**GSM MODEM**

**What is a GSM Modem?**

A **GSM modem** is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.

When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network.  While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

**[Now SMS Ligt can send and receive SMS and MMS Messages using a GSM modem.](http://www.nowsms.com/lite)**

A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

For the purpose of this document, the term GSM modem is used as a generic term to refer to any modem that supports one or more of the protocols in the GSM evolutionary family, including the 2.5G technologies GPRS and EDGE, as well as the 3G technologies WCDMA, UMTS, HSDPA and HSUPA.

A GSM modem exposes an interface that allows applications such as Now SMS to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. To perform these tasks, a GSM modem must support an “extended AT command set” for sending/receiving SMS messages, as defined in the [ETSI GSM 07.05](http://www.etsi.org) and [3GPP TS 27.005](http://www.3gpp.org/ftp/specs/html-info/27005.htm) specifications.

GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery.

A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, such as the Falcon Samba 75. (Other manufacturers of dedicated GSM modem devices include Wavecom, Multitech and iTegno.  We’ve also reviewed a number of modems on our [technical support blog](http://www.nowsms.com/tag/gsm-modem).) To begin, insert a GSM SIM card into the modem and connect it to an available USB port on your computer.

A GSM modem could also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. Any phone that supports the “extended AT command set” for sending/receiving SMS messages, as defined in [ETSI GSM 07.05](http://www.etsi.org) and/or [3GPP TS 27.005](http://www.3gpp.org/ftp/specs/html-info/27005.htm), can be supported by the Now SMS & MMS Gateway. Note that not all mobile phones support this modem interface.

Due to some compatibility issues that can exist with mobile phones, using a dedicated GSM modem is usually preferable to a GSM mobile phone. This is more of an issue with MMS messaging, where if you wish to be able to receive inbound MMS messages with the gateway, the modem interface on most GSM phones will only allow you to send MMS messages. This is because the mobile phone automatically processes received MMS message notifications without forwarding them via the modem interface. It should also be noted that not all phones support the modem interface for sending and receiving SMS messages. In particular, most smart phones, including Blackberries, iPhone, and Windows Mobile devices, do not support this GSM modem interface for sending and receiving SMS messages at all at all. Additionally, Nokia phones that use the S60 (Series 60) interface, which is Symbian based, only support sending SMS messages via the modem interface, and do not support receiving SMS via the modem interface.

## The Future of GSM

GSM together with other technologies is part of an evolution of wireless mobile telecommunication that includes [High-Speed Circuit-Switched Data (HSCSD)](http://www.topbits.com/hscsd-high-speed-circuit-switched-data.html), [General Packet Radio System (](http://www.topbits.com/gprs-general-packet-radio-service.html)[GPRS](http://www.tech-faq.com/gprs-general-packet-radio-service.shtml)), Enhanced Data rate for GSM Evolution ([EDGE](http://www.topbits.com/edge.html)), and Universal Mobile Telecommunications Service (UMTS).

## GSM Network Operators

T-Mobile and Cingular operate GSM networks in the United States on the 1,900 MHz band. GSM networks in other countries operate at 900, 1,800, or 1,900 MHz

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**GSM** (**Global System for Mobile Communications**:

Originally from ***Group Special Mobile***) is the most popular [standard](http://en.wikipedia.org/wiki/Comparison_of_mobile_phone_standards) for [mobile telephony](http://en.wikipedia.org/wiki/Mobile_telephony) systems in the world. The [GSM Association](http://en.wikipedia.org/wiki/GSM_Association), its promoting industry trade organization of mobile phone carriers and manufacturers, estimates that 80% of the global mobile market uses the standard.[[1]](http://en.wikipedia.org/wiki/GSM#cite_note-0) GSM is used by over 1.5 [billion](http://en.wikipedia.org/wiki/1000000000_%28number%29) people[[2]](http://en.wikipedia.org/wiki/GSM" \l "cite_note-1) across more than 212 countries and territories.[[3]](http://en.wikipedia.org/wiki/GSM#cite_note-2) This ubiquity means that subscribers can use their phones throughout the world, enabled by international [roaming](http://en.wikipedia.org/wiki/Roaming) arrangements between [mobile network operators](http://en.wikipedia.org/wiki/Mobile_network_operator). GSM differs from its predecessor technologies in that both signaling and speech channels are [digital](http://en.wikipedia.org/wiki/Digital), and thus GSM is considered a *second generation* ([2G](http://en.wikipedia.org/wiki/2G)) mobile phone system. This also facilitates the wide-spread implementation of data communication applications into the system.

The GSM standard has been an advantage to both consumers, who may benefit from the ability to roam and switch carriers without replacing phones, and also to network operators, who can choose equipment from many GSM equipment vendors.[[4]](http://en.wikipedia.org/wiki/GSM#cite_note-3) GSM also pioneered low-cost implementation of the [short message service](http://en.wikipedia.org/wiki/Short_message_service) (SMS), also called text messaging, which has since been supported on other mobile phone standards as well. The standard includes a worldwide [emergency telephone number](http://en.wikipedia.org/wiki/Emergency_telephone_number) feature ([112](http://en.wikipedia.org/wiki/1-1-2)).[[5]](http://en.wikipedia.org/wiki/GSM#cite_note-4)

Newer versions of the standard were backward-compatible with the original GSM system. For example, [Release '97](http://en.wikipedia.org/wiki/3GPP#Standards) of the standard added packet data capabilities by means of [General Packet Radio Service](http://en.wikipedia.org/wiki/General_Packet_Radio_Service) (GPRS). Release '99 introduced higher speed data transmission using [Enhanced Data Rates for GSM Evolution](http://en.wikipedia.org/wiki/Enhanced_Data_Rates_for_GSM_Evolution) (EDGE).

### GSM carrier frequencies

GSM networks operate in a number of different carrier frequency ranges (separated into [GSM frequency ranges](http://en.wikipedia.org/wiki/GSM_frequency_ranges) for 2G and [UMTS frequency bands](http://en.wikipedia.org/wiki/UMTS_frequency_bands) for 3G), with most [2G](http://en.wikipedia.org/wiki/2G) GSM networks operating in the 900 MHz or 1800 MHz bands. Where these bands were already allocated, the 850 MHz and 1900 MHz bands were used instead (for example in [Canada](http://en.wikipedia.org/wiki/Canada) and the [United States](http://en.wikipedia.org/wiki/United_States)). In rare cases the 400 and 450 MHz frequency bands are assigned in some countries because they were previously used for first-generation systems.

Most [3G](http://en.wikipedia.org/wiki/3G) networks in Europe operate in the 2100 MHz frequency band.

Regardless of the frequency selected by an operator, it is divided into [timeslots](http://en.wikipedia.org/wiki/Time_division_multiplexing) for individual phones to use. This allows eight full-rate or sixteen half-rate speech channels per [radio frequency](http://en.wikipedia.org/wiki/Radio_frequency). These eight radio timeslots (or eight [burst](http://en.wikipedia.org/wiki/Burst_transmission) periods) are grouped into a [TDMA](http://en.wikipedia.org/wiki/Time_division_multiple_access) frame. Half rate channels use alternate frames in the same timeslot. The channel data rate for all 8 channels is 270.833 Kbit/s, and the frame duration is 4.615 ms.

The transmission power in the handset is limited to a maximum of 2 watts in GSM850/900 and 1 watt in GSM1800/1900.

## Check if your GSM phone or modem supports SMS text mode

To check if your modem supports this text mode, you can try the following command:

**AT+CMGF=1 <ENTER>**

If the modem responds with "OK" this mode is supported. Please note that using this mode it is only possible to send simple text messages. It is not possible to send multipart, Unicode, data and other types of messages.

## Setting up the modem

If the modem contains a SIM card with is secured with a PIN code, we have to enter this pin code first:

**AT+CPIN="0000" <ENTER>**  (replace 0000 with your PIN code).

Please not that in most cases you have only 3 attempts to set the correct PIN code. After setting the PIN code, wait som0e seconds before issuing the next command to give the modem some time to register with the G0SM network.

In order to send a SMS, the modem has to be put in SMS text mode first using the following command:

**AT+CMGF=1 <ENTER>**

In text mode there are some additional parameters that can be set. Using the following command we can read the current values:

**AT+CSMP? <ENTER>**

The modem wills response with a string like this:

**+CSMP: 1, 169, 0,0OK**

**The first value is a combination of some option bits**:

|  |  |  |
| --- | --- | --- |
| **bit 7** | **RP** | Reply path, not used in text mode |
| **bit 6** | **UDHI** | User Data Header Information |
| **bit 5** | **SRR** | Set this bit to request a delivery report |
| **bit 3,4** | **VPF** | Validity Period, set b4=1 if a VP value is present |
| **bit 2** | **RD** | Reject Duplicates, do not return a message ID when a message with the same destination and ID is still pending |
| **bit 0,1** | **MTI** | Message Type Indicatorb1=0 & b0=0 -> SMS-DELIVERb1=0 & b0=1 -> SMS-SUBMIT |

Bit 0 of the message is always set when sending messages (SMS-SUBMIT). So the first value should be 1 or higher. The second parameter sets the Validity Period of the message. This value is encoded as follows:

|  |  |
| --- | --- |
| 0 – 143 | (VP + 1) x 5 minutes |
| 144 – 167 | 12 Hours + ((VP-143) x 30 minutes) |
| 168 – 196 | (VP-166) x 1 day |
| 197 – 255 | (VP-192) x 1 week |

The third parameter contains the PID (Protocol Identifier). This parameter is only used for advanced messaging. The fourth parameter contains the DCS (Data Coding Scheme). This parameter is used to select the character set/message type. When setting the DCS parameter to '0' standard 7 bit text is send. When setting this parameter to '16' the message is sent as a flash message.

To send a message with a validity period of 1 day, the parameters have to be set like this:

Bit 0 and 4 of the first field has to be set, so the first value will become 1 + 16 = 17.

Send the following command to the modem to set this parameters:

**AT+CSMP=17, 167,0,16 <ENTER>**

If the modem responds with "OK" ,the modem is ready to send (flash) text messages with a validity period of 1 day.

## Sending the message

To send the SMS message, type the following command:

**AT+CMGS="+31638740161" <ENTER>**

Replace the above phone number with your own cell phone number. The modem will respond with:

**>**

You can now type the message text and send the message using the <CTRL>-<Z> key combination:

**Hello World! <CTRL-Z>**

After some seconds the modem will respond with the message ID of the message, indicating that the message was sent correctly:

**+CMGS: 62**

The message will arrive on the mobile phone shortly.

## Sending an Unicode SMS message

Some modems also have the capability to send Unicode or UCS2 messages without encoding a PDU. You can send Unicode messages by only converting the Unicode data to a HEX string and send this string to the modem.

To check whether your modem supports this mode, just type the following command:

**AT+CSCS=?**

This command displays the codepages supported by the modem. The modem will respond like this:

**+CSCS: ("GSM","PCCP437","CUSTOM","HEX")**

If this string contains "HEX" or "UCS2", Unicode seems to be supported. To specify that you will use an HEX string to send the message, set the codepage to "HEX" or "UCS2" depending on the modem response. In our example we will set the modem to "HEX”:

**AT+CSCS="HEX" <ENTER>**

Next, we have to specify the correct DCS (Data Coding Scheme) for Unicode messages, which is 0x08. We can set this value by changing the fourth parameter of the AT+CSMP command to '8':

**AT+CSMP=1,167,0,8 <ENTER>**

The modem is now ready to send messages as Unicode. Now is the time to send the actual message:

**AT+CMGS="+31638740161" <ENTER>**

Replace the above phone number with your own cell phone number. The modem will respond with:

**>**

The only thing you have to program by yourself, is a simple routine which converts the Unicode string to an hexadecimal string like this:

مرحبا

Which is 'Hello' in Arabic will be converted like this:

"06450631062D06280627"

You can send this hexadecimal string to the modem:

**06450631062D06280627 <CTRL-Z>**

After some seconds the modem will respond with the message ID of the message, indicating that the message was sent correctly:

**+CMGS: 63**

The message will arrive on the mobile phone shortly.

