Introduction to SMS and SMS Messaging Services

The Short Message Service (SMS), as defined within the GSM digital mobile phone standard that is popular in Europe, the Middle East, Asia, Africa and some parts of North America, has several unique features:

A single SMS 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 SMS' (for example, in binary format) are also supported.

SMS is a store and forward service, in other words, SMS' 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.

SMS features confirmation of message delivery. This means that unlike paging, users do not simply send an SMS 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 SMS has been delivered or not.

SMS' 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 SMS’ 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.

SMS History

SMS was an accidental success that took nearly everyone in the mobile industry by surprise. Few people predicted that this hard of use service would take off. There was hardly any promotion for or mention of SMS by network operators until after SMS started to be a success. SMS advertising went from showing business people in suits entering text messages to bright pink and yellow advertisements aimed at the youth markets that adopted SMS.

SMS was the triumph of the consumer - every generation needs a technology that it can adopt as its own to communicate with - and the text generation took up SMS. Paradoxically, it was because SMS was so very difficult to use that the young people said that they were going to overcome the man machine interface and other issues and use the service anyway. The fact that the entry barriers to learning the service were so high were an advantage because it meant that parents and teachers and other adult authority figures were unlikely, unable and unwilling to use the service.

A whole new alphabet emerged because SMS messages took a long time to enter and were quite abrupt as people attempted to say as much as possible with as few keystrokes. Abbreviations such as 'C U L8er' for 'See you later' sprung up for timesaving and coolness. The use of smileys to reduce the abruptness of the medium and to help indicate the mood of the person in a way that was difficult with just text became popular.

The introduction of prepay mobile tariffs in which people could pay for their airtime in advance and thereby control their mobile phone expenditure was the catalyst that accelerated the take up of SMS. The network operators were unable technically to bill prepay customers for the SMS they were using because the links between the prepay platform and the billing system and the SMS Centers were not in place. The network
operators responded with silence- the prepay literature did not mention SMS at all even though the prepay phones supported the service. One thing that is certain is that in these days with the Internet revolution to spread information, the young people will identify loopholes like this. And they did. Suddenly, millions more SMS messages were being sent- with some individual mobile phone subscriptions accounting for thousands of SMS per month alone as they set up automated message generators. Network operators worked with their platform suppliers to try and sort this out and implement charging for SMS for prepay customers. Meanwhile SMS incubated and spread and people were using it because it cost nothing whereas carrying out the same transaction using voice clearly did cost. Eventually after a few months the network operators finally got their act together and managed to implement SMS charging for prepay users- such that they could decrement the prepay credit by the cost of an SMS message.

A mass SMS message distribution campaign was then typically sent out- such that everyone that had used SMS received a text message informing them that from a certain date, SMS would be charged for. This led to an immediate and protracted decline in SMS usage to between 25% and 40% of the pre-charging levels as people suddenly stopped using SMS or using it as much. Then something interesting happened- the volume of SMS messages started gradually increasing again and soon reached its pre-charging levels. SMS volume growth has continued its upward growth ever since, fueled by simple person to person messaging as people told each other how they were feeling and what they were doing- information services and other operator led initiatives failed to interest the user community to any degree and never have done. Whilst it was free, SMS had become an important part of the way that young people communicated with each other in their daily life. SMS would have taken off without this prepay factor because it was already being used before that time- but it would never have taken off as quickly.

SMS continued its astonishing growth during the year 2000 in Europe, a period of time when the mobile industry was trying to dictate the deployment of WAP. Despite doing nearly nothing else of any benefit, WAP did at least increase the attention that the mobile Internet received as people tried to work out services that would appeal to the mobile phone users. Those companies that survived the WAP debacle started to realize that it was SMS and not WAP that had the addressable audience of users and the clearer business case. Advertising and other services based on SMS started to be trialed as companies realized that people who could use SMS for person to person messaging would also be able to access SMS based commercial messages.

The next great success for SMS based services was ringtones. Nokia had started its smart messaging protocol that was built on binary SMS rather than the standard text SMS. Nokia had expected this technology to be used for information services and over the air service profiling and it had languished for years, until suddenly in the year 2000, it found its application- ringtones that allow users to change the way their mobile phone rang. Because the network operators were woefully inadequate and unable to offer the ringtone suppliers fair and flexible revenue sharing, the service providers started using premium rate Interactive Voice Response (IVR) voice platforms to trigger the transmission of ringtones. The ringtones market soon became a billion dollar market- and few of the network operators even offered services- this category was dominated by independent service providers who advertised in newspapers and magazines.

SMS was the triumph of the consumer- a grassroots revolution that the mobile industry had next to nothing to do with and repeatedly reacted to. This is in stark contrast to the top down technology and industry led approaches to other nonvoice services such as WAP. The industry can learn a lot from SMS as it tries to create other nonvoice services- it is no surprise that the only other nonvoice success- i-mode in Japan was also an unprecedented and unexpected success. The mobile industry would do well to realize that success for nonvoice involves setting the right environment to allow services to succeed- ensuring everyone implements the same open standards in the same ways, putting the right payment and microbilling technologies in place and recognizing that it takes a while to build a critical mass of usage. The mobile industry needs to realize that it can either delay the mobile Internet revolution by refusing to cede control to the end user and application and service development communities- or this will be taken away from it by the markets by force. Either way, the nonvoice revolution will arrive- it is not a question of whether, just when.
SMS (Short Message Service) - Technical Overview

The SMS service is simply a digital network facility that allows digital phone users to receive text messages on their digital phones. Each message may be a maximum of 160 characters long. In this document, we provide an introduction to basic SMS concepts, networks and specifications, and SMS tools and services.

What is SMS?

Short Message Service (SMS) is the transmission of short text messages to and from a mobile phone, fax machine, and/or IP address. Messages must be no longer than 160 alphanumeric characters and contain no images or graphics. SMS is a relatively simple messaging system provided by the mobile phone networks. SMS messages are supported by GSM, TDMA and CDMA based mobile phone networks currently in use. Although services based on SMS have been feasible for many years, the recent mobile phone penetration and large scale adoption of the existing services by users, have made the SMS based services even more attractive to service providers.

Once a message is sent, it is received by a Short Message Service Center (SMSC), which must then direct it to the appropriate mobile device. To do this, the SMSC sends a SMS Request to the home location register (HLR) to find the roaming customer. Once the HLR receives the request, it will respond to the SMSC with the subscriber's status: 1) inactive or active 2) where subscriber is roaming. If the response is 'inactive', then the SMSC will hold onto the message for a period of time. When the subscriber accesses his device, the HLR sends a SMS Notification to the SMSC, and the SMSC will attempt delivery.

The SMSC transfers the message in a Short Message Delivery Point-to-Point format to the serving system. The system pages the device, and if it responds, the message gets delivered. The SMSC receives verification that the message was received by the end user, then categorizes the message as 'sent' and will not attempt to send again.

Although services enabled by WAP (Wireless Application Protocol) and UMTS (Universal Mobile Telecommunications System) will most probably replace SMS messages as the most popular media for wireless applications, there will still be a very large user base for a long time. The great market interest related to WAP and so-called mCommerce (mobile commerce) has made also SMS interesting as a service delivery channel. Operators and service providers are creating many new services. Wireless Application Service Provision (WASP) is a recent, interesting service architecture for providing SMS based services.

The basic principle is that there is only one SMSC (SMS Center) that encodes the messages to be submitted through the GSM network. The basic difficulty in developing SMS based services is the variety of protocols used in SMS Centers. The European Telecommunication Standards Institute (ETSI) has approved four SMSC protocols: SMPP (by Logica), CIMD (by Nokia), UCP/EMI (by CMG) and SMS2000 (by SEMA). All these protocols have slightly different functionalities and largely different character conversions. Supporting all these protocols is a demanding task for a service provider. There are several SMS gateways able to interact with some or all of the SMS protocols. However, there is no standard way for service providers to interact with the SMS gateways. Also, only few of the SMS gateways support all the SMSC protocols. This draft proposes a solution by introducing an easily adoptable interface to SMS Centers or SMS gateways for service providers. Most countries use the GSM standard, the United States is one of the few countries to favor use of CDMA and TDMA standards over GSM (though there are GSM networks throughout the US). CDMA and TDMA allow extremely limited SMS capabilities.
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 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
- A mobile phone that supports SMS.
- The use of SMS must be enabled for the 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)
- Knowledge of how to send or read a short message using the 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.

What is an SMSC?

SMS messages are transferred between mobile phones via a Short Message Service Center. The SMSC is software that resides in the operators network and manages the processes including queuing the messages, billing the sender and returning receipts if necessary. Many operators now offer web based interfaces to their SMSC so we can send short messages to any mobile phone from the web. Some websites now offer free SMS.

In North America, SMS was made available initially on digital wireless networks built by early pioneers such as BellSouth Mobility, PrimeCo, and Nextel, among others. These digital wireless networks are based on GSM, code division multiple access (CDMA), and time division multiple access (TDMA) standards.

Network consolidation from mergers and acquisitions has resulted in large wireless networks having nationwide or international coverage and sometimes supporting more than one wireless technology. This new class of service providers demands network-grade products that can reliably and easily provide a uniform solution, enable ease of operation and administration, and accommodate existing subscriber capacity, message throughput, future growth, and services. Short messaging service center (SMSC) solutions based on an intelligent network (IN) approach are well suited to satisfy these requirements, while adding all the benefits of IN implementations.

SMS vs WAP

SMS is the short messaging service for GSM. It is also present on most other digital cellular networks and tends to operate in a similar fashion on each network. SMS enables 2-way short messages to be sent between GSM subscribers. Using gateways, it is also possible to interchange messages with other systems such as Internet email, the web etc. So, SMS is essentially a messaging transport service to enable reliable 2-way messaging.

WAP on the other hand is a "protocol set" aboard which various services can be delivered. Like any protocol, it
states how devices can be made compatible ("speak the same language") in order to exchange information. Since SMS is a means for information to be transported, two devices could use SMS to exchange WAP-compliant data.

As well as being a transport service, SMS also has a protocol. However, as mentioned earlier, the SMS protocol is really only concerned with reliable 2-way messaging and so it is restricted to basic functionality. In protocol terms, this means a very basic command set such as "Send Message" and "Receive Message". Clearly for anything more sophisticated, this protocol is very limited. However, there's nothing to stop another protocol being added on top with more commands that just get sent using the Send and Receive of SMS. This is what WAP does.

So why does WAP do this? Well, to use the mobile phone to converse with any information-delivery system (such as the web or a database), the method of delivery needs to be tailored to the limitations of the phone - mainly the small text-only display, and the restrictive keyboard and navigation keys. So a part of WAP is concerned with sensible data formatting and navigation appropriate to these limitations. However, sending data over mobile air interfaces poses problems with delays and slow links. These can be overcome to an extent by optimizing the way in which the protocol is mapped to the interface (such as the SMS carrier or an ordinary GSM data call). Another part of WAP is concerned with efficient protocol transport.

So is SMS still needed after WAP? The answer is yes. Firstly there are many applications that simply do not need WAP. The simple send and receive primitives of SMS are sufficient. Also, there is often no need, or no context, to maintain an ongoing (connected) communications session over SMS and so SMS tends to get used in a connectionless mode, like sending a letter or an email - whereby immediate, or even any, response is not required (though it may be desirable at times).

Many SMS messages are alerts of one kind or another, used to notify the recipient of an event. These types of messages usually require follow-on action other than sending a reply using SMS. In these circumstances, SMS is sufficient and there is no need to move to WAP.

Secondly, WAP is not widely available yet and there are millions of phones that can handle SMS but not WAP. These will stay in circulation for some time.

WAP is particularly useful for interactive services on the handset. Interactive services can be realized using native SMS, but this is not as elegant as WAP. Using WAP, the user can be prompted for information and guided along the interactivity path, whereas while using only SMS, the user has to remember how to respond with any preset commands.

So, do we need SMS or WAP or both? The answer is both are needed and they have different uses and applications. SMS is particularly good for pushing out information to mobile phone users. In particular, Xsonic InTouch monitors a variety of data sources within the Microsoft Exchange messaging server and pushes out alerts, such as "new email from...", "appointment at...", etc. Xsonic DataNow also generates alerts from any data changes that occur within an SQL Server database.

Alerts can be followed up by a variety of actions. These may include SMS replies of one form or another. Additionally, SMS can be used to pull data from a database. This feature gets used in Xsonic InTouch to pull contact details from a user's personal contacts folder in the Exchange database. In this way a mobile worker could get the fax number of a customer, their address, home phone number etc. For many of these types of applications, the quick alert or prompt/pull operations of SMS are ideal. Indeed, an advantage of SMS is that it is quick.

The advantage of WAP is that it enables greater interactivity with the data source. This would be useful, for example in any operation that is multi-paged in nature (such as navigating through a hierarchy). Traversing an
email Inbox is one such application. With Xsonic InTouch, a WAP phone could be used to receive SMS alerts (e.g. calendar reminders, email notification etc.) and the user could then elect to respond with short SMS commands and get a quick reply, or they could elect to connect to the server via a secure remote access point and navigate through the various Exchange folders.

SMS and WAP are different entities and are often complimentary. A well designed application would exploit the essential characteristics of SMS and WAP to suit the end-user requirements. For fast alert or quick-shot pull systems, SMS is a good solution. For any communications requiring ongoing interaction with a hierarchical data source, WAP is a good solution. Sometimes, both solutions can be used to get the best of both worlds.

**Benefits of SMS**

In today's competitive world, differentiation is a significant factor in the success of the service provider. Once the basic services, such as voice telephony, are deployed, SMS provides a powerful vehicle for service differentiation. If the market allows for it, SMS can also represent an additional source of revenue for the service provider.

The benefits of SMS to subscribers center around convenience, flexibility, and seamless integration of messaging services and data access. From this perspective, the primary benefit is the ability to use the handset as an extension of the computer. SMS also eliminates the need for separate devices for messaging because services can be integrated into a single wireless device- the mobile terminal. These benefits normally depend on the applications that the service provider offers.

At a minimum, SMS benefits include the following:

- Delivery of notifications and alerts
- Guaranteed message delivery
- Reliable, low-cost communication mechanism for concise information
- Ability to screen messages and return calls in a selective way
- Increased subscriber productivity

More sophisticated functionality provides the following enhanced subscriber benefits:

- Delivery of messages to multiple subscribers at a time
- Ability to receive diverse information
- E-mail generation
- Creation of user groups
- Integration with other data and Internet-based applications

The benefits of SMS to the Service Provider are as follows:

- Ability to increment average revenue per user (due to increased number of calls on wireless and wireline networks by leveraging the notification capabilities of SMS)
- An alternative to alphanumeric paging services, which may replace or complement an existing paging offer
- Ability to enable wireless data access for corporate users
- New revenue streams resulting from addition of value-added services such as e-mail, voice mail, fax, and Web-based application integration, reminder service, stock and currency quotes, and airline schedules
- Provision of key administrative services such as advice of charge, over-the-air downloading, and over-the-air service provisioning
- Protection of important network resources (such as voice channels), due to SMS’ sparing use of the control and traffic channels
- Notification mechanisms for newer services such as those utilizing wireless application protocol (WAP)

All of these benefits are attainable quickly, with modest incremental cost and short payback periods, which make SMS an attractive investment for service providers.