

Delivering a Cisco TelePresence Network Connection Service: The Value of an IP Next-Generation Network

Telepresence network services will represent a \$4 billion opportunity for service providers by 2010, according to research by Cisco[®]. With its ultrahigh definition and CD-quality audio, the Cisco TelePresence Meeting solution empowers users to interact and collaborate more effectively than ever before – and also imposes far greater demands on the network than voice over IP (VoIP) or video conferencing. Therefore, to offer a telepresence connection service, service providers need a carrier-class network that supports stringent service-level agreements (SLAs) for quality of service (QoS) and high availability, as well as call admission control (CAC) to reserve bandwidth before a session is initiated. Furthermore, to offer bundled and tiered telepresence connection services that attract customers and increase revenues, providers need the ability to integrate the Cisco TelePresence Meeting solution with other IP-based applications. The Cisco framework for IP Next-Generation Network (NGN) meets these requirements by integrating application, service, and network layers in a single carrier-class system.

Executive Summary

Cisco TelePresence is a new conferencing technology that creates a unique, “in-person” experience over the network by combining innovative high-definition video, audio, and interactive elements. It simulates face-to-face interaction by providing a life-size video image of each remote participant, with fluid motion and ultrahigh resolution that can reveal subtle facial expressions. Participants can look at the eyes of remote participants – rather than at a camera – as if they were in the same room. The lifelike experience is enhanced by CD-quality audio. Each person’s voice seems to originate from his or her image and is completely synchronized with the video.

Enterprise customers regard the most compelling advantages of Cisco TelePresence as increasing employee productivity and job satisfaction by reducing travel; decreasing travel costs; and increasing the speed of decision making to gain a competitive advantage. Sample uses for Cisco TelePresence include business meetings, a local presence for remote executive assistants and lobby attendants, remote interviewing and human resources benefits support, trading windows for investment banks, access to specialists from remote bank branches, arraignment and deposition for legal professionals, remote expert consultation for offshore drilling platforms, and face-to-face customer service and support.

Cisco TelePresence provides an opportunity for service providers to enhance their revenue stream by using their IP NGN framework. Only with the intelligence of an IP NGN can service providers deliver the extraordinary video and audio quality that characterizes the Cisco TelePresence experience. The intelligence enables the network to assign priority to Cisco TelePresence traffic and dynamically allocate bandwidth as needed to provide the highest quality video and audio. Service providers that build a network architecture that supports a Cisco TelePresence network connection service can earn additional revenue from their telepresence customers by offering tiered and bundled Cisco TelePresence services, a managed application-aware Multiprotocol

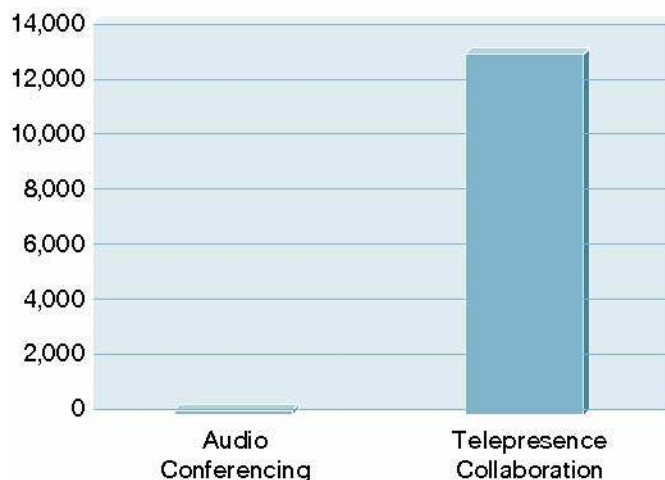
Label Switching (MPLS) VPN service, managed IP communications, and managed security services.

This white paper, intended for service provider business managers, explains the requirements for delivering a Cisco TelePresence network connection service. The first section describes the network characteristics needed to support a Cisco TelePresence network connection. The next section explains how the Cisco IP NGN fulfills the requirements for a Cisco TelePresence network connection service with its integrated application, service, and network layers. The white paper concludes by describing the marketing and technical resources that Cisco offers to members of the Cisco Powered program to help them take full advantage of the Cisco TelePresence market opportunity.

Requirements for Offering a Cisco TelePresence Network Connection Service

Cisco TelePresence imposes unprecedented demands on the network, which must deliver and synchronize ultrahigh-definition video and high-quality audio according to stringent customer SLAs. Figure 1 compares the bandwidth requirements of telepresence and VoIP sessions.

Figure 1. Massive Bandwidth Requirements for Cisco TelePresence Network Connection Service



To offer a Cisco TelePresence network connection service, or any other converged multimedia service, providers need an intelligent, carrier-class network. The most basic requirements are high availability and QoS to support collaborative high-definition video applications. In addition, to make full use of Cisco TelePresence for business-to-business applications, service providers also need bandwidth guarantees, service flexibility, the ability to offer tiered and bundled services, standards-compliant solution components, security, and the ability to support intercompany telepresence sessions.

High Availability

Initial business applications for Cisco TelePresence are executive-level meetings and negotiations. Rescheduling this type of meeting because of network unavailability is not an acceptable option to enterprise customers. Therefore, the SLA requirement for network availability is 99.999 percent.

To meet the SLA requirements, service providers need a carrier-class network with resilient communications paths, error detection, reporting, and correction. All network components must operate continuously, in the core network as well as edge networks, despite component failure or

distributed-denial-of-service (DDoS) attacks. Providers can more easily meet high-availability SLAs for telepresence if they can perform software and hardware upgrades and maintenance while the network continues to operate.

QoS

To provide the Cisco TelePresence experience, the network needs to support stringent SLA metrics in the transport network:

- One-way network delay: less than 150 milliseconds
- Peak-to-peak delay variation (jitter): less than 10 milliseconds
- Packet loss: less than .05 percent

The recommended architecture for achieving these SLA targets supports QoS at every node in the traffic path – not simply at the network edge. Consistent implementation of QoS from end to end across a Cisco Powered network simplifies and accelerates service introduction and reduces costs by avoiding the need for service providers to laboriously patch together different vendors' QoS implementations. The provider must also enable queuing in accordance with best practices for real-time traffic and assign guaranteed bandwidth to the queues of Cisco TelePresence traffic.

Bandwidth Guarantees

Whereas a voice conference call between two company sites requires approximately 100 Kbps of bandwidth, a Cisco TelePresence session with 1080p resolution requires 15Mbps of bandwidth – 150 times more bandwidth than the voice call. Bandwidth requirements increase further if the company later connects three or more conference rooms. Therefore, service providers can differentiate their telepresence network connection service by offering bandwidth guarantees. To support bandwidth guarantees, the provider's network needs the intelligence to recognize telepresence traffic, assign it the highest priority, and dynamically allocate bandwidth as needed to meet customer SLAs. The network must also support video CAC, a technology that reserves bandwidth before the call begins.

Service Flexibility

Providers differentiate their service if they can offer a portfolio of fee-based managed services rather than offering the Cisco TelePresence network connection service in exactly the same way for every enterprise customer. For greater service differentiation and to address a broader market segment, the network should give the provider the flexibility to offer application-specific QoS.

Standards-Compliant Signaling and Session Initiation Protocol Support

Providers can build bundled solutions more quickly and at lower cost if the network supports Session Initiation Protocol (SIP) and standards-based signaling. Standards-based solution components decrease operating costs and can accelerate service introduction, helping providers differentiate their Cisco TelePresence network connection service.

Security

To offer availability SLAs, providers need to protect the network and the Cisco TelePresence service itself. Network security requires protection against DDoS attacks as well as protecting foundation routers and switches. Service security involves protecting the Cisco TelePresence system from unauthorized access.

Support for Intercompany Communication

Some enterprise customers want to conduct Cisco TelePresence meetings with customers or business partners. Intercompany communications require more stringent security requirements because the network must maintain secure extranet connectivity and support application-specific policies for accessing various network resources. Customers that conduct sensitive meetings will prefer service providers that can provide a secure connection and secure call establishment that prevents people from listening or viewing the voice, video, or data exchanged during the session.

Cisco Framework for IP NGN: How It Supports Cisco TelePresence

Cisco has developed a converged network architecture, the IP NGN that supports multimedia and converged applications. As a carrier-class solution, the Cisco framework for IP NGN is designed, developed, and tested to meet stringent technical, functional, and operational requirements as well as to provide scalability, manageability, and reliability. This section of the white paper summarizes the attributes of the Cisco IP NGN architecture that support a Cisco TelePresence network connection service in a carrier-class environment.

Advantages of Deploying the Complete Cisco Framework for IP NGN

The Cisco framework for IP NGN contains three layers – application, services, and network – each of which provides unique features that enable the Cisco TelePresence experience. If any one of the three layers were not integrated into the framework, the extraordinary video and audio quality and data collaboration that characterize Cisco TelePresence would not be possible. Integrating the application, services, and network layers in one system enables the service provider to offer competitive capabilities that alternative service providers cannot provide. The systems approach also creates operational efficiencies and reduces costs, helping to increase profitability.

Integrating the application, services, and network layers in one system enables the service provider to offer competitive capabilities that alternative service providers cannot provide.

The power of the IP NGN architecture comes not only from the breadth of capabilities in each of its layers, but also from the integration among the layers. That is, the Cisco framework for IP NGN network is more than a collection of devices at the network layer. It also includes intelligence in the services layer and the ability to integrate with other SIP-based applications – from Cisco as well as other vendors – in the application layer. Therefore, service providers gain significant advantages for service differentiation and operational efficiency by deploying the IP NGN as a system instead of deploying just selective elements. Examples of the capabilities enabled by integration among the layers include the following, explained in more detail later in this white paper:

- **Application-awareness** – Most networks cannot determine the type of traffic an encrypted packet contains, which prevents the service provider from offering higher SLAs for telepresence. With the Cisco framework, deep packet inspection in the service layer enables the network to recognize encrypted telepresence packets, and QoS capabilities in the network layer enable the network to assign priority to telepresence packets.
- **Enhanced security** – The combination of DDoS protection in the service layer and network-foundation protection features in the network layer enables business continuity and bandwidth guarantees.

- Integration with calendaring application – Cisco TelePresence appears as a single endpoint to the Cisco Unified CallManager software. When Cisco TelePresence is integrated with Microsoft Outlook, employees can schedule Cisco TelePresence sessions by simply sending a meeting invitation.
- Simplified network maintenance and service updates – To update the Cisco IOS® Software in Cisco routers and Cisco Catalyst® switches, the service provider can make the change just once, and then the IP NGN automatically propagates it throughout the network. In contrast, if a provider added Cisco routers and Cisco Catalyst switches to another network core, new service introduction would take longer and be more costly. In addition, the service provider might not be able to deliver the same SLAs because of the extra time required for troubleshooting and for provisioning new customers.

As a carrier-class solution, the Cisco framework for IP NGN is designed, developed, and tested to meet stringent technical, functional, and operational requirements as well as to provide scalability, manageability, and reliability.

The remainder of this section describes capabilities of the Cisco IP NGN that enable providers to offer a differentiated and value-added Cisco TelePresence network connection service.

Application Layer

The application layer of the Cisco framework for IP NGN enables providers to integrate Cisco TelePresence with other applications in order to offer tiered and bundled services. This creates a source of incremental revenue that also helps the service provider advance up the “value chain” as perceived by enterprise customers.

SIP Support

Because Cisco TelePresence signaling is based on SIP, providers can integrate Cisco TelePresence with other SIP-enabled applications from Cisco as well as other vendors. For example, integrating the Cisco TelePresence Meeting solution with Cisco IP Contact Center makes it possible to offer a video concierge service, and integrating it with Cisco Unified MeetingPlace® makes it possible to offer a collaboration service, including whiteboard projection.

While application integration without an IP NGN is possible, it is generally far more costly and time consuming. SIP support in the Cisco framework for IP NGN enables service providers to introduce new telepresence-related services more quickly and at less cost.

Simplified Session Scheduling

In a 2006 focus group conducted by Cisco, enterprise customers indicated that they would use telepresence more frequently if they could launch a session with the click of a single button. In response to this feedback, Cisco designed the Cisco TelePresence Meeting solution to integrate with enterprise groupware, such as Microsoft Outlook or Microsoft Exchange, enabling employees to schedule Cisco TelePresence sessions from their calendars. The software pushes the scheduling information to a Cisco Unified IP phone in the Cisco TelePresence meeting room so that employees can launch the meeting by pressing a single button on the Cisco Unified IP phone in the conference room. They can initiate unscheduled sessions simply by dialing the Cisco Unified IP phone. In either case, no involvement from customer IT groups is required, increasing the appeal of the Cisco TelePresence solution to enterprise customers.

Service Layer

The service layer of the Cisco IP NGN enables the service provider to differentiate its Cisco TelePresence network connection service by adjusting parameters to meet the needs of individual enterprise customers. For example, deep packet inspection in the service layer enables the provider to identify the application initiating the traffic so that it can support application-specific policies.

Application Awareness and Policy Management

Although every IP network can transport voice, video, and data, not every IP network is capable of delivering the extraordinary Cisco TelePresence experience. To offer the Cisco Certified TelePresence connection, providers need a network with the intelligence to recognize telepresence and other types of application traffic and to apply application-specific policies. Policies typically include assigning the highest priority to telepresence traffic and dynamically allocating bandwidth as needed. The service layer in the Cisco framework for IP NGN has the intelligence to recognize telepresence traffic – even when encrypted – through stateful deep packet inspection. Application awareness also enables providers to optimize the use of network resources, thereby increasing the return on investment for network infrastructure.

Multiple Layers of Security

The service layer of the Cisco framework for IP NGN provides the multiple layers of security essential for a Cisco TelePresence service:

- Network security, including DDoS protection as well as network foundation protection – For DDoS protection, the Cisco Guard system works in conjunction with Cisco Traffic Anomaly Detectors to detect the presence of a potential DDoS attack, divert traffic destined for the targeted device, and identify and block malicious traffic in real time. Through the use of Border Gateway Protocol (BGP), Cisco Guard can accomplish this without affecting the flow of legitimate Cisco TelePresence traffic. Network foundation protection (NFP) refers to a set of network security features embedded in Cisco Catalyst switches and Cisco routers that harden the data, network, management, and service planes.
- Service security – To protect the Cisco TelePresence system itself from unauthorized access, business subscribers can deploy Cisco firewall systems and intrusion prevention systems on the customer premises. The Cisco Integrated Services Router combines both capabilities on a single device. To protect sensitive Cisco TelePresence sessions from eavesdropping or recording, the service provider can encrypt the telepresence media as well as signaling information.

Intercompany Connectivity

Connecting business partners to company headquarters using extranet VPNs has traditionally been laborious, costly, and time consuming. The service layer of the Cisco framework simplifies the process through the use of a VRF-aware Session Border Controller (SBC) function at the provider edge. SBC provides secure connectivity between sites to enable intercompany Cisco TelePresence sessions.

Network Layer

With the Cisco framework for IP NGN, providers can deliver multiple services over a single network infrastructure, minimizing capital and operational expense. The benefit of a converged network extends to the service provider's customers, as well.

The network layer of the Cisco framework for IP NGN provides the QoS and SLAs required to deliver Cisco TelePresence and other latency-sensitive services over a converged network. Following are major advantages of the network layer for a Cisco TelePresence network connection service.

Call Admission Control

To help ensure a consistently excellent user experience, the CAC feature, which is part of the network layer, reserves bandwidth for Cisco TelePresence calls before the call is initiated. CAC helps ensure that QoS is enforced for existing as well as new Cisco TelePresence sessions. It is particularly useful for remote sites because their bandwidth is likely to be scarce and expensive. In these cases, CAC polices service levels for every call.

Traffic Engineering

The traffic engineering features of the Cisco framework for IP NGN increase capacity utilization, increase network availability, and reduce network congestion. For example, DiffServ Aware Traffic Engineering optimizes bandwidth and delivers QoS guarantees for Cisco TelePresence and other latency-sensitive traffic. MPLS Fast Reroute features increase network resiliency by rerouting traffic around a failed network element in a few milliseconds.

Consistent QoS Implementation

The Cisco Modular QoS Command Line Interface (MQC) standardizes the interface and semantics for defining QoS features across all Cisco routers and Cisco Catalyst switches that use the Cisco IOS Software. This helps ensure that features behave consistently end to end across the service provider's network as well as customer networks.

Network Optimization

Cisco NetFlow technology, built into all Cisco Catalyst switches and Cisco routers, collects information that service provider operations staff can analyze to optimize the Cisco TelePresence experience. Providers can use NetFlow data to discover peak usage times and traffic routing requirements, detect and classify security incidents, and more. Another way that the Cisco framework for IP NGN optimizes application performance is by enabling the provider to manage delay, jitter, bandwidth, and packet loss.

Service Assurance

The Cisco IOS Software IP SLA feature helps service providers attain the excellent network performance required for the Cisco TelePresence Meeting solution by collecting up-to-the-minute network performance information, including response time, one-way latency, jitter, packet loss, and other network statistics. The Cisco IOS Software IP SLA feature can be deployed on any network router or on dedicated shadow routers.

High Availability

The Cisco NGN framework provides continuous system operation during network and service upgrades for edge and core networks. High availability is especially critical at the network edge, which is the convergence point for terminating customer connections and deploying new services. The Cisco framework for IP NGN also minimizes the effect of hardware and software failures and

supports the stringent SLAs needed for always-available network services such as Cisco TelePresence and other strategic applications.

Business and Marketing Support: Cisco Powered Program

Business customers that make the considerable investment in a Cisco TelePresence solution want specific, enforceable guarantees of network performance and reliability rather than vague assurances. Cisco provides objective, third-party validation that the provider's network meets the requirements for telepresence by certifying qualified service providers as offering a Cisco Certified TelePresence network connection. Cisco strongly recommends that service providers become certified. To do so, they must meet requirements that Cisco developed based on industry-recommended best practices and design guidelines learned through the Cisco Design Validation Process. The certification process requires service providers to undergo a third-party audit of best practices in the following areas:

- Services
- Architecture
- Measurement practices
- SLAs and reporting
- Network management system tools
- Organization
- Operations

The Cisco Powered program provides members with marketing and technical resources to help them successfully introduce and deliver a Cisco Certified TelePresence network connection service. Program benefits include:

- Brand recognition – In a Cisco focus group conducted in 2006, enterprise technical decision makers said that out-tasking the telepresence service to a service provider with a Cisco Certified TelePresence network connection would give them greater confidence as to the reliability and quality of the service.
- Promotion by Cisco – Cisco recommends to its customers that purchase a Cisco TelePresence system that they work with a service provider offering a Cisco Certified TelePresence network connection.
- Marketing resources – Cisco provides valuable marketing resources to service providers that participate in the Cisco Powered program. Service providers can use these marketing materials to accelerate time to market. The materials also help providers capitalize on the strength of the Cisco brand and the company's relationships with enterprise customers.
- Training and technical support, including:
 - Discounted training
 - Networkers Online Webcasts, including live design sessions and technology updates
 - Technical courses led by Cisco engineers
 - Design guides and industry best practices

Conclusion

Cisco TelePresence represents a significant revenue opportunity, accelerating and increasing the return on investment from the service provider's IP NGN. The Cisco framework for IP NGN provides the breadth of capabilities required to deliver a successful Cisco TelePresence network

connection. These include application and subscriber awareness, service flexibility, support for application integration, service continuity, and security.

The power of the Cisco framework for IP NGN is that it integrates all three layers needed for a Cisco TelePresence network connection service – application, services, and network layer – into a single, cohesive system. This enables the service provider to offer competitive capabilities that alternative service providers cannot provide. The systems approach also creates operational efficiencies and reduces costs, helping to increase profitability.

For service providers, the network is the business, and the Cisco framework for IP NGN provides a strong, intelligent, and flexible business foundation.

To learn more about the Cisco framework for IP NGN, go to <http://www.cisco.com/go/sp/ipngn>.

To learn more about the requirements for a Cisco Certified TelePresence connection, go to <http://www.cisco.com/go/sp/telepresence>.



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