CHAPTER 3

Cable DVB/DAVIC Management Program

This chapter describes how to use the Cable DVB/DAVIC Management Program to configure the Cisco DVB INA2320 and collect data from the connected cable modems. This chapter contains the following sections:

- Introduction
- Before You Start the Cable DVB/DAVIC Management Program
- Installing the Cable DVB/DAVIC Management Program
- Cable DVB/DAVIC Management Program
- Quick Connection to the Ethernet and the HFC network
- MIB File Descriptions

In the section MIB File Descriptions you find a description of the entire Management Information Base for the Cisco DVB INA2320.

Introduction

The Cisco DVB Interactive Network Adapter INA2320 is configured and supervised using a management program based on Simple Network Management Protocol (SNMP). This program is called the Cable DVB/DAVIC Management Program. Install the Cable DVB/DAVIC Management Program and the Management Information Base (MIB) file on the management station PC that is connected to the same Ethernet as the Cisco DVB INA2320. Using this program, you can get and set all parameters in the Cisco DVB INA2320.

The Cable DVB/DAVIC Management Program and the MIB file for the INA are included in the delivery of the Cisco DVB INA2320. The Cable DVB/DAVIC Management Program runs under the Windows NT 4.0 operating system.

Management Software Sections

In the Cable DVB/DAVIC Management Program, you have access to the following parts of the Interactive Network Adapter:

- System configuration and software
- Log messages
- Connections
- Modem configuration

- Modulator and Demodulator setup (In-band and Out-of-band setup)
- MAC protocol information
- IP, NAT and multicast configuration
- RADIUS authentication and accounting
- IP routing and IP filtering
- Quality of service
- DSMCC, PID value

For more detailed information how to install and use the Cable DVB/DAVIC Management Program, see the "Installing the Cable DVB/DAVIC Management Program" section on page 3-4.

Modem Status Information

For each connected modem the Cisco DVB INA2320 performs the following functions:

- Noise level estimate
- Frequency estimate
- Power level offset
- Timing offset

The results are displayed in a modem table. The cable modem is identified by its MAC address.

Data Traffic Monitoring

Using the Cable DVB/DAVIC Management Program you can monitor the data traffic for all connections for each cable modem and the data traffic at the Ethernet interface of the Cisco DVB INA2320. The Cisco DVBINA2320 displays the values for the number of bytes sent to and received from each modem. It also displays the number of bytes sent to the backbone on a given connection. For further details see the "Connection Details" section on page 3-19.

SNMP Agent and Client

The Cisco DVB INA2320 has an SNMP agent. This SNMP agent communicates with the SNMP client, which is a part of the Cable DVB/DAVIC Management Program. The Cable DVB/DAVIC Management Program is a Windows application.

RADIUS Client for Authentication and Accounting

The Cisco DVB INA2320 operates as a RADIUS client and is responsible for passing authentication and accounting information from the connected cable modems or set-top boxes to the RADIUS servers.

Access Rights

The Cable DVB/DAVIC Management Program supports two different user access levels:

- Read-only community
- Read and write community

Specify individual passwords for read-only and for read and write.

Save and Load Cisco DVB INA2320 Configuration Data

When connected to the Cisco DVB INA2320, you can save the current INA configuration in a file as a backup or for cloning other Cisco DVB INA2320s. Load the configuration file again when needed or use it for another Cisco DVB INA2320, which needs identical unit settings.

Log Function for Monitoring

The software includes a log function where you can recall the latest messages stored in the Cisco DVB INA2320. The messages can be displayed on the screen and are useful when troubleshooting the unit. For further information on the log function, go to the "INA Log Function" section on page 3-18.

Network Management PC and FTP Server

The Cable DVB/DAVIC Management Program is installed on the network management PC. This PC can also be configured as an FTP server and can be used for downloading the INA software into the Cisco DVB INA2320. For further information how to set up the management PC as an FTP server, refer to Appendix C, "FTP Server Setup (Microsoft WIN NT4.0)."

Integration in Third Party Management Systems

The Cisco DVB INA2320 supports SNMP v2c. As the MIB file is compliant to SNMP v1, the management of the Cisco DVB INA2320 and the connected cable modems can thus be integrated into existing management systems. The Cisco DVB INA2320 MIB file contains all the necessary information including the available commands and the valid parameter ranges.

The Cisco DVB INA2320 MIB file is included in the delivery.

Before You Start the Cable DVB/DAVIC Management Program

Check that you have the following items:

- Supplied CD-ROM containing the following items:
  - Installation files for Interactive Network Adapter
  - Cable DVB/DAVIC Management Program
  - Release Notes

PC Requirements for the Cable DVB/DAVIC Management Program

The PC requirements for the management station to run the Cable DVB/DAVIC Management Program are

- Pentium class PC
- Minimum 32 MB of RAM
- CD-ROM drive
- Windows NT 4.0
- Standard Ethernet network adapter

Note   The PC for the management station can be the same as the one for the FTP service.

Installing the Cable DVB/DAVIC Management Program

You need the Cable DVB/DAVIC Management Program to configure the Cisco DVB INA2320 and control modem connections. The supplied CD-ROM contains the files necessary to install the Cable DVB/DAVIC Management Program. The files for the Cable DVB/DAVIC Management Program are in the directory /MS.

To install the software:

Step 1   Insert the supplied CD-ROM in the CD-ROM drive of the management station PC.

Step 2   Click **Start**.

Step 3   Click **Run**.

Step 4   Browse to /MS/**setup.exe** on the supplied CD-ROM.

Step 5   Click **OK**.

Step 6   Follow the instructions on the screen.

During the installation process, you can change the destination directory for the files. You can also select where the program icon is added to the Program folder.

Having installed the Cable DVB/DAVIC Management Program successfully, the software is added to the list of programs in the Start / Programs menu in Windows.

Note   Make sure that the PC with the Cable DVB/DAVIC Management Program has access to the Ethernet interface of the Cisco DVB INA2320.

Uninstalling the Cable DVB/DAVIC Management Program

If you want to remove the Cable DVB/DAVIC Management Program from the network management PC again, use the Uninstall function to remove all the relevant files from the system.

To uninstall the Cable DVB/DAVIC Management Program:

Step 1   Click **Start**>**Settings**>**Control Panel**.

Step 2   Double-click **Add/Remove Programs**.

Step 3   Click **Cable DVB/DAVIC Management Program**.

Step 4   Click **Add/Remove**.

Cable DVB/DAVIC Management Program

Navigation

The Cable DVB/DAVIC Management Program is displayed in a tree structure and looks very similar to a common MIB and file browser application. In the menu line, there are general commands you need to start a connection to the INA and the path to the MIB file. You can set the program to display the MIB variables in a text converted or a MIB type display. The following sections in this manual show the variables in the text converted display.

The Cable DVB/DAVIC Management Program is made in the same modular structure as the INA, the commands are grouped according to their functionality. To find the setting you want to view or change, scroll to the respective section of the MIB file. Then click on the parameter you want to view or configure. Set the parameter to the desired value and send it to the Cisco DVB INA2320.

The following windows are available:

- Top window displaying the INAs you have set up.
- Lower left window displaying the expandable MIB tree structure with all the section of the MIB file.
- Lower right window displaying the variables available for the selected MIB tree branch.
- Properties window that contains the information and valid settings on a given parameter selected. When the fields in the Properties windows are grey, the field is a read-only field. If the fields appear white, you can enter or select values.

Click on the MIB section that you want to read and/or edit. You can resize the window to your specific needs by pointing the cursor on the edge and dragging until the window is the required size.

Menus in the Cable DVB/DAVIC Management Program

The following menus are available in the Cable DVB/DAVIC Management Program:

- **File**—Contains the **Exit** function.
- **Network Devices**—Contains a menu item **New** to use when connecting to a new INA and the possibility to switch to the next and previous established connections.
- **Values**—Get the values from the connected units and save to file and load from file, you can also hide the **Properties** window here.
- **Table**—Create and delete modem configuration tables.
- **Options**—Load, save, add and remove MIB files, you can also select how to display the MIB labels and select the SNMP version. You can save the network devices on exit.
- **View**—Hide and display the Toolbar and the Status Bar.
- **Help**—View the version of the Cable DVB/DAVIC Management Program.

Tables With Detailed Information

In all the sections of the MIB that are marked with a plus sign you can display more detailed information. You find a sub menu called Tables, click on one of the entries to display the additional information on this connection. This listing in the right window contains further information tables with configuration and statistics data.

User Entry Hints in the Properties Window

For each field or command available, the help text in the **Properties** window provides descriptive information about the parameter and the valid parameter range, if applicable. (See Figure 3-1.)

Figure 3-1   Example of the Properties Window
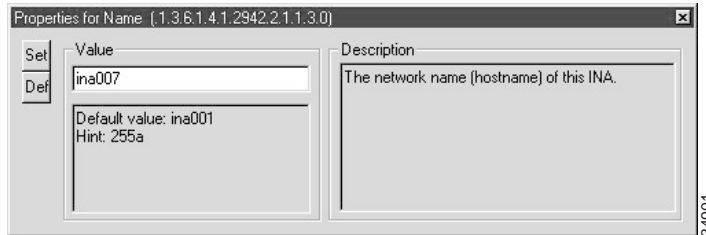
The following table gives a short description of the hints which are given in the Properties window in which format you need to enter the data.

Hint	Description
1x	This hint represents media- or physical-level addresses, a MAC address defined by IEEE 802.1a. enter the data in hexadecimal format.
255a	This hint represents that the syntax may not exceed 255 characters in length

Note   **Active after Reboot:** If this is mentioned in the description of a command, the new setting will first be available in the INA2320 after a reboot has been performed and the INA is fully operational again.

The management software does not poll the Cisco DVB INA 2320 at regular intervals, the user requests the settings using the management software.

Connecting to the Cisco DVB INA2320

To start the Cable DVB/DAVIC Management Program and connect to a Cisco DVB INA2320:

Step 1   Start your PC and the Windows application.

Step 2   Click **Start**.

Step 3   Click **Programs**.

Step 4   Select **Cable DVB/DAVIC Management Program** and click on the application.

The fields are empty, because there is no connection established to the Interactive Network Adapter.

Step 5   Address the Cisco DVB INA2320 via the Ethernet interface by using the IP address of the Ethernet interface of the Cisco DVB INA2320.

First Connection to the INA2320

Before you can configure a Cisco DVB INA2320, the INA must be powered up. Then you have to establish a connection to the Cisco DVB INA2320.

The first time you establish a connection to the Cisco DVB INA2320 you must use the default IP address and default netmask and gateway values. When you have connected to the Cisco DVB INA2320 using the its default settings change the IP address, netmask and gateway to your specific settings.

Note   The Cisco DVB INA2320 might have been set to different values than the default values.

To get a first-time connection to the Cisco DVB INA2320 follow the instructions:

- Start the Cable DVB/DAVIC Management Program.
- Power up the INA2320, see the "Powering On and Booting" section on page 2-8.

  You can start the INA2320 for the first time in two different ways:

  - Start the INA from Flash memory, it powers up with all default settings.
  - Use an FTP server to start the Cisco DVB INA2320 from the network. The FTP server connection to the INA is described step-by-step in Appendix C, "FTP Server Setup (Microsoft WIN NT4.0)."

Connecting to the Cisco DVB INA2320 Using the Cable DVB/DAVIC Management Program

To use the Cable DVB/DAVIC Management Program:

Step 1   Check that the INA started correctly. All LEDs must show green, then the INA has completed the power up process.

The Cisco DVB INA2320 starts up using software in its Flash memory or by downloading the INA software from a connected FTP server.

Note   If the INA2320 is to be started from an FTP server, ensure that the FTP server setup has the correct path and file name and that the INA software files to be downloaded are in the correct directory on the FTP server. There is a step-by-step procedure for the installation of an FTP server in Appendix C, "FTP Server Setup (Microsoft WIN NT4.0)."

Step 2   In the menu **Network Devices**, select **New**.

Step 3   The **New Network Device** window appears.

Step 4   Enter the name of the Cisco DVB INA2320 in the **Name** field.

Step 5   Enter the **IP Address** of the Ethernet interface of the Cisco DVB INA2320. The default IP address of the INA after the first power on is 192.168.1.1.

Step 6   Enter the **Community** password.

There are two user security levels available:

- Read community—Read the current INA settings, the default password is public.
- Write community—Read and change the current INA settings, the default password is private.

> **Note** Public and private are default access passwords in the SNMP standard. Cisco recommends changing the default passwords to secure the INA from being reconfigured accidentally.

Step 7 Click **OK**.

Step 8 Having established the connection, you can change the IP address from the Cable DVB/DAVIC Management Program. For instructions on how to proceed, see the "INA System" section on page 3-13.

Step 9 Click the **Values** menu and select **Get all**.

The PC contacts the INA, in the status bar the text `Working` is displayed, the INA sends the requested data to the management PC. All the current INA settings are available in the Cable DVB/DAVIC Management Program now.

To Read and Write Settings

To Read the INA Settings

To read the INA settings:

Step 1 Click the INA in the top window.

Step 2 Click on the **Values** menu.

   a. Click **Get** to get the current setting for a single section or table. The keyboard shortcut for **Get** is F4.

   b. Click **Get All** to get all the current settings from the Cisco DVB INA2320. The keyboard shortcut for **Get All** is F5.

Step 3 To retrieve a specific parameter, click on the section that holds the parameter.

Step 4 Click on the parameter.

Step 5 Click **Values** and then **Get** to retrieve the current value for this parameter from the Cisco DVB INA2320.

The INA sends its settings to the management PC each time you request them via the Cable DVB/DAVIC Management Program.

To Write INA Settings

To write a new value into the Cisco DVB INA2320:

Step 1 Make sure that you have write access. If you have read only access, change the community password.

Step 2 In the **Community** field enter the write password, the default write password is "private."

Step 3 Click **Values**, then **Get All.**

Step 4 Click on the section for the parameter to be changed.

Step 5 Click on the parameter to be changed.

Step 6 In the **Properties** window, type in the new value for the parameter.

Step 7 Click **Set** in the **Properties** window.

As soon as you click **Set**, the new value is sent to the INA. If you do not click **Set**, the new setting is not sent to the Cisco DVB INA2320.

Note For many commands, the Cisco DVB INA2320 must perform a reboot before the requested changes become active. When a reboot is necessary to effectuate the configuration changes, it is indicated in the description of the affected command.

To Save and Load an INA2320 Configuration

To Save the INA2320 Configuration in a File

For service purposes it is very useful that you can save the configuration settings of a unit in a file. The configuration file can then be sent to your support centre for analysis purposes or for later reference.

To save the INA configuration data:

Step 1 Click the **Values** menu.

Step 2 Click **Save to file...**.

Step 3 Select the destination of the settings file on the PC.

Step 4 Edit the file name and directory, if needed.

Step 5 Click **Save**.

The status line shows `Working`. When the status line displays "OK," the saving process is finished.

To Load the INA2320 Configuration from a File

If you need to reload a specific INA configuration for cloning a Cisco DVB INA2320 or to   load the settings into a replacement unit, you can load a stored configuration file from the PC into the Cisco DVB INA2320. This feature is useful if the unit has been serviced and taken out of operation and you want to reconfigure it to the settings it had previously.

To load the INA configuration data:

Step 1 Click on the menu **Values**.

Step 2 Click on **Load from file...**

Step 3   Scroll to the file you want to load and select it.

Step 4   Click **Open**.

The status line shows "Working." When the status line displays "OK," the loading process is finished.

Help Function and Exit

Help Function

When you click on the menu Help a window is displayed containing information about the version number of the Cable DVB/DAVIC Management Program. Help information for the single parameters is displayed in the **Properties** window, that contains information of the type:

- Valid range for the parameter in question
- Default value for the parameter
- General description and explanation for the parameter

The **Properties** window is displayed when you select a specific parameter in a branch of the MIB tree.
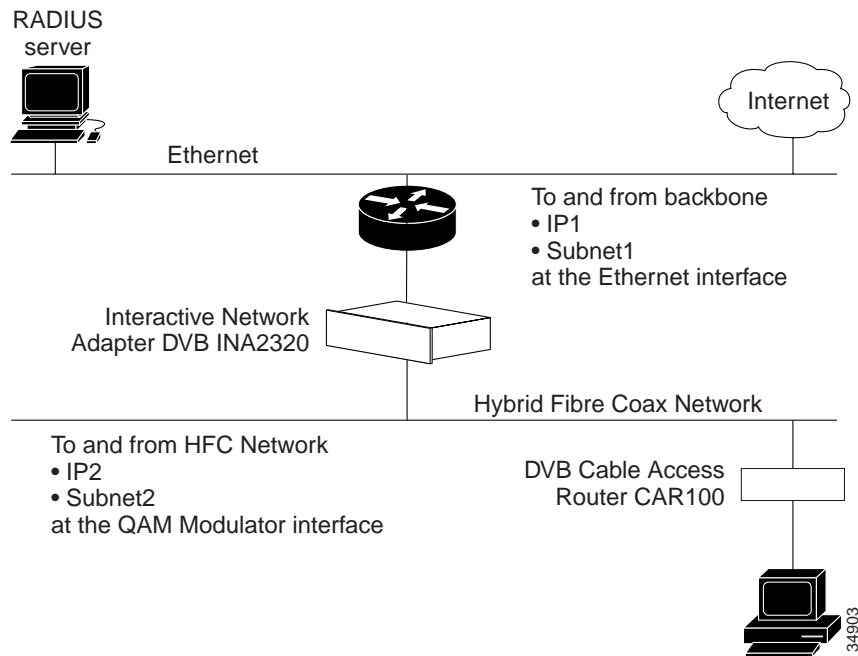
To Exit the Cable DVB/DAVIC Management Program

If you want to leave the Cable DVB/DAVIC Management Program:

Step 1   Click on the **File** menu.

Step 2   Click **Exit** to leave the Cable DVB/DAVIC Management Program.

Quick Connection to the Ethernet and the HFC network

To set up the Ethernet and the HFC interfaces of the Cisco DVB INA2320 to the Ethernet and to the HFC network, specify the address parameters for both interfaces. (See Figure 3-2.)

Figure 3-2 Ethernet and HFC Interfaces of the Cisco DVB INA2320

To make a quick configuration of the Cisco DVB INA2320:

Step 1 Start the Cable DVB/DAVIC Management Program.

Step 2 Address the INA you want to configure by typing in the IP address of the Ethernet interface IP address of the Cisco DVB INA2320.

Step 3 By default, the MIB tree is expanded to display **Private, INA**, **Objects,** then the sub menus to configure the **INA** are displayed.

Step 4 To configure the Ethernet interface IP address, go to the **System** section.

Step 5 Enter the new values for:

   a. **IP Address**, this is the new IP address of the Ethernet interface of the Cisco DVB INA2320.

   b. New value for **Netmask**, this is the subnet mask of the Ethernet interface of the Cisco DVB INA2320.

   c. New value for **Gateway**, this is the default gateway on the Ethernet, to forward IP addresses which are not in the same subnet.

Step 6 Set the downstream modulation frequency.

Step 7 Set the modulation type, if necessary.

Step 8 To configure the connection to the HFC network, go to the **Routing** section.

Step 9 Click **Subnet Table**. The subnets available route the traffic to the cable modems connected to this subnet. The entries in the Subnet Table ware the IP addresses of the Cisco DVB INA2320 at the HFC Interface. There are 32 subnet entries available, that is 32 IP addresses at the HFC interface of the Cisco DVB INA2320.

Step 10 Double-click on a subnet table entry and click **IP Address**.

Step 11   Enter the correct value for the subnet IP address and, if necessary, the Prefix length.

Tips   Set the date and time in the Cisco DVB INA2320 after start-up. This is necessary for identifying the log messages. Go to the section "System" in the Cable DVB/DAVIC Management Program.

MIB File Descriptions

The following paragraphs guide you through all parameter sections the Cable DVB/DAVIC Management Program describing the following sections:

- INA System
- INA Software
- INA Log Function
- INA Connection
- Modem Information Tables
- INA Modulator Setup
- INA Demodulator Setup
- INA MAC
- IP Details, NAT and Multicast
- RADIUS Authentication and Accounting
- IP Frame Routing
- Quality of Service
- DSM-CC and PID Value

All parameters available in the Cisco DVB INA2320 are described in this chapter.

INA System

In the section INA System you find the current MIB version in the INA and the INA serial number, addresses and password fields. In this section you reboot the Interactive Network Adapter.

The following table lists the INA identification fields and the reboot parameters:

Parameter	Description
ina Mib Version	This field shows the current MIB file version used by the INA. Read-only field

Reset Now	This field can have the states **defaultValues**, **reboot** or **ready**.
	
	 To perform a reboot:
	
	 • Click on the arrow to display the drop-down list.
	
	 • Reboot makes the INA restart, the INA returns to the last saved settings
	
	 • Default values makes the INA restart, the configuration is set to the default values except the following parameters:
	
	    – INA Name
	    – IPAddress
	    – Netmask
	    – Gateway
	    – Sw Path
	    – Sw User ID
	    – Sw Password
	    – Sw Boot Device

Name	Enter the identification of the INA in the network in this field. To change the name: • Enter the new identification (max. 13 characters). • Click **Set**. This name is used for naming the configuration files.
IP Address	Set the IP address of the Ethernet connection of the INA in this field. To change the Ethernet interface IP address: • Enter the new value for the IP address. • Click **Set**. The Ethernet interface IP address and the gateway must be in the same subnet. Active after INA reboot.
Netmask	Change the netmask of the INA Ethernet interface in this field. To change the netmask: • Enter the new value for the netmask. • Click **Set**. Active after INA reboot.

Parameter	Description
Gateway	Change the gateway of the INA Ethernet interface in this field. To change the gateway: • Enter the new value for the gateway. • Click **Set**. If there is no gateway, set the value to the same as set in the INA boot server (FTP server) in the section INA Software. If the data is to be sent to an address in the same subnet, the data is not sent to the Gateway. Active after INA reboot.
Reset Count	The number indicates how often a reboot has been performed since the INA left the factory. (Read-only field.)
Read Community	This is the password for read access to SNMP objects in the Cisco DVB INA2320. It allows access by Get and get-next PDUs. To change the password, type in the new password. The password length must be in the range of 0 to 128 characters. **Note** Write down the new password. There is currently no confirmation on the entry or reset to a default value.
Write Community	This is the password for write access to SNMP objects in the INA. It allows access by set, get and get-next PDUs. To change the password, type in the new password. The password length must be in the range of 0 to 128 characters. **Note** Write down the new password. There is currently no confirmation on the entry or reset to a default value.
Date	This field shows the current date of the INA. Set the date by entering a new value. The date format is YYYY/MM/DD. The length is 10 characters.
Time	This field shows the current time of the INA. You can set the time by entering a new value. The time format is hh/mm/ss. The length is 8 characters.

Parameter	Description
System Error Reset	Possible states: • Enable: this starts the system watchdog and causes the Cisco DVB INA2320 to reboot if any system error occurs. • Disable: disables the system watchdog (default value).
Software Error Reset	Possible states: • Enable—This causes the Cisco DVB INA2320 to reboot if any fatal software errors occur. • Disable—Disables the reboot function if any fatal software errors occur (default value).

INA Software

In this section of the Cable DVB/DAVIC Management Program, you set software upgrade parameters and boot device. To find the INA software files when booting from an FTP server, the INA needs the IP address and the path where it can find the INA software files for down-load. The FTP Server is a server running an FTP server application where the INA configuration files and programs are located. The INA needs to load these files during power-up when the INA is set to power-up from network.

The following table describes the fields available in the section INA Software of the Cable DVB/DAVIC Management Program. The first five fields are only of interest, if the INA is booted from a connected FTP server on the network.

In the field Boot Device you set the software boot device, that is whether the INA starts to load its software from an FTP server on the network or from its Flash memory.

Parameter	Description
Server	This field shows the IP address of the FTP server used for software upgrades and downloading INA settings. The FTP server must either be in the same subnet as the INA IP address on the Ethernet connection (backbone) or can be accessed via a gateway. Active after INA reboot.
Path	This field shows the FTP path where all INA software files are located. Length: 0 to 128 characters Default value: ina/ **Note** Make sure that this path is correct and points to the INA software files on the FTP server.

Parameter	Description
Admin Status	In this field you can force the INA to read INA software from a connected FTP server and load the upgraded software into the flash memory. This feature is used for software upgrade purposes. To perform a Software upgrade, click on **upgradeFromMgt**. This field has the following values: • **ignoreSwUpgrade**—This state is automatically set after a successful software download into the INA. • **allowSwUpgrade**—(default value). • **upgradeFromMgt**—The INA initiates immediately a software download from the connected FTP server using the path specified above. Note Before you select upgradeFromMgt check that the Boot Device in this section is set to flash. Note When the software upgrade is finished, this field displays **ignoreSwUpgrade**. Performing a software upgrade takes a long time. Approximately 2 MB data are downloaded into the INA Flash memory. Wait until this field shows **ignoreSwUpgrade.** Caution Do not disconnect power during software upgrade! If you set the INA to boot from flash and the flash image is corrupt or wrong, it will boot from the FTP server.
User ID	This is the user identification for the FTP server, which the INA uses to access the FTP server. Length: 0 to 64 characters Default value: ina
Password	This is the password the INA uses to access the FTP server. Length: 0 to 64 characters Default value: ina
Boot Device	This field shows the different methods of booting the INA. Change the INA boot setting if necessary: **flash0**: The INA boots from the INA Flash memory. **network**: The INA boots using an FTP server containing the software files, and connected to the Ethernet (default). Active after INA reboot.
Bios	Shows the INA BIOS revision number.

Parameter	Description
System Version	Shows the version number of the current INA software.
Flash Version	Shows the version of the system saved in flash.

INA Log Function

The log function provides information on each event in the INA2320 that has been logged. The newest log message is displayed on top of the log table. The number of log entries in the log table is the difference between the number shown at **End Index** and the number shown at **Begin Index**.

To reset and clear the log table:

Step 1   Click **Log.**

Step 2   Select and click **Reset**.

Step 3   Change the setting from **Ready** to **Reset** to clear the log table. The index number is not reset to 1, it continues to number the log entries.

To display the INA log table:

Step 1   In the Cable DVB/DAVIC Management Program, go to the section **Log** and click on the + sign to expand the section.

Step 2   Click **Log Table**.

Step 3   The Log Table appears in the right window.

Step 4   You can double-click on a log entry to display this log entry only.

The event log contains the following columns:

Column	Description
Index	Shows the running number of the log messages.
Time	Shows the time of the log message.
Description	Shows the time when the event happened, the error code and a descriptive text. For the software version implementation dependent description of the log event see Appendix D, "Log Message Overview" for a list of the codes and their description.

If you save the settings to a file, the log messages will be saved in this text file. The maximum size for the log file is 0.5 Mbyte, the file is kept in the flash memory. If the log message queue is full, the oldest log messages will be discarded.

INA Connection

This section of the Cable DVB/DAVIC Management Program is used for service purposes.

The first field sets the maximum number of concurrent open connections for this specific INA and the table of connections currently in use. The valid range is 1000 to 8192, the default value is 8192. The field Active Count shows how many connections are currently established by the INA to connected modems.

Connection Details

You can see more details for a specific connection in a Connection Table. To display a specific Connection Table do the following:

Step 1   Click **Connections** and click on the + sign to expand the branch. Two tables become available:

– Active VCs Table

– Stat Table

Step 2   Click **Active VCs Table**, the current connections for each downstream are displayed in the right window.

Step 3   Click **Stat Table**, a list of the current connections is displayed in the right window.

Step 4   Double-click on the connection you want details on.

The connections are listed in number order. After you have displayed a connection, you can recognize a cable modem by means of the displayed cable modem MAC address. Each connection provides the columns listed in the table below.

The following table shows the fields available for a selected connection. All fields in a connection table are read-only fields.

Stat Table

Connection Field	Description
Index	Virtual circuit identifier, number of the virtual connection, this is the virtual circuit number for the connection (Vpi:Vci)
	For each INA there is one connection for broadcast MAC messages, one for MAC control messages and one for each connected cable modem.
VPI	Virtual Path Identifier, Identification of the Virtual Circuit is made of VPI:VCI.
VCI	Virtual Circuit Identifier, Identification of the Virtual Circuit is made of VPI:VCI.
Mac Address	Shows the modem MAC address of modem of this connection
Create Time	Shows the time when the connection was established
DS Bytes	Number of downstream bytes sent by the INA to the modem on this connection since the last reboot

Connection Field	Description
US Bytes	Shows the number of transmitted upstream bytes on this connection from the modem to the INA since the last reboot
From Backbone Bytes	Shows the number of bytes received from the backbone on this connection and sent from the INA to the modem.
To Backbone Bytes	Shows the number of bytes sent to the backbone on this connection and sent from the modem to the INA.
Multi Up Bytes	Number of bytes containing multicast messages sent upstream
DS Channel No	Shows the number of the downstream channel to which this Vc is related to.

Modem Information Tables

In this section, you can configure each of the connected cable modems and set the type of authentication for all connected modems. For each configured modem, you can set whether the modem should use authentication or not. You can also display details on each active modem connected to the Cisco DVB INA2320.

The following tables are available in the section **Modem**:

- Modem Table, one table for each configured cable modem

- Status Table, one table for each active cable modem

- MAC Status Table, one table for each active cable modem

In these tables you can display detailed information for each cable modem that is signed on. For each modem connection you can display a statistics table and a MAC statistics table. These two tables read out data from the connected cable modem and display it in the Cable DVB/DAVIC Management Program. All the parameters listed in modem tables are described in the following paragraph.

You can configure each new modem being added to the Cisco DVB INA2320, for further details on this procedure, see the "To Create a New Cable Modem or Set-Top-Box Configuration" section on page 3-21. During a sign-on procedure, the cable modem sends its MAC address to the Cisco DVB INA2320.

The parameters are available in the section **Modem**:

Parameter	Description
Statistics Update	Set in this field the time interval in milliseconds between the INA updates the modem statistics counter. The valid range is 10000 to 300000 ms. The default value is 60000 ms.
Authentication Required	Select one of the following values: - radius, see also "RADIUS Authentication and Accounting" section on page 3-46 - ina, then you need to configure each cable modem. - none (default value) Set in this field whether modems have to be configured from the INA to be allowed to sign on, whether they should use RADIUS authentication or whether modems just can sign on without fulfilling any conditions. Active after INA reboot.

Parameter	Description
Max Modems	This item shows the maximum number of modems that can be connected to the INA simultaneously. The valid range is 250 to 2000. Default value: 2000 Active after INA reboot.
Configured Modems	This item shows the number of modems currently configured by the INA.
Active Count	This item shows the number of modems currently active, they are physically connected to the INA and currently signed on (connected at MAC level).

To Create a New Cable Modem or Set-Top-Box Configuration

You can configure a cable modem or a Set-Top Box by entering data in a configuration table and saving it. The configuration data are only applicable for the specific cable modem or Set-Top-Box.

You use the cable modem or STB configurations for the following reasons:

- When using INA authentication
- When applying Quality of Service levels for specific cable modems or STBs
- When working with fixed IP addresses for the cable modems or STBs

When using INA authentication, you have to enter configuration data for all cable modems or STBs connected to the Interactive Network Adapter. If you do not configure a cable modem or STB, the unit cannot sign on.

The data is stored in an internal database and validated each time a configured unit tries to sign on to the network.

Note All modems which use a defined Quality of Service level must be configured in a modem configuration table. Modems which are not configured will use automatically the Quality of Service index 1, for further details on assigning Quality of Service levels see Quality of Service Entry, page 3-54. The QoS index 1 is the default value which is assigned to all modems that are not configured.

To configure a new cable modem or STB connected to the Cisco DVB INA2320:

Step 1 In the menu, click **Tables**.

Step 2 Click **New Entry**. A new window with the title **Select Table** appears with the following selections:

- inaMdTable
- inaIpEncapTable

Step 3 To create a new cable modem configuration, click **inaMdTable**, then **Select**. The window title changes to **Create Table Entry**, configure the following parameters:

Table 3-1   Create a Cable Modem Configuration

Parameter	Description
MAC Address	Click on **MAC Address** to enter the MAC address of the modem, finish by clicking **OK**.
	The modem MAC address is a unique value that identifies the modem to which this entry is applicable. Enter the MAC address in hexadecimal form.
	Example: 00.10.FD.00.04.3E
	Note You must enter the MAC address, you cannot go further with the configuration without a MAC address. Click **Cancel** to leave the table **Create Table Entry**.
Disabled	Use this field to stop the modem from accessing the network, if no authentication is selected. Identify the modem by using its MAC address.
	To disable this specific cable modem, set **Disabled** to **True**. This setting disables the modem from sign on (default value), the modem cannot sign on. Use this setting to stop modem traffic on a specific modem.
	To enable this specific cable modem set **Disabled** to **False**. This setting enables the modem to sign on, the modem can sign on at any time, even if **Authentication** is set to **none**.
	Note If **Disabled** is set to **True**, the modem is disabled and cannot sign on to the network.
Demodulator	In this file you can set which demodulator the configured cable modem should use. When set to 0, the INA will decide which demodulator the cable modem should use.
	Valid range: 0, 1, 2
	Default: 0
Channel	In this field, you can force a cable modem to use a specified upstream channel. This is an optional setting.
	During sign-on, the cable modem uses a service channel to sign on to the network. After successful sign-on, it moves the upstream communication to the specified upstream channel. The service channel and the backup service channel are the first two upstream channels in the Demodulator module.
	As a default setting the Cisco DVB INA2320 controls for all cable modems which upstream channels the cable modems should use.
QoS Index	In this field you can set the quality of service index entry that is used for this modem configuration, for further details see the "Quality of Service" section on page 3-53. The default value of the QoS level is 1.

Parameter	Description
IP Address	If a DHCP server is not a chosen option by the service provider for automatic IP addressing, the INA can be informed about the modem IP address.
	Note The Cisco DVB INA2320 cannot assign IP addresses. It can relay DHCP messages and can handle statically configured IP addresses of cable modems.
	In the field **IP Address** you enter a static IP address of the cable modem. This is the IP address which the cable modem uses to sign on to the INA.
	Only use this field when you are not using a BootP or DHCP server for automatic assignment of modem addresses.
Permanent	Set to true(1) if the cable modem entry is permanent.
	Default value: true

Step 4   To create a Set-Top-Box configuration, click **inaIpEncapTable**, then **Select**. The window title changes to **Create Table Entry**, configure the following parameters:

Table 3-2   Create a Set-Top-Box Configuration

Parameter	Description
IP Address	Click on **IPAddress** to enter the IP address of the Set-Top-Box, finish by clicking **OK**.
MAC Address	Click on **MAC Address** to enter the MAC address of the Set-Top-Box, finish by clicking **OK**.
	The STB MAC address is a unique value that identifies the STB to which this entry is applicable. Enter the MAC address in hexadecimal form.
	`Example: 00:10:FD:00:04:3E`
	Note You must enter the MAC address, you cannot go further with the configuration without a MAC address. Click **Cancel** to leave the table **Create Table Entry**.
PID	Enter the PID (Packet IDentifer) number of the IP encapsulation entry. Enter zero to use the inaDsmccPid.
	Valid range: 0 or 16 to 8190
	Default value: 0

Modem Connection Details

For each cable modem connection you can display tables containing general information and information for service purposes. You can display the following two table types:

- Modem Statistics Table containing statistics data
- Modem Mac Table containing specific MAC data

The data readout from the modem is valuable when the modem is not functioning properly.

Modem Table for Configured Cable Modems

For each configured cable modem you can display the parameters for this modem. To display a modem table:

Step 1 Double-click on or expand the **Modem** section.

Step 2 Click **Modem Table.**

Step 3 Click on the connection for which you want to display the modem table. The Index is the MAC address of the cable modem.

Step 4 A list of parameters is displayed. Click on the parameter you want to change or view.

The following table describes the parameters available

.

Parameter	Description
Row Status	The row status available are: • destroy—delete this cable modem entry • createAndWait (currently not supported) • createAndGo—this creates a new cable modem table • notReady • notInservice (currently not supported) • active—this shows the table containing configuration data for a specific cable modem is active. This software version can only support *createAndGo*, *destroy* and *active*.
MAC Address	Click on MAC Address to view the MAC address of the modem. The modem MAC address is a unique value that identifies the modem to which this entry is applicable. Enter the MAC address in hexadecimal form. `Example: 00.10.FD.00.04.3E`
Disabled	Use this field to stop the modem from accessing the network. Identify the modem by using its MAC address. To disable this specific cable modem, set **Disabled** to **True**. This setting disables the modem from sign on (default value), the modem cannot sign on. Use this setting to stop modem traffic on a specific modem. To enable this specific cable modem set **Disabled** to **False**. This setting enables the modem to sign on, the modem can sign on at any time, even if **Authentication** is set to **none**. **Note** If **Disabled** is set to **True**, the modem is disabled and cannot sign on to the network.
Demodulator	In this file you can set which demodulator the configured cable modem should use. When set to 0, the INA will decide which demodulator the cable modem should use. Valid range: 0, 1, 2 Default: 0
Channel	In this field, you can force a cable modem to use a specified upstream channel. This is an optional setting. During sign-on, the cable modem uses a service channel to sign on to the network. After successful sign-on, it moves the upstream communication to the specified upstream channel. The service channel and the backup service channel are the first two upstream channels in the Demodulator module. As a default setting the Cisco DVB INA2320 controls for all cable modems which upstream channels the cable modems should use.

Parameter	Description
QoS Index	In this field you can set the quality of service index entry that is used for this modem configuration, for further details see the "Quality of Service" section on page 3-53. The default value of the QoS level is 1.
IP Address	If a DHCP server is not a chosen option by the service provider for automatic IP addressing, the INA can be informed about the modem IP address. **Note** The Cisco DVB INA2320 cannot assign IP addresses. It can relay DHCP messages and can handle statically configured IP addresses of cable modems. In the field **IP Address** you enter a static IP address of the cable modem. This is the IP address which the cable modem uses to sign on to the INA. Only use this field when you are not using a BootP or DHCP server for automatic assignment of modem addresses.

Status Table for Each Cable Modem Connection

The status table for a cable modem connection contains information on a cable connection seen from the INA. To display a cable modem status table:

Step 1 Double-click on or expand the **Modem** section.

Step 2 Click **Status Table**.

All cable modem connections for this Interactive Network Adapter are listed.

Step 3 If necessary, use the scroll bar to select the cable modem you want to see details on.

Step 4 Double-click on the cable modem. The window content is updated and a list of parameters available is displayed containing the status table for this cable modem.

The following table shows the fields in the Modem Status Table (read-only fields)

:

Parameter	Description
Index	Shows the MAC address in decimal format
Sign On Time	Shows the date and time when the modem has signed on
MAC Address	Shows the MAC address of the modem. This value is unique and identifies the modem to which this entry is applicable.
On Time	Shows the time the modem is connected and has received or sent data, in seconds.
Off Time	Shows the time the modem has been connected without sending or receiving data (MAC layer).
Demodulator	This field shows the number of the Demodulator module by the modem. • 1—left Demodulator module • 2—right Demodulator module
Channel	Number of the upstream channel used by this modem. • 0—channel 1 • 1—channel 2 • 2—channel 3 • 3—channel 4
Downstream Bytes	Number of bytes sent from the INA to the modem
Upstream Bytes	Number of bytes sent from the modem to the INA including backbone, modem-to-modem and broadcast and multicast traffic.
To Backbone Bytes	Number of bytes sent from the modem to the backbone—this contains only the backbone traffic.
From Backbone	Number of bytes sent from the backbone to the modem—this contains only the backbone traffic.
Multi Up Bytes	Number of bytes for control messages, sent from the modem to the INA—this contains only the traffic for broadcast and multicast traffic.

Parameter	Description
Current VC Count	Number of connections used by the modem.
Authenticated	This field shows whether the modem has been authenticated by the INA or RADIUS. • 0—not authenticated • 1—Authenticated by INA or RADIUS

Modem MAC Status Table

The information in the MAC Status Table is useful for network monitoring purposes and preventive maintenance. It gives information about the cable modem seen from the modem side. By reading out the MAC data from each connected cable modem you can monitor the state of each connected modem. This can give you an indication of cable modems not functioning properly or give indications of bad areas in the network, for example if many cable modems in this part of the network deliver many RS error packets.

This table is related to specifications in the DVB standard ETS 300 800. The modem MAC statistics table is a read-only table on a given cable modem. To display the cable modem MAC statistics table do the following:

Step 1   Double-click on or expand the **Modem** section.

Step 2   Click **MAC Status Table**.

All cable modems for this Cisco DVB INA2320 are listed. If necessary, use the scroll bar to select the connection you want to see details on.

Step 3   Double click on the connection. The window content is updated and a list of parameters available is displayed containing the MAC status table for this connection.

The following table shows the fields in the Modem MAC Statistics Table:

Parameter	Description
Status	NIU/STB_Status as returned by the modem in the Sign-On Response message. See the DVB standard ETS 300 800 for further details.
Error Code	NIU/STB_Error_Code as returned by the modem in the Sign-On Response message. See the DVB standard ETS 300 800 for further details.
Retry Count	NIU/STB_Retry_Count as returned by the modem in the Sign-On Response message, indicating the number of Sign-On Response messages sent since the start of the Sign-On procedure.

Parameter	Description
Capability Encapsulation	Encapsulation is an 3-bit field that indicates the type(s) of encapsulation supported by the NIU/STB (read-only). Possible values: • 0—DirectIP • 1—EthernetMACBridging • 2—PPP • 3...7—reserved
Capability US Bitrate	This field indicates the upstream bit rate(s) supported by the NIU/STB. Possible values (read-only): • 0—256 kbps • 1—1.544 Mbps • 2—3.088 Mbps • 3—6.176 Mbps • 4...7—reserved
Capability DS OOB Bitrate	This field indicates the downstream out-of-band bit rates supported by the NIU/STB: {1.544 Mbit/s, 3.088 Mbit/s, reserved 2..3} (read-only) Possible values: • 0—1.544 Mbps • 1—3.088 Mbps • 2...3—reserved
Capability Resource Request Capable	This field indicates if the NIU is able to send <MAC> Resource Request Messages (read-only). Possible values: • Yes • No
Capability Fragmented MAC Messages	This field indicates that the NIU/STB is able to support MAC messages having the compound MAC_Information_Elements field of 1 to 512 bytes in size. This flag is also for backwards compatibility with NIU/STBs not supporting MAC message fragmentation and reassembly. By not setting this bit, the NIU/STB indicates that it does not support fragmented MAC messages at all, and will not understand or utilize the Fragment_No_MAC_Address and Fragment_MAC_Address_Included MAC message syntax types. (read-only) Possible values: • Yes • No

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Parameter	Description
Capability Security Supported	This field indicates that the NIU/STB is able to support the security extensions specified in this protocol (read-only). Possible values: • Yes • No
Capability Minislots for Reservation	This field indicates that the NIU/STB can handle minislots (read-only). Possible values: • Yes • No
Capability IB Signaling	This field indicates that the NIU/STB can handle IB signaling (read-only). Possible values: • Yes • No
Capability OOB Signalling	This field indicates that the NIU/STB can handle IB signaling (read-only). Possible values: • Yes • No
Slot Configuration Errors	Modem error parameter. The number of errors in Slot_Configuration_CRC-Error_Count as found by the CDC decoder.
ATM Packet Loss	Modem error parameter. This field shows the ATM cells on the upstream which are damaged or lost, either due to unrecoverable Reed-Solomon errors or because of an erroneous HEC of the ATM cell header.
SL-ESF CRC Error	Modem error parameter. SL_ESF_CRC_Error_Count, the number of CRC errors found in consecutive C1-C6.
SL ESF Frame Count	Modem error parameter. SL-ESF-Frame_Count, the number of frames the statistics apply on.
Slot Configuration Count	Modem error parameter. The number of R-bytes sets (Rxa-Rxc) used to calculate Slot_Configuration_CRC_Count.
RS Errors	Modem error parameter. This field shows the number of errors corrected by the Reed-Solomon decoder. The Reed Solomon Errors are low level communication errors. When this number increases drastically, the connection to the cable modem should be monitored closely. Downstream channel data.

Parameter	Description
RS Correctable Errors	Modem error parameter.
	MPEG frames received with correctable Reed-Solomon errors (In band only). Downstream channel data.
RS Not Correctable Errors	Modem error parameter.
	MPEG frames received with non-correctable Reed-Solomon errors (In band only). Downstream channel data.
Number of connections	Shows the number of connections used by a modem.
Connection ID1	Shows the modem connection identification for connection 1.
US Power Control Setting	For service purposes.
	Modem physical layer parameter, power control setting, the actual power sent by the modem for the upstream transmission.
	Unit: dBµV
US Time Offset Value	For service purposes.
	Modem physical layer parameter, time offset value, the relative offset of the upstream transmission timing. A negative value indicates an adjustment forward in time. A positive value indicates an adjustment back in time.
	Unit: 100 ns
US Frequency	For service purposes. Modem physical layer parameter.
	This field shows the upstream frequency used by the modem.
	Unit: Hz
DS OOB Frequency	For service purposes. Modem physical layer parameter.
	This field shows the out of band downstream frequency used by the modem. It shows zero if it is not significant.
	Unit: Hz
DS IB Frequency	For service purposes. Modem physical layer parameter.
	This field shows the in band downstream frequency used by the modem. It shows zero if it is not significant.
	Unit: Hz
DS SNR Estimated	For service purposes. Modem physical layer parameter.
	This field shows the estimated signal to noise ratio of the downstream carrying the MAC messages. It shows zero if it is not estimated. The value is read out from the cable modem tuner.
	Unit: dB
DS Power Level Estimated	Shows the power level estimated, from the downstream.
	Modem physical layer parameter.
	This field shows the estimated power level of the modem for the downstream carrying the MAC messages. It shows zero if it is not estimated. (EuroModem required)
	Unit: dBµV
MAC Address	This field shows the modem MAC address

INA Modulator Setup

The Cisco DVB INA2320 has one Modulator module containing two downstream channels. In the section **Modulator**, you can set In-band or Out-of-band bandwidth types, the modulation scheme applied and the downstream frequency.

To set the modulator:

Step 1 Click on Modulator in the section Modulator.

Parameter	Description
Serial Number	This field shows the manufacturer's serial number of the modulator module. (Read-only field)
Channel Count	Shows the number of configured modulator channels. Valid range: 0 to 1
Module Failure	Shows whether the Module Failure activity LED on the modulator module is on or off. (Read-only field)
Major	Shows whether the system general failure LED on the modulator module on or off. (Read-only field)
Minor	Not used, always off. (Read-only field)
MAC MPEG Frames	Shows the number of MAC MPEG frames transmitted. (Read-only field)
3ms Interrupt	Shows the number of 3ms interrupts generated by the INA2320. (Read-only field) If this is a high number, it indicates that the system is busy (CPU overload) and the INA is too busy to send the upstream marker in the downstream channels.
Asi Bit Rate	Shows the bit rate at the ASI output. Unit: bps
Asi Idle Cells	You can set the INA2320 to insert idle MPEG frames in the ASI output up to the maximum bit rate. Possible values: • enable - insert idle MPEG frames in the ASI output • disable - no idle MPEG frame insertion in the ASI output

Step 2 To display a table listing the parameters available for a Modulator module click on the + sign to expand the branch. Two entries become available, one for each downstream channel.

Step 3 Click on one of the entries to display the **Modulator** table with a list about the settings for one downstream.

Parameter	Description
Channel	Shows which downstream channel is configured: • 0 is downstream channel 1 marked Channel 1 • 1 is downstream channel 2 marked Channel 2

Parameter	Description
BW Type	In this field you set the bandwidth type for the downstream modulation. Select one of the following bandwidth settings: • bw8MHz (default) for In-band operation • bw1MHzOob for Out-of-band operation (symbol rate 0.772) • bw2MHzOob for Out-of-band operation (symbol rate 1.544) This is the downstream bandwidth used by the INA modulator. ✎ Note When selecting Out-of-band operation, check that the up converter used supports the frequency selected. See also "RF output frequency" on page 15. Active after INA reboot.
QAM Type	In this field you set the modulation scheme applied to the downstream channel. The following modulation schemes are supported: • QAM 128 • QAM 64 (default) • QAM 32 • QAM 16 • QPSK Active after INA reboot.
Symbol Rate	Shows the downstream symbol rate. This field is only applicable for In-band operation. In band downstream symbol rates available: • 6.8 • 6.875 • 6.9 (default) Unit: Mbaud Active after INA reboot.
RF Frequency	In this field you set the downstream RF output frequency at the up converter in Hz, enter a value in the range of: • 5 000 000 to 1 000 000 000 Hz. Default value: 650 000 000 Hz Active after INA reboot.

Parameter	Description
IF Frequency	Shows the selected downstream IF output frequency at the modulator in Hz, can be set to • Low 36 150 000 (default) • High 44 000 000 ✎ **Note** The built-in up converter supports 36.15 MHz only. Active after INA reboot.
Spectral Inversion	Spectral inversion can be turned on. It is set to off per default. Active after INA reboot.
Pro Chan Frequency	Specify which frequency the connected CPE devices should use for the provisioning channel. • Valid range: 50 000 000 to 1 000 000 000 Hz When set to 0, the CPE devices use the downstream channel frequency as the provisioning channel frequency.
Mac Ctrl Frames	Number of MAC control messages generated by the INA2320.
Missed Mac Ctrl Frames	Number of MAC control messages not sent.
Mac Frames	Number of MAC frames generated by the INA2320.
Data Frames	Number of downstream data frames sent by the INA2320.
Multiple Dsmcc Enable	You can set the INA2320 to insert multiple DSMCC frames in one MPEG frame. • false (default value) - no insertion of multiple DSMCC frames in one MPEG frame. • true - insert multiple DSMCC frames in one MPEG frame.

INA Demodulator Setup

The Cisco DVB INA2320 has one or two Demodulator modules installed, depending on the ordered INA2320 configuration. With one Demodulator module installed, the Cisco DVB INA2320 enables four upstream channels, with two Demodulator modules installed, the Cisco DVB INA2320 enables 8 upstream channels.

In the INA Demodulator Setup you configure each of the installed Demodulator modules separately. The Cable DVB/DAVIC Management Program indicates how many Demodulator modules are installed currently. The upstream channels available are numbered 1 to 4, the connectors on the front plate are labelled accordingly.

To upgrade from 4 upstream channels to 8 upstream channels, you have to order an upgrade kit, contact your local Cisco Systems representative.

To display the Demodulator configuration for a specific Demodulator module:

Step 1 Click on the section **Demodulator**. In the right window it is displayed how many enabled upstream channels are counted.

Step 2 Under **Demodulator**, click on **Demodulator Table**. In the right window the enabled upstream channels are displayed in detail. The column marked Index indicates the Demodulator number and the upstream channel number. Example: 1.4 designates the upstream channel number 4 in Demodulator module number 1 (left).

Step 3 Double-click on the upstream channels to display the settings for this upstream channel in a listing. The contents of the window is updated.

Step 4 Select the parameter you want to change or view.

Step 5 The **Properties** window appears.

Step 6 View or set the parameters required. All Demodulator parameters and their values are listed in the table below.

The following table shows the details of the selected upstream channel:

Parameter	Description
Index	The index shows which Demodulator module and which Upstream channels are enabled.
	Example: 1.1 is the upstream channel number one in the Demodulator module number 1 (left in front view).
No	Shows the demodulator module number (read-only)
Channel No	Shows the upstream channel number (read-only)
Channel Status	This field shows the status of the selected Demodulator channel.
	Possible settings:
	• Enabled
	• Disabled
	(Read-only field)
Bandwidth Type	Set the upstream bandwidth type; the following bandwidths are supported:
	• bw2MHz (default)
	• bw1MHz
	Active after INA reboot
Frequency	Shows the currently selected upstream frequency.
	To change the upstream channel frequency for this demodulator module, enter a new value and click on **Set**.
	• Valid range: 5 000 000 Hz to 65 000 000 Hz,
	Default value: 20 000 000 Hz
	Active after INA reboot.
Signal Level	Shows the required upstream signal level in the demodulator, it is a value in the range 43 to 84 dBµV. This is the signal level value needed at the connector of the Demodulator module (no internal loss).
	Default value: 66 dBµV
	Active after INA reboot.

Parameter	Description
Serial Number	Shows the manufacturer's serial number of the demodulator module. (Read-only)
Downstream Channel No	Shows the number of the downstream channel related to this upstream channel. You can set this upstream to use downstream channel 1 or downstream channel 2.
	Default Value: dsChannel 1
	Active after INA reboot.

Tips If you want to disable an upstream channel temporarily, set it to the same upstream frequency as the first upstream channel in a Demodulator module. Only the first upstream channel with this frequency will work, the others will be disabled. This is valid for upstream channels coming from the same cable island on one cable.

The following parameters in the INA Demodulator setup are read-only fields for service purposes.

Parameter	Description
Timing Errors	This field shows the number of upstream ATM cells received with timing error. (Read-only)
Power Errors	This field shows the number of upstream ATM cells received with signal level error. (Read-only)
Reed Solomon Errors	This field shows the number of upstream ATM cells received with Reed-Solomon errors. (Read-only)
HEC Errors	This field shows the number of upstream ATM cells received with Header Error Control errors. (Read-only)
Other Errors	This field shows the number of upstream ATM cells received with e.g. collision errors or out-of-burst sequence. (Read-only)
AAL5 Frames	Number of AAL5 frames received on the upstream channel. (Read-only)
AAL5 CRC Errors	Number of AAL5 frames received with CRC errors. (Read-only)
AAL5 Too Large	Number of AAL5 frames received, which are too large. (Read-only)
AAL5 Aborted	Number of AAL5 frames received, which were aborted due to connection breakdown. (Read-only)

INA MAC

This section of the Cable DVB/DAVIC Management Program is used by the service personnel for advanced service purposes.

Note During normal operation nothing has to be edited in this section.

One set of configuration parameters is sent per enabled downstream channel. You can view this set of configuration parameters in the Cable DVB/DAVIC Management Program. For further details on the MAC parameters, consult the DVB standard ETS 300 800.

MAC Setup

To display the MAC setup:

Step 1 Click on the **MAC** section.

Step 2 Select the parameter you want to change or view in the right window.

Step 3 The **Properties** window appears.

Step 4 View the parameters required.

The following table shows the parameters available in the MAC setup:

Parameter	Description
Sign On Increase Power Retry Count	The number of attempts the modem tries to enter the system at the same power level before incrementing its power level. This field is used in DAVIC 1.1 and 1.2, it is not used in DVB 2.0. Valid range: 1 to 10 Default value: 2 Unit: attempts
Service Channel Frame Length	The number of slots in the upstream Contention-less (fixed rate) based Service Channel The valid range is 0 to 65535. Default value: 3 slots
Service Channel Last Slot	The last slot in the Service Channel. The valid range is 0 to 65535. Default value: 1007 (slot number)
Max Power Level	The maximum power level the modem should start on to transmit upstream data. The valid range is 68 to 120 dBμV. Default value: 120 dBμV
Min Power Level	The minimum power level the modem shall be allowed to use to transmit upstream data. **Note** According to the attenuation in the network, this value might be increased to a larger value. The valid range is 68 to 120 dBμV. Default value: 68 dBμV

Parameter	Description
Max Backoff Exponent	The maximum value of the back off exponent counter, used by the modem for its contention algorithm. The valid range is 1 to 32. Default value: 10
Min Backoff Exponent	The minimum value of the back off exponent counter, used by the modem for its contention algorithm. The valid range is 1 to 32. Default value: 1
Idle Interval	The interval between MAC Idle Messages to be sent by the modem if it has nothing else to send. The value of zero indicating that no Idle Messages shall be sent is currently not supported. The valid range is 1 to 3600 s. Default value: 30 s
Absolute Time Offset	The default time offset which is used when first signing on. It is used to secure correct timing between upstream and downstream data traffic. **Note** If cable modems are located at a great distance, you may set the time offset to a larger number. Valid range: -32768 - 32767 Default value = 0 Unit: 100 ns
Round Trip Delay	Set this parameter to add additional round trip delay for long distance cable networks. Unit: 100 ns Range: -32768 to 32767 Default value: 0
Frequency Ranging Step	Only used for LMDS (EN 301 199) Valid range: 0 to 255 Default value: 0 Unit: steps
Max Contention Access Msg Len	'Connect Message' parameter: 'Maximum Contention Access Message Length' The maximum length of a message that may be transmitted using contention access. Any message greater than this should use reservation access. The valid range is 0 to 255 ATM cells. Default value: 1 ATM cell

Parameter	Description
Max Reservation Access Msg Len	"Connect Message" parameter: "Maximum Reservation Access Message Length"
	The maximum length of a message that can be transmitted using a single reservation access. Any message greater than this should be transmitted by making multiple reservation requests.
	The valid range is 0 to 255 ATM cell.
	Default value: 50 ATM cells
Grant Protocol Timeout	The time the modem waits after sending the Reservation_Request_Message or after receiving the last Reservation_Grant_Message, with an entry addressed to the modem containing a nonzero Remaining_Slot_Count, before initiating a Reservation_Status_Request_Message
	Valid range: 100 to 60000
	Default value: 100
	Unit: ms
	Note Read more about timeout in ETS 300800.
Timeout 00	Time-Out value: Head-End Time-Out, No frequency change
	Values:
	t60000, t30000, t9000, t6000, t3000, t900, t600, t300, t90, t60, t30, t9, infinite
	Default = t300
	Unit: ms
Timeout 01	Time-Out value: Head-End Time-Out, Frequency change
	Values as in Timeout 00, default value: t9000.
Timeout 02	Time-Out value: Terminal Time-Out, Intervals
	Values as in Timeout 00, default value: t900.
Timeout 03	Time-Out value: Terminal Time-Out, Short
	Values as in Timeout 00, default value: t90.
Timeout 04	Time-Out value: Terminal Time-Out, Long
	Values as in Timeout 00, default value: t300.
Timeout 0D	Time-Out value: Terminal Time-Out, Security Sign-On
	Values as in Timeout 00, default value: t90.
Timeout 0E	Time-Out value: Terminal Time-Out, Main key exchange
	Values as in Timeout 00, default value: t600.
Timeout 0F	Time-Out value: Terminal Time-Out, Quick/Explicit key exchange
	Values as in Timeout 00, default value: t300.
Status Req. Msg Interval	Status_Request_Message interval
	Values as in Timeout 00

Parameter	Description
Number Of Retries	Time out, number of retries before giving up.
	The valid range is 3 to 10 attempts, default value: 5
Sign On Msg Interval Min	Minimum value of the interval between 'SignOn Request Message's sent continuously by the Headend on the downstream channel
	The valid range is 10 to. 10000 ms, default value: 900 ms
Sign On Msg Interval Max	Maximum value of the interval between "SignOn Request Messages" sent continuously by the Headed on the downstream channel
	The valid range is 10 to 10000 ms, default value: 90 ms
Sign On Msg Recalculation Interval	The interval between recalculation of the interval between "SignOn Request Messages"
	The valid range is 1000 to 60000 ms.
	Default value: 10000 ms
Sign On Msg Recalculation Few Collisions	The "few" number of collisions for recalculation of the interval between "SignOn Request Messages"
	The valid range is 1 to 100
	Default value: 9000
Sign On Msg Recalculation Many Collisions	The "many" number of collisions for recalculation of the interval between "SignOn Request Messages"
	The valid range is 10 to 10000.
	Default value: 9000
Us Slot Marker Pointer	MAC Control Message: Upstream Slot Marker Pointer, the time between the first symbol of the next Sync byte and the next 3msec marker
	Valid range: 0 to 3000 us
	Default value: 3000 us
Grant Offset	Slot reservation: Minimum time from a grant message to the slots granted by that message
	Valid range: 1 to 30 ms
	Default value: 12 ms
Protocol Type	Select the protocol type which standard to use. This is dependent upon the connected CPE devices
Min Contention Slot	You can set the minimum number of contention slots in one 3 ms period.
	Valid range: 1 to 15
	Default value: 1
Max Contention Slot	You can set the maximum number of contention slots in one 3 ms period.
	Valid range: 1 to 15
	Default value: 11

IP Details, NAT and Multicast

IP details

This section of the Cable DVB/DAVIC Management Program is used for setting up internal routing entries and explains the DHCP, NAT and IGMP multicast configurations.

When allowing internal routing, data traffic between two cable data modems connected to the same INA are not sent to the default gateway. As they are routed internally in the INA, the default gateway is not unnecessarily loading the backbone network, the data traffic stays on the HFC side of the Cisco DVB INA2320.

The INA supports built-in Network Address Translation (NAT) to all connected cable modems. All connected cable modems may be represented by one single IP address on the Ethernet interface of the Cisco DVB INA2320. The NAT functionality secures private IP addresses by not making them available outside the HFC network. In this way the NAT functionality adds essentially a fire wall dimension to the system. The INA translates all modem IP addresses coming from the HFC network to one public IP address on the Ethernet interface of the INA.

The Internet Group Management Protocol (IGMP) is supported by the INA. It keeps a list of multicast group memberships and a timer for each membership for the attached network. IGMP is an integral part of IP. The cable modems can subscribe to a multicast group membership. The INA registers multicast group subscribers and provides the data traffic to the subscribe cable modems.

To display the IP section:

Step 1   Click on the **IP** section.

Step 2   Select the parameter you want to change or view in the right window.

Step 3   The **Properties** window appears.

Step 4   View or set the parameters required.

The following parameters appear in the table:

Parameter	Description
ARP Cache Timeout	In this field you enter or view the number of minutes that multicast addresses are kept in the ARP cache, the maximum value disables time out. Valid range: 1 to 65536 Default value: 15 Unit: minutes
Allow Internal Routing	In this field you specify if the INA is allowed to route internally between cable modems. If set to no, the packets are sent to the backbone via the default gateway. Values: • No • Yes (default value)

Parameter	Description
Allow Backbone Routing	In this field you specify if the INA is allowed to route to the backbone. If set to no, packets are dropped Values: • No • Yes (default value)
Use DHCP Relay	Set this field to **true** if the INA should relay DHCP messages to the cable modems. Values: • True—INA relays DHCP messages • False—INA does not relay DHCP messages Default value: True
Use NAT	In this field you set the INA to use NAT (Network Address Translation) on the Ethernet port. Values: • True—the INA uses NAT, • False—the INA does not use NAT Default value: False **Note** When set to True, there is no direct access to the connected cable modems, no SNMP commands can go through to the cable modems using NAT.
NAT Max No Of Connections	You can set the maximum number of concurrent connections to or from modems for this INA. Valid range: 16 to 20480 Default value: 8192 Active after INA reboot.
NAT IP	In this field you set the IP address used for the NAT connections. Set this typically to the INA Ethernet IP address, for the INA Ethernet IP address see the "INA System" section on page 3-13. Default value: 192.168.1.1 Active after INA reboot.
NAT Connection Timeout	In this field you set the number of seconds to keep a NAT connection open without traffic being sent. Valid range: 1 to1000000 Default value: 60 Unit: seconds Active after INA reboot.

Parameter	Description
Router Type	In this field you can set whether the INA to work as an IP Router or a MAC bridge Values: • ipRouter • macBridge
Encapsulation Type	Specifies the encapsulation of data from the INA on the HFC network. Use this parameter to set the INA to routing or MAC bridging mode. Values: • DirectIp – only used in routing mode (default value) • LlcSnap
DHCP Server Address	This field is used as a DHCP helper address, that allows the DHCP server to be placed in a subnet different than the subnet on the Ethernet side of the INA2320. The default value is 0.0.0.0, which indicates that no DHCP helper address is used. Active immediately after setting.
DHCP Backup Server Address	This field is used when there is a backup DHCP server in the network. The default value is 0.0.0.0, that indicates that no DHCP Backup server is used. **Note** This field is only used if the DHCP Server Address is different from 0.0.0.0. Active immediately after setting.
Use CSRC	The Cisco DVB INA2320 can be set to support the Cisco Subscriber Registration Center software for automatic provisioning of CPE devices. • true – support of CSRC • false– no support of CSRC (default)
Use Option 82	The Cisco DVB INA2320 can insert option 82 in DHCP messages. • true – Option 82 inserted in DHCP messages • false – Option 82 not inserted in DHCP messages (default) **Note** Use the Option 82 only if CSRC support is disabled, i.e. **Use CSRC** is set to **false**.
Use Sub Option 82	The Cisco DVB INA2320 can insert the sub options of option 82 in DHCP messages. • enable • disable (default) **Note** When setting the User Sub Option 82 to **enable**, the parameter **Use CSRC** must be set to **false** and the **Use Option 82** must be set to true.

Parameter	Description
Use IP Encapsulation Gateway	The Cisco DVB INA2320 can run in IP encapsulation mode. In this mode the unit provides an IP encapsulated data stream at the ASI output connector. • true – Cisco DVB INA2320 is used as an IP encapsulator • false (default)
Allow All	This parameter is only used in MAC bridging mode. When set to true, all data traffic is allowed. When set to false, you can use the parameters Allow IP and Allow PPPoE to filter data traffic types. • true – all data traffic passes through • false – no data traffic passes through
Allow IP	This parameter is only used in MAC bridging mode. • true – only IP data traffic passes through • false – no IP data traffic passes through (default value) When set to true, IP data traffic is allowed and the existing IP filter tables are used.
Allow PPPoE	This parameter is only used in MAC bridging mode. • true – only PPPoE data traffic passes through • false – no PPPoE data traffic passes through (default value) When set to true, all IP data traffic is not allowed and the existing IP filter tables are not used.

Configuration of the Internet Group Multicast Protocol

In this section of the Cable DVB/DAVIC Management Program you configure the Internet Group Multicast functionality for both interfaces of the INA2320, the HFC interface and the Ethernet interface. There are no IGMP routing protocols in the Cisco DVB INA2320, the INA passes on the data packets.

You can specify on which interface of the INA multicast is supported. Furthermore you specify timing for multicast sender and subscriber to send queries. Various queries can be setup to customize the multicast parameters to your specific needs, including a retry counter to tune for expected packet loss.

To configure IGMP:

Step 1   Display the IGMP Table by expanding the **IP** section.

Step 2   Click on **IGMP Table**.

Step 3   Double-click on one of the two entries, cableNet or Ethernet, to configure the selected part. Index 1 is used to configure the Cisco DVB INA2320 to support IGMP on the HFC interface (cableNet), Index 2 is used to configure the Cisco DVB INA2320 to support IGMP on the Ethernet interface.

Step 4   View or set the parameters required.

The following table shows the parameters and the valid settings to configure the multicast function.

Parameter	Description
Index	This field shows which interface of the INA is displayed currently for configuring IGMP.
Use IGMP	Set this to true if IGMP should be used to support multicast addresses on the respective interface. Values: • True, multicast supported on the interface selected • False, multicast not supported on the interface selected Default Value: True
Robustness	This parameter is used for tuning to expected packet loss. Set this parameter to the number of times IGMP messages are retried. Valid range: 1 to 10 Default value: 2
Query Interval	The INA asks on the selected interface whether there is a subscriber for a given multicast address. You can set the time interval for which the INA sends a query. Set the seconds between two queries sent by the querying INA Valid range: 1 to 1000 Default value = 125 Unit: seconds
Query Response Interval	Set the maximum response time from the subscriber unit to the multicast group. Valid range: 10 to 10000 Default value: 100 Unit: 1/10 s
Startup Query Interval	Set the interval between general queries sent by the querying party on startup. Valid range: 1 to 1000 Default value: 30 Unit: s
Startup Query Count	Set the number of queries sent out on startup of the INA2320, separated by the StartupQueryInterval Valid range: 1 to 10 Default value: 2

Parameter	Description
Last Member Query Interval	Set the maximum response time inserted into group specific queries sent in response to leave group messages. The time is in units of 1/10 of a second Valid range: 1 to 1000 Default value: 10 Unit: 0.1 s
Last Member Query Count	Set the number of group specific queries sent before the Cisco DVB INA2320 assumes there are no local members Valid range: 1 to 10 Default value: 2
Unsolicited Report Interval	Set the time between repetitions of a host´s initial report of membership in a group Valid range: 1 to 100 Default value: 10 Unit: s

RADIUS Authentication and Accounting

Authentication and Accounting

In this section of the Cable DVB/DAVIC Management Program, you set the necessary parameters for the Interactive Network Adapter to send and receive authentication and accounting information to and from a RADIUS server. You specify the IP address of the RADIUS server and timing parameters like time out and retries. Furthermore various parameters for accounting and port information on the RADIUS server are set from the INA.

To display the RADIUS parameters in the Cable DVB/DAVIC Management Program:

Step 1   Click on the **Radius** section.

Step 2   Select the parameter you want to change or view in the right window.

Step 3   The **Properties** window appears.

Step 4   View or set the parameters required.

The following parameters are available in this section:

Parameter	Description
Use Accounting	Set the field to one of the following values: • True—INA generates RADIUS accounting messages • False—INA does not generate RADIUS accounting messages Default: False
Min Accounting Update Interval	Enter the number of seconds between accounting information is sent from the INA to the RADIUS server. Valid range: 60 to 10.000.000 Default value: 3600 Unit: s
Max Accounting Delay	The number of seconds the INA queues an accounting request when the RADIUS server is not responding. Valid range: 0 to 1200 Default value: 600 Unit: s
Request Timeout	The interval in milliseconds between retransmission of RADIUS requests from the Cisco DVB INA2320 to the RADIUS server. Valid range: 1000 to 60000 Default value: 3000 Unit: ms
Request Retries	Enter the number of times a RADIUS request message should be re transmitted from the INA. Valid range: 2 to 10 Default value: 3
Multi Operation	This specifies whether the RADIUS server is able to handle several authentication/accounting requests at the same time. True—the RADIUS handles several requests simultaneously False—the RADIUS server only handles one request at a time Default value: true
Shared Secret	Enter the shared secret string for RADIUS security. The shared secret encryption is used for security between the INA and the RADIUS server. Default: empty string The maximum number of characters allowed is 16.
Support Acct Input Packets	This parameter defines whether Accounting Input Packets attributes are supported by the RADIUS server or not. Set the field to: • True—supported • False—not supported Default: true

Parameter	Description
Support Acct Output Packets	This configuration parameter defines whether the Accounting Output Packets attributes are supported by the RADIUS server. • True—supported • False—not supported Default: true
Authentication Port Number	Select in this field which port number to use when accessing the RADIUS server authentication port: • p1812 (default) • p1645
Accounting Port Number	Select in this field which port number to use when the INA messages access the RADIUS server accounting port: • p1813 (default) • p1646
Server Ip Address	In this field you specify the IP address of the RADIUS server.
No of Concurrent Requests	In this field you specify the maximum number of concurrent RADIUS requests allowed to be outstanding at the RADIUS server. Valid range: 1 to 50 Default value: 20

IP Frame Routing

This feature works both ways, from the cable modem to the Cisco DVB INA2320 and from the Cisco DVB INA2320 to the cable modem. By using IP routing and IP filtering functionality, you can set the INA to discard unwanted data traffic by filtering IP addresses and making data flow more effective using well defined routing entries according to your network structure. By setting the prefix length that has to be matched to be considered as a valid route you can specify the data path in your network very precisely - down to routing to a single IP address.

The Cisco DVB INA2320 can be set up to perform IP routing and filtering. You can configure up to 1024 routing entries and up to 64 filter entries to avoid unnecessary data traffic. The Cisco DVB INA2320 supports multiple subnets on the HFC interface. You can define up to 32 subnet table entries to support the multiple subnets.

Note To operate the Cisco DVB INA2320 in routing mode, check that the setting Router Type, page 3-43 in IP details is set to ipRouter.

Routing Table

Using the routing function, the Cisco DVB INA2320 routes IP packets from a specified source IP address to a specified destination IP address. There are 1024 static routing entries available in the Cisco DVB INA2320. For each of the entries in the routing table, you can display and change the settings by clicking on the respective entry number.

The IP routing functionality is used to direct IP traffic to PCs connected to cable modems. In this case, the cable modems have to be operated without Network Address Translation (NAT). The modems function as gateways for the IP traffic sent to a PC connected to a cable modem.

To display the a routing entry window in the Cable DVB/DAVIC Management Program:

Step 1   Click on the **IP Routing** section.

Step 2   Select the routing entry you want to change or view in the right window.

Step 3   Double-click on the entry. The contents in the right window is updated.

Step 4   Click on the parameter you want to view or edit.

Step 5   The **Properties** window for this entry appears.

Step 6   View or set the IP addresses required.

Step 7   Set the prefix length according to your requirements.

Example: If you set the prefix length to 8, the first group of numbers in the IP address must match the IP address to be routed to the Gateway IP. If you set the prefix length to 16, the first two groups of numbers (six digits) in the IP address must match the IP address to be routed to the Gateway IP.

The following parameters are available for each routing table in the Cable DVB/DAVIC Management Program:

Parameter	Description
Index	The index number for this routing table. This cannot be changed.
Active	Set to yes, if this entry should be considered when routing. Values: • No (default) • Yes **Note** You can only change the other settings when the field Active is set to no.
IP	Enter the IP address to base routing on.

Parameter	Description
Prefix Length	By setting the prefix length, you set the filtering criteria fro the IP address.
	Number of bits of the IP address to consider when routing
	Valid range: 0 to 32
	Default value: 24
	If you set this value to 16, the first two groups of numbers in the IP address must match the IP address to be routed to the Gateway IP.
Gateway Ip Address	Enter the IP address of the gateway used for this routing entry.
	Note When used with cable modems and a PC connected to the cable modem and NAT switched off, this IP address is the IP address of the HFC interface of the cable modem.

Filter Table

In the filter table you set the IP filtering parameters for the Cisco DVB INA2320. The filtering can be used to block off unwanted data traffic to and from specified IP addresses.

The filtering works for data traffic from the HFC network and traffic from the Ethernet after the best-match principle.

Note The data traffic going to the INA Ethernet IP address cannot be denied. You can deny subnets on the HFC side to cut off cable modem traffic.

You can configure up to 64 filtering entries. For each entry in the filter table you can display and change the settings by clicking on the respective entry number.

The following parameters are available in the Filter Table section:

Parameter	Description
Index	Index into the filter table. This cannot be changed.
	Valid range: 1 to 64
Active	Set this field to yes if this entry should be considered when routing.
	Settings available:
	• No (default)
	• Yes
	Note You can only change the settings when this field is set to no.

Parameter	Description
Filter Type	Set the type of traffic to apply this filter to. Settings available: • tcp • udp • ip (default)
Permit	Data traffic is allowed if this is set to permit, otherwise data traffic is denied. Settings available: • deny • permit (default)
Destination IP Address	Destination IP address to apply this filter on. All data passing through this filter are sent to the destination IP address.
Destination Prefix Length	By setting the prefix length you set the filtering criteria for the IP address. Number of bits of the Destination IP address to consider when filtering Valid range: 0 to 32 Default value: 0
Destination Port ID	Destination Port Id to apply this filter on. Default value: 0 If set to 0, all destination ports of the selected filter type are filtered.
Source IP Address	Source IP address to apply this filter on. All data coming from this IP address will be subject to the filter.
Source Prefix Length	By setting the prefix length you set the filtering criteria for the IP address. Number of bits of the Source IP address to consider when filtering Valid range: 0 to 32 Default value: 0
Source Port ID	Source Port Id to apply this filter on. Default value: 0 If set to 0, all destination ports of the selected filter type are filtered.

Subnet Table

The INA2320 supports multiple subnets. You can define up to 32 subnet configurations in the subnet table. The multiple subnets enable IP filtering of the traffic on the HFC network. Each subnet table defines a specific subnet address for the INA at the HFC interface towards the connected cable modems. In this way the data flow is more effective, as the data are only sent to the subnet matching the criteria for the IP address set in the subnet table.

By specifying the prefix length to be matched by the IP address you can size you subnets down to a single modem, if you set the prefix length to 24, only the IP address matching the given IP address in the subnet table can pass data into this subnet.

> ✎
> **Note**   In the subnet table you set the IP address of the HFC cable network interface. The
> first entry is the default entry for the IP address of the INA on the HFC network.
> This entry will be used as the return address for DHCP/BootP requests.

The following parameters are available to configure IP filtering with multiple subnets.

Parameter	Description
Index	This is the index number for the subnet table
IP Address	IP address of the subnet
Prefix Length	Set the prefix length for the IP address to match the criteria for IP filtering.
	Set the number of bits of the IP address used to specify the subnet.
	Valid range: 0 to 32
	Default value: 24

Example

If you set the prefix length to 8, the first three digits in the IP address must match the Subnet IP address to be sent to this subnet.

If you set this value to 16, the first six digits in the IP address must match the Subnet IP address to be sent to this subnet.

If you set this value to 32, the complete IP address must match the subnet address before the data can pass through.

Multicast Mapping Table

Use the Multicast Mapping Table to configures to map specific IP addresses to a specific connection (VCI).

The following parameters are available in the Multicast Mapping Table section:

Parameter	Description
Multicast Mapping Index	Index into the multicast mapping table.
Multicast Mapping Active	Set this field to Yes to activate the multicast mapping entries.
	Settings available:
	• No (default)
	• Yes
	✎ **Note** You can only change the settings in this table when this field is set to no.
Multicast Mapping IP	Destination IP address to apply this filter on.
	All data coming from this IP address will be subject to the filter.

Parameter	Description
Multicast Mapping Prefix Length	By setting the prefix length you set the filtering criteria for the IP address. Number of bits of the Source IP address to consider when filtering Valid range: 0 to 32 Default value: 0
Multicast Mapping Vci	Identification of the VCI to be used to for the IP address mapping.

Quality of Service

You can set the Cisco DVB INA2320 to provide up to 32 different profiles of quality of service (QoS). Any profile can be assigned to a cable modem. You assign a class to each entry. The classes supported are best effort, committed data rate or fixed rate. Additionally you can specify a minimum and maximum bandwidth for both the upstream and the downstream channels.

Having defined the 32 QoS entries, you assign one QoS entry (or index) to each of the configured modems, see the "To Create a New Cable Modem or Set-Top-Box Configuration" section on page 3-21.

How Quality of Service is Handled

When starting transmitting data, the INA gives as much bandwidth as possible on the cable modem connection. When the limit for a particular slot is reached, the throughput is adjusted according to the defined QoS index for this connection.

Example 1

The QoS is set to 10Kbit/s, the window size to 10 seconds, resulting in 10x10Kbit/s=100Kbit per window. When starting the data transmission, let us assume 1Mbps is available for this connection. The cable modem sends at 1Mbps until the maximum window limit is reached, this is after 100Kbit divided by 1Mbps, meaning after 0,1 s. After the period of 0,1 second, the cable modem is only allowed to send at 10 kbps.

You can experience that when the window size is large and the QoS limit is very low, while the available bandwidth is very high, the time the modem is allowed to use the available bandwidth is very short.

Example 2

The QoS is set to 200 kbps, the window size is set to the standard value 2 s. This gives 2x200 kbps = 400 kbit per window.

When starting the data transmission, let us assume that 1 Mbps is available for this connection. The cable modem sends at 1 Mbps until the window limit is reached, that is 400 kbit divided by 1Mbps, meaning after 0,4 s. After the period of 0,4 seconds, the cable modem is only allowed to send at 200kbps.

The same principle applies also for the downstream traffic. The amount of time the cable modem is allowed to use the maximum bandwidth is dependent on both the QoS limit and the window size. If the window size is very small, for example 20 ms, the amount of time where the available capacity in the channel can be used, is very small, even if the QoS limit is large. A 20 ms window at QoS 400 kbps with 4 Mbps available, only allows for 4 Mbps throughput for a period of 2 ms.

At a large window size, the maximum throughput time is relatively long, especially if the maximum throughput is near the limit of the QoS. A 30 second window at QoS 400 kbps with 1Mbps available, allows 1 Mbps throughput for a period of 12 s.

Tips The best compromise between bandwidth and feel of speed is around the default window size 2 s.

If it is desired to have very little overswing - or very large overswing - the window size can be used to adjust to the wanted effect.

Note Boot the cable modems after changing the applied QoS profile in order to activate the new settings.

The following table shows the parameters available in the QoS section of the Cable DVB/DAVIC Management Program.

Parameter	Description
Use Qos	Set this parameter to true to set the Cisco DVB INA2320 to use the Quality of Service Index.
	The default Quality of Service Index is 1, non-configured modems will use this entry as a default value.
	The following settings are available:
	• True—Use the QoS index
	• False—Do not use the QoS index
	Default value: false

Quality of Service Entry

In the Quality of Service Entry window you define a Quality of Service Index. Up to 32 profiles are available, for each entry you set the following:

- Class of service, such as Best Effort, Fixed Rate or Committed Rate.
- Window Size, here you specify the average time to calculate the allowed data rate. The bigger the window is, the more flexible the user feels the use of the system.
- Minimum bandwidth
- Maximum bandwidth

You specify all four parameters separately for the upstream and downstream channel.

To define a QoS profile index:

Step 1 Select an Index to identify the QoS profile.

Step 2 Select the class of service for the upstream channel in US Class of Service.

Step 3 Specify the upstream channel window size.

Step 4 Specify the minimum upstream bandwidth, if you have selected Committed Rate.

Step 5   Specify the maximum upstream bandwidth, if you have selected Committed Rate.

Step 6   Select the class of service for the downstream channel in DS Class of Service.

Step 7   Specify the downstream channel window size.

Step 8   Specify the minimum downstream bandwidth, if you have selected Committed Rate.

Step 9   Specify the maximum downstream bandwidth, if you have selected Committed Rate.

The following table lists the above mentioned parameters more detailed.

Parameter	Description
Index	This is the index into the Quality Of Service table. Index 1 is the default index and is used as a default value for all modems which are not configured. Note This is the number you assign to each configured modem as the index specifying the selected QoS profile for this modem.
US Class of Service	Select the class of Service for the upstream channel. Values available: • FixedRate • CommittedRate • BestEffort Default value: BestEffort
US Window Size	Set the number of milliseconds used for the Quality of Service window in the upstream channel. Valid range: 10 to 60000 Default value: 2000 Unit: ms
US Min BW	If committed rate is selected, this value is the number of kbit/s which is guaranteed. This is only used for fixed rate, and not for the classes BestEffort or Fixed Rate traffic. Valid range: 0 to 6000 Default value: 0 Unit: kbits/s
US Max BW	This value is the maximum bandwidth allowed on the upstream channel in kbits/s. Valid range: 0 to 6000 Default value: 64 Unit: kbits/s

Parameter	Description
DS Class of Service	Select the class of Service for the downstream channel. Values available: • FixedRate • CommittedRate • BestEffort Default value: BestEffort
DS Window Size	Set the number of milliseconds used for the Quality of Service Window in the downstream channel. Valid range: 10 to 60000 Default value: 2000 Unit: ms
DS Min BW	If committed rate is selected, this is the number of kbit/s which is (attempted) guaranteed. This is not used for the classes BestEffort or Fixed Rate traffic. Valid range: 0 to 6000 Default value: 0 Unit: kbits/s
DS Max BW	This is the maximum bandwidth allowed on the downstream channel in kbits/s. Valid range: 0 to 6000 Default value:64 Unit: kbits/s

DSM-CC and PID Value

In this section you can set the PID (Program Identifier) to be used when transmitting In-band (downstream) data.

This PID value is set when data is sent to the HFC network. The default MAC PID 0x001C is defined by the DVB standard to be used for MAC messages sent from the INA to the connected cable modems. The Dsmcc Pid is the Packet Identifier for the data packets.

To enter a new value in this field, do the following:

Step 1   Click on the **DSM-CC** section in the Cable DVB/DAVIC Management Program.

Step 2   Click on **PID** in the right window.

Step 3   Enter the new PID value and click **OK**. The valid range is 0 to 8191, the default value is 2048.

Note   The DSM-CC PID is displayed in decimal format.