CHAPTER 4

Using the VQE-S Application Monitoring Tool

This chapter describes how to use Cisco VQE-S Application Monitoring Tool (VQE-S AMT). The tasks that you can perform with VQE-S AMT are listed in Table 4-1.

Table 4-1 VQE-S AMT Tasks

VQE-S AMT Task	Section Where Described
Log in to VQE-S AMT	Logging in to and Navigating in VQE-S AMT, page 4-1
Monitor the health of the VQE-S processes	Monitoring the Health of the VQE-S Processes, page 4-3
View channel configuration details, status, and statistics	Viewing Channel Configuration and Status, page 4-5
Monitor statistics for Unicast Retransmission and RCC	Monitoring Unicast Retransmission and RCC, page 4-13
View configuration details, status, and statistics for CDE110 Ethernet interfaces	Monitoring Interfaces, page 4-19
View configuration details, status, and statistics for VQE-S RTCP Exporter	Monitoring RTCP Exporter, page 4-21
View STUN Server statistics	Monitoring the STUN Server, page 4-23
Configure VQE-S logging levels	Configuring VQE-S Logging, page 4-23
Configure VQE-S debugging levels	Configuring VQE-S Debugging, page 4-24

Note VQE-S AMT supports configuration capabilities for logging levels and debugging options. However, the configured values do not persist when VQE-S AMT is restarted.

Logging in to and Navigating in VQE-S AMT

Before logging into VQE-S AMT, you need a valid Linux username and password on the Cisco CDE110 hosting VQE-S AMT. The username does not have to belong to any special group. Creation of the username is the responsibility of the Cisco CDE110 system administrator.

VQE-S AMT supports two web browsers: Microsoft Internet Explorer version 6.0 or later, and Mozilla Firefox version 2.0 or later. The minimum screen resolution required for VQE-S AMT is 1024 x 768 pixels.

VQE-S AMT uses secure HTTPS. Access by multiple simultaneous browsers is supported.

To display the Channels Status Summary graph of active, inoperative, and inactive channels in the AMT VQE-S Status window, Adobe Flash Player must be installed on the computer that hosts the browser accessing VQE-S AMT. Adobe Flash Player is free and can be found at this URL:

http://get.adobe.com/flashplayer/

To login to VQE-S AMT, follow these steps:

Step 1 Point your web browser to the Cisco CDE110 that hosts VQE-S AMT using an IP address or fully qualified domain name:

`https://ip_address`

or

`https://fully_qualified_domain_name`

The VQE-S AMT login dialog box is displayed.

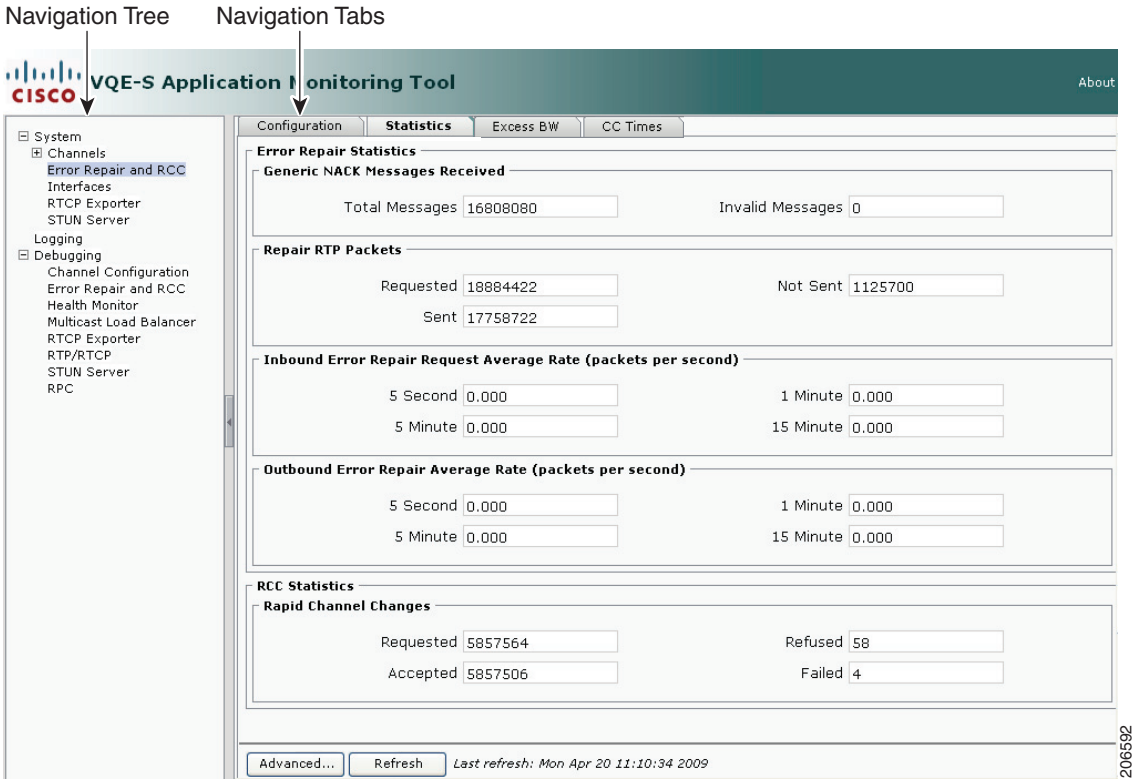
Step 2 Enter a Linux username and password.

Step 3 Click **OK**.

If the username and password are valid, the AMT VQE-S Status window is displayed.

Figure 4-1 shows the VQE-S AMT navigation controls and buttons.

Figure 4-1 VQE-S AMT Navigation



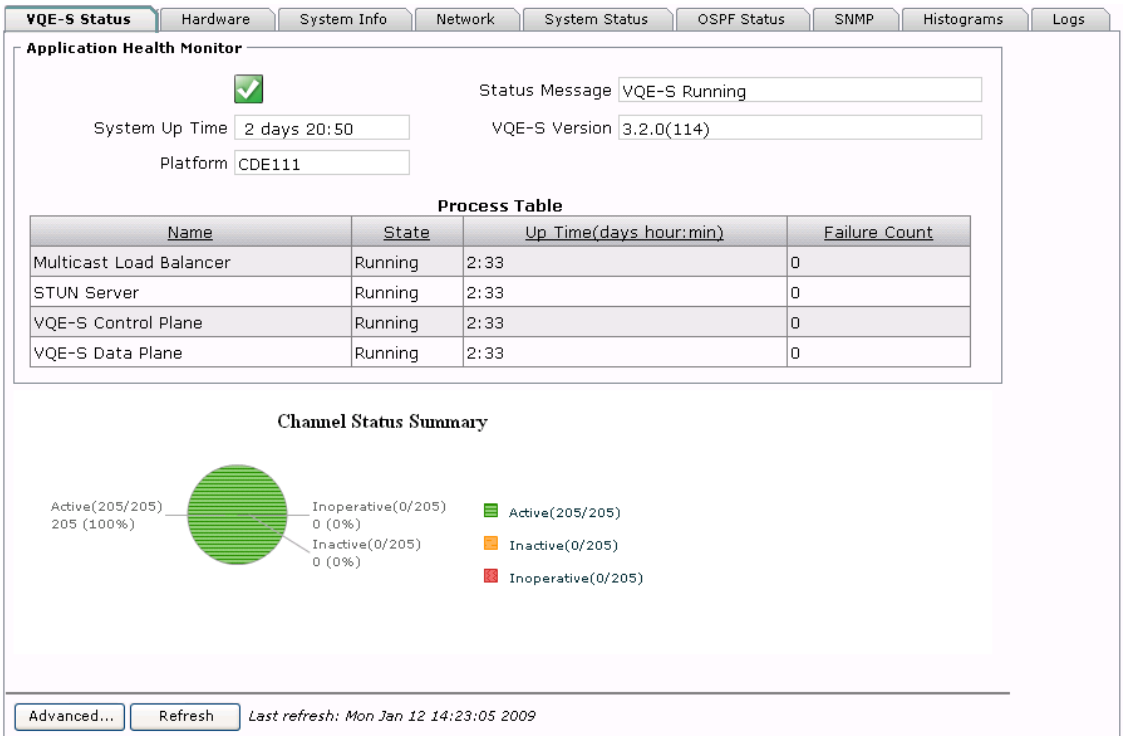
VQE-S AMT (Figure 4-1) provides these controls and buttons for navigating and displaying VQE data:

- **Navigation tree**—Use the collapsible and expandable tree to display the VQE-S AMT items that can be viewed or configured. The navigation tree can be hidden by clicking the < arrow in its right border.
  - A parent node in the tree (such as Channels) usually provides summary data.
  - A child node in the tree (such as an individual channel name) provides data on the specific child node.
- **Navigation Tabs**—Click the tabs to display VQE data for viewing or VQE parameters for configuring in the main window. Some but not all VQE items have Configuration and Statistics tabs that display the relevant data or parameters.
- **Advanced**—Click to get additional, detailed information on the current VQE-S AMT items. The advanced data is intended for Cisco Technical Support and are not described in this document.
- **Refresh** —Click to update the displayed data. VQE-S AMT statistical data are not automatically updated when VQE-S real-time counters are incremented. The Last refresh date-and-time information to the right of the **Refresh** button indicates when the last update of displayed data occurred.

Monitoring the Health of the VQE-S Processes

When you click the **System** node in the navigation tree and the **VQE-S Status** tab, VQE-S AMT displays the VQE-S Status window (Figure 4-2). The Application Health Monitor and a Channel Status Summary are displayed in the VQE-S Status window.

Figure 4-2 VQE-S Status Window



In the Application Health Monitor, a green icon with a checkmark indicates the VQE-S system is running and healthy. A red icon with an X indicates one or more problems with the VQE-S processes.

Using the Application Health Monitor, you can view the following status information:

- System Up Time—Time that Cisco CDE110 hosting VQE-S has been running.
- Platform—Cisco CDE110 hardware platform that is hosting this VQE-S. Platform can be one of the following:
  - Cisco CDE110 (models CDE110-1-036TXA-K9 and CDE110-1-036TXD-K9)
  - Cisco CDE111 (models CDE111-2-146TXA-K9 CDE111-2-146TXD-K9)
  - UNKNOWN if the hardware platform cannot be determined
- Status Message—Current status of the VQE-S software or information on problems (for example, the message “Config File Parsing Failed”)
- VQE-S Version—Current version of the VQE-S software.
- Process Table—Information on these VQE-S processes:
  - Multicast Load Balancer
  - STUN Server
  - Data Plane
  - Control Plane

In the Process Table, Failure Count is the number of times the process has failed and been restarted by VQE-S Process Monitor. Process Monitor is responsible for starting and monitoring the preceding processes.

The Channels Status Summary section provides the number of and a graph for active, inoperative, and inactive channels.

In addition to the VQE-S Status tab, you can get information on the VQE-S system on the five other tabs. Table 4-2 lists the information that is available from each tab accessible from the System node.

Table 4-2

System Node Tab	Information Provided
VQE-S Status	Application Health Monitor and Channel Status Summary
Hardware	Processor and memory on the Cisco CDE110 that hosts VQE-S Each CDE110 has two physical processors and four virtual processors.
System Info	Hostname, operating system version, date and time, Network Time Protocol servers, Domain Name System servers, and **iptables** information (trusted channel-provisioning servers).
Network	Output from the **ifconfig** and **ip addr show lo** commands. • The configuration information displayed by **ifconfig** is for the four CDE110 Ethernet interfaces and the CDE110 loopback addresses. • The loopback addresses displayed by **ip addr show lo** are the feedback target addresses for the configured channels.
System Status	Detailed information on host uptime, currently running processes, and file system disk space.
OSPF Status	Output from a number of commands that show OSPF information, including status, neighbors, interfaces, database, and routes.

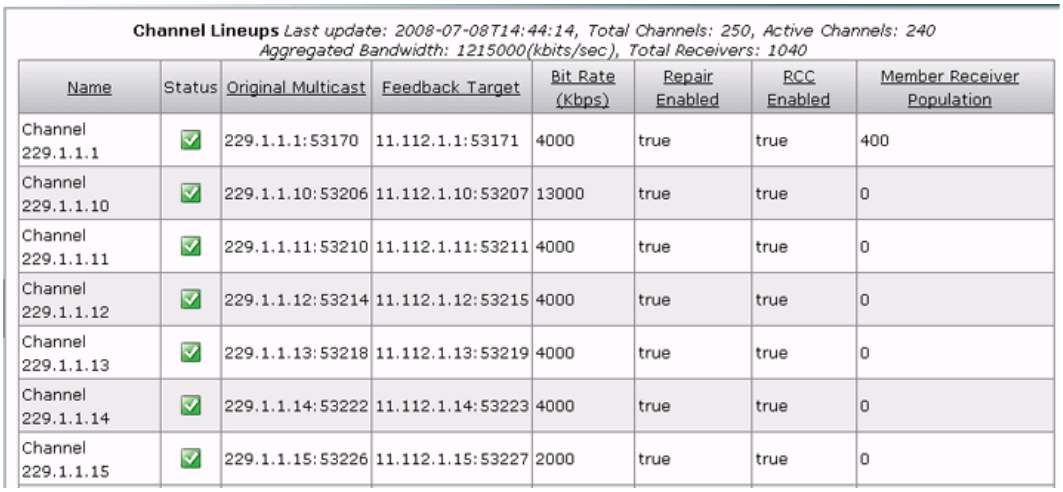
Table 4-2

System Node Tab	Information Provided
SNMP	SNMP information on the VQE-S host taken from the snmpd.conf file.
Histograms	Set-top box IGMP latency data is displayed in graphs and tables.
Logs	Most recent 300 lines from the following VQE-related log files are displayed: • VQE-S log (/var/log/vqe/vqe.log) • System messages log (/var/log/messages) • HTTPD error log (/var/log/httpd/error_log) • SSL error log (/var/log/httpd/ssl_error_log) • Tomcat log (/usr/share/tomcat5/logs/catalina.out)

Viewing Channel Configuration and Status

When you click the **Channels** node in the navigation tree, VQE-S AMT displays the Channel Lineups window (Figure 4-3).

Figure 4-3 Channel Lineups Window



Channel Lineups *Last update: 2008-07-08T14:44:14, Total Channels: 250, Active Channels: 240*
Aggregated Bandwidth: 1215000(kbits/sec), Total Receivers: 1040

Name	Status	Original Multicast	Feedback Target	Bit Rate (Kbps)	Repair Enabled	RCC Enabled	Member Receiver Population
Channel 229.1.1.1	☑	229.1.1.1:53170	11.112.1.1:53171	4000	true	true	400
Channel 229.1.1.10	☑	229.1.1.10:53206	11.112.1.10:53207	13000	true	true	0
Channel 229.1.1.11	☑	229.1.1.11:53210	11.112.1.11:53211	4000	true	true	0
Channel 229.1.1.12	☑	229.1.1.12:53214	11.112.1.12:53215	4000	true	true	0
Channel 229.1.1.13	☑	229.1.1.13:53218	11.112.1.13:53219	4000	true	true	0
Channel 229.1.1.14	☑	229.1.1.14:53222	11.112.1.14:53223	4000	true	true	0
Channel 229.1.1.15	☑	229.1.1.15:53226	11.112.1.15:53227	2000	true	true	0

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Using the Channel Lineups window, you can do the following:

- Click on a column heading to reorder the channels in the list. For example, clicking on **Feedback Target** orders the entries by feedback target: the combination of an IP address and RTCP port number.
- Double-click on any item in a channel's row to display the full details for the channel in a new window.
- Click the **Re-Activate** button to cause VQE-S to create all channels that are not currently created in the VQE-S software.

In Figure 4-3, the channel-lineup summary data indicates when the lineup was last updated (for example, with VCPT) and provides totals for all channels and active channels as well as aggregated bandwidth and total receivers:

```
 Last update: 2007-08-06T14:15:31, Total Channels: 10, Active Channels: 9
Aggregated Bandwidth: 88000 (kbits/sec), Total Receivers: 0
```

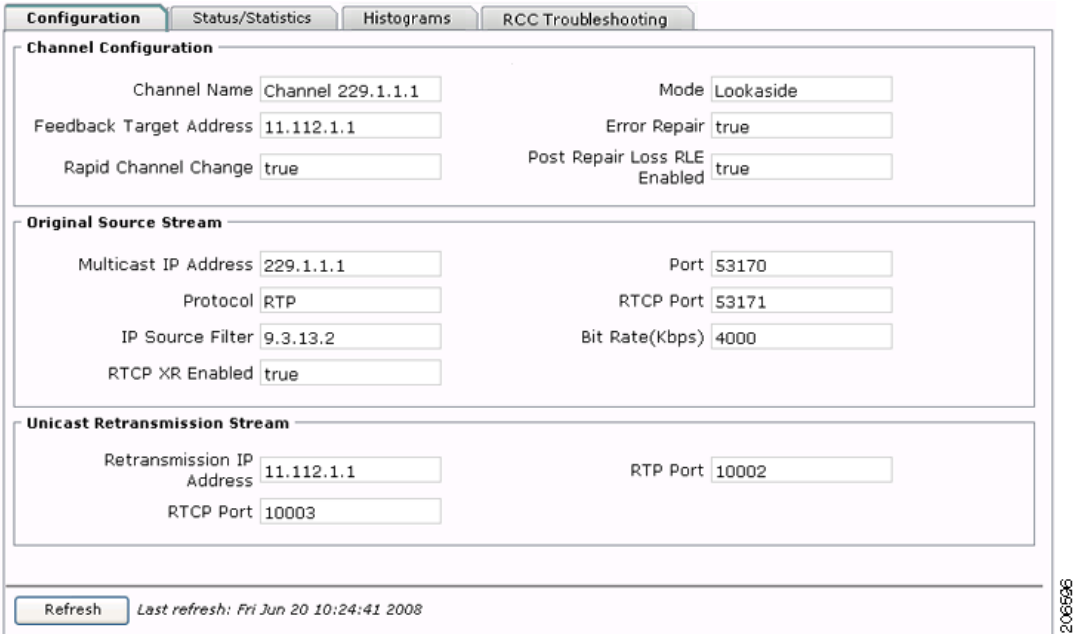
The Channel Lineups window has the same information that is defined for channels using VCPT but has the following additions. For information on the other data that appears in the Channel Lineups table, see Table 3-3 on page 3-8.

- Status—Indicates channel status as follows:
  - Green with a checkmark—Channel is active. VQE-S is receiving the multicast stream.
  - Yellow with exclamation mark (!)—Channel is inactive. The channel is successfully initialized, but VQE-S is not receiving the multicast stream.
  - Red with an X—Channel is inoperative (for example, the channel is not configured correctly).
- Member Receiver Population—Provides the number of VQE Clients that are currently receiving this multicast stream.

Viewing Channel Configuration

When you click on a channel name in the navigation tree and then click the **Configuration** tab, VQE-S AMT displays the Channel Configuration window (Figure 4-4).

Figure 4-4 Channel Configuration Window



The Channel Configuration window has the information listed in Table 4-3.

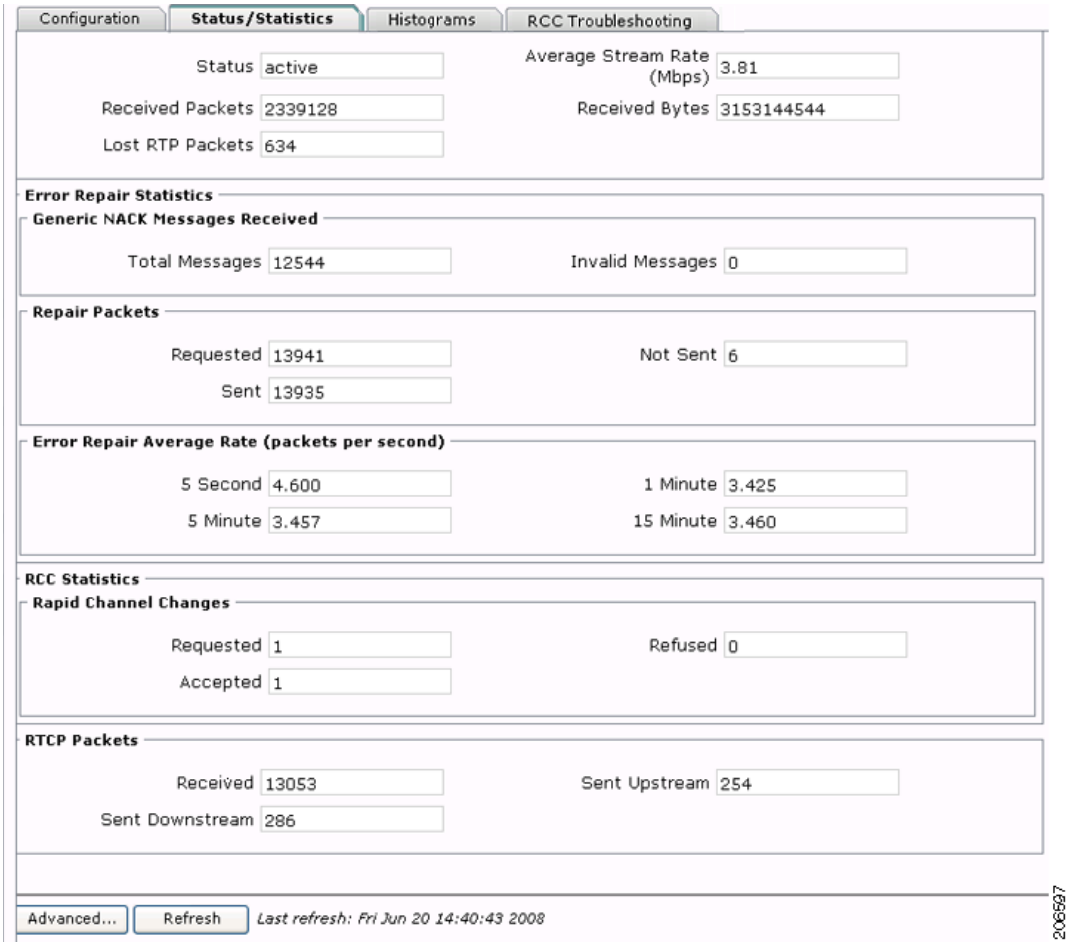
Table 4-3 Channel Configuration

Field	Description
Channel Configuration	
Channel Name	Name of the channel.
Feedback Target Address	Feedback Target IP address assigned on the VQE-S host.
Rapid Channel Change	• true—RCC is enabled for this channel. • false—RCC is not enabled for this channel.
Mode	Currently only Lookaside mode is supported.
Error Repair	• true—Unicast Retransmission is enabled for this channel. • false—Unicast Retransmission is not enabled for this channel.
Post Repair Loss RLE Enabled	• true—RTCP Extended Reports will include the Loss RLE (run-length encoded) report block type. • false—RTCP Extended Reports will not include the Loss RLE report block type.
Original Source Stream	
Multicast IP Address	Multicast IP address for the channel's original source stream.
Protocol	Currently only RTP is supported.
IP Source Filter	Source IP address of the channel's original source stream.
RTCP XR Enabled	• true—RTCP Extended Reports are enabled. • false—RTCP Extended Reports are not enabled.
Port	Number of the port for the original source stream. When the protocol is RTP, this is the RTP port number.
RTCP Port	Number of the RTCP port for the original source stream.
Bit Rate (Kbps)	Bit rate configured for the original source stream.
Unicast Retransmission Stream	
Retransmission IP Address	IP address of the Unicast Retransmission stream.
RTCP Port	Number of the RTCP port for the Unicast Retransmission stream.
RTP Port	Number of the RTP port for the Unicast Retransmission stream.

Viewing Channel Statistics

When you click on a channel name in the navigation tree and then click the **Statistics** tab, VQE-S AMT displays the Channel Statistics window (Figure 4-5).

Figure 4-5 Channel Statistics Window



The Channel Statistics window has the information listed in Table 4-4.

Table 4-4 Channel Statistics

Field	Description
Channel Input Stream	
Status	• active—VQE-S is receiving the multicast stream. • inactive—The channel is successfully initialized, but VQE-S is not receiving the multicast stream. • inoperative—The channel is not, for example, configured correctly.
Received Packets	Number of RTP packets received by VQE-S for this multicast stream.

Table 4-4 Channel Statistics (continued)

Field	Description
Lost RTP Packets	Number of RTP packets sent but not received by VQE-S for this multicast stream. Lost RTP Packets, in general, specifies the number of missing input RTP packets for a channel, as determined by missing sequence numbers. Some lost packets can occur when a channel is first received because a few packets may be dropped internally by the VQE-S in the course of initializing the channel. Once the channel has been initialized (typically less than a one second delay), further increments in this counter may reflect lost packets in the network between the source of the RTP stream and the VQE-S.
Average Stream Rate (Mbps)	Average megabits per second received by VQE-S for this multicast stream.
Received Bytes	Number of bytes received by VQE-S for this multicast stream.
Error Repair Statistics—Generic NACK Messages Received	
Total Messages	Number of NACK messages received by VQE-S from VQE-C for this multicast stream.
Invalid Messages	Number of invalid messages received by VQE-S from VQE-C for this multicast stream. Invalid messages are received messages that, for example, cannot be parsed.
Repair Packets	
Requested	Number of RTP packets VQE Clients have requested for Error Repair for this multicast stream.
Sent	Number of RTP packets sent by VQE-S that have succeeded in repairing an error for this multicast stream.
Not Sent	Number of failed RTP packets that were not repaired by VQE-S for this multicast stream. VQE-S may not be able to send an Error Repair packet for the following reasons: • The most likely cause is that the Error Repair requests were bursty and exceeded the Error Repair rate-policer limit at one point. • The requested RTP packets were not found in the VQE-S memory cache. • The VQE-S failed to send the RTP packets because of a socket sendto() failure.
Error Repair Average Rate (packets per second)	
5 second, 5 minute, 1 minute, 15 minute	For each time interval, the average number of packets per second that VQE-S has sent to VQE Clients to repair errors for this multicast stream. Averages are calculated for each time interval over a period of time that is greater than the interval. For example, the five second calculation might be an average of 12 five-second intervals over a one minute period.
RCC Statistics—Rapid Channel Changes	
Requested	Number of Rapid Channel Changes requested for this channel.
Accepted	Number of Rapid Channel Changes requested for this channel where the VQE-S has accepted the request and sent IPTV packets and other channel data to a VQE Client on the set-top box.

Table 4-4 Channel Statistics (continued)

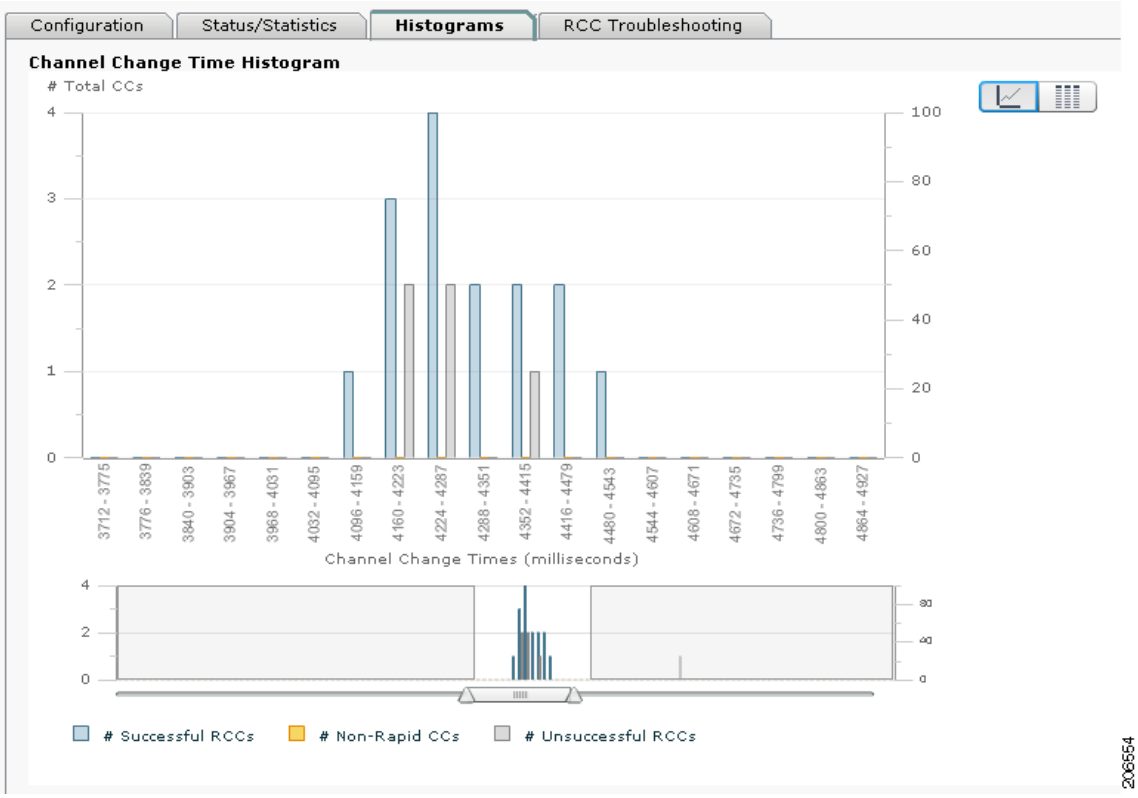
Field	Description
Refused	Number of Rapid Channel Changes requested for this channel where VQE-S refused the request. For example, VQE-S may refuse an RCC request for the following reasons: • If the VQE-S did not find an I-frame that is a suitable starting point for the RCC burst • If the VQE-S exceeded the output interface bandwidth limit or CPU load limit If the CPU load limit is exceeded, the Advanced Channel Debug Stats counter "Refused RCC - no core resources on DP" shows when the limit is exceeded.
Failed	Number of Rapid Channel Changes that have failed. A VQE-C has made an RCC request, and VQE-S has accepted the request and sent IPTV packets and other channel data to a VQE Client. But the RCC failed. For example, an RCC can fail if the VQE-C stops receiving the packets from the VQE-S earlier than expected.
RTCP Packets	
Received	Number of RTCP packets received by VQE-S for this multicast stream.
Sent Downstream	Number of RTCP packets that VQE-S sent downstream for this multicast stream.
Sent Upstream	Number of RTCP packets that VQE-S sent upstream for this multicast stream.

Viewing Channel Histograms

When you click on a channel name in the navigation tree and then click the **Histograms** tab, VQE-S AMT displays the Channel Histograms window (Figure 4-6).

Note The VQE-S AMT Channel Channel Time histogram is only supported for VQE-C integrations that have implemented the RCC instrumentation as described in the VQE-C System Integration Guide.

Figure 4-6 Channel Histograms Window



In the Channel Histogram window, the Channel Change Time histogram and table are displayed. The data displayed in the histogram and table includes the following:

- The total number of channel changes (CCs) per time bucket.
- The number of successful rapid channel changes (RCC) for the selected time bucket.
- The number of unsuccessful RCCs for the selected time bucket.
- The number of non-rapid CCs (that is, channel changes where RCC was not requested) for the selected time bucket.

Each time bucket in this histogram represents a subset of channel change times from 0 to 7000ms. Any channel change times that take longer than 7000ms will be collected in the uppermost bucket.

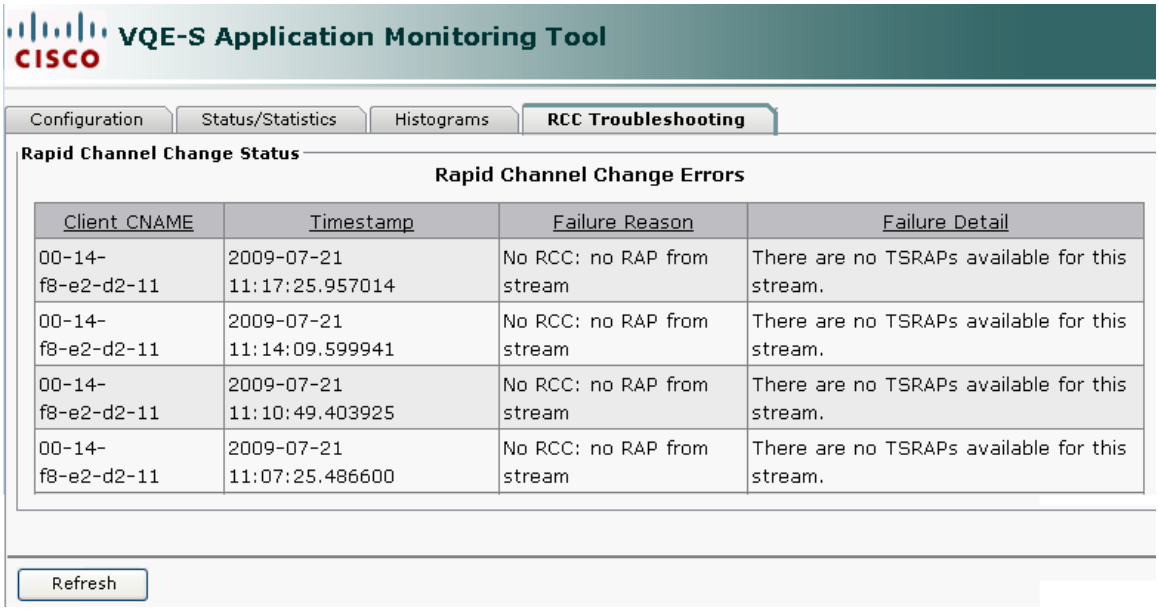
You can move the slider below the histogram to change the way in which the histogram is displayed.

Note The histogram will be displayed and populated, regardless of whether RCC is enabled at the VQE-S. If no Multicast Acquisition (MA) XR report (a RTCP XR report block type) is received for a repair session, the histogram is unchanged.

Viewing RCC Troubleshooting

When you click on a channel name in the navigation tree and then click the **RCC Troubleshooting** tab, VQE-S AMT displays the RCC Troubleshooting window (Figure 4-7).

Figure 4-7 RCC Troubleshooting Window



The RCC Status window has the information listed in Table 4-5.

Table 4-5 Rapid Channel Change Status

Field	Description
Client CNAME	Identifier for the Set-top Box (STB) for which the RCC was requested but failed. Typically, the CNAME is the MAC address of the STB.
Timestamp	Time of the event. For example, 2009-07-21 08:42:03.05.
Failure Reason	Specific reason for the failure on either the VQE-S or the VQE-C.
Failure Detail	Additional information regarding the failure that may be used for debugging purposes.

The table presents the last 20 RCC failures on this channel. To reorder the list of RCC failures, click on a column heading. For example, clicking on **Timestamp** orders the RCC failures by date and time.

Monitoring Unicast Retransmission and RCC

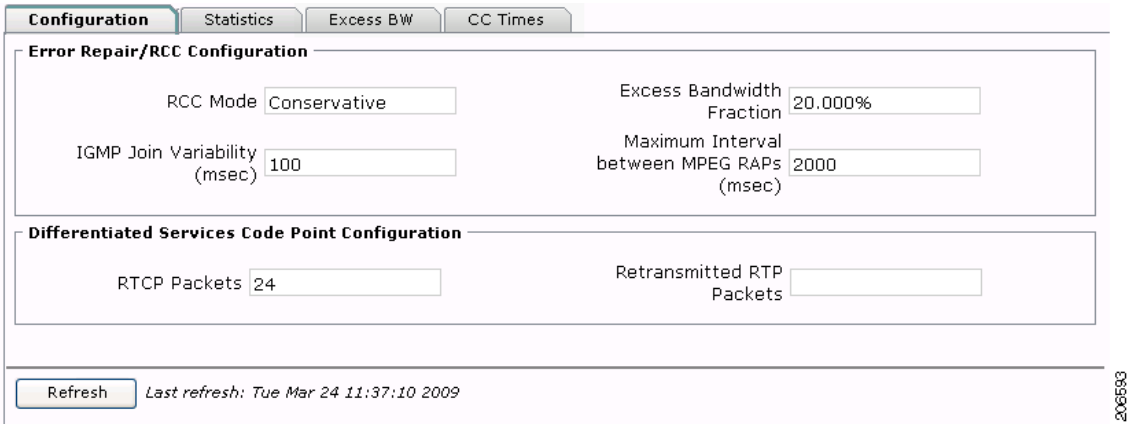
Note In VQE-S AMT, Error Repair is the term used for Unicast Retransmission.

You can use VQE-S AMT to view Error Repair and RCC statistics.

Viewing Error Repair and RCC Configuration

When you click **Error Repair and RCC** in the navigation tree and click the **Configuration** tab, VQE-S AMT displays the Error Repair and RCC Configuration window (Figure 4-8).

Figure 4-8 Error Repair and RCC Configuration Window



The Error Repair and RCC Configuration window has the information listed in Table 4-6. Each of the parameters listed in the table can be configured with the VQE Configuration Management System. For information on configuring VQE-S, see Chapter 7, "Configuring VQE Server and VQE Tools."

Table 4-6 Error Repair and RCC Configuration

Field	Description
Error Repair/RCC Configuration	
RCC Mode	RCC mode can be aggressive or conservative. This value is configured with the vqe.vqes.rcc_mode parameter in VCDB. For information on this parameter, see Table A-3 on page A-6.
IGMP Join Variability (msec)	Amount of variability (in milliseconds) between the fastest and slowest IGMP joins for RCC. This value is configured with the vqe.vqes.igmp_join_variability parameter. For information on this parameter, see Table A-3 on page A-6.
Excess Bandwidth Fraction	Percent of channel bandwidth that will be available on the access link for Unicast Retransmission and Rapid Channel Change. This value is configured with the vqe.vqes.excess_bw_fraction parameter. For information on this parameter, see Table A-4 on page A-9.

Table 4-6 Error Repair and RCC Configuration (continued)

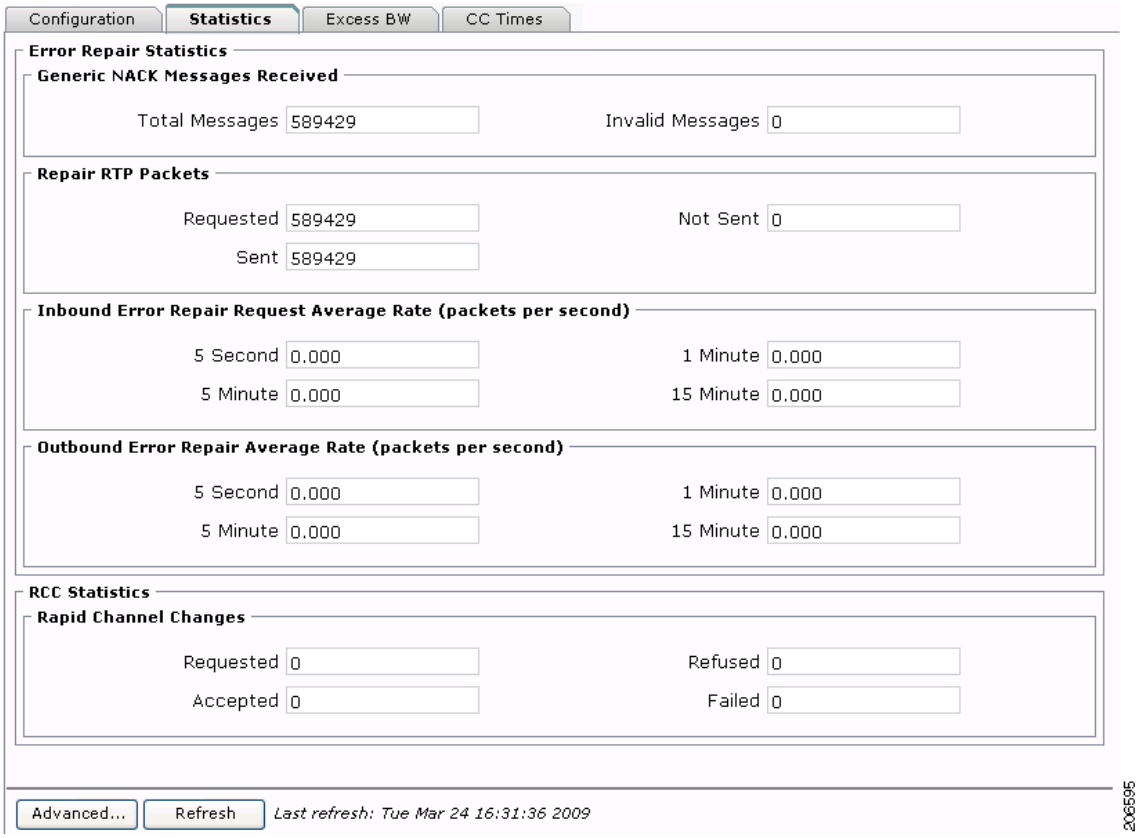
Field	Description
Maximum Interval between MPEG RAPs (msec)	Maximum time interval (in milliseconds) between MPEG RAPs (random access points) for the entire channel lineup. This value is configured with the vqe.vqes.rap_inteval parameter in VCDB. For information on this parameter, see Table A-3 on page A-6.
Differentiated Services Code Point Configuration	
RTCP Packets	DCSP value for RTCP packets that VQE-S transmits. This value is configured with the vqe.vqes.rtcp_dscp parameter in VCDB. For information on this parameter, see Table A-1 on page A-2.
Retransmitted RTP Packets	DCSP value for RTP packets that VQE-S transmits. This value is configured with the vqe.vqes.rtp_trans_dscp parameter in VCDB. For information on this parameter, see Table A-1 on page A-2.

Viewing Error Repair and RCC Statistics

When you click **Error Repair and RCC** in the navigation tree and click the **Statistics** tab, VQE-S AMT displays the Error Repair and RCC Statistics window (Figure 4-9). The statistics are for this VQE-S and are similar to the Error Repair and RCC statistics displayed for individual channels but are for all channels in the current channel lineup.

The Error Repair and RCC statistics are reset to 0 when VQE-S restarts or when the channel lineup changes.

Figure 4-9 Error Repair and RCC Statistics Window



The Error Repair and RCC Statistics window has the information listed in Table 4-7.

Table 4-7 Error Repair and RCC Statistics

Field	Description
Generic NACK Messages Received	
Total Messages	Number of NACK messages received by this VQE-S from VQE Clients.
Invalid Messages	Number of invalid messages received by this VQE-S from VQE Clients. Invalid messages are received messages that, for example, cannot be parsed.
Repaired RTP Packets	
Requested	Number of RTP packets VQE Clients have requested for Error Repair from this VQE-S.
Sent	Number of RTP packets sent by this VQE-S that have succeeded in repairing an error.

Table 4-7 Error Repair and RCC Statistics (continued)

Field	Description
Not Sent	Number of failed RTP packets that were not repaired by VQE-S. VQE-S may not be able to send an Error Repair packet for the following reasons: • The most likely cause is that the Error Repair requests were bursty and exceeded the Error Repair rate-policer limit at one point. • The requested RTP packets were not found in the VQE-S memory cache. • The VQE-S failed to send the RTP packets because of a socket sendto() failure.
Inbound and Outbound Error Repair Average Rate (packets per second)	
5 second, 5 minute, 1 minute, 15 minute	For each time period, the average number of packets per second that VQE-S has received (inbound) or sent (outbound) to VQE Clients to repair errors (Unicast Retransmission).
RCC Statistics—Rapid Channel Changes	
Requested	Number of Rapid Channel Changes requested for this channel.
Accepted	Number of Rapid Channel Changes requested for this channel where the VQE-S has accepted the request and sent IPTV packets and other channel data to a VQE Client on the set-top box.
Refused	Number of Rapid Channel Changes requested for this channel where VQE-S has refused the request. For example, VQE-S may refuse an RCC request for the following reasons: • If the VQE-S did not find an I-frame that is a suitable starting point for the RCC burst • If the VQE-S exceeded the output interface bandwidth limit or CPU load limit If the CPU load limit is exceeded, the Advanced Channel Debug Stats counter "Refused RCC - no core resources on DP" shows when the limit is exceeded.
Failed	Number of Rapid Channel Changes that have failed. A VQE-C has made an RCC request, and VQE-S has accepted the request and sent IPTV packets and other channel data to a VQE Client. But the RCC failed. For example, an RCC can fail if the VQE-C stopped receiving RCC packets from the VQE-S earlier than was expected.

Viewing Excess Bandwidth

When you click **Error Repair and RCC** in the navigation tree and click the **Excess BW** tab, VQE-S AMT displays the Excess BW window (Figure 4-10).

Figure 4-10 Excess BW Window

If Error Repair or RCC is enabled and active, you can choose to display a client e-factor histogram or table by clicking the icons in the upper right of the window. Use the Select a client e-factor histogram drop-down menu to select Error Repair or RCC histograms.

An e-factor is an excess bandwidth fraction that determines the rate at which packets are sent during Error Repair and RCC. The data displayed in the histograms and tables include the following:

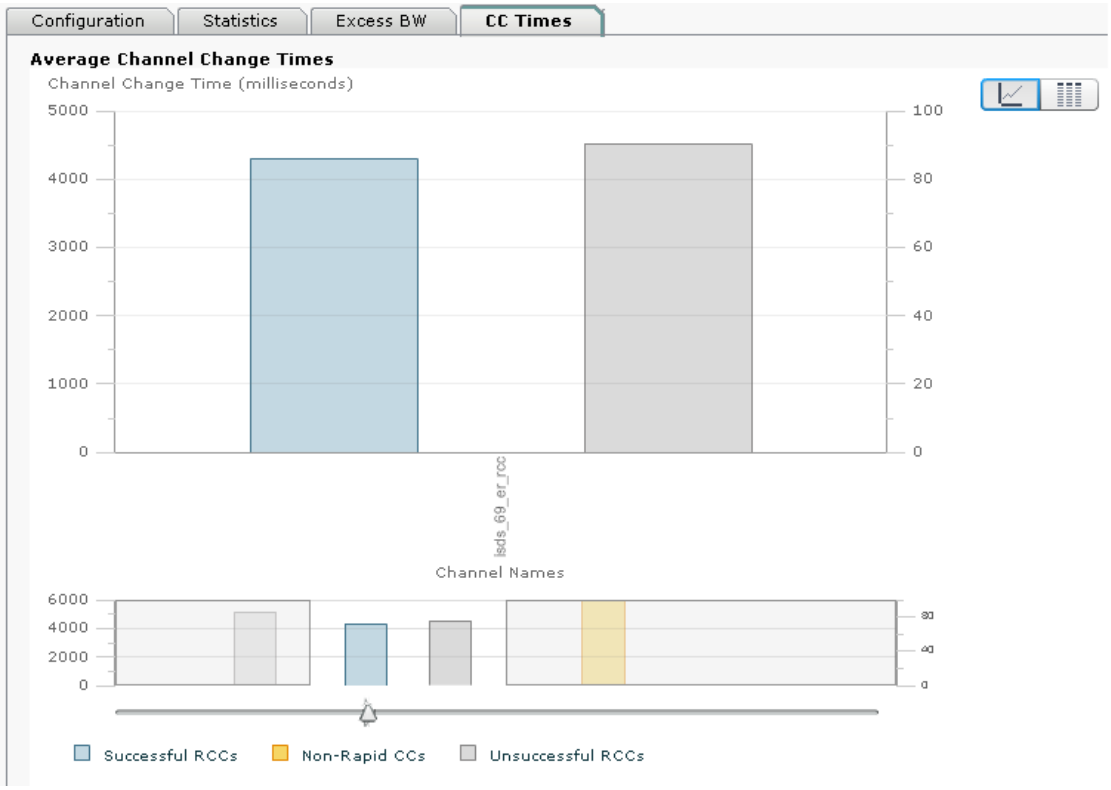
- An e-factor count with the number of times a client e-factor has been calculated. This appears on the vertical axis in the histograms.
- An e-factor distribution of the client e-factor percentages that have been used. This appears on the horizontal axis in the histograms. If the distribution is widely dispersed, there can be more than one grouping of percentages.

You can move the slider below the histograms to change the way in which the histograms are displayed. The e-factor percentages will never be negative values.

Viewing Channel Change Times

When you click **Error Repair and RCC** in the navigation tree and click the **CC Times** tab, VQE-S AMT displays the CC Times window (Figure 4-11).

Figure 4-11 Channel Change Times Window



In this window, the Average Channel Change Time histogram and table are displayed. The data displayed in the histogram and table includes the following:

- The average channel change time in milliseconds for each channel on the VQE-S for the following three categories:
  - Successful RCCs
  - Unsuccessful RCCs
  - Non-rapid CC (that is, channel changes where RCC was not requested).

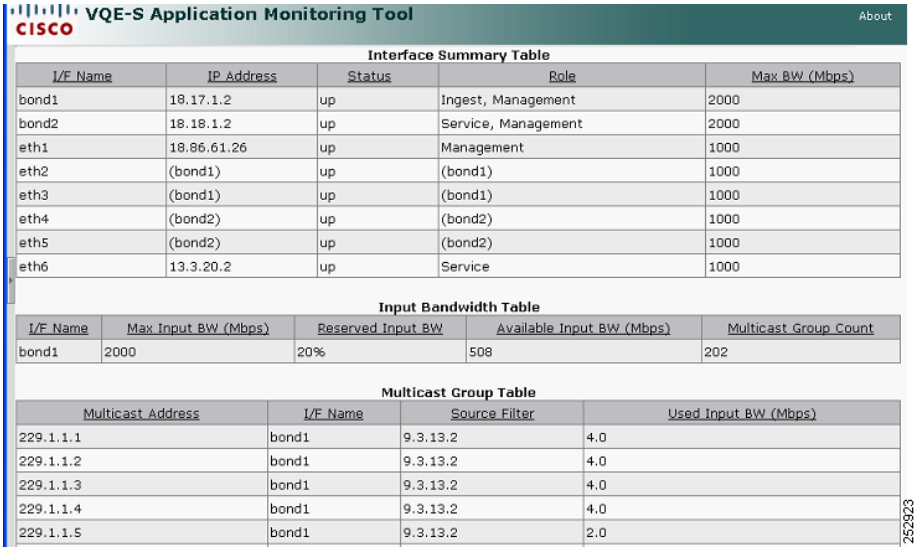
The data displayed is based on the last 100 successful channel changes where RCC was enabled, the last 100 unsuccessful change changes where RCC was enabled and the last 100 channel changes where RCC was disabled.

You can move the slider below the histogram to change the way in which the histogram is displayed.

Monitoring Interfaces

When you click **Interfaces** in the navigation tree, VQE-S AMT displays three tables associated with the CDE110 Ethernet and bond interfaces: the Interface Summary Table, the Input Bandwidth Table, and the Multicast Group Table. Figure 4-12 shows these tables. (In Figure 4-12, some channels in the Multicast Group Table have been omitted.)

Figure 4-12 Interface-related Tables



The Interface Summary Table (shown in Figure 4-12) has the information listed in Table 4-8. The information is about the Ethernet and bond interfaces on the Cisco CDE110 that are currently configured for VQE-S ingest and services traffic.

Table 4-8 Interface Summary Table

Column	Description
I/F Name	Name that is assigned to the Ethernet interface or bond interface by Linux. For information on these names, see "Configuring the Linux Operating System for VQE-S" section on page D-3.
IP Address	One of the following: • If this interface is an Ethernet interface and it does not belong to a bond interface, IP address assigned to the Ethernet interface. • If this interface is an Ethernet interface and it belongs to a bond interface, the bond interface name is displayed. • If this interface is a bond interface, IP address assigned to the bond interface.
Status	Either up or down.

Table 4-8 Interface Summary Table (continued)

Column	Description
Role	One or more of the following: • Ingest—Used for traffic for multicast streams from the upstream video sources. • Service—Used for VQE-S services traffic (Unicast Retransmission and RCC) to the downstream VQE Clients on the set-top boxes. • Management—Used for VQE-S management traffic to the management network. • Bond interface name—Used for Ethernet interfaces that are members of a bond interface. Displays the bond interface name.
Max BW (Mbps)	Maximum speed of the interface.

The Input Bandwidth Table (shown in Figure 4-12) has the information listed in Table 4-9. The table provides information on the Ethernet interfaces or bond interfaces currently being used for VQE-S ingest traffic. The interfaces listed in this table are currently under the control of the VQE-S Multicast Load Balancer.

Multicast Load Balancer distributes traffic for incoming multicast streams over the Ethernet interfaces that are configured for ingest. If a bond interface is used for ingest traffic, the Mulicast Load Balancer distributes traffic over the Ethernet interfaces that are members of the bond interface. The interfaces must be correctly configured and operational (up) to participate in this load balancing. Multicast Load Balancer determines the best interface on which to join or leave the multicast group, distributing the joins across available interfaces to avoid oversubscription. Multicast Load Balancer also monitors the status of these interfaces, moving the streams to other interfaces in case of interface failure.

Table 4-9 Input Bandwidth Table

Column	Description
I/F Name	Name of the interface that is being used for receiving multicast streams.
Max Input BW (Mbps)	Maximum speed of the interface.
Reserved Input BW	Percentage of maximum input bandwidth that has been reserved for all non-ingest traffic and will not be used for receiving multicast streams. The VCDB parameter vqe.vqes.unicast_reservation specifies this percent. • If the interface is used for both VQE-S ingest and VQE-S services, the reservation should include sufficient bandwidth for receiving Unicast Retransmission and RCC requests, RTCP reports from the set-top boxes, and control traffic, such as IGMP and RTCP. • If the interface is used for ingest only, the reservation should include sufficient bandwidth for incoming control traffic, such as IGMP and RTCP.

Table 4-9 Input Bandwidth Table (continued)

Column	Description
Available Input BW (Mbps)	Interface bandwidth that is available for ingest of multicast streams but that is not currently being used. Initially, when no multicast streams are being received by this interface, this value is equal to Max Input BW minus Reserved Input BW.
Multicast Group Count	Number of multicast streams that are currently being received by the interface.

The Multicast Group Table (shown in Figure 4-12) has the information listed in Table 4-10. The table provides information about the multicast streams currently being received by this VQE-S.

Table 4-10 Multicast Group Table

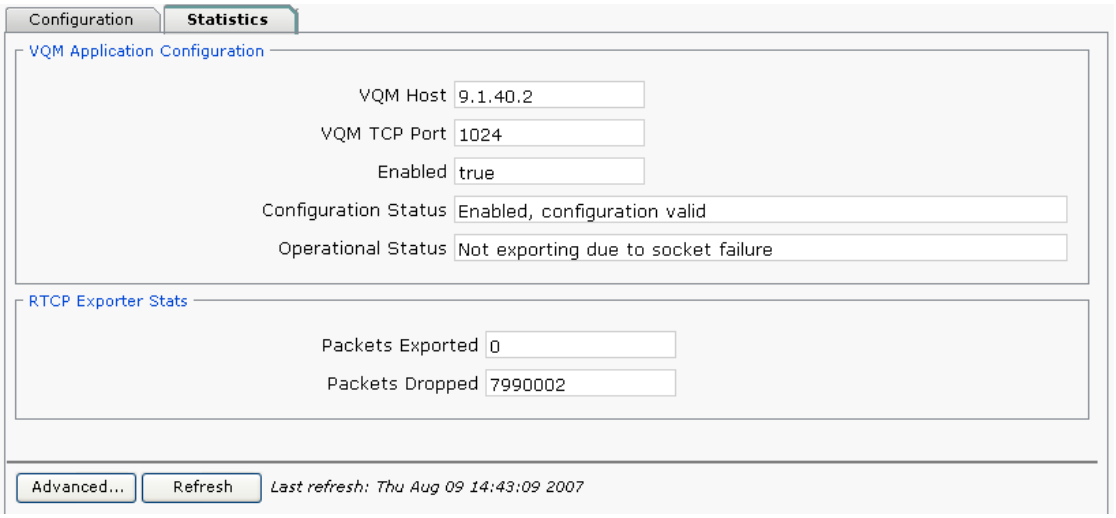
Column	Description
Multicast Address	Destination IP address for this multicast group.
I/F Name	Name of the interface that is being used for receiving this multicast stream.
Source Filter	Source IP address of the multicast group's sender.
Used Input Bandwidth (Mbps)	Receive bandwidth consumed on this interface by receiving this multicast steam. This bandwidth is specified in the channel definition (for example, in VCPT's Bit Rate field).

Monitoring RTCP Exporter

When you click **RTCP Exporter** in the navigation tree and click the **Configuration** tab, VQE-S AMT displays the VQE-S RTCP Exporter parameters. RTCP Exporter currently has no parameters that can be configured with VQE-S AMT, and the parameters are for viewing only. For information on configuring RTCP Exporter, see the "Configuring VQE-S RTCP Exporter" section on page 2-39.

When you click **RTCP Exporter** in the navigation tree and click the **Statistics** tab, VQE-S AMT displays the RTCP Exporter Statistics window (Figure 4-13).

Figure 4-13 RTCP Exporter Statistics Window



The RTCP Exporter Statistics window has the information listed in Table 4-11. The statistics are for this VQE Server's RTCP Exporter.

Table 4-11 RTCP Exporter Statistics

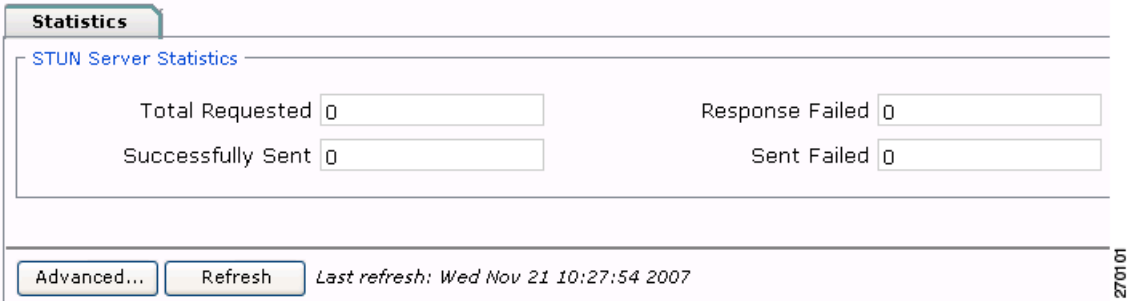
Field	Description
VQM Application Configuration	
VQM Host	IP address of the host on which the video-quality monitoring (VQM) application resides.
VQM TCP Port	TCP port number on which the VQM application listens for video quality data from RTCP Exporter.
Enabled	Either true (enabled) or false (not enabled).
Configuration Status	Either enabled or not enabled. It is possible for the value in the Enabled field to be true, and the value in the Configuration Status field to be not enabled (for example, if the host IP address or TCP port are not valid).
Operational Status	Message providing information on the operational status of RTCP Exporter.
RTCP Exporter Stats	
Packets Exported	Number of RTCP compound packets that have been exported to a VQM host.
Packets Dropped	Number of RTCP compound packets that have been dropped rather than exported to a VQM host. In heavy load situations, RTCP Exporter may intentionally drop RTCP packets. Details on dropped packets (number of dropped packets and the position and time where this loss occurred) is contained in the collection of reports exported by this VQE-S.

For information on RTCP Exporter and the video-quality monitoring application, see the "VQE-S RTCP Exporter for Video-Quality Monitoring" section on page 1-23.

Monitoring the STUN Server

When you click **STUN Server** in the navigation tree, VQE-S AMT displays the STUN Server Statistics window (Figure 4-14).

Figure 4-14 STUN Server Statistics Window



The STUN Server Statistics window has the information listed in Table 4-12.

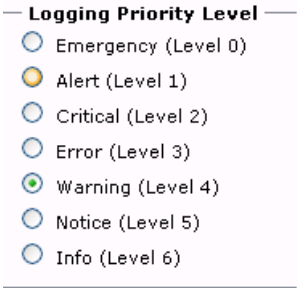
Table 4-12 STUN Server Statistics

Field	Description
Total Requested	Number of STUN binding requests that the VQE-C STUN Client sent to the STUN Server.
Successfully Sent	Number of responses to STUN binding requests that the STUN Server successfully sent to the VQE-C STUN Client.
Response Failed	Number of instances where the STUN Server fails to generate a binding response because of an internal error.
Sent Failed	Number of instances where the STUN Server successfully generates a binding response but fails to send it to the VQE-C STUN Client (for example, because of a socket error).

Configuring VQE-S Logging

When you click **Logging** in the navigation tree, VQE-S AMT displays the logging priority levels (Figure 4-15) for VQE-S. The priority levels allow you to control the logging level for system messages for all VQE-S processes (Process Monitor, Control Plane, Data Plane, and Multicast Load Balancer). By default, all VQE-S system messages are written to the file /var/log/vqe/vqe.log.

Figure 4-15 Logging Priority Levels



To configure a VQE-S logging priority level, click the button next to the level you want and click **Apply**.

In VQE-S AMT, the logging priority levels are listed from least verbose to most verbose. The Emergency level generates the smallest number of messages, and the Info level generates the greatest number of messages. The default value is Warning.

When you select a logging level, log messages are generated for the levels below that level. For example, when the level is set to Error, messages are generated for Emergency, Alert, Critical, and Error.

The selected logging priority level does not persist when VQE-S is stopped. When VQE-S restarts, the logging priority level goes back to the default (Warning). To set a logging priority level that does persist, use the VQE-S parameter vqe.vqes.log_priority. For information on this parameter, see Table A-1 on page A-2.

Configuring VQE-S Debugging

When you click **Debugging** in the navigation tree and click a debug component, the debugging options for that component are displayed. Figure 4-16 shows the debug components. The options allow you to control the types of debugging messages that are written to the syslog file. By default, debug messages are written to the file /var/log/vqe/vqe.log.

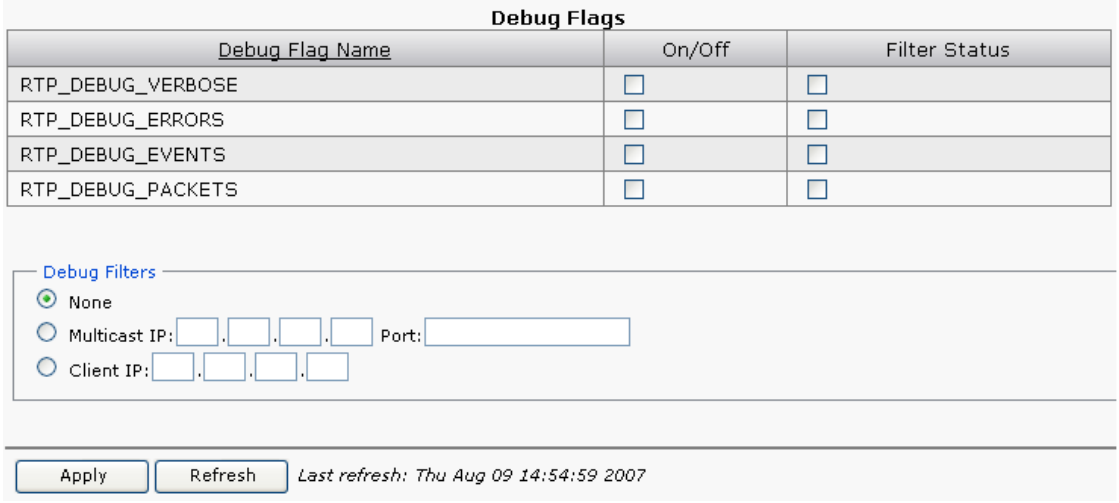
Figure 4-16 Debug Components

To configure VQE-S debugging, follow these steps:

Step 1 In the VQE-S AMT navigation tree, click the + sign next to **Debugging** and click the component for which you want debug messages.

The debug flags and filters for that component are displayed. For example, Figure 4-17 shows the flags and filters for the RTP/RTCP category.

Figure 4-17 RTP/RTCP Flags and Filters



Note In the Debug Filters for the STUN Server, only the Client IP filter is supported. The Multicast IP filter is not supported because the STUN Server has no knowledge of channels. Filtering on the Client IP address will provide debug messages for the specified client.

Step 2 To enable a debugging flag, click the check box in the On/Off column, or to disable an enabled flag click the check box to uncheck it.

Note For the next step, be aware that not all debug flags support debug filters (in the Filter Status column). If debug filters are not supported, the check box next to the flag is grayed out.

Step 3 For an enabled debugging flag, if you want to filter debugging messages by a specific channel or VQE Client, do the following:

a. In the Filter Status column, click the check box for the option.

b. In the Debug Filters section, click either **Multicast IP** or **Client IP**:

- For Multicast IP, enter the channel's source stream IP address and (RTP/UDP) port number.
- For Client IP, enter the VQE Client's IP address.

Step 4 Click **Apply**.

The selected debugging options are enabled.

The selected debugging options do not persist when VQE-S is stopped. When VQE-S restarts, debugging goes back to the default—no options are enabled.