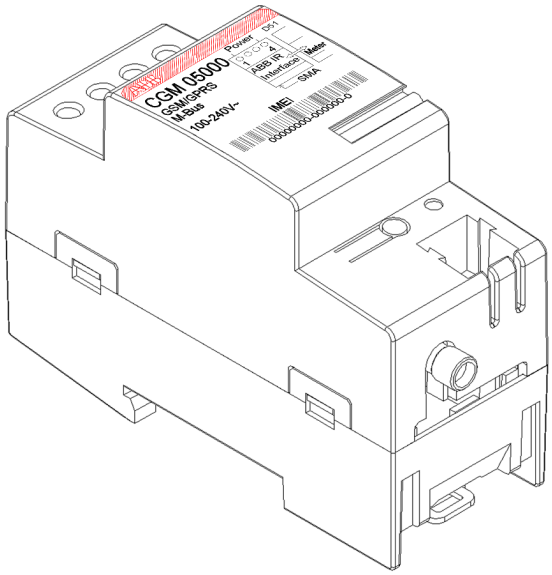

GSM/GPRS Communication Adapter User's Manual

Rev B3

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Table of Contents

1 GENERAL

This manual contains information about the CGM 05000 GSM/GPRS communication adapter, which is a member of the serial communication adapters (SCA) family for electronic electricity meters manufactured by ABB AB. Throughout this manual the CGM 05000 GSM/GPRS communication adapter will be referred as the SCA or the adapter.

The purpose of this manual is to give the user a good overview and understanding of the features that the CGM 05000 GSM/GPRS communication adapter offers.

WARNING! The voltages connected to the SCA are dangerous and can be lethal. Therefore it must be insured that the terminals are not touched during operation. When installing the SCA all voltages must be switched off.

Note: The adapter is equipped with a positive temperature coefficient (PTC) thermistor for overload protection.

2 PRODUCT DESCRIPTION

The CGM 05000 GSM/GPRS communication adapter is a serial communication adapter that enables automatic meter reading (AMR) of ABB electricity meter over a GSM/GPRS network using the M-Bus protocol over Carrier Switched Data (CSD) communication on GSM or on the GPRS network by using the internet protocols of TCP/IP or UDP/IP. Furthermore the CGM 05000 does also provide the functionality of remote reading of energy consumption from ABB electricity meters by using SMS messages*.

Like all other ABB serial communication adapters the CGM 05000 GSM/GPRS communication adapter have the size of 2 DIN-modules and follows the ABB's pro M-standard, which defines mechanical dimensions, way of mounting (35 mm DIN-rail) and design outlook.

The adapter is a quad band GSM/GPRS device, which enables communication with ABB electricity meters on GSM or GPRS over GSM 850/900/1800/1900 networks. Furthermore the SCA does also support remote configuration using short message service (SMS) and over the air download of application*.

Note: The supplied antenna is of dual band type for GSM 900/1800 network and need to be replaced if the adapter is used in countries using GSM 850/1900 network.
* Functions available only in Firmware v.1.03 and above.

2.1 PRODUCT OVERVIEW

The different parts of the SCA are depicted below.

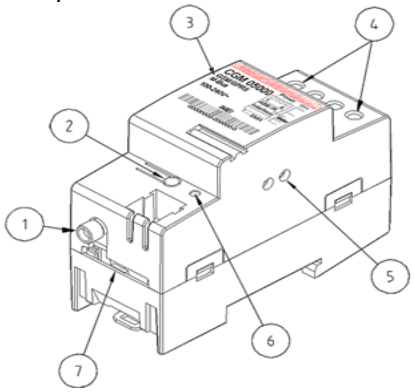

Figure 1: SCA parts.

1. Antenna SMA connector
2. Reset Button
3. Label with the type designation
4. Terminal for connecting power
5. Infra-red communication port
6. Status LED
7. SIM card slot and Power Switch

2.2 TYPE DESIGNATION

Below are tables with explanation for all positions in the type designation for the SCA.

SERIAL COMMUNICATION ADAPTERS

Type						
	Pos	1	2	3	4	5	6-8
Basic							
Serial Communication Adapters		C					
Media							
Power Line, Band A			A				
Power Line, Band C			C				
Ethernet			E				
GSM/GPRS			G				
Protocol							
LonWorks				L			
M-Bus				M			
Other/Multiple Protocol				X			
					0		
Supply voltage							
100 – 240 V						5	
Optional functionality							
No options							000

Table 1: Type designation of ABB Serial Communication Adapters.

3 INSTALLATION

1. Disconnect the power supply.
2. Strip the wires and connect them to the top terminals (4) of the SCA.
3. Hold the SIM card with the golden circuit facing towards you, and then push it gently into the SIM card holder (7) of the adapter with the type designation label facing towards you, push the SIM card until it snaps into the SIM card holder.
4. Connect the antenna cable to the SMA antenna connector (1) of the SCA.
5. Place the SCA to the left of the meter and snap it on the DIN-rail.
6. Verify that the SCA is correctly wired and the voltage is according to the technical specification before turning the power on by closing the hatch of the SIM card holder (7).
7. Verify that the status LED (6) is yellow or flash green/yellow when the power is on and that the LED turns green when the module is connected to a GSM/GPRS-network.

Note: The PIN code of the SIM card should be disabled before it is installed into the GSM/GPRS adapter. For a single piece it is easiest done by a mobile phone, please refer to the User's Manual of the mobile phone of how it is done. For information on how to disable the PIN code for multiple SIM cards please contact your network operator.

Note: If the adapter is installed in a confined steel cabinet or an area with limited GSM/GPRS signal coverage an external antenna has to be connected to provide for the best signal reception.

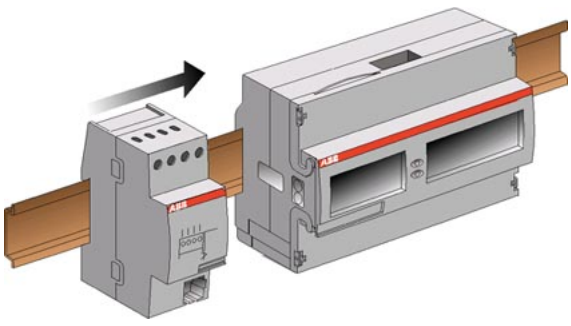

Figure 2: Installation of the SCA.

3.1 STATUS LED

The status LED 1. of figure 1. indicates the state of the SCA. The chart below describes the state of the SCA and how the status LED indicates this.

Status LED	SCA Status
Green, Yellow, OFF…	Power ON, Not connected to a GSM/GPRS network.
Steady Green	Power ON, Connected to a GSM/GPRS network.
Flashing Green	Transmission/reception of GSM/GPRS data.
Yellow	Minor failure.
Red	Fatal Error if the LED is steady red for more than 5 min.

Table 2: Table over the status LED indication.

3.2 TROUBLE SHOOTING

Status LED	Cause	Corrective actions
Green, Yellow, OFF	The adapter is not connected to a GSM/GPRS-network.	Please check the GSM/GPRS signal coverage where the SCA is installed, if necessary replace the supplied antenna with an external antenna.
Yellow	Minor failure.	Please reboot the SCA.
Red	Fatal error.	Please contact your dealer if the LED is steady red for more than 5 minutes.
Off	No power to SCA.	Please check the terminal connection and the power cable.

Table 3: Trouble shooting guide.

4 TECHNICAL DATA

Radio Features

Quad Band GSM/GPRS:	GSM 850/900/1800/1900
Mobile Class:	B
GPRS Class:	8

Network Protocol and Standards Compatibility

Data protocols:	M-Bus Protocol, TCP/IP, UDP/IP, DHCP, SMS.

Power Supply

Nominal voltage:	100-240 VAC
Voltage range:	-20 % to +15 % of nominal voltage.
Frequency:	50/60 Hz ± 5 %
Power consumption in standby:	0.53 VA at 230 V AC, 50 Hz.
Power consumption in operation:	1.37 VA at 230 V AC, 50 Hz.
Terminal wire area:	0 – 2.5 mm²
Recommended tightening torque:	0.5 Nm

Mechanical Data

Casing material:	Polyamide
Weight:	105 g

Environmental Specifications

Operating temperature range:	-30 °C to +55 °C
Storage temperature range:	-40 °C to +70 °C
Humidity:	75% yearly average 95% on 30 days/year

Interface Specifications

Antenna Connection interface:	SMA

Standards

Electromagnetic emissions & personal safety:	According to IEC 61010.

4.1 DIMENSIONS

The physical dimensions of the SCA are displayed below.

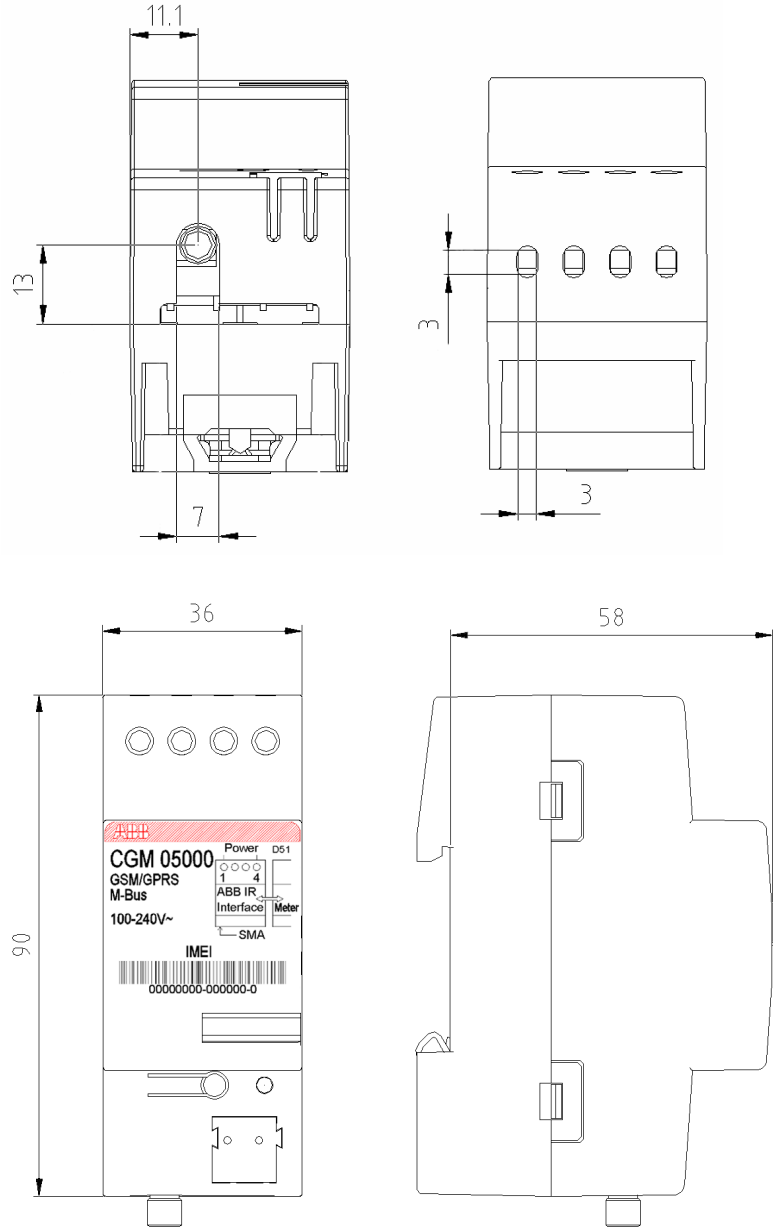

Figure 3: The physical dimension of the SCA.

5 AUTOMATIC METER READING

The adapter provides Automatic Meter Reading (AMR) using the M-Bus protocol over TCP/IP or UDP/IP through a GPRS network or over Carrier Switched Data (CSD) communication on the GSM network. This is done transparently without altering the original M-Bus telegrams. Please note that the shortest time between readouts is different depending on the type of the electricity meter; please refer to the user's manual of the electricity meter for more information.

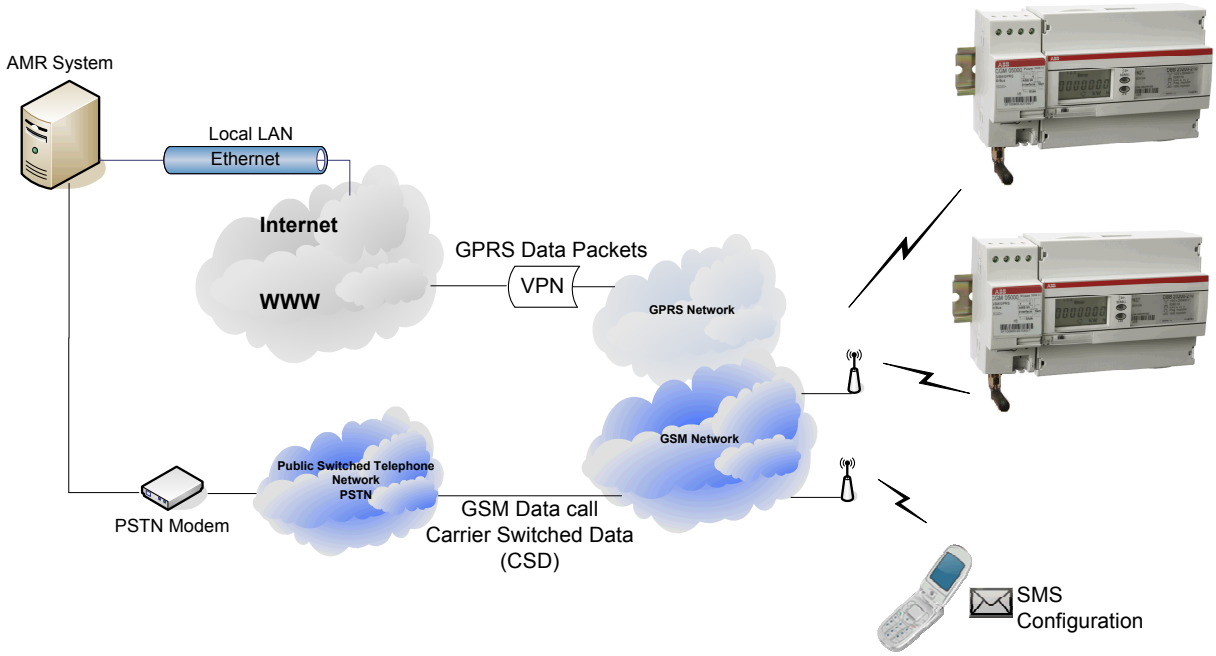

Figure 5: Example of Automatic Meter Reading (AMR) of ABB electricity meter with the CGM 05000 GSM/GPRS adapter.

6 SECURITY

To provide for maximum security and prevent unauthorized access of the SCA, the adapter contains an access control list of data call numbers. This list holds the valid telephone numbers that is authorized to access the GSM/GPRS adapter. Maximum 9 data call numbers can be stored in the access control list. If no data call numbers are stored in the access control list the adapter will answer to any calling data call number. The telephone number that is added to the access control list should be of the same format as it shown when calling a phone with the Caller ID or CID function. Please refer to the SMS configuration section of adding/removing data call numbers to/from the access control list.

Note: The access control list will be erased and restored to the factory settings upon a factory reset.

7 AMR USING GSM

As soon as the SCA has been turned ON it will be on standby for answering incoming GSM data calls. Below shows the settings that should be configured in the AMR software that enables the communication with SCA on GSM using the M-Bus protocol.

Baud rate: 9600
Parity: None
Data Bits: 8 bits
Stop Bits: 1 bit
Hardware Flow Control: None

8 AMR USING GPRS

The CGM 05000 GSM/GPRS adapter supports GPRS communication by using SIM cards with static IP addressing or dynamic IP addressing using Calling Line Identity Presentation (CLIP) call. In order to use the GPRS communication an access point name (APN) has to be configured, which is done by SMS configuration described in section 9.

Below follows a more detailed explanation over static and dynamic IP addressing methods that are used by the adapter.

8.1 STATIC IP ADDRESSING

The CGM 05000 GSM/GPRS adapter supports static IP addressing, which means if the SIM card is configured for static IP addressing the adapter will have the same the same IP address each time it is connected to a GPRS network. Furthermore the adapter does also have a static IP mode, in which the adapterwill stay connected to the GPRS network until the adapter is disconnected or powered down. By default the adapter are configured in the static IP mode for communication on port 21 for UDP and port 6021 for TCP. Please note that in order to use static IP addressing the SIM card has to be configured for static IP addressing, please contact your mobile operator for setting up the SIM card for static IP addressing. For configuration and setting up of the adapter for static IP addressing, please refer to the SMS configuration command SETCFG in section 9.

8.2 DYNAMIC IP ADDRESSING

Besides support of static IP addressing, the CGM 05000 GSM/GPRS adapter does also support dynamic IP addressing, which means if the SIM card is configured for dynamic IP addressing the adaper will have different IP address for each time it gets connected to the GPRS network. Furthermore the adapter does also have a dynamic IP mode that is used together with the CLIP call function of the adapter. In this mode the adapter will only connect on TCP to a known preconfigured IP address on the GPRS network when an authorized CLIP call number calls the adapter. The connection to the GPRS network will be dropped as soon as the AMR timeout has timed out after that the TCP connection has been dropped by the AMR system. By default when the adapter is configured in the dynamic IP addressing mode it is configured to communicate on port 5001 on TCP. For configuration and setting up the adapter for dynamic IP addressing, please refer to the SMS configuration command SETCFG in section 9.

Below follows a brief description of communication using dynamic IP addressing with CLIP call.

1. Please ensure that the adapter is set to Dynamic IP Mode and that a CLIP call number and an IP address of an AMR system has been configured in the adapter.
2. Call the adapter with the device that has the authorized CLIP call number and the adapter will connect to the GPRS network and establish a TCP connection to the stored IP address of the AMR system.
3. The AMR system can start to readout the electricity meter's quantities through the adapter.
4. When the readout has been completed, the AMR system will disconnect the TCP connection to the adapter.
5. The adapter will disconnect from the GPRS network as soon as the AMR timeout has timed out in the adapter.

9 COMMANDS & CONFIGURATION BY SMS

Commands and configurations can be sent to the CGM 05000 GSM/GPRS communication adapter by SMS and depending of command the adapter will respond back to the cellular phone number that sent the SMS command. When configuring the adapter please note that the adapter will not respond or send back any notification to the sender as confirmation for the newly set configuration. In order to be able to receive a confirmation whether the adapter has received a command or configuration the cellular phone can be configured to receive a SMS delivery receipt after sending a SMS command or configuration, please refer to the Users Manual of your cellular phone for more information on how the SMS delivery receipt are configured.

Note: In order to be able to perform SMS configuration the phone number of the configuration device has to be a valid entry in the SCA's access control list for data call numbers if such has been configured.

9.1 SMS MESSAGE FORMATS

The SMS message format for the CGM 05000 GSM/GPRS adapter consists of a Data field.

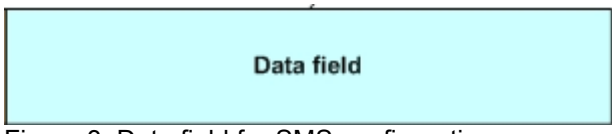

Figure 3: Data field for SMS configuration.

The Data field consists of field codes of a various numbers of commands and their associated parameters. The parameters can range from 0 to 8 depending of the given command type. The fields, commands and the parameters are separated by a ";" character and the field codes and its action are separated with a "=" character. Below follows a description and examples over the syntax of an SMS configuration message.

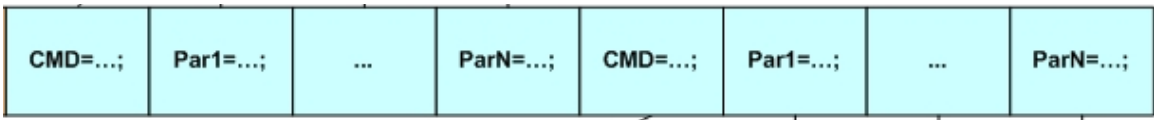

Figure 4: SMS configuration field format.

Figure 5: Example of SMS configuration of setting a Data Call Number.

Figure 6: Example of SMS configuration of deleting a Data Call Number.

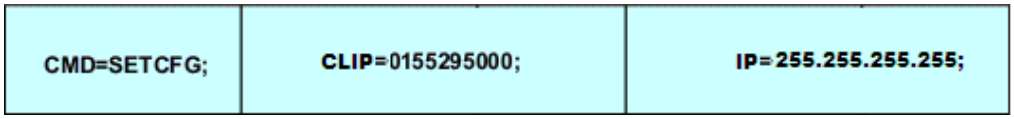

Figure 7: Example of SMS configuration for CLIP call configuration.

Figure 8: Example of SMS configuration for deleting CLIP call.

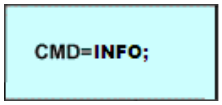

Figure 9: Example of SMS command for readout of energy consumption.

Table 4 & 5.shows the SMS commands and their parameters that are supported by the adapter.

Command description	Command	Parameter Fields
Set Communication Adapter Configuration	CMD=SETCFG;	New GSM Data Call Number DATA=xxxxxxxxxxxxx
		New CLIP Call Number CLIP= xxxxxxxxxxxxx
		New Remote IP Address for CLIP call IP=xxx.xxx.xxx.xxx
		GPRS Mode MODE=x (0/1, Dynamic/Static IP address, Default: 1)
		New GSM Duration Time GDT=xx (0-60 minutes, Default: 10 min.)
		GPRS Access Point Name APN=apn.op.com
		GPRS Service User Name USER=xxxxxxxxxx
		GPRS Service Password GPWD=xxxxxxxxxx
		New AMR (GPRS) Duration Time ADT=xx (0-60 minutes, Default: 1 min.)
		Toggle SMS initialize at startup of the adapter. SMSI=x (0/1, OFF/ON, Default: ON)
		Toggle SIM card check at startup of the adapter. SIMC=x (0/1, OFF/ON, Default: ON)
		Configuration of UDP port number UDPP=xxxxx (0-65535, Default port: 21)
		Configuration of Static TCP port number TCPSP=xxxxx (0-65535, Default port: 6021)
		Configuration of Dynamic TCP port number TCPDP=xxxxx (0-65535, Default port: 5001)

Table 4: Table over the commands and parameters that are supported by SMS

Command description	Command with no parameters	Comments
Delete GSM Data Call Number or Clip Call	CMD=DELRNO;	GSM Data Call Number DATA=xxxxxxxxxxxxx
		CLIP Call Number CLIP=xxxxxxxxxxxxx
Set GSM Duration Time or AMR Duration Time	CMD=SETDUT;	New GSM Duration Time GDT=xx (0-60 minutes, Default: 10 min.)
		New AMR (GPRS) Duration Time ADT=xx (0-60 minutes, Default: 1 min.)
Request of electricity meter and the adapter information.	CMD=INFO;	Request for readout by SMS of the below information. • Meter type and serial number. • Energy consumption of the Meter. • Resettable energy register (ODINSingle) • Number of reset (ODINSingle) • IP address of the adapter • DNS address of the adapter • Firmware version of the adapter. (Only available on firmware v.1.03 and above.)
Reset of resettable energy register.	CMD=RETM;	Reset of the resettable energy register (ODINSingle). (Only available on firmware v.1.03 and above.)
OTA upload of application.	CMD=UPDATE;	OTA upload of adapter firmware. (Only available on firmware v.1.03 and above.)
Reboot	CMD=REBOOT;	Restarts the adapter.
Hardware Reset	CMD=HWRST;	Hardware reset of the adapter.

Table 5: Table over the commands and parameters that are supported by SMS.

10 OTA OVER GSM

The CGM 05000 GSM/GPRS communication adapter supports over the air download (OTA) of application for firmware upgrades over the GSM network.

11 RESETTING THE ADAPTER

Reset is performed by pushing the reset button (6) in figure 1..There are two types of reset that can be performed, soft reset and factory reset. Below follows a description of these and how they are preformed.

11.1 SOFT RESET

A soft reset will reset the running applications of the adapter without affecting the configuration and databases of the adapter.

To perform a soft reset, press and hold down the reset button of the adapter for 10 seconds or more. This will have the same effect on the adapter as if the adapter has been powered off and on again.

11.2 FACTORY RESET

A factory reset will reset the running applications, databases, and the configuration of the adapter to its default factory configuration.

To perform a factory reset:

1. Switch OFF the power by sliding the power switch (7) in figure 1. of the adapter to its OFF position.
2. Press and hold down the reset button (6) and switch the power back ON to the adapter, keep the reset button down for another 30 seconds and the adapter will restart.

12 SERVICE AND MAINTENANCE

12.1 CLEANING

If the communication adapter is dirty and needs to be cleaned, use lightly moistened tissue with a water based mild detergent. Make sure that no liquid goes into the communication adapter as this could damage the adapter.

13 ABBREVIATIONS AND ACRONYMS

AMR	Automatic Meter Reading.
APN	Access point name of GPRS service provider network.
CLIP	Calling Line Identity Presentation
CSD	Circuit Switched Data.
UDP	User Datagram Protocol.
IP	Internet Protocol, The main internetworking protocol used in the Internet. Used in conjunction with the Transfer Control Protocol (TCP) to form TCP/IP.
IP Address	A four-byte number uniquely defining each host on the Internet. Ranges of addresses are assigned by Internic, an organization formed for this purpose. Usually written in dotted-decimal notation with periods separating the bytes (for example, 192.168.1.10).
GPRS	General Packet Radio Service. Wide Area Network technology that is adapted for cellular phone communication on packet switched network architecture.
GSM	Global System for Mobile Communications. Wide Area Network technology that is adapted for cellular phone communication on circuit switched network architecture.
SIM	Security Identity Module. Plug in module that is able to contain information for cellular phone networks and is also programmable.
OTA	Over The Air download provides download of software upgrades over the air.
SMS	Short Message Service. Text message technology developed for cellular phones.
TCP	Transmission Control Protocol..

14 INDEX