Cisco Medianet 2.x: Simplifying, Lowering the Risks, Reducing Costs, and Improving the Deployment of Video and Collaboration

What You Will Learn

What are the Cisco Medianet 2.x components and how do they work together to:

- Reduce IT costs and complexity of deploying video, voice, and data, as well as improve the user experience
- Provide improved visibility into the network to accelerate troubleshooting, and the ability to assess the impact of voice, video, and data on the network
- Differentiate business-critical applications so a consistent user experience can be delivered end to end

Challenge

Providing a good quality video and collaboration experience for users can quickly become complex and costly due to the fact that organizations quite often deploy different collaboration applications and endpoints from different vendors at the same time, in the same infrastructure.

The characteristics of voice applications are very consistent when compared with the different video applications. Different video applications have different bandwidth requirements; traffic is bursty, it is unpredictable, highly compressed, and often, available in a variety of form factors from different vendors.

This inconsistency of application characteristics increases the complexity for IT organizations when deploying and managing many different types of applications from different vendors and devices. The IT challenges are sometimes exacerbated due to shrinking budgets and increasing end-user quality expectations, as video becomes pervasive in users everyday lives outside of the office.

Following an architectural approach to video with Cisco Medianet helps organizations deal with these challenges, simplifying, lowering the risks, cutting costs and improving the quality of video and collaboration deployments.

Business Benefits

The benefits of medianet to your business include:

- Reduced operational costs
  - Simplified installation and management of video endpoints
  - Faster troubleshooting for voice, data, and video applications
- Better investment decisions to meet business objectives - provides the ability to assess the impact of video, voice, and data in your network
- Service-Level Agreement (SLA) assurance and negotiation - provides the ability to gather key metrics for the service provided

- The ability to differentiate business-critical applications, determine the importance of a session based on its business value and provide end-to-end Quality of Service (QoS)
- Faster end-user adoption of rich-media applications through a high quality, positive user experience
- Pre-deployment assessment that increases the confidence of network and application operators

Solution

The Cisco Medianet Architecture extends the network boundary to include the endpoints. The network works together with the endpoints in order to scale, optimize, and enhance the performance of collaboration components.

The idea behind this approach comes from the realization that the endpoints or applications are the place in the architecture where there is the most information about the applications. The endpoints can communicate with the network, making the network media-aware and armed with important information that can be used to make intelligent decisions. The endpoints also become network aware and can request intelligent network services, for example, for troubleshooting.

This approach can be accomplished with the Media Services Interface (MSI) which is embedded in Cisco endpoints and collaboration applications. MSI provides a set of APIs enabling applications to use medianet network services, as well as send valuable information about the media flows to the network.

If video is critical to your business, the Cisco Medianet Architecture will provide a framework to help simplify deployment, troubleshooting and management of applications.

The Cisco Medianet Architecture includes a variety of components that work together to address the challenges associated with the deployment and management of video and collaboration applications. This document focuses on new capabilities introduced in Cisco Medianet 2.2 and later releases. It is also suggested to review the Cisco Medianet 2.1 Solution Overview, which describes other components of the solution.

Media Monitoring

Media Monitoring enhances visibility into the network to simplify, baseline, and accelerate troubleshooting of video, voice, and data applications, validating network performance and configuration before deploying new applications or before events.

Media Monitoring is composed of three features: Performance Monitor, Mediatrace, and IP SLA Video Operation (IP SLA VO). These three features form a suite of tools to enable the network operator to perform media performance monitoring and troubleshooting.

- Performance Monitor allows administrators to analyze the performance of rich-media traffic across the network to provide a holistic view of the network service being delivered.
- Mediatrace discovers Layer 2 and Layer 3 nodes along a flow path. It also implicitly uses Performance Monitor to provide a dynamic hop-by-hop analysis of media flows in real time to facilitate efficient and targeted diagnostics.
- IP SLA VO generates synthetic traffic streams that are very similar to real media traffic. It can be used in conjunction with Mediatrace to perform capacity planning analysis and troubleshooting, even before applications are deployed.

Performance Monitor

Performance Monitor is a medianet Cisco IOS® Software feature that measures the performance of the Real-Time Transport Protocol (RTP), TCP, and IP Constant-Bit-Rate (CBR) traffic on network devices. Performance Monitor analyzes RTP-based audio and video flows and reports on service-affecting metrics, such as packet loss and network jitter. For TCP flows, Performance Monitor reports on Round-Trip Time (RTT) and packet-loss occurrences. Hop-by-hop knowledge of these metrics, along the network path, leads to granular fault isolation and easier troubleshooting of user traffic flows.

Performance Monitor can be applied to a variety of media applications including Cisco TelePresence® systems, Cisco audio and video phones, Cisco video surveillance cameras, Cisco digital media players, , and Cisco WebEx® client applications. Performance Monitor uses standardized reporting methods that facilitate cross-vendor application support.

Performance Monitor maintains historical data about analyzed flows traversing routers and switches. The metrics collected by Performance Monitor can be exported to a network management tool through NetFlow Version 9 or the Simple Network Management Protocol (SNMP). Network management software can further analyze, summarize, and correlate this information to provide traffic profiling, base lining, and troubleshooting services for the application and network operator of the user network.

Performance Monitor can send alarms from the routers and switches through syslog and SNMP traps. Different media applications, for example Cisco TelePresence conferencing compared to Video on Demand (VoD), have different sensitivities to packet loss and jitter. These varying sensitivities can be encoded into Performance Monitor threshold evaluations and actions. An example would be the generation of an SNMP trap when Cisco TelePresence traffic loss is greater than 1 percent. When a threshold is crossed, an alarm is generated that can notify the operator that there is a problem. This event may eventually engage further diagnostics, such as Mediatrace, to troubleshoot and further isolate the cause of degradation.

Mediatrace

Mediatrace is a network diagnostic tool that monitors the state of an audio, video, or data flow across a network path. Mediatrace discovers Layer 2 and Layer 3 devices along the flow path and can provide different levels of information, ranging from the device-specific (CPU or memory), to the interface-specific (input interface speed or output interface drops), to the flow-specific (differentiated services code point [DSCP] values, network jitter, and packet loss).

Table 1.   Mediatrace Request Types

Mediatrace Request Type	Functionality
Hops	Discover Layer 2 and Layer 3 network nodes along the flow path
System	Collect system information of network nodes along the path; for example, 1 minute CPU utilization, memory consumed
Performance Monitor	Collect Performance Monitor statistics from the network nodes; for example, network jitter, packet loss count

Mediatrace collects information from network nodes along the flow path and presents this information in a single screen that allows for easy analysis. Depending on the type of Mediatrace request (refer to Table 1), the feature may implicitly enable Performance Monitor to gather flow-specific information. Mediatrace can be manually invoked or run periodically along a specific path of routers and switches. Mediatrace also supports initiation of the request from an off-path router. Mediatrace can be invoked in multiple ways: locally on a router or switch using the

Command-Line Interface (CLI), using Web Services Management Agent (WSMA) from a network management tool, or from a medianet-enabled endpoint.

With relevant statistics available for a flow from the network nodes along its path, Mediatrace easily and very accurately pinpoints the source or sources of degradation along the network path.

IP SLA Video Operation

IP SLA video operation functions as a valuable tool to assess the readiness of a network to carry rich-media traffic. It can synthetically generate video profiles mimicking real application traffic, such as Cisco TelePresence activity, IP video surveillance, or IPTV traffic. IP SLA VO can also use user-captured packet traces from the customer's existing network, which can then be included in the synthetically generated traffic stream. This feature can also be used to run network readiness tests prior to important collaboration meetings, to validate that the network will be able to support the expected rich-media traffic.

The ability of IP SLA VO to generate realistic RTP traffic similar to real-life Cisco TelePresence, IPTV, or IP surveillance traffic in terms of packet sizes, burstiness, and traffic rate provides accurate and realistic stress testing. IP SLA VO adds to the existing IP SLA probes that are available in Cisco IOS Software, such as User Datagram Protocol (UDP) jitter and Domain Name System (DNS). Users of IP SLA will find that IP SLA VO simply extends the familiar IP SLA control and scheduling CLI and MIB framework, allowing for easy integration with existing network management tools.

When used in conjunction with Performance Monitor and Mediatrace, IP SLA VO provides the ability to troubleshoot bottlenecks that are likely to occur within the network. IP SLA VO generates metrics such as packet loss, jitter, and end-to-end delay for the generated synthetic traffic. Hop-by-hop metrics gathered by Performance Monitor and Mediatrace on the IP SLA VO traffic can help isolate bottlenecks and possibly lead to remedial actions.

Media Awareness

Media Awareness enables the network to become application and rich-media context aware from an end to end perspective. The network works together with the video endpoints and applications for optimal quality of experience for end-users and improved visibility for IT.

Media Awareness uses explicit and implicit signaling mechanism to become application context-aware so appropriate polices can be applied end to end, eliminating the need for static configuration. Explicit signaling enables richer application-specific policies.

The solution includes three features:

- Flow Metadata allows an application to explicitly signal any arbitrary attributes to the network that can be used by all the network nodes in the flow path. This allows appropriate policies to be applied at each hop, end to end, thereby improving the quality of experience.
- Media Services Proxy (MSP) uses lightweight deep-packet-inspection techniques to snoop standards-based signaling protocols. MSP produces metadata attributes that can be shared among network nodes.
- Network Based Application Recognition 2 (NBAR2) enables protocol detection for a network, which is the process by which the system determines that a particular network flow is from a specific application.

Flow Metadata

The Flow Metadata feature allows the application to convey information about itself to the underlying network. This conveyance is accomplished by the presence of the Media Services Interface (MSI) in the endpoint. The metadata attributes emanating from the endpoint:

- Allows the network to identify the flows with the corresponding endpoint or application
- Appropriately provisions network resources for the application, which contributes to Quality of Service (QoS)

Flow Metadata makes it easy for management software to report information in a more meaningful way. For example, "John from finance is having quality problems with his Jabber® desktop video" is much easier to diagnose than obscure IP addresses and protocol numbers. Imagine extending this meaningful application context information to network policies such as QoS, routing, and SLAs. The Flow Metadata feature enables granular policies based on application context and is not limited to network attributes. For example, with Flow Metadata, it is now possible to easily prioritize scheduled sessions over impromptu sessions.

Media Services Proxy

Media Services Proxy (MSP) uses a variety of standard signaling protocols (Session Description Protocol [SDP], Session Initiation Protocol [SIP], H.323, H.245, Real Time Streaming Protocol [RTSP], multicast DNS [mDNS], etc.) to learn about the characteristics of endpoints and applications from legacy systems, allowing sharing of flow attributes among network nodes and allowing existing endpoints and applications to be augmented by the Cisco intelligent network while the transition to "smart" endpoints is in progress.

MSP is a software feature available in Cisco IOS Software recommended to be positioned at the network access layer. When endpoints establish audio and video calls, the MSP identifies the endpoint attributes by sniffing the signaling and associating these attributes with the endpoint. It then provides services on behalf of the endpoint; for instance, generation of metadata, that can be used by downstream network nodes.

Network Based Application Recognition 2 (NBAR2)

NBAR2, or Next Generation Network based Application Recognition, is a classification engine that recognizes and classifies a wide variety of protocols and applications, including web-based and other difficult-to-classify applications and protocols that use dynamic TCP/User Datagram Protocol (UDP) port assignments.

Well-known protocols can be classified by L3 and L4 fields.

When NBAR2 recognizes and classifies a protocol or application, the network can be configured to apply the appropriate Quality of Service (QoS) for that application or traffic with that protocol.

The match protocol (NBAR2) command is used to classify traffic on the basis of protocols supported by NBAR2.

NBAR2 is capable of classifying the following types of protocols:

- Non-TCP and non-UDP IP protocols.
- Statically assigned TCP and UDP port numbers.
- Dynamically assigned TCP and UDP port numbers; This kind of classification requires stateful inspection.
- Subport classification or classification based on deep packet inspection.

For more information about the NBAR2 protocol library, go to:
http://www.cisco.com/en/US/prod/collateral/iosswrel/ps6537/ps6558/ps6616/product_bulletin_c25-627831.html

Media Services Interface

Cisco endpoints are equipped with the Media Services Interface (MSI), a software component that enables endpoints to consistently use intelligent network services to improve the quality of experience and help reduce the cost of deployment and operations.

Medianet Releases 2.2 and later releases bring MSI support to a broad range of media endpoints. For a complete and up-to-date listing of endpoints that support the MSI, refer to the Medianet Datasheet.

Medianet Service Discovery and Autoregistration

Medianet Service Discovery allows medianet endpoints and applications to dynamically discover a wide variety of medianet services, ranging from application servers to network management servers and including other medianet service nodes such as transcoding platforms. Medianet Service Discovery, which uses the Dynamic Host Configuration Protocol (DHCP) service discovery service provided by MSI, is a fundamental component of medianet autoconfiguration. It builds upon the network autoconfiguration functions that allowed the network switch port to be automatically configured by now facilitating the dynamic configuration of endpoint or application as opposed to configuration as part of the medianet system. To complete the solution, the endpoint or application can use autoregistration to concurrently register to these medianet services, providing an automated, ready-to-use provisioning of both the network and the endpoint or application. It also significantly reduces the cost and time to deploy endpoints and applications, and provides a platform for building more dynamic, customized rich-media solutions.

Cisco WebEx

Cisco WebEx web conferencing solutions allow organizations of all sizes to easily meet and collaborate over the web from anywhere, using any device. Cisco WebEx offers a comprehensive suite of software-as-a-service solutions tailored to specific business processes—general collaboration, training, events, and support—that are securely delivered through the Cisco Collaboration Cloud. Cisco WebEx Meeting Center now offers high-quality video, which allows meeting participants to see each other with exceptional clarity in full-screen mode, turning web conferencing into a virtual videoconferencing room.

The growing use of Cisco WebEx video and other rich-media applications across the organization brings legitimate questions from IT about the performance of these services and their impact on available bandwidth, compared to other business-critical applications.

Medianet gives network and application administrators unparalleled visibility into their environment for media, including Cisco WebEx traffic. Medianet capabilities for Cisco WebEx include video traffic simulation through IP SLA VO, Performance Monitoring, and Media Awareness. These features can work in parallel to provide administrators with tools for better network planning, faster problem resolution, higher service quality, and greater bandwidth efficiency.

Video traffic simulation enables administrators to understand the potential effect of video traffic on a particular site prior to deployment. Medianet can simulate Cisco WebEx video traffic on the network so IT can more precisely model bandwidth usage and determine, for example, whether a particular site can adequately support high-quality or high-definition video.

In addition, Cisco WebEx solutions offers end-to-end video, voice over IP (VoIP), and data monitoring through the integration of MSI into the Cisco WebEx meeting client. Media Monitoring provides Cisco WebEx customers with early detection of reduced network services that can affect media quality. Session statistics include packet retransmission rate, latency (RTT), jitter, bandwidth usage, and client CPU usage for each media stream that is monitored.

The session monitoring statistics can be exposed by using a Network Management System (NMS) through network devices and endpoints. Both Cisco WebEx–hosted services as well as the Cisco WebEx node for on-premises deployments offer this real-time, IP-based monitoring function.

Cisco WebEx customers can use the enhanced network visibility enabled by medianet to isolate and troubleshoot network or client problems more quickly. Medianet also provides Cisco WebEx customers with greater application visibility through its Flow Metadata feature so Cisco WebEx traffic can be distinguished from other types of traffic in the NetFlow records. Customers will also be able to implement QoS to prioritize their Cisco WebEx voice, video, and data traffic, and also to apply granular routing policies based on traffic type or location in order to optimize bandwidth efficiency and improve the rich-media user experience.

Cisco Prime Infrastructure

Cisco Prime Infrastructure accelerates business and network transformation with unified lifecycle management and application visibility. It provides a single integrated solution for comprehensive lifecycle management of the wired/wireless access, campus, and branch networks, and rich visibility into end-user connectivity and application performance assurance issues.

Cisco Prime Infrastructure collects data from medianet-enabled devices to provide visibility into voice statistics enterprise-wide and helps accelerate voice/video troubleshooting, while reducing instrumentation configuration and data collection complexity. In addition to Mediatrace, Cisco Prime Infrastructure collects data from a broad array of embedded technologies such as NetFlow, IOS Performance Agent, and SNMP. This permits network operators to quickly and easily gain comprehensive insights into network and application performance to more effectively manage the services their network delivers.

For more information about Cisco Prime Infrastructure, please visit http://www.cisco.com/go/primeinfrastructure.

Cisco Prime LAN Management Solution

Cisco Prime LAN Management Solution (LMS) is an integrated suite of management functions that simplify the configuration, administration, monitoring, and troubleshooting of Borderless Networks.

The medianet work center provides day-1 through day-N workflows for assessing, preparing, and setting-up auto-configuration and location settings, to simplify the provisioning and tracking of medianet endpoints, such as digital media players and IP video surveillance cameras. The medianet workflows enable the network operator to select the type of medianet to provision, automatically prepare the network for deployment, and check to ensure the appropriate location attributes are configured for tracking and monitoring purposes, reducing the chance for errors and time required to set-up an end-to-end video infrastructure.

For more information about Cisco Prime LMS, please visit: http://www.cisco.com/go/lms.

Cisco Prime Collaboration

Cisco Prime Collaboration provides accelerated, automated provisioning of Cisco® Unified Communications and continuous real-time monitoring and advanced troubleshooting tools for Cisco Unified Communications and Cisco TelePresence® systems including the underlying transport infrastructures.

The solution provides efficient, integrated service assurance management through a single, consolidated view of the Cisco voice and video collaboration environment. Real-time monitoring of voice and video networks includes dashboard summaries and alarm correlation. The solution proactively notifies operators of issues and facilitates speedy resolution of problems through proactive fault detection, and rapid isolation using purpose-built diagnostic tools. For video, the solution allows operators to view end-to-end session paths over Cisco and third-party devices, and on Cisco Medianet routers, jitter and packet loss statistics help pinpoint hotspots affecting session quality. As a result, Cisco Prime Collaboration expedites operator resolution of service quality issues before affecting end users-for a superior end-user collaborative experience.

For more information about Cisco Prime Collaboration, please visit http://www.cisco.com/go/primecollaboration

Cisco Medianet Readiness Assessment Service

The Cisco Medianet Readiness Assessment (MRA) Service helps organizations accelerate smooth deployments of media-rich applications and helps customers get the most from their technology investment.

Figure 1.   Service Overview
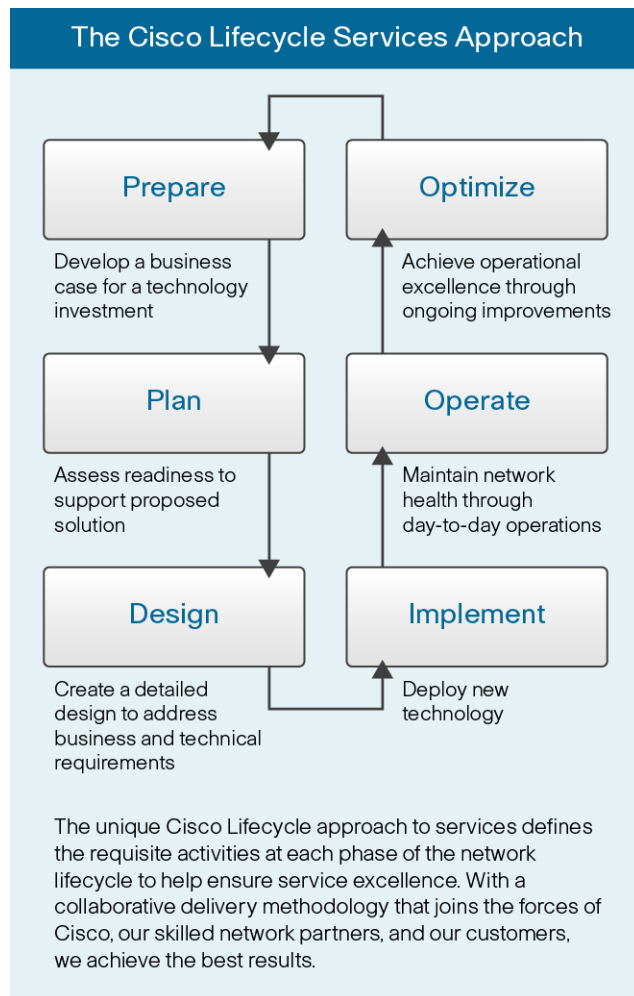
In today's competitive business environment, enterprises that can effectively communicate, collaborate, and respond rapidly to change are most likely to succeed. In order to make sure that customers can deploy media-rich applications smoothly, they must go through a prepare and plan phase that enables them to understand how best to get their network media ready.

Enterprises can face several challenges as they prepare their case for a technology. Unlike voice, video is more bursty and bandwidth-intensive, and it is more sensitive to delay, jitter, and packet loss. As the benefits of video are realized, the adoption rate of video applications and convergence will accelerate in the coming years, putting more pressure on enterprises to get ready for video.

MRA is a service that should be performed when planning to deploy video (or media-rich) applications over the enterprise IP network. To reap the advantages of the media-rich applications, organizations need to make sure that the network is well prepared to address challenges posed by these applications. MRA is a comprehensive service offering that provides an assessment of network infrastructure and its ability to transport the media-rich applications that need to be deployed. The service offering helps enterprises prepare, plan, and design their networks for the successful implementation of the media-rich applications. MRA is part of the Cisco lifecycle

approach—Prepare, Plan, Design, Implement, Operate, and Optimize (PPDIOO)—to delivering services that help ensure customer satisfaction and return on investment. MRA encompasses the prepare and plan phase and provides input for the design phase of deployment (Figure 1). The service is delivered by Cisco Services, which has a deep understanding of the requirements imposed on the network, by not only the new media-rich applications, but also by considerations such as performance, scalability, security, and high availability.

Why Cisco?

The Cisco competitive differentiation comes from its unique ability to tightly integrate rich-media applications and the intelligent network services through the MSI. This integration between applications and network provide unparalleled visibility, dynamic troubleshooting and the ability to protect business critical traffic. Other application vendors focus on the applications, which limit their ability to leverage network intelligence and react to unforeseen network degradation. Other network vendors focus on the network, and miss opportunities to perform advanced services, due to limited or lack of visibility into the applications.

For More Information

To learn more about Cisco Medianet 2.x capabilities and which products contain which features, please review the Medianet Data Sheet.

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