The Cisco Service Exchange Framework

A Comprehensive Approach to Service Delivery
Supporting both IMS and non-IMS Applications

Competitive Pressures

Service providers are rapidly replacing single-purpose networks with all-encompassing IP networks. The benefits of moving to an IP Next-Generation Network (NGN) are well understood: rapid delivery of rich multimedia services, increased efficiency in resource management, and better service and network control—a complete business transformation.

But the potential of IP service delivery is increasing competition. Cable operators are provisioning voice over IP (VoIP) and wireline operators are countering this business threat with competing video-on-demand (VoD) and IPTV offers. Moreover, fixed mobile convergence (FMC) is required to ensure transparent delivery of mobile "follow me" IP services and revenue sharing across network boundaries. And to add complexity, as all providers are working their own "triple play", new competition is coming from nonfacility operators who deliver services that ride "over the top" of provider networks for free.

As a result, carrier infrastructure must be flexible enough to support emerging multimedia services and new networking standards while protecting major capital investments. Successfully overcoming these challenges gives providers a strategic advantage in this dynamic and demanding environment of growing subscriber expectations.

The Cisco® IP NGN, with its Service Exchange Framework (SEF), is designed to address the needs of mobile, cable, and wireline providers to create an infrastructure that is flexible enough to deliver IP services that keep them competitive and profitable. Many providers see the IP Multimedia Subsystem (IMS) as the cornerstone of their strategy to quickly deliver new IP services at a fraction of today's costs. Understanding the importance of IMS-based applications—applications based on Session Initiation Protocol (SIP)—and non-IMS-based applications is an indispensable part of building next-generation networks that meet overall IP service delivery needs and requirements.

The Cisco SEF offers service providers the flexibility to deal with both IMS and non-IMS applications.

IMS—Where Fixed and Mobile Networks Converge

IMS has become synonymous with fixed mobile convergence. It reduces the complexity of IP service delivery, offers ways to bridge application service between disparate networks, and adds compelling new features that enhance usability and collaboration.

Conceived for third-generation (3G) mobile networks, IMS focuses on SIP applications. Additional standards bodies—including Third Generation Partnership Project 2 (3GPP2), ETSI, ITU-T, and CableLabs®—have collaborated to broaden this standard to address service delivery across mobile, wireline, and cable networks. Although the IMS specification has focused the industry on network interoperability, it is still not ready to address the entire spectrum of applications that form the service delivery puzzle.

The Promise of IMS

By combining FMC, which allows seamless roaming between mobile and broadband networks, with enhanced collaboration capabilities and new features such as location and presence, IMS has some important advantages. Compelling new classes of service become possible, such as videoconferencing with buddy list capability, which allows users to instantly identify a co-worker's presence and add that person to a call session. Rapid prototype and delivery of collaborative applications that work across cable, wireline, and mobile networks exemplify the promise of IMS and increase convenience and utility for business and residential users (Figure 1).

Figure 1: IMS Enables New Service Applications
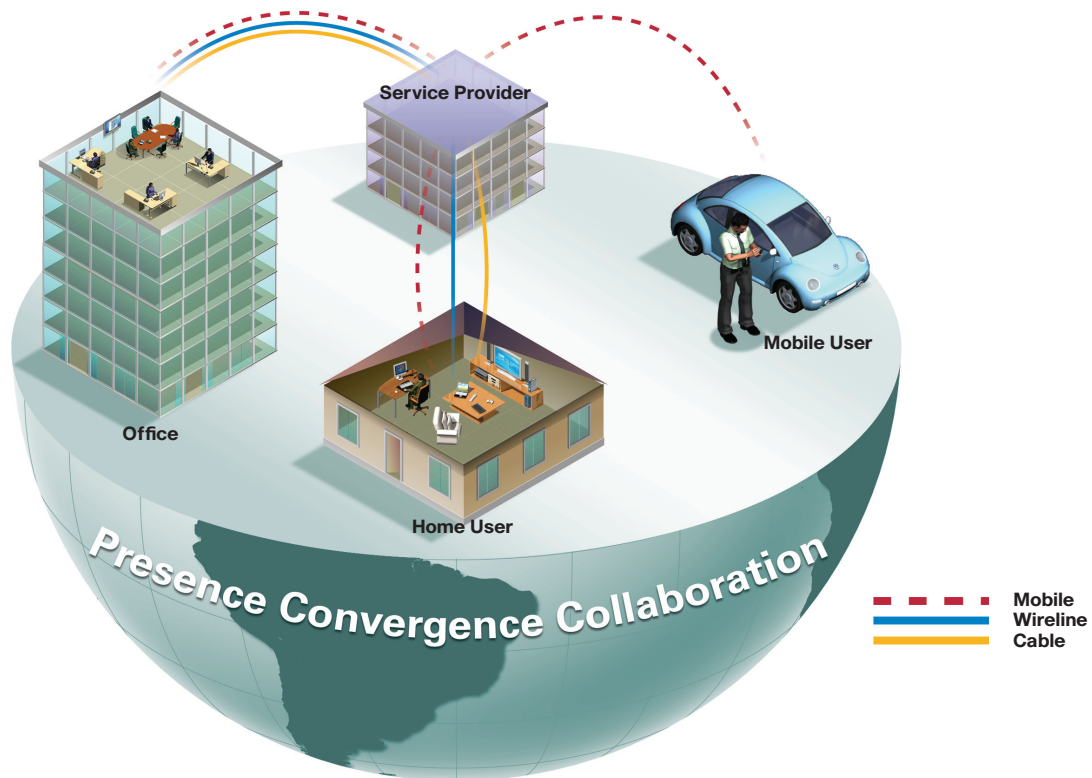
IMS-Functional Integration and User Convenience

Unified Messaging	Multimedia Buddy Lists	Location-based Services
Click to Dial	Presence-based Gaming	One-number Reach
Video Conferencing	Dual Mode Phones	

IMS strategies and implementations still depend on service providers' business goals and the applications they must support. As IMS adoption increases across the provider community, the application base will grow. Today, most IMS applications tend to be real-time—oriented around person-to-person interaction. These applications include both session and non-session-based services such as instant messaging, group chat, push-to-talk (PTT), and voice or push-to-video, to name just a few.
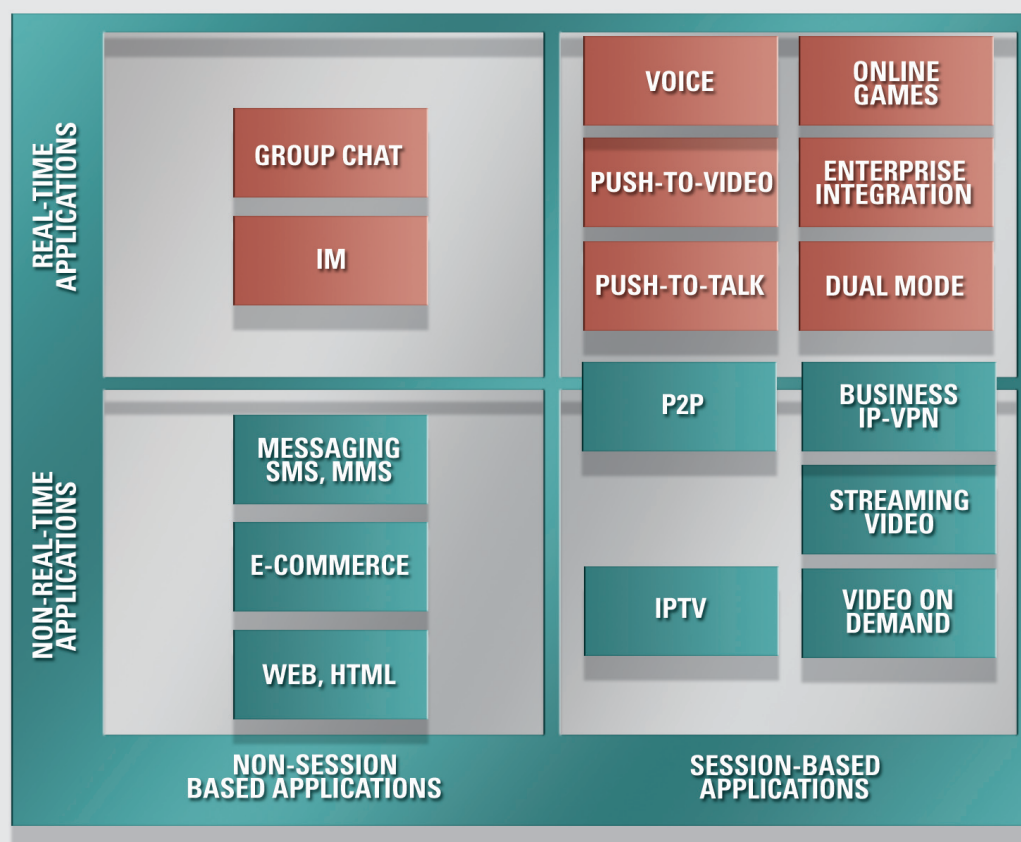
What About Non-IMS Applications?

IMS and non-IMS service applications have significant differences, which affect how they are provisioned and how to best design a network for all-encompassing IP service delivery. Designing for IMS alone addresses only part of a service provider's business opportunity—and may create the need for costly network redesign if the needs of non-IMS service delivery are not met. Making the right decisions now means providers are best equipped to meet short- and long-term business and service delivery challenges. Many service providers are struggling to find the best way to balance their IMS and non-IMS offerings. What approach has the highest probability for success?

Application Coexistence Across Next-Generation Networks

The best solution for dealing with complex IP service delivery must enable network operators to effectively manage any IP application (Figure 2). Non-IMS applications generate significant revenue and will continue to do so in comprehensive service portfolios—but they are not supported by the IMS standard. Can providers afford to ignore them? Certainly not.

Figure 2: Examples of IMS and non-IMS Applications

	REAL-TIME APPLICATIONS		NON-REAL-TIME APPLICATIONS

Real-Time Applications:
- GROUP CHAT
- IM
- VOICE
- ONLINE GAMES
- PUSH-TO-VIDEO
- ENTERPRISE INTEGRATION
- PUSH-TO-TALK
- DUAL MODE

Non-Real-Time Applications:
- MESSAGING SMS, MMS
- E-COMMERCE
- WEB, HTML
- P2P
- BUSINESS IP-VPN
- STREAMING VIDEO
- IPTV
- VIDEO ON DEMAND

NON-SESSION BASED APPLICATIONS | SESSION-BASED APPLICATIONS

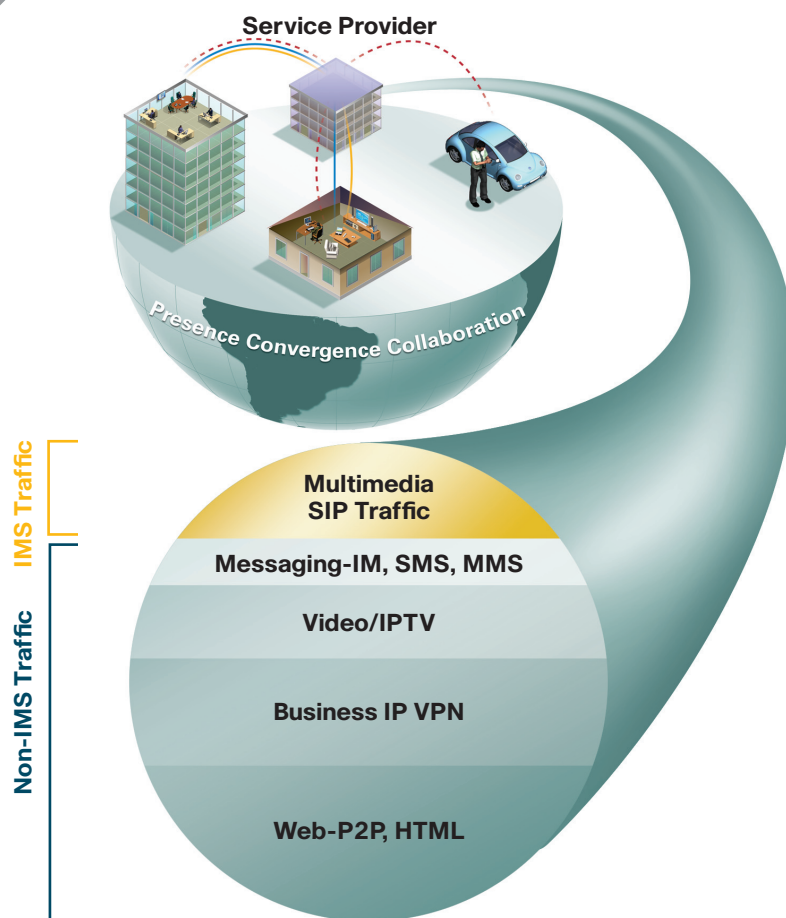IMS (SIP) APPS OR NON-IMS APPS
NON-IMS APPS

Figure 3: Bandwidth Comparisons – IMS and non-IMS Applications

Service delivery decisions are never simple or without consequence. An all-encompassing IP network must address real-time and non-real-time as well as session- and non-session-based services. Services such as Web surfing, video on demand, streaming video, IPTV, IP VPNs, and peer-to-peer (P2P) downloads generate most traffic on provider networks and most of today's revenue. Video traffic is expected to grow exponentially, comprising most of the IP traffic growth in the near term—whereas IMS traffic is expected to grow marginally by comparison (Figure 3).

The bottom line is that some services are IMS, some are non-IMS, and some will merge over time. Enabling applications to coexist on the same multiservice network is critical to ensuring a flexible approach that supports the dynamic—often volatile—evolution of IP service delivery. Any new business and consumer service has uncertainties associated with its popularity and acceptance. Sustaining profitability for cable, wireline, and mobile providers and meeting the needs of business and residential subscribers require infrastructure flexible enough to support both IMS and non-IMS applications.
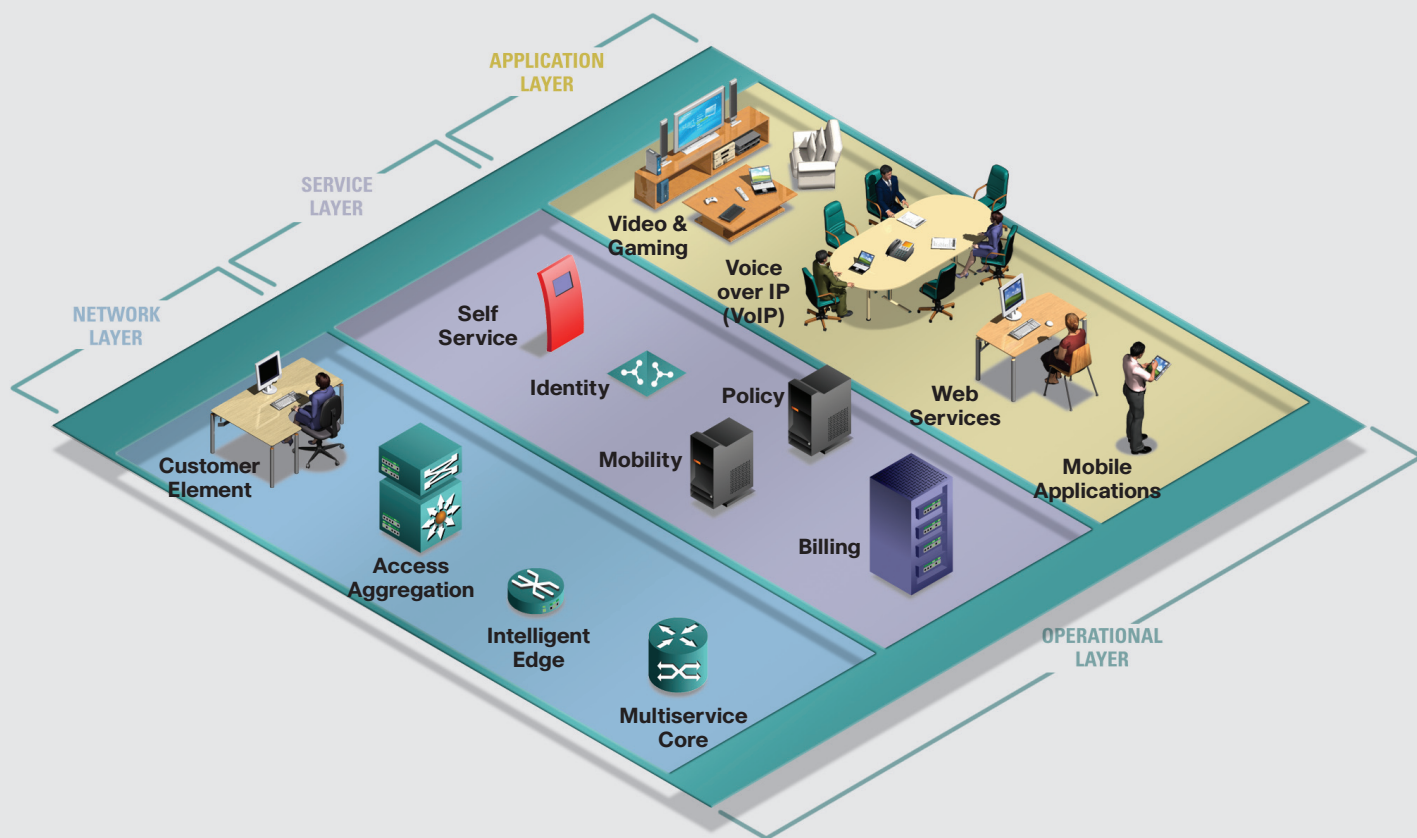
Figure 4: Cisco Service Exchange Framework

Cisco Service Exchange Framework—Unsurpassed Support for Any IP Application

The Cisco IP NGN, comprising tightly integrated layers that offer network, service, and application convergence, introduces intelligence into the network. Cisco equips providers with an adaptable network infrastructure that accommodates change and effectively manages service diversity (Figure 4).

The Cisco Service Exchange Framework—The Network Knows the User

Coupled with the network and application layers, the Cisco Service Exchange Framework is built to work with any application—IMS and non-IMS (Figure 5). The Cisco SEF delivers a cost-effective user experience by answering important questions such as: Who is the user? What is the user attempting to do? How can the network respond to the user's requests? and Where can users go on the network? It does so across the entire network, not just a single service.

The Cisco SEF helps service providers consistently and accurately monitor and record usage as customers travel anywhere across SEF-enabled networks. Providers can bill based on use and content; dynamically mix and match bundled services through their billing system; and use policy to balance loads across networks and avoid gridlock while increasing access times. With the registration, authentication, and access control services, providers do not need to recreate entire systems with each new offering—this means lower costs, bigger margins, and increased profits.
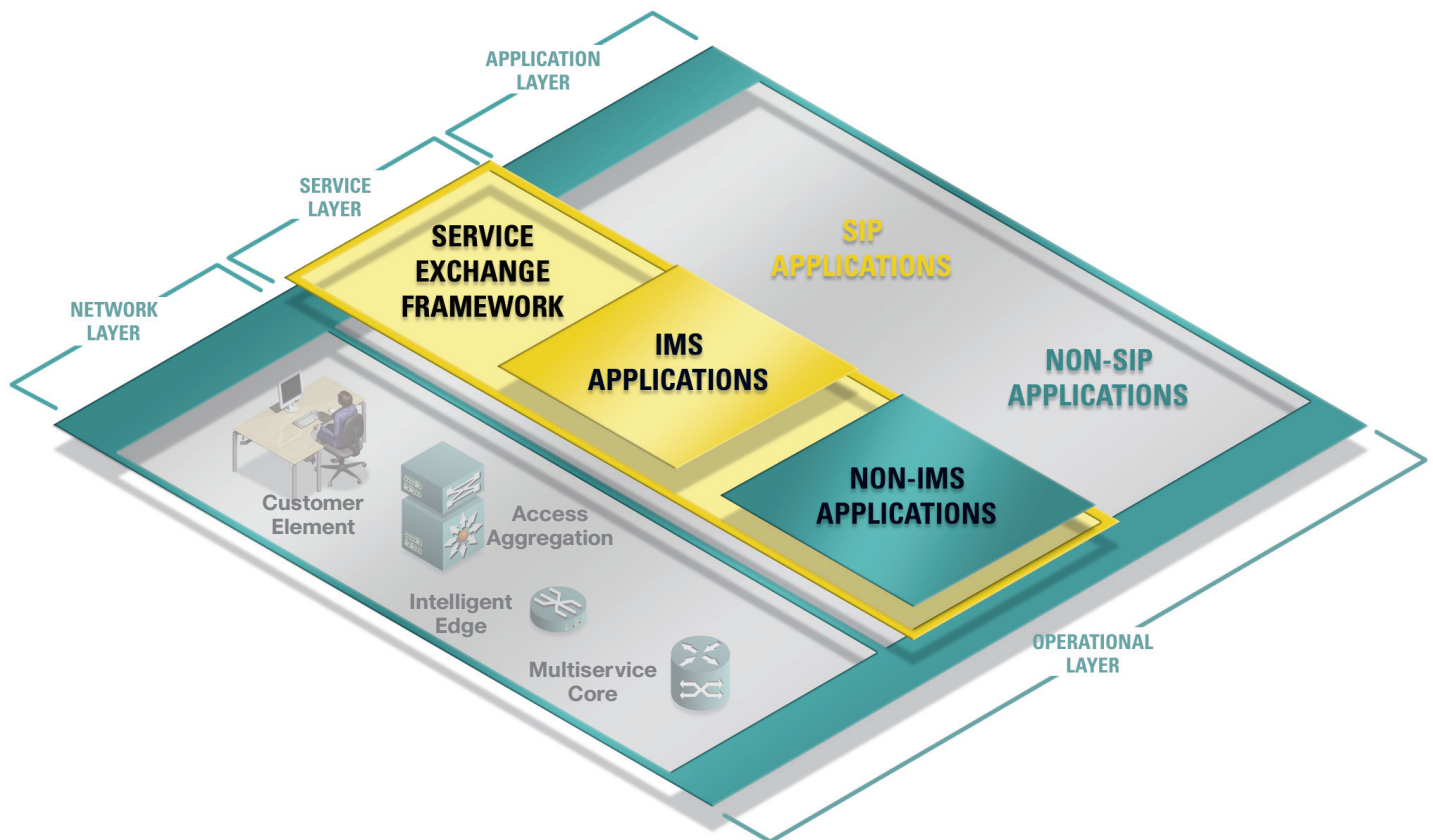

Figure 5: Cisco IP NGN Architecture

A Proven Path to Profitability

The Cisco SEF supports FMC, taking advantage of subscriber and application awareness to integrate identity, policy, billing, and personalization. By incorporating mobility features such as presence and location, the Cisco SEF always knows "where" users are and what services they are trying to access—as well as the privileges the subscribers have.

More Services, Greater Efficiency, and Better Control

A transport-agnostic Cisco Service Exchange Framework provides a scalable environment to support a broad range of business and consumer services. Using elements of the Cisco SEF, providers can bundle voice, video, and data ("triple play") services to increase revenue. They can offer personalization and self-selection, video quality of service (QoS), virtualized content, detailed billing and usage models, and extensive prepaid and postpaid options.

Service Differentiation and Bundling

The enhanced subscriber and application awareness that Cisco SEF provides helps service providers create new ways to differentiate and package their service offerings. Following are just a few examples of how the Cisco Service Exchange Framework is being used to support IMS and non-IMS service offerings across mobile, wireline, and cable networks.

2G/3G push-to-talk: The Cisco SEF has been deployed in major provider networks, increasing average revenue per user (ARPU) and offering interoperability between mobile phone partner networks while extending support to a host of other multimedia services.

Self-subscription and personalization: The Cisco SEF allows mobile customers to personalize and preconfigure applications for easy access and self-selected access independent multimedia services.

Content filtering: Internet providers have used the Cisco SEF to provide network-based content filtering that automatically protects less-sophisticated broadband users from virus attacks and denies website access to minors as part of their network service offering.

P2P traffic management: The deep packet inspection capabilities integrated into the Cisco SEF are enabling service providers worldwide to identify and apply time-of-day policies that avoid prime time bandwidth gridlock resulting from P2P traffic consumption.

Video oversubscription: The Cisco SEF is being used to preserve the video viewing experience of all network subscribers by enabling a "graceful busy" signal. When demand exceeds capacity, a new subscriber request is deferred with notification to maintain overall viewer experience.

Distributed denial-of-service (DDoS) protection: The Cisco DDoS solution enhances the security profile of any provider network by helping the provider locate and address network anomalies at the source of an attack—helping ensure the integrity of network traffic.

Fair use: Mobile providers are using the Cisco SEF to track per-subscriber traffic and applications. By setting proscribed bandwidth limitations on certain traffic types, providers can fairly distribute finite bandwidth for data traffic across their entire subscriber community.

Facilitating New Business Models

Service providers and nonfacility operators of "over-the-top" services need to find ways to create mutually beneficial relationships.

With the Cisco SEF network, providers can identify both the source of content and the subscriber destination point. Detecting nonaffiliated applications and enhancing QoS parameters make new cobranding and fee sharing arrangements possible. Now providers can reassert the importance of their pipeline in the business equation by offering an exchange. Elevating service delivery beyond "best effort" enhances the subscriber experience and results in an increased willingness to pay. Enhanced service delivery meets the needs of a broader segment of the marketplace—games and video without jitter, and voice calls without packet loss.

By increasing the total addressable market, both the over-the-top providers and service providers can find new ways to increase profits together while giving subscribers the highest-quality service possible—everyone wins. Service prioritization forms a basis for content partnerships that benefit the network operator, content provider, and subscriber (Figure 6).
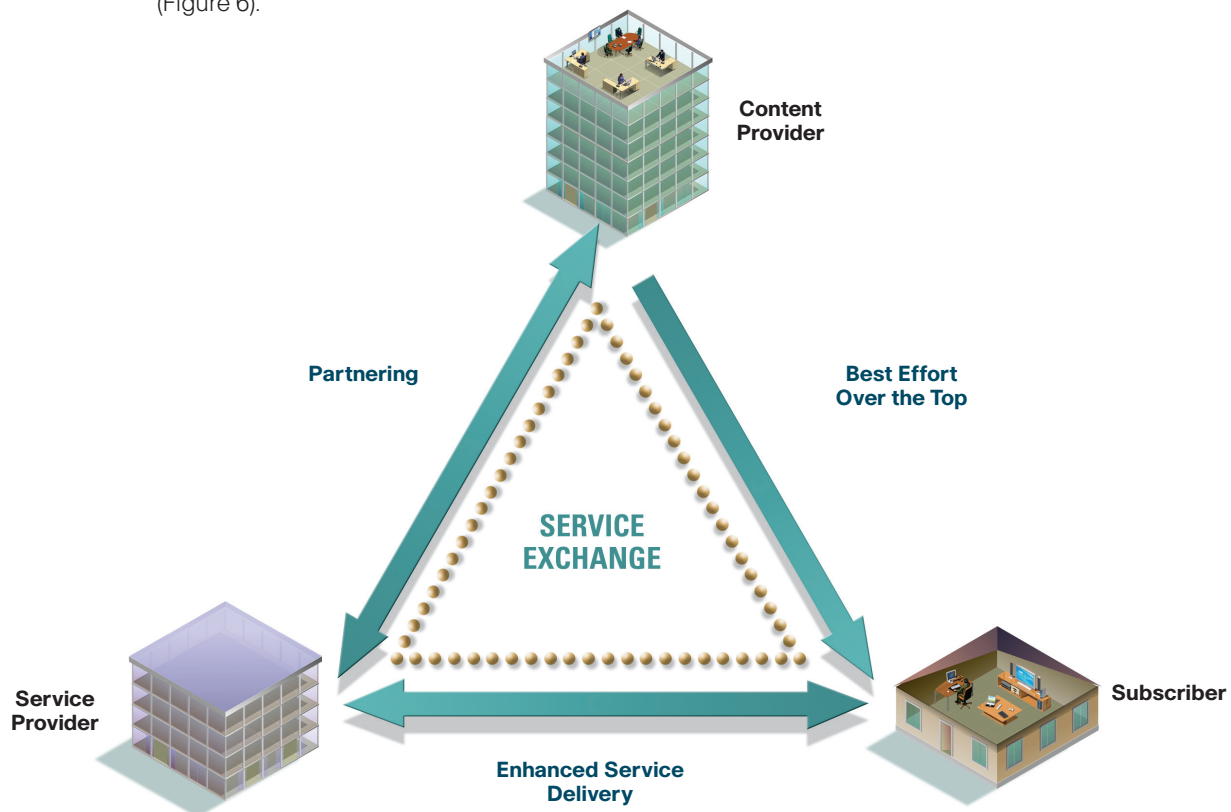

Figure 6: Everyone Wins—Service Providers, Content Partners, and Subscribers

The solutions that comprise the Cisco SEF support both IMS and non-IMS applications

Cisco Service Exchange Framework Solution	Core Functions	Capabilities
Cisco Intelligent Access and Aggregation Platforms		
Broadband remote-access servers and universal broadband routers • Cisco 7000 • Cisco 10000 Series	Broadband aggregation	• Content filtering for traffic control • Per-user stateful firewall • Usage-based services support (Cisco Service Selection Gateway [SSG])
Video over broadband • Cisco 7600 Series	Optimized video service delivery	• First asymmetric Gigabit Ethernet-optimized video network • Enhanced multicast for video • Scalability: 100,000+ video streams per router or switch
Cisco Mobile Exchange	Mobility services	• Mobile IP • Service selection • Content monitoring and security
Cisco Integrated Policy Management Solutions		
Cisco Service Control Engines	Application-level traffic optimization	• Subscriber and application awareness • Stateful deep packet inspection • Integrated policy management
Cisco Broadband Policy Manager	Dynamic policy control	• Real-time policy control • Programmable policy rules and enforcement
Cisco Call Session Control and Subscriber Presence Solutions		
Cisco Call Session Control Platform (CSCP) • Cisco CSCP-Edge Proxy • Cisco CSCP-Name Resolution Server • Cisco CSCP-Service Engine	SIP proxy, session control, and presence	• Service authorization, selection, and invocation • Session routing and QoS signaling • Subscriber identity and presence management
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
Cisco BTS 10200 Softswitch	Packet voice	• Class independent softswitch supporting SIP, MGCP, SS7, LNP, lawful intercept, and 911 • Voice over broadband with a comprehensive residential voice feature set • Converged voice and data services for small-and-medium businesses
Cisco PGW 2200 PSTN Gateway	VoIP-to-PSTN interconnect	• Media gateway control • VoIP transit and PSTN/PLMN signaling interface • Business voice VPNs, PBX interworking
Session Border Control		
Cisco Session Border Control (integrated with Cisco 12000 Series Router)	IP session management on provider edge borders	• Service provider-to-enterprise edge for service-level agreement (SLA), signaling, and media normalization • Service provider-to-service provider edge to exchange VoIP traffic

A Complete Service Delivery Approach—Build, Partner, and Acquire

Cisco Systems® is committed to meeting the IMS and non-IMS service delivery needs of cable, wireline, and mobile providers. To offer service providers the greatest flexibility regardless of their approach, Cisco will build, partner, or acquire the necessary technology to meet individual customer requirements (Figure 7).
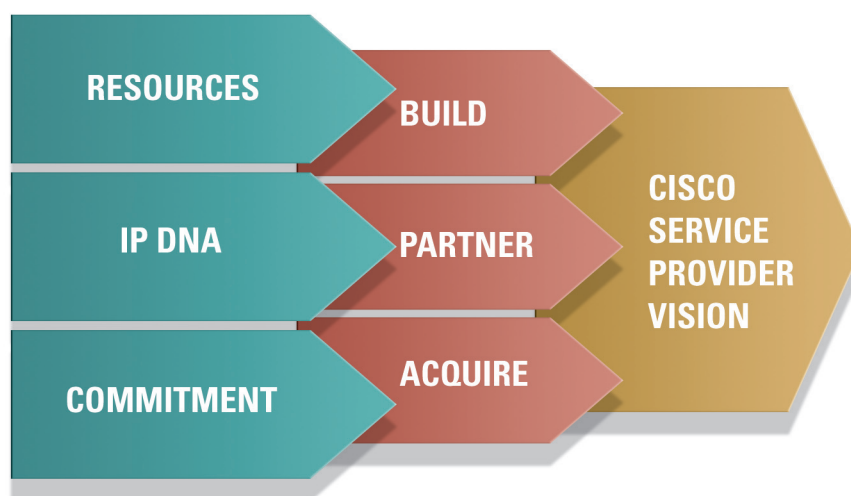

Figure 7: A Flexible Approach to Service Delivery

Make Cisco Your Value-Added IP NGN Provider

With enhanced network intelligence and a 20-year history of IP innovation and world-renowned technical support, Cisco has the solutions, experience, and commitment to help service providers successfully deliver triple-play and mobile service offerings that are personalized to meet the needs of business and residential subscribers.

For more information about the complete Cisco IP NGN vision and architecture for service providers, visit the Cisco Website at **www.cisco.com/go/ipngn**

CISCO SYSTEMS

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
      800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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