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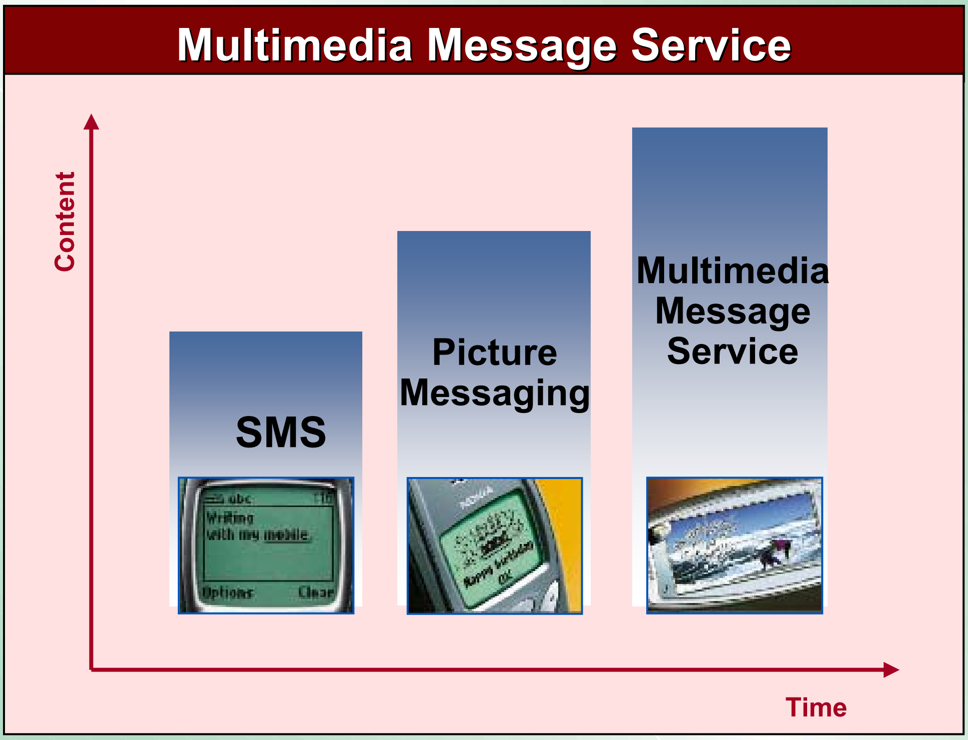


Courtesy: www2.bc.edu

IN THIS ISSUE

Foreword

With this issue, TEC Newsletter is completing seven years of its publication. This has been made possible through continuous encouragement and feedback received from our esteemed readers. This newsletter aims to serve as a medium for disseminating the technological developments in telecommunications. We look forward to your feedback and suggestions.

I take this opportunity to wish all our readers and their families a very happy and prosperous New Year.

J. R. Gupta
Sr. Deputy Director General
Telecom Engineering Centre

Multimedia Message Service

Short Message Service (SMS) has been enormously popular due to its easy-to-use feature and attractive pricing schemes. From a service perspective, Multimedia Message Service (MMS), with its ability to add visuals and sounds to text, is a natural sequel to SMS, in line with 2G to 3G migration. However, business case and implementation issues are different for MMS. The MMS allows mobile users to send and receive messages on a non-real-time basis, between MMS enabled handsets, to email users & Internet based multimedia applications and vice-versa, exploiting the whole array of media types available today e.g. text, images, audio and video in an ordered and synchronised manner.

Practically, all mobile sets have supported the application level for SMS and it is possible to send SMS to any handset without the need to check for individual support. But, handset support and its price are important issues in case of MMS. Terminals without MMS capability can receive SMS notification for the stored MMS, which can be accessed using web. MMS may operate with a variety of bearers (e.g. GPRS, PDSN). The network transport is transparently handled by Wireless Access protocol (WAP). The user experience will vary depending on the bandwidth of the mobile network.

MMS Network Architecture

Multimedia messaging may encompass many different network types. 3GPP has envisaged that the Internet protocol and its associated set of messaging protocols shall provide the basis of connectivity between these different networks. This approach enables messaging in 2G and 3G wireless networks to be compatible with messaging systems found on the Internet.

Different functional entities are described below:

MMS User Agent

The MMS User Agent resides on a Mobile Station (MS) i.e. handset or on an external device connected to it. It is an application layer function that provides the users with the ability to view, compose and handle (e.g. submitting, receiving, deleting) Multimedia Messages (MM)

MMS Relay/Server

The MMS Relay/Server is responsible for storage and handling of incoming and outgoing messages and for the transfer of messages between different messaging systems. MMS relay interfaces to external elements like WAP gateways, the Internet etc. Depending on the business model, the MMS

Relay/Server may be a single logical element or may be separated into MMS Relay and MMS Server elements.

MMS Relay/Server provides the following functionalities:

- Receiving and sending messages
- Conversion of formats
- MM notification
- Generating delivery reports
- Address translation
- Temporary storage of messages
- Ensuring that messages are not lost until successfully delivered
- Negotiation of terminal capabilities

In addition, the MMS Relay/Server should be able to generate charging data (Charging Data Record or CDR) when receiving MMs from or when delivering MMs to another element and related value-added services supported by the operator.

MMS User Databases

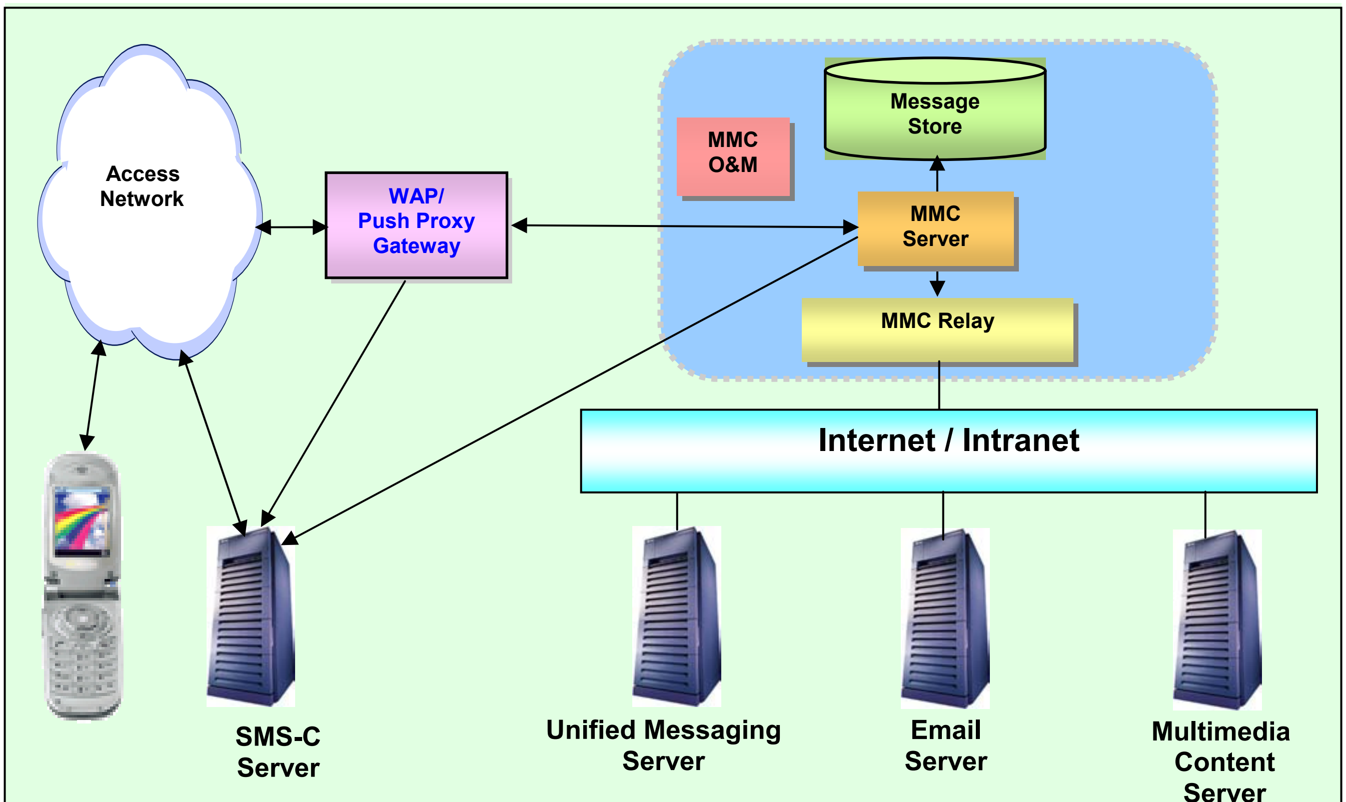
The MMS has access to several databases. These consist of data such as user profile database, subscription database, HLR.

External Servers

Several external servers like email server, MS server may be included within or connected to an MMS system. Convergence functionality between external agents and MMS User Agents is provided by the MMS Relay/Server which enables the integration of different server types across different networks.

Message deposit

Messages can be deposited by mobile users, email users and Internet based multimedia



Multimedia Messaging System

applications. The maximum allowed message size is normally configured in the MMS server, which operates on store and forward principle. The received message is stored in the MMS server and routed to destination address depending on the conditions set in the subscriber profile.

Message delivery

Messages are delivered to mobile users using WAP as the bearer technology. Upon receiving a notification from the MMS server, the terminal automatically initiates a WAP session and sends a request to the service to deliver the multi-media message. After determining the multimedia presentation capabilities of the mobile terminal, the message is downloaded to the terminal and an acknowledgement is sent by the terminal. In case the terminal is not MMS compatible, a media conversion or a notification using SMS of a destination multimedia application is possible depending on the implementation. Messages to Internet destinations are delivered using the SMTP (Simple Mail Transfer Protocol). In case of messages to mobile users, the messages are addressed using MSISDN, while messages to Internet destinations are addressed using email addresses. The originating user can request for a delivery report.

MMS features

The features supported by the MMS server are implementation specific. Multiple Address destinations, Date/time dependent delivery, forwarding to a UMS, prioritisation of messages are some of the commonly available features.

- **Personal albums**
  Multimedia albums provide subscribers access to a long-term storage repository for the multimedia content. Personalised services such as personalised 'multimedia albums' containing subscriber's own library is possible.
- **Address hiding**
  'Address hiding' is a feature which will hide the address before delivering the message to the recipient in the original message.
- **MMBox**
  An optional feature of MMS is the support of network-based storage called Multimedia Message Box or 'MMBox', a logical entity associated with the MMS Relay/server into which Multimedia Messages may be stored, retrieved and deleted. Depending upon an operator's configuration, each subscriber may have an MMBox configured to automatically store incoming and submitted MMs.

Business Model

In a competitive scenario, operators provide services like MMS to increase their data revenues and to retain their customer base. However, demand for MMS depends on the content, applications and pricing for the service as well as handset. Third party content is expected to dominate the MMS traffic, since person-to-person MMS traffic may not be high, unlike in SMS. Normally, content provision is outsourced and operators therefore need to work closely with the content providers to make the service successful. Applications could vary from informational (e.g. news, sports, stocks, travel) to commercial (e.g. banking, marketing) to entertainment (e.g. music and movie-clip downloads, cartoons). Flexible billing solutions for MMS service are available for both post-paid as well as pre-paid subscribers. They support models based on event-driven billing, volume, content or message type. Post-paid billing is through generation of Charge Data Records (CDR).

IPv6

Source: The following are extracts reproduced from the booklet 'IPv6 Cluster: Moving to IPv6 in Europe' edited by 6LINK (2003 edition), for information purposes.

What is IPv6?

IPv6 is an upgrade to the data networking protocols that power the Internet. The Internet Engineering Task Force (IETF) developed the basic specifications during the 1990s after a competitive design phase used to select the best overall solution. The primary motivation for the design and deployment of IPv6 is to expand the available "address space" of the Internet, thereby enabling billions of new devices (PDAs, cellular phones, appliances, etc.), new users (countries like China, India, etc.), and new, "always-on" technologies (xDSL, cable, Ethernet-to-the-home, fibre-to-the-home, PLC, etc.).

While the existing protocol, IPv4, has a 32-bit address space that provides for a theoretical 2^{32} (approximately 4 billion) unique globally addressable hosts, IPv6 has a 128-bit address space that can uniquely address 2^{128} (billions of billions) hosts. In practice, the number of global IPv4 addresses that can be used is far less, due to inefficiencies in their allocation and use. IPv4 simply cannot support an Internet scaling to many billions of globally connected hosts. Network Address Translation (NAT) has extended IPv4's life in conjunction with private IPv4 addresses. However, NAT complicates application deployment and, more importantly, cannot support new Internet growth areas including those always-on and peer-to-peer services that require connections be established into devices in home networks and those networks obfuscated by NAT routers.

During the design of IPv6, the IETF took the opportunity to make further improvements above and beyond providing extra address space, making IPv6 extensible and highly adaptable to further requirements.

In short, technically speaking, the main advantages of IPv6 are:

- Expanded addressing capabilities;
- Server-less auto-configuration ("plug-n-play") and reconfiguration;
- More efficient and robust mobility mechanisms;
- Built-in, strong IP-layer encryption and authentication;
- Streamlined header format and flow identification, and;
- Improved support for options/extensions.

Taken together, these features provide the means for restoring the end-to-end Internet paradigm, facilitating peer-to-peer applications, end-to-end security, and avoiding network address translators.

IPv6 Plug and Play

Plug and play networking refers to the ability for network devices to be deployed and configured, as much as possible, without significant human intervention. It will become increasingly important for network devices to be able to be deployed as simply as possible, with minimal requirements of the users of the devices. This will be most evident in home networking scenarios, but also where new classes of sensor and embedded devices are deployed. IPv6 offers the globally unique address space to make such devices addressable from anywhere on the IPv6 Internet. It also gives mechanisms for such devices to auto configure their network connectivity.

IPv6, like IPv4, offers the option for devices to be configured through stateful auto configuration, via the Dynamic Host Configuration protocol (DHCP). The IETF Dynamic Host Configuration Working Group has defined DHCPv6 for IPv6 hosts and devices. Where managed configurations are not required, IPv6 offers the alternative of stateless address auto-configuration through RFC2462. However, we may also anticipate security requirements for such devices (e.g. secure access to a device in the home from a remote mobile PDA) in which case security mechanisms also need to be simple to configure and deploy.

Role of Multicast in IPv6

With the standardisation of IPv6, multicast technology became a much more important mechanism than it was for IPv4. In IPv6, many protocol internal functionalities are realised on the basis of IP multicast, which is used as a substitution for the well-known IPv4 broadcast mechanisms. IPv6 multicast is one of the most important basic IPv6 mechanisms of which implementation and deployment is very necessary to realise an IPv6-based Internet and to allow future applications to work and behave in the same way as they are working for IPv4 today. But in contrast to IPv4, IPv6 has the chance to solve the problems earlier encountered during the implementation of IPv4 multicast, during the standardisation phase, keeping in mind the lessons the Internet community learned with IPv4.

Mobile IP

Mobile IPv6 defines host mobility support in the Internet. It enables a mobile node moving from one IPv6 subnet to another to preserve the ability to be reached at its permanent (or home) address and maintain continuity of its ongoing sessions. While Mobile IPv6 is well suited to handle host mobility, some extensions are required when it comes to support a mobile network, i.e. an IPv6 subnet that can change its point of attachment to the Internet. The NEMO working group in IETF, which started in October 2002, is working on these aspects.

The formation of a mobile network can exist at various levels of complexity. Here are the scenarios of various instances of mobile networks:

- A cell phone with one cellular interface and one Bluetooth interface together with a Bluetooth-enabled PDA constitute a very simple instance of a mobile network. The cell phone is the mobile router while the PDA is used for web browsing or runs a personal web server;
- Train passengers use their laptops with Wireless LAN cards to connect to Wireless LAN Access Points deployed in the train. The mobile router is used to link together the Access Points and to provide connectivity to the Internet. A similar scenario can occur as well on a plane, on a ship, and any moving vehicles;
- Multi-level aggregation of mobile networks can be desirable. For example, a person carrying a personal area network of a cell phone and PDA getting into a car, might wish to offer Internet access to the car's electronic devices, or it might want to use the car's own mobile router to connect his/her PDA to the Internet (instead of the cell phone).

Impact of IPv6 on Applications and Services

Users perceive the Internet through the applications they use in their daily work and do not care about the underlying protocols. It

is therefore difficult to explain the impact of the IPv6-based Next Generation Internet to the users, because they will see only more new applications. As many new applications have appeared during the last years without IPv6 being there, it is very important to define clearly what applications IPv6 will make possible that would never have existed (or would have been significantly more costly to deploy) if the Internet were to remain IPv4 only.
The main benefit brought by IPv6 is a huge address space that will allow a public IPv6 address for any system or device connected to the Internet. The impact of this huge address space on the applications is expected to be big, because it will allow the recovery of the end-to-end connectivity of applications lost after the introduction of NAT devices. It will enable:

- An enhanced security based on end-to-end IPsec usage complemented by a proper security framework providing digital identities;
- The deployment of applications and services which require public IP addresses with end-to-end connectivity such as
  - Deployment of Voice over IP;
  - Deployment of Mobile IP;
  - Deployment of the previously mentioned IPsec, which is mandatory in Ipv6;
  - Deployment of UMTS Multimedia Services based in Release 5 of 3GPP;
  - All kinds of devices needing end-to-end access, for example: remote sensors, PDAs, transport, mobile phones, home devices, etc.;

Approvals issued by TEC during the period July 2003 to November 2003

Type Approvals........................	243
Interface Approvals...................	155
Service Test Certificates.............	48
Total	**446**

Transition and porting of applications to IPv6

The Internet is a huge network with a large number of applications available and in use. Those applications will need to continue to function during the transition from IPv4 to IPv6. Both protocols will coexist for a considerable time to come. IPv6 was designed to fulfill several criteria that should help assure a smooth coexistence during the transition.

In the general case, existing IPv4 applications need modifications when ported to IPv6, because the TCP/IP network architecture was not properly layered. Applications can use either symbolic domain addresses or IP addressing to identify hosts and routers. Many applications perform a proper decoupling and use only symbolic domain names above the socket interface. But other applications use IP addresses as parameters needing a big redesign when ported to IPv6.

IPv6 forces the use of a slightly modified version of the transport interface (the IPv6 socket interface). Hence, from applications point of view, the IPv6 deployment requires changes in the existing code and may be a redesign of the parts that are IPv4 dependent.

Other issues

The deployment and integration of IPv6 will take place gradually and IPv4 and IPv6 will coexist for many years to come. Performance, conformance and Interoperability issues need to be addressed to guarantee general interworking and a high level of reliability for applications based on IPv6.

Approvals issued by TEC upto 30.11.2003

Type Approvals.......................	6505
Interface Approvals...................	3787
Service Test Certificates.............	1594
Grand Total	**11886**

IMPORTANT ACTIVITIES OF TEC DURING JUNE TO NOVEMBER 2003

A. Preparation of GRs/IRs & Technical documents

Following GRs/IRs and Technical documents issued:

GRs

- Softswitch for transit applications.
- Signalling Gateway.
- Short Message Service Cell Broadcast (SMSCB).
- Trunk Media Gateway for IP based TAX network.
- Network Management System (NMS) for IP based TAX network).
- Standard on Alpha Numeric Keypad for Phone Terminal.
- SDH based 4/3/1 Digital Cross Connect System.
- VoIP Protocol and Performance Analyzer.
- Voice Quality Analyzer.
- Optical Time Domain Reflectometer (1550nm & 1625 nm wavelength) – Type II For Long Haul Application
- Integrated Fibre Termination and Distribution System
- Optical Multi Services Access Network (OMSAN)
- Broadband RAS
- Radio Network of WLL System based on cdma2000 IX standards

IR

- IR on Customer Premises Equipment (CPE) for MPLS Network Access.

Revised GRs

- 2 GHz Feeder Cable.
- Narrowband RAS.
- CDOT TDMA PMP System.
- Optical Splice Closure for Optical Fibre Cables
- Armoured Optical Fibre Cable for Direct Burial.
- National Standards ISDN basic rate access U-Interface.
- Solid Polythene Insulated, Fully filled Polythene Sheated Underground Telecom Cables.
- Routers.
- Optical Time Domain Reflectometer.
- LAN Switch.

Revised IRs

- ISDN Customer Premises equipment.
- ISDN User Network Interface.
- Privately Owned PABX with DID Interface

B. Tests and Field trials

Tests/field trials have been carried out for:

- IN system: Billing and Customer Care.
- CDMA 1x System in Nepal.
- 8 digit numbering scheme for CDOT MAX-XL.
- 100% CDR generation in NT & CDOT switches.
- Integrated Media Gateway.
- CDMA Network of MTNL.
- Very long haul DWDM of M/s HFCL.

C. Other Activities

- **Manufacturer Forum conducted for**

- Multimedia Messaging System and SIM card
- Mobile IN
- IR for CPE & SR for ISDN user network
- Internet Backbone Router.
- LAN Switch
- ADSL ,VDSL
- ISP Monitoring System and IP Centrex
- Optical Fibre Cables.
- Remote Fibre Monitoring System
- Enterprise Management System for IP based on SNMP Network.

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