Overview of Cisco Multicast Manager

Cisco Multicast Manager (CMM) 3.1 is a web-based network management application that enables monitoring and troubleshooting of IP multicast networks. CMM allows you to:

- Discover the devices in your IP multicast network.
- Determine the network topology to visualize the network architecture.
- Manage the network elements through multicast polling and monitoring of alerts.
- Troubleshoot problems by identifying the source of network faults.
- Support for Protocol Independent Multicast (PIM), PIM Sparse Mode (PIM-SM), PIM Dense Mode (PIM-DM), PIM Source Specific Multicast (PIM-SSM), and Multicast VPN (MVPN).

This chapter contains the following sections:

- CMM Applications and Architecture, page 1-1
- Additional Product Features, page 1-5

CMM Applications and Architecture

CMM is used in several industries, by:

- Financial services customers who broadcast information such as stock quotes and prices for other financial instruments over IP multicast.
- Service providers who deliver video over IP multicast. Using CMM, video service providers can monitor video quality over multiple channels, view alarms that indicate problems in the video delivery network, and isolate the source of faults that affect video broadcast.
  
  CMM 3.1 includes support for Cisco VidMon monitoring on Cisco 7600 Series routers and Cisco ASR 9000 devices.
- Service providers who need to manage their Multicast VPN (MVPN) environment.

Multicast Monitoring and Troubleshooting

CMM provides powerful features for monitoring IP multicast networks, including:

- Automated multicast discovery and topology generation
- Proactive multicast polling and monitoring
- Real-time multicast diagnostics
- Alerting and reporting
- Support for Protocol Independent Multicast (PIM), PIM Sparse Mode (PIM-SM), PIM Dense Mode (PIM-DM), PIM Source Specific Multicast (PIM-SSM), and Multicast VPN (MVPN)

**Figure 1-1** shows how Cisco Multicast Manager can be used to trace a multicast group. The trace is presented in tabular and graphical format. The table can update dynamically, showing the packet per second (PPS) rate, output errors, and discards for each interface along the tree. Cisco Multicast Manager also includes support for video probes that might be deployed for monitoring video quality. The embedded address management database shows which channels are affected if there is a problem with a specific multicast group.

**Support for Cisco Video Solutions**

CMM can be used to monitor multicast flows used in video networks. For example, CMM is used in the Cisco Video Assurance Management Solution (VAMS), which monitors end-to-end video transmission networks. CMM receives traps from industry standard video probes such as BridgeTech probes, IneoQuest probes, and Mixed Signals probes.

**Figure 1-2** shows a typical CMM architecture in a video network.
When users view CMM events in the event lists in Cisco VAMS, they can use the cross-launch capability in Cisco VAMS to launch CMM to perform a trace and other analysis of the IP multicast network.

For more information on Cisco VAMS see the User Guide for Cisco Multicast Manager, 2.0 at the following location:


Vidmon Support

The Cisco IOS supports video monitoring on Cisco 76xx devices and on Cisco ASR 9000 Series devices. IOS video monitoring, referred to as Vidmon, is implemented through IOS CLI commands.

CMM video monitoring includes support for the Vidmon capability provided in Cisco 7600 series routers running IOS 12.2(33)SRE and in ASR 9000 Series (Viking) devices running IOS XR 3.9.1.

The Vidmon support in CMM 3.1 varies for Cisco 7600 series routers and ASR 9000 devices. The Cisco 7600 supports VidMon metrics only on the enhanced service blade (ES+) line cards.

Vidmon Metrics

Vidmon provides the following video metrics:

- **Media Delivery Index (MDI) Reporting**—MDI is a metric developed in cooperation between IneoQuest and Cisco and presented in RFC 4445. MDI is a combination of two metrics that are used to measure the network’s contribution to video impairments. The two MDI metrics are:
- **MDI:MLR**—MDI:Media Loss Rate indicates whether MPEG packets were dropped.
- **MDI:DF**—MDI:Delay Factor (DF) indicates the buffering requirements for the packets in the media stream. DF represents the difference between the arrival and drain rates of a media stream. This is largely based on the arrival of the IP flow. The DF over an interval period represents the buffering required to handle variations in transmission at a point in the transmission path.

**MRV Reporting**—Media Rate Variation (MRV) measures loss as a function of the L3/L4 header. For Constant Bitrate Flows (CBR) a normalized bit arrival rate is created based on the known media arrival rate.

VidMon Media Rate Variation (MRV) measures loss as a function of the L3/L4 header. For Constant Bitrate Flows (CBR) a normalized bit arrival rate is created based on the known media arrival rate. The video flow is monitored for variations in the arrival rates which represent perturbations caused by excessive delay or loss in the media flow.

### CMM Implementation of Vidmon

CMM implements Vidmon support as follows:

1. When CMM monitors a video flow using Vidmon, depending on the device that is monitored, CMM uses two tables: a MDI table and a CBR table. The monitored IOS devices support MDI and CBR as follows:
   - The Cisco 7600 platform supports both MDI and CBR. The Vidmon implementation on Cisco 7600 devices uses a MDI table or a CBR table.
     - The MDI table contains both DF and MDI information. The CBR table contains DF and MRV information.
   - ASR 9000 Series devices support only CBR through a CBR table.

2. When CMM detects a video flow it looks for the presence of an MDI table. If there is an MDI table, then CMM retrieves DF and MLR information.

3. If there is no MDI table, CMM examines the CBR table for the flow and retrieves DF and MRV information from the CBR table.

### MLR Reporting

For Cisco 7600 devices CMM allows you to set a MLR threshold in packets

### DF Reporting

For both Cisco 7600 series devices and Cisco ASR 9000 series (Viking) devices, CMM allows you to set a delay factor in milliseconds and generate a VIDEO DF HIGH event when the DF threshold is exceeded.

### MRV Reporting

For both Cisco 7600 series devices and Cisco ASR 9000 series (Viking) devices, CMM allows you to set a maximum and minimum MRV rate in millisecond percentages, and generates alerts if the maximum or minimum MRV is exceeded:

- When a specified MRV Maximum threshold is exceeded, CMM generates a VIDMON MRV HIGH alert.
- When a specified MRV Minimum threshold is reached, CMM generates a VIDMON MRV LOW alert.

Using the Graphs tab in the CMM Dashboard interface, you can view real-time graphs that compare MLR, DF, and MRV data for up to four devices at a time.
Additional Product Features

CMM 3.1 provides the following features:

- **Automated Multicast Discovery**—CMM discovers complete multicast topology from a single seed device, along with the MVPN provider and provider edge devices and VRF tables they support. Discovery bridges the service provider edge to the customer edge to create an end-to-end view of the multicast environment.

CMM discovery includes the ability to discover the routers in the service provider network by starting with a single router in the service provider network (PE or P router) as well as discovery of the CE routers in the Enterprise networks. Both IOS and IOS-XR based routers are supported.

- **Alerts and Reports**—Any exceptions detected by the polling engine are sent as Simple Network Management Protocol (SNMP) traps and logged for reporting purposes. Reports are available for Rendezvous Points (RPs), Source-Group (S,G) PPS rates, tree changes, interface bandwidth, Layer 2 port PPS rates. Real-time alerts originating from an IneoQuest iVMS application are also actionable through the video operations solution (VOS) add-on.

- **Show All Groups Feature**—Provides a complete list of active S,Gs.

- **IGMP Diagnostics**—Displays all devices that have seen an Internet Group Management Protocol (IGMP) join for a particular group.

- **MSDP Status**—Shows the status of all Multicast Source Discovery Protocol (MSDP)-enabled devices and their peers, including Source-Active cache information.

- **Layer 2 Diagnostics**—Shows which multicast groups are being forwarded on a particular Layer 2 switch port.

- **Health Check**—Provides on-demand checking of forwarding trees; RPs and checking for the existence of specific S,Gs can also be scheduled to run automatically.

- **6500/7600 Troubleshooting**—Provides the equivalent of a Cisco IOS Software command-line interface “show tech” for multicast, along with Local Target Logic (LTL) checking and PPS rates taken from the route processor, switch processor, or distributed forwarding card. For example, you can execute the `show mls ip multicast statistics` command to output statistics on multicast flows on a specified device. Output can be e-mailed directly to the Cisco Technical Assistance Center for further analysis. For information on using this feature, see 6500/7600 Troubleshooting, page 8-14.

- **Configurable SNMP Trap Descriptor**—Support for user configuration of the descriptor for SNMP traps issued by CMM. This configuration will be on a per domain-basis.

- **Explicit User Tracking**—CMM supports the ability to identify the multicast receivers connected to a Catalyst 6500 devices with IOS version 12.2(33) and higher. Three use cases are supported:
  - **Device Query**—Generates a list of receiver information based on a specified device.
  - **Stream Query**—Generates a list of receiver information based on a specified (S,G).
  - **Receiver Query**—Generates stream flow information based on a specified receiver IP address.

- **Identify PIM Interfaces That are Down**—CMM trace logic relies on Protocol Independent Multicast (PIM) interface reachability. If any one of the PIM interfaces along the multicast tree is down, the trace will not be completed and the user does not know the problem. CMM provides a feature to show the users which PIM interfaces are down. The analysis will be done on a per-domain basis.

- **Configurable Login Message**—CMM 3.1 provides a login message that is presented to users immediately after they successfully log in to the application. This message is configurable by an administrator and allow messages of at least 1600 Unicode characters. The message must be
specifically acknowledged to continue with the login. Users can disable this feature, if no login message is desired. Typical uses of such a message are an unauthorized use warning message or to remind users of planned application downtime, etc.

- **Northbound API**—CMM provides a software development kit (SDK) that allows you to develop a client application that communicates with CMM by using Web Services Definition Language (WSDL) messages. The API operations provided by the SDK allow you to perform tasks such as:
  - Getting a trace image file from the CMM server for use by your application.
  - Getting the Source and Group (S,G) in a domain or on a device.
  - Getting multicast events.
  - Getting the multicast devices in a domain.
  - Adding Layer 2 devices, Layer 3 devices, or video probes in bulk.
  - Adding, deleting, and viewing polling configurations.