Mobile Intelligent Networking

Purpose

The purpose of this white paper is to inform the reader about mobile IN technology. For further information, see www.mobilein.com. The prerequisite for this paper is the white paper *Mobile Networking*.

Mobile IN

Mobile intelligent network (IN) pertains to the concept of intelligence in mobile networks. The notion of network intelligence is evolving beyond the traditional model of centralized control and processing, and expanding to network edge devices such as mobile terminals and servers. However, the use of the term mobile IN will be used in this white paper to refer to more traditional centralized network intelligence.

IN Concepts

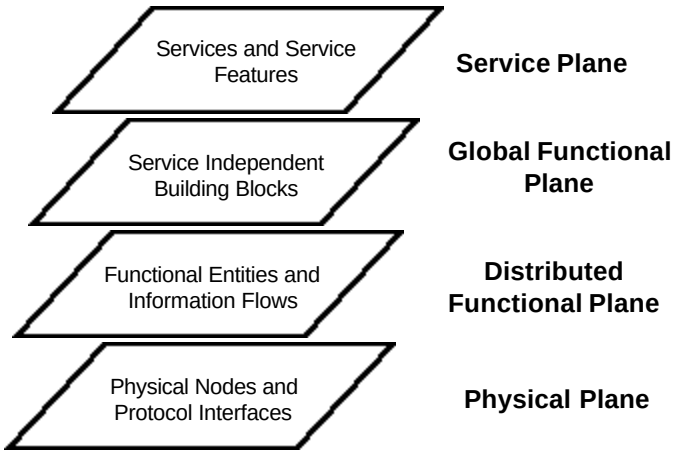
All intelligent networking for telecommunications involves the concept of a "query/response" system. This system entails the notion of distributed intelligence wherein a database is queried for information necessary for call processing. For example, a mobile communication switch or Mobile Switching Center (MSC), that is equipped with mobile IN call logic, can launch a message or "query" to a database hosted by a network element called a Service Control Point (SCP). The SCP processes the request and issues a "response" to the MSC so that it may continue call processing as appropriate.

Mobile IN Technology

The two primary forms of mobile IN technology employed in GSM networks are the Intelligent Network Application Part (INAP) and Customized Applications for Mobile network Enhanced Logic (CAMEL). INAP is a technology developed for fixed networks. CAMEL was designed strictly for mobile networks.

INAP and CAMEL are both based on the Intelligent Network Conceptual Model (INCM). The INCM forms a framework for design and capabilities for IN design and is represented by a Service Plane, Global Functional Plane, Distributed Functional Plane, and the Physical Plane.

Intelligent Network Conceptual Model



These planes are the domains of the services and service features, service independent building blocks, functional entities and information flows, and physical nodes and protocol interfaces respectively. The design of INAP and CAMEL based networks and applications are based on the technology framework defined by the INCM.

Many GSM network operators still rely on operator specific IN solutions and/or proprietary extensions of core INAP capabilities for services such as mobile virtual private network, virtual PBX, personal number service, and call screening. The primary reason for this is that INAP preceded CAMEL, and because of this, it had greater functionality.

On the other hand, CAMEL (Customized Applications for Mobile network Enhanced Logic) was developed to provide a standard for mobile intelligence across varying vendor equipment for GSM networks. This means that participating mobile network operators who deploy CAMEL based services may provide advanced services to each other's respective roaming mobile users.

CAMEL

Finalized in 1997, CAMEL phase I introduced improved capabilities as mobile operators could begin to offer services and features to their customers that could work while roaming. Phase I of CAMEL does not offer the ability to interact with

the Specialized Resource Function (SRF). The SRF is a functional capability found in Voice Response Units (VRU).

Completed in 1998, CAMEL phase II built on the basic call control capabilities provided with phase I. Phase II provided many additional INAP capabilities, but perhaps the most significant is support for SRF which allows interaction with specialized network resources such as the Voice Response Unit (VRU). The VRU is an important network element for certain applications such as IN based mobile prepay service.

The VRU plays voice prompts during prepay account recharge and announcements such as a low balance warning before or during the call to alert the subscriber of that condition. In CAMEL phase I, a call is simply cutoff in progress when an account balance reaches zero. The SRF issue is resolved in CAMEL phase II wherein SRF is supported.

For more information about mobile prepay, see www.mobileprepay.com.

The future of CAMEL will be largely determined by its ability to evolve to support data. CAMEL capabilities mostly support voice services. As wireless data applications driven by GPRS, EDGE, and UMTS proliferate, there will be a need to manage the interaction between voice and data networks and call sessions. It is likely that CAMEL will also need to evolve to support various multimedia applications. While there is certainly a need for CAMEL in the foreseeable future, its long-term utility lies in its ability to adapt to the world of mobile data.

For more information about the evolution of wireless data, see www.mobiledataevolution.com.

Mobile IN Capabilities

Capabilities may be network based, user terminal based, server based, or any combination therein. New capabilities that add value to existing capabilities can be referred to as value-added capabilities. The reasons for deploying mobile IN technologies are to provide value-added capabilities for purposes such as cost reduction, improved service delivery, increased variety and quality of services, and rapid service creation and deployment.

These capabilities rely on underlying mobile networking technologies to handle mobility management functions. Together with mobile networking, mobile IN capabilities allow the mobile network operator to deploy a variety of advanced and/or value-added applications.

Value-added Applications

All value-added applications share the same characteristics:

1. Not a form of basic service but rather adds value total service offering
2. Stands alone in terms of profitability and/or stimulates incremental demand for core service(s)
3. Can sometimes stand alone operationally
4. Does not cannibalize basic service unless clearly favorable
5. Can be an add-on to basic service, and as such, may be sold at a premium price
6. May provide operational and/or administrative synergy between or among other services – not merely for diversification

Mobile IN enables value-added applications such as:

- One number service
- Prepay service
- Location based services
- Call management services
- FreePhone

A discussion of these applications is beyond the scope and purpose of this white paper. See www.mobilein.com for more information.

Implementation Issues

The first step to implement mobile IN is to migrate intelligence away from the MSC, VLR and HLR, and introduce functionality similar to that used by wireline networks for signaling to SCPs and SNs. Eventual ubiquitous availability of software logic will allow roaming mobile users to have greater access to services.

The next step can take place concurrent with the first step and involves deployment of applications into SCPs and SNs along with more advanced call control logic. This second step is critical as simply deploying triggers and supporting messages is not enough. In order for services to be truly ubiquitous and available, mobile operators must deploy standards based applications.

Summary

This white paper is an introduction to mobile IN. For more details, see www.mobilein.com and the book ***Wireless Intelligent Networking***.

