



**Are you ready for
Multimedia Messaging Service**
An evolutionary approach to implementing MMS

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Executive summary

This document presents ideas for operators who intend to join the MMS wave. This document is not an exhaustive presentation of an MMS business plan. Rather, a number of the most important issues are highlighted to give an understanding of what is required for MMS.

The MMS concept builds upon the success of SMS. Hence, this paper presents a way to enter the MMS market using an evolutionary approach. This protects the operator's network investments and minimises the risks in introducing the new service. The MMS concept is discussed and the required hardware and software are described. Finally, recommendations on the basic steps to prepare for entry to the MMS market are presented.



MMS technology concept

Multimedia Messaging Service (MMS) is a messaging service for the mobile environment that has been standardised by the WAP forum and 3GPP. To the end user, MMS is very similar to the Short Message Service (SMS): it provides automatic and immediate delivery of user-created content. The addressing used is primarily the phone number of the recipient and the bulk of the MMS traffic goes from phone to phone. MMS also provides support for e-mail addressing. Hence, messages can also be sent from phone to e-mail and back.

In addition to the content type used for SMS text, MMS messages can contain still images, voice or audio clips, synthetic audio, video clips, and presentation information. A multimedia message is a multimedia presentation created by the sender using, for example, predefined templates. Alternatively, the content can be obtained ready made from a third-party content provider.

The message is delivered using a push to the recipient's phone and the recipient is notified only after the whole message has been received.

MMS transport is carried out using WAP protocols and any bearer capable of supporting WAP can be used. Therefore MMS is bearer independent, i.e. MMS is not limited to only GSM or WCDMA. The Wireless Session Protocol (WSP), specified in the WAP Forum, is used for message transport from phone to MMSC and from MMSC to phone. In addition, WAP push features are used to deliver the message from the server to the recipient. MMS uses WAP protocols, but is a separate phone application, independent from the browser.

As the MMS concept is built upon SMS, the target of the service is to bring a new facility to the mass market of MMS users: the multimedia evolution of SMS.

Hardware and software

To launch MMS, a number of practical preparations have to be made in the network prior to the service launch.

MMS centre

The MMS Centre (MMSC) is the store and forward network element that delivers the MMS messages from the sender to the recipient. The MMSC concept is similar to an SMSC; i.e. the server stores the message only during the time that is required to find the receiving phone. After the receiving phone has been found, the MMSC immediately forwards the multimedia message to the recipient and the message is deleted from the MMSC. Thus, the MMSC is not a mailbox server, because it does not store the message if it can be delivered. The MMSC is a new network element that is needed to launch MMS services. The SMSC cannot be upgraded to an MMSC in terms of software, as the capacity and interface requirements are different.

MMS is primarily targeted at phone-to-phone traffic. There is always a possibility that the receiving phone cannot be reached due to being switched off, having a spent battery or poor network coverage. The MMSC is needed to store the MMS messages until the receiving phone can be reached. In addition, the MMSC hosts a number of interfaces for connecting to other networks, e.g. the Internet, and an external application interface to enable delivery of value-added services. The MMSC may also have an interface for e-mail.

The Nokia MMS Centre provides interfaces for an external WAP gateway, the billing system, an External Application Interface (EAIF) for MMS applications and many more.

WAP gateway

Although the MMS user experience is similar to SMS, MMS is not transmitted in the SMS transmission channel. The SMS transmission channel is too narrow for transmitting multimedia content. The Nokia view is that any cellular data carrier providing at least 14.4 kbit/s is sufficient for MMS. Examples include single slot GSM data, HSCSD and GPRS. Other protocols and carriers can also be used.

On the protocol level, MMS is transported using the WAP Wireless Session Protocol (WSP). In addition, the lightweight MMS protocol data units defined by the WAP forum are used. The WAP browser is not involved in MMS – only the WAP transport protocols are used. To enable the use of the WAP protocols in the MMS message transfer, a WAP gateway is needed to connect the MMSC to the wireless WAP network.

The Nokia MMS Centre uses an integrated WAP interface to connect to the wireless data network. In addition, the existing WAP gateway on the operator network can be used at the launch of the service while traffic is still low. To enable the operator to cope with increased MMS traffic, Nokia suggests that a dedicated WAP gateway should be used for MMS traffic. However, a specific GPRS access point should be used for the MMSC and other WAP services. This ensures that low-end phones with only one PDP context can use MMS and other WAP services simultaneously.

Segmentation And Re-assembly (SAR) is a software feature supported by Nokia's WAP functionality. It enables large messages to be sent in small packets, reducing the retransmission time for



lost packets. SAR also reduces the network load due to the more efficient re-transmission schemes.

Profile server

Personalisation is key to any service, the wireless device users desire and expect to control their messaging domain. Profiling will enable users and operators to effectively supply, control and manage value-added services. The profile server should be fast with a high capacity network element optimised for read requests, ensuring that MMS network elements share an equal view of subscriber profile information.

Nokia Profile Server provides vital information for MMS solutions about subscribers' mobile terminal capabilities, storage and processing of end-user multimedia service preferences and information about end-users' subscription details. MMS profiling services can be tailored to individual needs and preferences, for example prepaid subscribers may be barred from accessing high-value services to prevent large reductions in credit. On the other hand, subscribers may control the delivery of their identity and location details to origin servers and block unwanted push services.

Value-added services (VAS)

The combination of high capacity multimedia messaging and applications provides a comprehensive multimedia solution. The applications will complement person-to-person messaging. Two MMS features that are invaluable in any operator service are provided: support for non-multimedia terminals (commonly referred to as legacy phone support) and storage. Legacy phone support will be

crucial to the initial deployment of MMS services. This will increase the number of subscribers who are able to send and receive multimedia messages thus enabling MMS to reach an important mass status. The other main feature: permanent message storage with multiple access allows all users to store and manage messages therefore providing additional network storage to the existing terminal storage.

To seamlessly combine the Internet and mobile messaging worlds, format conversions are required. The MMS solution converts messaging formats that are supported on the Internet and mobile networks to address important compatibility requirements. Text, pictures and audio clips can be converted from the MIME formats that are supported on the Internet to formats specified in the 3GPP standards. Additionally, users and operators have the ability to determine message routing and filtering.

The demands and needs of subscribers who desire comprehensive applications and content services are met by a content application gateway between the wireless network and applications on the Internet and corporate Intranets. Content can be provided in the standard HTML and WML formats adapted by the application gateway, thereby making it suitable for mobile terminals. The messaging platform enables operators to develop new multimedia messaging services and enhance the existing SMS services towards MMS. Services that are provided by the messaging platforms are accessible using MMS and SMS.

Nokia also offers the next generation of call termination in a multimedia environment. This new attractive service will remove the need to dial a number to retrieve voice messages and will deliver the messages in the form of voice clips directly to the terminal.

For the operator to be able to offer more than a plain person-to-person MMS service with user-created content, the following value-added service platforms can be considered:

Multimedia terminal gateway

The Multimedia Terminal Gateway offers the possibility of supporting non-MMS enabled terminals as part of the overall MMS service portfolio. Subscribers that do not own MMS terminals will receive an SMS notification that an MMS message has been sent to them and that they can view the message by logging onto their operator's website. For security reasons, they will need to insert the user name and password that were sent to them in the notification message.

Another value-added service offered by the Multimedia Terminal Gateway is disk space for long-term storage of the subscriber's favourite MMS messages, the "Multimedia Album". They can compose, delete and forward messages directly from their "Multimedia Album".

Multimedia e-mail gateway

The Nokia Multimedia E-mail Gateway provides the operator with the possibility of sending MMS messages between MMS terminals and e-mail accounts. Message routing, spam filtering and call detail record creation are some of the features provided by the Multimedia E-mail Gateway. By expanding the MMS market to cover e-mail accounts, the operator is effectively creating a larger target market.

Messaging gateway

As the MMS terminal market penetration will be very modest in the beginning, it is essential that the operator is able to offer ready-made MMS content to its subscribers. By partnering with third-party content providers, the operator can stimulate MMS usage by offering attractive MMS content. The Nokia

Messaging Gateway offers an open service creation interface through which third-party content developers can create HTML-based MMS services and offer these services to MMS subscribers.

Multimedia voice gateway

With Nokia Multimedia Voice Gateway, Nokia offers a voice clip call termination that will be the pioneer of multimedia call answering. It is a call-answering service that is based on a store and forward application. It features voice call termination and instant delivery of voice messages to the subscriber's multimedia terminal. The voice message is sent as a voice clip in a multimedia message. The subscriber can also record a personal greeting over the phone.

Terminals

To launch the service, the operator has to ensure that attractive MMS terminals are available on the market. Nokia offers the Nokia 7650 imaging phone as a solution for MMS terminals.

The MMS functionalities of the Nokia 7650 include an integrated digital camera with a VGA resolution, picture taking and sending capabilities, a photo album for storing pictures and a large 176 x 208 pixel colour display.

The terminal allows users to combine audio, graphic, text and imaging content in one message. Once the user has selected a picture, written a piece of text and included an audio clip, a multimedia message can be sent directly to another multimedia messaging compatible terminal, as well as to the recipient's e-mail address. The advanced graphical user interface and joystick with 5-way navigation add ease and speed to the use of this new device.



The Nokia 7650 makes it possible to use multimedia entertainment and information services. Hence, the user could receive the latest news or sports headlines together with a picture and a short voice commentary. It is also a phone, of course, and the user can do a lot more with their voice than talk during calls. They can save up to 25 names and numbers for voice dialling, so they can call their friends by pressing one button and saying the name. There is also a voice recorder that can be used for recording voice messages to send as part of a multimedia message. The user can record a memo to herself, or record part of a phone conversation.

With the Nokia 7650, the connection to WAP services using GPRS is always activated, so it is quick to connect to the WAP homepage or a bookmarked page. GPRS makes it convenient to use many mobile services, such as MMS and e-mail. The Nokia 7650 works at three speeds, all of them quite fast. At normal speed, it sends and receives at up to 14.4 kilobits per second. When sending and receiving e-mail, the data connection can be increased to double speed – up to 28.8 kilobits per second. If you want to use the Nokia 7650 as a modem to download Internet pages to a compatible PC, the data can be received at up to 43.2 kb/s. GPRS and HSCSD are supported.



The user can connect wirelessly via infrared or Bluetooth to a compatible PC or to another phone supporting Bluetooth and share pictures, graphics and contact cards.

System testing

When the MMS system is delivered and installed, the operators should take time to perform their own tests to ensure that the delivered system corresponds to the contract. The system testing includes testing basic functionalities, such as the transfer of messages from the sending terminal to the receiving terminal and messages sent to and from network applications. Also, more advanced features such as content adaptation services should be tested if available. Moreover, integration with other systems should be tested, such as the Nokia Terminal Gateway (TGW), the Customer Care and Billing System (CCB) and other value-added services. The aim of these tests is to ensure that everything is installed correctly and that the system works and is capable of supporting the operator's business, e.g. CDRs are generated according to the chosen charging model. The operator may also perform more complex tests including capacity and performance tests.

Operator service concept development

MMS provides a versatile development platform for all kinds of Store and Automatic Forward services. In the launch phase, MMS will be an extension of the existing mobile messaging transfer system, e.g. SMS. The target is to position MMS as a further development of SMS: the user experience should be the same and the end user should see MMS as an improved SMS, a multimedia SMS. The end user is not interested in or concerned with the delivery technology, as long as the service is the same.

History has shown that, for various reasons, it took 3–5 years per market to make SMS successful. SMS has proven to be a very profitable business for the operators and Nokia sees that the SMS traffic can be gradually migrated to MMS, potentially making the service learning period, or "chasm", shorter for MMS. Therefore, it is reasonable to state that MMS has good business potential for operators in the person-to-person messaging area.

MMS is already an excellent transport mechanism for digital content. We see that MMS together with e-Business solutions form a versatile platform for future content delivery business. Hence, the operators need to explore the degree to which they want to partner with content developers, e.g. digital image libraries, e-postcard providers, auctioning services, etc. and, together with them, launch content services that are optimised for MMS terminals.

Service concept

Before the service launch, an operator-specific MMS concept needs to be prepared. MMS and the Nokia MMS solution provide a flexible platform that enables the operator to develop a competitive MMS proposal to attract the mass market. A number of ways to market MMS are presented below.

MMS gives the operator the widest flexibility within the concept of a standard: the operator can use MMS as a platform for a wide range of person-to-person messaging applications.

There is no other store and forward service capable of multimedia which is optimised for the mobile environment.
=> You can differentiate MMS from those operators who only offer SMS and e-mail.

The Nokia MMS Centre has an external application interface through which any application can be interfaced. The operator can partner with third-party content developers and offer MMS content services.
=> You can offer media rich content application services.

With the non-multimedia terminal support offered by the Nokia Multimedia Terminal Gateway, the operator can increase the number of subscribers who are able to send and receive multimedia messages and enable MMS to reach a critical mass status.
=> You can offer an MMS service available for all subscribers independent of their terminal capabilities and differentiate with the richness of the service offered.

MMS is a store and forward service, which by its nature does not offer long-term storage for messages. The Nokia solution includes a message storage facility that makes it possible for the operator to offer a storage service that is customised to their needs.
=> You can offer a storage service, web and WAP user interface and differentiate from competition for example with the offered storage space.

MMS includes interoperability with e-mail.
=> You can offer an e-mail interface concept, e.g. address, billing, spam filtering, message routing and more and differentiate with the flexibility of the service offering.

Nokia offers the next generation of call termination in a multimedia environment.
=> You can offer an enhanced voice messaging service with immediate message delivery to the terminal.



Charging concept

Subscriber confidence is vital when defining the pricing structure of multimedia messaging services. If the end user is unsure of the cost, it is likely that they will not send messages at all. If this reaction is widespread amongst users, ultimately it will result in very low MMS revenue. This situation is to be avoided.

The operator should ensure that the end-users feel that the costs of MMS on their phone bills are predictable and they can safely use the service. Nokia recommends that the operators deploy an MMS charging model similar to the one used in SMS: transaction-based billing, i.e. based upon the number of transmitted messages. However due to the variations in size of multimedia messages, from a few kilobytes to a several Megabytes, this may require further adjustment to reflect the cost of delivering the message. Nokia are currently analysing the solutions proposed by standardisation bodies.

To avoid the message recipient switching off their MMS application to avoid unwanted costs, receiving MMS should be free of charge. Using the familiar SMS billing model where "the sender pays all costs per message" will lower the barrier of entry for users who wish to use the new MMS service. The exception to this rule would be some application originating-mobile terminating services where the recipient has ordered the content or has made a subscription to these kinds of value-added services. In this case, the recipient would pay for the multimedia message.

Initially, Nokia does not suggest introducing a subscription fee or monthly fee as they may add to the barriers of entry for new MMS users. However as user acceptance grows, this model may be

desirable for certain services. For example, access to value-added services such as webmail accounts like Hotmail could successfully be provided as a subscription-based service.

Charging solutions

The technical realisation of the "sender pays all costs per message" billing model requires some integration. For example, a mobile-to-mobile multimedia message sent via GPRS not only creates a charging record at the MMSC but also a record for the SMS notification and a GPRS record for the access to the MMSC. If no further action were taken, the subscriber would be charged for the total cost of all these records. This is not an attractive charging model from a subscriber point of view, as they do not have a clear idea of the cost of sending a multimedia message. Furthermore, it would not be allowed in countries such as Germany where the total price of a service including access must be advertised.

Another consideration is the support of the specific requirements of prepaid customers. Prepaid subscribers form a significant percentage of the operator's

user base. However, they bring extra complexity to the operator's network in terms of service status management, which is required to provide the necessary revenue assurance. To elaborate, as a prepaid subscriber's balance fluctuates due to usage and balance top-up, their access to and consumption of services needs to be denied or allowed when necessary. This ensures that the subscriber can only use services when they have sufficient credit available. For this purpose, Nokia recommends the Nokia Charging Centre.

Therefore, any solution for the charging of multimedia messaging services must address both of the previous issues. To reiterate, the subscriber must only be charged for the advertised cost of the multimedia messaging service and the charging solution must take this into account.

Generally, there are two types of charging records. Access records, produced by the MSC or GGSN, and content or messaging records, produced by the MMSC and application gateways such as Nokia Multimedia Terminal Gateway. To ensure accurate charging, the following solutions have been identified.



Suppression of access charges

It is proposed that when using MMS, the user should not be separately charged for the bearer service. Hence, the access charging record associated with a multimedia message is not charged. Instead, the total cost of message delivery should be reflected in the price associated with the content or messaging record. With this in mind, the following solutions are proposed.

HSCSD Access Charging Solution: Toll-Free Number

A subscriber uses WAP over HSCSD to send and receive multimedia messages. Depending on the subscriber payment type, the solution is as follows:

Postpaid Call Detail Record (CDR) example. The Mobile Switching Centre (MSC) produces a charging record which is forwarded to the Customer Care and Billing System (CCB). The MMSC access number is defined as toll free in the rate plans. When the charging record total is calculated, no charge is incurred for accessing the MMSC.

Prepaid system charging example. In a Nokia environment, the MSC controls the call and communicates with the Intelligent Network (IN) to debit the prepaid subscriber's account in real time. In this instance, the MMSC access number is defined as toll free in the rate plans and so the subscriber's prepaid balance will not be debited.

GPRS Access Solution: Toll-Free IP addresses in GGSN

A subscriber sends and receives multimedia messages over GPRS. The MMSC WAP Gateway IP address is defined as toll free on the GPRS Gateway Support Node (GGSN). Therefore, any traffic to this address would have no impact on the data volume indicated in the charging record produced by the GGSN. This solution is valid for both postpaid and prepaid traffic.

Messaging based charging solutions

To ensure that only one Service Detail Record (SDR) total is calculated, two solutions are proposed: discarding/zero rating SDRs produced by the other network elements involved in the service delivery, or configuring the other network elements so that they do not produce charging records.

In both cases, the solution requires that the network element that produces the SDR includes the subscriber's identifier and sufficient details of the services to allow the charging system to identify the correct set of rates to use for a particular service. For example, if a subscriber saves an image to their photo album and then accesses a third-party service, the charging system would be able to ascertain this from the contents of the two SDRs, which the network elements generated, and calculate the correct charge.

During service start up, the MMSC should be the key network element to produce SDRs as it would be involved in all services.. As the service becomes more established, SDR creation can also be handled by other network elements. Normally this would be the first element in the delivery process and will be described as the key network element. For example, if the Voice Gateway VGW receives a voicemail and forwards it to the MMSC for delivery to a subscriber, the VGW would be the key network element responsible for producing the SDR.

Discarding or zero rating supporting services' SDRs

This solution proposes that each network element involved in the delivery of a service would produce charging records. These would then be discarded or zero rated by the CCB or prepaid system except for the record produced by the key network element. This requires that the network elements include sufficient

information in the SDRs they produce so that the charging system can identify them as being zero rated

Supporting services do not produce charging records

In this solution, only the key network element will produce charging records. The other network elements would be configured not to produce records for events involved in the delivery of the service. It is therefore necessary that the communications between the network elements facilitating the delivery of a service contain sufficient information for them to recognise the events as ones that do not require charging records.

Launch concept

There are two aspects that need to be addressed when preparing for the service launch: how to make the service as easy to put into operation as possible, i.e. service activation and how to ensure that the end-user continues to use the service more and more frequently.

It is crucial that the MMS service can be used immediately from when the subscriber purchases an MMS terminal. The operator needs to ensure that the terminal, the service settings and data service subscriptions are in place at the point of sale. In practise, this means that the correct MMS settings need to be included on the MMS terminal when purchased or they need to be delivered over the air. Nokia provides a service activation solution that enables easy phone configuration for mobile phone users through various initiation methods. The subscriber also needs to have a subscription to a data service such as circuit-switched data, HSCSD or GPRS. The operator needs to carefully consider how they will ensure that all MMS terminal users are subscribing to a data service. Should the data service be

included with the MMS service and terminal purchase? Should all subscriptions have a data service activated as default?

When the subscriber decides to buy an MMS terminal, the operator should also consider how to ensure that the subscriber decides to subscribe to the MMS value-added services on offer, such as Multimedia Album, e-mail interworking etc, at the point of sale. There needs to be clear incentives for the retailer to sell these value-added services, e.g. commission-based incentives may be set up to ensure that subscriptions are acquired.

The operator also needs to consider how to include their total subscriber base in their MMS offering. For example, by offering a web service from which MMS messages can be composed, viewed and forwarded, the operator is able to address the needs of those who have no immediate plans to upgrade their terminals. The web-based MMS service will encourage awareness and use of MMS, and eventually subscribers may decide to upgrade their terminals so that they can enjoy MMS when on the move.



Lastly, but perhaps most importantly, the service pricing needs to be clear, easy to understand and in line with the SMS pricing principles. In practise, this means that the sender pays a fixed fee per message. The recipient does not have to worry about whether or not they will be charged for accepting a certain message, as receipt of messages is free. This pricing principle also means that a subscriber with an MMS terminal can receive MMS messages even if they have not have activated the service, assuming they are subscribing to a data service. The "sender pays per message" principle also ensures that MMS users will not receive spam and unwanted multimedia messages.

Market making

To increase the awareness of MMS, the operator will not have to rely solely on user-created content to fill their networks. By offering third-party MMS content services through the operator's portal and by offering "Multimedia Album" types of services, the operator is able to offer a wide variety of MMS content from the start, and therefore demonstrate to the market how much richer and more versatile MMS content is compared with SMS. As an example of third-party MMS content, Nokia is partnering with companies such as eurosport.com and Lycos Europe to ensure that there is enough attractive MMS content when the service is launched. Through attractive content services, the market demand for MMS is created, and once MMS terminal ownership increases, user-created content will start "filling" the operators' data network capacity.

Service launch

The road to a successful MMS service launch in the first half of 2002 will have to start now.

Operators are currently testing MMSCs and MMS terminals to ensure that the start-up, or provisioning aspects, i.e. an immediate, "ready to go" service at the point of sale and billing aspects, i.e. sender pays, fixed fee per message, prepaid support, are translated into a system integration project.

The Nokia Artuse MMSC used in the trials is commercially ready, i.e. the product is based on the final, commercial software platform. In practise, this means that the Nokia Artuse MMSCs are already being shipped for commercial implementations. The Nokia Multimedia Terminal Gateway and Nokia Multimedia E-mail Gateway will be commercially available during the first quarter of 2002. For the trial period, Nokia can provide prototype MMS terminals in limited volumes to ensure that the operator is able to test the end-to-end service chain.

The Nokia 7650 imaging phone will be commercially available during the second quarter of 2002; therefore the MMS service launch, based on the complete Nokia end-to-end MMS solution, will be ready to launch during the first half of 2002.

Conclusions

When preparing the MMS service launch, Nokia recommends that the operator follows the SMS format. The same service pricing principles, where the sender pays a fixed fee per message sent, should apply. The user experience should also be the same as with SMS – the message is instantly delivered to the recipient's terminal, with automatic presentation. In short: MMS should be the same as SMS except for the richness of the message.

To stimulate the market and to ensure a rapid uptake of MMS from the day of launch, the operator needs to offer value-added services that can be enjoyed by subscribers who still do not own an MMS terminal.

The MMS service should be immediately "ready to go" when the MMS terminal is purchased. The required service and terminal settings need to be in place when the subscriber exits the shop with their brand new MMS terminal.

The MMS service roll out has already started. The operators should commence the MMS trials using the commercially available Nokia MMSC and terminal prototypes to ensure that the customer care, provisioning and billing systems are prepared for the service launch.



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