

SWS_Gateway Product Description

Rev. 0 – 2011/02/20



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1 Overview

Scope of the document is detail technical specification, HW and SW for the 2 gateways BG864-2.4 and GG864-2.4.

1.1 Reference

- [1] Universal Gateway Specification v2B (Schlumberger Water Services- Divers Long range RF architecture)
- [2] Telit.ppt
- [3] ZE60 Software interface specification
- [4] cr 280912.pdf (meeting report 28/09/2009)
- [5] cr 151209.pdf(meeting report 15/12/2009)
- [6] protocol ideas.pdf

1.2 General System Architecture

The proposed product satisfy the topology scenarios 1 and 2 as specified in [1]

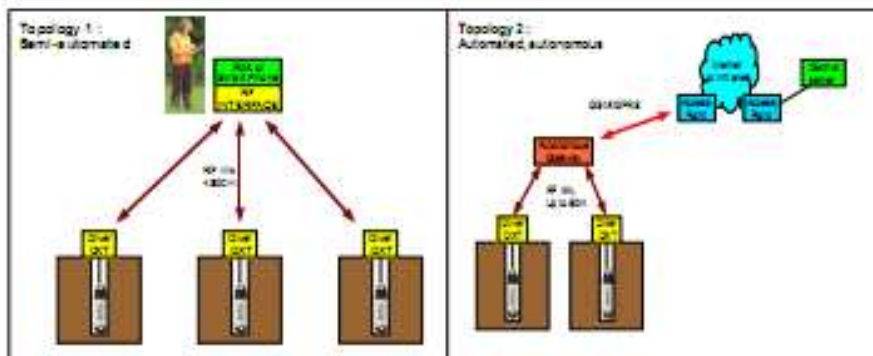


Figure 1 Topology Scenarios

Telit provides the gateway in two different configurations



2 Configuration 1 (BG864-2.4)

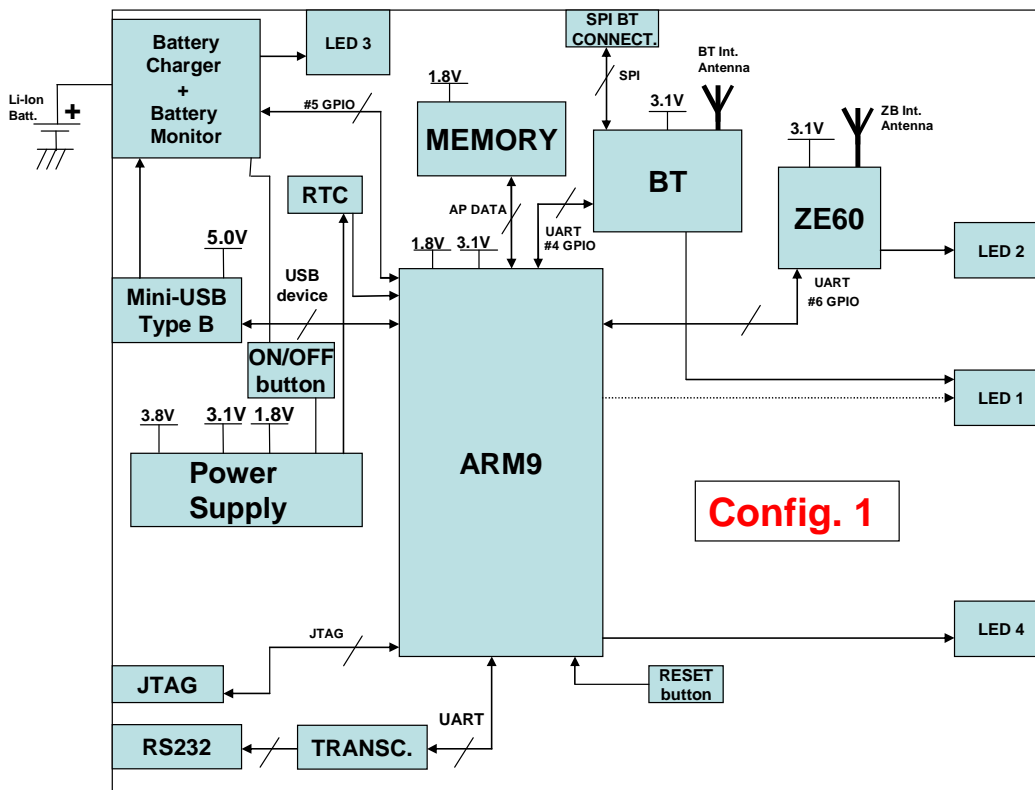


Figure 2 Configuration 1 Block Diagram

2.1 Main Building Blocks

- ARM9 ATMEL AT91SAM9260
- Memories (Flash and RAM)
- ZE60 (w/o internal antenna)
- BT chip CSR BC63B239A04-IQD-E4
- External connectors for:
 - Mini-USB device
 - RS232



- Switch-slide Power-Supply
- Internal antennas for:
 - BT
 - ZE60
- Rechargeable Li-Ion battery
 - continuous charging application will be allowed → the battery charging will be stopped when battery is completely charged.
- Status Leds for:
 - BT
 - ZE60
 - Charger
 - ARM
- Box
- Power supply: external 4.5÷5.5V from mini-USB connector or 3.4÷4.2V from Li-Ion battery
- Reset button
- Operational Temperature: [-20°C +60°C]
- Storage Temperature: [-40°C- +85°C]

2.2 Main Building Blocks features

- ARM9 ATMEL AT91SAM9260
Based on the ARM926EJ-S™ ARM® Thumb® Processor
 - 8-KByte Data Cache, 8-KByte Instruction Cache, Write Buffer
 - 200 MIPS at 180 MHz
 - Memory Management Unit
 - EmbeddedICE™, Debug Communication Channel Support
 - External Bus Interface (EBI)
 - USB 2.0 Full Speed (12 Mbits per second) Device Port
 - USB 2.0 Full Speed (12 Mbits per second) Host Single Port in the 208-lead PQFP
 - Ethernet MAC 10/100 Base T
 - Fully-featured System Controller, including
 - Reset Controller, Shutdown Controller
 - Four 32-bit Battery Backup Registers for a Total of 16 Bytes
 - Clock Generator and Power Management Controller
 - Advanced Interrupt Controller and Debug Unit
 - Periodic Interval Timer, Watchdog Timer and Real-time Timer
 - Reset Controller (RSTC)
 - Clock Generator (CKGR)
 - Selectable 32,768 Hz Low-power Oscillator or Internal Low Power RC Oscillator on
 - Battery Backup Power Supply, Providing a Permanent Slow Clock
 - Power Management Controller (PMC)
- Memories (Flash and RAM)
 - COMBO NAND SDRAM 128 MB FLASH/64 MB RAM
 - Memory will be shared for:
 - Code
 - Data



- Logging files (no dedicated memory will be provide for logging applications)
- ZE60
 - Frequency band: 2400 - 2483.5 MHz
 - Power Supply:+2.4V-+3.6V
 - Output Power: 19dBm \pm 1 dB on the whole band (selectable by software for compliance)
 - Consumption typ@3.6V :
 - Transmission :125mA
 - Reception : 35mA
 - Stand-by (32.768 khz On) : 2 μ A
 - Sleep (wake up on interruption): 1 μ A
 - Channel spacing: 5 MHz
 - Channel number : 16 , Channel 11 (2405MHz) \rightarrow Channel 26 (2480MHz)
 - Technology : DSSS
 - Modulation: O-QPSK with half sine pulse shaping
 - Radio bit rate: 250 kbps
 - Sensitivity for PER(1%): -98dBm typ
 - Serial link:
 - Full Duplex, from 1200 to 115200 bps
 - 7 or 8 bits, with or without parity, 1 or 2 stop bits
 - Protocol Type: RS-232, TTL level
 - Temperature: - 40+ 85 $^{\circ}$ C
 - Relative humidity @ 25 $^{\circ}$ C: 20-75%
 - Size: Rectangular 26 x 15 mm
 - Height: 3 mm
 - Weight: 1,7 g
 - PCB thickness: 0.8 mm
 - Components: All SMD components, on one side of the PCB.
 - Mounting: SMD, Half moons on the 4 external sides
 - Number of I/O pins: 30
- Bluetooth
 - Fully qualified Bluetooth $^{\circ}$ v2.1 + EDR Specification
 - Piconet and scatternet support
 - Minimum external components
 - Low-power 1.5V operation, 1.8V to 3.6V I/O
 - Integrated 1.8V and 1.5V regulators
 - UART to 4Mbaud
 - SDIO (Bluetooth Type A)/CSPI interface
 - Deep sleep SDIO operation
 - 40-lead 6 x 6 x 0.9mm 0.5mm pitch QFN
 - Support for IEEE 802.11 coexistence
 - Green (RoHS and no antimony or halogenated flame retardants)



2.3 Physical Characteristics

2.3.1 Dimensions

The Telit BG864-2.4 dimensions are:

- Length: 136 mm
- Width: 57.6 mm
- Thickness: 29.5 mm

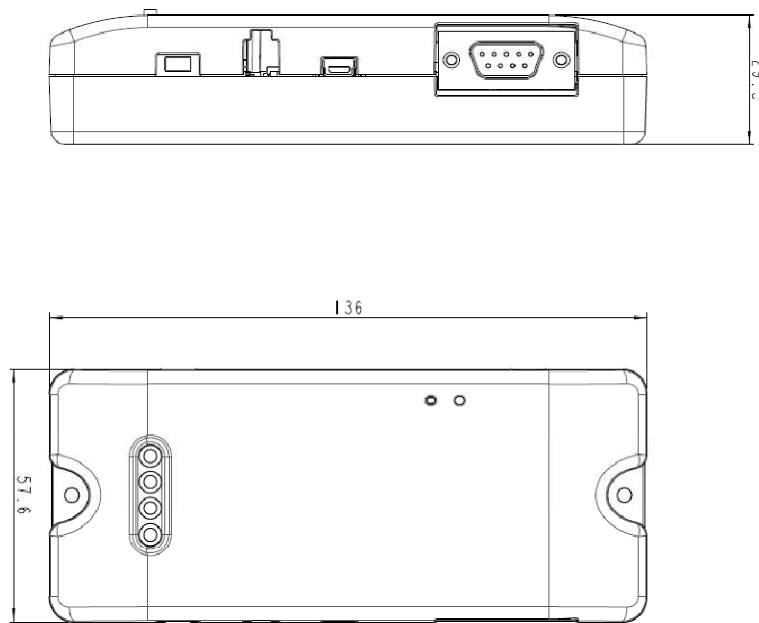


Figure 3 - SWS-GW layout and dimensions

2.3.2 Environmental Characteristics

- Operational Temperature: -20°C +60°C
- Storage Temperature: -40°C +85°C

2.4 Interface Description

2.4.1 Overview

BG864-2.4 provides the following interface connectors:

- RS232 serial interface



- Mini-USB interface
- ON/OFF Switch Slide

Furthermore, there are four led indicators (ARM, Bluetooth, Battery Charger and SR status) and one push button (RESET).

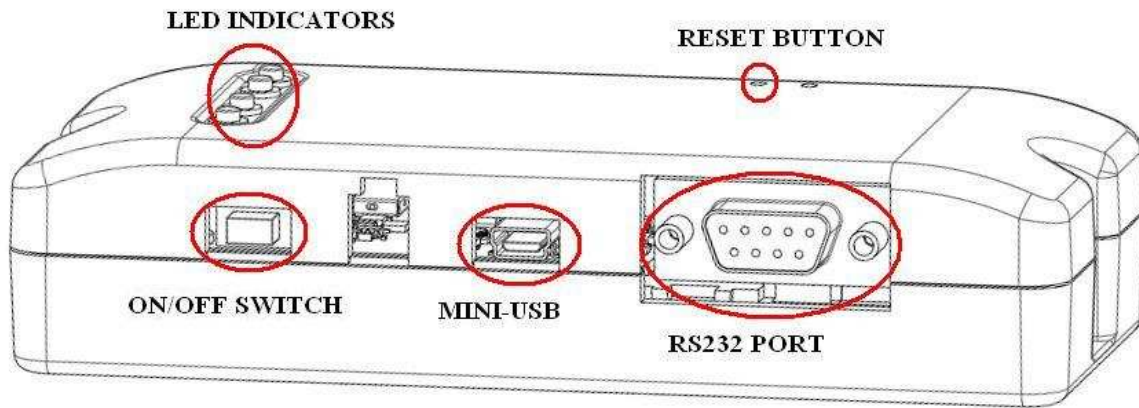


Figure 4 – Interface overview

2.4.2 Supply Voltage

The BG864-2.4 can be supplied by an internal rechargeable Li-Ion battery or directly by the MINI-USB port.

Power supply input is described in the following subsection and must fulfil the following requirements:

Li-Ion Batt. Supply Voltage Range	3.4÷4.2V
Mini USB Supply Voltage Range	4.5÷5.5V

Table 1 – Supply Voltage



Danger – Operating voltage range must never be exceeded; care must be taken in order to fulfill Min/Max voltage requirements.

2.4.3 Battery source

Power is supplied by an internal rechargeable Li-Ion battery.

Battery voltage range is 3.4 ÷ 4.2V.

If the Gateway is connected via the Mini-USB to an external PC (or power supply) then the battery will be automatically recharged by means of integrated battery charger circuitry.



The battery capacity should be sized on the customer's application and battery life requirements.



Warning – Do not charge the Li-Ion battery out of temperature range of 0÷45°C .



Battery connector must be Molex 87439-0200 or compatible.

2.4.4 Switching the BG864-2.4 ON and OFF

The switch on/off slide button is used to turn ON or OFF the gateway.

2.4.4.1 Switching ON Procedure

The BG864-2.4 switches on when slide switch is moved on the left.

FRONT VIEW



SWITCH ON

BG864-2.4 operating system is operational after about 20 seconds from the power-on.

2.4.4.2 Switching OFF

The BG864-2.4 switches off when slide switch is moved on the right.

FRONT VIEW



SWITCH OFF

The BG864-2.4 can be switched off either by disconnecting the power supply from the MINI-USB port and the battery or by software command.

It is suitable a software switch-off command before disconnect the power supply.



Note- When the slide switch is in OFF position and the battery is connected, battery charge continues to function if BG864-2.4 is connect to an external supply from the MINI-USB port



2.4.5 Antenna

In BG864-2.4 there are two internal antennas, one for Bluetooth and one for the Short Range technology.

2.4.5.1 Bluetooth Antenna specifications

The Bluetooth antenna for BG864-2.4 has the following specifications:

Bluetooth ANTENNA SPECIFICATIONS	
Frequency Range	2.4 GHz
Bandwidth	2.4 – 2.5 GHz
Peak Gain	2.2 dBi
Average Gain	1.9 dBi
Impedance	50 ohm
Peak Efficiency	74%
Average Efficiency	72%
VSWR	< 2:1

Table 2 – Bluetooth Antenna specifications

2.4.5.2 Short Range Antenna Specifications

The short range antenna for BG864-2.4 has the following specifications:

Short Range ANTENNA SPECIFICATIONS	
Frequency Range	2.4 GHz
Bandwidth	2.4 – 2.5 GHz
Peak Gain	2.2 dBi
Average Gain	1.9 dBi
Impedance	50 ohm
Peak Efficiency	74%
Average Efficiency	72%
VSWR	< 2:1

Table 3 – Short Range Antenna specifications

2.4.6 Serial Port

The RS232 standard interface serves to connect a PC, Data Terminal Equipment (DTE) or an application, which acts as host controller for the BG864-2.4 with all its functions.

Serial port connects directly the host controller with the UART-Debug of the ARM chip inside BG864-2.4.

RS232 level translator is present on board.



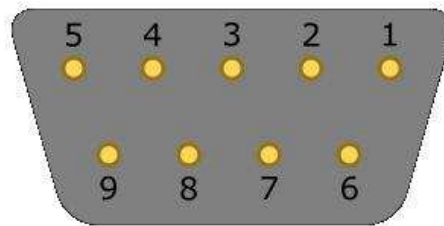
2.4.6.1 RS232 standard interface connector

The connector mounted in the BG864-2.4 is a standard RS232 Sub-D 9pin female with the following characteristics:

- Baud rate from 300 to 115.200 bit/s
- Autobauding (300 to 38.400 bit/s)

Pin-out (refers to DTE side):

PIN	Signal	Description
1	-	NC
2	RXD	RX Output
3	TXD	TX Input
4	-	NC
5	GND	GROUND
6	-	NC
7	-	NC
8	-	NC
9	-	NC



(FRONT VIEW)

Table 3 – serial port pin-out

To connect to a host controller, a pin-to-pin 9pin cable with D9 type connectors on both sides is needed (1 male & 1 female). Shielding of this cable is recommended and its length shall not exceed 3 m.

2.4.7 Mini USB type connector

Pin-out of Mini-USB connector is shown in the following table:

PIN	Signal
1	USBCNX / Charger Power Supply
2	DDM
3	DDP
4	-
5	GND

Table 4 – Mini USB pin-out

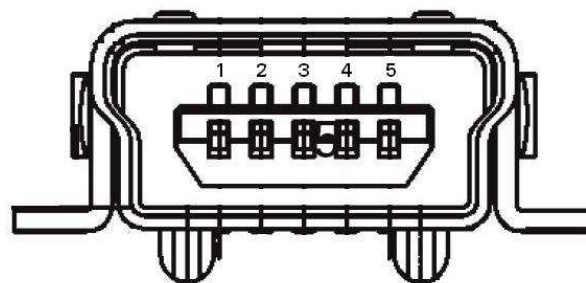


Figure 5 - Mini-USB connector front view



2.4.8 LED Indicators

The BG864-2.4 has four led indicators:

1. Bluetooth status,
2. ARM status,
3. SR status
4. charger status.

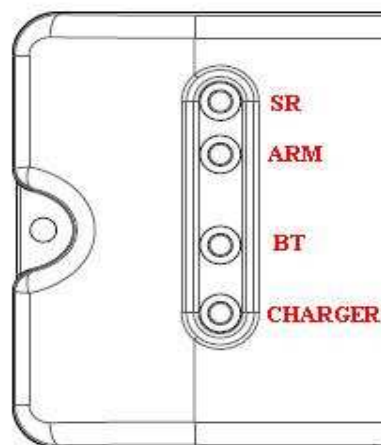


Figure 6 - LED indicators

2.4.8.1 Bluetooth LED indicator

The follow table shows information on the status of the four led indicators:

LED ID	LED STATUS	DEVICE STATUS
SR	Permanently OFF	OFF
	Blinking	Comm. Session
ARM	Permanently ON	Wake-up Session
	Permanently OFF	OFF/Stand-by
	Blinking	Operating
BT	Permanently ON	Boot State
	Permanently OFF	OFF
	Blinking	Connected
BATT. CHARG.	Permanently ON	Battery charging
	Permanently OFF	Charge Complete

TABLE 5 – LED indicators



2.4.9 Push Button

In the surface of the BG864-2.4 box there is one hole to allowing with a sharp object to push the reset button inside.

Reset Button is connected to the reset signal of the ARM processor. Pushing this button force the reset and make the BOOT of the processor.

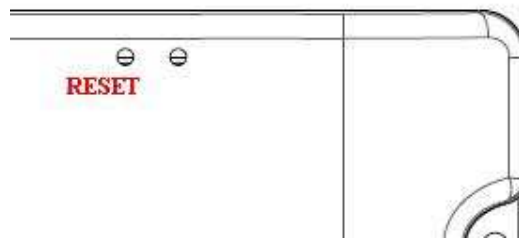


Figure 7 - Push Buttons



Note- The second hole near reset button's hole is unused



3 Configuration 2 (GG864-2.4)

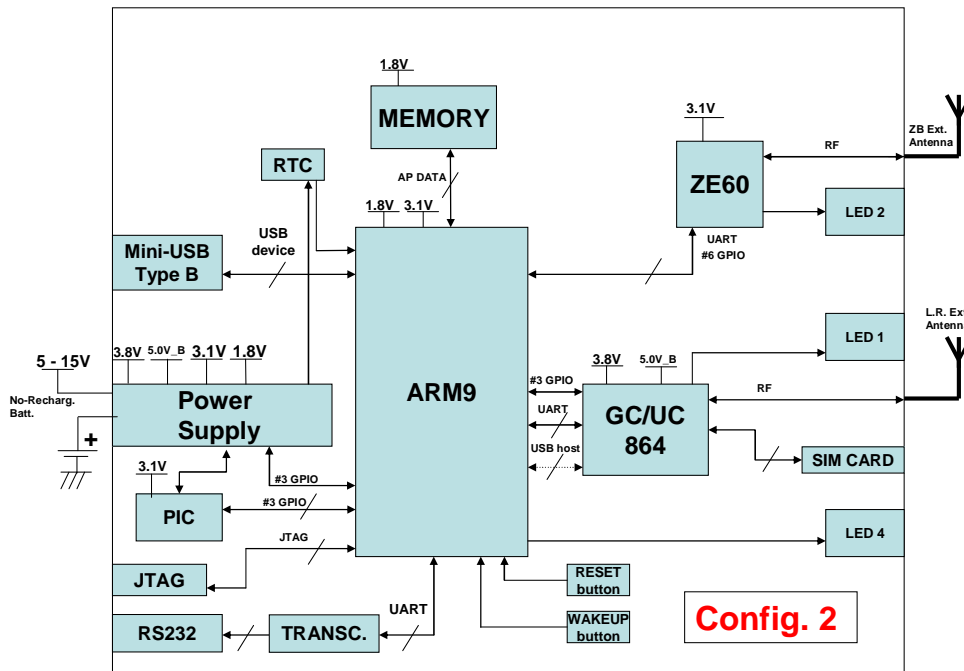


Figure 8 Configuration 2 Block Diagram

3.1 Main Building Blocks

- ARM9 ATMEL AT91SAM9260
- Memories (Flash and RAM)
- ZE60
- GSM module Unified FF (GC864)
- SMA connectors for External antennas:
 - GSM
 - ZE60
- external I/F connectors
 - Power supply
 - RS232



- SIM card holder
- Mini-USB
- Status leds for:
 - GSM
 - ZE60
 - ARM
- Box
- Reset button and Wake-Up button
- Power supply voltage 5-15V
- Operational Temperature: [-20°C +70°C]
- Storage Temperature: [-40°C- +80°C]

3.2 Main Building Blocks features

- GC864 GSM module
 - Quad-band EGSM 850/900/1800/1900 MHz
 - Control via AT commands according to GSM 07.05, 07.07 and Telit enhancements
 - Serial Port multiplexer GSM 7.10
 - SIMM access profile
 - TCP/IP stack access via AT commands
 - Supply voltage range: 3.22-4.5V DC
 - Dimensions: 30x36.2x3.2 mm
 - Weight: 6.1 grams
 - RoHS compliant
 - Extended temperature range
 - -40°C to 85°C (operational)
 - -40°C to 85°C (storage)
 - Sensitivity:
 - -107 dBm (typ.) @ 850/900 MHz
 - -106 dBm (typ.) @ 1800/1900 MHz
 - Power consumption (typ.)
 - Power off: <26 uA
 - Idle(registered, power saving): 2.6 mA
 - Dedicated mode: 200 mA
 - GPRS cl.10: 370 mA
 - Output power
 - Class 4 [2W] @ 850/900 MHz
 - Class 1 [1W] @ 1800/1900 MHz



3.3 Physical Characteristics

3.3.1 Dimensions

The Telit GG864-2.4 dimensions are:

- Housing Length: 136 mm
- Overall Length: 136 mm
- Width: 57,6 mm
- Thickness: 29,5 mm

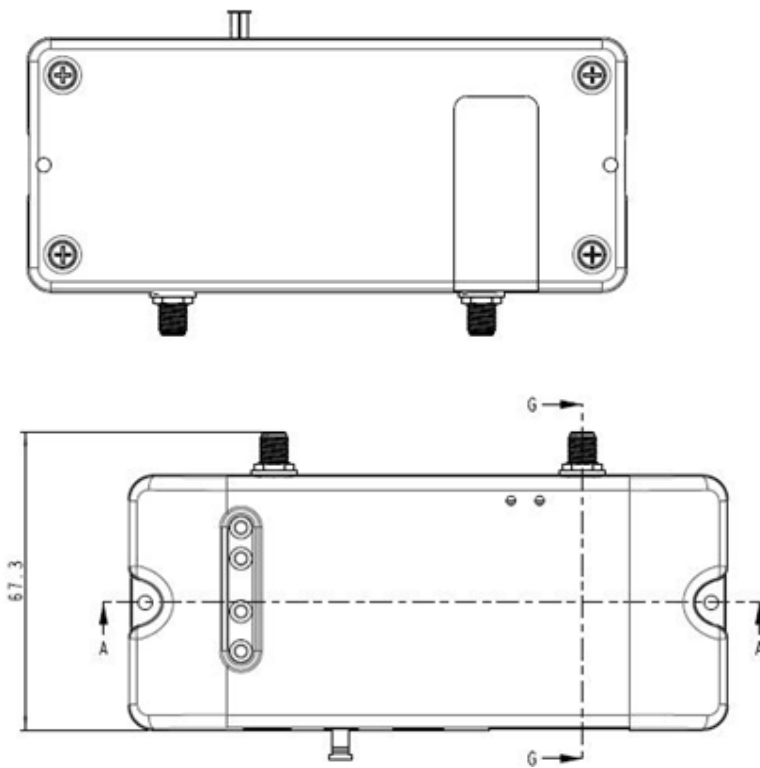


Figure 9 - SWS-GW layout and dimensions



3.4 Interface Description

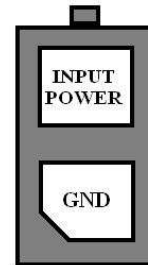
3.4.1 Power connector

The power connector on the left side of the terminal is a Molex 2-pins connector (part no.: 43045-0210).

Pin description:

- GND = Ground reference
- Input Power = 5 - 15 VDC

FRONT VIEW



Warning - Power Cable connecting the the power source to the Gateway shall not exceed 3 meters lenght

3.4.2 Supply Voltage

The external power supply must be connected to power supply input as described in the following subsection and must fulfil the following requirements:

Nominal Supply Voltage	12 volts
Min Supply Voltage	5 volts
Max supply Voltage	15 volts

Table 5 – Supply Voltage



Danger – Operating voltage range must never be exceeded; care must be taken in order to fulfill Min/Max voltage requirements.

3.4.3 Battery source

The external power supply could be sourced by an external no rechargeable battery.

Battery voltage range is 5 – 15V.

The battery capacity should be dimensioned on the customer's application and battery life requirements.



3.4.4 Switching the GG864-2.4 ON and OFF

3.4.4.1 Switching ON

The GG864-2.4 switches on automatically each time the power supply is connected the first time or re-connected.



Note- When the power supply cable is disconnected, it is recommended to wait approximately 5 seconds before applying the power again.

3.4.4.2 Switching OFF

The GG864-2.4 can be switched off either by disconnecting the power supply or by software command.

It is suitable a software switch-off command before disconnect the power supply cable.



Warning – Please note that hardware power off should be done only after a proper GSM logoff. Any GSM device is request to issue a “detach” request at turning off.

3.4.5 Antenna

3.4.5.1 Antenna Output



Warning – BEFORE connecting the GG864-2.4 to a power supply source, suitable antennas shall be connected and properly installed.

The antenna has to be installed with care to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). in case this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

For a good efficiency of the antenna and a minimum interference with other electronic systems, a space of min. 40 cm around the radiating part should be left free of electrically conducting materials.

The less distance and the fewer obstacles between the SWS-GW antenna and the antenna of the GSM/GPRS network base station, the less power is radiated by the gateway and the better signal quality is achieved.

3.4.5.2 Antenna Connectors

The GG864-2.4 includes two SMA bulkhead female, class 4 (2W) co-axial connectors for the two external antennas.

3.4.5.3 GSM Antenna Requirements

The GSM antenna for GG864-2.4 device shall fulfill the following requirements:



GSM ANTENNA REQUIREMENTS	
Frequency Range	Standard Dual Band GSM/DCS frequency range or Standard Quad Band GSM/DCS/OCS frequency range if used for all four bands
Bandwidth	70 MHz in GSM850, 80 MHz in GSM & 170MHz in DCS & 140 MHz PCS band
Gain	< 3 dBi
Impedance	50 ohm
Input power	> 2 W peak power
VSWR absolute max	<= 10:1
VSWR recommended	<= 2:1

Table 6 – GSM Antenna requirements

3.4.5.4 Short Range Antenna Requirements

The short range antenna for GG864-2.4 device shall fulfill the following requirements:

Short Range ANTENNA REQUIREMENTS	
Frequency Range	2.4 GHz
Bandwidth	2.30 – 2.50 GHz
Gain	< 4 dBi
Impedance	50 ohm
VSWR recommended	<= 1.5:1

Table 7 – Short Range Antenna requirements

3.4.6 Serial Port

The RS232 standard interface serves to connect a PC, Data Terminal Equipment (DTE) or an application, which acts as host controller of the SWS-GW with all its functions.

Serial port connects directly the host controller with the UART-Debug of the ARM chip of SWS-GW. RS232 level translator is present on board.

3.4.6.1 RS232 standard interface connector

The connector mounted in the SWS-GW is a standard RS232 Sub-D 9pin female with these characteristics:

- Baud rate from 300 to 115.200 bit/s
- Autobauding (300 to 38.400 bit/s)

Pin-out (refers to DTE side):

PIN	Signal	Description
1	-	NC
2	RXD	RX Output
3	TXD	TX Input
4	-	NC
5	GND	GROUND
6	-	NC
7	-	NC
8	-	NC



9	-	NC
---	---	----

Table 8 – serial port pin-out

(FRONT VIEW)

To connect to a host controller, a pin-to-pin 9pin cable with D9 type connectors on both sides is needed (1 male & 1 female). Shielding of this cable is recommended and its length shall not exceed 3 m.

3.4.7 Mini USB type connector

Pin-out of Mini-USB connector is shown in the following table:

PIN	Signal
1	USBCNX
2	DDM
3	DDP
4	-
5	GND

Table 9 – Mini USB pin-out

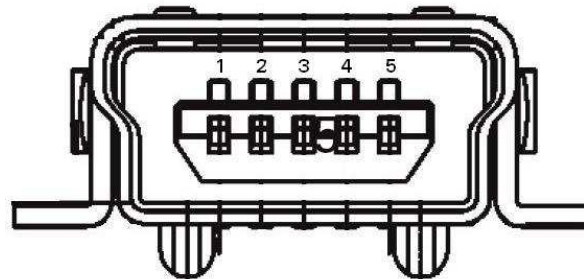


Figure 10 - Mini-USB connector front view

3.4.8 LED indicators

The GG864-2.4 has three led indicators:

1. GSM status
2. ARM status
3. SR status (fourth led indicator is not connected in this configuration).



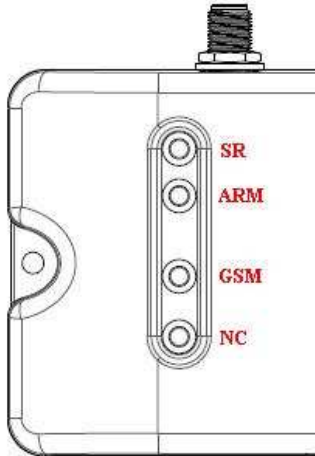


Figure 11 - LED indicators

3.4.8.1 GSM LED indicator

The red LED shows information on the network service availability and call status.

LED STATUS	DEVICE STATUS
permanently on	a call is active
fast interrupt sequence (period 0,5s, Ton 1s)	Net search / Not registered / turning off
slow interrupt sequence (period 0,3s, Ton 3s)	Registered full service
permanently off	device off

TABLE 10 – GSM LED indicator

3.4.8.2 ARM LED indicator

The red LED shows information on the ARM status:

LED STATUS	DEVICE STATUS
Permanently OFF	OFF/Stand-by
Blinking	Operating
Permanently ON	Boot State



TABLE 11 – ARM LED indicator

3.4.8.3 Short Range LED indicator

The red LED shows information on the network service availability and call status.

LED STATUS	DEVICE STATUS
Permanently OFF	OFF
Blinking	Comm. Session
Permanently ON	Wake-up Session

TABLE 12 – SR LED indicator

3.4.9 Push Buttons

In the box of GG864-2.4 there are two holes to push with a sharp object the two buttons inside:

- Reset Button: is connected to the reset signal of the ARM processor. Pushing this button force the reset and make the BOOT of the processor.
- Wake-Up Button: is connected to the wake-up signals of the ARM processor. Pushing this button wake-up the processor from a power mode state.



Figure 12 - Push Buttons



4 SW Specification

4.1.1 SW architecture

In the following picture is depicted SW architecture of Gateway in both configuration1 (BG864-2.4) and configuration 2 (GG864-2.4).

Telit provides Linux Operating system with all low level drivers needed in the SWS gateway:

- GPIO
- Serial
- USB device

And provides access for the main peripheral:

- Bluetooth

It is provided all sw to initialize and setup Bluetooth communication and access to the Bluetooth interface as a serial port where it is possible to send and receive data (SPP profile).

- GSM/GPRS

Communication with GSM/GPRS is provided through the serial port where it is possible send and receive data.

- USB
- ZE60

And to manage power modes.

SWS Gateway application is a customization of Gateway application with the scope of export the serial protocol Interface to communicate with the external host.

It:

- Manages the gateway
- Route messages between peripherals
- Wake up and power up the peripherals at preprogrammed intervals



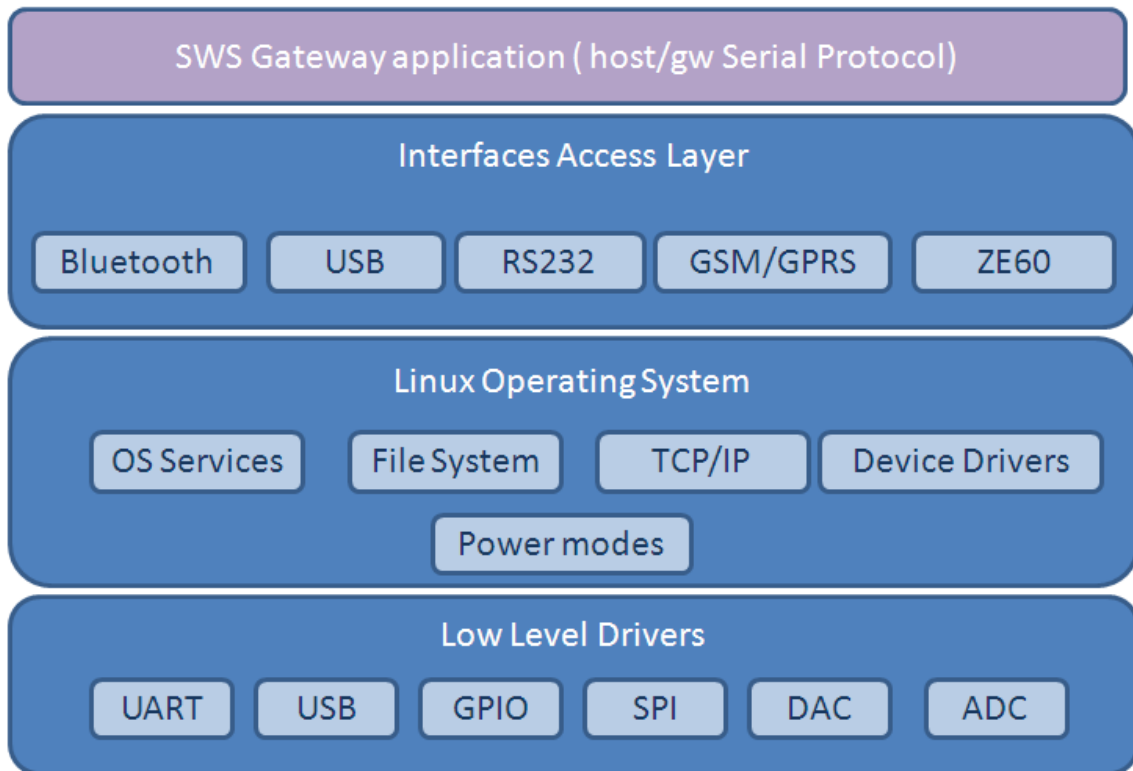


Figure 13 Gateway SW architecture

For detailed specification of the communication protocol see next paragraphs.

4.1.1.1 SWS Gateway Application (Configuration 1 –no GSM)

In this configuration two operating modes are possible:

1. Autonomous gateway

In this mode gateway is in standalone mode, without any external devices connected to it and communicates only via radio with DXT in the SR network, collecting data sent by each DXT in a log file stored in flash.

Upload of log data files will be possible through specific command on serial protocol to retrieve the file (see Get Log file).

Format of log files, naming convention and upload process have to be agreed with Alciom.

2. Slave mode

In slave mode, gateway is connected to other device that acts as a master and controls the operations of the gateway.

Other devices can be:

- Fixed PC by USB connection



- Mobile devices, as PDA, phone, field equipment, through Bluetooth connection or RS232 serial connection.

In slave mode gateway supports communication protocol between host and gateway that has to be the same through all the interfaces:

- USB
- RS232
- Bluetooth
- GSM/GPRS* (by socket connection- see sws gateway application conf 2)

As all the interfaces can be seen as serial interfaces a serial protocol will be developed. All the interfaces will be available at the same time but communication will be with one of them at a time. A specific command will be developed to set the communication mode and to switch to another (see Set Gateway Mode command).

4.1.1.2 SWS Gateway Application (Configuration 2 – GSM)

In this configuration two operating modes are possible:

1. Autonomous gateway(

In this mode gateway is in standalone mode, without any external devices connected to it and communicates only via radio with DXT in the SR network, collecting data sent by each DXT in a log file stored in flash, and sending it at preprogrammed interval (once a day) through GPRS network to an FTP server.

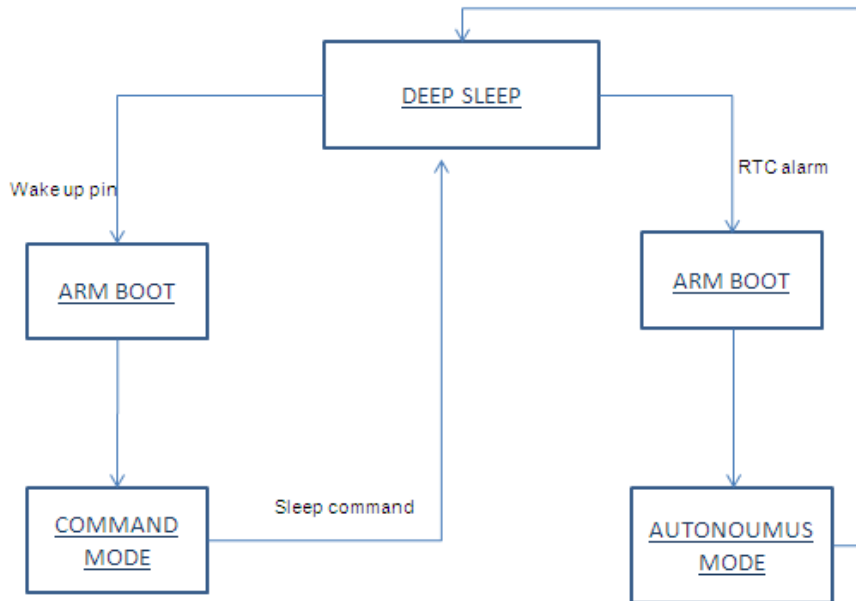
2. Controlled mode

In this mode, gateway is always connected to GSM/GPRS network , or always connected via USB or RS232 to the server and wait commands from it.

In this mode all the command /answer should follow the serial protocol described in next paragraph. If GPRS/GSM connection is active, same protocol as described in next paragraph will be available through socket connection.

.



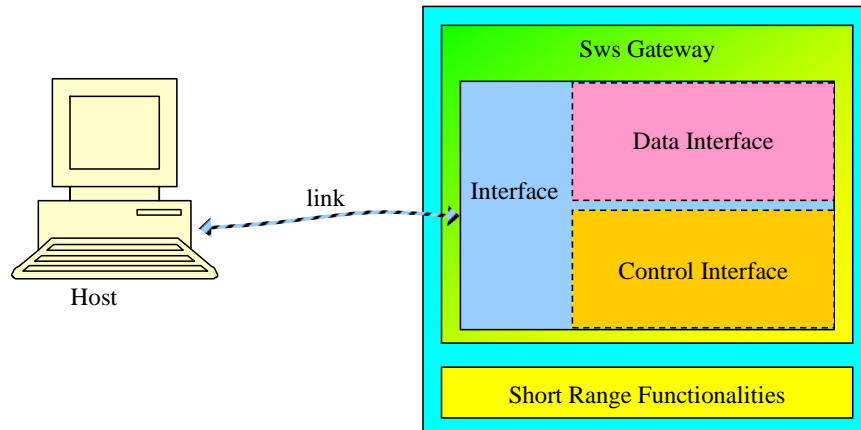


			ARM9	GSM	ZE60
1	deep sleep		backup mode	OFF	OFF
2	ARM Boot	System boot	normal	OFF	OFF
3	COMMAND mode	Serial protocol exported	normal	OFF	OFF
				ON	ON
4	AUTONOMOUS mode	Collect data from DXT and send data through ftp connection	normal	ON	ON



4.2 Host/gateway serial protocol

The Host interacts with the SWS GW Application through a serial interface



This serial interface is internally split into two interfaces:

1. Control (or management) Interface. This interface receives commands from Host and sends back information/responses.
2. Data Interface, that allows direct communication with DXT nodes joined to the SR network.

Control and Data Interfaces are mutually exclusive, they can be used one at a time.

4.2.1.1 Data-mode

If the data-mode is used, **SWS** Gateway is completely transparent. Data messages flow in both directions as a raw bit stream.

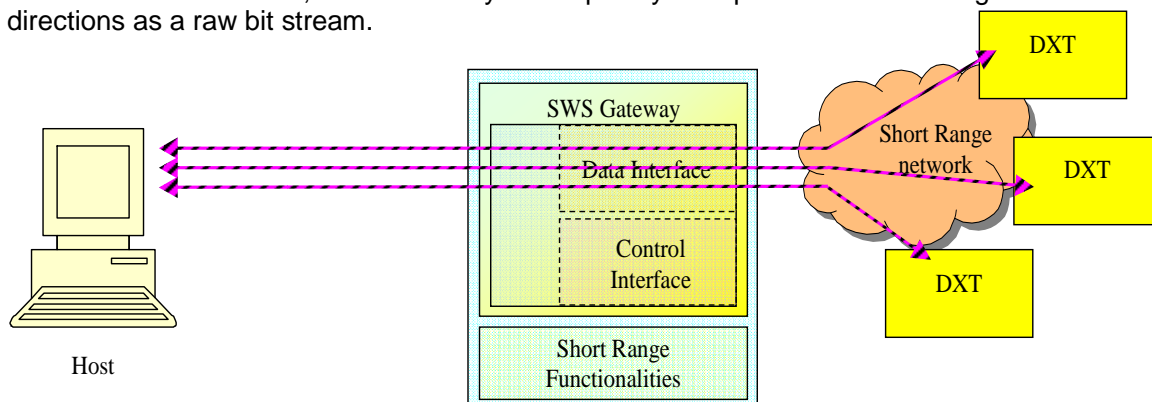


Figure 7 – Gateway in data mode



The way data messages are used is totally user dependent. From a logical point of view the responsible for data managing are applications running on Host and each DXT connected to the gateway.



Figure 8 – Data Mode: data flow at application layer

4.2.1.2 Command-mode

If command-mode is used, the Host may send specific commands to SWS gateway in order to configure it.

4.3 Control Interface

Once SWS GW Application has been started, the Control Interface will be available on the serial interface (it can be RS232, USB or Bluetooth)

The Control Interface receives from the Host the serial packets, converts them to internal control messages and sends the responses to the Host.

All frame formats in this clause are routed in the order in which they are transmitted, that is, from left to right. For every field the left most byte is the least significant byte and the right most byte is the most significant byte (little endian).

The serial packets shall be formatted as illustrated in Figure 9 .

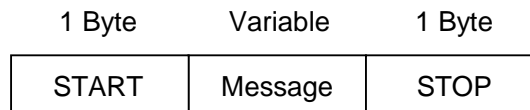


Figure 9

Every packet has a START byte and a STOP byte.

4.3.1 Stuff algorithm

When using START and STOP bytes in the Message, it must be ensured that they will not be confused with the true START and STOP. To achieve this result, an escaping technique called “stuff



algorithm” has to be used. Every time the Message field contains a byte equal to the START or the STOP, the same byte must be preceded by a STUFF byte and incremented of an OFFSET. Every time that in the Message field there is a byte equal to the STUFF byte it must be preceded by another STUFF byte.

Values of START, STOP, STUFF and OFFSET bytes are shown in Table 4.1.

Name	Value
START	0xab
STOP	0xcd
OFFSET	0x01
STUFF	0xef

Table 4.1

4.3.2 Message protocol

The message protocol is used by the Host to configure and to manage the SWS Gateway. It is an acknowledged protocol, so that every time the Host sends a command to the Control Interface of the Gateway, it will acknowledge the command with an ACK (Figure).

Therefore there are two types of messages:

- Command/Response messages
- ACK messages

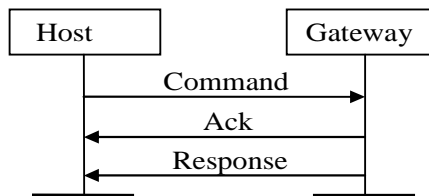


Figure 10

If the Command do not respect the protocol or if its parameters are out of range, the Control Interface of the Gateway will send only a NACK (acknowledge with status set to ERROR) and no response.

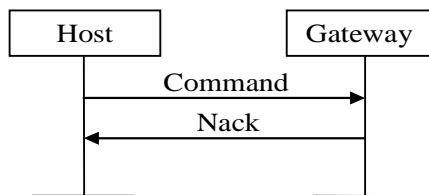


Figure 11

ACK and messages are:

2 bytes		1 byte	
START	Opcode	Status	STOP

Status message for ACK is 0x01, status message for NACK is 0x02.



4.3.3 Command and Response messages

Command and Response messages format is shown in the Figure 42.

2 Bytes	2 Bytes	1 Byte	Variable
OpCode	BitMask	Reserved	Parameters

Figure 42

The OpCode is the code of the Command sent by the Host or the Response sent by the Gateway. The field BitMask explains which parameters are active in the Parameters field. Note that all the parameters are always present in the packet, so a specific Command/Response has always the same size. If a parameter is not active, the respective value will be not modified. If a parameter is mandatory and an invalid BitMask field has been set, command will be not executed. Default values will be loaded by Reset command.

The field Reserved is ignored, and its value shall be set to 0xFF.

The field Parameters holds the parameters of the command. It has a specific format for every command depending on the OpCode. Every parameter could be optional (O) or mandatory (M), if it is optional and the parameters is not enabled the Gateway will use a default value.

Every response has a Status field. All the parameters of responses are mandatory.

Every command has a 10 minutes timeout. When timeout expires and command is not executed yet, error response will be received.

During execution of any command (after ACK message has been received and before response is received), only Get Status and Reboot commands can be executed; other commands or bytes on control interface are not considered.

Table 4.2 shows the list of commands and responses.

OP Code	Command/Response Name	Description
0x0001	Set date/time	Set RTC time
0x0002	Get date/time	Get RTC time
0x0003	Get serial number	Get gateway serial number
0x0004	Set GW SR parameters	Set radio channel, network ID, encryption word and wakeup session timings in the GW
0x0005	Set DXT SR parameters	Set radio channel, network ID, encryption word and cyclic wakeup timings in a DXT
0x0006	Set gateway mode	Choose control interface (BT/USB/UART/GSM)
0x0007	Set GSM parameters	Set APN, DNS and SIM PIN
0x0008	Set BT parameters	Set BT local name and PIN
0x0009	Get Battery level	Get Battery level (percentage)
0x000A	Get hw/sw version	Get hardware/software version
0x000B	Get GSM parameters	Get GSM parameters
0x000C	Get GW SR parameters	Get SR parameters from the GW
0x000D	Get DXT SR parameters	Get SR parameters from a DXT
0x000E	Scan for DXT	Scan for active DXTs
0x000F	Set Auto DXT Data	Set parameters of Get Data from DXTs when GW



		is in autonomous mode
0x0010	Get Status	Get SR/BT/GSM status
0x0011	Set data mode	Set transparent communication to the local SR module
0x0012	Set Escape sequence from data mode	Set Escape sequence from transparent communication to the local SR module
0x0013	Get DXT Data	Get DXT Data (over serial communication or FTP)
0x0014	Add DXT list	Add a DXT in the list
0x0015	Get DXT list	Get the DXT list
0x0016	Remove DXT list	Remove a DXT from the list or clean it
0x0017	Disable SIM PIN	Disable PIN SIM
0x0018	Turn off SR	Turn off SR module in the GW
0x0019	Reboot	Reboot gateway
0x001A	Standby	Put gateway in standby
0x001B	Deep Sleep	Put gateway in deep sleep
0x001C	Turn off	Turn off gateway
0x001D	Reset	Reset configuration and reboot GW
0x001E	Get Auto Dxt Data	Get parameters of Get Data from DXTs when GW is in autonomous mode
0x001F	Get Log File	Get application log file (over serial communication or FTP)
0x0020	Get BT parameters	Get name and address of the local and host BT device
0x0021	Scan for BT	Scan for discoverable BT devices
0x0022	Add BT host	Put BT in discoverable state and wait for pairing with BT host
0x0023	Reset BT host	Delete pairing with BT host
0x0024	Set GPRS host parameters	Set parameters for control interface on GPRS
0x0025	Set FTP parameters	Set parameters of the FTP server
0x0026	Set Wakeup parameters	Set date/hour of the next wake up (autonomous mode for C2)
0x0027	Get GPRS host parameters	Get parameters for control interface on GPRS
0x0028	Get FTP parameters	Get parameters of the FTP server
0x0029	Get Wakeup parameters	Get date/hour of the next wake up (autonomous mode for C2)
0x002A	Flash SR	Flash SR through USB
0x002B	Get Battery voltage	Get Battery voltage and get temperature

Table 4.2

Table 4.3 shows the values of the Status codes for the responses.

Status	Value	Description
SUCCESS	0x0001	The command succeeded
ERROR	0x0002	Generic error
TIMEOUT	0x0003	Command timeout expired
DXT END	0x0004	Scan DXT process is complete
PASSWORD ERROR	0x0005	Wrong PIN/password



Status	Day	Month	Year	Hour	Minutes
--------	-----	-------	------	------	---------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Day	1	1-31	Day of the month	N/A
Month	1	1-12	Month of the year	N/A
Year	1	10-255	Year since 2000	N/A
Hour	1	0-23	Hour since midnight	N/A
Minutes	1	0-59	Minutes after the hour	N/A

4.3.4.3 Get Serial Number

Get Gateway serial number.

OPCODE: 0x0003

Parameter field=NULL

Get Serial Number Response

Status	S/N
--------	-----

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
S/N	12	String	Serial number of GW	N/A

4.3.4.4 Set GW SR parameters

Set SR parameters in the GW.

OPCODE: 0x0004

field parameters is:

channel	Network ID	Old Encryption key	New Encryption key	Wakeup session duration	Comm session duration	Comm slot duration
---------	------------	--------------------	--------------------	-------------------------	-----------------------	--------------------

If a new encryption has to be set, old and new encryption keys are mandatory. Parameters are set if SR module is not in wakeup session, comm session or comm slot.

Field	size	Valid Range	Description	Default
-------	------	-------------	-------------	---------



channel	1	0x0B-0x1A	RF channel for SR network	0x0B
Network ID	2	0x0000-0xFFFF	Network ID for the SR network	0x1234
Old key	16	Any value	Current Encryption word	All 0x00
New key	16	Any value	New Encryption word to be set	N/A
Wakeup session duration	1	1-254	Wakeup session duration in sec	29
Comm session duration	1	0-255	Comm session duration in sec	120
Comm slot duration	1	0-255	Comm slot duration in sec	15

Set GW SR parameters response

Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0005-0x0006	Result of the command	N/A

4.3.4.5 Set DXT SR parameters

Set SR parameters in a DXT.

OPCODE:0x0005

field parameters is:

Address	channel	Network ID	Old Encryption key	New Encryption key	Fast period	Slow period
---------	---------	------------	--------------------	--------------------	-------------	-------------

MAC address parameter is always mandatory.

If a new encryption has to be set, old and new encryption keys are mandatory.

If the SR module in the gateway is off or in idle, it performs a wakeup session and then starts a comm slot with the DXT. If the SR module in the gateway is in comm session, scan is not performed. Comm slot will be ended after settings and SR module in the gateway will be turn off.

NOTE: gateway will wait comm slot seconds for the dedicated wakeup response. If fast period will be greater than comm slot seconds, setting and getting registers or data from a DXT could fail.

Generally, if slow period is greater than (wakeupSession/2 + 1), DXT could not wake up (see [3]).

Field	size	Valid Range	Description	Default
Address	8	MAC address from 00-15-4F-00-00-00-	DXT MAC address	N/A



		00-00 to 00-15-4F-FF-FF-FF-FF-FE		
channel	1	0x0B-0x1A	RF channel for the DXT	0x0B
Netowrk ID	2	0x0000-0xFFFF	Network ID for the DXT	0x1234
Old key	16	Any value	Current Encryption word	All 0x00
New key	16	Any value	New Encryption word to be set	N/A
Fast period	1	1-254	Cyclic wakeup in sec during comm session	1
Slow period	1	1-254	Cyclic wakeup in sec during wakeup session	14

Set DXT SR parameters response

Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0005-0x0006	Result of the command	N/A

4.3.4.6 Set Gateway mode

OPCODE:0x0006

Where field parameters is:

mode

Mode parameter is mandatory.

Field	Size	Valid Range	Description	Default
Mode	1	0x00-0x03	Set command interface	0x00

Mode value:

- 0x00 = USB
- 0x01=Bluetooth (RFCOMM profile) (only for C1)
- 0x02=RS232 (115200 8N1)
- 0x03=GPRS (GW is a client, host is the server) (only for C2)

New configuration will be active only after next restart of the system. Only one interface can be active at a time.



Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.8 Set BT parameters

Set BT parameters (only for C1). This command is not available when BT interface is active.

OPCODE:0x0008

Where field parameters is:

Old PIN code	New PIN code	Local name
--------------	--------------	------------

If a new PIN has to be set, old and new PIN codes are mandatory.

Field	size	Valid Range	Description	Default
Old PIN	30	String	Current BT PIN code	1234
New PIN	30	String	New BT PIN code to be set	N/A
Local name	30	String	Name of the local BT device	SWSGW_serial Number

Set BT parameters response

Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0005	Result of the command	N/A

4.3.4.9 Get Battery level

Read the battery level (percentage).

In C1 configuration, during the first battery charging or if battery has been just plugged, gateway should be on until battery is fully charged.

OPCODE:0x0009



Where field parameters is:

No parameters

Get Battery level response

Status	level
--------	-------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Level	1	0 (flat battery) -100 (charged battery)	Battery level (percentage)	N/A

4.3.4.10 Get HW/SW version

OPCODE:0x000A

Where field parameters is:

No parameters

Get HW/SW version response

Status	HW version	SW version
--------	------------	------------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
HW version	15	String	Hardware version	N/A
SW version	15	String	Software version	N/A

4.3.4.11 Get GSM parameters

Get GSM parameters (only for C2)

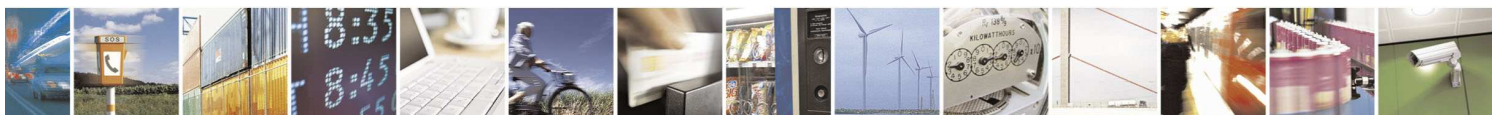
OPCODE:0x000B

Where field parameters is:

No parameters

Get GSM parameters response

Status	APN	DNS
--------	-----	-----



Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
APN	30	String	APN hostname	N/A
DNS	4	IP address	DNS server	N/A

4.3.4.12 Get GW SR parameters

Get SR parameters from the GW

OPCODE:0x000C

field parameters is:

No parameters

Parameters are read if SR module is not in wakeup session, comm session or comm slot.

Get GW SR parameters response

Status	Channel	NetworkID	Wakeup session duration	Comm session duration	Comm slot duration

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0006	Result of the command	N/A
channel	1	0x0B-0x1A	RF channel for SR network	N/A
Network ID	2	0x0000-0xFFFF	Network ID for SR network	N/A
Wakeup session duration	1	1-254	Wakeup session duration in sec	N/A
Comm session duration	1	0-255	Comm session duration in sec	N/A
Comm slot duration	1	0-255	Comm slot duration in sec	N/A

4.3.4.13 Get DXT SR parameters

Get SR parameters from a DXT.

OPCODE:0x000D



Where field parameters is:

Address

MAC address parameter is mandatory.

Field	Size	Valid Range	Description	Default
Address	8	MAC address from 00-15-4F-00-00-00-00-00 to 00-15-4F-FF-FF-FF-FF-FE	DXT MAC address	N/A

If the SR module in the gateway is off or in idle, it performs a wakeup session and then starts a comm slot with the DXT. If the SR module in the gateway is in comm session, scan is not performed. Comm slot will be ended after the registers are read and SR module in the gateway will be turn off.

Get DXT SR parameters response

Status Fast period Slow period

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0006	Result of the command	N/A
Fast period	1	1-254	Cyclic wakeup in sec during comm session	N/A
Slow period	1	1-254	Cyclic wakeup in sec during wakeup session	N/A

4.3.4.14 Scan for DXT

Look for active DXTs.

OPCODE:0x000E

Where field parameters is:

No parameters

Scan is performed if SR module is in off or idle state. After Scan, SR module goes to Comm Session.

Scan For DXT response

A Scan Response,one for each device, will be received



Parameters field of *Scan Response*.

Status	Address
--------	---------

Next table shows the valid range for the values of the parameters of the *Scan Response*.

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0004 or 0x0006	Result of the command	N/A
Address	8	MAC address from 00-15-4F-00-00-00-00-00 to 00-15-4F-FF-FF-FF-FF-FE	DXT MAC address	N/A

When scan is completed, status byte is 0x0004 and the other parameters are meaningless.

4.3.4.15 Set Auto DXT Data

Set parameters of Get Data from DXTs when GW is in autonomous mode. (Only for C2)

OPCODE:0x000F

Where field parameters is:

DXT list	mode baro	block baro	mode diver	block diver
----------	-----------	------------	------------	-------------

No parameter is mandatory.

Field	size	Valid Range	Description	Default
DXT list	1	0x00: All the active DXTs in the network; 0x01: All the active DXTs from the saved list	Active DXTs or DXT list	0x00
bode baro	1	0x00: No data; 0x01: Last data; 0x02: All data; 0x03 Specific data	Get Last Data / All Data / Specific Data or don't get data	0x01
block baro	2	0-6000	Specific block	0
mode diver	1	0x00: No data; 0x01: Last data; 0x02: All data; 0x03 Specific data	Get Last Data / All Data / Specific Data or don't get data	0x01
block diver	2	0-6000	Specific block	0

Set Auto DXT Data response

Status



Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.16 Get Status

Get SR/GSM/BT status.

OPCODE:0x0010

Where field parameters is:

No parameters

Get Status is accepted also during execution of another command.

Get Status response

Status	Opcode	SR Status	BT Status (only for C1)	GSM Status (only for C2)
--------	--------	-----------	-------------------------	--------------------------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Opcode	2	0x0000-0x0015	Opcod of the command in execution; if there is no command in execution, 0x0000 is returned	N/A
SR Status	1	0x00-0x05 0x00: off / standby 0x01: idle 0x02: busy 0x03: wup session 0x04: comm session 0x05: comm slot	SR current status	N/A
BT Status	1	0x00- 0x05 0x00: off 0x01: idle 0x02: discoverable 0x03: inquiry 0x04: paired 0x05: rfcomm	BT current status	N/A
GSM Status	1	0x00-0x05 0x00: off 0x01: not registered 0x02: registered 0x03: starting GPRS 0x04: GPRS	GSM current status	N/A



0x05: FTPput

4.3.4.17 Set data mode

OPCODE:0x0011

Where field parameters is:

No parameters

In transparent mode all the data received in serial interface will be sent directly, without interpreting them, to the UART interface of the local ZE60 and should follow the format described in document “ZE60 Software Interface Specifications”. It is task of ZE60 FW to manage this packet and translate in RF frame in order to send to the specific DXT.

Set data mode response

Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

After response, transparent mode will be available in one second.

4.3.4.18 SET Escape sequence from data mode

OPCODE:0x0012

Where field parameters is:

Sequence

Escape sequence parameter is mandatory.

Field	Size	Valid Range	Description	Default
Sequence	3		When in transparent communication this sequence is received from host, GW returns to Control Interface	+++

The first char in the sequence is the most left one.

After escape sequence, local SR module is turned off and control interface will be available in one second.

Set escape sequence response



Status

Field		Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.19 Get DXT Data

Send data from DXT over serial communication (C1 and C2) or FTP (only C2).

OPCODE:0x0013

Where field parameters is:

Address	FTP/serial	mode baro	block baro	mode diver	block diver
---------	------------	-----------	------------	------------	-------------

All the parameters (except block parameters) are always mandatory. Block parameters are mandatory if specific data is required.

Field	Size	Valid Range	Description	Default
Address	8	MAC address from 00-15-4F-00-00-00-00-00 to 00-15-4F-FF-FF-FF-FF-FF or 00-00-00-00-00-00-00-00	DXT MAC address	N/A
FTP/serial	1	0x00: serial, 0x01: FTP	Sending file mode	N/A
bode baro	1	0x00: No data; 0x01: Last data; 0x02: All data; 0x03 Specific data	Get Last Data / All Data / Specific Data or don't get data	N/A
block baro	2	0-6000	Specific block	N/A
mode diver	1	0x00: No data; 0x01: Last data; 0x02: All data; 0x03 Specific data	Get Last Data / All Data / Specific Data or don't get data	N/A
block diver	2	0-6000	Specific block	N/A

If ZE60 module is off or in idle, it performs a wakeup session and then asks for data. If ZE60 module is in comm session, scan is not performed.

FTP/serial can be only 0x00 for C1. If the Address is 00-15-4F-FF-FF-FF-FF-FF, data will be received from all the connected DXTs. If the Address is 00-00-00-00-00-00-00-00, data will be received from all the active DXTs from the saved list.

If you ask for baro and diver data, one comm slot is dedicated for baro and another one for diver.

Each comm slot will be executed only if there is enough time in the current comm session.



Get DXT Data response (serial)

If received data length from DXTs is SIZE, (SIZE/256) packets are received. Every packet is:

Status	NumTotPackets	Num	Len	Data bytes
--------	---------------	-----	-----	------------

Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0003, 0x0006 or 0x0009	Result of the command	N/A
NumTotPacket	2	0-65535	Total number of packets	N/A
Num	2	0-65535	Number of the current packet (the first packet has Num = 0)	N/A
Len	1	0-255	Number of bytes to be considered in the unstuffed Data bytes field – 1	N/A
Data bytes	256		DXT data bytes	N/A

In the Data bytes field could contain a certain number of DXT frames; each DXT frame is anticipated by its MAC address (big endian).

If no DXT awakes during comm slot but it had been found during wakeup session, Status is 0x0009, Len and NumTotPacket are equal to 0.

If DXT is awake during comm slot but it sends no data, DXT frame is 4 bytes long and these bytes are equal to 0 (its respective data bytes will be made up of its MAC address and 4 bytes equal to 0)

Get DXT Data response (FTP) (only for C2)

Status

Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0003, 0x0006 or 0x0009	Result of the command	N/A

One file is sent to FTP server. Its name has this format:

date_hour.dat

It contains a certain number of DXT frames; each DXT frame is anticipated by its MAC address (big endian).

If no DXT awakes during comm slot but it had been found during wakeup session, Status is 0x0009 and no file is sent to FTP server.

If DXT is awake during comm slot but it sends no data, DXT frame is 4 bytes long and these bytes are equal to 0 (its respective bytes will be made up of its MAC address and 4 bytes equal to 0)



4.3.4.20 Add DXT list

Add a new MAC address in the saved list. This list can be used by Get DXT Data and during the autonomous mode.

OPCODE:0x0014

Where field parameters is:

Field	Size	Valid Range	Description	Default
Address	8	MAC address from 00-15-4F-00-00-00-00-00 to 00-15-4F-FF-FF-FF-FF-FE	DXT MAC address to add to the list	N/A

MAC address parameter is mandatory.

Add DXT list response

Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.21 Get DXT list

Get the saved list.

OPCODE:0x0015

Where field parameters is:

No parameter

Get DXT list response

When list is finished, status byte is 0x0004 and the other parameters are meaningless.



No parameter

Disable SIM PIN response

Status

Field		Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0007	Result of the command	N/A

Status will be 0x0007 if SIM PIN is already disabled.

4.3.4.24 Turn Off SR

Turn off the SR module in the GW.

OPCODE:0x0018

Where field parameters is:

No parameter

Turn off SR response

Status

Field		Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.25 Reboot

OPCODE:0x0019

Where field parameters is:

No parameter

Reboot is accepted also during execution of another command.

Reboot response

Status

Field		Valid Range	Description	Default
-------	--	-------------	-------------	---------



Status	2	0x0001-0x0003	Result of the command	N/A
--------	---	---------------	-----------------------	-----

4.3.4.26 Standby

Only for C1. This command is not available when BT interface is active.

OPCODE:0x001A

Where field parameters is:

No parameters

Standby response

Status

Field		Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.27 Deep Sleep

Only for C2.

OPCODE:0x001B

Where field parameters is:

No parameter

Deep sleep response

Status

Field		Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.28 Turn off

Only for C1.

OPCODE:0x001C

Where field parameters is:



No parameter

Turn off response

Status

Field		Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.29 Reset

Reboot gateway with default configuration. SR registers also are reset. SR module has to be off.

OPCODE:0x001D

Where field parameters is:

No parameter

Reset response

Status

Field		Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0006	Result of the command	N/A

4.3.4.30 Get Auto DXT Data

Get parameters of Get Data from DXTs when GW is in autonomous mode. (Only for C2)

OPCODE:0x001E

Where field parameters is:

No parameter

Get Auto DXT Data response

Status	DXT list	mode baro	block baro	mode diver	block diver
--------	----------	-----------	------------	------------	-------------



Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
DXT list	1	0x00: All the active DXTs in the network; 0x01: All the active DXTs from the saved list	Active DXTs or DXT list	N/A
bode baro	1	0x00: No data; 0x01: Last data; 0x02: All data; 0x03 Specific data	Get Last Data / All Data / Specific Data or don't get data	N/A
block baro	2	0-6000	Specific block	N/A
mode diver	1	0x00: No data; 0x01: Last data; 0x02: All data; 0x03 Specific data	Get Last Data / All Data / Specific Data or don't get data	N/A
block diver	2	0-6000	Specific block	N/A

4.3.4.31 Get Log File

Get Log application file over serial communication (C1 and C2) or FTP (only C2).

Log application file contains:

- the last operations done by gateway
 - C1: the operations since boot are always reported
 - C2: if there is an error occurred during previous autonomous mode and this has never been sent over FTP or serial communication, the operations since this error are reported, else the operations since boot are reported
- the actual status of the gateway
- the DXT list

If control interface is not on serial port, gateway sends log info to RS232 serial port.

OPCODE:0x001F

Where field parameters is:

FTP/serial

FTP/serial parameter is mandatory.

Field	Size	Valid Range	Description	Default
FTP/serial	1	0x00: serial, 0x01: FTP	Sending file mode	N/A

Get log file response (serial)

If received data length is SIZE, (SIZE/256) packets are received. Every packet is:

Status	NumTotPackets	Num	Len	Data bytes
--------	---------------	-----	-----	------------



Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
NumTotPacket	2	0-65535	Total number of packets	N/A
Num	2	0-65535	Number of the current packet (the first packet has Num = 0)	N/A
Len	1	0-255	Number of bytes to be considered in the unstuffed Data bytes field – 1	N/A
Data bytes	256		Data Log bytes	N/A

Get log file response (FTP) (only for C2)

Status

Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0002	Result of the command	N/A

One file is sent to FTP server. Its name has this format:

date_hour.log

4.3.4.32 Get BT parameters

Get BT properties (only for C1)

OPCODE:0x0020

Where field parameters is:

No parameter

Get BT parameter response

Status	Local address	Local name	Host address	Host name
--------	---------------	------------	--------------	-----------

Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Local address	6		Address of the local BT device	N/A
Local name	30	String	Name of the local BT device	N/A
Host address	6		Address of the host BT device	N/A
Host name	30	String	Name of the host BT device	N/A



If no host has been paired, host address is all-zero.

4.3.4.33 Scan for BT devices

Scan for discoverable BT devices. (Only for C1)

Local BT device is not discoverable. This command is not available when BT interface is active.

OPCODE:0x0021

Where field parameters is:

No parameter

Scan For BT response

A *Scan Response*, one for each device, will be received

Parameters field of *Scan Response*.

Status	Address	Name
--------	---------	------

Next table shows the valid range for the values of the parameters of the *Scan Response*.

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003 or 0x0008	Result of the command	N/A
Address	6		BT address	N/A
Name	30	String	BT name	N/A

When scan is completed, status byte is 0x0008 and the other parameters are meaningless.

4.3.4.34 Add BT host

Put gateway in discoverable state and wait for pairing (only C1). One host can pair with GW. If host has not a serial profile, it is not paired. When this command is sent, actual BT host is deleted. This command is not available when BT interface is active.

OPCODE:0x0022

Where field parameters is:

Timeout

Timeout parameter is mandatory.



Field	Size	Valid Range	Description	Default
Timeout	1	1-255	GW waits timeout seconds	N/A

Add BT host response

Status	Address	Name
--------	---------	------

Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Address	6		Host address	N/A
Name	30	String	Host name	N/A

4.3.4.35 Reset BT host

Delete actual BT host (only C1).

OPCODE:0x0023

Where field parameters is:

No parameter

Reset BT host response

Status

Field	Size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.36 Set GPRS host parameters

Set parameters for control interface on GPRS (only C2). This command is not available when GPRS interface is active.

OPCODE: 0x0024

Where field parameters is:

Host GPRS	Host port
-----------	-----------

No parameter is mandatory.



Field	size	Valid Range	Description	Default
Host GPRS	30	String	Hostname of the machine that controls GW through GPRS	host.name.com
Host port	2	0-65535	TCP/IP port used by GPRS host	6790

Set GPRS host parameters Response

Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.37 Set FTP parameters

Set parameters for FTP server (only C2).

OPCODE: 0x0025

Where field parameters is:

FTP server name	FTP login	FTP password	FTP folder

No parameter is mandatory.

Field	size	Valid Range	Description	Default
FTP server name	30	String	FTP server hostname	ftp.server.com
FTP login	30	String	Username for FTP login	user
FTP password	30	String	Password for FTP login	1234
FTP folder	60	String	Folder in the FTP server	Temp/telediver

Set FTP parameters Response

Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.38 Set Wakeup parameters

Set date/hour of the next wakeup (only C2).

OPCODE: 0x0026



Where field parameters is:

Day	Month	Year	Hour	Minutes	Polling freq
-----	-------	------	------	---------	--------------

No parameter is mandatory.

Field	size	Valid Range	Description	Default
Day	1	1-31	Day of the month	2
Month	1	1-12	Month of the year	1
Year	1	10-255	Year since 2000	10
Hour	1	0-23	Hour since midnight	0
Minutes	1	0-59	Minutes after the hour	0
Polling freq	2	1-65535	Polling frequency in minutes	1440

Set Wakeup parameters Response

Status

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A

4.3.4.39 Get GPRS host parameters

Get parameters for control interface on GPRS (only C2).

OPCODE: 0x0027

Where field parameters is:

No parameter

Get GPRS host parameters Response

Status	Host GPRS	Host port
--------	-----------	-----------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Host GPRS	30	String	Hostname of the machine that controls GW through GPRS	N/A
Host port	2	0-65535	TCP/IP port used by GPRS host	N/A



4.3.4.40 Get FTP parameters

Get parameters for FTP server (only C2).

OPCODE: 0x0028

Where field parameters is:

No parameter

Get FTP parameters Response

Status	FTP server name	FTP folder
--------	-----------------	------------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
FTP server name	30	String	FTP server hostname	N/A
FTP folder	60	String	Folder in the FTP server	N/A

4.3.4.41 Get Wakeup parameters

Get date/hour of the next wakeup (only C2).

OPCODE: 0x0029

Where field parameters is:

No parameter

Get Wakeup parameters Response

Status	Day	Month	Year	Hour	Minutes	Polling freq
--------	-----	-------	------	------	---------	--------------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Day	1	1-31	Day of the month	N/A
Month	1	1-12	Month of the year	N/A
Year	1	10-255	Year since 2000	N/A
Hour	1	0-23	Hour since midnight	N/A
Minutes	1	0-59	Minutes after the hour	N/A
Polling freq	2	1-65535	Polling frequency in minutes	N/A



4.3.4.42 Flash SR

Flash the SR module through the USB virtual serial port. After gateway sends ACK, use ZTC on the USB virtual serial port. After flashing, in C1 configuration press reset button, in C2 configuration unplug and plug again the power.

OPCODE: 0x002A

Where field parameters is:

No parameter

Flash SR parameters Response

Only ACK is sent.

4.3.4.43 Get Battery voltage

Get battery voltage and temperature (only for C2). Voltage is read one time during application boot. Temperature is read one time: in autonomous mode or in GPRS controlled mode during application boot, in controlled mode when this command is received by gateway.

OPCODE:0x002B

Where field parameters is:

No parameters

Get Battery Voltage response

Status	voltage	sign	temperature
--------	---------	------	-------------

Field	size	Valid Range	Description	Default
Status	2	0x0001-0x0003	Result of the command	N/A
Voltage	2	0 – 23000 mV	Battery voltage (mV)	N/A
sign	1	0x00: positive 0x01: negative	Temperature sign	N/A
temperature	1	0 - 100	Temperature (°C) (absolute value)	N/A



4.4 AT command console (C2)

The “modem” u-boot command performs a pass-through between the modem serial port and the RS232 port of the gateway.

Command is:

modem uart0 53 18 17

Example on RS232 port (start gateway and enter under u-boot console typing a key before kernel booting; after “Modem is ready” print, you can send AT commands)

```

RomBOOT
>
CRC ok loading custom env

U-Boot 1.2.0 (Oct 20 2010 - 15:34:01)- 221 Telit

DRAM: 64 MB

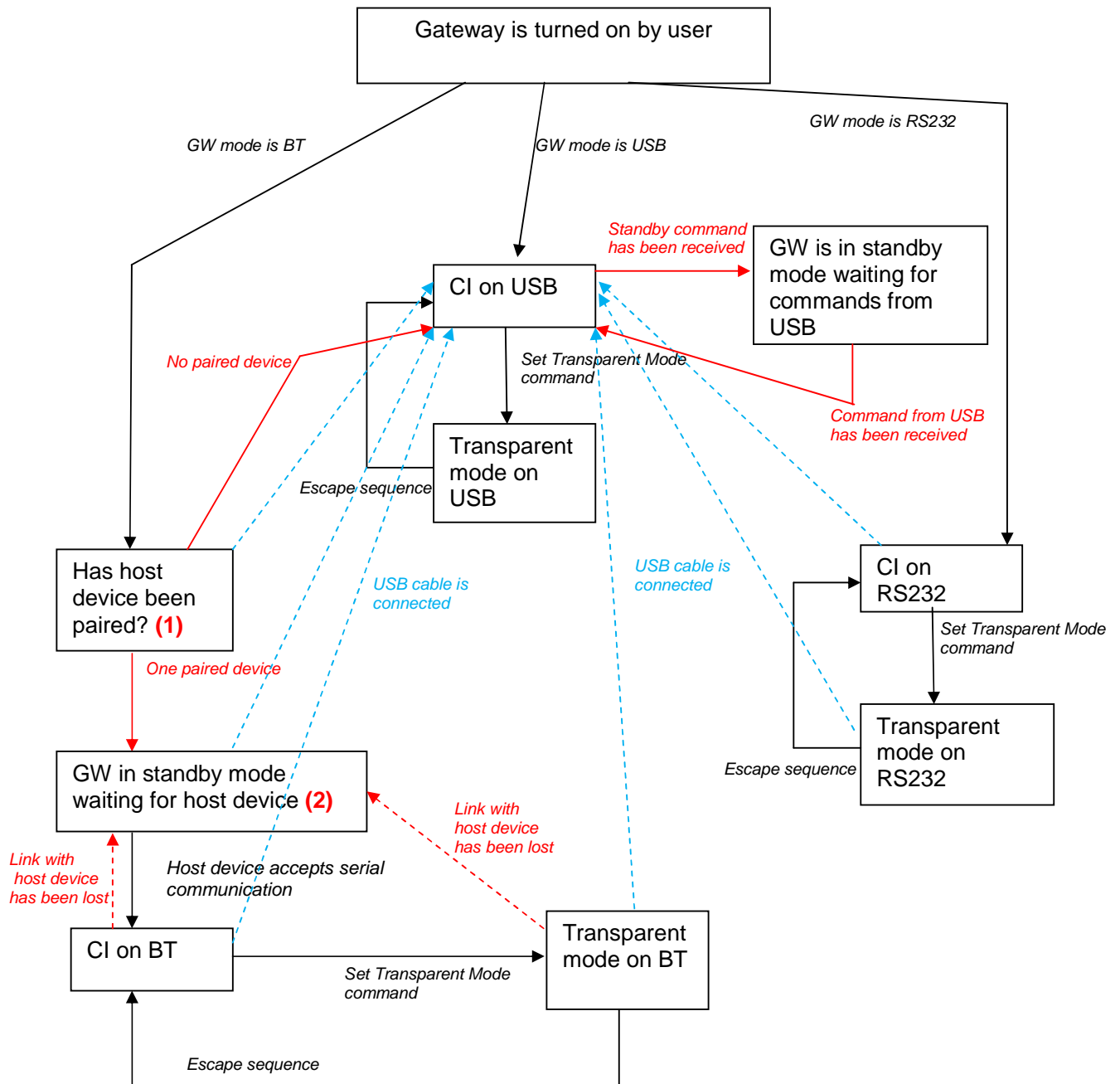
Bank #1
Flash:NAND Numonyx NAND01G-B2C 128MB 1.8V 8-bit
Hardware ECC (ECC data size = 512 bytes)
Nb min erasable unit: 1024
min erasable Size: 131072
Size=134217728 bytes
Logical address: 0x40000000
Block 193 is factory bad (0x41820000)
Block 615 is factory bad (0x44ce0000)
Block 713 is factory bad (0x45920000)
Area 0: 40000000 to 403BFFFF (RO) Primary Bootstrap
Area 1: 403C0000 to 4043FFFF (RO) U-Boot code
Area 2: 40440000 to 404BFFFF (RO) U-Boot Environment
Area 3: 404C0000 to 407BFFFF User Area 1
Area 4: 407C0000 to 47FFFFFF User Area 2

usbser: usb console disabled (usbser_timeout = 0)
In: serial
Out: serial
Err: serial
Hit any key to stop autoboot: 0
U-Boot> modem uart0 53 18 17
Turning on modem
Modem is ready
at
OK

```



5 Appendix: configuration 1 (BT)



USB interface is the default mode, so:

- When gateway is turned at the first time, control interface on USB is started.
- When USB cable is disconnected and USB interface is active, gateway waits for cable connecting.
- If Set Gateway mode command (see 4.3.4.6) is sent during control interface, at the next boot the new interface will be active.
- To pass from control interface to transparent mode and vice versa takes at most one second.
- In order to put gateway in standby mode, use Standby command (see 4.3.4.26). Gateway will be woken up when a command is received on the active interface.
- In the state (1), GW checks if there is a registered BT host device. In order to register a BT host device, use Add BT host command (see 4.3.4.34).
- When GW is in the state (2), if host device is reachable and accepts serial communication, GW will be woken up from standby mode and launches CI on BT.
- In order to turn off gateway, use Turn Off command (see 4.3.4.28). ARM led will turn off and switch can be moved to “OFF” position after 5 seconds.
- If battery is too low and power supply from USB is not provided, gateway automatically turns off.

5.1 BT pairing using Windows Mobile

If a host with Windows Mobile is used, it should be configured in order to export an incoming port on the BT serial profile.

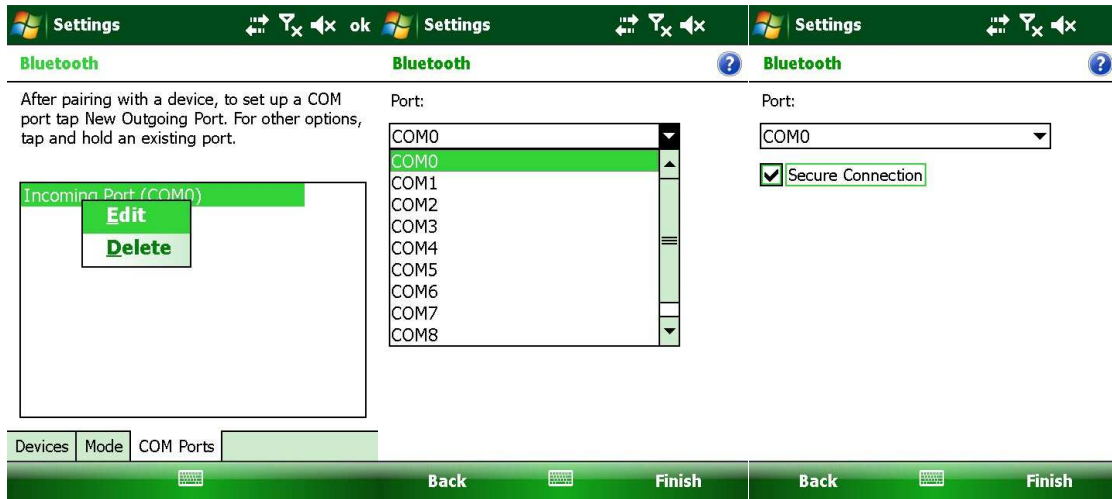
The following steps configure the PDA (this procedure can be done only one time):

- Modify the Windows registry using NautizRegistry application: click on “start update”

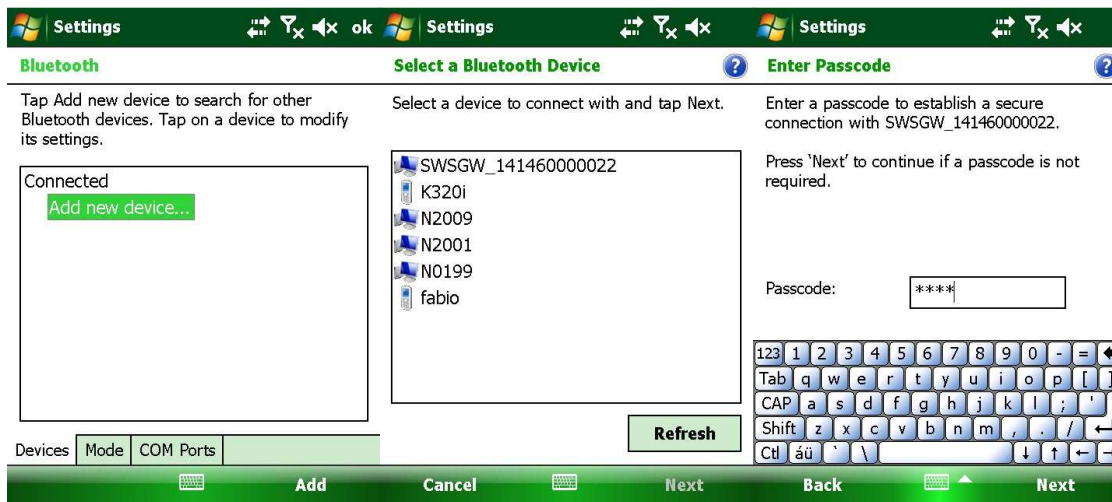


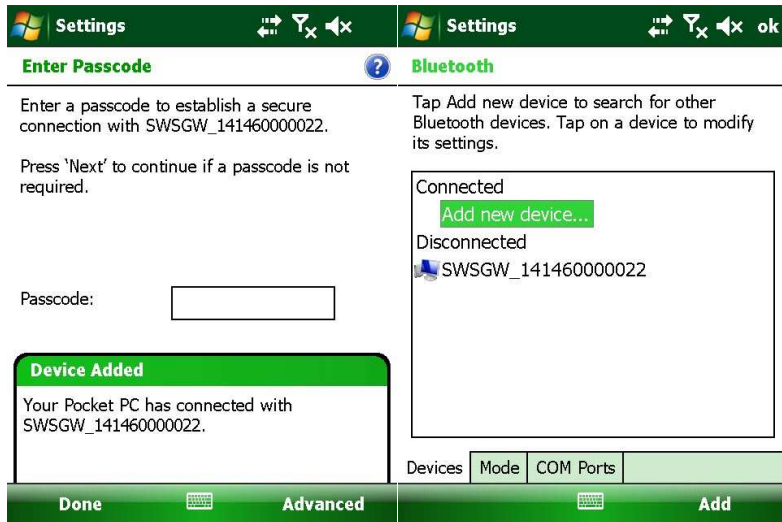
- Under Start/settings/connections/Bluetooth, choose the name associated to the incoming BT serial port in order to enable it (by default COM0 is show but it is not enabled, it is enabled only choosing it again)





- Now, SPP is configured. During AddBtHost, host can be registered by gateway:





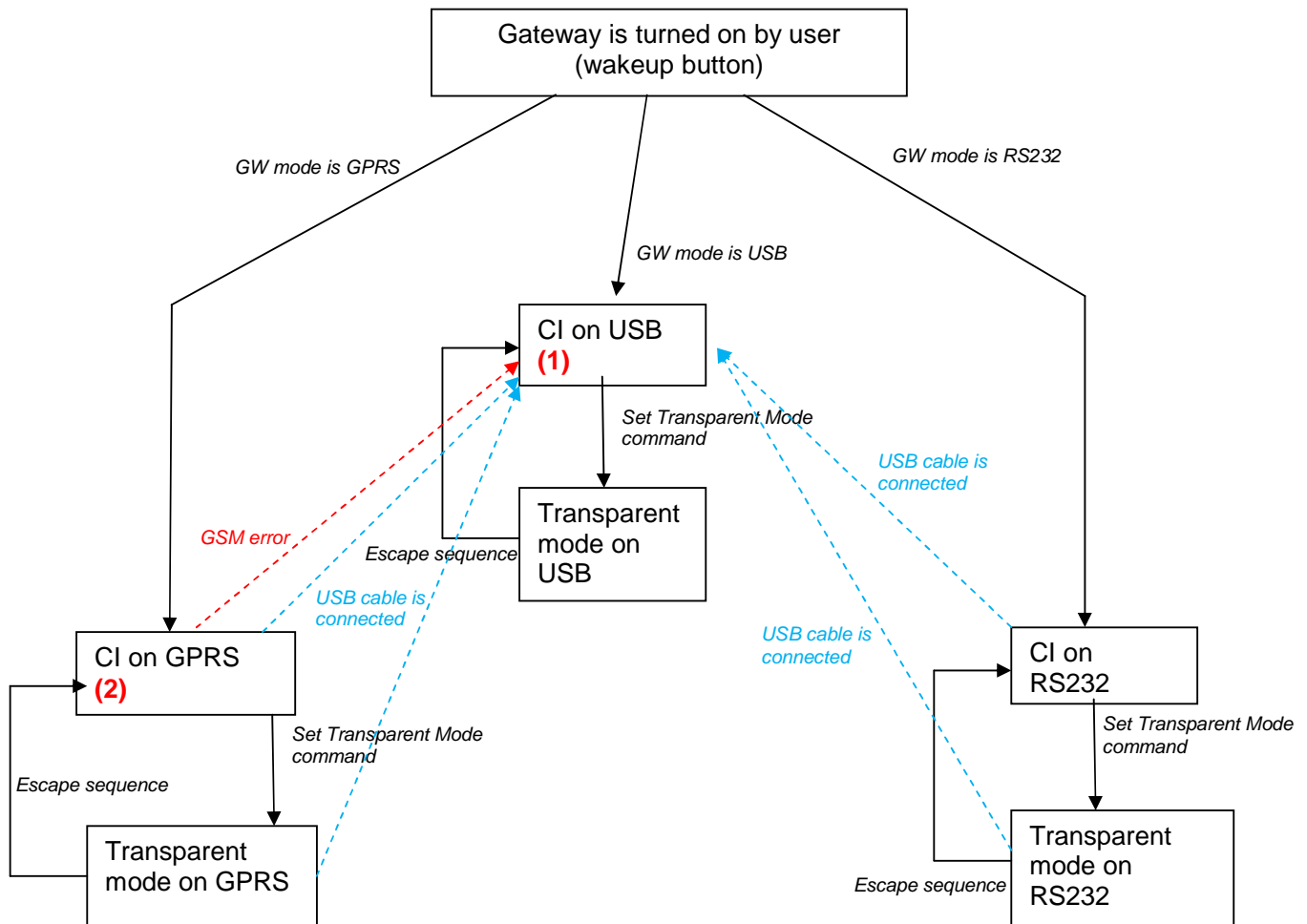
- In order to enable the control interface on BT, send setGatewayMode and Reboot commands: at the next reboot, if BT host is visible, gateway will open a serial connection with it (in this example, with the COM0 serial port).



6 Appendix: configuration 2 (GSM) - controlled and autonomous modes

Gateway in configuration2 stays most of the time in deep sleep mode and it can be woken up from RTC alarm or by wake up button. In the first case autonomous mode is activated while in the latest it goes directly in controlled mode.

6.1 Controlled mode

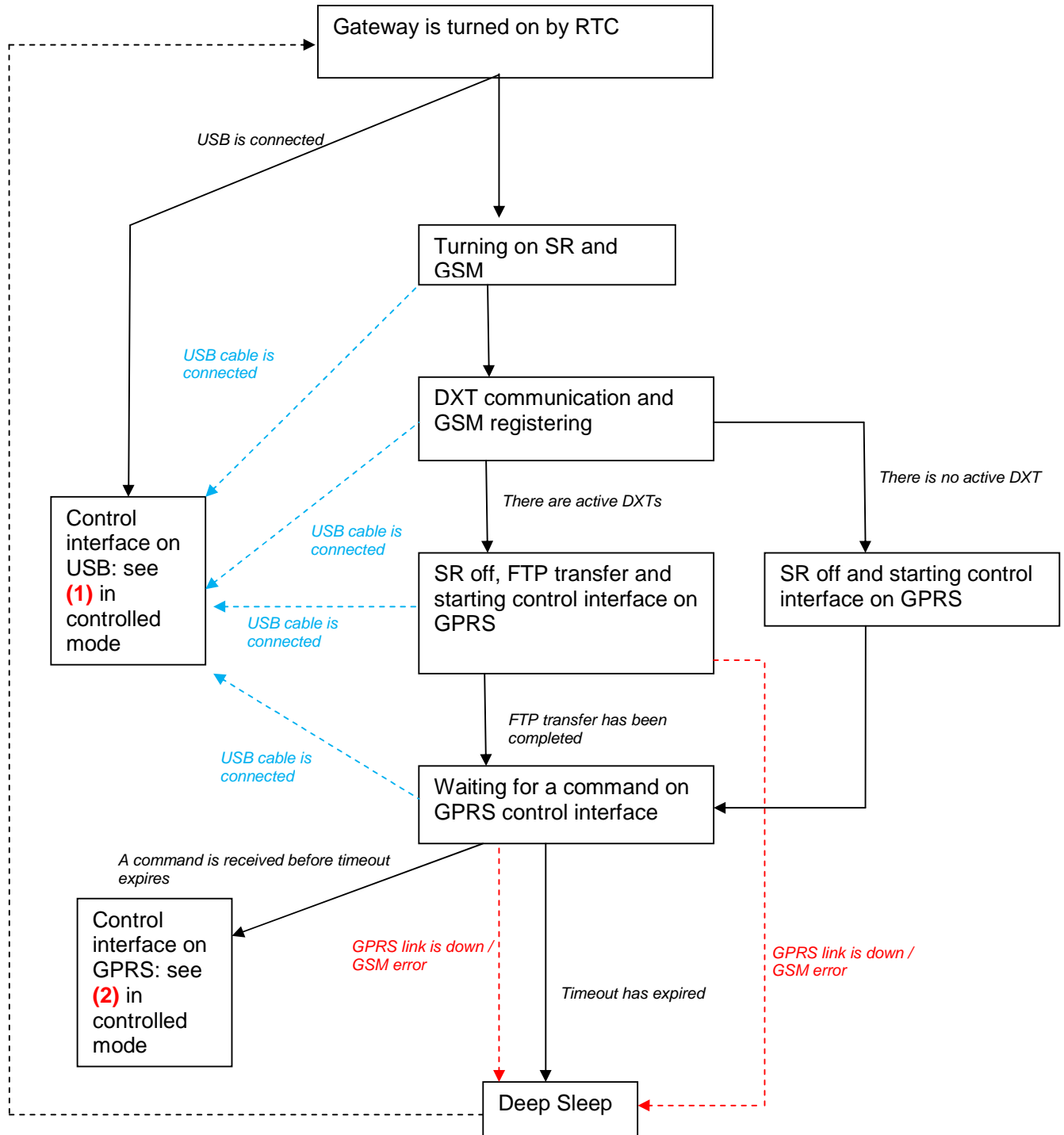


USB interface is the default mode, so:

- When gateway is turned at the first time, control interface on USB is started.
- When USB cable is disconnected and USB interface is active, gateway waits for cable connecting.
- If Set Gateway mode command (see 4.3.4.6) is sent during control interface, at the next boot the new interface will be active.
- At boot time, if USB cable is connected, control interface will be started always on the USB.
- During functioning, if USB cable is connected, control interface on USB will be started in one second. Old interface will be again active at the next reboot.
- To pass from control interface to transparent mode and vice versa takes at most one second.
- In order to put gateway in deep sleep, use Deep Sleep command (see 4.3.4.27). Gateway can be woken up by user through wakeup button (controlled mode) or by RTC alarm (autonomous mode).
- During autonomous mode, interface on GPRS is enabled: if gateway is turned on in controlled mode and USB cable is unplugged, control interface is active on GPRS
- If reset button is pressed while gateway is going to deep sleep, system could reset two times or go to deep sleep after a reset.



6.2 Autonomous mode



When it is woken up from RTC:

- If the USB cable is connected, gateway goes into controlled mode. Otherwise:
- **state “Turning on SR and GSM”:**
 - SR and GSM modules are turned on in parallel from ARM9
- **State “DXT communication and GSM registering”:**
 - gateway starts one wakeup session and then comm session, while GSM module is registering to network
 - gateway collects data from DXTs on the basis of Set Auto Dxt Data command (see 4.3.4.15)
 - DXTs to be asked for data: all the active DXTs in the network or all the active DXT present in the saved list (see 4.3.4.20, 4.3.4.21, 4.3.4.22)
 - each comm slot will be stopped when gateway will receive the *end of data* DXT-frame from each DXT
- **state “SR off, FTP transfer and starting control interface on GPRS”:**
 - DXT communication is finished and SR is turned off
 - FTP transfer: gateway connects to FTP server and sends one file with the format described in 4.3.4.19. If a previous error has occurred, application log file is automatically sent (see 4.3.4.31)
 - While data file is sent to FTP server, control interface on GPRS is started (gateway is the client, host is the server)
 - FTP and GSM parameters are set by Set GSM parameters (see 4.3.4.7)
- **State “Waiting for a command on GPRS control interface:”**
 - Once FTP transfer is finished, if a command is received within 45 seconds or had been received during FTP transferring, gateway goes to controlled mode, otherwise it goes back to deep sleep (next wake up time is automatically calculated on the basis of Set GSM parameters - 4.3.4.7)



7 Conformity Assessment Issues

Configuration 1(BG864-2.4)

The SWS-GW conforms to the following European Union Directives:

- R&TTE Directive 1999/EC (Radio Equipment & Telecommunications Terminal Equipments)
- Low Voltage Directive 73/23/EEC and product safety
- Directive 89/336/EEC for conformity for EMC

In order to satisfy the essential requisite of the R&TTE 99/5/EC directive, the SWS-GW is compliant with the following standards:

- Radio Spectrum. Standards: EN 300 328
- EMC (Electromagnetic Compatibility). Standards: EN 301 489-1 and EN 301 489-7
- LVD (Low Voltage Directive) Standards: EN 60 950



NOTE: the device can be used in all EU and in other countries on 2.4 GHz ISM band. When used in EU countries, When operating outdoor in France, the emission shall be limited to 10mW in the 2454-2483.5MHz range.

The power output of the BG864-2.4 has been limited to fulfill the R&TTE recommendation 300 328 in respect of Power Spectral Density (10mW/MHz). Customers willing to operate the unit within the EU have to order the European version of the product

For more information please contact Telit Customer Support TS-EMEA@telit.com

Configuration 2 (GG864-2.4)

The SWS-GW conforms to the following European Union Directives:

- R&TTE Directive 1999/EC (Radio Equipment & Telecommunications Terminal Equipments)
- Low Voltage Directive 73/23/EEC and product safety
- Directive 89/336/EEC for conformity for EMC

In order to satisfy the essential requisite of the R&TTE 99/5/EC directive, the SWS-GW is compliant with the following standards:

- GSM (Radio Spectrum). Standards: EN 301 511 and 3GPP 51.010-1
- EMC (Electromagnetic Compatibility). Standards: EN 301 489-1 and EN 301 489-7
- LVD (Low Voltage Directive) Standards: EN 60 950



NOTE: the device can be used in all EU and in other countries on 2.4 GHz ISM band. When operating outdoor in France, the emission shall be limited to 10mW in the 2454-2483.5MHz range.

The power output of the BG864-2.4 has been limited to fulfill the R&TTE recommendation 300 328 in respect of Power Spectral Density (10mW/MHz). Customers willing to operate the unit within the EU have to order the European version of the product

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