Ericsson's Service Network: a "melting pot" for creating and delivering mobile Internet service

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The Ericsson Service Network, a new solution for creating and delivering mobile Internet service, is based on the new horizontally layered concept—one that separates applications and services from the access and core networks. In this way, the mobile Internet and other communications services, which are accessed by users from any device and any network, converge at the application level. The Service Network becomes a "melting pot" for all types of services and service combinations. It gives service providers a way of managing the complex mobile Internet mass market and of maintaining "ownership" of their subscriber base. For end-users, it provides a personalized service environment, independent of access type.

In this article, the author outlines the need for the Service Network and describes how it will work.

The mobile Internet combines the power of the Internet with the convenience of mobility. Instead of connecting a personal computer or finding an Internet café, anyone with a mobile phone can access the Internet or other online information anytime, anywhere. But the mobile Internet means more than giving mobile access to the Internet. It is more personal. It provides access to services that are based on personal preferences, location, and current circumstances—content context action.

The difference between the Internet and the mobile Internet is akin to the difference between the cinema and television. A whole new genre of services is being opened up by the mobile Internet, in much the same way as TV delivered an enhanced viewing experience to a mass audience in their own homes. The mobile Internet is different from the Internet as we know it because it offers services that

- are relevant in a mobile environment;
- can be efficiently and neatly presented and used in this environment;
- have critical factors that are location-based;
- provide immediacy of reach and response; and
- offer the same basic service set and profile data in all access environments, even if they are presented and sometimes executed differently.

What makes the mobile Internet unique is the fact that the mobile terminal is closely tied to the individual user: terminals are normally switched on and carried by individuals wherever they go. Users can send and receive e-mail instantly. Important news can be "pushed" to users as it occurs. Localized Yellow Pages or street maps are immediately available. The mobile terminal provides secure transactions for online payments, banking and stock trading.

But for mobile Internet services to attract a mass market, certain critical success factors must be in place. First, a variety of suppliers must quickly and easily be able to develop new and attractive services. Similarly, users must quickly and easily be able to tailor services to suit their own individual requirements. Obviously, the services must be very easy to use. And user integrity must be secured at all levels, especially for location-based services. It is not enough that services are safe, they must also be perceived as being safe, particularly for mobile commerce.

BOX A, TERMS AND ABBREVIATIONS

3GPP	Third-generation Partnership Project	MExE	Mobile execution environment
AAA	Authentication, authorization and accounting	MPS	Mobile positioning system
API	Application program interface	MVNO	Mobile virtual network operator
ASP	Application service provider	O&M	Operation and maintenance
ASUS	Application support server	OSA	Open service architecture
CAMEL	Customized applications for mobile network-enhanced logic	OTA	Over-the-air
CRM	Customer relationship management	PKI	Public key infrastructure
E-commerce	Electronic commerce	PSEM	Personal service environment management
GSM	Global system for mobile communication	SAG	Service accounting gateway
HLR	Home location register	SCS	Service capability server
IDAE	Integrated distributed application environment	SDK	Service development kit
IP	Internet protocol	SIM	Subscriber identity module
ISP	Internet service provider	SMS-C	Short message service center
M-commerce	Mobile electronic commerce	SNOS	Service Network operation system
		USC	User service center
		VHE	Virtual home environment
		WAP	Wireless application protocol
		WISE	Wireless Internet solution
		WTA	Wireless telephony application

An increasingly complex picture

Ericsson predicts that once a mass market starts to develop, the number of mobile Internet users will grow exponentially and each user will demand more and new services. While mobile Internet services will have a role to play in simplifying everyday life, they will also become increasingly complex to deliver. Increased personalization will add complexity; billing will also be more complex; and each application will have to be able to use many different technology platforms (for example, positioning, messaging, and e-commerce systems) in an integrated way.

To be successful, operators and service providers will need to meet increasing user

demand with a constant stream of sophisticated—and complex—new services. They must quickly be able to implement new services and make them available to the mass-market. Operators will increasingly become service brokers, and being first to market with new attractive services will be vital to success. The ability to personalize information by building up individual user profiles and then target information to specific individuals will also be key.

In the long term, there will most likely not be a separate mobile Internet: the mobile terminal will be just one means of accessing the Internet—the home of applications for fixed and mobile users. New and existing players (operators, service providers, content providers and application service providers) have ample opportunities to establish partnerships and gain first-mover advantage. The major players in the mobile Internet market are likely to be

- existing mobile operators—this group of players is already starting to offer mobile Internet services over second-generation networks, thereby gaining vital experience in preparation for third-generation systems;
- greenfield operators of third-generation systems—these players can start the business with a "clean sheet"; that is, without any pre-existing service obligations. They can implement third-generation systems and services at once, although a lack of operator experience might be a disadvantage;
- mobile virtual network operators (MVNO) are new players who do not need to make heavy investments in infrastructure. Instead, they can concentrate on services—the most important part of third-generation networks. A disadvantage is they do not control the network and, by implication, the quality of their services; and
- Internet service providers/application service providers (ISP/ASP)—these players are already well experienced in offering Internet-based services. One problem might be that they will have to charge for services that are currently offered for "free" on the fixed Internet.

In the mobile Internet, new streams of revenue are being created from content provision, advertising, e-commerce transactions, and so on. These revenues will be split between the different players (for example, network operators, content providers, portals and banks).

Shift from vertical integration to horizontal layers

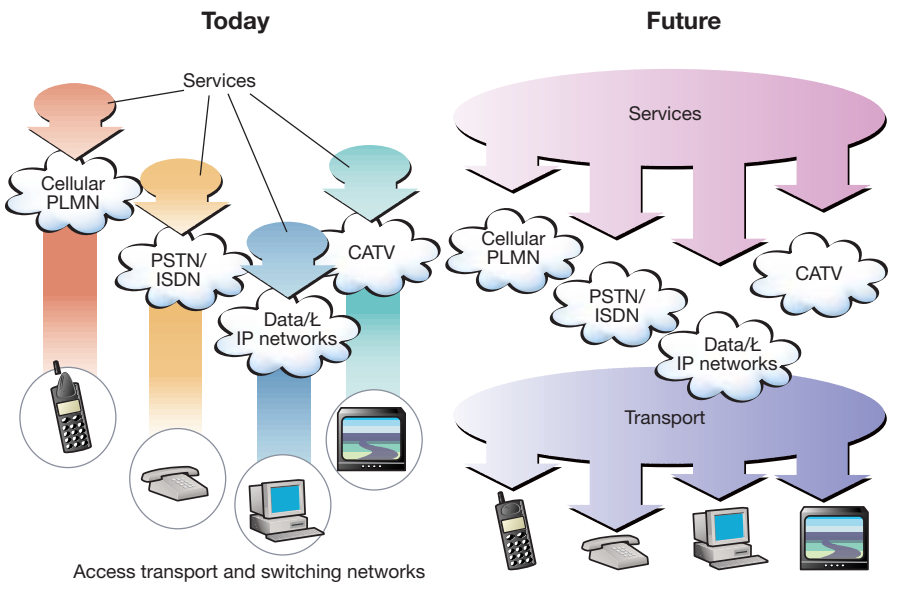
Traditionally, the telecommunications market has been vertically integrated, with applications and services closely tied to the delivery channel—whether the channel was GSM or the fixed circuit-switched network—which resulted in strong vertical segmentation of the supplier market and the associated value chains.

Unfortunately for end-users, Internet services are not uniformly managed or standardized, which makes global access to a set of Internet-based services difficult to achieve.

Perhaps paradoxically, the effect of the mobile Internet and third-generation systems is to improve this situation, by decoupling applications from the underlying infrastructure and by forcing the development of open standards.

The traditional vertical business and technology segmentation is beginning to tilt, so that the value chain is segmented horizontally, where virtually any application or service can be provided over any underlying network technology (Figure 1). Consequently, the mobile Internet business will be driven from the operator or service provider toward the enterprise or content provider.

Figure 1
The shift from a vertically integrated to a horizontally layered service environment.



In this horizontally segmented market, in which user devices, infrastructure and applications are no longer closely tied, a new client-server architecture is appearing that needs close coordination between user devices and the various network layers. User applications consist of a client part in the terminal and a server part in the network, communicating over open interfaces to a network that is application-independent. The interfaces are open in order to stimulate their adoption and use.

The principles of the layered network architecture are being standardized by the Third-generation Partnership Project (3GPP). Ericsson, which is a member of the 3GPP, is committed to supporting the open industry standards specified in the 3GPP, including the

- open service architecture (OSA)—this enables service providers to make use of network functionality through an open standardized interface (OSA API). The network functionality is provided by service capability servers; and
- virtual home environment (VHE)—a concept for carrying a personal service environment across network boundaries and between terminals. Users are thus consistently presented with the same personalized features, customized user interface and services, regardless of which network or terminal they use (within the capabilities of the terminal and network), or of their location.

Today, virtually all service solutions are vertical: they have their own operation and maintenance (O&M) systems, their own customer database, and so on. This means that if we wanted to arrange a trip to Paris, we might book our train tickets by logging on to a ticketing solution with username and password. But if we wanted to get directions to the railway station, we would have to log on to a separate location-based service solution. And afterward, if we wanted to send e-mail to a friend who will be accompanying us to Paris, we would have to log on again to the messaging solution. Obviously, this is neither user-friendly nor efficient.

Operators and service providers need a product that efficiently enables all applications to share the functionality of the Service Network solution. The product should also enable efficient O&M from a single interface, and provide the flexibility, scalability and user-friendliness demanded by the fast-changing mobile Internet market. With a well-designed and structured portal, users can also benefit from greater personalization and control over services and have a single log-on point from which to access a range of services.

This is the role of the Service Network, which hosts functionality and shares it between all applications and user groups.

The Service Network platform

Ericsson's Service Network platform is based on three main offerings:

- building blocks—separate offerings with building components from the Service Network platform;
- pre-integrated packages—a set of pre-integrated components (if necessary, these can be supplied with system integration services); and
- consultation and system integration—services for building complete, tailored-to-fit solutions.

To build a Service Network solution, Ericsson selects the building blocks that best match the customer's needs along with the pre-packaged solutions the customer wants. Ericsson's consultancy and system integration services then combine the building blocks and pre-packed solutions into the Service Network solution.

For third-generation systems, the Service Network solution must be able to handle four key interfaces. The first interface (to the mobile core network) is handled by the service capability servers (SCS), which are connected directly to the core network.

The second interface enables end-users to administer their own services through a portal, which is one of the building blocks in the personal service environment management (PSEM) system. The PSEM stores personal information as user profiles and defines how services are provided and presented to the end-user. It also handles end-user service provisioning and service management, acting as the end-user's contact point for managing their own personal service environment.

The third interface—the service development kit (SDK) interface—gives application developers an interface to applications or services. It also hosts an operator-specific Developers' Zone solution.

The final interface is the operator's interface to operation and maintenance through the Service Network operation system (SNOS).

Operators and service providers need a solution that efficiently connects these inter-

faces and functions together, regardless of end-user identity, application, network, terminal, time or place.

Ericsson's Service Network solution comprises several components which have been integrated as an open architecture that enables third-party products to be either loosely or tightly coupled with the Service Network solutions.

The personal service environment management utility includes several functions for providing and managing end-user services. Examples of functions include a portal interface (a structured way of presenting services) and the management of user profiles and other service data.

Service enablers come in two main forms: service capability servers and application support servers (ASUS). For services such as call control, user location, user status, message transfer and terminal capabilities, the service capability servers handle interworking with network components. The SCSs access specific network resources through an open-standard API (as specified by the 3GPP). Examples include

- the SIM application toolkit and over-the-air (OTA) SIM card management system;
- a Jambala server—also called a customized applications for mobile network-enhanced logic (CAMEL) server—for, say, intelligent network services;
- the mobile execution environment (MExE), which is the wireless application protocol (WAP) gateway and the wireless telephony application (WTA) server;
- a mobile positioning system (MPS) for location-based services[1]; and
- a home location register (HLR) gateway or mobile information gateway for terminal status.

The application support servers interface with external resources and systems, such as billing, notification or security systems. They provide system-wide support—they are not connected to an application-specific function. For example, charging for applications might be independent of the specific application. The application support servers include

- a charging server that hosts the authentication, authorization and accounting (AAA) server and service accounting gateway (SAG) server;
- notification support, which initiates push services and uses service capability servers to push information to users via the SMS center (SMS-C) or WAP gateway;
- security support—a very large area including Mobile e-Pay for mobile commerce, a firewall, and public key infrastructure (PKI) for sensitive applications;
- directory support; and
- geo-navigation support, which adds value to positioning information, for example, by calculating the shortest walk to a specific destination.

Applications and services are operator-specific. Through the Developers' Zone, they can include functionality provided by partners and third parties.

The service network operational system offers a single interface for all O&M within the Service Network.

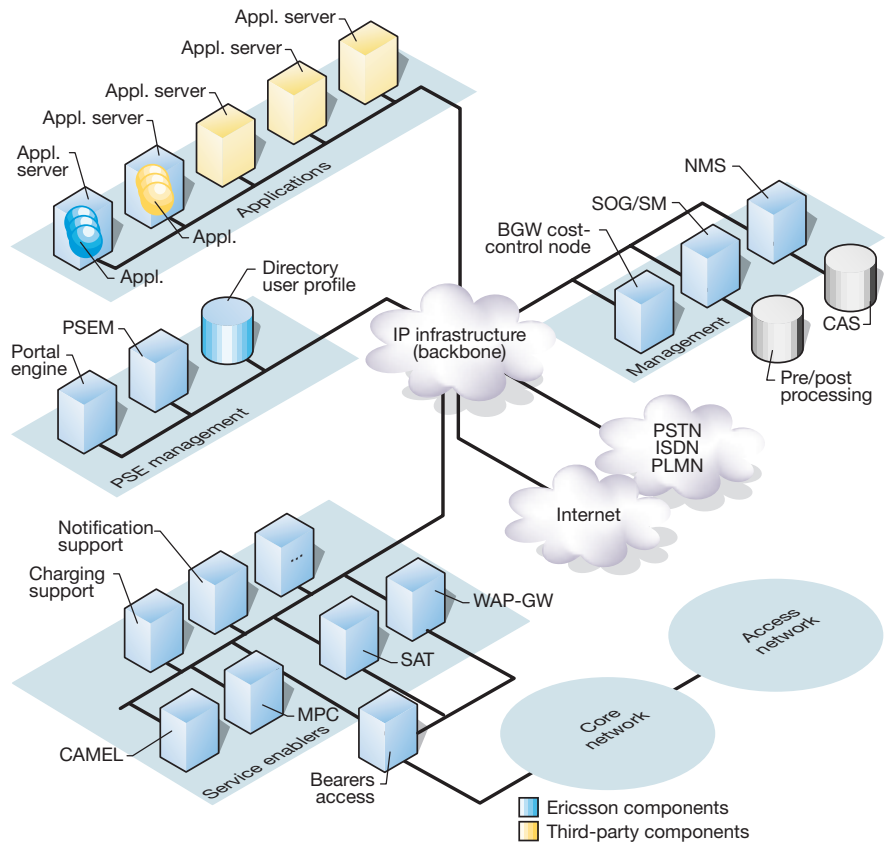


Figure 2
Server view of Ericsson's Service Network solution.

User service center migration

The Ericsson Service Network is based on experience of the user service center (USC). The USC, which was built with a Service Network in mind, has been available for almost two years. However, although the USC

supports the WAP gateway, WebOnAir filter proxy, SIM application toolkit, OTA SIM management, and a messaging solution, it does not support all enablers. It will thus be further developed to host the WISE Portal 2.1, together with some applications and additional enablers.[2] The user service center will migrate toward an open and flexible architecture based on the open-standard architecture specified by the 3GPP.

Benefits for operators and service providers

The Service Network gives operators, service providers and third-party developers an attractive and easy-to-use interface for developing applications. It has been designed to help operators and service providers to build successful mobile Internet services by offering

- a range of new applications and services, for example, through the Developers' Zone alliance program;
- efficient operation and maintenance with a common database and uniform subscription interfaces;
- end-user monitoring and satisfaction through customer relationship management (CRM) tools;
- a wide range of reliable service enablers; and
- expert consulting services to support strategic decisions, including advice, systems integration and facility management for operators, service providers and enterprises.

The Ericsson Service Network is designed to help operators and service providers to bring interesting and advanced services to market in the fastest, most convenient way, and to keep integration costs as low as possible. For example, the Service Network SDK will use standardized APIs, such as Parlay, Jain and other open-industry interfaces. The application developer can thus concentrate on the creative part—features—and leave the database integration, site management, user interface and access to the right core network functions to the Service Network.

The cost of introducing large quantities of new services rapidly needs to be low.

The Service Network will become a plug-and-play environment, helping operators to achieve short time-to-market and to establish a reputation for being the first to offer advanced services.

It will also be important to keep track of which services are successful, and which are not. Some services will be long-runners, while others might be an enormous but short-lived hit. One way that operators and service providers will be able to keep track of the success and usage of services is through the Service Network's CRM system, which helps identify users' personal preferences, thereby improving service targeting and enabling bundling and niche marketing campaigns. It will also show how successful individual services are and indicate when they should be removed to make way for new services.

How the Service Network works: an example

Ericsson has produced many different scenarios to illustrate the Service Network. What we believe will be one of the most important issues for success is how new services can be developed, operated and launched.

Imagine a third-party application developer who works in close partnership with a mobile operator. The developer can enter the Developers' Zone solution of the operator, hosted within the Service Network, and log on to his own Developers' Zone page.

Once logged on, the developer can see how existing services are doing—for example, how many people are using them, revenue earned, and so on—and create new applications.

To create an application, the developer uses a service development kit—made available by the operator—which can be likened to a toolbox for application development. The developer downloads the open APIs he needs to create the application, for example, for positioning, WAP, mobile e-commerce

and video streaming. When he has finished developing the application, he can test it on a simulator or test site provided by the operator. Once the developer is satisfied with the application, he can upload it to an application server.

Finally, the application developer "signs" the new application to confirm that it is ready, perhaps also sending some information to the operator to indicate how he wants it to be marketed or how the operator should charge for its use.

When this is done, a message is automatically sent to the operator's O&M system. The operator then tests the application to ensure that it meets standards for, say, quality and decency. The operator can then make the application available to his customers.

The application can be categorized according to the operator's own model—for example, according to application type (sports, movie, or news) and functionality (positioning, messaging, or m-commerce).

Finally, the application is put on a publicly available application server. The new application can be marketed in a highly targeted way, by automatically sending a message to the website or mobile phone of customers whose profiles match the application categories.

The operator could also use the Service Network capabilities to send messages to members of the Developers' Zone, launching a competition for, say, the best sports application.

The Service Network enables the operators to have close or loose partnerships with application developers, perhaps giving certain developers special opportunities to test applications live and to stipulate how use of the applications is to be charged.

Conclusion

A highly flexible and open architecture is needed to deliver the mobile Internet's promise of "personalized services for the masses." Moreover, service providers must be able to create and offer personalized services quickly and easily, which is the role of the Ericsson Service Network.

Mobile Internet subscribers will demand—and get—a service environment that is tailored to their own personal requirements. They will want to access it using whichever device or method is most convenient at the time. The Ericsson Service Network fulfills this criterion, providing a vital layer between connectivity networks and the end-user.

Because its open architecture is standards-based, the Service Network enables operators to easily integrate new service and application ideas from third parties, whenever these ideas come along.

The Service Network is the IP-based "glue" that binds together the many different access media, core networks, content and service providers and user devices for seamless service delivery. It handles virtually any type of service and convergence of telecommunications, data communications, Internet and multimedia services. This convergence will enable new service combinations across numerous kinds of access network and across traditional service domains.

Using the Service Network as a platform, Ericsson can provide

- open, standardized interfaces;
- partnerships with content and service providers;
- support for third-party developers and application centers; and
- integration and consulting expertise.

Ericsson's goal is to enable mobile operators to add value to their services on their own terms, in a highly manageable way.

The Service Network approach is designed to provide performance, reliability and low cost of ownership. The open, scalable architecture of the Service Network is designed to provide economies of scale, while reducing development time and enabling easy integration of new technology as it becomes available. It offers mobile operators a low time and cost threshold for testing and introducing new applications, thereby reducing the business risk.

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