper key usage attribute)
kBlm_CdlErr19	Ed19	eCM configuration file CVC validation failure
kBlm_CdlErr20	Ed20	Improper SNMP CVC format
kBlm_CdlErr21	Ed21	CVC subject organizationName for manufacturer does not match the Host devices manufacturer name
kBlm_CdlErr22	Ed22	CVC subject organizationName for code cosigning agent does not match the Host devices current code cosigning agent
kBlm_CdlErr23	Ed23	The CVC validity start time is less-than or equal-to the corresponding subject's cvcAccessStart value currently held in the Host device
kBlm_CdlErr24	Ed24	Missing or improper key usage attribute

CDL Error #	Displayed Error	Description
kBlm_CdlErr25	Ed25	SNMP CVC validation failure
Ed26	Ed26	Invalid Source ID or path name
Ed27	Ed27	TFTP server is unresponsive or no IP address
Ed90	Ed90	Corruption
Ed91	Ed91	Exhausted maximum number of reboot retries
Ed98	Ed98	General code download failure
ECUt	ECUt	Invalid CVT

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Customer Information

If You Have Questions

If you have technical questions, call Cisco Services for assistance. Follow the menu options to speak with a service engineer.

Access your company's extranet site to view or order additional technical publications. For accessing instructions, contact the representative who handles your account. Check your extranet site often as the information is updated frequently.

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