Cisco Systems

Cisco Mobile Exchange

Enabling profitable mobile data services

The Internet is going mobile.

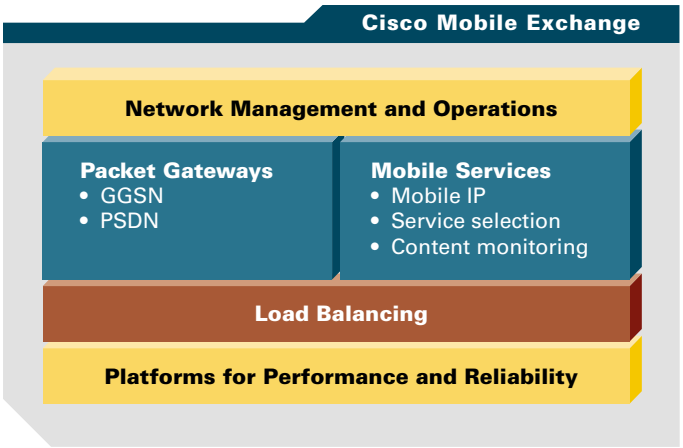
People want access to information, and they want it on the move. The proliferation of cellular phones proves it. Mobile voice services are incredibly successful—so successful that revenue growth is slowing down because the cellular market is virtually saturated and providers are competing on cost. Mobile operators can now create a new competitive edge and take advantage of their vast installed base to grow revenue by adding IP services to their offerings—creating the Mobile Internet.

The Mobile Internet delivers information to mobile and wireless subscribers transparently; that is, the user experience, services, and billing are independent of access medium or end-user devices, and they are available anywhere, any time. The Mobile Internet ends the search for an Ethernet port or phone jack. It offers a service-rich environment that serves as a personal assistant to subscribers. It knows who they are, where they are, and what they are trying to do.

The market is poised to embrace mobile IP networking—live connections that reach users anywhere on any device. Yet, as with the wired Internet, success in the Mobile Internet is not about connections—it's about delivering desirable content and applications to users. Businesses want to enable mobile virtual private networking (VPN) access to intranet, e-learning, or workforce optimization applications. Consumers want Web-based shopping and Internet gaming.

Cisco Systems applies its undisputed IP leadership to the Mobile Internet with the Cisco Mobile Exchange, a standards-based framework that links the radio-access network (RAN) to IP networks and their value-added, content-based IP services. This framework delivers solutions that simplify and enhance service delivery independent of underlying technologies. Cisco Mobile Exchange takes advantage of the proven performance of Cisco switch and router platforms, offering mobile operators the affordable insertion cost, unlimited scalability, and carrier-class reliability that service providers expect from Cisco, the worldwide leader in networking for the Internet.

Figure 1: Cisco Mobile Exchange



Challenges

Creating the Mobile Internet poses both logistical and technical challenges. The most obvious challenge is reaching a variety of client devices with similar services over different access media. Subscribers may use General Packet Radio Service (GPRS) or Wireless Access Protocol (WAP) phones or personal digital assistants (PDAs) while on the road. They could also use a PC on a wireless LAN (WLAN) in an office, airport lounge, or coffee shop, or work from home over a broadband connection. No matter how they access services, subscribers need a common user experience and a single bill each month.

Cisco Mobile Exchange is comprised of several components (Figure 1), including packet gateways, mobile services, load balancing, network management, and operations, delivered on a range of Cisco platforms and application modules. Together, these components successfully solve the many challenges that face mobile operators that seek profitability from their second-generation (2G), 2.5G, or 3G mobile packet infrastructures and 802.11 WLANs.

Packet Gateways

The packet gateway is the interface between the mobile infrastructure and standard IP networks. A gateway translates between access-specific protocols of the RAN and the access-independent world of the Internet. Mobile operators transmit IP packets through the air using one of two standards:

- The Global System for Mobile Communications (GSM) standard, deployed worldwide, delivers data via GPRS protocols through the gateway GPRS support node (GGSN).
- The code division multiple access (CDMA) standard found in North and South America and several Asia-Pacific countries delivers data using 1XRTT protocols through the packet data serving node (PDSN).

Many first-generation packet gateways do not scale to accommodate profitable numbers of users and sessions. For mobile operators seeking to upgrade their first-generation packet gateways, Cisco offers both GGSN and PDSN gateways on Cisco 7200 and 7600 Internet routers and Cisco Catalyst® 6500 Series switches, with scalability features an order of magnitude beyond previous solutions.

Mobile Services

Packet gateways are important, but transparent to subscribers. People pay for content; therefore, mobile operators need to look beyond simple packet conversion toward rich data, voice, and video services tailored for each subscriber. Personalized services require higher-layer network intelligence that accommodates the unique requirements of mobile networking. The network needs to know its subscribers, where they are, and what they want to do—and that is where Cisco Mobile Exchange excels.

Cisco invests in mobile networking with leadership solutions that

enable mobile operators to tap the rich revenue potential of IP services. Currently, Cisco Mobile Exchange solutions span three areas: mobile IP, service selection, and content monitoring. Each area supplies a critical function for enabling profitable content-based services.

Mobile IP

Wired networks track users by IP address; however, IP addresses have only regional significance in the mobile world. The network needs a way to track individual subscribers as they roam between networks, much as a Signaling System 7 (SS7) network tracks cellular phone users by telephone number.

Mobile IP, an Internet Engineering Task Force (IETF) standard (RFC 2002), identifies a host device by a single IP address, even though the device may move its physical point of attachment from one network to another. For example, subscribers with a laptop on a WLAN in the office may travel to a customer site, staying connected to their office intranet via a GPRS-based VPN service. As they roam between the WLAN and GPRS networks, Cisco Mobile IP protocols follow them and forward packets at rates appropriate for each connection.

Service Selection

A key technology that helps service providers brand their services and start the foundation for future growth is service selection, which lets mobile operators intervene in data flows and determine particular services that subscribers can access. Service selection enables mobile operators to separate services from access media. It provides a common user interface and a uniform billing infrastructure. This capability allows a provider to both exercise discrete control over service access and enable self-provisioning to reduce operational costs, speed service availability, and recover lost revenue. For example, mobile operators may gather substantial revenue from their messaging services. However, if a subscriber logs onto a third-party instant messaging server, the provider loses revenue for those transactions. Using service selection, the provider can give access to alternate messaging services only if the subscriber pays a fee. Operators need the ability to support several billing structures based on particular services and markets, and Cisco provides this capability with its service selection technologies.

The Cisco Service Selection Gateway (SSG) and Service Edge Subscriber Manager (SESM) work together to allow providers to control what subscribers can do based on subscriber payments and privileges. The Cisco SSG presents a Web portal, displaying service icons that the subscriber can click to gain access to their subscribed services. This customizable portal offers a subset of the total service portfolio, displays targeted advertising, or with a VPN service, appears as a corporate intranet page. The Cisco SESM enables self-provisioning, allowing subscribers to log on to a Web page to buy services on a one-time or permanent basis and to check service usage. Together, the Cisco SSG and SESM reduce operational expenditures and increase subscriber satisfaction through more efficient, faster service.

Content Monitoring

Alternatively called content billing, content monitoring examines packets to obtain higher-layer information such as particular URLs, domains, or file names. With this information, a mobile operator can bill for usage-based services or gather data for market research.

For example, an enterprise provides its employees with a PDA and mobile access service. Because the provider employs usage-based billing, the enterprise does not have to pay for employees' personal activities. The mobile operator can split the bill between the enterprise and the employee. With content monitoring, the network can track when an employee is checking e-mail (a service the enterprise pays for) or checking sports scores (a service the employee pays for). This helps enterprises contain network access costs. It also encourages companies to subscribe to new mobile services with full confidence in their business value.

Another application for content monitoring is legal intercept, which makes it easier for mobile operators to comply with per-country legal service requirements. Content monitoring allows the provider to track and record subscriber usage in terms of user identity, traffic volume, content, and applications. Content monitoring also allows operators to duplicate traffic, and then send one flow to the user and the other to a designated intercept port. Cisco Mobile Exchange provides easy integration with external systems such as pre-or-postpaid billing for maximum billing flexibility.

Load Balancing

Service providers that manage Internet data centers understand the value of load balancing, which spreads incoming traffic across many redundant servers to optimize performance, reliability, and scalability. Load balancers also detect server availability and associate subscriber sessions with specific servers or network elements. As mobile data services grow from thousands to millions of subscribers, load balancing also fulfills scalability and reliability requirements by continually monitoring the state of nodes and servers in the network.

Cisco Mobile Exchange offers load-balancing solutions for packet gateways, WAP gateways, server farms, Web cache devices, SSGs, and content service gateways (CSGs). Application-optimized load

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balancing is available via the Cisco Supervisor Engine II Module, or the Cisco Content Switch Module (CSM) for Cisco Catalyst 6500 Series switches.

Network Management and Operations

Managing the Cisco Mobile Exchange framework is just as important as proper design and deployment. Cisco Mobile Exchange supports device-level management today, with standard Management Information Bases (MIBs) and interface management via a command-line interface (CLI). The management platform takes advantage of the automation and policy management capabilities of the proven CiscoWorks network management system. Cisco continuously enhances management to provide complete visibility into the Cisco SSG, SESM, and other applications on Cisco Mobile Exchange devices. Ultimately, Cisco Mobile Exchange network management will offer the integrated operations support system (OSS)-level functionality that mobile operators demand, such as traffic management and engineering, performance management, and capacity planning.

Network Elements

The foundation of Cisco Mobile Exchange is the network element layer. Its functionality and applications reside in proven Cisco platforms, including the Cisco Catalyst 6500 Series switches, Cisco 7200, 7400, and 7600 Internet routers. Already embraced by service providers worldwide, these platforms combine the power of Cisco IOS® Software, the flexibility of modular design, and the interoperability of industry standards. Most functionality will be deployed on application modules for Cisco Catalyst 6500 Series Switches and Cisco 7600 Internet Routers, giving operators the efficiency and performance of hardware with modular flexibility for optimal resource management. This approach efficiently uses valuable rack space because it tightly integrates critical functionality into high-performance systems.

Going Mobile with Cisco

The Mobile Internet takes mobile data networking beyond simple protocol translation. It applies the intelligence and flexibility of IP to enable compelling services that allow mobile operators to strengthen customer relationships and differentiate themselves from commodity transport providers.

With Cisco Mobile Exchange, Cisco successfully adapts its IP data networking expertise to the unique requirements of the mobile world. It enables the intelligent framework that identifies users, knows where they are, and delivers services to them anywhere, over any access medium, to any client device. Operators can offer a common user experience and send subscribers one bill for all their services.

Cisco Mobile Exchange integrates with existing radio infrastructures through Cisco IOS Software and application modules for proven Cisco platforms that many mobile operators already own. It's a cost-effective business model that enables operators to add subscribers before investing in additional equipment. The modular components and industry-standard interoperability offer the flexibility that mobile operators need to sustain profitability.

At Cisco, we're the IP experts. Let us help you develop and deploy the Mobile Internet.

For More Information

To learn more about Cisco Mobile Exchange and other mobile wireless products and solutions, go to www.cisco.com/go/mobile.

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