SAGEM RT3000
Fixed GSM / GPRS Gateway

Technical description

Summary

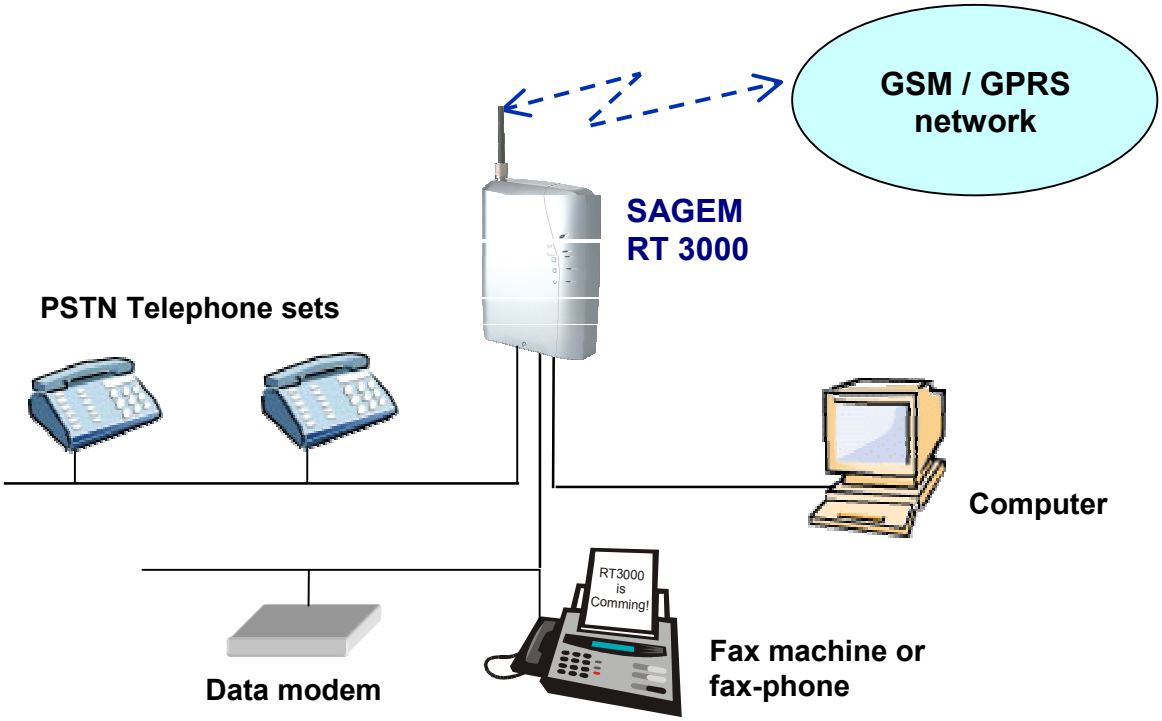
1 Overview

1.1 General description

The SAGEM RT3000 is a Fixed GSM / GPRS Gateway which supports voice, fax, data and SMS (Short Message Service) services.

It offers access to a GSM / GPRS network for fixed user terminals such as:

- analog PSTN telephone sets
- analog fax machines
- analog phone-fax machines
- analog data modems
- personal computers.



The SAGEM RT3000 can also provide access to a GSM network for other types of equipment such as:

- PBX with analog network lines
- payphones.

1.2 Applications

1° GSM WLL (GSM Wireless Local Loop)

The main application of the SAGEM RT3000 is the GSM WLL, which consists to connect new subscribers to the PSTN, by the use of wireless connections through a GSM network.
This solution allows fixed operators to deploy rapidly and economically new subscriber lines to the PSTN in areas were there is a lack of PSTN copper lines, provided these areas are covered by a GSM network.

The SAGEM RT3000 is suitable:

- as well for residential subscribers by supporting basic services: telephone and Internet access
- as for SOHO subscribers thanks to additional features such as:

- possibility to connect several telephone sets in parallel
- support of analog fax service.

2° GSM payphones
The SAGEM RT3000 can also be used to connect payphones to a GSM network thanks to the following additional features:

- polarity reversal
- metering pulses
- low bit-rate data modem transmission for downloading charges tables.

3° End user specific applications
The SAGEM RT3000 could be a solution for end-users specific applications such as:

- access to the PSTN with fixed terminals (especially analog fax machines and data terminals) in areas where PSTN copper lines are too expensive or not possible
- occasional access to the PSTN in some premises when the use of a mobile SIM card in the SAGEM RT3000 is less expensive than the subscription for a fixed line.

4° Least cost routing for PBX
In countries where calls from PSTN to mobiles are more expensive than calls from mobile to mobile, PBX least cost routing consists to route PBX outgoing calls to mobile terminals to a GSM network instead of the PSTN.
SAGEM RT3000 is suitable for such application on PBX with analog network lines.

2 Mechanical description

2.1 Housing

The housing of the SAGEM RT3000 is a plastic case designed to be fixed on a wall by screws.

Five LEDs provide different information about the current status of the SAGEM RT3000 as described in section 8.

The housing can be opened, according to instructions and safety notes of the User Guide, to insert the SIM card.
It is locked by a screw.

2.2 Connectors

All connectors (user ports connectors, power supply connector) are at the bottom of the housing, excepted antenna connector which is located on the top.

2.3 Marking on SAGEM RT3000 housing

2.3.1 On front side

On the front side of the generic version of the SAGEM RT3000, there are the following marking:

- SAGEM logo

- picturegram for each LED
- safety label:

2.3.2 On back side

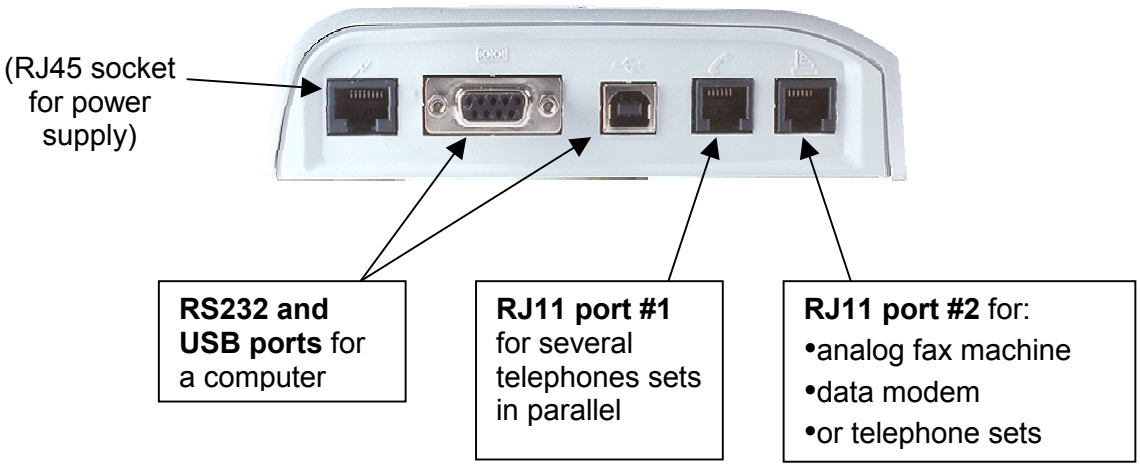
On the back side of RT3000 housing a Product Label provides different technical information:

- part number
- serial number
- IMEI
- approval marking
- ....

3 User ports

3.1 Overview

The following ports are located at the bottom of the standard SAGEM RT3000:



Note : the USB port is not available on all models of SAGEM RT3000.

On the standard SAGEM RT3000, there are four ports for connection of user's terminals, but only one can be active at the same time:

- two RJ11 ports for analog terminals:
  - RJ11 port #1 for telephones sets
  - RJ11 port #2 for telephones sets, analog G3 fax machines, analog phone-fax machines and data modems
- two digital ports for personal computers:
  - RS232 port
  - USB (client) port.

3.2 Analog ports (RJ11 ports #1 and #2)

On the two analog ports together, a total of 5 terminals (REN = 1 each) can be connected (in parallel). But only one fax machine, phone -fax or data modem can be connected to the SAGEM RT3000 (on RJ11 port #2).

The impedance of each port can be configured: 600 ohms, 900 ohms or complex value.

Pinning (1-6): NC-NC-A-B-NC-NC.

3.3 Digital ports (RS232 and USB ports)

The two digital ports cannot be used simultaneously: if a device is connected to the USB port and USB power signal is detected, the RS232 port is automatically deactivated.

On some versions of the SAGEM RT3000, only one of these ports can be available.

3.3.1 RS232 port

Characteristics of RS232 port are as following:

- RS-232 signals supported: TX, RX, RTS, CTS, DTR, DCD
- maximum bit rate: 115200 bps
- galvanic insulation performed by Opto couplers.

The SAGEM RT3000 is seen by the PC as a modem. A driver for SAGEM RT3000 "modem" is available for the following operating systems: Win 98 SE, ME, 2000, XP.

3.3.2 USB port

Characteristics of USB port are as following:

- USB 1.1 version
- galvanic insulated performed by Opto couplers.

An USB driver for SAGEM RT3000 is available for the following operating systems: Win 98 SE, ME, 2000, XP.

3.4 Selection of the ports for incoming calls and SMS

The SAGEM RT3000 can be configured to specify the user port for incoming calls and incoming SMS as following.

Selection of the ports for incoming calls:

- incoming voice calls :
  - either on both RJ11 ports
  - or only on one of the two RJ11 ports
- incoming fax calls :
  - either on RJ11 port #2
  - or on PC port (RS232 or USB)
- incoming CSD data calls :
  - either on RJ11 port #2
  - or on PC port (RS232 or USB).

Selection of the ports for incoming SMS:

- either on one of the two RJ11 ports
- or on PC port (RS232 or USB).

3.5 Configuration of RJ11 port #2 for outgoing calls

The SAGEM RT3000 can be configured to specify the type of outgoing calls on RJ11 port #2:

- either there is an automatic recognition of outgoing fax calls and data modem calls
- or all outgoing calls are handled by the SAGEM RT3000 as fax calls.

4 Services

4.1 Services on analog ports

4.1.1 Common features for voice, analog fax and modem data calls

4.1.1.1 Outgoing calls

4.1.1.1.1 Off hook, on hook detection

The SAGEM RT3000 detects off hook and on hook status on analog ports.

4.1.1.1.2 Dialing

SAGEM RT3000 supports both modes of dialing: DTMF and decadic (pulse) modes.

End of dialing is detected by the SAGEM RT3000:

- either by expiration of a timeout, if no more digit has been dialed after a configurable duration
- or by the special character "#" dialed after the last digit of the called number; this second possibility is available only for DTMF dialing.

4.1.1.1.2.1 DTMF dialing

Digits: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, A, B, C, D, *, #

Frequencies: According to ITU-T Q.23 standard for DTMF signaling

		Upper frequency group (Hz)			
		1209	1336	1477	1633
Lower	697	**1**	**2**	**3**	**A**
frequency	770	**4**	**5**	**6**	**B**
group (Hz)	852	**7**	**8**	**9**	**C**
	941	*****	**0**	**#**	**D**

4.1.1.1.2.2 Decadic dialing

Digits: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0

4.1.1.2 Incoming calls

Depending on the type of call (voice, fax or data) and the selection of the ports for incoming calls (see section 3.4), the ringing signal is generated by the SAGEM RT3000 on:

- only one analog port
- or on the two analog ports.

If the ringing signal is generated on the two analog ports, the first "off hook" will win, and a busy signal will be generated on the other port.

Ringing signal

- Frequency: 25 Hz or 50 Hz (according to SAGEM RT3000 configuration)
- Cadence: defined by configuration of the SAGEM RT3000
- Waveform: sinusoidal.

4.1.1.3 Tones

The following tones are generated by the SAGEM RT3000 on analog ports.
Frequency and cadence of these tones can be configured (see section 9.2).

4.1.1.3.1 Dialing tone

The dialing tone is generated on an analog port, once the SAGEM RT3000 is registered on the GSM network, if an off-hook status is detected on this port:

- Frequency: according to configuration (default value: 425 Hz)
- Cadence: according to configuration
- Waveform sinusoidal.

4.1.1.3.2 Ringback tone

The ringback tone is either coming from the GSM network (In-band signal) or locally generated by the SAGEM RT3000 itself, depending on the configuration of the SAGEM RT3000.
If this tone is generated by the SAGEM RT3000, it has the following characteristics:

- Frequency: according to configuration (default value: 440 Hz)
- Cadence: according to configuration
- Waveform sinusoidal.

4.1.1.3.3 Busy tone

The Busy tone indicates the following events:

- Congestion of the Telecommunication Network
- Congestion of the SAGEM RT3000: an other port is already active for an other call
- Called party is busy
- Call drop
- Clearing by any user.

This tone has the following characteristics:

- Frequency: according to configuration (default value: 425 Hz)
- Cadence: according to configuration
- Waveform sinusoidal.

4.1.1.3.4 Call waiting advisory tone (for voice calls only)

This tone indicates that somebody is trying to call, when the SAGEM RT3000 is already in communication or that it is in dual call state.
This tone has the following characteristics:

- Frequency: according to configuration (default value: 440 Hz)
- Cadence: according to configuration
- Waveform sinusoidal.

4.1.1.3.5 Accepted programming tone

This tone indicates to the user the acceptance of the programming of a supplementary service.
This tone has the following characteristics:

- Frequency: according to configuration (default value: 950 Hz)
- Cadence: according to configuration
- Waveform sinusoidal.

4.1.1.3.6 Non accepted programming tone

This tone indicates to the user the non acceptance of the programming of a supplementary service.
This tone has the following characteristics:

- Frequency: according to configuration (default value: 300 Hz)

- Cadence: according to configuration
- Waveform sinusoidal.

4.1.1.3.7 SIM card missing or waiting for PIN code entry tone

This tone indicates to the user that the SIM card is missing or that the (correct) PIN has not been entered.
This tone has the following characteristics:

- Frequency: according to configuration (default value: 950 Hz)
- Cadence: according to configuration
- Waveform sinusoidal.

4.1.1.4 Supplementary services

The following supplementary services are available as well for voice, as for analog fax and data modem communications, provided they are supported by the GSM network, and included in the user subscription:

- Call forwarding:
  - CFU: Call Forwarding Unconditional
  - CFB: Call Forwarding if Busy
  - CFNRy: Call Forwarding if no answer
  - CFNA: Call Forwarding not accessible
- Call barring:
  - Call barring of all outgoing
  - Call barring of international outgoing
  - Call baring incoming
- CLIP: Calling Line Identification Presentation
- CLIR: Calling Line Identification Restriction.

Call forwarding and call barring supplementary services
These supplementary services can be activated, deactivated and checked by the user, with a DTMF phone set, by dialing sequences according to the following table.

	Service	Activating	Deactivating	Status Checking
A	Call forwarding unconditional (CFU)	**21*Telnumber# **21*Telnumber*call_type#	##21#	*#21#
B	Call forwarding if Busy (CFB)	**67*Telnumber# *67*Telnumber*call_type#	##67#	*#67#
C	Call forwarding if no answer (CFNRy)	**61*Telnumber# **61*Telnumber**delay_time# **61*Telnumber*call_type# **61*Telnumber*call_type*delay_time#	##61#	*#61#
D	Call forwarding not accessable (CFNA)	**62*Telnumber# **62*Telnumber*call_type#	##62#	*#62#
E	Call barring all of outgoing	*33*password# *33*password*call_type#	#33*password# #33*password*call_type#	*#33# *#33**call_type#
F	Call barring international outgoing	*331*password# *331*password*call_type#	#331*password# #331*password*call_type#	*#331# *#331**call_type#

G	Call barring incoming	*35*password# *35*password*call_type#	#35*password# #35*password*call_type#	*#35# *#35**call_type#
H	Call waiting	*43#	#43#	*#43#
I	Change password	**03*old pw*new pw*new pw#		

Call_types: 11 = voice, 13 = FAX, 25 = DATA

Note:
- For items A, B, C and D activating commands support both "*" and "**" prefix commands.
- For items A, B, C and D deactivating commands support both "#" and "##" prefix commands

CLIP supplementary service
If the CLIP supplementary service is enabled, the calling party number is transmitted by the SAGEM RT3000 on the active analog port according to ETSI EN 300659-1 with V.23 method.

The CLIP function can be enabled/disabled by configuration of the SAGEM RT3000.

CLIR supplementary service
If the CLIR supplementary service is enabled, the phone number of the SAGEM RT3000 will not be transmitted to the called party.

The CLIR function can be enabled/disabled by configuration of the SAGEM RT3000.

4.1.2 Specific features for voice calls

4.1.2.1 Supplementary services dedicated to voice calls

The following supplementary services are available for voice calls, provided they are supported by the GSM network and included in the user subscription:
- call hold
- call waiting
- multi party call.

For these supplementary services, the Flash key of the telephone set is used.
The Flash key is detected by the SAGEM RT3000 according to configuration parameters:
- minimum and maximum duration of the flash.

4.1.2.1.1 Call Hold / Call Waiting

General
When a call is already active on SAGEM RT3000, it is possible to receive a second call or to establish a second call.

Establishment of a second call
To establish a second call, the call already established is put in Call Hold state by pressing successively the keys Flash and 2 of the telephone set.

Reception of a second call
The user receives a Call Waiting Advising Tone to inform him of incoming of a second call.
The user can then:
- put the first call in Call Hold state and switch to the second call by pressing successively the keys Flash and 2 of the telephone set,

- hang up to finish the first call; in this case the call in Call Waiting state is not rejected: it is announced like any normal incoming call by ringing,
- make nothing and continue the first call; after a duration depending on the network, the second call is transferred to the voice mail box (Call Forwarding on No Reply - CFNRy).

Handling of the two calls
In a situation with two established calls with one in Call Hold state, the user can:
- switch from one call to the other by pressing successively the keys Flash and 2 of the telephone set (the active call changes to Call Hold state)
- transform the two calls in a 3 parties call (multi party call).

4.1.2.1.2 Multi-Party call

In a situation with two established calls with one in Call Hold state, the user can transform the two calls in a 3 parties call (multi party call) by pressing successively the keys Flash and 3 of the telephone.

4.1.2.2 DTMF codes transmission during voice calls

During a voice call, DTMF digits dialed (for remote control) on the telephone set are detected by the SAGEM RT3000 and sent to the GSM network in signalling messages, according to GSM protocol.

4.1.2.3 Vocoder

The SAGEM RT3000 supports all the three types of vocoder defined in GSM standard:
- HR (Half Rate)
- FR (Full Rate)
- EFR (Enhanced Full Rate).

4.1.2.4 Echo cancellation and noise reduction

The SAGEM RT3000 supports Dynamic Echo Cancellation and Noise Reduction.

4.1.3 Features for billing purpose

4.1.3.1 Metering pulses generation

Metering (or billing) pulses at 12 kHz or 16 kHz can be generate by the SAGEM RT3000 on analog ports during a voice call.
The duration of a metering pulse, as well the duration between two consecutive pulses can be configured in the SAGEM RT3000: this duration is the same whatever the called number.
The waveform of metering pulses is sinusoidal.

Generation of metering pulses can be enable and disabled on each analog port by configuration of the SAGEM RT3000.

4.1.3.2 Polarity reversal

The SAGEM RT3000 supports polarity reversal based on Spain PSTN specifications.
However there are some differences with these PSTN specifications due to the adaptation to the wireless environment.

Polarity reversal is particularly useful for payphones: in the case of an outgoing call, it indicates the beginning and the end of the conversation state.

Polarity reversal can be enable and disabled on each analog port by configuration of the SAGEM RT3000.

4.1.4 Analog Fax service

On RJ11 port #2, the SAGEM RT3000 supports analog Group 3 Fax machines at 9.6 kbps.

Interface with the fax machine is based on V.29 standard.
ECM (Error Correction Mode) is not supported.

Note:
The SAGEM RT3000 is equipped with very advanced fax technologies, ensuring best results in fax transmission via GSM. Nevertheless, due to the nature of GSM fax, correct fax communications cannot be guaranteed at all places and at all the time.

4.1.5 Data modem service

On RJ11 port #2, the SAGEM RT3000 supports data modem for CSD (Circuit Switched Data) communications at bit rates of 300 to 9600 bps.

V.21; V.22; V.22bis; V.32 modem standard are supported.

For error correction and flow control on the link between the local modem and the SAGEM RT3000, the MNP2 (Microcom Networking Protocol) can be activated by configuration of the SAGEM RT3000.

Outgoing Analog modem calls are detected by Calling tone or by specific called numbers reserved for data modem calls: these specific called numbers are configured in the SAGEM RT3000.

4.1.6 Landsline SMS service

The SAGEM RT3000 supports transmission and reception of SMS from/to an analog phone set capable of Landsline SMS.

4.2 Services on digital ports (RS232 or USB port)

When a Personal Computer is connected to one of the two digital ports of the SAGEM RT3000, the following services are supported:

- data communications in circuit mode
- data communications in packet mode
- digital fax communications
- SMS.

The support of all these services is based on AT commands exchanged between the PC and the SAGEM RT3000 (see Annex A : List of supported AT commands).

4.2.1 Data calls in Circuit Switched mode (CSD)

The SAGEM RT3000 is functioning like a GSM modem: it is controlled by AT commands.

It supports bi-directional data communications in circuit switched mode at bit rate of 9600 bps with an other GSM modem or a modem connected to the PSTN.

If the called party's modem is connected to the PSTN, it must support 9600 bps (V.32) / V.42: this is necessary for communication with the GSM network.

4.2.2 Data calls in Packet mode

The SAGEM RT3000 supports access to the Internet via the GPRS (General Packet Radio Service) of the GSM network.

For such connection, the PPP dial-up mechanism of the PC operating system is used.

Characteristics of GPRS connections supported by the SAGEM RT3000:

- class B terminal
- multi slot class 10 (up to 4 TS down-link or 2 TS up-link)
- coding schemes: CS-1, CS-2, CS-3, CS-4
- PBCCH support.

4.2.3 Digital fax service

With a fax software installed on the PC connected to one of the two PC ports of the SAGEM RT3000, it is possible to send and receive fax documents.
The remote fax machine can be any facsimile device.

The fax software installed on the PC shall be compatible to fax class 1.

For digital fax service on PC port, the SAGEM RT3000 supports AT command set TR29 Class 1.

4.2.4 SMS with a PC

With a SMS software installed on the PC connected to one of the two PC ports of the SAGEM RT3000, it is possible to send and receive SMS.

The SMS software shall support the SMS AT commands listed in Annex A.

5 Radio interface

5.1 Frequency bands

There are two versions of SAGEM RT3000 regarding the frequency bands:

- a **dual band** version working in the following frequency bands:
    - EGSM (900 MHz)
    - DCS (1800 MHz)

- a **mono band** version working in:
    - PCS (1900 MHz) frequency band.

5.2 Transmit power

Class 4 (2 W): for EGSM frequency band
Class 1 (1W): for DCS and PCS frequency bands.

5.3 Antenna

A female TNC connector is located at the top of the SAGEM RT3000 to connect:

- either a small 0 dBi antenna delivered with the generic version of the SAGEM RT3000
- or a coaxial cable for an external high gain antenna.

The impedance is 50 ohms.

If an external antenna is used, it is mandatory to do an installation according to safety rules regarding lighting protection.

6 Security

Security is based on GSM standard: a SIM card is located inside the SAGEM RT3000.

Thanks to this SIM card:
- authentication of the SAGEM RT3000 is performed by the GSM network
- data transmitted on the radio link are encrypted.

6.1 SIM card features

6.1.1 SIM card type

The SAGEM RT3000 works with standard (mini) 3V SIM cards.

6.1.2 SIM card holder

The SIM card holder is located inside the SAGEM RT3000.
To place the SIM card, the housing shall be opened according to User Guide instructions.

6.1.3 PIN protection

6.1.3.1 User's PIN identification

The SAGEM RT3000 supports regular PIN function, as on a mobile terminal, to prevent utilization of the device by an authorized user.

After power up of the SAGEM RT3000, before to set up a first call, the user shall enter his PIN (Personal Identification Number) with a DTMF telephone set connected to the SAGEM RT3000.

6.1.3.2 Optional AUTOPIN protection

AUTOPIN is an optional feature available on some versions of SAGEM RT3000.

It prevents the use of the SIM card of the SAGEM RT3000 in a mobile terminal to benefit of fixed communications rate for mobile communications.

After the user has entered his PIN, the SAGEM RT3000 modifies the PIN of the SIM card with a secret value which is specific for each piece of SAGEM RT3000.

In the case of a restart of the SAGEM RT3000, the user will not have to enter the PIN again: the SAGEM RT3000 will enter itself the secret value of the new PIN.

AUTOPIN is not available on generic version of SAGEM RT3000.

6.1.4 SIMLOCK

SIMLOCK is an optional feature available on versions of SAGEM RT3000 dedicated to a specific GSM operator.

It prevents the use of the SAGEM RT3000 device on the GSM network of an other operator.

MCC and MNC of the GSM network are registered in the SAGEM RT3000 at factory, and the SAGEM RT3000 will only work with SIM card having the same value of MCC and MNC.

Of course, SIMLOCK is not available on the generic version of SAGEM RT3000.

6.2 Emergency voice calls

The SAGEM RT3000 supports Teleservice 12 "Emergency Call".

This teleservice provides the possibility to set up an emergency call even without the SIM card.

The default value of the emergency phone number is 112.

Up to 3 emergency numbers are pre-defined in the SAGEM RT3000 at factory.
If one of these numbers is dialed, the dialed number is called.

Up to 3 additional configurable emergency numbers can be configured in the SAGEM RT3000 and combined with one of the pre-defined emergency numbers.
If one of the configurable emergency numbers is dialed, the corresponding pre-defined emergency number is called.

7 Power supply

7.1 External power supply

The SAGEM RT3000 is powered by an external power supply which performs adaptation from mains AC voltage to 18V DC.

This power supply is plugged by a cord to the RJ45 socket at the bottom of the SAGEM RT3000.

Two types of power supply are available:
- 230 VAC 50 Hz with EU mains plug
- 110 to 230 VAC 50/60 Hz with US mains plug.

7.2 Internal back-up battery

An internal battery provides back-up for voice service during mains failures.

Two versions of SAGEM RT3000 are available:
- regular autonomy version designed for the most of the countries
- high autonomy version for countries with frequent failures of the mains power.

Typical values:

	Regular autonomy version	**High autonomy version**
Autonomy in conversation mode	2 h	4 h
Autonomy in standby mode	8 h	15 h
Charge of the battery	slow	fast (*)

(*) fast charge between 0° and 45°C

To shut down the SAGEM RT3000 (even if powered by the internal battery) the cord of the external power supply shall be removed from SAGEM RT3000 RJ 45 socket.

7.3 External back-up battery

An external battery backup pack could be connected to the RJ45 connector of the SAGEM RT3000.

It shall deliver a DC voltage in the range of 12 to 24 VDC.

Note however that the charge of internal back-up battery requires a minimum voltage of 17 VDC, but if there is an external back-up battery, the internal back-up battery is no more useful.

8 LEDs indicators

On the front side of the SAGEM RT3000 there are five LEDs which provide the following information.

ON: High quality of RF signal

SLOW Flash: Network serching

ON: Medium or High quality of RF signal

SLOW Flash: Network searching or Low quality of RF signal

OFF: No RF signal

RAPID Flash: waiting for the PIN

CADENCE Flash: waiting for the PUK

SLOW Flash: SMS received

RAPID Flash: FAX warning

ON: Offhook on analog or PC port

SLOW Flash: Call barring or Call forwarding enabled

RAPID Flash: FAX warning

Green ON: powered from external power supply or battery

Red ON: powered from internal battery

OFF: no power

9 Configuration of the SAGEM RT3000

9.1 Parameters configuration

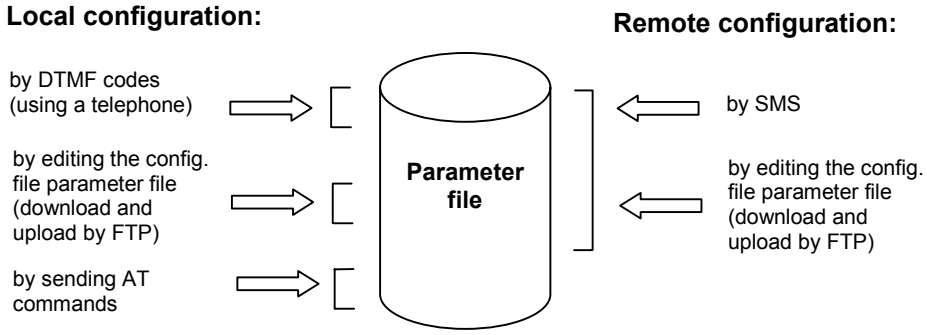
The complete configuration of the SAGEM RT3000 is written in a **parameter file** which is stored in the non-volatile memory of the device.

When configuring the SAGEM RT3000, the parameter file will be modified.

The SAGEM RT3000 can be configured by following methods:

- **Local configuration by entering DTMF codes** (with a DTMF telephone set)
  This method allows the user to change only those parameters that are changed most often.
- **Modification of the parameter file with a local or remote PC**
  This method consists to load the parameter file on a local or a remote PC by a FTP transfer, then to edit and modify the parameter file with a text editor and then to download the modified file back to the device.
- **Remote configuration by sending configuration SMS.**
- **Sending AT commands with the local PC.**

These different methods are summarized by the following picture:



All parameters can be configured by editing the parameter file.

But only some of them can be configured by one or several of the other methods.

9.1.1 Basic configuration

Parameters of basic configuration are principally modified by the end user.

All these parameters can be modified with a DTMF phone set connected to the SAGEM RT3000.

Type of parametres of basic configuration:

- selection of the ports for incoming calls and incoming SMS
- voice signal level for telephone calls
- end of dialing timeout
- flash signal duration
- fax port configuration
- telephone number of the fixed network SMS center.

9.1.2 Advanced configuration

Parameters of advanced configuration are generally modified by the operator, or by experienced users.

They can be modified:
- by editing locally or remotely the parameter file
- or, for some of them:
  - locally by AT commands
  - or remotely by SMS.

Type of parameters of advanced configuration:
- remote stations allowed to configure remotely the SAGEM RT3000
- indication of mains power failures by SMS
- additional emergency phone numbers
- fast dialing with #
- ringing signal frequency (25 or 50 Hz)
- analog ports impedance
- metering pulses
- polarity reversal
- fax configuration (timeout, etc ...)
- GPRS PDP context (for each GPRS provider)
- data communications parameters (flow control, bit rate, etc ...)
- frequency band.

9.2 Tones configuration

Frequency, cadence and level of the tones generated by the SAGEM RT3000, and also cadence of ringing signal, can be configured by editing the **tone** file of the SAGEM RT3000.

This configuration can be performed locally or remotely by a FTP transfer of the **tone** file on a PC, as for the parameter file (see section 9.1).

10 Installation and maintenance

10.1 Installation

10.1.1 Location of the SAGEM RT3000

The SAGEM RT3000 and its external power supply are designed to be used exclusively indoor.

The SAGEM RT3000 has to be fixed on a wall with screws thanks to the holes on the back side of the housing.

10.1.2 To be observed for safety reasons

The power supply of the SAGEM RT3000 converts the mains voltage into low DC voltage.
The outlet must be easily accessible and must not be recovered.

The mains voltage is specified on the power supply.

The SAGEM RT3000 generates high voltage tension which could be dangerous. Installation must be done by authorized persons only. End users are not allowed to open the housing.

Security label (see section 2.3.1) has to be put by the installation peoples in order to prevent any unauthorized access.

For safety reasons, the telephone cables must remain exclusively inside the house and must never go outside the house.

10.1.3 To be observed for medical reasons

The SAGEM RT3000 is a radio transmitter which may disturb medical electronic devices, for example hearing prosthesis, pacemaker, …

A doctor or the manufacturer of the medical device will be able to advise the user usefully.

10.1.4 Cable length

The maximum distance between the SAGEM RT3000 and conventional telephone sets or fax machines is 300 meters with 0,4 mm cable assuming a total loop impedance including telephone equal to 500 Ω maximum.

The maximum distance between the RT3000 and PC is typically 3 meters.

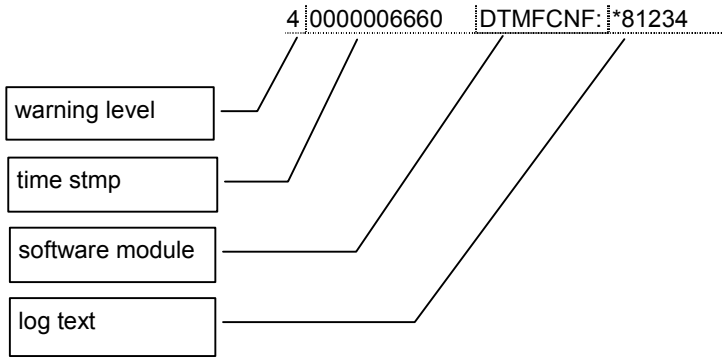
10.2 Maintenance

10.2.1 Generation of Logfiles

Relevant events of the SAGEM RT3000 are stored in a Logfile. This Logfile can be accessed **locally** or **remotely** by performing a FTP transfer to a PC.

This Logfile can then be read on the PC with a standard text editor.

A Logfile entry has the following format:



Meaning:

- **Warning level:** Errors are on level 1, information about normal events are on level 4.
- **Time stamp**: The time this logfile entry is written
- **Software module**: The software module that has generated this logfile entry
- **Log text**: Description of the event.

10.2.2 Reports by SMS

The following reports can be received by SMS:

- Alert messages :
  - External power down
  - External power up
- Signal quality as answer to reception of a special SMS.

10.2.3 Measurement of RF field strength

10.2.3.1 By LEDs indications

Two LEDs on the front side of the SAGEM RT3000 (see section 8) provide an indication of the RF signal level:

- no signal
- low signal quality
- medium signal quality
- high signal quality.

10.2.3.2 By AT command

The RSSI and BER can be read with the following AT command: **AT+CSQ.**

10.2.4 SAGEM RT3000 firmware update

The firmware of the SAGEM RT3000 can be updated from a local connected PC or from a remote PC, by performing a FTP transfer.

11 Environment conditions and dimensions

11.1 Environment operating conditions

Temperature range: -10° to +55°C

Relative humidity: 0 to 95% non condensed

IP class 31

11.2 Dimension and weight of SAGEM RT3000

SAGEM RT3000 device:

Dimension: ca. 195 x 151 x 38 mm (L x W x H) (excluding antenna)

Weight: ca. 670 g (including internal battery and antenna)

ca. 420 g (without internal battery)

Battery:

Weight: ca. 250 g

Power supply:

Weight: ca. 160 g

12 Standard compliance

12.1 EMC and ESD

Environment: CE compliant (Residential, commercial and light-industrial environment)

Standards: ETS 300 342-1
EN 55024
EN 61000-6-1

12.2 Safety

Standard: EN60950

12.3 Telco requirements

- Compliant to R&TTE
- GCF approval for GSM module inside the SAGEM RT3000.

Annex A : List of supported AT commands

ATA	Accept call
ATB[*n*]	Setting of the transfer parameter ***n*** for data connections.
ATD*[n] [;] [x]*	Dial number
ATE[*n*]	Command echo
ATH[*n*]	Hang up
ATI[*n*]	Output product code
ATQ[*n*]	Specifies whether or not the device transmits any result code to the connected TE. Information text transmitted in response is not affected by this setting.
ATS0=*n*	Writes value *n* into status register *0*. Set number of rings before automatically answer the call. This command is valid only for data calls.
ATS0?	Displays the value of status register 0
ATS3=*n*	Writes the value *n* into status register 3. This parameter determines the character recognized by TA to terminate an incoming command line (13 = <CR> by default)
ATS3?	Displays the value of status register 3
ATS5=x	Writes the value x into status register 5. Determines the command line editing character.
ATS5?	Displays the value of status register 5
ATV[*n*]	Set result code format mode. This parameter setting determines the contents of the header and trailer transmitted with result codes and information responses.
ATZ	Load standard configuration
AT&C[*n*]	Set circuit Data Carrier Detect (DCD) function mode.
AT&D[n]	Set circuit Data Terminal Ready (DTR) function mode.
AT&F	Load factory setting
AT&k[n]	Local data flow control (DTE ⇔ DCE)
AT&V	Displays current configuration
AT&W	Save configuration
A/	Repeat previous command line
AT+FCLASS=*n*	Setting the Faxclass
AT+CGATT=*n*	PS attach or detach

AT+CGDCONT=*APN* Define PDP context.

AT+CPIN=*PIN* Enter the PIN number of the SIM card

AT+CCLK=*time* Set real time clock.

AT+CCLK? Displays the time

AT+CGMI Request manufacturer identification

AT+CGMM Request model identification

AT+CGMR Request revision identification

AT+CPWD=*oldpw, newpw* Change Password.

AT+CPWD=*pwlength* Sets integer type maximum length of the password for the facility

AT+CREG=*n* Network registration

AT+CCFC=*reas*,*mode*[,*number*[,*type*[,*class*[,*subaddr*[,*satype*[,*time*[,*status*]]]]]]] Call forwarding number and conditions control

AT+CSQ=*rssi* [*ber*] Signal Quality

AT+CNUM Displays Subscriber Number

AT+CIMI Request international mobile subscriber identity

AT+CGSN Request product serial number identification

AT+CGQREQ=[*cid*[,*precedence*[,*delay*[,*reliability*[,*peak*[,*mean*]]]]]] This command specifies a Quality of Service Profile that is used when the device sends an Activate PDP Context Requestmessage to the network.

AT+CGQMIN=[*cid*[,*precedence*[,*delay*[,*reliability*[,*peak*[,*mean*]]]]]] Quality of Service Profile (Minimum acceptable)

AT+CBST=[*speed*[,*name*[,*ce*]]] Select bearer service type. This command selects the bearer service *name* with data rate *speed*, and the connection element *ce* to be used when data calls are originated.

AT Command Interface for SMS

AT+CMGD=<index>	Deletes the message
AT+CMGF=[<mode>]	Sets the mode
AT+CMGF?	Calls up the current mode
AT+CMGF=?	Lists the modes supported
AT+CMGL[=<stat>]	Lists the messages according to various characteristics
AT+CMGL=?	Shows the message display options supported
AT+CMGR=<index>	Reads the message
AT+CMGS=<da><CR> <Txt> <CTRL Z>	Sends the message
AT+CMGS=<length><CR>	Sends the message
AT+CMGW=<oa/da><CR> <Txt> <CTRL Z>	Writes the message into the memory
AT+CMGW=<length>[,<stat>]<CR>	Writes the message into the memory
AT+CMSS=<index>[,<da>]	Sends the SMS message from the memory
AT+CNMI= [<mode>][,<mt>][,<bm>][,<ds>][,[bfr]	Indicates new SMS message
AT+CNMI?	Response: +CNMI: <mode>,<mt>,<bm>,<ds>,<bfr>
AT+CNMI=?	Lists the options
AT+CPMS= <mem>	Sets the memory location
AT+CPMS?	Calls up the current memory location
AT+CPMS=?	Lists the memory locations supported
AT+CSCA=<sca>[,<tosca>]	Sets the Service Center address
AT+CSCA?	Displays the address currently set
AT+CSCA=?	Lists the characters allowed for the telephone number
AT+CSMP=[<fo>[,<vp>[,<pid>[,dcs]]]] *	Sets the text modes parameters
AT+CSMP?	Calls up the current settings for text mode
AT+CSMP=?	Response “OK” (setting text mode parameters)

AT Command Interface for SIM Application TOOLKIT

AT+KSTC	SIM Application toolkit command
AT+KSTE	End of a toolkit command
AT+KSTER	Response to an envelope command
AT+KSTF	Type error
AT+KSTIA	Access to an instance of an icon
AT+KSTIR	Get a data block of an icon instance
AT+KSTIS	Retrieve the icon
AT+KSTP	Profile supported by DTE
AT+KSTR	Terminal Response
AT+KSTV	Envelope command

SAGEM RT3000

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