Cisco D9054 HDTV Encoder

Installation and Operation Guide

Software Version 4.2

Please Read This Entire Guide

Veuillez lire entièrement ce guide

Bitte das gesamte Handbuch durchlesen

Sírvase leer completamente la presente guía

Si prega di leggere completamente questa guida

Important:

Please read this entire guide before you install or operate this product. Give particular attention to all safety statements.

Important:

Veuillez lire entièrement ce guide avant d'installer ou d'utiliser ce produit. Prêtez une attention particulière à toutes les règles de sécurité.

Zu beachten:

Bitte lesen Sie vor Aufstellen oder Inbetriebnahme des Gerätes dieses Handbuch in seiner Gesamtheit durch. Achten Sie dabei besonders auf die Sicherheitshinweise.

Importante:

Sírvase leer la presente guía antes de instalar o emplear este producto. Preste especial atención a todos los avisos de seguridad.

Importante:

Prima di installare o usare questo prodotto si prega di leggere completamente questa guida, facendo particolare attenzione a tutte le dichiarazioni di sicurezza.

Notices

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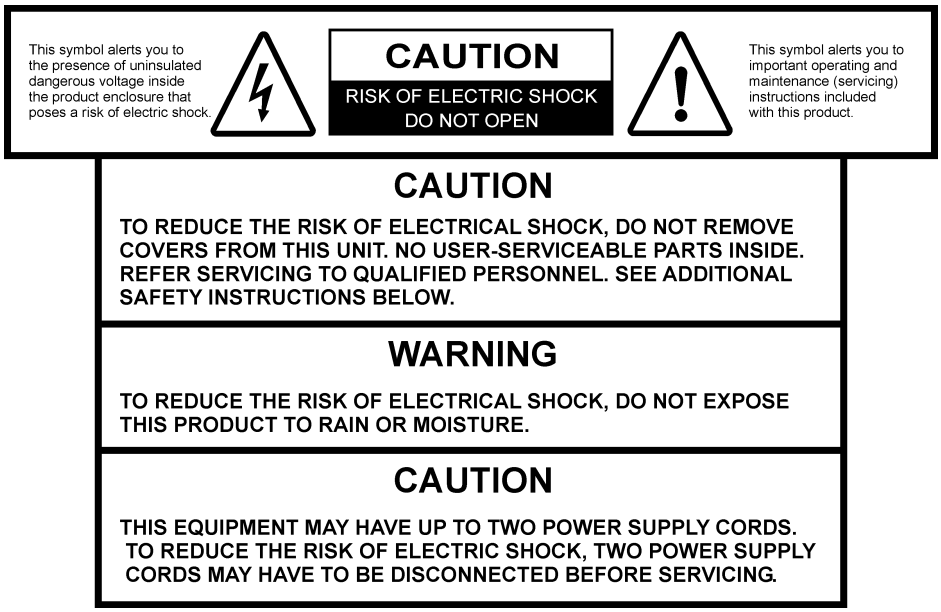


Protect yourself from electric shock and your system from damage!

- This product complies with international safety and design standards. Observe all safety procedures that appear throughout this guide, and the safety symbols that are affixed to this product.
- If circumstances impair the safe operation of this product, stop operation and secure this product against further operation.

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

	You will find this symbol on the product and/or in the literature that accompanies this product. It indicates important operating or maintenance instructions.
	You may find this symbol on the product and/or in the literature that accompanies this product. It indicates a live terminal; the symbol pointing to the terminal device.
	You may find this symbol on the product and/or in the literature that accompanies this product. It indicates a protective earth terminal.
	You may find this symbol on the product and/or in the literature that accompanies this product. It indicates excessive or dangerous heat.

Power

- **Important!** This is a Class I product. You must earth this product.
  This equipment may have up to two power supply cords. To reduce the risk of electric shock, two power supply cords may have to be disconnected before servicing.
- This product plugs into a socket-outlet. The socket-outlet must be near this product, and must be easily accessible.

- Connect this product only to the power source that is indicated on the rear panel of this product.
- If this product does not have a mains power switch, the power cord serves this purpose.

Enclosure

- Do not allow moisture to enter this product.
- Do not open the enclosure of this product unless otherwise specified.
- Do not push objects through openings in the enclosure of this product.

Cables

- Always disconnect all power cables before servicing this product.
- Always pull on the plug or the connector to disconnect a cable. Never pull on the cable itself.
- Do not walk on or place stress on cables or plugs.

Factory service

- Refer service only to service personnel who are authorized by the factory.

Règles de sécurité

Protégez-vous des risques d'électrocution et protégez votre système contre les endommagements éventuels.

- Ce produit respecte les standards internationaux de sécurité et de conception. Veuillez observer toutes les procédures de sécurité qui apparaissent dans ce guide, ainsi que les symboles de sécurité qui figurent sur le produit.
- Si, du fait des circonstances, ce produit cesse de fonctionner normalement, cessez de l'utiliser et empêchez-en l'utilisation future.

Évitez le risque de blessures et de dommages aux produits! Ne procédez à aucune tâche tant que vous n'aurez pas entièrement assimilé les conditions indiquées par un symbole!

	Ce symbole figure dans la documentation accompagnant ce produit. Il indique d'importantes instructions de fonctionnement ou d'entretien.
	Ce symbole peut être attaché à ce produit. Il indique une borne sous tension; la direction indique la borne.
	Ce symbole peut être attaché à ce produit. Il indique une borne de terre de protection.
	Ce symbole peut être attaché à ce produit. Il indique une température excessive ou dangereuse.

Alimentation

- **Important!** Ce produit fait partie de la classe I. Vous devez le mettre à la terre.
- Ce produit se branche dans une prise murale. Cette dernière doit être placée à proximité du produit et doit être facilement accessible.
- Ne branchez ce produit qu'à la source d'alimentation indiquée sur son panneau arrière.
- Si ce produit n'a pas d'interrupteur d'alimentation générale, le cordon d'alimentation remplit ce rôle.

Enceinte

- Ne laissez pas l'humidité pénétrer dans ce produit.
- N'ouvrez pas l'enceinte de ce produit, sauf instructions contraires.
- Ne forcez pas d'objets dans les ouvertures du boîtier.

Câbles

- Débranchez toujours tous les cordons d'alimentation avant de réparer ce produit.
- Tirez toujours sur la prise ou le connecteur pour débrancher un câble. Ne tirez jamais directement sur le câble.
- Ne marchez pas sur les câbles ou les prises et n'y exercez aucune pression.

Réparations effectuées à l'usine

- Ne confiez les travaux de réparations qu'au personnel autorisé par l'usine.

Sicherheitsvorkehrungen

Schützen Sie sich gegen elektrischen Schlag, und Ihr Gerät gegen Beschädigung!

- Dieses Gerät entspricht internationalen Sicherheits-und Ausführungsnormen. Beachten Sie alle in diesem Handbuch enthaltenen Sicherheitshinweise sowie die am Gerät angebrachten Warnzeichen.
- Sollten örtliche Umstände den sicheren Betrieb dieses Gerätes beeinträchtigen, schalten Sie es ab und sichern es gegen weitere Benutzung.

Vermeiden Sie Verletzungen sowie Beschädigung des Gerätes! Wenn Sie zu einem der folgenden Warnzeichen gelangen, nicht weiterarbeiten, bis Sie seine Bedeutung voll verstanden haben!

	Dieses Symbol erscheint auf dem Gerät und/oder in der ihm beiliegenden Literatur. Es bedeutet wichtige, zu beachtende Betriebs-oder Wartungsanweisungen.
	Wenn dieses Zeichen am Gerät angebracht ist, warnt es vor einer spannungsführenden Stelle.
	Dieses Symbol kennzeichnet auf dem Gerät die Anschlußstelle der Sicherheitserde.
	Wenn dieses Zeichen am Gerät angebracht ist, warnt es vor heißen Stellen, die zu Verbrennungen führen können.

Netzspannung

- **Wichtig!** Dieses Gerät ist ein Produkt der Schutzklasse I. Es muß geerdet werden.
- Das Gerät ist an einer Steckdose anzuschließen. Diese muß sich leicht zugänglich in unmittelbarer Nähe des Gerätes befinden.
- Die Netzversorgung muß den auf der Rückwand des Gerätes angegebenen Werten entsprechen.
- Falls sich kein Hauptschalter am Gerät befindet, dient das Netzkabel diesem Zweck.

Gehäuse

- Das Innere des Gerätes ist vor Feuchtigkeit zu schützen.
- Das Gehäuse ist nicht zu öffnen.
- Niemals einen Gegenstand durch die Gehäuseöffnungen einführen!

Kabel

- Vor jeglicher Wartung des Gerätes sind alle Kabel zu entfernen.
- Hierzu grundsätzlich am Stecker oder Verbindungsstück und niemals am Kabel selber ziehen.
- Nicht auf die Kabel oder Stecker treten oder diese einer Zugbelastung aussetzen.

Hersteller-Wartung

Wartungsarbeiten sind nur durch vom Hersteller autorisierte Techniker vorzunehmen.

Precauciones de seguridad

¡Protéjase contra la electrocución y proteja su sistema contra los daños!

- Este producto cumple con los criterios internacionales de seguridad y diseño. Observe todas los procedimientos de seguridad que aparecen en esta guía, y los símbolos de seguridad adheridos a este producto.
- Si las circunstancias impiden la operación segura de este producto, suspenda la operación y asegure este producto para que no siga funcionando.

¡Evite lastimarse y evite dañar el producto! No avance más allá de cualquier símbolo hasta comprender completamente las condiciones indicadas!

	Encontrará este símbolo en el impreso que acompaña a este producto. Este símbolo indica instrucciones importantes de funcionamiento o mantenimiento.
	Es posible que este símbolo esté pegado al producto. Este símbolo indica un terminal vivo, la flecha apunta hacia el aparato terminal
	Podría encontrar este símbolo pegado al producto. Este símbolo indica un terminal de protección de tierra.
	Podría encontrar este símbolo pegado al producto. Este símbolo indica calor excesivo o peligroso.

Power

- **Importante!** Este es un producto de Clase I. Tiene que estar conectado a tierra.
- Este producto se conecta a un enchufe. El enchufe necesita estar cerca del producto y ser fácilmente accesible.
- Conecte este producto únicamente a la fuente de suministro eléctrico indicada en el panel posterior del producto.
- Si el producto no tiene interruptor para la linea principal, utilice el cordón toma de corriente para este propósito.

Cubierta

- No permita que la humedad penetre en este producto.
- No abra la cubierta del producto a menos que se indique lo contrario.
- No introduzca objetos a través de las aberturas de la cubierta del producto.

Cables

- Siempre desconectar todos los cables eléctricos antes de revisar o reparar el producto.
- Tire siempre del enchufe o del conector para desconectar un cable. Nunca tire del cable mismo.
- No camine ni aplique presión sobre los cables o enchufes..

Revisión y reparación de fábrica

Solo personal aprobado por la fábrica puede darle servicio al producto.

Proteggetevi da scosse elettriche e proteggete il vostro sistema da possibili danni!

- Questo prodotto soddisfa le norme internazionali per la sicurezza ed il design. Seguite tutte le procedure di sicurezza contenute in questa guida e i simboli di sicurezza applicati al prodotto.
- Se circostanze avverse compromettono la sicurezza d'uso di questo prodotto, interrompetene l'uso e assicuratevi che il prodotto non venga più utilizzato.

Evitare infortuni alla persona e danni al prodotto! Non procedere oltre a qualunque simbolo fino a quando non si siano comprese pienamente le condizioni indicate!

	Questo simbolo, che appare nella letteratura di accompagnamento del prodotto, indica importanti istruzioni d'uso e di manutenzione.
	Sul prodotto potete vedere questo simbolo che indica un dispositivo terminale sotto tensione; la freccia punta verso il dispositivo.
	Potrete trovare il presente simbolo applicato a questo prodotto. Questo simbolo indica un terminale protettivo di messa a terra.
	Potrete trovare il presente simbolo attaccato a questo prodotto. Questo simbolo indica un calore eccessivo o pericoloso.

Alimentazione

- **Importante!** Questo prodotto è di Classe I. Va messo a terra.
- Questo prodotto si inserisce in una presa di corrente. La presa di corrente deve essere in prossimità del prodotto, e deve essere facilmente accessibile.
- Collegare questo prodotto solamente alla fonte di alimentazione indicata sul pannello posteriore di questo prodotto.
- Se questo prodotto non è dotato di un interruttore principale, il cavo di alimentazione funge a questo scopo.

Chiusura

- Proteggete da umidità questo prodotto.
- Non aprire la chiusura di questo prodotto a meno che non sia specificato diversamente. Non inserire oggetti attraverso le fessure della chiusura.

Cavi

- Staccare sempre tutti i cavi di alimentazione prima di svolgere l'assistenza tecnica al prodotto.
- Per scollegare un cavo tirate la spina o il connettore, non tirare mai il cavo stesso.
- Non calpestare o sottoporre a sollecitazioni i cavi o le prese.

Riparazionoi di fabbrica

- Per le riparazioni contattate solamente personale tecnico autoizzato dalla fabbrica.

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

This equipment meets applicable safety standards.

> ⚠ **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.**

Electric shock can cause personal injury or even death. Avoid direct contact with dangerous voltages at all times. The protective ground connection is essential to safe operation and must be verified before connecting the power supply.

Know the following safety warnings and guidelines:

- **Dangerous Voltages**
  - Only qualified service personnel are allowed to perform equipment installation or replacement.
  - Only qualified service personnel are allowed to remove chassis covers and access any of the components inside the chassis.
- **Grounding**
  - Do not violate the protective grounding by using an extension cable, power cable, or autotransformer without a protective ground conductor.
  - Take care to maintain the protective grounding of this equipment during service or repair and to re-establish the protective grounding before putting this equipment back into operation.

Installation Site

When selecting the installation site, comply with the following:

- **Protective Ground** - The protective ground lead of the building's electrical installation should comply with national and local requirements.
- **Environmental Condition** - The installation site should be dry, clean, and ventilated. Do not use this equipment where it could be at risk of contact with water. Ensure that this equipment is operated in an environment that meets the requirements as stated in this equipment's technical specifications, which may be found on this equipment's data sheet.

Installation Requirements

⚠ WARNING:

Allow only qualified service personnel to install this equipment.
The installation must conform to all local codes and regulations.

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:

- Install this equipment in a restricted access location.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other equipment (including amplifiers) that produce heat.
- 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.
- Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with this equipment.
- Make sure the mounting surface or rack is stable and can support the size and weight of this equipment.
- The mounting surface or rack should be appropriately anchored according to manufacturer's specifications. Ensure this equipment is securely fastened to the mounting surface or rack where necessary to protect against damage due to any disturbance and subsequent fall.

Ventilation

This equipment has openings for ventilation to protect it from overheating. To ensure equipment reliability and safe operation, do not block or cover any of the ventilation openings. Install the equipment in accordance with the manufacturer's instructions.

Rack Mounting Safety Precautions

Mechanical Loading

Make sure that the rack is placed on a stable surface. If the rack has stabilizing devices, install these stabilizing devices before mounting any equipment in the rack.

⚠ WARNING:

Avoid personal injury and damage to this equipment. Mounting this equipment in the rack should be such that a hazardous condition is not caused due to uneven mechanical loading.

Reduced Airflow

When mounting this equipment in the rack, do not obstruct the cooling airflow through the rack. Be sure to mount the blanking plates to cover unused rack space. Additional components such as combiners and net strips should be mounted at the back of the rack, so that the free airflow is not restricted.

⚠ CAUTION:

Installation of this equipment in a rack should be such that the amount of airflow required for safe operation of this equipment is not compromised.

Elevated Operating Ambient Temperature

Only install this equipment in a humidity- and temperature-controlled environment that meets the requirements given in this equipment's technical specifications.

⚠ CAUTION:

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install this equipment in an environment compatible with the manufacturer's maximum rated ambient temperature.

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.

- Use caution when moving this equipment/cart combination to avoid injury from tip-over.
- If the cart does not move easily, this condition may indicate obstructions or cables that may need to be disconnected before moving this equipment to another location.
- Avoid quick stops and starts when moving the cart.
- Check for uneven floor surfaces such as cracks or cables and cords.

Grounding

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

Safety Plugs (USA Only)

Equipment protection Class I - Cisco supplies a mains cord with a 3-terminal (grounding-type) safety plug. 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.

  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.

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.

Equipotential Bonding

If this equipment is equipped with an external chassis terminal marked with the IEC 60417-5020 chassis icon ( ), or 5017 ( ), the installer should refer to CENELEC standard EN 50083-1 or IEC standard IEC 60728-11 for correct equipotential bonding connection instructions.

AC Power

Important: This equipment is Class I equipment, it must be grounded.

- If this equipment plugs into an outlet, the outlet must be near this equipment, and must be easily accessible.
- Connect this equipment only to the power sources that are identified on the equipment-rating label normally located close to the power inlet connector(s).
- If this equipment has 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 when unused for long periods of time.

Circuit Overload

Know the effects of circuit overloading before connecting this equipment to the power supply.

> ⚠ **CAUTION:**
>
> **Consider the connection of this equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Refer to the information on the equipment-rating label when addressing this concern.**

General Servicing Precautions

> ⚠ **WARNING:**
>
> **Avoid electric shock! Opening or removing this equipment's cover may expose you to dangerous voltages.**

Be aware of the following general precautions and guidelines:

- **Servicing** - Refer all servicing to qualified service personnel. Servicing is required when this equipment has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into this equipment, this equipment has been exposed to rain or moisture, does not operate normally, or has been dropped.
- **Wristwatch and Jewelry** - For personal safety and to avoid damage of this equipment during service and repair, do not wear electrically conducting objects such as a wristwatch or jewelry.
- **Lightning** - Do not work on this equipment, or connect or disconnect cables, during periods of lightning.
- **Labels** - Do not remove any warning labels. Replace damaged or illegible warning labels with new ones.
- **Covers** - Do not open the cover of this equipment and attempt service unless instructed to do so in the instructions. Refer all servicing to qualified service personnel only.
- **Moisture** - Do not allow moisture to enter this equipment.
- **Cleaning** - Use a damp cloth for cleaning.

Safety Checks - After service, assemble this equipment and perform safety checks to ensure it is safe to use before putting it back into operation.

Accessories

Use only attachments or accessories specified by the manufacturer.

Contents

Safety Precautions v

Règles de sécurité vii

Sicherheitsvorkehrungen viii

Precauciones de seguridad ix

Precauzioni di sicurezza x

Important Safety Instructions xi

About This Manual xxiii

Chapter 1 Quick Setup - Read Me First!

Connecting the Units 1-1
Front Panel Setup 1-3

Chapter 2 Introduction

D9054 HD Encoder 2-2
Application Examples 2-5
Video Interfaces 2-6
Audio and Data Interfaces 2-7
Transport Stream Outputs 2-9
Control and Management Interfaces 2-10

Chapter 3 Installation

Section A - Rack Installation 3-2
General 3-2
Installing the D9054 HD Encoder 3-3

Section B - Connector Panel 3-5
Overview 3-5

Section C - Connecting the Input/Output Signals 3-7
Connecting the Video Inputs 3-7
Connecting the Audio Inputs 3-8
Connecting to the Contact Closure Interface 3-9
Connecting an External Alarm System 3-10
Connecting the Ethernet Management Interface 3-11
Connecting the IP TS Outputs 3-12
Connecting the ASI Outputs and the ASI Monitor 3-13

Chapter 4 Front Panel Operation

About the Front Panel 4-2
Keypad Convention 4-4
Startup Screen 4-5
Main Menu 4-6
PSI Menu 4-7
Video Menu 4-9
Audio Menu 4-13
Output Menu 4-22
System Menu 4-24

Chapter 5 Setup and Monitoring

Logging On to the Web Interface 5-6
Changing the Password for the Web Interface 5-7
Web Interface - Summary Screen 5-8
Tab Pages 5-9
The Menu Bar and Buttons 5-10
Context-Sensitive Online Help 5-11

Section A - Setting Up Video 5-12
Setting Up the Video Input 5-12
Setting Up the H.264 Video Encoder 5-13
3:2 Pulldown and 3:2 Pulldown Inversion 5-16
Setting Up the H.264 Video Encoding Rate 5-18
Setting Up the H.264 Video Encoding Parameters 5-20
Setting Up the H.264 Video Encoder Delays 5-21
Setting Up the H.264 Aspect Ratio 5-22
Setting Up Statistical Multiplexing 5-25
Setting Up the Statistical Multiplexing Encoding Rate 5-26
Determining the Default Video Rate 5-29
Setting Up the Statistical Multiplexing Pools 5-30
Setting Up the Statistical Multiplexing Clock 5-31
Setting Up Statistical Multiplexing Quality of Service 5-32
Setting Up the Statistical Multiplexing Redundancy 5-34
Monitoring Statistical Multiplexing 5-35
Setting Up the H.264 PIP Video Channel 5-39
Setting Up the H.264 PIP Video Encoding Parameters 5-40
Setting Up the Test Pattern 5-41

Section B - Setting Up the Pre-processor 5-42
Setting Up the Pre-processor Parameters 5-42
Setting Up the Pre-processor, Custom Filtering 5-43
Section C - Setting Up the Audio 5-44
Setting Up the Layer II Audio Input 5-45
Setting Up the Layer II Channel Information 5-50
Setting Up the Layer II Test Tones 5-51
Setting Up the Dolby Digital Audio Input 5-53
Setting Up Dolby Digital Processing 5-59
Setting Up the Dolby Digital Channels 5-62
Setting up the Dolby Digital Extended BSI 5-64
Setting Up Dolby Digital Passthrough 5-65
Setting Up Dolby Digital Test Tones 5-66
Setting Up the AAC Audio Input 5-68
Setting Up AAC Processing 5-74
Setting Up AAC Passthrough 5-77
Setting Up the AAC Test Tones 5-78
Setting Up the Linear/Dolby E Audio Input 5-80
Setting Up the Linear/Dolby E Processing 5-82
Setting Up the Linear Parameters 5-83
Setting Up the Reference Output (MCA card only) 5-84
Setting up the Dolby-E Decoder (MCA card only) 5-85
Section D - Setting Up the VBI 5-86
Testing and Enabling Closed Captions 5-86
Section E - Digital Program Insertion (DPI) 5-87
Setting Up the DPI 5-87
Section F - Setting Up the TS Output 5-96
Setting Up the TS Output Parameters 5-96
Setting Up the ASI Output Parameters 5-97
Setting Up the IP Streaming Output 5-98
Section G - Setting Up the PSI 5-103
Enabling/Disabling the PSI/SI Information 5-103
Setting Up the Transport Stream 5-104
Setting Up the Service Stream 5-105
Setting Up the Video Program 5-106
Setting Up the Layer II Audio Program 5-107
Selecting the Dolby Digital Audio Descriptor Mode 5-109

Setting Up the Dolby Digital Audio Program 5-110
Setting Up the AAC Audio Program 5-112
Setting Up the Linear Audio Program 5-114
Setting Up the NIT 5-116
Setting Up the Cable NIT 5-117
Setting Up the Satellite NIT 5-118
Setting Up the Terrestrial NIT 5-119

Section H - Working with the System 5-120
Reading the System Information or Managing the System 5-120
Reading the D9054 HD Encoder Temperatures 5-122
Reading the Message Status 5-123
Setting Up the Message Parameters 5-124
Viewing Messages 5-126
Viewing the Message Log 5-127
Setting Up the Trap Destinations 5-128
Removing a Trap Destination 5-130
Reading the Module Information 5-131
Setting the Date and Time Manually 5-132
Setting the Clock Synchronization 5-133
Installing and Enabling Software Options 5-135
Setting Up the IP Network 5-137

Chapter 6 Service and Maintenance

Section A - Firmware Upload 6-2
Uploading Firmware to the D9054 HD Encoder using the Web Interface 6-2

Section B - Front Panel LEDs 6-3
Introduction 6-3
Messages 6-4

Section C - Power Supply Replacement 6-24
Introduction 6-24

Section D - Filter and Fan Replacement 6-25
Introduction 6-25

Chapter 7 Customer Information

Product Support 7-2
Returning Products 7-4

Appendix A Technical Specifications

Section A - Video Input and Processing A-2
MPEG-4 Encoder Specifications A-2
HD-SDI Input A-3
Embedded Data in SDI A-4
Section B - Audio Input and Processing A-5
Audio Input A-5
Section C - Transport Stream Output A-7
Section D - Control and Management Interfaces A-8
Section E - Power and General Specifications A-9
Power A-9
General A-11

Appendix B Transport Stream Rates

Introduction B-2
Transport Stream Rates for the Tributaries B-3
Available Rate on the Transmission Media B-10

Appendix C ISO 639-2 Language Codes

Language Codes - Sorted by Alpha 3-Letter Code (ISO 639-2) C-2

Appendix D Equipment and Accessories

Accessory Kits for the D9054 HD Encoder D-2
Options and Upgrades D-3

Appendix E Compliance

Applicable Standards and Notices E-1

Appendix F References

Applicable Documents F-1

Glossary Glossary-1

Index Index-1

About This Manual

Objective

This manual describes how to install, use and maintain the Cisco® D9054 HDTV Encoder.

Note: The manual describes all available options for the D9054 HD Encoder. Your D9054 HD Encoder may only have some of the features described in this manual.

Audience

The audience of this manual includes **users (operators)** and **service personnel** who are responsible for the installation, configuration, operation, monitoring and service of the D9054 HD Encoder.

Required Knowledge

To use this documentation, the user should have a basic knowledge of the technology used in relation to this product. Service personnel should have additional skills and be familiar with cabling, electronic circuitry, and wiring practices.

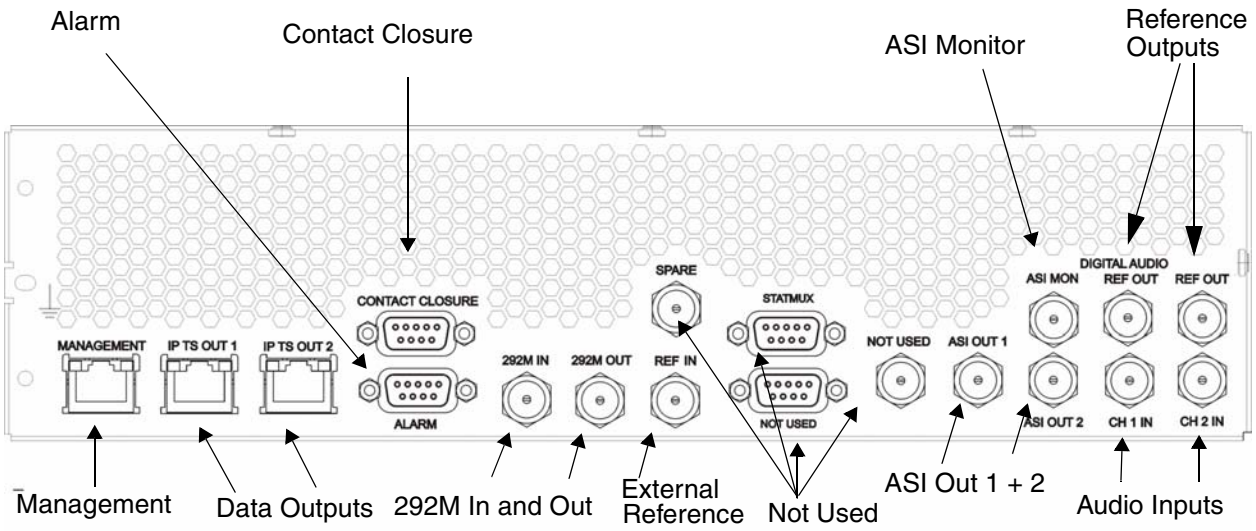
This manual is intended for operators who are responsible for the configuration, remote operation and maintenance of the D9054 HD Encoder.

Chapter 1
Quick Setup - Read Me First!

Connecting the Units

Electrical Connection

Proceed as follows to connect the unit:



1. Connect the HD-SDI video input signal to the connector for video - 292M IN. There are 2 connectors to provide a loop-back possibility. For further information, see **Connecting the Video Inputs**, page 3-7.
2. Connect the audio input signals to the CH1 and CH2 IN connectors. Use a high-quality balanced audio cable. For further information, see **Connecting the Audio Inputs**, page 3-8.
3. If relevant, connect the cable from the external alarm system to the alarm connector. For further information, see **Connecting an External Alarm System**, page 3-10.
4. If relevant, for synchronization, connect an external video source to REF IN.
5. Connect the external contact control equipment such as a DTMF decoder to the contact closure connector. For further information, see **Connecting to the Contact Closure Interface**, page 3-9.

6. Connect the MANAGMENT port on the D9054 HD Encoder to the Ethernet LAN.

   For further information, see **Connecting the Ethernet Management Interface**, page 3-11.

7. Connect the DATA 1 and DATA 2 connectors from the equipment after the D9054 HD Encoder to the IP TS OUT 1 and IP TS OUT 2 ports.

   The equipment after the D9054 HD Encoder is typically an IP set top box.

8. Connect the output signal from the D9054 HD Encoder ASI MONITOR port to an ASI monitor.

9. Connect the power sources of all the units.

   For further information, see the specific product manuals in question. When connecting the power source to the D9054 HD Encoder it takes less than a minute for the unit to initialize. The front panel display shows the startup display.

Front Panel Setup

Locking/Unlocking the Front Panel

The front panel can be locked or unlocked using either the front panel keypad or the Web interface.

Proceed as follows to unlock the front panel using the front panel keypad:

1. Press **MENU**.
2. Navigate to **Lock** in the LCD display and press the **SELECT** key.
3. If the front panel is presently locked, the cursor will flash on the first character of '**L**ocked'.
4. Press the left arrow key to change the current state to 'Unlocked' and then press the **Select** key.
5. You will be prompted to confirm your selection. Use the right arrow to display 'Yes' and then press the **Select** key.
6. The front panel will now be unlocked allowing you to change the IP address.

To lock the front panel, perform the same procedure, except use the right arrow key to change the state. In this case you will not be prompted to confirm the operation.

Note: To control this feature using the Web Interface, refer to Reading the System Information or Managing the System in Chapter 5.

Setting Up the IP Parameters of the D9054 HD Encoder

Follow the procedure below when a D9054 HD Encoder is added to or reinserted in the installation.

Proceed as follows to set the IP parameters of the Management port of the D9054 HD Encoder:

1. Press the MENU key on the front panel of the D9054 HD Encoder.
   The MENU key toggles between the start up display and the main menu.
2. From the main menu press the RIGHT arrow key and navigate over to the System menu and press the SELECT key.
3. Press the RIGHT arrow key and navigate over to the IP sub-menu and press the SELECT key.
   You have now entered the IP menu.
4. Go to the required menu item and press SELECT to access the IP Address, Mask and Gateway. Use the right and left arrow keys to navigate the IP sub-menu and if necessary, change any of the values.
   Use the right arrow key to navigate to the digits you want to change and press a numeric key to enter a value. Press the SELECT key to store the entered value(s).
5. If necessary, change the other IP parameters as described in steps 3 and 4 above.

6. Press the UP arrow to leave the IP menu.

   Note: When you leave the IP menu by pressing the UP Arrow key the IP, Mask and Gateway parameters are validated against each other and stored. Any inconsistencies will be shown in the display.

   Important: For the changes to take effect you must reset the D9054 HD Encoder after you have finished setting or changing the IP address, subnet mask and default gateway. Proceed as follows to reset the D9054 HD Encoder.

7. From the main menu press the RIGHT arrow to navigate to the System menu, and then press the SELECT key.
8. Press the Right arrow to navigate to Reset and then press the SELECT key.
9. When are prompted to confirm that you want to reset the encoder, press the SELECT key once more to confirm the reset. The encoder will reset.

Chapter 2
Introduction

Overview

Introduction

This chapter is a general introduction to the D9054 HDTV Encoder. It describes the most common applications and interfaces of the encoder.

In This Chapter

This chapter contains the following topics.

Topic	See Page
D9054 HD Encoder	2-2
Application Examples	2-4
Video Interfaces	2-6
Audio and Data Interfaces	2-7
Transport Stream Outputs	2-9
Control and Management Interfaces	2-10

D9054 HD Encoder

General Description

The design of the D9054 HD Encoder is compact. It is a 2U encoder that fits into a 19-inch rack. It features single-channel High-Definition, high-quality SDI or composite video processing. It is targeted at uplink applications and supports MPEG-4 part 10 MP@L4 and MPEG-4 part 10 HP@L4, Dolby® Digital, Layer II and AAC passthrough audio encoding.

The D9054 HD Encoder features advanced pre-processing for optimum performance at low bit rates. It also features an Ethernet management interface and supports communication with a third party control system. The Ethernet management interface supports the open SNMP communication protocol for easy integration into the ROSA™ control and management system from Cisco or into 3rd party SNMP managers.

The HDTV encoder also includes Picture-in-Picture (PIP) functionality which compresses, packetizes, and produces real-time MPEG-4/AVC video at a reduced size for Picture-in-Picture applications. It works in conjunction with the MPEG-4 H.264 video encoding engine to provide a second low-resolution video channel in Picture-in-Picture (PIP) mode.

ROSA Control and Management

ROSA enables full control and monitoring functionality of the D9054 HD Encoder installations with redundancy switching, error reporting and remote control.

Using the ROSA Device Configuration shell you can configure the unit and set all the necessary parameters.

Software Update

All software in the D9054 HD Encoder is stored in non-volatile memory that can be electrically programmed. New software releases for the D9054 HD Encoder can be downloaded via the Ethernet 10/100 Base-T Management interface.

Audio Channels

The D9054 HD Encoder is equipped with two or six stereo audio channels. The audio channels may be part of the video or stand-alone audio channels.

Encoding Bit Rates

Video and audio data can be encoded at the following bit rates and coding standards:

Input Signal	Mode	Bit rate	Scan Range	Coding standard
Video Signal	Capped VBR	Up to 20 Mbit/s	1080i, 720p	MPEG-4 part 10 MP@L4
		Up to 25 Mbit/s	1080i, 720p	MPEG-4 part 10 HP@L4
Audio Signal	N/A	32 to 384 kbit/s	N/A	MPEG-1 Layer II
		56 to 640 kbit/s		Dolby Digital[a)] Dolby Digital passthrough Dolby Digital Plus[b)]
		14 to 640 kbit/s		AAC[c)] AAC Passthrough

a. Dolby Digital is available as an order option.
b. Dolby Digital Plus is available as an order option.
c. AAC is available as an order option.

VBI Signals

The D9054 HD Encoder supports closed captioning according to EIA 608/708 embedded in the video signal.

Pre-Processing

The pre-processing includes:

- PreSight™ noise reduction (adaptive low-pass spatial filter.)

The PreSight noise reduction removes noise and details that stress the encoder at low bit rates. It is possible to adjust the filter manually during operation without service interruption, or to set the filter to adjust automatically to the encoding complexity of the video contents.

Subsampling

The D9054 HD Encoder supports subsambling. Subsampling decreases the resolution of the source material in order to lower the amount of data to be encoded.

1080i: supports full, 3/4, 2/3 and 1/2 resolution.

720p: supports full, 3/4 and 1/2 resolution.

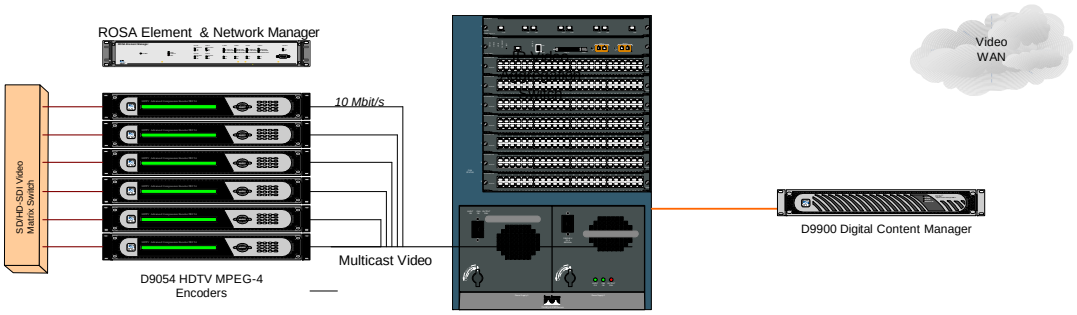
Transport Stream

The encoded data, carrying the video and audio signals, is internally multiplexed into the MPEG-4 and DVB compliant transport stream when the D9054 HD Encoder is used in a stand-alone or ROSA controlled application. When the D9054 HD Encoder is controlled by a PowerVu® Network Centre (PNC) control system (available in the future), a PowerVu multiplexer is expected to be used where appropriate DVB tables are inserted for compliant transport. The three ASI outputs always carry the transport stream (TS).

Application Examples

IP Distribution

The D9054 HD encoder is designed for compression of high-quality services, including video, audio, data and ancillary services, over satellite. Users typically need to control multiple encoders in an automatically redundant system to securely transmit services to a large IP set-top box population. Typical solutions are targeted at programmers, broadcasters, service providers and private networks who have a particular interest in full turnkey solutions. See an example below of an IP multicast video solution.



Video Interfaces

Video Interface

The D9054 HD Encoder can encode one HD-SDI video input signal.

Video Input

The HD-SDI input interface accepts a 1.485 Gbit/s or a 1.485/1.001 Gbit/s serial digital component signal according to SMPTE-292M. The following input formats are supported:

Input Format
1080i/25 Hz
1080i/29.97 Hz
720p/50 Hz
720p/59.94 Hz

Video Encoding

The input signal is encoded to a bit rate of up to 20 Mbits/s for video according to MPEG-4 part 10 MP@L4, and up to 25 Mbit/s according to MPEG part 10 HP@L4. The adjustable delay feature and the possibility of setting the GOP sequence in the D9054 HD Encoder offer unique possibilities for optimizing the relations between delay and picture quality.

Closed Captioning

The D9054 HD Encoder supports closed captioning embedded in the HD-SDI signal as specified by SMPTE-292M.

Audio and Data Interfaces

Audio Input

Four audio stereo channels can be input at the D9054 HD Encoder. Each of the audio inputs accept digital AES/EBU or embedded audio. You can assign the encoded audio channels, in multiples of two, to the video program or to independent audio only programs.

Digital Audio Interface

The audio input interface accepts a digital input, formatted as an AES/EBU encoded signal. Left and right channel samples are extracted from the input and synchronized to the video signal.

Embedded Audio

The audio input interface can be configured to accept an input of embedded audio from the HD-SDI video input interface.

Audio Encoding Formats

The supported audio encoding formats are MPEG-1 layer II, Dolby Digital, Dolby Digital passthrough, AAC, or AAC passthrough.

Layer II Encoding

The audio inputs may be encoded in the following ways:

- a stereo program
- a joint stereo program
- two independent mono programs
- Dual channel

You can set the sampling frequency for the digitizing process to one of the following values:

- 32 kHz
- 44.1 kHz
- 48 kHz.

For audio attached to the video the D9054 HD Encoder locks the audio sampling frequency to the video. For AES/EBU digital input signals, the D9054 HD Encoder automatically adapts the incoming rate by using sample rate conversion. Audio only programs are locked to a free-running internal 27 MHz clock.

Dolby Digital Encoding

The audio inputs may be encoded in the following ways:

- Dual Mono 1+1
- Stereo 2/0
- Mono 1/0
- 3/2 (L,R,C,Ls,Rs)

You can set the sampling frequency for the digitizing process to one of the following values:

- 32 kHz
- 44.1 kHz
- 48 kHz

The D9054 HD Encoder locks the audio sampling frequency to the video. For AES/EBU digital input signals, the D9054 HD Encoder automatically adapts the incoming rate by using sample rate conversion.

Dolby Digital Passthrough

The D9054 HD Encoder supports passthrough of up to six pre-encoded Dolby Digital stereo channels.

AAC Internal Encoding or Passthrough

The D9054 HD Encoder supports internal AAC audio encoding or passthrough of up to six pre-encoded AAC channels.

Linear Audio and Dolby E Passthrough

The D9054 HD Encoder supports passthrough of up to six pre-encoded Dolby E channels. It also supports Linear audio.

Audio Only

The D9054 HD Encoder supports eight audio-only programs. One or more audio sources can be combined to make up a program.

Transport Stream Outputs

DVB-ASI Transport Stream Output

The D9054 HD Encoder has three DVB-ASI outputs. These outputs can be used as an input for e.g. a satellite modem or a multiplexer. One of the outputs is an ASI monitor output for monitoring of the outgoing data stream. Unlike the two other ASI outputs, the monitor output cannot be muted.

The outputs support SI generation with standard tables compliant to MPEG-2 and DVB.

IP Transport Stream Outputs

The D9054 HDTV Encoder has two IP TS outputs. These outputs can be used as inputs to IP networks.

Ethernet Management

The D9054 HD Encoder features an Ethernet management interface which will support communication with the PNC system in the future. For information on the Ethernet management interface, see **Connecting the Ethernet Management Interface**, page 3-11.

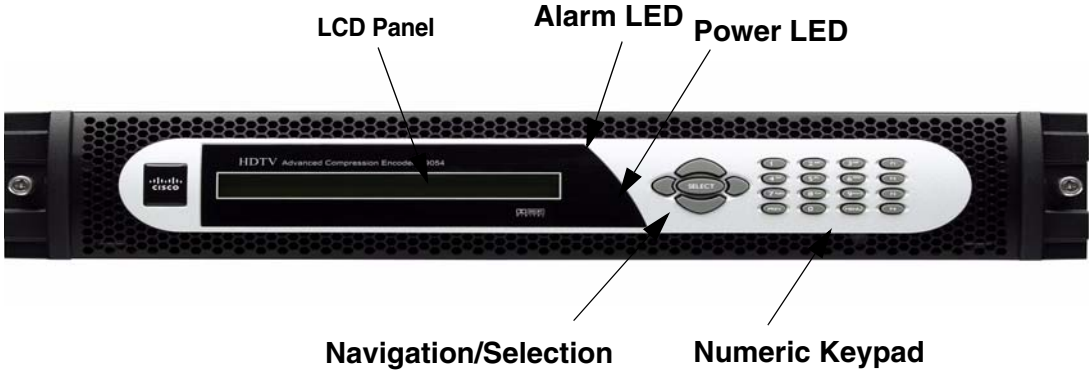
ROSA Management

The ROSA/Copernicus™ system is a multi-server/multi-client based system enabling you to set up and manage a whole network of encoders. In the ROSA Single-User system the server and client is located on the same PC. Consequently it has only one simultaneous user. ROSA enables full control and monitoring functionality of the D9054 HD Encoder installations with redundancy switching, error reporting and remote control.

Front Panel Control

The front panel supports encoder setup and control of a subset of the parameters available either via the Web GUI or ROSA control management system (IP address is one example).

The following drawing shows the front panel with its different sections.



Ethernet

The main control interface for the D9054 HD Encoder is the 10/100 BaseT Ethernet interface.

You can set up and control the D9054 HD Encoder via the Ethernet connection using SNMP and a management system, for example the ROSA Network Management system or the Web-based GUI.

From ROSA you can update the D9054 HD Encoder software using FTP (File Transfer Protocol).

A MIB file is included in the delivery from Cisco for the D9054 HD Encoder to support 3rd party SNMP managers when the ROSA System is not utilized.

Alarm Relay Interface

During operation the condition of the D9054 HD Encoder can be monitored by three relay contact outputs, accessible from the Alarm connector on the rear panel of the D9054 HD Encoder. Furthermore, the alarm status is signalled by Alarm LEDs on the front of the D9054 HD Encoder and by messages sent via the management system.

Chapter 3
Installation

Overview

Introduction

This chapter describes how to install the D9054 HD Encoder. Before installing the D9054 HD Encoder, read all safety precautions and guidelines thoroughly.

Qualified Personnel

Only appropriately qualified and trained personnel should attempt to install, operate or maintain the D9054 HD Encoder.

> ⚠ **WARNING:**
>
> **Allow only qualified personnel to install this product. Otherwise, personal injury or equipment damage may occur.**

In This Chapter

This chapter contains the following topics.

Topic	See Page
Section A - Rack Installation	3-2
General	3-2
Section B - Connector Panel	3-5
Installing the D9054 HD Encoder	3-5
Section C - Connecting the Input/Output Signals	3-7
Connecting the Video Inputs	3-7
Connecting the Audio Inputs	3-8
Connecting to the Contact Closure Interface	3-9
Connecting an External Alarm System	3-10
Connecting the Ethernet Management Interface	3-11
Connecting the IP TS Outputs	3-12
Connecting the ASI Outputs and the ASI Monitor	3-13

Section A - Rack Installation

General

Introduction

The encoder is supplied with two power supplies that provide redundant power with no single point of failure. Normal typical operation requires both supplies to be powered up and switched on. Each power supply should be powered from a separate mains branch circuit, in order to ensure redundancy.

The DC outputs from both power supplies are combined together in a current-sharing scheme so that the total load is shared.

Power Connection

To operate the encoder, you must connect it to an AC power source. For information about connecting the chassis to AC power, see Appendix A - Technical Specifications.

As Cisco units are designed for 24 hours' operation, some products do not have a power switch. In this case the mains cord and/or DC power supply cable serve(s) as the mains disconnect device.

> ⚠ **WARNING:**
>
> **Make sure that at least one end of the power cable(s) remains easily accessible for unplugging, if you need to switch off the unit. For example: Ensure that the socket outlet is installed near the product.**

> ⚠ **WARNING:**
>
> **To avoid electrical shock, connect the three-prong plug on this product to an earth-grounded three-pin socket outlet only.**

Installing the D9054 HD Encoder

Rack Mounted

The D9054 HD Encoder is a 2U unit with connector access at the rear panel. The D9054 HD Encoder is intended for mounting in a standard 19" rack with minimum 1U spacing between units to allow adequate ventilation/air flow.

Cooling

The D9054 HD Encoder is cooled by the use of internal fans. The air intake is from the front and the air outlet is on the rear.

Note: Adequate cooling must be provided equalling 475 W per unit to avoid overheating.

> ⚠ **CAUTION:**
>
> **The inlet air temperature must not exceed 40°C/104°F at any time.**

Grounding

You must ensure that the unit is properly connected to ground in order to meet safety and EMC requirements. Before any other connection is made, the unit must be connected to a protected ground terminal as described below:

- Via the three wire power cord of the AC power supply. This connection is mandatory.

To Mount the D9054 HD Encoder

To mount the D9054 HD Encoder in a rack do the following:

1. Mount L-brackets in the rack to support each D9054 HD Encoder to be installed.
2. Place the D9054 HD Encoder in its position in the rack.
3. Pull the top of the front panel forward such that it is supported by the hinges at the bottom of the front panel to gain access to the side mounting flanges.
4. Mount the D9054 HD Encoder securely to the rack by securing the mounting flanges to the rack using the four screws provided.
5. Lift the hinged front panel back into place such that it is seated securely to the front panel of the encoder chassis, and then fasten it to the mounting flanges using the two PEM nuts provided.
6. Make sure the air outlet holes on the back of the D9054 HD Encoder are not obstructed to allow air flow from the front to the back of the chassis.

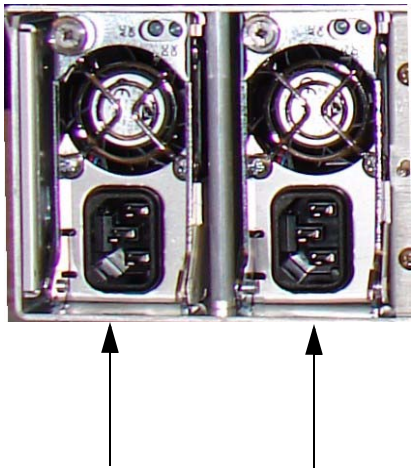
To Connect AC Power

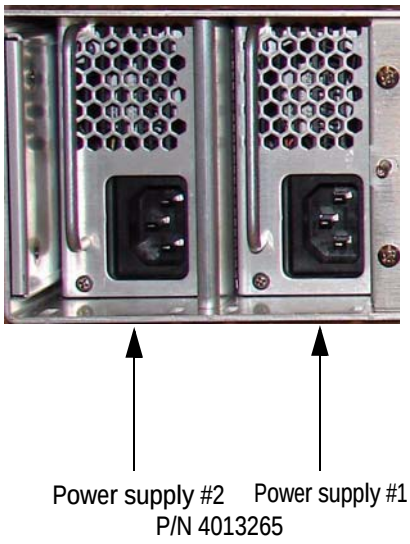
To connect AC power to the D9054 HD Encoder do the following:

1. Connect the power cords (supplied with the D9054 HD Encoder) between the rear panel power receptacles and a 100 to 120/200 to 240 V AC power outlet.
2. Make sure that the power cable is connected to protective ground.
   See **Grounding** at the beginning of this section.

The D9054 HDTV Encoder could be equipped with either of two power supplies. The following photograph shows the two different power supply face plates on the chassis rear panel.

Note: Power supplies 1 and 2 are located in the rear of the chassis as shown in the photograph below. Note their position in the event of a power supply alarm, possibly resulting in replacement of a power supply. Alarm messages appear in the Message Log. See Viewing the Message Log in Chapter 5 for more information.





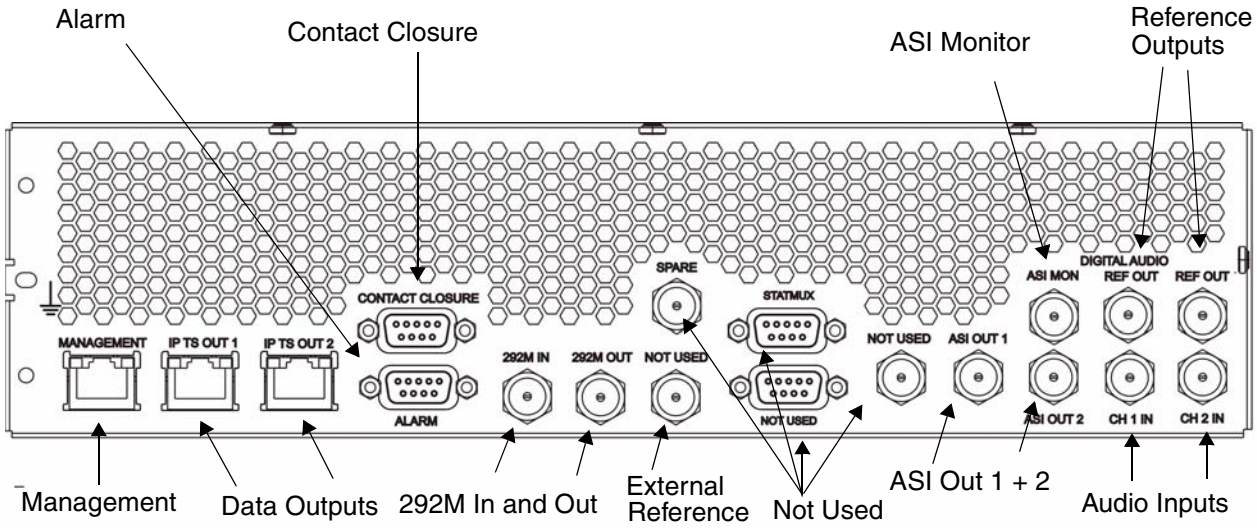
Section B - Connector Panel

Overview

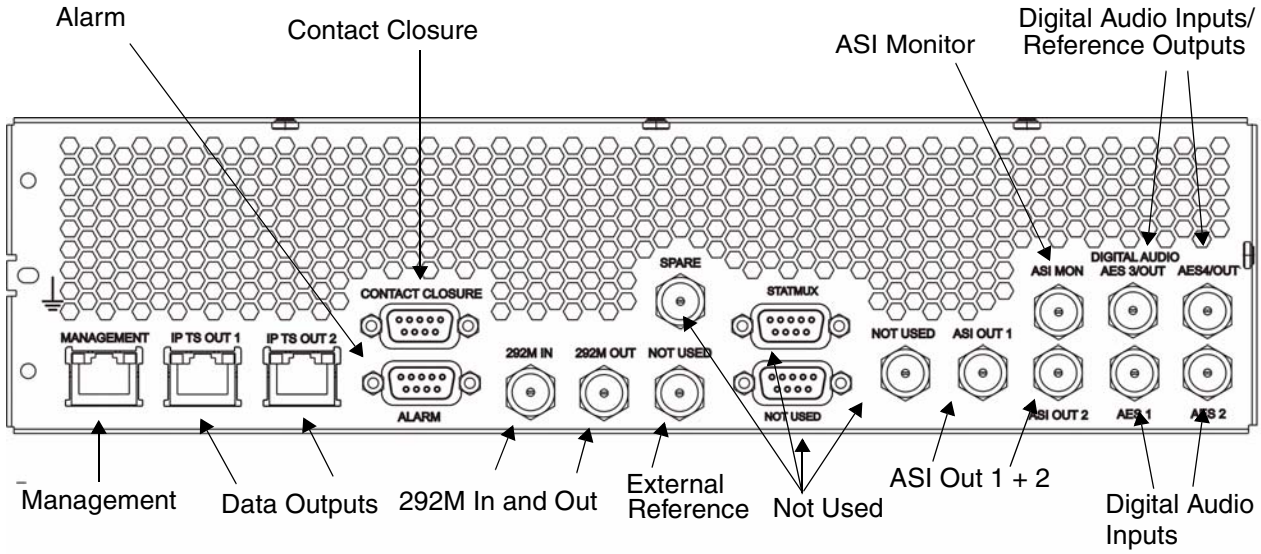
D9054 HD Encoder Connector Panel

The rear panel will appear different depending on the equipped audio configuration; whether it is equipped with a Dual Channel Audio (DCA) card or Multiple Channel Audio (MCA) card.

The following drawings show the two available rear connector panel configurations:



Dual Channel Audio (DCA) Rear Panel



Multiple Channel Audio (MCA) Rear Panel

Connectors

The following table describes the function and type of the various connectors:

Connector	Function	Connector Number and Type
Power	AC power.	IEC 60320 Sheet 14
MANAGEMENT	For control and management of local and remote D9054 HD Encoders.	RJ45
IP TS OUT 1/IP TS OUT 2	Data outputs for connection to an IP distribution network.	RJ45
ALARM	Alarm relays.	9-pin sub-D female
292M IN	HD-SDI video input according to SMPTE-292M.	BNC
292M OUT	Active loop-through of HD-SDI video input according to SMPTE-292M.	BNC
REF IN	Reference input for synchronization to an external video source.	BNC
ASI OUT 1/ASI OUT 2	ASI output. Two identical outputs.	BNC
ASI MON	Monitoring of the ASI output signal. This output signal cannot be muted.	BNC
Dual Channel Audio (with DCA card)		
CH1 IN/CH2 IN	Digital AES/EBU or embedded audio inputs.	BNC
REF OUT	Reference outputs to support external audio encoding. Supports audio locked to internal video according to SMPTE-276M.	BNC
Multiple Channel Audio (with MCA card)		
AES1/AES2	Digital AES/EBU or embedded audio inputs.	BNC
AES3/OUT, AES4/ OUT	Digital AES/EBU or embedded audio inputs, or reference outputs to support external audio encoding. Supports audio locked to internal video according to SMPTE-276M.	BNC

Section C - Connecting the Input/Output Signals

Connecting the Video Inputs

Connector for the Video Input

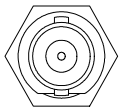
The video input connector is of the BNC type. The input signal is looped through to the connector marked OUT.

The following video input signal is supported:

- 1.5 Gbit/s High Definition Serial Digital Interface (HD-SDI) according to SMPTE-292M, with 1080i/25 Hz, 1080i/29.97 Hz, 720p/50 Hz or 720p/59.94 Hz.

Video Connector

The following table shows the video connector:

Connector	Interface Type	Connector Type
	SMPTE-292M	BNC female

To Connect the Video Input

1. Connect the video input signal to the connector for video, labeled 292M IN. There are 2 connectors to provide active loop-through possibility.
2. If required, connect the 292M OUT connector to a video monitor.

To Connect the Reference Input

Do as follows to connect to the reference input:

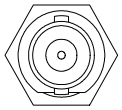
1. Connect the reference input signal to the REF IN connector. Use a 75-ohm double-braided coax cable.

Connecting the Audio Inputs

Connectors for the Audio Input

The configuration of the D9054 HD Encoder supports either two or four audio inputs, depending on the equipped audio card. The DCA card supports two AES inputs and two Reference outputs. The MCA card supports up to four AES inputs, with the option to set AES3 and/or AES4 as Reference Outputs. From the GUI, you set up the D9054 HD Encoder to use either digital AES/EBU or embedded stereo inputs. The D9054 HD Encoder also supports encoding of audio embedded in the HD-SDI video signal.

The following drawing shows the audio connector:

Connector	Interface Type	Connector Type
	SMPTE-276M	BNC female

Note: The digital audio output is always 75-ohm single-ended.

To Connect the Audio Inputs

Connect the audio inputs as follows:

1. Connect the audio input signals to the CH1 IN and CH2 IN BNC connectors (with DCA configuration) or AES1 to AES4 BNC connectors (with MCA configuration).
   Use a high-quality double-shielded RJ6 coaxial cable.

Connecting to the Contact Closure Interface

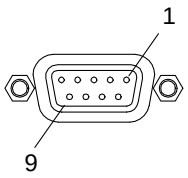
Contact Closure Connector

The D9054 encoder has a contact closure interface which can be used to trigger digital program insertion (DPI). The contact closure interface has 8 inputs.

Pin Allocation

The connector labeled CONTACT CLOSURE is a 9-pin Sub-D connector (female).

The following table shows the connector and the pin allocation for the Contact Closure connector.

Connector Drawing	Pin Number	Description
	1	Input 1
	2	Input 2
	3	Input 3
	4	Input 4
	5	Input 5
	6	Input 6
	7	Input 7
	8	Input 8
	9	Ground

Note: Contact open = not connected (internal pull-up).
Contact closed = connected to ground.

To Connect to the Contact Closure Interface

Connect the external contact closure equipment to the contact closure interface.

Configuring Open-collector outputs for the Advanced D98xx Series Receivers

The Advanced D98xx series receivers (for example, Cisco D9854 Advanced Program Receiver and Cisco D9858 Advanced Receiver Transcoder) supports decoding of SCTE-35 messages with DTMF descriptor.

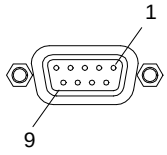
The receiver outputs tones or sets the open collector contacts according to the content of the DTMF descriptor. For more information on the open-collector output settings, see **Setting Up the DPI**, page 5-87.

Connecting an External Alarm System

Connector for an External Alarm System

The D9054 HD Encoder is equipped with a connector for alarm relay outputs for remote alarm signaling.

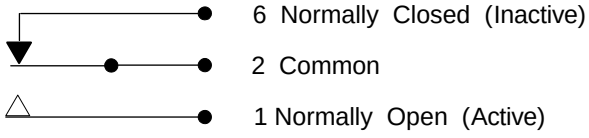
The Alarm output connector is a 9-pin Sub-D female connector. The following table shows the connector and the pin allocation table for the Alarm output connector.

Connector	Relay Name	Function	Normally Closed Pin	Common Pin	Normally Open Pin
	A	A-Alarm	6	2	1
	B	B-Alarm	3	8	7
	C	C-Alarm	9	5	4

1. Connect the cable from the external alarm system to the alarm connector.

Example, Alarm Relays

The following figure shows an example of how the alarm relays work.



02-085

For example, for an A-alarm under normal operational conditions (no alarm), pin 6 is closed, that is connected to pin 2 and pin 1 is open. However, should an alarm condition occur pin 6 is open and pin 1 is closed, that is connected to pin 2. This means that the A-alarm is active and the A-alarm LED lights on the front panel.

Note: The A-alarm relay is always activated when the power is off or the D9054 HD Encoder is booting, whereas the other alarm relays maintain their status.
For example, if a B-alarm relay is inactive when the power is switched off, it stays inactive. However, if it is active when the power is switched off, it stays active.

For information about the maximum relay load, see **Alarm Interface**, page A-8.

Connecting the Ethernet Management Interface

The Ethernet Interface

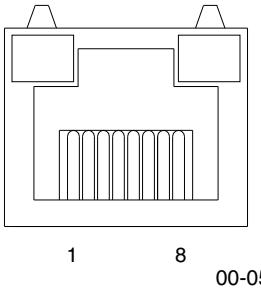
The RJ-45 interface for 10/100 BASE-T Ethernet is intended for management via the ROSA control management system.

Hint: If you experience problems with the 10 BASE-T Ethernet it is advised that you change it to a 100 BASE-T connection.

Note: You must set up the IP address, the default gateway and the subnet mask to match the network connection. This is done through the front panel menu. For further information, see **Front Panel Setup**, page 1-3.

Pin Allocation, Ethernet Connector

The table shows the Ethernet connector and the pin allocation (MDI interface):

Connector	Pin	Pin Allocation
	1	Tx+
	2	Tx-
	3	Rx+
	4	Not connected
	5	Not connected
	6	Rx-
	7	Not connected
	8	Not connected

Informative Notes

Proper cables are required for reliable Ethernet operation; to run over a maximum segment length of 100 m the cable has to comply with the EIA/TIA Category 5 wire specifications. The cable must be shielded to ensure compliance with EMC requirements.

To Connect the Ethernet Interface

1. Connect a crossed RJ-45 cable between the Ethernet connector on the D9054 HD Encoder and the Ethernet port of your PC.

Note: You need a crossover cable if you want to connect the Ethernet interface of the D9054 HD Encoder directly to another Ethernet device without using a hub or switch.

You need to set up the IP address on both the D9054 HD Encoder (via the front panel display) or the ROSA driver for D9054 HD Encoder. For information on setting up the IP address via the front panel, see **Front Panel Setup**, page 1-3.

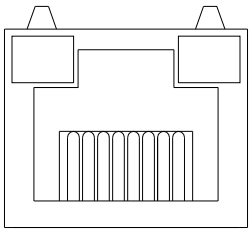
Connecting the IP TS Outputs

The Ethernet Interface

The RJ-45 interfaces IP TS OUT 1 and IP TS OUT 2 are 10/100 BASE-T Ethernet. They are intended for output of the transport stream encapsulated in IP packets to the main receiver.

Pin Allocation, Ethernet Connector

The table shows the Ethernet connector and the pin allocation (MDI interface):

Connector	Pin	Pin Allocation
	1	Tx+
	2	Tx-
	3	Rx+
	4	Not connected
	5	Not connected
	6	Rx-
	7	Not connected
	8	Not connected

Informative Notes

For reliable Ethernet operation; to run over a maximum segment length of 100 m the cable has to comply with the EIA/TIA Category 5 wire specifications. The cable must be shielded to ensure compliance with EMC requirements.

To Connect the Ethernet Interface

1. Connect a crossed RJ-45 cable between the Ethernet connector on the D9054 HD Encoder and the Ethernet port of the equipment after the D9054 HDTV Encoder.

Note: You need a crossover cable if you want to connect the Ethernet interface of the D9054 HD Encoder directly to another Ethernet device without using a hub or switch.

The equipment after the D9054 HDTV Encoder could be an IP router or a switch.

Connecting the ASI Outputs and the ASI Monitor

To Connect the ASI Outputs

Do as follows to connect to the ASI output:

1. Connect the output signals from the D9054 HD Encoder connectors ASI OUT 1 and/or ASI OUT2 to the ASI input connectors of the equipment after the D9054 HD Encoder.

   Use a Belden "Brilliance" (or equivalent) cable with foil/braid construction. The shield must provide 99% or better shielding effectiveness (i.e. high-quality double-shielded RJ6 coaxial cable).

   The equipment after the D9054 HD Encoder could be a Transport Stream Multiplexer such as the Continuum DVP D9600 Re-multiplexer and Transport Stream Processor.

   Hint: The two outputs are identical and can be used for back-up purposes.

2. If you want to check the ASI output signal connect an ASI monitor to the ASI monitor connector.

   Note: The ASI monitor output cannot be muted but otherwise it works similar to the two primary outputs.

Chapter 4
Front Panel Operation

Overview

Introduction

This chapter describes how to set up the Cisco D9054 HDTV Encoder using the front panel keys and display. This information is primarily applicable for standalone operation. The only thing you need to set up via the front panel interface is the IP address of the Cisco D9054 HDTV Encoder. In this case the rest of the information in this chapter is for reference purposes only.

In This Chapter

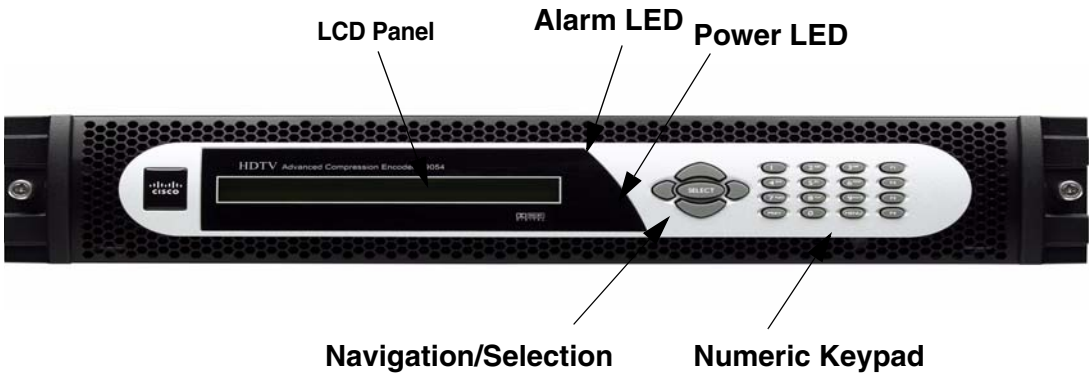
This chapter contains the following topics.

Topic	See Page
About the Front Panel	4-2
Keypad Convention	4-4
Startup Screen	4-5
Main Menu	4-6
PSI Menu	4-7
Video Menu	4-9
Audio Menu	4-13
Output Menu	4-22
System Menu	4-24

About the Front Panel

Introduction

The D9054 HD Encoder is operated using controls and indicators on the front panel. These include the numeric keypad, the Navigation/Selection keypad, the LCD, the ALARM and POWER indicators. These are shown in the following illustration:



Keypad

The numeric keypad is used to enter alphanumeric values. The **MENU** key sets the software to the initial menu and the **PREV** key or the **UP** arrow key returns to the previous menu. The **PREV** key can also be used to cancel a numeric entry at any point during the entry sequence, and the **LEFT Arrow** key allows backspacing through the entry.

LCD

The LCD provides information on the selections available at any menu level, current settings for parameters, and certain status and alarm indications. This is a 2x40, backlit LCD display. The top line may be status data or identifier information. It can also display optional functions available for tuning operations. The bottom line will show selections or parameter values available using the navigation/ selection keypad. The items are selected by pressing the **SELECT** (center key) or **DOWN Arrow** key on the navigation/selection keypad.

Front Panel LEDs

The function of the LEDs is described in the table below.

LED	Signal	Explanation	Remedy
POWER	Green	The D9054 HD Encoder is correctly powered	N/A
	Off	There is no power present.	Check the AC line supply.
ALARM	Red	An A-alarm is active.	Read the message in the GUI.
	Off	No A-alarm is active.	N/A

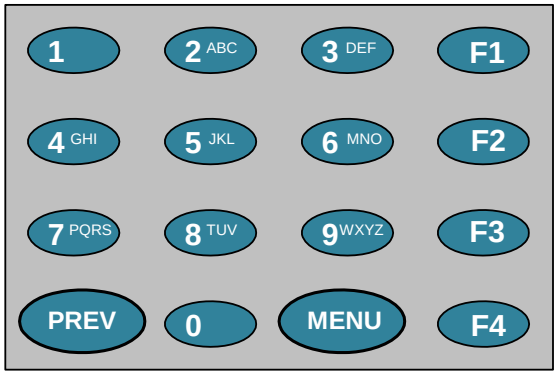
Navigation/Selection Keypad

The navigation keys (**LEFT**, **RIGHT**, **UP** and **DOWN**) and the **SELECT** key on this keypad are the primary controllers. Each navigation key performs various functions, depending on the current state of the menu system (i.e. sometimes the left navigation key backspaces over an entry and sometimes moves the cursor to a different menu item). Once the cursor is over the desired function, pressing the **SELECT** (center key) or **DOWN Arrow** key selects the current item (this may go to a different menu or change a setting). Pressing the **SELECT** key stores any entered values.

Keypad Convention

Overview

Throughout this manual, there are references to parts of a keypad on the front of the encoder. This is the Navigation/Selection keypad (see diagram at right), which changes its function, depending on the current state of the menu. For clarity, the following table shows which parts of this integral interface are being referenced by which term.

When you see this…	It means…	
LEFT Arrow key	Press the key on the left side of the Navigation/Selection Keypad.	
RIGHT Arrow key	Press the key on the right side of the Navigation/Selection Keypad.	
UP Arrow key	Press the key on the top of the Navigation/Selection Keypad.	
DOWN Arrow key	Press the key on the bottom of the Navigation/Selection Keypad.	
SELECT key	Press the key in the center of the Navigation/Selection Keypad.	
PREV key	Press the key on the lower left of the numeric keypad[a)].	
MENU key	Press the key on the lower right of the numeric keypad[a)].	
Alphanumeric Entry	Pressing the numeric keys 0-9 once will enter the respective digit into a data entry field.	
F1 - F4	To be defined.	

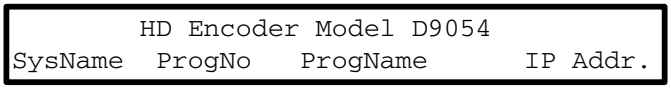
a. Numeric keypad keys are uniform. MENU and PREV have been enlarged here for effect.

Startup Screen

Structure

On power up and initialization, an identifying startup screen displays the product name, the system name, and the IP address of the unit.

The startup screen contains the following parameters:



SysName

Description: The Name of the system.

ProgNo

Description: The video program number. The program number is set up from the GUI.

ProgName

Description: The video program name. The program name is set up from the GUI.

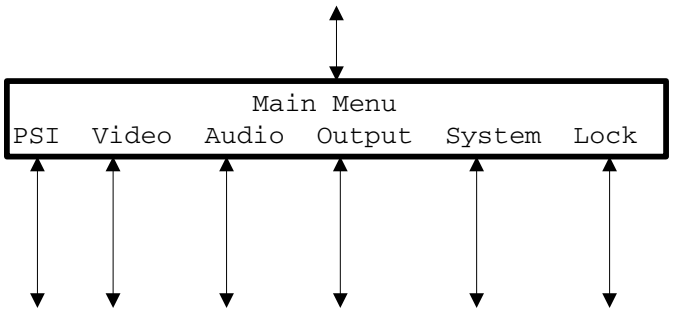
IP Addr.

Description: The IP address of the D9054 HD Encoder. The IP address is set up from the System menu, see **IP, IP Address**, page 4-24.

Main Menu

Structure

Operation of the HD Encoder Model D9054 begins at the Main menu. From the startup screen press the MENU or SELECT key to view the Main menu.



04-052

Menu Selection

Select the desired function by moving the cursor left or right by pressing the LEFT or RIGHT key. Once a selection is made by pressing the SELECT or the DOWN key, the LCD presents the second menu level for the selected function. Succeeding levels for each function are described on the following pages.

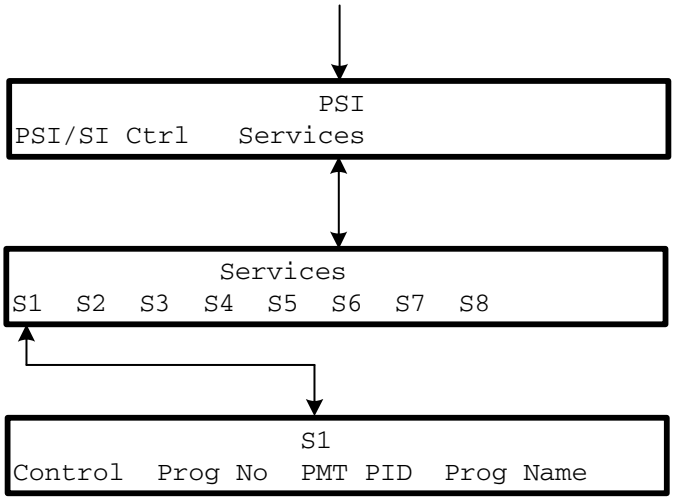
PSI Menu

Structure

To see the PSI Menu, press the Menu key and then the SELECT key.

Each parameter is described below. All settings are selected and stored in the GUI.

The menu has the following structure:



PSI/SI Ctrl

Parameters: DVB, MPEG, Disable.

Description: The status of the transmission of PSI/SI information.

Services

Parameters: S1, S2, S3, S4, S5, S6, S7, S8.

Description: From this menu you select the audio program for which you want to view.

Services, <S1 to S8>, Control

Parameters: Enable, Disable.

Description: Indicates the status of the service.

Services, <S1 to S8>, Prog No

Parameters: A figure between 1 and 65535.

Description: The program number of the service.

Services, <S1 to S8>, PMT PID

Parameters: A figure between 16 and 8190.

Description: The PMT PID assigned to the service. The default values for services 1 through 8 are 8021 to 8028 respectively.

Services, <S1 to S8>, Prog Name

Parameters: Up to 30 alphanumeric characters.

Description: The name of the service. The supported character set is ASCII.

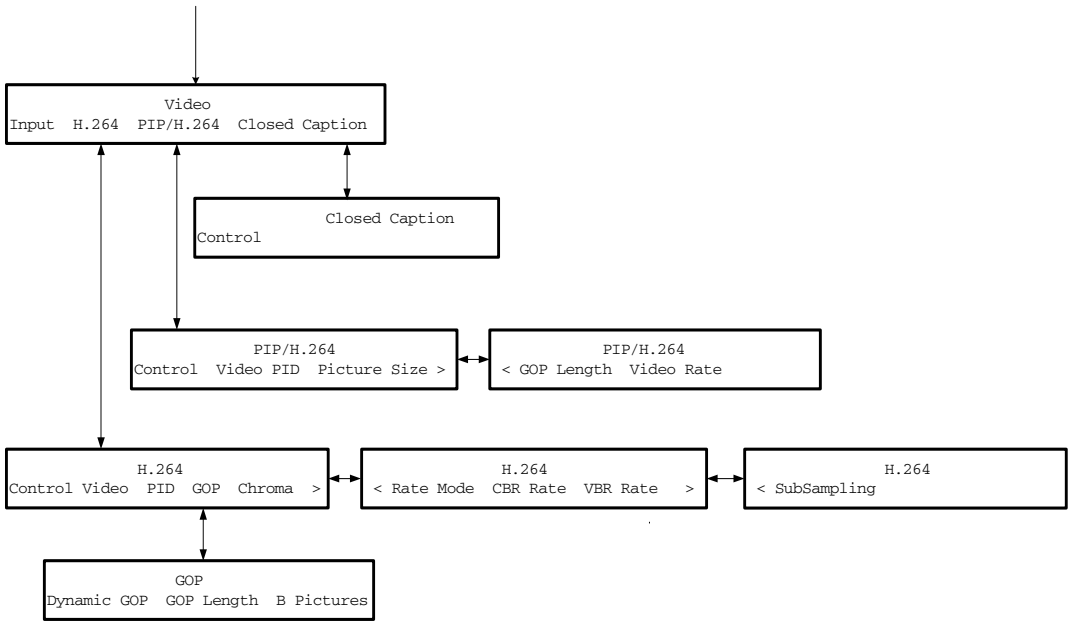
Video Menu

Structure

To see the Video menu from the Main menu, press the RIGHT Arrow key and the SELECT key.

Each parameter is described in this section. Settings are selected and stored from the GUI.

The menu has the following structure:



Input

Parameters: 1080i/25 Hz, 1080i/29.97 Hz, 720p/50 Hz, 720p/59.94 Hz.

Description: Indicates the video input format of the source to encode.

H.264, Control

Parameters: Enable, Disable.

Description: Indicates the status of the video.

H.264, Video PID

Parameters: A figure between 16 and 8190[1)].

Description: The PID of the video. Observe that you may not use the same PID for any other program element.

H.264, GOP, Dynamic GOP

Parameters: Enable, Disable.

Description: Dynamic GOP should always be enabled for best video quality. Dynamic GOP adds to end-to-end delay. If lower end-to-end delay is more important than video quality, then Dynamic GOP should be turned off (disabled).
When Dynamic GOP is on (the default is off), the encoder selects between two hierarchical GOP structures, one with 3 B-pictures and the other with 15 B-pictures. The selection is automatically based on video content (scene's spatio-temporal complexity).
When using Dynamic GOP, the **GOP Length** must be a multiple of 16 (i.e., 16, 32, 48, etc).

H.264, GOP, GOP Length

Parameters: A figure in the range from 1 to 255.

Description: The GOP length and the number of B-pictures influences the picture quality and delay.

H.264, GOP, B Pictures

Parameters: 0, 1, 2 or 3.

Description: The GOP length and the number of B-pictures influences the picture quality and delay.

The following table shows example settings and their meaning:

GOP Length	B Pictures	Meaning
1	0	I only
2	1	IB
4	0	IPPP
12	2	IBBPBBPBBPBB

H.254, Chroma

Parameters: 4:2:0.

Description: You typically use 4:2:0 in distribution applications.

H.264, Rate Mode

Parameters: Variable, Fixed, Statmux.

Description: Fixed is used for constant bit rate support. Variable (Capped VBR) is constrained to a maximum rate whereby Statmux allows you set video bit rate (i.e., minimum and maximum) which the encoder can operate within.

Capped variable bit rate encoding simply means that your video channel is encoded at a variable bit rate which is capped at a specific value. For further information, see **H.264, VBR Rate**, page 4-11.

H.264, CBR Rate

Parameters: 3,000,000 to 20,000,000 for H.264 MP@L4 for 4:2:0 chroma format.

3,000,000 to 25,000,000 for H.264 HP@L4 for 4:2:0 chroma format.

Steps: 1 bit/s.

Description: The video bit rate for Fixed Rate Mode.

H.264, VBR Rate

Parameters: 3,000,000 to 20,000,000 for H.264 MP@L4 for 4:2:0 chroma format.

3,000,000 to 25,000,000 for H.264 HP@L4 for 4:2:0 chroma format.

Steps: 1 bit/s.

Description: The capped video bit rate for Variable Rate Mode.

H.264, SubSampling

Parameters: Full, 3/4, 2/3 or 1/2. 2/3 horizontal resolution is not supported for 720p.

Description: The subsampling rate.

The following table shows the lowest recommended minimum rates with various GOP sequences at full and 3/4 horizontal subsampling:

Video GOP Sequence	Lowest Recommended Minimum Bit Rate (Mbit/s) in Fixed Rate Encoding	
	Full Horizontal Subsampling	3/4 Horizontal Subsampling
1	30	22.5
2	20	15
3	15	11.25
≥4	10	7.5

The video bit rate must always be lower than the transport stream (TS) bit rate. For further information, see **Transport Stream Rates for the Tributaries**, page B-3.

PIP/H.264, Control

Parameters: Off, On.

Description: Indicates the status of the video.

PIP/H.264, Video PID

Parameters: A figure between 16 and 8190[1)].

Description: The PID of the PIP video channel. Observe that you may not use the same PID for any other program element.

PIP/H.264, Picture Size

Parameters: 192x192, 128x96.

Description: Indicates the resolution of the PIP video channel.

PIP/H.264, GOP Length

Parameters: A figure in the range from 1 to 255.

Description: The GOP length and the number of B-pictures influences the picture quality and delay.

The following table shows example settings and their meaning:

GOP Length	Meaning
1	I only
2	IB
4	IPPP
12	IBBPBBPBBPBB

PIP/H.264, Video Rate

Parameters: 200,000 to 500,000, 192 x1926 resolution for 4:2:0 chroma format.

150,000 to 500,000, 128 x 96 resolution for 4:2:0 chroma format.

Steps: 1 bit/s.

Description: The capped video bit rate.

Closed Caption, Control

Parameters: Enable, Disable.

Description: The closed caption status.

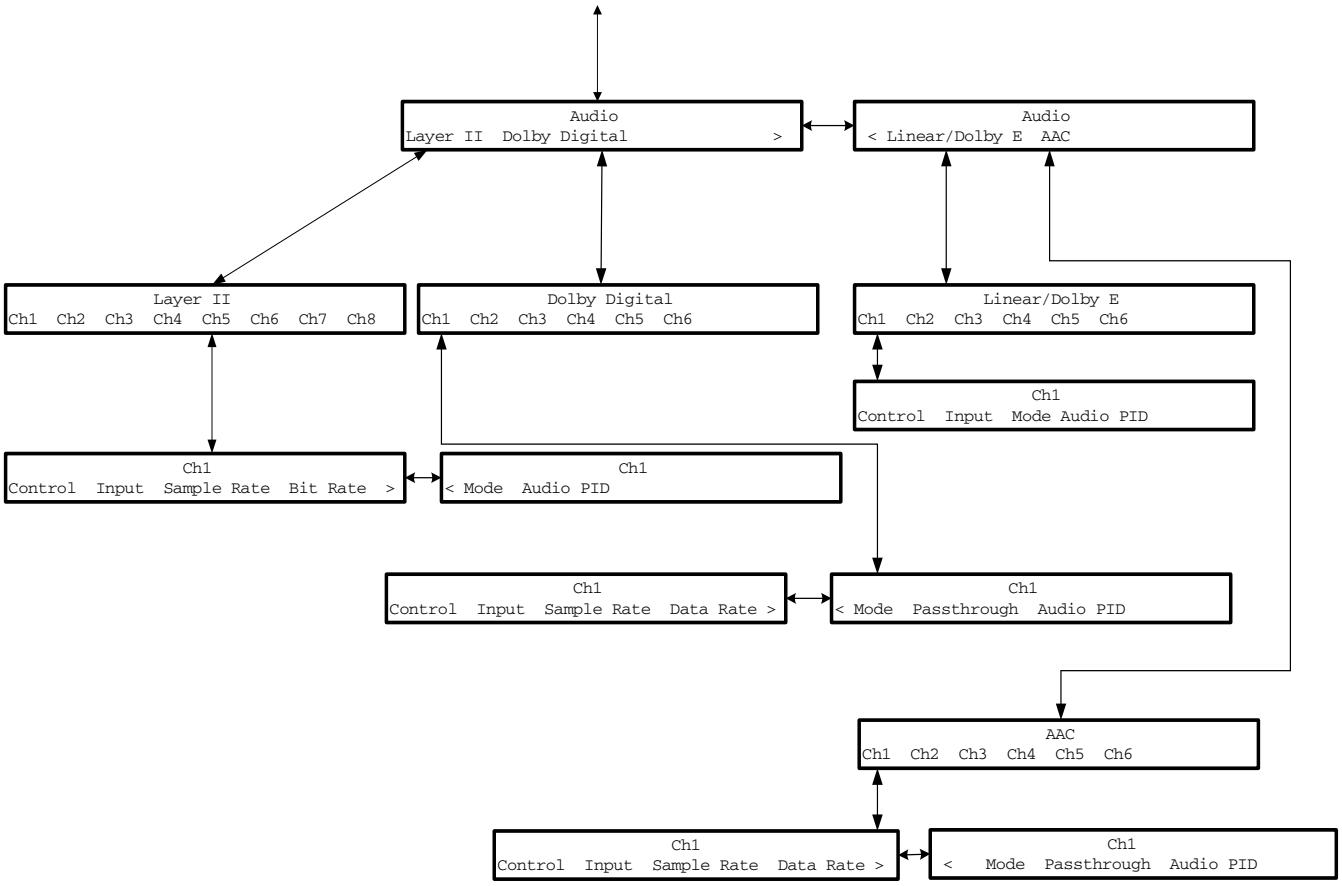
Audio Menu

Structure

To see the Audio menu from the Main menu press the RIGHT Arrow key twice and the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:



Audio

Parameters: Layer II, Dolby Digital, Linear/Dolby E, and AAC.

Description: The D9054 HD Encoder can encode the audio input according to the Layer II, Dolby Digital, Dolby E, and AAC standards. It also accepts either a pre-encoded Dolby Digital input, Dolby E, or AAC input.

Layer II, <ch1 to ch12>

Parameters: Ch1 to Ch12.

Description: Select the channel you want to set up. Layer II channels Ch2 and Ch4 are only used in Single Mono mode, and in this case they represent the right channels. In Single Mono mode channels Ch1, and Ch3 represent the left mono channels.

In Stereo, Joint Stereo and Dual Channel mode, you only use channels Ch1 and Ch3.

Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1** through **Ch 12**.

Layer II, <ch1 to ch12>, Control

Parameters: Enable, Disable.

Description: Enable or disable the channel in question.

Layer II, <ch1 to ch12>, Input

Parameters: Digital, Embedded, Dolby-E Decoder.

Description: The D9054 HD Encoder inputs the signal from the digital input connector in the selected format. If you select **Embedded** the D9054 HD Encoder extracts the audio embedded in the active SDI video signal of the program. The packet and pair is set in the GUI.

Note: Dolby-E Decoder input type is only available if the D9054 Encoder has a Multiple Channel Audio (MCA) card that is equipped with a Dolby Advanced Sub-Module (DASM).

Layer II, <ch1 to ch12>, Sample Rate

Parameters: 32000 Hz, 44100 Hz, 48000 Hz.

Description: The sample rate of the input signal. It doesn't pay to increase the encoding sample rate above that of the input sample rate.

For the lowest audio bit rates it's often recommendable to use the lowest sample rate for best quality.

Layer II, <ch1, to ch12>, Bit Rate

Parameters: 32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 or 384 (kbit/s).

Description: The bit rate must be ≤ 192 kbit/s if you set the Layer II mode to Mono.
If you use Joint stereo it is recommended that you use bit rates up to 128 or 192 kbit/s. Joint Stereo with a bit rate of 256 or 384 kbit/s reduces sound quality compared to stereo.

Layer II, <ch1 to ch12>, Mode

Parameters: Stereo, Joint Stereo, Dual Channel, Single Mono.

Description: Do not use Joint stereo audio coding if you want to transfer matrixed sound (i.e., Dolby Surround). Use Stereo instead. If you use Joint stereo, part of the phase information which is essential for re-creating the surround channel information disappears.

Important: If you select the Single Mono mode, you get the setup which has been enabled in the ROSA GUI.

Layer II, <ch1 to ch12>, Audio PID

Parameters: A figure between 16 to 8190[1)] .

Description Observe that you may not use the same PID for any other program element.

Dolby Digital, <ch1 to ch6>

Parameters: Ch1 to Ch6.

Description: Select the channel you want to set up.

Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1** through **Ch 6**.

Dolby Digital, <ch1 to ch6>, Control

Parameters: Enable, Disable.

Description: Enable or disable the channel in question.

Dolby Digital, <ch1 to ch6>, Input

Parameters: Digital, Embedded, Dolby-E Decoder.

Description: The D9054 HD Encoder inputs the signal from the Digital input connector in the selected format. If you select **Embedded** the D9054 HD Encoder extracts the audio embedded in the active SDI video signal of the program. The packet and pair is set in the GUI.

Note: Dolby-E Decoder input type is only available if the D9054 Encoder has a Multiple Channel Audio (MCA) card that is equipped with a Dolby Advanced Sub-Module (DASM).

1) Note that the DVB tables use the PIDs from 16 to 20.

Dolby Digital, <ch1 to ch6>, Sample Rate

Parameters: 32000 Hz, 44100 Hz, 48000 Hz.

Description: The sample rate of the input signal. It doesn't pay to increase the encoding sample rate above that of the input sample rate.

For the lowest audio bit rates it's often recommendable to use the lowest sample rate for best quality.

Dolby Digital, <ch1 to ch6>, Data Rate

Note: This menu will only be displayed if you have installed the Dolby Digital audio option.

Parameters: 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, 640 (kbit/s).

Description: Settings for the compressed bit rate are available from 56 to 640 kbit/s. Increasing the number in this field increases the audio bandwidth at the encoder, improving the quality of the audio transmitted by the encoder. The default is 192 kbit/s. Use the following data rate ranges for the selected audio mode.

Mode	Data Rate Range
Stereo 2/0	96 – 640 kbit/s
Dual Mono 1+1	96 – 640 kbit/s
Mono (Center) 1/0	56 – 640 kbit/s
3/2 (L,R,C,Ls,Rs)	224 – 640 kbit/s

Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

Dolby Digital, <ch1 to ch6>, Mode

Note: This menu will only be displayed if you have installed the Dolby Digital audio option.

Parameters: Stereo 2/0, Dual Mono 1+1, Mono 1/0, 3/2 (L,R,C,Ls,Rs).

Description: Use this setting to select the number of channels and the channel format within the encoded bit stream.

The three available audio encoding modes are listed below. The mode definition uses two numbers (*m*/*n*), with *m* indicating the number of front channels, and *n* indicating the number of rear (surround) channels.

Mode	Channel Format
Stereo 2/0	Left, Right
Dual Mono 1+1	(Left – Channel 1, Right – Channel 2)
Mono (Center) 1/0	Center
3/2 (L,R,C,Ls,Rs)	Left, Right, Center, Left surround, Right surround

The default setting is Stereo (*2/0)*.

If the mode is set to Dual Mono (1+1), then two completely independent program channels, referenced as Mono Channel 1 and Mono Channel 2, are encoded into the bit stream. **Dual-mono mode is primarily intended for professional applications. Dual-mono cannot be expected to work with consumer Dolby Digital (AC-3) decoders.**

Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for ch1 and ch4.

Dolby Digital, <ch1 to ch6>, Passthrough

Parameters: Enable, Disable.

Description From this menu you enable or disable passthrough of Dolby Digital. The D9054 HD Encoder accepts a pre-encoded Dolby Digital audio input. It is recommended that you set the maximum data rate to that of the external Dolby Encoder. If the data rate of the Dolby Encoder is lower than the setting in the D9054 HD Encoder the audio will be passed through and only the actual bits in the data stream will be used. The default rate is 192 kbit/s.

The external Dolby Encoder must be locked to the clock of the D9054 HD Encoder. This can be achieved by connecting the Ref Out (Reference Output) ports to the external encoder.

Dolby Digital, <ch1 to ch6>, Audio PID

Parameters: A figure between 16 to 8190[2] .

Description Observe that you may not use the same PID for any other program element.

Linear/Dolby E, <ch1 to ch6>

Parameters: Ch1 to Ch6.

Description: Select the channel you want to set up.

Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1** through **Ch 6**.

Linear/Dolby E, <ch1 to ch6>, Control

Parameters: Enable, Disable.

Description: Enable or disable the selected channel.

Linear/Dolby E, <ch1 to ch6>, Input

Parameters: Digital, Embedded.

Description: The D9054 HDTV Encoder inputs the signal from the Analog/ Digital input connector in the selected format. If you select Embedded, the D9054 HDTV Encoder extracts the audio embedded in the active SDI video signal of the program. The packet and pair is set in the GUI.

Linear/Dolby E, <ch1 to ch6>, Mode

Parameters: Linear or Dolby E.

Description: Use this setting to select between Linear and Dolby E mode.

Linear/Dolby E, <ch1 to ch6>, Audio PID

Parameters: A figure between 16 to 8190.

Description Observe that you may not use the same PID for any other program element.

2) Note that the DVB tables use the PIDs from 16 to 20.

AAC, <ch1 to ch6>

Parameters: Ch1 to Ch6.

Description: Select the channel you want to set up.

Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1** through **Ch 6**.

AAC, <ch1 to ch6>, Control

Parameters: Enable, Disable.

Description: Enable or disable the channel in question.

AAC, <ch1 to ch6>, Input

Parameters: Digital, Embedded, Dolby-E Decoder.

Description: The D9054 HD Encoder inputs the signal from the Digital input connector in the selected format. If you select **Embedded** the D9054 HD Encoder extracts the audio embedded in the active SDI video signal of the program. The packet and pair is set in the GUI.

Note: Dolby-E Decoder input type is only available if the D9054 Encoder has a Multiple Channel Audio (MCA) card that is equipped with a Dolby Advanced Sub-Module (DASM).

AAC, <ch1 to ch6>, Sample Rate

Parameters: 32000 Hz, 44100 Hz, 48000 Hz.

Description: The sample rate of the input signal. There is no advantage to increasing the encoding sample rate above that of the input sample rate.

For the lowest audio bit rates it's often recommended to use the lowest sample rate for best quality.

AAC, <ch1 to ch6>, Data Rate

Note: This menu will only be displayed if you have installed the AAC option.

Parameters: 32, 40, 48, 56, 64, 72, 80, 96, 112, 128, 144, 160, 176, 192, 224, 256, 288, 320, 352, 382, 416, 448, 512, 576, 640 (kbit/s).

Description: Settings for the compressed bit rate are displayed in the range from from 32 to 640 kbit/s. The default is 192 kbit/s.

AAC, <ch1 to ch6>, Mode

Note: This menu will only be displayed if you have installed the AAC audio option.

Parameters: Dual Mono 1+1, Single Mono 1/0, Stereo 2/0, Joint Stereo 2/0, Mono 1/0 LR, or 3/2 (L,C,R,Ls,Rs,LFE).

Description: Do not use Joint stereo audio coding if you want to transfer matrixed sound (i.e. Stereo Surround sound). Use Stereo instead. If you use Joint stereo, part of the phase information which is essential for re-creating the surround channel information disappears.

The default setting is Stereo (2/0).

If the mode is set to Dual Mono (1+1), then two completely independent program channels, referenced as Mono Channel 1 and Mono Channel 2, are encoded into the bit stream. **Dual-mono mode is primarily intended for professional applications. Dual-mono cannot be expected to work with consumer AAC decoders.**

Note: The 3/2 (L,C,R,Ls,Rs,LFE) mode is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for Ch 1 and Ch 4.

AAC, <ch1 to ch6>, Passthrough

Parameters: Enable, Disable.

Description From this menu you enable or disable passthrough of AAC audio. The D9054 HD Encoder accepts a pre-encoded AAC audio input. It is recommended that you set the maximum data rate to that of the external AAC Encoder. If the data rate of the AAC Encoder is lower than the setting in the D9054 HD Encoder the audio will be passed through and only the actual bits in the data stream will be used.

The default rate is 192 kbit/s.

The external AAC Encoder must be locked to the clock of the D9054 HD Encoder. This can be achieved by connecting the Ref Out (Reference Output) ports to the external encoder.

AAC, <ch1 to ch6>, Audio PID

Parameters: A value between 16 to 8190[3] .

Description Observe that you may not use the same PID for any other program element.

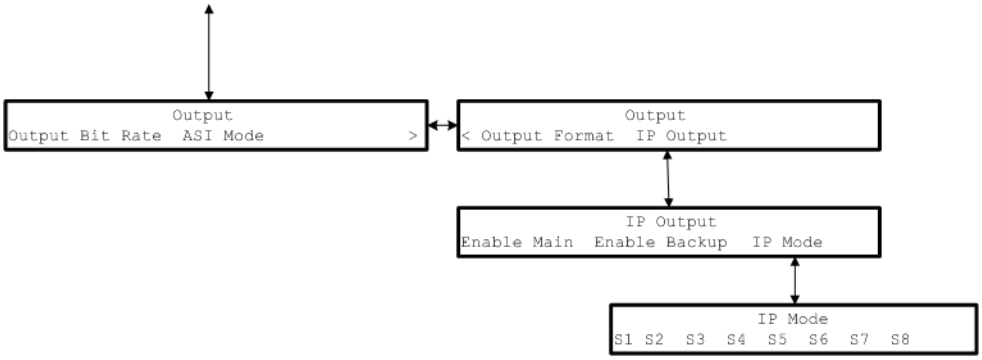
3) Note that the DVB tables use the PIDs from 16 to 20.

Output Menu

Structure

To see the Output menu from the Main menu press the RIGHT Arrow key three times and the SELECT key.

Each parameter is described below. The menu has the following structure:



Output Bit Rate

Parameters: 10M to 120M.

Steps: 1 bit/s.

Description: The ASI output bit rate (transport stream rate). For information about how much the various tributaries (video, audio etc.) take up of in the transport stream, see **Transport Stream Rates for the Tributaries**, page B-3.

ASI Mode

Parameters: Packet, Burst.

Description: In Packet mode you send a whole MPEG packet together (188/204[4]) bytes) and have stuffing in between packets. In Burst mode you send 1 byte at a time with stuffing in between. Some non-Cisco decoders specifically require Packet or Burst mode.

Output Format

Parameters: 188, 204 RS Off.

Description: **188** means that the Reed Solomon Error Correction algorithm is not applied on the IP TS output.
204 RS OFF. This setting only applies in a stand-alone or ROSA controlled application. The setting means that the Reed Solomon algorithm is not applied on the output. The 16 bytes overhead are 0 bytes which may later be used for Reed Solomon error correction.

4) 204 bytes mode is not applicable to the PNC Control System.

IP Output

Parameters: Enable Main, Enable Backup, or IP Mode.

Description: Select Enable Main if you want to enable/disable IP data from the IP TS OUT 1 connector. Select Enable Backup if you want to enable/disable IP data from the IP TS OUT 2 connector. Select IP Mode if you want to set the mode for the eight services on the IP TS OUT 1 and IP TS OUT 2 connectors.

IP Output, Enable Main

Parameters: Disable, Enable

Description: Select Enable to stream data to the main receiver from the IP TS OUT 1 connector.

If you select Disable, there will be no output on the IP TS OUT 1 connector.

Note: You have to use the web GUI or the ROSA interface to set up the MAC and IP addresses of the receiver of the IP streaming packets.

IP Output, Enable Backup

Parameters: Disable, Enable.

Description: Select Enable to stream data to the backup receiver from the IP TS OUT 2 connector.

If you select Disable, there will be no output on the IP TS OUT 2 connector.

Note: You have to use the web GUI or the ROSA interface to set up the MAC and IP addresses of the receiver of the IP streaming packets.

IP Output, IP Mode

Parameters: S1, S2, S3, S4, S5, S6, S7, S8.

Description: Select the service.

IP Mode, <Sn>

Parameters: Disable, UDP, or RTP.

Description: For the service selected, select the IP streaming mode.

Note: You have to use the web GUI or the ROSA interface to set up the MAC and IP addresses of the receiver of the IP streaming packets.

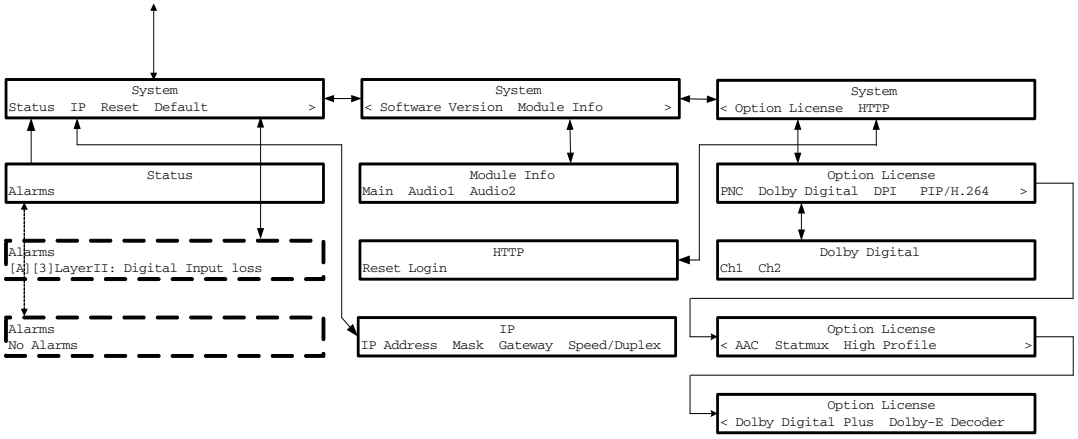
System Menu

Structure

To see the System menu from the Main menu press the RIGHT Arrow key four times and the SELECT key.

Each parameter is described in the following. For instructions on how to select and store settings, see **About the Front Panel**, page 4-2.

The menu has the following structure:



Status, Alarms

Parameters: N/A.

Description: A list of alarms in the system. The most recent ones are displayed first.

IP, IP Address

Parameters: <0 to 255>.<0 to 255>.<0 to 255>.<0 to 255>.

Description: The IP address of the management interface to the D9054 HD Encoder. Contact your network administrator to obtain an IP address.
Use the numeric keys to type the IP address.
Press the SELECT key to store the entered values.
Press the UP Arrow key to leave the menu.
When you leave the IP menu by pressing the UP Arrow once more the IP, Mask and Gateway parameters are validated against each other and stored. Any inconsistencies will be shown in the display.
Important: For the changes to take effect you must reset the encoder after you have finished setting or changing the IP address, subnet mask and default gateway. The encoder will display a reminder.

Note: The reset may take up to 90 seconds.

Note: The IP Address is not affected by the Default command.

IP, Mask

Parameters: <0 to 255>.<0 to 255>.<0 to 255>.<0 to 255>.

Description: The subnet mask of the management interface to the D9054 HD Encoder. Similar to the **IP Address** above.

Note: The subnet mask is not affected by the Default command.

IP, Gateway

Parameters: <0 to 255>.<0 to 255>.<0 to 255>.<0 to 255>.

Description: The default gateway of the management interface to D9054 HD Encoder. The D9054 HD Encoder uses this gateway to route IP traffic across the network. Similar to the **IP Address** above.

Note: The default gateway setting is not affected by the Default command.

Hint: The default gateway 0.0.0.0 means that no gateway is used.

IP, Speed/Duplex

Parameters: Auto Negotiation (default), 10 Mbps Half/Full Duplex, or 100 Mbps Half/Full Duplex.

Description: Displays the speed/duplex of the management interface to the D9054 HD Encoder.

Reset

Parameters: N/A.

Description: Resets (boots) the D9054 HD Encoder.

The D9054 HD Encoder displays a message asking you to confirm the resetting of the unit. Press SELECT to reset and UP or PREV to leave the menu without resetting.

Hint: You should reset the D9054 HD Encoder in the following cases:

- If there has been a temperature alarm causing the D9054 HD Encoder to disable functionality.
- If you have set or changed the IP address, subnet mask or gateway of one of the IP interfaces of the D9054 HD Encoder via the front panel display.

Note: The reset may take up to 90 seconds.

Default

Parameters: N/A.

Description: The D9054 HD Encoder will display a message asking you to confirm the defaulting of the unit. Press **SELECT** to default and UP or PREV to leave the menu without defaulting.
Use the default settings if you have set up the D9054 HD Encoder with illegal and incompatible settings to get the encoder back in a functional state.

Note: The default may take up to 10 seconds.

Software Version

Parameters: N/A.

Description: The software version of the system controller.

Module Info, Main

Parameters: N/A.

Description: The hardware and the software part numbers of the main board.

Module Info, Audio1

Parameters: N/A.

Description: The hardware part number[5)] of the onboard audio module. The audio module contains two stereo channels or 4 mono channels.

Module Info, Audio2

Parameters: N/A.

Description: The hardware part number[6)] of the optional add-on audio module. The audio module contains two stereo channels or 4 mono channels.

5) The audio module has no software part number and will show N/A in the software part number field.
6) The audio module has no software part number and will show N/A in the software part number field.

Option License, PNC

Parameters: Disabled.

Description: The status of the license signifies the following:

Status	Explanation
Disabled	The option is presently disabled (for future use).

Option License, Dolby Digital

Parameters: Enabled, Disabled.

Description: You need an option license for each of the Dolby Digital audio channels. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

Option License, DPI

Parameters: Enabled, Disabled.

Description: You need an option license for DPI. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

Option License, PIP/H.264

Parameters: Enabled, Disabled.

Description: You need an option license for the PIP channel. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

Option License, AAC

Parameters: Enabled, Disabled.

Description: You need an option license for each of the AAC audio channels. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

Option License, Statmux

Parameters: Enabled, Disabled.

Description: You need an option license for Statmux. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

Option License, High Profile

Parameters: Enabled, Disabled.

Description: You need an option license for High Profile. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

Option License, Dolby Digital Plus

Parameters: Enabled, Disabled.

Description: You need an option license for Dolby Digital Plus. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

Option License, Dolby-E Decoder

Parameters: Enabled, Disabled.

Description: You need an option license for Dolby-E Decoder. The status of the license signifies the following:

Status	Explanation
Enabled	The option is present and enabled.
Disabled	The option is present but has been disabled. In this case you have to enable the option to make it work.

Please contact your local Cisco sales representative if you want to buy an option.

HTTP, Reset Login

Parameters: N/A.

Description: This resets the Web GUI password; i.e., no password will be required to log on to the Web GUI.

Note: You must reboot the encoder to enable this feature; otherwise the last password used will be required to log on to the Web GUI.

Chapter 5
Setup and Monitoring

Overview

Control Modes

You can set up and control the D9054 HDTV Encoder using the embedded Web interface, or a PC and the ROSA management system.

Front Panel Keypad

The operation of the D9054 HDTV Encoder can be monitored using the front panel keypad and LCD display. You can also change the IP address of the encoder using the front panel keypad. For further information, see **Front Panel Operation**, page 4-1.

Embedded Web Interface

The D9054 HDTV Encoder is delivered with an embedded web-based GUI enabling you to set up and control the unit via an IP network.

ROSA Management

The ROSA/Copernicus system is a multi-server/multi-client-based system enabling you to set up and manage a complete network of encoders. In the ROSA single-user system, the server and client are located on the same PC. Consequently it has only one simultaneous user. ROSA enables full control and monitoring functionality of D9054 Encoder installations and redundancy switching, error reporting and remote control.

In This Chapter

This chapter describes how to set up and monitor the D9054 HD Encoder using the embedded Web interface. This interface looks identical whether you are using the embedded Web interface or the ROSA interface.

This chapter contains the following topics.

Topic	See Page
Logging On to the Web Interface	5-6
Changing the Password for the Web Interface	5-7
Web Interface - Summary Screen	5-8
Tab Pages	5-9
The Menu Bar and Buttons	5-10
Context-Sensitive Online Help	5-11
Section A - Setting Up Video	5-12
Setting Up the Video Input	5-12
Setting Up the H.264 Video Encoder	5-13
3:2 Pulldown and 3:2 Pulldown Inversion	5-16
Setting Up the H.264 Video Encoding Rate	5-18
Setting Up the H.264 Video Encoding Parameters	5-18
Setting Up the H.264 PIP Video Channel	5-39
Setting Up the H.264 Video Encoder Delays	5-21
Setting Up the H.264 Aspect Ratio	5-22
Setting Up Statistical Multiplexing	5-25
Determining the Default Video Rate	5-29
Setting Up the Statistical Multiplexing Pools	5-30
Setting Up the Statistical Multiplexing Clock	5-31
Setting Up Statistical Multiplexing Quality of Service	5-32
Monitoring Statistical Multiplexing	5-35
Setting Up the H.264 PIP Video Channel	5-39
Setting Up the H.264 PIP Video Encoding Parameters	5-40

Topic	See Page
Setting Up the Test Pattern	5-41
Section B - Setting Up the Pre-processor	5-42
Setting Up the Pre-processor Parameters	5-42
Setting Up the Pre-processor, Custom Filtering	5-43
Section C - Setting Up the Audio	5-44
Setting Up the Layer II Audio Input	5-45
Setting Up the Layer II Channel Information	5-50
Setting Up the Layer II Test Tones	5-51
Setting Up the Dolby Digital Audio Input	5-53
Setting Up Dolby Digital Processing	5-59
Setting Up the Dolby Digital Channels	5-62
Setting Up Dolby Digital Passthrough	5-65
Setting Up Dolby Digital Test Tones	5-66
Setting Up the AAC Audio Input	5-68
Setting Up AAC Processing	5-74
Setting Up AAC Passthrough	5-77
Setting Up the AAC Test Tones	5-78
Setting Up the Linear/Dolby E Audio Input	5-80
Setting Up the Linear/Dolby E Processing	5-82
Setting Up the Linear Parameters	5-83
Setting Up the Reference Output (MCA card only)	5-84
Section E - Digital Program Insertion (DPI)	5-87
Setting Up the DPI	5-87
Section D - Setting Up the VBI	5-86
Testing and Enabling Closed Captions	5-86
Section F - Setting Up the TS Output	5-96
Setting Up the TS Output Parameters	5-96

Topic	See Page
Setting Up the ASI Output Parameters	5-97
Setting Up the IP Streaming Output	5-98
Section G - Setting Up the PSI	5-103
Enabling/Disabling the PSI/SI Information	5-103
Setting Up the Transport Stream	5-104
Setting Up the Service Stream	5-105
Setting Up the Video Program	5-106
Setting Up the Layer II Audio Program	5-107
Selecting the Dolby Digital Audio Descriptor Mode	5-109
Setting Up the Dolby Digital Audio Program	5-110
Setting Up the AAC Audio Program	5-112
Setting Up the Linear Audio Program	5-114
Setting Up the NIT	5-116
Setting Up the Cable NIT	5-117
Setting Up the Satellite NIT	5-118
Setting Up the Terrestrial NIT	5-119
Section H - Working with the System	5-120
Reading the System Information or Managing the System	5-120
Reading the D9054 HD Encoder Temperatures	5-122
Reading the Message Status	5-123
Setting Up the Message Parameters	5-124
Viewing Messages	5-126
Viewing the Message Log	5-127
Setting Up the Trap Destinations	5-128
Removing a Trap Destination	5-130
Reading the Module Information	5-131
Setting the Date and Time Manually	5-132

Topic	See Page
Setting the Clock Synchronization	5-133
Installing and Enabling Software Options	5-135
Setting Up the IP Network	5-137

Logging On to the Web Interface

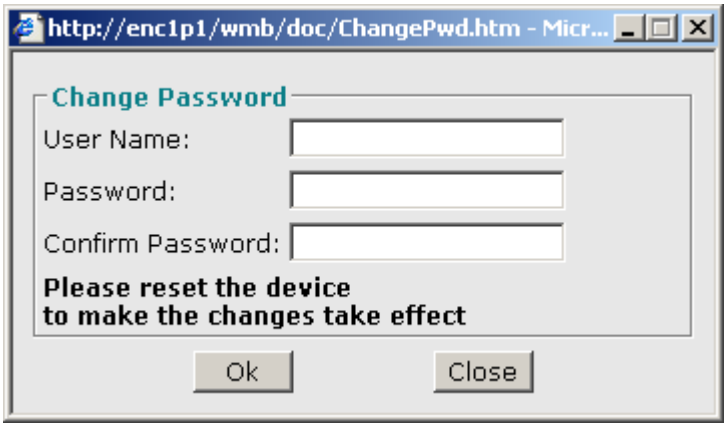
To Log on to the Web Interface

Proceed as follows to log on to the Web Interface:

1. Open MS Internet Explorer.
2. The encoder defaults to no login for the user interface.

   Note: You can choose to configure the system for a user name and password using the Logon button at the top. The new user name and password take affect after resetting the encoder.

3. When the GUI is configured for a user name and password, type the IP address of the D9054 HD Encoder to set up in the Address bar and press Enter.



4. Type the user name.

   Hint: If you have forgotten your user name and password contact Cisco Customer Support to have it reset.

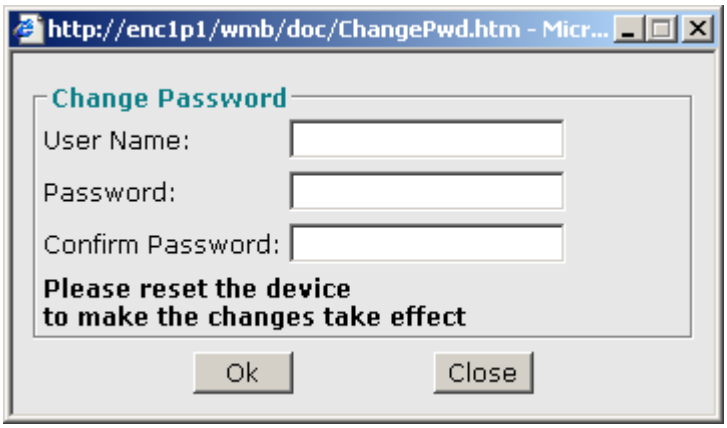
5. Type the password.

Changing the Password for the Web Interface

To Change the Password for the Web Interface

Proceed as follows to change the password for the Web Interface:

1. Log on to the Web Interface.
2. Click the **Logon** button at the top.
3. Type the user name and new password.



The password can be a maximum of eight ASCII characters.

Important: The password and user name will be remembered for the whole of the web session. Close the web browser if you want to prevent others from getting access to the settings of the D9054 HD Encoder.

Hint: If you have forgotten your Web GUI password, you can reset it from the front panel user interface.

4. Type the new password once more.
5. Click **OK**.
6. Reset the D9054 HD Encoder.

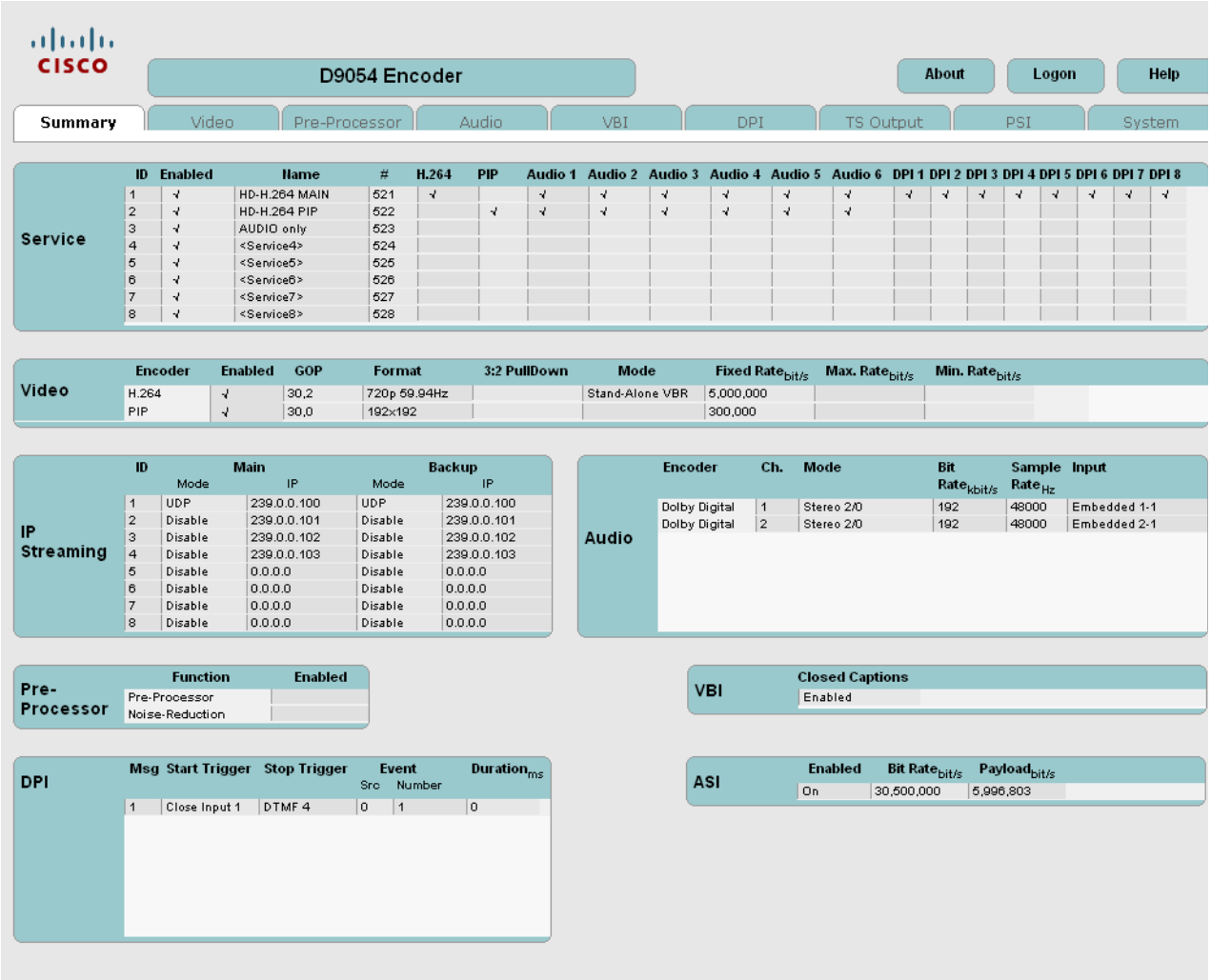
   You reset the D9054 HD Encoder by pressing the Reset button from the System tab page.

Web Interface - Summary Screen

To get an Overview of the Main D9054 HD Encoder Settings

Proceed as follows to obtain an overview of the main D9054 HD Encoder settings:

1. Log on to the Web Interface.
2. Click the **Summary** tab.



The Summary shows the main settings of the D9054 HD Encoder.

Tab Pages

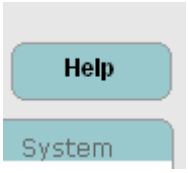
The GUI of the D9054 HD Encoder has a number of tab pages.

The function for the tab pages is as follows:

- Summary
  From this page you can get an overview picture of the most important settings in the D9054 HD Encoder.
- Video
  From this page you can set up the
  - video input type and resolution
  - picture width, the GOP sequence, chroma format, video aspect ratio
  - rate for fixed rate (CBR) encoding
  - statistical multiplexing parameters such as encoding rate, statmux pools, redundancy states and monitoring statistics
- Pre-processor
  From this page you can set up the pre-analysis and noise reduction parameters.
- Audio
  From this page you can set up the audio input parameters such as type, impedance, sample rate, clipping level, audio encoding mode, bit rates.
- VBI
  From this page you enable or disable the various VBI resources.
- DPI
  From this page you set up the digital program insertion parameters.
- TS Output
  From this page you can set up the output mode, format and bit rate. You can also set up the parameters for the IP streaming output.
- PSI
  From these tab pages you define the PIDs, program names and numbers for the various program elements.
- System
  From this tab page you an read various system parameters such as serial number, software version number, system uptime, temperatures and slot information. You can set up trap destinations, see messages and change message settings. You can also install options and reboot or reset the system to the default settings.

The Help Button

The GUI of the D9054 HD Encoder has the following help button:



The Table of Contents for the online help file is displayed when you click the Help button.

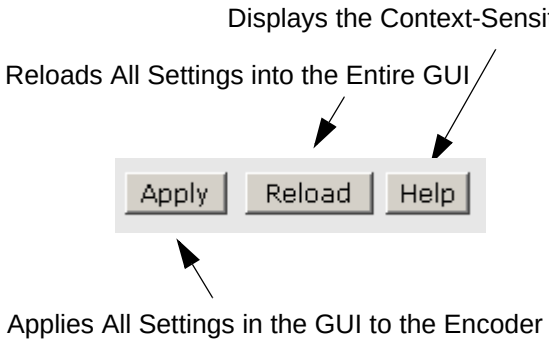
The About Button

The GUI of the D9054 HD Encoder has the following About button:

The current D9054 system version information is displayed when you click the About button.

The Apply, Reload and Context-sensitive Help Buttons

The GUI of the D9054 HD Encoder has the following general buttons:



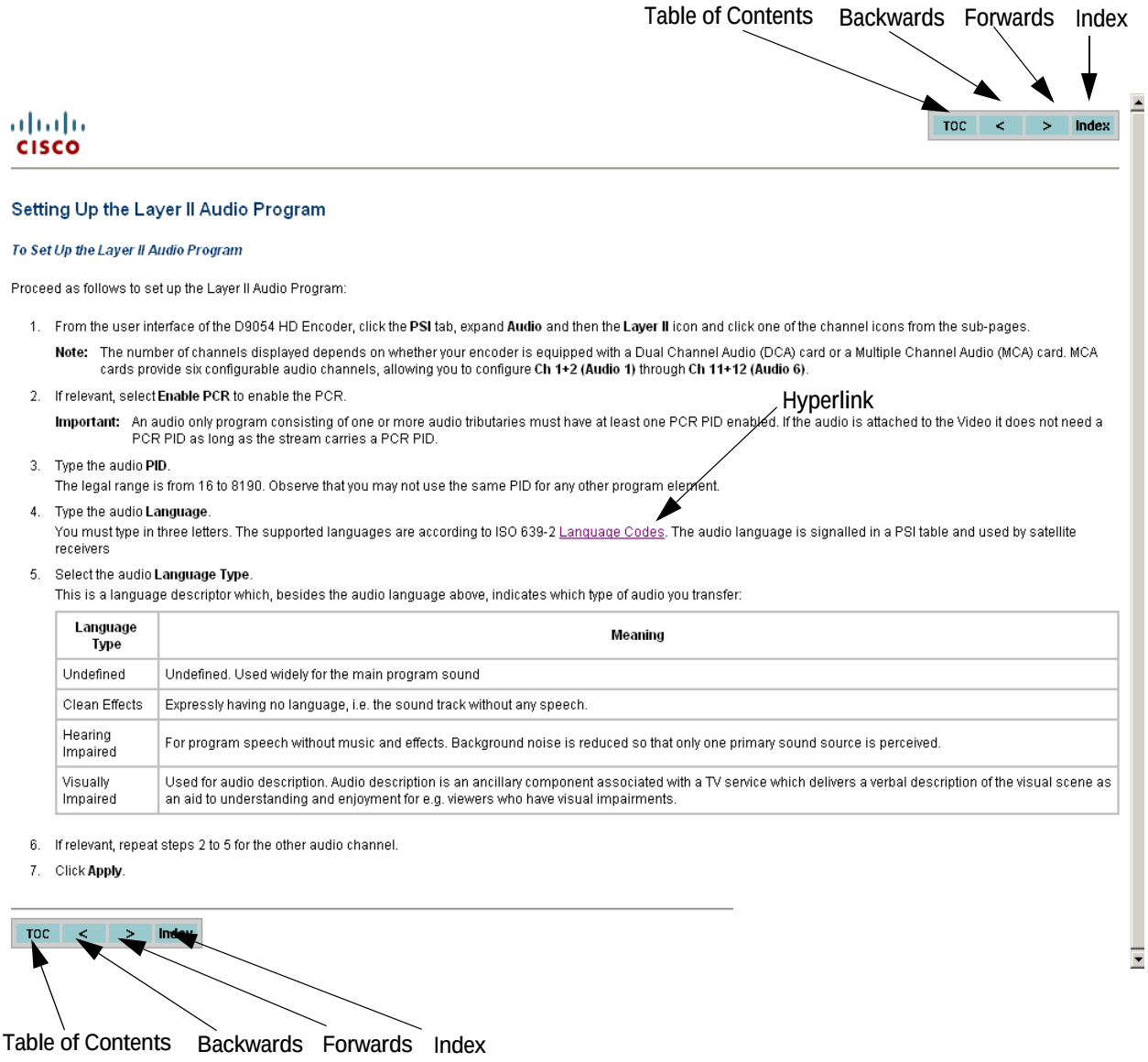
Note: Apply all values including the new ones are validated against each other. Incompatible settings result in an error message telling you why the values couldn't be set.

Online Help Features

The GUI of the D9054 HD Encoder has context-sensitive online help. Just press the help button in the GUI and the help belonging to the current window will display. Throughout the help system there are hypertext links to related topics.

From the help window you can:

- use the table of contents to navigate in the help system
- use the index to find specific topics



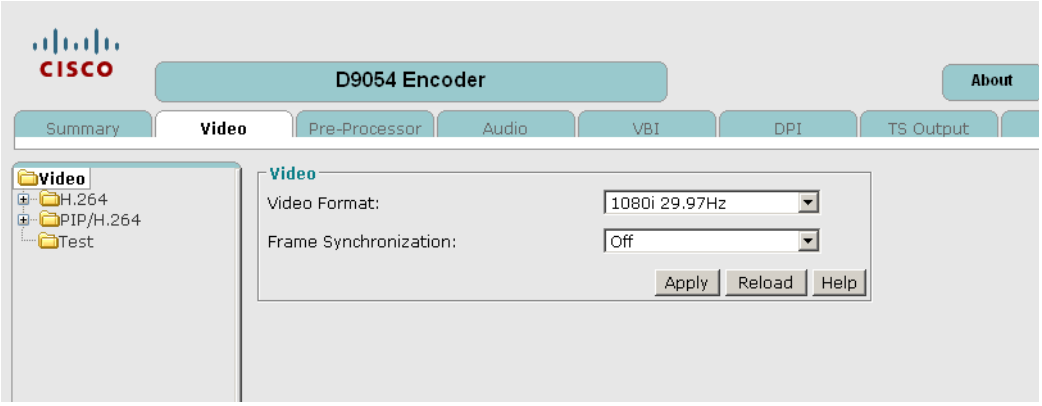
Section A - Setting Up Video

Setting Up the Video Input

To Set Up the Video Input

Proceed as follows to set up the Video Input:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab.



2. Select the **Video Format**.
   You may select 1080i/25 Hz, 1080i/29.97 Hz, 720p/50 Hz or 720p/59.94 Hz formats.

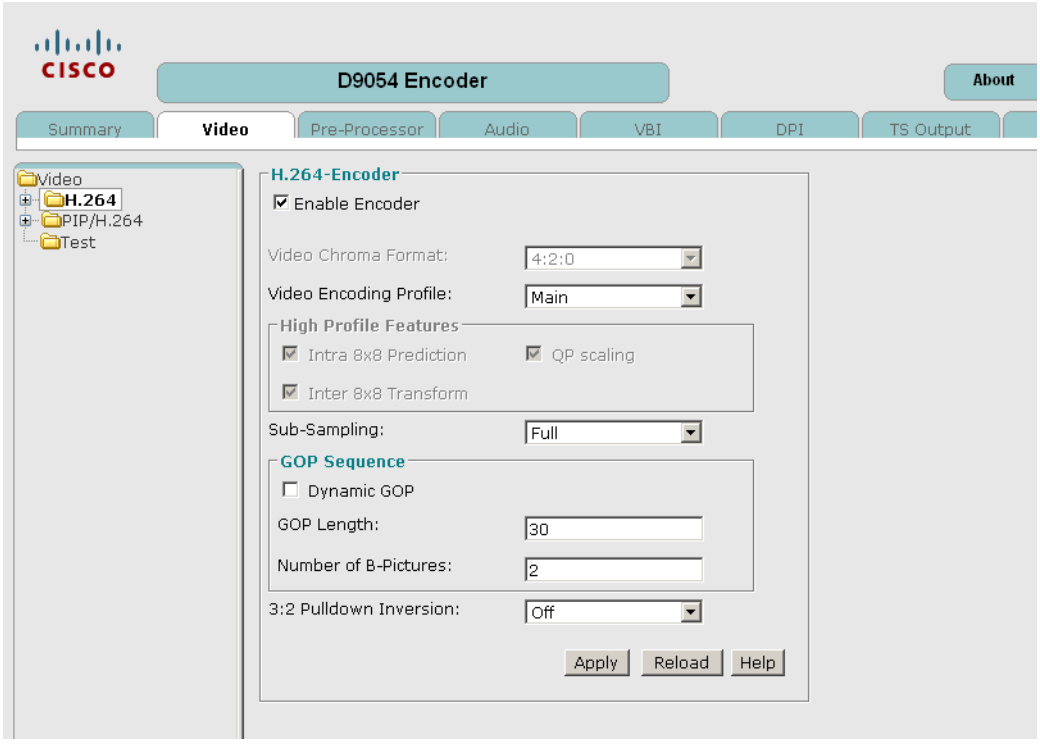
3. Set the **Frame Synchronization**.
   You may select Off, Internal Clock or External Reference. The default is Off.
   When Off is selected, the internal frame synchronizer is bypassed. This provides the best lip sync as the internal clock is locked to the incoming video signal.
   When Internal Clock is selected, an internal reference is used as the encoding reference. The internal clock should be used when the encoder is connected to an unstable video source.
   If the encoder is configured for an external reference, it will use an SD analog video signal to reference its encoding reference. If the encoder is configured to pass Dolby AC3, AAC or Dolby E/linear pre-encoded audio, it is mandatory that the frame synchronizer be set to Off or that the external reference is locked to the incoming video source.

4. Click **Apply**.

To Set Up the H.264 Video Encoder

Proceed as follows to set up the Video Encoder:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab and then the **H.264** icon from the sub-pages.



2. Select **Enable Encoder** to enable the video encoder.

   Disabling the video encoder means that the video program will not be encoded. If you have defined an audio only program it will continue to be encoded.

3. Select the **Chroma Format**.

   The chroma format is fixed at 4:2:0.

   If you have problems with the video delay, see **Setting Up the H.264 Video Encoder Delays**, page 5-21.

4. Select the **Video Encoding Profile**.

   The default is Main. High Profile is also available if you purchased the High Profile option license. High Profile provides a marginal reduction in the required bit rate without degradation in the video quality.

5. If the High Profile license is installed, and High Profile is selected as the Video Encoding profile as shown below, all of the High Profile Features should be enabled (checked) for optimal compression efficiency. Individual features should only be disabled if the decoder(s) do not support the particular feature.

   Note: For this application you must be using decoders downstream which support High Profile functionality to make use of these features such as the D9887 HDTV Modular Receiver.

   Each of the High Profile settings are described below:

   Intra 8x8 Prediction - selects Intra 8x8 prediction mode and 8x8 transform for Intra-coded macroblocks in addition to Intra 16x16 and 4x4 prediction modes in Main Profile. This increases compression efficiency.

   Inter 8x8 Transform - selects 8x8 transform for Inter-coded macroblocks in addition to 4x4 transform in Main Profile. This increases compression efficiency.

   QP scaling - selects different quantization step sizes for each frequency. This improves subjective quality at lower bit rates or for stressed content.

6. Select Full, 3/4, 2/3 or 1/2 **Sub-sampling**.

   Subsampling decreases the resolution of the source material in order to lower the amount of data to be encoded. 2/3 horizontal resolution is not supported for 720p.

7. Enable **Dynamic GOP**. Dynamic GOP should always be enabled for best video quality.

   Dynamic GOP adds to end-to-end delay. If lower end-to-end delay is more important than video quality, then Dynamic GOP should be turned off (disabled).

   When Dynamic GOP is on (the default is off), the encoder selects between two hierarchical GOP structures, one with 3 B-pictures and the other with 15 B-pictures. The selection is automatically based on video content (scene's spatio-temporal complexity).

   When using Dynamic GOP, the **GOP Length** must be a multiple of 16 (i.e., 16, 32, 48, etc).

8. Type the **GOP Length**.

   The GOP length must be in the range from 1 to 255.

9. Type the **Number of B-Pictures**.
   The number of B pictures must be 0, 1, 2, 3, 7 or 15.
   For I-Frames only (i.e., IIII..) set GOP Length = 1 and Number of B-pictures = 0.
   For IPIP..., set GOP Length = 2, Number of B-Pictures = 0.
   For IPPIPP..., set GOP Length = 3, Number of B-Pictures = 0.
   For typical MPEG-like GOP (i.e., IBBP...) set GOP Length = 15, Number of B-Pictures = 2.
10. Set the **3:2 Pulldown Inversion** (abbreviated 3:2 PDI) to On if you are going to encode 1080i/29.97 Hz material.
    This improves the picture quality when encoding 1080i/29.97 Hz material that originates from film.
    Turn off the 3:2 PDI in the following instances:

Situation	Reason
Your decoders are not fully MPEG-2 compliant.	The decoders may not accept information on picture repetition and cannot regenerate a correct video sequence.
You need to encode all frames	3:2 PDI removes some of the frames and this means that you cannot provide full picture-to-picture transparency from the video input to the Transport Stream.

    The 3:2 PDI feature is only applicable for the 1080i/29.97 Hz format.

    Note: Enabling 3:2 PDI increases the delay by 1 frame.

    Important: Do not enable or disable 3:2 PDI during live operation. The D9054 HD Encoder restarts if you enable or disable 3:2 PDI.
11. Click **Apply**.

3:2 Pulldown and 3:2 Pulldown Inversion

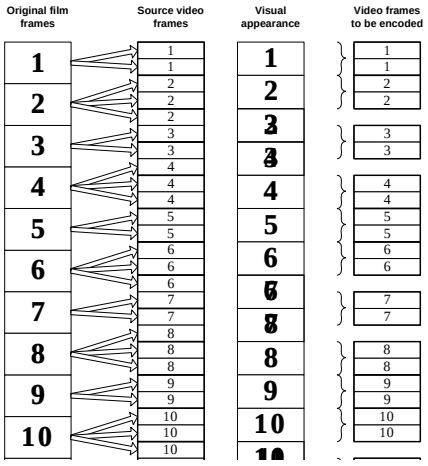
Overview

When 24 fps film is converted to 29.97 or 30 Hz HD video, the film frame rate needs to be up-converted in order to be displayed on a TV set. This process is called 3:2 pulldown.

Basically 3:2 pulldown inversion brings back movie's original frame rate from HD's 29.97 or 30 fps to 24 fps.

3:2 Pulldown

The 3:2 pulldown technique is used to generate video at HD frame rates from a 24 fps film source. With this technique, additional video frames are generated from the film frames according to a characteristic, repetitive pattern.



An unwanted side-effect of this process is picture redundancy and higher load of an encoder. The 3:2 pulldown inversion technique inverts the process and removes the redundant frames thus increasing encoding efficiency.

3:2 Pulldown Inversion

The 3:2 PDI feature of the D9054 HD Encoder excludes the pictures of a 1080i/29.97 Hz video signal that have been duplicated through 3:2 pulldown, and allows the D9054 HD Encoder to encode the original frames at film rate. The data in the Transport Stream from the D9054 HD Encoder includes information on picture repetition so that a standards-compliant decoder may output a video signal at correct 29.97, 30, 59.94 or 60 Hz HD frame rates.

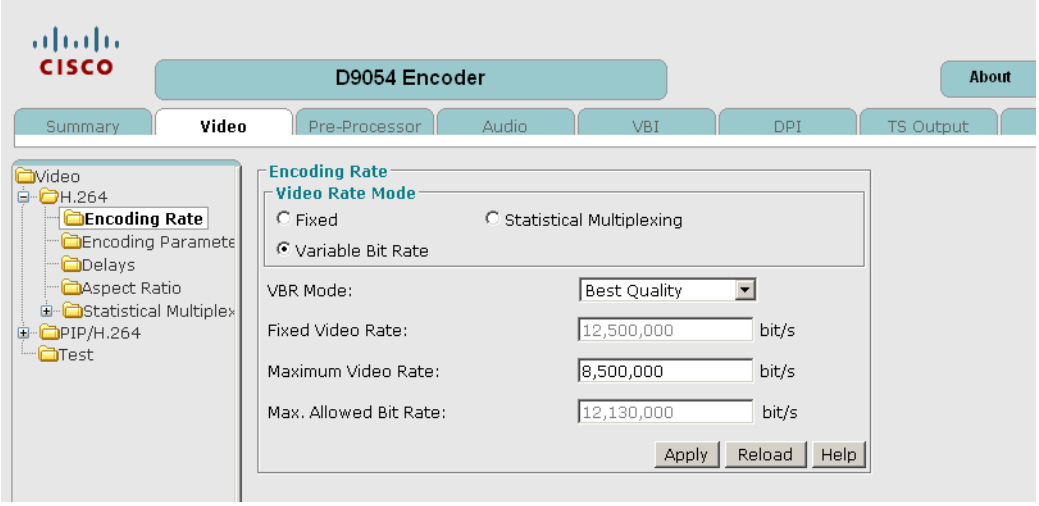
Encoder Behavior

The 3:2 pulldown detector of the D9054 HD Encoder detects if there is a distinctive pattern of the 3:2 pulldown cadence, and controls the encoder actions, time stamping, etc. The D9054 HD Encoder tracks the input material and goes automatically and seamlessly in and out of 3:2 pulldown inversion, if the 3:2 PDI feature has been enabled. No user intervention is therefore required for channels with mixed film/video originated content.

Especially for low bit rates the 3:2 PDI feature provides a significant improvement of the picture quality when encoding 1080i/29.97 Hz material that originates from film. The improvement varies with the encoding rate, and the nature of the material. Evidently, the overall benefit to your service depends on how often 3:2 pulldown material actually appears. In normal 1080i/29.97 Hz distribution applications, it is recommended that you enable 3:2 PDI.

Proceed as follows to set up the Video Encoder:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab, expand the **H.264** icon and click the **Encoding Rate** icon from the sub-pages.



2. Set the **Video Rate Mode**. Set the Video Rate Mode to Fixed, VBR or Statmux. Fixed is used for constant bit rate support. VBR is constrained to a maximum rate whereby Statmux allows you set video bit rate (i.e., minimum and maximum) which the encoder can operate within.

3. Set the **VBR Mode**. This controls the video encoding bit rate during periods of low complexity. Select a setting from most to least aggressive. Selections are: Best Quality, Low, Moderate, Aggressive and Very Aggressive. The default is Best Quality.

4. Set the Video Bit Rate. The GUI automatically displays the **Maximum Allowed Bit Rate** in order to help you set the correct video bit rate. (Fixed Video Rate is not used.)

   The maximum encoding rate allowed depends on the outgoing TS rate. You must increase the TS rate, if possible, if you need a higher encoding rate than displayed. The legal bit rate is in the range from 3 to 20 Mb/s at MPEG-4 part 10 MP@L4 video compression rate or 3 to 25 Mb/s MPEG-4 part 10 HP@L4 video compression rate for the 4:2:0 Chroma format.

   Note: If you want to increase the video bit rate, ensure there is sufficient capacity on all of the outputs.

The following table shows the lowest recommended minimum rates with various GOP sequences and at full and 3/4 horizontal subsampling:

Video GOP Sequence	Lowest Recommended Minimum Bit Rate (Mbit/s)	
	Full Horizontal Subsampling	3/4 Horizontal Subsampling
1	30	22.5
2	20	15
3	15	11.25
≥4	10	7.5

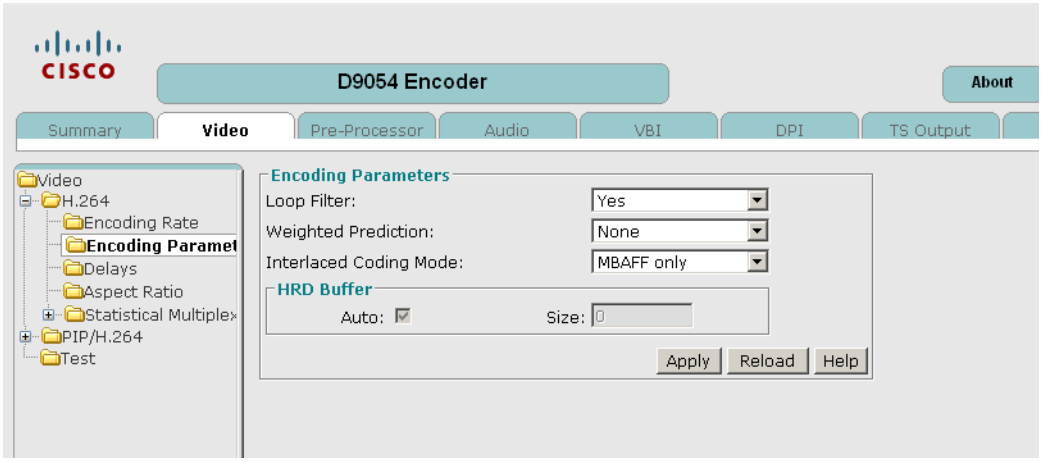
5. Click **Apply**.

Setting Up the H.264 Video Encoding Parameters

To Set Up the H.264 Video Encoding Parameters

Proceed as follows to set up the H.264 Video Encoding Parameters:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab, expand the **H.264** icon and click the **Parameters** icon from the sub-pages.



2. Set the **Loop Filter.** This enables (Yes) or disables (No) the de-blocking filter that reduces the appearance of blocking artifacts, especially at low bit rates. The default is Yes.
3. Select the **Weighted Prediction.** This enables the use of the weighted prediction tool set as specified in the H.264/MPEG part 10 specification. Selections are: None or Implicit. The default is None.
4. Select the **Interlaced Coding Mode**.

   This selects the Adaptive Frame Field coding mode of the H.264 tool set. The default is MBAFF only. This is applicable to 1080i mode only. Selections are: MBAFF only, Picture AFF and Field Picture Only. The default is MBAFF only.

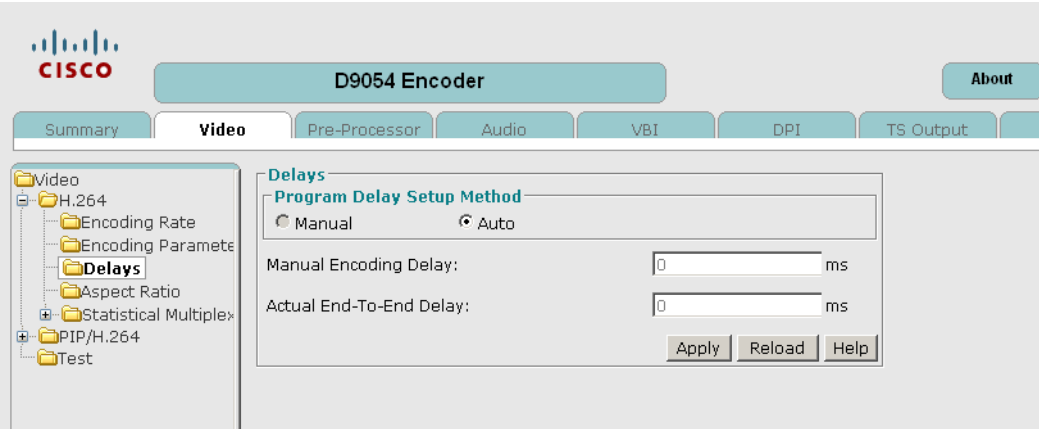
   - MBAFF Only - this combines the two fields and compresses them as a single frame, but before coding the frame, splits the pairs of two vertically adjacent macroblocks into either pairs or two field or frame macroblocks.
   - Picture AFF - this combines the two fields and codes them as one frame (frame mode). This mode provides the best video quality.
   - Field Picture Only - this does not combine the two fields and codes them as separate fields (field mode).
5. Click **Apply**.

Setting Up the H.264 Video Encoder Delays

To Set Up the H.264 Video Encoder Delays

Proceed as follows to set up the Video Encoder Delays:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab, expand the **H.264** icon and click the **Delays** icon from the sub-pages.



   The GUI automatically displays the actual end-to-end delay. The end-to-end delay includes the pre-processing delay and the encoding delay but excludes any additional delay in external equipment such as implementation delay in decoders. The feature is fixed at Auto and cannot be changed manually.

2. The **Auto** delay setup method is automatically selected. The D9054 HD Encoder automatically sets the delay to the maximum which provides the best picture quality.

   The Manual method is unavailable for this release.

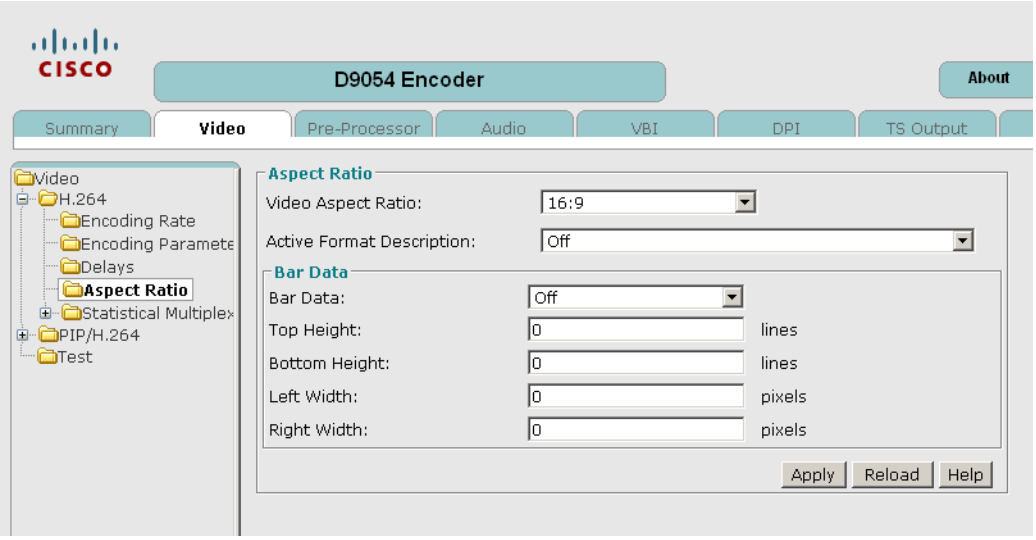
3. Click **Apply**.

Setting Up the H.264 Aspect Ratio

To Set Up the H.264 Aspect Ratio

Proceed as follows to set up the Aspect Ratio.

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon and click the **Aspect Ratio** icon from the sub-pages.



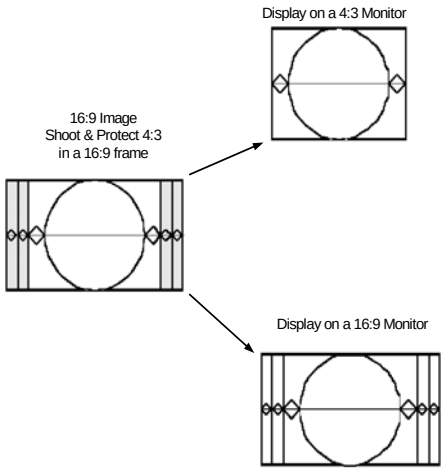
2. Set the **Video Aspect Ratio**.

   Select 16:9 for wide-screen format. Select 4:3 for standard television format.

3. Select the **Active Format Description**.

   The AFD is used for signaling to the set-top box or IRD how the coded video image is best displayed when the monitor does not match the coded image. The default setting is Off.

   If you have a 16:9 format picture and the decoder/receiver has a 4:3 monitor, you can select "16x9 with shoot & protect 4x3" to represent the picture as shoot & protect 4:3 format.

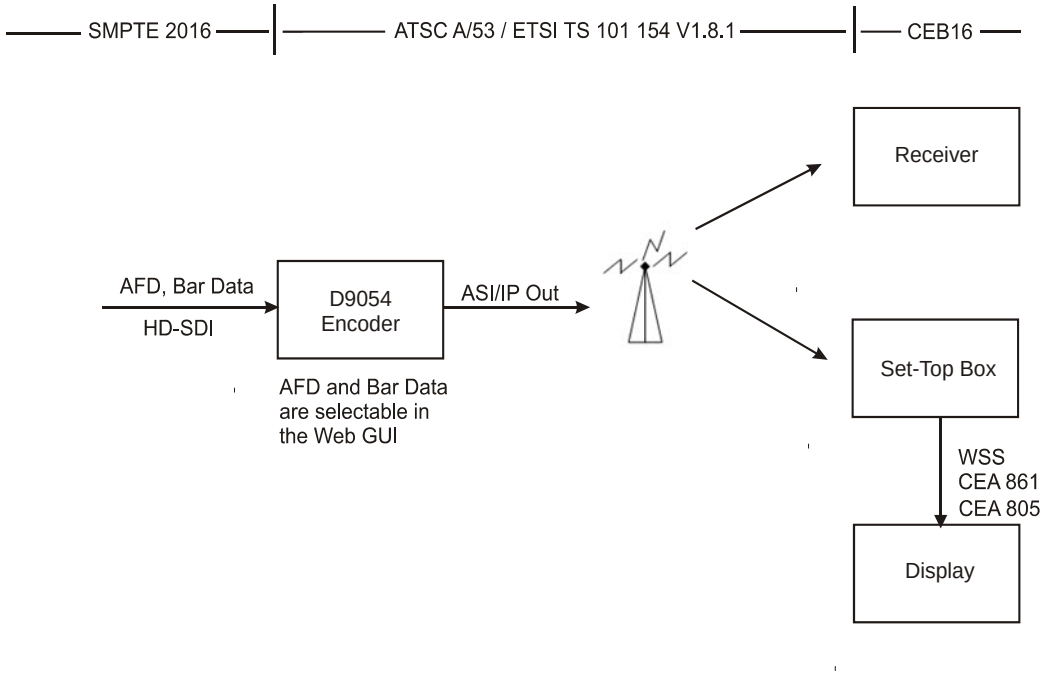


- If you select Off, no AFD signaling is present in the user data bits.
- All other selections will force AFD signaling to the new setting, regardless of the video format.

4. Set the **Bar Data**.

   Bar data is used during format conversion to scale the image for the optimum width and height of the picture when AFD cannot signal the exact format (e.g., for Cinemascope movies). It can also be used for other non-standard-size picture display. The possible selections are: Off, Auto, Top and Bottom Bars, or Left and Right Bars. The default setting is Off. Select Auto for the encoder to automatically scale the image.

   The diagram below shows the standards which define the use of AFD and bar data in the transmitted signal from receipt by the encoder to display by a set-top box.



   Bar data signals one pair of bars only; either Top and Bottom Bars or Left and Right Bars.

Setting	Explanation
Top and Bottom Bars	Allows adjustment of the Top Height and Bottom Height settings. Selecting Top and Bottom Bars signals with AFD 0100 (i.e., aspect ratio > 16:9). The Top Height and Bottom Height can be adjusted in the range from 0 to 360 lines (up to half the screen height). SMPTE-2016-1, Annex B provides examples of how to translate the bar height to a bar data value.
Left and Right Bars	Allows adjustment of the Left Width and Right Width settings. Selecting Left and Right Bars signals with AFD 0100 (i.e., undefined/unknown). The Left Width and Right Width can be adjusted in the range from 0 to 640 pixels (up to half the screen width).

5. Click **Apply**.

Setting Up Statistical Multiplexing

Before You Begin

To make it easier to identify each encoder and its role in the Statistical Multiplexing pool, ensure that each encoder is assigned a unique system name, its video service is assigned a unique PID, and unique service ID.

Note: You need a statmux license for each D9054 HD Encoder that runs in statmux mode.

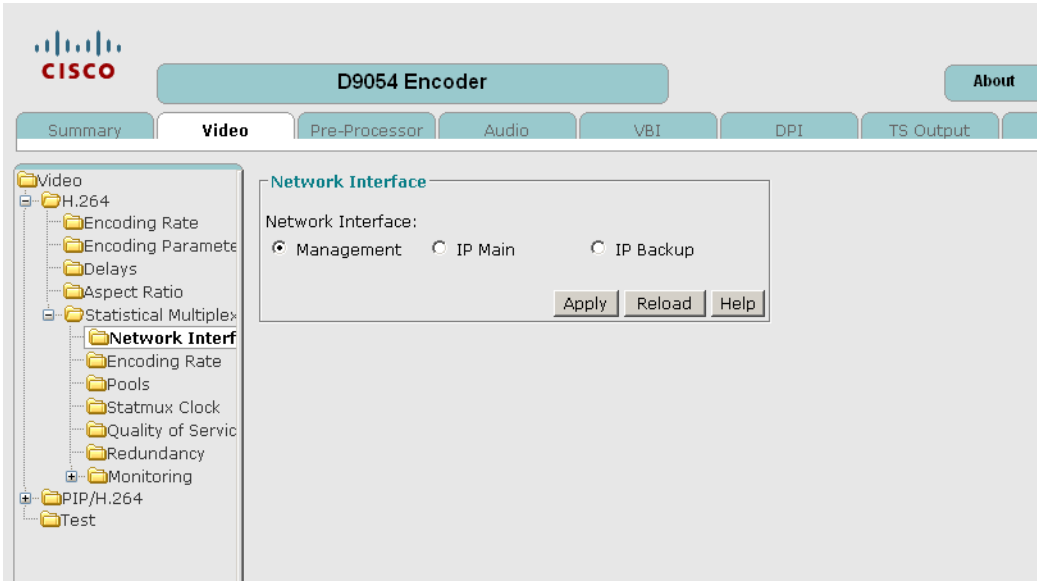
Note: Ensure that all video programs are frame synchronized by an External Frame synchronizer (i.e., set Frame Synchronization to External Reference).

Note: An external black burst reference must be used if using a mix of interlaced and progressive video formats.

Refer to **Setting Up the Video Input**, page 5-12 for more information.

Proceed as follows to set up the Statistical Multiplexing Network Interface:

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon, expand the **Statistical Multiplexing** icon and click the **Network Interface** icon from the sub-pages.



2. Select the communication port, either Management, IP Main or IP Backup. The Encoder uses the Management port as the default.

   Note: If you select or change the Network Interface to either IP Main or IP Backup port, you must power-cycle the encoder before communication at either of the ports in functional.

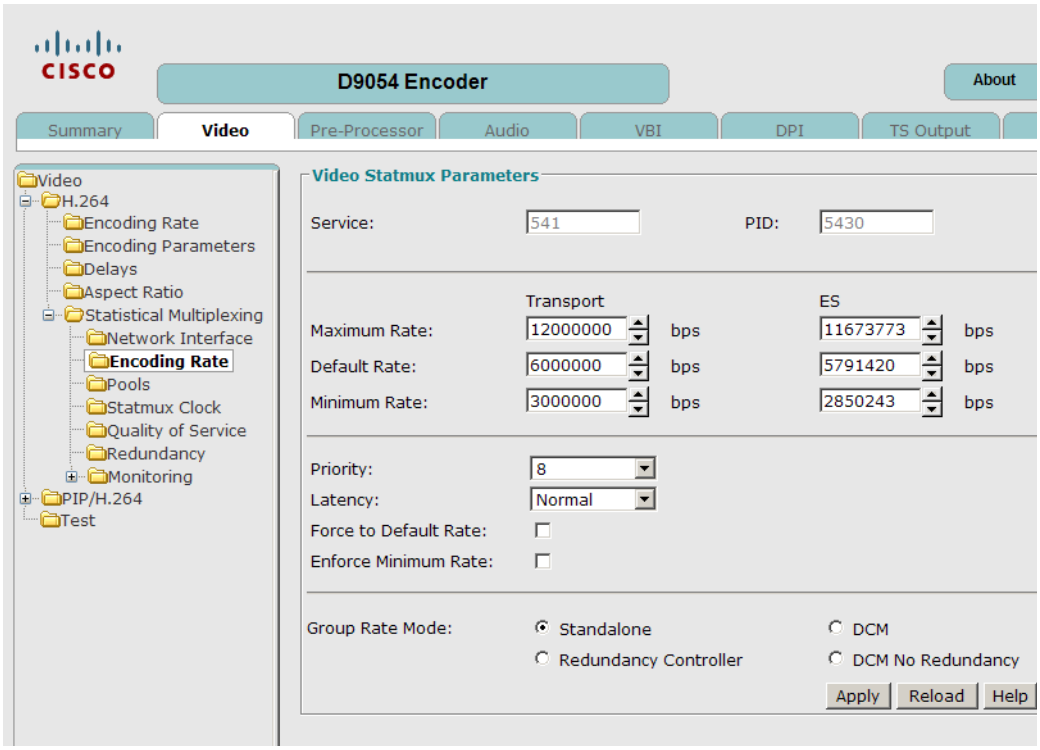
3. Click **Apply**.

Setting Up the Statistical Multiplexing Encoding Rate

To Set Up the Statistical Multiplexing Encoding Rate

Proceed as follows to set up the Statistical Multiplexing Encoding Rate:

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon, expand the **Statistical Multiplexing** icon and click the **Encoding Rate** icon from the sub-pages.



Note: The maximum video rate must be higher than (or equal to) the default video rate, and the default video rate must be higher than (or equal to) the minimum rate.

2. Set the **Maximum** (video) **Rate** for the Elemental Stream (**ES**).

   This setting is used to prevent the rate for a service from exceeding a specified value. The permissible range is from 3 to 20 Mbit/s.

   Example: A typical application is that you want to extract programs from the statistical multiplex bouquet and forward these programs separately. In that case, you may need to limit the maximum rate of each channel to extract so that you avoid overflow of the equipment that handles the extracted statmux programs.

   The maximum video rate limit setting does not imply that the encoder will try to go up to that rate, but simply that it will not exceed that rate. The maximum video rate during operation may be lower if the statmux pool size does not allow room for it.

3. Set the **Default** video **Rate** for the Elemental Stream (**ES**).

   The legal range is from 3 to 20 Mbit/s for Main Profile encoding and 3 to 25 Mbit/s for High Profile encoding. The default video rate is the service's contribution to the statmux pool when the D9054 HD Encoder participates in statistical multiplexing. During statistical multiplex operation, each D9054 HD Encoder that participates in statistical multiplexing will be granted capacity from the statmux pool. The sum of the default video rates for the active statmux channels equals the size of the statmux bit rate pool.

   The total rate of the statmux channels will not go beyond the statmux pool size, but may go lower depending on the input video complexity.

   The default video rate determines the encoding rate at which the encoder starts after power-up. Also, it determines the rate the encoder settles to during communication errors between the encoders in the statmux pool, or when the encoder is disconnected.

   For further information on setting up the default video rates, see **Determining the Default Video Rate**, page 5-29.

4. If relevant, set the **Minimum** video **Rate** for the Elemental Stream (**ES**).

   The legal range is from 0.5 to 20 Mbit/s for Main Profile encoding and 0.5 to 25 Mbit/s for High Profile encoding. The default rate is 1 Mbit/s. The instantaneous rate during statmux operation will not go below the stated minimum video rate. The instantaneous rate may be higher than the stated minimum video rate if so determined by the rate algorithm.

5. Set the **Priority**.

   The priority setting determines how to weight the video quality of a channel compared to the other channels in the statmux pool. There is a total of 16 values from 0 to 15. You are also allowed to give different channels the same priority. If all channels are equally important, the priority setting should be the same for all channels. The standard setting for all channels is 8. We recommend that you leave the priority setting at the standard setting unless you want to prioritize your statmux channels differently.

6. Set the **Latency**, i.e., video delay.

Delay	**Explanation**
Short	Represents a HRD (Hypothetical Reference Decoder) delay of 1250 ms.
Normal	Represents a HRD delay of 1500 ms.
Extended	Represents a HRD delay of 1750 ms.

These delay figures do not include additional delay from the pre-processing.

You select extended delay for applications where picture quality has priority to end-to-end delay. For the normal delay setting, the D9054 HD Encoder adheres strictly to the limitations in ISO/IEC 14496-1 (H.264 specification). You only select short delay for applications which require it as picture quality is likely to be reduced.

Note: Some decoders may require that you select normal delay.

7. If necessary, force the channel to the default video rate by enabling the **Force to Default Rate** option. This will force the channel to ignore the maximum and minimum rates. See **Determining the Default Video Rate**, page 5-29 for more information. This is not normally necessary unless maintenance is required.
8. If the **Enforce Minimum Rate** option is selected, the minimum rate setting will be enforced even when fewer bits are required to encode simple video content. When de-selected (default), the instantaneous rate can go below the minimum rate setting for simple content.
9. Set the **Group Rate Mode**. If the encoder is in a statmux pool that only contains AVC encoders, set the Group Rate Mode to Standalone. The default setting is Standalone. In this case, the encoders in each statmux pool communicate with each other to share bandwidth/resources.

   Select Redundancy Controller if there is an external redundancy controller without a DCM (e.g., PowerVu Network Centre Control System). The encoder will go into safe mode on power up by setting the redundancy state to standby.

   Select DCM for the encoder to receive and process group rate messages from the DCM and use the received group rate as the total bandwidth for bits allocation.

   Select DCM No Redundancy for the encoder to receive and process group rate messages from a DCM without backup enabled. It will also use the received group rate as the total bandwidth for bits allocation.
10. Click **Apply**.
11. To assign encoders to a statmux pool, refer to **Setting Up the Statistical Multiplexing Pools**, page 5-30.

Determining the Default Video Rate

To Determine the Default Video Rate

1. It is recommended that you initially set the default video rates for all statmux channels to the VBR capped bit rate or slightly lower.

   You may change individual channel rates later.

   Note: When the number of statmux channels is high you may typically reduce the default video rates slightly while maintaining the same subjective quality.

   If you have experience from a fixed rate service (e.g., CBR or capped VBR), it may be a good idea to start using default video rates comparable to the previous fixed rates.

   Note: The actual default video rates in your setup will depend on your application, the anticipated source material, and your quality requirements. The smaller the size of the statmux pool compared to the target video quality, the less frequently you will reach the quality limit.

2. If required, set the default video rate higher for some of the channel(s).

   This improves the quality of the changed channels when the encoder is removed from the statmux pool, when there is loss of the external reference, or loss of the network connection.

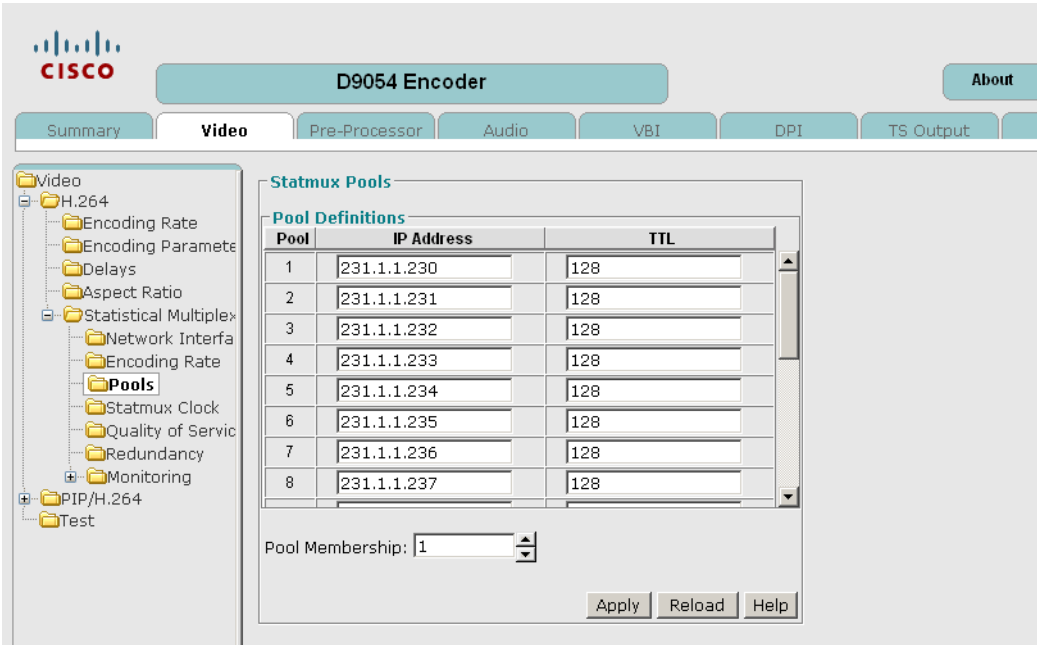
3. Use higher default video rates for any channels with full resolution and lower default video rates for any channels with reduced resolution.

Setting Up the Statistical Multiplexing Pools

To Set Up the Statistical Multiplexing Pools

Proceed as follows to set up the Statistical Multiplexing Pools:

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon, expand the **Statistical Multiplexing** icon and click the **Pools** icon from the sub-pages.

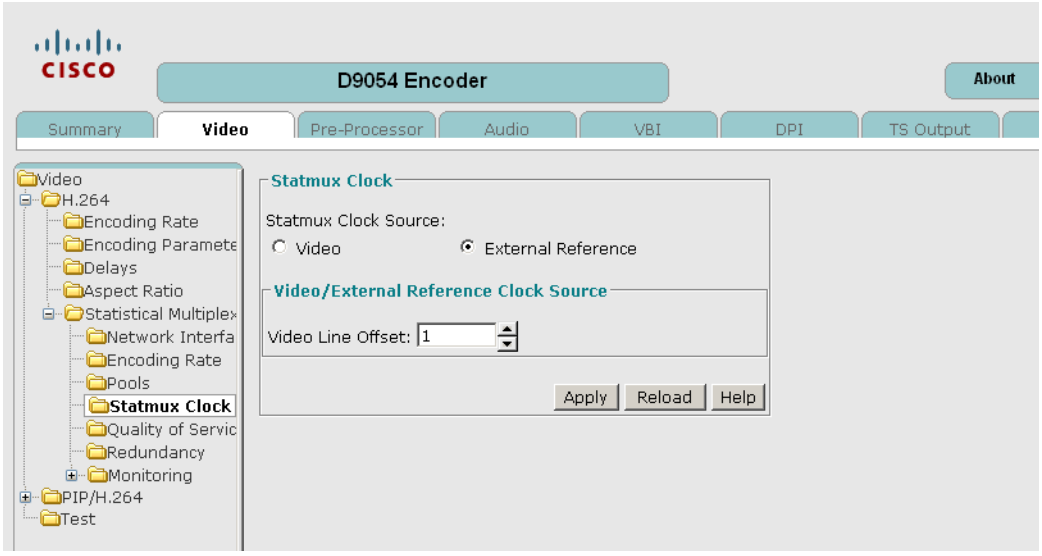


2. The messages/communication sent between encoders are sent over the Ethernet interface using UDP multicast. Each statmux group or pool uses an unique multicast address and port. The range of addresses is from 224.0.0.0 to 239.255.255.255. Enter the UDP multicast IP address assigned to the statmux pool. Each encoder on the network is configured to listen to only messages from its assigned statmux group multicast address and port.
3. Enter the **TTL** (Time to Live). This number identifies the number of routers IP packets can travel through before they are dropped. The range is from 0 to 255. The default is 128.
4. Enter the Pool number that the encoder belongs to in the range from 1 to 20. Each pool is defined as a statmux group. All encoders in the same pool share a fixed bit rate, determined by the sum of the default bit rates.
5. Click **Apply**.
6. Go to **Setting Up the H.264 Video Encoding Rate**, page 5-18 to set the Video Rate Mode to Statistical Multiplexing.

To Set Up the Statistical Multiplexing Clock

Proceed as follows to set up the Statistical Multiplexing Clock:

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon, expand the **Statistical Multiplexing** icon and click the **Statmux Clock** icon from the sub-pages.



2. Select the statmux clock source. All statmux clocks must be synchronized to either:
   - the input/incoming video source,
   - or to a black burst or other appropriate video reference signal.
   - Select **Video** if the incoming video source is synchronized. All encoders belonging to the same statmux pool must be synchronized via the same source.
   - Select **External Reference** if the synchronization source is a black burst or other appropriate video reference signal.
   - **Video Line Offset** sets the video line to be used for statmux synchronization.

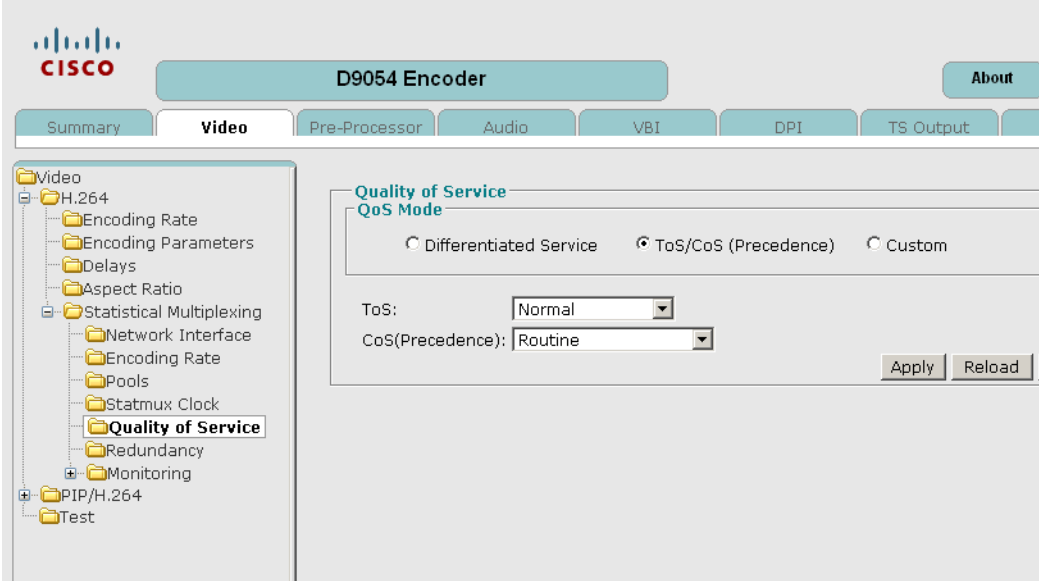
   Note: It is not recommended that you change the Video Line Offset. The default setting is line 1. If it is necessary to change the offset, ensure that the same setting is used for all encoders belonging to the same statmux pool.

3. Click **Apply**.

To Set Up the Statistical Multiplexing Quality of Service

Proceed as follows to set up the Statistical Multiplexing Quality of Service:

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon, expand the **Statistical Multiplexing** icon and click the **Quality of Service** icon from the sub-pages.

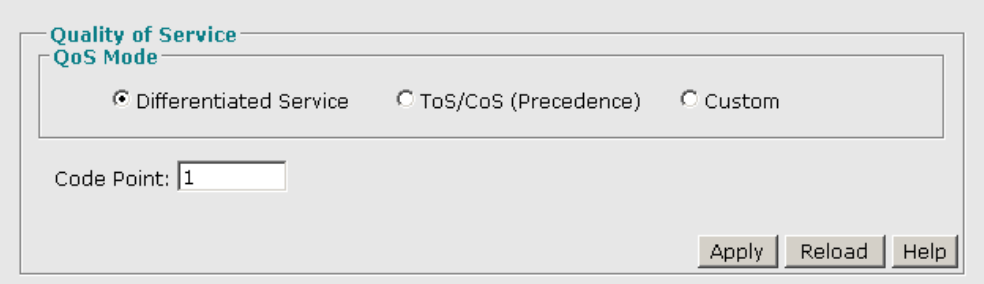


2. Choose the desired quality of service (**QoS Mode**); either Differentiated Service, ToS/CoS (Precedence) or Custom. The default is ToS/CoS (Precedence). These settings are used to guide the selection of the actual service parameters when transmitting data through a network.

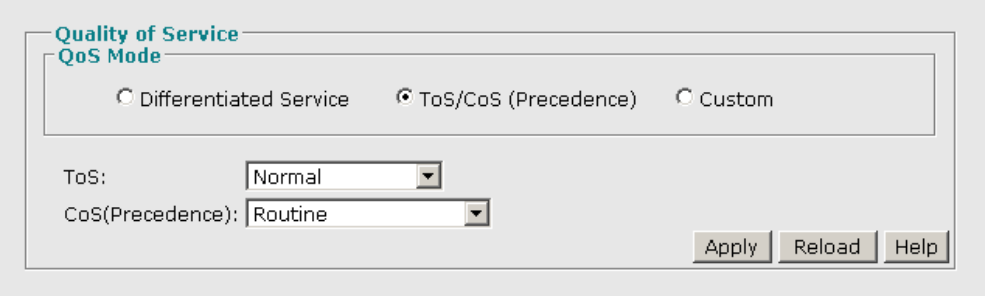
   Each of the three available modes and the RFC (Request for Comment) references to set these modes are described in the following table.

Mode	Description
Differentiated Service	Refer to RFC 2474 and RFC 3260. Supports configuration of TOS bits in the IP header, allowing integration in Diff Serve networks.
ToS/CoS (Precedence)	Type of service precedence. Refer to RFC 791.
Custom	Refer to RFC 3168.

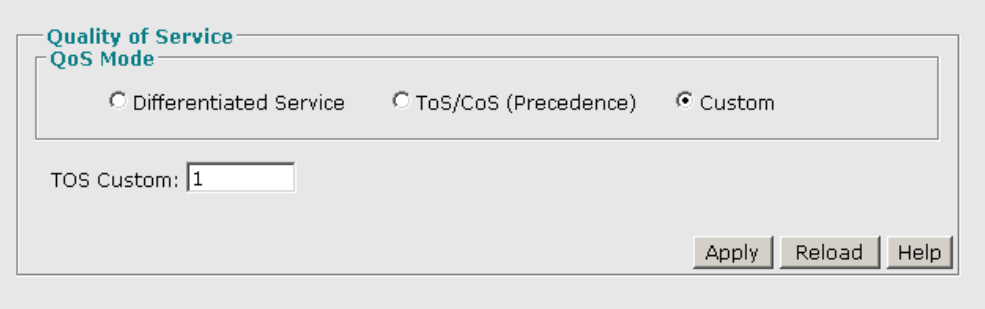
- When you select **Differentiated Service** as the QoS mode, you need to set the Differentiated Service "Code Point" (DSCP) for each Stream ID. The Code Point is 6-bit field which indicates the type of service the packet carries when the encoder is connected to a router (i.e., to set the priority).



- When you select the **ToS/CoS (Precedence)**, you can select from one of five different TOS settings: Normal, Min. Cost, Max. Reliability, Max. Throughput, and Min. Delay. The default setting for each field is Normal.



- Set the CoS (Precedence) mode settings. Some networks offer service precedence, which treats high precedence traffic with a higher priority than other traffic (by accepting only traffic above a certain precedence at the time of high load). Choose from Routine, Priority, Immediate, Flash, Flash Override, Critic ECP, Internetwork Control or Network Control. The default is Routine.
- When you select **Custom** as the QoS Mode, set the 8-bit field that contains the QoS bits. This value is a multiple of the value set for the Differentiated Service Code point.

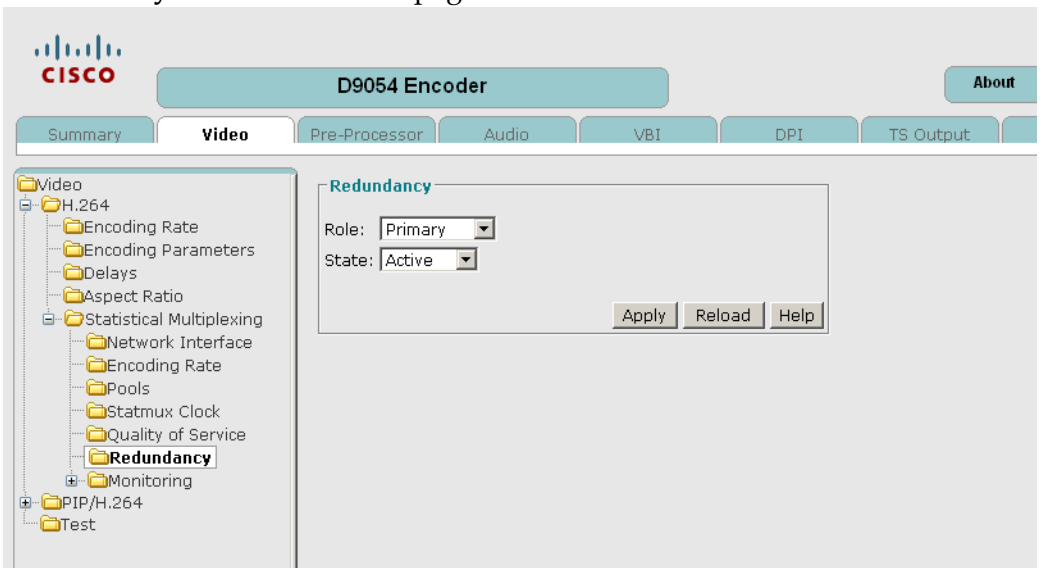


3. Click **Apply**.

To Set Up the Statistical Multiplexing Redundancy

Proceed as follows to set up the Statistical Multiplexing Redundancy:

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon, expand the **Statistical Multiplexing** icon and click the **Redundancy** icon from the sub-pages.

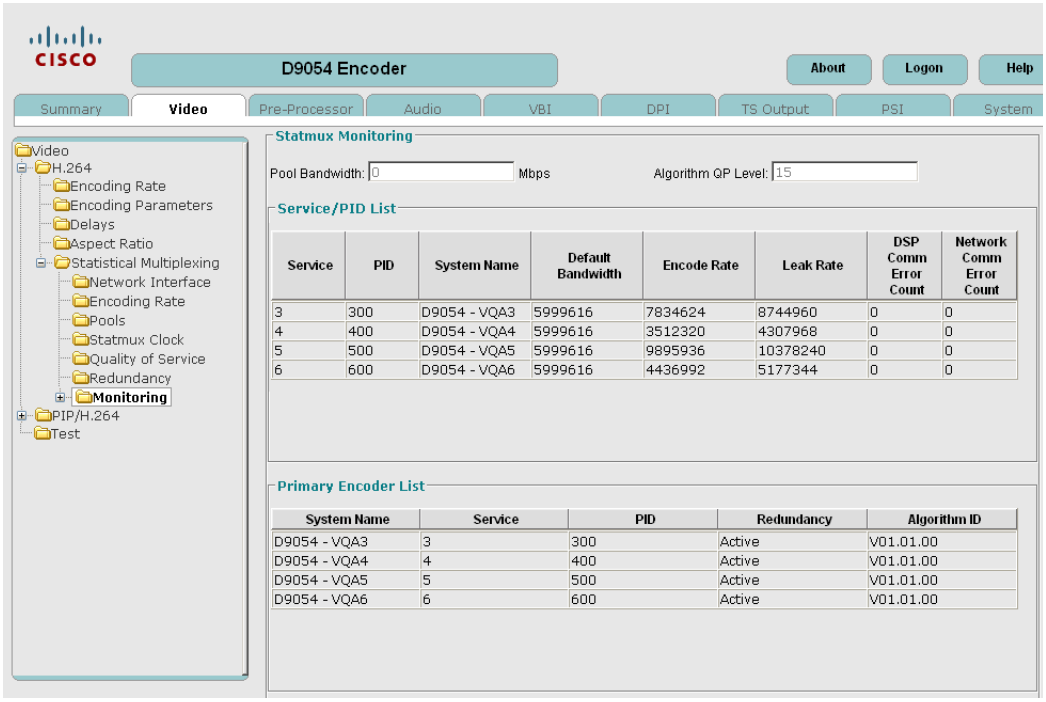


2. Set the **Role** of the D9054 Encoder. The encoder's role is normally set as Primary, but may be set to Secondary for use as a backup encoder.
3. Set the operating **State** of the Secondary encoder to either Active or Standby. Active means the encoder is fully participating in the statmux pool. Standby means the encoder does not participate in the statmux pool.
4. Click **Apply**.

To Monitor Statistical Multiplexing

Proceed as follows to monitor Statistical Multiplexing:

1. From the user interface of the D9054 HD Encoder click the **Video** tab, expand the **H.264** icon, expand the **Statistical Multiplexing** icon and click the **Monitoring** icon from the sub-pages.



The GUI automatically displays information about the statmux pool that the encoder belongs to, e.g., the services being shared among encoders in the statmux pool, the operating states of the encoders (active or standby), and their roles (primary or secondary).

Pool Bandwidth

This is total of the default bandwidths of all encoders in the statmux pool that the local encoder belongs to.

Algorithm QP Level

This is the Quantization Parameter value resulting from the statmux algorithm. Higher values indicate lower performance.

Service/PID List

Service

These are the video services output by each of the encoders in the statmux pool.

PID

These are the unique PID numbers assigned to each of the video services output by the encoders in the statmux pool.

System Name

These are the system names of all the encoders in the statmux pool. See **Reading the System Information or Managing the System**, page 5-120 for more information.

Default Bandwidth

This is the default bandwidth set for each of the encoders in the statmux pool in the range from 3 to 20 Mbps for Main Profile encoding and 3 to 25 Mbps for High Profile encoding.

Encode Rate

This is the encoding rate in bits/second for each of the encoders in the statmux pool.

Leak Rate

This is the leak rate of the encoders in the statmux pool. Leak rate is the transport packet output rate in bits/second.

DSP Comm Error Count

These are the number of communication errors which have occurred within the encoder since the error count was reset (via Reset Local Statistic operation), for each of the encoders in the statmux pool that the local encoder belongs to. These types of errors are local communication errors on the statmux data path within the encoder.

Network Comm Error Count

This is the number of network communication errors which have occurred since the encoders were powered up or reset for each of the encoders in the statmux pool that the local encoder belongs to. Network communication errors are initiated when an error in communication exist between the local encoder and any of the encoders in the same statmux pool. It is expected that network communications errors may occur is some instances during encoder power up but should not increment once fully powered up.

Note: Network communication errors can be cleared for the local encoder by clicking Reset Local Statistic at the bottom of the page. For more information, see **To Reset the Local Statistic**, page 5-38.

Primary Encoder List/ Secondary Encoder List

System Name

These are the unique system names for each of the encoders in the statmux pool. See **Reading the System Information or Managing the System**, page 5-120 for more information.

Service PID

These are the unique PID numbers assigned to each of the services output by the encoders in the statmux pool.

Redundancy

This is the operating state of each of the encoder in the statmux pool, either Active or Standby.

Algorithm ID

These are the algorithm IDs assigned to each of the encoders in the statmux pool.

To Reset the Local Statistic

1. Select **Reset Local Statistic** to reset the error count. This will reset the error count for the local encoder to 0.
2. Click **Reload**.

   Note: To ensure that statmux is operational, press Reload several times.

To verify statmux operation, check that the following data changes for each Reload:

- Encoder Rate
- Leak Rate

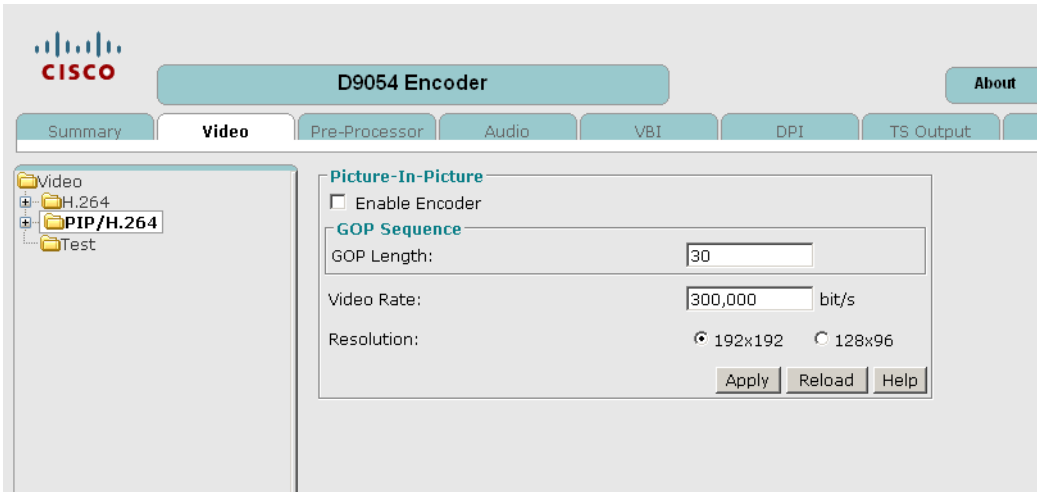
Also, check that the following data remains constant for each Reload:

- Pool Bandwidth
- Number of entries in the list
- DSP Comm Error Count
- Network Comm Error Count

To Set Up the H.264 PIP Video Channel

Proceed as follows to set up the H.264 PIP Video Channel:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab, and click the **PIP/H.264** icon from the sub-pages.



2. The **Enable Encoder** checkbox enables or disables the Picture-in-Picture channel. Normally it is disabled (unchecked). The PIP channel displays at 192x192 or 128x96. The default is 192x192.

3. Type the **GOP Length**. The GOP length must be in the range from 1 to 255.

   Hint: Generally it is advantageous to increase the GOP length if the video bit rate is low, however, lock-up time in the decoder is increased for long GOPs.

   Hint: If you need to clip digitally in the picture it is suggested that you use a closed GOP so that you don't lose a picture. A closed GOP is one that uses no referenced pictures from the previous GOP at the current GOP boundary. For example the GOP is closed when it starts with an I frame and subsequent B frames do not rely on I or P frames from the previous GOP.

4. Set the Video Bit Rate for the PIP channel.

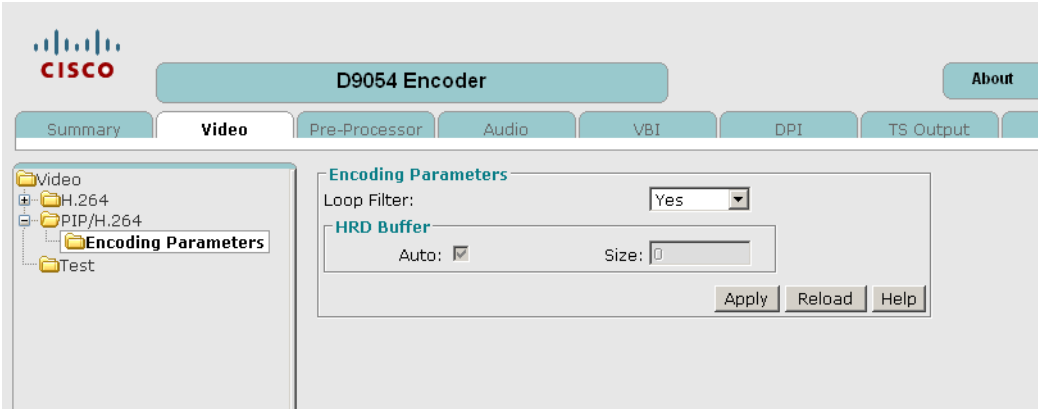
   The maximum encoding rate allowed depends on the outgoing TS rate. You must increase the TS rate, if possible, if you need a higher encoding rate than displayed. The channel is set to a default of 300 kb/s but can operate in the range from 200 kb/s to 500 kb/s for 192x192 resolution, or from 150 kb/s to 500 kbps for 128x96 resolution, for 4:2:0 Chroma format.

5. Click **Apply**.

To Set Up the H.264 PIP Video Encoding Parameters

Proceed as follows to set up the H.264 PIP Video Encoding Parameters:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab, expand the **PIP/H.264** icon and click the **Encoding Parameters** icon from the sub-pages.



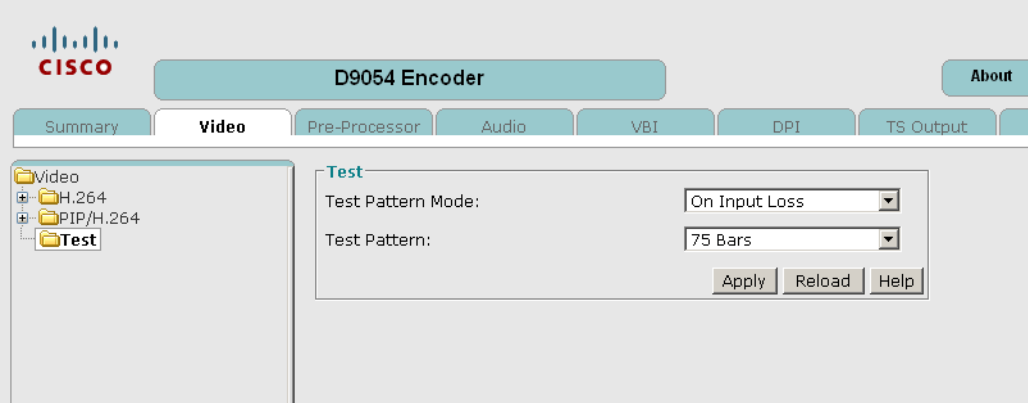
2. Set the **Loop Filter.** This enables (Yes) or disables (No) the de-blocking filter that reduces the appearance of blocking artifacts, especially at low bit rates. The default is Yes.
3. The **HRD Buffer** option is set (fixed) at Auto, thereby using the factory set value of 0. At the default setting, the encoder selects the optimum setting for this field based on the settings of the other related parameters. It cannot be changed.
4. Click **Apply**.

Setting Up the Test Pattern

To Set Up the Test Pattern

Proceed as follows to set up the Test Pattern:

1. From the user interface of the D9054 HD Encoder, click the **Video** tab and click the **Test** icon from the sub-pages.



2. Set the mode of the test pattern.
   If this is a test situation, select Always.
3. Set the **Test Pattern** to Output Muted, 75 Bars or Black.
4. Click **Apply**.

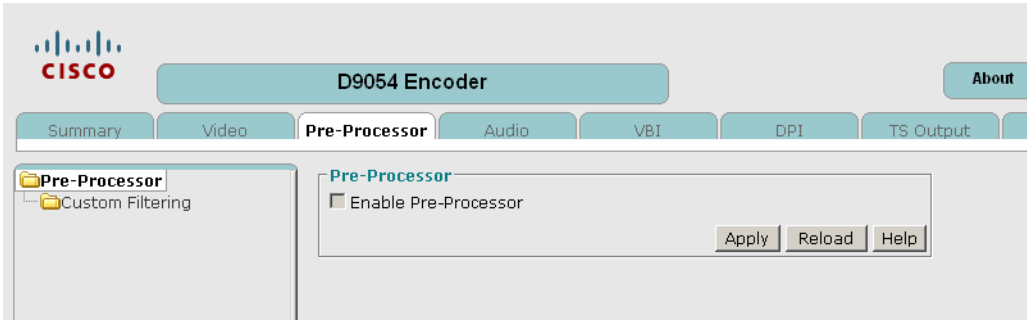
Section B - Setting Up the Pre-processor

Setting Up the Pre-processor Parameters

To Set Up the Pre-Processor Parameters

Proceed as follows to set up the Pre-processor:

1. From the user interface of the D9054 HD Encoder, click the **Pre-Processor** tab.



The **Enable Pre-Processor** function is not applicable to the D9054 Encoder, and is disabled.

Go to the **Custom Filtering** sub-page if you are an expert in pre-processing.

Setting Up the Pre-processor, Custom Filtering

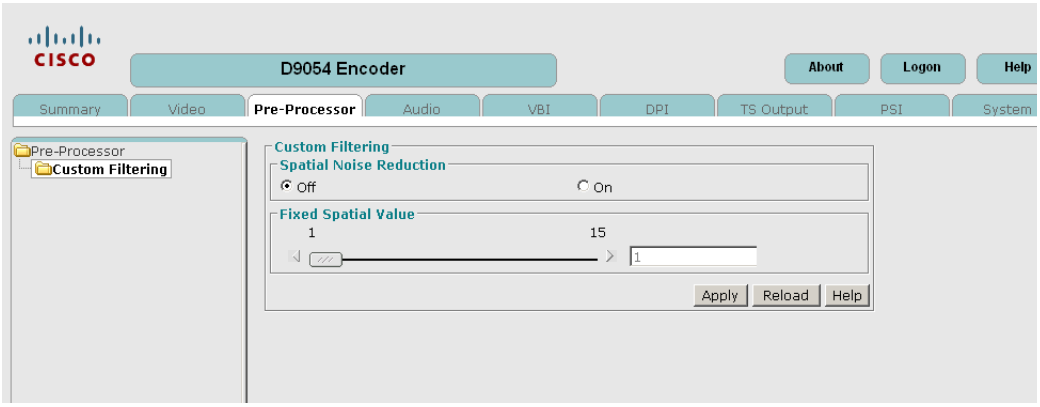
Important

It is strongly advised that you only use the custom setup if you are an expert in pre-processing.

To Set Up the Pre-processor, Custom Filtering

Proceed as follows to set up the Pre-processor, Custom Filtering:

1. From the user interface of the D9054 HD Encoder, click the **Pre-Processor** tab and click the **Custom Filtering** icon from the sub-pages.



2. Set the **Spatial Noise Reduction** to **On** or **Off**.

   The filtering action is determined pixel by pixel throughout the whole picture. This setting provides a choice of filter profiles as explained in the following step.

   Note: In case you do not want the D9054 HD Encoder to perform spatial filtering, you may set the filter to Off. This could be the case if you do not want the D9054 HD Encoder to reduce the noise in the source material.

3. If you have set the spatial noise reduction to On, set the **Fixed Spatial Value**.

   Your choice depends on how much noise is visible in the source, and on how much you want to filter. The values to the right provide more filtering than the profiles to the left.

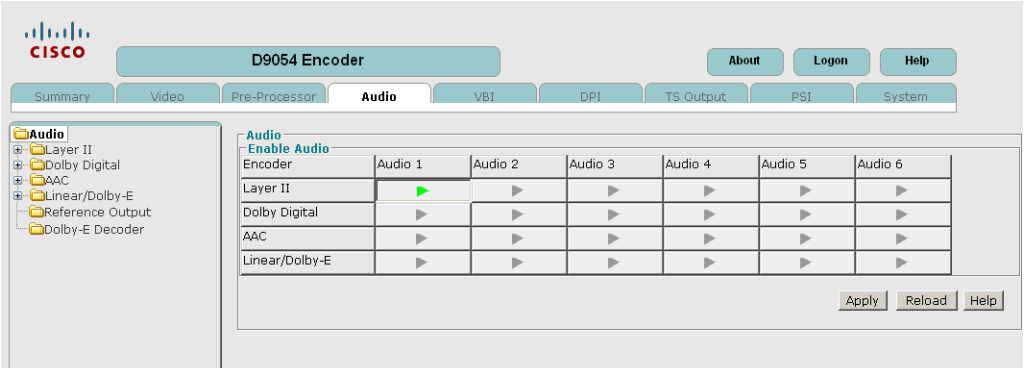
4. Click **Apply**.

Section C - Setting Up the Audio

To Enable Audio Channels

Proceed as follows to select and enable audio channels:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab.



2. Select and enable the audio channel(s) you want to use by clicking on the cell in the table. The arrow in the table cell will change colour from grey to green when it is selected. Select from either Layer II, Dolby Digital, AAC or Linear/Dolby-E.

   Note: When audio channels are enabled or disabled in this window, they will appear in the same state as in their individual channel windows. You can choose to enable or disable each channel in this window or the individual audio channel windows.

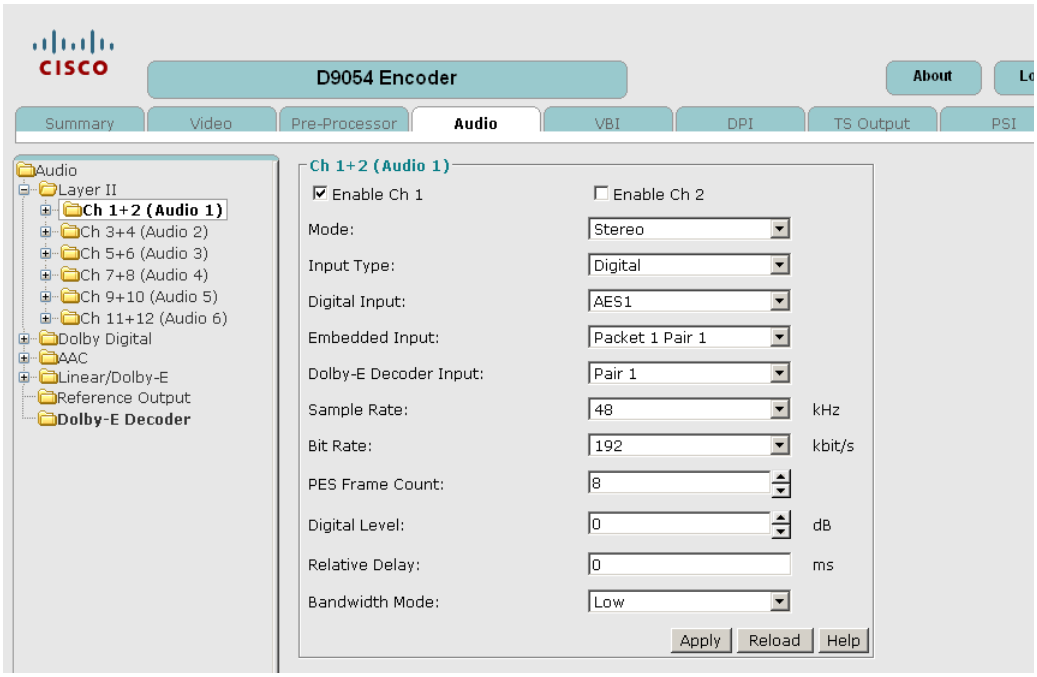
3. Click **Apply**.

To Set Up the Layer II Audio Input

Proceed as follows to set up the Layer II Audio Input:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **Layer II** icon and click the appropriate channel icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure audio pairs **Ch1+2 (Audio 1)** through **Ch11+12 (Audio 6)**.



2. If relevant enable the audio channel(s).
   Normally Audio Channel 1 is enabled and part of the video program.

   Important: Audio channel 2 is only applicable when the encoding mode is Single Mono.

   Note: Enable the audio after you have changed all audio settings if you do not want to transmit the audio while the changes take place.

3. Set the encoding **Mode**.

   You may select Stereo, Joint Stereo, Dual Channel, or Single Mono.

   Dual Channel gives the best stereo quality.

   In some cases you use Stereo or Joint Stereo instead as these two modes may optimize the sound quality. Stereo channels may "borrow" bits from each other thus utilizing the available bandwidth. Joint stereo encodes high frequencies with insignificant stereo contents as mono thus utilizing the bandwidth for stereo contents.

   Hint: Do Not use Joint stereo audio coding if you want to transfer matrixed sound (i.e., Dolby Surround). Use Stereo instead. If you use Joint stereo, part of the phase information which is essential for re-creating the surround channel information disappears.

4. Select in the **Input Type** field whether your audio input is Digital, Embedded, or Dolby-E Decoder.

   The D9054 HD Encoder inputs the signal from the Digital input connector in the selected format. If you select **Embedded**, the D9054 HD Encoder extracts the audio embedded in the active HD-SDI video signal of the program.

   If you select Dolby-E Decoder, you must set up the Dolby-E Decoder in the Dolby-E Decoder page. For more information, see **Setting up the Dolby-E Decoder (MCA card only)**, page 5-85.

   Note: Dolby-E Decoder input type is only available if the D9054 Encoder has a Multiple Channel Audio (MCA) card that is equipped with a Dolby Advanced Sub-Module (DASM) and a Dolby-E Decoder license.

5. If Digital was selected as the input type above, select one of the four connectors to use as the **Digital** audio **Input** (AES1 to AES4).

6. If Embedded was selected as the input type above, select the **Embedded Input**.

   The HD-SDI video input can contain up to two stereo audio channels each represented by a packet 1 to 4 and pair 1 or 2. You can transfer up to two of these channels.

7. If Dolby-E Decoder was selected as the input type above, select which pair of the Dolby-E output to use as input under **Dolby-E Decoder Input** (Pair 1 to Pair 4).

8. Select the **Sample Rate** of the signal.
   Set the sampling rate to 32, 44.1 or 48 kHz.

   Note: It is not recommended to increase the encoding sample rate above the input sample rate.

   Note: For the lowest audio bit rates use the lowest sample rate for improved quality.

9. Set the **Bit Rate** of the signal.
   The legal bit rates for Layer II encoding are 32, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 and 384 kbit/s. The table below shows the bit rates allowed for each type of Layer II mode.

Bit Rate	Allowed Modes
32K	Mono
48K	Mono
56K	Mono
64K	All
80K	Mono
96K	All
112K	All
128K	All
160K	All
192K	All
224K	Stereo, Joint, Dual
256K	Stereo, Joint, Dual
320K	Stereo, Joint, Dual
384K	Stereo, Joint, Dual

   Note: The bit rate must be ≤ 192 kbit/s if you set the Layer II mode to Mono.
   If the encoder is equipped with a **Dual Channel Audio (DCA) card**, for optimum audio quality, the Joint Stereo mode is highly recommended for data rates below 192 kbps. The Stereo mode should be used for data rates of 192 kbps and above.

If the encoder is equipped with a **Multiple Channel Audio (MCA) card**, and the Joint Stereo mode is selected, the audio encoder utilizes an adaptive algorithm to automatically and optimally switch between stereo mode and joint stereo mode (based on the data rate, sample rate, and audio content). It is recommended to select the Joint Stereo mode as the default setting for all data rates. For data rates below 192 kbps, Joint Stereo mode is highly recommended for optimal audio quality. The Stereo mode is used to operate in stereo mode only, without automatic switching and to operate at data rates of 192 kbps and above.

10. Set the **PES Frame Count**.

    Use this field to set the desired number of audio frames in each PES packet. This affects the number of stuffing bytes inserted in the encoded audio stream, but has little affect on the encoding quality. The legal range is from 1 to 8. The default value is 8.

11. Set the **Digital Level**.

    You may type a value in the range from -12 to 12 dB. The default is 0 dB.

12. Set the **Relative Delay**.

    The legal range is from -1000 to 1000 ms.

    Use this field if you want to adjust the encoding audio delay to synchronize audio with video in a program which has both.

    Example: If you use external video equipment which adds to the video delay, you type a positive external audio delay value corresponding to the external video delay.

    Note: You cannot set a positive relative audio delay greater than the end-to-end delay determined by the video encoder.

13. Set the **Bandwidth Mode**. This option is only applicable to MCA cards.
    This parameter allows you to set the quality of the audio vs. bandwidth. The default setting is **Low**.

Setting	Description
Low	This the most conservative setting. Some high frequencies may be lost, but no coding artifacts will be audible.
High	This setting is less conservative. A wider frequency spectrum will be covered. Coding artifacts for most audio material will not be audible.
Full	This setting provides the highest (full) bandwidth range regardless of audio quality; however, more coding artifacts will be audible than at the other settings.

14. Click **Apply**.

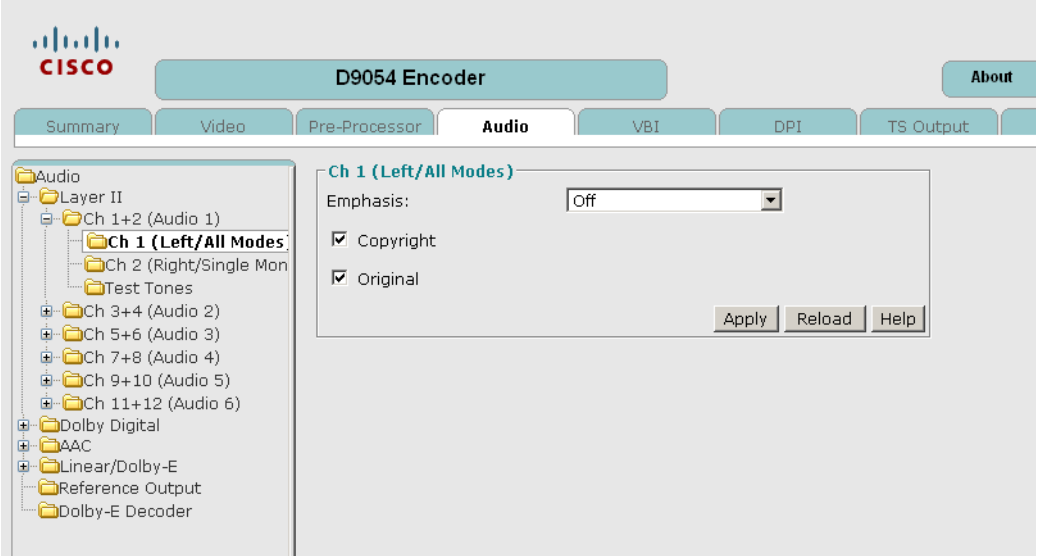
Setting Up the Layer II Channel Information

To Set Up the Layer II Channel Information

Proceed as follows to set up the Layer II Channel Information:

1. From the Layer II sub-pages, expand the relevant channel icon and click the left or right channel icon.

   Important: The left channel applies to all encoding modes whereas the right channel only applies to Single Mono Right.



2. Select On or Off to enable or disable **Emphasis**.

   Emphasis is normally set to Off.

3. Select **Copyright** if you want to signal that the encoded bit stream is protected by copyright. The default is selected.

4. Select **Original** if you want to signal that the encoded bit stream is an original. The default is selected.

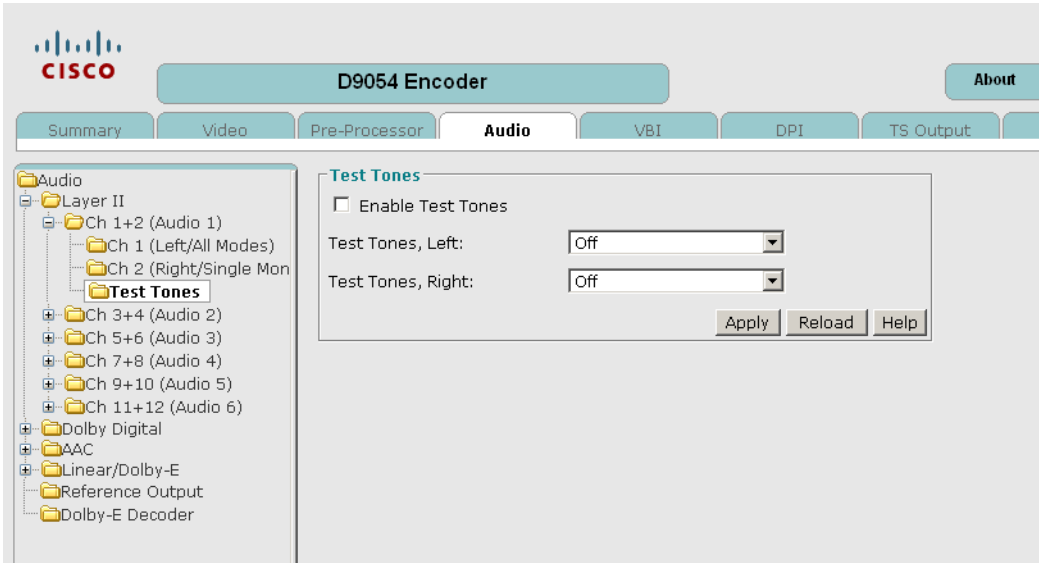
5. Click **Apply**.

Setting Up the Layer II Test Tones

To Set Up the Layer II Test Tones

Proceed as follows to set up the Layer II Test Tones:

1. From the Layer II sub-pages, expand the relevant channel icon and click the **Test Tones** icon.



2. If relevant, set and enable the left and/or right test tones.

   Note: When Test Tones Left or Test Tones Right are set to Off the respective channel encodes the incoming signal.

   This option determines whether to send a test pattern to the left and/or right channel, and the frequency (Hz or kHz) and amplitude of that test pattern. See the table below for possible options:

Test Pattern Values	
Frequency	**Amplitude (dBFS)**
Off	
125 Hz	-1.05
500 Hz	-1.05
1 kHz	-1.05
1 kHz 21 dB	-21.05
1 kHz 61 dB	-61.05
2 kHz	-1.05
10 kHz	-1.05
Silence	

Note: Digital Silence is used to create a stream with perfect (or digital) silence.

Note: The test tone frequencies apply at a sampling frequency of 48 KHz.

3. Click **Apply**.

Setting Up the Dolby Digital Audio Input

To Set Up the Dolby Digital Audio

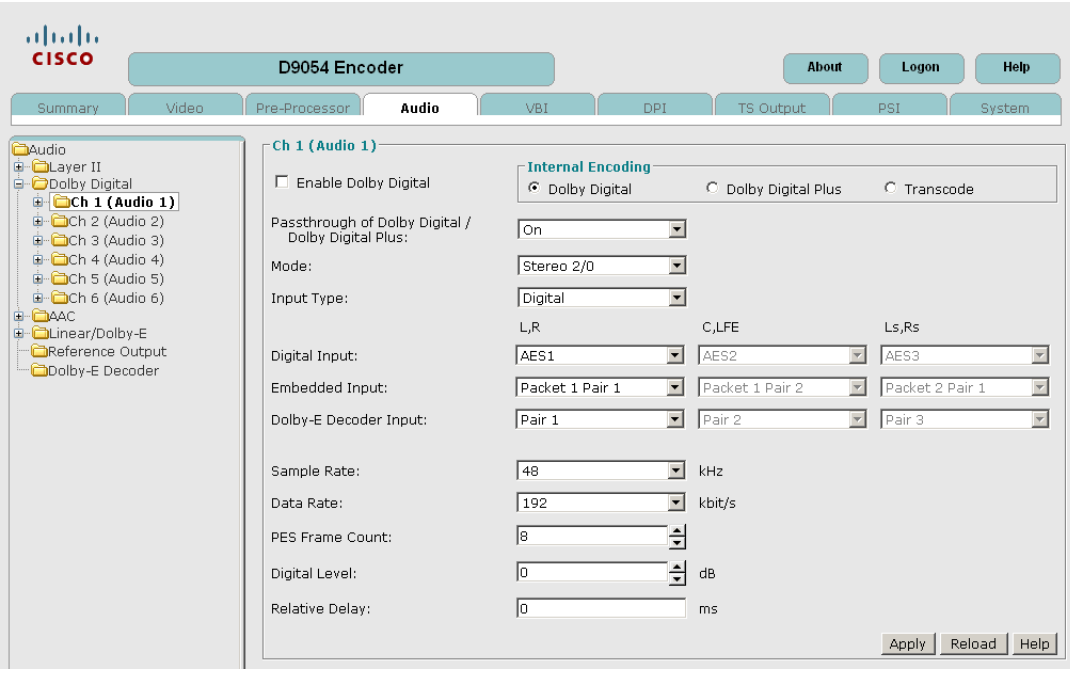
Important: If the GUI displays grayed out fields or buttons this means that you do not have a license for the option in question.

Proceed as follows to set up the Dolby Digital audio:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **Dolby Digital** icon and click the appropriate channel icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.

   Note: ROSA displays an error message if you try to set up an audio channel without having installed the option.



2. Select **Enable Dolby Digital** to enable Dolby Digital encoding.

3. Select the **Internal Encoding**. Select **Dolby Digital** or **Dolby Digital Plus** to encode PCM audio to Dolby Digital or Dolby Digital Plus. Select **Transcode** to transcode from Dolby Digital to Dolby Digital Plus.

   Note: Dolby Digital Plus and Transcode are only available for encoders equipped with a Multiple Channel Audio (MCA) card and a Dolby Digital Plus license.

4. If relevant, enable **Passthrough of Dolby Digital/Dolby Digital Plus**.

   Important: Passthrough of Dolby Digital or Dolby Digital Plus requires that Dolby Digital Encoding be enabled.

   For Passthrough of Dolby Digital or Dolby Digital Plus, you can set the Input Type to Digital or Embedded.

   Note: The Sample Rate must be set to 48 kHz if Passthrough of Dolby Digital is enabled.

5. Select the Audio Coding **Mode** of the input signal.

Mode	Channel Format
Stereo 2/0	Left, Right
Dual Mono 1+1	Left – Channel 1, Right – Channel 2
Mono (Center) 1/0	Center (uses the left channel of the physical input)
3/2 (L,R,C,Ls,Rs)	Left, Right, Center, Left surround, Right surround

   Use this field to select the number of channels and the channel format within the encoded bit stream.

   The four available audio encoding modes are Stereo 2/0, Dual Mono 1+1, Mono (Center) 1/0, and 3/2 (L,R,C,Ls,Rs). The mode definition uses two numbers (*m*/*n*), with *m* indicating the number of front channels, and *n* indicating the number of rear (surround) channels.

   The default setting is Stereo 2/0.

   Note: LFE is only available if LFE is enabled in the Processing page. For more information, see **Setting Up Dolby Digital Processing**, page 5-59.

   If the mode is set to Dual Mono (1+1), then two completely independent program channels, referenced as Mono Channel 1 and Mono Channel 2, are encoded into the bit stream. **Dual-mono mode is primarily intended for professional applications. Dual-mono cannot be expected to work with consumer Dolby Digital decoders.** Dual Mono mode is recommended if simultaneous output of unrelated, independent audio signals is required.

   Dual Mono mode gives the greatest degree of audio separation, but requires more complex coding, and, consequently, higher operating bit rates.

   If the mode is set to 3/2 (L, R, C, Ls, Rs), the C, LFE and Ls, Rs settings for the digital, embedded, and Dolby-E decoder inputs are enabled.

   Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

   Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for Ch 1 and Ch 4.

Note: When 3/2 (L,R,C,Ls,Rs) mode is selected on Ch 1, internal encoding on Ch 2 and Ch 3 will become unavailable. If the Metadata Source Type from the Processing page is set to Digital or Dolby-E, internal encoding on Ch 2 and Ch 3 will become unavailable.

Note: When 3/2 (L,R,C,Ls,Rs) mode is selected on Ch 4, internal encoding on Ch 5 and Ch 6 will become unavailable. If the Metadata Source Type from the Processing page is set to Digital or Dolby-E, internal encoding on Ch 5 and Ch 6 will become unavailable.

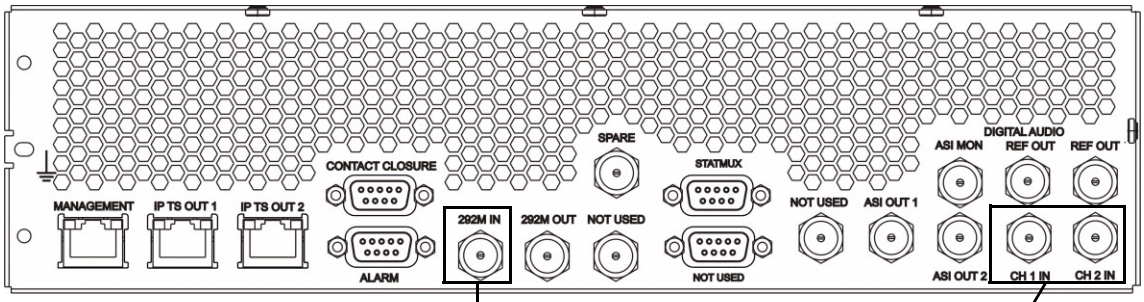
6. Select in the **Input Type** field whether your audio input is digital, embedded, or Dolby-E Decoder.

   The D9054 HD Encoder inputs the signal from the Digital input connector in the selected format. If you select **Embedded** the D9054 HD Encoder extracts the audio embedded in the active HD-SDI video signal of the program.

   The following table outlines the input selections, depending on the Mode and Input Type selected (for encoders equipped with a Multiple Channel Audio (MCA) card only):

Mode	Input Type	Input Selections
Stereo 2/0, Dual Mono 1+1 or Mono (Center) 1/0	Digital	L,R for Digital Input
	Embedded	L,R for Embedded Input The HD-SDI video input can contain up to 8 stereo audio channels each represented by a packet 1 to 4 and pair 1 or 2. You can transfer up to 2 of these channels.
	Dolby-E Decoder Note: Only available for encoders equipped with a Multiple Channel Audio (MCA) card that is equipped with a Dolby Advanced Sub-Module (DASM) and a Dolby-E Decoder license.	L,R for Dolby-E Decoder Input
3/2 (L,R,C,Ls,Rs)	Digital	(L,R), (C,LFE), and (Ls,Rs) for Digital Input
	Embedded	(L,R), (C,LFE), and (Ls,Rs) for Embedded Input
	Dolby-E Decoder	(L,R), (C,LFE), and (Ls,Rs) for Dolby-E Decoder Input

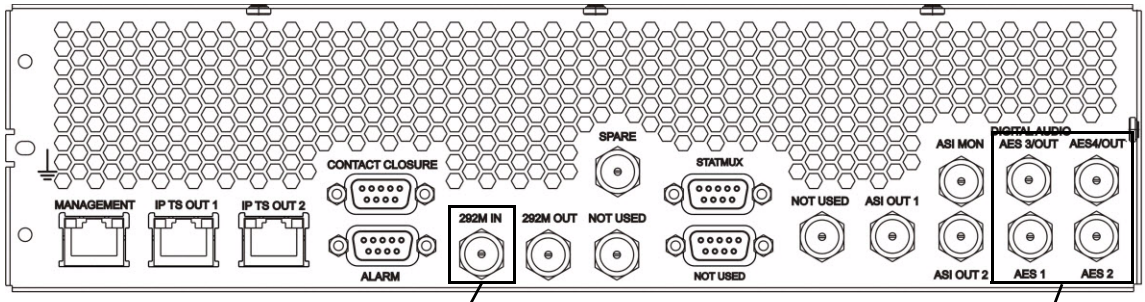
The following displays the input type and the Web GUI input selections in relation to the rear panel equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card:



Embedded Input in Web GUI
(Packet 1-4, Pair 1 or 2)

Digital Input in Web GUI

Dual Channel Audio (DCA) Rear Panel



Embedded Input in Web GUI
(Packet 1-4, Pair 1 or 2)

Digital Input in Web GUI
(AES1 to AES4)

Multiple Channel Audio (MCA) Rear Panel

If you select Dolby-E Decoder (Pair 1 to 4), you must set up the Dolby-E Decoder in the Dolby-E Decoder page. For more information, see **Setting up the Dolby-E Decoder (MCA card only)**, page 5-85.

7. Select the **Sample Rate** of the signal.
   Set the sampling rate to 32, 44.1 or 48 kHz.

   Note: You must select 48 kHz if the Passthrough of Dolby Digital is enabled.

   Note: There is no advantage to increasing the encoding sample rate above that of the input sample rate.

   Note: For the lowest audio bit rates it is often recommended to use the lowest sample rate for best quality.

8. Set the **Data Rate** of the signal.
   Use this field to select the digital audio transmission rate. Settings for the compressed bit rate are available from 56 to 640 kbit/s. Increasing the number in this field increases the audio bandwidth at the encoder, improving the quality of the audio transmitted by the encoder.
   The default is 192 kbit/s.
   Use the following data rate ranges for the selected audio mode.

Mode	Data Rate Range		
	Dolby Digital	Dolby Digital Plus	Transcode
Stereo 2/0	96 – 640 kbit/s	56 - 640 kbits/s	72 - 640 kbits/s
Dual Mono 1+1	96 – 640 kbit/s	56 - 640 kbits/s	72 - 640 kbits/s
Mono (Center) 1/0	56 – 640 kbit/s	56 - 640 kbits/s	72 - 640 kbits/s
3/2 (L,R,C,Ls,Rs)	224 – 640 kbit/s	72 - 640 kbits/s	192 - 640 kbits/s

   If the **Passthrough of Dolby Digital/Dolby Digital Plus** is enabled, it is recommended that you set the maximum data rate to that of the external Dolby Encoder. If the data rate of the Dolby Encoder is lower than the setting in the D9054 HD Encoder the audio will be passed through and only the actual bits in the data stream will be used.

   Note: The external Dolby Encoder must be locked to the clock of the D9054 HD Encoder. This can be achieved by connecting the Digital Output of the audio connector to the external encoder.

   Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

9. Set the **PES Frame Count**.
   Use this field to set the desired number of audio frames in each PES packet. This affects the number of stuffing bytes inserted in the encoded audio stream, but has little affect on the encoding quality. The legal range is from 1 to 8. The default value is 8.

10. Set the **Digital Level**.

    You may type a value in the range from -12 to 12 dB. The default is 0 dB.

11. Set the **Relative Delay**.

    The legal range is from -1000 to 1000 ms.

    Use this field if you want to adjust the encoding audio delay to synchronize audio with video in a program which has both.

    Example: If you use external video equipment which adds to the video delay, you type a positive external audio delay value corresponding to the external video delay.

    The resolution is 1 millisecond.

    Note: You cannot set a positive relative audio delay greater than the end-to-end delay determined by the video encoder. For information about the video delay, see **Setting Up the H.264 Video Encoder Delays**, page 5-21.

12. Click **Apply**.

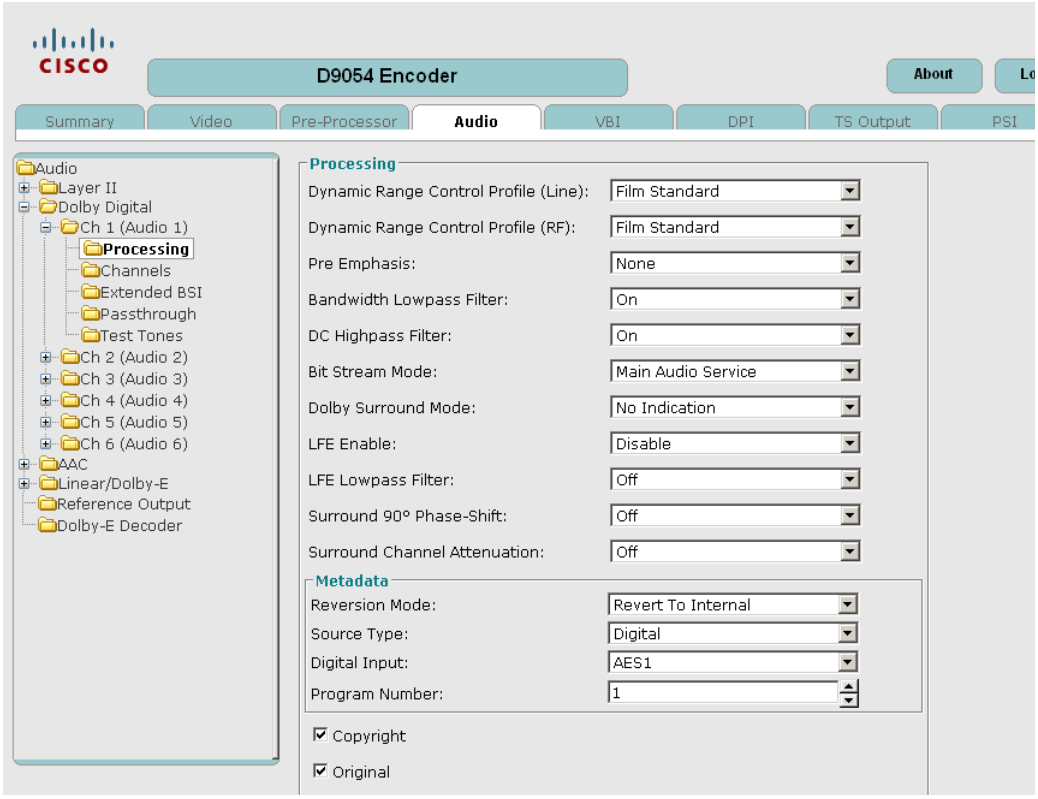
Setting Up Dolby Digital Processing

To Set Up the Dolby Digital Processing

Proceed as follows to set up the Audio Dolby Digital Processing:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **Dolby Digital** icon, expand the appropriate channel icon and click the **Processing** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Select the **Dynamic Range Control Profile (Line/RF)**.

   Select one of the dynamic range compression presets built into the Dolby Digital encoding/decoding algorithm to be applied to the audio stream in Line Mode or RF Mode. Each setting reduces the audio bitstream's output to a characteristic dynamic range.

   You may select None, Film Standard, Film Light, Music Standard, Music Light or Speech.

3. If relevant, select the 50/15 microseconds of CCITT J.17 **Pre Emphasis**.

   By selecting the pre-emphasis you indicate that the incoming data stream has pre-emphasis. The default is None.

4. If relevant, enable the **Bandwidth Lowpass Filter**.

   By enabling this filter you apply a low-pass filter to the input channel before the Dolby Digital encoding. The default is On.

5. If relevant, enable the **DC Highpass filter**.

   By enabling this filter you apply a DC high-pass filter to the input channel before the Dolby Digital encoding. The default is On.

6. Select the **Bit Stream Mode**.

   Use this field to select the type of information that the bit stream conveys. This is an information-only field for the benefit of operators and other technicians and *does not* affect the performance or behavior of the actual signal.

   The current system choices are:

   - Main Audio Service
   - Main Audio Service: Dialog
   - Visually Impaired
   - Hearing Impaired
   - Dialog
   - Commentary
   - Emergency Flash

   The default is Main Audio Service.

7. Select the **Dolby Surround Mode**.

   This option indicates whether or not a two-channel Dolby Digital bit stream is providing a Dolby Surround encoded program. This setting is used only if you have selected Stereo 2/0. Possible options are Dolby Surround Encoded, Not Dolby Surround Encoded, or Not Indicated. The default is “No Indication”.

8. Select to enable or disable **LFE Enable**.

   This option enables low-frequency effects.

   If you select Disable, it disables LFE for the audio input selections when setting up the Dolby Digital Input Audio.

9. Select the **LFE Lowpass Filter** option. Select On to enable the digital 120 Hz low-pass filtering to the LFE channel. Otherwise, select Off.

10. Select the **Surround 90 degrees Phase-Shift**. Select On to apply a 90-degree phase shift to the surround channel. Otherwise, select Off.

11. Select to enable or disable the **Surround Channel Attenuation**. Select On to apply a -3dB attenuation to the Surround Channel. This is useful when converting a film soundtrack for home theatre playback.
12. Select the **Reversion Mode** used if the Metadata is missing. Select **Revert to Internal** to override the parameter settings contained in the Metadata stream with the user defined parameters above. Local settings are copied to the Metadata structures if the event metadata is enabled but not present. Select **Hold Last State** to disable the reversion.
13. Select the Metadata's **Source Type** (Internal, Digital, or Dolby-E Decoder).

    Note: This is only applicable for Ch 1 and Ch 4.

    Note: Selecting Digital or Dolby-E Decoder will make internal encoding unavailable on Ch 2 and 3 or Ch 4 and 5.
14. If Digital was selected as the source type above, select the **Digital Input** (AES1 to AES4).
15. Select a Metadata **Program Number** to use (1 to 8).
16. Select **Copyright** if you want to signal that the encoded bit stream is protected by copyright. The default is selected.
17. Select **Original** if you want to signal that the encoded bit stream is an original. The default is selected.
18. Click **Apply**.

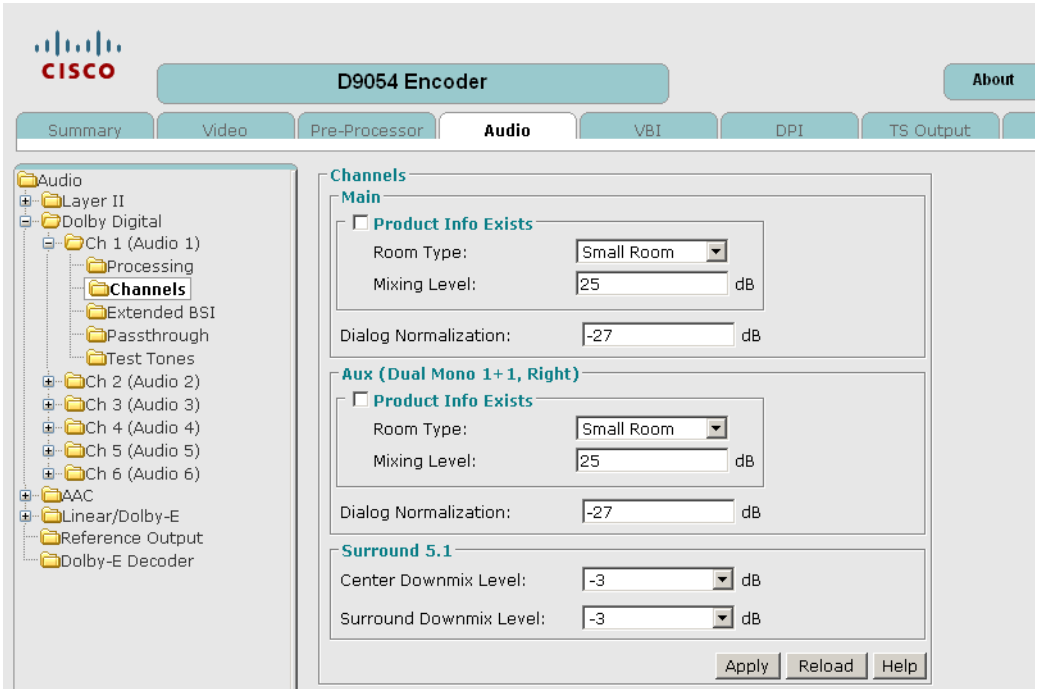
Setting Up the Dolby Digital Channels

To Set Up the Dolby Digital Channels

Proceed as follows to set up the Dolby Digital Channels:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **Dolby Digital** icon, expand the appropriate channel icon and click the **Channels** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Select whether the **Main** product information exists.

   This option indicates whether the room type and mixing level parameters exist within the **Main** Dolby digital bit stream. The default is de-selected.

   Note: If you have selected Dual Mono 1+1 encoding the **Main Product Info Exists** setting applies to the left channel.

3. Select the **Room Type**.

   This option indicates the type of mixing room used for the final audio mixing session. This is used only if the **Main Product Info Exists** is On (see above). Possible options are Small Room, Large Room, and Not Indicated. The default is Small Room.

4. Set the **Mixing Level**.

   This option indicates the acoustic sound pressure level of the dialog level during the final audio mixing session of the **Main** encoded Dolby digital bit stream. Possible options are in the range of 0 to 31. If you have selected Dual Mono encoding the **Main** mixing level setting applies to the left channel. The default is 25.

   Note: In Dual Mono 1+1 mode this setting applies to the **Main** channel (left).

5. Set the **Dialog Normalization**.

   Use this field to select how far (measured in dB) the average dialog level is below digital 100% for Stereo 2/0 streams, Mono 1/0 streams, or the main channel of Dual Mono 1+1 streams. The default is -27. The range is from -1 to -31 dB.

   Note: The minus sign has been removed.

   Note: In Dual Mono 1+1 mode this setting applies to the **Main** channel (left).

6. In Dual Mono 1+1 repeat steps 2 to 5 for the **Aux** channel.

   Note: These settings apply to the right channel.

7. Set the **Center** and **Surround Downmix Level** for Dolby Digital Surround 5.1, in dB.

8. Click **Apply**.

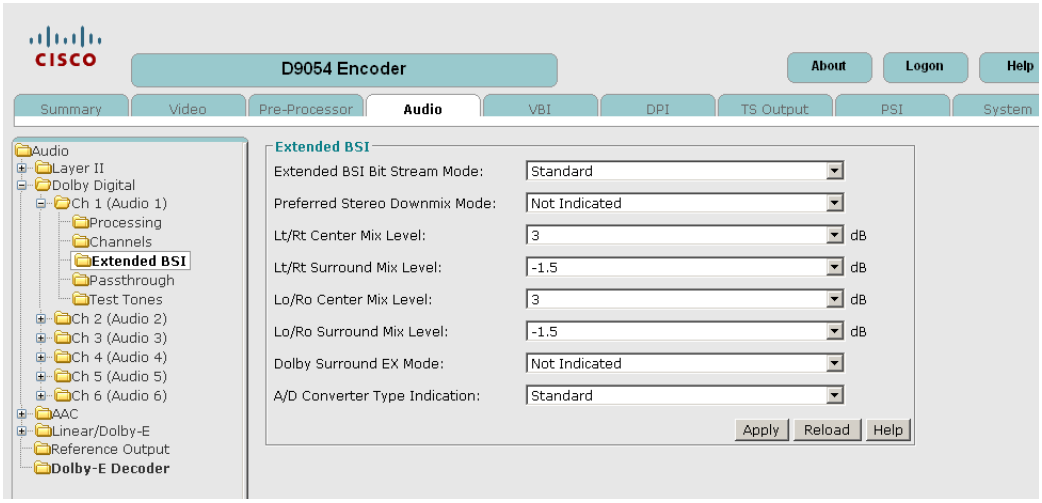
Setting up the Dolby Digital Extended BSI

To Set Up the Dolby Digital Extended BSI

Proceed as follows to set up the Dolby Digital Channels:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **Dolby Digital** icon, expand the appropriate channel icon and click the **Extended BSI** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Select the **Extended BSI Bit Stream Mode** (Standard or XBSI). If you select Standard, it disables the Surround 5.1 selections in the Dolby Digital Audio Channels page.
3. Select the **Preferred Stereo Downmix Mode** (Not Indicated, Lt/Rt downmix preferred, or Lo/Ro downmix preferred).
4. Set the **Center Mix Level** of the **Lt/Rt** or **Lo/Ro**, in dB. The options are: 3, 1.5, 0, -1.5, -3.0, -4.5, -6.0, or OFF.
5. Set the **Surround Mix Level** of the **Lt/Rt** or **Lo/Ro**, in dB. The options are: -1.5, -3.0, -4.5, -6.0, or OFF.
6. If known, select the **Dolby Digital Surround EX Mode**. You can select one of the following: Not Indicated, Not encoded in Surround EX, or Encoded in Surround EX.
7. Select the type of **A/D Converter** used to capture the PCM samples. You can select Standard or HDCD.
8. Click **Apply**.

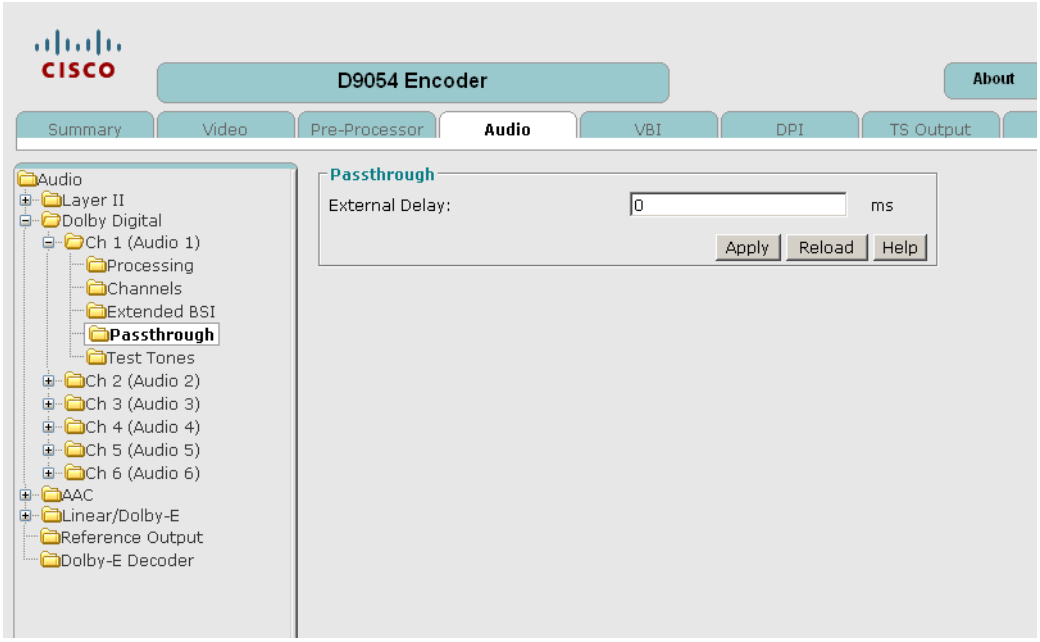
Setting Up Dolby Digital Passthrough

To Set Up Dolby Digital Passthrough

Proceed as follows to set up Audio Dolby Digital Passthrough:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **Dolby Digital** icon, expand the appropriate channel icon and click the **Passthrough** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Set the **External Delay**. You can enter a range from 0 to 2500 ms.

   If you use an external audio encoder which adds to the audio delay, enter a delay value that corresponds to the external audio delay.

3. Click **Apply**.

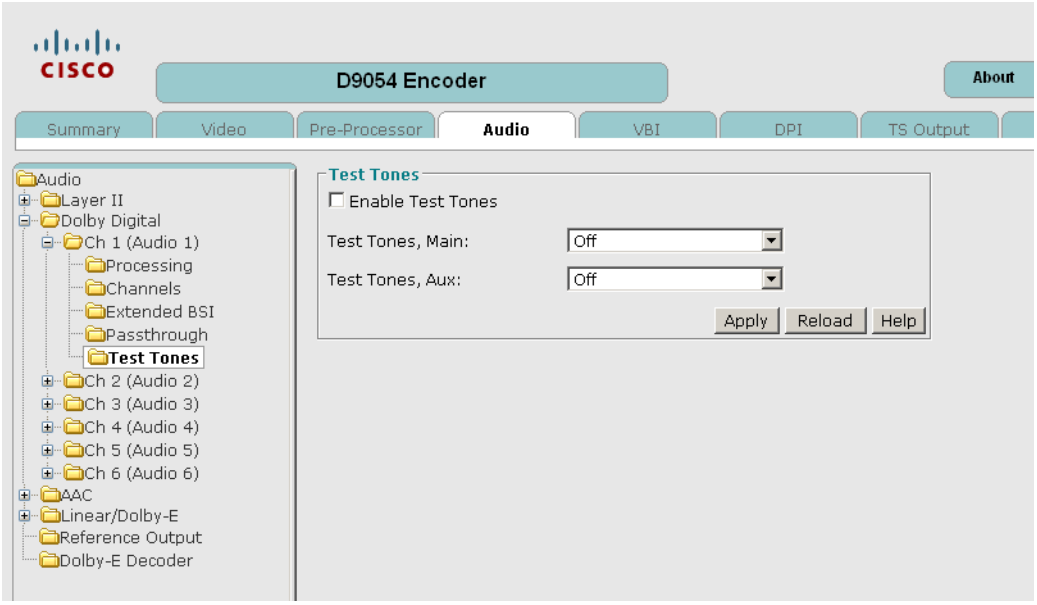
Setting Up Dolby Digital Test Tones

To Set Up Dolby Digital Test Tones

Proceed as follows to set up the test tones:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **Dolby Digital** icon, expand the appropriate channel icon and click the **Test** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. If relevant, set and enable the main and/or Aux test tones.

   Note: When Test Tones Main or Test Tones Aux are set to Off the respective channel encodes the incoming signal.

   This option determines whether to send a test pattern to the main and/or Aux channel, and the frequency (Hz or kHz) and amplitude of that test pattern. See the following table for possible options:

Test Pattern Values	
Frequency	**Amplitude (dBFS)**
Off	
125 Hz	-1.05
500 Hz	-1.05
1 kHz	-1.05
1 kHz 21 dB	-21.05
1 kHz 61 dB	-61.05
2 kHz	-1.05
10 kHz	-1.05
Silence	
Chord (Main only)	

Note: Digital Silence is used to create a stream with perfect (or digital) silence.

Note: The Chord test tone is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

Note: The test tone frequencies apply at a sampling frequency of 48 kHz.

3. Click **Apply**.

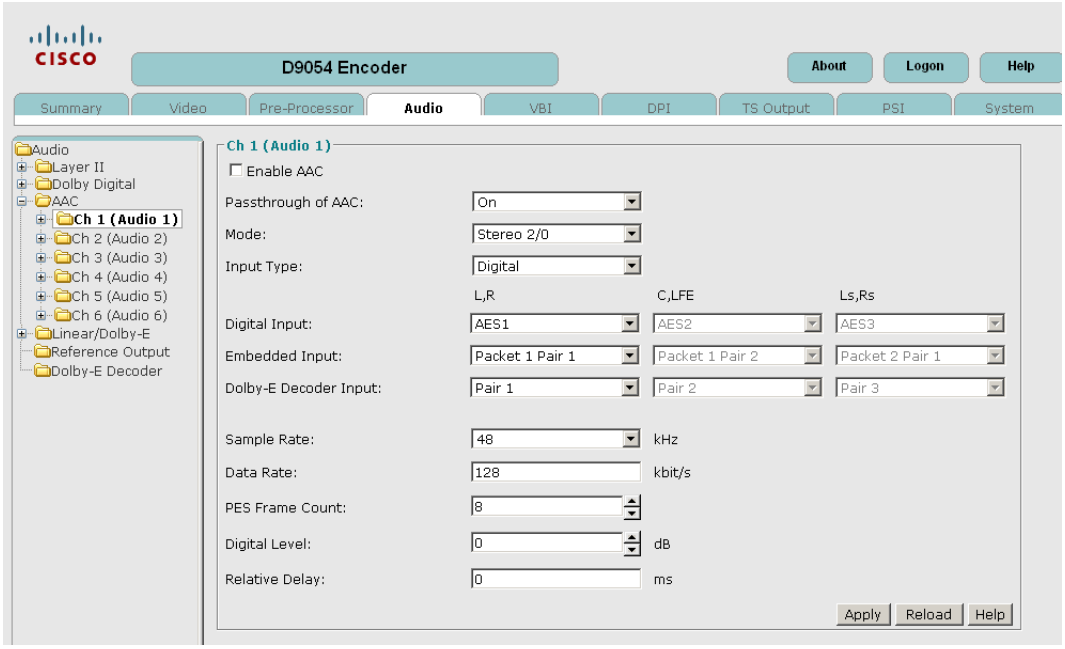
Setting Up the AAC Audio Input

To Set Up AAC Audio

Proceed as follows to set up AAC audio:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **AAC** icon and click the appropriate channel icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Select **Enable AAC** to enable the AAC engine. Whether you are encoding AAC or passing through pre-encoded AAC depends on the Passthrough of AAC setting below.

3. If relevant, select on for **Passthrough of AAC**; otherwise setting this to Off uses the internal encoding engine.

   Passthrough of AAC requires that AAC Encoding be enabled in the GUI.

   For Passthrough of AAC you can set the Input Type to Digital or Embedded.

   Note: It's possible to enable passthrough of AAC without having the AAC option installed.

   Note: The Sample Rate must be set to 48 kHz if Passthrough of AAC is enabled.

4. Select the Audio Coding **Mode** of the input signal.

   Use this setting to select the number of channels and the channel format within the encoded bit stream.

   You may select Dual Mono 1+1, Single Mono 1/0, Stereo 2/0, Joint Stereo 2/0, Mono 1/0 LR, or 3/2 (L,C,R,Ls,Rs,LFE).

   Do not use Joint stereo audio coding if you want to transfer matrixed sound (i.e. Stereo Surround sound). Use Stereo instead. If you use Joint stereo, part of the phase information which is essential for re-creating the surround channel information disappears.

   The default setting is Stereo (2/0).

   If the mode is set to Dual Mono (1+1), then two completely independent program channels, referenced as Mono Channel 1 and Mono Channel 2, are encoded into the bit stream. **Dual-mono mode is primarily intended for professional applications. Dual-mono cannot be expected to work with consumer AAC decoders.**

   Note: The 3/2 (L,C,R,Ls,Rs,LFE) mode is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

   Note: The 3/2 (L,R,C,Ls,Rs) mode is only available for Ch 1 and Ch 4.

5. Select in the **Input Type** field whether your audio input is digital, embedded, or Dolby-E Decoder.

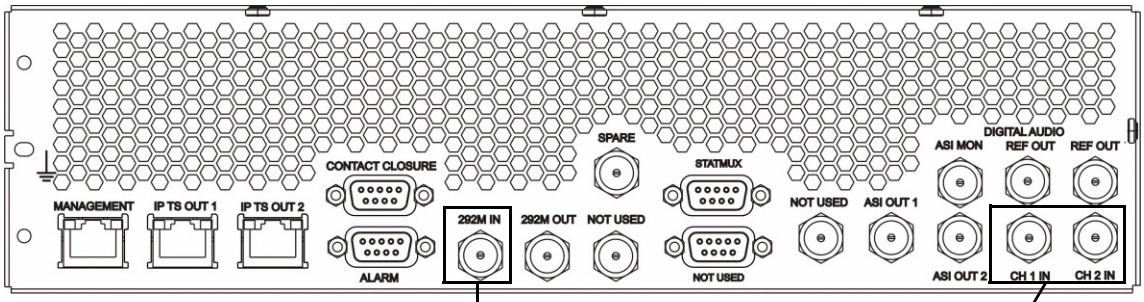
   The D9054 HD Encoder inputs the signal from the Digital input connector in the selected format. If you select **Embedded** the D9054 HD Encoder extracts the audio embedded in the active HD-SDI video signal of the program.

   If you select Dolby-E Decoder, you must set up the Dolby-E Decoder in the Dolby-E Decoder page. For more information, see **Setting up the Dolby-E Decoder (MCA card only)**, page 5-85.

The following table outlines the input selections, depending on the Mode and Input Type selected (for encoders equipped with a Multiple Channel Audio (MCA) card only):

Mode	Input Type	Input Selections
Stereo 2/0, Dual Mono 1+1, Mono (Center) 1/0, Single Mono 1/0, or Joint Stereo 2/0	Digital	L,R for Digital Input
	Embedded	L,R for Embedded Input The HD-SDI video input can contain up to 8 stereo audio channels each represented by a packet 1 to 4 and pair 1 or 2. You can transfer up to 2 of these channels.
	Dolby-E Decoder Note: Only available for encoders equipped with a Multiple Channel Audio (MCA) card that is equipped with a Dolby Advanced Sub-Module (DASM) and a Dolby-E Decoder license.	L,R for Dolby-E Decoder Input
3/2 (L,R,C,Ls,Rs)	Digital	(L,R), (C,LFE), and (Ls,Rs) for Digital Input
	Embedded	(L,R), (C,LFE), and (Ls,Rs) for Embedded Input
	Dolby-E Decoder	(L,R), (C,LFE), and (Ls,Rs) for Dolby-E Decoder Input

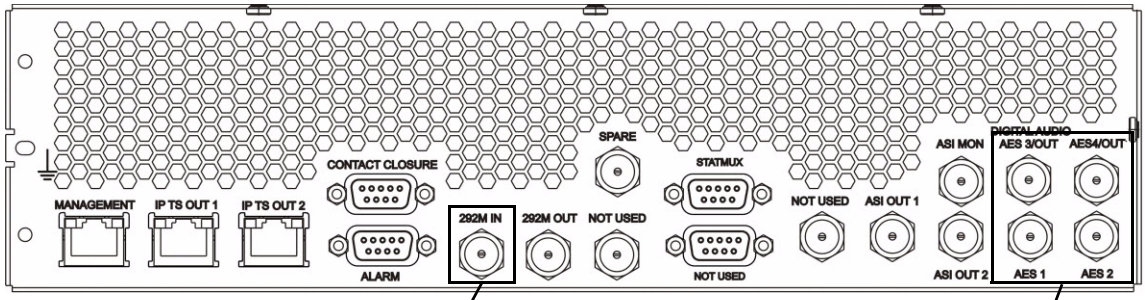
The following displays the input type and the Web GUI input selections in relation to the rear panel equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card:



Embedded Input in Web GUI (Packet 1-4, Pair 1 or 2)

Digital Input in Web GUI

Dual Channel Audio (DCA) Rear Panel



Embedded Input in Web GUI (Packet 1-4, Pair 1 or 2)

Digital Input in Web GUI (AES1 to AES4)

Multiple Channel Audio (MCA) Rear Panel

If you select Dolby-E Decoder (Pair 1 to 4), you must set up the Dolby-E Decoder in the Dolby-E Decoder page. For more information, see **Setting up the Dolby-E Decoder (MCA card only)**, page 5-85.

6. Select the **Sample Rate** of the signal.

   Set the sampling rate to 32, 44.1 or 48 kHz.

   Note: You must select 48 kHz if the Passthrough of AAC is enabled.

   Note: There is no advantage to increasing the encoding sample rate above that of the input sample rate.

   Note: For the lowest audio bit rates it is often recommended to use the lowest sample rate for best quality.

7. Set the **Data Rate** in the range from 14 to 320 kbit/s for Stereo channels and from 14 to 160 kbit/s for mono channels.

   The recommended data rate depends on the number of channels, i.e., mode, and whether Spectral Band Replication (SBR) is enabled or not, see **Setting Up AAC Processing**, page 5-74.

Type	Recommended Data Rate Range (kbit/s)	No. of Channels
AAC Passthrough	14 to 640	
AAC + SBR	14 to 64	1
AAC + SBR	24 to 96	2
AAC + SBR	64 to 264	6
AAC	32 to 160	1
AAC	40 to 320	2
AAC	96 to 640	6

   For passthrough of AAC you must set the data rate to the peak rate of the external AAC Encoder. If the data rate of the AAC is the same as the setting in the D9054 HD Encoder, the audio will be passed through and only the actual bits in the data stream will be used.

   Note: The external AAC Encoder must be locked to the clock of the D9054 HD Encoder. This can be achieved by connecting the Digital Output of the audio connector to the external encoder.

8. Set the **PES Frame Count**.

   Use this field to set the desired number of audio frames in each PES packet. This affects the number of stuffing bytes inserted in the encoded audio stream, but has little affect on the encoding quality. The legal range is from 1 to 8. The default value is 8.

9. Set the **Digital Level**.

   You may type a value in the range from -12 to 12 dB.

10. Set the **Relative Delay**.

    The legal range is from -1000 to 1000 ms.

    Use this field if you want to adjust the encoding audio delay to synchronize audio with video in a program which has both.

    Example: If you use external video equipment which adds to the video delay, you type a positive external audio delay value corresponding to the external video delay. The resolution is 1 millisecond.

    Note: You cannot set a positive relative audio delay greater than the end-to-end delay determined by the video encoder. For information about the video delay, see **Setting Up the H.264 Video Encoder Delays**, page 5-21.

11. Click **Apply**.

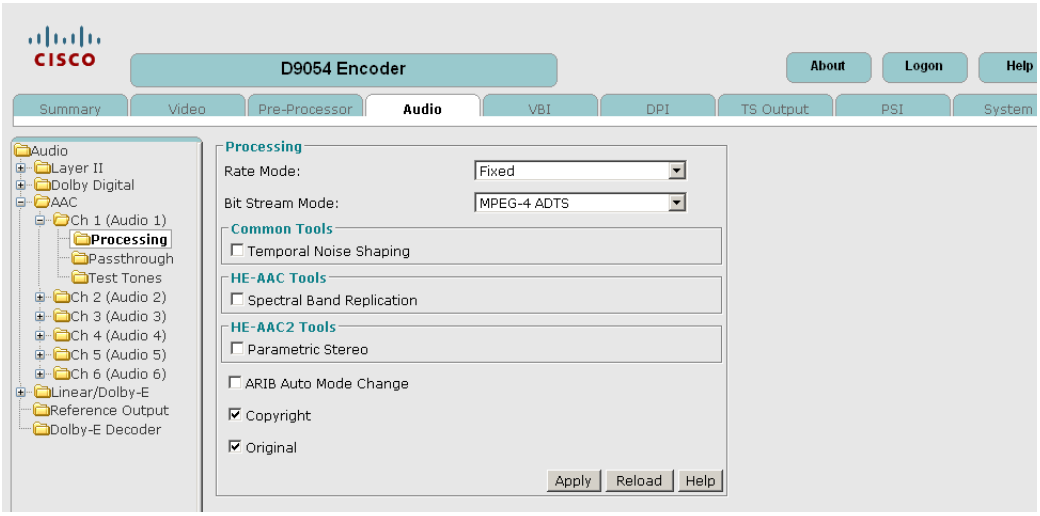
Setting Up AAC Processing

To Set Up AAC Processing

Proceed as follows to set up AAC Processing:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **AAC** icon, expand the appropriate channel icon and click the **Processing** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Select the **Rate Mode**. You may select Average or Fixed.

   The default mode is Average. Average denotes an average rate whereas Fixed denotes a constant rate. The fixed mode may result in decreased audio quality if the incoming rate exceeds the rate setting.

   In Average mod the maximum peak data range depends on the number of channels and the sampling frequency:

Sampling Frequency	Required TS Capacity (kbit/s)	
	1 Mono Channel	Stereo (2 Channels)
32 kHz	192	384
44.1 kHz	265	530
48 kHz	288	576

Note: The table above applies to 188-byte packet mode. If 204-byte packet mode is used, you must multiply by a factor of 204/188.

3. Select the **Bit Stream Mode**.

   Use this field to select the format of the bit stream. This is used by the decoding system and does not affect the performance of the actual signal.

   You may select MPEG-2 ADTS (Audio Data Transport Stream), MPEG-4 ADTS, MPEG-4 LOAS (Low Overhead Audio Stream), or MPEG-4 LATM LOAS Explicit (available for encoders equipped with a Multiple Channel Audio (MCA) card only).

   ADTS is the primary ES format used for MPEG-2 AAC-LC but is also the most common format in MPEG-4 AAC-LC and AAC-HE broadcast applications. The difference between MPEG-2 and MPEG-4 ADTS headers is a single bit, which indicates to the decoder which compression "tools" may have been used in creating the ADTS payload. For MPEG-2 streams, this is Temporal Noise Shaping (TNS) and Mid-Side Encoding (MS). MPEG-4 provides additional tools such as Spectral Band Replication (SBR) and Perceptual Noise Substitution (PNS). Most MPEG-2 decoders will mute the audio output when a MPEG-4 stream is indicated since they will not recognize streams created with SBR or PNS tools. MPEG-4 LOAS is mainly used for audio only (no video) services. Selection will be based on the requirements of the target decoders. MPEG-4 ADTS is only valid for bit rates below 128 kbit/s.

4. Enable the relevant compression tools. The functions of the various tools are as follows:

Tool	**Function**
Temporal Noise Shaping (TNS)	The basic idea of TNS relies on the duality of time and frequency domain. TNS uses a prediction approach in the frequency domain to shape the quantization noise over time. It applies a filter to the original spectrum and quantizes this filtered signal. Additionally, quantized filter coefficients are transmitted in the bit stream. These are used in the decoder to undo the filtering performed in the encoder, leading to a temporally shaped distribution of quantization noise in the decoded audio signal. (This means the noise can appear shortly after or even before the exciter signal, so it's an intentional "post/pre-echo", but not noticeable if implemented correctly, i.e., below the masking threshold.)

Tool	Function
Spectral Band Replication (SBR)	SBR is a proprietary Coding Technologies' technique that halves the sampling rate, but encodes the missing higher frequencies at a rate of 1.5 kbit/s and stores them in the auxiliary data fields of the MPEG format.
Parametric Stereo	Select to enable the MPEG-4 HE-AAC v2 Parametric Stereo tool.

The following is a list of mandatory combinations to use when enabling the compression tools:

- Temporal Noise Shaping
- Temporal Noise Shaping, Spectral Band Replication, and Parametric Stereo
- Temporal Noise Shaping and Spectral Band Replication
- Spectral Band Replication
- Spectral Band Replication and Parametric Stereo

5. Select **ARIB Auto Mode Change** to allow mode changes through the ARIB STD-B39 ancillary data. The default is de-selected.
6. Select **Copyright** if you want to signal that the encoded bit stream is protected by copyright. The default is selected.
7. Select **Original** if you want to signal that the encoded bit stream is an original. The default is selected.
8. Click **Apply**.

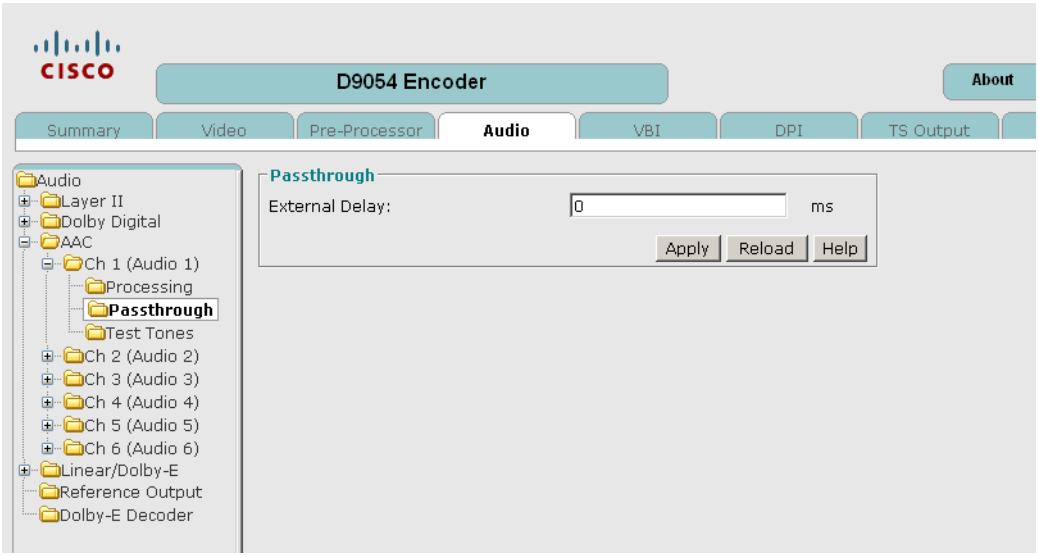
Setting Up AAC Passthrough

To Set Up AAC Passthrough

Proceed as follows to set up the AAC Passthrough:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **AAC** icon, expand the appropriate channel icon and click the **Passthrough** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Set the **External Delay**.

   The legal range is from 0 to 2000 ms.

   If you use an external audio encoder which adds to the audio delay you type a delay value corresponding to the external audio delay.

3. Click **Apply**.

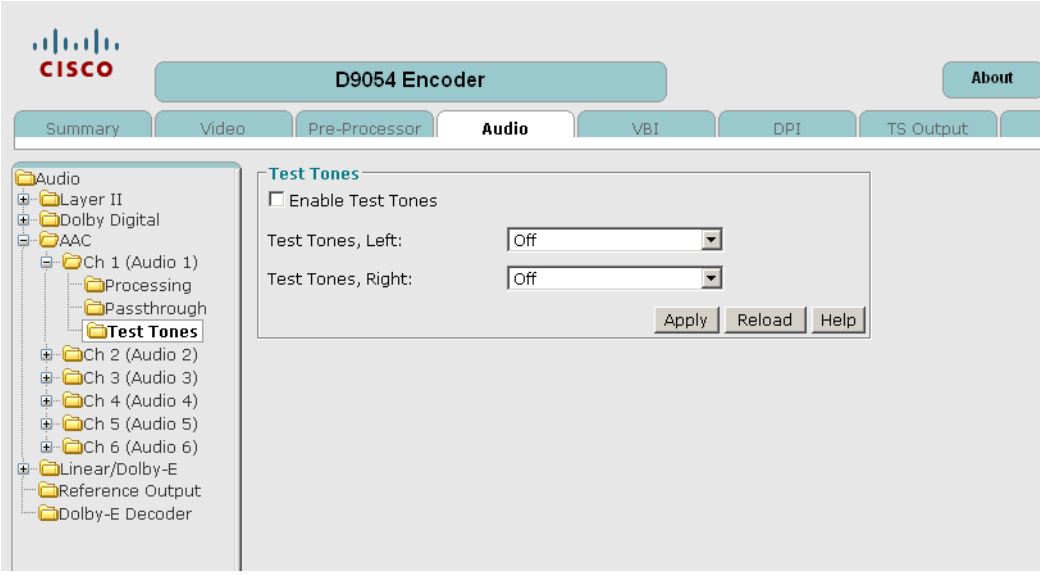
Setting Up the AAC Test Tones

To Set Up the AAC Test Tones

Proceed as follows to set up the AAC Test Tones:

1. From the user interface of the D9054 HD Encoder, click the **Audio** tab, expand the **AAC** icon, expand the appropriate channel icon and click the **Test Tones** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6).**



2. If relevant, set and enable the left and/or right test tones.

   Note: When Test Tones Left or Test Tones Right are set to Off, the respective channel encodes the incoming signal.

This option determines whether to send a test pattern to the left and/or right channel, and the frequency (Hz or kHz) and amplitude of that test pattern. See the following table for possible options:

Test Pattern Values	
Frequency	**Amplitude (dBFS)**
Off	
125 Hz	-1.05
500 Hz	-1.05
1 kHz	-1.05
1 kHz 21 dB	-21.05
1 kHz 61 dB	-61.05
2 kHz	-1.05
10 kHz	-1.05
Silence	
Chord (Left only)	

Note: Digital Silence is used to create a stream with perfect (or digital) silence.

Note: The Chord test tone is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

Note: The test tone frequencies apply at a sampling frequency of 48 kHz.

3. Click **Apply**.

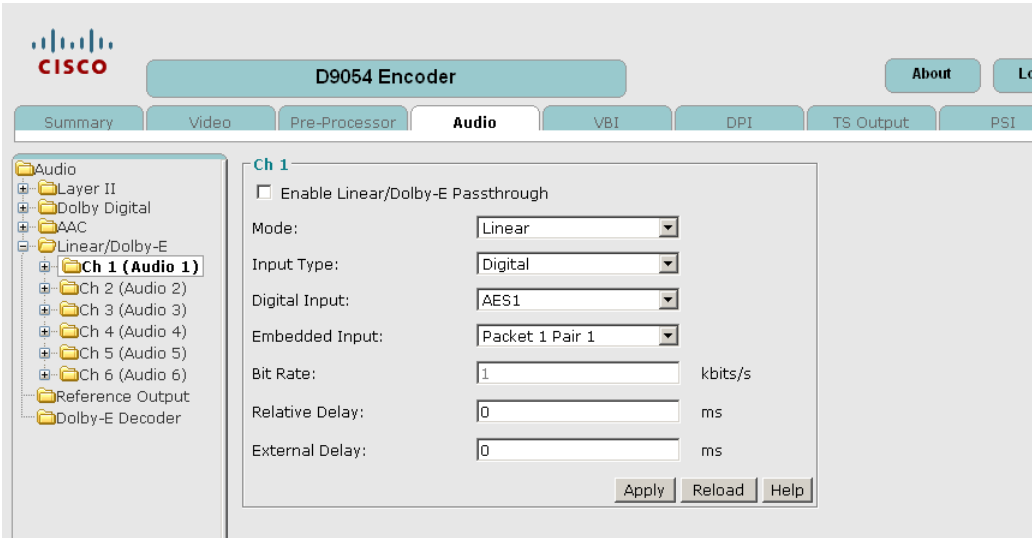
Setting Up the Linear/Dolby E Audio Input

To Set Up the Linear/Dolby E Audio

Proceed as follows to set up the Linear/Dolby E Audio:

1. From the user interface of the D9054 Encoder click the **Audio** tab, expand the **Linear/Dolby-E** icon and click the appropriate channel icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card (MCA). MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. If relevant, select **Enable Linear/Dolby-E Passthrough** to enable the audio channel.

   Note: Enable the audio after you have changed all audio settings if you don't want to transmit the audio while the changes take place.

3. Set the encoding **Mode**.
   You may select Linear or Dolby-E passthrough.

   Note: You can transfer Dolby Digital, Dolby-E and uncompressed PCM data in the linear channel. This may be useful if you are transferring different types of data. Note however, that only by transferring Dolby-E data in the Dolby-E mode you will be able to receive Dolby E alarms.

4. Select in the **Input Type** field whether your audio input is digital or embedded.
   The D9054 Encoder inputs the signal from the Digital input connector in the selected format. If you select Embedded, the D9054 Encoder extracts the audio embedded in the active HD-SDI video signal of the program.

5. If Digital was selected as the input type above, select one of the four connectors to use as the digital audio input (**Digital Input**). You can select AES1, AES2, AES3, or AES4.

   Note: Digital Input is only available for encoders equipped with a Multiple Channel Audio (MCA) card.

6. If Embedded was selected as the input type above, select the embedded packet pair (**Embedded Input**).

   The HD-SDI video input can contain up to 8 stereo audio channels each represented by a packet 1 to 4 and pair 1 or 2. You can transfer up to 4 of these channels.

7. The **Bit Rate** field displays the bit rate of the signal. This is read-only.

8. Set the **Relative Delay**.

   The legal range is from -1000 to 1000 ms.

   Use this field if you want to adjust the encoding audio delay to synchronize audio with video in a program which has both.

   Example: If you use external video equipment which adds to the video delay, you type a positive external audio delay value corresponding to the external video delay.

   Note: You cannot set a positive relative audio delay greater than the end-to-end delay determined by the video encoder.

9. Set the **External Delay**.

   The legal range is from 0 to 2000 ms.

   If you use an external audio encoder which adds to the audio delay you type a delay value corresponding to the external audio delay.

10. Click **Apply**.

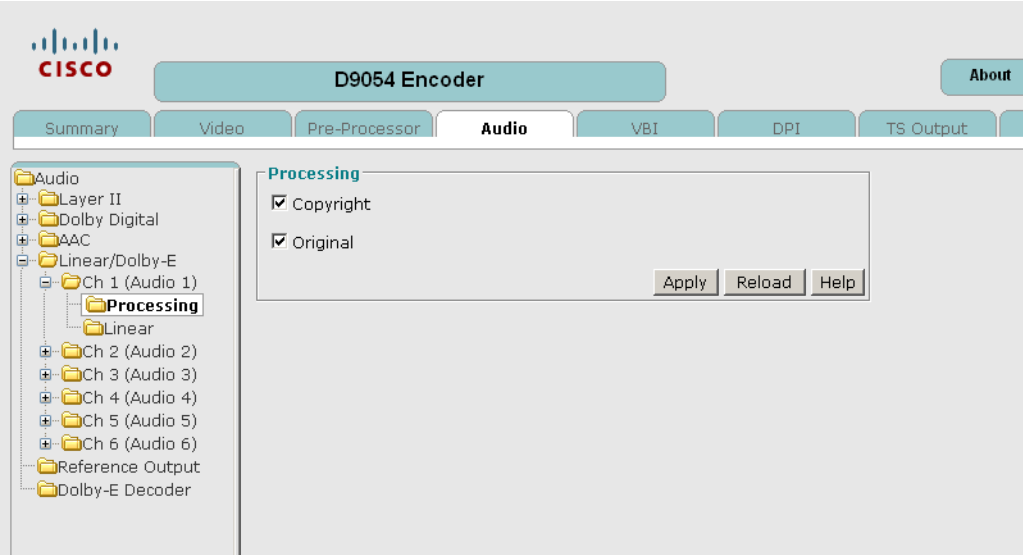
Setting Up the Linear/Dolby E Processing

To Set Up the Linear Processing

Proceed as follows to set up the Linear/Dolby-E Processing:

1. From the user interface of the D9054 Encoder click the **Audio** tab, expand the **Linear/Dolby-E** icon, expand the appropriate channel icon and click the **Processing** icon from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card (MCA). MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



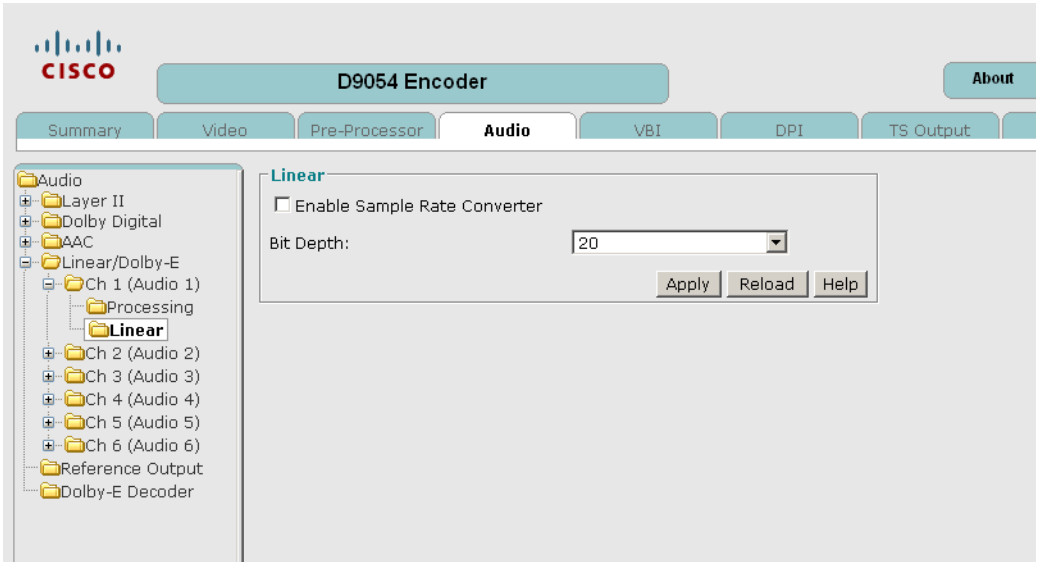
2. Select **Copyright** if you want to signal that the encoded bit stream is protected by copyright. The copyright has the same meaning as the copyright bit on CDs and DAT tapes, i.e. telling that it is illegal to copy the contents if the bit is set. The default is selected.
3. Select **Original** if you want to signal that the encoded bit stream is located on its original media. The default is selected.
4. Click **Apply**.

Setting Up the Linear Parameters

To Set Up the Linear Parameters

Proceed as follows to set up the linear parameters:

1. From the user interface of the D9054 Encoder click the **Audio** tab, expand the **Linear/Dolby-E** icon, expand the appropriate channel icon and click the **Linear** icon from the sub-pages.



2. If relevant, enable the **Sample Rate Converter**.

   Enable the sample rate converter if your source is not synchronized to the D9054 Encoder.

3. Set the **Bit Depth**.

   The sample rate is 48 kHz. You may select 16, 20 or 24 bits.

   Note: The bit depth setting is only applicable for linear mode. The bit depth is always 20 bits in the Dolby-E mode.

4. Click **Apply**.

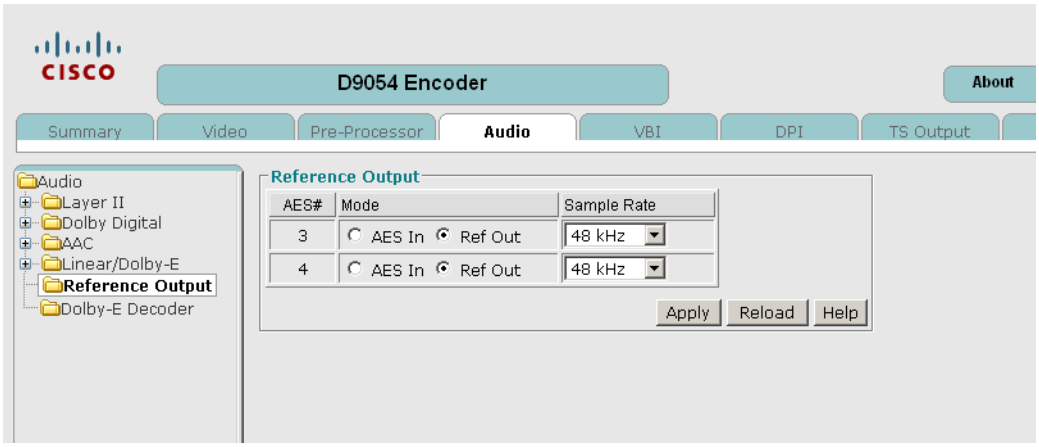
Setting Up the Reference Output (MCA card only)

Note: The Reference Output sub-page is only available when the encoder is equipped with a Multiple Channel Audio (MCA) card. This sub-page is not used for dual-channel audio applications.

To Set Up the Reference Output

Proceed as follows to set up the reference output:

1. From the user interface of the D9054 Encoder, click the **Audio** tab and then the **Reference Output** icon from the sub-pages.



2. As the default, AES3 and AES4 are set as Reference Outputs. They may be configured as digital AES inputs if more inputs are required in addition to AES1 and AES2.

   The default sample rate is 48 kHz. You may select sample rates of 32, 44.1 or 48 kHz.

3. Click **Apply**.

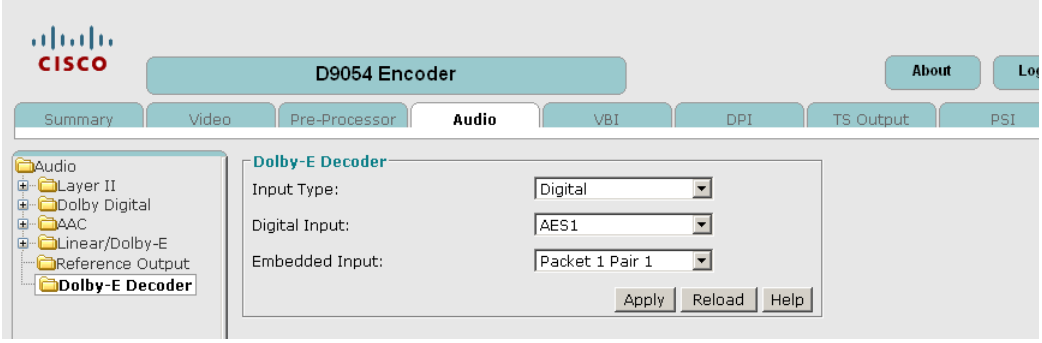
Setting up the Dolby-E Decoder (MCA card only)

Note: The Dolby-E Decoder sub-page is only available when the encoder is equipped with a Multiple Channel Audio (MCA) card and a Dolby-E Decoder license. This sub-page is not used for dual-channel audio applications.

To Set Up the Dolby-E Decoder

Proceed as follows to set up the Dolby-E Decoder:

1. From the user interface of the D9054 Encoder, click the **Audio** tab and then the **Dolby-E Decoder** icon from the sub-pages:



2. Select in the **Input Type** field whether your audio input is digital or embedded. The D9054 Encoder inputs the signal from the digital input connector in the selected format (digital or embedded). If you select Embedded, the D9054 Encoder extracts the audio embedded in the active HD-SDI video signal of the program.
3. If Digital was selected as the input type above, select one of the four connectors to use as the digital audio input (**Digital Input**). You can select AES1, AES2, AES3, or AES4.
4. If Embedded was selected as the input type above, select the embedded packet and pair (**Embedded Input**). You can select Packet 1 to 4 and Pair 1 or 2.

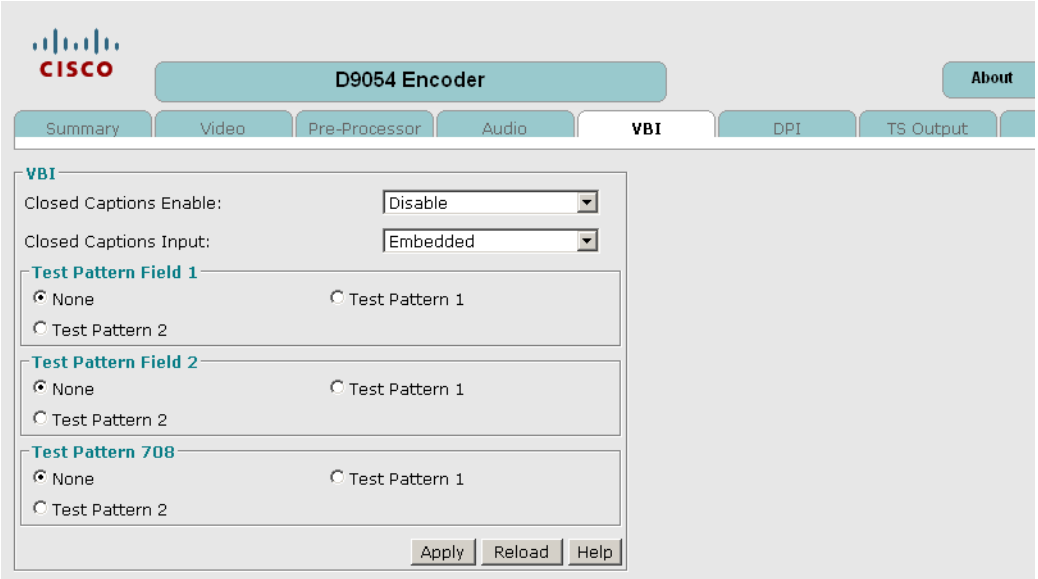
Section D - Setting Up the VBI

Testing and Enabling Closed Captions

To Test and Enable Closed Captions

Proceed as follows to test and enable closed captions:

1. From the user interface of the D9054 HD Encoder, click the **VBI** tab.



2. To enable closed captions select Enable in the **Closed Captions Enable** field. The selections are: Disable, 608 only and 708 only. The default is Disable.
3. Currently the D9054 HD Encoder supports closed captions **Embedded** in the video signal. It cannot be changed.
4. If relevant, enable test patterns in fields 1, field 2, and 708 respectively.
5. Click **Apply**.

Section E - Digital Program Insertion (DPI)

Setting Up the DPI

Overview

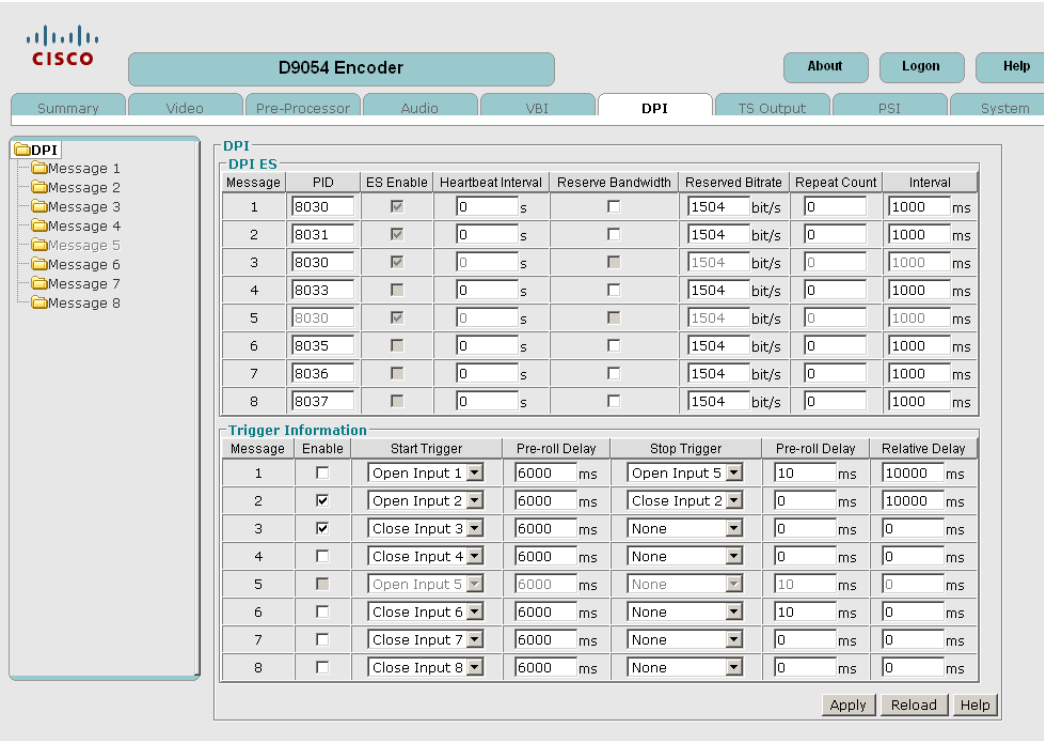
Digital Program Insertion (DPI) makes it possible to insert advertisements into program content in the digital domain. DPI messages are supported in the D9054 HD Encoder in accordance with the SCTE-35 standard. Up to eight DPI messages can be triggered via contact closures.

DPI messages can be inserted via contact closure or embedded in the HD-SDI input signal via the SCTE-104 standard. See **To Set Up the DPI via the HD-SDI Input (SCTE-104 standard)**, page 5-94 for instructions to set up DPI messages via the HD-SDI input.

To Set Up the DPI via Contact Closure

Proceed as follows to set up the DPI for up to eight contact closures:

1. From the user interface of the D9054 HD Encoder, click the **DPI** tab.



The GUI displays the global DPI message information and trigger information for all eight DPI messages.

2. Set the **PID** of the DPI.

   This is the transport packet PID of the DPI stream. You can make each PID unique to transmit each DPI message on a different PID, or set all messages to the same PID to transmit all DPI messages on the same PID. If you assign the same PID to multiple DPI messages, this will set all the parameters for identically assigned DPI channels to be greyed out, not allowing the use of different DPI messages for other Service IDs. You may type a figure in the range from 16 to 8190.

3. Set the **Heartbeat Interval** (Duration Period).

   The heartbeat is used to signal a live DPI PID connection.

   Possible range is from 0 to 3600 seconds between heartbeat packets.

   Note: Typically you won't need the heartbeat duration setting if you have set the bandwidth reservation bit rate to a value other than 1504.

4. Enable the **Reserve Bandwidth**.

   This enable or disable generation of Bandwidth Reservation packets.

5. Set the **Reserved Bit Rate**.

   The bandwidth reservation bit rate describes the packet bandwidth of the DPI stream in bits per second. Possible range is 1504 to 90240 bit/s.

   Note: The bandwidth reservation bit rate is typically used in connection with encryption of the encoded signal so that the splice cannot be detected.

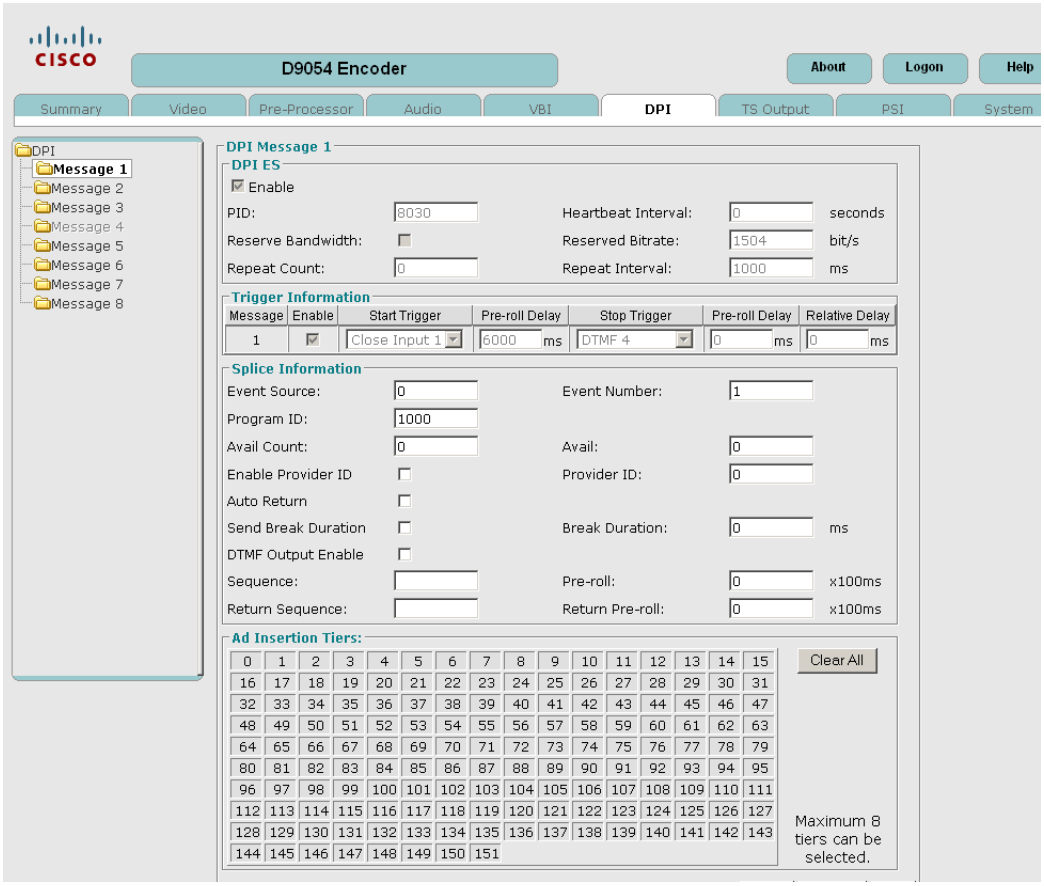
6. Set the **Repeat Count**.

   This is the number of times the splice message is to be repeated.

7. Set the **Interval**.

   This is the repeat period for the number of repetitions of splice message generation. The default is 1000 ms.

8. Go to the DPI message page.



The top half of the page indicates (read-only) the global DPI message information for all the messages on the selected PID. The Enable check box will be checked if any of the eight messages are enabled.

The **Trigger Information** will also be displayed for the selected DPI message.

9. Enter the **Event Source**.

   This is the Event Source ID for the alternate program to be inserted. The legal range is from 0 to 15. The default is 0.

10. Enter the **Event Number**.

    This number indicates together with the Event Source the unique identification of the program to be inserted. The legal range is from 0 to 268435455.

11. Enter the **Program ID**.

    This indicates the ID of the alternate Program to be inserted. The legal range is from 0 to 65535.

12. Enter the **Avail Count**.

    This parameter represents the expected maximum number of breaks, e.g., advertisements, in the program. Entering 0 means that the parameter is not used. The legal range is from 0 to 255.

13. Enter the **Avail**.

    The Avail parameter is the counter for breaks, e.g. advertisements, in the program. The counter starts as 1 and you must increment it for each new break period until a new program starts. Entering 0 means that the parameter is not used. The legal range is from 0 to 255.

14. Enter the **Provider ID**.

    This is the unique ID of the provider of the program. The legal range is from 0 to 4294967295.

15. Select **Enable Provider ID**.

    Enabling this means that the Provider ID is sent as part of the DPI message.

16. Select **Enable Auto Return**.

    This sets whether the input is to trigger on a dual or single edge and if the Break Duration time is to be used with or without an automatically generated return (stop splice).

17. Enable or Disable **Send Break Duration** according to the SCTE-35 standard.

18. Enter the **Break Duration**.

    This is the splice break duration. You can enter a value in the range from 0 to 8640000. The default is 0.

19. Select **DTMF Output Enable** to generate a DTMF tone when the advertisement or break is to start or to set up the open-collector outputs for the Advanced D98xx series receivers (for example, Cisco D9854 Advanced Program Receiver and Cisco D9858 Advanced Receiver Transcoder), which supports decoding of SCTE-35 messages with DTMF descriptor.

20. Enter the **Sequence** and **Return Sequence** numbers (0 to 9, *, #). The Sequence number sets the tone to start the DPI message. The Return Sequence sets the tone to stop the DPI message. This is an optional DTMF sequence to be included according to the SCTE-35 standard. The digits 0 to 9 before */# are a request for tone outputs. */# starts or stops the tone generation, if preceded by a minimum of one digit.

    You can optionally configure the sequence to set the open-collector contacts for the Advanced D98xx series receivers (for example, Cisco D9854 Advanced Program Receiver and Cisco D9858 Advanced Receiver Transcoder).

    To set an open-collector contact, set two digits after */# to request a trigger output. The first digit is the pin number and the second digit indicates whether it should be set or cleared. For example, 123*81 will cause the tone sequence 123 to start on open-collector pin 8.

    Note: If there are no digits defined before */#, then */# does not output as a tone (for example, *81).

    For more information on contact closure pin allocation, see **Connecting to the Contact Closure Interface**, page 3-9.

21. Enter the **Pre-roll** and **Return Pre-roll**. The Pre-roll sets the period of time before the tone is to be played to switch to the DPI message. The Return Pre-roll sets the period of time before the tone is to be played to switch or return to the program. Parameters are in 100 ms increments.

22. The **Ad Insertion Tiers** section allows you to assign unique ad insertion tiers with the DPI stream. When you assign ad insertion tiers to the encoder, the encoder is authorized to encode the signal for ad insertions that match the ad insertion tiers assigned by your automation system. If the encoder cannot find a tier match, the encoder is not authorized and cannot access the ad insertion.

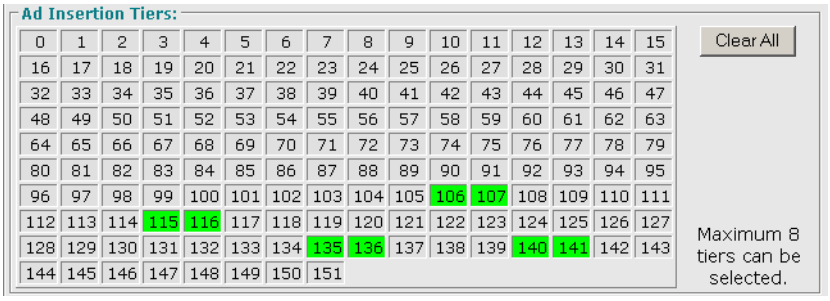
    To assign an Ad Insertion Tier, click an unassigned (gray) number in the Tier Map area. The number's background turns green. You can assign the tiers that appear in the window. You can assign multiple tiers.

    To remove an assigned tier from the encoder, click on the assigned (green) number in the Tier Map area. The number's background turns gray.

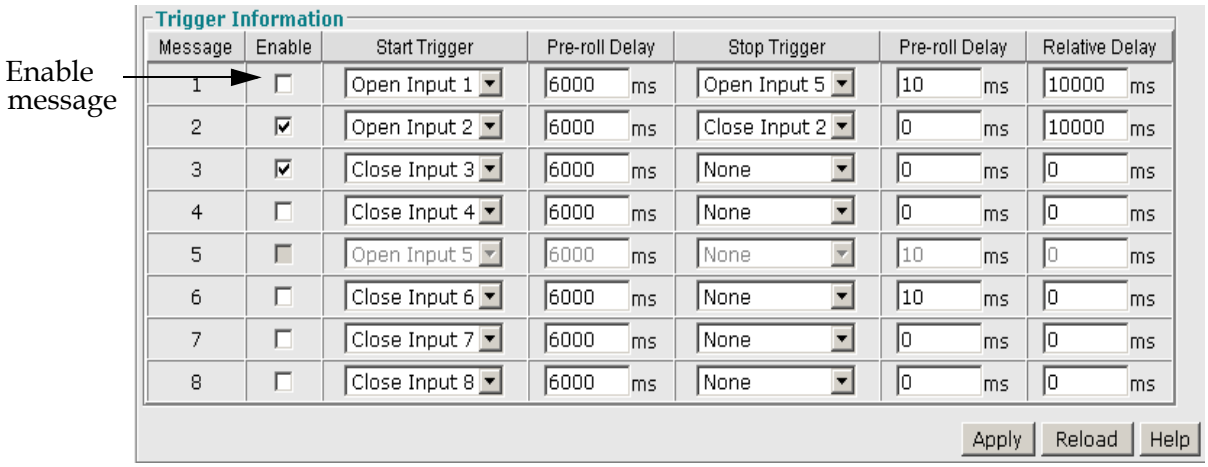
    Click **Clear All** to remove all the assigned tiers.

    Note: A maximum of 8 tiers can be selected.

    For example, the tier map below assigns tiers 106-107, 115-116, 135-136, and 140-141 to the encoder.



23. Click **Apply**.
24. Go back to the DPI page to set the state of the DPI messages you want to trigger.



Enable the DPI Messages you want to send. The DPI elementary stream describes the DPI.

25. Select the contact closure **Start Trigger**.

    This indicates the input number and the position (Open/high or Close/low) of the contact closure input to start the generation of the DPI. Possible inputs are Open Input/Close Input of the selected input (i.e., 1 to 8) and DTMF.

26. Select the contact closure **Stop Trigger**.

    This indicates the input number and the position (Open/high or Close/low) of the contact closure input to stop the generation of the DPI. Possible inputs are None, Auto Stop, Open Input 1 to 8, Close Input 1 to 8, and DTMF.

27. Set the **Pre-roll Delay** for the Start Trigger.

    This feature allows splicers to delay requests to the ad server in order to accommodate play out equipment latency in the system. Possible values are in the range of 1 to 60000 ms. The default value is 6000 ms.

    Note: Pre-roll Delay must be less than the Break Duration.

    Note: The Pre-roll Delay must be greater than Repeat Count x Repeat Interval.

28. Set the **Pre-roll Delay** for the Stop Trigger.

    This sets the time delay required prior to the Stop trigger initiating due to equipment latency. Possible values are in the range of 0 to 60000 ms. The default value is 0 ms.

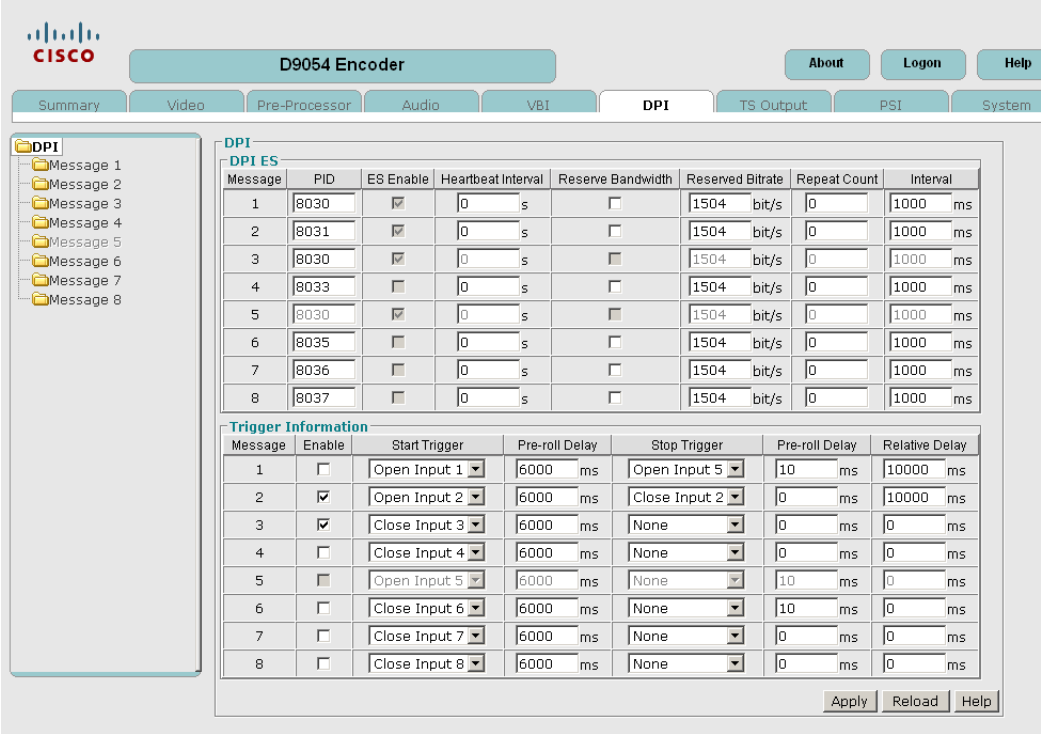
    Note: Pre-roll Delay must be less than the Break Duration.

29. Set the **Relative Delay** in the range from -10000 to +10000 ms. The default is 0. This value is used to mathematically manipulate the PTS timestamp to compensate for known external delays from the DPI source. A negative relative delay cannot be less than the current PCR base value plus 4 seconds. If this was the case, it would mean that the splice was defined to occur before the packet is physically placed in the multiplex.
30. Click **Apply**.

To Set Up the DPI via the HD-SDI Input (SCTE-104 standard)

Proceed as follows to set up the DPI messages embedded in the HD-SDI input signal:

1. From the user interface of the D9054 HD Encoder, click the **DPI** tab.



The GUI displays the global DPI message information. This page is also used to enable the DPI messages embedded within the HD-SDI signal (see step 8).

2. In the DPI ES section, set the **PID** of the DPI.

   This is the transport packet PID of the DPI stream. You may type a figure in the range from 16 to 8190.

3. Enable the **Reserve Bandwidth**.

   This enable or disable generation of Bandwidth Reservation packets.

4. Set the bandwidth's **Reserved Bitrate**.

   The bandwidth reservation bit rate describes the packet bandwidth of the DPI stream in bits per second. Possible range is 1504 to 90240 bit/s.

   Note: The bandwidth reservation bit rate is typically used in connection with encryption of the encoded signal so that the splice cannot be detected.

5. Set the **Heartbeat Interval** (Duration Period).

   The heartbeat is used to signal a live DPI PID connection.

   Possible range is from 0 to 3600 seconds between heartbeat packets.

   Note: Typically you won't need the heartbeat duration setting if you have set the bandwidth reservation bit rate to a value other than 0.

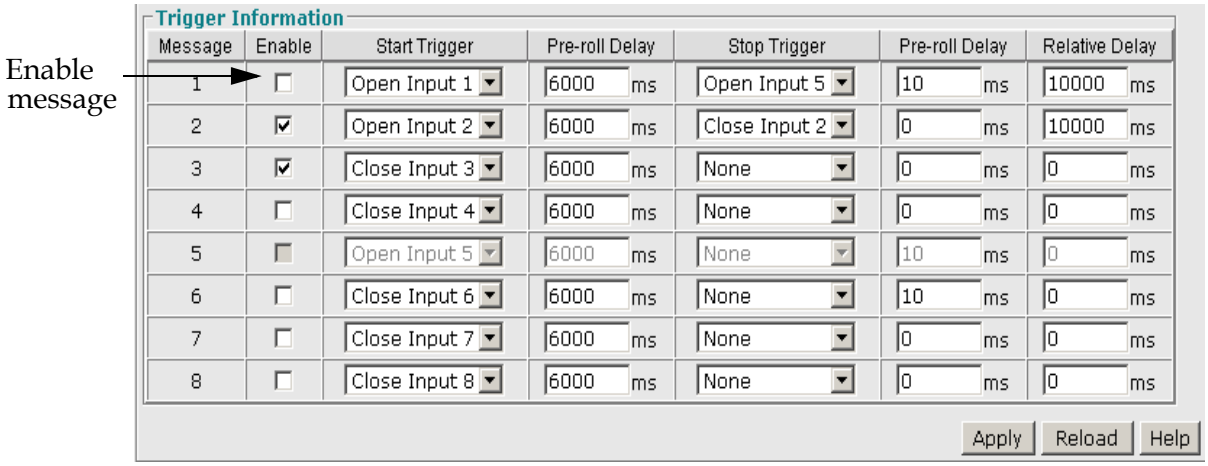
6. Set the **Repeat Count**.

   This is the number of times the splice message is to be repeated.

7. Set the **Interval**.

   This is the repeat period for the number of repetitions of splice message generation. The default is 1000 ms.

8. In the Trigger Information section, select the first **Enable** check box (i.e., Message 1) to enable the DPI message(s) embedded within the HD-SDI signal.



9. Set the **Relative Delay** in the range from -10000 to +10000 ms. The default is 0. This value is used to mathematically manipulate the PTS timestamp to compensate for known external delays from the DPI source. A negative relative delay cannot be less than the current PCR base value plus 4 seconds. If this was the case, it would mean that the splice was defined to occur before the packet is physically placed in the multiplex.

10. Click **Apply**.

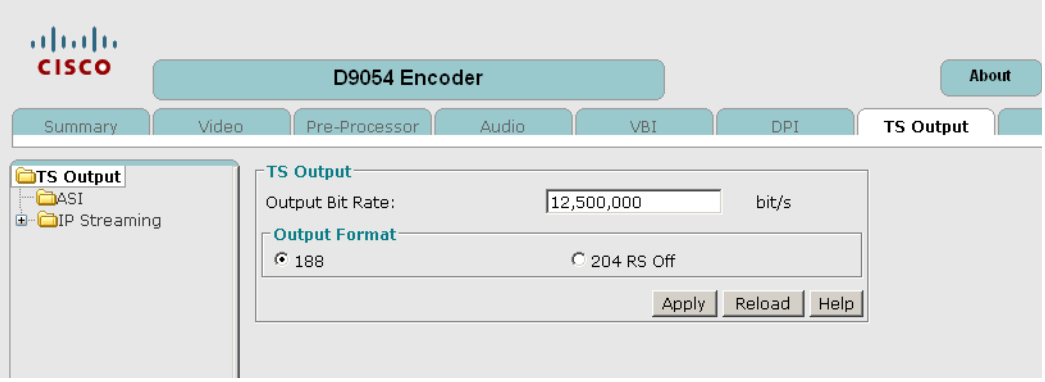
Section F - Setting Up the TS Output

Setting Up the TS Output Parameters

To Set Up the TS Output Parameters

Proceed as follows to set up the TS Output:

1. From the user interface of the D9054 HD Encoder, click the **TS Output** tab.



2. Enter the **Output Bit Rate** in bit/s.

   The legal range is from 1 to 120 Mbit/s. This bit rate must not be smaller than the Used Payload.

3. Select 188 or 204 bytes mode for the **Output Format**.

   The value must be the same in the encoder and the decoder.

Format	Meaning
188	188 bytes mode without Reed Solomon algorithm.
204 RS OFF	204 bytes mode without the Reed Solomon algorithm applied. This means that there is **RS** overhead but only with dummy bytes.

   Note: If you use a modulator you should switch off the RS error correction.

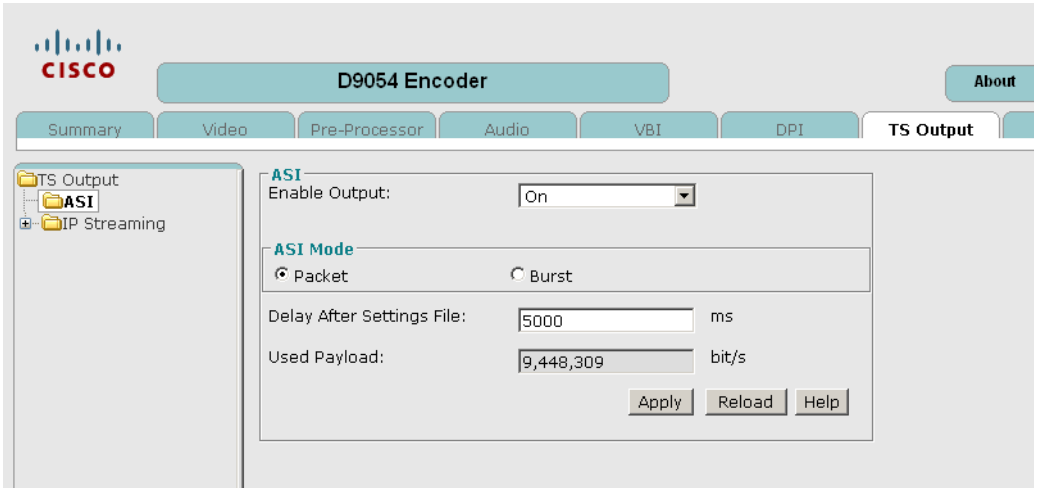
4. Click **Apply**.

Setting Up the ASI Output Parameters

To Set Up the ASI Output Parameters

Proceed as follows to set up the ASI output:

1. From the user interface of the D9054 HD Encoder, click the **TS Output** tab and the **ASI** icon from the sub-pages.



   The GUI displays the bit rate of the **Used Payload** if you press **Reload**.

2. For the **Enable Output**, select **On**, **Off** or **Null Packets.**

   Under normal operation you should verify that the output is set to **On**. The output may have been set to **Off** by the Encoder Backup Task. For further information refer to the *Digital Headend Backup, Task Driver for Rosa 3.0, User's Guide, part number 6985066*.

3. Select the **ASI Mode** to **Packet** unless you have specific requirements.
   Select between the two DVB transmission modes for ASI. In **Packet** mode a whole MPEG packet is sent (188/204 bytes) and stuffing is inserted between packets. In **Burst** mode one byte is sent at a time with stuffing inserted between bytes. Some non-Cisco decoders specifically require Packet or Burst mode.

4. Set the **Delay After Settings File** in the range from 0 to 65635 ms. The default is **5000 ms**.

   When a valid settings file has been received (e.g., in a back-up scenario in ROSA), the TS output must only contain null-packets for the specified time period. When the time period has expired, the output must be re-enabled.

   If a settings file is received while the ASI Enable output parameter is set to Off, the output will remain muted before, during and after the period specified in this field.

5. Click **Apply**.

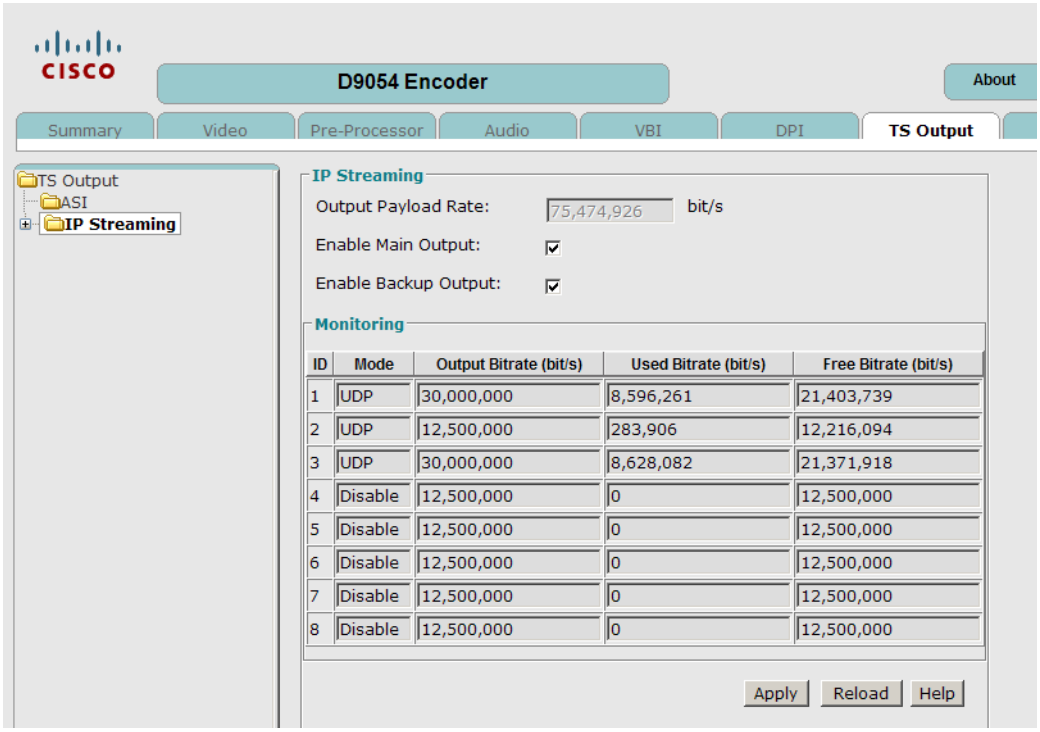
Setting Up the IP Streaming Output

The D9054 HD Encoder can stream IP to an IP network device with a defined MAC address and IP address on a selected IP subnet.

Setup in the D9054 HD Encoder ROSA/Web Interface

Proceed as follows to set up the IP Streaming Output:

1. From the user interface of the D9054 HD Encoder, click the **TS Output** tab and the IP Streaming icon from the sub-pages.



The D9054 HD Encoder GUI automatically displays the output payload rate of the IP streaming. This rate depends on how many IP streams you have enabled in the Stream Setup picture and whether or not you have enabled the Maintain the TS Rate setting.

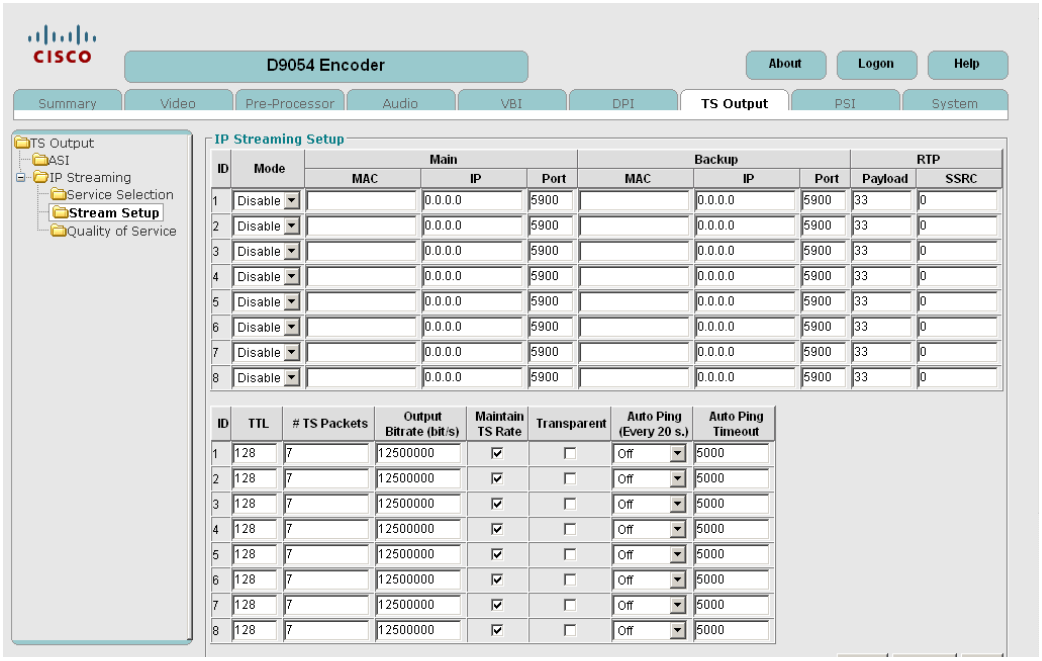
This page also displays the mode for each of up to 8 IP output streams, the total output bit rate, the used bit rate and the free (available) bit rate for each stream.

The GUI displays the bit rate of the used payload if you press **Reload**.

2. Select **Enable Main Output** to stream data to the main receivier from the IP TS OUT 1 connector. If Enable Main Output is de-selected, there will be no output on the IP TS OUT 1 connector.

3. Select **Enable Backup Output** to stream data to the backup receiver from the IP TS OUT 2 connector. If Enable Backup Output is de-selected, there will be no output on the IP TS OUT 2 connector.

4. Click the **Stream Setup** icon from the sub-pages.



5. For each of up to eight Index IDs, select the mode; either **UDP**, **RTP**, or **Disable** to enable IP streaming. The default is **Disable**.
6. Enter the **MAC** Addresses of the destination and backup IP set top boxes. MAC addresses are not required for multicast destinations. For unicast destinations, the MAC address is not required if the target supports ARP.
7. Enter the **IP** Addresses of the destination and backup IP receivers. These are the IP addresses of the receivers or a multicast address. When entering a unicast address, ensure that the IP address, Subnet Mask and Gateway are properly set up; otherwise the Encoder will not be able to communicate with the external device.
8. Enter the IP **Ports** of the destination and backup IP receivers. These are the destination ports for the data to be routed. The range is from 0 to 65535.
9. Type the **Payload** and **SSRC** of the Real-Time Transport Protocol (RTP). Payload is a 7-bit value that indicates the format of the payload. The SSRC is a 32-bit synchronization source identifier that identifies the source of a stream.
10. Enter the **TTL** (Time to Live). This number identifies the number of routers that IP packets can travel through before they are dropped. The range is from 1 to 255. The default is 128.
11. Enter the number of transport packets (**# TS Packets**) per UDP. This sets the number of transport packets when UDP mode is selected. Choose a value in the range from 1 to 7. The default is 7.

12. Enter the **Output Bitrate** for each IP stream in the range from 50,000 to 120000000 bit/s (120 Mb/s).

    Important: Maintain TS Rate must be enabled for each active IP stream; otherwise the corresponding **Output Bitrate** setting will have no affect on the TS output. The default is 12500000 (12.5 Mb/s).

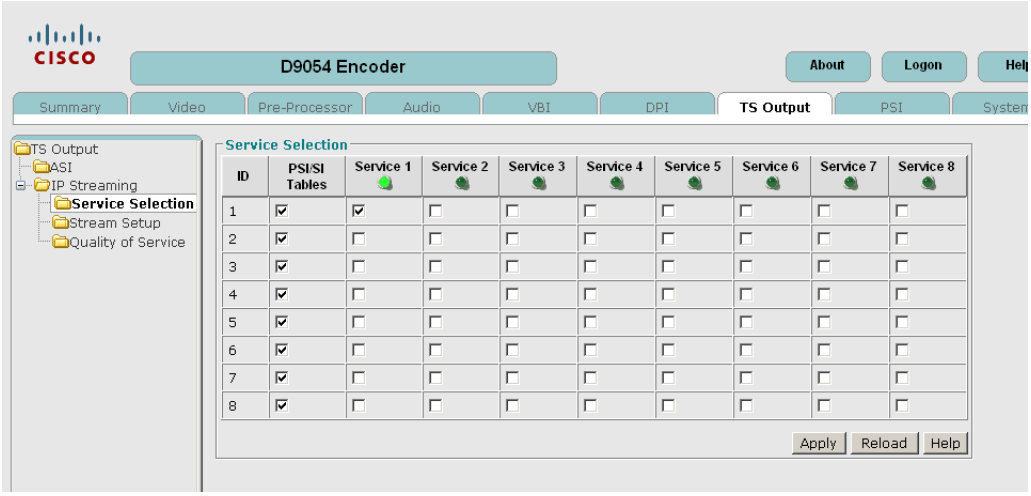
13. Enable **Maintain TS Rate** for each active IP stream. This parameter is used to indicate whether or not to transmit ASI null packets in the associated IP stream. If enabled, the IP payload bit rate will controlled by the Output Bitrate setting. If disabled, no ASI NULL packets are transmitted in the associated IP stream. The default is enabled (checked).

14. Enable **Transparent** mode for each active IP stream. When the mode is enabled, all PIDs/services transmitted on the ASI output will also be transmitted in the associated IP stream. In other words, the IP stream service selection page is ignored. The default is disabled (unchecked). (Null packets are selected using the Maintain TS Rate parameter above).

    Note: Auto Ping and **Auto Ping Timeout** are only used when troubleshooting the IP connection to the receiver. **Auto Ping** allows you to transmit ping packets to the destination address specified for the selected device(s). When Auto Ping is enabled (On), ping packets are transmitted every 20 seconds. If no valid reply is received within the specified timeout period, an alarm is issued to the management system. The Auto Ping default is Off.

15. Set the **Auto Ping Timeout** to a value in the range from 1000 to 10000 (in ms). The default is 5000 ms.

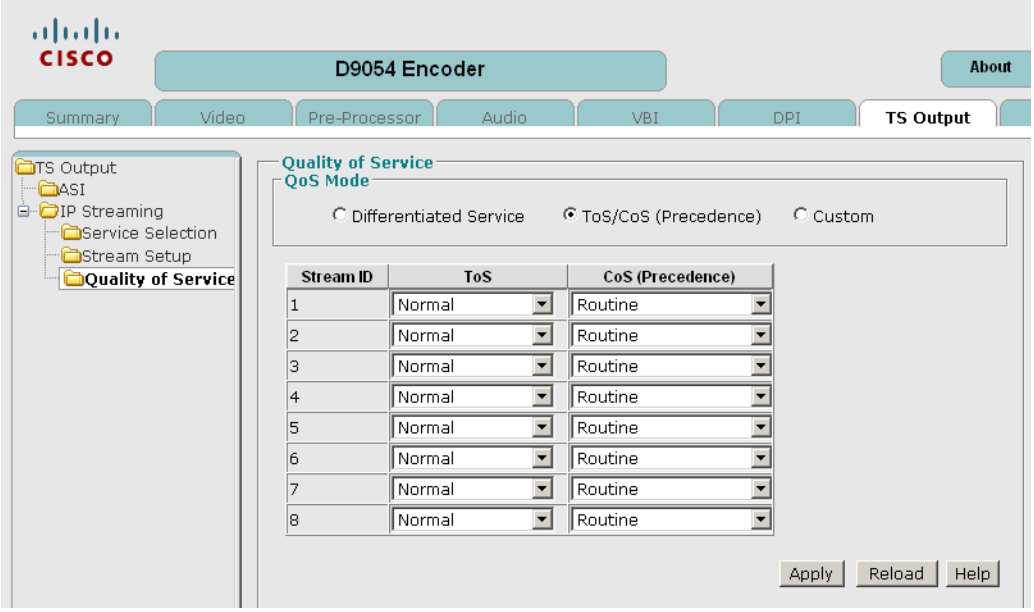
16. The D9054 HD Encoder can stream up to eight services on one IP output. Proceed as follows to set up each of up to eight services for each stream. From the user interface of the D9054 HD Encoder click the **TS Output** tab and the IP **Service Selection** icon from the sub-pages.



17. Enable the **PSI/SI Tables** and the **Service** number (Service 1 to Service 8) in the column for each of the services setup for each ID.

    Note: The eight Service IDs (Service 1 through Service 8) on the Service Selection page correspond to the same IDs on the Stream Setup page.

18. Click the **Quality of Service** icon from the sub-pages.



19. Select the desired quality of service (**Qos**); either **Differentiated Service**, **ToS/CoS (Precedence)** or **Custom**. The default is ToS/CoS (Precedence). These settings are used to guide the selection of the actual service parameters when transmitting data through a network.

    Each of the three available modes and the RFC (Request for Comment) references to set these modes are described in the following table.

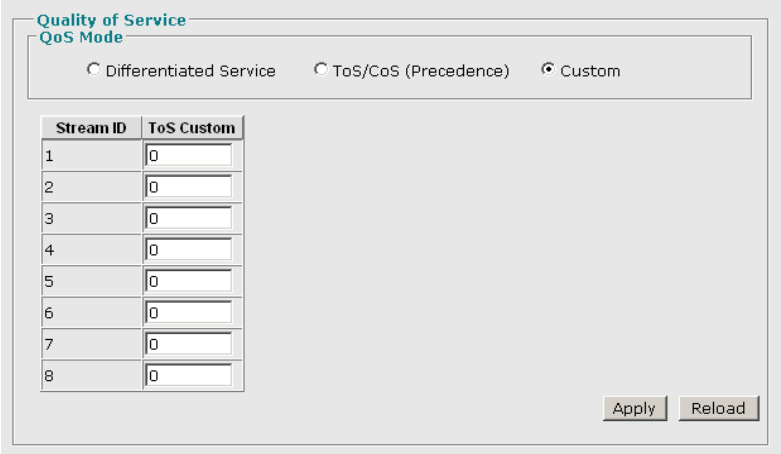
Mode	Description
Differentiated Service	Refer to RFC 2474 and RFC 3260. Supports configuration of TOS bits in the IP header, allowing integration in Diff Serve networks.
ToS/CoS (Precedence)	Type of service precedence. Refer to RFC 791.
Custom	Refer to RFC 3168.

When you select the ToS/CoS (Precedence), you can select from one of five different settings: Normal, Min. Cost, Max. Reliability, Max. Throughput, and Min. Delay. The default setting for each field is Normal.

- Set the CoS (Precedence) mode settings. Some networks offer service precedence, which treats high precedence traffic with a higher priority than other traffic (by accepting only traffic above a certain precedence at the time of high load). Choose from Routine, Priority, Immediate, Flash, Flash Override, Critic ECP, Internetwork Control or Network Control. The default is Routine.

When you select Differentiated Service as the QoS mode, you need to set the Differentiated Service "Code Point" (DSCP) for each Stream ID. The Code Point is 6-bit field which indicates the type of service the packet carries when the encoder is connected to a router (i.e., to set the priority).

When you select Custom as the QoS Mode, set the 8-bit field that contains the QoS bits. This value is a multiple of the value set for the Differentiated Service Code point.



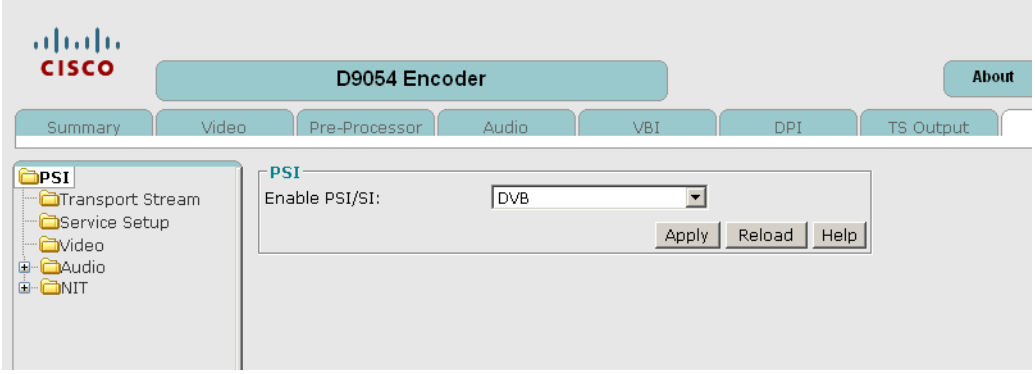
20. Click **Apply**.

Section G - Setting Up the PSI

Enabling/Disabling the PSI/SI Information

Proceed as follows to enable or disable the PSI/SI information:

1. From the user interface of the D9054 HD Encoder click the **PSI** tab.

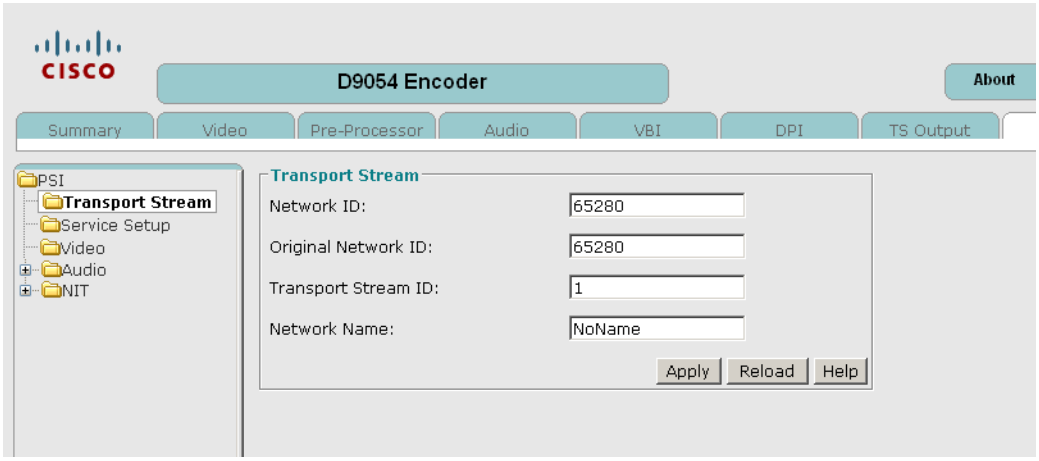


2. To enable the PSI/SI information, select DVB or MPEG. The default setting is Off.
3. Click **Apply**.

To Set Up the Transport Stream

Proceed as follows to set up the Transport Stream:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab and the **Transport Stream** icon from the sub-pages.



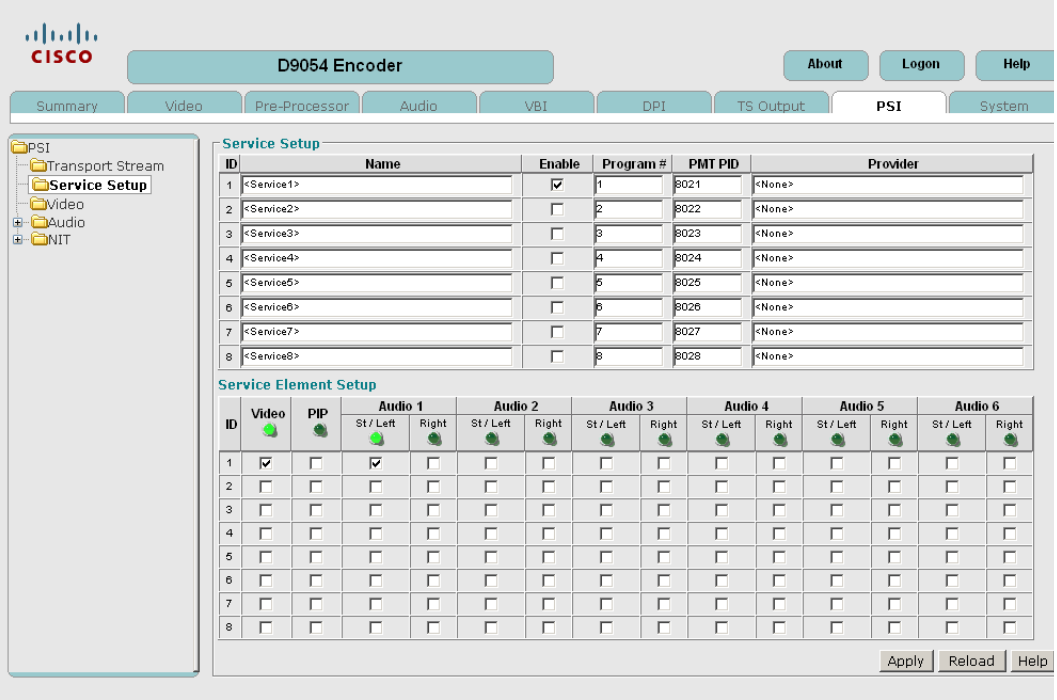
2. Type the **Network ID**.
   The range is from 0 to 65535.
3. Type the **Original Network ID**.

   Note: If the NIT is transmitted on the network on which the TS was originated, the network ID and the original network ID have to be identical.
4. If required, change the **Transport Stream ID**.
   You may enter a value between 1 and 65535. You may enter the ID as a decimal figure.
5. Type the **Network Name**.
   You may type alphanumeric characters. Up to 30 characters are allowed. The supported character set is ASCII.
6. Click **Apply**.

To Set Up the Service Stream

Proceed as follows to set up the Service Stream:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab and the **Service Setup** icon from the sub-pages.

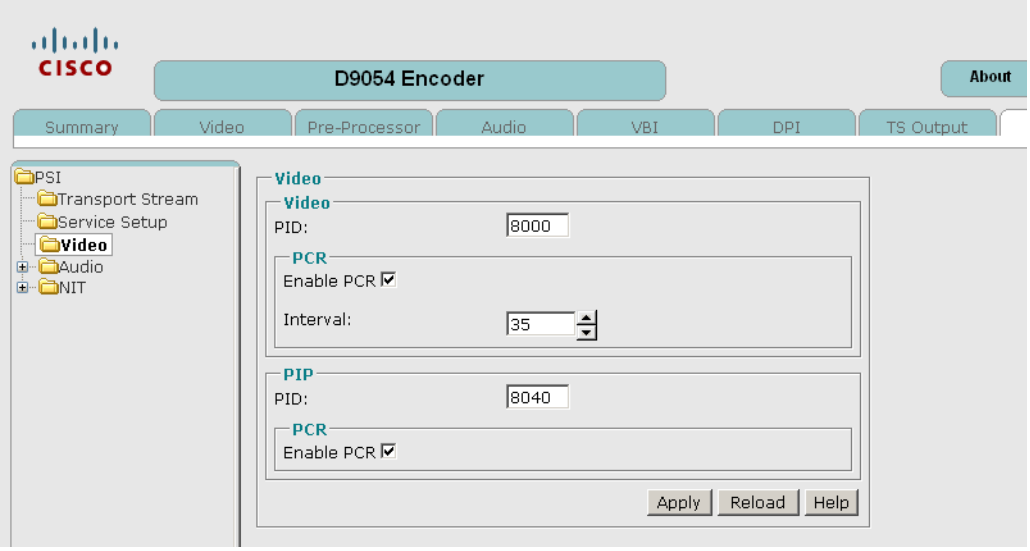


2. Enter the **Name** of the service. This field can be up to 30 characters in length and can consist of any printable character.
3. Select **Enable** for the service.
4. Assign a **Program #** to the service in the range from 1 to 65535.
5. Enter the **PMT PID** assigned to the service in the range from 16 to 8190. The default values for services 1 through 8 are 8021 to 8028 respectively.
6. Enter the name of the service **Provider**. This field can be up to 30 characters in length and can consist of letters and numbers.
7. Select each service element associated with the service, e.g., Video, Audio 1 (Left and Right) and/or Audio 2 (Left and Right).
8. Click **Apply**.

To Set Up the Video Program

Proceed as follows to set up the Video Program:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab and the **Video** icon from the sub-pages.



2. Enter the **PID** for the **Video** channel.

   You may type a number in the range from 16 to 8190. Observe that you may not use the same PID for any other program.

3. If relevant, select **Enable PCR** for the Video channel to enable the PCR for the video channel and enter the **Interval** to send the PCR, in ms.

4. Enter the **PID** for the **PIP** channel.

   You may type a number in the range from 16 to 8190[1)] . Observe that you may not use the same PID for any other program.

5. If relevant, select **Enable PCR** for the PIP channel to enable the PCR for the PIP channel.

6. Click **Apply**.

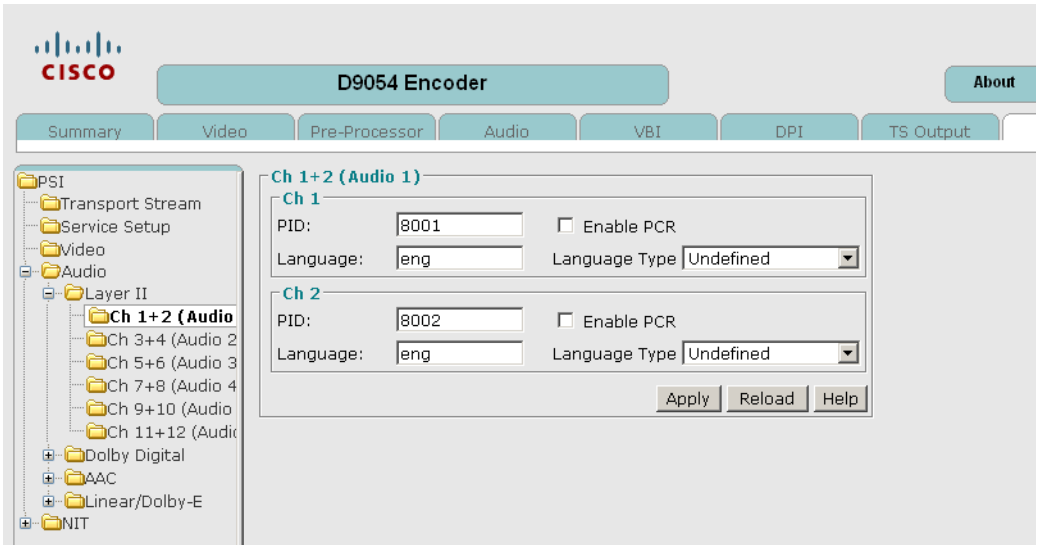
1)Note that the DVB tables use the PIDs from 16 to 20.

To Set Up the Layer II Audio Program

Proceed as follows to set up the Layer II Audio Program:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab, expand **Audio** and then the **Layer II** icon and click one of the channel icons from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1+2 (Audio 1)** through **Ch 11+12 (Audio 6)**.



2. If relevant, select **Enable PCR** to enable the PCR.

   Important: An audio only program consisting of one or more audio tributaries must have at least one PCR PID enabled. If the audio is attached to the Video it does not need a PCR PID as long as the stream carries a PCR PID.

3. Type the audio **PID**.

   The legal range is from 16 to 8190[1)] . Observe that you may not use the same PID for any other program element.

4. Type the audio **Language**.

   You must type in three letters. The supported languages are according to ISO 639-2. The audio language is signalled in a PSI table and used by satellite receivers. See **ISO 639-2 Language Codes**, page C-1 for more information.

1) Note that the DVB tables use the PIDs from 16 to 20.

5. Select the audio **Language Type**.

   This is a language descriptor which, besides the audio language above, indicates which type of audio you transfer:

Language Type	Meaning
Undefined	Undefined. Used widely for the main program sound
Clean Effects	Expressly having no language, i.e. the sound track without any speech.
Hearing Impaired	For program speech without music and effects. Background noise is reduced so that only one primary sound source is perceived.
Visually Impaired	Used for audio description. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment for e.g. viewers who have visual impairments.

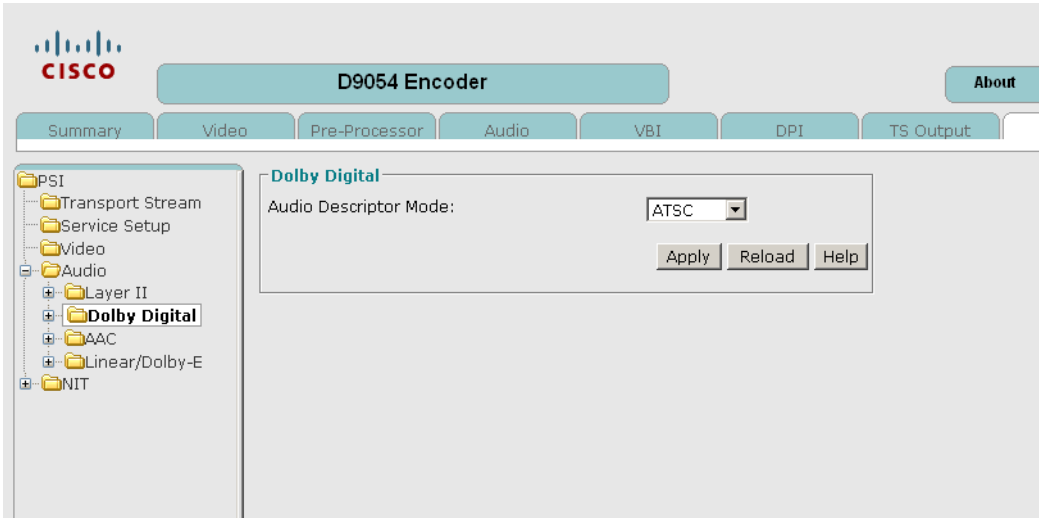
6. If relevant, repeat steps 2 to 5 for the other audio channel.
7. Click **Apply**.

Selecting the Dolby Digital Audio Descriptor Mode

To Select the Dolby Digital Audio Descriptor Mode

Proceed as follows to select the Dolby Digital Audio Descriptor Mode:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab, expand the **Audio** icon and click the **Dolby Digital** icon from the sub-pages.



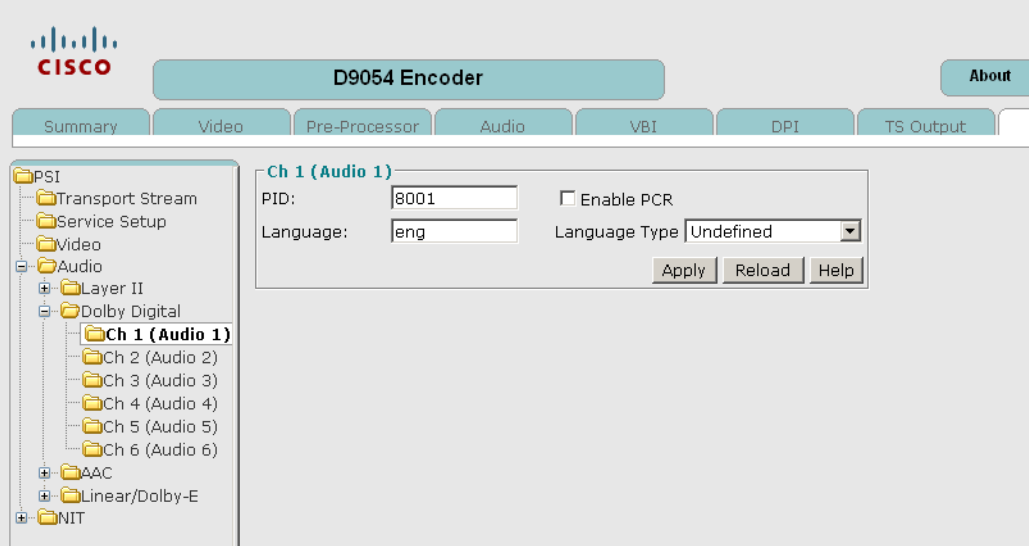
2. Select DVB or ATSC for the **Audio Descriptor Mode**.
   This setting determines whether it is signaled in the PMT and PAT that Dolby Digital audio is transmitted according to the DVB or the ATSC standard. The default setting is DVB mode.
3. Click **Apply**.

To Set Up the Dolby Digital Audio Program

Proceed as follows to set up the Dolby Digital Audio Program:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab, expand the **Audio** icon, expand the **Dolby Digital** icon and click one of the channel icons from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Type the audio **PID**.

   The legal range is from 16 to 8190[1)] . Observe that you may not use the same PID for any other program element.

3. If relevant, select **Enable PCR** to enable the PCR.

   Important: An audio only program consisting of one or more audio tributaries must have at least one PCR PID enabled. If the audio is attached to the Video it does not need a PCR PID as long as the stream contains a PCR PID.

4. Type the audio **Language**.

   You must type in three letters. The supported languages are according to ISO 639-2 The audio language is signalled in a PSI table and used by satellite receivers. See **ISO 639-2 Language Codes**, page C-1 for more information.

1) Note that the DVB tables use the PIDs from 16 to 20.

5. Select the audio **Language Type**.

   This is a language descriptor which, besides the audio language above, indicates which type of audio you transfer:

Language Type	Meaning
Undefined	Undefined. Used widely for the main program sound
Clean Effects	Expressly having no language, i.e. the sound track without any speech.
Hearing Impaired	For program speech without music and effects. Background noise is reduced so that only one primary sound source is perceived.
Visually Impaired	Used for audio description. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment for e.g., viewers who have visual impairments.

6. Click **Apply**.

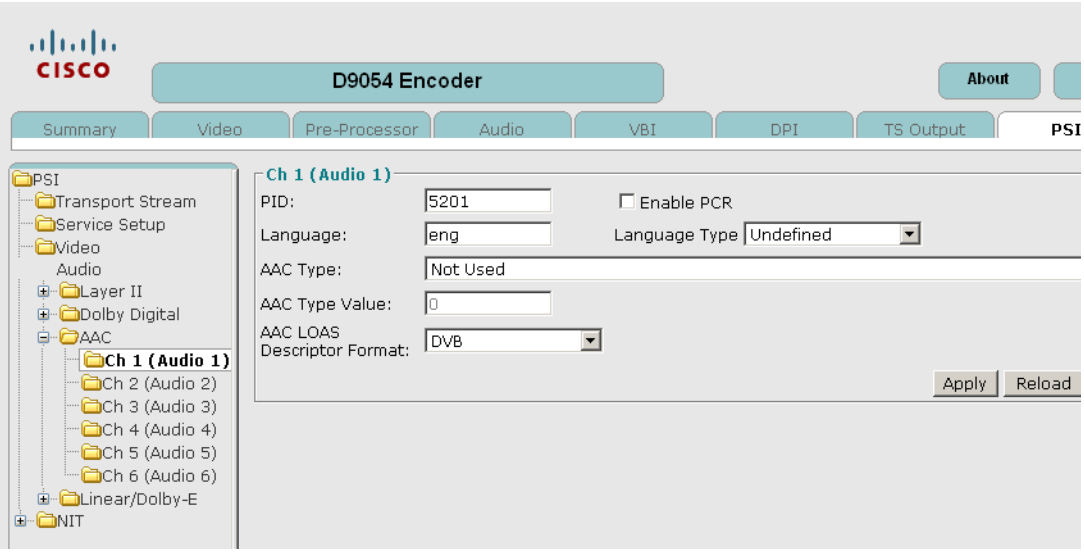
Setting Up the AAC Audio Program

To Set Up the AAC Audio Program

Proceed as follows to set up the AAC audio program:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab, expand the **Audio** icon, expand the **AAC** icon and click one of the channel icons from the sub-pages.

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Type the audio **PID**.

   The range is from 16 to 8190[1)] . Observe that you may not use the same PID for any other program element.

3. If relevant, select **Enable PCR** to enable the PCR.

   Important: An audio only program consisting of one or more audio tributaries must have at least one PCR PID enabled. If the audio is attached to the Video it does not need a PCR PID as long as the stream contains a PCR PID.

4. Type the audio **Language**.

   You must type in three letters. The supported languages are according to ISO 639-2. The audio language is signalled in a PSI table and used by satellite receivers. See **ISO 639-2 Language Codes**, page C-1 for more information.

1) Note that the DVB tables use the PIDs from 16 to 20.

5. Select the audio **Language Type**.
   This is a language descriptor which, besides the audio language above, indicates which type of audio you transfer:

Language Type	Meaning
Undefined	Undefined. Used widely for the main program sound
Clean Effects	Expressly having no language, i.e. the sound track without any speech.
Hearing Impaired	For program speech without music and effects. Background noise is reduced so that only one primary sound source is perceived.
Visually Impaired	Used for audio description. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment for e.g. viewers who have visual impairments.

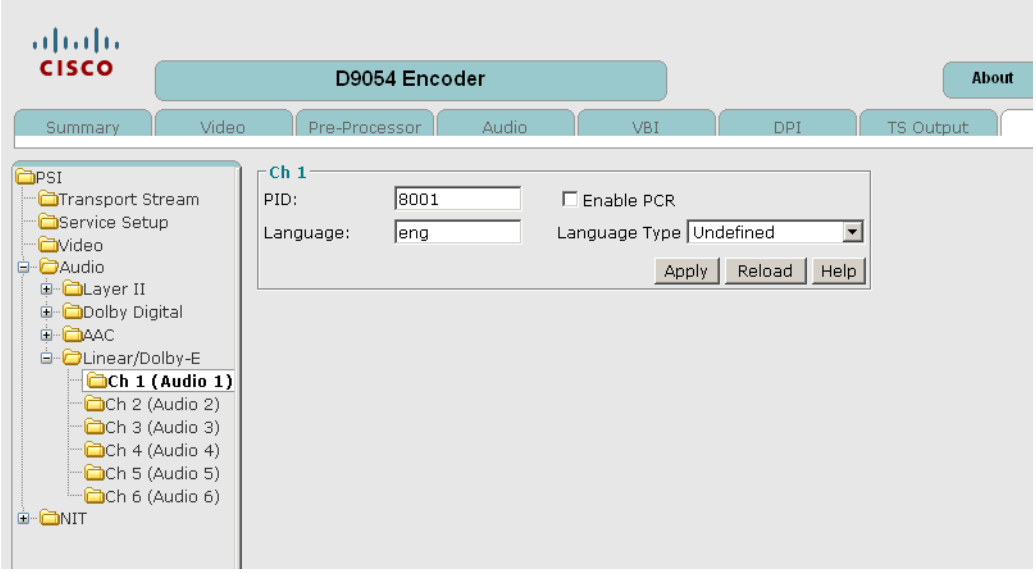
6. Select the type of audio in the stream (**AAC Type**).
   Select **Other (specify)** to enter a customized value in the AAC Type Value below.
   Select **Not Used** if you do not want to send this portion of the descriptor.
7. The **AAC Type Value** displays the value of the AAC Type specified above. If **Other (specify)** was selected as the AAC Type, you must set the AAC Type Value, in the range from 0 to 255.
8. Select the **AAC LOAS Descriptor Format** to use for AAC LOAS audio channels. There are two different formats: **DVB** (default) or **MPEG**. Select **Both** if you want to send DVB and MPEG descriptors.
9. Click **Apply**.

To Set Up the Linear Audio Program

Proceed as follows to set up the Linear Audio Program:

1. From the user interface of the D9050 Encoder click the **PSI** tab, expand the **Audio** icon, expand the **Linear/Dolby-E** icon and click one of the channel icons from the sub-pages

   Note: The number of channels displayed depends on whether your encoder is equipped with a Dual Channel Audio (DCA) card or a Multiple Channel Audio (MCA) card. MCA cards provide six configurable audio channels, allowing you to configure **Ch 1 (Audio 1)** through **Ch 6 (Audio 6)**.



2. Type the audio **PID**.

   The legal range is from 16 to 8190[1)] . Observe that you may not use the same PID for any other program element.

3. If relevant, **Enable the PCR**.

   Important: An audio only program consisting of one or more audio tributaries must have at least one PCR PID enabled. If the audio is attached to the Video it does not need a PCR PID.

4. Type the audio **Language**.

   You must type in three letters. The supported languages are according to ISO 639-2. The audio language is signalled in a PSI table and used by satellite receivers.

1)Note that the DVB tables use the PIDs from 16 to 20.

5. Select the audio **Language Type**.
   This is a language descriptor which, besides the audio language above, indicates which type of audio you transfer:

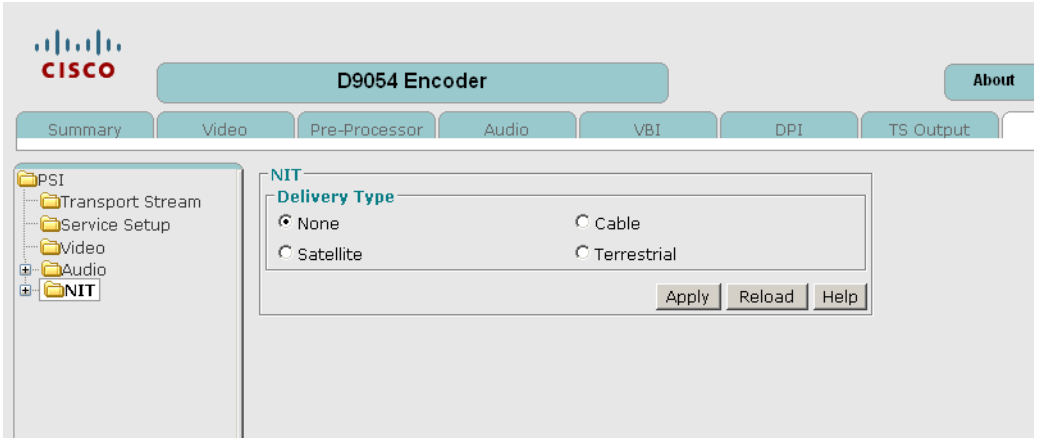
Language Type	Meaning
Undefined	Undefined. Used widely for the main program sound
Clean Effects	Expressly having no language, i.e. the sound track without any speech.
Hearing Impaired	For program speech without music and effects. Background noise is reduced so that only one primary sound source is perceived.
Visually Impaired	Used for audio description. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the visual scene as an aid to understanding and enjoyment for e.g. viewers who have visual impairments.

6. Click **Apply**.

To Set Up the NIT

Proceed as follows to set up the NIT:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab and then the **NIT** icon from the sub-pages.



2. Select the relevant **Delivery Type**.

   The delivery types are the following:

   - cable delivery system descriptor, **Setting Up the Cable NIT**, page 5-117
   - satellite delivery system descriptor, and **Setting Up the Satellite NIT**, page 5-118
   - terrestrial delivery system descriptor, and **Setting Up the Terrestrial NIT**, page 5-119
   - none.

   The delivery system descriptors are used to transmit the physical parameters for each transport multiplex in the network. IRDs interpret the delivery system descriptor in order to tune to Transport Streams quickly. Select **None** if the transmission does not target the end user IRD.

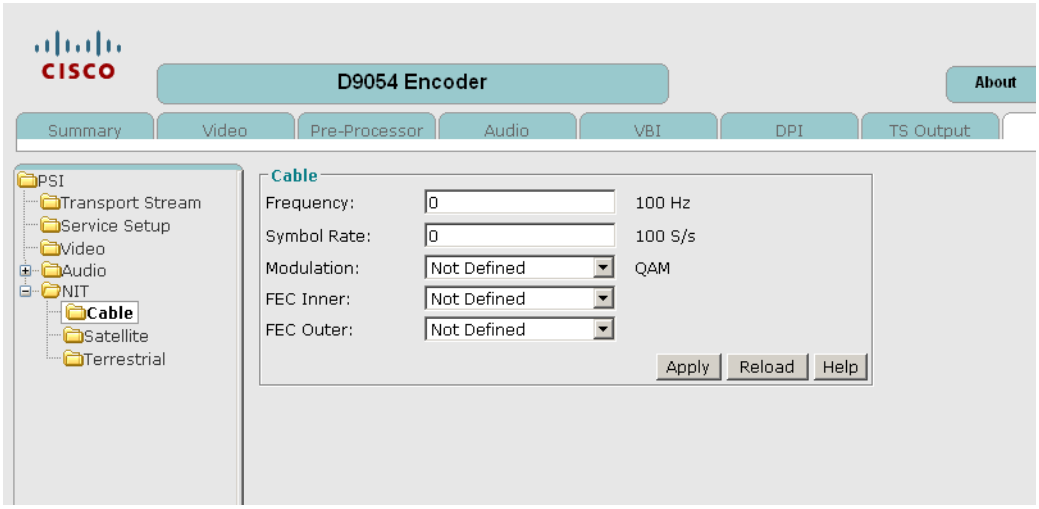
3. Click **Apply**.

Setting Up the Cable NIT

To Set Up the Cable NIT

Proceed as follows to get access to the Cable NIT display:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab, expand the **NIT** icon and click the **Cable** icon from the sub-pages.



Example of Setup for a DVB Cable Delivery System

The following table displays a valid example of the NIT for a DVB cable delivery system:

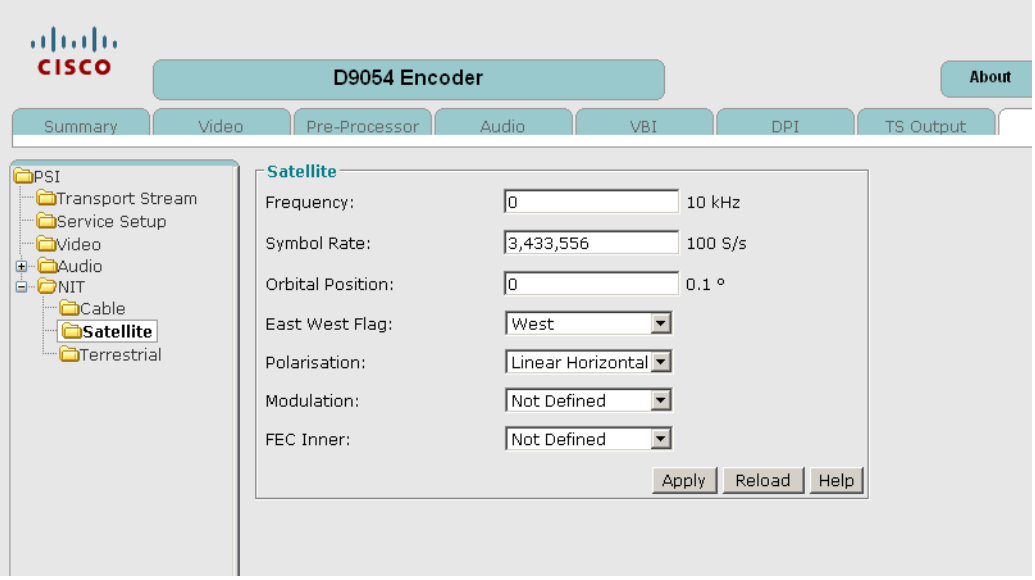
Cable Delivery System Parameters	
Frequency	770 (MHz)
Symbol rate	6.875 (Msymbol/s)
Modulation	64-QAM
FEC Inner	5/6 Convolutional code rate
FEC Outer	RS (204/188)

Setting Up the Satellite NIT

To Set Up the Satellite NIT

Proceed as follows to get access to the Satellite NIT display:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab, expand the **NIT** icon and click the **Satellite** icon from the sub-pages.



Example of Setup for a DVB Satellite Delivery System

The following table displays a typical example of the NIT for a DVB satellite delivery system.

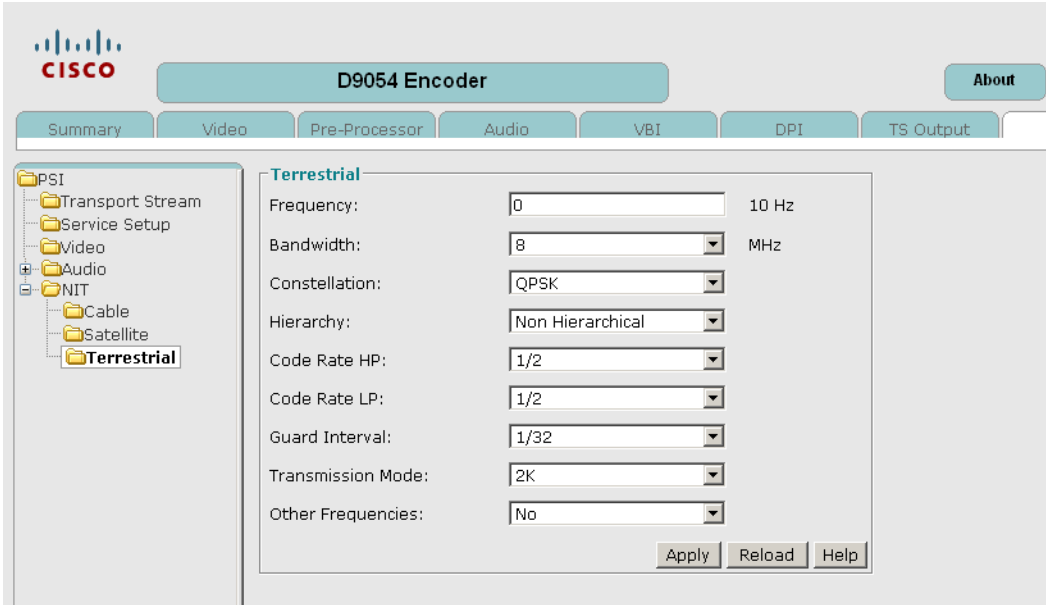
Satellite Delivery System Parameters	
Frequency	12.266 (GHz)
Symbol rate	27.5 (Msymbol/s)
Orbital position	19.2 (degrees)
West East flag	Eastern position
Polarization	Linear - horizontal
Modulation	QPSK
FEC inner	3/4 Convolutional code rate

Setting Up the Terrestrial NIT

To Set Up the Terrestrial NIT

Proceed as follows to get access to the Terrestrial NIT display:

1. From the user interface of the D9054 HD Encoder, click the **PSI** tab, expand the **NIT** icon and click the **Terrestrial** icon from the sub-pages.



Example of Setup for a DVB Terrestrial Delivery System

The following table displays a valid example of the NIT for a DVB terrestrial delivery system.

Terrestrial Delivery System Parameters	
Frequency	585 MHz
Bandwidth	8 MHz
Constellation	64-QAM
Hierarchy	Non hierarchical
Code rate HP (applies to hierarchical and non-hierarchical encoding)	rateHalf
Code rate LP (Applies to hierarchical encoding)	rateTwoThirds
Guard interval	1/32
Transmission mode	8k Mode
Other frequencies (in use)	Yes

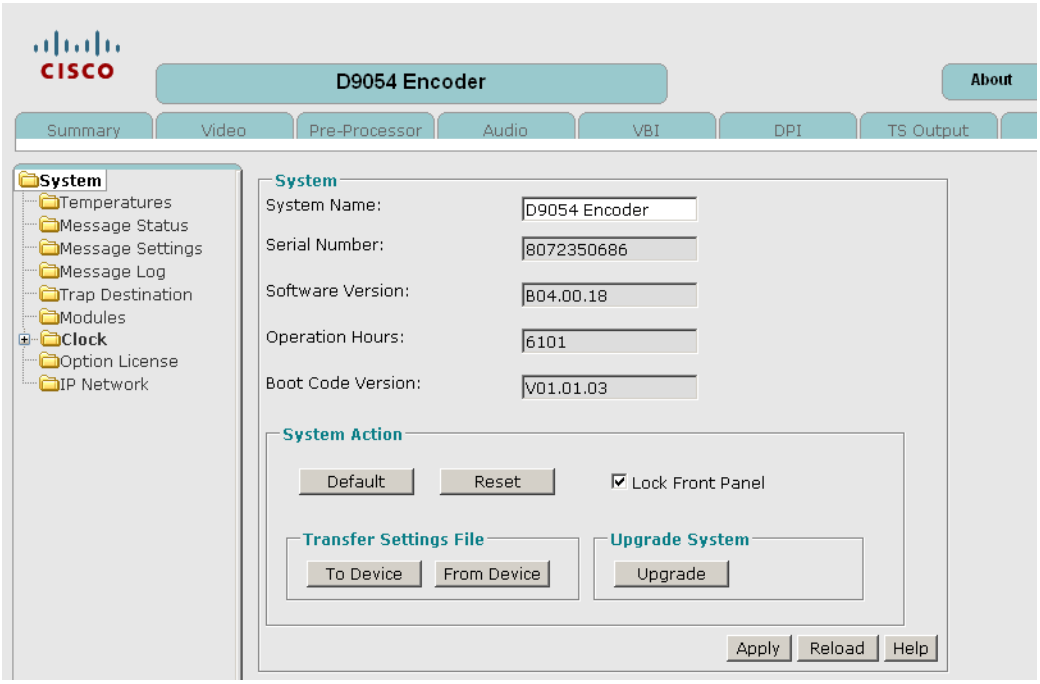
Section H - Working with the System

Reading the System Information or Managing the System

To Read the System Information or to Manage the System

Proceed as follows to read the system information or to manage the System:

1. From the user interface of the D9054 HD Encoder, click the **System** tab.



   The GUI automatically displays the serial number, software version, operating hours, the version of the boot code and the D9054 device driver/GUI version.

   Important: Have the above information readily available if you contact a Cisco office for support.

2. If relevant, enable **Lock Front Panel** to lock the front panel.

   When the front panel is locked you can only see settings but not change them from the front panel menus.

3. If relevant, click **Default** to default all settings in the D9054 HD Encoder.

   Hint: Use the default settings if you have set up the D9054 HD Encoder with illegal and incompatible settings to get the encoder back in a functional state.

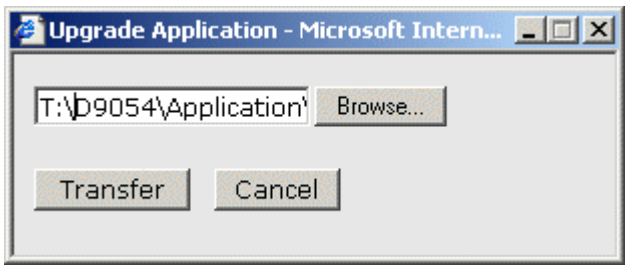
4. If relevant, click **Reset** to reset (boot) the D9054 HD Encoder.

   Hint: You should reset the D9054 HD Encoder if you have set or changed the IP address of the encoder via the front panel display.

5. Click **Transfer Settings File From Device** if you want to create a settings file. You can save the settings file on your hard disk or on a network where other D9054 HD Encoders can import the settings file.

   Important: You must give the file name the extension "`.ini`" in order to be able to see it when you want to **Transfer Settings File To Device**.

6. If relevant, upgrade the software of your D9054 Encoder. Ensure that the software application you want to upgrade to is located in a directory/location on your PC before proceeding with the upgrade.
   - To perform a software upgrade, click **Upgrade**. A window will be displayed allowing you to enter the location of the file, or to browse to the file.



   Note: It is best to locate the software upgrade file in a directory with a short path (i.e., c:\temp) due to a character-string limitation with Internet Explorer 6.
   - Select **Transfer**. The application will be downloaded to the encoder. This may take up to a minute.
   - When the software application has been transferred to the encoder, a message will be displayed indicating that the transfer was successful.

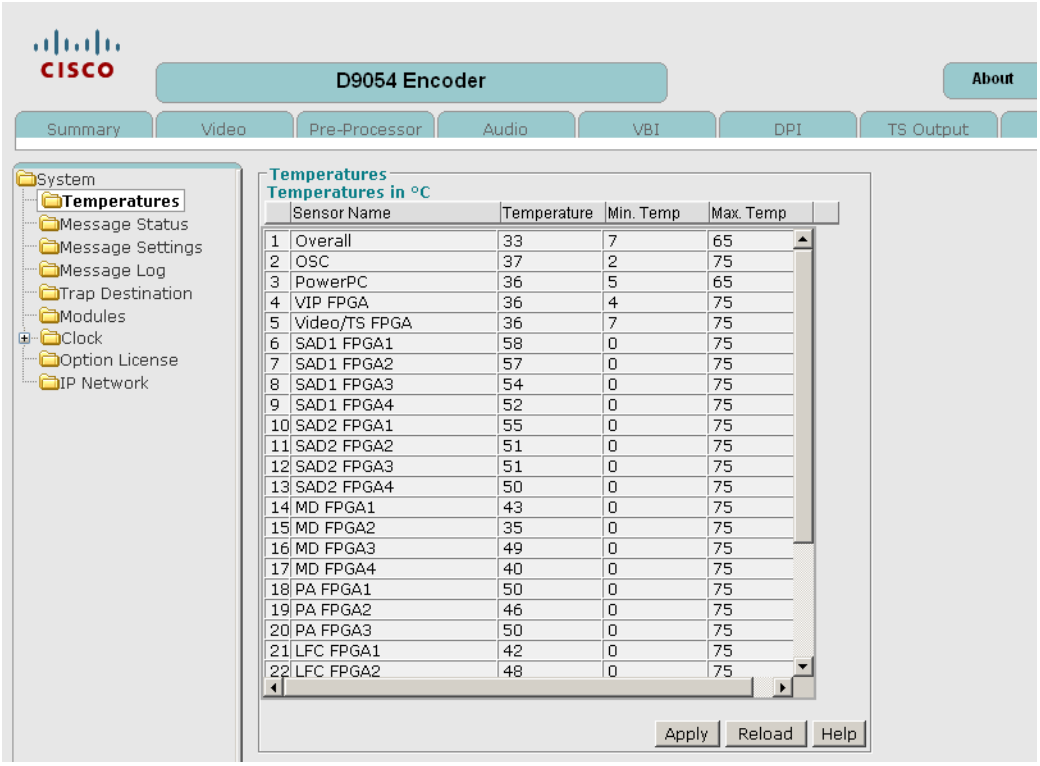
   - Once the transfer has been completed, the encoder will reboot. This will be indicated on the front panel LCD by the message - Reset in progress. It may take a minute or two for the reboot process to be completed.
   - Click **Reload** to update the Boot Code Version on the **System** page.

Reading the D9054 HD Encoder Temperatures

To Read the D9054 HD Encoder Temperatures

Proceed as follows to read the D9054 HD Encoder temperatures:

1. From the user interface of the D9054 HD Encoder, click the **System** tab and the **Temperatures** icon from the sub-pages.



The GUI automatically displays the temperatures measured by the sensors in the D9054 HD Encoder. The temperatures signify the following:

Heading	Meaning
Temperature	The measured temperature.
Min. Temp.	The lower operational limit.
Max. Temp.	The upper operational limit.

If you receive temperature alarms while the ambient temperature is within the specifications, you should check whether the air flow is blocked.

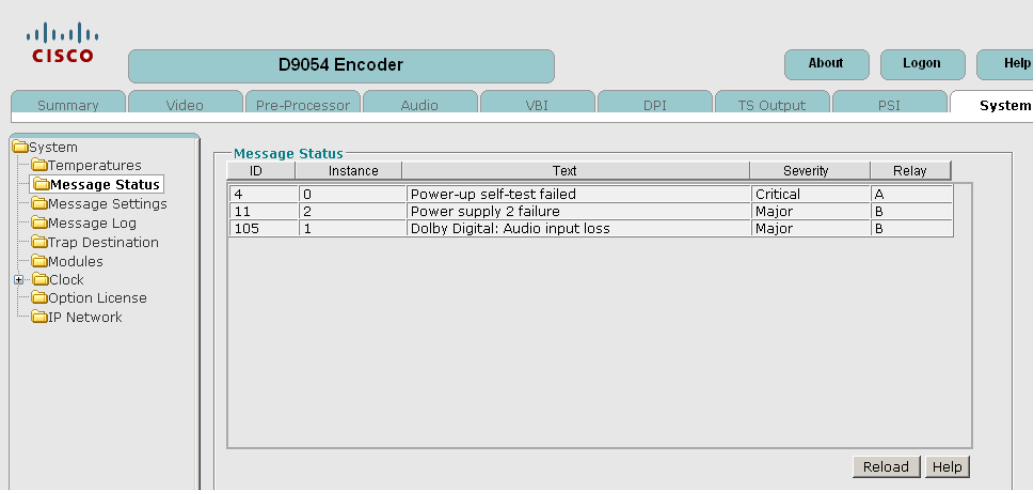
Important: If you continue to operate the encoder after a temperature alarm has been received, the encoder may eventually reach the maximum safe operating temperature/threshold and shut down. The power supply fan will continue to operate but the unit will cease to function. When this occurs, power cycle the encoder by unplugging the power cord from the unit, and then reconnecting it.

Reading the Message Status

To Read the Message Status

Proceed as follows to read the message Status:

1. From the user interface of the D9054 HD Encoder click the **System** tab and the **Message Status** icon from the sub-pages.



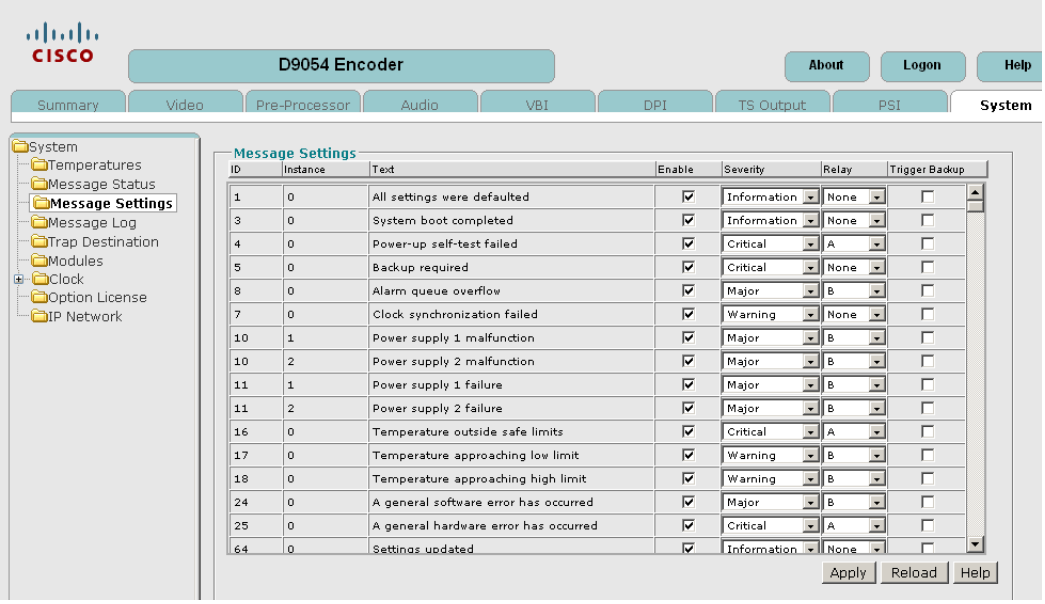
The Message Status table displays a list of all the pending messages in the D9054 HD Encoder system. The messages are sorted according to generation time so that the latest messages are shown at the top of the list.

2. Click **Reload** to get an updated Message Status list.

To Set Up the Message Parameters

Proceed as follows to set up the message parameters:

1. From the user interface of the D9054 HD Encoder, click the **System** tab and the **Message Settings** icon from the sub-pages.



The Message Settings table displays a list of all available Messages in the D9054 HD Encoder system.

2. For each of the messages, select **Enable** if you want the message to be enabled.

   If you enable a message it means that a message is sent to the ROSA element manager whenever the message event occurs.

   Note: De-selecting the Enable box will not disable reporting of the message in the Message Status and Message Log.

   Important: You will not be able to see any messages in the ROSA GUI until you have set up the trap destination for the messages. For further information **Setting Up the Trap Destinations**, page 5-128.

3. For each of the messages select a **Severity** from the scroll list.
   The following categories are available:
   - Critical
   - Major
   - Minor
   - Warning
   - Information
4. For each of the messages select alarm **Relay** A, B, C or none from the relay scroll list.

   Note: Any A-alarm will result in the alarm LED on the front panel being illuminated. For information on alarm relays, see **Connecting an External Alarm System**, page 3-10.
5. Select **Trigger Backup** if you want the Digital Headend Backup task to be notified or the ASI output to be turned off when the alarm event occurs. For further information refer to the *Digital Headend Backup, Task Driver for Rosa 3.0, User's Guide, part number 6985066*. If the Trigger Backup box is checked the ROSA Element Manager will poll the encoder to check whether the alarm event occurs.
6. Click **Apply**.

Viewing Messages

Before You Begin

Before you can view any messages from the D9054 HD Encoder in ROSA you must set up the trap destination for the messages. For further information, see **Removing a Trap Destination**, page 5-130.

Overview

When viewing messages you can specify which columns to show for each message and the order in which they are shown. For further information, please see the ROSA manual.

To View the Messages

Do as follows to view the messages:

1. Right-click the D9054 HD Encoder icon from the Copernicus Server Explorer tree window.
2. Select **All messages** or **Pending messages**.
   If you select pending messages you will only see the active messages.
3. Select the message you want to investigate.
   The following table shows the most important message columns:

Heading	**Meaning**
Msg. Info	The main message description
Name	The detailed message description
Msg. Subject	The channel in question

Hint: Few messages from the D9054 HD Encoder contain additional details. If you right-click and select **Toggle Detail** from the menu you may get additional detailed information.

Viewing the Message Log

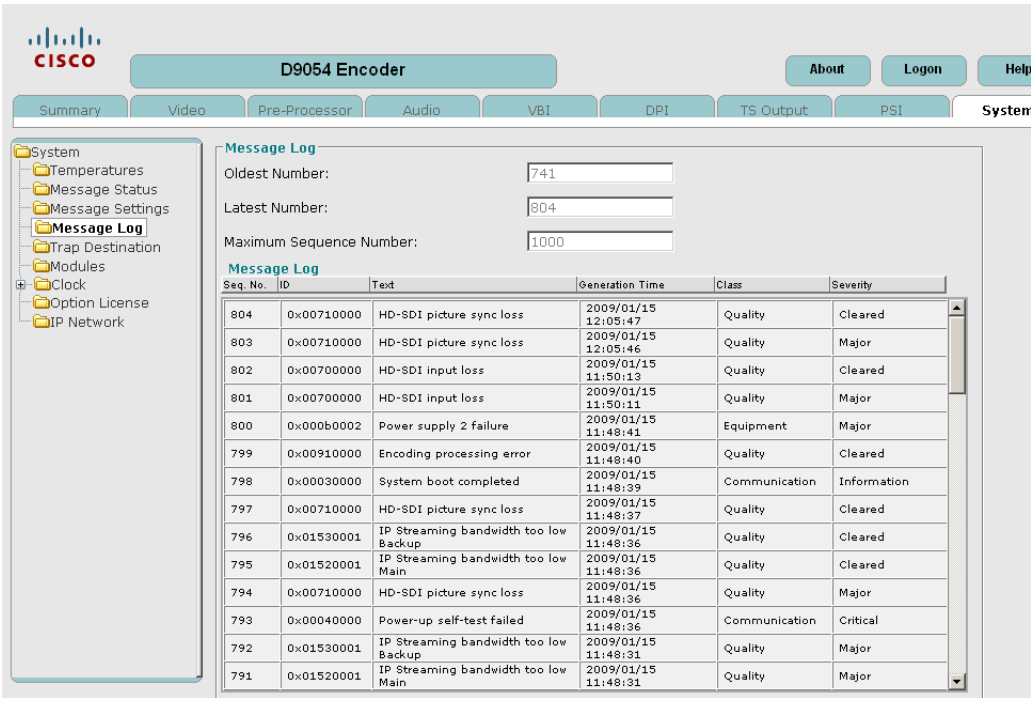
Important

Normally you use the ROSA message view to see any messages from the D9054 HD Encoder. For further information, see **Viewing Messages**, page 5-72. However, if ROSA/Copernicus has been shut down or there have been network errors, some messages sent from the D9054 HD Encoder to the ROSA/Copernicus may be lost. In such cases you can view the messages actually stored in the D9054 HD Encoder by following the procedure below.

To View the Message Log

Proceed as follows to view the message log:

1. From the user interface of the D9054 HD Encoder, click the **System** tab and the **Message Log** icon from the sub-pages.



ROSA automatically displays:

- the oldest sequence number/message in the message log,
- the latest (most recent) sequence number/message in the message log, and
- the maximum sequence number of a message that can be in the message log.

ROSA also displays a table of the latest 64 messages stored in the D9054 HD Encoder system.

Setting Up the Trap Destinations

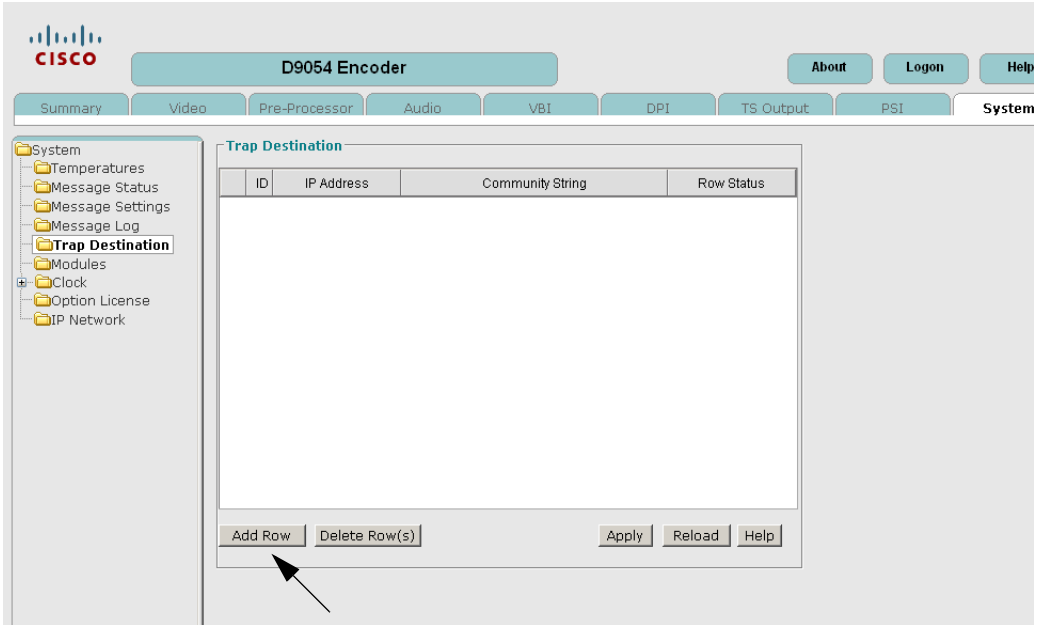
Important

If you have a firewall between the D9054 HD Encoder and the Copernicus/Trap server you may need to change the protection settings to allow the SNMP traps from the D9054 HD Encoder (UDP packets) to arrive to the Copernicus/Trap server. To enable the D9054 HD Encoder Alarm/Message mechanism in ROSA you must add a trap destination IP address to which the D9054 HD Encoder will start sending its SNMP traps[1)] .

To Set Up the Trap Destination

Proceed as follows to set up the trap destination:

1. From the user interface of the D9054 HD Encoder, click the **System** tab and the **Trap Destination** icon from the sub-pages.



2. Click **Add Row**.

1) With ROSA you can define up to 10 trap destinations. With the web interface you can set up one trap destination.

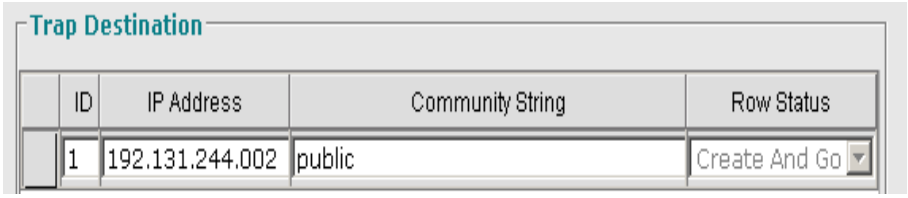
3. Enter an index number (**ID**).

   This is just a serial number. You may enter a number in the range from 1 to 10, as long as it does not conflict with an existing number.

4. Type the **IP Address** of the ROSA/Copernicus server/Trap server to receive the SNMP traps.

5. Type "public" in the **Community String** field.

   ROSA does not evaluate the Community String field. It may be used by other systems for security handling.



6. Click **Apply**.

   Hint: After you have created a trap destination you can edit the fields directly by typing in the field in question.

7. If relevant, change the **Row Status** for the SNMP trap.

   The row status indicates whether the receiving unit is active or not in service.

   Note: D9054 HD Encoder will not begin to send traps to the destination until you set the row status to Active and click **Apply**.

   Hint: Open Copernicus Server Explorer tree and verify that the trap destination work by right-clicking the unit you have just defined as the receiver of the traps and selecting "All Messages". ROSA displays an informational message from the unit telling you that its settings have been updated.

8. Repeat steps two to seven for any additional SNMP trap server.

9. Click **Close**.

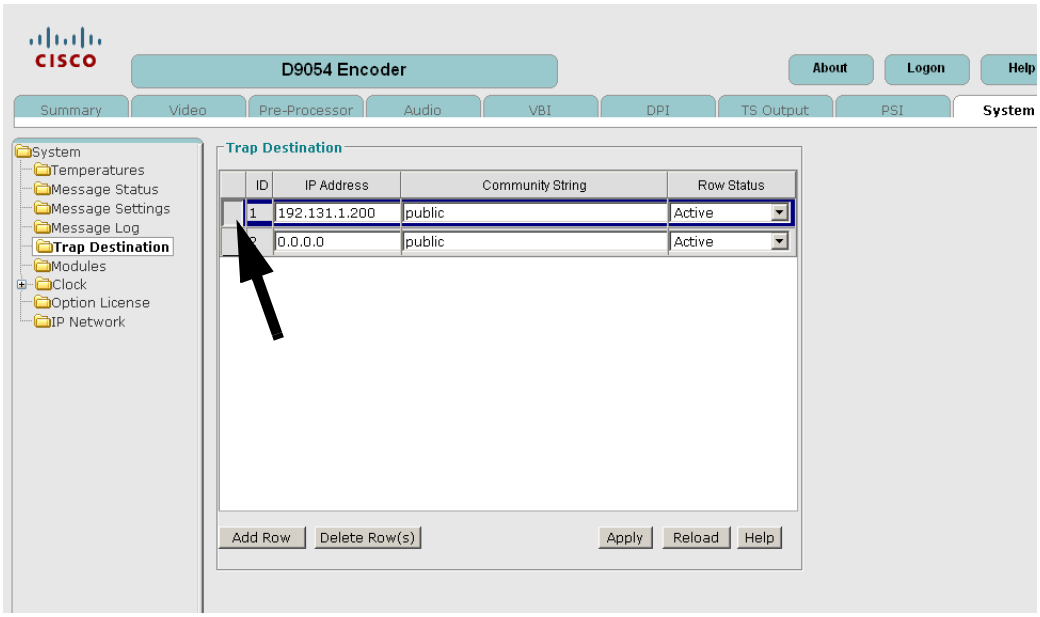
   You will not see the added trap destinations until you click **Close**.

Removing a Trap Destination

To Remove a Trap Destination

Proceed as follows to remove a trap destination:

1. From the user interface of the D9054 HD Encoder, click the **System** tab and the **Trap Destination** icon from the sub-pages.



2. Click in the left column outside the row you want to delete.

   Hint: To select consecutive rows, click the first column in the first row, press and hold down SHIFT, and then click the first column in the last row.

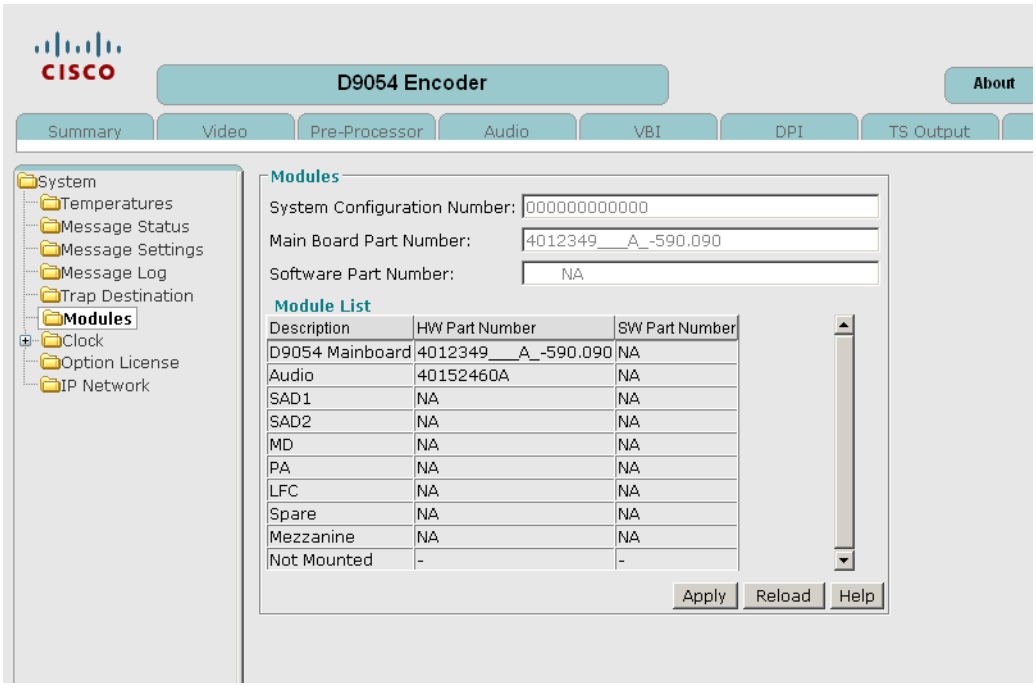
   Hint: To select rows that are not consecutive, press and hold down CTRL, and then click the first column in each row.

3. Click **Delete Row(s)**.

4. Click **Apply**.

Proceed as follows to read the module Information:

1. From the user interface of the D9054 HD Encoder, click the **System** tab and the **Modules** icon from the sub-pages.



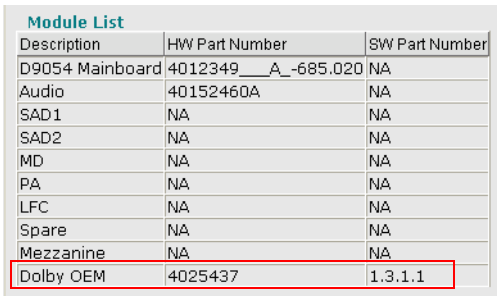
ROSA automatically displays:

- the system configuration number,
- the part number of the main board, and
- the part number of the embedded software.

The system configuration number is used for showing which modules are installed in the D9054 HD Encoder.

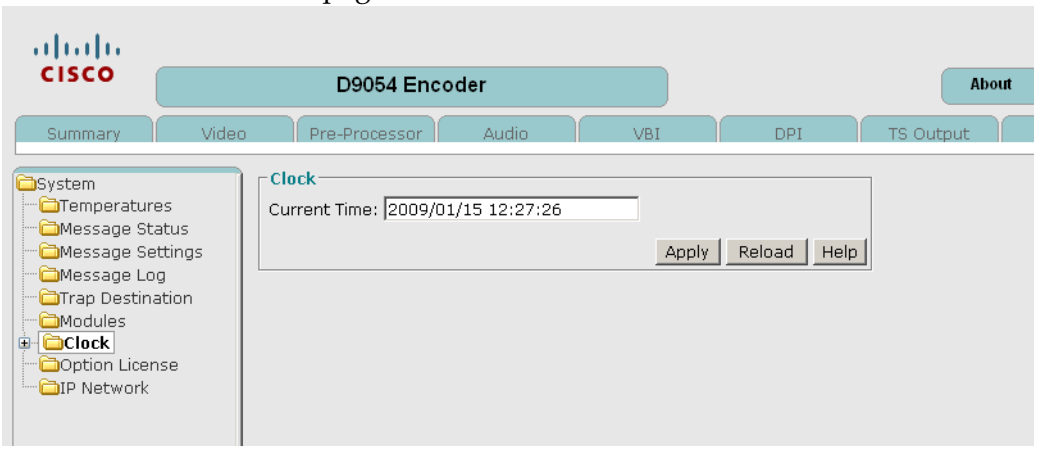
For each installed module ROSA shows the module name, hardware and software part number of the module.

If the Encoder has a Multiple Channel Audio (MCA) card that is equipped with a Dolby Advanced Sub-Module (DASM), the part numbers for the main board and software are displayed at the end of the Module List (Dolby OEM):



Proceed as follows to set the Date and Time:

1. From the user interface of the D9054 HD Encoder, click the **System** tab and the **Clock** icon from the sub-pages.



   ROSA displays the internal date and time of the D9054 HD Encoder.

2. Type the new date and time in the format YYYY/MM/DD HH:MM:SS in the **Current Time** field according to the 24-hour clock.

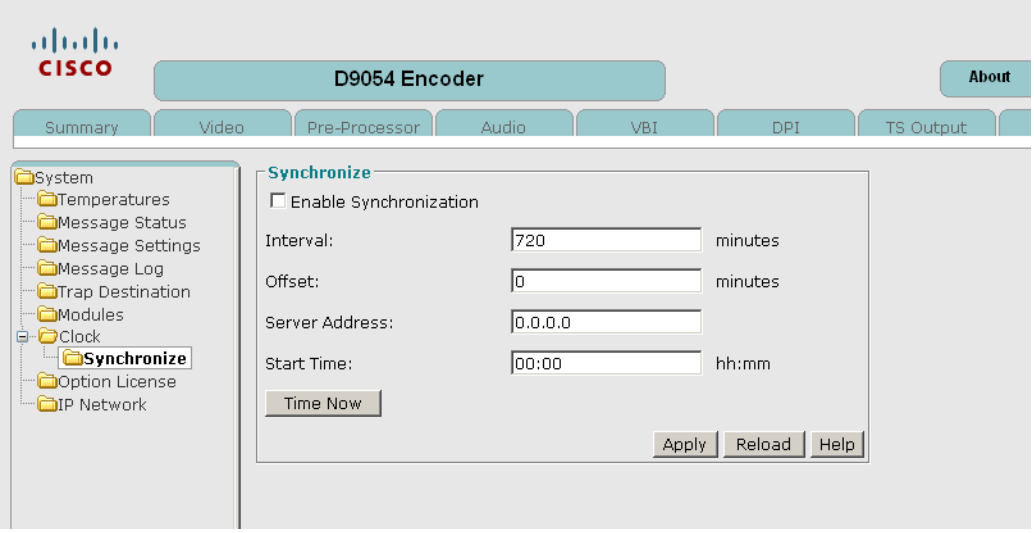
   "YYYY" designate the year, "MM" the month, "DD" the day, "HH" the hours, "MM" the minutes and "SS" the seconds.

3. Click **Apply**.

Note: After loss of power and after reset, the time setting is lost. If synchronization is enabled, the time is sent from the Copernicus/ROSA PC clock at the next synchronization.

Proceed as follows to set the Clock Synchronization:

1. From the user interface of the D9054 HD Encoder, click the **System** tab, expand the **Clock** icon and click the **Synchronization** icon from the sub-pages.



ROSA displays the existing clock synchronization of the D9054 HD Encoder.

2. Select **Enable Sychronization** to enable the synchronization.

   This means that the D9054 HD Encoder will synchronize to the clock of the Copernicus server/ROSA PC or any other time server with the address specified in the Server Address field. Only the TCP based daytime service is implemented as defined in the RFC 867.

   Hint: To use the Time/Clock synchronization with a ROSA Single-User/DCS, you must run a custom setup. This is installed by default on the Copernicus server/ROSA PC.

3. Type the synchronization **Interval** in minutes.

   The Copernicus/ROSA PC clock is automatically downloaded to the encoder at the specified interval, starting when you Click **Apply**. To synchronize once a day at 1 o'clock am set the interval to 1440 min. and Start Time to 01:00.

4. Type the synchronization **Offset** in minutes. The range is from -1440 to 1440.

   This field is used when the clock server is located in a different time zone than the encoder.

5. Type the IP address of the synchronization server.

   Do one of the following:

   - Type the synchronization **Start Time** and click **Apply**.
   - Click **Apply** to store the entered settings and click **Time Now** if you want synchronization to take affect immediately.

   Note: To maintain accurate synchronization between the Copernicus server/ ROSA PC it is recommended that you synchronize once a day.

   Note: After loss of power and after reset, the time setting is lost. If synchronization is enabled, the time is sent from the Copernicus/ROSA PC clock at the next synchronization.

The Web Interface

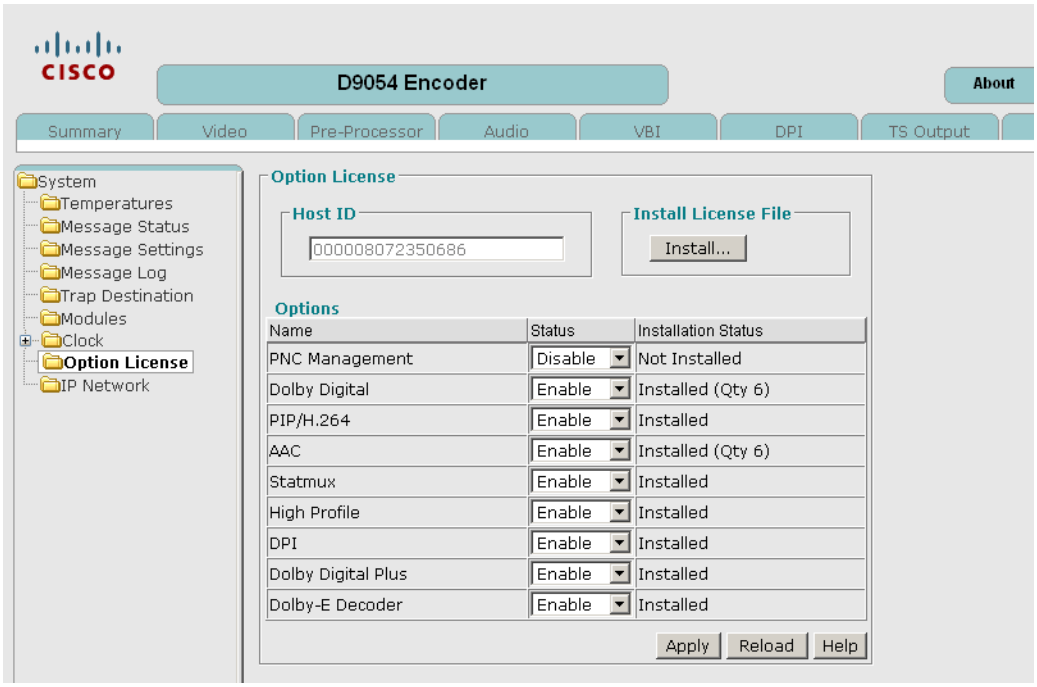
You can install software options from the web interface.

To Install a Software Option

Before you can install a software option, you need to obtain a license file. For more information, contact Cisco.

Do as follows to install a new software option:

1. From the user interface of the D9054 HD Encoder click the **System** tab and then the **Option License** icon from the sub-pages.



ROSA automatically displays a list of available options and their status. The Host ID field uniquely identifies the D9054 HD Encoder you are working on. It consists of five leading 0s and the serial number of the D9054 HD Encoder.

2. Click the **Install...** button.
3. Browse for the license file for the option you want to install or enter the path for the location/directory on your PC and click **Open**.

   Note: It is best to locate the software upgrade file in a directory with a short path (i.e., c:\temp) due to a character-string limitation with Internet Explorer 6.

   Loading takes approximately 10 seconds. The Option is installed in your D9054 HD Encoder. Check that the text in the **Installation Status** column changes from **Not Installed** to **Enabled** and the **Status** column from **Disabled** to **Enabled**.

To Enable or Disable a Software Option

Proceed as follows to enable or disable a software option:

1. On the **Option License** sub-page, click the box in the **Status** column for the option you want to enable or disable.
2. Select **Enable** or **Disable** from the list.
   The **Installation Status** field is a read-only field.
3. Click **Apply**.
4. Click **Reload** to refresh/update the status after the license is installed.

The D9054 HD Encoder can transmit the IP output to an IP network device with a predefined MAC address and IP address on a selected IP subnet.

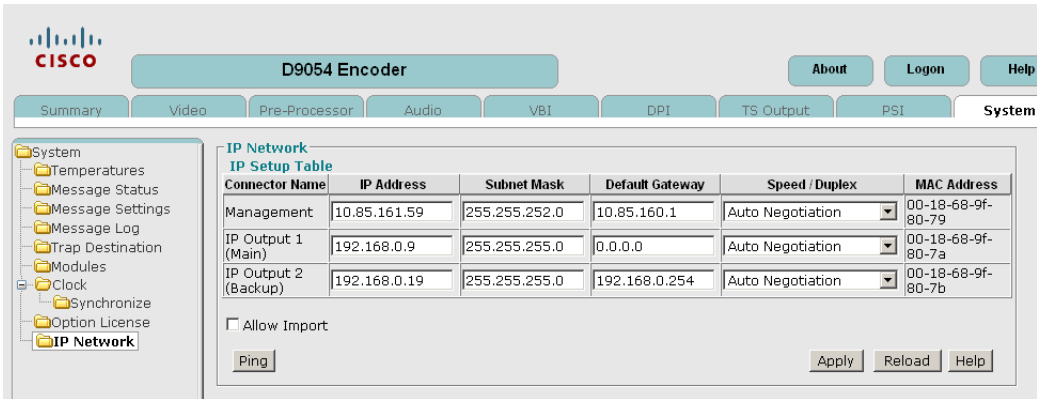
Setup in the D9054 HD Encoder ROSA/Web Interface

To Set up the Management and IP Ports

Before you can communicate with third party management devices or stream video to a set top box, you need to set up the IP parameters of the D9054 Encoder data Management and Ethernet ports.

Do as follows to set the communication parameters of these ports:

1. From the user interface of the D9054 HD Encoder click the **System** tab and the **IP Network** icon from the sub-pages.



   ROSA automatically displays a list of available options and their status.

2. Enter the **IP Address** for the Management interface/port and two IP ports. This is the IP address of the IP port. Check with your network administrator for the IP address to assign to this port.

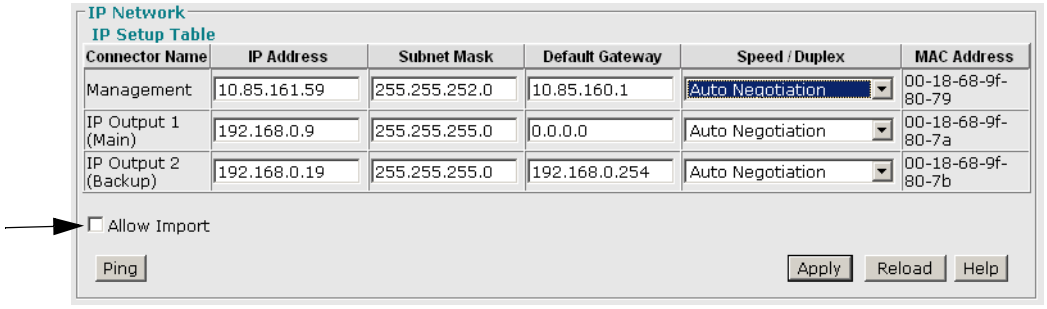
   Note: If you change the IP Address for the Management interface/port, the encoder will automatically reset.

3. Enter the **Subnet Mask** for the Management interface/port and two IP ports. These fields are set to a default value commonly used by most networks. If the Subnet Mask for your network is different than that displayed in this field, contact your Network Administrator and enter it in this field. The default is 255.255.255.000.

4. Enter the **Default Gateway** for your network to enable transmission of IP data off of the subnet. Contact your Network Administrator for your Gateway address.

5. Select the **Speed/Duplex** for the Management interface/port and two IP ports. The default is Auto Negotiation.

6. The Encoder displays the **MAC Address** of the two IP ports and the Management interface. These are read-only fields.
7. If relevant, enable **Allow Import**.



Allow Import is applicable in redundant IP streaming (SSM) applications. Checking this box allows the IP source address to be changed when the settings file is imported as part of a redundancy switch. This is helpful in the event that the main encoder fails as the backup encoder will appear as the main encoder (with the same IP address) to downstream equipment. This does not require resetting of the encoder(s).

8. Click **Apply**.

Chapter 6
Service and Maintenance

Overview

Introduction

This chapter gives information to assist you in upgrading firmware to the D9054 HD Encoder and replacing the fan assembly. It also describes how the status of the D9054 HDTV Encoder is communicated via front panel LEDs.

In This Chapter

This chapter contains the following topics.

Topic	See Page
Section A - Firmware Upload	6-2
Uploading Firmware to the D9054 HD Encoder using the Web Interface	6-2
Section B - Front Panel LEDs	6-3
Introduction	6-3
Messages	6-4
Section - Front Panel LEDs	6-4
Introduction	6-24
Section D - Filter and Fan Replacement	6-25
Introduction	6-25

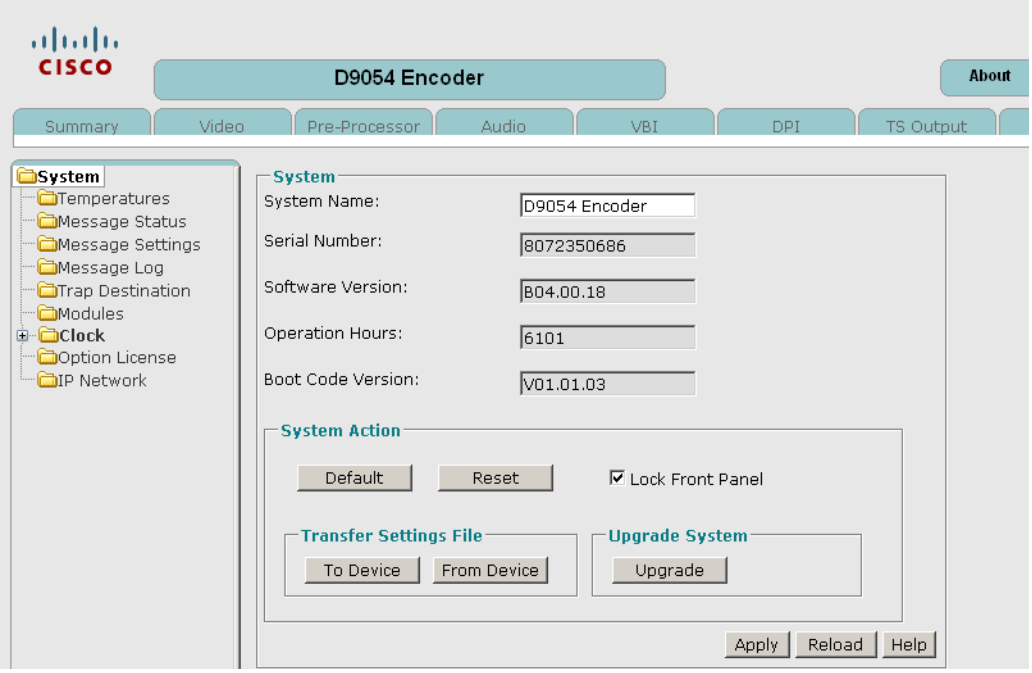
Section A - Firmware Upload

Uploading Firmware to the D9054 HD Encoder using the Web Interface

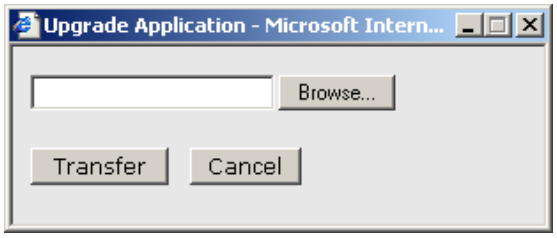
To Upload Firmware to the D9054 HD Encoder

Do as follows to upload a new firmware version to the D9054 HD Encoder:

1. From the user interface of the D9054 HD Encoder click **System** to display the System page.



2. Click **Upgrade** to display the Upgrade Application window.



3. Click **Browse** to search for the directory containing the application package to upload, or type the path to the file directly in the window.

   Note: It is best to locate the application package to upload in a file directory with a short path (i.e., c:\temp) due to a character-string limitation with Internet Explorer 6.

4. Click **Transfer** to accept the file, or choose **Cancel** to abort the operation.

5. The D9054 HD Encoder will automatically reset itself after approximately 30 seconds. The reset process itself also takes approximately 30 seconds.

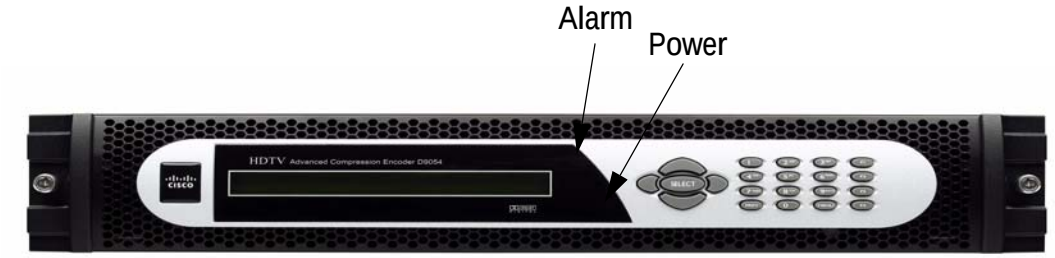
Section B - Front Panel LEDs

Introduction

Overview

To help signal the status of operation or the presence of an alarm, the D9054 HD Encoder makes use of front panel LEDs.

The photograph below shows the location of the LEDs on the front panel of the D9054 HD Encoder.



LED Function

The function of the LEDs is described in the table below.

LED	Signal	Explanation	Remedy
POWER	Green	The D9054 HD Encoder is correctly powered.	N/A
	Flashing	Initialization is in process.	N/A
	Off	There is no power present.	Check the AC line supply.
ALARM	Red	An A-alarm is active.	Read the message in the GUI.
	Off	No A-alarm is active.	N/A

Messages

General

The status of the D9054 HD Encoder and its immediate surroundings is reported to ROSA in the form of messages and alarms. In ROSA you can enable or disable messages and attach an alarm category to each message.

Before You Start

If you have a ROSA system, messages from the D9054 HD Encoder are shown in the Copernicus Server Explorer tree.

You define and set up the status of the messages from the Message Settings page in the D9054 HD Encoder GUI.

D9054 HD Encoder Message List

The following shows an alphabetical list of the available messages, their default status and an explanation to the messages.

AAC test Supply Replacement

Message	Description and Remedy	Severity	Default Alarm Category	Enable
AAC: Audio input loss	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Minor	B	On
AAC: TS rate/ Audio rate mismatch	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the encoding rate or increase the TS rate. If a FIFO occurs recurrently, contact the closest Cisco customer support center for assistance.	Minor	B	On
AAC: Audio delay error	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change the video settings to decrease the end-to-end delay. Check the relative and external delay settings.	Minor	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
AAC: Embedded audio not present	Description: The encoder failed to lock to the embedded audio. Remedy: Check that the audio channels are embedded where required. Check the sources of the embedded audio.	Minor	B	On
AAC: Overload on the audio input signal	Description: The audio input is nearly overloaded. The audio input level is too high and close to the clipping level. Remedy: Increase the clipping level or reduce the input level.	Minor	B	On
AAC: Requested audio encoding delay set too high	Description: The audio delay setup is too high. Remedy: Decrease the audio delay.	Minor	B	On
AAC: Requested audio encoding delay set too low	Description: The audio delay setup is too low. Remedy: Increase the audio delay.	Minor	B	On
AAC: Passthrough Header Error (Invalid)	Description: The passthrough input header is invalid. Remedy: Correct the passthrough input header.	Minor	B	On
AAC: Passthrough Header Error (Sample Rate)	Description: Sample rate on passthrough input is wrong. Remedy: Correct the sample rate.	Minor	B	On
AAC: PCR insertion rate not achievable	Description: The requested PCR rate can not be achieved. Remedy: No action possible.	Minor	B	On
AAC: Passthrough input rate lower than requested output rate	Description: The incoming bit rate on passthrough is lower than the encoder setting. Remedy: Increase the bit rate.	Minor	B	ON
AAC: Passthrough input rate higher than requested output rate	Description: The incoming bit rate on passthrough is higher than the encoder setting. Remedy: No action required.	Minor	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
AAC: Passthrough Data invalid	Description: The passthrough data is corrupted or missing. Remedy: Check the passthrough input.	Minor	B	On
AAC: Passthrough PTS error	Description: Incoming packets were not processed in time resulting in data being dropped. Remedy: Check the expected maximum passthrough rate and configure the audio channel for the worst case input bit rate.	Minor	B	On
AAC: Passthrough Settings inconsistency	Description: The passthrough setting does not match. Remedy: Check the passthrough settings.	Minor	B	On
AAC: Passthrough enabled but no sync words	Description: Passthrough input is missing. Remedy: Apply passthrough signal.	Minor	B	On
AAC: Passthrough header corrupted or invalid	Description: The passthrough input header is corrupted or invalid. Remedy: Correct the passthrough input header.	Minor	B	On
AAC: Passthrough header mismatch	Description: The passthrough input header is incorrect. Remedy: Correct the passthrough input header.	Minor	B	On
AAC: Passthrough sample rate mismatch	Description: Sample rate on passthrough input is incorrect. Remedy: Correct the sample rate.	Minor	B	On
AAC: Detected change in incoming passthrough rate	Description: The incoming passthrough rate has changed due to a change in the audio program content. Remedy: Check whether changes in audio content are expected. The message serves as information only.	Minor	B	On
AAC: DSP hardware failure	Description: DSP hardware failure. Remedy: Contact the closest Cisco customer support center for assistance.	Minor	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
A general hardware error has occurred	Description: A general hardware error has occurred. Remedy: When the error is persistent, contact the closest Cisco customer support center for repair.	Critical	A	On
A general software error has occurred	Description: A general software error has occurred. Remedy: If problems are observed, reset the encoder. When the error is persistent, contact the closest Cisco customer support center for assistance.	Major	A	On
All settings were defaulted	Description: All settings were set to default as a result of a default command. Remedy: Not applicable.	Information	None	On
An option has expired	Description: An installed option license expired. Remedy: Order the needed licence through the closest Cisco customer support center.	Information	None	On
Application file downloaded	Description: An application code has been downloaded to the encoder. The system will reboot. Remedy: Wait for the unit to reboot.	Information	None	On
Application file is rejected	Description: An attempt was made to upload the appl.pkg file. Remedy: This may not be a valid appl.pkg file, or the file is incomplete because it has timed out. Try to upload the app.pkg file again, or obtain the correct file.	Information	None	On
Backup required	Description: Backup is required. One of the events configured to trigger a backup event has occurred. Remedy: Look at the other messages to find the cause of the event.	Critical	None	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Can't enable option as it is not installed	Description: The enabled option has not been properly installed. Remedy: Order the needed licence through the closest Cisco customer support center.	Information	None	On
Clock synchronization failed	Description: Synchronization with the specified clock server has failed. Remedy: Check the IP address for the clock server and the IP routing. Also check that the time server uses the RFC 867 (Day Time Protocol).	Warning	None	On
Dolby Digital: Audio input loss	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Minor	B	On
Dolby Digital: Detected change in incoming passthrough rate	Description: The incoming passthrough rate has changed due to a change in the audio program content. Remedy: Check whether changes in audio content are expected. The message serves as information only.	Minor	B	On
Dolby Digital: Digital audio input error	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Minor	B	On
Dolby Digital: Embedded audio not present	Description: The encoder failed to lock to the embedded audio. Remedy: Check that the audio channels are embedded where required. Check the sources of the embedded audio.	Minor	B	On
Dolby Digital: Overload on the audio input signal	Description: The audio input is nearly overloaded. The audio input level is too high and close to the clipping level. Remedy: Increase the clipping level or reduce the input level.	Minor	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Dolby Digital: TS rate/Audio rate mismatch	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the encoding rate or increase the TS rate. If a FIFO occurs recurrently, contact the closest Cisco customer support center for assistance.	Minor	B	On
Dolby Digital: Audio delay error	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change the video settings to decrease the end-to-end delay. Check the relative and external delay settings.	Minor	B	On
Dolby Digital: Requested audio encoding delay set too low	Description: The audio delay setup on the Audio DSP is too low. Remedy: Increase the audio delay.	Minor	B	On
Dolby Digital: Requested audio encoding delay set too high	Description: The audio delay setup on the Audio DSP is too high. Remedy: Decrease the audio delay.	Minor	B	On
Dolby Digital: PCR insertion rate not achievable	Description: The requested PCR rate can not be achieved. Remedy: No action possible.	Minor	B	On
Dolby Digital: Passthrough input rate lower than requested output rate	Description: The incoming bit rate on passthrough is lower than the encoder setting. Remedy: No action required.	Minor	B	On
Dolby Digital: Passthrough input rate higher than requested output rate	Description: The incoming bit rate on passthrough is higher than the encoder setting. Remedy: Increase the encoder setting to match the maximum incoming stream rate.	Minor	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Dolby Digital: Passthrough enabled but no sync words	Description: Passthrough input is missing. Remedy: Apply passthrough signal.	Minor	B	On
Dolby Digital: Passthrough FSCOD not valid	Description: Sampling frequency code field does not match. Remedy: Set the sampling frequencies on the Dolby encoder and the passthrough encoder to the same values.	Minor	B	On
Dolby Digital: Passthrough FRMSZCOD not valid	Description: The frame size code field is not valid. Remedy: Use a valid bit rate on the Dolby encoder.	Minor	B	On
Dolby Digital: Passthrough FRMSZCOD lower and changed	Description: The frame size code field is lower than expected and has changed. Remedy: Lower the bit rate on the Dolby encoder.	Minor	None	On
Dolby Digital: Passthrough header corrupted or invalid	Description: The passthrough input header is corrupted or invalid. Remedy: Correct the passthrough input header.	Major	B	On
Dolby Digital: Passthrough header mismatch	Description: The passthrough input header is incorrect. Remedy: Correct the passthrough input header.	Major	B	On
Dolby Digital: Passthrough sample rate mismatch	Description: Sample rate on passthrough input is incorrect. Remedy: Correct the sample rate.	Major	B	On
Dolby Digital: TS rate/audio rate mismatch	Description: The encoding rate is too high compared to the TS rate, or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the audio encoding rate or increase the TS rate. If a FIFO error occurs recurrently, contact the closest Cisco customer support center.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
DPI stop without start	Description: An external control signal occurred out of sequence. A Start command must be triggered before it can be stopped. Remedy: Setup of automation system may need to be corrected.	Minor	B	On
DPI cancel without start	Description: An external control signal occurred out of sequence. A Start command must be triggered before it can be cancelled. Remedy: Setup of automation system may need to be corrected.	Minor	B	On
DPI PTS delay invalid	Description: The relative delay setting has made the “splice_time()” PTS value to reference a point in time that has already occurred. Remedy: Change relative delay parameters.	Minor	B	On
DPI Message trigger ignored due to debounce delay	Description: The general purpose input detected multiple triggers too close together in time. Remedy: Reduce the debounce delay setting, or increase the time between triggers or provide debounce protection to the general purpose input.	Minor	B	On
DPI Transport packet overflow	Description: Data was lost when attempting to load a DPI message to the buffer. Remedy: Increase the DPI bit rate.	Minor	B	On
Embedded closed captions input loss	Description: There is no closed captions data embedded in the HD SDI input. Remedy: Examine the video input signal.	Major	B	On
Encoding processing error	Description: The internal MPEG processing of the encoder failed. The encoding will restart. Remedy: Check your settings for parameter violations. Observe the limitations in the manual. If persistent, contact the closest Cisco customer support center for assistance.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Ethernet IP streaming Main (or Backup) link down	Description: The main or backup IP TS OUT port is down. If IP streaming is enabled, the IP TS OUT port must be connected. If IP Streaming with backup is enabled, both of the IP TS OUT ports (IP TS OUT 1 and IP TS OUT 2) must be connected. Remedy: Connect the port in question. The cable may be missing or the associated switch may not be working.	Warning	None	On
Fan malfunction	Description: One of the internal fans has stopped operating. Continual operation of the encoder could result in unit shutdown if the temperature reaches the safe operating temperature limit. Remedy: Contact the closest Cisco customer support center to purchase a fan replacement kit and/or have the unit serviced.	Major	B	On
Front panel unlocked	Description: The front panel has been unlocked. Settings in the device can now be changed via the front panel. The front panel can be locked via the web interface.	Warning	None	On
HD-SDI input loss	Description: There is no video source on the SDI video input. Remedy: Examine the video input signal.	Major	A	On
HD-SDI picture sync loss	Description: SDI picture sync loss. The video signal does not comply with the specifications, or an asynchronous switch has occurred. Remedy: Examine the video input signal.	Major	B	On
H264 IP Statmux: Group rate message out of sync	Description: A statmux message arrived at the encoder outside the expected window for message arrivals. This may be caused by network jitter, or the encoder is not synchronized (either blackburst sources to the encoders or video sources to encoders are not in sync depending on which method is being used).	Major	A	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
H264 IP Statmux: Group rate message missing	Description: A statmux message did not arrive at the encoder. This may occur if the statmux network drops packets or the Ethernet port fails.	Major	A	On
H264 IP Statmux: Unexpected group rate message	Description: Statmux messages arrived at an encoder that is not in the group.	Minor	B	On
H264 IP Statmux: Multiple group rate messages	Description: Multiple statmux messages arrive at the encoder in 1 s-tick with the same encoder Id. This is usually caused by multiple encoders having the same value for the last byte of their statmux port Ethernet address. Remedy: Ensure that the encoders all have a different value for the last byte of the Ethernet address.	Major	A	On
H264 IP Statmux: Group rate mode mismatch	Description: This occurs when trying to mix encoders that have different control types set (i.e., Standalone, redundancy controller, DCM, DCM no redundancy). Remedy: Set all encoders to the same controller type.	Major	A	On
H264 IP Statmux: Not in group rate message bitmask	Description: There is confusion between the encoders about which encoders are in the group. This can occur if certain statmux messages are dropped by the network.	Major	A	On
H264 IP Statmux: DSP Beginning of frame sync error	Description: The mainboard host processor (PPC) has lost control of the communication buffers. Remedy: If the error is not resolved immediately, power-cycle the encoder. If this does not correct the issue, contact the closest Cisco customer support center for assistance.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
H264 IP Statmux: DSP End of frame sync error	Description: The mainboard host processor (PPC) has lost control of the communication buffers. Remedy: If the error is not resolved immediately, power-cycle the encoder. If this does not correct the issue, contact the closest Cisco customer support center for assistance.	Major	B	On
H264 IP Statmux: Network communication error	Description: A statmux message failed to arrive when expected. Causes may include network jitter or encoders not synchronized. Either blackburst sources to the encoders or video sources to encoders are not in sync depending on which method is being used.	Major	A	On
H264 IP Statmux: QP Threshold error	Description: The encoder was not assigned enough bits by the statmux algorithm and is encoding at a low quality. This can occur if the group rate is too low for the content (i.e., low group bit rate and very difficult content on all channels at the same time.)	Minor	B	On
H264 IP Statmux: PPC beginning of frame sync error	Description: The mainboard host processor (PPC) has lost control of the communication buffers. Remedy: If the error is not resolved immediately, power-cycle the encoder. If this does not correct the issue, contact the closest Cisco customer support center for assistance.	Major	B	On
H264 IP Statmux: PPC End of frame sync error	Description: The mainboard host processor (PPC) has lost control of the communication buffers. Remedy: If the error is not resolved immediately, power-cycle the encoder. If this does not correct the issue, contact the closest Cisco customer support center for assistance.	Minor	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
H264 IP Statmux: Rate Table Sequence Error	Description: The mainboard host processor (PPC) has lost control of the communication buffers. Remedy: If the error is not resolved immediately, power-cycle the encoder. If this does not correct the issue, contact the closest Cisco customer support center for assistance.	Minor	B	On
H264 IP Statmux: Safe Rate Mode	Description: Due to an error, the encoder has changed to it's default rate. This is seamless and does not cause video hits. The encoder will remain in CBR mode at the default rate until the error is cleared.	Minor	B	On
H264 IP Statmux: Service/Pid Conflict	Description: There is more than 1 active encoder in the statmux group with the same video PID. Remedy: Ensure that different video PIDs are set for each encoder in the statmux group.	Minor	B	On
H264 IP Statmux: S-tick out of sync	Description: The statmux rate quality messages arrived later than expected. This indicates that the encoder is not functioning in statmux mode. Remedy: Contact the closest Cisco customer support center for assistance.	Major	A	On
H264 IP Statmux: S-tick rate mismatch	Description: A statmux tick (s-tick) rate mismatch occurred in the statmux group. The s-tick rate is one field in the Rate/ Quality message. Remedy: Check that all encoders are set to the same Statmux Clock Source. If the clock source is set to Video, ensure that all sources are set to the same Video Format. If the clock source is set to External Reference, check the reference source.	Major	A	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
H264 IP Statmux: Statmux protocol minor version	Description: The Statmux protocol Minor version number in the Encoder Version Msg for each D9054 encoder doesn't match across the statmux group. Remedy: Check that the Algorithm ID displayed on the Statistical Multiplexing, Monitoring page is identical for the same model encoders, e.g., D9034, D9054, etc., and upgrade them if required. Upgrade the encoders to the same version if required.	Minor	A	On
H264 IP Statmux: Statmux protocol major version	Description: The statmux protocol major version number in Encoder Version Msg for each D9054 encoder doesn't match across the statmux group. Remedy: Check that the Algorithm ID displayed on the Statistical Multiplexing, Monitoring page is identical for the same model encoders, e.g., D9034, D9054, etc. Upgrade the encoders to the same version if required.	Major	A	On
IP Streaming Bandwidth too low Main (or Backup)	Description: The Main (or backup) IP output rate exceeds the available bandwidth. Remedy: Decrease the IP output bandwidth.	Major	B	On
IP Streaming No Ping Response Main (or Backup)	Description: The equipment connected to the IP transport output(s) does not respond to an "Auto" ping. Remedy: Check the Ethernet cable and the equipment connected to the encoder.	Major	B	On
Layer II: Audio delay error	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change video settings to decrease end-to-end delay. Check relative and external delay settings.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Layer II: Audio input loss	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Major	B	On
Layer II: Embedded audio not present	Description: The encoder failed to lock to the embedded audio. Remedy: Check that the audio channels are embedded where required. Check the sources of the embedded audio.	Major	B	On
Layer II: TS rate/ Audio rate mismatch	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the encoding rate or increase the TS rate. If a FIFO error occurs recurrently, contact the closest Cisco customer support center for assistance.	Major	B	On
Layer II: Audio delay error	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change the video settings to decrease the end-to-end delay. Check the relative and external delay settings.	Major	B	On
Layer II: Digital audio input error	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Major	B	On
Layer II: Overload on the audio input signal	Description: The audio input is nearly overloaded. The audio input level is too high and close to the clipping level. Remedy: Increase the clipping level or reduce the input level.	Major	B	On
Layer II: Requested audio encoding delay set too low	Description: The audio delay setup on the Audio DSP is too low. Remedy: Increase the audio delay.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Layer II: Requested audio encoding delay set too high	Description: The audio delay setup on the Audio DSP is too high. Remedy: Decrease the audio delay.	Minor	None	On
Layer II: PCR insertion rate not achievable	Description: The requested PCR rate cannot be achieved. Remedy: No action possible.	Minor	None	On
Layer II: TS rate/ audio rate mismatch	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the audio encoding rate or increase the TS rate. If a FIFO error occurs recurrently, contact the closest Cisco customer support center for assistance.	Major	B	On
Linear/Dolby E: Audio delay error	Description: It is not possible to implement the requested audio delay. Remedy: Decrease the audio data rate or change the video settings to decrease the end-to-end delay. Check the relative and external delay settings.	Major	B	On
Linear/Dolby E: Audio input loss	Description: The encoder failed to lock to the audio frame or the audio sample frequency is out of range. Remedy: Check the cable and the incoming signal.	Major	B	On
Linear/Dolby E: DSP hardware failure	Description: DSP hardware failure. Remedy: Contact the closest Cisco customer support center for assistance.	Minor	B	On
Linear/Dolby E: Embedded audio not present	Description: The encoder failed to lock to the embedded audio. Remedy: Check that the audio channels are embedded where required. Check the sources of the embedded audio.	Major	B	On
Linear/Dolby E: Overload on the audio input signal	Description: The audio input is nearly overloaded. The audio input level is too high and close to the clipping level. Remedy: Increase the clipping level or reduce the input level.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Linear/Dolby E: Passthrough PTS error	Description: Incoming packets were not processed in time resulting in data being dropped. Remedy: Check the expected maximum passthrough rate and configure the audio channel for the worst case input bit rate.	Minor	B	On
Linear/Dolby E: Requested audio encoding delay set too low	Description: The audio delay setup on the Audio DSP is too low. Remedy: Increase the audio delay.	Major	B	On
Linear/Dolby E: Requested audio encoding delay set too high	Description: The audio delay setup on the Audio DSP is too high. Remedy: Decrease the audio delay.	Minor	None	On
Linear/Dolby E: Passthrough data invalid	Description: Passthrough data corrupted missing. Remedy: Check the passthrough input.	Major	A	On
Linear/Dolby E: PCR rate not achievable	Description: The requested PCR rate can not be achieved. Remedy: No action possible.	Minor	B	On
Linear/Dolby E: Board Delay too high	Description: The audio delay setup on the Audio DSP is too high. Remedy: Decrease the audio delay.	Major	A	On
Linear/Dolby E: Passthrough input rate lower than requested output rate	Description: The incoming Data Rate on passthrough is too low. Remedy: Increase the selected bit rate.	Major	A	On
Linear/Dolby E: Passthrough enabled but no sync words	Description: Passthrough input is missing. Remedy: Apply passthrough signal.	Major	B	On
Linear/Dolby E: Passthrough header corrupted or invalid	Description: The passthrough input header is corrupted or invalid. Remedy: Correct the passthrough input header.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Linear/Dolby E: Passthrough PTS error	Description: Incoming packets were not processed in time resulting in data being dropped. Remedy: Check the expected maximum passthrough rate and configure the audio channel for the worst case input bit rate.	Minor	B	On
Linear/Dolby E: Passthrough header mismatch	Description: The passthrough input header is incorrect. Remedy: Correct the passthrough input header.	Major	B	On
Linear/Dolby E: Passthrough sample rate mismatch	Description: Sample rate on passthrough input is incorrect. Remedy: Correct the sample rate.	Major	B	On
Linear/Dolby E: Detected change in incoming passthrough rate	Description: The incoming passthrough rate has changed due to a change in the audio program content. Remedy: Check whether changes in audio content are expected. The message serves as information only.	Minor	B	On
Linear/Dolby E: TS rate/audio rate mismatch	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the audio encoding rate or increase the TS rate. If a FIFO error occurs recurrently, contact the closest Cisco customer support center for assistance.	Major	B	On
Macro Close	Description: An open macro has been executed. Remedy: None required.	Information	None	On
Macro Open	Description: A close macro has been executed. Remedy: None required.	Information	None	On
Power supply 1 failure	Description: Power supply 1 has failed. Remedy: Replace the power supply.	Major	B	On
Power supply 2 failure	Description: Power supply 2 has failed. Remedy: Replace the power supply.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
Power supply 1 malfunction	Description: Power supply 1 has malfunctioned due to either (e.g.,) internal fan failure an over-temperature condition. Continued operation will lead to failure. Remedy: Replace the power supply.	Major	B	On
Power supply 2 malfunction	Description: Power supply 2 has malfunctioned due to either (e.g.,) internal fan failure an over-temperature condition. Continued operation will lead to failure. Remedy: Replace the power supply.	Major	B	On
Power-up self-test failed	Description: The internal power-up self-test failed. Remedy: When persistent, contact your Cisco customer support center for assistance.	Critical	A	On
Regulus connection error	Description: An error was detected on the RS-232 connection to the Regulus Statistical Multiplex Controller. Remedy: Check the RS-232 connection between the Statistical Multiplex Controller and the encoder. Consult the manuals for information on how to interconnect the devices.	Major	B	On
Settings file is rejected	Description: The received settings file was illegal, and could therefore not be applied. Remedy: Evaluate settings and re-apply when corrected.	Information	None	On
Settings updated	Description: The settings have changed either by a settings file import, a change via the front panel or via ROSA/SNMP.	Information	None	On
Statmux RS-232 interface error	Description: An error in the RS-232 statmux interface has been detected. Remedy: Check that the RS-232 cabling is OK and that the equipment connected to the RS-232 interface operates as required.	Major	B	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
System boot completed	Description: System boot has been completed.	Information	None	On
Temperature approaching high limit	Description: The temperature is approaching the upper limit for safe operation. Remedy: Apply external cooling if the ambient temperature is above 45 degrees Celsius. Also check that whether the (internal) fan filter is dirty or that the four fans appear to be operating properly. Contact the closest Cisco customer support center for assistance.	Warning	B	On
Temperature approaching low limit	Description: The temperature is approaching the lower limit for safe operation. Remedy: Raise the ambient temperature to more than 0 (zero) degrees Celsius.	Warning	B	On
Temperature outside safe limits	Description: The temperature is outside the safe limits. The unit will be shut down. Remedy: Check that the ambient temperature is within 0 to 45 degrees Celsius. Also check whether the (internal) fan filter is dirty or that the four fans are operating properly. Contact the closest Cisco customer support center for assistance.	Critical	A	On
The option import string is invalid	Description: An option license file is invalid. Remedy: Check the Host ID and the ordered options in the option license file.	Information	None	On

Message	Description and Remedy	Severity	Default Alarm Category	Enable
TS rate/video rate mismatch	Description: The encoding rate is too high compared to the TS rate or the encoding rate is too low. The encoding will restart. Remedy: Check the settings. Change the encoding rate or increase the TS rate. In a statmux set-up, the TS rate of an encoder must have room for the maximum instantaneous encoding rate. If a FIFO error occurs recurrently, contact the closest Cisco customer support center for assistance.	Major	B	On
Video bitrate error	Description: For the selected video and chroma formats, it is not possible to implement the requested video bit rate. Remedy: Change video input or chroma format or check the selected video bit rate.	Major	B	On
Video delay error	Description: For the selected video delay, it is not possible to implement the requested video delay. Remedy: Change the video bit rate or change other video settings to decrease the end-to-end delay. Alternatively, increase the specified delay.	Major	B	On

Section C - Power Supply Replacement

Introduction

Removal and Replacement

There are no user-serviceable parts in the D9054 HDTV Encoder power supplies. If one of the power supplies requires replacement, contact Cisco for information on how to obtain a replacement power supply.

When removing a Tectrol power supply, remove the power cord from the defective supply (LEDs will be off), loosen the latch screw and pull out on the handle at the top of the power supply to remove it from the chassis.

To remove a Power-one power supply, remove the power cord from the defective supply (LEDs will be off), loosen and then remove the screw in the lower left corner of the power supply which secures the plate holding the power supply in place. Then remove the plate and the pull out on the handle on the power supply to remove it from the chassis.

When replacing power supplies, ensure that you replace each with the same model number and manufacturer from the table below; both being the same.

Power Supply Manufacturer	Cisco Part Number
Tectrol	4013265
Power-one	1004633

Important:

Note: Power supply replacement is the reverse of removal.

CAUTION:

The power supplies may be replaced while the D9054 HDTV Encoder is functioning (i.e., they are hot swappable).

Section D - Filter and Fan Replacement

Introduction

Removal and Replacement

If either the filter or one of the four fans requires replacement, contact Cisco for a new filter or a fan replacement kit for the specific fan.

Note: There are three different fans (two being the same) in the D9054 HDTV Encoder. Make note of the location of the failed fan with respect to the others (i.e., left, right, or center two) when ordering a replacement.

The kits include instructions on how to remove the existing filter and/or fans respectively, and installation of the new kit.

The following filter and/or fan kits may be ordered for use with the D9054 HD Encoder.

Part number	Description
4016244	Kit, Filter Replacement, D9054
4016245	Kit, Fan Replacement 1, D9054
4016246	Kit, Fan Replacement 2, D9054
4016247	Kit, Fan Replacement 3, D9054

Filter Cleaning

It is recommended that the filter be cleaned or replaced every 4 months. In dustier environments the filter should be cleaned or replaced more frequently.

Chapter 7
Customer Information

Overview

In This Chapter

This chapter contains the following topics.

Topic	See Page
Product Support	7-2
Returning Products	7-4

Product Support

Cisco provides its customers who have purchased support agreements with telephone support from anywhere in the world. If you require technical telephone assistance or product training support, or if you have any questions concerning their Cisco product, you may contact the appropriate Customer Support Center from those listed below. Charges may apply for customers without a current and applicable product support agreement.

Customers	Location	Phone Number
Programmers and Broadcasters	USA and Canada	Toll-Free: 1.888.949.4786 +1.770.236.4786 dmn_support@cisco.com
Telcos and Cable Service Providers	Cisco Services	Toll-Free: 1.800.722.2009 Local: 770.236.6900 (press 2 at the prompt) customer-service@cisco.com
All Customers	Europe	+32.56.445.155 or +32.56.445.197 saemea-support@cisco.com
All Customers	Asia	+852.2588.4746 saapac-support@cisco.com

Customers who call a Customer Support Center are asked specific questions in order to identify their needs. In this way, each call can be directed to the customer support representative most experienced with their Cisco product. Customer Support Centers also provide the following pre- and post-sales support services for Cisco products.

Training Support

On and off-site training plus technical support services are available for purchase both equipment operators and system administrators.

Warranty and Post-Warranty Support

Warranty and post-warranty support services are available to help customers return Cisco products for service or repair.

Customer Responsibility

When returning equipment, the customer is solely responsible for equipment packaging and transportation costs to the factory.

At the customer's request, Cisco will make reasonable efforts to provide warranty service at the customer's premises, provided that the customer pays current field service rates plus direct travel and accommodation expenses.

In Case of Repair

If your product requires repair, perform following steps.

1. Notify Cisco of the problem immediately, providing the model number and serial number of the equipment plus details of the problem. On receipt of this information, service information and shipping instructions will be provided.
2. Upon receipt of instructions, return the product by prepaid freight. Refer to the section Returning Products for details.

In Case of a Fault

If your product requires repair, perform the following steps:

1. Notify Cisco of the problem immediately, providing the model number and serial number of the equipment plus details of the problem. On receipt of this information, service information and shipping instructions will be provided.
2. Upon receipt of instructions, return the product by prepaid freight. Refer to the section Returning Products for details.

Returning Products

Introduction

You must have a return material authorization (RMA) number to return a product. Contact the nearest customer service center and follow their instructions.

Returning a product to Cisco for repair includes the following steps:

- Obtaining a RMA number
- Obtaining a customer service center shipping address
- Packing and shipping the product

Obtaining an RMA Number and Shipping Address

You must have an RMA number to return products.

RMA numbers are valid for 60 days. If you already have a number, but it is older than 60 days, you must contact a customer service representative to revalidate the number. You can return the product after the RMA number is revalidated.

Follow these steps to obtain an RMA number and shipping address.

1. Contact a customer service representative to request a new RMA number or revalidate an existing one.

   Refer to the earlier section titled Product Support to find a customer service telephone number in your area.

2. Provide the following information to the customer service representative:
   - Product name, model number, part number, serial number (if applicable)
   - Quantity of products to return
   - A reason for returning the product
   - Your company name, contact, telephone number, email address, and fax number
   - Any service contract details
   - Purchase order number of repair disposition authority, if available

   Result: The customer service representative issues the RMA number and provides the shipping address.

   Note: If you cannot provide a purchase order number:
   - A proforma invoice listing all costs incurred will be sent to you at the completion of product repair.
   - Customer service must receive a purchase order number within 15 days after you receive the proforma invoice.
   - Products can accrue costs through damage or misuse, or if no problem is found. Products incurring costs will not be returned to you without a valid purchase order number.

3. Proceed to **Packing and Shipping the Product**.

Packing and Shipping the Product

Follow these instructions to pack the product and ship it to Cisco.

1. Are the product's original container and packing material available?
   - If **yes**, pack the product in the container using the packing material.
   - If **no**, pack the product in a sturdy, corrugated box, and cushion it with packing material.

   Important:
   - You are responsible for delivering the returned product to Cisco safely and undamaged. Shipments damaged due to improper packaging may be refused and returned to you at your expense.
   - Do not return any power cords or accessories.
2. Write the following information on the outside of the container:
   - Your name
   - Your complete address
   - Your telephone number
   - RMA number

   Note: Absence of the RMA number may delay processing of product repair and/or result in the equipment being returned unrepaired. Include the RMA number in all correspondence.
3. Ship the product to the address provided by the customer service representative.

   Note: Cisco does not accept freight collect. Be sure to prepay and insure all shipments.

Appendices

Appendix A - Technical Specifications
Appendix B - Transport Stream Rates
Appendix C - ISO 639-2 Language Codes
Appendix D - Equipment and Accessories
Appendix E - Compliance
Appendix F - References

Appendix A
Technical Specifications

Overview

Introduction

This appendix contains the technical specifications for the D9054 HDTV Encoder.

Note: The technical specifications are subject to change without prior notice.

In This Appendix

This appendix contains the following topics.

Topic	See Page
Section A - Video Input and Processing	A-2
MPEG-4 Encoder Specifications	A-2
HD-SDI Input	A-3
Embedded Data in SDI	A-4
Section B - Audio Input and Processing	A-5
Audio Input	A-5
Section C - Transport Stream Output	A-7
Section D - Control and Management Interfaces	A-8
Section E - Power and General Specifications	A-9
Power	A-9
General	A-11

Section A - Video Input and Processing

MPEG-4 Encoder Specifications

General

Item	Specification
Number of channels	1
Encoding engine	According to MPEG-4 MP@L4
Frame types	I, P, and B frames
Encoding control	Adaptive coding parameters and GOP controlled by pre-analysis
PreSight™ noise reduction	Low-pass spatial filter can be set to fixed or none.
Modes	Capped VBR
Video resolution	8 bits per sample
Chroma format	4:2:0
Aspect Ratio	4:3, 16:9
Resolutions	1080i@29.97 Hz, 1080i@25 Hz, 720p@59.94 Hz, 720p@50 Hz

Video

Item	Specification
Encoding rate	4:2:0 H.264 MP@L4 - 3 to 20 Mbit/s for 1080i and 720p formats H.264 HP@L4 - 3 to 25 Mbit/s for 1080i and 720 formats
H resolutions	1080i: 1920, 1440, 1280 720p: 1280, 960, 640
V resolutions	1080, 720
Picture in Picture	
Encoding format	H.264 Main Profile
Picture size	192 x 192 or 128 x 96
Bit rate	200 to 500 kbit/s, 192 x 192 resolution 150 to 500 kbit/s, 128 x 96 resolution

HD-SDI Input

System

Item	Specification
Video Formats	
Signal form	Y, CR, CB
Sampling structure	4:2:0
Line numbers/field rates	1080i/25 Hz, 1080i/29.97 Hz, 720p/ 59.94 Hz, 720p/50 Hz
Serial interface	SMPTE-292M
Bit rate	1.485 Gbit/s ± 10 ppm; or 1.485/1.001 Gbit/s ± 10 ppm

Input Characteristics

Item	Specification
Number of inputs	1
Connector	BNC
Nominal input level	800 mV_{pp} nominal
Impedance	75Ω unbalanced
Return loss	≥ 15 dB in the range 5 to 1000 MHz ≥ 12 dB in the range 1000 to 1485 MHz
Jitter acceptance	According to SMPTE RP184
Interference rejection	No bit errors in presence of superimposed interfering signal

Embedded Data in SDI

VBI Processing

Item	Specification
Closed Captioning	
General	CEA 708, SMPTE-334M
Output format	ATSC A/53, Part 4 ETSI TS 101 154
DPI	
General	SCTE-104, SMPTE RP 2010
Output format	SCTE-35
AFD	
General	SMPTE-2016
Output format	ATSC A/53, Part 4 ETSI TS 101 154
AAC mode	
General	ARIB STD-B39

Embedded Audio

Item	Specification
Format	According to SMPTE-299M
Audio sampling frequency	48 kHz locked to the video. According to SMPTE-272M
Resolution	20 bits

Section B - Audio Input and Processing

Audio Input

General

Item	Specification
Inputs	Digital AES/EBU and embedded
Connector	2 BNC
Number of channels	4 mono Dolby Digital channels

Dolby Digital Encoding

Item	Specification
Encoding	According to ATSC Standard: Digital Audio Compression (AC-3) Rev. A, August 2001.
Audio Coding Modes	Dual Mono 1+1, Mono 1/0, Stereo 2/0
Audio data rate	56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576 and 640 kbit/s
Sample frequency	32, 44.1 and 48 kHz

Dolby Digital Audio Performance (at 640 kbit/s)

Item	Specification
SINAD at 1,020 Hz	> 80 dB
Idle channel noise	< -86 dB A-weighted

AAC Passthrough

Item	Specification
Pre-encoding	Encoding by external AAC encoder according to ATSC Standard: Digital Audio Compression (AC-3) Rev. A, August 2001.
Audio data rate	32, 40, 48, 56, 64, 72, 80, 96, 112, 128, 144, 160, 176, 192, 224, 256, 288, 320, 352, 384, 416, 448, 512, 576 and 640 kbit/s
Sample frequency	32, 44.1 and 48 kHz

Linear Audio Encoding

Item	Specification
No. of channels	Up to 4 stereo per audio encoder.
Encoding	Linear
Sample frequency	48 kHz
Resolution	20 bits
Transmission	According to SMPTE-302M

Passthrough of Dolby E

Item	Specification
Pre-encoding	Encoding by external Dolby E encoder according to ATSC Standard: Digital Audio Compression (AC-3) Rev. A, August 2001.

Linear Audio/Dolby E Performance

Item	Specification
Frequency response	+/- 0.15 dB re. 1 kHz: 20 to 20,000 Hz
SINAD at 1020 Hz	>80 dB, 3 dB below clipping
Idle channel noise	<-80 dBq0ps, weighted acc. to ITU-R Rec. 468

Dolby Digital Encoding

Item	Specification
Encoding	According to ATSC Standard: Digital Audio Compression (AC-3) Rev. A, August 2001.
Audio Coding Modes	Dual Mono 1+1, Mono 1/0, Stereo 2/0
Audio data rate	56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576 and 640 kbit/s
Sample frequency	32, 44.1 and 48 KHz

Section C - Transport Stream Output

ASI Output

Item	Specification
Number of outputs	3, one is designated ASI Monitor
Type of connector	75Ω BNC
Output impedance	75Ω according to EN 50083-9
Data amplitude	800 mV peak-peak ± 10% according to EN 50083-9
Return loss	>17 dB, 27 to 270 MHz
Transport stream bit rate	1 to 120 Mbit/s ± 100 ppm
Transport stream formats	According to EN 50083-9. 188 bytes structure, 204 bytes without Reed Solomon, Burst or packet format.
ASI bit rate	270 Mbit/s ± 100 ppm

Section D - Control and Management Interfaces

Ethernet Management Interface

Item	Specification
Number of connectors	1
Type of connector	Eight-pin RJ-45, MDI
Ethernet type	10/100 Base-T
Required setup	IP address, default gateway and subnet mask

Alarm Interface

Item	Specification
Number of outputs	3, each having one set of contacts closed and one set open during normal operation. Alarms are signalled by reversing the polarity of the two contact sets.
Type of connector	Terminal block
Max. voltage	≤ 30 V AC, ≤ 30 V DC
Max. current	≤ 1 A

Contact Closure Interface

Item	Specification
Connector type	9-pin sub-D female
Minimum duration of event guaranteed to be detected	250 ms, 1 frame period, e.g., for 1080i/25 Hz 40 ms for DPI applications
Max. on generator impedance	100 Ω
Min. off generator impedance	100 kΩ

Front Panel Interface

Item	Specification
LCD	2 lines of 40 characters backlit LCD.
Keypad	Arrow keys, 0 to 9, Select, Menu and Prev keys, F1 to F4
LEDs	Green LED for Signal status. Red LED for Alarm indication.

Section E - Power and General Specifications

Power

AC Power Connector

Item	Specification
Type of connector	IEC 320 style C14 appliance receptable (one per power supply)
AC input	100 to 240 V AC, 50/60 Hz ± 10%
Power	500 W
Current	5A total, 2.5A per power supply maximum
Power Quality	ANSI/IEEE Std C62.41.1-2002

Introduction

The encoder is supplied with two power supplies that provide redundant power with no single point of failure. Normal typical operation requires both supplies to be powered up and switched on. Each power supply should be powered from a separate mains branch circuit, in order to ensure redundancy.

The DC outputs from both power supplies are combined together in a current-sharing scheme so that the total load is shared.

Power

To operate the encoder, you must connect it to an AC power source.

WARNING:

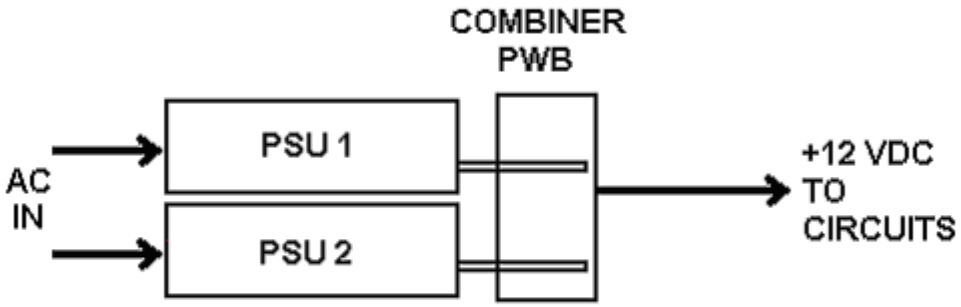
Make sure that at least one end of the power cable(s) remains easily accessible for unplugging, if you need to switch off the unit. For example: Ensure that the socket outlet is installed near the product.

WARNING:

To avoid electrical shock, connect the three-prong plug on this product to an earth-grounded three-pin socket outlet only.

Architecture

The following diagram illustrates the power supply architecture.



General

Mechanics

Item	Specification
Height	2 U (8.9 cm) (3.5″)
Width	44.7 cm (17.6″)
Depth	53.3 cm (21.0“)
Weight	14.3 kg (31.5 lb.)

Environment

Item	Specification
Storage	
General	The product is within the original packaging.
Humidity	5 to 95% non-condensing
Temperature	-10 to +70°C (14 to 158°F)
Operation	
Humidity	5 to 95% non-condensing
Temperature	0 to +40°C (32 to 104°F)
Altitude	
Operating	10,000 ft. (3,048 m) max.
Non-operating	30,000 ft. (9,144 m) max.

Appendix B
Transport Stream Rates

Overview

Introduction

This appendix presents the required transport stream rates for the various tributaries (video, audio, VBI, etc).

Also, it presents the available transport stream rates on an ASI network.

In This Appendix

This appendix contains the following topics.

Topic	See Page
Introduction	B-2
Transport Stream Rates for the Tributaries	B-3
Available Rate on the Transmission Media	B-10

Introduction

General

The D9054 HDTV Encoder automatically allocates the necessary transport stream rates for the chosen tributary rates. With the following tables at hand, you may prepare and evaluate a rate budget for the D9054 HD Encoder before actual configuration. The transport stream rates for the tributaries are, apart from the video and audio rounded up to the nearest kbit/s.

Transport Stream Rates for the Tributaries

Supported Tributaries

In the D9054 HD Encoder, the following tributaries can be multiplexed together:

- H.264 Video Transport Stream
- H.264/PIP Video Transport Stream
- Layer II Audio Transport Stream
- Dolby Digital Audio
- AAC/AAC Passthrough
- DPI

The SI/PSI rate for the video program is 53 kbit/s. If you, besides the video program, have an additional audio only program this takes up 33 kbit/s.

To help you to calculate the total TS rate used by the D9054 HD Encoder the following sections show the transport stream rates of each tributary.

Video[1)]

The required transport stream rate in the D9054 HD Encoder primarily depends on the video coding rate, to some extent on the frame rate, but only slightly on the GOP.

The following table shows the required transport stream rates for a selection of video rates. The transport stream rate figures are truncated to two decimals. The variation of the required transport stream rate for different GOPs is within truncation accuracy so you need not take the GOP into consideration.

1) Closed captions output packets are part of the video tributary. It is advised that you only enable the output packets that you know you will use.

Layer II Audio, Attached to the Video or to Another Audio Only Channel

The various audio rates require the following transport stream rates. These figures apply to audio attached to the video or to another audio only channel.

	Required TS Capacity[a)]		
Audio Encoding Rate	**32 kHz Sampling Frequency**	**44.1 kHz Sampling Frequency**	**48 kHz Sampling Frequency**
32 kbit/s	36.6 kbit/s	36 kbit/s	39.2 kbit/s
48 kbit/s	52.2 kbit/s	50.4 kbit/s	54.8 kbit/s
56 kbit/s	62.7 kbit/s	64.8 kbit/s	62.7 kbit/s
64 kbit/s	67.9 kbit/s	72 kbit/s	70.5 kbit/s
80 kbit/s	83.6 kbit/s	86.4 kbit/s	86.2 kbit/s
96 kbit/s	99.2 kbit/s	100.8 kbit/s	101.8 kbit/s
112 kbit/s	120.1 kbit/s	122.3 kbit/s	117.5 kbit/s
128 kbit/s	135.8 kbit/s	136.7 kbit/s	133.2 kbit/s
160 kbit/s	167.1 kbit/s	165.5 kbit/s	172.3 kbit/s
192 kbit/s	198.4 kbit/s	201.5 kbit/s	203.7 kbit/s
224 kbit/s	229.8 kbit/s	230.3 kbit/s	235 kbit/s
256 kbit/s	266.3 kbit/s	266.3 kbit/s	266.3 kbit/s
320 kbit/s	329 kbit/s	331.1 kbit/s	329 kbit/s
384 kbit/s	396.9 kbit/s	395.8 kbit/s	399.5 kbit/s

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

Layer II Audio, Audio Only

The various audio rates require the following transport stream rates. These figures apply to audio only.

	Required TS Capacity[a)]		
Audio Encoding Rate	**32 kHz Sampling Frequency**	**44.1 kHz Sampling Frequency**	**48 kHz Sampling Frequency**
32 kbit/s	36.6 kbit/s	36 kbit/s	39.2 kbit/s
48 kbit/s	52.2 kbit/s	57.6 kbit/s	54.8 kbit/s
56 kbit/s	62.7 kbit/s	64.8 kbit/s	62.7 kbit/s
64 kbit/s	73.1 kbit/s	72 kbit/s	70.5 kbit/s
80 kbit/s	88.8 kbit/s	86.4 kbit/s	86.2 kbit/s
96 kbit/s	104.4 kbit/s	108 kbit/s	101.8 kbit/s
112 kbit/s	120.1 kbit/s	122.3 kbit/s	125.3 kbit/s
128 kbit/s	135.8 kbit/s	136.7 kbit/s	141 kbit/s
160 kbit/s	167.1 kbit/s	172.7 kbit/s	172.3 kbit/s
192 kbit/s	203.7 kbit/s	201.5 kbit/s	203.7 kbit/s
224 kbit/s	235 kbit/s	237.5 kbit/s	235 kbit/s
256 kbit/s	266.3 kbit/s	266.3 kbit/s	266.3 kbit/s
320 kbit/s	334.2 kbit/s	331.1 kbit/s	336.8 kbit/s
384 kbit/s	396.9 kbit/s	395.8 kbit/s	399.5 kbit/s

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

Dolby Digital/Dolby Digital Passthrough, Audio Attached to the Video or to Another Audio Only Channel

The various audio rates require the following transport stream rates. These figures apply to audio attached to the video or to another audio only channel.

	Required TS Capacity[a)]		
Audio Encoding Rate	**32 kHz Sampling Frequency**	**44.1 kHz Sampling Frequency**	**48 kHz Sampling Frequency**
56 kbit/s	58.8 kbit/s	59.4 kbit/s	58.8 kbit/s
64 kbit/s	66.6 kbit/s	70.2 kbit/s	70.5 kbit/s
80 kbit/s	86.2 kbit/s	86.4 kbit/s	88.1 kbit/s
96 kbit/s	101.8 kbit/s	102.6 kbit/s	99.9 kbit/s
112 kbit/s	117.5 kbit/s	118.7 kbit/s	117.5 kbit/s
128 kbit/s	133.2 kbit/s	134.9 kbit/s	135.1 kbit/s
160 kbit/s	164.5 kbit/s	167.3 kbit/s	170.4 kbit/s
192 kbit/s	199.8 kbit/s	199.7 kbit/s	199.8 kbit/s
224 kbit/s	231.1 kbit/s	232.1 kbit/s	235 kbit/s
256 kbit/s	262.4 kbit/s	264.5 kbit/s	264.4 kbit/s
320 kbit/s	329 kbit/s	329.3 kbit/s	329 kbit/s
384 kbit/s	395.6 kbit/s	394 kbit/s	393.6 kbit/s
448 kbit/s	462.2 kbit/s	458.8 kbit/s	464.1 kbit/s
512 kbit/s	524.8 kbit/s	529 kbit/s	528.8 kbit/s
576 kbit/s	591.4 kbit/s	593.7 kbit/s	593.4 kbit/s
640 kbit/s	658 kbit/s	658.5 kbit/s	658 kbit/s

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

Dolby Digital/Dolby Digital Passthrough, Audio Only

The various audio rates require the following transport stream rates. These figures apply to audio only.

	Required TS Capacity[a)]		
Audio Encoding Rate	**32 kHz Sampling Frequency**	**44.1 kHz Sampling Frequency**	**48 kHz Sampling Frequency**
56 kbit/s	62.7 kbit/s	64.8 kbit/s	64.6 kbit/s
64 kbit/s	70.5 kbit/s	70.2 kbit/s	70.5 kbit/s
80 kbit/s	86.2 kbit/s	86.4 kbit/s	88.1 kbit/s
96 kbit/s	101.8 kbit/s	102.6 kbit/s	105.8 kbit/s
112 kbit/s	117.5 kbit/s	118.7 kbit/s	123.4 kbit/s
128 kbit/s	137.1 kbit/s	134.9 kbit/s	135.1 kbit/s
160 kbit/s	168.4 kbit/s	167.3 kbit/s	170.4 kbit/s
192 kbit/s	199.8 kbit/s	199.7 kbit/s	199.8 kbit/s
224 kbit/s	235 kbit/s	232.1 kbit/s	235 kbit/s
256 kbit/s	266.3 kbit/s	264.5 kbit/s	270.3 kbit/s
320 kbit/s	332.9 kbit/s	334.7 kbit/s	334.9 kbit/s
384 kbit/s	395.6 kbit/s	399.4 kbit/s	399.5 kbit/s
448 kbit/s	462.2 kbit/s	464.2 kbit/s	464.1 kbit/s
512 kbit/s	528.8 kbit/s	529 kbit/s	528.8 kbit/s
576 kbit/s	591.4 kbit/s	593.7 kbit/s	593.4 kbit/s
640 kbit/s	658 kbit/s	658.5 kbit/s	658 kbit/s

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

AAC Passthrough

The various audio rates require the following transport stream rates. These figures apply to audio attached to the video or to another audio only program respectively to audio only programs.

	Required TS Capacity (kbit/s), Audio Attached to Video or Another Audio Program[a)]			Required TS Capacity (kbit/s), Audio Only[a)]		
Audio Encoding Rate	**32 kHz Sampling Frequency**	**44.1 kHz Sampling Frequency**	**48 kHz Sampling Frequency**	**32 kHz Sampling Frequency**	**44.1 kHz Sampling Frequency**	**48 kHz Sampling Frequency**
32 kbit/s	41125	48579	44063	41125	48579	52875
40 kbit/s	52875	56675	52875	52875	56675	52875
48 kbit/s	58750	64772	61688	58750	64772	61688
56 kbit/s	64625	72868	70500	70500	72868	70500
64 kbit/s	76375	80965	79313	76375	80965	79313
72 kbit/s	82250	89061	88125	82250	89061	88125
80 kbit/s	88125	97158	96938	94000	97158	96938
96 kbit/s	105750	113351	114563	111625	113351	114563
112 kbit/s	123375	129544	132188	123375	129544	132188
128 kbit/s	141000	145737	141000	141000	145737	149813
144 kbit/s	158625	161930	158625	158625	161930	158625
160 kbit/s	170375	178123	176250	176250	178123	176250
176 kbit/s	188000	194316	193875	188000	194316	193875
192 kbit/s	205625	210509	211500	205625	210509	211500
224 kbit/s	240875	242895	246750	240875	242895	246750
256 kbit/s	270250	275280	273188	270250	275280	273188
288 kbit/s	305500	307666	308438	305500	307666	308438
320 kbit/s	334875	340052	343688	340750	340052	343688
352 kbit/s	370125	372438	370125	370125	372438	378938
384 kbit/s	399500	404824	405375	405375	404824	405375

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

Transport Stream Rates for the Tributaries, Continued

	Required TS Capacity (kbit/s), Audio Attached to Video or Another Audio Program[a)]			Required TS Capacity (kbit/s), Audio Only[a)]		
416 kbit/s	434750	437210	440625	434750	437210	440625
448 kbit/s	464125	469596	475875	470000	469596	475875
512 kbit/s	534625	534368	537563	534625	534368	537563
576 kbit/s	599250	599140	599250	599250	599140	608063
640 kbit/s	663875	663912	669750	663875	672008	669750

a. Applies to 188-byte packet mode. If 204-byte packet mode is used you must multiply by a factor of 204/188.

Available Rate on the Transmission Media

ASI

The rate of the ASI output is set up by the user to match the transmission media or any other device to follow the D9054 HD Encoder.

The maximum available transport stream rate is limited by the hardware. The maximum transport stream rate of the D9054 HD Encoder is 120 Mbit/s output.

Note: When you select the 204[2)] byte format without RS the payload transport stream rate is reduced to 188/204 of the specified transport stream rate.

Satellite Interfaces

A satellite modulator may be connected to the ASI output of the D9054 HD Encoder. The available transport stream rate on the satellite link depends on the modulation, the symbol rate (= Baud rate) and the code rate according to the following formula:

Transport stream rate = Rs * 188/204 * code rate * n

where:

Rs is the symbol rate in MBaud or Msymbols/sec,
the 188/204 refers to the outer Reed-Solomon coding in the modulator,
n = 2 for QPSK, 3 for 8PSK and 4 for 16QAM,
and the code rate is the rate of the inner coding (1/2, 2/3, 3/4, 5/6 and 7/8).

The transport stream rate of the D9054 HD Encoder shall be set up to equal the rate calculated by the formula above. Remember to disable the RS in the D9054 HD Encoder

The maximum transport stream rate is determined by the ASI interface, or the satellite modulator, whichever is lowest. Note that satellite modulators often have a minimum transport stream rate that is much higher than the minimum transport stream rate of the D9054 HD Encoder.

Note: 10 Mbaud gives the following transport stream rate with 8PSK modulation with 7/8 code rate:

10 Mbaud * 188/204 * 7/8 *3 = 24.9 Mbit/s

2) 204 bytes mode is not applicable to the PNC Control System.

Appendix C
ISO 639-2 Language Codes

Overview

Introduction

This appendix lists the Standard Codes for the Representation of Names of Languages according to ISO 639-2.

In This Appendix

This appendix contains the following topics.

Topic	See Page
Language Codes - Sorted by Alpha 3-Letter Code (ISO 639-2)	C-2

Language Codes - Sorted by Alpha 3-Letter Code (ISO 639-2)

ISO 639-2

This table is based on the ISO 639-2 Standard Codes for the Representation of Names of Languages.

Language Code	**Code**
Abkhazian	abk
Afar	aar
Afrikaans	afr
Albanian	alb/sqi[a)]
Amharic	amh
Arabic	ara
Aragonese	arg
Armenian	arm/hye[a)]
Assamese	asm
Avestan	ave
Aymara	aym
Azerbaijani	aze
Bashkir	bak
Basque	baq/eus[a)]
Belarusian	bel
Bengali	ben
Bihari	bih
Bislama	bis
Bosnian	bos
Breton	bre
Bulgarian	bul
Burmese	bur/mya[a)]
Catalan	cat
Chamorro	cha
Chechen	che

Language Code	Code
Chinese	chi/zho[a)]
Church Slavonic	chu
Chuvash	chv
Cornish	cor
Corsican	cos
Croatian	scr/hrv[a)]
Czech	cze/ces[a)]
Danish	dan
Dutch	dut/nld[a)]
Dzongkha	dzo
English	eng
Esperanto	epo
Estonian	est
Faroese	fao
Fijian	fij
Finnish	fin
French	fre/fra[a)]
Frisian	fry
Gaelic	gla
Gallegan	glg
Georgian	geo/kat[a)]
German	ger/deu[a)]
Greek, (1453-)	gre
Guarani	grn
Gujarati	guj
Haitian	hat
Hausa	hau
Hebrew	heb
Herero	her

Language Code	Code
Hindi	hin
Hiri	ho
Hungarian	hun
Icelandic	ice/isl[a)]
Ido	ido
Indonesian	ind
Interlingua	ina
Interlingue	ile
Inuktitut	iku
Inupiaq	ipk
Irish	gle
Italian	ita
Japanese	jpn
Javanese	jav
Kalaallisut	kal
Kannada	kan
Kashmiri	kas
Kazakh	kaz
Khmer	khm
Kikuyu;	ki
Kinyarwanda	kin
Kirghiz	kir
Komi	kom
Korean	kor
Kuanyama;	kj
Kurdish	kur
Lao	lao
Latin	lat
Latvian	lav

Language Code	Code
Limburgan	lim
Lingala	lin
Lithuanian	lit
Luxembourgish;	lb
Macedonian	mac/mkd[a)]
Malagasy	mlg
Malay	may/msa[a)]
Malayalam	mal
Maltese	mlt
Manx	glv
Maori	mao/mri[a)]
Marathi	mar
Marshallese	mah
Moldavian	mol
Mongolian	mon
Nauru	nau
Navaho,	nv
Ndebele,	nr
Ndebele,	nd
Ndonga	ndo
Nepali	nep
Northern	se
Norwegian	nn
Norwegian	nb
Norwegian	nor
Nyanja	nya
Occitan (post 1500)	oci
Oriya	ori
Oromo	orm

Language Code	Code
Ossetian;	os
Pali	pli
Panjabi	pan
Persian	per/fas[a)]
Polish	pol
Portuguese	por
Pushto	pus
Quechua	que
Raeto-Romance	roh
Romanian	rum/ron[a)]
Rundi	run
Russian	rus
Samoan	smo
Sango	sag
Sanskrit	san
Sardinian	srd
Serbian	scc/srp[a)]
Shona	sna
Sichuan	ii
Sindhi	snd
Sinhalese	sin
Slovak	slo/slk[a)]
Slovenian	slv
Somali	som
Sotho,	st
Spanish;	es
Sundanese	sun
Swahili	swa
Swati	ssw

Language Code	Code
Swedish	swe
Tagalog	tgl
Tahitian	tah
Tajik	tgk
Tamil	tam
Tatar	tat
Telugu	tel
Thai	tha
Tibetan	tib/bod[a)]
Tigrinya	tir
Tonga	tog
Tsonga	tso
Tswana	tsn
Turkish	tur
Turkmen	tuk
Twi	twi
Uighur	uig
Ukrainian	ukr
Urdu	urd
Uzbek	uzb
Vietnamese	vie
Volapuk	vol
Walloon	wln
Welsh	wel/cym[a)]
Wolof	wol
Xhosa	xho
Yiddish	yid
Yoruba	yor
Zhuang;	za

Language Code	Code
Zulu	zul

a. Languages that have two synonymous codes.

Appendix D
Equipment and Accessories

Overview

Introduction

This appendix contains names and part numbers of options and accessories for the D9054 HD Encoder.

In This Appendix

This appendix contains the following topics.

Topic	See Page
Accessory Kits for the D9054 HD Encoder	D-2
Options and Upgrades	D-3

Accessory Kits for the D9054 HD Encoder

Accessory Kit

The accessory kit for the D9054 HD Encoder contains the following items:

Part number	Description
4038938 Rev A	Cisco D9054 HDTV Encoder, Installation and Operation Guide

The following line cords may be ordered for use with the D9054 HD Encoder:

180178	Line cord, 125 V, Australian version
207340	Line cord, 250V, 10 A, Argentina
700788	Line cord, 250 V, European (Harmonized) version
3993131	Line cord, 250 V, 10 A, UK version
3993130	Line cord, 250 V, 10 A, Italian version
3993133	Line cord, 125 V, 7 A, Japanese version
3993138	Line cord, 125 V, 10 A, North American version

Options and Upgrades

Software Options

The following software options are available:

Note: Contact a Cisco sales representative if you want to purchase an option.

Part number	Description
4012577.0001	Dolby Digital (AC-3) 2.0 encoding, channel 1 and 2
4012577.0021	Dolby Digital (AC-3) 2.0 encoding, channel 3 and 4
4012577.0031	Dolby Digital (AC-3) 2.0 encoding, channel 5 and 6
4012577.0004	HE-AAC stereo internal encoding, channel 1 and 2
4012577.0024	HE-AAC stereo internal encoding, channel 3 and 4
4012577.0034	HE-AAC stereo internal encoding, channel 5 and 6
4012577.0100	Dolby Digital Plus 5.1 encoding (or 3 stereos), requires DASM
4012577.0200	Dolby E decoding, requires DASM
4012577.0002	Picture in Picture (PIP) license
4012577.0008	DPI license for support via GPI or SCTE-104 via SDI
4012577.0010	High Profile license
4012577.0020	AVC Statistical multiplexing license

Hardware Upgrades

The following software upgrades are available:

Note: Contact a Cisco sales representative if you want to purchase an upgrade.

Part number	Description
4028478	Upgrade kit, DCA to MCA conversion, includes 6 MPEG-1 LII Stereo channels, Dolby Digital Plus passthrough
4028638	Factory Upgrade - Dolby Advanced Sub-Module (DASM)

Appendix E
Compliance

Applicable Standards and Notices

Safety

The D9054 HDTV Encoder has been approved for safety by the Standards Council of Canada and the OHSA (NRTL) Accredited Testing Laboratory to the following standards:

CAN/CSA-C22.2 No. 60950-1-03

ANSI/UL Std No. 60950-1-2003

Also, this product has been evaluated under the IECEE CB scheme to the following international standard:

IEC 60950-1 Ed 2

For the CB report and Certificate the product are evaluated for the country differences outlined in CB Bulletin 109A:

EMC

Electrostatic Discharge Electrostatic discharge (ESD) results from the static electricity buildup on the human body and other objects. This static discharge can degrade components and cause failures.

Take the following precautions against electrostatic discharge.

- Use an anti-static bench mat and a wrist strap or ankle strap designed to safely ground ESD potentials through a resistive element.
- Keep components in their anti-static packaging until installed.
- Avoid touching electronic components when installing a module.

Electromagnetic Compatibility Regulatory Requirements

Ethernet cables should be of single-shielded or double-shielded type. Coaxial cables should be of the double-braided shielded type. Where this equipment is subject to USA FCC and/or Industry Canada rules, the following statements apply:

FCC Notices

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC rules. These limits exist to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with this instruction manual may cause harmful interference in which case the user at his own expense must take whatever measures may be required to correct the interference.

Shielded cables should be used to interconnect this unit with any peripheral equipment (i.e., data sources, terminals, monitors, etc.) to ensure compliance with Class A limits. Failure to do so may result in radio or TV interference.

Industry Canada Notice

This digital apparatus does not exceed the limits for Class A radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications. Le present appareil numerique n'emet pas de bruites radioelectriques qui dépassant les limites applicables aux appareils numeriques de Class A prescrites dans le reglement sur le brouillage radioelectrique edicte par le Ministre des Communications du Canada.

Unauthorized Modifications

The manufacturer is not responsible for any radio or TV interference resulting from unauthorized modifications made to this equipment. It is the responsibility of the user to correct such interference at his own expense.

Scientific-Atlanta Europe NV
Luipaardstraat 12
8500 Kortrijk
Belgium

Declaration of Conformity

CE MARKING 06

The Product	HD Advanced Encoder
Reference or Model Number	D9054
Rating	100-240 VAC 5.0/2.5 A 50/60 Hz

Has been designed and manufactured in accordance with the following Harmonised Standards:

Number and Date of Issue	Title of Standard
EN 60950-1:Ed 2	Information technology equipment - Safety - Part 1: General requirements
CISPR 22:2003 +A1 +A2:2006, Class A	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
CISPR24 : 1997 +A1 +A2	- Information technology equipment - Immunity characteristics - Limits and methods of measurement
IEC 61000-3-2 : 2005	- Electromagnetic Compatibility - Part 3: Limits Section 2: Limits for Harmonic Current Emissions (Equipment Input Current less than 16A per phase)

According to the provisions of the Low Voltage Directive 73/23/EEC and the Electromagnetic Compatibility Directive 89/336/EEC amended per Directive 93/68/EEC

Toronto, Canada, July 1, 2006
(Issue place and Date)

Scientific Atlanta Canada Inc (Digital Media Networks Business Unit)
(Company name)

100 Middlefield Road, Scarborough Ontario Canada M1S 4M6
(Company Address)

For the manufacturer: Steven Lawrence, Product Regulatory Compliance
(Signature, Name and Title)

Appendix F
References

Applicable Documents

AES3-1992	Serial transmission format for two-channel linearly represented digital audio data
ANSI/SCTE 35 2004	Digital Program Insertion Cueing Message for Cable
ANSI/ SMPTE 12M-1995	Television, Audio and Film - Time and Control Code
ANSI/SCTE 104 2004	Automation System to Compression System Communications Applications Program Interface (API)
AS/NZS, 2002	Limits and methods of measurements of radio disturbance characteristics of information technology equipment
ATSC Standard, August 2001	Digital Audio Compression (AC-3) Rev. A
ATSC A/53, Part 4, 2007, Amdmt 1	MPEG-2 Video System Characteristics
CCITT Rec x.733, 02 1992	Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function
CCITT Rec x.734, 09 1992	Information technology - Open Systems Interconnection - Systems Management: Event report management function
CCITT Rec x.735, 09 1992	Information technology - Open Systems Interconnection - Systems Management: Log control function
CCITT Rec x.736, 01 1992	Information technology - Open Systems Interconnection - Systems Management: Security alarm reporting function
CSA C 22.2 No. 60950, 2000	Safety of information technology equipment

EIA-708-B, December 1999	Digital Television (DTV) Closed Captioning
EIATIA-232-E, 1991	Interface between data terminal equipment and data circuits
EN 55022, 1998 including A1, 2000	Limits and methods of measurements of radio disturbance characteristics of information technology equipment
EN 55024, 1998 including A1, 2001	Information technology equipment - Immunity characteristics - Limits and method of measurement
EN 60950, 2000	Safety of information technology equipment
EN 61000-3-2, 2000	Limits for harmonic current emission
EN 61000-3-3, 1995 including A1, 2001	Limitations of voltage fluctuations and flicker
EN 300 468 V1.4.1	"Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems"
EN 50083-9 E 1998	"Interfaces for CATV/SMATV headends and similar professional equipment"
ETR 162 E1	"Allocation of Service Information (SI) codes for DVB systems".
ETR 211 E.2 - 1997	"Digital broadcasting systems for television; guidelines on implementation and usage of service information".
ETR 290, 05 1997	Measurement guidelines for DVB systems.
ETSI EN 300 468 V1.4.1, 2000-11	Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems.
ETSI TR 102 154 v1.1.1, 2001-04	Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 Systems, Video and Audio in Contribution and Primary Distribution Applications.
ETSI TS101 154 V1.8.1, 2007-07	Specification for the use of Video and Audio Codinjg in Broadcasting Applications based on MPEG-2 Transport Stream
FCC CFR 47 Part 15	Radio Frequency Devices.
IEC 60950, 1999	Safety of information technology equipment.
IEC 68-2-1, IEC 68-2-6	Basic Environmental Testing Procedures.
IEC 68-2-29, 1987, IEC 68-2-56	Basic Environmental Testing Procedures.
IIEEE 802.3, 1996	IEEE Standard for Local and metropolitan area networks. Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications.

ISO/IEC 11172-3 - 1993	"Information Technology - Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s - Part3: Audio."
ISO/IEC 13818-1, 1995	Generic Coding of Moving Pictures and Associated Audio: Systems - Part1:Audio."
ISO/IEC 13818-2 - 1999	"Information Technology - Generic coding of moving pictures and associated audio - Part 2: Video."
ISO/IEC 13818-3 - 1994	"Information Technology - Generic coding of moving pictures and associated audio - Part 3: Audio."
SMPTE 2016-1 2007	Format for Active Format Description and Bar Data
SMPTE 2016-3 2007	Vertical Ancillary Data Mapping of Active Format Description and Bar Data
ITU-R BT. 470-6	"Conventional Television Systems"
ITU-T Rec. G.742, 1972	"Second order digital multiplex equipment operating at 8448 kbit/s and using positive justification"
ITU-R Rec. 647, 1986	A digital audio interface for broadcasting studios.
RFC 791, 1981	Internet protocol, protocol specification.
RFC 867, 1985	Daytime Protocol.
RFC 1904, 1996	Conformance Statements for Version 2 of the Simple Network Management Protocol (SNMPv2).
RFC 1905, 01 1996	"Protocol operations for version 2 of SNMP"
SMPTE 272M, 1994	Proposed edition, "Formatting AES/EBU Audio and Auxiliary Data into Digital Video Ancillary Data Space."
SMPTE 274M, 2003	Television - 1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates.
SMPTE 276M, 2001	1280 x 720 Progressive Image Sample Structure - Analog and Digital Representation and Analog Interface.
SMPTE 291M, 1998	Proposed edition, "Ancillary Data Packet and Space Formatting".
SMPTE 292M, 1998	Bit-Serial Digital Interface for High-Definition Television Systems.
SMPTE 296M, 2001	Television - 1280 x 720 Progressive Image Sample Structure - Analog and Digital Representation and Analog Interface.
SMPTE299M, 1997	24-Bit Digital Audio Format for HDTV Bit. Serial Interface.
SMPTE 333M, 1999	Television - DTV Closed-Caption Server to Encoder Interface.
SMPTE 334M, 2000	Vertical Ancillary Data Mapping for Bit-Serial Interface.

SMPTE RP 168, 2002	"Definition of vertical switching point for synchronous switching."
TR 101 154 V1.4.1	"Digital Video Broadcasting (DVB); Implementation guidelines for the use of MPEG-2 systems; Video and audio in satellite, cable and terrestrial broadcasting applications."
UL 60950-1, 2003	Safety of information technology equipment.

Glossary

List of Terms and Abbreviations

AAC LC	AAC Low Complexity
ASI	Asynchronous Serial Interface. A 270 Mbit/s data stream similar to the 270 Mbit/s SDI signal. Note that the 270 Mbit/s is only the ASI rate. You may put in any MPEG stream from about 1.5 Mbit/s to 120 Mbit/s.
Aspect ratio	The width-to-height ratio of an image. A 4:3 aspect ratio means the horizontal size is a third again wider than the vertical size. Standard television ratio is 4:3 (or 1.33:1). Wide screen DVD and HTDV aspect ratio is 16:9 (or 1.78:1).
CBR	Constant Bit Rate
DCA	Dual Channel Audio card
DVB	Digital Video Broadcasting
EIA	Electronic Industries Association
GOP	Group Of Pictures. A GOP is a picture sequence which can be coded as an entity. For instance, it is possible to cut between GOPs. For that reason, the first picture in a GOP has to be intra-coded (I-picture). Time codes are carried on GOP level. ,
GUI	Graphical User Interface
HD-SDI	High Definition Serial Digital Interface
IP	Internet Protocol. The TCP/IP Transmission Control Protocol/ Internet Protocol is the basic communication language or protocol of the Internet.
LED	Light Emitting Diode
MCA	Multiple Channel Audio card
MDI	Media Dependant Interface
MPEG	Moving Picture Experts Group (or often Motion Picture Experts Group). A working group under ISO/IEC and its set of standards for coding of moving pictures and associated audio. Standards are MPEG-1 and MPEG-2.
NIT	Network Information Table. Provides information about the physical network.
PIP	Picture in Picture
PSI	Program Specific Information. Normative data necessary for the demultiplexing of TSs and the regeneration of programs.
QAM	Quadrature Amplitude Modulation. QAM is a method of

	combining two amplitude-modulated (AM) signals into a single channel, thereby doubling the effective bandwidth.
QPSK	Quaternary Phase Shift Keying. A common form of phase modulation that transmits two bits per Hertz. Thus, a 6 MHz channel supports 12 Mbit/s.
RS	Reed-Solomon Coding. FEC algorithm optimized to correct errors in the transmission caused by transient noise (burst errors).
SBR	Spectral Band Replication is a technology to enhance audio or speech codecs, especially at low bit rates.
SDI	Serial Digital Interface. 270 Mbit/s digital video format
SMPTE	Society of Motion Picture and Television Engineers
SNMP	Simple Network Management Protocol. SNMP is an internet standard protocol developed to manage nodes such as servers, workstations, routers, switches and hubs on an IP network.
SPI	Synchronous Parallel Interface
TS	Transport Stream
VBR	Variable Bit Rate

A

AAC audio
front panel setup, 4-19
installing option, 5-135
AAC passthrough
setting up, 5-68
specifications, A-5
test tones, 5-78
alarm
connector, 3-10
interface, 3-10
specifications, A-8
system connectors, 3-10
view, 5-126
alarm relay
connector, 3-10
overview, 2-11
ASI output
front panel setup, 4-22
setting up, 5-96
specifications, A-7
audio input
front panel setup, 4-14, 4-15, 4-19
audio rate, A-5
audio rates, A-5

C

clock synchronization
setting up, 5-133
component input
specifications, A-3
connectors
alarm system, 3-10
ASI outputs, 3-13
contact control, 3-9
HD-SDI input, 3-7
macro, 3-9
management, 3-11, 3-12, 3-13
SMPTE 292M, 3-7
video input, 3-7
contact control
connector, 3-9
pin allocation, 3-9

D

default video rate
guidelines, 5-29
setting up, 5-27
delay
setting up PIP video, 5-39
setting up video, 5-20, 5-40
delay H264
setting up video, 5-22
device driver
version, 5-120
digital audio
connector, 3-8
front panel setup, 4-14, 4-15
Dolby Digital
front panel setup, 4-17
front panel setup, audio, 4-16, 4-19
installing option, 5-135
Dolby Digital audio
setting up, 5-53, 5-62
Dolby Digital audio encoding
specifications, A-5
Dolby Digital passthrough
overview, 2-8
DPI
setting up, 5-87
TS rate, B-10
Dynamic GOP, 5-14

E

embedded audio
front panel setup, 4-14, 4-15
specifications, A-5
EMC, -xiv
encoder setup
default video rate, 5-29
Ethernet interface
front panel setup, 4-24
overview, 2-11
specifications, A-8
ethernet interface
pin allocation, 3-11, 3-12

F

firmware upload, 6-2
front panel interface
specifications, A-8

G

GOP
dynamic, 5-14
length, 5-39
ground, -xiv
GUI version, 5-120

H

H264 video encoder
setting up delay, 5-22
HD-SDI
connector, 3-7

I

installing
Dolby Digital, 5-135
software options, 5-135, 5-137
IP address
setting from front panel, 4-24
IP streaming, 5-137, 5-138
IP streaming output
setting up, 5-98, 5-100

L

Layer II audio
channel information, 5-50
setting up, 5-44, 5-45
test tones, 5-51
layer II encoding
front panel setup, 4-15
overview, 2-7, 2-8
specifications, A-5
LEDs, 4-3, 6-3
linear audio encoding
specifications, A-6

M

macro
connector, 3-9
messages, 5-124
explanation, 6-4
setting up, 5-123, 5-124
viewing, 5-126
monitor
statmux, 5-35

O

online help, 5-11

P

pin allocation
alarm connector, 3-10
audio connector, 3-8
contact control, 3-9
Ethernet connector, 3-12
ethernet connector, 3-11
PIP
installing option, 5-135
pools
statmux, 5-30
power, -v, -xv
connecting AC, 3-4
specifications, A-9
pre-processor
setting up, 5-42
PreSightPlus
noise reduction, 2-3
sub-sampling, 2-3
product support, 7-2
PSI
setting up, 5-103, 5-104, 5-105

R

rate
Dolby Digital, 4-16, 4-19
front panel setup, audio, 4-14
front panel setup, video, 4-10
SDI input rate, A-3
statmux, 5-26
rates
ASI bit rate, A-7
specifications, audio, A-5
TS bit rate, A-7
redundancy
statmux, 5-32, 5-34
reference input
installation, 3-7
returning products, 7-4
ROSA
Device Configuration shell, 2-2
ROSA/Copernicus system, 2-10
Single-User system, 2-10

S

Safety, F-1, F-2, F-4
Safety Precautions, -vi
SDI
connector, 3-7
setting up, 5-12
specifications, A-3
setup
message parameters, 5-124
SMPTE 292M input
connector, 3-7
software
installing options, 5-135, 5-137
reading version, 5-120
system controller version, 5-120
software upload, 6-2
software version
device driver, 5-120
statistical multiplexing
default video rate, 5-29
monitoring, 5-35
network interface, 5-25
redundancy, 5-32, 5-34
setting the clock source, 5-31
setting up, 5-25
setting up pools, 5-30
setting up Quality of Service, 5-32
status signalling, 4-3, 6-3
subsampling, 4-11
system controller
version, 5-120
system interfaces
connectors, 3-10

T

trap destination
removing, 5-130
setting up, 5-128
TS rates
ASI/SPI, B-10
layer II audio, B-4, B-6, B-7, B-8
satellite interfaces, B-10
video, B-3

U

uploading software, 6-2

V

version
module, 5-131
video encoder
setting up delay, 5-20, 5-39, 5-40
video input
connector, 3-7
front panel setup, 4-9
setting up, 5-12
specifications, A-2

W

Web interface
log on, 5-6
summary screen, 5-8

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