

# The Service Exchange Framework

**Mastering services requires comprehending and controlling every packet and policy in your network. Here's how to do it.**

By Janet Kreiling

Next-generation networks (NGN) are rife with potential: personalized services, interoperating applications, keeping a connection from home to office and from PDA to PC to phone. But to a large extent, this potential has yet to be realized with intelligent networks that provide the subscriber and application awareness required to effectively converge the plethora of residential and business services available today. Consumers have access to a wide array of communications, entertainment, and online services, usually from a wide variety of broadband service providers. These services traverse multiple network types, each with their own unique capabilities, and they originate and terminate on many different devices. Most service providers do not yet have the capability to converge these services, but a few are beginning to implement new levels of network intelligence that will dramatically change the way we work, play, and learn.

For example, Sprint is using presence and location information from the Cisco Call-Session Control Platform (CSCP) to give its subscribers “push-to-talk” service. The CSCP tracks which people on the user’s talk-to list are present on the network. Plala Networks, a subsidiary of NTT East Corp., is using the Cisco Service Control Engine (SCE) to monitor and manage bandwidth-gobbling peer-to-peer traffic so other users can receive acceptable service. The Cisco SCE detects peer-to-peer file transfers; then policy servers limit the bandwidth available to this type of traffic.

These uses are just the beginning. For a next step, cellular providers might evolve push-to-talk services so subscribers could push to access a voice-enabled portal offering applications such as Mapquest. Directions could be spoken or displayed. A provider monitoring and limiting bandwidth could determine, for example, that demand is less during certain hours of the day and offer a managed service package for small businesses with guaranteed bandwidth and quality of service (QoS).

## Service Exchange Framework Building Blocks

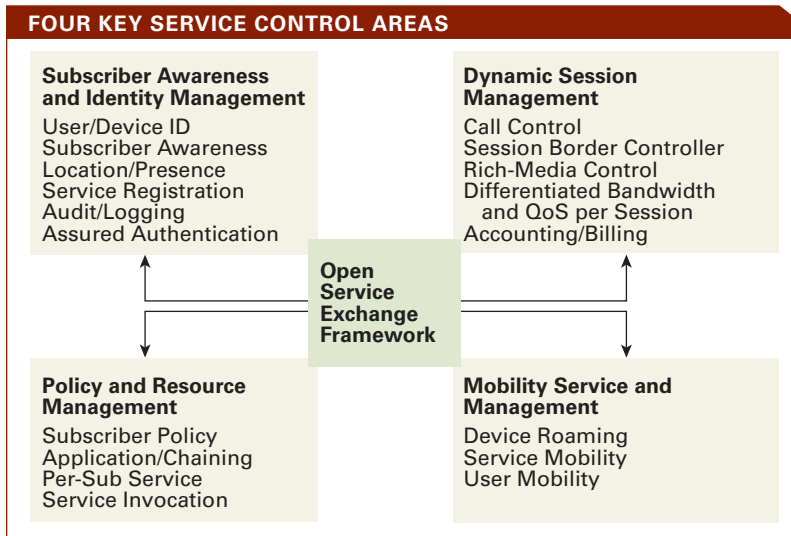
Imaginative, wide-ranging, useful services such as these are possible now. Every required network element—hardware and software, core and edge—is available. And only Cisco offers them all, in the *Service Exchange Framework (SEF)*, which can be customized

to support a provider’s unique next-generation business model. The SEF provides the intelligence that enables service convergence—a fundamental element of IP-based next-generation networks (see *Packet* First Quarter 2005, [cisco.com/packet/172\\_8b1](http://cisco.com/packet/172_8b1)).

“The SEF enables service providers to analyze, optimize, secure, and meter application- and content-based services in their existing IP networks,” says Thomas Barnett, Jr., senior service provider marketing manager at Cisco. “That’s every capability they need to maximize and deliver services and applications in an IP-based next-generation network.” Right now, he adds, “Most providers have very little of the detailed information or control they need to deliver NGN services. They may not know what device a subscriber is using, where the subscriber is located, what applications he or she should have access to, or what policies such as content or bandwidth control, should be imposed. So the carrier’s ability to deliver services and applications, such as e-mail, instant messaging, voice, gaming, and video, with the desired quality of service and class of service [CoS]—in a way that maximizes network efficiency and the user experience—is limited.”

The following four capabilities are crucial to delivering next-generation service control (see figure):

- *Subscriber awareness and identity management*—The network can identify users and their devices, determine a person’s location, and establish presence for that person, including sharing his or her status (on or off network) with other subscribers. With these abilities, providers can deploy presence-based services such as push-to-talk, instant messaging, voice, and video, call routing and screening, and 3G+ mobile applications such as streaming audio and video and interactive gaming.
- *Policy and resource management*—The provider gains programmable session and policy control including authentication, authorization and accounting (AAA), QoS, and VPN routing and forwarding for all services the customer subscribes to, along with one very tangible subscriber benefit: signing on once with only one password for all applications.



**NGN SERVICE CONTROL**

Four areas of service control help providers optimize network resources, deliver customized services, and ensure reliable service delivery and performance.

- *Dynamic session management*—End-to-end attributes of individual sessions can be managed in real time using techniques such as queuing, policing, traffic shaping, and packet marking, which ensures contracted-for QoS and accurate billing. Internetwork signaling with border control allows services to follow a subscriber from a wireline to a wireless network, a circuit-switched to an IP network, or an enterprise to a public network.
- *Mobility service and management*—Presence, name space, subscriber data, and service integration—the four information elements central to a mobile call—can all be managed centrally. When tasks such as storing customer data, AAA, provisioning, and service interaction are consolidated, it becomes possible to create new services for mobile networks or for calls moving onto mobile networks quickly with maximum re-use of assets and minimal expense.

Says Barnett, “These capabilities help service providers optimize network resources, deliver customized services, enhance the subscriber experience, and ensure reliable service delivery and performance.”

**Cisco Solutions for the Service Exchange Framework**

Cisco provides a variety of solutions to deliver these subscriber- and service-aware capabilities for next-generation service control. Because these are stand-alone, inline hardware and software solutions that do not duplicate or interfere with any essential networking functions (such as access or aggregation), service providers can deploy this critical service layer in a phased approach that meets their business and service needs.

The Cisco Mobile Exchange (CMX) is an open platform that provides an intelligent enforcement layer

within the operator’s network and easily interfaces with all of the control elements in the IP network. CMX has proven interoperability with all major radio access network (RAN), AAA, content billing, and content filtering and compression vendors. It provides three primary functions—access and service control, seamless mobility, and deep-packet inspection. CMX also leverages Cisco IOS Software and enables mobile operators to deliver secure, profitable mobile services. The cornerstone of the CMX framework is the Cisco 7600 Series Router. Modular blades deployed in the Cisco 7600 Series provide a variety of CMX capabilities, including packet gateways, mobile services, load balancing, network management, and operations. Together, these components successfully solve the many challenges that face mobile operators seeking profitability from their second-generation (2G), 2.5G, 3G, or 4G mobile packet infrastructures and IEEE 802.11 wireless LANs.

The aforementioned CSCP is designed for broadband operators interested in deploying a robust, carrier-grade, next-generation services delivery environment for providing multimedia applications and services over their IP-based networks. The CSCP consists of the Cisco Service Engine, Cisco Edge Proxy, and the Cisco Name Resolution Server—software solutions all based on Session Initiation Protocol (SIP), the Internet Engineering Task Force (IETF) standard that defines peer-to-peer, multimedia signaling. With the CSCP, operators can offer a differentiated multimedia communication experience to their subscribers with services integrating voice, video, push to talk, presence, geolocation, “buddy” lists, and more.

The Cisco Service Control solution allows providers to take full advantage of their existing IP network infrastructure to differentiate between services such as voice over IP (VoIP), Web browsing, music downloads, video streaming, and peer-to-peer traffic. The Cisco SCE adds a programmable service layer to networks, allowing operators to identify subscribers, classify applications, guarantee service performance, and charge for multiple IP services. Performing Layer 7 stateful, deep-packet inspection at multigigabit speeds, the Cisco SCE is transport- and content-independent, fully extensible and programmable, and easily integrates into existing network fabrics. This network element resides “in traffic” behind an IP aggregation point and enables the network to differentiate between individual services—enabling providers to manage and bill for premium services running on common transport.

**Phased Approach to Service Control and Network Intelligence**

The starting point for an IP-based NGN is the provider’s existing network. “A provider can start with a specific service, add the solution or solutions required for it, and then build more services onto that

system or add other solutions for other services,” Barnett says. “This is a custom process, driven by each provider’s business plan and customer needs. Providers can deploy solutions to offer services that will differentiate them in their own market.”

SEF solutions from Cisco give service providers a clear path for cost-effective, low-risk rollouts of multimedia applications and help to address operations, administration, management, and provisioning (OAM&P) challenges, adds Barnett. Triple-play (voice, video, and data) services, voice over broadband, and presence-enabled communications are a few examples. A multitude of services can be initiated and expanded using SEF solutions.

Copel Telecommunications, based in Brazil, uses the Cisco SCE deep-packet inspection capability to identify and classify applications and guarantee performance of offerings such as VoIP, Internet access, and multimedia services to enterprise clients. Copel will be able to implement traffic-line intelligence that addresses new standards, protocols, billing techniques, and classification of content type in real time, and can thus customize services to satisfy the needs of individual customers. A provider with such a wide-ranging application of the Cisco Service Control Engine’s abilities might next enable tiered services by adding a policy control solution.

Swisscom Mobile is already using CMX for its “Mobility Unlimited” solution, which allows subscribers to access data from the fastest transmission technology available wherever they are and change to another transmission mode seamlessly while on the move.

An evolution plan for a provider with this starting point might include adding deep-packet inspection to monitor and manage data applications, or policy control to ensure the security of a user’s corporate Intranet and applications while employees travel. With SEF solutions, providers could offer customers a “turbo button” for real-time bandwidth changes, or enable them to cross from a mobile to a fixed network while maintaining the same call. Such a capability would make the provider’s service very attractive to third-party developers of high-bandwidth multimedia applications, Barnett says, and create opportunities for partnering.

### Service Optimization

In addition to gracefully evolving to next-gen offerings, providers can use the SEF to finally understand down to the packet what’s going on in their networks—how much bandwidth is consumed by given services, applications, and users. They can

determine how much bandwidth and what QoS to devote to a given user and application. They can see where the inefficiencies are in how their resources are used, and where efficiencies can lead to new service and revenue opportunities.

For example, providers can reduce costs by monitoring and regulating how much capacity is used by bandwidth-hungry applications, and limit them or permit dynamic bandwidth allocation through policy control. “Taking the guesswork out of capacity planning and detailing subscriber demographics helps operators uncover hidden operational costs and new revenue potential in wireline, mobile, and cable networks,” Barnett points out.

In a truly intelligent network, subscribers will be able to sign themselves up for services and service attributes. Examples include subscribing to a cell phone plan, VoIP, or pay-per-view; ordering bandwidth or QoS that varies by time of day; and imposing parental or employer controls. Each such interaction is one fewer that is handled by a customer service representative, for further cost savings. Subscribers have proven willing to pay more for a more personalized experience—getting any service they want, when they want it, over any device—so the IP-based NGN also offers income potential even beyond revenues from services and ventures with application developers.

As providers continue to face competitive pressures to cut costs and provide more flexible services, they are “already creating multiservice converged networks by eliminating networks dedicated to specific types of traffic and applications, or reducing layers within networks,” says Barnett. “IP is the basis for the sweeping transformation we’re seeing in networks, and the SEF is the way to master profitable, innovative service delivery over the IP next-generation network.” ■

Read the full white paper, *The Service Exchange Framework: Providing Greater Control for Cisco IP Next-Generation Networks*, at [cisco.com/packet/172\\_8b2](http://cisco.com/packet/172_8b2).

### FURTHER READING

- White paper: *The Cisco Call Session Control Platform*  
[cisco.com/packet/172\\_8b3](http://cisco.com/packet/172_8b3)
- White paper: *Bridging the Infrastructure Gap: The Importance of Service Control in Broadband Networks*  
[cisco.com/packet/172\\_8b4](http://cisco.com/packet/172_8b4)
- White paper: *Cisco and the Service Provider IP Next-Generation Network Journey*  
[cisco.com/packet/172\\_8b5](http://cisco.com/packet/172_8b5)