

2N SMARTGATE GSM GATEWAY



Wireless
Modules
by Siemens
embedded

- > **Dramatic cost saving**
- > **DialThru technology gateway with ME function**
- > **Voice, Data and SMS transmission**
- > **Analogue FAX (optionally)**
- > **FXS and FXO interfaces for PBX or phone sets**
- > **FSK CLIP**

Dear customer,

Let us congratulate you on having purchased the SmartGate system. This new product has been developed and manufactured to provide the maximum utility value, quality and reliability. We hope you will be fully satisfied with this GSM gateway for a long time. Therefore, use your SmartGate for purposes it has been designed and manufactured for, in accordance herewith.

The manufacturer reserves the right to modify the product in order to improve its qualities.

Safety Precautions



Do not switch on SmartGate in the vicinity of medical apparatuses to avoid interference. The minimum distance of the antenna and pacemakers should be 0,5 m.



Do not switch on SmartGate aboard of a plane.



Do not switch on SmartGate near petrol stations, chemical facilities or sites where explosives are used.



Any mobile telephone use prohibition based on RF energy radiation applies to SmartGate too.



SmartGate may disturb the function of TV sets, radio sets and PCs.



Warning! SmartGate contains components that can be swallowed by small children (SIM card, antenna, etc.).



The voltage value mentioned on the power adapter may not be exceeded. If you connect SmartGate to another power supply, make sure that the voltage value is in the acceptable range.



When your SmartGate comes to the end of its operational life, dispose of it in accordance with applicable regulations.

User Manual Versions

Version	Amendments to Earlier Versions
1.00	<ul style="list-style-type: none">• The User Manual applies to SmartGate FW Version 1.00A.
1.01	<ul style="list-style-type: none">• Analogue FAX support. (optionally).

Upgrade

The manufacturer continuously meets customer requirements by improving the firmware. For the latest SmartGate processor firmware, programming tool and User Manual see www.2n.cz. For a detailed description of the SmartGate firmware upgrade refer to the section devoted to the PC programming tool.

Packing List

SmartGate delivery contains the following items:

Item	Number of Pieces
SmartGate	1 pc
Antenna for direct connection	1 pc ¹⁾
Magnetic Antenna with coax cable	1 pc ¹⁾
Supply adapter	1 pc
Telephone cable	2 pc
PC-connection serial cable	1 pc
SMS sending input connector	1 pc
Dowels	2 pcs
Screws	2 pc
CD-ROM with User Manual and software	1 pc ²⁾
Quick Installation Guide + mounting pattern	1 pc
Warranty certificate	1 pc

Notes:

- 1) *The delivery includes an antenna to be connected directly to the SmartGate SMA connector. An antenna with a cable should be used when GSM signal is poor or in case of interference with other devices.*
 - 2) *Enclosed software:*
 - *SmartGate PCManager for parameters programming.*
 - *SmartGate SMSgateway for easy SMS sending and receiving.*
 - *SmartGate Driver for PC.*
 - *User Manual in pdf format.*
 - *Lists of AT Commands for SIEMENS GSM modules.*
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1. SmartGate purpose

1.1. Basic Functions

- The primary purpose of SmartGate is to transmit voice between GSM network and attached phone terminals. You can connect terminal with FXO interface (trunk line of PBX, phone set, answering machine etc.) to FXS interface on SmartGate (connector with phone icon) and terminal with FXS interface (extension line of PBX) to FXO interface on SmartGate (connector with crossed out phone icon).
- You can establish data connections (GPRS, CSD) and send/receive SMS using SmartGate in combination with a PC and appropriate software.
- You can send an SMS to a pre-programmed number using the SMS sending input.
- Analogue fax transmission on some models.

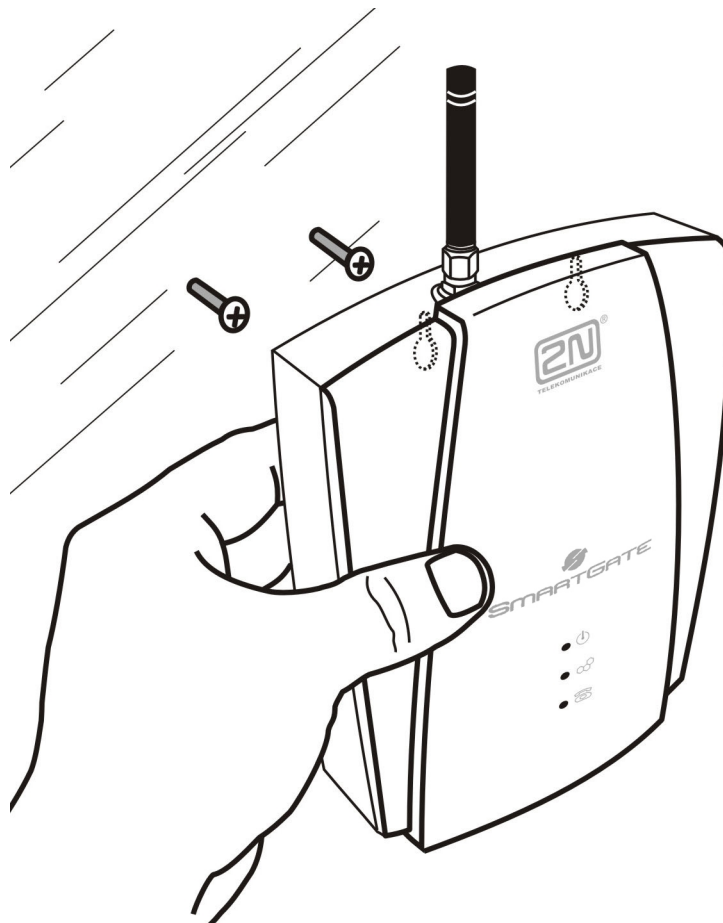
1.2. Advantages of SmartGate Use

- **Call cost cutting** – the calls are routed to GSM or analog network according to their number prefix. Route all GSM calls from PBX to SmartGate to save a lot on PSTN – GSM calls.
- **Easy installation** – you can easily program SmartGate as you need with enclosed SW.
- **You get all you need in the delivery** – your SmartGate delivery contains all you need to operate the system (the power supply adapter, telephone cables, PC serial cable, SMS input connector, CD-ROM with software).
- **Solution for sites without telephone lines** – such as mountain chalets, exhibitions, conferences, etc.
- **DialThru technology** – all your calls will be routed most cost-effective way.
- **ME – Mobility Extension** – you never miss an incoming call from analog network. Incoming call will ring on connected phone and on your mobile phone too.
- **CLIP** - SmartGate is equipped with the FSK-based CLIP feature, so if a terminal capable of receiving the CLIP is used you know the caller's number.
- **Quick data connection** – SmartGate transmits data using the high-speed GPRS connection (GPRS class 10, max. 85.6 kbps).
- **SMS sending input** – simply send an SMS to a pre-programmed number by closing the contact. Recommended for easy supervision, simple securing, etc.
- **Radiation hazard minimization** – you are not exposed to a direct effect of the antenna RF electromagnetic field while telephoning as opposed to mobile telephones.
- **Full GSM coverage** - SmartGate is available as tri-band for European markets (900, 1800 and 1900MHz), and as tri-band for the American market (850, 1800 and 1900MHz).

2. Installation

2.1. Proper Location

- SmartGate is designed for vertical mounting on suspension holes (use the mounting pattern). This position is the best for signal reception because a vertical antenna is used. SmartGate can be operated in the horizontal position too where the GSM signal is good or with antenna connected on coax cable.
- Install SmartGate with respect to the GSM signal strength – check the signal strength using the PCManager.
- Place SmartGate out of range of sensitive devices and human bodies for electromagnetic interference reasons.
- SmartGate can disturb other telecommunication systems. Place phone lines and connected terminals and PBX's faraway from antenna.
- For the allowed range of operating temperatures refer to the “*Technical Parameters*”.
- It is impossible to operate SmartGate on sites exposed to direct solar radiation or near heat sources.
- SmartGate is designed for indoor use. It may not be exposed to rain, flowing water, condensed moisture, fog, etc.
- SmartGate may not be exposed to aggressive gas, acid vapours, solvents, etc.
- SmartGate is not designed for environments with high vibrations such as means of transport, machine rooms, etc.



2.2. External Antenna Connection

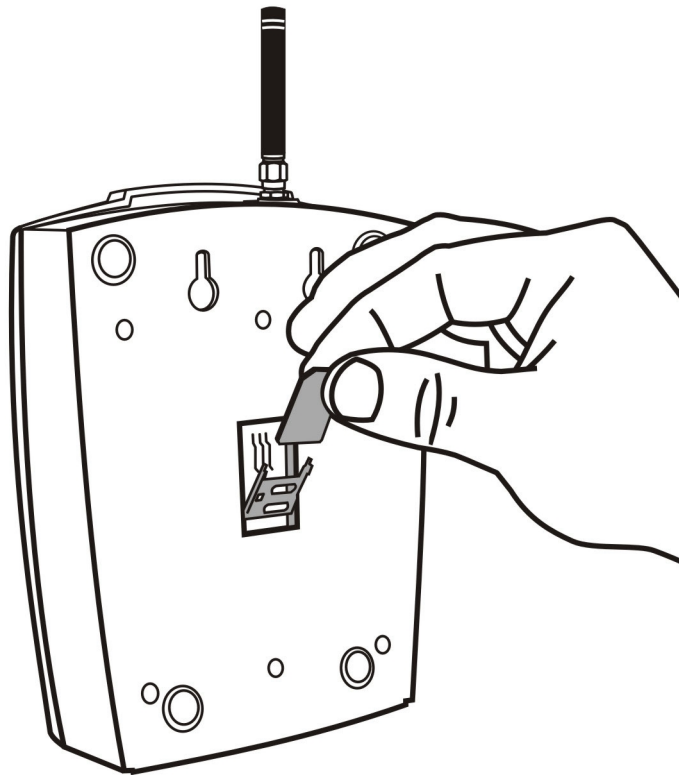
Screw the antenna enclosed into the SMA antenna connector. Tighten the antenna connector gently with your hand - never use spanner!

The antenna for direct connection has a sufficient gain for trouble-free operation in normal conditions. If the GSM signal is poor, in case of voice disturbance, or if you want to place your antenna separately from SmartGate, you can use an antenna with an SMA-connector terminated coax cable. The antenna should be mounted vertically.

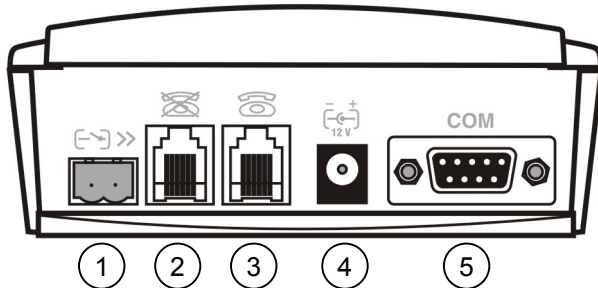
For antenna and cable parameters see the “*Technical Parameters*”.

2.3. SIM Card Installation

Open the SIM card holder on SmartGate’s backside, insert the SIM card and close it properly. Select the required GSM provider and SIM card services, such as call forwarding, call barring, preferred networks, SMS service centre, etc. in your mobile phone before inserting your SIM card in SmartGate.



2.4. Connector description



- ① SMS sending input
- ② Telephone line – interface FXO
RJ 11, 6/2
- ③ Telephone line – interface FXS
RJ 11, 6/2
- ④ Power supply connector
DC Jack 5,5/2,1mm
- ⑤ RS232C serial line
D-Sub 9 pins

2.5. Telephone Lines Connection

2.5.1. DialThru gateway – basic connection

Phone set is normally connected to extension line of PBX. Wire up SmartGate between phone set and PBX. Link extension line of PBX to FXO interface and phone set to FXS interface on SmartGate. Optionally you can connect analogue fax (special model of SmartGate).

2.5.2. Gateway for extension line of PBX

Link free extension line of your PBX to FXO interface on SmartGate. FXS interface remains unconnected.

2.5.3. Gateway for trunk line of PBX

Link free trunk line of your PBX to FXS interface on SmartGate. Program PBX to route all GSM calls to SmartGate. Incoming calls from GSM network will be routed to PBX.

You can connect a standard telephone, answering machine or any other FXO-interface terminal to SmartGate. Outgoing calls from phone will be routed to GSM network, incoming calls from GSM will ring on the phone. Optionally you can connect analogue fax (special model of SmartGate).

SmartGate is equipped with the FSK-based CLIP and so it is advantageous to connect a terminal that is able to display or process the CLI. You must activate the function on SmartGate.

2.5.4. Gateway for both, trunk and extension, lines of PBX

SmartGate is very flexible thanks to his three routing tables. You can connect trunk and extension lines of one PBX to proper connectors on SmartGate. You can program the complex as follows: outgoing calls from PBX will be routed through trunk line to GSM network. Incoming calls from GSM will be routed to extension line of PBX. This configuration is suitable for PBX's with no capability of dial-in on trunk lines.

2.6. Power Supply Connection

SmartGate is powered with 10-16V DC. Where a source other than the included power supply adapter is used, the voltage range and polarity shown on the SmartGate power supply connector have to be maintained. For backup power supply you can use EnergyBank – backup source with accumulators.

Do not power on the supply until the antenna is connected to SmartGate to avoid the GSM module damage.

2.7. SMS Sending Input Connection

You have got a special connector for easy connection to SmartGate. The connector is equipped with screwing clamps to connect wires from a switching contact (device to be monitored). The other connector end can be connected to the respective SmartGate panel connector.

The input is designed for the contact of relay connected between the input pins. The input is activated by contact closing (pin interconnection).

A transistor switch or logic signal can be used too. The pin near the telephone line connector is connected to GND of the device the second one is active. Please, respect the loop current polarity. There is over-voltage protection up to +12V DC there.


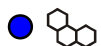

2.8. PC Connection

You have got a serial cable for PC connection. It is a modem cable where all of the 9 pins are 1:1 interconnected – in case you want to use another cable.

If you use a longer cable, make sure it works properly. There may occur errors at higher transmission rates.

3. SmartGate Status Indication

3.1. Indication LEDs

Name	Meaning
 Power supply	<ul style="list-style-type: none"> • Light = SmartGate is powered. • Flashes once in 2s = HW error, contact the manufacturer.
 GSM network	<ul style="list-style-type: none"> • Light = registered into GSM network • Flashes once in 1s = not registered, SIM card inserted • Flashes once in 3s = not registered, SIM card not inserted • Flashes 4 times quickly = enter your PIN • Flashes 8 times quickly = enter your PUK • Flashes quickly continuously = all functions are blocked. Your SIM doesn't correspond to the GSM operator lock
 Telephone line	<ul style="list-style-type: none"> • No light = standby <p>Orange for FXS interface:</p> <ul style="list-style-type: none"> • Flashes quickly = line off-hook or ringing • Light = call FXS – GSM • Flashes once in 3s = data connection in progress <p>On FAX models:</p> <ul style="list-style-type: none"> • Flashes 2 times then pause = fax connection in progress; after power on signalize need of FW upgrade. • Flashes 3 times then pause = fax connection in progress <p>Green for FXO interface:</p> <ul style="list-style-type: none"> • Flashes quickly = line off-hook or ringing • Light = call FXO – GSM <p>Alternately orange and green:</p> <ul style="list-style-type: none"> • Quickly = ringing from FXO is connected to FXS interface • Slowly = call FXS – FXO

3.2. Telephone Line Tones

3.2.1. Status Tones

The GSM gateway sends tones to the telephone line to indicate the line status. The tone frequency is 425 Hz in initial setting. Frequency is programmable; it is possible to set up double frequency tones.

Dial tone: Continuous tone, or — — (morse A) according to setting

- SmartGate is ready to receive dialing.

Ringing tone: ——— ———

- The called subscriber's telephone is ringing.
- The GSM network or connected PBX transmits this tone.

Busy tone: — — — — — , programmable cadency

- In case of call routing to GSM network SmartGate generate busy tone in any of the following cases:
 - The SIM card has not been installed.
 - SmartGate is not registered to GSM network.
 - SmartGate is registered into a foreign network but roaming is disabled.
 - The called subscriber line is busy.
 - The called subscriber hangs up (disconnection).
 - The called number has too many digits (more than 30).
 - The called number is barred.
- In case of call routing to SmartGate's FXO interface SmartGate generate busy tone in any of the following cases:
 - Line is not connected. There is no current on the line.
 - The called number has too many digits (more than 30).
 - The called number is barred.
 - If the called subscriber line is busy or called subscriber hangs up, busy tone is generated by PBX.

Dialing end signaling: —

- Dialing reception has been terminated. Connection is being established.

PIN tone: -----

- Enter the PIN code.
- This tone is transmitted upon power up if the PIN has to be entered manually.

PUK tone: -----

- Enter the PUK code.
- This tone is transmitted upon repeated wrong PIN entering attempts. SIM card is blocked.

4. SIM Card PIN protection

If a SIM card is PIN-protected and the PIN is not programmed in SmartGate, GSM LED indicates the state and the PIN tone is transmitted on telephone line.

4.1. PIN Entering by PCManager

Like other parameters, the PIN code can be entered using a PC programming tool. The PIN will be entered automatically upon every SmartGate power up.

4.2. PIN Entering via Telephone Line

PIN entering via a telephone line connected to FXS interface:

1. Hook off the phone, you can hear the PIN tone.
2. Enter the PIN using the DTMF. You can cancel the wrong PIN by entering of a , or you can hang up before sending a .
3. To confirm enter a .
4. If you hear the busy tone in a while (a few seconds), you have entered the PIN correctly. Hang up and wait for registering to the GSM network.
5. If you hear the PIN tone again in a while, you have entered a wrong PIN. Re-enter the PIN correctly.
6. If you hear the PUK tone in a while, you have entered a wrong PIN and the SIM card is blocked. Use the mobile phone to unblock the SIM card.

PIN entering via a telephone line connected to FXO interface if SmartGate is used as gateway for extension line of PBX:

1. Dial the SmartGate's extension number on your PBX. SmartGate detects ringing and after off hook generates the PIN tone.
2. Enter the PIN using the DTMF. You can cancel the wrong PIN by entering of a , or you can hang up before sending a .
3. To confirm enter a .
4. If SmartGate after a while (a few seconds) hangs up, you have entered the PIN correctly.
5. If you hear the PIN tone again in a while, you have entered a wrong PIN. Re-enter the PIN correctly.
6. If you hear the PUK tone in a while, you have entered a wrong PIN and the SIM card is blocked. Use the mobile phone to unblock the SIM card.

A correctly entered PIN is stored in SmartGate's memory as if you had programmed it using the PCManager. The PIN will be entered automatically upon every SmartGate power up.

4.3. Automatic PIN Entering

You need not enter the PIN upon power up if it is stored in SmartGate – it is entered automatically. This function is useful in case of power failure; SmartGate is operable in a short time after power recovery without any intervention by the operating staff.

Caution! One PIN entering option is exhausted by the attempt to enter the PIN automatically upon SIM card or PIN change. If wrong, the automatically entered PIN is cleared from the internal memory to avoid another false attempt upon next power on. There are still two manual PIN-entering attempts after such unsuccessful automatic entering. To prevent the unsuccessful automatic PIN entering, delete or program properly the SmartGate PIN using the PCManager in the case of SIM card change.

5. Voice function

Outgoing and incoming call establishing procedures is for illustration described for analog phone connected to FXS interface and extension line of PBX connected to FXO interface on SmartGate. In case of other equipment connection, please check SmartGate's function by connecting a phone.

Suppose that a SIM card has been inserted, the PIN code entered or not required, the antenna connected and SmartGate registered to GSM network – the GSM network LED is permanently on and you can hear the dial tone upon line off-hook.

5.1. DialThru gateway

Extension line of PBX is connected to FXO interface and phone is connected to FXS interface on SmartGate.

5.1.1. Outgoing call on FXS interface

1. Hook off the telephone, you can hear the dial tone and the Line LED starts flashing.
2. Dial the required subscriber number. SmartGate receives tone dialing (DTMF) by default. If your telephone transmits pulse dialing only, program SmartGate to receive pulse dialing. The delay between dialed digits may not exceed 5 s (programmable parameter). The number is evaluated as complete after this timeout.
3. A short delay follows the last-dialed digit for SmartGate to await further dialing. Then, the dialing end is signaled and connection is established.
4. Prefix of dialed number is compared with filled rows of FXS routing table. The call is rejected, routed to GSM network or to FXO interface according to the routing table.
5. If the called subscriber is available, you can hear the ringing tone. If not, you can hear the busy tone or any of the GSM provider's messages.
6. When the called subscriber answers the call, a call is established. The Line LED is permanently on during the call (Orange for calls to GSM. Green-Orange alternate for FXS-FXO calls).
7. Hang up to terminate the call. The Line LED goes off. If the called subscriber hangs up first, you can hear the busy tone.

5.1.2. Incoming call from GSM network

1. The CLI is compared with filled rows of GSM routing table. The call is rejected, routed to FXS interface – connected phone, or to FXO interface according to the routing table. Routing to FXO interface isn't usually used in case of DialThru gateway.
2. Ringing on FXS interface signals incoming call. The Line LED flashes during ringing. If programmed so, SmartGate transmits the CLIP by FSK between the first and second rings. Advanced telephone sets are able to display the CLI.
3. Hook off the phone to establish the call. The Line LED is permanently on during the call.
4. Hang up to terminate the call. The Line LED goes off. If the called subscriber hangs up first, you can hear the busy tone.

5.1.3. Incoming call on FXO interface

1. SmartGate detects a ringing signal and immediately interconnects it to FXS interface – the phone starts to ring.
2. The CLIP transmitting must provide connected PBX.
3. If you hook off the phone the call is established.

5.1.4. Automatic Call ("BabyCall")

If the BabyCall function is enabled on FXS interface, a pre-programmed timeout is counted down after off-hook. If you don't start dialing within this timeout, SmartGate signals dialing end and starts to establish a call to the pre-programmed number using GSM network automatically – from now SmartGate behaves as if a standard outgoing call to GSM had been established. Any dialing during the BabyCall timeout cancels this function and a standard outgoing call can be made.

5.1.5. ME- Mobility Extension

ME function takes place during ringing on FXS interface if SmartGate is programmed as DialThru gateway.

Fill in telephone number for ME function and number of rings to ME function start.

1. SmartGate detects a ringing signal and immediately interconnects it to FXS interface – the phone starts to ring.
2. If there is no call connection before the pre-programmed number of rings, SmartGate simultaneously establishes call to GSM network. Some timeout take place between GSM call establishing start and ringing of mobile phone.
3. As long as SmartGate detects ringing on FXO interface, connected analog and GSM phones ring.
4. You can receive the call on analog line as well as on your mobile phone.
5. During call received on mobile phone you can send FLASH to PBX, for special PBX functions, by preprogrammed DTMF code.

If you want repeatedly temporarily disable and afterwards enable the ME function, fill in Password for ME activation/disabling. If password is filled in:

1. Hook off the phone.
2. For temporarily disabling the function dial the password and confirm by .
- For activation the function dial the password and confirm by .
3. Hang up.

5.1.6. Tariff pulses 16 or 12 kHz

SmartGate has tariff pulse transmitter on FXS interface. You can use tariff pulses for outgoing call pricing. SmartGate offer pseudotariff only – tariff metering doesn't correspond to real price of call, tariff pulses are transmitted according to programmed parameters and call duration. You must program specific parameters in FXS routing table to set tariff metering for different prefixes of dialed numbers. Tariff metering is transmitted only during calls to GSM network. Connected PBX must provide the tariff metering during calls to FXO interface.

You can also program SmartGate to transmit tariff pulses as call connect/disconnect signaling if your PBX cannot receive telephone line polarity reversal signaling.

5.2. Gateway for extension line of PBX

Extension line of PBX is connected to FXO interface on SmartGate. FXS interface remains unconnected.

You have to program parameter “FXO call route to” for proper function on FXO interface. You can fill in some rows in FXO routing table to reject given calls, for automatic call routing etc.

Fill in GSM routing table to route an incoming GSM calls to FXO interface.

It is necessary to set up conditions for call-disconnect detection from PBX. If SmartGate detects busy tone or continuous tone from PBX, it disconnects the established GSM call.

5.2.1. Outgoing call on FXO interface

1. SmartGate detects a ringing signal from PBX and, if it is possible to establish GSM call, it hooks off the line after preprogrammed number of rings. SmartGate transmits dial tone and green LED for line starts flashing.
2. Dial the GSM subscriber number using DTMF. The delay between dialed digits may not exceed 5 s (programmable parameter). The number is evaluated as complete after this timeout.
3. A short delay follows the last-dialed digit for SmartGate to await further dialing. Then, the dialing end is signaled and connection is established.
4. Prefix of dialed number is compared with filled rows of FXO routing table. The call is rejected or routed to GSM network according to the routing table.
5. If the called subscriber is available, you can hear the ringing tone. If not, SmartGate hangs up.
6. When the called subscriber answers the call, a call is established. The green Line LED is permanently on during the call.
7. Hang up to terminate the call. PBX sends busy tone to SmartGate’s subscriber line, SmartGate detects it and disconnects the GSM call.

5.2.2. Incoming call from GSM network

1. The CLI is compared with filled rows of GSM routing table. The call is rejected, or routed to FXO interface – extension line of PBX according to the routing table.
2. SmartGate hooks off the line. If there is filled in the “Dial in” parameter for given CLI, SmartGate dials it using DTMF.
3. The GSM subscriber hears the ringing tone from PBX if the automatic dial in function was applied, if not he hears dial tone from PBX and he can dial required extension himself.
4. The call termination is the same as in case of outgoing call.

5.3. Gateway for trunk line of PBX

Outgoing and incoming call establishing procedures is for illustration described for analog phone connected to FXS interface. The rules for call establishing in case of trunk line connection are the same, you have to program your PBX to route GSM calls to SmartGate. We strongly recommend to check SmartGate's function by connecting a phone in case of interconnection with PBX trunk line.

5.3.1. Outgoing call on FXS interface

1. Hook off the telephone, you can hear the dial tone and the orange Line LED starts flashing.
2. Dial the required GSM subscriber number. SmartGate receives tone dialing (DTMF) by default. If your telephone transmits pulse dialing only, program SmartGate to receive pulse dialing. The delay between dialed digits may not exceed 5 s (programmable parameter). The number is evaluated as complete after this timeout.
3. A short delay follows the last-dialed digit for SmartGate to await further dialing. Then, the dialing end is signaled and connection is established.
4. Prefix of dialed number is compared with filled rows of FXS routing table. The call is rejected, or routed to GSM network according to the routing table.
5. If the called subscriber is available, you can hear the ringing tone. If not, you can hear the busy tone or any of the GSM provider's messages.
6. When the called subscriber answers the call, a call is established. The orange Line LED is permanently on during the call.
7. Hang up to terminate the call. The Line LED goes off. If the called subscriber hangs up first, you can hear the busy tone.

5.3.2. Incoming call from GSM network

1. The CLI is compared with filled rows of GSM routing table. The call is rejected, or routed to FXS interface – connected phone according to the routing table.
2. Ringing on FXS interface signals incoming call. The orange Line LED flashes during ringing. If programmed so, SmartGate transmits the CLIP by FSK between the first and second rings. Advanced telephone sets are able to display the CLI.
3. Hook off the phone to establish the call. The Line LED is permanently on during the call.
4. Hang up to terminate the call. The Line LED goes off. If the called subscriber hangs up first, you can hear the busy tone.

6. FAX function

Sending fax message to and from PSTN

FAX call to PSTN routed from FXS to FXO interface (DialThru gateway) works on every model and needn't any other settings.

GSM fax message

SmartGate with fax converter has ability to send and receive GSM fax messages using analogue fax Group 3 connected to telephone line FXS. The fax communication service must be registered with your GSM operator.

Sending a fax message to GSM

Before destination number dial code ***01***, to inform the Gateway, that the call is a fax call.

Receiving a fax message from GSM

It is recommended to activate separate fax number on your SIM card – **multinumbering scheme**. Fax messages should be routed to this number, the message will be than received as fax message automatically.

If the fax number is not activated, the call from analogue network routed to your GSM number is not detected as fax call and is routed via the analogue channel of GSM network and the connection is not successful. In this case it is possible to activate fax engine in the gateway to receive the next call as fax call: Hook off, dial the code ***9901#** and hook on again. After this the gateway is prepared to receive a fax call from analogue network. After receiving the fax this setting is suspended.

7. SMS Sending Input

This universal input is intended especially for reporting alarm or error statuses of any equipment provided with the appropriate contact (a relay contact, e.g.).

By activating this input (electric input pin interconnection) you send one SMS to one pre-programmed telephone number.

Caution! Do not use in life-supporting or property-protection applications because of the character of SMS service and SmartGate equipment. The manufacturer shall not be liable for health and property damage incurred as a result of SMS sending failure.

8. COM – Serial Interface

The complete serial interface RS-232C on a 9-pin connector is identical with any external modem.

The transmission rate ranges from 1200 to 115200 bps (SmartGate supports autobauding, i.e. responds to an AT command at a rate identical with the AT command transmission rate, and retains set on this rate). The transmission setup must be 8 bits, no parity and one STOP bit (8N1).

SmartGate's central processor uses the same interface for establishing calls and so it must have the possibility to block an external serial interface-all PC SW must provide transmission hardware flow control (HW handshaking).

COM can be used for:

- Programming and monitoring;
- CSD PC-PC data transmission;
- CSD or high-speed GPRS connection to the Internet;
- SMS sending and receiving.

8.1. Programming, Monitoring

Install the SmartGate PCManager software available on the included CD-ROM into your PC.

The program is designed for SmartGate parameters programming. It can read configuration data from the memory and store them in SmartGate. Moreover, all parameters can be saved in your PC file for backup or saving into another SmartGate system.

The SmartGate PCManager contains an easy monitoring tool too. With this tool you can identify the GSM provider's name, signal strength, GSM module, SIM card, and so on during SmartGate operation.

8.2. CSD PC-PC Data Transmission

The CSD mode provides data transmission in the GSM network at the maximum transmission rate of 14400 bps. It works like a classic connection of two modems (AT commands ATD, ATH, ATA, etc.). Connection can be made with another GSM modem or a PSTN modem.

Caution! Data calls and fax calls from the PSTN come as voice calls (the telephone line on SmartGate rings) because an analog network is unable to distinguish a modem/fax call. Therefore, it is necessary to have a special telephone number for incoming data and fax calls on the SIM card different from voice call numbers (Multi-numbering scheme). The GSM network identifies a call incoming to this number as a data/fax call and lets the COM serial interface ring.

8.3. CSD or High-Speed GPRS Data Connection to Internet

To connect to the Internet, install the faxmodem driver from the SmartGate CD-ROM first. Another possibility is to use the GSM provider's installation wizard in case it supports the SIEMENS GSM module installed in SmartGate (SIEMENS MC45/46 or MC55/56).

The installation wizard usually configures the telephone connection of the network too. If you use manual installation, you have set it properly. Ask your GSM provider for Internet connection instructions because they can be different for each provider (especially the telephone number to be dialed, DNS, etc.). It is necessary, for example, to set the APN in modem extra settings in the GPRS mode:

Example: `at+cgdcont=1,"IP","internet.t-mobile.cz"`

Caution! GSM providers mostly specify the ***99#** number to be dialed for GPRS connection in their instructions. SIEMENS GSM modules require the ***99***1#** format.

8.3.1. CSD or GPRS Data Connection?

The maximum CSD transmission rate is 14400 bps. GSM connection is reserved for the whole time of connection and calls are charged according to the connection time. The CSD mode can provide data connection of two PCs.

SmartGate is equipped with GSM modules providing GPRS class 10 (4+2 timeslots), which means that it is able to transmit data into a PC at the rate of 85600 bps and at half the rate towards the GSM network. The GPRS cannot be used for connection of two PCs. It can only provide connection with an APN – e.g. the Internet. Most GSM providers charge GPRS connections according to the volume of data transmitted or by a lump sum and so the GPRS is suitable for long-time connection with occasional data transmissions.

8.4. SMS Sending and Receiving

It is possible to send and receive SMS units using appropriate AT commands. There are a number of PC programs that are based on this principle. Install SW designed for SIEMENS GSM modules (SIEMENS mobile telephone SW can also be used). You can send and receive SMS even during SmartGate voice calls.

8.5. Combination of COM Traffic with Voice Calls

As already mentioned, SMS transmission can be made even during telephone calls. The SMS program is only blocked temporarily during outgoing call to GSM establishing and incoming call from GSM ringing.

The same applies to PCManager monitoring. A message announcing that SmartGate is blocked is displayed during voice call establishing.

No voice call to GSM can be made during CSD data transmission.

Outgoing and incoming calls even to GSM can be made during GPRS connection. The GPRS connection remains active during the whole call to GSM but no data can be transmitted (SmartGate is a GPRS terminal of class B). Once the call is terminated, data transmission is recovered immediately.

8.6. List of Supported AT Commands

There are original files related to SIEMENS GSM modules in the PDF format on the SmartGate CD-ROM.

Caution! Since the GSM module is primarily used by the SmartGate central processor for voice calls, use AT commands carefully. You might misconfigure the GSM module thus making SmartGate inoperative. To solve most of these problems, switch SmartGate off and on again to make the central processor execute full initialization of the GSM module.

Do not use particularly:

ATQ1	AT+CMUT=	AT^SNFI=
ATS3=	AT+CMUX=	AT^SNFM=
ATS4=	AT+CSCS=	AT^SNFO=
ATS5=	AT^SAIC=	AT^SNFPT=
ATV0	AT^SM20=	AT^SNFS=
AT&C0	AT^SMSO=	AT^SNFV=
AT+IPR=	AT^SNFA=	AT^SNFW=
AT+CFUN=	AT^SNFD=	

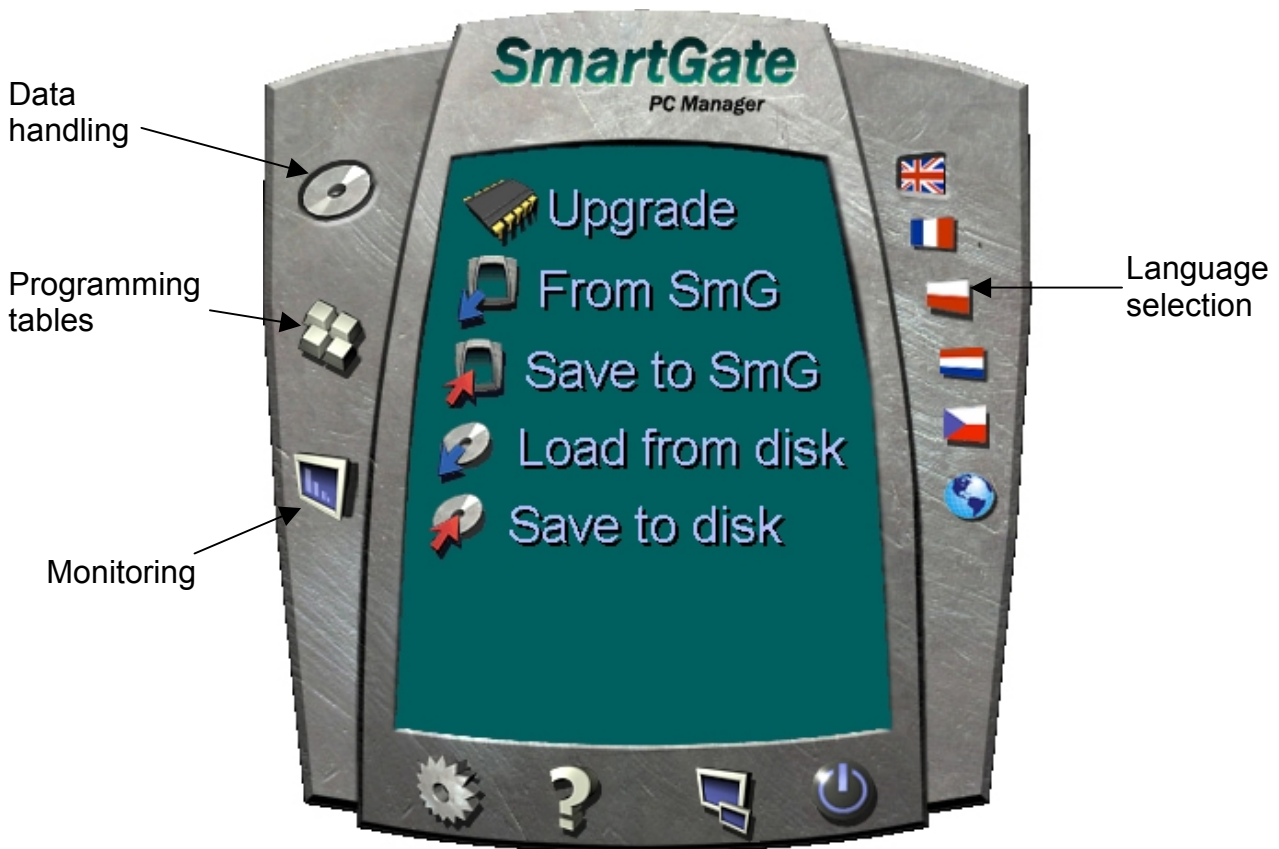
9. SmartGate Parameter Programming

Most of SmartGate's parameters have such default values that meet most users' demands and need not be changed. Usually you have to program routing tables according to SmartGate usage. Use a PC with the PCManager installed for SmartGate's parameter programming.

9.1. PC based Programming

For programming, connect SmartGate to a PC with a serial cable and make sure that the SmartGate PCManager is installed. Programming is intuitive and easy. All items and parameters are accompanied with texts hints - just point at anything with the mouse cursor.

SmartGate data uploading and storing, including firmware upgrade, are executed in a special mode, in which SmartGate waits for about 3s after power up (all LEDs are on). If instructed so by the PCManager during this timeout, SmartGate remains in this mode as long as it is necessary. If SmartGate is not reset after the PCManager is terminated, switch the system off and on again.



9.1.1. Basic Programming Instructions

1. Run the PCManager and select the language for displaying texts on the right-hand side.
2. Click on the CD-ROM icon for data handling on the left-hand side.
3. Load data from SmartGate – if SmartGate is not in its special programming mode, you are invited to switch SmartGate off and on again.
4. Click on the programming table icon on the left-hand side.
5. The parameters are arranged according to their functions in the tables. Set all parameters you want to change. If you point at a parameter with the mouse, help is displayed.
6. Click on the CD-ROM icon again for handling data.
7. Save data into SmartGate – if SmartGate is not in its special programming mode, you are invited to switch SmartGate off and on again.

9.1.2. Further Data Handling Options

In addition to the SmartGate memory, settings can be saved in a PC file and reloaded into the PCManager. This is recommended for backing up of current configurations or saving the same configuration in another SmartGate unit.

Caution! The table Security includes the PIN code and service password. These parameters have a special handling. They are not saved in a PC file for security reasons. If you load a PC file into the PCManager and then into SmartGate, the PIN and service password should not change unless you change them manually before saving.

Caution! All tables are filled-in with default values after PCManager start. It is recommended to load data from SmartGate before parameters programming and saving. If you only save data after PCManager start, all parameters except the PIN and service password in the SmartGate memory will have default values.

Caution! The PIN and service password can only be modified either manually or by full initialization.

9.1.3. Upgrade

The manufacturer responds to clients' requirements with periodical firmware updating. The current SmartGate firmware, PCManager and User Manual are available on www.2n.cz. The latest firmware version is always included in every new PCManager installation.

Upgrading procedure:

1. Run the PCManager, select the language for displaying texts on the right-hand side.
2. Click on the CD-ROM icon for data handling on the left-hand side.
3. Click on the upgrade – if SmartGate is not in its special programming mode, you are invited to switch SmartGate off and on again.
4. If there is more than one file in the PCManager directory, choose one of them. The upgrade takes place automatically. **Do not switch your PC or SmartGate off during the process of upgrading!**

Caution! The PCManager checks the software version in SmartGate and the upgrade file. If the version in the file is new, everything is all right. An identical or earlier software version is stored in SmartGate too but the PCManager requires confirmation to be on the safe side.

Caution! With regard to potential SmartGate memory data structure change, the PCManager and SmartGate are "matched" according to versions. A PCManager version can be used for SmartGate programming that differs from the SmartGate version by a letter following the version number (e.g.1.00A). The PCManager itself identifies this fact and notifies you.

9.1.4. Monitoring

Monitoring is active when SmartGate is in operation and registered to the GSM network. If SmartGate is not registered to GSM, the COM is blocked and no monitoring can be made.

This simple informative function helps you identify:

- The GSM module type and IMEI ID;
- The SIM card IMSI ID and selected SMS service centre necessary for SMS sending;
- The GSM provider's name and signal strength received by SmartGate - this information helps you find the optimum signal location (the information is updated in 10s intervals);
- The SmartGate line status – standby, outgoing call, incoming call including telephone number. The COM is locked during dialing and incoming call ringing, so the PCManager reports COM blocking.



9.2. Parameter Tables

All programmable parameters are listed in this section. Each parameter is accompanied with the unit used, description of SmartGate's behavior, setting options, setting step and default value (value after initialization). Identical texts are displayed as help hints in PCManager program.

9.2.1. Telephone interface FXS parameters

Type of dialing

Select the dialing type to be received by SmartGate on the FXS interface. SmartGate accepts only the selected type of dialing, ignoring the others.

Setting options:

DTMF -SmartGate receives tone dialing only.

Pulse -SmartGate receives pulse dialing only

Default setting: DTMF

Timeout for dialing end recognize [s]

Timeout during which SmartGate waits for further digits to be dialed. It starts to establish connection when this timeout passes.

Setting options: 1-255 s

Setting step: 1 s

Default setting: 5 s

Minimal On Hook [ms]

The minimum line current break that SmartGate evaluates as hang-up.

Setting options: 100-25500 ms

Setting step: 100 ms

Default setting: 500 ms

Beep after dialing end

Select a beep to signal the end of dialing (beginning of outgoing call establishing).

Setting options: YES/NO

Default setting: YES

Dial tone – frequency [Hz]

Setting of frequency/frequencies of dial tone.

Setting options: 1-3400 Hz

Setting step: 1 Hz

Default setting: 425 Hz

Dial tone - cadence

This tone is generated after Off-Hook in case SmartGate is ready to accept dialing.

Setting options:

- Continuous -SmartGate generate continuous dial tone
- Morse A -SmartGate generate dial tone with 330/330/660/660 ms cadence

Default setting: Continuous

Busy tone – frequency [Hz]

Setting of frequency/frequencies of busy tone.

Setting options: 1-3400 Hz

Setting step: 1 Hz

Default setting: 425 Hz

Busy tone - cadence

Busy tone cadence setting.

Setting options:

- 330/330 ms -cadence 330 ms tone, 330 ms pause
- 200/200 ms -cadence 200 ms tone, 200 ms pause
- 250/250 ms -cadence 250 ms tone, 250 ms pause
- 375/375 ms -cadence 375 ms tone, 375 ms pause
- 500/500 ms -cadence 500 ms tone, 500 ms pause

Default setting: 330/330 ms

Tone after disconnection

If the remote subscriber hangs up first, the SmartGate subscriber can hear the tone selected here.

Setting options:

- Busy -SmartGate transmits the busy tone upon call end.
- Permanent -SmartGate transmits the permanent tone upon call end.

Default setting: Busy tone

Line reversal indication for call in progress

Select call in progress signaling by telephone line polarity reversal on FXS interface. There is voltage of reversed polarity on the telephone line during the whole call.

Setting options: YES/NO

Default setting: NO

Tariff pulse when call starts/ends

Signaling of call start or end by tariff pulse.

Setting options:

- None -SmartGate doesn't send tariff pulse as signaling of call start/end.
- Call end -SmartGate sends tariff pulse when call ends.
- Call start -SmartGate sends tariff pulse when call starts.
- Call start and end -SmartGate sends tariff pulse when call starts and ends too.

Default setting: None

Tariff pulse frequency [kHz]

Tariff pulse frequency setting.

Setting options:

- 16 kHz -SmartGate transmits 16 kHz tariff pulses
- 12 kHz -SmartGate transmits 12 kHz tariff pulses

Default setting: 16 kHz

Ringling signal – frequency [Hz]

Ringling signal frequency setting.

Setting options:

- 25 / 50 Hz -SmartGate rings with 50 or 25 Hz on FXS interface

Default setting: 50 Hz

Ringling signal - cadence

Ringling signal cadency setting.

Setting options:

- 1000/4000 ms - 1 s ring, 4 s pause
- 400/200/400/2000 ms - 400ms ring, 200ms pause, 400ms ring, 2s pause
- 1500/3500 ms - 1,5 s ring, 3,5 s pause
- 2000/4000 ms - 2 s ring, 4 s pause

Default setting: 1000/4000 ms

CLI transmitting

Set this item to enable/disable identification of a telephone line calling from a GSM network. The function can be enabled if you have a device on your telephone line that is capable of receiving FSK according to ETSI standards.

Setting options:

- Disable -SmartGate does not transmit the CLI.
- FSK during ringing -SmartGate transmits the FSK-based CLI according to the ETSI EN 300 659 standard (transmission during ringing).

Default setting: Disable

Replace character + in CLI by

If this parameter is filled, the + character in the international prefix of CLI is replaced by the defined string. The + character can neither be transmitted by the FSK protocol nor dialed by the DTMF from a terminal.

Setting options: 0-4 characters (0-9,*,#)

Default setting: blank

BabyCall number

A number to be dialed for the automatic call function. If this item is blank, the function is disabled.

Setting options: 0-20 characters (0-9,*,#,+)

Default setting: blank

BabyCall timeout [s]

Time between line Off-Hook and automatic call beginning (if enabled). During this timeout SmartGate waits for dialing that cancels the automatic call. You can make standard call if the BabyCall function is enabled.

Setting options: 0-255 s

Setting step: 1 s

Default setting: 0 s

Transmission volume

Volume setting for GSM transmission with a 4 dB step. Setting is common for both FXS and FXO interfaces.

Default setting: medium volume level

Reception volume

Volume setting for GSM reception with a 4 dB step. Setting is common for both FXS and FXO interfaces.

Default setting: medium volume level

9.2.2. Telephone interface FXO parameters**Number of rings before Off-Hook**

If SmartGate is programmed as FXO gateway, parameter sets the count of rings before Off-Hook.

Setting options: 1-255

Step: 1

Default setting: 1

Time for dialing start

If SmartGate is programmed as FXO gateway, parameter defines timeout for first dialing digit. After timeout SmartGate hangs up the line.

Setting options: 1-255 s

Step: 1 s

Default setting: 15 s

Timeout for dialing end recognize [s]

If SmartGate is programmed as FXO gateway, parameter defines timeout during which SmartGate waits for further digits to be dialed. It starts to establish connection when this timeout passes.

Setting options: 1-255 s

Setting step: 1 s

Default setting: 5 s

Type of transmitted dialing

Set type of dialing for automatic dial-in from GSM and for dialing during outgoing call from FXS interface.

Setting options:

DTMF -SmartGate transmits tone dialing
 - -for future use

Default setting: DTMF

Minimal On-Hook [ms]

Parameter defines minimal time of line On-Hook between calls. Set the parameter longer then duration of FLASH on your PBX.

Setting options: 100-25500 ms

Step: 100 ms

Default setting: 1500 ms

Maximal Off-Hook without dialing [s]

Parameter defines maximal time of line Off-Hook before dialing to FXO interface during outgoing call from FXS interface. Set up shorter time then timeout from extension line Off-Hook and dialing receiver disconnection on your PBX. In this case PBX usually changes dial tone to busy tone. If defined timeout passes before dialing, SmartGate shortly hangs up, after that Off-hooks again and then dials.

Setting options: 1-255 s

Step: 1 s

Default setting: 15 s

Beep after dialing end

If SmartGate is programmed as FXO gateway, parameter enables a beep to signal the end of dialing (beginning of outgoing call establishing).

Setting options: YES/NO

Default setting: YES

Dial tone – frequency [Hz]

Setting of frequency/frequencies of dial tone.

Setting options: 1-3400 Hz

Setting step: 1 Hz

Default setting: 425 Hz

Dial tone - cadence

This tone is generated after Off-Hook in case SmartGate is ready to accept dialing.

Setting options:

Continuous -SmartGate generate continuous dial tone
 Morse A -SmartGate generate dial tone with 330/330/660/660 ms cadence

Default setting: Continuous

Busy tone detection

Set number of busy tone periods for detection of call disconnection from your PBX. The "0" setting disables busy tone detection.

Setting options: 0-255

Step: 1

Default setting: 4

Continuous tone detection [ms]

Set duration of constant frequency continuous tone for detection of call disconnection from your PBX. The "0" setting disables continuous tone detection.

Setting options: 0-8900 ms

Step: 35 ms

Default setting: 2030 ms

BabyCall number

If SmartGate is programmed as FXO gateway, parameter defines a number to be dialed for the automatic call function. If this item is blank, the function is disabled.

Setting options: 0-20 characters (0-9,*,#,+)

Default setting: blank

BabyCall timeout [s]

If SmartGate is programmed as FXO gateway, parameter defines time between line Off-Hook and automatic call beginning (if enabled). During this timeout SmartGate waits for dialing that cancels the automatic call. You can make standard call if the BabyCall function is enabled.

Setting options: 0-255 s

Setting step: 1 s

Default setting: 0 s

Transmission volume

See FXS interface parameters.

Reception volume

See FXS interface parameters.

Mobility Extension FLASH code

Fill in DTMF code to enable GSM FLASH function. If SmartGate receive DTMF dialing corresponding to filled code during GSM - FXO call, it generates FLASH to FXO interface.

Setting options: 0-4 characters (0-9,*,#)

Default setting: blank

FLASH length [ms]

Time of current loop interruption (line On-Hook) during FLASH.

Setting options: 100-1500 ms

Step: 100 ms

Default setting: 100 ms

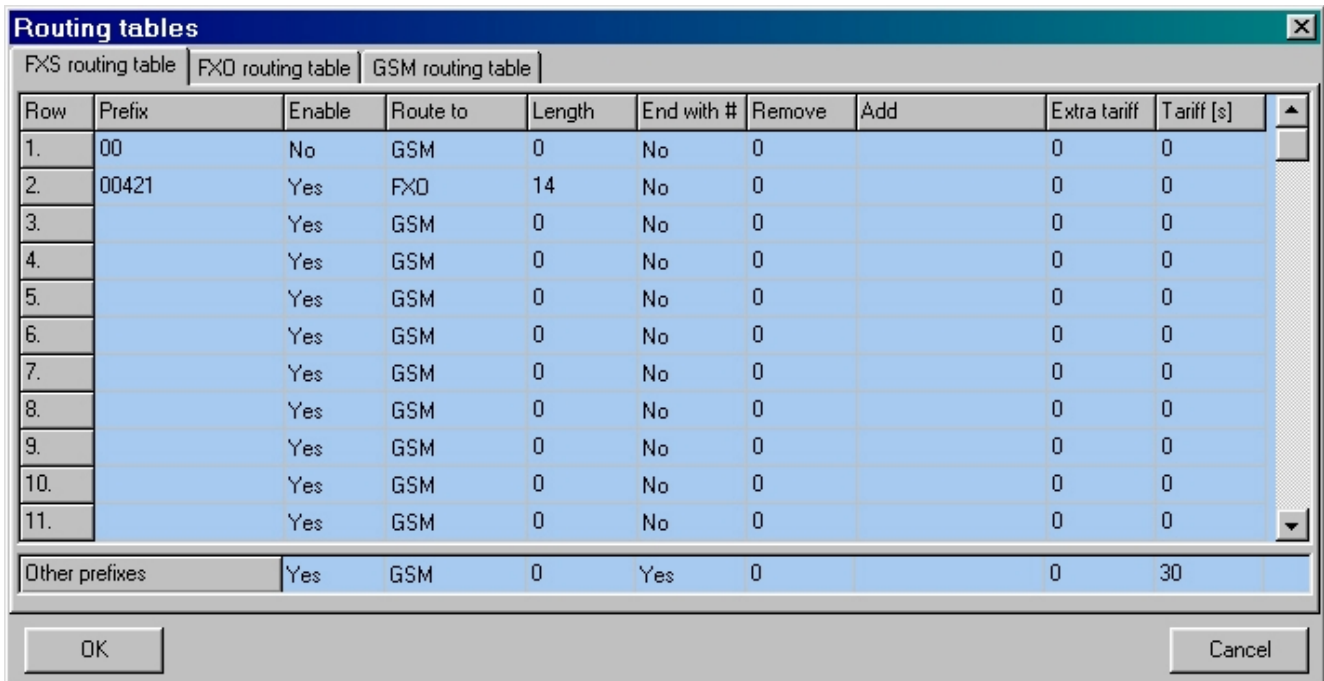
9.2.3. Routing Parameters

All parameters related to the dialed number and call routing are arranged in three routing tables. Each table pertains to one interface: FXS, FXO and GSM.

FXS routing table

According to the prefix of dialed number on FXS interface you can:

- Bar the number to be dialed - the calling subscriber hears the busy tone;
- Route the call to GSM network, or to PBX through the FXO interface;
- Accelerate connection establishing by knowing the number length for the given prefix;
- Accelerate connection establishing by allowing to terminate dialing with a #;
- Modify the number to be dialed by removing and/or adding prefix.
- Set tariff metering for the given prefix.



Row	Prefix	Enable	Route to	Length	End with #	Remove	Add	Extra tariff	Tariff [s]
1.	00	No	GSM	0	No	0		0	0
2.	00421	Yes	FXO	14	No	0		0	0
3.		Yes	GSM	0	No	0		0	0
4.		Yes	GSM	0	No	0		0	0
5.		Yes	GSM	0	No	0		0	0
6.		Yes	GSM	0	No	0		0	0
7.		Yes	GSM	0	No	0		0	0
8.		Yes	GSM	0	No	0		0	0
9.		Yes	GSM	0	No	0		0	0
10.		Yes	GSM	0	No	0		0	0
11.		Yes	GSM	0	No	0		0	0
Other prefixes		Yes	GSM	0	Yes	0		0	30

Every table line includes a phone number prefix (of variable length) and other parameters. The parameters define SmartGate's behavior in case the beginning of the dialed number matches this prefix on the same table row. The table contains 120 rows for up to 120 different prefixes.

There may be exceptions to the rule - a number may start with the same digits but has to be served in a different way. Any table row that starts with the same prefix followed by one or more digits is considered an exception of the line with shorter prefix.

Remember to complete the "Other prefixes" line for a number whose prefix is not found in the table.

An example in the figure shows how to bar all international calls with the exception of calls to Slovakia. Calls to Slovakia are routed through FXO interface and the call is established immediately after 14 digits are dialed. All other calls are enabled and they

are routed to GSM network. Their tariff is one impulse every 30 second and you can accelerate connection establishing by dialing of a # after the dialed number.

Prefix

Dialed number prefix identifying the call type. "Other numbers" line is used for calls with prefixes that are not included in the table.

Setting options: 0-16 characters (0-9,*,#)

Default setting: blank

Call enable

This parameter allows/bars calls with corresponding prefixes.

Setting options: YES/NO

Default setting: YES

Route to

This parameter defines FXS call routing.

Setting options:

GSM -the call is routed to GSM network only

FXO -the call is routed to FXO interface only

GSM, FXO -the call is primary routed to GSM network. In case of GSM network error, it is routed to FXO interface

FXO, GSM -the call is primary routed to FXO interface. In case of FXO interface error, it is routed to GSM network

Default setting: GSM

Number length

The parameter defines the expected length of dialed number. It enables to start dialing into GSM or FXO interface immediately after the last digit is dialed. If the telephone number to be dialed is shorter, a timeout is respected. The "0" setting means that the function is disabled.

Setting options: 0, 3-15

Setting step: 1

Default setting: 0

End with #

This parameter enables to establish the call when a # is received. The # character is removed from the dialed number. If a # should be part of the dialed number, this function cannot be used for the given prefix.

Setting options: YES/NO

Default setting: NO

Remove

The Remove parameter is used for automatic call routing. A defined count of digits (prefix) is removed from the number beginning.

Setting options: 0-20

Setting step: 1

Default setting: 0

Add

The Add parameter is used for automatic call routing. A defined string (prefix) is added to the beginning of the number to be dialed.

Setting options: 0-16 characters (0-9,*,#,+)

Default setting: blank

Extra tariff

Pseudo tariff metering setting (tariff is based on call duration) for GSM calls. Connected PBX must send tariff metering pulses for FXO calls. The Extra tariff parameter defines transmitting of fixed quantity of tariff pulses after call start. This parameter sets minimal call cost.

Setting options: 0-255

Setting step: 1

Default setting: 0

Tariff [s]

Pseudo tariff metering setting (tariff is based on call duration) for GSM calls. Connected PBX must send tariff metering pulses for FXO calls. The Tariff parameter sets the call cost according to call duration. Set how often in seconds do you want to transmit pulses. Smaller number means more expensive call. 0 means not to transmit pulses according to call duration.

Setting options: 0-255 s

Setting step: 1 s

Default setting: 0 s

FXO routing table

Calls from FXO interface are routed according to "FXO calls rote to" parameter. You can set SmartGate as DialThru gateway or as gateway for extension line of PBX.

You can program ME function for the DialThru gateway.

For gateway for extension line of PBX you can fill in the FXO routing table. According to the prefix of dialed number on FXO interface you can:

- Bar the number to be dialed – SmartGate hangs up, the call isn't established;
- Accelerate connection establishing by knowing the number length for the given prefix;
- Accelerate connection establishing by allowing to terminate dialing with a #;
- Modify the number to be dialed by removing and/or adding prefix.

The principle of table function is the same as in the FXS routing table. The call is controlled according to parameters on the row with dialed number prefix match. Remember to fill in the "Other prefixes" line for a number whose prefix is not found in the table.

FXO calls route to

The main parameter for FXO calls routing. You can program SmartGate as DialThru gateway, or as gateway for extension line of PBX.

DialThru gateway:

Incoming ringing is immediately connected to FXS interface. If function ME set, SmartGate starts to establish GSM call to ME number after defined number of rings. Routing table FXO is disabled.

gateway for extension line of PBX:

SmartGate detects incoming ringing and Off-Hook the line after programmed number of rings, if it is possible to make call to GSM. SmartGate generate dial tone and after dialing takes an action according to FXO routing table.

Setting options:

- FXS - DialThru gateway
- GSM - gateway for extension line of PBX

Default setting: FXS - DialThru gateway

ME number

If you program SmartGate as DialThru gateway, fill in telephone number for ME function. SmartGate starts to establish GSM call to ME number after defined number of rings. Then you can receive incoming FXO call on telephone line or in GSM network. Blank parameter disables ME function.

Setting options: 0-16 characters (0-9,*,#,+)

Default setting: blank

Number of rings to ME

If you program SmartGate as DialThru gateway and ME number is filled in, SmartGate starts to establish GSM call to ME number after defined number of rings. Then you can receive incoming FXO call on telephone line or in GSM network.

Setting options: 0-255

Step: 1

Default setting: 1

Password for ME activation / disabling

If you program SmartGate as DialThru gateway and fill in ME number, function ME is active. If you fill in password for ME activation/disabling, you can activate/disable function ME without PC programming.

Off-Hook FXS line and dial PASSWORD plus to disable the function.

Off-Hook FXS line and dial PASSWORD plus to activate the function again.

Setting options: 0-8 characters (0-9)

Default setting: blank

Prefix

Dialed number prefix identifying the call type. "Other numbers" line is used for calls with prefixes that are not included in the table.

Setting options: 0-16 characters (0-9,*,#)

Default setting: blank

Call enable

This parameter allows/bars calls with corresponding prefixes.

Setting options: YES/NO

Default setting: YES

Number length

The parameter defines the expected length of dialed number. It enables to start dialing into GSM or FXO interface immediately after the last digit is dialed. If the telephone number to be dialed is shorter, a timeout is respected. The "0" setting means that the function is disabled.

Setting options: 0, 3-15

Setting step: 1

Default setting: 0

End with

This parameter enables to establish the call when a # is received. The # character is removed from the dialed number. If a # should be part of the dialed number, this function cannot be used for the given prefix.

Setting options: YES/NO

Default setting: NO

Remove

The Remove parameter is used for automatic call routing. A defined count of digits (prefix) is removed from the number beginning.

Setting options: 0-20

Setting step: 1

Default setting: 0

Add

The Add parameter is used for automatic call routing. A defined string (prefix) is added to the beginning of the number to be dialed.

Setting options: 0-16 characters (0-9,*,#,+)

Default setting: blank

GSM routing table

Incoming calls from GSM contain the CLI. According to received CLI SmartGate can do following:

- Reject the call;
- Route the call to FXS or FXO interface;
- Automatic dial in. SmartGate dials preprogrammed PBX subscriber number (for example switchboard operator) to be connected with calling GSM subscriber.

FXS line Off-Hook to DISA timeout [ms]

Timeout between FXS line Off-Hook and automatic dial in according to parameter "Dial in" in the table.

Setting options: 100-25500 ms

Setting step: 100 ms

Default setting: 2000 ms

FXO line Off-Hook to dial-in timeout [ms]

Timeout between FXS line Off-Hook and automatic dial in according to parameter "Dial in" in the table.

Setting options: 100-25500 ms

Setting step: 100 ms

Default setting: 1000 ms

CLI – calling number

Fill in CLI, to route the call according to parameter on the same table line. It is possible to fill in only prefix for group of CLI's. If parameter "Substring" = 0, you must fill prefix as you see it on display of your mobile phone - It means inclusive of + and international prefix if they are included. If parameter "Substring" > 0, SmartGate searches filled prefix as substring of the received CLI, but max. to position given by "Substring" parameter. Positions are counted from zero. See examples in "Substring" parameter hint.

Setting options: 0-16 characters (0-9,*,#,+)

Default setting: blank

Substring

Parameter is used to make filling CLI prefix easier. If parameter "Substring" > 0, SmartGate searches filled prefix as substring of the received CLI, but max. to position given by "Substring" parameter. Positions are counted from zero.

for example received CLI +420603198222 corresponds with settings:

CLI - calling number	Substring
+420603198222	any setting
+420603	any setting
+420	any setting
603198222	4, or more
603	4, or more

Setting options: 0-15

Step: 1

Default setting: 0

Route to

It is possible to route incoming GSM call to FSX or FXO interface, or reject it. Remaining settings are planned to use for CallBack option in future.

Setting options:

FXS	-incoming call is routed to FXS
FXO	-incoming call is routed to FXO
reject	-incoming call is rejected

Default setting: FXS

Dial in

Parameter "Dial in" is used for automatic connection to switchboard operator, or directly to other subscriber. If this parameter is blank, calling person has telephone line fully at disposal and has to dial the subscriber number by DTMF.

Setting options: 0-16 characters (0-9,*,#)

Default setting: blank

9.2.4. SMS Sending Input Parameters

Telephone number for SMS

The telephone number to which an SMS is sent upon SMS input activation. If blank, the function is off.

Setting options: 0-16 characters (0-9,*,#,+)

Default setting: blank

SMS text

The SMS text to be sent to the preset telephone number. If the SMS text is blank, an empty SMS is sent.

Setting options: 0-40 characters

Default setting: blank

Send if activated longer than [ms]

Set the SMS activation time necessary for SMS sending. This parameter prevents SMS sending in the event of short-time activation. If a "0" is selected, SMS is sent immediately upon the input activation.

Setting options: 0-25500 ms

Setting step: 100 ms

Default setting: 0 ms

Timeout after sending [s]

Set the Time of inactivity after SMS sending. During this timeout no SMS is sent even if the SMS input gets activated. This prevents sending multiple SMS units in the case of repeated activation of the input.

Setting options: 0-2550 s

Setting step: 10 s

Default setting: 0 s

9.2.5. GSM & SIM Parameters

GSM operator lock

Provider blocking is set by manufacturer in SmartGate. If SmartGate is blocked to a GSM provider, no other GSM provider's SIM card can be used. If an unacceptable SIM card is used, the GSM module does not register to GSM and the GSM network LED flashes quickly on the SmartGate panel.

CLIR – incognito

Sets the calling line identification restriction (CLIR) for outgoing calls from SmartGate. Attention, before enabling it is necessary to activate this feature by GSM operator, otherwise outgoing calls can be rejected by GSM network.

Setting options:

- According to provider - depending on how the function is selected in the GSM network
 - Activation - ID is not sent.
 - Suppression - ID is always sent.
- Default setting: According to provider

Roaming enable/disable

You can make SmartGate work even if it is registered to a foreign GSM network.

Setting options:

- Disable -The GSM module logs out of a foreign network and attempts to register again in within 5 minutes.
 - Enable -SmartGate works in any GSM network.
- Default setting: Disable

Time period for low credit checking [h]

Set to change time interval between credit checks. If your credit drops under defined value, SmartGate sends SMS "LOW CREDIT". The "0" setting means that the function is disabled.

Setting options: 0-255 h

Step: 1 h

Default setting: 0

Code for credit checking

Credit in prepaid SIM cards is checked by network function, which displays text message on mobile phone display. Code of network function must be terminated with "#" symbol.

ATTENTION - find out if you have to pay for this function. Every check can lower your credit.

Setting options: 0-8 characters (0-9,*,#,+)

Default setting: blank

Minimal credit

Set minimal credit value to send warning SMS "LOW CREDIT". If credit is lower than given value, warning SMS is send after every credit check, until you recharge your SIM card.

Setting options: 0-999

Step: 1

Default setting: 0

Credit value position in received SMS

If there are more numbers except credit value in text answer (e.g. date, time and so on) SmartGate seeks the number corresponding with credit value from given position in text. The seek algorithm skips every non-number character. If credit value is the first number in text you can leave setting 0. If there are other numbers before credit value, set parameter to text position, from which the algorithm will seek.

Setting options: 0-180

Step: 1

Default setting: 0

Telephone number for service SMS

Telephone number for service SMS. The number is common for GGMC SMS and "LOW CREDIT" SMS on prepaid SIM cards.

Setting options: 0-16 characters (0-9,*,#,+)

Default setting: blank

9.2.6. Service Parameters

Hardware version

SmartGate hardware version - for information only (cannot be modified). Must be used for communication with the manufacturer.

Firmware version

SmartGate firmware version - SmartGate central processor program version. The manufacturer can issue upgrades to extend functions. To load new firmware into SmartGate use the Upgrade function. Keep communicating with the manufacturer.

Serial number

SmartGate serial number - for information only (cannot be changed). Must be used for communication with the manufacturer.

GSM operator lock

Refer to GSM & SIM Parameters.

COM enable

With this parameter you can enable/disable the serial interface function. You can disable communication in the operating mode, maintaining the special programming mode after power up.

Setting options: YES/NO

Default setting: YES

Time period for GGMC SMS [h]

Time interval for GGMC SMS sending. GGMC = GSM Gateway Monitoring Centre. The "0" setting means that the function is disabled.

Setting options: 0-255 h

Step: 1 h

Default setting: 0

Telephone number for service SMS

Telephone number for service SMS. The number is common for GGMC SMS and "LOW CREDIT" SMS on prepaid SIM cards.

Setting options: 0-16 characters (0-9,*,#,+)

Default setting: blank

9.2.7. Initialization

All programmable parameters are arranged in tables according to their functions. You can initialize either all parameters at once or one table of parameters.

9.2.8. Security Parameters

PIN – value

Fill in the PIN value for automatic PIN entering upon SmartGate power up. It is applied only if the SIM card is PIN secured. If the given PIN fails to match the SIM, it is deleted automatically. If entered via a telephone line upon SmartGate start, the PIN is stored automatically.

Setting options: 0, 4-8 characters (0-9)

Upon full initialization: blank

10. Troubleshooting

No LED is on after power up

- Check the power supply.

All LEDs are on. No call is currently in progress.

- SmartGate is in the special PCManager-based programming mode - exit the PCManager to reset SmartGate.
- Try to switch SmartGate off and on, the LEDs should go off in 3s and signal the status of SmartGate.

SmartGate does not register to GSM

- Check the SIM card.
- Check the PIN entering.
- Check the antenna connection.
- Select a place with a good GSM signal.

No tone can be heard after line off-hook

- Check the telephone line connection.
- SmartGate is not initialized properly upon start (approx. 10s after power up).
- SmartGate is not supplied with power.

SmartGate keeps transmitting a tone during dialing, not receiving the dialing

- Select the correct dialing type (DTMF or pulse).

Voice disturbance on telephone lines during GSM call

- Check signal strength using PCManager monitor. Place SmartGate to place with good GSM signal.
- Check distance between telephone lines and SmartGate's antenna. Distance between antenna and other telecommunication systems should be as long as possible.
- If there are still problems, use the antenna with coax cable.

SmartGate does not communicate with PC

- Check the serial cable connection.
- Check the COM number setting on PC.
- Check the COM parameters (1200-115200 bps, 8N1).
- SmartGate is not registered to GSM network.
- A dialing or outgoing call establishing process takes place on SmartGate.
- An incoming call is ringing on SmartGate.

11. List of Abbreviations

- **APN** - Access Point Name – necessary for the GPRS service
- **CLIP** - Calling Line Identification Presentation
- **CLI** - Calling Line Identification
- **CSD** - Circuit Switched Data
- **COM** - PC serial port
- **DTMF** - Dual Tone Multifrequency - tone dialing
- **SmG** - SmartGate
- **FSK** - Frequency Shift Keying. Protocol for CLI transmission on telephone line.
- **FXO** - an interface electrically identical with a standard telephone (opposite side = FXS interface)
- **FXS** - a telephone interface allowing standard telephone connection (opposite side = FXO interface)
- **FW** - Firmware - similar to SW, a term for the central microprocessor program
- **GSM** - Group Switched Mobile system - the present standard digital mobile telephone network
- **GPRS** - General Packet Radio Service - high-speed data transmission for GSM networks
- **HW** - Hardware - an electronic device, circuit, board, component, etc. in this context
- **ME** - Mobility Extension, special SmartGate function.
- **P(A)BX** - Private (Automatic) Branch Exchange
- **PC** - Personal Computer (based on the IBM PC standard)
- **PIN** - Personal Identification Number - a SIM card securing password
- **PUK** - Personal Unblocking Key - a password used to unblock a blocked SIM card after repeated wrong PIN entering
- **RS-232C** - a PC serial port standard
- **SIM** - Subscriber Identity Module - a chip-equipped module to be inserted in a GSM device for identification
- **SMS** - Short Message Service, a term for the system and one unit (message)
- **SW** - Software
- **TTL** - Transistor-Transistor Logic - a standard digital technology defining voltage for levels 0 and 1
- **PSTN** - Public Switched Telephone Network

12. Technical Parameters

GSM:

GSM module, GSM bandwidth	MC45/MC55 EGSM 900 / GSM 1800 / GSM 1900 MC46/MC56 EGSM 850 / GSM 1800 / GSM 1900
Transmission power	2 W EGSM 850 / 900 MHz, 1W GSM 1800 / 1900 MHz
Receiver sensitivity	-104 dBm
Audio	HR+FR+EFR Half rate+Full rate+Enhanced full rate Echo cancellation, Echo suppression
DATA	GPRS Class 10, 4+2 max. 85.6 kbps downlink CSD max. 14.4 kbps; Coding scheme CS 1, 2, 3, 4
Fax	Fax Group 3 on model with fax converter
Antenna	850/ 900/ 1800/ 1900 MHz 50 Ω SMA antenna connector
SIM card	3V or 1.8V plug-in

Power Supply:

Mains supply	230/12V; 0,5A adapter
DC power supply	10 to 16 V DC (accumulator 12V)
12V consumption	Standby 100 mA Call/data typ. 300 mA, max. 400 mA
Supply connector	DC Jack 5,5/2,1 mm

Telephone Interface FXS (for PBX external line or phone set):

Interface type	2-wire analog, FXS
Telephone connector type	RJ 11, 6/2
Line impedance	600 Ω
Loop voltage	26 V DC
Loop current	max. 40 mA
Loop resistance	max. 800 Ω
Tone frequency	adjustable, default 425 Hz
Dialing type	tone (DTMF) or pulse
Ringing voltage	42 Vrms 50/25 Hz
Calling line identification	CLI during ringing according to ETSI FSK
Tariff pulses	f=16/12 kHz ; Umin=100 mVef on 200 Ω
Answer supervision	polarity reversal, 12/16 kHz pulses

Telephone Interface FXO (for PBX extension line):

Interface type	2-wire analog, FXO
Telephone connector type	RJ 11, 6/2
Line impedance	600 Ω
On-hook DC resistance	1 MΩ
Off-hook line voltage (typ.)	4,5 V/25 mA
Dial tone frequency	adjustable, default 425 Hz
Ringing voltage	Min. 20 Vrms 25-50 Hz
Ringing impedance	4 - 10 kΩ / 50 Hz

Dial thru parameters:

Voltage drop (typ.)	1,7V / 25 mA
Closed loop resistance (typ.)	6 Ω

SMS Sending Input:	
Closed loop resistance	max. 1 k Ω
Open loop resistance	Min. 25 k Ω
Input overvoltage protection	max. +/- 12 V
Data Interface:	
Interface type	RS-232C
Connector	D-Sub 9 pins
Interface transmission rate	1200 - 115200 bps (autobauding) 8N1
Others:	
Dimensions (w/o connectors)	170 x 130 x 45 mm
Operating temperature	0°C to 45°C
Operating status signaling	3 LEDs (on, GSM network, line)