

**SMS transmission within
the PSTN**

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The Short Messaging Service (SMS) has paved the way for a new approach to personal communication. Following the success in mobile telecommunication networks, SMS has also become a well-known feature in fixed line telecommunication networks. Based on ETSI standards, a continuously growing number of fixed line SMS capable terminals are installed and several SMS providers offer the possibility of exchanging Short Messages within and between fixed line and mobile telecommunication networks.

Different protocol solutions.

SMS via PSTN has within the last years been standardized by ETSI. Basically ETSI has until now worked with 2 different solutions: the UBS (User Based Service) and NBS (Network Based Service). The main difference between the two services is that the SMS transmission in case of UBS is performed off hook, while the NBS transmission is carried out in on hook state. In both solutions SMS messages are sent via the SMSC (Short Message Service Center) using a store and forward principle. The SMSC is the link between the originating SMS terminal (SMTE) and the receiver. Most SMSC's offer the possibility to send messages across different networks. This means it will be possible to send a SMS from a fixed line terminal to a mobile SMS terminal.

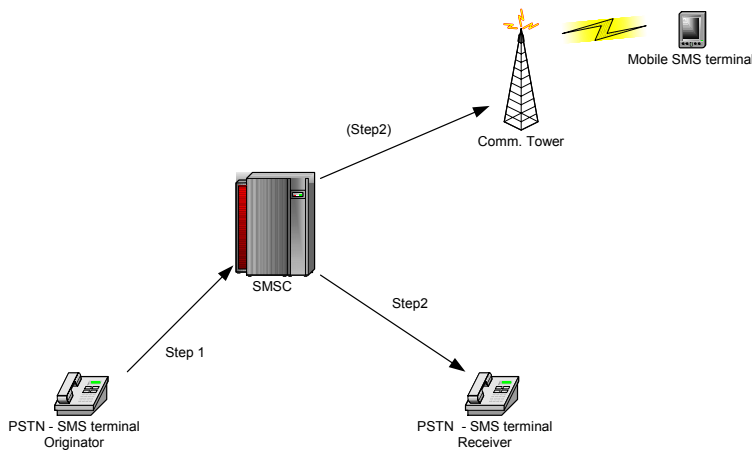


Figure 1 – Transmission using a store and forward principle

Available Services.

UBS services are at this time available in a couple of European countries with more to come. Standardization of the NBS solution has recently been stopped because most operators seem to adopt the UBS solution.

Principle of User Based Solution.

Since different companies started the work with SMS via PSTN at the same time, two different protocols have been developed for the purpose.

- **Protocol Type 1** – Initiated by Siemens and Deutsche - Telekom. Has the advantage of being fully compliant with the GSM SMS service
- **Protocol Type 2** – Initiated by Telecom Italia. Has the advantage that it specifically focuses on the residential fixed network environment.

Physical layer and Hardware requirements.

Hardware requirement for both solutions is almost identical, since the differences between the two protocols mainly are found in the

higher protocol layers. Data is transmitted on the physical layer using 1200 Baud FSK modulation within a traditional voice-band call. This means that the terminal hardware must be capable of sending and receiving 1200 Baud FSK according to ETSI standard for off hook data transmission.

Protocol Type 1:

Protocol type 1 is based on existing transport layer specification for GSM SMS, on top of a new data link layer. This means that the standard message size is 160 characters. The protocol allows multiple messages to be combined to form longer messages.

Variants of this protocol are used in countries like Germany, United Kingdom, France and others

Protocol Type 2:

Protocol type 2 is a completely new design, made to meet new demands that SMS via PSTN presents. Providers in Spain and Italy have implemented this solution.

From a user perspective, the main differences between the two protocol stacks are found in the transport layer. The differences are based on the additional requirements that a fixed network user can have compared to a mobile user. This includes privacy features like private message boxes within the same subscription that allow multiple user to have their own private message box. The need for this kind of features in the fixed network is due to the fact that more than one user often has access to terminals in residential phone system. Protocol type 2 by default supports messages with up to 640 characters.

Overview of transmission process in UBS

When an SMS is to be sent from a PSTN terminal, the user composes the message using the text editor in the terminal. As in GSM the text input can be done by using text recognition technologies as Eatoni and T9.

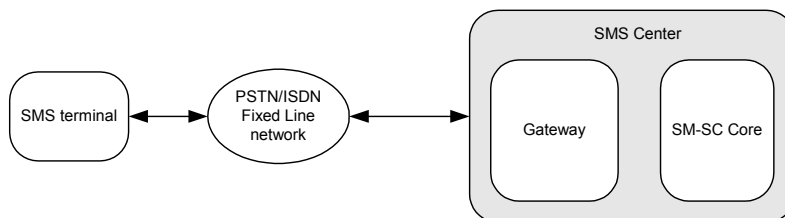


Figure 2 – Transmission overview

- When the message is ready for transmission, the user is asked to enter the destination phone number.
- The first step in the transmission is establishment of a normal call setup. This is done by dialing the SMSC number stored in the terminal.
- When the SMSC receives the call, it responds by sending a "Connection established" command as a FSK data packet
- When the terminal receives this command, it can start transmission of the SMS data. During the transmission, the data link layer takes care of error handling and retransmits data, if necessary.
- When SMS data has been transmitted, the terminal terminates the call and returns to on hook.

- Transmission in the other direction(SMSC -> SMTE) is done in much the same way. In this case, the terminal compares the incoming CLIP to the stored SMSC numbers. If a match is found the call is established as an SMS call.

Enhanced message service.

As an extension to GSM, SMS Enhanced Message Service (EMS) has been introduced to add extra features to the standard SMS service. EMS includes features like sending/receiving melodies, pictures, formatted text and sounds. Common for these features is that they require a more complex MMI to present the message to the user. EMS is also supported in PSTN in current UBS solutions

The future - Multimedia Message Service (MMS).

The Multimedia Messaging Service (MMS) in the mobile networks was created to provide a sophisticated kind of messaging which combines the advantages of both SMS and Email messaging. With MMS, the user is able to send and receive messages with a wide range of contents, e.g. text, images, audio- and video clips and even streaming contents. Similar to the SMS, the Multimedia Messaging Service is a non-real-time delivery system providing a store-and-forward mechanism.

At the time writing (December 2003) ETSI has started working on specifications that allow fixed line terminals to send MMS messages within the PSTN. As it is the case for EMS features, MMS will also raise the requirements to the terminal MMI and demand more powerful terminals with fully graphical color displays along with advanced audio features.

RTX Telecom solutions.

RTX Telecom is capable of delivering protocol solutions that support both Protocol 1 and 2. RTX has completed turnkey projects for leading manufacturers.

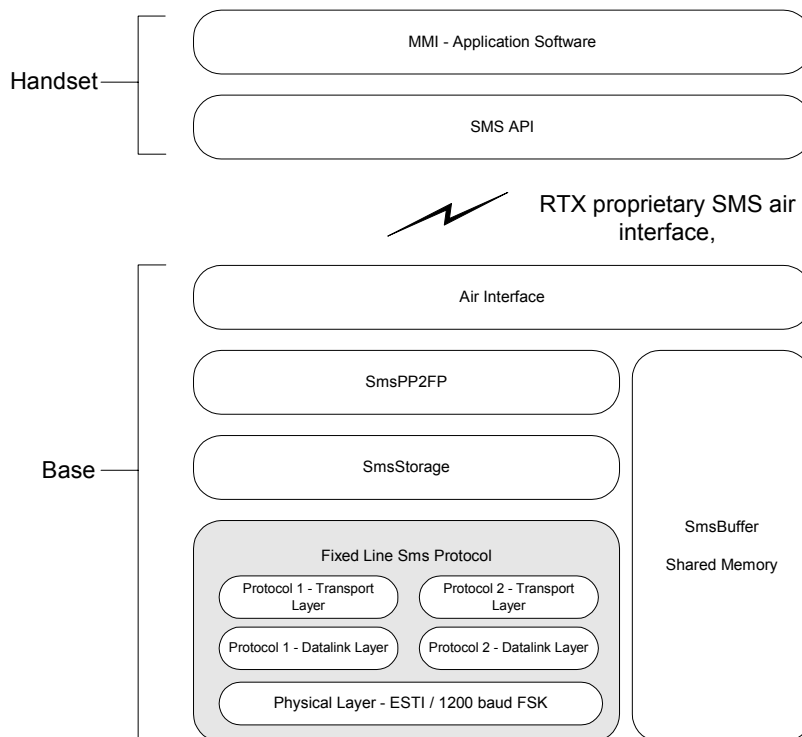


Figure 3 – The RTX SMS protocol stack



Both RTX protocols have been approved by specific providers and have been in the market now for more than on 1½ year. Based on the standard protocol type 1, RTX has implemented operator specific extensions for various countries like UK, France and Hong Kong

In future, RTX will continue to focus on new features entering the PSTN world.

References:

[1] ETSI ETS 300 659 - 1/2/3 - "Onhook and Offhook data transmission".

[2] ETSI TS 100 901 (V7.4.0): "Digital cellular telecommunications system (Phase 2+) (GSM); Technical realization of the Short Message Service (SMS) (GSM 03.40 version 7.4.0 Release 1998)".

[3] ETSI ES 201 912 (V1.1.1) - "Short Message Communication between a fixed network Short Message Terminal Equipment and a Short Message Service Centre".