

The Short Message Service (SMS), as defined within the GSM digital mobile phone standard has several unique features:

- A single short message can be up to **160 characters** of text in length. Those 160 characters can comprise of words or numbers or an alphanumeric combination. Non-text based short messages (for example, in binary format) are also supported. These are used for ringtones and logos services for instance.
- The Short Message Service is a **store and forward service**, in other words, short messages are not sent directly from sender to recipient, but always via an SMS Center instead. Each mobile telephone network that supports SMS has one or more messaging centers to handle and manage the short messages.
- The Short Message Service features **confirmation of message delivery**. This means that unlike paging, users do not simply send a short message and trust and hope that it gets delivered. Instead the sender of the short message can receive a return message back notifying them whether the short message has been delivered or not.
- Short messages **can be sent and received simultaneously with GSM voice, Data and Fax calls**. This is possible because whereas voice, Data and Fax calls take over a dedicated radio channel for the duration of the call, short messages travel over and above the radio channel using the signaling path. As such, users of SMS rarely if ever get a busy or engaged signal as they can do during peak network usage times.
- **Ways of sending multiple short messages are available**. SMS concatenation (stringing several short messages together) and SMS compression (getting more than 160 characters of information within a single short message) have been defined and incorporated in the GSM SMS standards.

To use the Short Message Service, users need the relevant subscriptions and hardware, specifically:

- a subscription to a mobile telephone network that supports SMS
- use of SMS must be enabled for that user (automatic access to the SMS is given by some mobile network operators, others charge a monthly subscription and require a specific opt-in to use the service)
- a mobile phone that supports SMS
- knowledge of how to send or read a short message using their specific model of mobile phone
- a destination to send a short message to, or receive a message from. This is usually another mobile phone but may be a fax machine, PC or Internet address.

## **Guide to SMS support on different networks**

Since its inclusion in the GSM standard, SMS has also been incorporated into many other mobile phone network standards, including Nordic Mobile Telephone (NMT), Code Division Multiple Access (CDMA) and Personal Digital Cellular (PDC) in Japan. Each of these standards implements SMS in slightly different ways and message lengths do vary. The availability and characteristics of SMS on different mobile network standards is:

Mobile network Standard	Type	SMS Availability	Message Length	Deployment
GSM 900	Digital	Yes	160	Widely
GSM 1800	Digital	Yes	160	Widely
GSM 1900	Digital	Yes	160	Widely
TACS/ETACS	Analog	No	N/A	N/A
NMT	Analog	Yes	N/A	Eastern Europe
TDMA/D-AMPS	Digital	Yes	N/A	North America
NAMPS	Analog	Yes	14 alphanumeric 32 numeric	North America
CDMA	Digital	Yes	256	North America
PHS	Digital	Yes	N/A	Japan
PDC	Digital	Yes	N/A	Japan
IDEN/NEXTEL	Digital	Yes	140	North and South America
TETRA/ Dolphin	Digital	Yes	256	Parts of Europe
Globalstar	Satellite	Yes	160	Truly global

The message length within GSM for short messages using non-European alphabets such as Chinese or Arabic is shorter.

**GSM:** Because of the use of three different network standards, the whole mobile market in the USA is complicated and splintered, and SMS does not survive unscathed in such an environment. GSM has long supported two-way SMS commercially in North America. SMS national interconnects, allowing short messages to be sent between different GSM networks, are patchy, although consolidation amongst the carriers and the GSM Alliance, an industry association set up to develop GSM in North America, has driven the introduction of national SMS roaming. (See <http://www.gsm-pcs.org>).

**NMT:** The Nordic Mobile Telecommunications (NMT) 450/ 900 analog standard introduced Short Message Service as part of its "Plus features", announced in early 1998, which also includes features such as caller line identity and voice mail indication. NMT Short Message Service is dependent upon the Mobile Station supporting the Message Waiting Indicator (MWI), another NMT Plus feature. In early 1998, none of the installed base of NMT phones supported MWI. As such subscribers want into use NMT SMS must subscribe to a mobile network that has an NMT-compliant SMS Center such as that from CMG and obtain a mobile phone that supports Message Waiting Indicator from the likes of Benefon and Nokia. When a short message is being sent to an NMT subscriber, the Mobile Station is located and the Message Waiting Indicator is forwarded to the Mobile Station. The MWI is sent by means of a normal voice call that is cleared before the mobile phone rings. The Mobile Station then fetches the short message(s) by an automatic or semi-automatic call to the SMS Center. NMT SMS calls use a radio channel just like a GSM voice or Data call would, as opposed to using the signaling channel as is the case with GSM Short Message Service. Centertel in Poland was the first mobile network to launch SMS over NMT commercially.

**PERSONAL HANDYPHONE SYSTEM (PHS):** Two different kinds of SMS are supported on PHS

networks- real-time and store and forward.

**PERSONAL DIGITAL CELLULAR (PDC):** SMS is supported by the Japanese Personal Digital Cellular (PDC) standard.

## NORTH AMERICA

The United States tried to agree upon one air interface that all network carriers would deploy, but never came to a consensus on which one to use. The Federal Communications Commission ("FCC") held tests in 1989 to identify the practicality of multiple submittals for different system architectures. The FCC adopted a consistent pattern of allowing the industry and the marketplace to dictate what standard was to be used, and gave operators and manufacturers the right to choose their preferred system. Support by different operators and equipment manufacturers resulted in the deployment of Time Division Multiple Access ("TDMA") and Code Division Multiple Access ("CDMA"). The main supporters of TDMA were in favor of time to market with a digital offering, while the CDMA supporters were in favor of increased network efficiencies and voice quality. The first US TDMA system went commercial in Chicago in 1993 by Southwestern Bell's Cellular One. The first US CDMA system went commercial in Los Angeles in 1996 by AirTouch Communications. The introduction of new PCS licenses in the US allowed new operators to choose from CDMA, TDMA, and from the US derivative of GSM at 1900 MHz.. These new PCS systems have been commercial since late in 1995, American Personal Communications offering service first. There are three main types of digital mobile networks in North America, shown in the table below with approximate indications of their adoption by PCS license holders:

Mobile Network Type	Standard Code	Adoption Rate
TDMA/ D-AMPS	IS-136	30%
CDMA	IS-95 (digital) IS-637 (digital) IS-91A / analog CDMA	55%
GSM 1900	GSM 1900	15%

Because of the use of three different network standards, the whole mobile market in the USA is complicated and splintered, and SMS does not survive unscathed in such an environment.

**NAMPS:**The analog Narrowband Advanced Mobile Phone System supports short messages of up to 14 alphanumeric characters in length or 32 numeric characters.

**TDMA** Two way SMS has now gone live on several TDMA networks around the world including on AT&T Wireless in the USA.

**CDMA:** Code Division Multiple Access (CDMA) is an air interface technology that was developed by the US military and commercialized by a US company called Qualcomm. (See <http://www.cdg.org>). CDMA supports SMS Mobile Terminate with a message length of 120 characters. Two way SMS is now available on CDMA networks and has been launched by networks such as Verizon Wireless in the USA. Other CDMA networks such as Sprint PCS have chosen NOT to implement two-way SMS.

See also [www.mobileCdma.com](http://www.mobileCdma.com) for more information on CDMA data technologies.

**IDEN/NEXTEL:** Motorola iDEN (integrated Digital Enhanced Network) is a TDMA-based digital network standard that is used by networks such as Nextel in the US. iDEN features group and private call services, Caller Identity, data transmission at 4,800 or 9,600 bps and text messages of up to 140 characters per message, with 16 alphanumeric message slots per iDEN phone. (See <http://www.motorola.com/iden>).

**GLOBALSTAR:** Globalstar is one of the leading global mobile satellite system suppliers. Globalstar has been very sensible in adopting many of the features of GSM such as SimCards. It will also offer SMS to the GSM specifications. This means that a user with a dual mode GSM/ Globalstar mobile phone will be able to receive short messages even when they are outside of GSM coverage. If the user has a dual mode CDMA/ Globalstar mobile phone, then they will be able to receive the CDMA equivalent of SMS wherever they are in the world. (See <http://www.globalstar.com>)

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## **MORE INFORMATION:**

### 1. Introduction

The Short Message Service (SMS) is the ability to send and receive text messages to and from mobile telephones. The text can comprise of words or numbers or an alphanumeric combination. SMS was created as part of the GSM Phase 1 standard. The first short message is believed to have been sent in December 1992 from a Personal Computer (PC) to a mobile phone on the Vodafone GSM network in the UK. Each short message is up to 160 characters in length when Latin alphabets are used, and 70 characters in length when non-Latin alphabets such as Arabic and Chinese are used.

### 2. Customer Usage and Market Growth

There is no doubting the success of the Short Message Service- the market in Europe alone has reached over one billion messages despite little proactive marketing by network operators and phone manufacturers. Key market drivers over the next two years such as the Wireless Application Protocol (WAP) will continue this growth path.

## **SMS VOLUMES PER EUROPEAN MARKET**

The SMS market in the European Union reached one billion short messages per month in April 1999. The market size thereby doubled in about six months. Very approximate market sizes are:

Country	SMS messages per month
Germany	200 million
Italy	150 million
Finland	75 million
UK	70 million
Norway	70 million
Sweden	70 million
Portugal	60 million
France	60 million
Spain	60 million
Denmark	50 million
Belgium	25 million
Greece	15 million
TOTAL	1 Billion

## NETWORK OPERATOR MESSAGE QUANTITIES AND GROWTH

Specific examples for certain leading mobile operators are:

Network Operator	Date	Number of Customers	Number SMS per month	Average SMS per Customer	Annualized Growth Rate
Sonera	Aug 98	1.2 million	20 million	17 Messages	800%
Sonera	Mar 99	1.6 million	40 million	25 Messages	200%
Vodafone (PRE-PAY)	Feb 99	1.2 million	19 million	16 Messages	n/a
Vodafone (POST-PAY)	Feb 99	3.8 million	8 million	2.1 Messages	200%
Vodafone (TOTAL BASE)	Feb 99	5 million	27 million	5.5 Messages	n/a
Mannesmann D2	Mar 99	5 million	100 million	20 Messages	800%

### 3. SMS Messaging Milestones

So how have these network operators developed their messaging volumes to such a high degree? How can you develop your own messaging market? What are the factors that are driving the continuing growth in the SMS market and to what degree?

## 1. FIRST GENERATION SMS CENTER

The network operator needs to purchase its first generation SMS Center as part of the network commissioning plan. The initial SMS Center may be simply a voice mail platform module or alternatively a standalone SMS Center. It is not possible to make the Short Message Service available without an SMS Center since all short messages pass through the SMS Center.

## 2. VOICE MAIL NOTIFICATIONS AND SMS MOBILE TERMINATE

The network operator sees SMS as a "tick box option"- something to say that it does have on its network. Often SMS Mobile Terminate Services are offered along with voice mail notifications, which account for the vast majority of SMS traffic on the network- typically over three-quarters.

## 3. SMS MOBILE ORIGINATE

The network operator launches SMS Mobile Originate to give customer true two-way SMS capability. Customers experiment with the service and work out new uses for it. Addition of SMS Mobile Originate typically leads to 25% increase in overall SMS volumes being handled.

## 4. EMAIL

Additional of a wireless Internet/ mobile email service often follows, typically with the customer's mobile number becoming part of the email address they are allocated as part of the service. Emails sent to that address are forwarded as a short message to their wireless phone. Such a service tends to be popular with customers, especially in markets where Internet penetration is low and people don't already have an email address. This typically leads to 20% increase in overall SMS volumes being handled.

## 5. INFORMATION SERVICES

Addition of information services. These services typically start with mainstream content such as news, travel, weather and sports and over time, new information providers are sourced that offer lifestyle services such as horoscopes and jokes. Because there is typically a lot of work involved in sourcing and setting up content, these services tend to build up slowly, typically accounting for about a 10% increase in SMS volumes being handled.

## 6. BUSINESS PARTNERS PROGRAM

The network operator starts to see independent companies experimenting with SMS-based

applications and offering these on a regional or company-specific basis. To encourage these developments and assist in their widespread deployment, the network operator hires a person whose sole responsibility is to manage relations with these business partners and help them to get any technical or commercial support they need. The aim is to try to get the business partners to deploy their applications using their network's SMS services rather than those of their competitors. Because vertical market applications can account for high messaging volumes, the introduction of a business partners program can soon lead to a further 20% increase in overall SMS message volumes being handled by the network.

## 7. SECOND GENERATION SMS CENTER

The network operator has seen gradual but significant increases in SMS traffic volumes as these initiatives have been taken and awareness of SMS builds.

They then often find that their SMS Center capacity is starting to be challenged and need to expand the existing platform or purchase an industrial strength SMS Center from another supplier. This then removes any constraints in handling messages, and may lead to corporate customer complaints about service reliability at peak times falling, typically leading to a 10% increase in overall SMS message volumes.

## 8. NATIONAL SMS INTERWORKING

The additional of interworking between network operators who are competing in the same geographical market gives customers to both networks the opportunity to use SMS in the same way as they do voice. Just as they can make a voice call to each other's phones, so too can they send short messages to each other.

Enabling this capability can rapidly increase the number of available messaging destinations, thereby increasing the value and use of SMS. As such, adding national SMS interworking can lead to an uplift of 50% in SMS message volumes.

By this time, the total use of SMS on the network has reached "Critical Mass". There are sufficient regular users and awareness of and momentum behind the services. SMS has become an integral and important part of many customer's everyday business and personal lives. Facilitating international SMS roaming is also important, particularly in land-locked countries where border crossing is frequent.

## 9. SMS FOR PREPAYMENT

The next quantum leap in SMS traffic volumes is caused by the introduction of SMS for prepayment customers. These customers pay for their cellular airtime as they go rather than having contracts. Enabling the prepay customers to send short messages causes large traffic uplifts because the typical young person who is the main user of prepaid services is also ready, willing and able to manipulate the phone keypad and originate short messages. When customers are cost conscious, they tend to use SMS to let their friends know about changes in meeting arrangements and so on, calculating that this is less expensive than making a voice call to communicate the same information. An increase in SMS traffic

of 100% (sometimes more) is not unusual when SMS for prepay is introduced.

For example, as we saw at the start of this guide, whilst Vodafone in the UK had more postpaid customers than prepay (three million postpaid, two million prepaid), the prepay customers sent more than twice as many short messages as the postpaid users.

## 10. PREDICTIVE TEXT INPUT PHONES

Because simple person to person messaging is such an important component of total SMS traffic volumes, anything that simplifies message generation is an important enabler of SMS. Predictive text input algorithms such as T9 from Tegic that anticipate which word the user is trying to generate significantly reduce the number of key strokes that need to be made to input a message. Widespread incorporation of such algorithms into the installed base of mobile phones will typically lead to an average uplift in SMS traffic of 25% per enabled user. These predictive text algorithms support multiple languages.

## 11. STANDARDIZED PROTOCOLS E.G. WAP

The introduction of standardized protocols such as SIM Application Toolkit and the Wireless Application Protocol (WAP) contributes to an increase in messaging usage by providing a standard service development and deployment environment for application developers and business partners. These protocols also make it easier for users to reply to and otherwise access messaging services through the provision of custom menus on the phone. As such, whilst these protocols are only a means to an end and not new messaging destinations or services in their own right, they are likely to lead to a 10-15% uplift in total SMS volumes.

## 12. TERMINAL DEVELOPMENTS E.G. SMART, HANDHELD COMPUTERS

The introduction of more friendly and easy to use terminals contributes to increases in messaging usage by providing simpler access to messaging services. Terminals such as smart phones make it easier for users to originate, reply to and otherwise access messaging services through the provision of a QWERTY keyboard rather than the limited keypad on standard mobile phones. As such, whilst these terminals are only a means to an end and not new messaging destinations or services in their own right, they are likely to lead to a 10-15% uplift in total SMS volumes.

As such, there are various steps that mobile carriers can and should take to spur the development of SMS usage. Each of these steps is complementary and useful in making SMS a success. It is the combined effect from these steps that has led to the significant and almost exponential growth in the usage of SMS by many developed network operators in the late 1990s.

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## 4. Consumer Applications using SMS

The vast majority of SMS usage is accounted for by consumer applications. It is not uncommon to



find 90% of a network operator's total SMS traffic being accounted for by the applications described in this next section. The main consumer applications based on SMS are:

## SIMPLE PERSON TO PERSON MESSAGING

Mobile phone users to communicate with each other routinely use the Short Message Service. Typically, such person to person messaging is used to say hello or prompt someone for something or arrange a meeting or tell someone something. Such messages are usually originated from the mobile phone keypad.

When the information to be communicated is short or it would take too long to have a full conversation or someone is traveling overseas or not available to take a voice call, SMS is an ideal messaging medium. For example, network operators typically charge the same to send a short message to someone in the same room as they do to someone traveling overseas with their mobile phone. Because short messages are proactively delivered to mobile phones that are typically kept in the user's pocket and can be stored for later reference, SMS is often more convenient than email or Data to communicate amongst distributed and mobile groups of people.

Once users have familiarized themselves with reading and sending short messages, they often find that SMS is a useful way of exchanging information and keeping in touch with friends. This is particularly so when the recipient is also able to reply to messages for two-way communication. If the recipient of the short message is unable to read or reply to it, then clearly the effectiveness of using SMS as the communications media is much lower. This is one of the reasons why simple person to person messaging is popular with many young people, a group that is generally more willing to learn how to use new technologies such as SMS. As such, simple person to person messaging generates a high volume of short messages.

## VOICE AND FAX MAIL NOTIFICATIONS

The most common use of SMS is for notifying mobile phone users that they have new voice or fax mail messages waiting. This is therefore the starting point for most mobile network operators and the first (but hopefully not the last) time that mobile phone users use SMS. Whenever a new message is dispatched into the mailbox, an alert by SMS informs the user of this fact. Because SMS is already routinely used to alert users of new voice mail messages, this application is and will remain one of the largest generators of short messages.

## UNIFIED MESSAGING

Unified messaging is an emerging value-added network service that is particularly compelling because it elevates communication above the technology used to communicate- the message takes precedence over the media. Currently, it is difficult to manage all the different kinds of messages that people get- they have to dial in and pick up emails, pick up their faxes from the fax machine, call in and listen to voice mail and so on.

Unified messaging involves providing a single interface for people to access the various different

kinds of messaging they use. Be the messages fax, voice mail, short messages, email or so on, they can be conveniently accessed from a single point in the most actionable form.

The user typically receives a short message notifying them that they have a new message in their unified messaging box. The short message often also includes an indication of the type of new message that has been deposited, such as fax, email or voice mail.

Unified messaging is a convenient application that is likely to become mainstream in the future. It should therefore be a significant generator of short messages as more services are launched.

## INTERNET EMAIL ALERTS

Upon receiving a new email in their mailbox, most Internet email users do not get notified of this fact. They have to dial in speculatively and periodically to check their mailbox contents. However, by linking Internet email with SMS, users can be notified whenever a new email is received.

The Internet email alert is provided in the form of a short message that typically details the sender of the email, the subject field and first few words of the email message. Most of the mobile Internet email solutions incorporate filtering, such that users are only notified of certain messages with user-defined keywords in the subject field or from certain senders. Users could find it expensive or inconvenient to be alerted about every email they receive (including unsolicited "spam" emails), which would reduce the value of the service.

Because of the high and increasing usage of Internet email to communicate globally, and the benefit from using SMS to notify mobile users about important new email messages, this is likely to be a fast growing and popular application for SMS.

## RINGTONES

Another emerging SMS-based application is downloading ringtones. Ringtones are the tunes that the phone plays when someone calls it. With the same phone often sold with the same default tune, it is important for phone users to be able to change their ringtone to distinguish it from others. Phones often come with a range of different ringtones built into the phone's memory that the users can choose from. However, it has become popular to download new ringtones from an Internet site to the phone-these phones tend to be popular television or film theme tunes. It is important that network operators consider copyright issues when offering ringtone services, since such commercial tunes must be licensed before they can legally be distributed (the people behind "The Saint" theme tune must be getting reach!). Ringtone composers are also popular because they allow mobile phone users to compose their own unique ringtones and download them to their phones.

Much of the usage is spurred by word of mouth- people hear someone else's phone ringing and ask where they got that particular ringtone.

As mobile phone penetration increases, and everyone has a mobile phone, unique ringtones to help determine just whose phone is ringing will become increasingly popular. Expect to see this application

grow in availability and popularity over time.

## CHAT

An emerging application for the Short Message Service is chat. In the same way as Internet chat groups have proven a very popular application of the Internet, groups of likeminded people- so called communities of interest- have begun to use SMS as a means to chat and communicate and discuss.

Chat can be distinguished from general information services because the source of the information is a person with chat whereas it tends to be from an Internet site for information services. The "information intensity"- the amount of information transferred per message tends to be lower with chat, where people are more likely to state opinions than factual data.

SMS-based chat services are an emerging application area. It remains to be seen how willing the participants in the chat groups are to pay for EVERY message sent to the chat channel. It is likely that commercial chat services will let participants select which messages they receive on their mobiles according to who the message sender is.

Because SMS chat applications are high volume applications whereby one message submission leads to multiple message deliveries, expect this application to be a significant generator of short messages in the future.

## INFORMATION SERVICES

The Short Message Service can be used to deliver a wide range of information to mobile phone users from share prices, sports scores, weather, flight information, news headlines, lottery results, jokes to horoscopes. Essentially, any information that fits into a short message can be delivered by SMS.

Information services can therefore be configured as push-based and from a public or private source or pull-based and from a public or private source. An information service for an affinity program may combine public information such as share prices with private information from bank databases.

Successful information services should be simple to use, timely, personalized and localized.

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## 5. Corporate Applications using SMS

Corporate applications that use the Short Message Service are currently few and far between. Most of the SMS messaging volumes are generated by consumer applications. The reasons are the older age of corporate mobile phone users and their lower price sensitivity, particularly since mobile phones bills are usually paid by the company. Corporate users are less willing to learn how to and make the effort to send a short message- they tend to use voice as their primary communications method. The main corporate applications based on SMS are:

## CORPORATE EMAIL

The Short Message Service can be used to extend the use of corporate email systems beyond an employee's desk and office PC. With 40% of employees typically away from their desks at any one time, it is important for them to keep in touch with the office at all times. Corporate email systems run on Local Area computer Networks (LAN) and include Microsoft Mail, Outlook, Outlook Express, Microsoft Exchange, Lotus Notes and Lotus cc:Mail.

Corporate email notifications are similar to Internet email notifications. Users are given information such as the sender and subject of the email. Any emails of a business or personal nature that are sent to the corporate email address can be sent out over the wireless network.

Because unlike Internet email notifications, corporate email services tend to use the existing corporate infrastructure and email addresses, this kind of email application tends to generate significant average quantities of short messages per user. Very few corporations have so far extended their office email systems out to the wireless environment, leaving a large opportunity for the deployment of such services.

## AFFINITY PROGRAMS

Some mobile network operators view the development of the Short Message Service as low down in their overall priorities- because few users select the mobile network solely or primarily on the basis of SMS. However, affinity programs- which are also known as lifestyle packages- are a large opportunity for mobile network operators with the potential to secure large numbers of new customers, in which SMS is an integral part of the offering.

Affinity programs are the result of collaboration between mobile carriers and other companies in different industries with large customer groups. Affinity partners include television companies, sports clubs, supermarkets and other retailers, airlines and banks. SMS can be used to provide customers with all kinds of reminders and information such as frequent flyer miles status, overdue videotape rentals, appointment reminders and prescription drug pick-up notifications.

All parties to affinity programs can potentially benefit from the partnership- mobile network operators gain access to a largely new set of potential customers and affinity partners get to offer their customers new convenient services to their customers- offering differentiation possibilities against their competitors.

For affinity programs, the mobile phone may be branded with the affinity partner's logo and may have custom and personalized packaging. The route to market- i.e. the sales channel for the affinity product- is likely to be different from that of standard mobile phone purchases. Typically, the customized phones are marketed and distributed using direct mail- customers receive information about the affinity program through an insert into their statements or bills and they can then sign up and receive the package containing the mobile phone by post. A single bill, lower rates and easy access to the services are often features of the affinity package.

## MOBILE BANKING

Let us take a closer look at a specific kind of affinity program- mobile banking.

The successful implementation of mobile banking programs incorporates several different elements discussed in this guide, such as Information services and SIM Application Toolkit.

Affinity programs and related lifestyle packages are a fast growing area of mobile communications, because as competition between network operators increases, differentiation and customization for specific user groups will be necessary to extend mobile phone penetration and usage. As such, they are likely to be a significant generator of short messages.

## ELECTRONIC COMMERCE

Electronic commerce applications involve using a mobile phone for financial transaction purposes- this usually means making a payment for goods or transferring funds electronically. Transferring money between accounts and paying for purchases are electronic commerce applications.

The convenience of paying for purchases using SMS must be weighed against the related issues of security, integration with the retail and banking hardware and systems, and money transfer issues. However, this area of electronic commerce applications is expected to contribute to growing SMS traffic in the

## CUSTOMER SERVICE

By providing mobile phone customers with information about their account, the Short Message Service can help to avoid the need for expensive person to person voice calls to customer service centers. In the customer service environment, SMS can help to deliver account status information, new service configuration and so on, in particular when standard SMS is combined with a protocol such as SIM Application Toolkit or Wireless Application Protocol. Some network operators find significant financial justification for deploying a value-added services platform on the basis of what they save in customer service costs alone.

## VEHICLE POSITIONING

This application integrates satellite positioning systems that tell people where they are with SMS which lets people tell others where they are. The Global Positioning System (GPS) is a free-to-use global network of 24 satellites run by the US Department of Defense. Anyone with a Global Positioning System (GPS) receiver can receive their satellite position and thereby find out where they are.

Many commercial GPS receivers also incorporate support for the Russian equivalent of the Global Positioning System.

The Short Message Service is ideal for sending Global Positioning System (GPS) position information

such as longitude, latitude, bearing and altitude. GPS information is typically about 60 characters in length, leaving room for other information such as the vehicle registration details, average speed from the tachometer and so on to be transmitted as part of the same short message.

Because the position updates are automatically generated, mobile network operators find that vehicle positioning applications are amongst the leading generators of short messages.

## JOB DISPATCH

160 characters is sufficient for communicating most delivery addresses such as those needed for a sales, service or some other job dispatch application such as mobile pizza delivery and courier package delivery.

The Short Message Service is used to assign and communicate new jobs from office-based staff to mobile field staff. Customers typically telephone a call center whose staff take the call and categorize it. Those calls requiring a visit by field sales or service representative can then be escalated to those mobile workers using SMS. Job dispatch applications can optionally be combined with vehicle positioning applications- such that the nearest available suitable personnel can be deployed to serve a customer.

SMS can be used not only to send the job out, but also as a means for the service engineer or sales person can keep the office informed of progress towards meeting the customer's requirement. The remote worker can send in a short status message such as "Job 1234 complete, on my way to 1235".

Because of the need to communicate with mobile workers and effectively and cost-effectively serve customers, such job dispatch applications are likely to be steady generators of short messages.

## REMOTE POINT OF SALE

SMS can also be used in a retail environment for credit card authorization. It is particularly convenient to use mobile technology when making sales from, for example, carts in the middle of aisles at shopping malls, at flea markets or at sports stadiums, where it would be inconvenient to trail a fixed telephone wire. A mobile phone is connected to a Point of Sale terminal such as a credit card swipe and keypad. The credit card number is sent to a bank for authorization. The authorization code is then returned as a short message to the Point of Sale terminal.

## OVER THE AIR

Over the air capability gives mobile network operators, application developers and corporate sales managers some remote control of mobile phones for service and subscription activation, personalization and programming.

Over the air facilitates a number of end user applications such as remote service activation and update book updates.

## REMOTE MONITORING

The Short Message Service can be used to manage machines in a remote monitoring environment. This application provides people with valuable information from a remote location when an important event occurs that they need to know about. The information is automatically delivered electronically without having to constantly employ physical resources locally on the off chance that such an event occurs. Examples of remote monitoring applications include remote meter reading, sending computer system fault information to mobile phones and notifying companies about empty vending machines.

Now that we have looked at the major applications that SMS facilitates, let's take a closer look at some of the factors that facilitate the achievement of the messaging milestones.

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## 6. SMS Roaming

### NATIONAL SMS INTERWORKING

Most network operators around the world recognize the need to allow customers to send short messages to people on network operators competing in the same country as them. Just as you can call using voice, so too should you be able to communicate using the Short Message Service.

To release national SMS interconnects, there are some issues. From a commercial perspective, network operators competing in the same country often charge different prices for the Short Message Service and offer different services.

In such cases, knowledgeable users could benefit from accessing less expensive or more sophisticated Short Message Services by changing SMS Center addresses or sending their messages in a different way. A price has to be agreed for such inter-network national messaging to discourage or prevent such behavior.

Technically speaking, network operators are reluctant to allow their competitors access to their signaling channels, over which short messages are transmitted.

This is because these channels also handle voice call set up and other mission critical tasks. However, firewalls have resolved many of these technical issues.

For example, about half the countries in Europe had inter-network national roaming by mid-1999 (including Scandinavia, UK, Netherlands) whilst half did not (including Germany, Portugal and France).

### INTERNATIONAL SMS ROAMING

Generally with the GSM Short Message Service, no specific international SMS roaming agreement is needed to use SMS overseas. Instead, international SMS roaming automatically arises whenever the

following conditions are met:

- the GSM network operators have a voice roaming agreement, and
  - the mobile network supports SMS. Obviously mobile phone users who are using another mobile network (known as "roamers") cannot use SMS if the mobile network they have roamed onto does NOT support the Short Message Service they are trying to use, and
  - neither of the network operators have taken specific measures to preclude such short messaging activity.
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## 7. SMS Phone Features

Nearly all GSM mobile telephones are able to receive short messages (known as SMS MT: Mobile Terminate). The only known exceptions that CANNOT receive short messages are some of the very first GSM mobile phones released in the early 1990s such as the Motorola 3200, the AEG Telcard 901 and the Alcatel HB100.

All major and minor phone manufacturers without exception now have at least one mobile phone available that can send short messages (known as SMS MO: Mobile Originate). Furthermore, most phone manufacturers are not now supplying ANY mobile phones in their range of models that do NOT support SMS send. Even budget phones can send messages. As such, the percentage of phones that are able to send short messages is increasing over time. At the beginning of 1999, approximately 75% of the installed worldwide base of GSM mobile phones were capable of SENDING a short message.

My optimal mobile device for using the Short Message Service would have the following features:

1. Predictive text input algorithms such as T9 from Tegic
  2. Screen size of three lines or more
  3. Keys that are not too small or too close together
  4. Autoread feature such as that on some Motorola phones whereby messages can be displayed immediately
  5. Confirmation of message delivery
  6. An "ABC" button to allow easy switching between numbers and letters, as with, for example, the Nokia 2110
  7. Ability to save messages in phone memory as well as SimCard, possibly save them in different message folders (like the Nokia 7110)
  8. Vibrating alert for incoming messages.
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## 8. SIM Application Toolkit

SIM Application Toolkit has been agreed and incorporated within the Global System for Mobiles



(GSM) standard. "SIM" denotes the smart card inserted into GSM mobile phones that contains information about the user.

SIM Application Toolkit allows the flexibility to update the SIM to alter the services and download new services over the air. For example, network operators can remotely provision the user's wireless terminal by sending codes embedded in short messages from the server. Within the SIM Application Toolkit specification, the Short Message Service is a key mechanism for personalizing the SIM in each user's GSM phone.

SIM Application Toolkit is designed as a client-server application. On the server side, SimCard platform specialists such as Orga, Gemplus and AU-System have introduced servers based on this standard. On the client side, phone manufacturers such as Siemens, Motorola, Bosch, Sagem and Alcatel have launched phones that have support SIM Application Toolkit. Significantly, two of the three largest mobile phone vendors, Ericsson and Nokia, have not launched or announced SIM Application Toolkit compliant phones.

The biggest advantages of SIM Application Toolkit are that it has been:

- fully ratified for the past couple of years as part of the GSM standard
- incorporated into several manufacturer's phone ranges
- incorporated into several commercial and trial network services, from mobile banking to information services to email
- proven to be a useful tool for accessing the SIM that contains all the information about the end user. This personal information allows security-related functions and identity verification to be carried out, which is essential for secure electronic commerce.
- supported by many new and established network operators who have stipulated that all new phones supplied on their network must support SIM Application Toolkit. Network operators making this commitment from various dates include Dutchtone The Netherlands, Orange UK, D1 T-Mobil Germany, Telecom Italia Mobile and KPN Orange in Belgium. D1 told me that since May 1999, every NEW phone connected to the T-Mobil network has been SIM Toolkit compliant. This follows the decision by new network operators such as Orange in Belgium and Dutchtone in the Netherlands that every phone will be SIM Toolkit enabled. Additionally, in May 1999, Telecom Italia Mobile launched a range of SIM Toolkit enabled services encompassing information services, prepay account renewal, mobile banking and email. VIAG Interkom's pilot mobile banking service also uses SIM Application Toolkit
- In addition, at CeBIT 99, I spoke with the leading five SimCard manufacturers, whose collective view was that SIM Toolkit and Wireless Application Protocol (WAP) are complementary and not competitive. SIM Toolkit will be used for applications needing a high degree of security such as mobile banking and also for more "static" information services such as hotlines, company directories and yellow pages. Wireless Application Protocol (WAP) will be used for more "dynamic" services such as Internet browsing and accessing changing

information services.

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## 9. Wireless Application Protocol (WAP)

See [www.wapforum.org](http://www.wapforum.org) and [www.mobileWAP.com](http://www.mobileWAP.com)

WAP is an attempt to define the standard for how content from the Internet is filtered for mobile communications. WAP was developed to be the way of making readily available content from the Internet easily available to mobile terminals.

One of the reasons why the mobile industry has got so excited about WAP is because it combines two of the fastest growing industries: wireless and the Internet.

The Wireless Application Protocol is envisaged as a comprehensive and scaleable protocol designed for use with:

- any mobile phone from those with a one line display to a smart phone
- any existing or planned wireless service such as SMS, Data, Unstructured Supplementary Services Data (USSD) and GSM Packet Radio Service (GPRS)
- any mobile network standard such as Code Division Multiple Access (CDMA), Global System for Mobiles (GSM), or Universal Mobile Telephone System (3GSM)
- multiple input terminals such as keypads, keyboards, touch-screens and styluses

The Wireless Application Protocol incorporates a relatively simple micro-browser into the mobile phone. WAP is aimed at turning a mass-market mobile phone into a "network-based smartphone". As a representative from the board of the WAP Forum commented "The philosophy behind Wireless Application Protocol's approach is to utilize as few resources as possible on the handheld device and compensate for the constraints of the device by enriching the functionality of the network".

The initial Wireless Application Protocol partner companies- Nokia, Ericsson, Motorola and Phone.com (formerly Unwired Planet)- formed a company called WAP Forum Limited to administer the global Wireless Application Protocol specification process and get new companies involved in developing the protocol. By mid 1999, the WAP Forum had about 100 members comprising major phone manufacturers, network operators, SMS Center suppliers and SMS software suppliers. See [www.wapforum.org](http://www.wapforum.org) for a current list.

For any WAP service to be launched on a mobile network (or SIM Application Toolkit), there needs to be an installed base of clients and servers. In mid-1999, WAP had many servers but no clients!

Nokia's policy is to incorporate WAP into high-end phones such as the 7110 but not consumer-

oriented phones such as the 3120. As such, the consumer market that is today's heavy user of SMS will not have access to the Wireless Application Protocol (WAP) until it has trickled down through the product range and become a standard feature. This decision will significantly delay WAP's market penetration and acceptance. Given that neither the 7110 nor the 3120 will be available in volume until the end of 1999, mass market Wireless Application Protocol (WAP) support will not arise until 2001 at the earliest.

Other phone vendors such as Alcatel have announced that they are introducing support for the Wireless Application Protocol across their entire product range.

However, since WAP requires a larger screen size and more memory to handle the WAP stack, it costs more to produce a WAP handset and will therefore mean more expensive mobile phone prices.

On the server side, there are about a dozen suppliers of WAP servers including CMG, Nokia, Ericsson, Phone.com (formerly Unwired Planet), SST, Dr. Materna, APiON, MD-Co, Akumiitti and Oracle. SMS services platform suppliers such as Sendit and Tecnomen have NOT developed their own WAP Gateway. These WAP server suppliers are all trying to sign up mobile network operators who are looking to trial WAP services and gain some market feedback. WAP trials will commence in the summer of 1999.

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## 10. The Future of SMS- Introducing the Long Message Service

It is a valid question to ask whether the Short Message Service (SMS) has a prosperous future ahead of it given that GSM is evolving to encompass high-speed packet data services such as GSM Packet Radio Service (GPRS) (See [www.mobileGPRS.com](http://www.mobileGPRS.com)).

GSM SMS has several unique features that can be summarized as message storage if the recipient is not available, confirmation of short message delivery to the sender and simultaneous transmission with GSM voice, data and fax services. Importantly, these features will NOT be incorporated into other planned GSM services such as GPRS. However, SMS does have some disadvantages-primarily the limited message length of 160 characters.

SMS as we know it will be used through to the year 2005 at least, since the mobile phones, infrastructure, specifications, market development and awareness are in place today. Over time, as users connect to networks that offer more advanced data services and buy mobile terminals that support them, they will find it more convenient to receive all their CHOSEN emails rather than only a notification by SMS. They will continue to use SMS for some applications- the underlying bearer will be mixed and matched according to the application and its importance to the user. SMS could be used automatically when roaming for example due to the advantages of store and forward when in a different time zone. Non-urgent emails could be sent by SMS for users to decide whether to forward the entire message. Urgent emails get sent immediately using packet data. By supporting multiple standards and bearer services, the Wireless Application Protocol anticipates this multiple service world. Essentially, in 3GSM, SMS will not be a standalone service but part of multimedia messaging.

Different applications will use different bearer services- bearers will be mixed and matched depending on characteristics of application and mobile environment.

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## 11. SMS Centers Comparison

Because SMS is a store and forward service, every single short message of any type passes through an SMS Center. As such, the selection of an SMS Center vendor is absolutely critical to success of the mobile network carrier's SMS-based services. The reliability of SMS services varies considerably between different mobile networks because they deploy different SMS Centers. In other words, not all SMS is the same. Choose badly and mobile network operators limit the possibilities of using SMS for time and mission critical applications such as for the emergency services, stolen vehicle recovery and so on. The deployment of further services is also severely hindered if there is insufficient SMS Center capacity and expandability.

SMS Center selection criteria include platform scalability, availability and reliability, connectivity and pricing. The main SMS Center vendors are CMG Telecommunications, Comverse Network Systems, Logica Aldiscon, ADC NewNet, Nokia, Ericsson, Motorola and Sema Group.

These SMS Centers are compared according to their feature sets below:

	CON	COST	DEPL	FUT	GLOB	RELIA	HARD
Sema	Med	Med	High	High	High	High	High
CMG	High	Low	High	High	Low	High	High
Nokia	High	Med	Med	High	Med	Med	Low
NewNet	High	High	Low	Med	Med	High	High
Aldiscon	High	Med	High	High	High	Low	Low
Ericsson	Med	Med	Med	Med	Med	Low	High
Motorola	Low	Med	Med	Med	Low	Med	High
Comverse	Low	High	Low	Med	Med	Med	High

Note: A rating of "High" denotes a better ranking than "Medium" and so on.

CONNECTIVITY: (CON).

Denotes SMS Center connectivity. All the SMS Center vendors support TCP/IP access. Ericsson connectivity is limited to networks with Ericsson mobile infrastructure. Theoretical connectivity does

not necessarily mean that all the deployed SMS Centers by that vendor support that form of connectivity- for example, few Sema Group SMS Centers in Europe support anything other than X.25 connectivity.

#### COST: (COST).

Denotes the cost of deploying the platform. ADC NewNet is the least expensive SMS Center. A network operator receiving quotations for a comparable volume and capacity found that CMG was the most expensive, followed by Sema, Logica Aldiscon and Nokia, who were priced comparably. CMG was around 50% more expensive in that case. The support cost was comparable among all the SMS Center vendors.

However, the SMS Center suppliers are all skilled in understanding a network operator's business and pricing accordingly- all gain ongoing revenues through upgrades as message volumes increase.

#### DEPLOYMENT: (DEPL).

Denotes the extent to which SMS Center has been widely deployed and the size of the customer base using that SMS Center. Logica Aldiscon has the highest number of SMS Center deployments globally, whilst Nokia, Motorola, Sema and CMG each have 35 to 45 platform installations in total. ADC NewNet, a relatively recent entrant into the SMS Center market, has deployed about a dozen SMS Centers. CMG supplies many large European network operators with high SMS traffic volumes.

#### FUTURE-PROOF: (FUT).

Denotes the extent to which the SMS Center is future-proof, and therefore incorporates or is designed to incorporate new mobile data protocols, services and standards. Nokia, CMG and Sema have all taken a proactive stance towards future SMS-based standards such as the Wireless Application Protocol (WAP).

As a founder member of WAP Forum, Nokia is particularly committed to developing future-proof products and services. Ericsson was also a founding partner in the WAP Forum, but has not publicly announced support for WAP by its MXE SMS Center. Logica Aldiscon has announced support for GSM Phase 2+ features and joined the WAP Forum. ADC NewNet has not joined the WAP Forum or made its position on supporting future standards clear.

#### GLOBAL: (GLOB).

Denotes the extent to which the deployments of the SMS Center are dispersed globally. Widespread global deployment means that the SMS Center is likely to have been interfaced with almost all the possible different configurations of mobile network architecture, from voice mail suppliers to SS7 signaling vendors, Home Location Registers (HLRs) and Mobile Switching Centres (MSCs).

Logica Aldiscon has deployed its SMS Center globally on every continent- its Telepath platform also pioneered the implementation of SMS in markets such as Japan. CMG has been very successful in implementing SMS Centers for mobile network operators running analog NMT networks- in particular

in Eastern Europe.

But CMG has few deployments outside of continental and Eastern Europe, and those few it currently has were supplied through Ericsson. The Sema SMS Center has been widely deployed on every continent. ADC NewNet have some installations in major markets such as India and China, Europe and the US.

Ericsson MXE customers are globally dispersed- but do tend to be concentrated in North and South America.

RELIABILITY: (RELIA).

Denotes the reliability of the SMS Center. ADC NewNet, Sema and CMG have highly reliable SMS Centers that once deployed, are able to reliably handle significant volumes of short messages. Nokia's SMS Center has adequate levels of reliability for standard short messaging purposes. The SC4 upgrade to the Nokia SMS Center significantly enhanced its reliability. Logica Aldiscon and Ericsson customers have complained about inconsistencies in the reliability of their SMS Centers- Logica Aldiscon's System Release 2600 should assist in improving its reliability.

HARDWARE: (HARD).

Both Sema and CMG use the high speed Compaq Alpha Server, both Ericsson and ADC NewNet use Sun Sparc stations and both Nokia and Logica Aldiscon have built their SMS Center on a Hewlett-Packard 9000 server. The Sun approach has the advantage of being industry-standard hardware that is readily available at a low entry price. In mid 1988, Hewlett-Packard launched its "Service Guard" concept that improves platform availability and has been adopted by both Nokia and Logica Aldiscon.

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## 12. Summary

For a relatively simple messaging service, there certainly are a lot of elements that need to be taken into account when developing and deploying SMS! However operators who take the time and trouble to invest in SMS will find appreciative customers and appreciating revenues. As such, please say "Yes to SMS"!