Overview of Cisco Multicast Manager

Cisco Multicast Manager (CMM) 3.2 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 effect video broadcast.

CMM 3.2 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, including multicast trace for Layer 2 and Layer 3 devices by PIM neighbor address or by IP Management Address
- For VidMon devices (Cisco 7600 series devices and Cisco ASR 9000 series devices, unicast trace as well as multicast trace.
- 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. Video probe monitoring includes the ability to monitor Digital Content Managers (DCMs). The embedded address management database shows which channels are affected if there is a problem with a specific multicast group.

Figure 1-1 Using Cisco Multicast Manager to Trace a Multicast Group

<table>
<thead>
<tr>
<th>Trace Data</th>
<th>Packet/Sec</th>
<th>Forwarding Int</th>
<th>Output Errors</th>
<th>Discards</th>
<th>Neighbor IP</th>
<th>Neighbor Int</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigabitEthernet0/0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>10.1.1.1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>GigabitEthernet0/1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>10.1.1.2</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>GigabitEthernet0/2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>10.1.1.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

In environments that use MPLS Point-to-Point Traffic Engineering (P2MP TE), CMM performs a complete multicast trace that traces flows from a source customer network through the P2MP TE tunnel to the destination customer network(s).

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:


Cisco 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 Cisco 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 3.2 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

Cisco 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 Cisco VidMon

CMM implements Cisco 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.
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.

Additional Product Features

CMM 3.2 provides the following additional features:

- **VidMon Trap Support**—CMM receives traps from various routers and video probes. CMM 3.2 also supports polling for specific data when cfmNotifyAlarm traps are received from VidMon devices, and uses the collected information to generate the necessary metrics.
- **Cisco DCM Support**—Cisco Multicast Manager 3.2 adds support for the Cisco Digital Content Manager (DCM).
- **SG Polling Configuration by Range**—With CMM 3.2, you can configure SG polling for a range of Source IP addresses or Group IP addresses.
- **Displaying Date and Time of Last Successful Login**—Cisco Multicast Manager 3.2 displays to users their last current login time.
- **Disabling of User IDs Not Used for Over 90 Days**—CMM 3.2 disables a user account if it is not used for more than 90 days. The user is not be able to logon anymore and CMM displays the message “Your User ID is disabled.”
- **Password Aging**—CMM 3.2 enforces password changes every 60 days. Users are prompted to change their password.
- **Trace Using Management IP Address**—In some service provider environments, access to PIM interface may be blocked, which affects CMM traces. With CMM 3.2,you can configure multicast flow trace based on either the PIM neighbor address of a device or the management IP address.
- **Show L2 Switches in Forwarding Tree**—CMM 3.2 shows Layer-2 switches in the forward trace in addition to the existing display of routers and video probes. In addition, CMM also supports the ability to automatically discovery Layer-2 devices as part of the multicast discovery process.
- **Show L2 Multicast Receivers in Forwarding Tree**—CMM 3.2 displays multicast receiver information when you click on devices on the Multicast Trace page. This feature is supported for 7600 and 6500 class devices.
- **SWIFT Licensing Support**—CMM 3.2 is licensed using Cisco’s SWIFT stands for Software Infrastructure and Fulfillment Technology (SWIFT), which allows you to request and receive licenses using CCO. CMM licenses are now based on host addresses.
- **Automatic Identification of CE-PE Interfaces for VRFs**—CMM interface polling automatically identifies the interface connecting the CE and PE for each VRF.
- **Support for VMware ESXi 4.x**—Cisco Multicast Manager 3.2 supports VMware ESXi 4.x environments.

- **Automatic L2 Device Discovery**—You can configure CMM 3.2 to automatically discover Layer-2 devices during domain discovery.

- **Unicast Flow Trace for VidMon Devices**—You can now launch a unicast flow trace from the VidMon flow monitoring page. The unicast trace includes the devices that were discovered in the domain.

- **IP Unnumbered Topology**—Provides the ability to handle cases where a customer is using IP unnumbered interfaces to carry multicast traffic.

- **Flexible Device Access for Telnet and SSH**—Improves device access by adding the ability for the user to select both Telnet and SSH access for devices in the domain. SSH v1 and, for Cisco IOS-XR devices, SSH v2, are supported.

- **Support for P2P/P2MP TE Links**—CMM now supports the ability to run a complete multicast trace from a source customer network, through a Point-to-Multipoint Traffic Engineering (PM2MP TE) tunnel to the destination customer network(s). CMM 3.2 provides a new Distributed Network Discovery/P2MP option to discover devices over P2MP TE tunnels.

- **Support for 3750 and 4500 Switches**—Cisco Multicast Manager 3.2 adds Layer-2 diagnostic support for Cisco Catalyst 3750 Series Switches and Cisco Catalyst 4500 Series Switches.