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Intelligent Mobile Network Services: An Ultimate Solution

Waseem Jeelani Bakshi
Assistant Professor, College of Engineering & Technology, BGSB University, Rajouri (J&K),India

Muheet Ahmed Butt
Scientist, PG Department of Computer Science, University of Kashmir, Srinagar (J&K), India.

Qamar Rayees Khan
Assistant Professor, Department of Computer Sciences, BGSB University, Rajouri (J&K), India

Majid Zaman
Scientist, Directorate of Information Technology, University of Kashmir, Srinagar, J&K, India.

Abstract: The enormous competition in the telecommunications markets is increasing rapidly day by day. In order to survive in the competitive telecommunication markets, the service providers and network operators have to reform their marketing and service delivery strategies in a much better way. Mobile Intelligent Network pertains to the concept of introducing intelligence in mobile communication networks. The notion of network intelligence is evolving beyond the traditional model of centralised control and processing and expanding to network edge devices such as mobile terminals and servers. This paper gives an insight into a working model of the Mobile Intelligent Network Services.

Keywords: MIN, CVPN, SSF, SCF, SDF, SRF, SME, SCE.

1.0 INTRODUCTION

In recent years, Intelligent Network (IN) has become an established concept in the PSTN. With the increasing use of cellular systems, the Public Land Mobile Network (PLMN) has begun to adapt the MIN functionality to meet requirements of mobile network providers, service providers and mobile subscribers. The "intelligence" in the MIN is realised in computer software and data. The ultimate objective of MIN is to increase revenue for the network operator and the service provider.

MIN offers a number of advantages to a GSM network operator:

- Increased subscriber numbers due to more attractive services
- Increased revenue to use of services
- Increased subscriber loyalty
- Increased flexibility in deploying services in a network
- Decreased development time for services
- Reusability of service modules

2.0 MIN SERVICES AVAILABLE FOR GSM SYSTEM

The various services available for GSM systems are shown below

2.1 Personal Number

The MIN service assigns a single number to a subscriber. This personal number is used to contact that subscriber at defined connections using a time-based routing profile for that subscriber. For example, if the personal number is dialled between 9 am and 5 pm the call may be routed to the subscriber's work number. However, if the personal number is dialled between 5 pm and 9 am the next morning, the call may be routed to the subscriber's mobile phone.

The target market for this service is mobile subscribers with high existing mobile communication expenditures. The service can be used to keep, attract and possibly migrate customers from different networks. Increased profitability will come from long term effects such as customer loyalties, as well as short term effects such as increased airtime, call completion and new service charges.

2.2 Pre-Paid SIM card

This service enables a subscriber to pay in advance for an agreed amount of call charges. This amount is stored on the subscriber's SIM card or in SCF in the network. When the limit of call charges is exceeded, the subscriber will no longer be able to make calls, but may purchase more call charges as desired.

In addition, there is no fixed term of subscription, meaning that a subscriber is not bound to a contract of subscription and its associated fees. Advantages for an operator include:

- Increased number of subscribers
- Increased number of calls
- Payment in advance for calls

2.3 Cellular Virtual Private Network (CVPN)

The Cellular Virtual Private Network service allows groups of users to define a common short numbering plan to simplify communication within the group. In the CVPN service, both mobile and fixed subscribers can be integrated as well as PABX users. Subscribers in the cellular private network are able to make calls outside the network by dialling an escape code.

Within this service it is possible to design a personal profile for each subscriber by combining call barring and terminating screening functions. Subscribers can also have a personal routing of their calls based on conditions (e.g. 'No Reply').

2.4 Information and Business

The free phone service allows subscribers to call for free. (in Sweden 020-numbers, in USA 800-numbers, in India 1800-numbers, and so on).

The Universal access service: A company can have one single number on which it can be reached. The MIN takes care of routing the call to an open office nearby, based upon from where you call.

The premium rate service gives the subscriber possibilities to get special types of information like weather forecasts or advice from a doctor.

3.0 MIN INTERESTED PARTIES

There are four interested parties in a MIN service:

- **Service User:** the party which makes a call a MIN service
- **Service Subscriber:** the party which offers the MIN service to the marketplace
- **Service Provider:** the party which operates the network and designs the MIN services
- **Service equipment supplier:** the party which supplies the hardware and software platforms for MIN services

4.0 SERVICE ARCHITECTURE

MIN service intelligence consists of modular software blocks called service scripts. Each script is designed to perform a particular function. For example there may be a script that requests the user to enter a security code and checks that it is the correct code for their account. This could be one of many scripts used as part of a credit card calling service.

Service scripts are collections of smaller blocks of logic, each designed to perform a particular task.

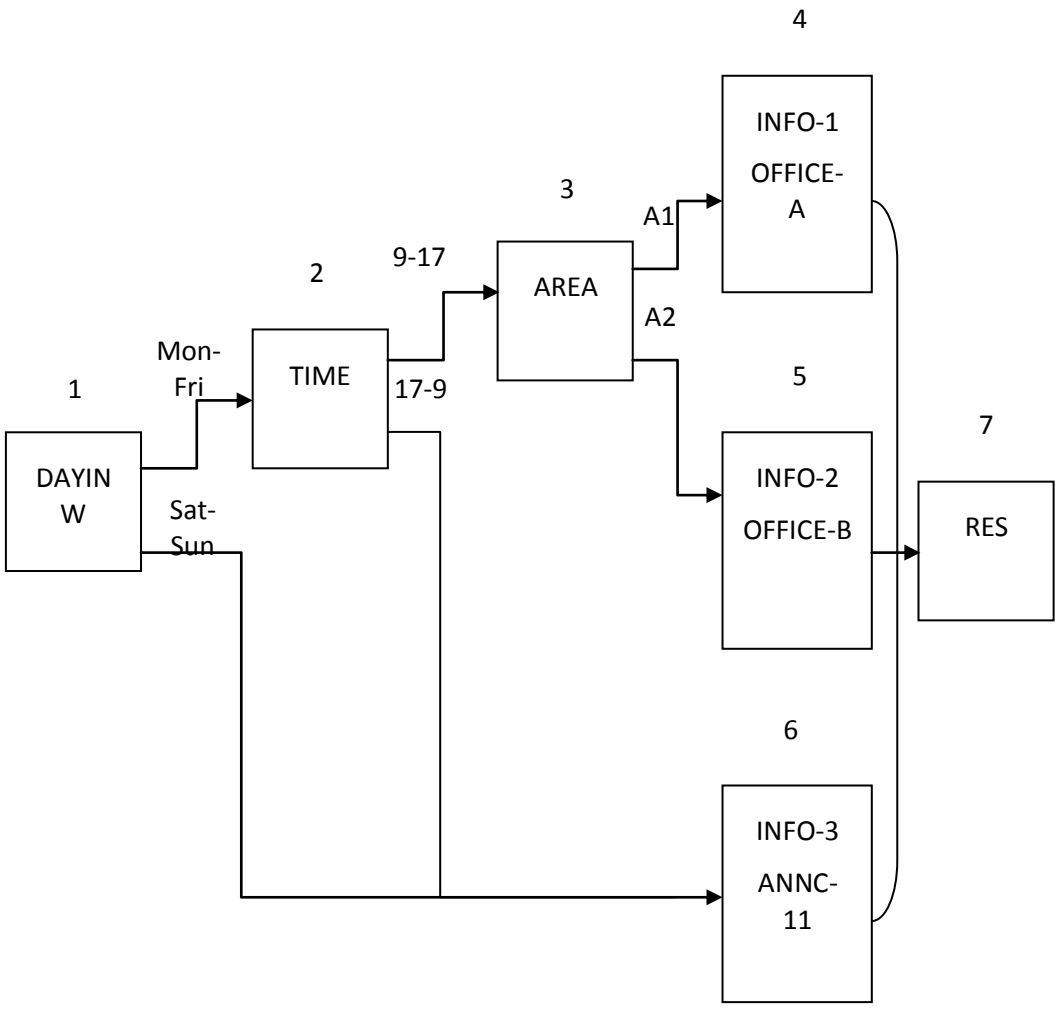

Figure 1: Example of Logic in a script for a time-based routing service.

5.0 MIN NETWORK ARCHITECTURE

The Mobile Intelligent Network (MIN) provides architecture for the introduction of new services throughout the network, with a minimum impact on the switching elements and the signalling systems.
To introduce MIN into a GSM network requires the introduction of the following functions and environments:

- Service Switching Function (SSF)
- Service Control Function (SCF)
- Service Data Function (SDF)
- Special Resource Function (SRF)
- Service Management Environment (SME)
- Service Creation Environment (SCE)

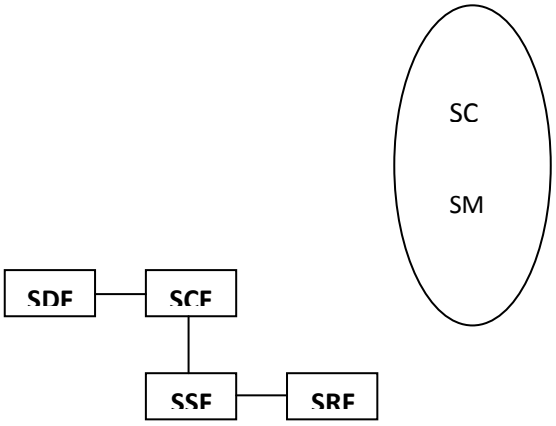

Figure 2: MIN network Functions

5.1 The Service Switching function (SSF)

The Service Switching Function acts as an interface between the normal mobile call control functions of a Mobile Switching Centre/Visitor Location Register (MSC/VLR) and the function that controls a MIN service. The node in which an SSF is located is termed the Service Switching Point (SSP). The SSP performs the necessary switching, signalling and charging to implement a MIN service, in response to the instructions it receives from the Service Control Function (SCF).

An SSF includes functions for:

- Initiating a MIN service (triggering)
- Call handling and switching
- Activation of resources such as announcement machines
- Charging
- Communication with the MSC/VLR and with the SCF

In GSM systems, SSF functions are implemented using Service Switching Function Application Module (SSFAM), which uses function blocks from the SErvice provisioning Subsystem (SES). The SSFAM is integrated within an MSC/VLR.

5.2 The Service Control Function (SCF)

A node in which the SCF is implemented is termed as Service Control Point (SCP). The logic and data required to execute a MIN service is located in a SCP. The SCP is the platform for the execution of MIN services.
An SCF contains functions for:

- Service script interpretation
- Service script storage
- Error handling
- Communication with the SSF and SDF

In GSM systems, SCF functions are implemented using the Service Control Function Application Module (SCFAM), which uses function blocks from SES. The SCFAM is located stand-alone on a dedicated node. Alternatively, the SCF and SSF functions can be located together on one node termed the Service Switching and Control Point (SSCP).

5.3 The Service Data Function (SDF)

In a MIN with more complex services or a larger number of services, it is often more efficient to store the data used by a service in a dedicated database. This node is called the Service Data Point (SDP). The function that administers the data is called the Service Data Function (SDF). Depending on the amount of data to be handled, this database may be a stand-alone or it may be integrated within the SCP node.
Each item of data is stored in a data module (DM), which may include hundreds of parameters about, e.g. a particular subscriber to a service.

In addition, for some services there may be large amounts of data, which already exists on a database which is not part of a MIN. One example may be a bank that has data about credit card accounts. It is neither secure nor economical to copy all these details into a node in a telecommunications network (i.e. an SDP) on a regular basis. Instead using the SDP's External Gateway Function (EGF), it is possible to contact such an external database for data during a MIN call.

In GSM systems the SDP is implemented in a computer. Communication between operator staff and the SDP takes place by the use of the Service Management Application System (SMAS).

5.4 The Special Resource Function (SRF)

In order to complete some MIN services, interaction is required between the call party and network devices. For example, for authorization purposes a MIN service may request a call party to enter a sequence of digits, which is the call party's Personal Identity Number. Such an announcement is handled by a Special Resource Function (SRF). A machine which implements SRF is termed an Intelligent Peripheral (IP).

5.5 Service Management Environment (SME)

In order to ensure that the services operate correctly, it is necessary to use a Service Management Environment (SME). The SME supports installation and management of the MIN services and their data. In GSM systems the SME is implemented using the application Service Management Application System (SMAS).

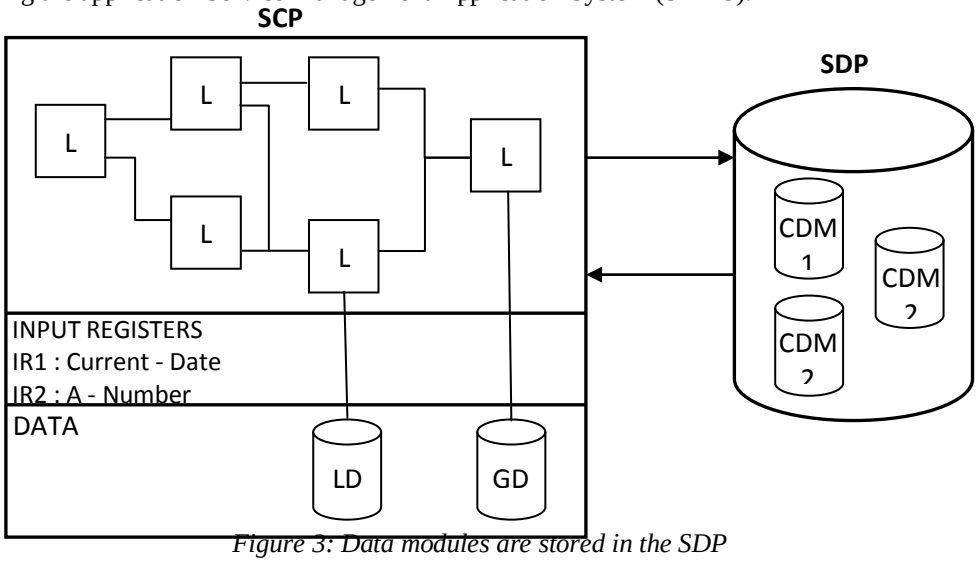

Figure 3: Data modules are stored in the SDP

5.6 Service Creation Environment (SCE)

The Service Creation Environment (SCE) is used to define the logic and data which MIN services consist of. The SCE is implemented using the application Service Management Application System (SMAS).

6.0 MIN CALLS (GENERAL DESCRIPTION)

For every MIN call the following procedures are followed:

1. MSC/VLR functions identify that the call requires a MIN service and contacts the SSF.
2. The SSF determines which SCF must be contacted for the service and identifies the call data, which must be sent to that SCF. The SSF requests instructions from the SCF about how to implement the MIN service.
3. The SCF executes the logic for the requested service and retrieves the necessary data from the SDF.
4. The SCF sends instructions to the SSF about the processing of the service.
5. The SSF performs actions to process the service, interacting with the MSC/VLR's cal control functions where necessary.

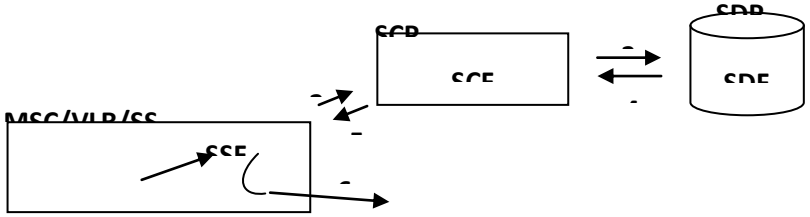

Figure 4: Inter-working of MIN nodes in a call

7.0 CONCLUSION

In order to succeed in competitive telecommunication markets, network operators and service providers have to develop new markets, enlarge their range of services and provide services at a quicker pace and at more competitive prices. A Mobile Intelligent Network (MIN) meets the market demand for advanced services within the existing telephony

network, from both the network operators and service provider's perspective. Supporting both fixed and mobile services on the intelligent network architecture, will bring a number of benefits to operators and customers.

REFERENCES

[1]. **K. Michaelis**: *FMC: Breaking Free of Technological Constraints*, Telecomm., pp. 47–49 (1999)

[2]. **D. Molony**: *Fixed-mobile integration*, Communications Week, pp. 23–27 (1998)

[3]. **Jong Min Lee, Ae Hyang Park, Jun Kyun Choi:** *Intelligent Network Architecture for Fixed-Mobile Convergence Services*, Ubiquitous Computing and Communication Journal.

[4]. ***Alcatel-Lucent****. Voice over LTE : The New Mobile Conversation, strategic white paper.* May 2012. www.alcatel-lucent.com/4g-consumer-communications

