

**Project Proposal  
Intelligent SMS**

Group #13

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We pledge our honor that we have abided by the Stevens Honor System

## **Abstract**

Intelligent SMS is a service to reinvent the way cellular customers receive information. For today's busy and mobile people, Intelligent SMS will enable people to be more productive and informed before making a critical decision...where to eat! The service will allow users to send a query from a cellular phone or any wireless device to our server which will provide countless amounts of valuable information on businesses including hours, prices, telephone numbers, specials, and even allows you to purchase it via SMS and have it delivered. The user's location will also be known to provide data on businesses in the same vicinity as the user. SMS messaging and applications are already popular in Europe and Asia, with America taking a close lead and gaining in popularity. Intelligent SMS plans to bring SMS technology to the mainstream in the United States and revolutionize the directory assistance here.

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## Introduction

Short Messaging Service (SMS) is basically a way for mobile wireless devices to send short text messages of 160 alphanumeric characters to mobile devices, fax machines, and IP addresses. It also supports non-Latin alphabets including Chinese and Arabic, but is limited to 70 characters. SMS is built on the Intel SS7 (Signal System 7) protocol, which is the underlying technology of SMS that allows for SMS transmissions.<sup>1</sup> As an alternative to voice calls, SMS allows users to send and receive messages simultaneously while using the voice channels of their cellular device. SMS messages never receive a busy signal because messages are stored and forwarded from a SMS message center (SMSC). SMS technology is useful in noisy places, areas with spotty voice reception, and quiet areas. Mobile devices are also capable of receiving stock quotes, weather reports, sports scores, and other important news headlines. Almost all of the currently manufactured phones are SMS ready. SMS is supported on GSM, CDMA, and TDMA networks, which encapsulates all of the big cellular phone carriers in America. SMS technology has taken storm in Europe and Asia, with about 10 years of development and usage in the sector. But the United States is some what behind and the amount of SMS users in America is estimated to catch up with its foreign counterparts during the next several years.

Directory assistance is available from all phone companies and independent companies including Bell Atlantic, Verizon, Nextel, and Connect SM. Directory assistance (411) services in the United States are still based on customer voice interactions with an operator. Current 411 services are slow and expensive because customers must wait for an operator and salaries must be paid. Basic 411 services can provide a telephone number and call forwarding and more extensive services like Nextel 411 offer movie listings, restaurant information, driving directions, and etc. Directory services can cost anywhere from 50 cents to two dollars plus air time. With SMS based directory assistance there will be a competitive low flat rate for quality information on the go.

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<sup>1</sup> See appendix for more information.

## Background

SMS was created as part of the Global System for Mobile Communications (GSM) phase I standard, an open, non-proprietary system with international roaming capabilities providing consumers with the same standardized service in more than 170 countries. It is believed that the first short message was sent in December 1992 from a Personal Computer (PC) to a mobile phone on the Vodafone GSM network in the UK. Today, the market in Europe has reached over one billion messages alone and is expected to double every six months.

The vast majority of SMS usage is accounted for by consumer applications. These applications are primarily used for simple person-to-person messaging, voice and fax mail notifications, unified messaging, Internet email alerts, ring tones, chat and information services. SMS-based corporate applications, on the other hand, include corporate email, mobile banking, electronic commerce, customer service, vehicle positioning, job dispatch, and remote monitoring.

The regulations for developing such applications have been defined by the European Telecommunications Standards Institute (ETSI). Certain areas of the technology that conform to the GSM standard must be the same on all mobile networks while other areas have intentionally been left open for the purpose of competition. Closely defined and strictly mandated features of the GSM SMS include the short message service's store and forward nature as well as its use of the mobile networks signaling path, the link between the SMS-GMSC/SMS-IWMSC and the MSC, and the interaction between the SMS Center and the HLR and VLR. Other elements such as SMS software designs and architectures are under the discretion of the application developer.

Over the past several years, the services offered through SMS have grown tremendously and have proved to be extremely successful. Presently, a service hosted by TCS will allow users to dial a short number on their mobile phone corresponding to the service they'd like to locate. The subscriber will then hear a voice message indicating that they'll soon be receiving directions to the location they're seeking via text messaging. The objective of such technologies is aimed at the mobile directory assistance market in the US. It is expected that this service will almost double from \$1.8 billion to \$3.6 billion over the next five years. Others, such as software giant, AutoDesk, have announced deals with SMS software vendors for similar offerings and already have clients in Europe. The objective of this project will be to create a better, efficient, and more informed consumer through the use of SMS technologies. This will be achieved through the information we can provide to the consumer, the time saved from performing multiple inquiries to businesses, and by handling any billing/purchasing requirements. This service will provide access to information about a business that customers cannot obtain through traditional directory assistance services, such as 411, phonebooks, yellow pages, etc. In essence, it will give information pertinent to the specific product/business itself, such as business hours, pricing information, service times, etc.



## Design Requirements

The Intelligent SMS is suppose to be a robust service that will allow for mobile users to send an SMS message to our service and get a reply back with all the information they need. For example, in our proposed prototype, a customer will be able to find information and order a pizza from any of the 25 local Pizzerias in Hoboken. If a user wants to know what are the specials and prices between pizza x and pizza y, the user can send a SMS requesting information each place. Once the SMS request is received, a SMS will be sent back to the user giving them reviews of the restaurant, prices, in store specials, and the opportunity to order, pay, and have it delivered. Intelligent SMS will allow for users to find information quickly without having to bother with expensive and annoying directory services with limited information. General requirements for the system are ease of use and a small learning curve for the service. Since our product will be aimed for anyone 12 and older and without any special technical knowledge, the SMS process will have to be straightforward and easy to read. The service provided needs to be quick, efficient, and able to support the demands of our users. The SS7 protocol for SMS already provides for reliability, delivery confirmation, and quick delivery of SMS messages. But on our technical stand point, the process from the SMS message, to the database, query, and sending back of information should be done in a few seconds. The network must also be able to handle the increased capacity of SMS users. Currently there are about 174,200 SMS users in 2003, but by 2006 there will be about 250,800 users, a 47% increase. Our system must be capable of being upgraded to handle more SMS users as the technology grows in popularity in the US.

The requirements to use SMS server software are to have a GSM phone, data link cable to attach the GSM phone to the computer, and a server. There are serial cables and USB cables for each phone to connect it to the computer. The GSM phone must be capable of SMS. The server also needs to have a modem to be able to connect to the SMS center. The phone number to a SMS center is also required. The second option with use SMS via email are a SMTP server, an email client, email domain for each wireless provider in U.S., and a server. Examples of the email domain are for Verizon the email domain is vtext.com and for AT&T the email domain is mobile.att.com.

The design requirements for the database in the prototype will be a Windows 2003 Server running Microsoft SQL 2000. The standard hardware that is needed to run the database consists of a server that meets the minimum requirements of an Intel Pentium processor 166 MHz or higher, 128 MB of RAM, 800 GB of hard drive space, CD-Rom, VGA display card, and a network interface card. However, in our design we will be assuming that we will be hosting a larger group of users and will require a server with higher specifications than the minimum requirements. The actual server being used is an AMD Athalon 1600+ computer with 512 megabytes of ram. For the operating system, Windows 2003 will need all security patches, updates, and service packs installed to increase security. The database will need to be encrypted to 128 megabyte standard to be secure enough to handle financial transactions and store sensitive data. The database algorithm must be setup to ensure that data retrievals and queries are received and sent back in a few seconds.

The 411 directory assistance portion of the project must be able to accommodate customer information requests quickly and accurately. When a customer needs information on a business and sends the SMS request to the server, a SMS message sent back should provide reviews, contact information, address, prices, hours, store specials, and any other pertinent business information. All of this information is stored in the SQL database and needs to be able to query specific information and send it back to the user. Customer positioning will allow for the service to query businesses in the local area of the user. Positioning will be done either by zip code, street names, or by GPRS tracking. Depending on where the customer is, the user can choose to select only businesses with in a certain distance from where they are located. For example, if a user wanted to get information on local Pizzerias on the north end of Hoboken, a SMS request would be sent, and a listing of Pizzeria's in the area would be sent back along with any pertinent information on each restaurant. The positioning method would be able to determine where the user is and send back only businesses close to the user, or the area where the user wants to get more information about. This would ensure that a user does not receive businesses information not even in the user's area.

## Design Implementation and Concerns

The prototype for the Intelligent SMS will be a fully functional system which will allow a mobile phone to send a query about any Pizzeria in Hoboken. A SMS message will be sent back with the restaurant rating, prices, daily specials, and the ability to order and pay. The implementation will start with setting up a database storing business information on a server. The next step involves the sending and receiving of SMS messages from a SMS enabled cellular phone. Then the process must be integrated together to allow SMS messages to be sent and received by the database, query the database, and have information sent back via a return SMS message.

The next step involves the sending and receiving of SMS messages from a customer's mobile device to our server. There are several methods to send and receive SMS requests. Option one is to implement a server with a Public Switched Telephone Network (PSTN) modem and SMS server software. The SMS server program uses the PSTN modem to dial into the SMS center to send and receive the SMS messages. SMS Demon and SMS Gateway are possible options for the SMS server. For this method, a customer would send a SMS request to the Server's telephone number and the SMS message would then be forwarded to our SMS server. The contents of the SMS messages are processed into a query for our database. The query results are then sent back through the SMS server to the cell phone user.

Option two would be to use email to send a SMS message. A Simple Mail Transfer Protocol (SMTP) server would need to be implemented. Every SMS enabled cellular phone has an email address associated to it. Each wireless provider has its own domain and the cell phone number is attached to this. For example, a Verizon customer with a phone number of 201-555-5555 would have the email address of [2015555555@vtext.com](mailto:2015555555@vtext.com). The customer would be able to send an SMS message via email to our server email address. Once the email is received, the contents of the email are processed into a query for the database. The query results are then sent back through email to the cell phone user.

Both the SMS server software option and the Email option have advantages and disadvantages. The SMS server software works faster than Email SMS, because there are fewer channels to travel through. An emailed SMS message has to go through the SMTP server, the email server of the wireless provider, the SMS center and then to the receiving cellular phone. Because of the long path for an Email to reach the receiving cellular phone lost data is more probable. SMS server software allows SMS messages to be directly sent thru the cell phone. The SMS message then goes to the SMS center and to the receiving mobile phone. Even more efficient is to have SMS server software directly connected to SMS center through a modem.

The email option's main advantage is that it does not require a GSM phone to be connected to the server. This is a large issue in the United States because of the multiple carriers and standards, not every cellular service is based on GSM. The implementation of the SMS sending/receiving system will be easier to setup with a SMS email system because it does not require a modem to dial into the SMS center or a GSM phone.

It would be more difficult to implement the SMS system using SMS server software because a local SMS center must be rented and we have to setup a contract to connect to the local server. Implementing familiar technologies like email would be easier than using and designing SMS server software.

A SQL database will be designed and implemented to store the data; prices, coupons, specials, etc. from our commercial retailers. Data from businesses will be obtained from menus and meetings with Pizzeria managers and will be inputted into the database by the team. A SMS message sent must be processed into a database readable format before it can be added to the SQL database.

A centralized design where all the different information is connected to each other and organized in tables is needed. But there are many different approaches to designing a database. In a star schema, each table has a single-part primary key that links to one part of the multipart primary key in the fact table. Option two is the snowflake schema. Snowflake schema's utilizes one or more dimension tables, which are decomposed into multiple tables with the subordinate dimension tables joined to a primary dimension table, as opposed to the fact table as in the star schema. In most designs, star schemas are preferable to snowflake schemas because they involve fewer joins for information retrieval and are easier to manage. Both methods are being considered for the time being until we decide on which implementation is more efficient for the SMS system.

An in-house application will be developed to convert SMS text into readable database format. The information that is sent and received from a SMS message is queried so that it is added to the database. Windows SQL server has its own dialect of SQL (Structured Query Language), which is known as Transact-SQL (TSQL). TSQL is an extremely powerful and advanced set of queries and commands that can be used to create; modify and delete databases, tables, triggers, constraints, etc. It's based on the ANSI SQL 92 standard but takes this standard into its own hands if you like, adding that extra touch of flexibility and robustness to the commands that it supports. The algorithm designed will allow for simple and quick transfers of messages into the SQL database.

An in-house application will be developed to convert SMS text into readable database format. The application will be written in Visual Basic or C++, depending on what component is chosen to send and receive SMS messages. The application should be capable of pulling data from a SMS server or from a SMS email message and then send the query results back from either system.

The data received from a SMS message is inputted into a query into the SQL database. Windows SQL server has its own dialect of SQL (Structured Query Language), which is known as Transact-SQL (TSQL). TSQL is an extremely powerful and advanced set of queries and commands that can be used to create; modify and delete databases, tables, triggers, constraints, etc. It is based on the ANSI SQL 92 standard but takes this standard into its own hands, if you like, adding that extra touch of flexibility and robustness to the commands that it supports. The algorithm designed will allow for simple and quick transfers of messages into the SQL database.