Intelligent Service Convergence with the Cisco IP Next-Generation Network Service Exchange Framework

Enabling Technologies and Intelligence That Support Enhanced Subscriber Personalization and Greater Service Provider Control over Unique “Connected Life” Experiences

Today’s digital-age consumers demand much more than faster network access and service reliability. The empowered subscriber requires ubiquity, personalization, and rich “connected” experiences that they can control and share. The relevance and importance of technology has created a “connected life” that affects nearly every aspect of our daily lives. Subscribers connect to an array of services through a wide spectrum of both wired and wireless access mediums. But many service providers have been unable to take full advantage of their broadband and mobile infrastructures to optimize their revenue opportunities. The ability of their network infrastructure to identify subscribers, classify applications, provide dynamic session and policy control, guarantee service performance, and charge for multiple IP services without costly infrastructure upgrades has fundamental gaps. Service providers need a means to manage and control subscriber-based traffic by application (for example, voice, video, and data) as well as meter and charge for those services accordingly. As an example, the growing popularity of integrated video capabilities (for example, IPTV or video on demand [VoD] and telepresence) adds levels of complexity never before required for residential business services. The ability to succeed in this environment will depend largely on the ability to take advantage of the full intelligence capability of the IP infrastructure. The far-reaching benefits of this intelligence include subscriber personalization and self-service, dynamic access, service customization, broad operational efficiencies, and dynamic network control, leading to a shift from being a traditional service provider to a next-generation “experience provider.”

This paper describes the market dynamics propelling rapidly changing service environments, network demands, and revenue opportunities. In particular, it addresses how the Cisco® Service Exchange Framework enables service providers to align customer personalization and service flexibility with network resources to accelerate differentiation and growth. The paper defines the three Cisco Service Exchange Framework building blocks and the eight important benefits that are the foundation to the next generation of services.

Overview

Today, the empowered subscriber wants anywhere, any time, any device connection based on dynamic access to a choice of network resources and services. In some cases, with the help of enlightened service providers, subscribers are beginning to live this enhanced experience with a broad array of services and access to resources through a wide spectrum of both wired and wireless mediums and devices. But many service providers lack the ability to deliver this kind of experience because their broadband and mobile infrastructures have not been optimized for enhanced service delivery based on unique subscriber requirements. As referenced in the introduction, they lack the ability to identify subscribers, classify applications, provide dynamic

session and policy control, and guarantee service performance, without making expensive network upgrades and implementing complex management models.

What is needed is a solution to manage and control subscriber-based traffic by application and to meter and charge for those services accordingly. For example, the growing popularity of integrated video capabilities (such as IPTV, VoD, and teleconferencing) adds levels of complexity never before required for residential and business services. Video plays an important role in virtually every aspect of the new connected life experience, yet the complexity of managing video bandwidth consumption and the sheer array of content available is very challenging. So too is the ability to maintain a high-quality experience for customers as they view video applications on different digital devices.

To remain competitive and profitable, network operators must deliver their current services more effectively and quickly add additional high-margin, rich-media services to their portfolios. But these objectives are not easily met because demands are changing rapidly for types of services, increased quality, and greater convenience, as well as reduced pricing. Differentiating between services and usage at the application level is essential for service providers. When providers can prioritize application traffic by subscriber, they can meter and more equitably charge for use of the IP network. They can also use this intelligence to provide real-time access to an array of service choices to further enhance the connected life experience and greatly increase average-revenue-per-user (ARPU) income. That degree of choice and independence will further define the new connected lifestyle. To provide this level of value, service provider networks must also be able to broker and redirect subscribers to the multitude of broadband and mobile services while mobile. To create such personalized experiences, subscribers must be able to self-register for the services they want, have a wealth of tiered service options to choose from (such as basic, premium, or self-selected bundling of various services), and be able to customize each service they choose (with such features as turbo buttons for broadband, parental controls, buddy lists, and ring tones) from a multitude of access devices.

Solution

Cisco Service Exchange Framework

To address this challenge, Cisco has developed the Cisco IP Next-Generation Network (IP NGN) vision, which encompasses an architecture, technologies, and products. Broadband and mobile service providers, with nearly unanimous consensus, have determined that IP will be the foundation technology to make the next-generation network a reality. The Cisco IP NGN is a sweeping transformation of both a service provider's entire network and business that takes full advantage of this evolving IP environment by aligning technology and network resources with business and subscriber requirements. By capitalizing on the power of intelligent IP-based Cisco networking solutions, service providers can build a better, longer-lasting, and economical infrastructure that supports traditional services and scales to deliver new manageable, controllable, and richer premium services over time.

As the middle layer of the Cisco IP NGN solution (refer to Figure 1), the Cisco Service Exchange Framework occupies a critical place between the network and the application layers. The Cisco Service Exchange Framework allows service providers to deploy and control access to subscribers of data, voice, video, and mobile services with no limits to the types of applications that they can offer. A converged services layer of the IP NGN, the Cisco Service Exchange Framework provides a set of enabling technologies that support open application program interfaces (APIs) and operate nearly transparently with third-party policy and service applications. Wireline, cable, and mobile

operators can easily integrate the Cisco Service Exchange Framework into existing operations support systems (OSSs) and business support systems (BSSs) to transform their networks by adding greater intelligence and control to current infrastructures without requiring significant incremental investment. The Cisco Service Exchange Framework allows service providers to optimize application-specific traffic while adding mobility, presence, and a complete suite of subscriber-aware capabilities.

When the Cisco Service Exchange Framework is deployed with intelligent network layer solutions from Cisco, service providers can effectively address a variety of challenges that confront next-generation networks, such as access reach and management, traffic optimization, mobile service management, and fixed-to-mobile convergence. As the anchor for the critical service convergence layer of the IP NGN architecture, this framework provides a variety of service-enabling control technologies that empower service providers with the following essential subscriber and service information:

- Who are the users?
- What devices and services are they using?
- What is each subscriber allowed to do?
- How can the network resources be dynamically controlled?
- How can service providers monitor and charge for a service on a per-user and per-usage basis?
- How can the network be made self-aware of demands?
- How can the network interwork with other carrier networks to provide rich-media control?
- Where can the user roam?
- Where are the user and the device now?
- Where is the service offered, and can it be maintained across other networks?

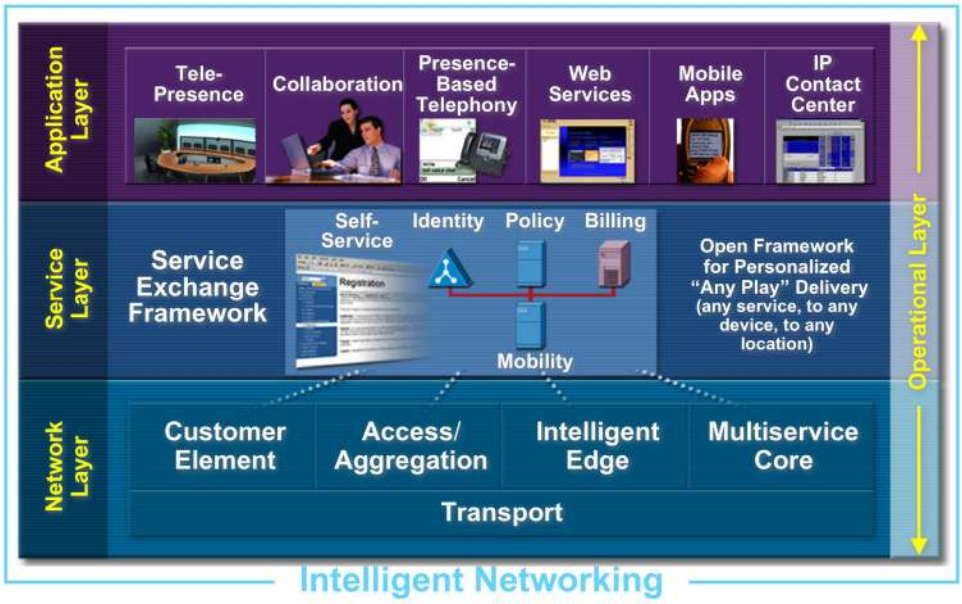
To achieve true service convergence, providers must have intelligent networks that answer these questions. The Cisco Service Exchange Framework allows carriers to:

- Offer a single point to sign on to the network with access to a multitude of service offerings based on user profiles
- Provide more granular usage analysis of individual subscribers and applications
- Manage and disseminate policies in real time
- Deliver, analyze, manage, and control existing and new applications
- Implement new security policies as part of an overall service offering
- Provide subscriber- and application-aware services
- Bundle and manage service pricing down to the transaction level using a common IP network
- Offer application-level quality of service (QoS)
- Ensure a superior quality of experience across all services delivered from a single IP network
- Track transactions by content type, device type, or subscriber

Service providers need an intelligent service control solution that meets the needs of fixed wireline, wireless, and mobile markets regardless of access technology. The Cisco Service Exchange Framework is such a solution, letting service providers effectively deliver the Cisco vision of the

connected life by providing any IP service to any subscriber, at any time, in any place on any device across an intelligent scalable IP network infrastructure (refer to Figure 1).

Figure 1. Cisco IP NGN Architecture



Transport networks can be viewed as a highway, where users are fundamentally accessing a high-speed network through a variety of data on-ramps. The Cisco Service Exchange Framework is critical to moving from a basic highway service structure to a toll-way service structure that allows service providers to reap the benefits of their infrastructure investment by establishing more granular levels of visibility and control over subscriber access, usage, and location. The toll way allows for more effective management, charging, and differentiation of unique voice, data, video, and mobile service offerings. The toll way also allows service providers to offer subscribers higher value and personalized service offerings that can increase customer loyalty while increasing ARPU. Ultimately, enhancing and differentiating applications by enriching content and applying appropriate QoS creates a far better user experience than that currently offered by today's best-effort networks. The ability to identify subscribers and classify applications on the IP network ensures that services such as voice over IP (VoIP), VoD, and interactive gaming can be prioritized to meet application metrics that differentiate them from current best-effort capabilities, thereby helping to support premium pricing.

"Follow-me mobility" is another example of how the Cisco Service Exchange Framework can be used to create high-value, high-margin differentiated services. With access to a network that integrates other networks, professionals can be connected and productive virtually anywhere. Even when moving from one place to another, sessions can remain active and users can remain in touch. Users can easily maintain the same voice, data, or video connection that they have in the office as they walk to their car, arrive at the airport, or arrive home. Providing application mobility over the most reliable and cost-efficient network available is an overriding goal of the IP NGN. To do this, networks must become even more tightly linked, with their operations and support systems tied together so that hand-offs and billing can occur effectively and extensive quality- and class-of-service distinctions can be recognized by the network end to end.

Cisco Service Exchange Framework Building Blocks

The open-access Cisco Service Exchange Framework addresses three important service control areas:

- Multidimensional identity and location management
- Policy and resource management
- Dynamic session and media management

Only Cisco provides a complete set of solutions that address each of these service-enabling areas. The following section examines each of the necessary building blocks for next-generation service control.

Multidimensional Identity and Location Management for Innovative New Offerings

The Cisco Service Exchange Framework supports subscriber awareness and identity management, allowing service providers to associate applications with subscribers for better management and control of user sessions on both broadband and mobile networks. This level of awareness allows for the prioritization of one service over another, ensuring that bandwidth is available for latency-sensitive applications such as interactive gaming or VoIP, or enabling bandwidth on demand (BoD) for specific periods of time that can be individually metered and billed to the subscriber. Subscriber awareness is one of the critical elements that differentiate the Cisco Service Exchange Framework from competitive solutions.

The Cisco Service Exchange Framework acquires, builds, and maintains subscriber- and session-identity attributes during different stages of a session lifecycle. Using this information, service providers can build a composite multidimensional identity for every session and provide this information to the authentication, billing, and policy engines that are part of any IP network infrastructure, allowing service providers to take full advantage of their investments while adding intelligence to their transport networks. The coordination of these critical attributes and the ability to apply relevant policies for each session constitute true subscriber awareness. Intelligence-enabled policies for flow redirection and authentication, authorization, and accounting (AAA) can be built and enforced based on these identity attributes as well.

In broadband networks, subscriber and application awareness make it possible for service providers to enhance usage analysis, traffic management, content charging, and overall network-level security. Subscriber and application awareness, when applied to bandwidth and service control options, allows service providers to:

- Specify a user's bandwidth based on access or type of application – For example, depending on the way a subscriber logs on to the network, the service provider can determine what services are available for that specific session. This dependency can be access-related (that is, Ethernet or Wi-Fi) or it can be business directed, based on the provider's rules. To ensure a quality experience, providers will have to prioritize a user's session based on characteristics of the application in use, such as VoIP or VoD where jitter cannot be tolerated.
- Offer flexible dynamic BoD – For example, subscribers may normally be given, as a default, a lower bandwidth setting that is sufficient for most of their needs (such as e-mail or Web browsing). However, when they need additional bandwidth (for example, to download a large file), they can access a Web portal to dynamically change their bandwidth for an additional fee or time period without service provider intervention.
- Offer application-directed bandwidth and QoS – For example, this dynamic service, initiated by the application, might be applied when a subscriber accesses specific content such as a

video. A dynamic change would be initiated to the user's Internet service through a Web portal without any service provider intervention, allowing service providers to offer additional revenue-producing services above and beyond standard bandwidth offerings while simultaneously applying application-specific traffic shaping to differentiate performance and enable premium billing.

- Identify subscribers and associate their use to specific applications – This capability allows for optimization of application-level traffic and helps ensure service providers can accurately meter and charge for individual services or bundles of premium services. In mobile networks, this capability allows service providers to specify a user and the user's device, determine the user's location, and establish presence for that subscriber. This ability to locate a subscriber can also be shared with other subscribers.

These capabilities help service providers rapidly develop and deploy a wide range of Session Initiation Protocol (SIP)-based subscriber-aware services, which are discussed later in this paper, including:

- Presence-based services such as instant messaging, push to talk, or push to view, where subscribers can immediately see the state and availability of their personal contacts and spontaneously communicate by text, voice, or images.
- Location-based services, which allow the subscribers to find the nearest business (for example, a restaurant, gas station, or theater) or proactively send local offers and invitations to by-passers (for example, free beverages from a coffee shop or available tickets to a sporting event).
- Variants of traditional telecommunications features, such as presence-based call routing, call screening, auto conferencing, and ring back when free.
- Third-generation (3G) mobile applications such as presence-enabled address books, location-based services (for example, mobile subscribers can find the nearest restaurant or theater or businesses can proactively send invitations to by-passers for free or discount offers), and interactive gaming.

In both mobile and broadband networks, the Cisco Service Exchange Framework Personalized Subscriber Management capabilities permit various types of subscriber self-management (such as allowing users to sign up for and authorize new services, define content filtering and parental controls, etc.). Service providers are also empowered to create differentiated service bundles for subscribers and enterprises, and Cisco solutions interface with operational and business systems to offer unified billing procedures that can accurately charge for these new offerings.

Policy and Resource Management for Network Optimization and Control

The Cisco Service Exchange Framework provides session- and flow-control capabilities to implement programmable policy control. The subscriber-to-services closed-loop architecture provides a network and policy infrastructure that enables application and content providers to deliver their information to broadband and mobile subscribers as if providers had their own direct connection to the subscriber. Applying service intelligence and application awareness enables service providers to more granularly control and manage application-level traffic.

Better visibility into how subscribers are using network resources allows service providers to optimize application-specific traffic across both broadband and high-speed mobile networks. In broadband networks, for example, peer-to-peer traffic is growing. Although these new service possibilities can bring substantial revenue opportunities, they also require greater scalability and

availability, application and subscriber awareness, security, and the adaptability to adjust to changing requirements rapidly and cost-effectively.

The Cisco Service Exchange Framework creates an intelligent service layer on top of transport networks that offer service providers better ways to shape and manage traffic based on subscriber needs or network policies. Using the Cisco Service Exchange Framework, a provider could limit peer-to-peer traffic to off-peak hours or scale back bandwidth availability to high-bandwidth users. Different billing policies and service-level agreements (SLAs) could also be established, based on:

- Subscriber prioritization – Bandwidth and QoS could be distributed in a balanced manner to avoid network abuse or overconsumption by some subscribers, based on each subscriber's prescribed SLA.
- Application prioritization and control – Bandwidth-intensive applications that might clog the network could be controlled to minimize their effect on network costs and congestion. Service providers could ensure that delay-sensitive applications, such as VoIP or VoD, receive priority, further optimizing network transport and ensuring that high-priority applications function properly even during peak congestion periods.

The Cisco Service Exchange Framework also supports load balancing, which spreads incoming traffic across many servers to optimize performance, reliability, and scalability. Load balancers also detect server availability and associate user sessions with specific servers or network elements. As mobile data services continue to grow, load balancing helps mobile carriers to meet scalability and reliability requirements by monitoring the in-service state of nodes and rerouting traffic as needed.

Dynamic Session and Media Management for Better Customer Experiences

Cisco provides a rich mix of options for call control, device control, session management, and signaling. Service providers need flexible and open solutions that support multiple protocols and provide end-to-end support. Cisco IOS® Software and Cisco IOS XR Software include a variety of QoS tools for designing and configuring packet networks to provide the necessary low latency and guaranteed delivery required for voice traffic. These QoS mechanisms, including tools such as queuing, policing, traffic shaping, packet marking, fragmentation, and interleaving, are designed to protect all types of fixed wireline and mobile traffic and prevent service-affecting problems associated with multiservice traffic competing for the same network resources. These tools manage traffic already present on the network while keeping excess or unauthorized traffic off the network. The Cisco application of session control provides the ability to control the attributes of an end-to-end call. The Cisco Service Exchange Framework next-generation signaling capabilities allow call information to be easily and securely carried across network boundaries.

Numerous functions may be required at the borders between IP network domains related to access control and provisioning of the appropriate QoS (per service or per subscriber). Border control functions may be required between access and core networks and between ISP networks. Numerous organizations have already specified some mechanisms for border control in specific scenarios. For example, the Third-Generation Partnership Project (3GPP) has specified an interface between a General Packet Radio Service (GPRS) access network and a core IP network, and this interface is fully supported by the Cisco Service Exchange Framework.

Whether operating on broadband or mobile networks, Cisco service control technology is programmable, allowing operators to dynamically manage sessions in real time. Instead of processing packets as individual events, Cisco Service Exchange Framework solutions can fully

reconstruct flows and the Layer 7 state of each individual application flow. By maintaining state information, the Cisco Service Exchange Framework readily identifies applications that employ dynamically assigned port numbers, tracks applications that involve multiple interrelated or spawned flows commonly found in VoIP or multimedia streaming protocols, and applies policy rules as part of controlling the admission policies or session characteristics of a data flow. The intelligent service layer extends the capability of broadband and mobile networks to enable operators to dynamically manage sessions by individual subscriber and application, meaning an unlimited number of applications can be managed across DSL, cable, or mobile networks, including VoIP, video, and interactive gaming and traditional VPN, e-mail, and Web traffic.

A database of information about subscribers is maintained within the Cisco Service Exchange Framework, along with a customer care interface for servicing and supporting subscribers. This interface works with Cisco and third-party applications to issue bills to subscribers. The Cisco Distributed VoIP Prepaid Calling solution provides mechanisms for timing and terminating calls so that a call is disconnected if its authorized duration expires (for example, if the prepaid balance expires). The prepaid calling billing application maintains all of the callers' records, authenticates the callers and rates, authorizes calls, and updates callers' card balances at the end of each call. Similar prepaid service and billing plans can be applied to gaming, music downloads, video streaming, and other rich-media applications.

Additionally, by taking advantage of Cisco capabilities to separate data and control-plane components, it becomes easier to implement common resource management of multiple service offerings, allowing the Cisco Service Exchange Framework to take advantage of a distributed architecture that can dynamically share resources among different service offerings and provide, for example, bandwidth savings during busy hours or different times of the day to enhance application delivery for complex services, such as VoD or interactive gaming.

With the increasing popularity of VoD services, high-definition television (HDTV), and DOCSIS® Internet access in cable networks, the demand for hybrid fiber-coaxial (HFC) network bandwidth is ever increasing. Cable operators must use the bandwidth of the existing HFC infrastructure more efficiently to avoid having to upgrade their networks as the need for bandwidth increases.

The Cisco Service Exchange Framework Supports Both IMS and Non-IMS Applications

IP Multimedia Subsystem (IMS) is an evolving standard for SIP applications. IMS was originally conceived before the emergence of VoIP by the 3GPP as an architecture that would allow mobile carriers to run voice services over an all-IP network. Today it is being promoted as the architecture of choice for multimedia communications services of all kinds. Wireline and cable operators are also interested in IMS, and standards organizations such as the ETSI and CableLabs® are creating standards to support both IMS and non-IMS applications.

Cisco actively participates in all standards groups that are defining IMS and IMS-based standards and protocols for all the service provider segments. Cisco understands the unique service delivery and networking challenges that confront mobile carriers, wireline providers, and cable operators as they look to transform and expedite the creation and delivery of rich, multimedia services from their networks. Anticipating the need to support both IMS and non-IMS applications, because not all of a provider's offerings will be SIP-based, the Cisco IP NGN and Service Exchange Framework supports both IMS and non-IMS applications. With IMS support, the Cisco Service Exchange Framework allows service providers to greatly simplify and accelerate the delivery of SIP-based applications alongside non-IMS applications. This comprehensive service delivery approach helps

providers deliver a wider range of service options, achieve greater network efficiencies, and improve network, service, and business control.

Cisco Service Exchange Framework Features and Benefits for Service Providers

The Cisco Service Exchange Framework overlays fixed and mobile network intelligence, subscriber awareness, and application-level control as well as presence on existing IP transport networks, helping service providers analyze, optimize, secure, and meter application- and content-based services. Each of these benefits is defined in more detail as follows:

- Usage analysis – Improving and developing new business models require that broadband and mobile service providers accurately understand their subscribers' usage. Cisco Service Exchange Framework technologies are designed to dramatically improve analysis. Obtaining meaningful usage data from IP networks is a particularly difficult task. IP network transport devices were not designed to provide usage information that captures the granular details of transport traffic, resulting in poor visibility into network activity. Providers frequently rely upon guesswork or inaccurate sampling techniques as they work to better understand usage patterns.

  Cisco Service Exchange Framework technologies provide high-performance application- and subscriber-aware traffic classification, providing operators with unrivaled visibility into network activity. By tracking all IP traffic flows and performing stateful deep packet inspection, the solution collects statistics about the applications and services used by individual subscribers. Taking the guesswork out of capacity planning and detailing the subscriber demographics helps operators uncover the new revenue potential and hidden operational costs associated with IP service delivery in both broadband and mobile networks.

- Traffic optimization – The growing number of broadband Internet subscribers and the emergence of broadband-aware applications and applications using much bandwidth such as peer-to-peer file sharing, voice, or streaming media is affecting the cost and profit equation for service providers. Regardless of the amount of bandwidth operators make available, new applications and growing file sizes make network congestion inevitable. The incremental costs of network upgrades and transit reduce operators' margins. The Cisco Service Exchange Framework helps providers reduce costs. Using state-of-the-art bandwidth management applied to network traffic on a global, subscriber, or individual flow-level hierarchy allows operators to dictate how network resources are distributed. The result is improved subscriber experience and overall satisfaction with broadband network performance as well as reduction in transit costs and costly network upgrades.

- Service security – The lack of security-conscious home users and the open nature of the Internet create a breeding ground for network security threats that affect both service providers and subscribers. Subscribers are under a constant threat of DoS attacks, worm, and virus infection. Recent threats have created "security storms" resulting from virulent Internet viruses such as Sasser, Slammer, or Blaster. Additionally, as more "IP-enabled" handsets and personal digital assistants (PDAs) become targets for hackers, service security turns out to be a paramount concern for operators in all areas.

  Increased network traffic caused by the multiplicative effect of infected hosts results in increased administrative costs and technical support calls, as operators seek to track, disable, and block the spread of a virus attack. Infected machines generate network congestion as they attempt to propagate a viral infection, resulting in performance

degradation for all users. Service control-enabled networks stop and proactively mediate security threats that create unwanted traffic and network congestion while increasing providers' costs.

- Tiering and access control – Differentiating service levels and compelling new content can further accelerate the migration of dialup users to broadband access, creating the necessary critical mass of users for premium content service deployment. As content proliferates and content suppliers begin to partner with network operators, both mobile and broadband service providers will need to protect copyrights, which may be based upon subscription, and mitigate against unauthorized access to content. The Cisco Service Exchange Framework helps ensure that operators can account for usage on an individual subscriber level, while enforcing different policies on a variety of applications or services. This dynamic, subscriber-centric enforcement model allows for the creation of access and BoD services that can improve overall subscriber satisfaction by allowing subscribers to select or gain access to the content or resources of their choice. Providers can now initiate truly customized broadband products and services and enforce service parameters directly correlated to the needs of individual users.
- Content charging – If the network were able to differentiate between types of content, value service offerings differently, or track and meter combined usage, mobile and broadband operators would be better able to competitively package and value content in unique ways. The Cisco Service Exchange Framework content charging solution offers carriers the ability to increase revenue and take full advantage of infrastructure investments by adding pre- and postpaid content-based services to mobile service offerings. Because the Cisco Service Exchange Framework can granularly control and classify traffic, broadband operators can create application quotas, while mobile carriers can use the content charging solution to enable real-time charging of traffic according to sophisticated rate plans and control traffic based on advanced pre- and postpaid billing models. Real-time charging is performed against a subscriber's balance in line with traffic, thus preventing potential revenue leakage.
- Premium service enablement – The ability of IP network to generate compelling new services is unlimited, but shortfalls in today's infrastructure are preventing providers from profitably maximizing network investment and limiting their ability to create new business models or customize services to individual subscriber preferences. Cisco technology is built to resolve a multitude of service delivery concerns. As the number of Internet subscribers grows and the number of intelligent portable devices increases, the market for both broadband and mobile operators is positioned to accept new premium service offerings such as VoIP, online gaming, music downloads, VoD, and IPTV. These services offer the potential to dramatically increase ARPU for service providers, further increasing the overall value of their network assets.

  Integrating into existing QoS frameworks and communicating with policy servers and network transport elements, the Cisco Service Exchange Framework technology enables dynamic, real-time provisioning of network QoS based on application activity, greatly simplifying integration and costs associated with multiservice delivery.
- "Over-the-top" video, voice, and gaming – One of the most significant risks that broadband service providers face is the threat from "nonfacility" service offerings. Traditional service provider services often compete with alternative "over-the-top" services such as broadband voice, online DVD streaming and downloads, and centralized multiplayer online gaming. Nonfacility services typically ride on a best-effort network and may not benefit from the

same QoS as managed triple-play (data, voice, and video) services. Nevertheless, nonfacility operators are able to provide an adequate user experience with comparatively lower operational expenses and a larger addressable market, making them formidable competitors.

However, with the Cisco Service Exchange Framework, service providers can treat over-the-top services as partners rather than competition. By creating an open network environment through which nonfacility operators can ensure a more reliable customer experience for their application traffic, broadband service providers can create new revenue-sharing business models. The Cisco Service Exchange Framework allows service providers to efficiently and equitably identify nonfacility service traffic streams for billing, auditing, and guaranteed performance.

- Mobility service enablement – The Cisco Service Exchange Framework provides significant enhancements for service providers seeking to offer mobility-based services. Further using subscriber and application awareness for SIP-based peer-to-peer and multimedia signaling, the Cisco Service Exchange Framework can enable service applications such as voice, video, push to talk, presence, geolocation, and “buddy” lists to name a few.

  By providing presence, the Cisco Service Exchange Framework helps enhance mobility application services by allowing mobile service providers to know the users’ locations, and therefore provide real-time, personalized relevant information such as local times or weather conditions or local news events to mobile users. Presence-based enhancements can provide carriers with ways to further differentiate service offerings. These capabilities are truly access-independent so that they are not tied to any particular network and their operation does not depend upon specific access but can take advantage of access services such as QoS. Service offers must travel from point to point with mobile users, and must interoperate as transparently as possible on an intercarrier basis. The Cisco Service Exchange Framework is designed to resolve the complexities of interoperability and mobility.

Table 1 provides details regarding the solutions that comprise the Cisco Service Exchange Framework.

Table 1. Cisco Service Exchange Framework Products and Solutions

Cisco Service Exchange Solution	Core Functions	Key Capabilities	Supports IMS	Supports Non-IMS
Cisco Intelligent Access and Aggregation Platforms				
Broadband remote-access servers and universal broadband routers • Cisco 7000 Series Routers • Cisco 10000 Series Routers	Broadband aggregation	• Content filtering for traffic control • Per-user stateful firewall • Usage-based services support (service selection gateway [SSG])	X	X
Video over broadband • Cisco 7600 Series Routers	Optimized video service delivery	• First asymmetric Gigabit Ethernet optimized video network • Enhanced multicast for video • Scalability: 100,000+ video streams per router or switch		X
• Cisco Mobile Exchange	Mobility services	• Mobile IP • Service selection • Content monitoring and security	X	X
Cisco Integrated Policy Management Solutions				

• Cisco Service Control Engines	Integrated policy management	• Subscriber and application awareness • Stateful deep packet inspection • Application traffic optimization	X	X
• Cisco Broadband Policy Manager	Dynamic policy control	• Real-time policy control • Programmable policy rules and enforcement	X	X
Cisco Call and Session Control and Subscriber Presence Solutions				
• Cisco MGX® 8880 Media Gateway	Packet voice and advanced services applications	• Industry's first Multiprotocol Label Switching (MPLS)-enabled media gateway for wireless, wireline, and cable • Unmatched VoIP density, scalability, and performance	X	X
• Cisco IP-to-IP Gateway	Session border control	• Service provider-to-enterprise edge for SLA, signaling, and media normalization • Service provider-to-service provider edge to exchange VoIP traffic • Service provider-to-service provider edge to exchange VoIP traffic	X	X
• Cisco BTS 10200 Softswitch	Packet voice	• Public-switched-telephone-network (PSTN) migration to IP NGN packet networks • Intelligent voice over broadband for residential and business services • Converged voice and data services	X	X
• Cisco PGW 2200 Softswitch	VoIP-to-PSTN interconnect	• Media gateway control • VoIP transit and PSTN signaling interface	X	X

Cisco Service Exhange Framework: Intelligent Solutions For Fast, Cost-Effective Service Delivery

The Cisco Service Exchange Framework provides a comprehensive and intelligent service layer that operates transparently with the diverse and ever-expanding application layer and the Cisco secure IP-based network layer. The Cisco Service Exchange Framework hardware and software solutions address fundamental business concerns for service providers – how to deliver more services; gain greater capital expenditures (CapEx) and operational expenses (OpEx) efficiencies; and better control services, networks, and overall business.

The Cisco Service Exchange Framework also protects service provider infrastructure investments by providing a flexible, open API solution that supports evolving IMS architectures and new services (both SIP and non-SIP). Because Cisco Service Exchange Framework solutions are standalone 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-control layer in a phased approach that meets their business and service needs. With the Cisco Service Exchange Framework, service providers can define the unique scope and timing of their service-control layer deployment.

Summary

The Cisco Service Exchange Framework enhances broadband and mobile IP networks with network-aware, application-aware, and subscriber-aware service control features. Technologies such as call session control, integrated session border control, and stateful deep packet inspection help service providers to identify, classify, and guarantee performance and usage – and to more

accurately charge for services. By taking full advantage of the exclusive Cisco Service Exchange Framework wire-speed and stateful architecture and associated technologies and products, service providers can profitably deliver an array of voice, data, video, and mobile services customized to individual subscriber needs. By adding the intelligence of subscriber awareness and identity management, policy and resource management, dynamic session management, and mobility and services management to IP-based NGNs, service providers can effectively deliver new and profitable rich-media services, while converging their infrastructures. The end result is a much greater range of service offerings and revenue streams, ubiquitous network coverage, enhanced customer loyalty or "stickiness," and greater efficiencies that contribute to a better return on investment with solutions for the connected life.

For More Information

- Cisco IP NGN
- Service Convergence
- Application Awareness
- Personalized Subscriber Management
- Advances to IMS (A-IMS)

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Printed in USA C11-380020-01 06/07

