



Cisco DSAN System Troubleshooting Guide

For Your Safety

Explanation of Warning and Caution Icons

Avoid personal injury and product damage! Do not proceed beyond any symbol until you fully understand the indicated conditions.

The following warning and caution icons alert you to important information about the safe operation of this product:



You may find this symbol in the document that accompanies this product. This symbol indicates important operating or maintenance instructions.



You may find this symbol affixed to the product. This symbol indicates a live terminal where a dangerous voltage may be present; the tip of the flash points to the terminal device.



You may find this symbol affixed to the product. This symbol indicates a protective ground terminal.



You may find this symbol affixed to the product. This symbol indicates a chassis terminal (normally used for equipotential bonding).



You may find this symbol affixed to the product. This symbol warns of a potentially hot surface.



You may find this symbol affixed to the product and in this document. This symbol indicates an infrared laser that transmits intensity-modulated light and emits invisible laser radiation or an LED that transmits intensity-modulated light.

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.

Notices

Trademark Acknowledgments

Cisco and the Cisco logo are trademarks of Cisco and/or its affiliates in the U.S. and other countries. A listing of Cisco's trademarks can be found at www.cisco.com/go/trademarks.

CableLabs and DOCSIS are registered trademarks of Cable Television Laboratories, Inc.

Other third party trademarks mentioned are the property of their respective owners.

The use of the word partner does not imply a partnership relationship between Cisco and any other company.^(1009R)

Publication Disclaimer

Cisco Systems, Inc. assumes no responsibility for errors or omissions that may appear in this publication. We reserve the right to change this publication at any time without notice. This document is not to be construed as conferring by implication, estoppel, or otherwise any license or right under any copyright or patent, whether or not the use of any information in this document employs an invention claimed in any existing or later issued patent.

Copyright

© 2011 Cisco and/or its affiliates. All rights reserved. Printed in the United States of America.

Information in this publication is subject to change without notice. No part of this publication may be reproduced or transmitted in any form, by photocopy, microfilm, xerography, or any other means, or incorporated into any information retrieval system, electronic or mechanical, for any purpose, without the express permission of Cisco Systems, Inc.

Contents

Cisco DSAN Product Notices	vii
-----------------------------------	------------

Important Safety Instructions	ix
--------------------------------------	-----------

Chapter 1 Introduction	1
-------------------------------	----------

Scope	2
Product Overview	3
DSAN Solution	3
Analog Regeneration	4
Product Features	5
Physical Description	6
Main Components	6
Input and Output Connections	7
Product Labels	8
Accessories	9
Functional Description	10
Forward Path Operation	10
Tuner Band Mapping	11
RF Channel Plan	12
Reverse Path Operation	12
Emergency Alert System Support	13
Distribution and Triggering	13
Notification Method	13
Exception Channel Handling	13
EAS Message Priority	14
DAXI Description	15
DAXI Front Panel	15
DAXI Back Panel	16
Additional Information	16

Chapter 2 Hardware Installation	17
--	-----------

Powering	18
Stingers	18
Powering Shunt Installation	18
Power Passing Shunt Installation	18
To Perform a Basic Power Check	19
Troubleshooting	19
Powering the DSAN from the Mains Power Supply	20

RF Level Setup.....	22
Forward Path Downstream Signal (Port 1)	22
Optional Forward Path Downstream Signal (Port 2)	23
Reverse Path Upstream Signal (Port 1)	24
Output Path Downstream Signal (Port 3)	24
Verifying Operation.....	25
Tuner Status.....	25
Demodulator Status.....	26

Chapter 3 CMTS Registration 27

Confirming CMTS Registration	28
Registration and Connection Sequence	29
Downstream Channel Lock	29
ADSG Broadcast Tunnel Setup	31
Upstream Ranging	31
IP Address Acquisition	34
Configuration File Acquisition	35
Additional Troubleshooting Information.....	37
Error Messages	37
LED Status.....	37
Incorrect Time Stamp	37
Current DSAN Software Version Installed	37

Chapter 4 Host Registration 39

Confirming Host Registration.....	40
System Time Acquisition	40
SI Data Acquisition	40
IP Address Acquisition	42
Configuration File Acquisition	43
Additional Troubleshooting Information.....	44
Error Messages	44
LED Status.....	44
Current DSAN Software Version Installed	44

Chapter 5 Video Output 45

Confirming Video Output	46
Wideband Tuner Setup	46
QAM Demodulator Setup	48
Video Processor Setup.....	50
Resolving Video Output Issues.....	53
Alarms Related to Configuration or SI	53
Alarm Related to Wideband Tuners	57
Alarm Related to QAM Demodulators.....	58

Alarms Related to Video Input	59
Alarm Related to Authorization	59
Alarm Related to EAS Runtime Processing	60
Chapter 6 Software Upgrade	63
Upgrading the DSAN Software	64
Automatic Upgrade via eCM Configuration File.....	64
Manual Upgrade via SNMP	65
Verifying Expected Results.....	67
Resolving Software Download Issues.....	70
Download Does Not Start.....	70
Download Completes, Upgrade Fails.....	71
Error Messages	72
Chapter 7 Customer Support Information	73
Support Telephone Numbers	74
Appendix A Technical Information	75
DSAN Error Messages.....	76
DSAN LED Indicators	78
Power.....	78
DOCSIS Status	78
Provisioning Status	79
Alarm Status	79
Output Channel Video Carrier Frequencies	80
Glossary	81
Index	89

Cisco DSAN Product Notices

Open Source GNU GPL Statement

The Cisco Digital Service Access Node (DSAN) contains, in part, certain free/open source software ("Free Software") under licenses which generally make the source code available for free copy, modification, and redistribution. Examples of such licenses include all the licenses sponsored by the Free Software Foundation (e.g. GNU General Public License (GPL), GNU Lesser General Public License (LGPL), Berkeley Software Distribution (BSD), the MIT licenses and different versions of the Mozilla and Apache licenses). To find additional information regarding the Free Software, including a copy of the applicable license and related information, please go to <ftp://ftpeng.cisco.com/pub/opensource>. Once at the site, search for the product listing and click on the related items identified. If you have any questions or problems accessing any of the links, please contact: spvtg-external-opensource-requests@cisco.com.

Important Safety Instructions

Read and Retain Instructions

Carefully read all safety and operating instructions before operating this equipment, and retain them for future reference.

Follow Instructions and Heed Warnings

Follow all operating and use instructions. Pay attention to all warnings and cautions in the operating instructions, as well as those that are affixed to this equipment.

Terminology

The terms defined below are used in this document. The definitions given are based on those found in safety standards.

Service Personnel - The term *service personnel* applies to trained and qualified individuals who are allowed to install, replace, or service electrical equipment. The service personnel are expected to use their experience and technical skills to avoid possible injury to themselves and others due to hazards that exist in service and restricted access areas.

User and Operator - The terms *user* and *operator* apply to persons other than service personnel.

Ground(ing) and Earth(ing) - The terms *ground(ing)* and *earth(ing)* are synonymous. This document uses *ground(ing)* for clarity, but it can be interpreted as having the same meaning as *earth(ing)*.

Electric Shock Hazard

Because of the potential for higher humidity, the presence of moisture, the proximity to ground potential and the possibility that hazardous voltages may be present on network connected cables, there is a greater risk of electric shock when working with electronic equipment in the outdoor environment.

To minimize the likelihood and effect of electric shock, follow the instructions in this warning and the precautions below.



WARNING:

To reduce risk of electric shock, perform only the instructions that are included in the operating instructions. Refer all servicing to qualified service personnel only.

- Do not work in rain, fog or snow conditions.





Important Safety Instructions

- Ensure equipment and cables are dry.
- Wear shoes with soles made of insulated material e.g. rubber, vinyl, etc.
- When making electrical connections, work with one hand in your pocket and avoid accidental contact with grounded surfaces.
- Use insulated tools to make electrical connections.
- Make all other connections before connecting power to the equipment.

Installation

This equipment should be installed by qualified service personnel and should comply with national and local requirements.

Note to the Installer

<p>Note to CATV System Installer (U.S.A. and Canada Only)</p> <p>This reminder is provided to call the CATV system installer's attention to Article 820-40 of the NEC (Section 54, Part I of the Canadian Electrical Code), that provides guidelines for proper grounding and, in particular, specifies that the CATV cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.</p>	<div><div>CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN</div><div>AVIS RISQUE DE CHOC ÉLECTRIQUE NE PAS OUVRIR</div></div>
<div><p>This symbol is intended to alert you that uninsulated voltage within this product may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this product.</p></div>	<p>CAUTION: To reduce the risk of electric shock, do not remove cover (or back). No user-serviceable parts inside. Refer servicing to qualified service personnel.</p> <p>WARNING TO PREVENT FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.</p> <div><p>This symbol is intended to alert you of the presence of important operating and maintenance (servicing) instructions in the literature accompanying this product.</p></div>

Equipment Placement



WARNING:

Avoid personal injury and damage to this equipment. An unstable mounting surface may cause this equipment to fall.

To protect against equipment damage or injury to personnel, comply with the following:

- If this equipment uses AC power, place this equipment close enough to a mains AC outlet to accommodate the length of this equipment's power cord.

- Route all power cords so that people cannot walk on, place objects on, or lean objects against them. This may pinch or damage the power cords. Pay particular attention to power cords at plugs, outlets, and the points where the power cords exit this equipment.
- Make sure the mounting surface or rack is stable and can support the size and weight of this equipment.

Outdoor Equipment Placement

Cisco equipment intended for outdoor installation is designed to be water-resistant, not water-proof. To protect against equipment damage or injury to personnel, install outdoor equipment so that it is:

- Protected from rain or accumulations of snow as much as possible.
- Not subject to direct water jets from sprinkler systems or garden hoses.
- Not subject to flooding.
- Positioned with cable connectors on the underside to minimize water entry by gravity.

Outdoor Equipment Cabling

To protect outdoor equipment cables, comply with the following:

- Protect cables from chaffing and sharp edges when routing them through building walls or around corners.
- Provide adequate support for cables to prevent strain or sagging.
- Provide a low loop in the cable close to its connection point to the equipment to minimize water ingress and to provide strain relief for the connector.
- Seal outdoor cable/connector joints against moisture ingress using silicone caulk or outdoor sealing tape.

Ventilation



WARNING:

Avoid electric shock and fire hazard! Never push objects through the openings in this equipment. Foreign objects can touch dangerous voltage points or cause electrical shorts that can result in electric shock or fire.

This equipment may have openings for ventilation that protect it from overheating. To ensure the reliability of this equipment, do not obstruct the openings.

- Do not place other equipment, lamps, books, or other objects on top of this equipment.

Important Safety Instructions

- Do not place this equipment in any of the following locations.
 - On a bed, sofa, rug, or similar surface
 - Over a radiator or a heat register
 - In an enclosure, such as a bookcase or equipment rack, unless the installation provides proper ventilation

Handling Precautions

When moving a cart that contains this equipment, check for any of the following possible hazards:



WARNING:



Avoid personal injury and damage to this equipment! Move any equipment and cart combination with care. Quick stops, excessive force, and uneven surfaces may cause this equipment and cart to overturn.

Cleaning the Equipment

Before cleaning this equipment, disconnect it from its electrical power source. Use a damp cloth to clean this equipment. Do not use a liquid cleaner or an aerosol cleaner. Do not use a magnetic/static cleaning device (dust remover) to clean this equipment.

Object and Liquid Entry

Never push objects of any kind into this equipment through openings, as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Do not expose this equipment to liquid or moisture. Do not place this equipment on a wet surface. Do not spill liquids on or near this equipment.

Overloading

For equipment that uses AC power, do not overload electrical outlets, extension cords, or integral convenience receptacles, as this can result in a risk of fire or electric shock. For equipment that requires battery power or other sources to operate, refer to the operating instructions for that equipment.

Lightning and Power Surges

To protect this equipment against damage from lightning storms and power-line surges, do the following where applicable:

- Disconnect the power cord from the grounded mains electrical outlet and disconnect the antenna or cable system under the following circumstances.
 - During lightning storms, or

- When you are not using this equipment for an extended period
- Ground your antenna system to provide some protection against voltage surges and built-up static charge.

Power Sources



WARNING:

Avoid electric shock and fire hazard! Do not overload electrical outlet and extension cords. For equipment that requires battery power or other sources to operate, refer to the operating instructions for that equipment.

- A label on this equipment indicates the correct power source for this equipment. If this equipment uses AC power, operate this equipment only from an electrical outlet with the voltage and frequency indicated on the equipment label.
- If this equipment plugs into an outlet, the outlet must be near this equipment, and must be easily accessible.
- This equipment may have two power sources. Be sure to disconnect all power sources before working on this equipment.
- If this equipment **does not** have a main power switch, the power cord connector serves as the disconnect device.
- Always pull on the plug or the connector to disconnect a cable. Never pull on the cable itself.
- Unplug this equipment if it will be unused for long periods of time.
- If you are uncertain of the type of power supply to your home or business, consult your local power company.

Grounding

This section provides instructions for verifying that the equipment is properly grounded.

Safety Plugs (USA Only)

If this equipment uses AC power, it may be equipped with either a 3-terminal (grounding-type) safety plug or a 2-terminal (polarized) safety plug. The wide blade or the third terminal is provided for safety. Do not defeat the safety purpose of the grounding-type or polarized safety plug.

To properly ground this equipment, follow these safety guidelines:

- **Grounding-Type Plug** - For a 3-terminal plug (one terminal on this plug is a protective grounding pin), insert the plug into a grounded mains, 3-terminal outlet.

Important Safety Instructions

Note: This plug fits only one way. If this plug cannot be fully inserted into the outlet, contact an electrician to replace the obsolete 3-terminal outlet.

- **Polarized Plug** - For a 2-terminal plug (a polarized plug with one wide blade and one narrow blade), insert the plug into a polarized mains, 2-terminal outlet in which one socket is wider than the other.

Note: If this plug cannot be fully inserted into the outlet, try reversing the plug. If the plug still fails to fit, contact an electrician to replace the obsolete 2-terminal outlet.

Grounding Terminal

If this equipment is equipped with an external grounding terminal, attach one end of an 18-gauge wire (or larger) to the grounding terminal; then, attach the other end of the wire to a ground, such as a grounded equipment rack.

Safety Plugs (European Union)


- **Class I Mains Powered Equipment** – Provided with a 3-terminal AC inlet and requires connection to a 3-terminal mains supply outlet via a 3-terminal power cord for proper connection to the protective ground.

Note: The equipotential bonding terminal provided on some equipment is not designed to function as a protective ground connection.

- **Class II Mains Powered Equipment** – Provided with a 2-terminal AC inlet that may be connected by a 2-terminal power cord to the mains supply outlet. No connection to the protective ground is required as this class of equipment is provided with double or reinforced and/or supplementary insulation in addition to the basic insulation provided in Class I equipment.

Note: Class II equipment, which is subject to EN 50083-1, is provided with a chassis-mounted equipotential bonding terminal. See the section titled **Equipotential Bonding** for connection instructions.

Equipotential Bonding

If this equipment is equipped with an external chassis terminal marked with the IEC 60417-5020 chassis icon () , the installer should refer to CENELEC standard EN 50083-1 or IEC standard IEC 60728-11 for correct equipotential bonding connection instructions.

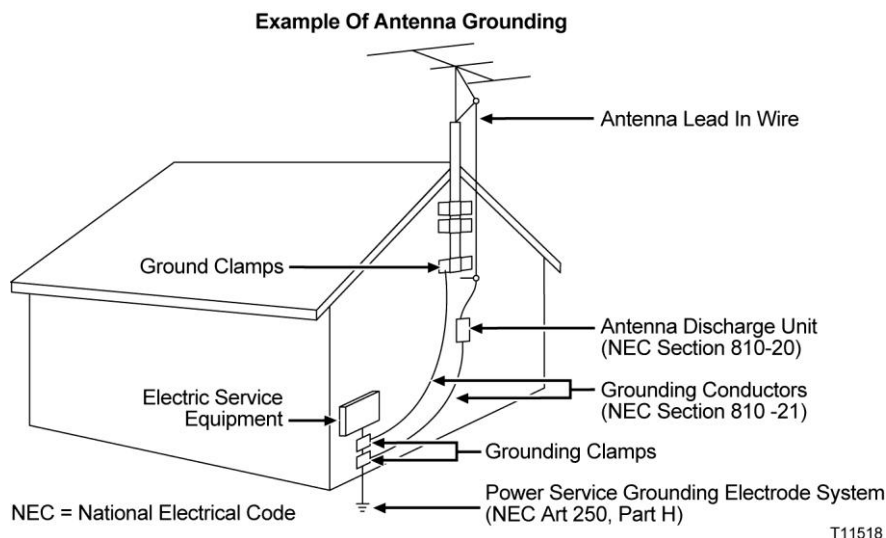
Outdoor Grounding System

If this equipment connects to an outdoor antenna or cable system, be sure the antenna or cable system is grounded. This provides some protection against voltage surges and built-up static charges.

Section 810 of the National Electric Code (NEC), ANSI/NFPA No. 70-1999, provides the following information:

- Grounding of the mast and supporting structure
- Grounding the lead-in wire to an antenna discharge unit
- Size of the grounding conductors
- Location of the antenna-discharge unit
- Connection to grounding electrodes
- Requirements for the grounding electrodes

For European Union countries, refer to CENELEC standard EN 50083-1 for grounding information.



Servicing



WARNING:

Avoid electric shock! Opening or removing this equipment's cover may expose you to dangerous voltages.

Do not open the cover of this equipment. Refer all servicing to qualified personnel only. Contact us for instructions.

Damage that Requires Service

For damage that requires service, disconnect this equipment from its electrical power source. Refer service to qualified service personnel when any of the following occurs:

- There is damage to the power cord or plug.
- Liquid enters the equipment.
- A heavy object falls on the equipment.

Important Safety Instructions

- Operation is not normal (the instructions in this manual describe the proper operation).
- You drop this equipment, or damage the cabinet of this equipment.
- This equipment exhibits a distinct change in performance.

Upon completion of any service or repairs to this equipment, ask the service technician to perform safety checks to determine that the equipment is in proper operating condition.



CAUTION:

Avoid damage to this equipment! Adjust only what the operating instructions describe. Improper adjustment of controls may result in damage that may require extensive corrective work by qualified service personnel.

Replacement Parts

When replacement parts are required, be sure the qualified service personnel has used parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

Safety Check

Upon completion of any service or repairs to this equipment, ask the service technician to perform safety checks to determine that this equipment is in proper operating condition.

Modifications

This equipment has been designed and tested to comply with applicable safety, laser safety, and EMC regulations, codes, and standards to ensure safe operation in its intended environment. Refer to this equipment's data sheet for details about regulatory compliance approvals.

Do not make modifications to this equipment. Any changes or modifications could void the user's authority to operate this equipment.

Modifications have the potential to degrade the level of protection built into this equipment, putting people and property at risk of injury or damage. Those persons making any modifications expose themselves to the penalties arising from proven non-compliance with regulatory requirements and to civil litigation for compensation in respect of consequential damages or injury.

Accessories

Use only attachments or accessories specified by the manufacturer.

**CAUTION:**

Maintain electrical safety! Power-operated equipment or accessories that you connect to this equipment should bear the UL listing mark or CSA certification mark on the accessory itself, and should not be modified so as to defeat the safety features. This will help avoid any potential for electric shock or fire. If in doubt, contact qualified service personnel.

Mounting Accessories

**CAUTION:**

Use this equipment only with a cart, stand, bracket, table, or other mounting accessories that meet Cisco specifications. Carefully follow all instructions for proper mounting.

Electromagnetic Compatibility Regulatory Requirements

This equipment meets applicable electromagnetic compatibility (EMC) regulatory requirements. Refer to this equipment's data sheet for details about regulatory compliance approvals. EMC performance is dependent upon the use of correctly shielded cables of good quality for all external connections, except the power source, when installing this equipment.

- Ensure compliance with cable/connector specifications and associated installation instructions where given elsewhere in this manual.

Otherwise, comply with the following good practices:

- Multi-conductor cables should be of double-braided shielded type and have conductive connector bodies and backshells with cable clamps that are conductively bonded to the backshell and capable of making 360° connection to the cable shielding. Exceptions from this general rule will be clearly stated in the connector description for the excepted connector in question.
- Ethernet cables should be of the double-shielded type.
- Coaxial cables should be of the double-braided shielded type.

EMC Compliance Statements

Where this equipment is subject to USA FCC and/or Industry Canada rules, the following statements apply:

FCC Declaration of Conformity

This device complies with *Part 15 of FCC Rules*. Operation is subject to the following two conditions: 1) The device may not cause harmful interference, and 2) The device must accept any interference received, including interference that may cause undesired operation.

Important Safety Instructions

FCC Statement for Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada - Industrie Canadienne Statement

This apparatus complies with Canadian ICES-003.
Cet appareil est conforme à la norme NMB-003 du Canada.

1

Introduction

This chapter outlines the scope of this document and provides an overview of the physical makeup and operation of the DSAN system.

In This Chapter

■ Scope.....	2
■ Product Overview.....	3
■ Product Features	5
■ Physical Description.....	6
■ Functional Description.....	10
■ Emergency Alert System Support	13
■ DAXI Description	15

Scope

This document provides information needed to troubleshoot a DSAN unit when it is installed in a Cisco DVB-S system.

Note: This document does not contain instructions on DNCS and CMTS configuration. For details on DNCS and CMTS configuration, consult your system administrator.

This chapter describes the physical features and operation of the DSAN system. Later chapters in this document cover the following topics:

- Hardware Setup
- CMTS Registration
- Host Registration
- Video Output
- Software Upgrade

In addition, an appendix provides supporting information.

For additional information on DSAN setup and operation, see the *Cisco DSAN System Installation and Operation Guide*, part number 4032302.

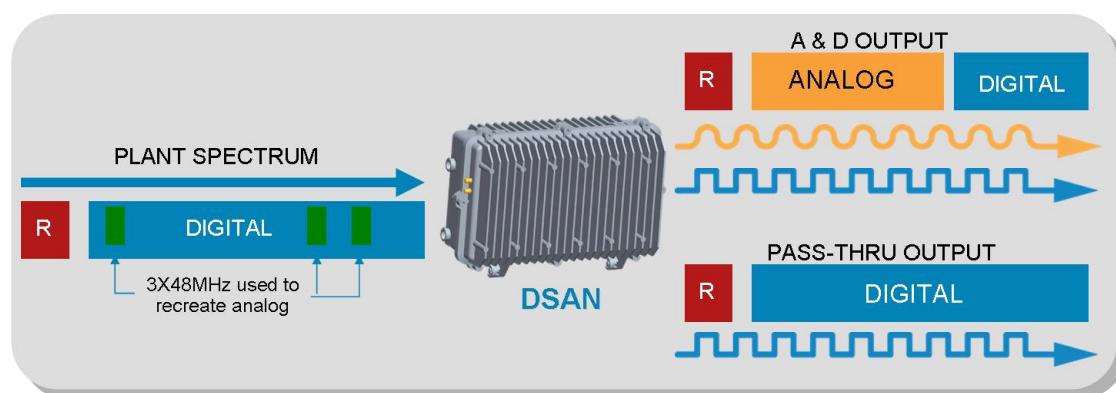
Product Overview

The Cisco DSAN solution provides a cost-effective, flexible, easy-to-deploy system for servicing the needs of MDU, hospitality, and other bulk analog accounts. The DSAN regenerates up to 82 analog channels of NTSC video at the customer premise through the use of bulk PowerKEY® decryption and bulk MPEG decoder technology. This environmentally hardened node product is designed to operate seamlessly within a CATV network for setup, provisioning, and billing, fitting easily into existing HFC installations.

Specifically designed for on-site deployment, the DSAN supports two auxiliary inputs, allowing customers to provide up to eight customized local channels (e.g., security cameras, DVD players, local bulletin boards, etc.) for their residents or guests. The channel lineups for each DSAN can also be configured independently to support specific customer needs, allowing service providers to offer a wider variety of content. Additionally, the DSAN supports digital pass-through, making it an extremely flexible platform that is ideal for customers wanting additional services such as HD, VOD, Data, and Voice.

DSAN Solution

The DSAN is a device that converts a pure digital plant spectrum to a combined spectrum containing both digital and analog output, as shown in the following illustration.



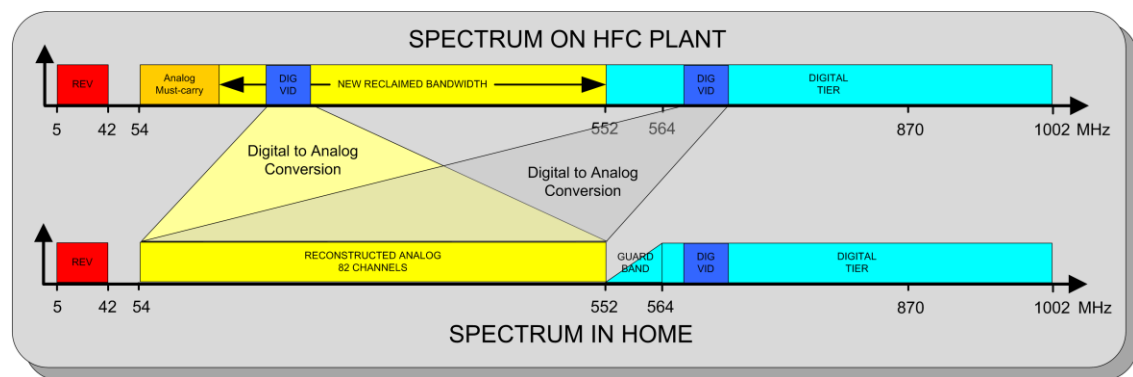
The analog output is recreated from portions of the digital plant spectrum, and occupies the 54-to-552 MHz frequency range designated for CATV analog channels. The combined digital output (564 MHz to 1 GHz) is available for use by compatible receiving equipment such as a set-top box, EMTA, or cable modem.

In addition to providing a combined analog plus digital output, the DSAN provides a pure digital pass-through output port that is identical to the input (minus attenuation) for servicing those customers who want the full service provider offerings.

Analog Regeneration

In order to recreate the 82 channels of analog content, the DSAN takes in three blocks of 48 MHz spectrum and enables the demodulation of 16 QAM carriers. These QAM signals can be located almost anywhere in the 1 GHz HFC spectrum, giving service providers unparalleled flexibility. For example, the DSAN can demodulate up to 16 QAM carriers and, at 10:1 compression, can select from up to 160 standard definition digital channels for conversion to the 82 analog channel outputs.

The following illustration shows an example of the regeneration process for an analog spectrum of 54 to 552 MHz that is reconstructed from a portion of the digital tier, which can span from 54 to 1002 MHz.



As shown above, a 12 MHz guard band is provided in the DSAN output spectrum between the reconstructed analog and the low end of the digital tier. A dedicated "brick wall" high-pass filter in the DSAN creates this guard band, which is needed to isolate the recreated analog channels from existing channels on the plant.

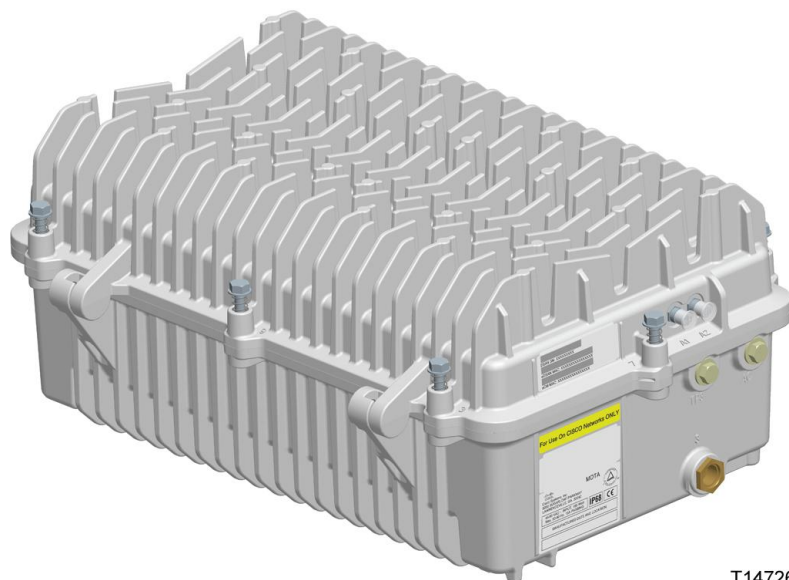
Note:

- The analog channel lineup is fully configurable: any regenerated analog channel can be positioned anywhere between 54 and 552 MHz in the EIA/NCTA channel allocation lineup.
- The DSAN does not pass existing analog channels. If there are analog channels on the HFC plant that must be delivered to the MDU, these channels can be digitally simulcast and regenerated by the DSAN product.

Product Features

- Recreates 82 channels of analog content
- Recreates analog spectrum from 54 to 562 MHz
- Dual output port flexibility with digital pass-through port
- Local Channel Insertion (LCI) capable
- Two ASI input ports for LCI - up to 8 input channels using the DAXI accessory
- Indoor/outdoor environmentally hardened, IP68 compliant node housing
- Coax input power with coax power passing on RF outputs
- Field-replaceable power supply
- Three independent tuners, each 48 MHz bandwidth, range 88 to 1002 MHz
- Simultaneous QAM demodulation of 16 channels from down-converted spectrum
- QAM 64 and QAM 256 digital tier demodulation support
- Audio processing decodes up to 2 audio streams per program
- BTSC stereo encoding of second audio program (SAP) for each channel
- Support for SCTE-20 and SCTE-21 closed captioning
- Emergency Alert System (EAS) support
- Uses standard GainMaker® accessories (shunts, crowbars, EQs, etc.)
- Mixed Services output can be remotely shut off by deprovisioning the device
- Out-of-band monitoring and management via CLI (local) or SNMP (remote)
- Support for bulk PowerKEY decryption of 82 channels

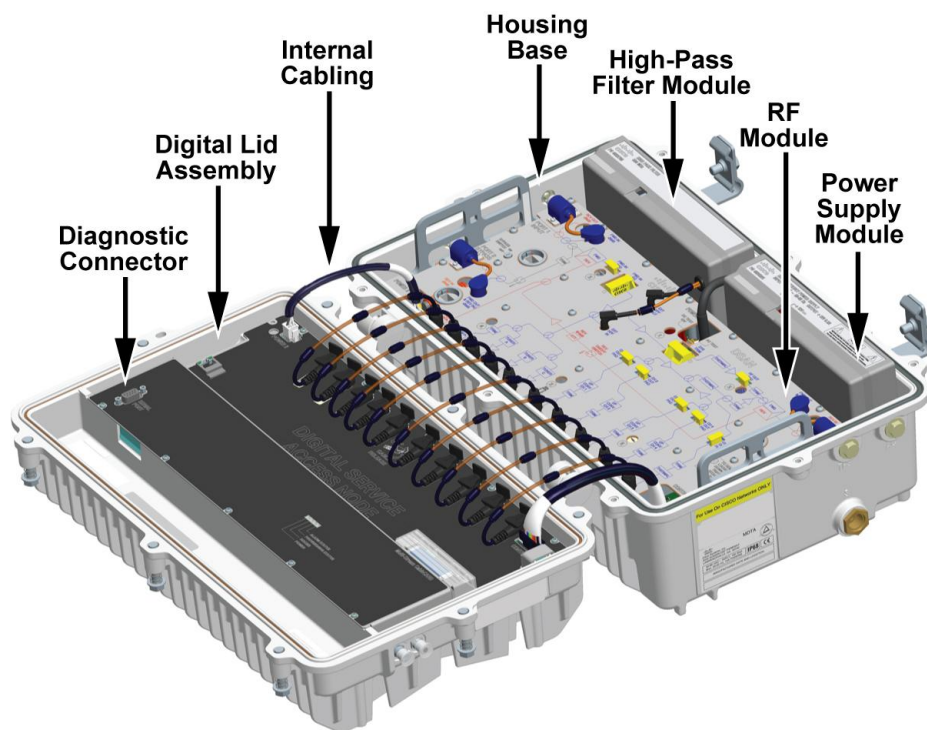
Physical Description



T14726

Main Components

The DSAN system unit includes the following main internal components.



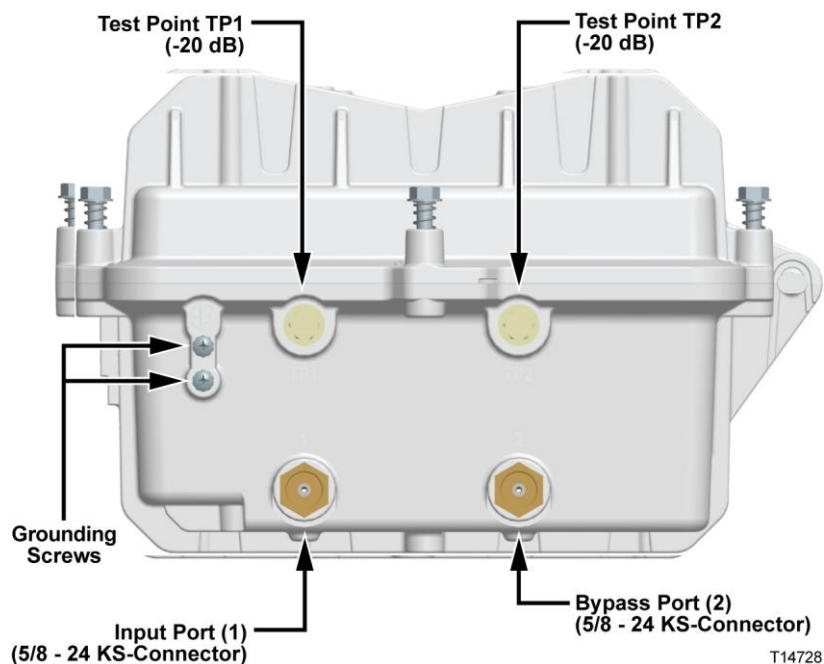
T14731

Component	Description
Housing base	Houses the high-pass filter, power supply, and RF module
RF module	Houses the RF tuners and upconverters and handles input and output signal routing
Power supply module	Converts coax line power to DC
Digital lid assembly	Houses the digital board
High pass filter module	Isolates regenerated analog from existing plant carriers
Internal cabling	1 power cable, 10 RF cables, 1 digital control cable
Diagnostic connector	Used for local management and troubleshooting

Input and Output Connections

The left side of the enclosure contains the following connectors:

- Input port (Port 1)
- Bypass Output port (Port 2)
- Input forward path test point TP1 (-20 dB)
- Bypass Output forward path test point TP2 (-20 dB)

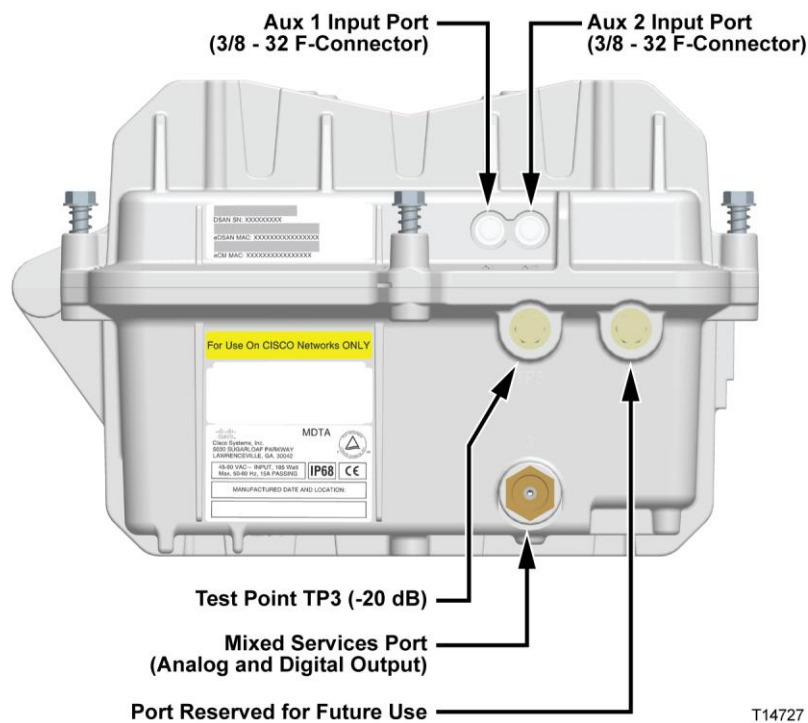


Chapter 1 Introduction

The right (product label) side of the DSAN enclosure contains the following connectors:

- Mixed Services output port (Port 3)
- Mixed Services output forward path test point TP3 (-20 dB)
- Aux 1 Input port
- Aux 2 Input port

An additional port next to the Mixed Services output port is reserved for possible future use.



Product Labels

Product labels are attached to the right side of the DSAN lid and base, as shown in the preceding illustration. These labels provide the following information.

- Label on lid - DSAN serial number, EDSAN (aka eHost) MAC address, and eCM MAC address
- Label on base (top) - DSAN ordering part number and other manufacturing information
- Label on base (bottom) - DSAN model number and compliance information

Duplicate copies of the serial number and MAC address label are affixed to the outside of the DSAN shipping carton and inside the lid of the DSAN housing.

Accessories

The DSAN accepts standard GainMaker attenuator pads, plug-in equalizers, and fused shunts. A dedicated mounting bracket is available for installing the unit on a wall or in a 19-inch equipment rack.

Description	Part Number
DSAN Rack/Cabinet Mounting Bracket	4028925
GainMaker Attenuator Pads	589693 through 589734 0 dB through 20.5 dB in 0.5 dB increments
GainMaker 75 ohm Terminator	589735 In Attenuator Pad Package
GainMaker Forward Equalizer Jumper	4007228
GainMaker Forward Equalizer	4008778 through 4008787 4019258 through 4019261 1.5 dB through 21 dB in 1.5 dB increments
GainMaker System Trim Jumper	589285 (ships with each DSAN)
GainMaker Fused AC Shunts	712769
GainMaker Crowbar Surge Protector	4000839

Note: For installation instructions, see *Hardware Installation* (on page 17).

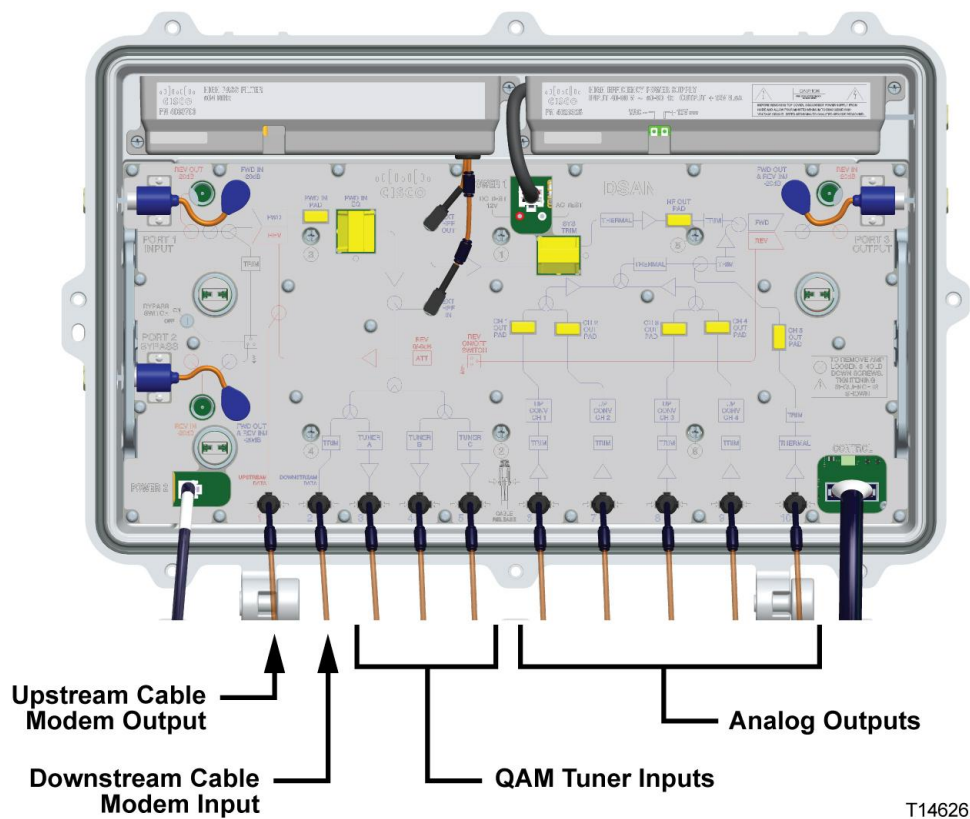
Functional Description

The DSAN is a single chassis that installs either indoors in an MDU equipment closet or basement, or outdoors on a strand or in an equipment cabinet or pedestal.

Forward Path Operation

The DSAN receives quadrature amplitude modulated (QAM) MPEG-2 encoded video and AC3 encoded audio, and generates up to 82 NTSC video with BTSC audio channels between 54 MHz and 552 MHz.

All DSAN configurations have one coaxial input sourced from the service provider headend. The DSAN can tune up to three 48 MHz bands residing in the 88 MHz to 1 GHz spectrum. Residing within this 48 MHz band are eight contiguous 6 MHz QAM channels. Each QAM channel may contain up to 15 MPEG-2 video channels.



T14626

In addition to the HFC input, the DSAN has two ASI auxiliary port inputs. These auxiliary inputs can support four channels each when sourced using the external DAXI product accessory.

The DSAN has two output ports:

- The Mixed Services output contains the regenerated analog tier (54 to 552 MHz) combined with the portion of the input above 564 MHz. Due to filter limitations, there is a guard band of 12 MHz, from 552 to 564 MHz, where the digital signals are not attenuated sufficiently. As a result, no digital signals are supported in this band.
- The second output, referred to as the Bypass output, is simply an attenuated copy of the input.

Tuner Band Mapping

The DSAN is configured from the headend using custom software that applies the following algorithm to configure the wideband tuners and track QAM usage.

1 Map First Wideband Tuner

- Map low end of first wideband frequency to lowest frequency of selected program input channel or QAM.
- Limit tuner to 88 MHz to 1002 MHz frequency range (112 to 978 MHz center frequencies).
- Keep count of the number of QAMs used (we can only use 16 of the 24 QAMs that the 3 wideband tuners support).

2 Map Second Wideband Tuner

- Map low end of second wideband frequency to lowest frequency of selected program input channel after first wideband frequency range.
- Limit tuner to 88 MHz to 1002 MHz frequency range (112 to 978 MHz center frequencies).
- Update the QAM count.

3 Map Third Wideband Tuner

- Map low end of third wideband frequency to lowest frequency of selected program after second wideband frequency range.
- Limit tuner to 88 MHz to 1002 MHz frequency range (112 to 978 MHz center frequencies).
- If the remaining selected QAMs are not within a 48 MHz band, the channel map is not valid.

Rules for Channel Mapping

A channel map is validated based on the following rules:

- Output channel numbers are unique.
- Valid EIA output channels are 2 through 78 and 95 through 99 (for channel plan

and cutoff frequency).

- All services must have unique source identifiers.
- The input carrier should be between 88 MHz and 1002 MHz (91 to 999 MHz channel center frequencies).
- The wideband tuners should cover the input carrier channel frequencies.
- The input carrier modulation mode should be QAM 64 or QAM 256.

RF Channel Plan

RF cables 6 through 10 (counting left to right) transfer channels from the digital lid assembly to the RF module in predefined frequency bands, as follows.

- RF cable 6 carries EIA channels 63-78 on 456 to 552 MHz.
- RF cable 7 carries EIA channels 31-46 on 264 to 360 MHz.
- RF cable 8 carries EIA channels 47-62 on 360 to 456 MHz.
- RF cable 9 carries EIA channels 22, 7-13, and 23-30 on 168 to 264 MHz.
- RF cable 10 carries EIA channels 2-6, 95-99, and 14-21 on 52 to 168 MHz.

This staggered allocation is designed to increase the physical distance between cables carrying adjacent frequencies, thereby reducing mutual interference.

Note: EIA channels are not contiguous. See *Technical Information* (on page 75) for a complete list of the output channel video carrier frequencies. It is important to note this information before making any channel measurements.

Reverse Path Operation

The DSAN provides a buffered signal path from the Mixed Services output port to the Input port to support reverse communication. A small amount of gain and response tailoring is applied to make up for passive losses through the DSAN so that its insertion into the reverse path is transparent. No additional balancing of the reverse path is needed or provided.

Diplex filters at the Input and Mixed Services output ports allow signals above 54 MHz to pass in the forward or downstream direction, while allowing signals in the range of 5 to 42 MHz to pass in the reverse or upstream direction.

Additionally, a splitter in the reverse signal path provides an input port for reverse DOCSIS data.

Emergency Alert System Support

This section describes the Emergency Alert System (EAS) support and operation for the DSAN device.

Distribution and Triggering

The DSAN unit supports EAS signaling via the SCTE-18 standard. The signaling is distributed to the DSAN device via a broadcast DOCSIS® DSG Tunnel that is configured on the CMTS. The DSAN unit continuously monitors this tunnel for SCTE-18 data to trigger an emergency event. The unit determines the appropriate tunnel for the events through the processing of the DOCSIS Downstream Channel Descriptor (DCD).

Notification Method

The DSAN unit supports EAS notification via force tuning of specified output channels to a particular details channel. The details channel is specified in the SCTE-18 data in the *details_OOB_Source_ID* parameter. Scrolling text and audio overlay are not supported due to the complexities of insertion to a high number of analog output channels by the device.

Typical provisioning of the DSAN device should include the details channel as one of the 82 existing provisioned services on the output. In the event that the details channel is not a provisioned service, the unit will attempt to move an input tuner and demodulator to the appropriate carrier to process the details channel, and all provisioned output channels will be force-tuned to the details channel, as no guarantee can be made that exception channels can be supported. It should be noted that this reconfiguration of internal tuners and demodulators may result in temporary interruption of services going into and out of the EAS event.

Exception Channel Handling

To support exception channels, the details channel has to be one of the 82 existing provisioned services on the output. Exemptions to force tuning may be specified by including *exception_OOB_Source_ID* parameters for the sources that wish to be excluded. As the System Information (SI) data is carried out-of-band (OOB) for the DSAN device, the *exception_major_channel_number* and *exception_minor_channel_number* parameters are not used to determine exception channels per SCTE-18 specification.

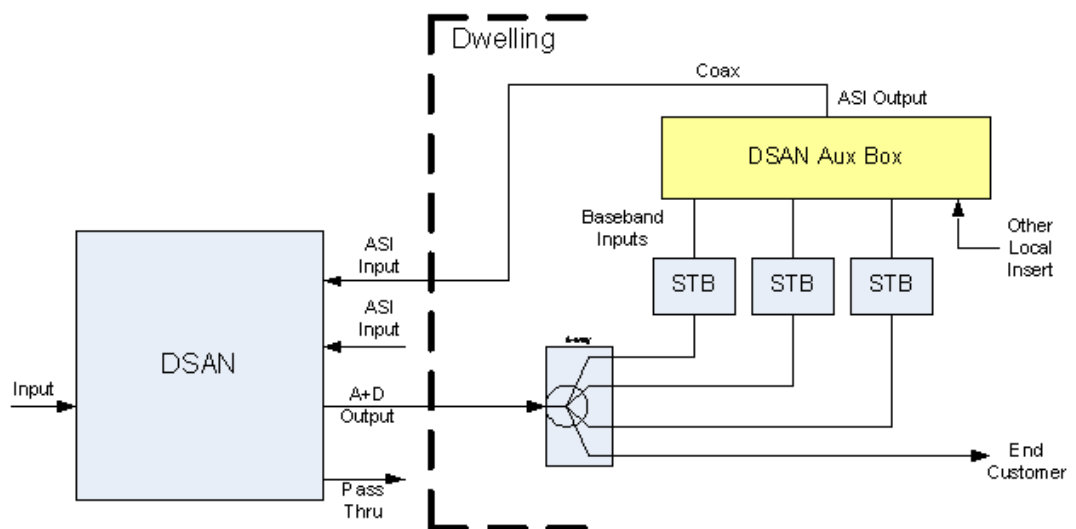
EAS Message Priority

All messages with a priority level of 1 through 15 will be processed and output services will be force-tuned as specified in the EAS message. All messages with a priority of 0 will be disregarded.

DAXI Description

The DSAN Auxiliary Input Box (DAXI) is a compatible external product that converts up to four analog video channels to digital format for distribution via the DSAN.

The DAXI provides baseband video and audio conversion to MPEG-2 Transport Stream. The output is carried over one ASI channel to the DSAN ASI input. The content that the DAXI converts can come from up to four external sources such as a set-top box, DVD player, analog security camera, or character generator.



The DAXI is a stand-alone product targeted for indoor applications. It is simple to install and requires no maintenance or remote management. It can be mounted on a rack, a wall, or a shelf.

DAXI Front Panel



Chapter 1 Introduction

The DAXI accepts four analog baseband audio and video composite signal inputs, and provides one ASI output. The DAXI front panel has LEDs to show status on the four video inputs, the ASI output, the input power, and general Alarm status.

DAXI Back Panel



The DAXI accepts four analog baseband video composite signals over female RCA connectors, and their corresponding analog stereo baseband audio signals over female RCA connectors. On the data path side, it provides one standard ASI output on a female F connector. The DAXI is powered by 12 VDC via an external power supply converter.

Additional Information

For more information on the DAXI, refer to DAXI documentation or contact the customer service representative for your area.

2

Hardware Installation

This chapter explains the process of setting up DSAN hardware, describes the expected results at each stage of the process, and identifies the common issues and corresponding error messages encountered during each stage.

For detailed instructions on installation and configuration, see the *Cisco DSAN System Installation and Operation Guide*, part number 4032302.

In This Chapter

■ Powering	18
■ RF Level Setup.....	22
■ Verifying Operation	25

Powering

This section provides information related to providing power to the DSAN.

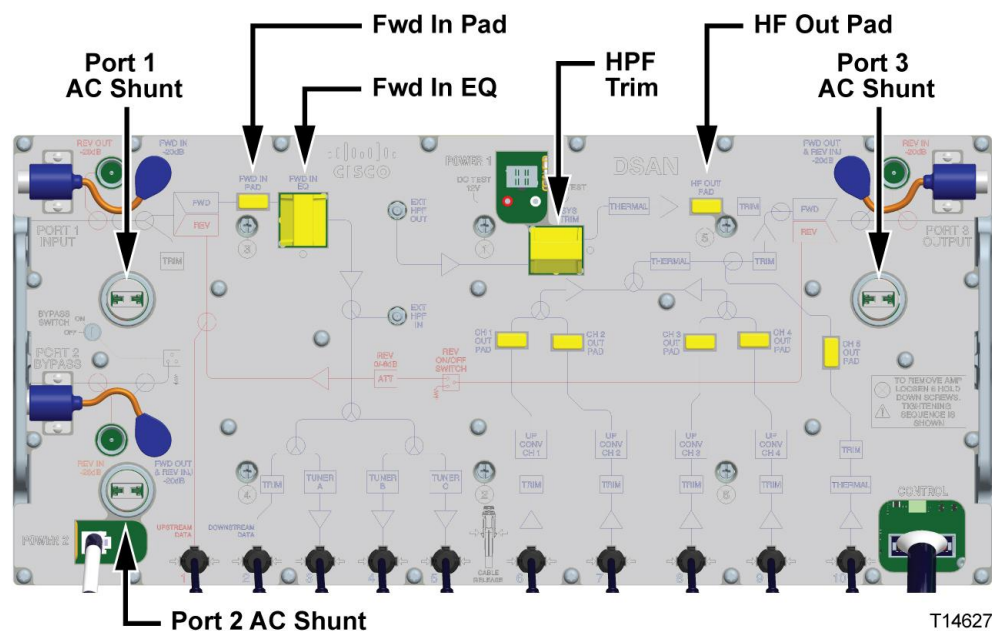
Stingers

Stingers are not installed at the factory, as the customer application determines the type of stinger required - F, N, or hardline. See the *Cisco DSAN System Installation and Operation Guide*, part number 4032302 for further details.

Powering Shunt Installation

The DSAN consumes approximately 106 W of power. Prior to installation, confirm that the plant power budget can support the load of the DSAN.

The DSAN can receive line power at 40 - 90 VAC through *any one* of its three KS ports - Port 1, Port 2, or Port 3, as shown in the following illustration.



Determine which port will accept power, and **install one shunt** at the appropriate location.

Power Passing Shunt Installation

The DSAN can also pass line power out any of its three KS ports - Port 1, Port 2, or Port 3, as shown above. Determine which port(s) will pass power, and install a shunt in the appropriate location(s).

**WARNING:**

Verify that all equipment downstream of a power passing DSAN port can safely handle the voltage. Spectrum analyzers and televisions generally cannot safely handle this voltage.

To Perform a Basic Power Check

After connecting the plant coax to the DSAN Input port and applying power to the unit, open the DSAN housing and verify that the power LED on the digital board is illuminated, as shown in the following illustration.



Troubleshooting

If the power LED is not illuminated:

- Use a digital multimeter (DMM) to check for the correct incoming AC or DC voltages.
- If incoming AC or DC voltage is not correct, check for power at the test lugs on the power supply module.
- If the power supply tests OK, probe the RF module itself for power. If power is not reaching the RF module, check for a loose or broken cable.

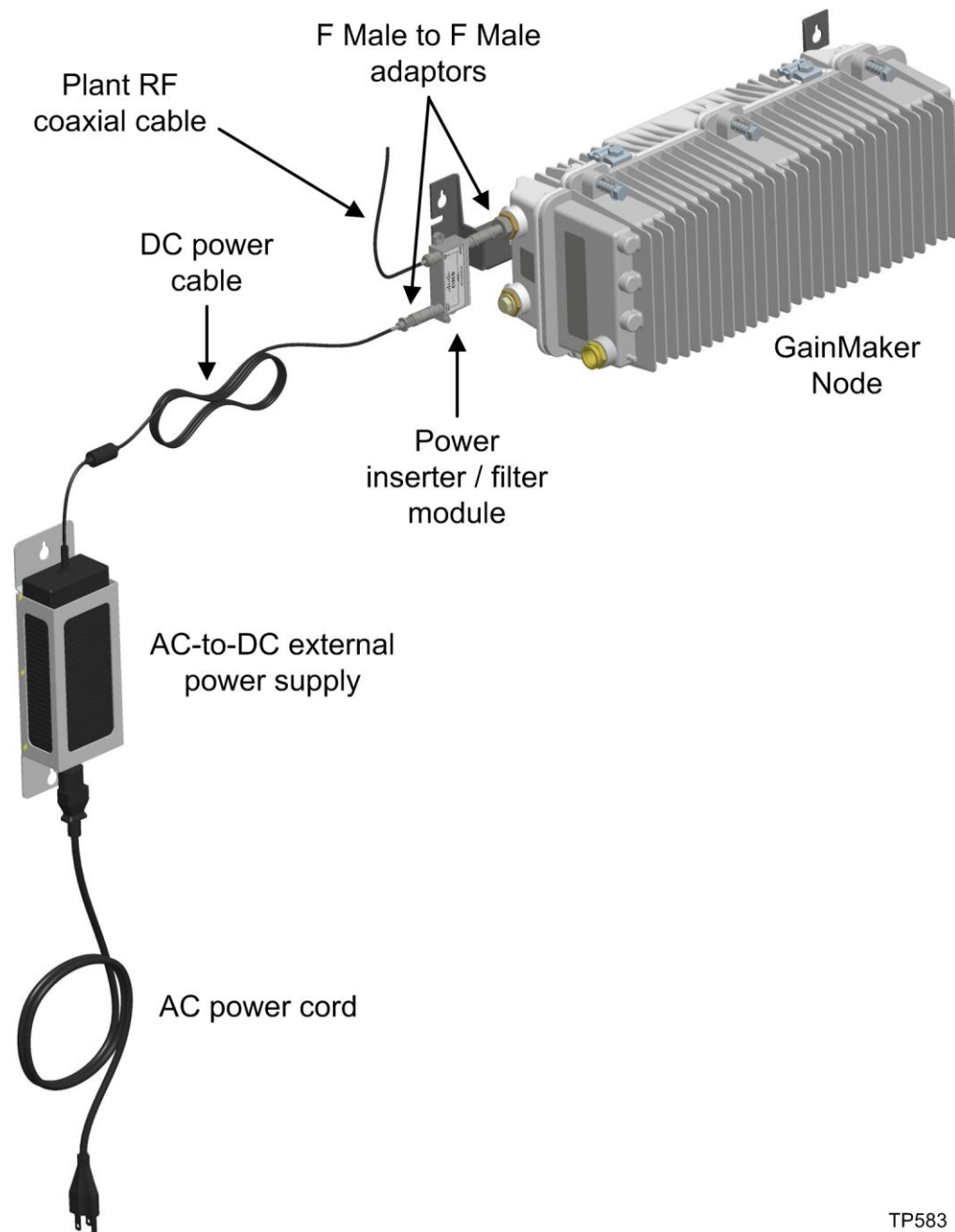
If you encounter power problems that cannot be readily cleared, contact Cisco and arrange to return the unit.

Powering the DSAN from the Mains Power Supply

The DSAN can receive DC power at 48 VDC from *any one* of the three KS ports - Port 1, Port 2, or Port 3, as shown earlier in this section.

Determine which port will accept power, and **install one shunt** at the appropriate location.

Connect the Mains Power Supply as shown in the following illustration. (Substitute the DSAN for the GainMaker in the picture.)



TP583

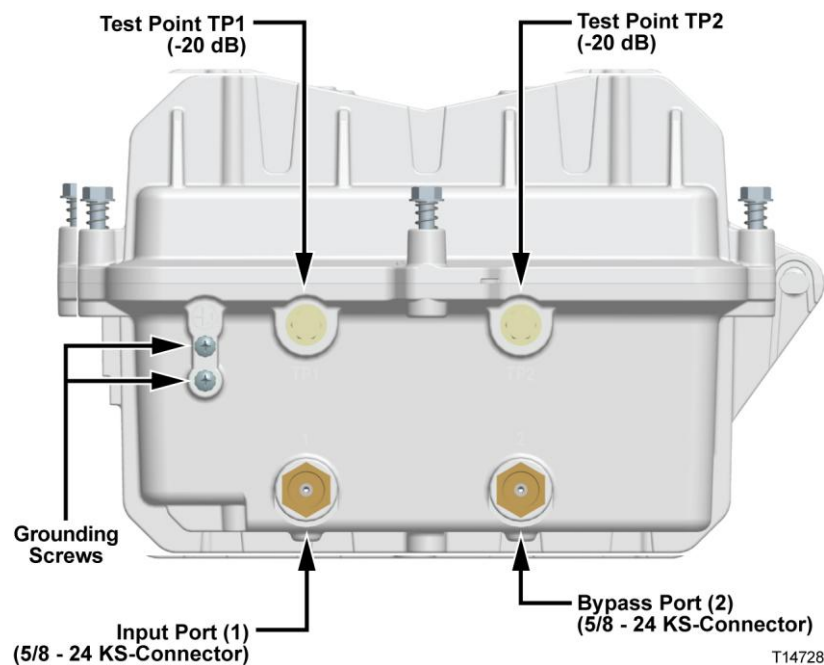
RF Level Setup

This section describes procedures for ensuring appropriate RF signal levels at each of the DSAN signal ports.

Note: You can perform these procedures immediately after applying power to the DSAN.

Forward Path Downstream Signal (Port 1)

- 1 Connect the cable plan to the Input port (Port 1) on the DSAN unit.
- 2 Connect the test equipment to the Input port test point (FWD IN -20dB TP) on the DSAN unit.

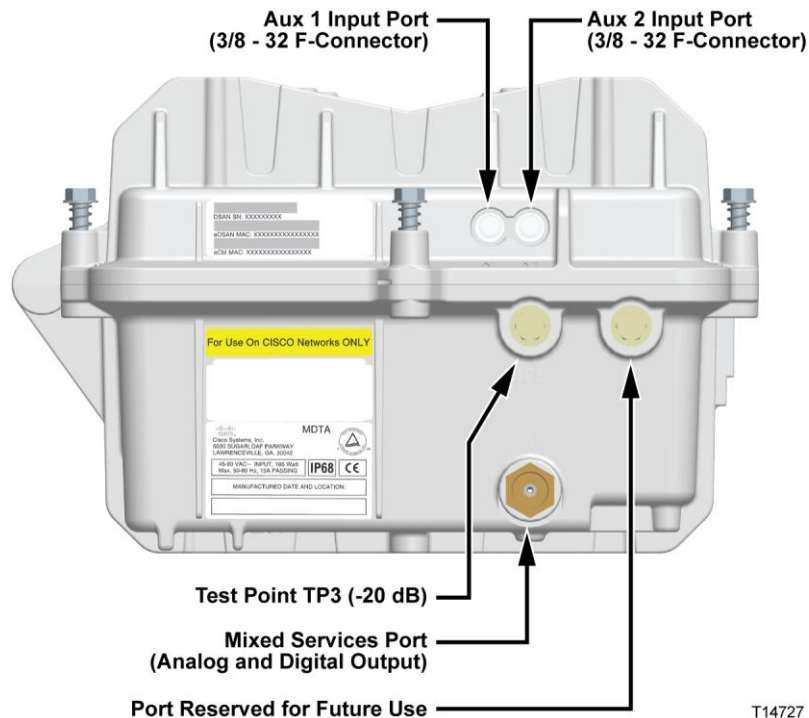


- 3 Measure the signal levels at the lowest frequency and highest frequencies specified in the system design.
- 4 Adjust the FWD IN EQ to flatten the frequency spectrum. Adjust the FWD IN PAD to adjust the level of the input signals.

Note: A FWD IN PAD value of 1 dB and a FWD IN EQ value of 0 dB give the proper setup for a flat input spectrum with digital signal levels at +4 dBmV (analog channels are + 10 dBmV, or 6 dB higher than digital). Changes in the FWD IN PAD and FWD IN EQ values will not change the measured results at the FWD IN -20 dB test point because this test point is located ahead of the input accessories.

- 5 Connect the test probe to the Mixed Services output port (Port 3) test point (FWD OUT -20 dB TP3).

After power is applied, the DSAN takes about 4 minutes to boot completely. No analog channels are present at this step until the unit has booted completely.



- 6 Monitor the output levels of all active channels between 585 MHz and the upper frequency limit of the plant.
 - a Note the highest and lowest signal levels over that frequency range.
 - b Add together the highest and lowest signal levels noted above, and then divide the result by 2.
 - c Use the resulting average value as the reference digital channel signal level.
- 7 Measure and note the output signal level of Channel 2 (55.25 MHz) at the Mixed Services output port (Port 3) test point (FWD OUT -20 dB TP). Use this value as the reference analog channel signal value for the next step.

Note: The Channel 2 output signal level should be approximately 20 dBmV. A lower level could be evidence of an incomplete boot or unmodulated carriers (+14 dBmV out).
- 8 Confirm that the reference analog channel signal level found above is 6 dB greater than the reference digital channel signal level found above. If necessary, adjust the FWD IN PAD value to achieve 6 dB difference between the reference analog and digital signal levels.

Optional Forward Path Downstream Signal (Port 2)

For optional downstream use, this port replicates the input signal at Port 1. The signal level is -9 dB relative to the signal level at the Input port. This signal level is not internally adjustable.

Reverse Path Upstream Signal (Port 1)

The reverse path is unity gain (0 dB). The DSAN provides no internal adjustment for levels and tilt for the upstream signal. Although no reverse path setup is required, you should verify the proper level upstream of the DSAN.

Output Path Downstream Signal (Port 3)

The signals generated by the DSAN exit the unit at the Mixed Services output port (Port 3). The nominal DSAN analog output level is + 20 dBmV (± 1.0 dB). The nominal DSAN analog spectrum output flatness is 3 dB peak-to-valley. The digital portion of the DSAN output spectrum should be configured to be 6 dB down from the analog portion (nominally +14 dBmV).

The DSAN analog output signal levels are fixed and are not a function of the input power level to the DSAN. The operator can adjust the level of the digital tier signals (>564 MHz) at the Mixed Services output port (Port 3), if needed, by changing the FWD IN PAD value.

Note: Due to its RF output level, the next component in the network following the DSAN must be an amplifier, preferably a high gain dual with a low input signal requirement.

Complete the following steps to verify and set the signal levels for the output of the DSAN unit.

- 1 Connect the test probe to the Mixed Services output port (Port 3) test point (FWD OUT -20dB TP).
- 2 Monitor the output levels of all active channels between 585 MHz and the upper frequency limit of the plant.
 - a Note the highest and lowest signal levels over that frequency range.
 - b Add together the highest and lowest signal levels noted above, and then divide the result by 2.
 - c Use the resulting average value as the reference digital channel signal level for step 4 below.
- 3 Measure and note the output signal level of Channel 2 (55.25 MHz) at the Mixed Services output port (Port 3) test point (FWD OUT -20dB TP). Use this value as the reference analog channel signal value for step 4 below.
- 4 Confirm that the reference analog channel signal level found above is 6 dB greater than the reference digital channel signal level found above. If necessary, adjust the FWD IN PAD value to achieve 6 dB difference between the reference analog and digital signal levels.
- 5 If any problems persist, see *Verifying Operation* (on page 25) for instructions on using the diagnostic interface for further investigation.

Verifying Operation

This section explains how to use the CLI diag pages to ensure correct DSAN operation following RF setup.

To confirm tuner and RF demodulator status, first complete the following steps:

- 1 Before applying power to the DSAN, open the unit and connect a PC laptop to the diagnostic port on the digital board. See the **CLI Diagnostics** chapter of the *Cisco DSAN System Installation and Operation Guide*, part number 4032302 for assistance as needed.
- 2 Apply power to the DSAN and allow 5 minutes for the unit to boot up and complete its cable modem registration process. The **dsan login:** prompt appears on the PC laptop screen.
- 3 Log in to the DSAN using the default user ID **dsan** and password **dsan1234**. Both user ID and password are case-sensitive. The **DSAN>** prompt appears.

Then use the procedures described below to verify tuner and demodulator status.

Tuner Status

On CLI diag page 1.0 (DSAN Status), verify that the RF Summary shows applicable tuners are locked. The following illustration shows all three tuners (A, B, and C) in the locked state.

```

----- DSAN Status -----
POST Results      Pass                (p. 2.0)
Current Alarms:   0                  (p. 3.0)

DOCSIS State:     Connected - Idle
Provisioning State: Idle
Remap State:      Channel Remapped

RF Summary
Tuner A:         Locked                (p. 5.0)
Tuner B:         Locked                (p. 5.0)
Tuner C:         Locked                (p. 5.0)

Demods:          In Use:    10          Locked: 10          (p. 7.0)
Channels:        Provisioned: 82        Errors: 0          (p. 9.1 - 9.6)

Time of Service:  80 hours              Temperature:    41.5 C

Current Date/Time: 02-01-2010 20:17:38 UTC
Boot Time:        02-01-2010 20:07:24 UTC

----- Pg: 1.0  <CR>:Refresh  n<CR>:Pg 2.0  x<CR>:Exit -----
>>>

```

If a tuner is unlocked:

- 1 Verify that the configuration file employs the tuner in question. If not, it will state "N/A" for that tuner.
- 2 Verify that the output of Port 3 has the digital tier (564-1002 MHz) set -6 dB from Channel 2.

Demodulator Status

On CLI diag page 7.0 (Demodulator Status), verify that the applicable demodulators are locked and that the **RS uncor Blks** count is not incrementing. The following illustration shows demodulators 0-9 locked.

----- Demodulator Status -----						
Demod	Status	PwrLvl (dBmV)	RS Tot Blks	RS Cor Blks	RS Uncor Blks	RS Err (%)
0	Locked	33.39	4533389	0	0	0
1	Locked	34.69	4532947	0	0	0
2	Locked	35.52	4533001	0	0	0
3	Locked	36.68	4533963	0	0	0
4	Locked	37.17	4532986	0	0	0
5	Locked	34.93	3150437	0	0	0
6	Locked	35.67	4533902	10	0	0
7	Locked	36.23	4522045	0	0	0
8	Locked	36.92	4521631	0	0	0
9	Locked	37.63	4521407	0	0	0
10	Disabled	N/A	N/A	N/A	N/A	N/A
11	Disabled	N/A	N/A	N/A	N/A	N/A
12	Disabled	N/A	N/A	N/A	N/A	N/A
13	Disabled	N/A	N/A	N/A	N/A	N/A
14	Disabled	N/A	N/A	N/A	N/A	N/A
15	Disabled	N/A	N/A	N/A	N/A	N/A
----- Pg: 7.0 <CR>:Refresh p<CR>:Pg 6.0 n<CR>:Pg 8.0 x<CR>:Exit -----						
>>>						

Note: You must refresh the diag page manually to check for incrementing counters.

If a demodulator is unlocked, verify that the output of Port 3 has the digital tier (564-1002 MHz) set -6 dB from Channel 2.

Important: Do not use the PwrLvl column on this page for absolute power measurements of any kind. Engineering has noted that a reading of < 29 dBmV indicates that an issue is present.

Note: For additional information, see the **CLI Diagnostics** chapter of the *Cisco DSAN System Installation and Operation Guide*, part number 4032302.

3

CMTS Registration

This chapter explains the CMTS registration process, describes the expected results at each stage of the process, and identifies common issues and error messages that you may encounter during the process.

For detailed instructions on CMTS registration, see the *Cisco DSAN System Installation and Operation Guide*, part number 4032302.

In This Chapter

- Confirming CMTS Registration..... 28
- Registration and Connection Sequence 29
- Additional Troubleshooting Information..... 37

Confirming CMTS Registration

Given proper headend support and DSAN hardware setup, the DSAN should configure automatically during the bootup period that immediately follows power-up.

Important: The DSAN bootup process takes several minutes to complete. There is no video output from the unit until the bootup process is complete.

To confirm proper CMTS registration during bootup, first complete the following steps.

- 1 Before applying power to the DSAN, open the unit and connect a PC laptop to its diagnostic port. See the **CLI Diagnostics** chapter of the *Cisco DSAN System Installation and Operation Guide*, part number 4032302 for assistance as needed.
- 2 Apply power to the DSAN and allow 5 minutes for the unit to boot up and complete its cable modem registration process. The **dsan login:** prompt appears on the PC laptop screen.
- 3 Log in to the DSAN using the default user ID **dsan** and password **dsan1234**. Both user ID and password are case-sensitive. The **DSAN>** prompt appears.

Then use the following descriptions of the registration and connection sequence to confirm successful CMTS registration.

Registration and Connection Sequence

This section describes the events that must take place to complete registration and connection.

Downstream Channel Lock

Upon initialization, the eCM searches for a CMTS carrier frequency, locks onto a valid carrier, and obtains the downstream channel descriptor (DCD). Once it obtains the DCD, the eCM verifies that the Cisco CA Client ID (0xE00) is present.

Troubleshooting

Review CLI diag page 4.1 to confirm that carrier frequency and RF levels are as expected. See *RF Level Setup* (on page 22) for help with identifying expected RF levels as needed.

```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eCM Rx/Tx Details

Docsis Version Supported = 2.0

Downstream Freq      = 555000000 Hz
Downstream Channel Width = 6000000 Hz
Downstream Power Level = +0.00 dBmV
Downstream S/N Level  = 36.40 dB
Downstream QAM Mode   = QAM256
Downstream Annex      = annexB
QAM Interleave        = 8 (I8, J16)

UnErrored Counter -----> 10725244
Correctable Errors Counter ---> 4
Uncorrectable Errors Counter -> 8

Upstream Frequency    = 38800000 Hz
Upstream Channel Width = 6400000 Hz
Upstream Power Level   = +44.20 dBmV

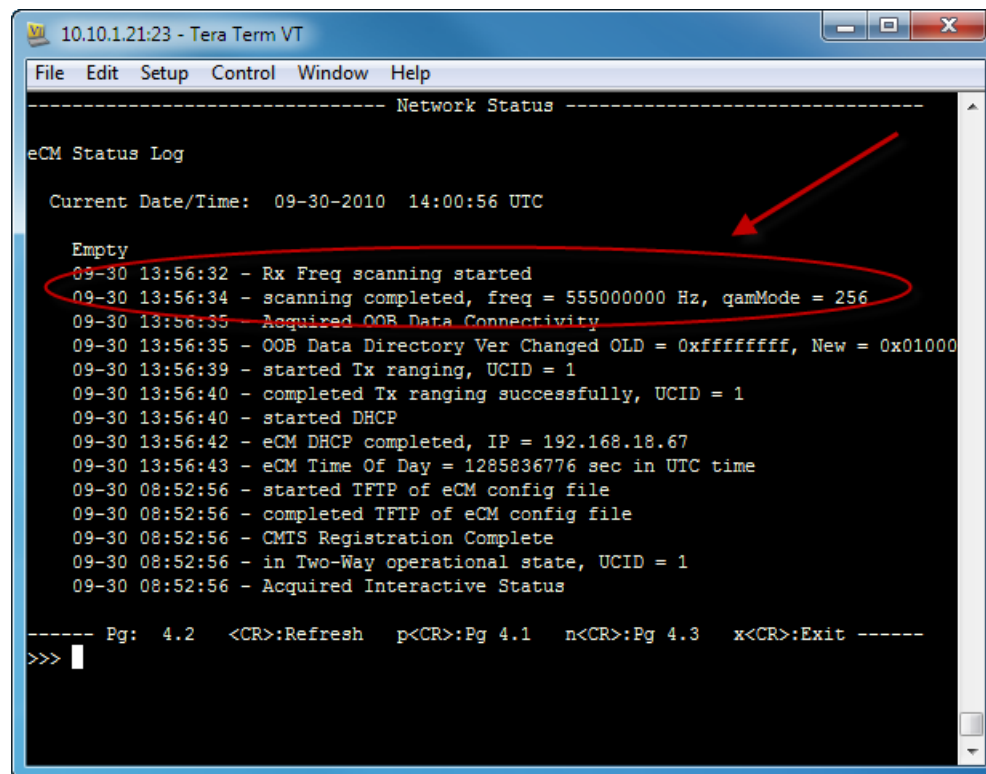
----- Pg: 4.1  <CR>:Refresh  p<CR>:Pg 4.0  n<CR>:Pg 4.2  x<CR>:Exit -----
>>>

```

Note: A very common mistake is not to specify the Cisco CA Client ID (0xE00) in the DCD. If the Cisco CA client ID is not specified in the DCD, the eCM will continue to search for a CMTS downstream channel that has it. If this occurs, contact your CMTS administrator for assistance.

Chapter 3 CMTS Registration

Review CLI diag page 4.2 to confirm that frequency scanning completed successfully.



```
10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eCM Status Log
Current Date/Time: 09-30-2010 14:00:56 UTC
Empty
09-30 13:56:32 - Rx Freq scanning started
09-30 13:56:34 - scanning completed, freq = 555000000 Hz, qamMode = 256
09-30 13:56:35 - Acquired OOB Data Connectivity
09-30 13:56:35 - OOB Data Directory Ver Changed OLD = 0xffffffff, New = 0x01000
09-30 13:56:39 - started Tx ranging, UCID = 1
09-30 13:56:40 - completed Tx ranging successfully, UCID = 1
09-30 13:56:40 - started DHCP
09-30 13:56:42 - eCM DHCP completed, IP = 192.168.18.67
09-30 13:56:43 - eCM Time Of Day = 1285836776 sec in UTC time
09-30 08:52:56 - started TFTP of eCM config file
09-30 08:52:56 - completed TFTP of eCM config file
09-30 08:52:56 - CMTS Registration Complete
09-30 08:52:56 - in Two-Way operational state, UCID = 1
09-30 08:52:56 - Acquired Interactive Status
----- Pg: 4.2 <CR>:Refresh p<CR>:Pg 4.1 n<CR>:Pg 4.3 x<CR>:Exit -----
>>> |
```

Note: If the Cisco CA client ID is not specified in the DCD, the eCM will continue to search for a CMTS downstream channel that has it. This error is indicated by a "downstream scanning completed" message on diag page 4.0 but a "Rx freq scanning failed" message on diag page 4.2 If this error occurs, contact your CMTS administrator for assistance.

ADSG Broadcast Tunnel Setup

The eCM establishes the Cisco out-of-band (OOB) tunnels, the SCTE-65 SI tunnel, and SCTE-18 EAS tunnel. You can use CLI diag page 4.3 to verify the setup of these ADSG broadcast tunnels, as shown in the following example.

```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eCM Available Flows based on ADSG Tunnels

Flow - Client ID ----- Dst IP ----- Src IP ----- Port[min,max]
1 00:01:A6:D0:0B:1E 127.1.0.1 192.168.10.253 [2000,13821]
2 0E:00 127.1.0.2 192.168.10.253 [2000,2000]
3 0E:00 127.1.0.3 192.168.10.253 [2001,2001]
4 0E:00 127.1.0.4 192.168.10.253 [2002,13817]
5 0E:00 127.1.0.5 192.168.10.253 [13818,13821]
6 00:01 127.1.0.6 192.168.10.253 [3001,3001]
7 00:02 127.1.0.7 0.0.0.0 [4098,4098]

----- Pg: 4.3 <CR>:Refresh p<CR>:Pg 4.2 n<CR>:Pg 4.4 x<CR>:Exit -----
>>>

```

Other tunnels may be specified in the DCD, but these are not processed.

Troubleshooting

If either the SCTE-65 SI tunnel or the SCTE-18 EAS tunnel is not present, verify with the CMTS administrator that the DCD is correct.

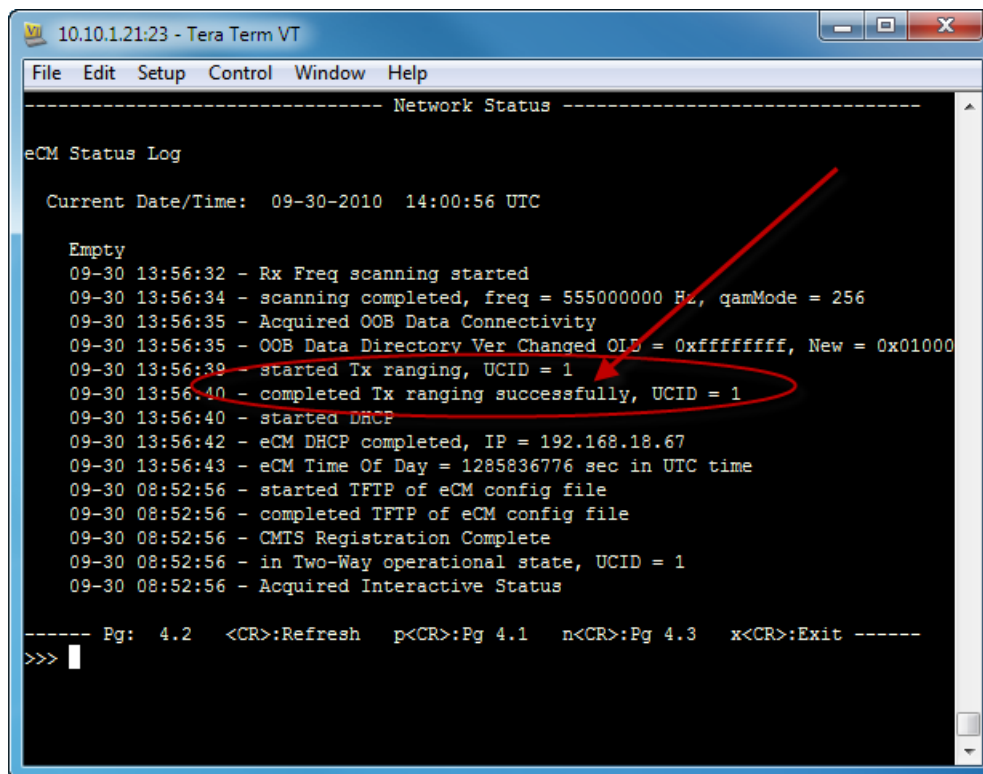
Upstream Ranging

After the OOB tunnels are set up, the eCM initiates registration with the CMTS and performs reverse path ranging to establish the correct transmit power level.

The upstream power level reported in CLI is 13.7 dB higher than the level at Port 1 because it is measured internally before attenuation. For example, a CLI reported power level of 49 dBmV would imply a power level of $(49 - 13.7 =) 35.3$ dBmV measurable at Port 1.

Chapter 3 CMTS Registration

Successful completion of upstream ranging is reported on CLI diag page 4.2, as shown in the following example.



```
10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eCM Status Log

Current Date/Time: 09-30-2010 14:00:56 UTC

Empty
09-30 13:56:32 - Rx Freq scanning started
09-30 13:56:34 - scanning completed, freq = 555000000 Hz, qamMode = 256
09-30 13:56:35 - Acquired OOB Data Connectivity
09-30 13:56:35 - OOB Data Directory Ver Changed OLD = 0xffffffff, New = 0x01000
09-30 13:56:39 - started Tx ranging, UCID = 1
09-30 13:56:40 - completed Tx ranging successfully, UCID = 1
09-30 13:56:40 - started DHCP
09-30 13:56:42 - eCM DHCP completed, IP = 192.168.18.67
09-30 13:56:43 - eCM Time Of Day = 1285836776 sec in UTC time
09-30 08:52:56 - started TFTP of eCM config file
09-30 08:52:56 - completed TFTP of eCM config file
09-30 08:52:56 - CMTS Registration Complete
09-30 08:52:56 - in Two-Way operational state, UCID = 1
09-30 08:52:56 - Acquired Interactive Status

----- Pg: 4.2 <CR>:Refresh p<CR>:Pg 4.1 n<CR>:Pg 4.3 x<CR>:Exit -----
>>> |
```

Use CLI diag page 4.1 to verify that the upstream gain and attenuation are correct. These parameters are reported as shown in the following example.

```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eCM Rx/Tx Details

Dccsis Version Supported = 2.0

Downstream Freq      = 555000000 Hz
Downstream Channel Width = 6000000 Hz
Downstream Power Level = +0.00 dBmV
Downstream S/N Level  = 36.40 dB
Downstream QAM Mode   = QAM256
Downstream Annex      = annexB
QAM Interleave        = 8 (I8, J16)

UnErrored Counter -----> 10725244
Correctable Errors Counter ---> 4
Uncorrectable Errors Counter -> 8

Upstream Frequency    = 388000000 Hz
Upstream Channel Width = 6400000 Hz
Upstream Power Level   = +44.20 dBmV

----- Pg: 4.1  <CR>:Refresh  p<CR>:Pg 4.0  n<CR>:Pg 4.2  x<CR>:Exit -----
>>>

```

Troubleshooting

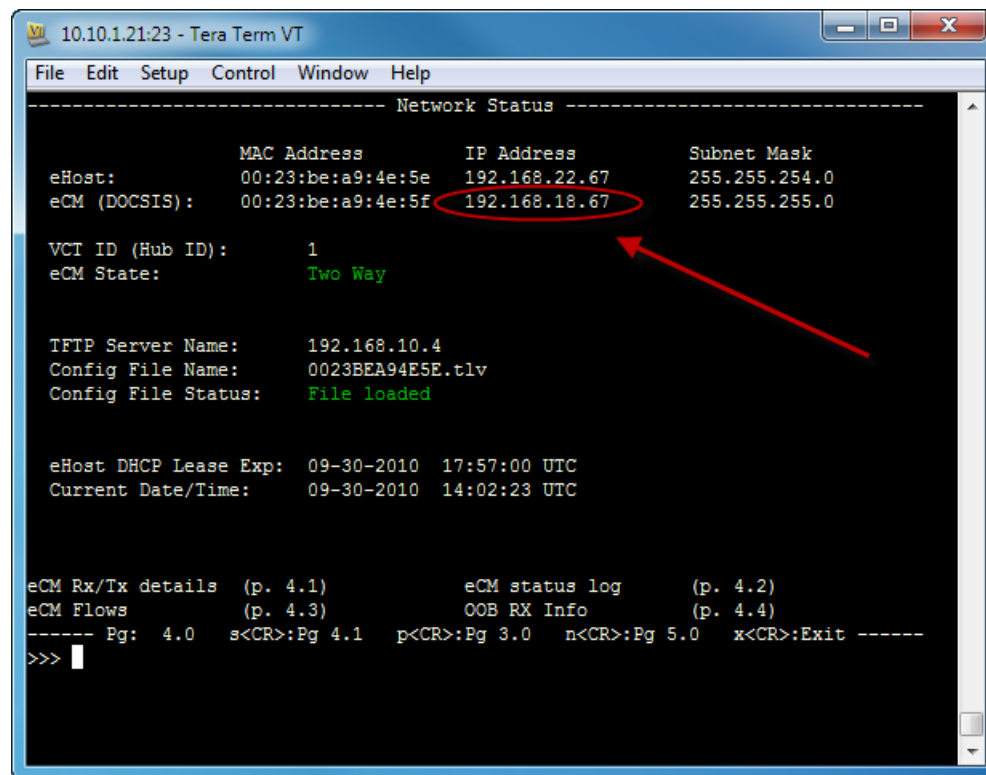
If upstream gain and attenuation are incorrect, check the reverse power level. The physical limits of the eCM are approached at around 54 dBmV.

If there is too much loss in the reverse path, ranging will fail and the eCM will default to one-way operation. You can correct this by reducing the loss of your plant upstream of the DSAN input.

Note: Adjusting the FWD INPUT pad in the DSAN does not change the upstream levels.

IP Address Acquisition

After ranging has succeeded, the eCM tries to obtain an IP address using DHCP. You can verify the IP address on CLI diag page 4.0, as shown in the following example.



```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eHost:          MAC Address      IP Address      Subnet Mask
eHost:          00:23:be:a9:4e:5e 192.168.22.67   255.255.254.0
eCM (DOCSIS):   00:23:be:a9:4e:5f 192.168.18.67   255.255.255.0

VCT ID (Hub ID): 1
eCM State:       Two Way

TFTP Server Name: 192.168.10.4
Config File Name: 0023BEA94E5E.tlv
Config File Status: File loaded

eHost DHCP Lease Exp: 09-30-2010 17:57:00 UTC
Current Date/Time:    09-30-2010 14:02:23 UTC

eCM Rx/Tx details (p. 4.1)      eCM status log (p. 4.2)
eCM Flows (p. 4.3)             OOB RX Info (p. 4.4)
----- Pg: 4.0 s<CR>:Pg 4.1 p<CR>:Pg 3.0 n<CR>:Pg 5.0 x<CR>:Exit -----
>>>

```

The DHCP response will include references to a Time of Day (TOD) server and a TFTP Server. The TOD server is used to get the system time and other data for use in eCM SNMP queries. The default date is 1/1/1970.

Troubleshooting

If the eCM does not have an IP address:

- Verify that the DHCP server is reachable on the IP network to which the eCM is connected. If your CMTS configuration uses a relay agent, verify that the eCM DHCP policy and relay agent are properly assigned to the same IP network.
- Use a packet sniffer to see if the DHCP messaging is occurring between the DHCP server and the eCM.
- Confirm that the eCM MAC address is authorized on your network, and verify with the DHCP administrator that the eCM is assigned to the correct DHCP policy.

- Investigate a possible "walled garden" situation in which the eCM has an IP address, but is unable to reach other parts of the IP network. This will result in the eCM receiving a standard configuration file, which may not be the one desired.
- Check the DHCP server log to see if the DHCP offer has been rejected.

Configuration File Acquisition

The TFTP server is used to obtain the eCM configuration file for the DSAN. You can verify receipt of the configuration file on CLI diag page 4.2, as shown in the following example.

```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eCM Status Log
Current Date/Time: 09-30-2010 14:00:56 UTC

Empty
09-30 13:56:32 - Rx Freq scanning started
09-30 13:56:34 - scanning completed, freq = 555000000 Hz, qamMode = 256
09-30 13:56:35 - Acquired OOB Data Connectivity
09-30 13:56:35 - OOB Data Directory Ver Changed OLD = 0xffffffff, New = 0x01000
09-30 13:56:39 - started Tx ranging, UCID = 1
09-30 13:56:40 - completed Tx ranging successfully, UCID = 1
09-30 13:56:40 - started DHCP
09-30 13:56:42 - eCM DHCP completed, IP = 192.168.18.67
09-30 13:56:43 - eCM Time Of Day = 1285836776 sec in UTC time
09-30 08:52:56 - started TFTP of eCM config file
09-30 08:52:56 - completed TFTP of eCM config file
09-30 08:52:56 - CMTS Registration Complete
09-30 08:52:56 - in Two-Way operational state, UCID = 1
09-30 08:52:56 - Acquired Interactive Status

----- Pg: 4.2 <CR>:Refresh p<CR>:Pg 4.1 n<CR>:Pg 4.3 x<CR>:Exit -----
>>>

```

Troubleshooting

If the eCM did not receive the configuration file:

- Verify that the TFTP server is reachable on the IP network.
- Verify that the correct TFTP server address is provided in the eCM DHCP response.
- Verify that the correct eCM configuration filename is provided in the eCM DHCP response.

Note: The file name is case-sensitive.

Chapter 3 CMTS Registration

- Verify that the TFTP server does in fact have the configuration file being requested.

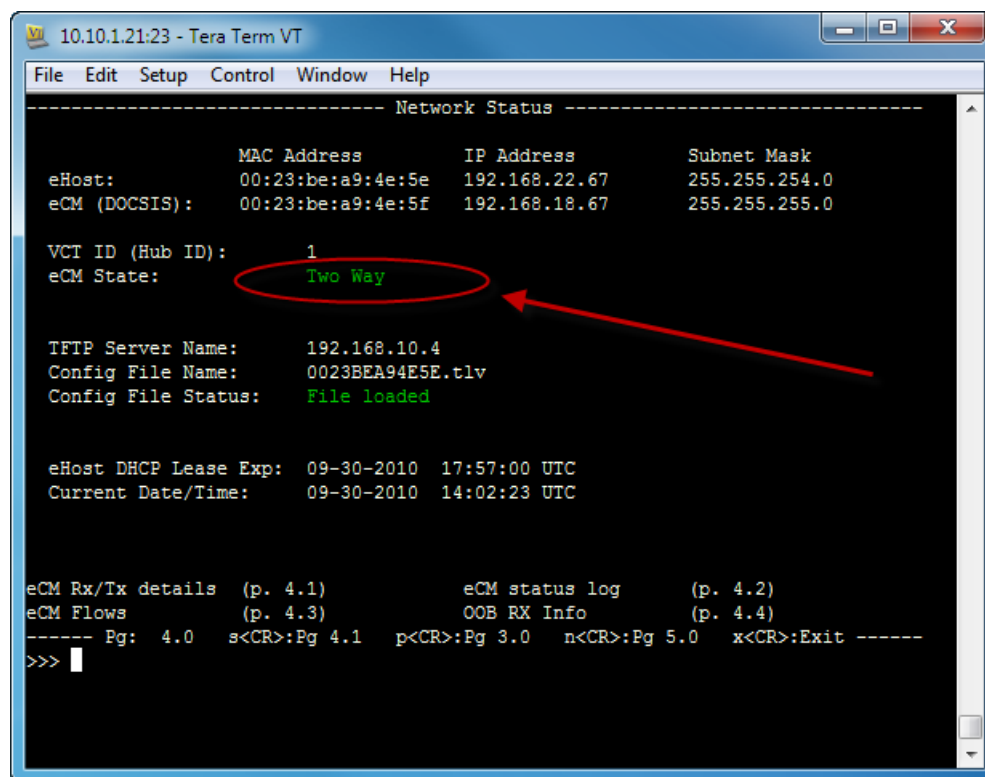
Configuration File

The eCM obtains and processes the configuration file. To verify that the eCM processed the configuration file:

- Verify that the DSAN eCM is a standard DOCSIS 2.0 enabled configuration file.
- Verify that the configuration file contains no more than 32 IP filters.

Two-Way Operation

Once an IP address is established, the eCM will enter two-way operation. Two-way operation is reported on CLI diag page 4.0, as shown in the following example.



The screenshot shows a Tera Term VT window with the title "10.10.1.21:23 - Tera Term VT". The window displays a network status report. A red circle highlights the "Two Way" status of the eCM, with a red arrow pointing to it from the right. The report includes details about the eHost, eCM (DOCSIS), VCT ID, TFTP Server Name, Config File Name, Config File Status, eHost DHCP Lease Exp, and Current Date/Time. At the bottom, there are links to various diagnostic pages (Pg 4.0, Pg 4.1, Pg 3.0, Pg 5.0) and an Exit option.

```
----- Network Status -----
eHost:          MAC Address      IP Address      Subnet Mask
eCM (DOCSIS):   00:23:be:a9:4e:5e 192.168.22.67   255.255.254.0
                00:23:be:a9:4e:5f 192.168.18.67   255.255.255.0

VCT ID (Hub ID): 1
eCM State:       Two Way

TFTP Server Name: 192.168.10.4
Config File Name: 0023BEA94E5E.tlv
Config File Status: File loaded

eHost DHCP Lease Exp: 09-30-2010 17:57:00 UTC
Current Date/Time:    09-30-2010 14:02:23 UTC

eCM Rx/Tx details (p. 4.1)      eCM status log (p. 4.2)
eCM Flows (p. 4.3)              OOB RX Info (p. 4.4)
----- Pg: 4.0 s<CR>:Pg 4.1 p<CR>:Pg 3.0 n<CR>:Pg 5.0 x<CR>:Exit -----
>>> 
```

Additional Troubleshooting Information

If you have problems that are not addressed by the troubleshooting information in the preceding section, the following references may be helpful.

Error Messages

One or more error messages may appear during CMTS registration. These error messages will appear on CLI diag page 3.x, and are also sent via an SNMP trap.

For a listing of all DSAN error messages by category, see *DSAN Error Messages* (on page 76).

LED Status

The status LEDs on the DSAN digital board can serve as an aid to troubleshooting.

For a description of the status LEDs, see *DSAN LED Indicators* (on page 78).

Incorrect Time Stamp

If SNMP queries for the eCM has an incorrect time stamp of 1970:

- Verify that the Time of Day (TOD) server is specified in the DHCP response to the eCM.
- Verify that the Time of Day (TOD) server is reachable by the eCM.

Current DSAN Software Version Installed

When no other cause can be found, a possible fix for incomplete CMTS registration is to upgrade the DSAN software. See *Software Upgrade* (on page 63) for details on performing this upgrade.

4

Host Registration

This chapter explains the host registration process, describes the expected results at each stage of the process, and identifies common issues and error messages that you may encounter during the process.

For detailed instructions on host registration, see the *Cisco DSAN System Installation and Operation Guide*, part number 4032302.

In This Chapter

- Confirming Host Registration..... 40
- Additional Troubleshooting Information..... 44

Confirming Host Registration

After the eCM acquires an IP address and enters two-way operation, the eHost will attempt to get SI data and system time, receive an IP address, and then download its configuration file from a TFTP server.

System Time Acquisition

The system time must be available before you can perform eHost registration. System time can be obtained from either of two sources: eCM Time of Day or eHost SI data.

SI Data Acquisition

The DSAN reports successful acquisition of SI data and system time on CLI diag page 1.0, as shown in the following example.

```

CDM2:115200baud - Tera Term VT
File Edit Setup Control Window Resize Help
----- DSAN Status -----
POST Results      Pass      (p. 2.0)
Current Alarms:   1        (p. 3.0)
DOCSIS State:    Connected - Idle
Provisioning State: Idle
Remap State:     Channel Remapped
RF Summary
Tuner A:         Locked      (p. 5.0)
Tuner B:         Locked      (p. 5.0)
Tuner C:         N/A        (p. 5.0)
Demods:          In Use: 9    Locked: 9    (p. 7.0)
Channels:        Provisioned: 82 Errors: 0    (p. 9.1 - 9.6)
Time of Service: 2318 hours   Temperature: 42.0 C
Current Date/Time: 10-15-2010 15:11:09 UTC
Boot Time:        10-13-2010 14:53:54 UTC
----- Pg: 1.0 <CR>:Refresh n<CR>:Pg 2.0 x<CR>:Exit -----
>>>
  
```

The eCM and eHost keep separate time clocks. The log files use the eHost time. The eHost will obtain its time from the DNCS SI data. The default date is 1/1/1970.

Troubleshooting

If the DSAN does not obtain the SI data:

- 1 Check CLI diag page 1 to see if the SI time is available from the DNCS. If not, the DOCSIS State will report as Wait for SI time, as shown in the following example.

```

COM2:115200baud - Tera Term VT
File Edit Setup Control Window Resize Help
----- DSAN Status -----
POST Results      N/A          <p. 2.0>
Current Alarms:   2            <p. 3.0>

DOCSIS State:     Wait for SI Time
Provisioning State: Wait for Config
Remap State:      Channel Remapped

RF Summary
Tuner A:          Locked        <p. 5.0>
Tuner B:          Locked        <p. 5.0>
Tuner C:          N/A          <p. 5.0>

Demods:           In Use: 9      Locked: 9      <p. 7.0>
Channels:         Provisioned: 82 Errors: 82      <p. 9.1 - 9.6>

Time of Service:  2318 hours    Temperature: 40.5 C

Current Date/Time: 01-01-1970 00:03:07 UTC
Boot Time:        01-01-1970 00:00:00 UTC

----- Pg: 1.0  <CR>:Refresh  n<CR>:Pg 2.0  x<CR>:Exit -----
>>>

```

It may be that the SI process is not running and SI data is not available. Verify the status of the SI process with your DNCS administrator.

- 2 Check CLI diag page 4.4 to verify that the SI parser counter is incrementing, as shown in the following example.

```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----

OOB RX Info

OOB Parser Name  State  Packets
SI Parser -----> Running  1495
EAS Parser -----> Running   0
DSMCC Parser -----> Running  90
...UNCONFIG -----> Running  76
...UNPASSTHRU -----> Running  11
EMM Parser -----> Running   0    in queue = 0

----- Pg: 4.4  <CR>:Refresh  p<CR>:Pg 4.3  n<CR>:Pg 5.0  x<CR>:Exit -----
>>>

```

If the SI parser counter is not incrementing, SI data is not available in the eCM SCTE-65 OOB SI tunnel. In this case:

- Verify the DNCS bridge configuration with your DNCS administrator.

- Verify the CMTS tunnel configuration with your CMTS administrator.
- Confirm that the IP data is flowing in the DNCS and CMTS match.

IP Address Acquisition

After receiving system time, the eHost obtains an IP address using DHCP. You can verify receipt of the IP address on CLI diag page 4.0, as shown in the following example.

```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eHost:      MAC Address      IP Address      Subnet Mask
eHost:      00:23:be:a9:4e:5e 192.168.22.67   255.255.254.0
eCM (DOCSIS): 00:23:be:a9:4e:5f 192.168.18.67   255.255.255.0

VCT ID (Hub ID): 1
eCM State:      Two Way

TFTP Server Name: 192.168.10.4
Config File Name: 0023BEA94E5E.tlv
Config File Status: File loaded

eHost DHCP Lease Exp: 09-30-2010 17:57:00 UTC
Current Date/Time:    09-30-2010 14:02:23 UTC

eCM Rx/Tx details (p. 4.1)      eCM status log (p. 4.2)
eCM Flows (p. 4.3)             OOB RX Info (p. 4.4)
----- Pg: 4.0  s<CR>:Pg 4.1  p<CR>:Pg 3.0  n<CR>:Pg 5.0  x<CR>:Exit -----
>>>

```

Note: The actual value of the IP address depends on the network IP configuration.

Troubleshooting

If the eHost does not have an IP address:

- Verify that the DHCP server is reachable on the IP network to which the eHost is connected.

If using a relay agent in your CMTS configuration, verify that the eHost DHCP policy and relay agent are assigned to the same IP network.

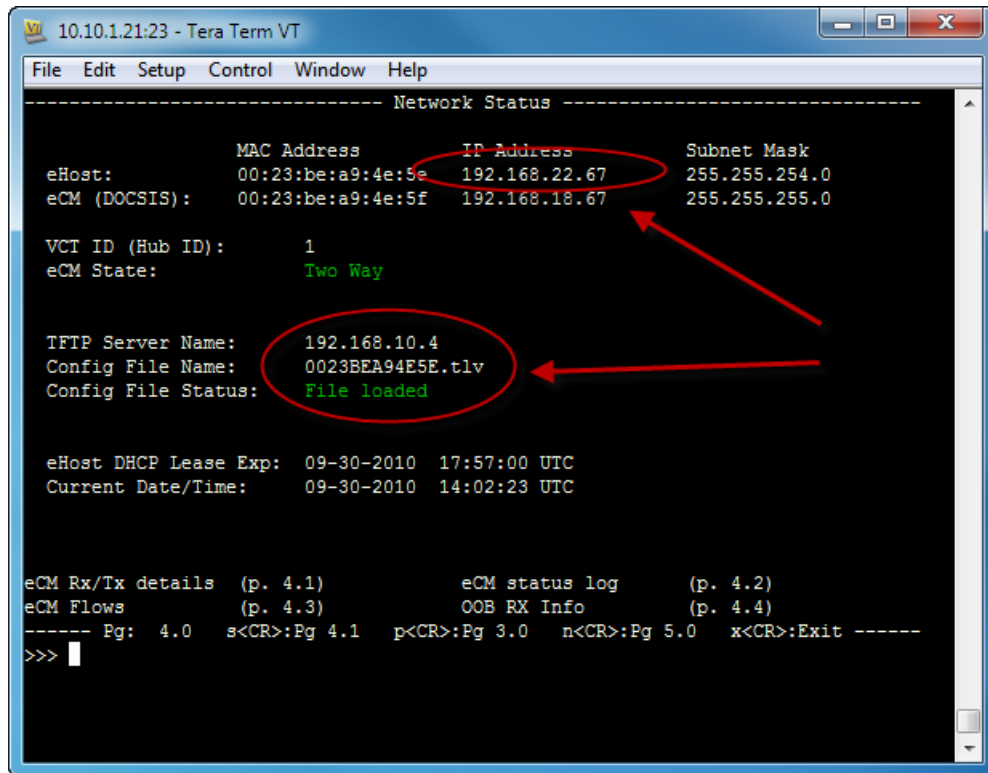
- Use a packet sniffer to see if DHCP messaging is occurring between the DHCP server and eHost.

If not, confirm that the eHost MAC address is authorized on your network, and verify with your DHCP administrator that the eHost is assigned to the correct DHCP policy.

- Verify that all mandatory DHCP options are included in the DHCP offer.
Mandatory options are 1, 3, 6, 15, 51, 54, 66, and 67. If any of these options is missing, the eHost will reject the DHCP offer.
- Check the DHCP server log to see if the offer has been rejected.

Configuration File Acquisition

The TFTP server is used to get the eHost configuration file for the DSAN. You can verify acquisition of the config file on CLI diag page 4.0, as shown in the following example.



```

10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eHost:          MAC Address      IP Address      Subnet Mask
eHost:          00:23:be:a9:4e:5e 192.168.22.67   255.255.254.0
eCM (DOCSIS):   00:23:be:a9:4e:5f 192.168.18.67   255.255.255.0

VCT ID (Hub ID): 1
eCM State:       Two Way

TFTP Server Name: 192.168.10.4
Config File Name: 0023BEA94E5E.tlv
Config File Status: File loaded

eHost DHCP Lease Exp: 09-30-2010 17:57:00 UTC
Current Date/Time:    09-30-2010 14:02:23 UTC

eCM Rx/Tx details (p. 4.1)      eCM status log (p. 4.2)
eCM Flows (p. 4.3)              OOB RX Info (p. 4.4)
----- Pg: 4.0 s<CR>:Pg 4.1 p<CR>:Pg 3.0 n<CR>:Pg 5.0 x<CR>:Exit -----
>>>
  
```

Troubleshooting

If the eHost does not receive the configuration file:

- Verify that the TFTP server is reachable on the IP network.
- Verify that the correct TFTP server address is provided in the eHost DHCP response.
- Verify that the correct eHost configuration filename is provided in the eHost DHCP response. Note that the file name is case-sensitive.
- Verify that the TFTP server has the configuration file being requested.

Additional Troubleshooting Information

If you have problems that are not addressed by the troubleshooting information in the preceding section, the following references may be helpful.

Error Messages

One or more error messages may appear during Host registration. These error messages will appear on CLI diag page 3.x, and are also sent via an SNMP trap.

For a listing of all DSAN error messages by category, see *DSAN Error Messages* (on page 76).

LED Status

The status LEDs on the DSAN digital board can serve as an aid to troubleshooting.

For a description of the status LEDs, see *DSAN LED Indicators* (on page 78).

Current DSAN Software Version Installed

When no other cause can be found, a possible fix for incomplete Host registration is to upgrade the DSAN software. See *Software Upgrade* (on page 63) for details on performing this upgrade.

5

Video Output

This chapter explains the process of confirming DSAN video output, describes the expected results at each stage of the process, and identifies the common issues and corresponding error messages encountered during each stage.

In This Chapter

- Confirming Video Output 46
- Resolving Video Output Issues 53

Confirming Video Output

The DSAN configures its video channel lineup in one of two ways, depending on the contents of its cache.

- If the DSAN cache does not contain valid configuration data, the DSAN starts building a channel lineup following successful eCM and Host registration based on the downloaded configuration and headend SI data.
- If the DSAN cache already contains valid configuration data, the DSAN immediately builds the channel lineup following system initialization using the cached configuration, without waiting on completion of eCM and Host registration. Following eCM and Host registration, the DSAN re-examines the headend SI data, and if there is any change in configuration, rebuilds the channel lineup.

You can confirm the channel remap state on CLI diag page 1.0, as shown in the following example.

```

----- DSAN Status -----
POST Results      Pass                (p. 2.0)
Current Alarms:   0                  (p. 3.0)

DOCSIS State:     Connected - Idle
Provisioning State: Idle
Remap State:      Channel Remapped

RF Summary
Tuner A:          Locked              (p. 5.0)
Tuner B:          Locked              (p. 5.0)
Tuner C:          N/A                 (p. 5.0)

Demods:           In Use: 9           Locked: 9           (p. 7.0)
Channels:         Provisioned: 82     Errors: 0          (p. 9.1 - 9.6)

Time of Service:  1444 hours          Temperature: 41.5 C

Current Date/Time: 10-08-2010 00:05:18 UTC
Boot Time:        10-06-2010 23:47:00 UTC

----- Pg: 1.0  <CR>:Refresh  n<CR>:Pg 2.0  x<CR>:Exit -----
>>>

```

Wideband Tuner Setup

After preparing the channel lineup, the DSAN assigns each of the three wideband tuners to a designated QAM center frequency and commands each tuner to lock to that frequency and begin processing the RF input.

Each wideband tuner handles a continuous 48 MHz bandwidth. A properly configured channel lineup will fit within the combined bandwidth of the three tuners.

You can verify that each tuner is locked onto its target RF input frequency on CLI diag page 1.0, as shown in the following example.

```

----- DSAN Status -----
POST Results      Pass                (p. 2.0)
Current Alarms:   0                    (p. 3.0)

DOCSIS State:     Connected - Idle
Provisioning State: Idle
Remap State:      Channel Remapped

RF Summary
Tuner A:          Locked              (p. 5.0)
Tuner B:          Locked              (p. 5.0)
Tuner C:          N/A                (p. 5.0)

Demods:           In Use: 9           Locked: 9           (p. 7.0)
Channels:         Provisioned: 82     Errors: 0          (p. 9.1 - 9.6)

Time of Service:  1444 hours          Temperature: 41.5 C

Current Date/Time: 10-08-2010 00:05:18 UTC
Boot Time:        10-06-2010 23:47:00 UTC

----- Pg: 1.0  <CR>:Refresh  n<CR>:Pg 2.0  x<CR>:Exit -----
>>>

```

The status of each tuner will report as either Locked (in green), Unlocked (in red), or N/A (in yellow) if the associated tuner is not configured.

Similarly, tuner status is displayed on diag page 5.0 as either L (in green) for locked or U (in red) for unlocked, as shown below.

```

----- Tuner Status -----
Power State:      Tuner A           Tuner B           Tuner C
PLL Status:       Locked            Locked            N/A
Center Freq:      528000000          942000000        N/A
Demod Status: (L=Locked, U=Unlocked)

0                L
1                L
2
3                L
4                L
5                L
6                L
7                L
8                L
9
10
11
12
13
14
15

----- Pg: 5.0  <CR>:Refresh  p<CR>:Pg 4.0  n<CR>:Pg 6.0  x<CR>:Exit -----
>>>

```

QAM Demodulator Setup

After successfully setting up the wideband tuners, the DSAN assigns 16 available QAM demodulators to the configured channels to demodulate the incoming QAM input and provide the MPEG-2 transport stream to the video processor.

Confirming Video Output

For proper operation, each demodulator should be locked to the target QAM frequency. You can check the locking status on CLI diag pages 1.0, 6.0, and 7.0, as shown in the following examples.

```
----- DSAN Status -----
POST Results      Pass                (p. 2.0)
Current Alarms:   0                    (p. 3.0)

DOCSIS State:     Connected - Idle
Provisioning State: Idle
Remap State:      Channel Remapped

RF Summary
Tuner A:          Locked              (p. 5.0)
Tuner B:          Locked              (p. 5.0)
Tuner C:          N/A                 (p. 5.0)

Demods:           In Use: 9           Locked: 9           (p. 7.0)
Channels:         Provisioned: 82     Errors: 0           (p. 9.1 - 9.6)

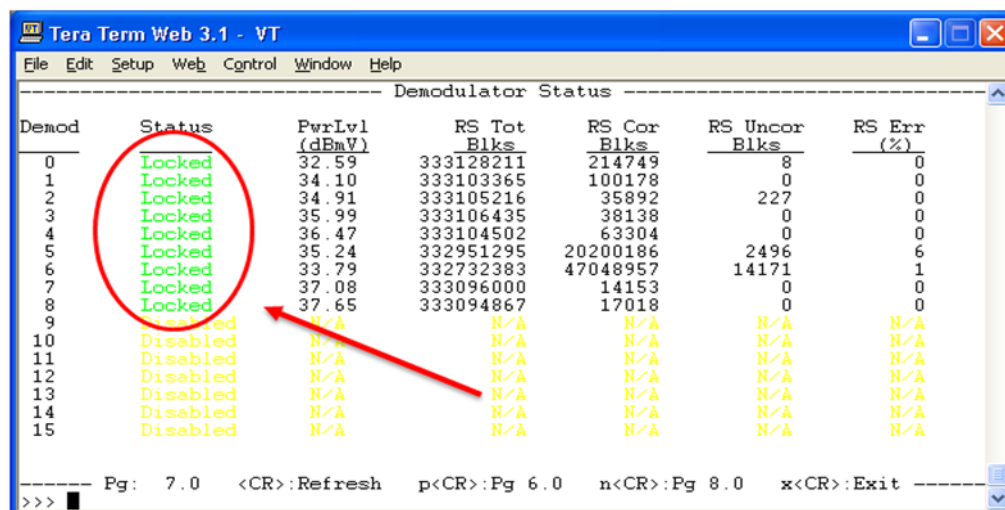
Time of Service:  1444 hours          Temperature: 41.5 C

Current Date/Time: 10-08-2010 00:05:18 UTC
Boot Time:         10-06-2010 23:47:00 UTC

----- Pg: 1.0  <CR>:Refresh  n<CR>:Pg 2.0  x<CR>:Exit -----
>>>
```

```
----- Demodulator Configuration -----
Demod   State   Tuner   Freq(kHz)   QAM Mode   Sym Rate
0       Enabled  A       507000      256        5360537
1       Enabled  A       513000      256        5360537
2       Enabled  B       921000      256        5360537
3       Enabled  A       519000      256        5360537
4       Enabled  A       525000      256        5360537
5       Enabled  A       531000      256        5360537
6       Enabled  B       927000      256        5360537
7       Enabled  A       543000      256        5360537
8       Enabled  A       549000      256        5360537
9       Disabled N/A      N/A         N/A         N/A
10      Disabled N/A      N/A         N/A         N/A
11      Disabled N/A      N/A         N/A         N/A
12      Disabled N/A      N/A         N/A         N/A
13      Disabled N/A      N/A         N/A         N/A
14      Disabled N/A      N/A         N/A         N/A
15      Disabled N/A      N/A         N/A         N/A

----- Pg: 6.0  <CR>:Refresh  p<CR>:Pg 5.0  n<CR>:Pg 7.0  x<CR>:Exit -----
>>>
```



Demod	Status	PwrLvl (dBmV)	RS Tot Blks	RS Cor Blks	RS Uncor Blks	RS Err (%)
0	Locked	32.59	333128211	214749	8	0
1	Locked	34.10	333103365	100178	0	0
2	Locked	34.91	333105216	35892	227	0
3	Locked	35.99	333106435	38138	0	0
4	Locked	36.47	333104502	63304	0	0
5	Locked	35.24	332951295	20200186	2496	6
6	Locked	33.79	332732383	47048957	14171	1
7	Locked	37.08	333096000	14153	0	0
8	Locked	37.65	333094867	17018	0	0
9	Disabled	N/A	N/A	N/A	N/A	N/A
10	Disabled	N/A	N/A	N/A	N/A	N/A
11	Disabled	N/A	N/A	N/A	N/A	N/A
12	Disabled	N/A	N/A	N/A	N/A	N/A
13	Disabled	N/A	N/A	N/A	N/A	N/A
14	Disabled	N/A	N/A	N/A	N/A	N/A
15	Disabled	N/A	N/A	N/A	N/A	N/A

----- Pg: 7.0 <CR>:Refresh p<CR>:Pg 6.0 n<CR>:Pg 8.0 x<CR>:Exit -----
>>> █

Video Processor Setup

After the QAM has locked onto its target frequency, it demodulates the input and passes channel lineup information to the video processor.

The video processor then performs the following actions to process and decode up to 82 configured channels:

- Extracts PSI information for each configured channel.
- Finds matched program PID information and provides this information to the decoder for video and audio decoding, and to the CA engine for encrypted channel handling.
- Decodes video and audio information.
- Provides individual channel processing information.

You can verify satisfactory completion of these activities by reviewing CLI diag pages 1.0, 8.0, 9.x, and 10.x, as follows:

- Page 1.0 provides an overall summary of current DSAN status.

```

----- DSAN Status -----
POST Results      Pass                (p. 2.0)
Current Alarms:   0                   (p. 3.0)

DOCSIS State:     Connected - Idle
Provisioning State: Idle
Remap State:      Channel Remapped

RF Summary
Tuner A:          Locked              (p. 5.0)
Tuner B:          Locked              (p. 5.0)
Tuner C:          N/A                (p. 5.0)

Demods:           In Use:      9      Locked:  9      (p. 7.0)
Channels:         Provisioned: 82     Errors:  0      (p. 9.1 - 9.6)

Time of Service:  1444 hours          Temperature:  41.5 C

Current Date/Time: 10-08-2010 00:05:18 UTC
Boot Time:         10-06-2010 23:47:00 UTC

----- Pg:  1.0  <CR>:Refresh  n<CR>:Pg 2.0  x<CR>:Exit -----
>>>

```

- Page 8.0 shows the current EIA channel assignments for each QAM demodulator. All channels in the expected lineup should be present.

```

----- Demodulator Channel Assignments -----
Channel Assignments Per Demodulator:

00  01  02  03  04  05  06  07  08  09  10  11  12  13  14  15
2  95  96  20  12  29  39  64  73
3  98  97  21  13  30  59  65  74
4  99  40  22  23  31  60  66  75
5  14  41  7  24  32  61  67  76
6  15  42  8  25  33  62  68  77
44 16  43  9  26  34  63  69  78
58 17          10 27  35      70
   18          11 28  36      71
   19          51 38  37      72
   45          52
   46          53
   47          54
   48          55
   49          56
   50          57

----- Pg:  8.0  <CR>:Refresh  p<CR>:Pg 7.0  n<CR>:Pg 9.0  x<CR>:Exit -----
>>>

```

- Page 9.x lists the current status of each EIA channel. All should be OK.

----- Service Map Status -----						
EIA CH	Source	Provis	Encrypt	Src ID	Status	Ref Page
2	QAM	Y	Y	2144	OK	10.2
3	QAM	Y	Y	2130	OK	10.3
4	QAM	Y	Y	2131	OK	10.4
5	QAM	Y	Y	2132	OK	10.5
6	QAM	Y	Y	2138	OK	10.6
7	QAM	Y	Y	2163	OK	10.7
8	QAM	Y	Y	2164	OK	10.8
9	QAM	Y	Y	2165	OK	10.9
10	QAM	Y	Y	2166	OK	10.10
11	QAM	Y	Y	2167	OK	10.11
12	QAM	Y	Y	2176	OK	10.12
13	QAM	Y	Y	2177	OK	10.13
14	QAM	Y	Y	2147	OK	10.14
15	QAM	Y	Y	2148	OK	10.15
16	QAM	Y	Y	2149	OK	10.16
17	QAM	Y	Y	2150	OK	10.17

----- Pg: 9.1 <CR>:Refresh p<CR>:Pg 9.0 n<CR>:Pg 9.2 x<CR>:Exit -----
>>> █

- In the event of a problem with a particular channel, navigate to the Ref Page (10.x) for that channel to check individual channel parameters.

For example, the page for EIA channel 2 might appear as shown below.

----- Channel Configuration -----			
EIA Ch Num:	2	Program Num:	17
Status:	OK	Video PID:	0x1041
Source ID:	2144	Audio PID:	0x1042
QAM Mode:	256	Second Audio PID:	0x1043
QAM Frequency:	507000000	CA PID:	0x104d
Carrier ID:	0		
CA Status:	Ready		
Late Key Status:	OK	ECM Count:	16
Late Keys/24 hr:	0	ECM Avg Proc Time:	8 ms
ECM Last 6 Error Reasons		ECM Error Count:	0
ECM LastError Time:N/A			

----- Pg: 10.2 <CR>:Refresh p<CR>:Pg 10.0 n<CR>:Pg 10.3 x<CR>:Exit -----
>>> █

Resolving Video Output Issues

The most common issues with DSAN video are frozen video or no video at all. This problem may affect all configured channels, or only certain ones.

If you have any of these issues, first recheck all related electrical and signal connections. If these are correct, examine the CLI diag pages for alarms related to one or more of these areas:

- Configuration or system information (SI)
- Wideband tuners
- QAM demodulators
- Video input
- Authorization
- EAS runtime processing

Alarms in these areas may help you pinpoint the cause of the issue. Use the appropriate alarm troubleshooting activities below to help identify possible remedies.

Alarms Related to Configuration or SI

These alarms may have any of the following causes:

- A corrupt configuration file
- A missing mandatory TLV
- An out-of-range Aux channel in config file
- One or more invalid EIA channels in config file
- A source ID missing from the SI
- VCTID not in the configuration file

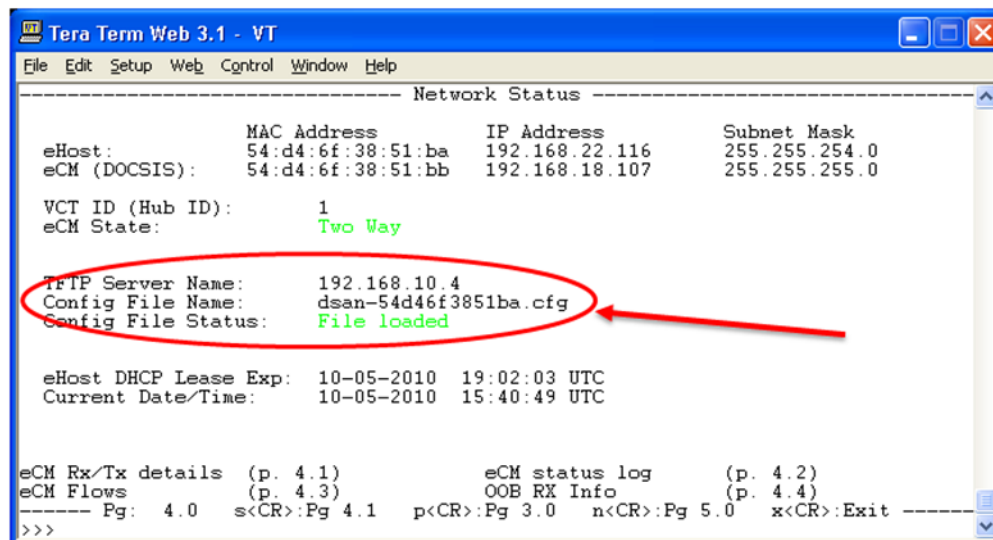
Use the following information to help correct the problem.

Corrupt Config File

A corrupt configuration file alarm results when the config file received from the headend is invalid, probably due to failure of the SHA1 checksum validation.

Chapter 5 Video Output

You can check the status of the configuration file on CLI diag page 4.0, as shown in the following example.



```
Tera Term Web 3.1 - VT
File Edit Setup Web Control Window Help

----- Network Status -----
eHost:          MAC Address      IP Address      Subnet Mask
eCM (DOCSIS):   54:d4:6f:38:51:ba 192.168.22.116  255.255.254.0
                54:d4:6f:38:51:bb 192.168.18.107  255.255.255.0

VCT ID (Hub ID): 1
eCM State:       Two Way

TrFTP Server Name: 192.168.10.4
Config File Name:  dsan-54d46f3851ba.cfg
Config File Status: File loaded

eHost DHCP Lease Exp: 10-05-2010 19:02:03 UTC
Current Date/Time:    10-05-2010 15:40:49 UTC

eCM Rx/Tx details (p. 4.1)      eCM status log (p. 4.2)
eCM Flows (p. 4.3)             OOB RX Info (p. 4.4)
----- Pg: 4.0 s<CR>:Pg 4.1 p<CR>:Pg 3.0 n<CR>:Pg 5.0 x<CR>:Exit -----
>>>
```

Mandatory TLV Missing

In the configuration file, one or more of the required TLVs - specifically, TLV 217.20, 217.25, or 217.53 - may be missing from the file.

Config File Has Out-of-Range Aux Channels

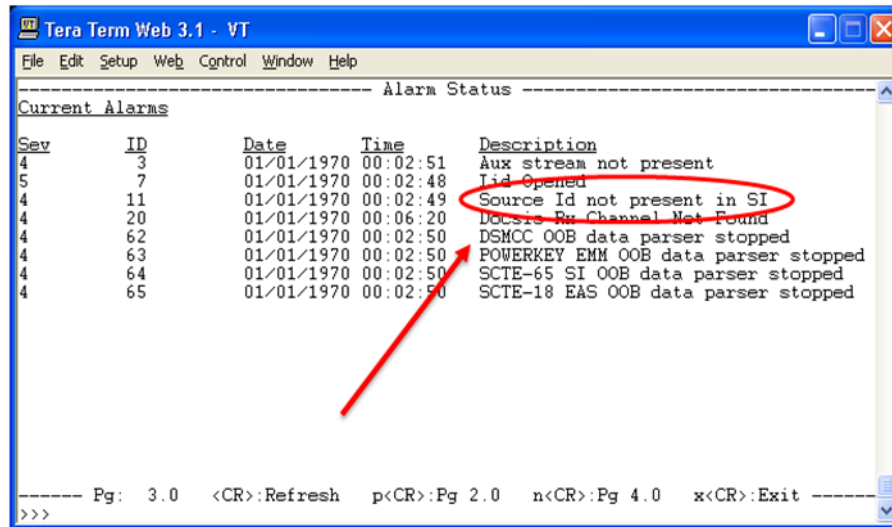
This alarm is triggered when an Aux channel is mapped outside the 2-78, 95-99 channel range.

Config File Has Invalid EIA Channels

This alarm is triggered when an EIA channel is mapped outside the 2-78, 95-99 channel range.

Source ID Not Present in SI

This alarm is triggered when the QAM mode is unknown, or when the source ID is not present in the SI. This alarm appears in the CLI diag pages as shown in the following example.

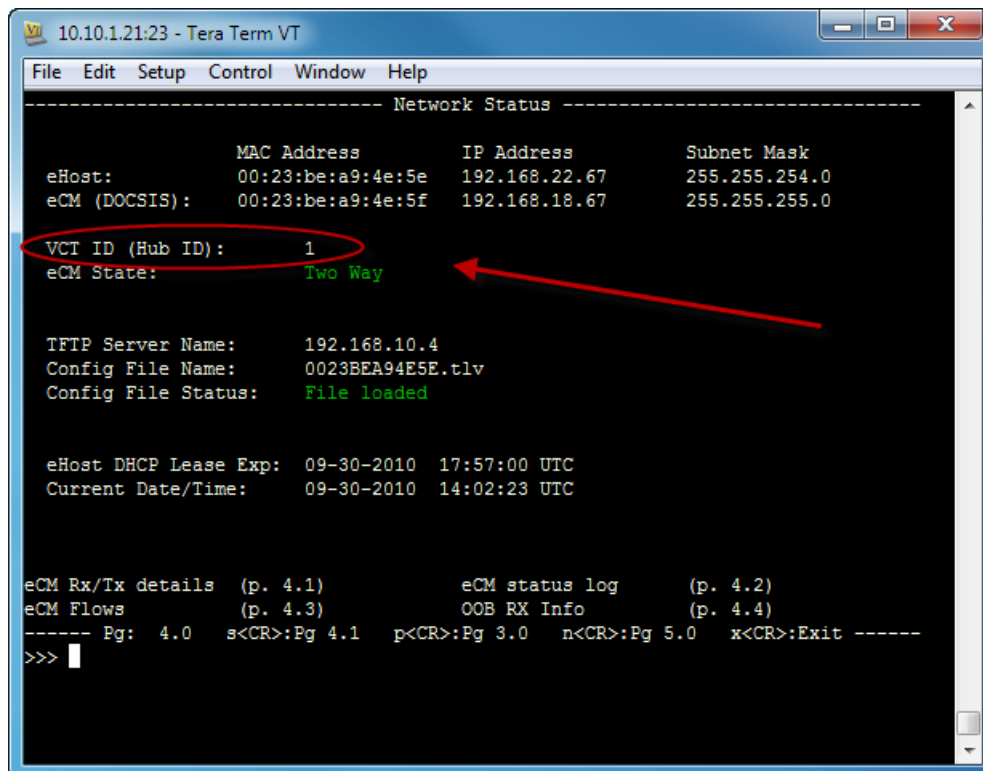


```
Tera Term Web 3.1 - VT
File Edit Setup Web Control Window Help
----- Alarm Status -----
Current Alarms
Sev    ID    Date      Time      Description
4      3      01/01/1970 00:02:51 Aux stream not present
5      7      01/01/1970 00:02:48 Lid Opened
4      11     01/01/1970 00:02:49 Source Id not present in SI
4      20     01/01/1970 00:06:20 DotSis Rx Channel Not Found
4      62     01/01/1970 00:02:50 DSMCC OOB data parser stopped
4      63     01/01/1970 00:02:50 POWERKEY EMM OOB data parser stopped
4      64     01/01/1970 00:02:50 SCTE-65 SI OOB data parser stopped
4      65     01/01/1970 00:02:50 SCTE-18 EAS OOB data parser stopped

----- Pg: 3.0  <CR>:Refresh  p<CR>:Pg 2.0  n<CR>:Pg 4.0  x<CR>:Exit -----
>>>
```

VCTID Not in Configuration File

In the event of a **VCTID not in configuration file** error, check CLI diag page 4.0 to see if the DSAN has the proper Hub ID, as shown in the following example. The DSAN must have a valid Hub ID in order to parse SI data.



```
10.10.1.21:23 - Tera Term VT
File Edit Setup Control Window Help
----- Network Status -----
eHost:          MAC Address      IP Address      Subnet Mask
eCM (DOCSIS):   00:23:be:a9:4e:5e 192.168.22.67   255.255.254.0
eCM (DOCSIS):   00:23:be:a9:4e:5f 192.168.18.67   255.255.255.0
VCT ID (Hub ID): 1
eCM State:      Two Way

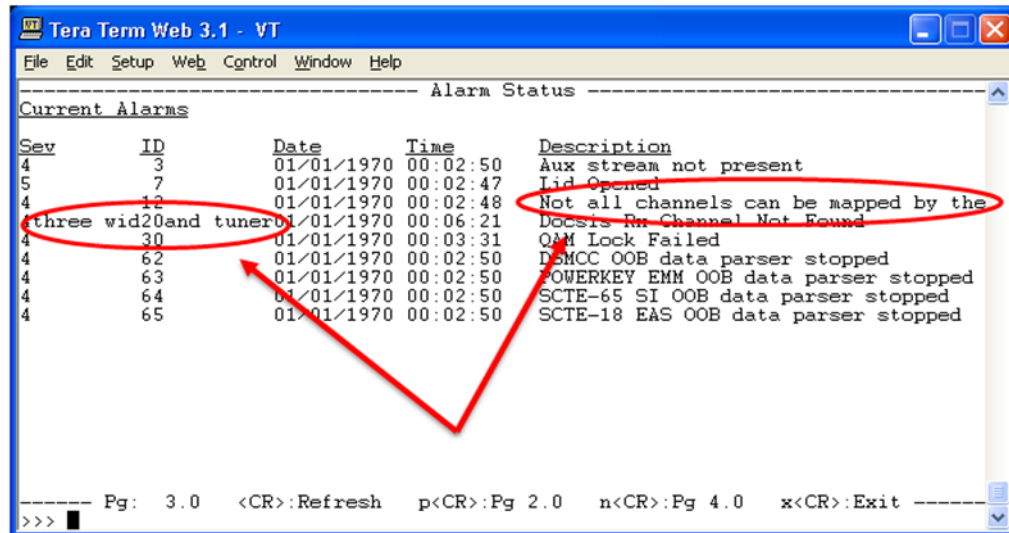
TFTP Server Name: 192.168.10.4
Config File Name: 0023BEA94E5E.tlv
Config File Status: File loaded

eHost DHCP Lease Exp: 09-30-2010 17:57:00 UTC
Current Date/Time:    09-30-2010 14:02:23 UTC

eCM Rx/Tx details (p. 4.1)      eCM status log (p. 4.2)
eCM Flows (p. 4.3)             OOB RX Info (p. 4.4)
----- Pg: 4.0 s<CR>:Pg 4.1 p<CR>:Pg 3.0 n<CR>:Pg 5.0 x<CR>:Exit -----
>>> 
```

Alarm Related to Wideband Tuners

An alarm may appear stating that not all channels can be mapped by the three wideband tuners. This alarm is triggered when the channel lineup does not fit within the contiguous 48 MHz bandwidth of the three wide-band tuners. The alarm appears as shown in the following example.



Alarm Related to QAM Demodulators

An alarm may appear stating that the QAM lock has failed to lock on a particular target frequency. CLI diag page 1.0 summarizes how many QAMs are unlocked. The field **Errors: XX** reports the errors. CLI diag pages 6 and 7 report any QAM frequencies that are unlocked, as shown in the following examples.

----- Demodulator Configuration -----

Demod	State	Tuner	Freq(kHz)	QAM Mode	Sym Rate
0	Enabled	A	507000	256	5360537
1	Enabled	A	513000	256	5360537
2	Enabled	B	921000	256	5360537
3	Enabled	A	519000	256	5360537
4	Enabled	A	525000	256	5360537
5	Enabled	A	531000	256	5360537
6	Enabled	B	927000	256	5360537
7	Enabled	A	543000	256	5360537
8	Enabled	A	549000	256	5360537
9	Disabled	N/A	N/A	N/A	N/A
10	Disabled	N/A	N/A	N/A	N/A
11	Disabled	N/A	N/A	N/A	N/A
12	Disabled	N/A	N/A	N/A	N/A
13	Disabled	N/A	N/A	N/A	N/A
14	Disabled	N/A	N/A	N/A	N/A
15	Disabled	N/A	N/A	N/A	N/A

----- Pg: 6.0 <CR>:Refresh p<CR>:Pg 5.0 n<CR>:Pg 7.0 x<CR>:Exit -----

>>>

Tera Term Web 3.1 - VT

File Edit Setup Web Control Window Help

----- Demodulator Status -----

Demod	Status	PwrLvl (dBmV)	RS Tot Blks	RS Cor Blks	RS Uncor Blks	RS Err (%)
0	Locked	32.59	333128211	214749	8	0
1	Locked	34.10	333103365	100178	0	0
2	Locked	34.91	333105216	35892	227	0
3	Locked	35.99	333106435	38138	0	0
4	Locked	36.47	333104502	63304	0	0
5	Locked	35.24	332951295	20200186	2496	6
6	Locked	33.79	332732383	47048957	14171	1
7	Locked	37.08	333096000	14153	0	0
8	Locked	37.65	333094867	17018	0	0
9	Disabled	N/A	N/A	N/A	N/A	N/A
10	Disabled	N/A	N/A	N/A	N/A	N/A
11	Disabled	N/A	N/A	N/A	N/A	N/A
12	Disabled	N/A	N/A	N/A	N/A	N/A
13	Disabled	N/A	N/A	N/A	N/A	N/A
14	Disabled	N/A	N/A	N/A	N/A	N/A
15	Disabled	N/A	N/A	N/A	N/A	N/A

----- Pg: 7.0 <CR>:Refresh p<CR>:Pg 6.0 n<CR>:Pg 8.0 x<CR>:Exit -----

>>>

Note: In the event of a problem, check the check the **RS Uncor Blks** field on this page. A rapidly incrementing field value here is an indication of an RF problem.

Alarms Related to Video Input

These alarms may have any of the following causes:

- Service unavailable
- Invalid video resolution
- Aux input is invalid
- Aux stream is not present

Use the following information to help correct the problem.

Service Unavailable

This alarm is triggered when the decoder failed to decode because of an internal error. To fix this error, try rebooting the DSAN.

Invalid Video Resolution

This alarm is triggered when the video stream has an invalid resolution, such as HD content, which cannot be supported by the video processor.

Aux Input Is Invalid

This alarm is triggered when the Aux channel is set up incorrectly (for example, out of range) in the configuration file.

Aux Stream Not Present

This alarm is triggered when one or more output channels are configured with an Aux input, and the Aux source is not connected to the DSAN port correctly (or not at all).

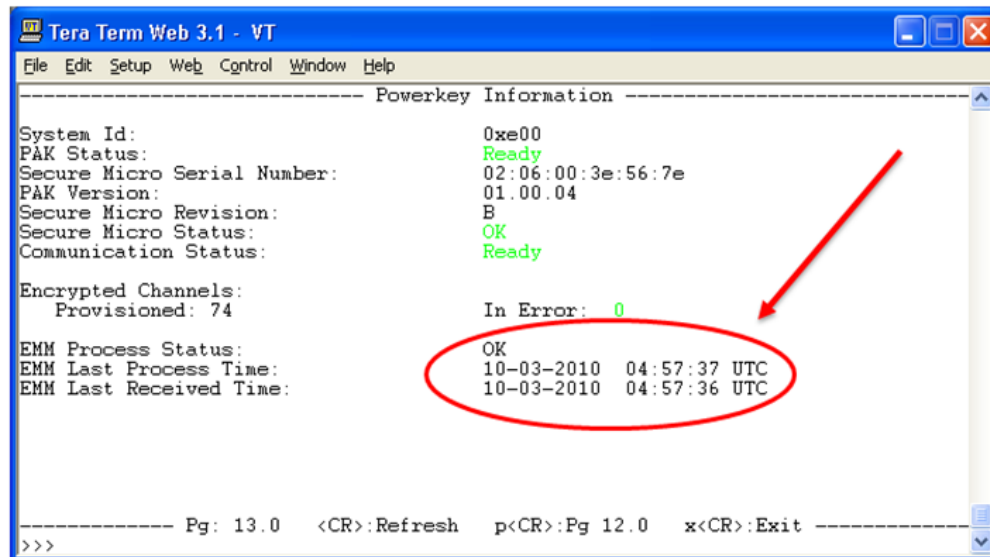
To correct the problem, check the cables and connections to the DSAN and repair or replace as needed. Also be sure that the equipment is connected to the expected Aux port on DSAN.

Alarm Related to Authorization

In the event of a Channel Not Authorized, Conditional Access error, confirm the following:

- The EMM file is loaded on DNCS.
- Encrypted sources configured for DSAN output are assigned to a package that is assigned to the DSAN.
- The number of packages per service does not exceed 24.
- The EMM has not expired.

If the EMM has expired, send an “Instant Hit” to the unit as shown in the following example.



Alarm Related to EAS Runtime Processing

These alarms may have any of the following causes:

- EAS Channel not in PSI
- EAS Channel not in SI
- EAS Channel not one of the provisioned channels

Use the following information to help correct the problem.

EAS Channel Not in PSI

This alarm is triggered when the EAS force tune channel has a PSI error. To correct the problem, fix the plant configuration for the EAS force tune program. Another possibility to consider is that the correct EAS force tune channel was not listed in the EAS equipment on the headend.

EAS Channel Not in SI

This alarm is triggered when the EAS channel is not present in the SI. To correct the problem, fix the plant configuration for the EAS force tune channel. Another possibility to consider is that the correct EAS force tune channel was not listed in the EAS equipment at the headend.

EAS Channel Not One of the Provisioned Channels

This alarm is triggered when the EAS force tune channel is not one of the 82 provisioned channels. To correct the problem, do *either* of the following:

- Add the EAS force tune channel to the provisioned channels.
- Modify the force tune channel to be one of the already configured provisioned channels.

6

Software Upgrade

This chapter explains the process of upgrading DSAN software, describes the expected results at each stage of the process, and identifies the common issues and corresponding error messages encountered during each stage.

In This Chapter

- Upgrading the DSAN Software 64
- Resolving Software Download Issues..... 70

Upgrading the DSAN Software

DSAN software upgrades are performed via the DOCSIS channel using the embedded cable modem (eCM). The methods used for triggering and transferring the software images are a limited implementation of the CableLabs® Common Download 2.0 specification. These methods are initiated and completed in a manner similar to a cable modem software download.

Two methods are supported that initiate the download and upgrade. The first is initiated by entries in the eCM configuration file, and occurs automatically during bootup of the DSAN if the upgrade image name is different from the currently executing image on the DSAN. The second is initiated manually by an operator using SNMP. Both methods transfer the software image via TFTP.

The downloaded image is a single monolithic image that contains all software including the host processor image, eCM image, and FPGA image. Prior to release, the monolithic image is signed with the Cisco digital signature, and may also be cosigned with a CableLabs or MSO digital signature. The signatures are used for image validation. The image is downloaded to the host processor flash memory and, upon successful download, executed after the DSAN reboots.

Automatic Upgrade via eCM Configuration File

Automatic upgrades may be triggered whenever the DSAN retrieves its eCM configuration file. The eCM configuration file is retrieved whenever the eCM registers with the CMTS, such as after a reboot. The eCM configuration file contains four entries used by the DSAN eCM to determine if a download is required and for download verification:

- Software Upgrade Filename - Filename of the software upgrade image.
- Software Upgrade TFTP server - IP address of the TFTP server that contains the software upgrade image.
- Software Admin Status (docsDevSwAdminStatus) - SNMP MIB object specified in the eCM config file. (See detailed description in SNMP section below.)
- Code Verification Certificate (CVC) - The CVC contained in the eCM is verified by the DSAN eCM against the CableLabs CVC to enable its ability to accept software upgrade files. The CVC may be the manufacturer CVC or a cosigner (CableLabs or MSO) CVC. The CVC is also used for image signature validation.

Upgrade Process Steps

To enable automatic upgrade via the eCM configuration file, edit the file as follows:

- 1 Set the eCM configuration file entries for Code Verification Certificate to **one** of the following:

- Manufacturer CVC if the image is not cosigned (that is, signed only by Cisco).
 - Cosigner CVC if the image is cosigned.
- 2 Set the eCM configuration file entry for **Software Upgrade Filename** to the desired software image filename.
 - 3 Set the eCM configuration file entry for **Software Upgrade TFTP Server** to the IP address of the TFTP server that contains the file listed above.
Note: If the IP address is 0.0.0.0 or is completely missing, the upgrade will be performed using a file location from the same address as the DHCP offer.
 - 4 Set the eCM configuration file entry for “docsDevSwAdminStatus” to **allowProvisioningUpgrade(2)**.

On the next reboot of the DSAN or the next retrieval of the eCM configuration file, the DSAN will commence the download, provided that:

- The CVC in the eCM configuration file matches the expected CVC (CableLabs CVC or cosigner CVC).
- The software image file is found on the TFTP server.

You can manually trigger the reboot using the SNMP MIB object **saDsAnAdminReset** with a value of **sysreset(3)**. A power cycle of the DSAN will also trigger the software upgrade after the eCM configuration file is retrieved.

Manual Upgrade via SNMP

You can manually initiate a software upgrade using SNMP. Prior to upgrading, the DSAN eCM must be registered with the CMTS, and must have received a valid eCM configuration file with valid CVC(s) as outlined above.

Three objects in the DOCSIS MIB (DOCS-CABLE-DEVICE-MIB/docsDev, OID: 1.3.6.1.2.1.69) are then used to control the upgrade. These objects are described below.

docsDevSwFilename

This object holds the filename of the software image to be downloaded via TFTP. Unless set via SNMP, this is the filename or abs_path on the TFTP server that is used retrieve the software image filename during the boot process. If unknown, the string **unknown** is returned.

OID: 1.3.6.1.2.1.69.1.3.2

Type: SnmpAdminString

Permission: read-write

Status: Current

MIB: DOCS-CABLE-DEVICE-MIB

docsDevSwServer

This object holds the address of the TFTP server used for software upgrades. If the TFTP server is unknown, it returns **0.0.0.0**.

OID: 1.3.6.1.2.1.69.1.3.1

Type: IpAddress

Permission: Read-write

Status: Current

MIB: DOCS-CABLE-DEVICE-MIB

docsDevSwAdminStatus

If the value of this object is set to upgradeFromMgt(1), the device will initiate a TFTP software image download. After successfully receiving an image, the device will set its state to ignoreProvisioningUpgrade(3) and reboot. If the download process is interrupted (e.g., by a reset or power failure), the device will load the previous image and, after re-initialization, continue to attempt loading the image specified in docsDevSwFilename.

If set to allowProvisioningUpgrade(2), the device will use the software version information supplied by the provisioning server when next rebooting (this does not cause a reboot).

When set to ignoreProvisioningUpgrade(3), the device will disregard software image upgrade information from the provisioning server.

OID: 1.3.6.1.2.1.69.1.3.3

Type: INTEGER

Permission: Read-write

Status: Current

Values:

1: upgradeFromMgt

2: allowProvisioningUpgrade

3: ignoreProvisioningUpgrade

MIB: DOCS-CABLE-DEVICE-MIB

Upgrade Process Steps

To manually initiate the software upgrade using SNMP, perform these steps:

- 1 Ensure that the eCM configuration file contains the proper CVC, which is either:

- The manufacturer CVC, if the image is not cosigned (signed only by Cisco).
 - The cosigner CVC, if the image is cosigned.
- 2 Set the docsDevSw objects as follows:
- Set “docsDevSwFilename” to the desired software image filename.
 - Set “docsDevSwServer” to the IP address of the TFTP server that contains the file listed above.
 - Set “docsDevSwAdminStatus” to **upgradeFromMgt (1)**.

Approximately 30 seconds after receiving the upgradeFromMgt command, the DSAN will commence the download, provided that:

- The CVC in the eCM software image file matches the expected CVC (CableLabs CVC or cosigner CVC).
- The software image file is found on the TFTP server.

Verifying Expected Results

You can obtain the eCM download status via SNMP using the DOCSIS MIB object **docsDevSwOperStatus**. When the download completes, you can then verify that the new image is running in the DSAN by querying the MIB object **docsDevSwCurrentVers**. The steps for performing these procedures are described below.

- 1 Obtain the eCM download status via SNMP.

Use the **docsDevSwOperStatus** object to review the current status of the eCM download. Possible values for this object are:

- InProgress(1) - Indicates that a TFTP download is underway, either as a result of a version mismatch at provisioning or as a result of a upgradeFromMgt request.
- CompleteFromProvisioning(2) - Indicates that the last software upgrade was a result of version mismatch at provisioning, and that the upgrade was initiated using the eCM configuration file.
- CompleteFromMgt(3) - Indicates that the last software upgrade was a result of setting docsDevSwAdminStatus to upgradeFromMgt, and that the upgrade was initiated using SNMP.
- Failed(4) - Indicates that the last attempted download failed, ordinarily due to TFTP timeout.

Upon successful completion of the upgrade, **docsDevSwOperStatus** reports either CompleteFromProvisioning(2) or CompleteFromMgt(3) as explained above.

Note: The docsDevSwOperStatus object has the following attributes.

OID: 1.3.6.1.2.1.69.1.3.4

Type: INTEGER

Permission: Read-only

Status: Current

MIB: DOCS-CABLE-DEVICE-MIB

- 2 Verify that the new image is running in the DSAN.

Use the **docsDevSwCurrentVers** object to identify the software image version number (e.g., **1.1.45**).

Note: The docsDevSwCurrentVers object has the following attributes.

OID: 1.3.6.1.2.1.69.1.3.5

Type: SnmpAdminString

Permission: Read-only

Status: Current

MIB: DOCS-CABLE-DEVICE-MIB

- 3 Perform additional monitoring via CLI as needed.

To perform additional monitoring of the download and upgrade, open a CLI session and observe CLI diag page 12.0. This page displays the current download status, and while a download is in progress, also displays the byte count.

```

Tera Term Web 3.1 - COM1 VT
File Edit Setup Web Control Window Help
----- Version Information -----
System Release Version:      1.1.30
Video Processor SW Version:  1.1.30
FPGA Version (main):         0050 (04/02/2010)
FPGA Version (cp):           0007 (09/22/2009)
Bootloader Version:          99.08
Hardware Revision:           6.4
  Digital Board Rev:         6
  RF Board Rev:              4
Hardware ID:                  0654
Model Number:                 8200
Serial Number:                DSB8888888
Test Mode:                    Enabled

Software Download Status:     In Progress
Image Size:                   28696640
Downloaded:                   155584
Written:                      155584

----- Pg: 12.0  <CR>:Refresh  p<CR>:Pg 11.0  n<CR>:Pg 13.0  x<CR>:Exit -----
>>>
  
```

Note: Software download may take several minutes to complete, and is followed by an automatic DSAN reboot, which may take another several minutes.

After the download has completed, the DSAN has rebooted, and the upgrade has successfully completed, the following status will be displayed on CLI diag page 12.0.

```

Tera Term Web 3.1 - COM1 VT
File Edit Setup Web Control Window Help
----- Version Information -----
System Release Version:      1.1.30
Video Processor SW Version:  1.1.30
FPGA Version (main):        0050 (04/02/2010)
FPGA Version (cp):          0007 (09/22/2009)
Bootloader Version:         99.08
Hardware Revision:          6.4
    Digital Board Rev:      6
    RF Board Rev:          4
Hardware ID:                 0654
Model Number:                8200
Serial Number:               DSB888888
Test Mode:                   Enabled
Software Download Status:    Success

----- Pg: 12.0  <CR>:Refresh  p<CR>:Pg 11.0  n<CR>:Pg 13.0  x<CR>:Exit -----
>>>
  
```

- 4 The download status shown on page 12.0 is also available in the DSAN SNMP MIB in the object **saDsanSwImageDownloadStatus**.

This object has one of the following possible values indicating image download status.

- successful(1)
- unreachable(2)
- incomplete(3)
- inProgress(4)
- invalidImage(5)

Note: The saDsanSwImageDownloadStatus object has the following attributes.

OID: 1.3.6.1.4.1.1429.1.10.2.1.6.6

Type: INTEGER

Permission: Read-only

Status: Current

MIB: SA-DSAN-MIB

- 5 Upon successful download and upgrade, the following messages will be logged to the file /mnt/app0/dsanlog:

```

dsan dsanapp: APPLICATION, DOWNLOAD, 6, Software Download Started , 142
dsan dsanapp: APPLICATION, DOWNLOAD, 6, File Transfer Success - Filename: ,
143
dsan dsanapp: APPLICATION, DOWNLOAD, 6, Software Upgrade Success - Filename:
DSAN_1_1_30_1725_PKEY_DOC.simg , 6
  
```

Resolving Software Download Issues

This section describes issues commonly encountered during software download, along with their associated causes and possible remedies.

Download Does Not Start

Several conditions may cause a download to be rejected by the eCM before the image transfer begins.

- Invalid eCM configuration file
- File not available on TFTP server
- TFTP server error or invalid TFTP server IP address
- Unsigned or incorrectly signed software image

When this occurs, the eCM will log error messages that can be viewed on CLI diag page 4.2, as shown in the following example.

```

Tera Term Web 3.1 - COM1 VT
File Edit Setup Web Control Window Help
----- Network Status -----
eCM Status Log
Current Date/Time: 10-13-2010 19:40:16 UTC
10-12 20:59:32 - CMTS Registration Complete
10-12 20:59:32 - in Two-Way operational state, UCID = 1
10-12 20:59:32 - Acquired Interactive Status
10-12 20:59:33 - started Upgrade
10-12 20:59:27 - Upgrade failed
10-12 22:58:55 - eCM DHCP completed, IP = 192.168.18.69
10-13 00:58:56 - eCM DHCP completed, IP = 192.168.18.69
10-13 02:58:55 - eCM DHCP completed, IP = 192.168.18.69
10-13 04:58:57 - eCM DHCP completed, IP = 192.168.18.69
10-13 07:44:38 - eCM DHCP completed, IP = 192.168.18.69
10-13 09:44:37 - eCM DHCP completed, IP = 192.168.18.69
10-13 11:44:38 - eCM DHCP completed, IP = 192.168.18.69
10-13 13:44:37 - eCM DHCP completed, IP = 192.168.18.69
10-13 15:44:38 - eCM DHCP completed, IP = 192.168.18.69
10-13 17:44:37 - eCM DHCP completed, IP = 192.168.18.69
----- Pg: 4.2 <CR>:Refresh p<CR>:Pg 4.1 n<CR>:Pg 4.3 x<CR>:Exit -----
>>>
  
```

Additionally, the failure will be logged to /mnt/app0/dsanlog.

To correct these conditions, perform the following steps.

- 1 Verify that the CVC in the eCM configuration file is for either the CableLabs Manufacturer CVC (for normal signed images) or the cosigner CVC (for cosigned images).
- 2 Verify that the TFTP server address used in the eCM configuration file (for automatic upgrades) or in the SNMP message used to set the docsDevSwServer object (for manual upgrades) is correct.

Note: If the IP address is 0.0.0.0 or is completely missing, the upgrade will be performed using a file location from the same address as the DHCP offer.

- 3 Verify that the eCM configuration file for docsDevSwAdminStatus is set to allowProvisioningUpgrade (for automatic upgrades).
- 4 Verify that the file specified in the eCM configuration file (for automatic upgrades) or in the docsDevSwFilename MIB objects (for manual upgrades) is correct and present on the specified TFTP server.
- 5 Verify that the DSAN can reach the TFTP server by pinging the DSAN eCM IP address shown on CLI diag page 4.0 from the TFTP server. For example:

```
# ping 192.168.18.69
```
- 6 Verify that the correct signed image is being used. The images provided by Cisco are signed with the manufacturer CVC. If cosigning is required, the subsequently cosigned image must be used.

Download Completes, Upgrade Fails

A download may successfully complete, but the actual upgrade may still fail. This can occur when:

- The downloaded image does not match the target DSAN model (i.e., software downloaded to an 8200 is for 8250).
- A CRC error occurs in the file, possibly as a result of an error during download or flash write.

The above conditions will cause the upgrade status to be reported as **Invalid Image** or **Upgrade Incomplete** on the CLI diag page 12.0 and in the saDsanSwImageDownloadStatus MIB object. Additionally, the error will be logged to dsanlog.

To correct these conditions, perform the following steps.

- 1 Verify that the file specified in the eCM configuration file (for automatic upgrades) or in the docsDevSwFilename MIB objects (for manual upgrades) is for the proper platform.

8200 platforms should use a filename in the following format:

```
DSAN_w_x_y_zzz_PKEY_DOC.simg
```

- 2 If you suspect a CRC error, retry the download.

Error Messages

Each of the following conditions lists the associated messages that will be saved to the log files.

- Incorrect CVC in eCM configuration file, file not available on TFTP server, or TFTP server error:

```
/mnt/app0/dsanlog:
```

```
dsan dsanapp: APPLICATION, DOCSIS, 6, DOCSIS Software Upgrade Started ,  
143
```

```
dsan dsanapp: APPLICATION, DOCSIS, 6, DOCSIS Software Upgrade Failed , 151
```

- Downloaded image does not match the target DSAN model

```
/mnt/app0/dsanlog:
```

```
dsan dsanapp: APPLICATION, DOCSIS, 6, DOCSIS Software Upgrade Started , 2
```

```
dsan dsanapp: APPLICATION, DOWNLOAD, 6, Software Download Started , 3
```

```
dsan dsanapp: APPLICATION, DOWNLOAD, 6, File Transfer Failed - Filename:  
UDSAN_2_0_25_1214.simg , 6
```

```
dsan dsanapp: APPLICATION, DOCSIS, 6, DOCSIS Software Upgrade Failed , 7
```

7

Customer Support Information

Introduction

This chapter contains information on obtaining product support.

Obtaining Product Support

IF...	THEN...
you have general questions about this product	contact your distributor or sales agent for product information or refer to product data sheets on www.cisco.com .
you have technical questions about this product	call the nearest Technical Support center.
you have customer service questions about this product	call the nearest Customer Service center.

In This Chapter

- Support Telephone Numbers..... 74

Support Telephone Numbers

This table lists the Technical Support and Customer Service numbers for your area.

Region	Centers	Telephone and Fax Numbers
North America	Cisco Services Atlanta, Georgia United States	For <i>Technical Support</i> , call: <ul style="list-style-type: none"> ■ Toll-free: 1-800-722-2009 ■ Local: 678-277-1120 (Press 2 at the prompt) For <i>Customer Service</i> , call: <ul style="list-style-type: none"> ■ Toll-free: 1-800-722-2009 ■ Local: 678-277-1120 (Press 3 at the prompt) ■ Fax: 770-236-5477 ■ Email: customer-service@cisco.com
Europe, Middle East, Africa	Belgium	For <i>Technical Support</i> , call: <ul style="list-style-type: none"> ■ Telephone: 32-56-445-197 or 32-56-445-155 ■ Fax: 32-56-445-061 For <i>Customer Service</i> , call: <ul style="list-style-type: none"> ■ Telephone: 32-56-445-444 ■ Fax: 32-56-445-051 ■ Email: service-elc@cisco.com
Japan	Japan	<ul style="list-style-type: none"> ■ Telephone: 81-3-5908-2153 or +81-3-5908-2154 ■ Fax: 81-3-5908-2155
Korea	Korea	<ul style="list-style-type: none"> ■ Telephone: 82-2-3429-8800 ■ Fax: 82-2-3452-9748 ■ Email: songk@cisco.com
China (mainland)	China	<ul style="list-style-type: none"> ■ Telephone: 86-21-2401-4433 ■ Fax: 86-21-2401-4455 ■ Email: xishan@cisco.com
All other Asia Pacific countries & Australia	Hong Kong	<ul style="list-style-type: none"> ■ Telephone: 852-2588-4746 ■ Fax: 852-2588-3139 ■ Email: saapac-support@cisco.com
Brazil	Brazil	<ul style="list-style-type: none"> ■ Telephone: 11-55-08-9999 ■ Fax: 11-55-08-9998 ■ Email: fattinl@cisco.com or ecavalhe@cisco.com
Mexico, Central America, Caribbean	Mexico	For <i>Technical Support</i> , call: <ul style="list-style-type: none"> ■ Telephone: 52-3515152599 ■ Fax: 52-3515152599 For <i>Customer Service</i> , call: <ul style="list-style-type: none"> ■ Telephone: 52-55-50-81-8425 ■ Fax: 52-55-52-61-0893 ■ Email: sa-latam-cs@cisco.com
All other Latin America countries	Argentina	For <i>Technical Support</i> , call: <ul style="list-style-type: none"> ■ Telephone: 54-23-20-403340 ext 109 ■ Fax: 54-23-20-403340 ext 103 For <i>Customer Service</i> , call: <ul style="list-style-type: none"> ■ Telephone: 770-236-5662 ■ Fax: 770-236-5888 ■ Email: keillov@cisco.com

A

Technical Information

Introduction

This appendix contains reference information that can help when troubleshooting the DSAN.

In This Appendix

■ DSAN Error Messages	76
■ DSAN LED Indicators.....	78
■ Output Channel Video Carrier Frequencies	80

DSAN Error Messages

The following table lists possible error messages that the DSAN may send to the network management system. Use the Category information to identify the appropriate section of this guide to refer to for additional details.

No.	Alarm Level	Description	Refer to Chapter
1	Warning	Lid Opened	Hardware Setup
2	Emergency	Unable to communicate with the Video Processor	Hardware Setup
3	Error	DAXI Temperature out of range	Hardware Setup
4	Error	Aux Communication Error	Hardware Setup
5	Error	DAXI Fan Fault	Hardware Setup
6	Critical	Config File Retrieval Error	CMTS Registration
7	Error	Docsis Connectivity Lost	CMTS Registration
8	Error	Docsis eCM Config File Retrieval Error	CMTS Registration
9	Error	Docsis eCM DHCP Failed	CMTS Registration
10	Error	Docsis Rx Channel Not Found	CMTS Registration
11	Error	Docsis Rx OOB Data Connection Lost	CMTS Registration
12	Error	Docsis Tx Data Path Lost	CMTS Registration
13	Error	Docsis Tx Ranging Failed	CMTS Registration
14	Error	DSMCC OOB data parser stopped	CMTS Registration
15	Error	PowerKEY EMM OOB data parser stopped	CMTS Registration
16	Error	SCTE-18 EAS OOB data parser stopped	CMTS Registration
17	Error	SCTE-65 SI OOB data parser stopped	CMTS Registration
18	Emergency	A Hardware error occurred	Host Registration
19	Error	eHost Has Not Received a Valid DHCP Offer	Host Registration
20	Notice	File Transfer Failed	Host Registration
21	Alert	DSAN Configuration Failed	Host Registration
22	Error	Aux Input is invalid	Video Output
23	Error	Aux loss of source	Video Output
24	Error	Aux stream not presented	Video Output
25	Critical	Config file is corrupt	Video Output

DSAN Error Messages

No.	Alarm Level	Description	Refer to Chapter
26	Critical	Mandatory TLV is Missing	Video Output
27	Error	Config file has Aux channel out of range	Video Output
28	Error	Config file has invalid EIA channels	Video Output
29	Error	Not all channels can be mapped by the three wideband tuners	Video Output
30	Error	Source ID not present in SI	Video Output
31	Error	QAM Lock Failed	Video Output
32	Error	Service Unavailable	Video Output
33	Error	Invalid Video Resolution	Video Output
34	Notice	EAS Channel not in PSI	Video Output
35	Notice	EAS Channel not in SI	Video Output
36	Notice	EAS Channel not one of the Prov. Channels	Video Output
37	Error	Channel Not Authorized	Video Output
38	Error	Conditional Access Error	Video Output
39	Error	Late Key Error	Video Output
40	Error	PowerKEY Communication Error	Video Output
41	Error	Secure Micro Failed to Initialize	Video Output
42	Notice	Software Upgrade Failed	Software Upgrade
43	Notice	Authentication failure during login	(general)
44	Notice	Login Failed	(general)

DSAN LED Indicators

The DSAN includes a set of LED indicators visible inside the housing on the digital lid assembly. The states of the LEDs indicate different DSAN operating conditions, as described below.

Power

The Power LED indicates that power is applied to the digital board, as follows:

State	Description
Off	DSAN powered off
Solid yellow	DSAN powered on

Note: The Power LED color was green on some early units. A yellow Power LED does not indicate a warning or error condition.

DOCSIS Status

The DOCSIS Status LED indicates eCM status, as follows:

State	Description
Off	eCM registration not started
Blinking yellow	eCM scanning for CMTS
Solid yellow	eCM upstream ranging in progress
Blinking green	eCM acquiring IP address
Solid green	eCM fully provisioned and has acquired an IP address through DHCP

Provisioning Status

The Provisioning Status LED indicates the status of eMDTA configuration file loading, as follows:

State	Description
Off	No configuration file available
Blinking yellow	Configuration in progress
Solid yellow	Configured using cached data
Solid green	Configured using downloaded data

Alarm Status

The Alarm Status LED indicates the presence of Major or Minor alarms, as follows:

State	Description
Solid green	No alarms present
Solid red	Minor alarm present
Flashing red	Major alarm present

Note: The Alarm Status LED ignores the Tamper Switch alarm, which goes active when the DSAN lid is opened to view the LEDs.

Output Channel Video Carrier Frequencies

The following table lists the 82 EIA channel numbers and their corresponding DSAN output video carrier frequencies. These carrier frequencies meet specification for the Standard Channel plan, but may differ slightly from the nominal channel plan. To accurately measure the DSAN RF levels, you may need to calibrate power meters to the following frequency chart. Failure to do so may result in inaccurate level settings that could adversely affect downstream quality and performance.

EIA Channel	Video Carrier Frequency (MHz)	EIA Channel	Video Carrier Frequency (MHz)	EIA Channel	Video Carrier Frequency (MHz)
2	55.25	25	229.2625	53	397.2625
3	61.25	26	235.2625	54	403.2625
4	67.25	27	241.2625	55	409.2625
5	77.25	28	247.2625	56	415.2625
6	83.25	29	253.2625	57	421.2625
95	91.2750	30	259.2625	58	427.2625
96	97.2750	31	265.2625	59	433.2625
97	103.2750	32	271.2625	60	439.2625
98	109.2750	33	277.2625	61	445.2625
99	115.2750	34	283.2625	62	451.2625
14	121.2625	35	289.2625	63	457.2625
15	127.2625	36	295.2625	64	463.2625
16	133.2625	37	301.2625	65	469.2625
17	139.2625	38	307.2625	66	475.2625
18	145.2625	39	313.2625	67	481.2625
19	151.2625	40	319.2625	68	487.2625
20	157.2625	41	325.2625	69	493.2625
21	163.2625	42	331.2750	70	499.2625
22	169.2625	43	337.2625	71	505.2625
7	175.2625	44	343.2625	72	511.2625
8	181.2625	45	349.2625	73	517.2625
9	187.2625	46	355.2625	74	523.2625
10	193.2625	47	361.2625	75	529.2625
11	199.2625	48	367.2625	76	535.2625
12	205.2625	49	373.2625	77	541.2625
13	211.2625	50	379.2625	78	547.2625
23	217.2625	51	385.2625		
24	223.2625	52	391.2625		

Glossary

A

ampere. A unit of measure for electrical current.

ac, AC

alternating current. An electric current that reverses its direction at regularly recurring intervals.

AGC

automatic gain control. A process or means by which gain is automatically adjusted in a specified manner as a function of input level or other specified parameters.

analog channel

A channel that occupies a fixed location in a 6 MHz bandwidth within the 54 MHz to 550 MHz range of the RF band. Analog video channels deliver one traditional broadcast television channel in each 6 MHz band.

attenuation

The difference between transmitted and received signal strength due to loss through equipment, lines, or other transmission medium. Usually expressed in decibels.

channel map

A logical element that links a service with a channel so that the service can be viewed or used by the subscriber. For example, a channel map could link The Golf Channel with channel 63 so that when subscribers tune to channel 63, they view The Golf Channel.

CLI

command line interface. A command reference software that allows the user to interact with the operating system by entering commands and optional arguments.

CW

continuous wave.

Glossary

dB

decibel. One tenth of a bel, the number of decibels denoting the ratio of two amounts of power being ten times the common logarithm of this ratio.

dBm

decibels relative to 1 milliwatt.

dBmV

decibels relative to 1 millivolt.

dBW

decibels relative to 1 watt.

dc, DC

direct current. An electric current flowing in one direction only and substantially constant in value.

DHCP

dynamic host configuration protocol. TCP/IP protocol that manages a pool of IP addresses.

DNCS

Digital Network Control System. A computer workstation that defines, organizes, monitors, and controls the components, features, and applications supported by the DBDS. The DNCS provides Scientific-Atlanta's Explorer DHCTs with broadcast services that are displayed on subscribers' televisions throughout a cable network. The DNCS works with the ATM switch and the Ethernet router providing data throughout the DBDS. The DNCS uses multi-mode fiber to transfer data through the ATM switch to the router. Data is sent in ATM cells over PVCs.

DSAN

digital service access node.

EMC

electromagnetic compatibility. A measure of equipment tolerance to external electromagnetic fields.

EQ

equalizer.

equalization

The process of compensating for an undesired result. For example, equalizing tilt in a distribution system.

FCC

Federal Communications Commission. Federal organization set up by the Communications Act of 1934 which has authority to regulate all inter-state (but not intra-state) communications originating in the United States (radio, television, wire, satellite, and cable).

forward path

Signal direction from the headend to the set-top terminal.

ft-lb

foot-pound. A measure of torque defined by the application of one pound of force on a lever at a point on the lever that is one foot from the pivot point.

gain

A measure of the increase in signal level, relative to a reference, in an amplifier. Usually expressed in decibels.

GHz

Gigahertz. A unit of frequency equal to one billion cycles per second.

headend

The local switching or processing center for the cable network in a hybrid fiber/coax network. Location for equipment that receives data from a satellite (or other) source and reformats that data for input to a broadband distribution network.

Hertz

A unit of frequency equal to one cycle per second.

HFC

hybrid fiber/coaxial. A network that uses a combination of fiber optics and coaxial cable to transport signals from one place to another. A broadband network using standard cable television transmission components, such as optical transmitters and receivers, coaxial cable, amplifiers, and power supplies. The broadband output stream is transmitted as an optical signal, over the high-speed, fiber optic transmission lines to local service areas where it is split, converted to electrical RF signals, and distributed to set-tops over coaxial cable.

Glossary

I/O

input/output.

in-lb

inch-pound. A measure of torque defined by the application of one pound of force on a lever at a point on the lever that is one inch from the pivot point.

IP address

Internet protocol address. A 32-bit sequence of numbers used for routing IP data. Each IP address identifies a specific component on a specific network. The address contains a network address identifier and a host identifier.

LED

light-emitting diode. An electronic device that lights up when electricity passes through it.

Mbps

megabits per second. A unit of measure representing a rate of one million bits (megabits) per second.

MDU

multiple dwelling unit.

MHz

megahertz. A unit of measure representing one million cycles per second; measures bandwidth.

N-cm

Newton centimeter

Nm

Newton meter. A measure of torque defined by the application of one Newton of force on a lever at a point on the lever that is one meter from the pivot point. (1 Nm = 0.737561 ft-lb)

node

Any device such as a PC that is connected to a network, or a branching or exchange point.

OID

object identifier.

provisioning

The process of preparing a device or service so that it operates properly and its control system recognizes it.

PWB

printed wiring board.

QAM

quadrature amplitude modulation. An amplitude and phase modulation technique for representing digital information and transmitting that data with minimal bandwidth. Both phase and amplitude of carrier waves are altered to represent the binary code. By manipulating two factors, more discrete digital states are possible and therefore larger binary schemes can be represented.

QAM256

A QAM technique that produces 256 discrete states, each state representing 8 bits of information. The most complex of common QAM techniques.

QAM64

A QAM technique that produces 64 discrete states, each state representing 6 bits of information.

reverse path

Signal flow direction toward the headend.

RF

radio frequency. The frequency in the portion of the electromagnetic spectrum that is above the audio frequencies and below the infrared frequencies, used in radio transmission systems.

RMA

return material authorization. A form used to return products.

RX

receive or receiver.

S/N or SNR

signal-to-noise ratio. The ratio, in decibels, of the maximum peak-to-peak voltage of the video signal, including synchronizing pulse, to the root-mean-square voltage of the noise. Provides a measure and indication of signal quality.

Glossary

SI

system or service information. Tuning information sent from the DNCS to DHCTs which provides the information that DHCTs need to be able to tune to a particular service.

SNMP

simple network management protocol. A protocol that governs network management and the monitoring of network devices and their functions.

strand mount

Installed equipment on an above-ground strand.

TCP/IP

transmission control protocol/Internet protocol. Two interrelated protocols that are part of the Internet protocol suite. TCP operates on the OSI transport layer and breaks data into packets. IP operates on the OSI network layer and routes the packets. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the individual units of data (called packets) that a message is divided into for efficient routing through the Internet.

TFTP

trivial file transfer protocol.

tilt

Spectral display slope caused by different attenuation of high frequencies and low frequencies through a medium.

torque

A force that produces rotation or torsion. Usually expressed in lb-ft (pound-feet) or N-m (Newton-meters). The application of one pound of force on a lever at a point on the lever that is one foot from the pivot point would produce 1 lb-ft of torque.

trap

An unsolicited message sent by a network device to notify a network or element management system of an alarm or other condition that requires administrative attention.

TX

transmit or transmitter.

V

volt.

V AC

volts alternating current.

V DC

volts direct current.

W

watt. A measure of electrical power required to do work at the rate of one joule per second. In a purely resistive load, 1 Watt = 1 Volt x 1 Amp.

Index

A

- A • 81
- ac, AC • 81
- Accessories • 9
- Additional Troubleshooting Information • 37, 44
- AGC • 81
- analog channel • 81
- Analog Regeneration • 4
- attenuation • 81

C

- channel map • 81
- CLI • 81
- CMTS Registration • 27
- Confirming CMTS Registration • 28
- Confirming Host Registration • 40
- Confirming Video Output • 46
- Customer Support Information • 73
- CW • 81

D

- DAXI Description • 15
- dB • 82
- dBm • 82
- dBmV • 82
- dBW • 82
- dc, DC • 82
- DHCP • 82
- DNCS • 82
- DSAN • 82
- DSAN Error Messages • 76
- DSAN LED Indicators • 78

E

- EMC • 82
- Emergency Alert System Support • 13
- EQ • 82
- equalization • 83

F

- FCC • 83

- forward path • 83
- Forward Path Operation • 10
- ft-lb • 83
- Functional Description • 10

G

- gain • 83
- GHz • 83

H

- Hardware Installation • 17
- headend • 83
- Hertz • 83
- HFC • 83
- Host Registration • 39

I

- I/O • 84
- in-lb • 84
- Input and Output Connections • 7
- Introduction • 1
- IP address • 84

L

- LED • 84

M

- Main Components • 6
- Mbps • 84
- MDU • 84
- MHz • 84

N

- N-cm • 84
- Nm • 84
- node • 84

O

- OID • 84
- Output Channel Video Carrier Frequencies • 80

P

- Physical Description • 6
- Powering • 18
- Product Features • 5
- Product Labels • 8
- Product Overview • 3
- provisioning • 85
- PWB • 85

Q

- QAM • 85
- QAM256 • 85
- QAM64 • 85

R

- Registration and Connection Sequence • 29
- Resolving Software Download Issues • 70
- Resolving Video Output Issues • 53
- reverse path • 85
- Reverse Path Operation • 12
- RF • 85
- RF Channel Plan • 12
- RF Level Setup • 22
- RMA • 85
- RX • 85

S

- S/N or SNR • 85
- Scope • 2
- SI • 86
- SNMP • 86
- Software Upgrade • 63
- strand mount • 86
- Support Telephone Numbers • 74

T

- TCP/IP • 86
- TFTP • 86
- tilt • 86
- torque • 86
- trap • 86
- Tuner Band Mapping • 11
- TX • 86

U

- Upgrading the DSAN Software • 64

V

- V • 86

- V AC • 87
- V DC • 87
- Verifying Operation • 25
- Video Output • 45

W

- W • 87



5030 Sugarloaf Parkway, Box 465447
Lawrenceville, GA 30042

678 277-1120
800 722-2009

This document includes various trademarks of Cisco Systems, Inc. Please see the Notices section of this document for a list of Cisco Systems, Inc., trademarks used in this document.

Product and service availability are subject to change without notice.

© 2011 Cisco and/or its affiliates. All rights reserved.

February 2011 Printed in United States of America

Part Number 4032301 Rev A