The Cisco IPTV SLA Solution for IP NGN Video Networks

Monitoring and Troubleshooting Solution for Service Provider IPTV Transport Networks

Executive Summary

Consumers of entertainment-grade video have high expectations of virtually perfect video quality. As service providers migrate their video content distribution to IP networks, there is an implicit need for tools that improve operational efficiency, increase network visibility, and help ensure a smooth migration from providers' current video networks. The Cisco® IPTV SLA solution provides monitoring of the IPTV broadcast flows through the IP network and delivers quality measurements, channel mapping, and route path analysis. It is the industry's first solution that couples the intelligence of the multicast protocol with the video channel lineups in a monitoring system. Moreover, it provides rapid problem isolation by offering a common platform for network and video operators.

With the IPTV SLA solution, network operators can quickly resolve video anomalies by isolating the issue to a particular portion of the IP network. The operator can see both the scope and the impact of network problem before the subscriber reports it. The IPTV SLA solution can be deployed in any video distribution network including wireline IPTV, cable, mobile, and satellite IP video networks.

Challenge

Service providers have been deploying next-generation IP networks to deliver converged IP services, with new features for subscribers, at reduced operational costs. However, the delivery of IPTV content poses some challenges: Errors can occur in the encoding and transcoding process, and the transport of IP packets across the network can contribute to video impairments. From the network perspective, IPTV is sensitive to both loss and excessive jitter in the IP network. These issues can lead to video anomalies visible to the IPTV subscriber as pixilation, picture freeze, or loss of picture. Today when anomalies are reported by the IPTV subscriber, the network operators have to associate the video content with the corresponding IP transport infrastructure and spend time correlating customer calls to troubleshoot the network. As a result, the service provider may experience long outage periods and higher operational costs associated with troubleshooting subscriber calls.

The IPTV SLA solution provides the network operator with visibility into both the IPTV multicast and video control planes, delivering video-quality measurements as well as IP transport statistics on a per-channel basis.

Business Benefits

Table 1 outlines some of the many benefits of the Cisco IPTV SLA solution.

Table 1.   IPTV SLA Benefits

Feature	Benefit
IPTV Multicast Flow Tracing	IPTV multicast flows can be isolated to only the network segments responsible for transmission. This reduces and isolates the potential problem domain for the service provider.
IPTV Video-Quality Measurements	The IPTV flow is measured for loss and latency that will result in video artifacts in the subscriber home. This video measurement is correlated with the multicast IPTV flow tracing for easy problem correlation.
IPTV Channel Mapping	An IPTV multicast flow can carry one or more channels. The IPTV SLA solution reports which channels are carried in a multicast flow through the network. Service providers can quickly determine the impact of any anomalies in the IPTV transport network.
Health Checks	The IPTV SLA solution offers a programmable interface, allowing a rule set to be created on a per-flow basis. Violations to this rule set, such as path or pps, will result in notification to the network operator.
IPTV-Related Multicast Flows	The solution automatically finds related multicast flows carrying similar video content. This helps operators to isolate problems and determine their impact.
Integrated Router Statistics	A complete set of multicast diagnostics is provided on a per-flow basis, including router and switch statistics.
Northbound Notification	The IPTV SLA solution integrates with the service provider's service manager applications by providing northbound trap notifications of IPTV flow alerts.

Solution

The Cisco IPTV SLA solution includes the Cisco Multicast Manager, a Web-based network management application that simplifies the monitoring and troubleshooting of multicast networks, and a service manager such as the Cisco Information Center (Figure 1). These combined elements provide a complete IP multicast transport monitoring solution.

**Figure 1.**   IPTV SLA Product Architecture
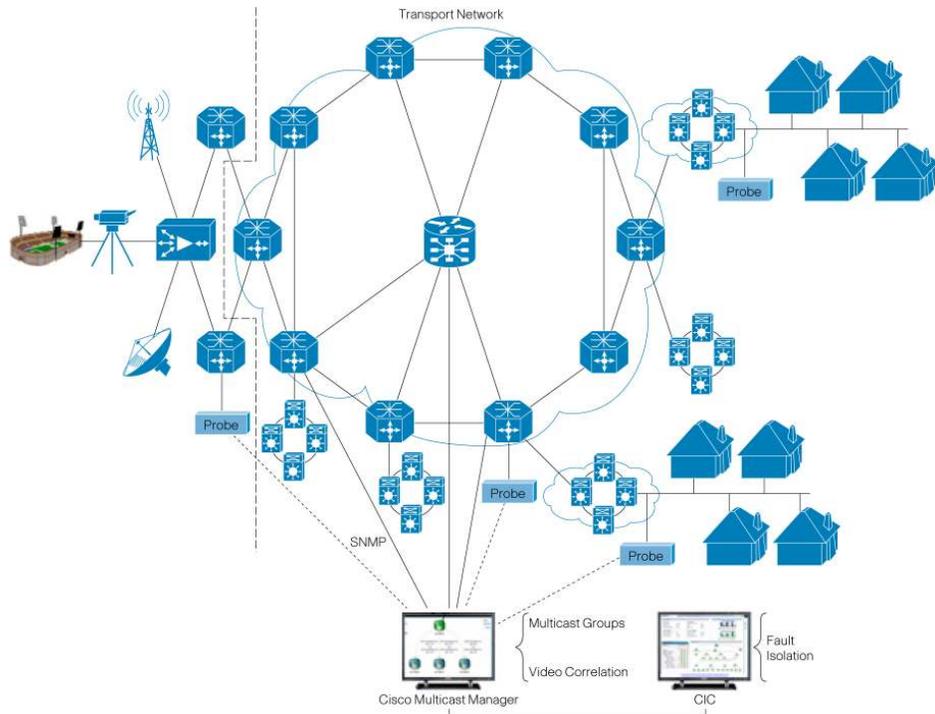
Broadcast video flows are delivered to subscribers using the intelligent multicast protocol. This provides efficient delivery of the IPTV flow in terms of both network path and bandwidth. The Cisco Multicast Manager participates in the multicast control plane monitoring all IPTV multicast flows through the IP network. The Cisco Multicast Manager can actively report the current state of any multicast flow in the network and associate that flow with the video content being carried in the IP payload

Any changes in the video delivery path will be detected by the Cisco Multicast Manager and reported as required. Multicast statistics, on a per-flow basis, are available from each router in the IPTV delivery path to assist network operators in isolating transport issues. These statistics are granular down to the interface level of each router in a particular IPTV flow path.

The Cisco Multicast Manager supports the use of video monitoring probes in the network positioned strategically at key demarcation points. These probes are capable of breaking down the IP payload and examining the video content to determine real-time video quality measurements using standards-based measurement such as Media Delivery Index (MDI).
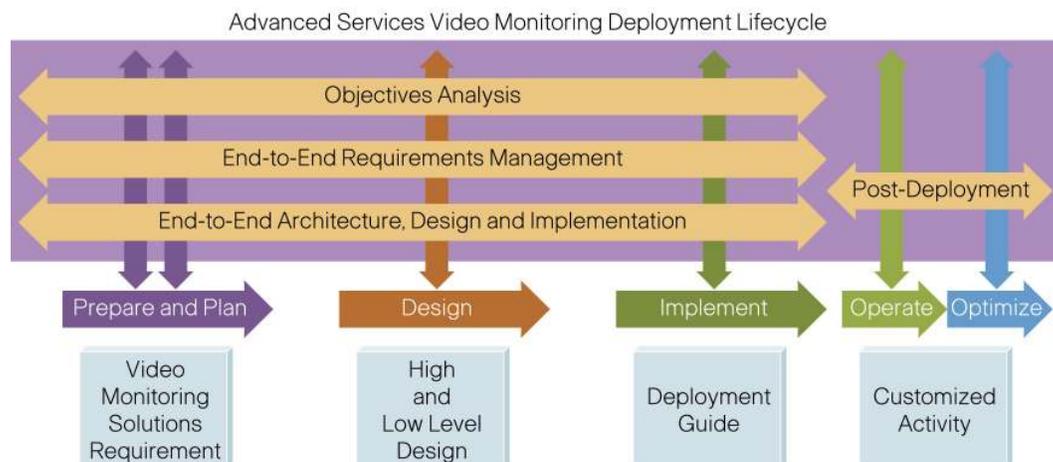
The probes report the video statistics back to the Cisco Multicast Manager, which then correlates with the IP multicast network to allow a visual representation of the IPTV flow through the network. The associated video channel carried in the IPTV flow then correlates with any related IP multicast flows carrying the same content. Figure 2 shows an example.

Figure 2. IPTV SLA Reporting
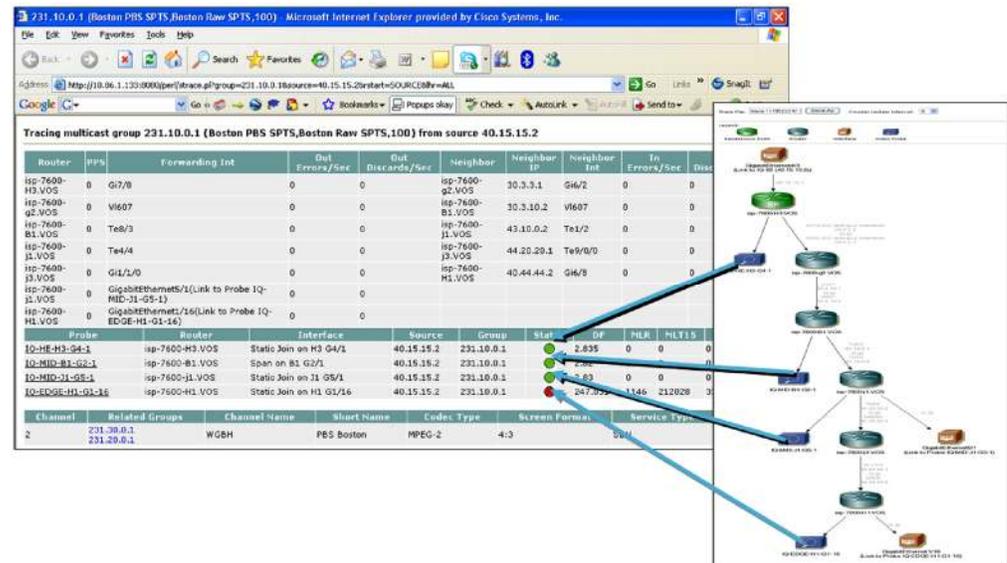
The Cisco Multicast Manager offers a northbound interface to provide trap alerts to a service manager such as the Cisco Information Center. By combining multiple silos of monitoring at the service manager level, IPTV alerts can be correlated against other monitored activities to provide complete fault root-cause analysis.

Cisco Advanced Services are available to deliver the full IPTV SLA solution, customized to meet the needs of the service provider. Cisco Advanced Services teams assist in the planning, design, implementation, and operation of the IPTV SLA solution, as represented in Figure 3.

Figure 3.   Cisco IPTV Advanced Services Model

Advanced Services Video Monitoring Deployment Lifecycle

Objectives Analysis

End-to-End Requirements Management

Post-Deployment

End-to-End Architecture, Design and Implementation

Prepare and Plan | Design | Implement | Operate | Optimize

Video Monitoring Solutions Requirement

High and Low Level Design

Deployment Guide

Customized Activity

Intelligent Networking

Cisco recommends multicast for the delivery of IPTV broadcast video. Multicast offers an intelligent control plane for the most efficient delivery of IP packets through the network. Video content also uses an intelligent control plane for IPTV channel lineups.

By coupling these intelligent control planes through the IPTV SLA solution, service providers gain a powerful advantage in monitoring and troubleshooting their IPTV networks.

The IPTV SLA solution enables both IP transport experts and video content experts to converge their resources through a common platform. A common platform reduces the time to resolution for IPTV flow-related issues and increases operational efficiency.

Why Cisco?

The Cisco IP SLA solution gives service providers the operational tools they need to migrate their video content to an IP NGN transport. Cisco is committed to enhancing and expanding the capabilities of its IPTV SLA solution based on the immediate and future needs of its customers. Finally, since Cisco is a leader in the delivery of multicast technology, the IPTV SLA builds on this expertise for the monitoring and troubleshooting of IPTV broadcast flows.

For More Information

For more information about the Cisco Multicast Manager as part of the Cisco IPTV SLA solution, please visit www.cisco.com/en/US/products/ps6337/products_data_sheet0900aecd80653c92.html or contact your sales representative.