



MTXTunnel-v7

User Manual



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Important information

This technical description contains important information for the start up and use of the MTXTunnel application. Read it carefully before you start working with MTX Terminal JAVA enabled & MTXTUNNEL. The warranty will be void should damage occur due to non-compliance with these instructions for use. We cannot accept any responsibility for consequential loss.

Service and Support

To contact customer support please use the contact details below:

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Alejandro Sanchez, 109
28019 Madrid –Spain

gsmsupport@matrix.es

Information about MTXTUNNEL product is available on the following web site:

<http://www.mtxtunnel.com>

Information about MTX65 product and accessories is available on the following web site:

<http://www.mtx-terminals.com>

And following FTP server (ask for user and password access):

<ftp://ftp.matrixelectronica.eu/>

Or contact your local distributor / sales agent:

REVISION INFORMATION

VERSION. 7.12 Release: May 2013

Index

1. - Introduction.	8
How to use this manual	8
2. - MTXTunnel V7 FEATURES	9
Hardware Multiplatform	9
TCP & UDP protocols	9
GPRS connections: Permanent / on request.	10
WebServer.	10
Telnet	10
SMS Alarm	11
Total control or MTXTunnel using SMS	11
DynDNS	11
Private DNS	12
Firewall	12
Automatic timing synchronization	12
GPRS-I2C/SPI Tunnel	12
Serial (RS232/485)-HTTP Tunnel	12
Serial (RS232/485)-SMS Tunnel	12
Ultra Low Power ULP Tunnel	13
GPRS Telemetry transmission	13
SSL Security	13
Modbus Monitoring	13
RF868MHz remote monitoring sensors (Wavenis)	14
Integration of MTXTunnel in end applications. API.	14
3. - FAQ. MTXTunnel V7 Basic concepts.	15
What is the MTXTunnel?.....	15
What is the MTXTunnel for?	15
Is MTXTunnel needed at the PC server's side?	16
Who starts the connection?.....	16
It is mandatory to be permanently connected to GPRS?.....	17
So... how long is MTXTunnel active for (GPRS connected)?.....	17
I want to use MTXTunnel as TCP Server so I can connect to them periodically from my PC. Will I need SIMs with IP fixed provisioned?.....	17
I found that in my case I'm going to use thousands of MTXTunnel devices. I cannot use missed calls or SMSs to work out IP addresses. I do not want to use DynDNS as it can be difficult to handle and even costly. What can I do?	18

Is it possible to send the new IP to a Web server? I’m more familiar with Web programming –ASP, PHP- rather than TCP-IP sockets. I’m thinking about using a Data Base. Is this possible?..... 18

MTXTunnel can be installed on several Cinterion-based modem terminals like MTX65i, MTX65IND, MTX65ULP y MTX65+G. What are the differences between them? 18

You are talking about relays, analog inputs... Is MTXTunnel not a Serial-GPRS Gateway? 19

I’ve read about sending AT commands using TCP/IP connection. Can I use an AT command to change the value of a digital output?..... 19

So, using MTX-IND, I can activate a relay using a SMS, but... it’s not practical because the AT command is not intuitive or easy to remember..... 19

MTX65i, MTX65IND and MTX65ULP modem terminals have 2 serial ports. Could I control 2 external devices with one terminal? 19

What about MTXTunnel installed on MTX65+G which has a GPS receiver inside? Can I use it for fleet management?.... 20

What is WebServer used for? 20

What is Telnet used for? 20

I’m worried about unauthorized access using WebServer or Telnet. 20

For maintenance purposes, I would like access to MTXTunnel at any time and in any location, from any IP address..... 20

Could I or somebody else receive an SMS when an input changes, like alarm detection? 20

MTXTunnel 5.0 is a GRPS-Serial tunnel Gateway. What is a GRPS-I2C, GPRS-SPI, HTTP-Serial or SMS-Serial tunnel? Do you have some examples? 21

I need a low power application MTX65ULP terminal modem. What can MTXTunnel do?..... 21

If MTXTunnel can be woken up in a configured time, does this mean that there is clock inside? But you can also say that it’s powered off. Please explain. 21

Can this timing be synchronized? 22

MTXTunnel used on the MTX65ULP wakes up at configured day/hour for some time (x minutes). Will the GPRS-Serial Gateway be active at this time?..... 22

What about SSL security? How does it work?..... 22

Please explain what MTXTunnel is able to do with a ModBus device connected to serial port on MTX-Terminal..... 22

The MTX-INDV2 modem terminal can integrate internally an 868MHz radio Wavocard. What can you do with it? 23

What does “API” feature mean?..... 23

Is it possible to access the advice via GPRS and GSM at the same time? 23

How to configure a specific scenario. 23

4. - MTXTunnel V7 Configuration Procedure. 24

You need 24

MES Installation & configuration 24

FIRST MTXTunnel Configuration 26

TESTING MTXTunnel configuration. 28

5. - WebServer Service 31

6. - TELNET 35

7. - AT Commands. User API. 36

7.1. - AT commands MTXTunnel user procedure 36

1. - Using main serial port COM1 (can the GPRS-serial tunnel be established or not?) 36

2. - Using secondary serial port COM2..... 37

3. - SMS messaging..... 37

4. - HTTP 37

5. - Telnet 39

6. - Using GPRS socket client connection 39

7.2. - Standard AT commands supported by MTXTunnel..... 39

7.3- Special MTXTunnel AT commands (API)..... 40

AT^MTXTUNNEL=END 40

AT^MTXTUNNEL=VERSION 40

AT^MTXTUNNEL=SETBAUDRATE,port,speed 41

AT^MTXTUNNEL=GETPARAM,parameter_name 41

AT^MTXTUNNEL= SETPARAM,parameter_name,ValueParametro 41

AT^MTXTUNNEL=GETIOS 41

AT^MTXTUNNEL=RS232,mode,data 42

AT^MTXTUNNEL=SMS,phone_number,message..... 42

AT^MTXTUNNEL=I2CSPI,mode,data 42

AT^MTXTUNNEL=SETMODBUS,address;position1;data_1;data_2;...;data_n..... 43

AT^MTXTUNNEL=GETMODBUS,address;position;numData 43

AT^MTXTUNNEL=TEMPORALCLIENT,IPaddress,TCPport 43

AT^MTXTUNNEL=DELETEBDD..... 44

AT^MTXTUNNEL= READWAVETHERM, MACWavenisaddress..... 44

AT^MTXTUNNEL= READWAVEFLOW, MACWavenisaddress 44

AT^MTXTUNNEL= READWAVESENSESEC, MACWavenisaddress 44

AT^MTXTUNNEL= READWAVESENSEV, MACWavenisaddress 44

AT^MTXTUNNEL= WAVENISRSSI, MACWavenisaddress..... 45

AT^MTXTUNNEL= REPEATERS, xxxxxxxxxxxxxxxxxxxx 45

8. - MTXTunnel v7 CONFIGURATION PARAMETERS 46

General configuration parameters “MTX_” 46

Configuration parameter related with COM2: “COMM2_” 68

Telnet Configuration parameters: “TELNET_” 72

WebServer configuration parameters: “WEBSERVER_” 76

Wakeup configuration parameter: “WAKEUP_” 82

GPRS connection configuration parameters: “GPRS_” 87

TCP Configuration parameters: “TCP_” 91

ALARM Configuration parameter: “ALARM_” 95

FIREWALL configuration parameters: “FIREWALL_” 98

SMS Configuration parameter: “SMS_” 99

DynDNS configuration parameter: “DYNDNS_” 104

DNS Parameter configuration: “DNS_” 108

ULP Configuration parameter: “ULP_” 114

LOGGER configuration parameters: “LOGGER_”	119
MODBUS configuration parameter: “MODBUS_”	123
WAVENIS configuration parameter: “WAVENIS_”	126
CSD: “CSD_” Configuration Parameters	129
9. -ANNEX. SCENARIOS AND CONFIGURATION EXAMPLES	130
Annex 1. Basic scenarios. Configuration examples.	130
9.1.1. MTXTunnel is configured as TCP/IP server and permanently connected to GPRS. Network operator fixed IP addresses are used.....	131
9.1.2. MTXTunnel configured as TCP/IP server and occasionally connected to GPRS. Network operator dynamic IP addresses are used.....	133
9.1.3. MTXTunnel configured as TCP/IP server and occasionally connected to GPRS. Dynamic IP addressing. Firewall and authorized phone numbers active.	135
9.1.4. MTXTunnel configured as TCP/IP client and connected permanently to GPRS. Network operator dynamic IP addresses are used.....	137
Annex 2. Advanced scenarios. Configuration examples.	139
9.2.1. Advanced Serial-GPRS Tunnel – Setting up the MTX Tunnel as permanently connected and TCP/IP Server configured to send the IP by socket to a private DNS server.....	139
9.2.2. Setting up the MTX Tunnel as permanently connected TCP/IP Server and configured to send the IP address to a web server by HTTP	141
9.2.3. Tunnel GPRS-RS232 – Set up the modem as a permanently connected TCP/IP server, with DynDNS and Client Temporal socket enabled.....	143
9.2.4. Advanced Tunnel GPRS-RS232 .Set up the modem as a TCP/IP Server connected occasionally when a GPIO and ADC level changes	145
9.2.5. Double GPRS-RS232 tunnel. Two RS232 devices controlled by a single modem and a single SIM card.....	147
Example scenario 2.5-bis Double GPRS-RS232 tunnel. Two RS232 devices controlled by a single modem and a single SIM card. Client socket connection type.....	149
9.2.6. SMS Alarm when a digital input changes level	151
9.2.7. Serial Cable replacer RS232-GPRS-RS232.....	153
9.2.8. Serial GPRS- UDP Tunnel. MTX configured as Client/Server UDP connected permanently to GPRS and using a SIM card with a fixed IP address.	155
9.2.9. Relay control by SMS message and MTXTunnel access by Web Browser.....	157
9.2.10. GPRS-Serial Tunnel with SSL security. MTXTunnel configured as TCP/IP Client connected to GPRS permanently using a SIM card with a dynamic IP address	159
9.2.11. GPS position and telemetry information sent to a WebServer using HTTP.....	161
9.2.12. Sending telemetries (GPIOs and ADCs values) to a Web server by HTTP.	163
9.2.13. Receive telemetry input values (GPIOs y ADCs) when digital input level changes or analog input value is out of range.	165
9.2.14. Digital and analogical input values periodically sent to a WEB server using JSON object.	167
9.2.15. ModBus TCP / ModBus RTU GPRS GATEWAY	169
9.2.16. Sending replications of digital inputs in relays via GPRS.....	171
Annex 3. ULP (Ultra Low Power) configuration and example scenarios	173
9.3.1. Sending an SMS alarm when the digital input is activated with ultra low power consumption.	173
9.3.2. Periodically digital and analog input value telemetry sent by SMS using ultra low power modem.	175
9.3.3. Periodically digital and analog input value telemetry by GPRS using ultra low power modem.	177
9.3.4. Event (None periodically) digital and analog input value telemetry by GPRS using ultra low power modem.	179
9.3.5. Timing alarm activation of GPRS-RS232 tunnel using MTX-ULP modem.....	181
9.3.6. GPRS-RS232/RS485 Tunnel using ultra low power consumption modem. Programmed timing activation.....	183

Annex 4. API configurations and examples scenarios	185
9.4.1. API used for reading MTXTunnel GPIOs and ADCs from third-party WEB page.	185
9.4.2. Using API to send data coming from a third-party Web Page form and output serial port MTXTunnel.	188
9.4.3. Using API to switch 4 relays from a third-party or end user Web page.	192
9.4.4. Using API to send SMS to external PLC device connected to COM1 at the same time as the Serial-GPRS tunnel is active.	194
Annex 5. Wavenis communication examples and scenarios	196
What is Coronis Wavenis?.....	196
How does this system work?	196
9.5.1. Read remote counters and current 4-20mA sensors	197
Annex 6. Examples and scenarios for automatic readings of MODBUS devices	200
9.6.1. PLC MODBUS RTU periodically registers the readings. Sending them as JSON to a WebServer	200
Annex 7. Metering Scenario Examples. Meter reading scenarios via GSM and GPRS	206
9.7.1. A basic example for meter reading with simultaneous GPRS connections and GSM calls	206
9.7.2. An advanced example for reading 2 serial devices using a single modem/ SIM and simultaneously using GPRS connection and GSM calls.	209
Annex 8. MTXTunnel I/O Description.....	214
MTXTunnel + MTX65i.....	214
MTXTunnel + MTX65ULP	215
MTXTunnel + MTX65+G	216
MTXTunnel + MTX65IND or MTX65IND2	217
MTXTunnel + MTX65iRS485	218
Annex 9. MTXTunnel Release notes.....	219
Annex 10. MTXTunnel Configuration Parameters index	223
Annex 11. Alphabetic MTXTunnel configuration parameter.....	226
Annex 12. MTXTunnel AT Proprietary commands (API)	229

1. - Introduction.

MTXTunnel is an application running into a JAVA GSM module and can be defined as a SERIAL-GRPS Gateway.

Now instead of connecting your machine to the serial port of a computer, you can connect this solution device to your machine. You can control it from your home/company location as if it were physically connected.

This MTXTunnel release 7 has dramatically increased its performance compared with previous versions. Now you will have more tools and possibilities for related real-scenarios with remote control and remote metering. Those are input/outputs read/control, analog input reading, relay control, control over external SPI/I2C bus, remote reading of GPS position, control and configuration using SMS, WebServer, Telnet and much more.

How to use this manual

If you are not familiar with MTXTunnel solution we recommend that you start with these sections:

1. - [Section 3](#) “MTXTunnel basic concepts. FAQ

Explains what you can do with MTXTunnel.

2. - [Section 4](#) “MTXTunnel configuration”.

You will learn about configuring MTXTunnel quickly and a step-by-step basic first configuration.

3. - Annex: “Scenarios examples”.

You will find plenty of different real scenarios. It's possible that your needs will be similar to those and only small modifications will be needed.

4. - Annex: “Configuration parameters”

Please read this Annex to find the parameters you may need for configuration and their syntax.

2. - MTXTunnel V7 FEATURES

Hardware Multiplatform

The new MTXTunnel v7 can be installed in the JAVA enabled MTX-TERMINAL modem family. It is important to know that by using specific terminals the MTXTunnel will have behave differently than using general ones. Please remember than you can find contacts and more information about MTX-Terminals at www.mtx-terminals.com .

MTX-TERMINALS modem

MTX65i: Generic serial-GPRS tunnel (Gateway) plus telemetry+SMS control

MX65I-RS485: One RS485 and one RS232 Port

MTX65IND: If RS485/RS422 bus is needed. Also relays are provided.

MTX65IND-V2: Same as above plus RF communication and main 220V AC power

MTX65ULP: Ideal for Ultra-Low-Power application (2uA)

MTX65+G: If you need GPS positioning.

TCP & UDP protocols

MTXTunnel can use these different protocols:

1. - GPRS-Serial Tunnel (TCP Server mode)

MTXTunnel is connected to GPRS waiting for incoming connection from a specific TCP port. When connection is accepted, the transparent tunnel serial-GRPS is created.

2. - GPRS-Serial Tunnel (TCP Client mode)

The MTXTunnel connected to GPRS both, by themselves, connect to a specific remote server, and the transparent tunnel serial-GRPS is created.

3. - GPRS-Serial Tunnel (UDP mode)

MTXTunnel is connected to GPRS and can create the transparent tunnel serial-GRPS using UDP protocol instead of TCP.

GPRS connections: Permanent / on request.

MTXTunnel can maintain the GPRS connection 100% of the time. This is a permanent connection.

MTXTunnel released 7 new features giving the ability to activate the tunnel GPRS-Serial (TCP Server, TCP Client, UDP,) on request.

The request can be performed by:

- incoming SMS (any or only authorized numbers)
- incoming missed call (any or only authorized identified numbers)
- a change in the level of digital input
- a voltage value (ADC) reaching programmed level
- incoming data that is present on the serial port (only in TCP server mode)

WebServer.

New MTXTunnel 7 includes an embedded WebServer which can be activated.

WebServer enables remote access to MTXTunnel using normal explorer internet connection.

Main WebServer features are:

- WebServer public access or restricted access (login & password will be required)
- Showing the status of digital and analog inputs
- Changing the digital output level (example relay activation in MTX-IND terminal) in just one click.
- Changing MTXTunnel parameter configuration remotely.
- Executing AT commands remotely with a simple Web page (as an example, see network coverage using AT+CSQ command).
- API. WebServer includes API (HTTP GET) to integrate MTXTunnel in end customer/user Web page.

Telnet.

New MTXTunnel 7 includes a small Telnet embedded server.

If active, MTXTunnel can be remotely accessed using a PC with a Telnet application

FEATURES

- Telnet public or restricted access (login & password)
- Able to enquire analog and digital inputs value/Statuses.
- Able to change digital outputs (relays in MTX-IND) status
- Able to change MTXTunnel configuration parameters remotely
- Execute AT commands remotely
- Telnet can be integrated into end application to control MTXTunnel remotely.

SMS Alarm

MTXTunnel v7 can send a predefined text via SMS as an alarm when the level of a digital input changes. The SMS can be sent to up to 10 remote users (phone numbers) at the same time.

Total control or MTXTunnel using SMS

New MTXTunnel v7 can be completely controlled with SMS because MTXTunnel can send AT commands from generic or specific phone numbers using SMS.

You can remotely read or write a digital input or output, get the GPS position, get network coverage, etc.

A configured ALIAS is allowed to simplify those actions.

Example: ALIAS: "RELE1ON>AT^SSIO=0, 0" Means that the SMS text as "RELE1ON" text is interpreted as end AT command "AT^SSIO=0, 0", and will switch ON Relay#1 in MTX-IND modem.

DynDNS

DynDNS is a service offered by <http://www.dyndns.org>, and can easily assign a DNS name to an IP dynamic address for free.

SIM card can connect to GPRS in 2 ways: fixed IP address or dynamic IP address. Dynamic IP addresses are more common and cheaper in service. The problem is that the network operator assigns a different IP address when MTXTunnel starts the GPRS connection.

When using DynDNS you can associate a DNS name like "yourdevice1.dyndns.org" to the IP address obtained from MTXTunnel.

Compatible with No-Ip service.

Private DNS

One of the most important features of the new MTXTunnel V7 is the fact that they send their current IP address when it's changed (after new connections). In a real scenario with thousands of remote MTXTunnel working with dynamic IP SIMs, using DynDNS is not feasible. So it is recommended to use a private server for this.

MTXTunnel will inform this private server when the IP address has been changed, or periodically. This will be done using a TCP socket or by HTTP GET to a web server.

Firewall

If enabled, all incoming connections on MTXTunnel are firewalled. This is a protection method for the Serial-GPRS tunnel, Web services and Telnet. Also any unauthorized IP addresses will be blocked. You can configure up to 10 authorized IP addresses.

Automatic timing synchronization

MTXTunnel does not need to set the time. It is done automatically.

It uses 2 time servers, using GPRS. This is mandatory when using the Datalogger feature on MTXTUNNEL in timing schedules.

GPRS-I2C/SPI Tunnel

MTXTunnel V7 can control and monitor devices connected to the SPI/I2C bus like the following MTX-Terminals modems: MTX65i, MTX65IND&MTXIND-V2, MTX65ULP and MTX65+G.

MTXTunnel will create a transparent gateway between I2C/SPI buses with the GPRS connection. It's as if they were directly connected to your PC.

Serial (RS232/485)-HTTP Tunnel

MTXTunnel can create a HTTP-Serial Tunnel so you can access to serial devices connected to MTX-Modems using a Web page.

Serial (RS232/485)-SMS Tunnel

MTXTunnel can create a SMS-Serial Tunnel. This way, all of the text sent via SMS can be redirected to the output on the serial port of MTX-Terminal.

Ultra Low Power ULP Tunnel

MTXTunnel V7 can be used with the MTX65ULP terminal and it's ideal in any application where consumption is critical as the modem and GPRS are only connected for short periods of time in specific hours.

Features

Switch on the modem. Activate the GPRS connection and the service (serial tunnel, WebServer, telnet, SMS ...) in an X configurable periodic time of the day (hour).

Switch on the modem and activate GPRS session and services (serial tunnel, WebServer, telnet, SMS ...) in an X configurable periodic time: date/hour.

Switch on the modem and send the metering by SMS in an X configurable periodic time.

GPRS Telemetry transmission

MTXTunnel V7 can be used for telemetry purposes like

- Reading digital and analog inputs.
- Obtaining GPS positioning (only with the MTX-65+G terminal model)

MTXTunnel is configurable to send those in a periodic way, at user configurable date and time, on a level change input or out of range level input, or by incoming missed calls and SMSs.

Those telemetry values can be sent

- ... to a server using TCP+socket connection
- ... to a server using UDP protocol
- ... to a WEB server using HTTP GET
- ... by SMS

SSL Security

MTXTunnel 7 is able to create secure socket connections with an encrypted SSL server. It is only possible when using Socket TCP Client connections.

Modbus Monitoring

MTXTunnel can read Modbus memory tables of remote devices (serial 232/485 RTU) and send them to a web server using JSON objet (http).

If GSM-GPRS network is lost, the data is stored on non-volatile flash memory up to 1500 registers.

RF868MHz remote monitoring sensors (Wavenis)

MTXTunnel works as a hub in Wavenis radio remote devices. You can read the temperature remotely with Wavetherm (temperature sensor), any analog value (0-10V and 4-20mA) or read pulses from a counter using Waveflow.

Integration of MTXTunnel in end applications. API.

MTXTunnel V7 can be easily integrated in a customer application as it can receive AT commands in the following interfaces:

- COM1 (GPRS-serial tunnel can be active or not)
- COM2 serial port
- SMS
- HTTP
- Telnet
- Client GPRS TCP socket. When tunnel is created, AT commands can be sent.

It is possible to both execute AT commands –standard and Cinterion proprietary ones- and MTXTunnel commands.

Read [API manual](#) section for more information.

3. - FAQ. MTXTunnel V7 Basic concepts.

If still you have doubts about the new MTXTunnel V7 please read the following FAQ section:

What is the MTXTunnel?

The MTXTunnel is an embedded software application that you can order to your distributor already installed into the [MTX-Terminal](#) GSM/GPRS modem: (MTX65i, MTX65IND, MTX65ULP y MTX65+G)



Industrial Featured
DIN rail MTX65IND

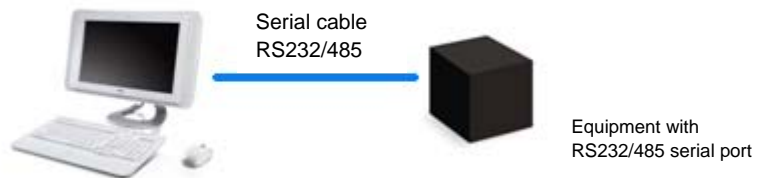


MTX65i, MTX65ULP
MTX65+G

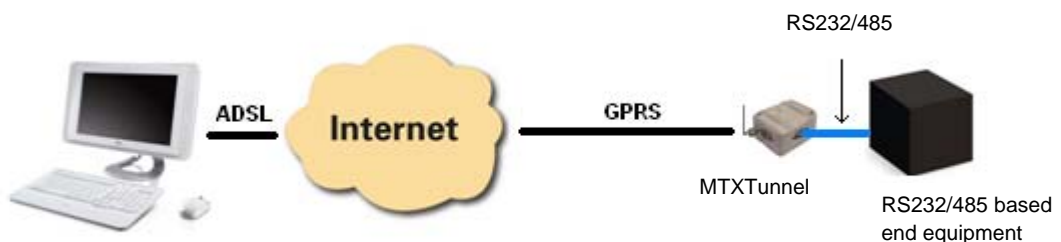
What is the MTXTunnel for?

The MTXTunnel can be mainly used to create a transparent Gateway (or tunnel) from the Serial Port to the GPRS. If you already have a machine or device with a serial port, you could read/control it in the same way as if it were physically connected to your computer.

This is the scenario: serial equipment connected to a PC to read/write ...



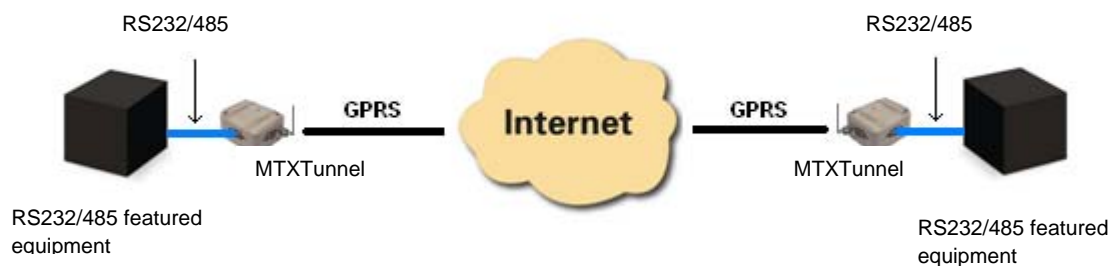
NOW with GPRS-Serial MTXTunnel gateway, the above scenario is showed in the following example. Now your PC has to establish a TCP/IP connection with MTXTunnel. Then, EVERYTHING you send to this TCP/IP connection will be sent to the equipment's serial port by MTXTunnel. On the contrary, all of the information in the equipment's serial port is sent to your server using the GPRS network.



Is MTXTunnel needed at the PC server's side?

It depends, but in general, it is not needed at the PC server's side 99% of the time.

- **Not needed:** If you already have your PC control software and already have the option to connect as TCP/IP or UDP, a modem with MTXTunnel is not needed. Just configure the IP and port of remote MTXTunnel and your PC will use the ready internet connection to send and receive data remotely.
- **Not needed:** If your PC control software does not have the option of connecting using TCP/IP or UDP and the only option you have is to choose a COM port, the MTXTunnel+modem is also not needed. There are some freeware drivers for your operating system as Windows can emulate a COM port. Once this free driver is installed, a virtual COM (like COM100) will be installed in your PC and you must point to the IP and TCP port of the MTXTunnel remote. You must choose this virtual COM in your PC software. Please contact gmsupport@matrix.es for more information about recommended emulation COM-TCP drivers.
- **Needed:** If you need a “serial cable replacer” because for example you have to communicate 2 RS232 serial devices remotely and there is no intelligence or PC control software (you cannot install virtual COM port), you will need 2 MTXTunnels, one in each end. This is the scenario:



Who starts the connection?

MTXTunnel has the following modes TCP Server, TCP Client and UDP.

- **TCP Server mode.** MTXTunnel is waiting for incoming connections. This is to say that the remote device (PC server) will start and establish the GRPS-Serial Gateway.
- **TCP Client mode.** MTXTunnel will start the Gateway. It will connect to the configured IP + port of the server PC AND establish the GRPS-Serial Gateway automatically.
- **UDP mode.** UDP is not oriented to connection protocol. MTXTunnel just waits for UDP packet and sends them to the serial port and vice versa. The data present at serial port is sent to a PC via UDP.

It is mandatory to be permanently connected to GPRS?

No. It's not.

If your application requires it to do so, MTXTunnel can be always GPRS connected. Remember that network operators will bill the data volume, not time.

If you do not need MTXTunnel to be connected 100% of the time and you want the connection to be sporadic, MTXTunnel can be activated in these situations:

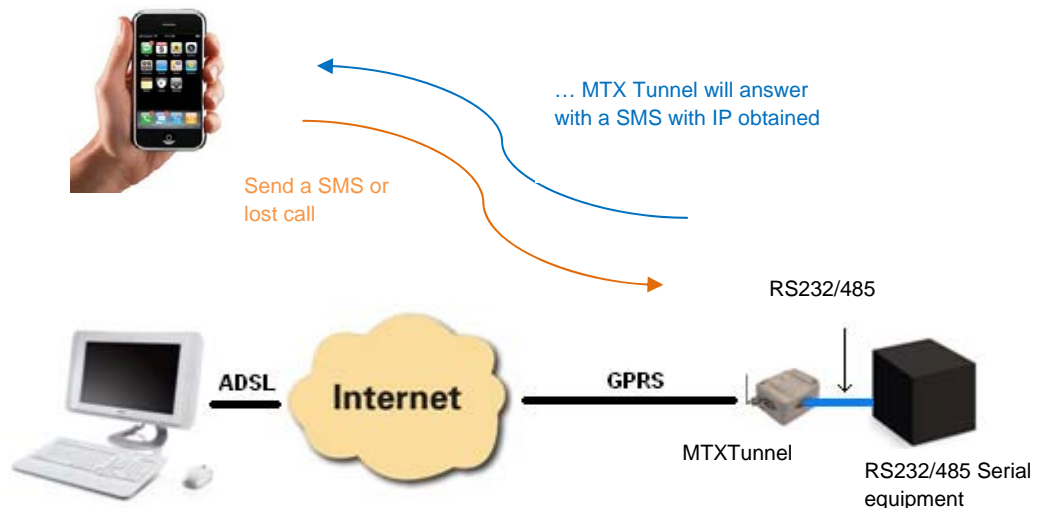
1. - Missed call from authorized phone number.
2. - Incoming SMS including the word "on" from an authorized phone number.
3. - By a change on a level of an input.
4. - If the analog input is higher than configured.
5. - With any date/hour scheduled timing.
6. - Just when data is present on RS232 port (only TCP Server mode).

So... how long is MTXTunnel active for (GPRS connected)?

It's configurable by the GPRS_timeout parameter. You can specify the time in minutes after which, if it doesn't detect traffic at GPRS connection, MTXTunnel will close the session.

I want to use MTXTunnel as TCP Server so I can connect to them periodically from my PC. Will I need SIMs with IP fixed provisioned?

It is not mandatory. You have various ways to find out the remote IP if using normal dynamic IP addressing SIMs. You can either make a missed call or send an SMS with the word "on" to remote MTXTunnel equipments. MTXTunnel will reply with an SMS including the IP obtained at this moment in time.



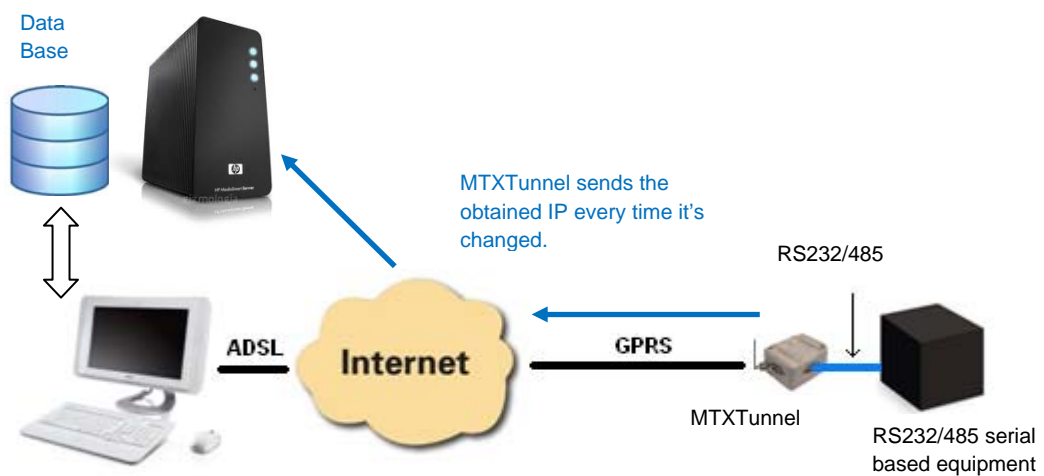
New MTXTunnel V7 is DynDNS featured. DynDNS is a service allowing you to associate DNS name (like modem1.dyndns.org) to the IP obtained by MTXTunnel. For now, you can use this for free: www.dyndns.org

Keep in mind that this service is NOT offered by MTXTunnel, we do not offer support and we are not responsible for this third party service.

I found that in my case I'm going to use thousands of MTXTunnel devices. I cannot use missed calls or SMSs to work out IP addresses. I do not want to use DynDNS as it can be difficult to handle and even costly. What can I do?

The MTXTunnel will inform the server PC every time an IP address changes.

You just need to enable a configuration parameter so each time MTXTunnel changes the IP it will send frame data to a server PC with the following information: IMEI, the newly obtained IP obtained and an optional user-configurable text.



Is it possible to send the new IP to a Web server? I'm more familiar with Web programming –ASP, PHP- rather than TCP-IP sockets. I'm thinking about using a Data Base. Is this possible?

Yes, it is. If you prefer, it's possible for MTXTunnel to send the newly obtained IP address to a Web Server using *http GET (URL + parameters)*.

MTXTunnel can be installed on several Cinterion-based modem terminals like MTX65i, MTX65IND, MTX65ULP y MTX65+G. What are the differences between them?

For main applications, the MTX65i is suitable.

If you need RS485 serial communication, remote activation of relays, or to be able to remotely read 4-20mA, the recommended modem is MTX65IND.

If power consumption is critical, use the MTX65ULP modem as it can be completely powered-off (consumption is around 2uA) except in the configured situations.

If you need some extra features like GPS positioning, you should choose the MTX-65+G.

You are talking about relays, analog inputs... Is MTXTunnel not a Serial-GPRS Gateway?

At the same time, MTXTunnel is a serial-GPRS Gateway and can also control digital input/outputs, analog inputs, relays, GPS receiver, devices connected to SPI/I2C...

Examples:

-MTXTunnel can remotely read a digital input or change a digital output.

-MTXTunnel can send (X seconds configurable) the GPS positioning to a PC or Web Server and can remotely read a sensor connected to SPI/I2C.

MTXTunnel can automatically send, every X configured seconds, the status of all input/outputs or GPS position to a server PC or WebServer. SMS messages can also be used. See [example annex](#) for more information.

I've read about sending AT commands using TCP/IP connection. Can I use an AT command to change the value of a digital output?

Yes, you can send AT commands via TCP/IP; you can also send them from a normal modem, via serial ports or you can send them via SMS. You can also read or write digital input/outputs on your Web page (see [API section 7](#) and example scenarios)

So, using MTX-IND, I can activate a relay using a SMS, but... it's not practical because the AT command is not intuitive or easy to remember.

You do not have to send the exact AT command. This means that the SMS text does NOT have to be "AT^SSIO=0, 0" to activate Relay #1. You can configure it and use ALIAS text.

Example: "RELE1ON" is the text of the SMS to activate GPIO0 (Relay #1). MTXTunnel will interpret it to AT^SSIO=0, 0.

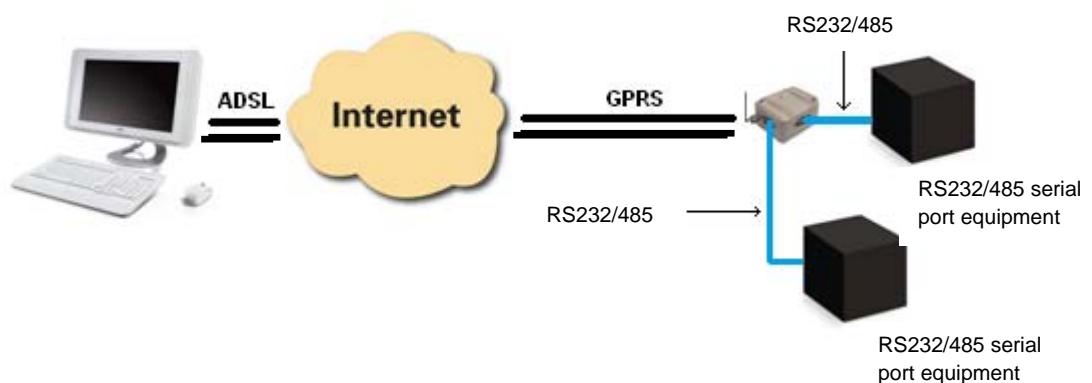
You can create up to 10 different ALIAS text strings.

MTX65i, MTX65IND and MTX65ULP modem terminals have 2 serial ports. Could I control 2 external devices with one terminal?

Yes, you can. MTXTunnel can control 2 RS232 external devices with just one SIM card. MTXTunnel will run 2 serial-GPRS running in parallel.

Just remember that the MTX65i and the MTX65ULP secondary port cannot use flow control because they do not have the CTS and RTS lines; they only have the TX and RX lines.

See [Annex 9.2.5](#) for a configuration example.



What about MTXTunnel installed on MTX65+G which has a GPS receiver inside? Can I use it for fleet management?

It's **not** intended for professional fleet management. MTXTunnel reads the GPS positioning using some of the MTXTunnel GSM/GPRS services: IP tunnel, WebServer, Telnet or SMS.

MTXTunnel can be configured to automatically send the GPS position every X seconds. However, MTXTunnel does not internally store the position in the Flash memory. This is a typical application if GPRS coverage is lost. So, this is for basic fleet management as professional ones normally stores position points like a data logger.

There is another version of MTXTunnel intended for professional track & trace using the MTX-65+G device. This version is called the MTXTunnel-GPS and has another license price, configuration parameters and also the general functionality is different. Please ask gsm-support@matrix.es for more information.

What is WebServer used for?

MTXTunnel WebServer which is included can be used to read the digital input/outputs or analog inputs and to change digital outputs easily in a PC (connected to internet) using a common internet browser.

Not only this, you can see and modify the MTXTunnel remotely. Also you can execute AT remote commands, like network coverage (AT+CSQ), check incoming SMS...

What is Telnet used for?

You can basically do the same with the Telnet service in MTXTunnel as you can with WebServer but it's more common used for third party application integration. Please read [TELNET](#) and [API](#) section.

I'm worried about unauthorized access using WebServer or Telnet.

MTXTunnel has an internal firewall which can be activated. Then MTXTunnel will only accept connections from previously configured IP addresses. Any other IP addresses will be blocked.

For maintenance purposes, I would like access to MTXTunnel at any time and in any location, from any IP address.

In this case Firewall WebServer must be disabled, but we recommend protecting WebServer with a Login and Password. MTXTunnel can work with our without a Login/Password (public WebServer). The same applies for Telnet.

Could I or somebody else receive an SMS when an input changes, like alarm detection?

You can configure MTXTunnel to send special and configured SMS text strings up to 10 configured different phone numbers.

SMS text can be configured in different text strings related with digital or analog input.

MTXTunnel 5.0 is a GRPS-Serial tunnel Gateway. What is a GRPS-I2C, GPRS-SPI, HTTP-Serial or SMS-Serial tunnel? Do you have some examples?

Examples.

GPRS-I2C Tunnel: You can read an I2C sensor remotely like a temperature sensor.

GPRS-SPI Tunnel: For example you can write data on SPI bus and if a display is connected to it, the data will be on display.

HTTP-Serial Tunnel: Example. You have a Web page with a form. All filled form data can be sent to serial port MTXTunnel connected device. Then MTXTunnel will collect the machine response and send the data as a web response to your Web page.

SMS-Serial Tunnel: Example. You can define a special text like “MTX” at the beginning of the SMS string. The text after this special string will be redirected to the serial port of the machine. MTXTunnel can get the response from the machine and send another SMS to the user. Example: “MTX 12345”: MTXTunnel will send “12345” string to the serial port and will get a response from the machine like “67890”, which will be sent as SMS.

I need a low power application MTX65ULP terminal modem. What can MTXTunnel do?

The **MTX65ULP** is normally switched off completely. This way the power consumption is about 2 uA. The modem is off and cannot do anything. It cannot receive calls, SMSs or communicate at all. Therefore an event needs to happen.

This event is similar to an interruption. A digital input level change or an alarm can wake up the modem.

As an example, MTXTunnel will wake up every 24 hours; send the telemetry (all the inputs values, RS232 ...) and after 5 minutes of being awake, the terminal will be automatically switched off. You can control or configure the wake up time and the sleep time period.

Is it also possible to define scheduled wake up tasks. For example, MTX65ULP can wake up X minutes every day at 10.00 AM or only on the 1st and 15th days of the current month at 08.00am and 08.00 pm.

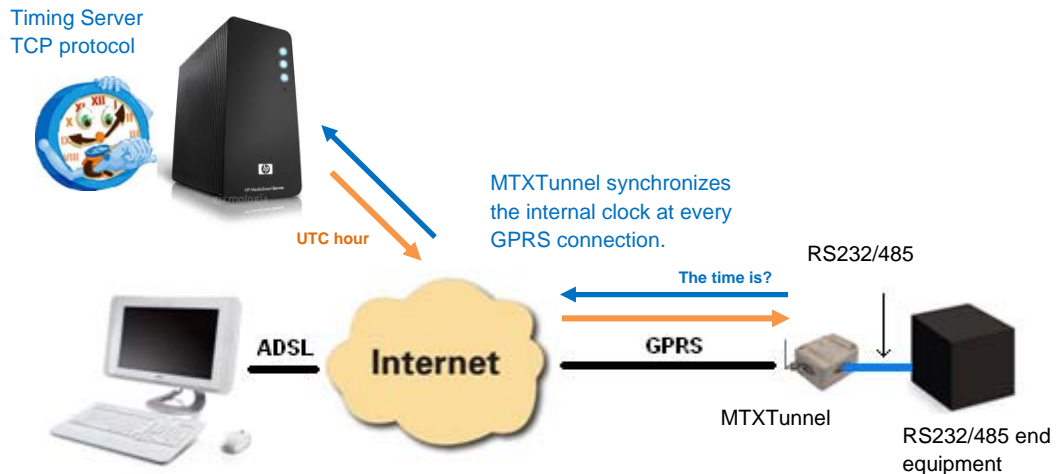
Keep in mind that the MTX65ULP is the ideal solution for remote water counter metering where there is no external power so it needs batteries to run for a long time (7 years...).

If MTXTunnel can be woken up in a configured time, does this mean that there is clock inside? But you can also say that it's powered off. Please explain.

MTX65ULP has own Real Time Clock independent to TC65 RTC and is always powered from external power, but it also has own battery source. This RTC allows to the modem wake up at configured-scheduled time/date.

Can this timing be synchronized?

All RTCs have some deviations. So, MTXTunnel V7 can use network timing synchronization. This feature is mandatory to use with the MTX65ULP. This way, every time MTXTunnel is connected to GPRS, it is linked to a timing server and can update the internal timing.



MTXTunnel used on the MTX65ULP wakes up at configured day/hour for some time (x minutes). Will the GPRS-Serial Gateway be active at this time?

During wake-up time, the modem will start and will run all configured services (WebServer, Telnet, Input/output telemetries...) as well as the serial tunnel gateway.

What about SSL security? How does it work?

Some applications need some encryption data transmission. SSL is used. This way the data is transmitted and received SSL encrypted, avoiding data recovering sniffer. SSL is only available in TCP client mode. Be sure that your server can support SSL sockets in the following specifications:

- TLS Protocol Version 1.0 as [RFC 2246](#).
- SSL V3 as [The SSL Protocol Version 3.0](#)
- WAP(TM) TLS Profile and Tunneling Specification as [WAP-219-TLS-20010411-a](#)

Nevertheless, we recommend SSL encryption if it is mandatory due to the bigger amount of data volume and the reduction in data speed transfer.

Please explain what MTXTunnel is able to do with a ModBus device connected to serial port on MTX-Terminal.

MTXTunnel will periodically request data to the ModBus device connected to serial port. It will store the data in the internal memory and it will send the data to an http web server encapsulated in JSON object. In any case the internal buffer is 1500 long which allows it to store data in case of network or coverage loss.

The MTX-INDV2 modem terminal can integrate internally an 868MHz radio Wavecard. What can you do with it?

- 1.-It can be used as a hub for remote Waveflow. Waveflow can be used for counting pulses coming from water, gas and electricity counters.
2. – It can be used as a hub for remote Wavetherm. Wavetherm can be used for temperature measurement using the 868MHz radio link.
3. – It can be used as a hub for remote Wavesense. Wavesense can be used for measuring 4-20mA sensors using the 868MHz radio link.

MTXTunnel will periodically request data and send it to a WebServer using JSON objects.

What does “API” feature mean?

API is mainly a way to integrate MTXTunnel in end user application. Basically it's like a special AT commands end user. It can easily integrate in a web page and for example can also switch a relay (change an Output).

API could also be used to remotely access MTX configuration and send AT commands at the same time without knowing all of the configuration parameter syntax.

Is it possible to access the advice via GPRS and GSM at the same time?

Indeed, since MTXTunnelv7.11 is has been possible to establish gateways with both at the same time, but GSM calls have priority. A typical is example is that of an energy operator (Endesa, Iberdrola...). They could want daily access to a meter to take a reading via GSM but you also want to be able to access the meter but via GPRS, MTXTunnel allows you to do this.

How to configure a specific scenario.

The new MTXTunnel V7 has a lot of configuration parameters, more than explained in the FAQ section. Take a look in the configuration section.

Next you can find step-by-step MTXTunnel examples of first configuration scenarios; they are very useful for you for first hand-on.

In the [Annex](#) there are lots of examples of scenarios with the appropriate configuration to get MTXTunnel working. Try to find the closest scenario to you and review the copy & paste selected configuration, it's nothing more special than that.

If you have specific questions contact the support line gsm-support@matrix.es.

4. - MTXTunnel V7 Configuration Procedure.

In this section you will create your first GPS-serial tunnel and we'll guide you through every step-by-step procedure.

You will create a TCP server tunnel, connect from your PC and transmit/receive data.

You need

- PC with Windows 2000 or XP operating system possibly with an RS232 serial port. If you have a PC without an RS232 serial physical port, you can use a common USB-RS232 converter.
- An RS232 serial cable to connect MTX-Terminal to the RS232 PC port. The cable must be pin to pin connected (pin1-pin1, pin2-pin2, pin9-pin9). DO not use a null-modem cable (crossed connection)
- Cinterion MES (Module Exchange Suite) application software which is free, please ask for the download link.

<ftp://ftp.matrizelectronica.eu/MTX-Terminals/MTXTUNNEL/MES.zip>

MES Installation & configuration

MES application. What is needed for?

MES software will allow you to see your MTX-Terminal modem as a memory stick.

MES means "Module Exchange Suite" and it's a Cinterion application.

MTXTunnel application is stored inside the flash memory of the terminal. To access to the flash memory you need the MES application so you need to extract and edit the "config.txt" file.

-IMPORTANT NOTE. In the previous version of MTXTunnel, the configuration file was MTXTunnel.jad. On MTXTunnel V7 do not use/edit this file.

The MTXTunnel configuration file is "config.txt" file. After being extracted from the internal terminal memory you can edit it with a normal text editor, like Windows Notepad.

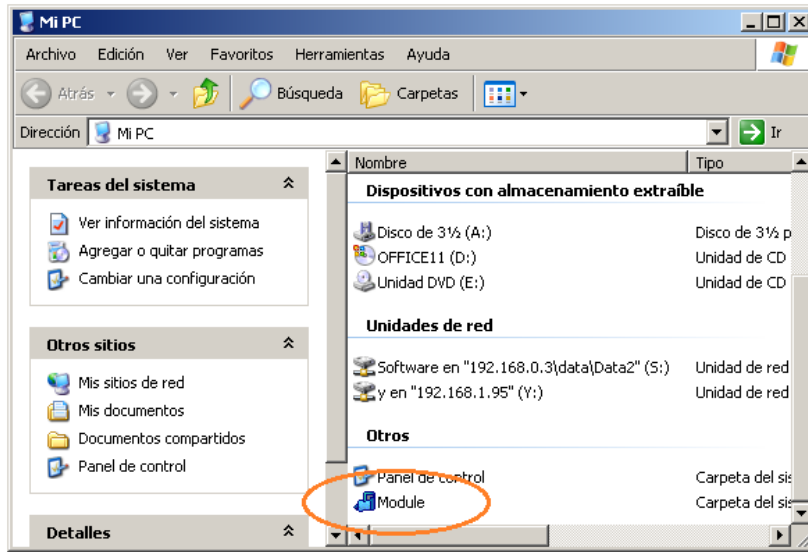
After editing this file you have to copy it again into the terminal's internal memory using MES application software.



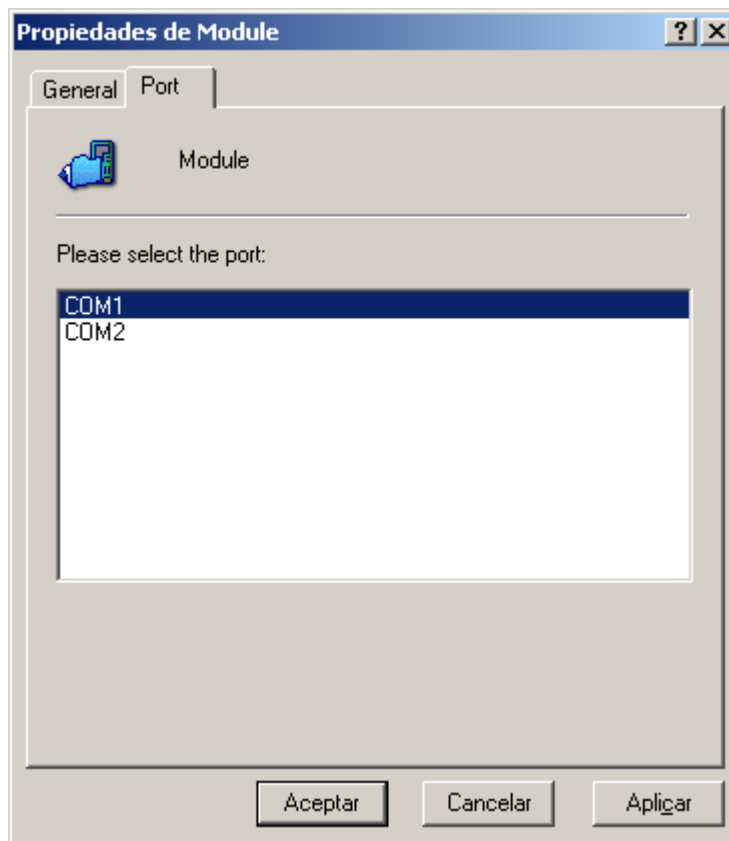
ATTENTION. MES application MUST to be configured BEFORE using FIRST time

After installing the MES application, you have to configure it. This MES application needs to know the COM serial port of your PC, which is connected to MTX Terminal modem.

Go to "My Computer" and look for a blue icon.



Right “Click” this icon and select “Properties”. Then, select COM port in “Port” section.



You can see the COM ports available in your computer. From this list select the COM port which the MTX terminal modem is connected to and then “Click” on “Apply” button.

Now the MES application is configured. This step is not needed if you do not change the COM port to another available one.

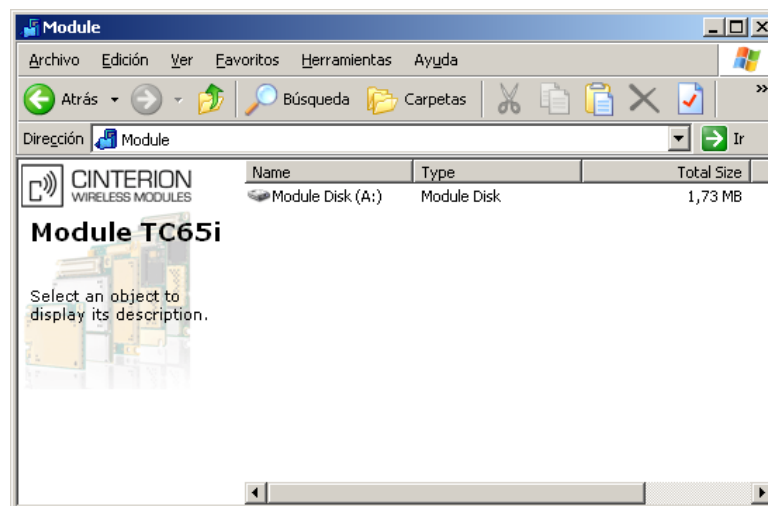
FIRST MTXTunnel Configuration

If you're not familiar with MTXTunnel, we recommend you do this test configuration to learn about the "MTXTunnel TCP-Server" scenario. Follow these steps:

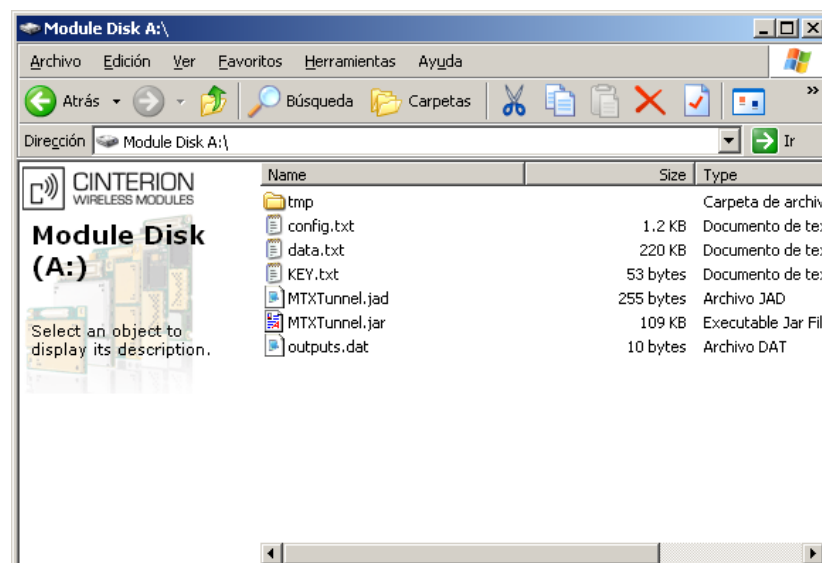
1. - Do NOT apply power to MTX modem terminal. Do not insert SIM card into MTX Modem. Open the SIM holder.
2. - Connect terminal modem to the computer using a normal RS232 cable (not null modem).
3. - Apply power to the modem and wait at least 10 seconds.

Then, **if the modem does not have a SIM card**, MTXTunnel enters into **CONFIGURATION mode**.

4. – Please "double click" on MES icon in "My computer". This screen will appear:

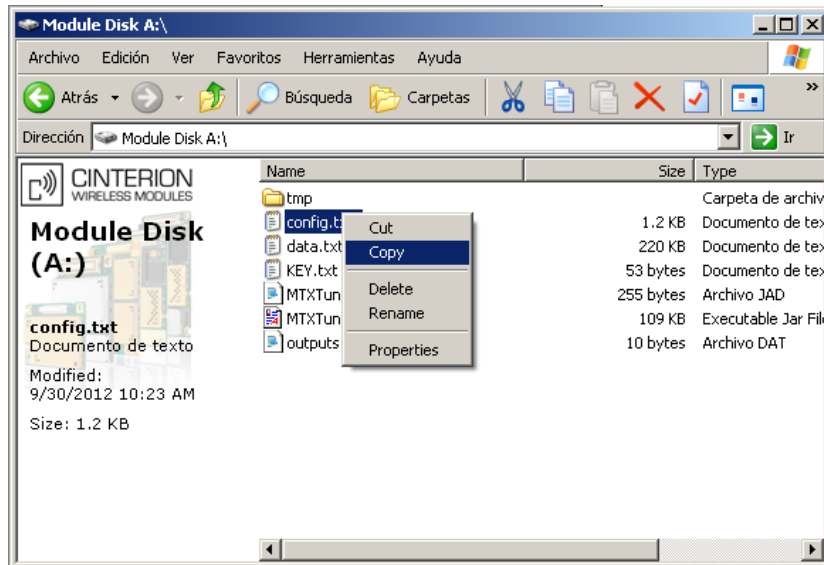


5. - Please "double click" into "Module Disk A: /" (or press ENTER) to see files into MTX-Terminal modem memory.



6. - If you can see the files, copy and paste “config.txt” into a hard disk computer directory to edit it.

This is due to the fact that this file cannot be edited in this memory; you have to do in your computer.



7. - Use “Notepad” or a similar text edition application and then open “config.txt” file. “config.txt” configuration file contains the main information for running MTXTunnel application correctly.

Write this configuration as follow:

MTX_PIN: 0000
MTX_mode: server
MTX_urc: on
MTX_model: MTX65i

GPRS_apn: movistar.es
GPRS_login: MOVISTAR
GPRS_password: MOVISTAR
GPRS_timeout: 0
GPRS_DNS: 8.8.8.8

TCP_port: 20010

COMM_baudrate: 115200
COMM_bitsperchar: 8
COMM_autorts: on
COMM_autocts: on
COMM_stopbits: 1
COMM_parity: none

FIREWALL_enabled: off

SMS_allPhones: on

For this first time please just modify **BLUE** colour marked.

`MTX_PIN` parameter: please write your SIM Card's PIN number to be used. If it doesn't have a PIN, write 0000

In `MTX_model` please write which MTX-Terminal you're going to use (MTX65ULP, MTX65IND or MTX65+G).

It is also IMPORTANT to modify and write the `GPRS_apn`, `GPRS_login`, `GPRS_password` parameters of the SIM card network operator.

We recommend that you use your common or familiar/popular SIM card for this first "hands-on" use, like Movistar or Vodafone. We've noticed that other not well-known network operators use Proxies and blocks entry connections (in same way the ADSL router in your home/office does). Otherwise, you'll have to use NAT.

Low cost or virtual operators can be used for client connections/configurations (`MTX_mode: client`) but not for Server connections/configurations (`MTX_mode: server`) like we do in this example because incoming connections are blocked.

Please check with your operator if Proxy is used.

8. - Save the changes in "config.txt" file and copy it into MTX terminal memory using MES to overwrite the old one.

9. - After this please switch off or remove the power from the modem. Insert the SIM card and close the SIM holder. MTXTunnel is now ready to use.

TESTING MTXTunnel configuration.

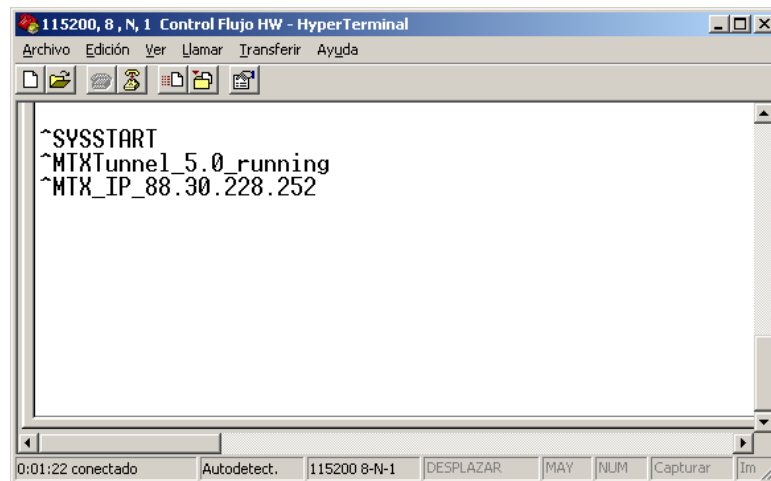
1. - Open a HyperTerminal or another similar terminal application. Configure PC R232 serial port with same value as MTX has, this means to say, the same as the "config.txt" example (115200, 8, N, 1 and HW flow control).

2. - Then, apply power to modem which is connected to the computer. You will be able to see the LED blinking slowly; which indicates that the terminal is looking for network registration. After a few seconds (not more than 60) you will see the LED blinking with a fast 1 flash blink every 4 seconds. This indicates that the terminal is registered with the network.

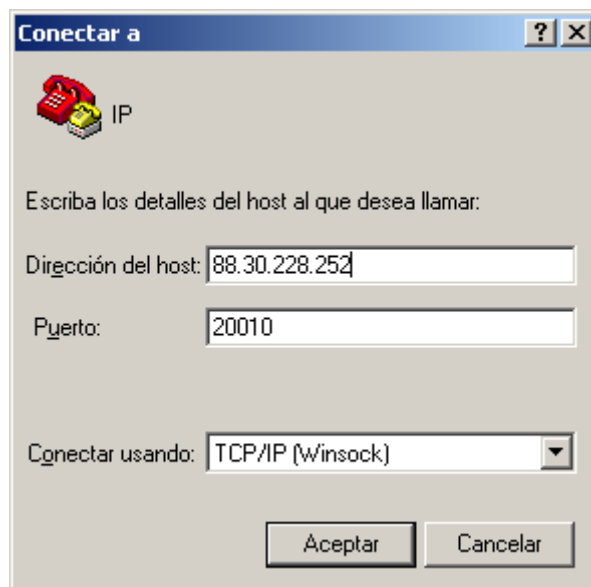
After a few more seconds the LED will change to 2 burst flash blinks every 4 seconds, indicating that the terminal is GPRS connected.

On the other hand, you can check in HyperTerminal window application (because `MTX_urc` is on) messages from MTXTunnel.

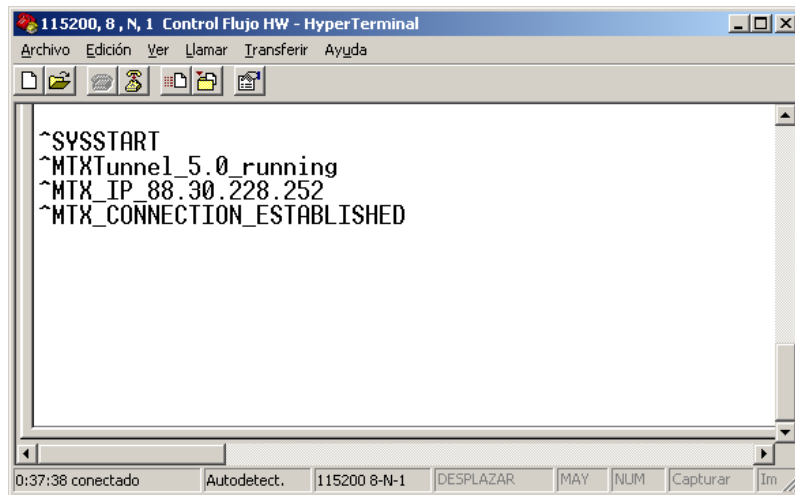
You can check that the IP shown is the IP that your network operator has assigned. Now MTXTunnel is READY. It is waiting for incoming connections in the 20010 configured port.



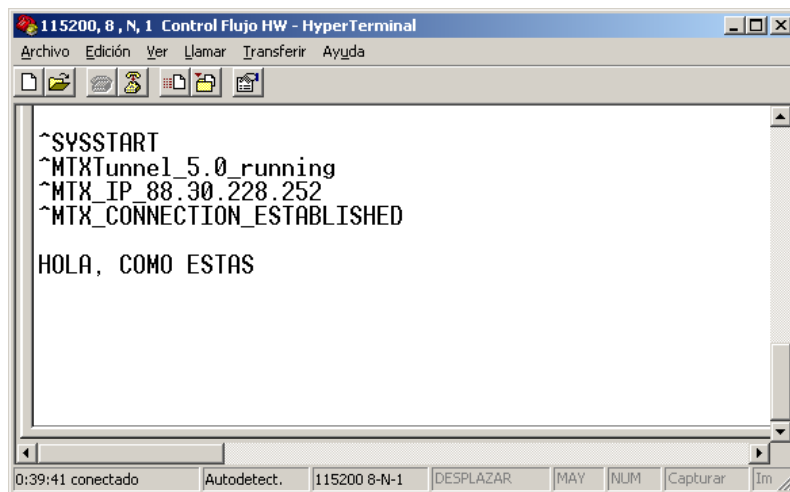
3. - Open ANOTHER HyperTerminal session. Now, do not use the COM port option, choose the TCP/IP Winsock option and specify the IP address above and the 20010 TCP port.



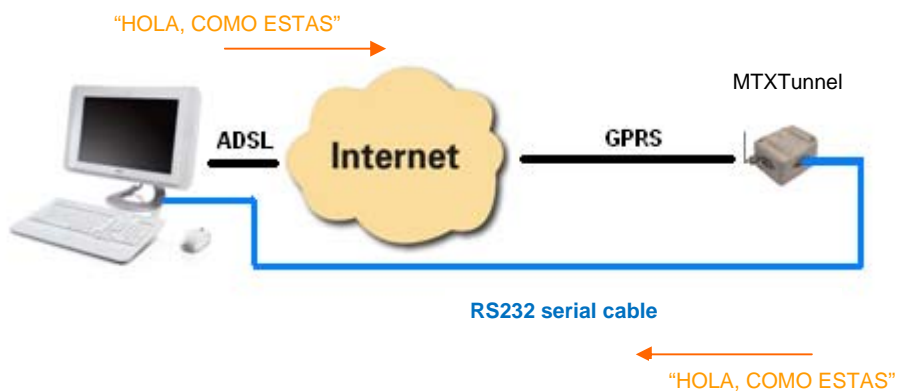
4. - After pressing the "OK" button you will see that you are connected to MTXTunnel using the serial port in the HyperTerminal window. The GPRS-serial gateway is done.



5. - Now, everything you write in the second HyperTerminal window is received by MTXTunnel and sent to the COM serial port. If you write (send) "HOLA, COMO ESTAS" from HyperTerminal TCP/IP WinSock connection, it's received in the other MTXTunnel HyperTerminal window.



In summary, now you've created your first GPRS serial Gateway tunnel, like the following picture:



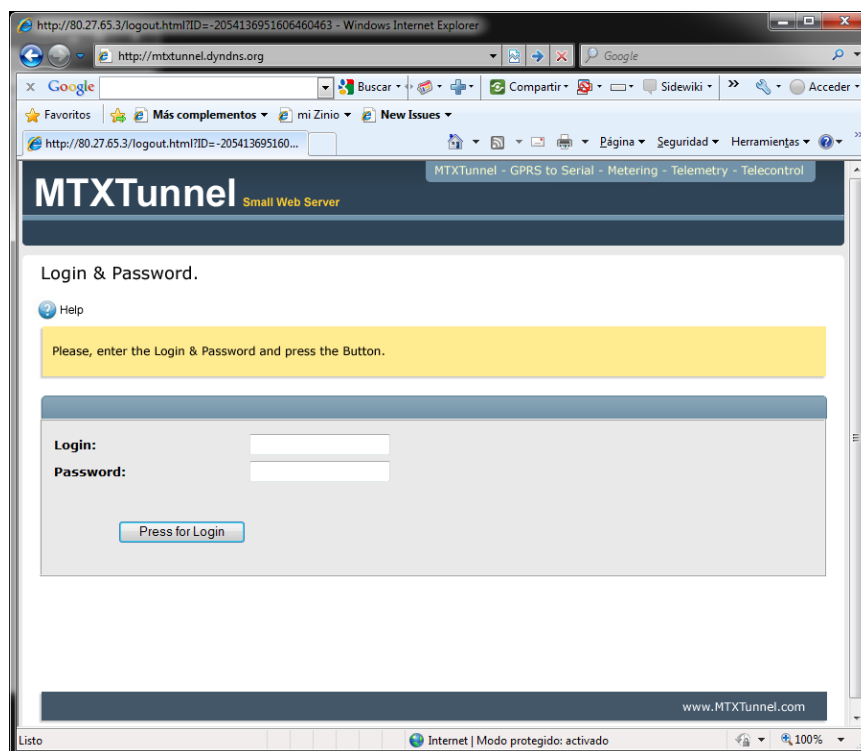
5. - WebServer Service

With MTXTUNNEL version 5.0 WebServer is included.

If enabled, you will be able to remotely access the GSM modem terminal with MTXTUNNEL if your PC connected to internet.

To access WebServer, open an internet browser –we recommend Microsoft Internet Explorer– on any PC and introduce the MTXTunnel IP address or DNS if DynDNS feature is activated. See next picture.

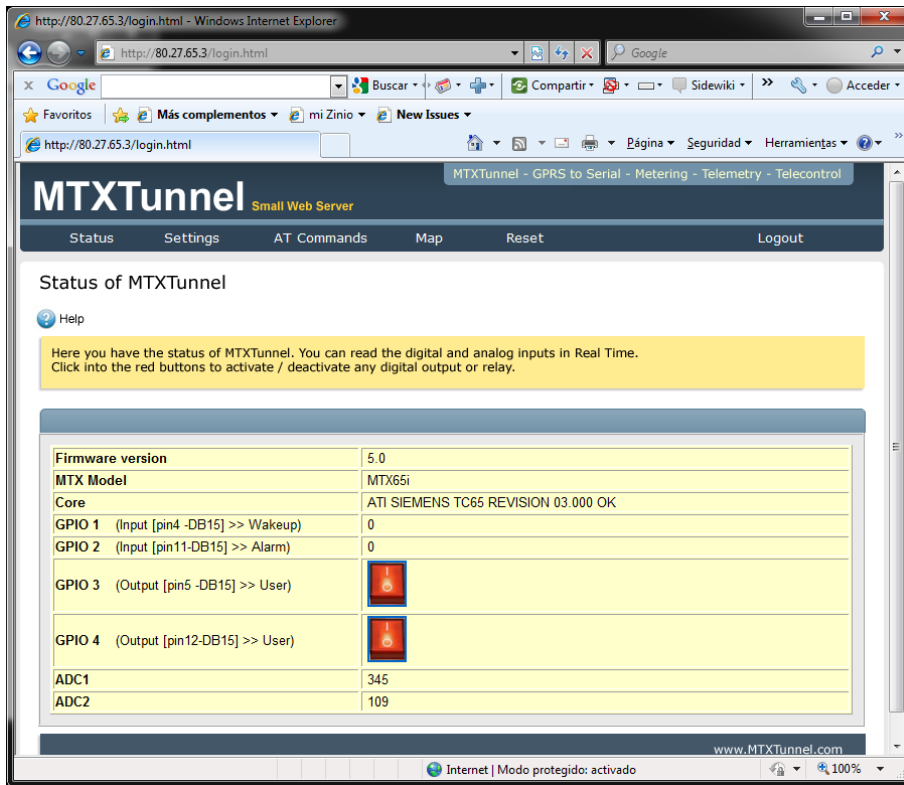
If you specified a Login and Password configuration parameter, this is what the WebServer will ask for at first.



After Login and Password grants check, the next page is WebServer Status. You can find MTXTunnel information as a firmware version, Cinterion model information and GPIO/Analog status/value.

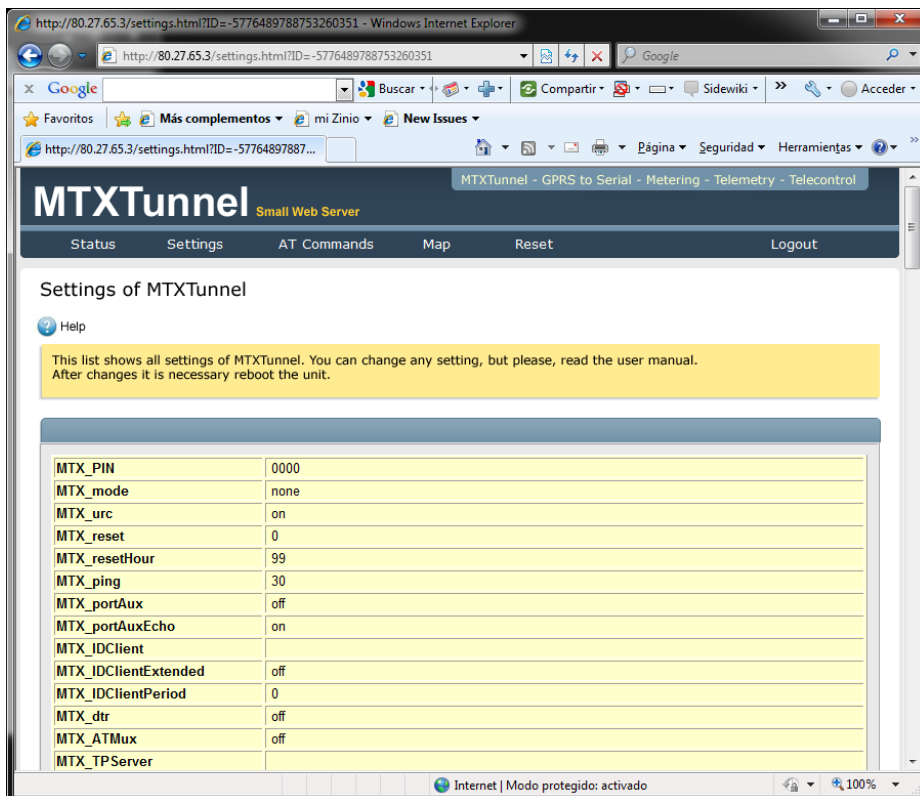
Please note next example page. GPIO3 & GPIO4 are configured as output. In “value” label there is a link where you can remotely change the value by just clicking your mouse.

In this example MTX-65i has been used. If using MTX65-IND you will switch a relay instead of changing the digital output value.

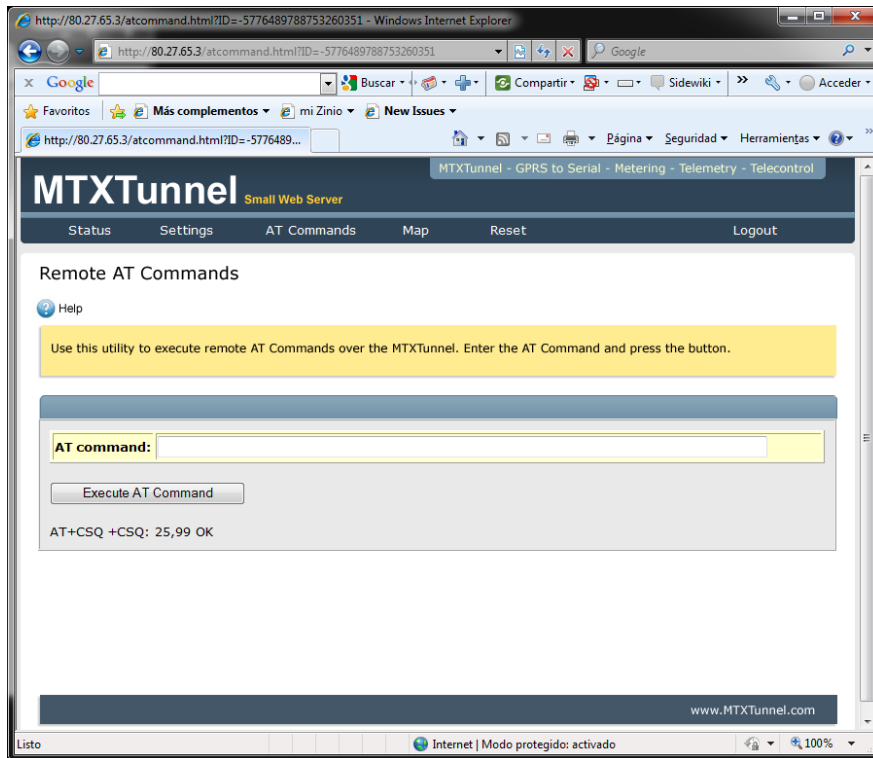


On the **Setting** menu label you can see and change any MTXTunnel configuration value. Any value must be done one by one because as it is oriented for punctual changes. Click on **Reset** to reset terminal modem and use the new configuration.

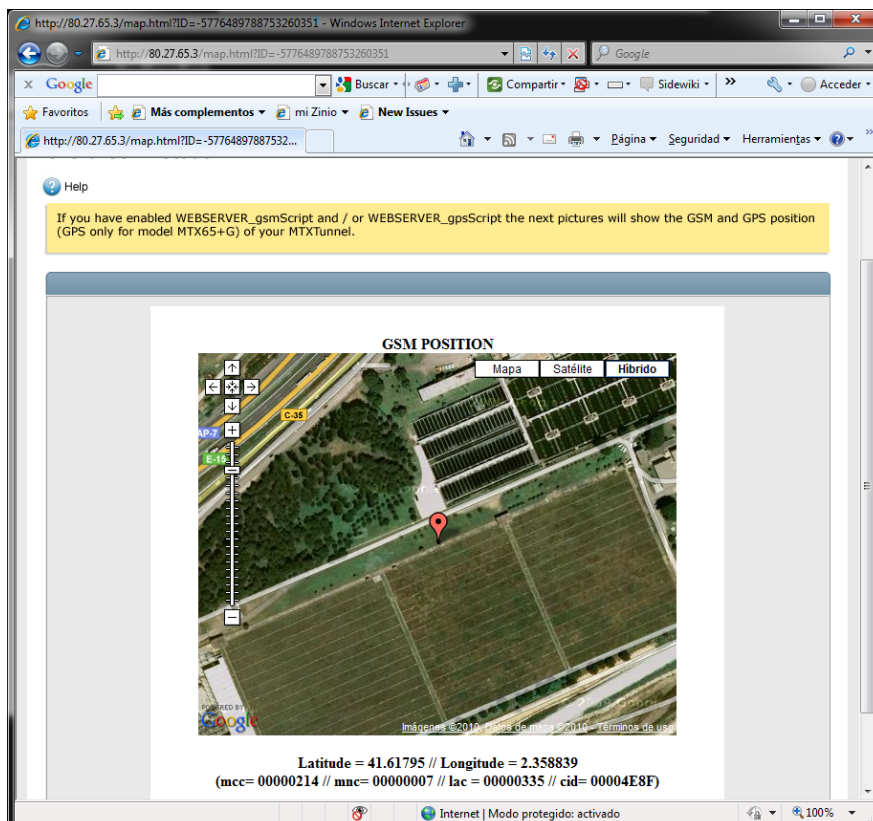
- It is recommended to use Telnet versus Web Browser



AT Commands page is intended to execute AT commands remotely. As an example, AT+CSQ command value is shown below:



Maps. In this section you can see maps. MTX65+G uses precise GPS positioning, other MTX-Terminal modems use cell network positioning.



Reset menu will save configuration values and it resets MTXTunnel.

Logout will close the session.

There are 3 important configuration values in “Settings” related with embedded MTXTunnel WebServer:

WEBSERVER_skin

WEBSERVER_gsmScript

WEBSERVER_gpsScript

Read the description of configuration values in this [section](#) for more information.

6. - TELNET

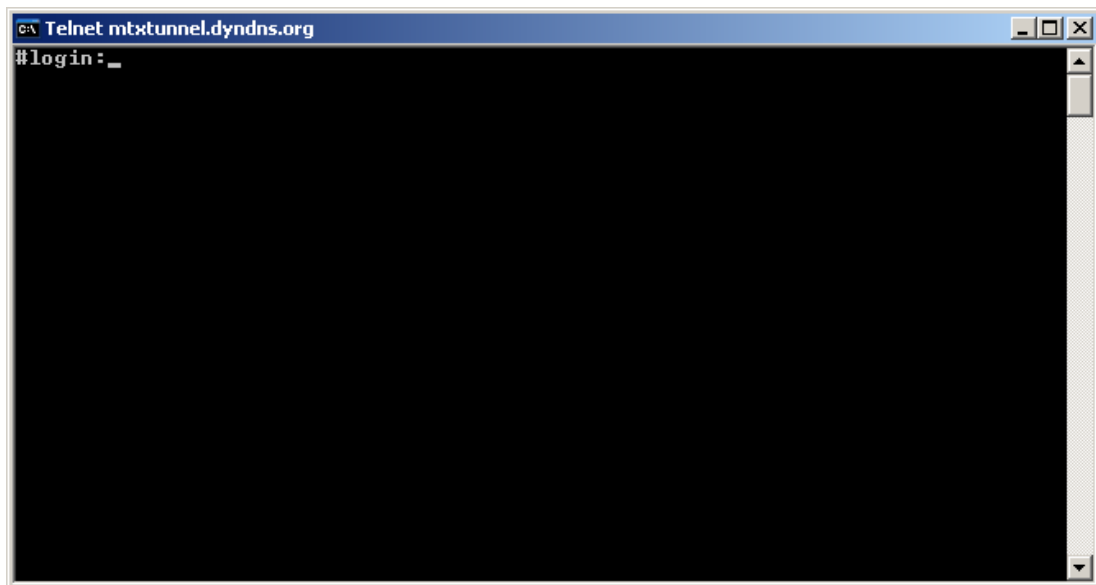
MTXTunnel features a small Telnet server.

If enabled, you can remotely access MTXTunnel with any Telnet client.

It is recommended to use Telnet to access MTXTunnel remotely; it is faster and effortless compared to WebServer.

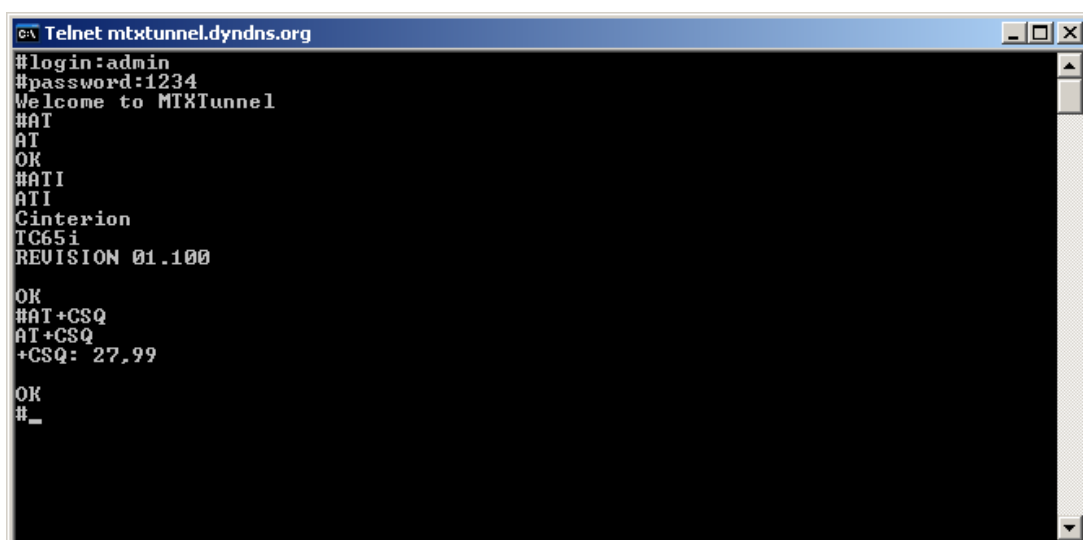
To access MTXTunnel Telnet, open the MSDos console in your PC and specify the GPRS IP address obtained by MTXTunnel. DNS can be used instead if DynDNS has been activated.

In the following example the default screen will be a LOG IN prompt, but only if Login & Password configuration parameter has been specified.



```
c:\> Telnet mtxtunnel.dyndns.org
#login: _
```

After the user and password are checked, the MTXTunnel Welcome prompt will appear. Then, you can send AT commands. These commands can be modem standard ones like (AT+CSQ) to check network coverage or special MTXTunnel configuration commands for example.



```
c:\> Telnet mtxtunnel.dyndns.org
#login: admin
#password: 1234
Welcome to MTXTunnel
#AT
AT
OK
#ATI
ATI
Cinterion
TC65i
REVISION 01.100

OK
#AT+CSQ
AT+CSQ
+CSQ: 27,99

OK
#_
```

7. - AT Commands. User API.

In main applications, MTXTunnel is used as a simple GPRS-Serial gateway. But sometimes, MTXTunnel needs to be integrated into a third-party system application which needs to access the modem remotely to find out a digital input value, network coverage, to check incoming SMS or an important action like to remotely or locally change a configuration value without using OTAP or MES respectively.

User API consists of a set of special AT commands intended to integrate MTXTunnel in an end custom application.

7.1. - AT commands MTXTunnel user procedure

Interfaces:

1. - Using main serial port COM1 (can the GPRS-serial tunnel be established or not?)

The AT command has a special syntax as the MTXTunnel application is running so tunnel can be created and the command is on the same channel...

Special syntax is used with AT commands between following TAGS `<MTXTunnel>` - `</MTXTUNNEL>`

For example, if you send this special command:

```
<MTXTUNNEL>AT</MTXTUNNEL>
```

You also will be responded by special syntax command:

```
<MTXTUNNEL>AT OK</MTXTUNNEL>
```

All these special syntax commands use don COM1 port and will be not resent by GPRS as they are interpreted by MTXTunnel as an AT command. This way, the machine connected to COM1 can also have modem control.

To enable this feature the configuration parameter `MTX_ATMux` must be "on".

If you do not need this feature please do not enable the above command, you will save CPU resources.

2. - Using secondary serial port COM2

You do not need to use special syntax to send AT commands with COM2, just use normal syntax. Please be sure to configure `MTX_portAux` parameter to “on”. If you do not need this feature please do not enable the above command, you will save CPU resources.

Please note that TELNET bypass (second GPRS-serial tunnel, to use 2 equipments) cannot be created if you need to use COM2 for auxiliary AT command use.

3. - SMS messaging

You can send AT commands and receive their answer using SMS messages.

Parameter configuration needed: `SMS_AEnabled` “on” and `SMS_ATResponse` “on”.

No special syntax has to be used, MTXTunnel will use AT command if SMS message begins with “AT” words

4. - HTTP

It has been explained that Web Browser can be used to send AT commands. There is a more highly recommended way using “api.html” WebServer.

For example this way you read a digital input, change level of digital output and switch a relay or remotely read the network coverage as follows:

<http://mtxtunnel.dyndns.org/api.html?ATCOMMAND=AT%2BCSQ&LOGIN=user&PASS=1234>

MTXTunnel will answer:

```
<MTXTUNNEL>AT+CSQ
+CSQ: 25, 99
OK
</MTXTUNNEL>
```

You need to extract the answer from the AT command between <MTXTunnel> tags.

Please note that URL syntax needs to be used and needs to be used in this order: ATCOMMAND, LOGIN y PASSWORD.

Please also note that in URL special characters used on AT commands, like the “plus”, “+”, cannot be used and need to be decoded as follows:

%20	> blank space
+	> blank space
%21	> !
%22	> \
%23	> "
%24	> \$
%25	> %
%26	> &
%27	> '
%28	> (
%29	>)
%2 ^a	> *
%2B	> +
%2C	> ,
%2D	> -
%2E	> .
%2F	> /
%3A	> :
%3B	> ;
%3C	> <
%3D	> =
%3E	> >
%3F	> ?
%40	> @
%5B	> [
%5C	> \
%5D	>]
%5E	> ^
%5F	> _

The red ones are the most common AT commands like “AT+” & “AT^”

5. - Telnet

In the previous chapter, we explained how to use TELNET to send AT commands. It is easy and convenient.

6. - Using GPRS socket client connection

MTXTunnelv7 is able to remotely send AT commands using the GRPS-Serial tunnel Gateway which is created when a TCP client socket is created. As explained before, this is useful when the network operator does not allow input connections or server mode.

To use this option please remember to configure MTX with parameter MTX_ATEEmbedded to “on”.

To remotely send AT commands via a client socket you should encapsulate the command in between the following tags: <MTXTUNNELR> </ MTXTUNNELR>

For example, if you send the command:

```
<MTXTUNNELR> AT </ MTXTUNNELR>
```

Your response will be:

```
<MTXTUNNELR> AT OK </ MTXTUNNELR>
```

MTX_invertedCom

Description.

This parameter allows you to invert the order of the modem’s COM ports that has 2 serial ports. For example, the MTX65i modem has two serial ports, one in the DB9 connector (the primary COM) and the other in the DB15 connector (the secondary COM) If MTX_invertedCOM is turned “on”, the DB15 connector’s serial port becomes the primary COM and the DB9 becomes the secondary COM.

Value.

on, off

Value: off

Notes.

- This parameter may be useful especially with the MTX65i if you prefer to use the DB15 connector instead of the DB9 connector or vice versa.

7.2. - Standard AT commands supported by MTXTunnel

MTXTunnel runs on Java enabled MTX-Terminal modem. Internally there is a Cinterion GSM/GPRS core like the following:

Cinterion model TC65 for MTX65ULP

TC65i for MTX65i, MTX65IND and MTX65IND-V2

XT65 for MTX65+G-V3 and MTX-65+G-V5+B

Those GSM-GRPS modules use the AT command set, some of them are standardized and others are Cinterion proprietary. MTXTunnel can run just a few of them. Those are:

- AT > OK
- ATI > Returns module firmware information
- AT+CSQ > Network GSM coverage
- AT+CCLK > Current time output
- AT^SSIO > Used to change a digital output
- AT^SGIO > Used to know a digital input value
- AT^SRADC > Used to know an analog input value
- AT^SGPSR > Returns GPS position (only XT65 module-MTX-65+G terminal)
- AT^MONI > Monitors information about BTS attached
- AT^SMONI > Monitors information about BTS attached
- AT+CFUN=1,1 > Resets MTXTunnel
- AT^SMSO > Resets MTXTunnel (switches off and because MTX-Terminals is featured for it, it switches on automatically)

Please read the AT Command manual from Cinterion for more information about the use, syntax and answers of those commands. Please ask for a copy from your distributor or Matrix Electronica. Also check ftp.matrixelectronica.eu/MTX-Terminals for more information.

7.3- Special MTXTunnel AT commands (API)

MTXTunnel needs special proprietary AT commands to allow MTXTunnel to be controlled by a third-party application, using a local serial port or GPRS connection remotely.

Please remember you can use one or two of the COM serial ports available. You can use them locally or you can use them remotely with GPRS using WebServer or Telnet and also SMS text messages.

Please read carefully this AT special commands set features:

AT^MTXTUNNEL=END

This command stops and ends MTXTunnel JAVA program execution. MTX-Terminal modem is now in normal mode.

This allows certain intelligent devices connected to MTX-Terminal to run or stop the MTXTunnel application and use the modem terminal for a voice call, CSD call, firmware upgrade... After this, MTXTunnel can be run again.

AT^MTXTUNNEL=VERSION

String returned is version information. Only for MTXTunnel V7 and above.

`AT^MTXTUNNEL=SETBAUDRATE,port,speed`

This command can change the modem serial port speed for a temporary amount of time, now MTXTunnel doesn't need to be reset.

Examples:

```
AT^MTXTUNNEL=SETBAUDRATE, 0, 9600
```

ASC0 port baud rate speed is now 9600 bauds

```
AT^MTXTUNNEL=SETBAUDRATE, 1, 19200
```

ASC1 port speed is now 19200 bauds

Only for MTXTunnel V7 and above

`AT^MTXTUNNEL=GETPARAM,parameter_name`

This command is intended to read or to find out a configuration parameter stored in a configuration file inside –non volatile memory–.

For example, to read APN value stored in configuration file, use:

```
AT^MTXTUNNEL=GETPARAM, GPRS_apn
```

`AT^MTXTUNNEL= SETPARAM,parameter_name,ValueParametro`

This command is used to change any MTXTunnel configuration parameter value.

For example, to change the baud rate of COM1 to 9600 bauds:

```
AT^MTXTUNNEL=SETPARAM, COMM_baudrate, 9600
```

Please be sure to reset the MTXTunnel application to get the new configuration.

The AT command to reset the terminal is `AT+CFUN=1, 1`

`AT^MTXTUNNEL=GETIOS`

This command gets readings from all GPIO and ADCs of MTX-Terminals with MTXTunnel running.

This is more convenient and faster than using one AT command for each GPIO/ADC, especially if you use SMS or GPRS connection for this.

After execution, this AT command responds with each value in following order. Every state is separated by “,” character:

GPIO1,GPIO2,GPIO3,GPIO4,GPIO5,GPIO6,GPIO7,GPIO8,GPIO9,GPIO10,ADC1,ADC2

AT^MTXTUNNEL=RS232,*mode,data*

This command allows you to send and receive data directly from an MTXTunnel serial port.

This is useful for end applications using WEB page forms; you can get the form values from the web page, collect them in the serial port, and after using them, send a response to the web page.

You can see in Annex an example. [See](#)

Mode values: 0, 1, 2 or 3.

0: **data** is forwarded through COM1 without waiting for a response from the device connected to COM1, so there is no value response to this AT command.

1: **data** is forwarded through COM1 and will wait for a response from the device connected to COM1. This response will be the return value of this AT command.

2: **data** is forwarded through COM2 without waiting for a response from the device connected to COM2, so there is no value response to this AT command.

3: **data** is forwarded through COM2 and will wait for a response from the device connected to COM2. This response will be the return value of this AT command.

NOTE.

Mode value 1 and 3. Maximum device response is 160 characters long.

data parameter is a text string sent through serial port.

AT^MTXTUNNEL=SMS,phone_number,message

This proprietary AT command is intended to send SMS text messages.

Do not use AT+CMGS command as it is intended to be used in end-party applications.

Parameters description:

“**phone number**”: End user phone number

“**message**” SMS text string

AT^MTXTUNNEL=I2CSPI,*mode,data*

This proprietary AT command can be used for a simple GPRS-I2C/SPI tunnel, so you can control a remote device connected to MTX-Terminal I2C or SPI bus like a temperature sensor, display, etc.

Please remember I2C and SPI cannot be used at same time.

MTX65ULP modem has **not** featured this.

You can see an example in the Annex. [See](#)

mode parameter values:

CONNECT: runs GPRS-I2C/SPI. Tunnel is activated.

data parameter: use same text string as if you were using the AT^SSPI command on TC65i or XT65. Please remember you have to specify bus speed, etc....

DATA: send data through I2C/SPI tunnel

data parameter: use same text string as if you were using AT^SSPI value command on TC65i or XT65.

DISCONNECT: stops GPRS-I2C/SPI. Tunnel is deactivated.

data parameter value must be "0".

AT^MTXTUNNEL=SETMODBUS,address;position1;data_1;data_2;...;data_n

When a MODBUS device is connected to secondary port on MTXTerminal, this proprietary AT command will allow some parameters stored in the memory table to change:

address: ModBus device address (0 ... 255)

position1: First position to write in modbus memory table

data_1, data_2: Data to be write in the Modbus on pointed posicion1 parameter.

Important: address, position1 and data_n are separated by ";"

AT^MTXTUNNEL=GETMODBUS,address;position;numData

When a MODBUS device is connected to secondary port on MTXTerminal, this proprietary AT command will allow you to read some parameters stored in the memory table:

address: ModBus device address (0 ... 255)

position: First position to write in modbus memory table

numData: Number of data to read from modbus table

Important: address, position and numData are separated by ";"

AT^MTXTUNNEL=TEMPORALCLIENT,*IPaddress*,*TCPport*

New AT command can create a temporal client TCP socket to a specific server IP address and port. Only use this when MTX_mode parameter is "server" or "none".

Now you could send AT commands remotely, just use special tags <MTXTUNNELR></MTXTUNNELR>

Parameters:

IPaddress: IP address (server) to be connected
TCPport: TCP to be connected

IMPORTANT. TEMPORAL client socket means it will be closed automatically if GPRS data is not sent or received within 60 seconds.

AT^MTXTUNNEL=DELETEBBDD

Use this command when you need to delete the datalogger internal memory on MTXTunnel.

After using it, the internal modem memory file "data.txt" will be deleted and the MTX-Terminal modem will be reset.

The following AT commands are only used if MTX_portAux "wavenis" value is configured.

You use it when MTX-IND-V1 and MTX-IND-V2 terminal modems are used with internal Wavenis card for concentrator scenario purposes and to allow communication via radio, with the modem and remote card sensor using Wavenis protocols.

AT^MTXTUNNEL= READWAVETHERM, MACWavenisaddress

In order to return the temperature of remote Wavenis device in real time the Wavenis MAC address must be specified.

AT^MTXTUNNEL= READWAVEFLOW, MACWavenisaddress

This command returns, in real time, the counting pulse value of the remote Waveflow device. Waveflow MAC address must be specified.

AT^MTXTUNNEL= READWAVESENSESEC, MACWavenisaddress

This command returns in real time the (4-20mA) value of remote Wavenis device, their MAC address must be specified in MACWavenisaddress parameter.

AT^MTXTUNNEL= READWAVESENSEV, MACWavenisaddress

This command returns in real time the (0-5V) value of the remote Wavesense device, their MAC address must be specified in MACWavenisaddress parameter.

AT^MTXTUNNEL= READWAVELOG, MACWavenisaddress

This command performs a real-time reading of the 4 digital inputs from the Wavelog device, whose MAC address must be specified in the MACWavenisaddress parameter.

AT^MTXTUNNEL= WAVENISRSSI, MACWavenisaddress

This command returns in real time the RSSI (Receive Signal Strength Indication) of the Wavenis remote device, their MAC address must be specified in MACWavenisaddress parameter.

AT^MTXTUNNEL= REPEATERS, xxxxxxxxxxxxxxxxxxx

If you use Wavenis card repeaters use the previous AT command.

xxxxxxxxxxxxxxxxxxx parameter has following syntax:

-Number of repeaters following of the MAC address of repeaters.

Example if using 2 repeaters with MAC address 0A0203040506 and 0B0708090909 respectively:

AT^MTXTUNNEL=REPEATERS, 020A02030405060B0708090909

Note: 01, 02 and 03 repeaters can be only specified.

8. - MTXTunnel v7 CONFIGURATION PARAMETERS

General configuration parameters “MTX_”

All general configuration parameter starts with “MTX_” prefix string.

MTX_PIN

Description.

PIN secure number of SIM inserted.

Values.

16 characters maximum

Default value: 0000

Notes.

- In case of use a SIM card with no PIN number security code can leave MTX_PIN with no value.

MTX_mode

Description.

This is a very important parameter. It is needed to write the connection mode for MTXTunnel.

MTXTunnel can wait for an incoming connection if it is a TCP socket server. Value is **server**.

If MTXTunnel connects to a remote server then it is a TCP socket client. Value is **client**.

If MTXTunnel uses UDP protocol for socket communication, value is **udp**.

If you do not need any GPRS-Serial tunnel Gateway use value “**none**”

Values.

server, client, udp, none

Default value: server

Notes.

- Using “none” as value you can use MTXTunnel for SMS and other telemetry application, but not GPRS connection will be done. See [Annex 2](#) with many scenarios example to understand this parameter.

MTX_urc

Description.

MTXTunnel can output in COM1 (ASC0) the status of connections or working state of MTXTunnel as URC –Unsolicited Result Codes- messages

URC messages can be:

^MTXTunnel_7.x_running

First message after powering up MTXTunnel. It means it is in running mode.

^MTX_IP_XXX.XXX.XXX.XXX

Message when MTXTunnel has got a new IP address in a GPRS connection.

^MTX_DTR_END_APPLICATION

This message outs when MTXTunnel application has been stopped by user request (special AT command or DTR serial line change level).

^MTX_CONNECTION_CLIENT_ESTABLISHED

Output message when MTXTunnel configured as client has connected successfully with the remote server.

^MTX_CONNECTION_CLIENT_END

Output message when MTXTunnel configured as client has closed the connection with the remote server because it ends programmed behaviour or remote end close socket.

^MTX_CONNECTION_ESTABLISHED

Output message when MTXTunnel is server mode configured and accepts a remote socket connection...

^MTX_CONNECTION_END

Output message when MTXTunnel configured as server has closed the connection with the remote equipment because of normal behaviour or remote end close socket.

^MTX_SOCKET_UDP_ESTABLISHED

Output message when MTXTunnel configured as “udp” is ready to send and receive UDP data.

^MTX_SOCKET_UDP_END

URC message will be shown when MTXTunnel configured as “udp” closes UDP socket due to a normal request (as an example, time for GPRS connection has been expired).

Values.

on, off

Default value: off

Notes.

- We recommend you to not activate URC messages unless necessary. In a normal GPRS-Serial RS232 tunnel Gateway these messages are in the same RS232 Serial port so there can be interference in the communication.
- The first time when configuring and testing MTXTunnel it can be useful to see what MTXTunnel is doing or get information like the newly obtained IP address.

MTX_reset**Description.**

Time parameter (in minutes) so that MTXTunnel can be reset automatically.

Values.

0 ... 43200 (30 days)

Default value: 0

“0” disable this feature and MTXTUNNEL will not be reset periodically.

Notes.

- It is not recommended to use this parameter unless you think it is necessary. MTXTunnel features many automatic procedures to ensure GPRS connection will be stable and working 100% of the time.

MTX_resetHour**Description.**

This parameter can perform automatic timing reset after X value hours.

Values.

0 ... 23 - 99

Default value: 99

Notes.

- “99” value disables this feature; modem will be never automatically reset.
- It is not recommended to use this feature unless you think it is necessary; MTXTunnel has internal procedures allowing GPRS connectivity to always be on...
- You need to use the `MTX_TPServer` parameter and use a timing server. The modem will synchronize internal time with server time TP protocol based. .
- Modem time format is **HOURL UTC**
- If you enable this parameter, please use also `MTX_reset` parameter at 25 hours. This way reset will be performed and all services are restored even if timing synchronization fails.

MTX_ping

Description.

This is a very important configuration parameter to ensure GPRS connectivity. MTXTunnel will perform a PING to a configured IP address at configured periodic second timing.

If value is "0" PING will be never performed.

Values (minutes)

0 ... 1440 (1 day)

Default value: 30

Notes.

- We recommend using MTX_PING with a least 30 minutes value.
- This parameter is more important if MTXTunnel is used in "server" mode. In this mode, MTXTunnel is waiting for incoming connections from remote equipments, and network operators can block the PPP connection without any notice. MTXTunnel cannot detect this block as there is no traffic so we use PING protocol to detect if the PPP connection is alive. PING traffic is almost nothing and you could avoid the network operation PPP blocking when there is no traffic transmission.

MTX_pingIP

Description.

In the case of the above parameter `MTX_ping > 0`, when periodic ping is activated, this parameter value defines the PING IP address to be performed.

If you do not use this parameter, MTXTunnel will perform PING to its own IP address.

Be careful, some network operators do not allow performing PING to the newly obtained IP address, so we recommend you use a well known IP address. You can use your own server/office IP or DNS Google one which is 8.8.8.8

Values.

xxx.xxx.xxx.xxx or you can use a URL like www.google.com

Default value: MTXTUNNEL obtained IP

Notes.

- We recommend that you use PING methods when using permanent connections.

MTX_portAux

Description.

MTX65i, MTX65IND and MTX65ULP have two COM serial ports, COM1 y COM2. If you activate this parameter with the value “on”, external equipment connected to COM2 could send AT commands.

Values.

on, off, wavenis, modbusmaster, gateway

Default value: off

Notes.

- If you are not going to use this feature, disable this parameter with the value “off” as it will save internal CPU resources.
- This parameter must be “off” when using the MTX-65+G terminal as it has only one COM1 port.
- Read [section 7](#) to see the AT commands that can be used. Please read the [MTX_ATLimited](#) parameter.
- From MTXTunnel version 5.6, “wavenis” value in parameter can be used to control RF Wavenis protocol based devices connected to COM2.
- Form MTXTunnel version 7 “modbusmaster” value in parameter can be used to read RTU modbus devices connected to COM2. Read [LOGGER_](#), [MODBUS_](#) parameter description for more information.

MTX_portAuxEcho

Description.

Enable [MTX_portAux](#) parameter “on” value when you need echo AT commands in COM2 port.

Values.

on, off

Default value: on

Notes.

- This parameter is only valid when [MTX_portAux](#) is enabled (“on”). If not, this will not used.

MTX_IDClient

Description.

If MTXTunnel is configured in client mode (`MTX_mode` value parameter “client”), MTXTunnel sends an identification string when the connection with the server is done. This string is the first to be sent after the connection with the remote server.

This is intended to identify MTXTunnel with the server, and is useful when dynamic IP addressing is used.

Values.

Text string 255 characters max.

Default value: (empty, nothing is sent)

Notes.

- If you leave the value empty MTXTunnel will not send an identification string.

MTX_IDClientExtended

Description.

By enabling this parameter with the value “on” and using identification string with `MTX_IDClient` parameter, it is possible to send more information to a remote server.

Now the extended string has the following format:

`MTX_IDClient#IMEI#gpio1#gpio2# ... #gpio10#adc1#adc2#`

MTX_IDClient is configuration string, *IMEI* is modem identifier, and *gpioX* is digital input/output and *adcX* is analog input.

gpioX and *adcX* are optional; it is not needed if you do not use input/outputs.

`MTX_IDClient#IMEI#`

Values.

on, off, imei

Default value: off

Notes.

- If you leave the value empty MTXTunnel will not send an identification string.

MTX_IDClientPeriod

Description.

`MTX_IDClient` information string is only sent after the client connection to the remote server once after every new connection. With this parameter IDClient can send the information periodically every X seconds, just use a value >0.

Values.

0 ... 2592000 (30 days)

Default value: 0 (only one string is sent at connection)

Notes.

- This can be useful if you need to remotely monitor the input/outputs and analog input because their statuses are sent periodically.

MTX_dtr

Description.

In some scenarios you may need to stop the MTXTunnel application. Then the modem would work with normal AT commands so you would be able to make a CSD call or voice call for example.

There are two ways to stop MTXTunnel.

- Send proprietary AT command (AT^MTXTUNNEL=EXIT)
- Use modem DTR line on COM1 serial port. It is needed to enable this feature with the parameter value at "on"

Values.

on, off

Default value: off

Notes.

- This feature is only available for MTX65i and MTX65ULP terminal modem platforms. MTX65IND and MTX-65+G do not have a DTR line.
- You can start MTXTunnel again using AT+CFUN=1, 1 command (recommended). Also you can use AT^SJRA="A:/MTXTunnel.jar" command

MTX_TPServer

Description.

MTXTunnel can be timing synchronized. Using TP (Time protocol) it connects to timing servers and fixes the RTC (Real Time Clock) deviation errors. Also it gets the time after power up.

It is allowed to use private or own time servers, but they are many free time servers and they can be used on MTXTunnel like this:

time-a.timefreq.blrdoc.gov > recommended as public free one
time-a.timefreq.blrdoc.gov
time-b.timefreq.blrdoc.gov
time-c.timefreq.blrdoc.gov
utcnist.colorado.edu
time-nw.nist.gov
nist1.nyc.certifiedtime.com
nist1.dc.certifiedtime.com
nist1.sjc.certifiedtime.com
nist1.datum.com
ntp2.cmc.ec.gc.ca
ntp1-0.uni-erlangen.de
ntp1-1.uni-erlangen.de
ntp1-2.uni-erlangen.de
ntp1-0.cs.tu-berlin.de
time.ien.it
ptbtime1.ptb.de
ptbtime2.ptb.de

Values.

Text string < 255 characters

Default value: None

Notes.

- Please note time server's returns UTC time and there are a few hours difference in your country. As an example, in Spain the time is UTC+1 or UTC+2 in summer. UTC 09.00 time in July is 11.00 local time in Spain.

MTX_TPServer2

Description.

Backup timing server. If previous main time server fails, MTXTunnel will take this second one as a security backup.

time-b.timefreq.bldrdoc.gov > recommended free public time server.

time-a.timefreq.bldrdoc.gov

time-b.timefreq.bldrdoc.gov

time-c.timefreq.bldrdoc.gov

utcnist.colorado.edu

time-nw.nist.gov

nist1.nyc.certifiedtime.com

nist1.dc.certifiedtime.com

nist1.sjc.certifiedtime.com

nist1.datum.com

ntp2.cmc.ec.gc.ca

ntp1-0.uni-erlangen.de

ntp1-1.uni-erlangen.de

ntp1-2.uni-erlangen.de

ntp1-0.cs.tu-berlin.de

time.ien.it

ptbtime1.ptb.de

ptbtime2.ptb.de

Values.

Text string < 255 characters

Default value: None

Notes.

- You can use this backup timing server only if you have configured main in MTX_TPServer parameter.

MTX_ATMux

Description.

This parameter when enabled activates multiplexer on COM1 serial port of MTXTunnel.

Multiplexer means it is possible to send AT commands to a modem when GPRS-RS232 tunnel is active/connected. This way you can use AT commands to see network coverage/information, change or read a digital output/input, stop MTXTunnel or change a configuration parameter.

You need to write AT commands into special tags strings because MTXTunnel has to interpret it and not send it to the GPRS using following syntax:

```
<MTXTUNNEL> </MTXTUNNEL>
```

Example:

```
<MTXTUNNEL>AT+CSQ</MTXTUNNEL>
```

MTXTunnel will return:

```
<MTXTUNNEL>AT+CSQ +CSQ: 22, 99 OK</MTXTUNNEL>
```

Values.

on, off

Default value: off

Notes.

- Special AT command must be sent with a pause of 1 second after last data sent on serial port but it is needed no pauses of more than 50ms between characters.
- Read [chapter 7](#) to know more information about which AT commands are allowed in this multiplexer mode.

MTX_WatchdogOnExit

Description.

MTXTunnel features watchdog. If enabled, MTXTunnel must internally refresh the watchdog every 300 seconds (5 minutes). In case this refresh fails, internal software watchdog will reset MTXTunnel application.

If MTXTunnel is stopped (you can stop using DTR or by AT command) watchdog remains active, means that after 5 minutes, MTXTunnel will be reset and so, starts again.

If you disable this feature with “off” value watchdog will never reset MTXTunnel, even if it is ended.

Values.

on, off

Default value: on

Notes.

- This is useful when the user needs to stop MTXTunnel temporarily to do certain modem classic communications (voice or data call, SMS....) and then if “on” ensure to run MTXTunnel after 5 minutes.
-

MTX_model

Description.

Very important and mandatory parameter which specifies which MTX-Terminal modem model will run MTXTunnel application.

Values.

MTX65i, MTX65IND, MTX65+G, MTX65ULP, MTX65IND2, MTX65iRS485

Default value: MTX65i

Notes.

- Please ensure to check this mandatory parameter. If you do not write the correct value, MTXTunnel could not work properly in any related with input/outputs features (like SMS alarm-control)

MTX_ATLimited

Description.

This optional parameter can disable the AT command limitation set execution if value is “off”. Remember you can use AT commands (multiplex on COM1, COM2, or via SMS or HTTP).

Values.

on, off

Default value: on

Notes.

- We recommend that you set this parameter to “on”. Only use “off” when you need to use another command, but keep in mind that using AT commands without limitation could interfere with MTXTunnel behaviour. Please read AT command set of MTX-Terminals or ask gsm-support@matrix.es for more information.

-

MTX_clientSSL

Description.

Allow SSL secure socket communication (only client mode `MTX_mode: client`).

Remote server needs to support secure SSL socket connection.

Values.

on, off

Default value: off

Notes.

- It's only possible to use an SSL security socket when MTX tunnel is used in client mode.
- Do not use this if it is not necessary, traffic data volume is increased and data communication speed will be slower.
- The server must support any of following SSL standards
 - + TLP protocol version 1.0 (RFC 2246)
 - + SSL v3.0

+ WAP™ TLS Profile and Tunneling Specification

MTX_temporalClient

Description.

This parameter allows you to establish a temporal client socket when MTXTunnel is in server mode (*MTX_mode*: server) and there is no connection established.

This allows critical alarm values to be sent without waiting for incoming server connection. After one minute (enough time to send the alarms), the socket is closed and MTXTunnel remains in normal server mode.

See scenario example in annex of this manual.

Values.

on, off

Default value: off

Notes.

- This temporal tunnel connection takes just one minute, if there is no data traffic, the socket will be closed.
- When the temporal socket is activated, the socket server services (server socket, WebServer....) are also activated. But if the temporary socket is closed after one minute, the associate services are closed after *GPRS_timeout* parameter.
- The temporal client socket can be activated if the GPRS connection is always active (*GPRS_timeout*=0) or not (*GPRS_timeout*>0).
- If there is already a GPRS connection (socket connected to MTXTunnel) it is not possible to start the temporal client socket.
- If the temporal client socket is running it is not possible to start server mode and any incoming connections will be not allowed.
- It is MANDATORY that *MTX_ATMux* parameter is disabled "off", if not the temporal client socket connection will be not started.
- From MTXTunnel v7 version is it also possible to use a special AT remote command to start the temporal client socket.

MTX_msToSend

Description.

A pause that indicates how many milliseconds must pass without receiving data through the serial port for the MTXTunnel to send data via GPRS.

Values.

0 ... 5000

Default value: 50

Notes.

- This is useful if the equipment connected to serial COM and MTXTunnel do not send data in concatenated way. Communication will be slower but all data is compacted.
-

MTX_gatewayModBus

Description.

This parameter will configure MTXTunnel as ModBus TCP / ModBus RTU tunnel gateway. MTXTunnel must be configured in server mode.

Values.

on, off

Default value: off

Notes.

- Remember MTXTunnel must be in server mode, waiting for TCP connection. See Annex 2, example 2.14.

MTX_alwaysConnectedClient

Description.

If MTXTunnel is configured in client mode (`MTX_mode:Client`), this parameter establishes TCP socket connection once (value “off”) or in case the socket is closed, the connection is retried every 30 seconds (value “on”).

Values.

on, off

Default value: on

Notes.

- “off” value is intended for the server to collect all data and close the socket. MTXTunnel will not retry in 30 seconds to open the socket, this will save resources in the server.
- Parameter only valid then MTXTunnel is in client mode.
-

MTX_init1, MTX_init2, MTX_init3

Description.

Those 3 parameters can execute AT commands after MTXTunnel starts or powers up.

As an example, one AT command could be sending an SMS when the modem is switched on.

Values.

AT command text string

Default value: None

Notes.

- This can be used in many end applications and helps in a special start-up. Please check the AT commands manual or ask gsm-support@matrix.es for further information.

MTX_AEmbedded

Description.

This parameter will allow MTX tunnel to interpret AT commands from a remote server. They must be between special tags <MTXTUNNELR> and </MTXTUNNELR>. MTXTunnel has to be in client mode.

Values.

on, off

Default value: off

Notes.

- The response to the AT command is also encapsulated between the same tags. <MTXTUNNELR></MTXTUNNELR>
- If you cannot use Telnet because your network operator blocks incoming connections with firewalls and proxies, this is the best way to send AT commands remotely. This is valid for permanent client or temporal client mode.

MTX_radioBand

Description.

This parameter can specify the favourite radio bands the modem will connect to.

This is really not necessary in most cases, but in some countries in South America it is recommended to set this parameter.

Values.

none, europe, america

Default value: none

Notes.

- If your modem is going to be used in Europe use “none” or “europe” value.
- If your modem is going to be used in an American country, use “america” value.

MTX_invertedCom

Description.

This parameter will invert COM values on MTX-Terminal modems with 2 serial COMS.

As an example, MTX65i has two RS232 serial ports and MTX65i-RS485 has one RS232 and other RS485.

If `MTX_invertedCOM` is enabled (value "on") the secondary COM2 port now will act as COM1 and vice versa.

Values.

on, off

Default value: off

Notes.

- This could be useful if you principally need the COM2 port of MTX-65i-RS485.

MTX_flushSerialBuffers

Description.

This parameter allows you to clean the serial buffers of any outstanding sending data before connecting to the TCP/IP socket. This means that if you have some outstanding serial data, it is removed by the modem's buffers before establishing the GPRS-serial gateway.

Values.

on, off

Default Value: off

Notes.

- None.

MTX_AEmbeddedPass

Description.

With the MTX_AEmbeddedPass parameter set to “on” it is possible to send configuration AT commands in its own GPRS-serial gateway. With MTX_AEmbeddedPass it is possible to set a password for embedded AT commands for enhanced security.

Values.

String of up to 32 characters.

Default Value: none

Notes.

- If you set a password for the MTX_AEmbeddedPass parameter, you will have to specify the password when you send an embedded AT command.

For example you need to send the command AT+CSQ. If you do not set a password you could send this <MTXTUNNELR>AT+CSQ</MTXTUNNELR>, but if you have set your password as XXX you will need to send <MTXTUNNELR XXX>AT+CSQ</MTXTUNNELR> which means you need to send: <MTXTUNNELR[space][password]> ATcommand</MTXTUNNELR>

MTX_clientReconnection

Description.

This parameter is useful for configuration scenarios in which client connections are present (MTX_mode: client). In these scenarios this parameter specifies when the MTXTunnel will retry the connection after a shutdown by the remote server.

Values.

0 ... 86400 (seconds)

Default Value: 30

Notes.

- Note that if you set the value with a very low number (e.g. 0), MTXTunnel will retry the connection very quickly if there are constant problems or failures with the remote server and this will increase bandwidth.

Configuration parameter related with COM1: "COMM_"

Configuration parameter starting with "COMM_" prefix references the main serial port on MTX-Terminal modem. On MTX-65i and MTX65ULP there is a DB9 connector. This is the main port used to control and connect your device to and therefore needs to have same configuration, like baud rate.

COMM_baudrate

Description.

Serial COM1 port speed baud rate.

Values (bps).

460800, 230400, 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200, 600, 300

Default value: 115200

Notes.

- You must use the same baud rate configuration with your device and MTXTunnel.
-

COMM_autorts

Description.

This parameter configures COM1 serial port to have hardware flow control (RTS line). If enabled (value="on") then hardware flow control will be used, otherwise (value="off") means no hardware flow control will be used.

Values.

on, off

Default value: on

Notes.

- Configuration in device connected to modem and MTXTunnel must be the same.
- Use same value in `COMM_autocts` parameter

COMM_autocts

Description.

This parameter configures COM1 serial port to have hardware flow control (CTS line). If enabled (value="on") then, hardware flow control will be used, otherwise (value="off"), no hardware flow control will be used.

Values.

on, off

Default value: on

Notes.

- Configuration in device connected to the modem and MTXTunnel must be the same.
- Use same value in COMM_autorts parameter

COMM_bitsperchar

Description.

COM1 serial port number of bits per character.

Values.

7, 8

Default value: 8

Notes.

- Configuration in device connected to modem and MTXTunnel must be the same.

COMM_stopbits

Description.

Number of stop bits per character in COM1 serial port.

Values.

1

Default value: 1

Notes.

- Configuration in device connected to modem and MTXTunnel must be the same.

COMM_parity

Description.

Parity used in COM1 serial port communication.

Values.

none, odd, even

Default value: none

Notes.

- Configuration device connected to modem and MTXTunnel must be the same.

Configuration parameter related with COM2: “COMM2_”

Configuration parameter starting with “COMM2_” prefix references the secondary serial port on MTX-Terminal modem. On MTX-65i and MTX65ULP it's the DB15 connector. The MTX-65+G does not have a secondary port.

This port is used normally to send AT commands to the terminal modem, so you can request network coverage or another MTXTunnel parameter configuration, etc.

This port can also be used to create another GPRS-serial tunnel gateway so you can control 2 devices with one terminal modem and one MTXTunnel application. See the [Annex](#) to see an example.

COMM2_baudrate

Description.

Serial COM2 port speed baud rate.

Values (bps)

460800, 230400, 115200, 57600, 38400, 19200, 9600, 4800, 2400, 1200, 600, 300

Default value: 115200

Notes.

- Configuration device connected to the modem and MTXTunnel must be same.
- This parameter can be used in all MTX-Terminal modems but not in MTX-65+G model.

COMM2_autorts

Description.

This parameter configures COM2 serial port to have hardware flow control (RTS line). If enabled (value="on") hardware flow control will be used otherwise (value="off"), no hardware flow control will be used.

Values.

on, off

Default value: off

Notes.

- Configuration device connected to modem and MTXTunnel must be the same.

- Use the same value in [COMM_autorts](#) parameter
- This parameter can only be used in MTX65IND and MTX65IND-V2 terminal; because other terminal models like MTX65i and MTX65ULP have no flow control lines available on COM2 serial port. MTX65+G do not have a COM2 port.

COMM2_autocts

Description.

This parameter configures COM2 serial port to have hardware flow control (CTS line). If enabled (value="on") hardware flow control will be used otherwise (value="off"), no hardware flow control will be used.

Values.

on, off

Default value: off

Notes.

- Configuration device connected to modem and MTXTunnel must be the same.
- Use the same value in [COMM_autorts](#) parameter
- This parameter can be used only in the MTX65IND and MTX65INDV2 terminal modems. Other MTX-Terminal modems do not have flow control in the second serial port. MTX-65+G model does not have a second serial port.

COMM2_bitsperchar

Description.

COM2 serial port number of bits per character.

Values.

7, 8

Default value: 8

Notes.

- Configuration in device connected to modem and MTXTunnel must be the same.
- This parameter can be used in all MTX-Terminal modems but not in the MTX-65+G model.

COMM2_stopbits

Description.

Number of stop bits per character in COM2 serial port.

Values.

1

Default value: 1

Notes.

- Configuration in device connected to modem and MTXTunnel must be the same.
- This parameter can be used in all MTX-Terminal modems but not in the MTX-65+G model.

COMM2_parity

Description.

Parity used in COM2 serial port data communication.

Values.

none, odd, even

Default value: none

Notes.

- Configuration in device connected to modem and MTXTunnel must be the same.

- This parameter can be used in all MTX-Terminal modems but not in the MTX-65+G model.

Telnet Configuration parameters: “TELNET_”

Telnet configuration parameters start with a “TELNET” prefix. Telnet is recommended to remotely send AT commands, to change some configuration parameters or to find out the status of the remote modem with MTXTunnel. It is important to understand that Telnet will only work if the GPRS link has been established previously.

You can see TELNET in a MSDOS console or with specific software.

TELNET_enabled

Description.

This command enables Telnet services in MTXTUNNEL.

Values.

on, off

Default value: off

Notes.

- MTXTunnel only supports 2 socket servers simultaneously. This means that Telnet cannot be enabled if MTXTUNNEL is working in server mode (`MTX_mode: server`) and WebServer is active (`WEBSERVER_enabled: on`).

TELNET_login

Description.

You can secure Telnet login with this command.

Values

Text string maximum 32 characters

Default value: (None)

Notes.

- If you write the login and password string, MTXTUNNEL will ask for credentials in the remote TELNET connection. If you do not use this feature, an anonymous connection will be created and there will be access without restriction after connection.
- It is recommended to use login and password access security if `TELNET_firewall` is disabled ("off" value)

TELNET_password

Description.

This command is used to specify Telnet login password

Values.

Text string maximum 32 characters

Default value: (None)

Notes.

- If you enable login & password parameters, those who want to gain access will be asked for it when remote Telnet connection is established. If you disable this feature (no value in login and password), you will have direct access to Telnet after connection.
- It is recommended to use (enable) login & password parameters if `TELNET_firewall` parameter is "off".

TELNET_firewall

Description.

This command enables Telnet firewall.

If firewall is enabled it will only accept remote connections from specific authorized IP addresses - see [FIREWALL IP1](#) command-

If disabled, any IP address can connect MTXTunnel remotely using Telnet.

Values.

on, off

Default value: on

Notes.

- If firewall is disabled (value= "off"), it is recommended to use login and password to avoid unauthorized access.

TELNET_port

Description.

TCP port used in MTXTunnel Telnet server.

Values.

1 ... 65535

Default value: 23

Notes.

- Do not use the same TCP port in command [TCP_port](#) and/or [WEBSERVER_port](#) .

TELNET_bypass

Description.

This parameter enables the use of TELNET as a bypass connection to control the device connected to the MTXTunnel modem's COM serial port.

In other words, this can allow 2 simultaneous Serial-GPRS tunnels and control two connected pieces of equipment, one to COM1 and other to COM2.

Values.

on, off

Default value: off

Notes.

- If enabled `TELNET_login` and `TELNET_password` parameters will be used.

WebServer configuration parameters: “WEBSERVER_”

WebServer configuration parameter starts with “WEBSERVER_” . MTXTunnel features small WebServer which you could easily access with internet explorer software and check any modem’s state, network information, input state, or you could change a digital output, etc.

WEBSERVER_enabled

Description.

This command allows you to enable or disable MTXTunnel WebServer.

WebServer can also be used to send AT commands remotely to the modem terminal running MTXTunnel.

An API is available to integrate your MTXTunnel WebServer in your own application for the following features:

1. Create a HTTP-RS232 serial tunnel Gateway. The http web page can be a form. The data filled are sent using MTXTunnel to the serial com port of the attached equipment and vice versa.
2. Read, write or change any MTXTunnel configuration parameter in your own application. Your end customer didn’t realize that MTXTunnel is running so your application is completely customized.
3. The http web page can be programmed in a few minutes so you can show the input/output MTXTunnel values for example.

Values.

on, off

Default value: off

Notes.

- Please read WebServer example scenarios for more information.

WEBSERVER_login

Description.

You can secure WebServer login with this command.

Values.

Text string maximum 32 characters

Default value: (None)

Notes.

- If you enable the login & password parameters, those who try to gain access will be asked for them when they connect to the web page. If you disable this feature (no value in login and password), you will directly access the web page.
- It is recommended to use (enable) login & password parameters if `WEBSERVER_firewall` parameter is "off".
-

WEBSERVER_password

Description.

Parameter used to specify password in order to access MTXTunnel WebServer.

Values.

Text string maximum 32 characters

Default value: (None)

Notes.

- If you enable login & password parameters, those who try to gain access will be asked for them when they connect to web page. If you disable this feature (no value in login and password), you will directly access the web page.
- It is recommended to use (enable) login & password parameters if `WEBSERVER_firewall` parameter is "off".

WEBSERVER_firewall

Description.

This command enables the WebServer firewall.

If the firewall is enabled it will only accept remote connections from specific authorized IP address -see `FIREWALL_IP1` command-

If disabled, any IP address can remotely connect to the MTXTunnel WebServer.

Values.

on, off

Default value: on

Notes.

- If firewall is disabled (value= "off"), it is recommended to use login (`WEBSERVER_login`) and password (`WEBSERVER_password`) parameter to avoid unauthorized access.

WEBSERVER_port

Description.

TCP port used in web connections MTXTunnel WebServer

Values.

1 ... 65535

Default value: 80

Notes.

- Do not use the same TCP port value in command `TCP_port` parameter and/or `TELNET_port`

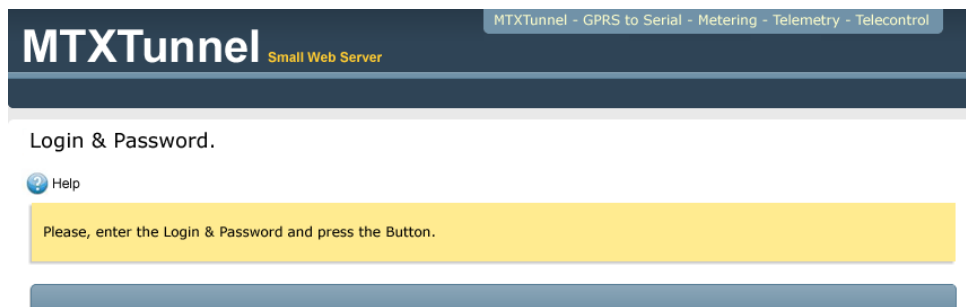
WEBSERVER_skin

Description.

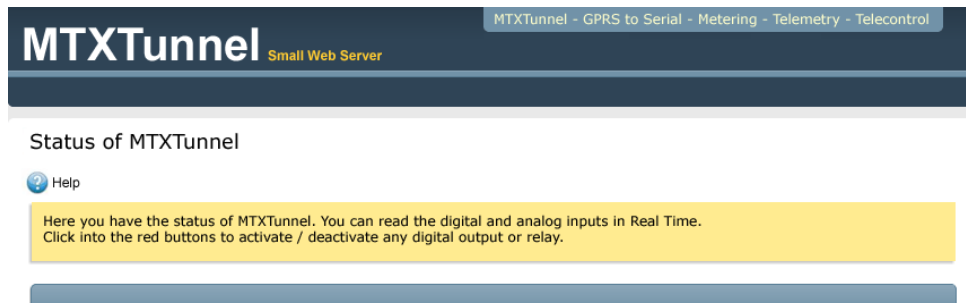
It indicates the URL link where you can find the MTXTunnel WebServer SKIN. You can customize the look of the MTXTunnel http web page with your company logo for example.

URL must contain all this following images:

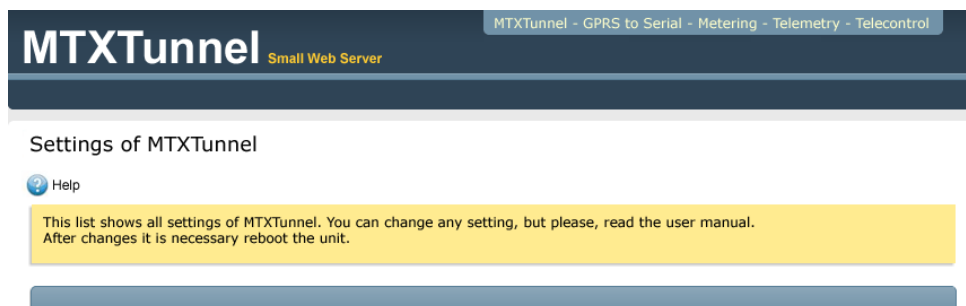
1. - “header0.gif” (858x268). Header in Login welcome page.



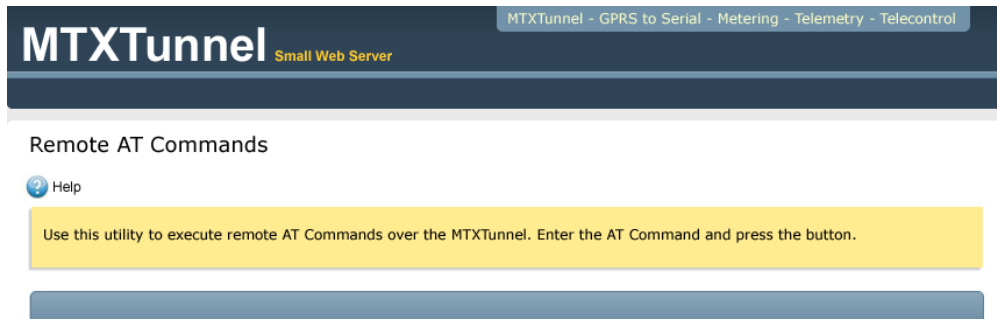
2. - “header1.gif” (858x268). Header in “Status” section page



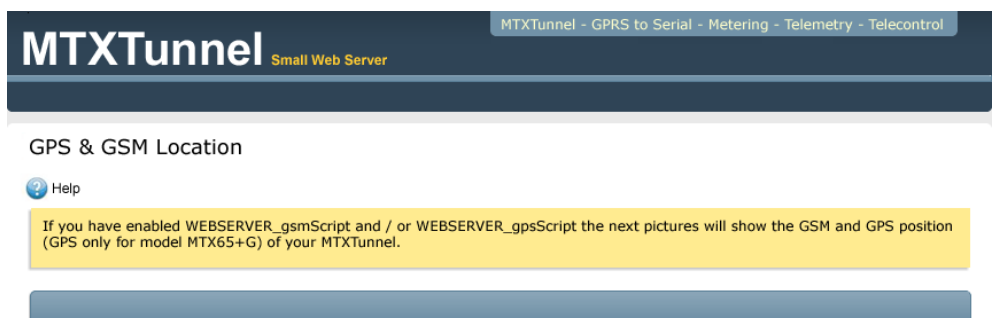
3. - “header2.gif” (858x268). Header in “Settings” page



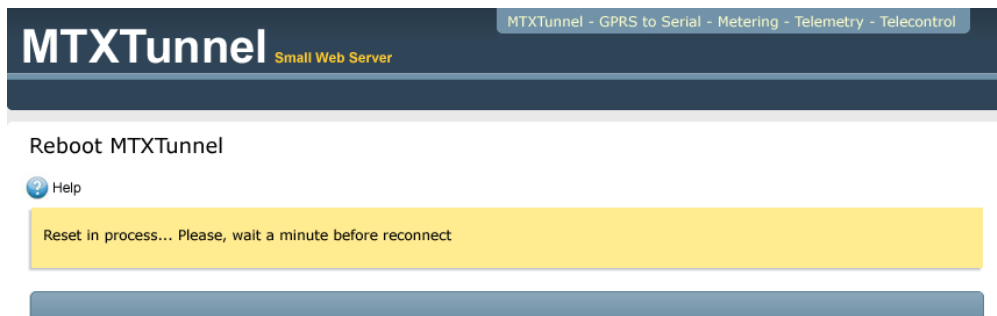
4. - “header3.gif” (858x268). Header in “AT Commands” page



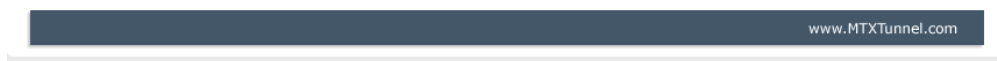
5. - “header4.gif” (858x268). Header in “Map” page



6. - “header5.gif” (858x268). Header in “Reboot” page section



7. - “footer.gif” (858x55). WebServer page footer.



7. - “espera.gif” (32x32). Animated Gif showed when loading pages.



7. - “onButton.gif” (35x42). Small button indicating output level high (activated relay in MTX-IND modem terminal)



8. - “offButton.gif” (35x42). Small button indicating output level low (deactivated relay in MTX-IND modem terminal)



Values.

URL maximum 100 character string

Default value: None

Notes.

- URL link must finish with “/”.
- As an example, URL **not** leading to your own Web server can be:
<http://www.mtxtunnel.com/webserverimg/>

Wakeup configuration parameter: “WAKEUP_”

The previous MTXTunnel V5 version can be used for GPRS-serial tunnel Gateway in the following ways:

1. - 100% active after modem power-up
2. - X minutes active upon demand, after receiving SMS with special text string “mtxtunnel on” or when receiving a missed call from an authorized configured phone number.

From version 5.0 more connection ways features has been added to active MTXTunnel gateway

3. - X minutes MTXTunnel GPRS-serial gateway is active after a change of digital input
4. - X minutes MTXTunnel GPRS-serial gateway is active after out of configured limits of analog input
5. - X minutes MTXTunnel GPRS-serial gateway is active after configured time alarm. 10 alarm times can be configured.

From version 5.0 all tunnelling modes (client or server) can be activated on any of above triggers. On previous versions, it was only possible to have a client mode tunnel (MTX_mode: client) with a permanent connection.

The next pages detail the configuration parameter related to MTXTunnel timing or input activation.

WAKEUP_gpioEnabled

Description.

By enabling this parameter, MTXTunnel GPRS connection will be performed on a digital input change during the configured time. Before this logic level change the GPRS-serial tunnel is not active.

Remember MTXTunnel GPRS connection can also be activated with a special SMS or missed call, both from authorized phone numbers.

Values.

on, off

Default value: off

Notes.

- The wake up digital input used to activate GPRS-RS232 serial tunnel depends on each MTXTerminal with MTXTunnel installed on it.
 1. - MTX65i >> GPIO1 (pin4 DB15 modem connector)
 2. - MTX65ULP >> GPIO1 (pin4 DB15 modem connector)
 3. - MTX65+G >> GPIO5 (pin5 RJ11 modem connector)
 4. - MTX65IND >> GPIO4 (modem pin block number 41)
- If wakeup input changes, MTXTunnel GPRS connection is activated but it will close after reaching `GPRS_timeout` the time configuration value without serial or GPRS traffic data.

WAKEUP_gpioValue

Description.

This value sets the trigger level of digital input to create GPRS tunnel.

Values.

0, 1, 2

Default value: 0

Notes.

- 0 and 1 value trigger digital input level to create GPRS connection.
- As an example, if `WAKEUP_gpioValue` is "1", the digital input has to change from "0" level to "1" level to activate GPRS session connection
- `WAKEUP_gpio Value` "2" means every change, from "0" to "1" and vice versa, activates GPRS session.
-

WAKEUP_adcEnabled

Description.

If enabled, this parameter will activate GPRS MTXTunnel when the analog input level changes.

Remember MTXTunnel GPRS connection can also be activated with a special SMS or missed call, both from authorized phone numbers, or other wakeup ways described in this chapter.

Values.

on, off

Default value: off

Notes.

- All MTX-Terminals modems feature ADC1 as wake-up analog input.
- If wake-up analog input level changes, MTXTunnel GPRS connection is activated, but closes after reaching the `GPRS_timeout` time configuration value without serial or GPRS traffic data.
- Analog input level trigger parameters are `WAKEUP_adcValueMin` and `WAKEUP_adcValueMax`. See next pages.

WAKEUP_adcValueMin

Description.

Minimum ADC1 analog input level trigger activates MTXTunnel GPRS.

Values.

0 ... 2400 (mV)

Default value: 0

Notes.

- MTXTunnel does not take into account the connection time value stored in the `GPRS_timeout` parameter, the GPRS connection will be active if ADC1 level is below the value set in this parameter.

WAKEUP_adcValueMax

Description.

Maximum ADC1 analog input level trigger activates MTXTunnel GPRS.

If ADC1 level exceeds this value, GPRS connection is established.

Values.

0 ... 2400 (mV)

Default value: 2400

Notes.

- MTXTunnel does not take into account the connection time value stored in the `GPRS_timeout` parameter, the GPRS connection will be active if ADC1 level is above the value set in this parameter.

WAKEUP_timeEnabled

Description.

GPRS connections (Serial-GPRS tunnel, WebServer, Telnet services) can be based on time programming. You can specify a total of 10 different timing values.

Values.

on, off

Default value: off

Notes.

- When the time condition matches, GPRS link is established and remains connected until `GPRS_timeout` except if the GPRS or serial data traffic is active or any other wakeup condition is active.
- It is mandatory to use a timing server (for internal RTC Synchronization). Please check `MTX_TPServer` parameter.
- Internal modem timing is UTC (Universal Time Clock). Check the time difference in your country and check if the season affects the hour too. Spain is UTC+1 except in summer when it is UTC+2, so for example UTC 09.00 July is 11.00 h local time.

WAKEUP_time1, WAKEUP_time2, WAKEUP_time10

Description.

These parameters are used to declare the 10 different alarm triggers to activate GPRS-Tunnel and all associated services: serial tunnel, WebServer, Telnet....

Values.

DDHHMM (DD day, HH hour in 24h format and MM minutes)

Default value: None

Notes.

- DD and HH can XX value. This means no day/time will be used in the timer.
- Example 1:
WAKEUP_time1: 012200
(GPRS connection will be performed every 01 (1st) day of the month, at 22.00 h.)
- Example 2:
WAKEUP_time1: 011030
WAKEUP_time2: 151030
(GPRS connection will be performed every 1st and 15th day of month, both at 10:30 h)
- Example 3:
WAKEUP_time1: XX1800
(GPRS connection will be performed every day of the month, at 18:00 h)
- Example 4:
WAKEUP_time1: XX0200
WAKEUP_time2: XX1400
(GPRS connection will be performed every day of the month at 02:00 and at 14:00 h)
- Example 5:
WAKEUP_time1: XXXX00
(GPRS connection will be performed every day of the month, every hour on the hour)

Modem timing format is HOUR UTC

GPRS connection configuration parameters: “GPRS_”

The following parameters are mandatory. They have references to MTXTunnel connection parameters related with the network operator. It depends on the SIM card and provisioned GPRS service. Ask your network operator for further information.

GPRS_apn

Description.

GPRS Access Point Name –APN-

Values.

< 100 characters text string

Default value: movistar.es

Notes.

- Some APN examples :

Movistar Spain (dynamic IP addressing):	movistar.es
Movistar Spain (fixed IP address):	internerestatico.movistar.es
Vodafone Spain (dynamic IP addressing):	airtelnet.es
Vodafone Spain (fixed IP address):	vodafone.es
Orange Spain (dynamic IP address):	internet

- Not all network operators are recommended for MTXTUNNEL applications.
- Some mobile network operators like Orange or other virtual network operators like Simyo or Yoigo use proxies and block incoming data traffic at TCP ports. Therefore MTXTunnel could not be used in server mode (`MTX_mode: server`) and could only be used in client mode, so MTXTunnel would be waiting for incoming connections.
- We found other operators using fixed (or also dynamic IP) addressing in a private range. This means that you have lots of security but you have to create a VPN to allow communication.
- Please do not hesitate to contact MTXterminals support line gsm-support@matrix.es for further information.

GPRS_login

Description.

GPRS connection LOGIN access parameter value. Your network operator will provide you this value.

Values.

Text string < 32 characters

Default value: MOVISTAR

Notes.

- LOGIN examples
- Movistar Spain (dynamic IP addressing): MOVISTAR
- Movistar Spain (fixed IP address): MOVISTAR
- Vodafone Spain (dynamic IP addressing): vodafone
- Vodafone Spain (fixed IP address): vodafone
- Orange Spain (dynamic IP address): CLIENTE

Some mobile network operators use proxies and block incoming data traffic at TCP ports.

GPRS_password

Description.

PASSWORD parameter value for GPRS setting. Ask your network operator to provide you with this value.

Values.

Text string < 32 characters

Default value: MOVISTAR

Notes.

- Some PASSWORD value examples:
- Movistar Spain (dynamic IP addressing): MOVISTAR
- Movistar Spain (fixed IP address): MOVISTAR
- Vodafone Spain (dynamic IP addressing): vodafone
- Vodafone Spain (fixed IP address): vodafone
- Orange Spain (dynamic IP address): AMENA

Some mobile network operators use proxies and block incoming data traffic at TCP ports.

GPRS_timeout

Description.

This parameter sets active GPRS connection time (and associate services –serial tunnel, WebServer, Telnet) it is activated by SMS, missed call, change in a digital or analog input, alarm timing...

Values.

0 ... 100000 (minutes)

Default value: 0

Notes.

- Value=0 will establish a permanent GPRS connection; this means that the modem (and associate services –serial tunnel, WebServer, Telnet) will be connected to the GPRS 100% of the time after power-up. MTXTunnel has intelligent procedures allowing persistent connectivity all the time, therefore it will reconnect after any failure in network signal coverage or power switch down.
- Value>0 specifies the length of time that the GPRS connection is active after activation (from SMS, missed call, change in a digital or analog input, alarm timing...).
- Time value is in minutes for MTX65i, MTX65ULP, and MTX65IND & MTX65IND2 modem platforms.
- Time value is in seconds for MTX65ULP modem model.

GPRS_dns

Description.

Public DNS IP address.

Values.

IP address in format XXX.XXX.XXX.XXX

Default value: 8.8.8.8 (Google DNS)

Notes.

- You should use the DNS parameter if you use names instead of IP addresses in any other parameter like TCP_IP, MTX_TPServer, ...

GPRS_auto

Description.

This parameter will automatically use APN, login and password information from the SIM card.

Values.

on, off

Default value: off

Notes.

- New parameter from version MTXTunnel v5.7
- If this parameter is enabled GPRS_auto “on” MTXTunnel will not take the values of GPRS_apn , GPRS_login & GPRS_password parameters into account.

If you use this feature GPRS_auto “on”, it is necessary to add a new configuration file to MTXTunnel memory called “operators.txt”. This file has the following syntax:

```
IDOperador1,apn,login,password,name[ENTER]  
IDOperador2,apn,login,password,name[ENTER]  
...
```

operators.txt file example

```
21407:movistar.es,MOVISTAR,MOVISTAR,Movistar  
21401:airtelnet.es,vodafone,vodafone,Vodafone  
21403:internet,CLIENTE,AMENA,Orange  
21404:internet,,Yoigo
```

- MTXTunnel gets the network operator (IDOperator variable) from “operator.txt” file and then gets the login and password information from it too.
- This is useful if you do not know which SIM card operator the end customer will use and it also makes it possible to change the SIM card operator without any further configuration or operation.

TCP Configuration parameters: “TCP_”

This important configuration parameter relates to TCP protocol communication in MTXTunnel. They are mandatory when using GPRS TCP – Serial RS232/485 tunnel in client (`MTX_mode: client`) or server mode (`MTX_mode: server`).

TCP_IP

Description.

IP server address MTXTunnel connects if it is client configured (`MTX_mode: client`).

Values.

IP address format XXX.XXX.XXX.XXX or DNS

Default value: None

Notes.

- This parameter is also used if MTXTunnel is configured in server mode (`MTX_mode: server`) and `MTX_temporalClient` enabled (value =”on”). The IP address or DNS name is used by the temporal client to establish connection. Please read `MTX_temporalClient` parameter for more information.

TCP_port

Description.

TCP port value: MTXTunnel used in both modes, client (`MTX_mode: client`) and server mode (`MTX_mode: server`). In server mode, MTXTunnel waits for incoming connection atg specified port.

Values.

1 ... 65535

Default value: 20010

Notes.

- This parameter is also used if MTXTunnel is configured in server mode and `MTX_temporalClient` parameter is enabled (value =”on”). The IP address or DNS name is used by the temporal client to establish connection. Please read `MTX_temporalClient` parameter for more information.

TCP_IP2

Description.

This parameter has only been available since the MTXTunnelv7.8. In the event that the modem is configured as a client (MTX_mode: client) and the connection is permanent (GPRS_timeout: 0), you could specify an IP address in this parameter which allows you to establish a second GPRS-serial gateway.

This means that on one hand you have the first GPRS-serial gateway associated with the modem's COM1 port and on the other hand you have the new GPRS-serial gateway associated with the modem's COM2 port.

Values.

An IP address XXX.XXX.XXX.XXX or a DNS

Default Value: None

Notes.

- This parameter can only be used with modems that have two serial ports. This means that you cannot use it with the MTX65+G models because they only have one serial port.

TCP_port2

Description.

This parameter has only become available since MTXTunnelv7.8. In the event that the modem is configured in client mode (MTX_mode: client), the connection is permanent (GPRS_timeout: 0) and you have specified an IP address in the parameter TCP_IP2, this parameter allows you to choose the port for the TCP connection.

This means that on one hand you have the first GPRS-serial gateway associated with the modem's COM1 port and on the other hand you have the new GPRS-serial gateway associated with the modem's COM2 port.

Values.

1 ... 65535

Default Value: 20010

Notes.

- This parameter can only be used with modems that have two serial ports. This means that you cannot use it with the MTX65+G models because they only have one serial port.

UDP configuration parameter: "UDP_"

These parameters are related to MTXTunnel data communication using the UDP protocol. It is needed the in GPRS (UDP) – Serial (RS232/485) tunnel.

UDP_IP**Description.**

End IP address MTXTunnel sends data in UDP protocol. MTXTunnel needs be set in UDP mode (*MTX_mode: udp*).

Values.

IP address format XXX.XXX.XXX.XXX. DNS text string can be also used.

Default value: None

Notes.

- The use of the UDP communication protocol is only recommended in applications with a large amount of remote devices that need to connect to a server. It will save data traffic but keep in mind that it is not a connection-oriented protocol (**no ACK**)

UDP_localPort**Description.**

Local UDP port used in UDP communication mode (*MTX_mode: udp*).

Values.

1 ... 65535

Default value: 20010

Notes.

- The use of UDP communication protocol is only recommended in applications with a large amount of remote devices that need to connect to a server. It will save data traffic but keep in mind that it is not a connection-oriented protocol (no ACK)

UDP_remotePort

Description.

Remote device UDP port MTXTunnel sends serial data in UDP communication mode (*MTX_mode: udp*).

Values.

1 ... 65535

Default value: 20010

Notes.

- The use of UDP communication protocol is only recommended in applications with a large amount of remote devices that need to connect to a server. It will save data traffic but keep in mind that is not a connection-oriented protocol (no ACK).

ALARM Configuration parameter: “ALARM_”

MTXTunnel can send SMSs when the level of any digital input changes. This can be performed with the GPRS tunnel activated at same time.

ALARM_gpioEnabled

Description.

This parameter will activate this SMS alarm feature when digital input level changes.

Values.

on, off

Default value: off

Notes.

- You MUST use a specific GPIO pin/number depending on which MTX-Terminal platform is using MTX-Tunnel: :
 1. - MTX65i >> GPIO2 (pin11 DB15 modem connector)
 2. - MTX65ULP >> GPIO2 (pin11 DB15 modem connector)
 3. - MTX65+G >> GPIO5 (pin5 DB15 modem connector)
 4. - MTX65IND >> GPIO8 (modem terminal block number 40)
 5. - MTX65IND2 >> GPIO8 (modem terminal block number 40)

ALARM_gpioValue

Description.

Alarm GPIO input level value definition: “0” ó “1”

Values.

0, 1

Default value: 0

Notes.

- Alarm is defined by the change in level value.
- “1” means a transition from “0” to “1”
- “0” means a transition level from “1” to “0”.

ALARM_gpioMessage, ALARM_gpioMessage1

Description.

SMS text sent when alarm occurs. ALARM_gpioMessage is the message sent when the digital input changes from “1” to “0”. ALARM_gpioMessage1 is the message sent when the associated digital input changes from “0” to “1”.

Values.

Up to 160 characters text string length

Default value: “Alarm”

Notes.

- Text string must be less than 160 characters because that is the limit of the length of the SMS text.

ALARM_gpioPause

Description.

This important parameter avoids sending SMSs continuously when the input alarm pin changes.

MTXTunnel will just send one SMS in the specified time value parameter.

Values.

0 ...86400 in minutes (1 day)

Default value: 60 (1 hour)

Notes.

ALARM_smsNumber1, ALARM_smsNumber2, ... , ALARM_smsNumber10

Description.

To specify which phone numbers you want to send the alarm SMS to.

Values.

Phone numbers, national or international numbering scheme.

Default value: None

Notes.

Valid characters are numeric "0" ... "9" and "+" character

FIREWALL configuration parameters: “FIREWALL_”

MTXTunnel by default allows access from any IP address.

If you enable a firewall, your system will be secure as you will avoid unauthorized access. This way, only configured IP (or DNS) addresses can connect and access MTXTunnel and the other services (GPRS serial tunnel, WebServer, Telnet...).

`FIREWALL_enabled`

Description.

Parameter to enable firewall and to enable access only from the configured IP address.

Values.

on, off

Default value: on

Notes.

- This firewall will avoid unauthorized connection with MTXTunnel services, if you need to use the same security access it is mandatory to enable `WEBSERVER_firewall` and `TELNET_firewall` (“on” value).

-

`FIREWALL_IP1, FIREWALL_IP2, ... , FIREWALL_IP10`

Description.

IP authorized addresses (`FIREWALL_enabled`: on).

Values.

IP address XXX.XXX.XXX.XXX string format

Default value: None

Notes.

- Can write up to 10 IP addresses

SMS Configuration parameter: “SMS_”

MTXTunnel has a lot of SMS features. SMSs can be used (sent and received) to configure, report, start/stop any service, etc.

You need to configure the SMS messaging feature with the following parameters:

SMS_sendIP

Description.

MTXTunnel starts the GPRS connection and associate services (tunnel, WebServer, telnet ...) if it receives a missed call or an SMS with “mtxtunnel on” text string. This parameter means that MTXTunnel has to send the obtained IP address in another SMS.

Values.

on, off

Default value: off

Notes.

- If the parameter was already enabled (value “on”) and the GPRS connection was already established, MTXTunnel sends the obtained IP address to the sender.
- Only authorized phones will receive a response if the `SMS_allPhones` parameter is “off”.

SMS_ATEabled

Description.

You can execute an AT command sent in an SMS format from a mobile phone terminal by enabling the following parameter:

Values.

on, off

Default value: off

Notes.

- Use “on” value to enable this feature. The SMS must start with the special string header “MTXTUNNEL AT”
- E.g. If you need to find out remote modem network coverage, send an SMS with `MTXTUNNEL AT+CSQ` text. Do not use “”
- Only authorized mobile phone numbers can execute AT commands using SMS if `SMS_allPhones` parameter is disabled (“off” value)

SMS_ATResponse

Description.

Some SMSs can be sent to perform an operation and you do not need a response (an SMS to be sent back to you). However if you need an SMS response from MTXTunnel execution status, enable this parameter.

Values.

on, off

Default value: off

Notes.

-If you send a command by SMS or RS232/485 (see [SMS_tunnelString](#)) to the end device, MTXTunnel waits for 5 seconds before replying and sending an SMS with the response or error.

SMS_allPhones

Description.

You can enable any configured phone numbers to receive SMS control messages to start the GPRS session (text "`mtxtunnel on`") or you can use a missed (voice) call in order to remotely execute an AT command.

Values.

on, off

Default value: off

Notes.

- "on" value means all end phone numbers are authorized for SMS control.
- "off" value will only allow this feature to work with configured phone numbers. See next parameter to see how to authorize phone numbers.

`SMS_validPhone1, SMS_validPhone2, ... , SMS_validPhone10`

Description.

This parameter is used to allow up to 10 phone numbers to have MTXTunnel SMS control.

`SMS_allPhones` parameter must be “off”

Values.

Numeric phone number, you can use local or international phone numbers.

Default value: None

Notes.

- Valid characters are numeric “0” ... “9” and “+” character.

`SMS_alias1, SMS_alias2, ... , SMS_alias10`

Description.

We have described how to send an AT command to a remote unit via SMS but AT commands are difficult to remember.

For example, the AT command used to change the level of digital output and switch a relay in the MTX-IND terminal modem is `AT^SSIO=0, 0`.

The MTXTunnel is integrated in an end-user party and is able to use an alias like `Rele1on`, this is easier and more convenient as the parameter value is `Rele1on>AT^SISO=0, 0`

Now the SMS text is as easy as `Rele1on`.

You can define up to 10 different alias names.

Values.

64 characters max text string

Default value: None

Notes.

- String must contain special character “>” to separate the alias and the AT command.

SMS_aliasOk

Description.

SMS_AT Response parameter can enable send the AT command response in an out coming SMS. This parameter can change this sometimes difficult to understand response value with this configuration parameter value when AT command is executed successfully.

Values.

100 characters max text string

Default value: None

Notes.

If the command is not executed successfully and an error occurs, use the following configuration parameter to define the alias text.

SMS_aliasError

Description.

You can use this parameter if the execution of an AT command was unsuccessful and there was an error. It is possible to change the error with your own text response string.

Values.

100 characters max text string

Default value: None

Notes.

- If the SMS_aliasError parameter is longer than 0 characters, this parameter will send an SMS response with an AT command error instead of only having the modem's technical result of the AT command error.

SMS_tunnelString

Description.

MTXTunnel features SMS tunnelling to serial COM1. This parameter enables and configures text to be sent directly to the device connected to COM1.

MTX value enables SMS tunnelling. Example “MTX+[space]123456789” SMS text will be interpreted and “123456789” text string will be sent to serial COM.

Values.

16 characters max text string

Default value: None

Notes.

- Space character is used as separator between the `SMS_tunnelString` parameter activation string and the text string to be sent to COM1.
- If `SMS_responseAT` parameter is enabled (value=on), MTXTunnel will wait 5 seconds and an SMS will be sent back with the device response data present at COM1 port.
- This response must be truncated to 160 characters long so it does not exceed the string length.

DynDNS configuration parameter: “DYNDNS_”

MTXTunnel version 5.0 and above include the “DYNDNS_” parameter. They refer to the DynDNS service which allows you to assign a DNS name to a dynamic IP address.

An example DNS: “mymodem.dyndns.org” this will indicate the IP address obtained by the network operator.

MTXTunnel connects with DynDNS server so it can detect and follow any changes in IP address.

You can use the free DynDNS account, please get more information about this service provider at www.dyndns.org

DYNDNS_enabled

Description.

This parameter enables DynDNS in MTXTunnel.

If used, every GPRS connection will refresh the IP address in the DynDNS server, so any change in IP address will be detected.

Values.

on, off

Default value: off

Notes.

- You can open a free account with the DynDNS service at www.dyndns.org
- Only use the DynDNS feature when your SIM is dynamic IP provisioned. It makes no sense using a dynamic IP provisioned SIM if your network operator has fixed IP addressing.
- DynDNS must be used in **incoming** connection requests with MTXTunnel services using socket servers like:
 - o GPRS-Serial RS232 server mode tunnel
 - o WebServer
 - o Telnet
 - o If you are going to use MTXTunnel client connection services, meaning MTXTunnel starts out a connection from a well known IP address, DynDNS service it is not needed and must be disabled (value “off”)

DYNDNS_server

Description.

DynDNS server information.

Values.

128 characters max text string

Default value: None

Notes.

- If you already have an account at www.dyndns.org normally DynDNS value is something like: *members.dyndns.org*

DYNDNS_hostname

Description.

DNS name of your account with your DynDNS service provider.

Values.

128 characters max. text string

Default value: None

Notes.

- Example

MiModem.dyndns.org

DYNDNS_login

Description.

Login of your DynDNS account

Values.

32 characters maximum text string

Default value: None

Notes.

DYNDNS_password

Description.

Your DynDNS account password

Values.

32 characters maximum text string

Default value: None

Notes.

DYNDNS_period

Description.

DNS information data string is sent if the MTXTunnel IP address changes, but you can also define it to send this information periodically. Therefore this gives you a more reliable indication as to whether the IP address has changed.

Values.

0, 30 ... 2592000 (in seconds)

Default value: 0

Notes

- DynDNS will not be checked/upgraded as the value="0", but it will still be aware when IP address changes.
- Parameter value is in seconds.
- It is recommended to use this parameter in some situations:
 - o Let's suppose the DynDNS server fails or hangs up and the modem IP address changes, the MTXTunnel will upgrade DynDNS even if the IP address has not changed.

DNS Parameter configuration: “DNS_”

In the previous section about DynDNS we explained how and why we use it in case a few remote modem SIMs have dynamic IP addresses. If you plan to use and control a large number of devices, this is not practical. It is not reliable because it depends on the third-party server and servers who charge to use it.

You can use your own server to collect all IP address changes that MTXTunnel obtains.

With the above parameters you can configure the DNS services so that you can use them in your own server. With MTXTunnel installed, you can have full control over all modems sending the IP address changes so your server can resolve and translate them to their alias name.

DNS_enabled

Description.

Enable DNS service using your own server. Every time the modem starts a GPRS connection or changes the IP address it's sent to your configured server.

Values.

on, off

Default value: off

Notes.

- Only use the DynDNS feature when your SIM is dynamic IP provisioned. It makes no sense using a dynamic IP provisioned SIM if your network operator has fixed IP addressing.
- DynDNS must be used in **incoming** connection requests with MTXTunnel services using socket servers like :
 - o GPRS-Serial RS232 server mode tunnel
 - o WebServer
 - o Telnet
 - o If you are going to use MTXTunnel client connection services, meaning that the MTXTunnel starts a connection from a well known IP address, DynDNS service it is not needed and must be disabled (value “off”)

DNS_mode

Description.

MTXTunnel mode, in which MTXTunnel sends the IP address change to a server, can use a TCP socket or HTTP protocol for web server.

Values.

socket, http, remoteat

Default value: socket

Notes.

- If you are going to write your own code/application, use “socket” option.
- If you already have a web server and the code is written in ASP or PHP, we recommend that you use the “http” option.
- For the remoteat value, consult the example in Annex 2.16

DNS_password

Description.

You can secure this service by setting up a password. MTXTunnel will send the [DNS_password](#) in any new GPRS connection or if there are any IP address changes and your server will have to check the password.

Values.

Up to 64 text string characters

Default value: None

Notes.

- [DNS_password](#) is sent using either “socket” or “http” transmission mode.

DNS_server

Description.

Socket mode: (`DNS_mode: socket`) value is DNS or IP server address.

HTTP mode: (`DNS_mode: http`) value is URL (domain + web page) of WebServer to which you will pass on information about the new IP address.

Values.

Text string less than 255 characters

Default value: None

Notes.

In HTTP mode "`DNS_mode: http`", `DNS_server` URL does not include "http://" string.

DNS example URL: `www.mtxtunnel.com/dns.asp`

- In Socket mode, MTXTunnel sends the following string to the server:

```
#IMEI#DNS_password#IPPublica#
```

- In HTTP mode, MTXTunnel sends the following string to server:

```
URL?IMEI=<suIMEI>&PASS=<DNS_password>&IP=<IP Public>
```

If you program web pages in ASP, you can collect the information using this method as an example:

```
<%  
IMEI=Request.QueryString("IMEI")  
Password=Request.QueryString("PASS")  
IP=Request.QueryString("IP")  
%>
```

DNS_port

Description.

TCP DNS server port being used in DNS socket mode (`DNS_mode: socket`)

Values.

1 ... 65535

Default value: 20011

Notes.

- Only use this parameter if the mode used is "socket".
 - o If you use the "http" mode, the standard port is 80. However if you use another one, you need to include it in the `DNS_server` parameter.
 - o E.g. if you are going to use port 20011, `DNS_server` value parameter is: `www.mtxtunnel.com:20011/dns.asp`

DNS_extended

Description.

If enabled, and only if the DNS service is enabled too (`DNS_enabled: on`), MTXTunnel will send the password and IP address information together with the IMEI and more information like the GPIO status. This is useful in telemetry applications.

Values.

on, off

Default value: off

Notes.

- `DNS_extended` “on”, `DNS_mode` set as “socket”, the information sent to the server is:

```
#IMEI#DNS_password#IPPublica#gpio1#gpio2#gpio3#gpio4#gpio5#gpio6#gpio7#
gpio8#gpio9#gpio10#ADC1#ADC2#<gpsLocation>#
```

Blue colour shows additional extended information.

gpioX is input/output X value (0 -1)

ADCX is analog to digital converter X value

Only in the MTX65+G terminal modem with GPS receiver, the GPS location (orange string) information is added (orange colour).

- `DNS_extended` “on”, `DNS_mode` set as “http”, the information sent to the server is:

```
URL?IMEI=<suIMEI>&PASS=<DNS_password>&IP=<IP Public> &GPIO1=X &GPIO2=X
&GPIO3=X &GPIO4=X &GPIO5=X &GPIO6=X &GPIO7=X &GPIO8=X &GPIO9=X
&GPIO10=X &ADC1=X&ADC2=X&GPS=<gpsLocation>
```

Blue colour shows additional extended information.

- o gpioX is input/output X value (0 -1)
- o ADCX is analog to digital converter X value

Only in the MTX65+G terminal modem with GPS receiver, the GPS location (orange string) information is added (orange colour).

DNS_gpios

Description.

When this parameter is enabled it can send DNS information (which can include GPIO and ADC values if `DNS_extended` = “on”) only when there is a level change in a digital input.

Values.

on, off

Default value: off

Notes.

- MTXTunnel sends just one data DNS information string if there has been just one or several change/s in digital inputs.
- Parameter available from version MTXTunnel v5.3

DNS_adc1, DNS_adc2

Description.

This parameter, if enabled, can send DNS information (which can include GPIO and ADC values if `DNS_extended` = “on”) only when the analog input is above or below trigger value.

Values.

0, 250 ... 2150 Trigger value in miliVolts

Default value: 0

Notes

- . 0 value disables this feature, DNS string will be not sent.
- `DNS_adcX >=250` sets trigger analog value above or below $\pm 250\text{mV}$, if it exceeds this value a DNS frame string will be sent..

 `DNS_adc1: 1200` means `DNS_adc1 > 1200mV + 250mV` text DNS string will be sent, and also when `DNS_adc2 < 1200mV - 250mV`
- Parameter available from MTXTunnel v5.3

DNS_period

Description.

DNS information data string is sent whenever the MTXTunnel IP address changes, but you can also define it to send the IP address periodically. This is useful for a more secure indication in IP address changes and it establishes timing periods by sending telemetries data if `DNS_extended` parameter is enabled (value "on").

Values.

0, 30 ... 2592000

Default value: 0

Notes

- Value=0 means DNS information is not sent periodically.
- Value of time is in seconds.

ULP Configuration parameter: “ULP_”

“ULP_” configuration parameter is only related to MTXTunnel installed on the MTX65ULP terminal modem. ULP means Ultra Low Power mode in which power consumption is only 2uA. In this mode, the modem remains on standby waiting for a configured alarm or a change in the level of digital input. Then all GPRS tunnels and services are established and after a different configured time, it will switch off returning to ULP mode.

If your application needs low power consumption please read the following configuration parameters:

ULP_mode

Description.

MTXTunnel default mode on MTXULP with the GPRS tunnel and TCP/UDP services:

There is another mode which saves even more power called SMS mode in which MTXTunnel wakes up to read digital and analog inputs and sends their values in an SMS text. After this, MTXTunnel returns to a low power mode again. This saves more power compared to GPRS connection tunnelling.

Values.

gprs, sms

Default value: gprs

Notes.

SMS mode (ULP_mode: sms) you must use the “ULP_sleepMode: minutes” configuration parameter.

It is not possible to set a time for the modem to wake up from the ULP mode but it is only possible to specify a time for it to sleep. This is because “ULP_sleepMode: date” needs a GPRS connection for time synchronization and it can only connect during normal wakeup mode.

- SMS text string has following format string:

`MTX_IDClient#GPIO1#GPIO2# ... #GPIO10#ADC1#ADC2#`

Orange colour marked shows optional text indicating telemetries values: GPIOx are digital input/outputs, ADCx are analog inputs. Those are only sent if ULP_smsExtended parameter is enabled (value “on”).

ULP_sleepMode

Description.

ULP sleep mode

“minutes” configuration value

MTXTunnel wakes up and connects to GPRS enabling services (Serial tunnel, WebServer, Telnet...). Those services will remain open until GPRS traffic stops waiting for GPRS_timeout timing and then MTXT tunnel can return to ULP mode. It will remain in this mode until X (ULP_minutes parameter) matches.

“date” configuration value

MTXTunnel wakes up and connects to GPRS enabling services (Serial tunnel, WebServer, Telnet...). Those services will remain open until GPRS traffic stops waiting for GPRS_timeout timing and then MTXT tunnel can return to ULP mode. It will remain in this mode until any hour of the configured parameter (ULP_time1. ULP_time2, ... ULP_time10) matches.

- GPRS_timeout are in seconds, not minutes like other scenarios.

Values.

minutes, date

Default value: minutes

Notes.

If you are going to use date **mode** you MUST synchronize the internal timing with the server timing using the MTX_TPServer parameter. The modem will connect with the server's time and upgrade its internal timing every time it wakes up. MTXTunnel uses UTC timing.

ULP_minutes

Description.

This parameter has the timing value of minutes in which modem is ULP if ULP_rtc="on" (enabled). After those minutes, the modem switches to normal mode

Values.

0 ... 43200

Default value: 0

Notes.

- If modem is in ULP sms mode (ULP_mode: "sms") using no RTC (ULP_rtc: "off"), the ULP modem is asleep until input level changes, then ULP_minutes>0 enables the modem to wake up at this specific minute and retry sending the SMS if normal mode has failed.

`ULP_time1, ULP_time2, ... , ULP_time10`

Description.

Up to 10 different alarm times to wake up MTXTunnel from ULP mode (2uA) and activate GPRS session.

GPRS session will be active during GPRS_timeout second time value.

Values.

DDHHMM (DD: day, HH hour in 24h format & MM (minutes))

Default value: None

Notes.

- DD and HH values can be XX, meaning any value.

Examples

ULP_time1: 012200

MTXTunnel wakes up (changes from ULP to normal mode) every 1st day of the month at 22:00 h)

ULP_time1: 011030

ULP_time2: 151030

MTXTunnel wakes up every 1st and 15th day of the month, at 10:30 h

ULP_time1: XX1800

MTXTunnel wakes up every 1st day of the month, at 18:00 h

ULP_time1: XX0200

ULP_time2: XX1400

MTXTunnel wakes up from ULP to normal mode every day of the month, at 02.00 and 14.00 h.

ULP_time1: XXXX00

MTXTunnel wakes up from ULP mode, every day of the current month and every hour on the hour.

- Modem time uses **UTC HOUR**, check differences with local time.

ULP_smsExtended

Description.

If disabled (value “off”) and ULP mode is SMS (ULP_mode: sms) text, SMS string is specified with `MTX_IDClient` parameter.

If enabled (value “on”), SMS string will have extended telemetry specified in `ULP_mode` parameter.

Values.

on, off

Default value: on

Notes.

- Sometimes you just need to send the “`MTX_IDClient`” value parameter and not the GPIOs values as this saves power.
- For example when the digital tamper input changes, the SMS text will not include any value just the “Input change”.

ULP_smsNumber1, ULP_smsNumber2, ULP_smsNumber3

Description.

This parameter sets the telephone numbers to send SMSs to with GPIO and ADC values when ULP mode is SMS: ULP_mode: sms

You can use up to 3 phone numbers.

Values.

National or international phone numbers are valid.

Default value: None

Notes.

ULP_rtc

Description.

This parameter configures the way to wake up the MTX65ULP modem.

Timing alarm: MTXTunnel wakes up when alarm timing occurs. Internal RTC is used.

Interruption digital input (tamper): MTX65ULP modem wakes up when a special digital trigger input is activated.

Values.

on, off

Default value: on

Notes.

- Using MTX65ULP with the RTC disabled leaves only the digital input wakeup trigger which is the lowest power mode on MTXTunnel.

LOGGER configuration parameters: “LOGGER_”

LOGGER_ prefix parameter relates to MTX internal datalogger features.

MTX internal datalogger must be used when it is installed on MTX-IND and MTX-IND-V2 terminal modems with a Wavocard inside. This RF module can read Wavenis remote sensors (temperature, pulses...). Datalogger will store all this data to memory.

Datalogger has to be enabled when reading ModBus equipment connected to serial port.

Datalogger can be used to store readings and status of inputs/outputs.

LOGGER_enabled

Description.

Enable internal MTXTunnel datalogger. It will store RF cards –Wavenis cards- readings, input/output value/status and Modbus data in memory and sends it to http server using GET via JSON object.

Values.

on, off

Default value: off

Notes.

- See [Anex5](#) for more information and examples of scenarios. Please use the account support line at gsm-support@matrix.es for further information.

LOGGER_password

Description.

This parameter can set a user password string that can be used in every JSON object frame that goes to the end server.

Values.

64 max characters text string

Default value: None

Notes.

- See [Anex5](#) for more information and examples of scenarios. Please use the account support line at gsm-support@matrix.es for further information.

LOGGER_server

Description.

This parameter sets the server's URL datalogger and sends its saved data using JSON object char.

Values.

256 max text character string

Default value: None

Notes.

- URL example
 - o www.midominio.com/set.asp?V=
 - V is the variable used to send JSON information to server
- See [Anex5](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

LOGGER_registerSize

Description.

This parameter sets the register size of the non volatile Flash internal datalogger for JSON objects.

E.g. If using a remote Wavetherm temperature sensor, the reading will be stored in the memory in a JSON format:

```
{"IMEI":357973041110401,"TS":"18/10/12  
10:04:37","P":"matrix","A":0B19083000D3,"BAT":0,"T1":23.4375,"T2":0.  
0 }
```

Parameter value should be at least the maximum frame length that a JSON frame has.

In the above example it would be be 110. If you do not know what it could be, use 300 as the value.

Values.

10 ... 1024

Default value: 100

Notes.

- See [Anex5](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

LOGGER_ioPeriod

Description.

Period time datalogger takes readings from digital and analog inputs, stores them to memory and after they are sent to server using JSON object.

Values.

0 (disable)
30 ... 2592000

Default value: 0

Notes.

- See [2.14 scenario examples](#) for more information. Please use the technical support line at gsm-support@matrix.es for any further questions.

MODBUS configuration parameter: “MODBUS_”

MODBUS_ parameter can configure MTXTunnel to take modbus RTU device readings. The Modbus RTU device is connected to a serial port on the modem of MTX Terminals and the internal registers are read.

It is also possible to read and write modbus variables with AT^MTXTUNNEL=GETMODBUS and AT^MTXTUNNEL=SETMODBUS commands.

MODBUS_address

Description.

ModBus RTU address parameter specification.

Values.

1 ... 255

Default value: 1

Notes.

- See [Anex6](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

-

MODBUS_start

Description.

This parameter indicates the first position to read from the Modbus register table.

Values.

1 ... 65535

Default value: 1

Notes.

- MTXTunnel use 2 bytes (Word type) variable data. Different sized data need further operations to send JSON object data to your server.
- See [Anex6](#) for more information and examples of scenarios. Please use technical support line at gsm-support@matrix.es for further information.

MODBUS_numWords

Description.

Number of registers to be read from ModBus device in address indicated by MODBUS_start parameter

Values.

1 ... 20

Default value: 1

Notes.

- This parameter is linked together with LOGGER_registerSize, so take the time to adjust it too.
- See [Anex6](#) for more information and scenario examples. Please use technical support line at gsm-support@matrix.es for further information.
-

MODBUS_period

Description.

This parameter shows after how many seconds the MTXTunnel must get the ModBus device to read its memory.

Values.

30 ... 2592000 seconds (from 30 seconds up to 30 days)

Default value: 900 (15 minutes)

Notes

- See [Anex6](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

MODBUS_onlyChanges

Description.

This parameter allows you to decide whether to send all readings from a Modbus device (set to “off”) or only send a message when there is a change in at least one of the readings (set to “on”).

Values.

on, off

Default Value: off

(All readings are sent)

Notes..

- See [Anex6](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

WAVENIS configuration parameter: “WAVENIS_”

WAVENIS_ prefix parameter relates to MTXTunnel featured with a Coronis card for concentrator applications: it reads and controls remote sensors to MTXTerminals using a RF 868 MHz radio link.

The central or concentrator modem must be the MTX65IND or the new recommended MTX65IND-V2 terminal modem with a Wavecard installed inside.

Please also read “LOGGER_” related parameters.

WAVENIS_mac1, WAVENIS_mac2, ... WAVENIS_mac32

Description.

This parameter allows the Coronis device's MAC addresses to be read. MTX will periodically read the remote devices specified by their own MAC identification.

You need to specify the repeaters if you are going to use them.

Values.

AABBCCDDEEFF; XX; YY; ZZ

AABBCCDDEEFF: MAC wavenis Coronis card

XX; YY; ZZ: 1, 2, ... 10 repeaters used

Default value: None

Notes.

- See [Anex5](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

WAVENIS_rep1, WAVENIS_rep2, ... WAVENIS_rep10

Description.

Repeater MAC address is used in Wavenis communications. You can use up to 10 repeaters.

Values.

AABBCCDDEEFF Wavenis MAC repeater address

Default value: None

Notes.

- See [Anex5](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

WAVENIS_period

Description.

This parameter sets the time period in seconds. MTXTunnel reads the Coronis devices already configured in the [WAVENIS_macXX](#) parameter.

Values.

0, ... 2592000

Default value: 0

Notes.

- Keep in mind that a single remote RF device reading can take from 2.5 seconds up to 10 seconds if repeaters are used. For example if MTXTunnel has to read 10 remote sensor RF cards, the device readings can take from 25 up to 100 seconds if no error communication occurs. Please use this parameter in an appropriate way.
- We recommend the minimum value of 30 seconds if only one Coronis card is used.
- Readings are stored in MTXTunnel internal Logger memory. Read [Logger_](#) parameters for more information.

See [Anex5](#) for more information and examples of scenarios. Please use the technical support line at gsm-support@matrix.es for further information.

WAVENIS_retries

Description.

The amount of times that you retry obtaining a reading in case an error occurs with MTXTunnel and its communication link to the remote Coronis card.

Values.

0,1,2,3

Default value: 2

Notes.

- We recommend setting the value to 2. This means that 2 retries will be done in case an error occurs on the 1st reading.
- See [Anex5](#) for more information and examples of scenario. Please use the technical support line at gsm-support@matrix.es for further information.

CSD: “CSD_” Configuration Parameters

The parameter with the prefix “CSD_” are related to MTXTunnel configurations for telemetry scenarios for conventional GSM data calls.

MTXTunnel allows you to receive GSM data calls (CSD) in order to create a GSM-serial gateway. It also allows you to use both at the same time, giving priority the GSM calls. This function is ideal for reading meters where you must be able to connect to an electrical meter through a GSM call and via GPRS to obtain continuous readings or readings in real time. Examples of typical energy operators are Endesa, Iberdrola etc.

CSD_enabled

Description.

This allows you to either enable or disable GSM data calls. If you set this parameter to “on”, the modem will answer GSM data calls after the first ring, establishing a GSM-serial gateway. If at any point the modem answers a GSM data call when a GPRS-serial gateway was already established, the GPRS-serial gateway is “frozen” to make way for the GSM-serial gateway. Once the GSM call is over, the GPRS-serial gateway is re-connects and returns to its previous state.

Values.

on, off

Default Value: off

Notes.

Look at the examples in Annex 7.1 and 7.2 for a better understanding of this parameter. Use the helpline gsm-support@matrix.es if you need any extra help.

9. -ANNEX. SCENARIOS AND CONFIGURATION EXAMPLES

Annex 1.

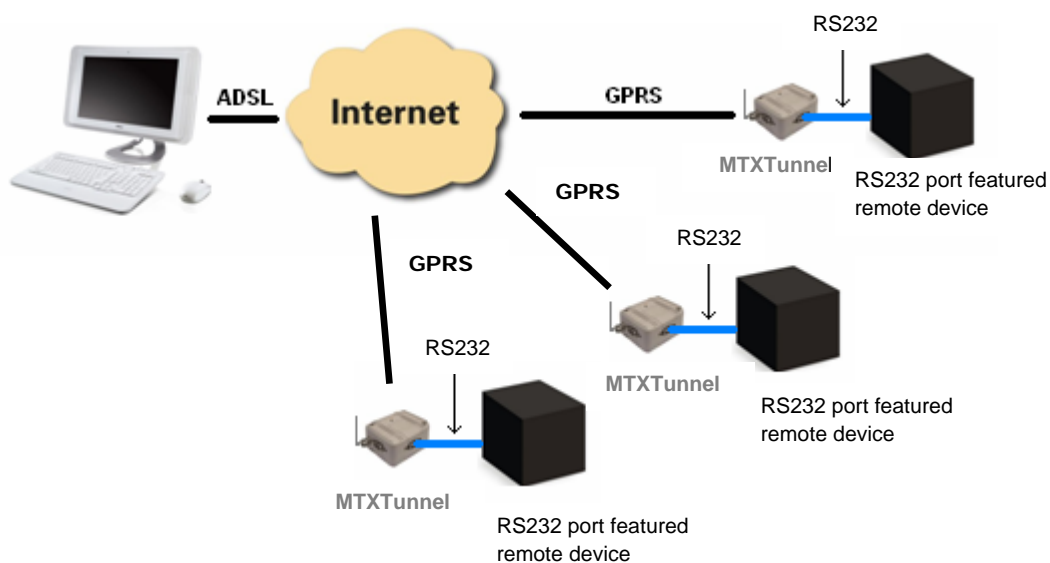
Basic scenarios. Configuration examples.

BASIC SCENARIOS. EXAMPLE 1.1. Basic Serial-GPRS tunnel.**9.1.1. MTXTunnel is configured as TCP/IP server and permanently connected to GPRS. Network operator fixed IP addresses are used.****Scenario details:**

- There are 3 RS232 remote devices, configured as 115200, 8, N, 1 and hardware flow control. We need to control and monitor from a central server –PC with internet connection-.
- You can access them at any time. Therefore, the modem connected to the remote devices must be permanently connected to GPRS. So the modem is configured as a server waiting for an input connection request in TCP port number 20010.
- We will use fixed IP address network operator SIM cards.

Solution.

MTX65i modem + MTXTunnel V7 software

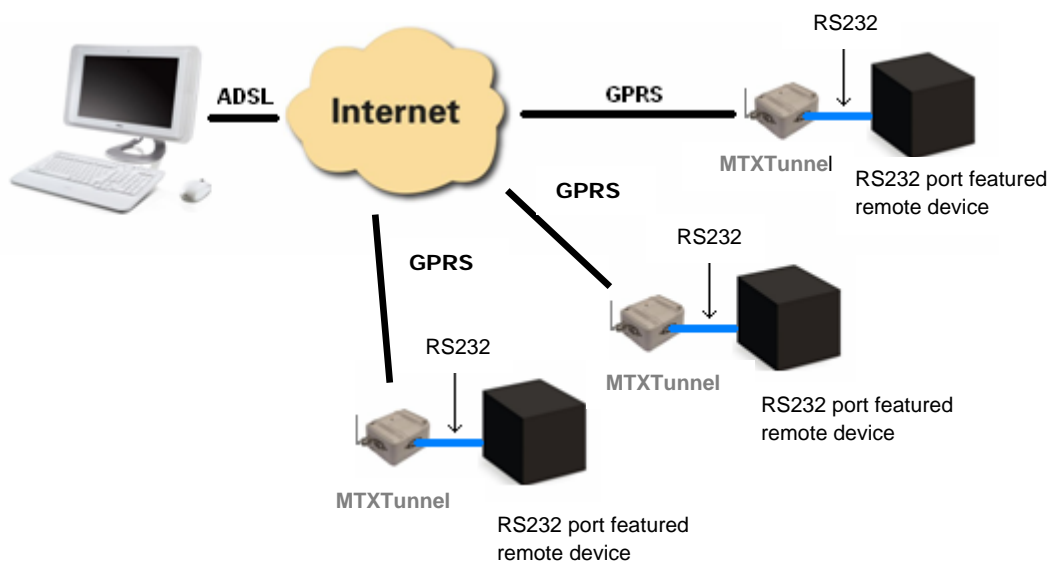


Config.txt configuration file:

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: internetestatico.movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected
MTX_PIN: 0000	If SIM card doesn't have PIN security, use 0000
MTX_model: MTX65i	MTX-Terminal modem model used
MTX_mode: server	TCP server mode
MTX_urc: off	We don't need the URC information messages
TCP_port: 20010	TCP port used.
FIREWALL_enabled: off	Firewall disabled: Any incoming connection from any IP address is allowed

BASIC SCENARIOS. EXAMPLE 1.2. Basic Serial-GPRS tunnel.**9.1.2. MTXTunnel configured as TCP/IP server and occasionally connected to GPRS. Network operator dynamic IP addresses are used.****Scenario details:**

- There are 3 RS232 remote devices, configured as a 9600, 8, N, 1 and no flow control. We need to control and monitor from a central server –PC with internet connection-.
- You need to access them occasionally with a remote control. Therefore the modem connected to remote devices doesn't need to be permanently connected to the GPRS. The modem will only connect to the GPRS when it receives a missed call an SMS with the text string "on" from any phone number. Then, the modem will connect to the GPRS waiting for a input connection request in TCP port number 20010.
- We will use dynamic IP address network operator SIM cards.

Solution.**MTX65i modem + MTXTunnel V7 software**

Config.txt configuration file:

COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: off	CTS flow control disabled
COMM_autorts: off	RTS flow control disabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 10	Modem remain connected to GPRS for 10 minutes if there is no serial data traffic
MTX_PIN: 0000	If SIM card has no PIN security, use 0000
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: server	TCP server mode
MTX_urc: off	URC messages will be not output
TCP_port: 20010	TCP port used.
FIREWALL_enabled: off	Firewall disabled: Any incoming connection form any IP address is allowed
SMS_allPhones: on	All phone numbers are authorized
SMS_sendIP: on	IP address will be sent to remote phone which has made missed call or "on" text
SMS	

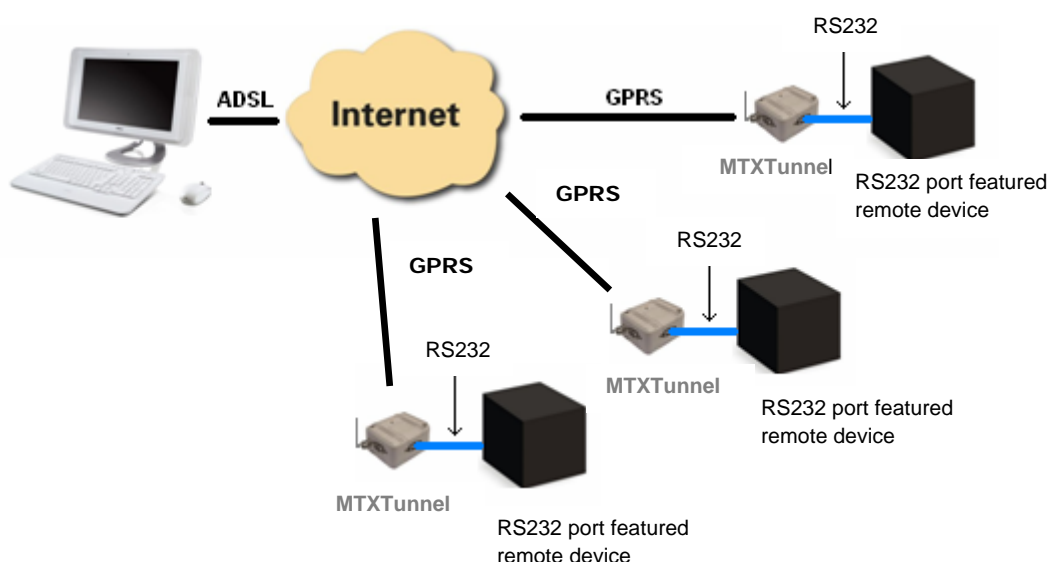
Details.

- "GPRS_timeout: 10" This parameter makes the GPRS connection activate after the missed call or incoming SMS with "on" text string but stop 10 minutes after data has been transferred and if there is no GPRS-serial data traffic.

As an example, if the data is transferred in 30 minutes then the connection will be closed after another 10 minutes, giving a total of 40 minutes.

BASIC SCENARIOS. EXAMPLE 1.3. Basic Serial-GPRS tunnel.**9.1.3. MTXTunnel configured as TCP/IP server and occasionally connected to GPRS. Dynamic IP addressing. Firewall and authorized phone numbers active.****Scenario details:**

- There are 3 RS232 remote devices, configured as a 9600, 8, N, 1 and no flow control. We need to control and monitor from a central server –PC with internet connection- using the GPRS-Serial tunnel gateway.
- You need to access them occasionally with a remote control, so the modem connected to the remote devices doesn't need to be permanently connected to the GPRS.
- Modem will connect to the GPRS for 10 minutes, but only after receiving a missed call or an SMS with the text string "on" from any phone number. The modem responds to same phone number with an SMS detailing the IP address obtained from the network.
- Then, the modem will connect to the GPRS waiting for an input connection request in TCP port number 20010
- We will use dynamic IP address, network operator SIM cards.
- For more security, modems will only respond to incoming missed calls or special SMSs from authorized phone numbers. They are 666123456 and 666123457. Another security feature is that MTXTunnel's modem will only accept an incoming connection from a specific IP address. For example in this case: 200.101.102.103

Solution.**MTX65i modem + MTXTunnel V7 software****Config.txt configuration file:**

COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: off	CTS flow control disabled
COMM_autorts: off	RTS flow control disabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 10	Modem remains connected to GPRS for 10 minutes if there is no serial data traffic
MTX_PIN: 0000	If SIM card has no PIN security, use 0000
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: server	TCP server mode
MTX_urc: off	URC messages will be not output
TCP_port: 20010	TCP port used.
FIREWALL_enabled: on	Firewall is enabled to only accept connections from authorized IP addresses
FIREWALL_IP1: 200.101.102.103	Authorized IP address to access MTXTunnel
SMS_allPhones: off	all phone numbers are forbidden
SMS_sendIP: on	IP address will be sent to remote phone which has made a missed call or "on" text
SMS	
SMS_validPhone1: 666123456	Authorized phone number 1
SMS_validPhone2: 666123457	Authorized phone number 2

Details.

- **GPRS_timeout: 10** This parameter makes the GPRS connection activate after the missed call or incoming SMS with "on" text string but stop 10 minutes after data has been transferred and if there is no GPRS-serial data traffic.

As an example, if the data is transferred in 30 minutes then the connection will be closed after another 10 minutes, giving a total of 40 minutes.

Config.txt configuration file:

COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: off	CTS flow control disabled
COMM_autorts: off	RTS flow control disabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	DNS server IP address
GPRS_timeout: 0	GPRS is permanently connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: client	TCP client mode
MTX_IDClient: equipoX	MTXTunnel identifier, X value is different in each modem.
MTX_urc: off	URC messages will be not sent
TCP_IP: oficina.midominio.com	Server IP address or DNS information
TCP_port: 20010	Server TCP port for connection

Annex 2.

Advanced scenarios. Configuration examples.

Complex scenarios. Example 2.1

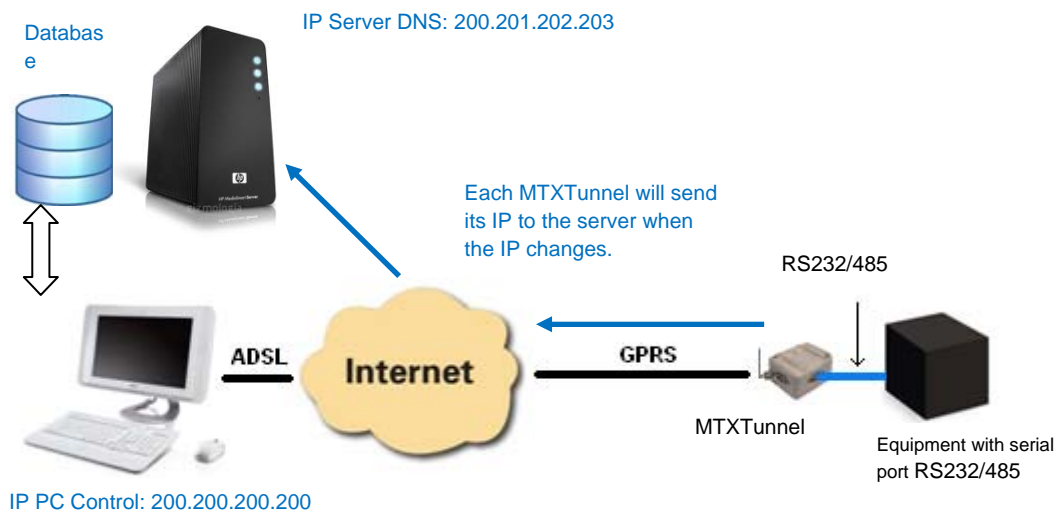
9.2.1. Advanced Serial-GPRS Tunnel – Setting up the MTX Tunnel as permanently connected and TCP/IP Server configured to send the IP by socket to a private DNS server.

Scenario details:

- We need to monitor 100 devices with the RS232 port (115200.8.N.1 and HW flow control) from a central control station using a GPRS link. This will be done with the MTXTunnel to acting as a transparent serial GPRS tunnel.
- It is mandatory to be able to access the RS232 remote devices at any time. So the modem connected to the serial port device (which needs to be controlled) must remain permanently connected to the GPRS, waiting for a connection. Access to the modems must only be allowed for the IP coming from the PC Control (200.200.200.200) and also for a backup IP coming from the central office ADSL line, whose IP is: 200.200.200.201
- In order to reduce costs, SIM cards use dynamic IP addressing. As we have a large number of modems, we will not use the DynDNS. Instead every time the MTX Tunnel will send the IP that it has assigned (this is assigned by the GSM operator) to a control centre. Every time a modem changes an IP address, the modem must send the new IP to the control centre in order to report the change (IP 200.201.202.203 and port TCP 20000). This way it always allows the PC control centre to know the current IP of each modem.

Solution:

MTX65i modem + MTXTunnel V7 software (GPRS-RS232 gateway)



Config.txt configuration file:

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 0	Value 0 means MTXTunnel is GPRS always connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: server	TCP server mode
MTX_urc: off	URC messages will not be sent.
TCP_port: 20010	TCP port used.
FIREWALL_enabled: on	Firewall is enabled so it only accepts connections from authorized IP addresses
FIREWALL_IP1: 200.200.200.200	This IP address can only connect to remote modem
FIREWALL_IP2: 200.200.200.201	This IP address can only connect to remote modem
DNS_enabled: on	DNS service enabled
DNS_mode: socket	DNS server information sent via socket type
DNS_password: 12345678	Password string sent in DNS communication
DNS_server: 200.201.202.203	DNS server IP address
DNS_port: 20000	DNS server TCP port open
DNS_extended: off	GPIO and ADC values extra information is not sent

Complex scenarios. Example 2.2

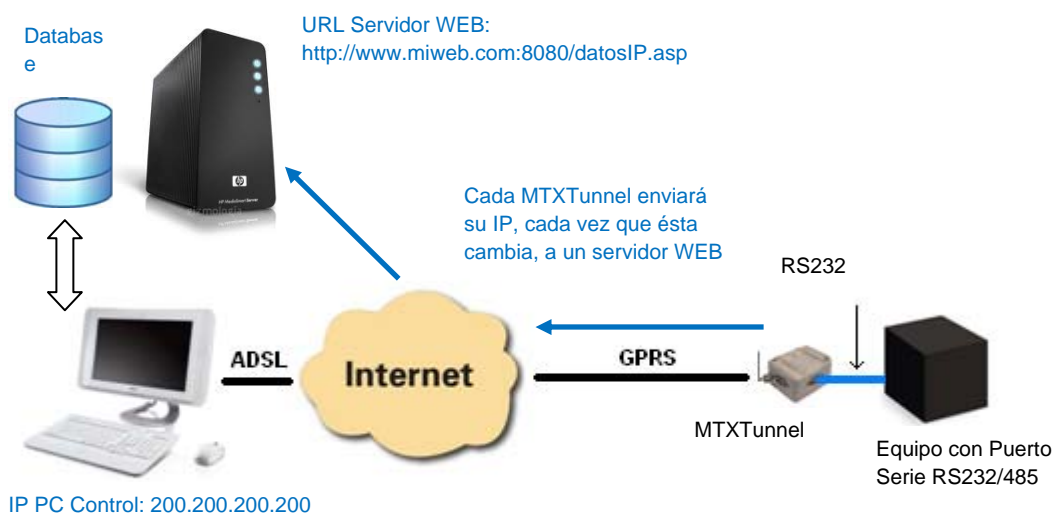
9.2.2. Setting up the MTX Tunnel as permanently connected TCP/IP Server and configured to send the IP address to a web server by HTTP

Scenario details:

- We need to monitor 100 devices with RS232 port (115200.8.N.1 and HW flow control) from a central control station using a GPRS link. This will be done using the MTXTunnel acting as a transparent serial GPRS tunnel.
- It is mandatory to be able to access the RS232 remote devices at any time, so the modem connected to the serial port device (which needs to be controlled) must remain permanently connected to GPRS waiting for a connection. Access to the modems must only be allowed for the IP coming from the PC Control (200.200.200.200) and also for a backup IP coming from the central office ADSL line, whose IP is: 200.200.200.201
- In order to reduce costs, SIM cards will use dynamic IP addressing. As we have a large number of modems, we will not use the DynDNS. So MTX Tunnel will send the IP every time that it has assigned one to a WEB server by HTTP (the IP address value assigned by the GSM operator). Every time a modem changes the IP address, the modem must send the new IP address value to the control centre (with URL <http://www.miweb.com/datosIP.asp> and port 8080). This way the external WebServer will store the IP in a SQL server database so the PC control centre has access to the devices at all times.

Solution:

MTX65i modem + MTXTunnel V7 software (GPRS-RS232 gateway)



Config.txt configuration file:

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 0	Value 0 means MTXTunnel is GPRS always connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: server	TCP server mode
MTX_urc: off	URC messages will not be sent
TCP_port: 20010	TCP port used.
FIREWALL_enabled: on	Firewall is enabled to only accept connections from authorized IP addresses
FIREWALL_IP1: 200.200.200.200	This IP address can only connect to remote modem
FIREWALL_IP2: 200.200.200.201	This IP address can only connect to remote modem
DNS_enabled: on	DNS service enabled
DNS_mode: http	GPRS IP address sent using HTTP GET
DNS_password: 12345678	Password string sent in DNS communication
DNS_server: www.miweb.com:8080/datosIP.asp	DNS server URL
DNS_extended: off	GPIO and ADC values extra information is not sent

Details.

1. - Bear in mind that when using HTTP, in case you use a TCP port different to the standard HTTP (TCP 80), the port must be included in the parameter "DNS_server" and not in "DNS_port" .
2. - Each time MTXTunnel changes the IP address, it will connect through and use the following URL:

<http://www.miweb.com:8080/datosIP.asp?IMEI=<suIMEI>&PASS=12345678&IP=<IP Public>>

The web server will receive the parameters sent by the MTXTunnel and store the IP address in a database. You can collect the parameters from the ASP page by inserting this example code: "datosIP.asp".

```
<%
  IMEI=Request.QueryString ("IMEI")
  Password=Request.QueryString ("PASS")
  IP=Request.QueryString ("IP")
%>
```

Complex scenarios. Example 2.3

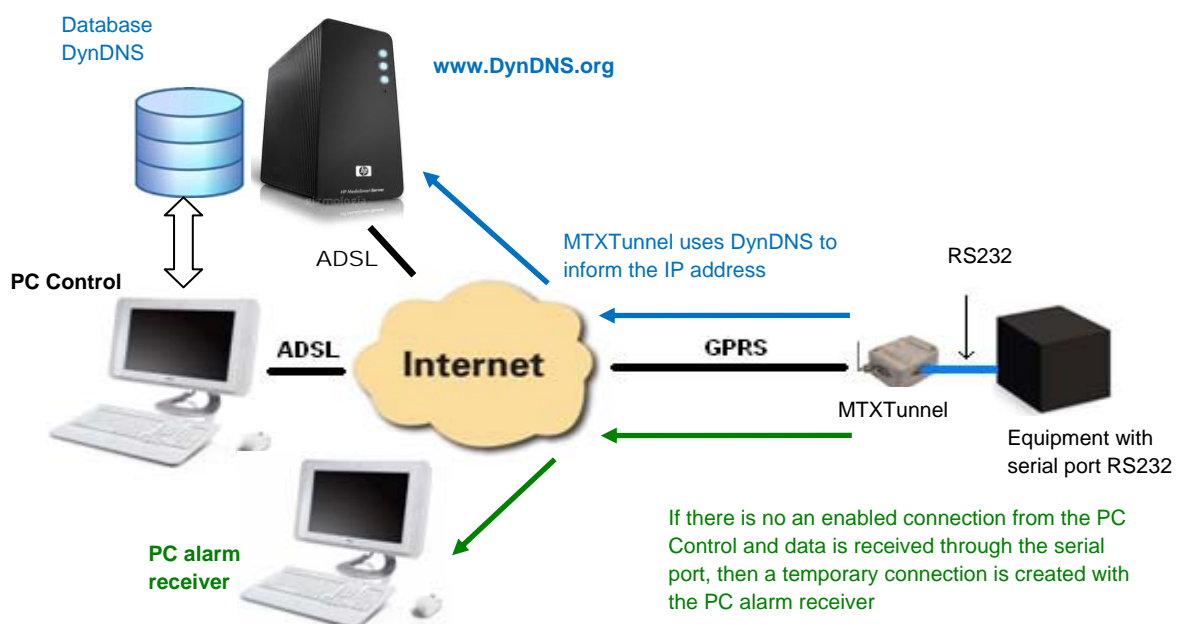
9.2.3. Tunnel GPRS-RS232 – Set up the modem as a permanently connected TCP/IP server, with DynDNS and Client Temporal socket enabled

Scenario details:

- There are several devices with an RS232 port which need to be monitored from a Control Centre via GPRS
- You must be able to gain access to the RS232 devices. So the modem connected to the device's serial port must remain continuously connected to GPRS, waiting for a connection.
- Modems will only accept incoming connections from the IP central office: 200.200.200.200 and will reject any connection coming from different IP addresses.
- In order to reduce the cost, SIM cards will use dynamic IP addresses. As there are only a few devices to be controlled, it is not necessary to configure a DNS private server (`DNS_enabled: off`) and you can just use the DynDNS service.
- Central Control station connections will be periodic. Sometimes the devices may send an **alarm** through the port. In the case of not having a connection available between the PC central control station and the MTXTunnel, the MTXTunnel must create a temporary connection to another server (same address 200.200.200.200, and port 20011) to report the alarm.

Solution.

MTX65i modem + MTXTunnel V7 software (GPRS-RS232 gateway)



Config.txt configuration file:

<http://www.mt xtunnel.com>

Eng 7.12 K06. Subject to change without prior notice

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: off	CTS flow control disabled
COMM_autorts: off	RTS flow control disabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 0	Value 0 means MTXTunnel is GPRS always connected
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: server	TCP server mode
MTX_temporalClient: on	Temporal client mode enabled
MTX_urc: off	URC messages will not be sent
TCP_IP: 200.200.200.200	Server IP address used for temporal client mode
TCP_port: 20010	TCP port used in server and temporal client socket connection
FIREWALL_enabled: on	Firewall enabled
FIREWALL_IP1: 200.200.200.200	IP address authorized to connect to MTXTunnel
DYNDNS_enabled: on	DynDNS service enabled
DYNDNS_server: members.dyndns.org	DynDNS server URL
DYNDNS_hostname: mtxtunnel.dyndns.org	Your DNS name
DYNDNS_login: user	Your DynDNS account login
DYNDNS_password: myPassword	Your DynDNS password account

COMPLEX SCENARIOS. EXAMPLE 2.4.

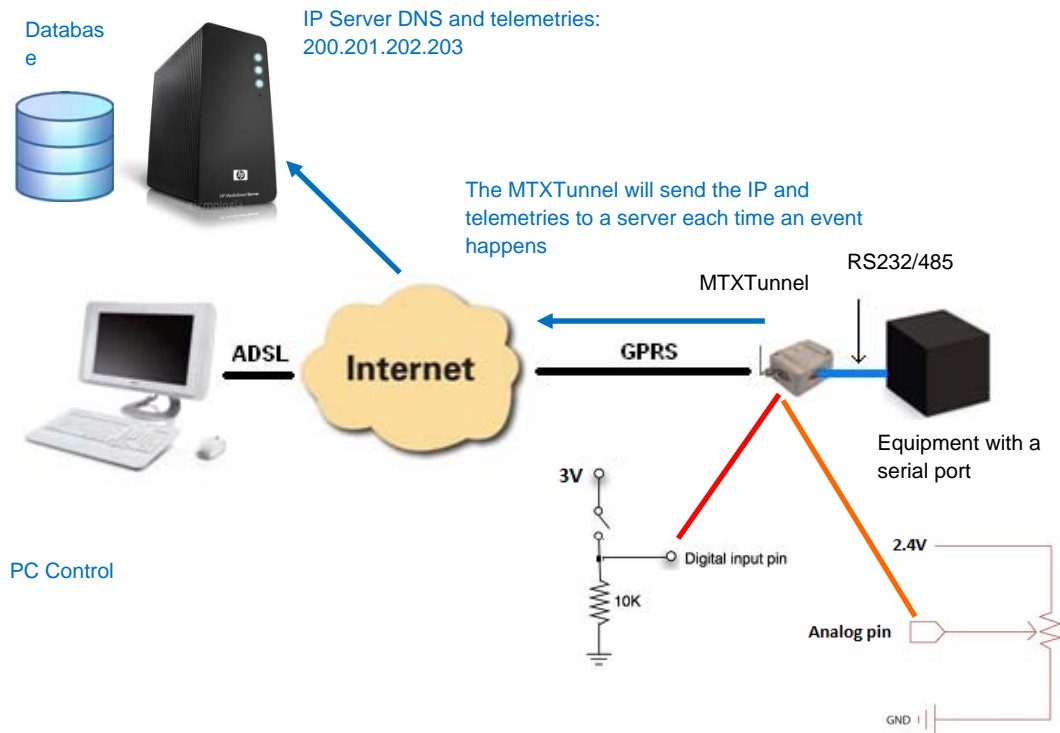
9.2.4. Advanced Tunnel GPRS-RS232 .Set up the modem as a TCP/IP Server connected occasionally when a GPIO and ADC level changes

Scenario details:

- There are several devices with an RS232 port and they need to be monitored from a Central PC via a Tunnel GPRS.
- We will very rarely need to access the RS232 devices, only when there is a special incoming SMS/misssed call, when there is a change from “0” to “1” on a digital input or when the level of the Analog / Digital converter of the modem is below 500mV or above 1500mV
- Therefore, the GPRS-RS232 Tunnel should be activated for 10 minutes when it receives a missed call or a special SMS with the word “on” from any phone number or when the trigger is met for the Analog / Digital input. In case there is a call or SMS, the MTX Tunnel will return an SMS with the IP address from the GSM operator because SIM cards with a dynamic IP will be used. The modem must also send its current IP address, the GPIOs and ADCs readings to a server and to a Control Centre (to report the event).

Solution.

MTX65i modem + MTXTunnel V7 software (GPRS-RS232 gateway)



Config.txt configuration file:

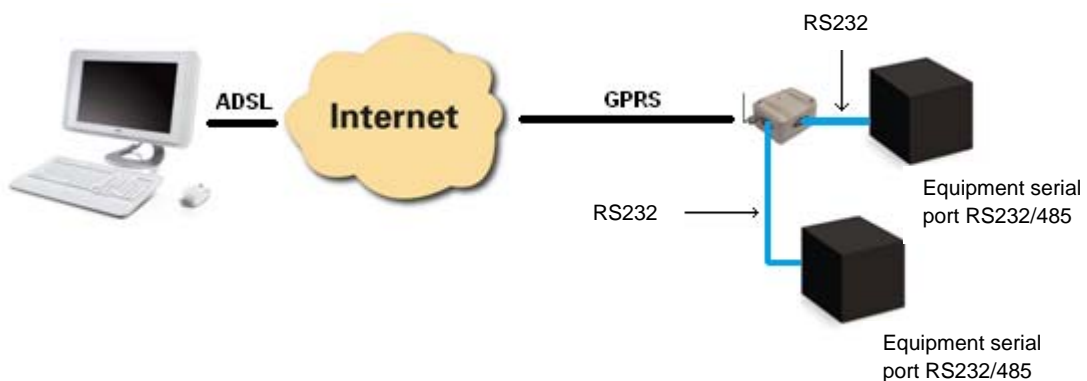
COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 10	Modem remains connected to GPRS for 10 minutes if there is no serial data traffic
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: server	TCP server mode
MTX_urc: off	URC messages will not be sent
TCP_port: 20010	TCP port used.
FIREWALL_enabled: off	MTXTunnel will accept incoming connections from any IP address
SMS_sendIP: on or SMS text "on"	GPRS IP address will be sent by SMS to mobile which has performed missed call
SMS_alPhones: on	all number phones are authorized
WAKEUP_gpio: on	GPRS-Serial tunnel will be active when GPIO input level changes
WAKEUP_gpioValue: 1	GPRS-Serial tunnel will be active when GPIO input level changes from "0" to "1"
WAKEUP_adc: on	GPRS-Serial tunnel will be active when Analog input level changes
WAKEUP_adcValueMin: 500	GPRS-Serial tunnel will be active when Analog input level trigger is below 500mV
WAKEUP_adcValueMax: 1500 1500mV	GPRS-Serial tunnel will be active when Analog input level trigger is above
DNS_server: 200.201.202.203	Server DNS IP address
DNS_mode: socket	DNS communication socket type
DNS_password: 12345678	Password string sent in DNS communication
DNS_port: 20000	DNS server port used
DNS_extended: on	Extended GPIO and analog values + IMEI information is sent to DNS server

COMPLEX SCENARIOS. EXAMPLE 2.5.**9.2.5. Double GPRS-RS232 tunnel. Two RS232 devices controlled by a single modem and a single SIM card.****Scenario details:**

- We want to control 2 serial devices RS232 that are nearby. Therefore, as the modem MTX65i has 2 serial ports, each serial port will be connected to one of two control devices which will save the system by using a single modem and a single SIM card.
- It is required to be able to simultaneously access the 2 serial devices from a Control PC, so the modem should listen, configured as server, through two TCP / IP ports. It will be possible to access the serial device connected to the COM1 of the modem the port TCP 20010 and the serial device connected to the COM2 of the modem by the port TCP 20011.
- The tunnel must remain permanently connected. There is no need to configure a DNS server as a SIM card with fixed IP address will be used.
- Access will only be allowed from two IP addresses coming from Control Centre. Any attempt to connect (unauthorized access) from other IP addresses must be aborted.

Solution.

MTX65i modem + MTXTunnel V7 software (2 GPRS-RS232 gateways)



Config.txt configuration file:

COMM_baudrate: 9600	Serial port baud rate 1
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
COMM2_baudrate: 19200	Serial port baud rate 2
COMM2_bitsperchar: 8	8 bit data
COMM2_stopbits: 1	1 stop bit.
COMM2_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Modem is connected to GPRS permanently
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: server	TCP server mode
MTX_urc: off	URC messages will not be sent
TCP_port: 20010	TCP port used in GPRS communication
FIREWALL_enabled: on	MTXTunnel will accept incoming connections from following IP addresses
FIREWALL_IP1: 200.201.202.203	IP address enabled to access MTXTunnel
FIREWALL_IP2: 200.201.202.204	IP address enabled to access MTXTunnel
TELNET_enabled: on	Telnet enable to control COM 2
TELNET_bypass: on	TELNET enabled to control modem COM2
TELNET_port: 20011	TCP port to access COM2 modem

Details.

1 - Remember that the MTXTunnel is able to create up to 2 socket servers. In this case, only one is used (TCP port 20010) for the main connection and another (TCP port 20011) for the secondary connection. This implies that it is NOT possible to activate the WebServer with this configuration.

Example scenario 2.5-bis

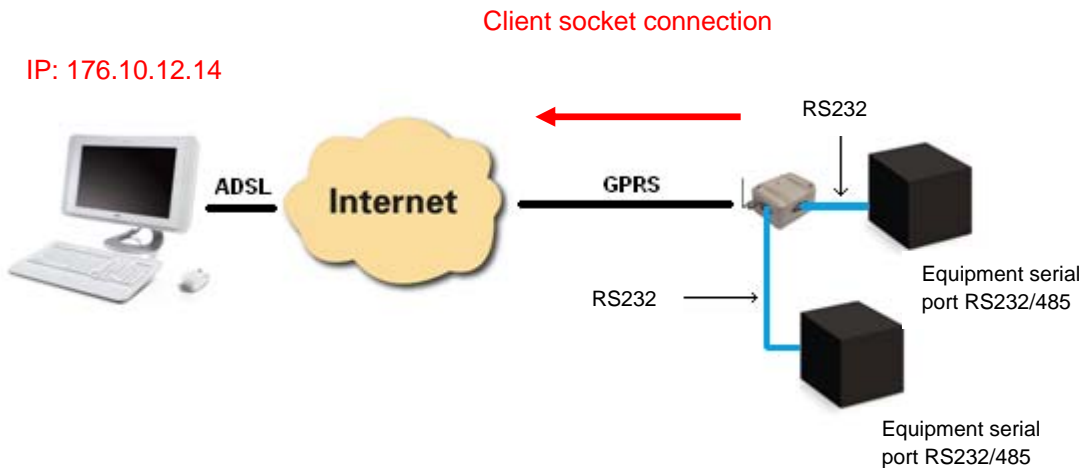
Double GPRS-RS232 tunnel. Two RS232 devices controlled by a single modem and a single SIM card. Client socket connection type.

Scenario Details:

- We want to control 2 serial devices RS232 that are nearby. Therefore, as the modem MTX65i has 2 serial ports, each serial port will be connected to one of two control devices which will save the system by using a single modem and a single SIM card.
- The modem is required to simultaneously create 2 GPRS-serial gateways in client mode. The PC server's 20010 TCP port will connect to the gateway that has access to the modem's COM1 serial device and the 20011 TCP port will connect to the gateway that has access to the modem's COM2 serial device.
- The 2 tunnels must be permanently connected.

Solution.

MTX65i modem + MTXTunnel v7 software (for 2 GPRS-RS232 tunnels)



config.txt configuration file:

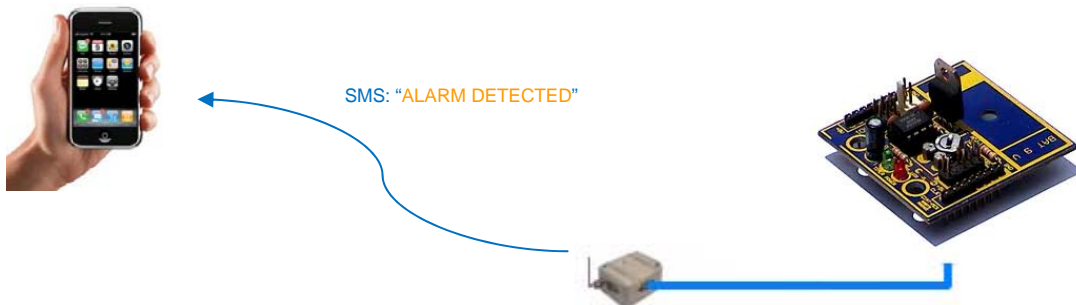
COMM_baudrate: 9600	Serial port baud rate 1
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
COMM2_baudrate: 19200	Serial port baud rate 2
COMM2_bitsperchar: 8	8 bit data
COMM2_stopbits: 1	1 stop bit.
COMM2_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Modem is connected to GPRS permanently
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: client	TCP client mode
MTX_urc: off	URC messages will not be sent
MTX_IDClient: ID1234ABCD	MTX identifier
TCP_IP: 176.10.12.14	The gateway associated with COM1 will connect to this IP address
TCP_port: 20010	Gateway associated with COM1 will connect to this TCP port
TCP_IP2: 176.10.12.14	The gateway associated with COM2 will connect to this IP address
TCP_port2: 20011	Gateway associated with COM2 will connect to this TCP port

COMPLEX SCENARIOS. EXAMPLE 2.6.**9.2.6. SMS Alarm when a digital input changes level****Scenario details:**

- The scenario is very simple. It's only necessary to send an SMS when a digital signal coming from an external circuit changes from "0" to "1".
- The SMS alarm must be sent for safety reasons to 5 phone numbers (67777771, 67777772, 67777773, 67777774 y 67777775). The text must be "Alarm detected"
- Once the alarm is produced, the digital signal can change continuously. Therefore the delivery of the SMS alarm should be limited to no more than one every hour.

Solution.

MTX65i modem + MTXTunnel V7 software



Config.txt configuration file:

MTX_model: MTX65i	MTX-Terminal modem model
MTX_mode: none	GPRS-Serial tunnel is not needed. Feature disabled
MTX_urc: off	URC messages will not be sent
ALARM_gpioEnabled: on	SMS deliver service when digital input changes enabled
ALARM_gpioValue: 1	Alarm SMS deliver trigger when digital input changes from "0" -> "1"
ALARM_gpioMessage: ALARMA DETECTADA	SMS alarm text string
ALARM_gpioPause: 3600	SMS deliver once per hour.
ALARM_smsNumber1: 677777771	Phone number 1 SMS is delivered
ALARM_smsNumber2: 677777772	Phone number 2 SMS is delivered
ALARM_smsNumber3: 677777773	Phone number 3 SMS is delivered
ALARM_smsNumber4: 677777774	Phone number 4 SMS is delivered
ALARM_smsNumber5: 677777775	Phone number 5 SMS is delivered

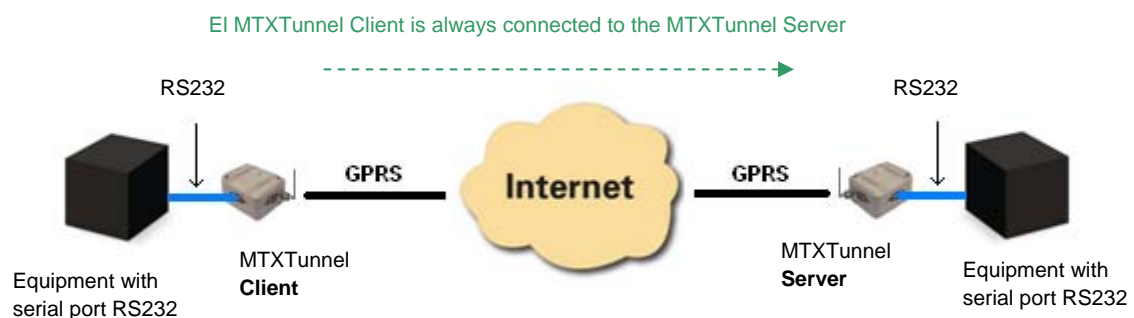
Details.

1 – Note that every model in the MTX range has a special digital input for SMS alarms. In the example that we are using (the MTX -65i), this special digital input will be the GPIO2 corresponding with the PIN11 of the modem expansion connector DB15.

2 - Note that GPRS_timeout has been used, despite being an application that does NOT use GPRS, just SMS. Configuration parameters `SMS_allPhones` is set to "1" and `GPRS_timeout` is set to "off", which means that any unauthorized phones can never activate the GPRS session.

COMPLEX SCENARIOS. EXAMPLE 2.7.**9.2.7. Serial Cable replacer RS232-GPRS-RS232****Scenario details:**

- We have 2 devices RS232 (115200.8, N, 1 flow control HW) linked by a serial cable and the data is sent through this cable. The intention is to replace this serial cable by a transparent link RS232-GPRS-RS232.
- None of the equipment is a PC, the equipment is not intelligent and the internal control programs cannot be changed. This can be seen as "black boxes" with an RS232 serial port with no possibility of changing anything. Therefore it will be necessary to use an MTXTunnel on each side of the communication, one acting as a "server" and the other one acting as a "client".
- One of them, the server, will use a SIM card with fixed IP address 200.1.2.3 (although it could be used in this scenario, it will not be using DynDNS in order to simplify the situation). The Client must be programmed to always be connected to the MTXTunnel Server's fixed IP address so that the tunnel Series-GPRS-Series is always set.

Solution.**2 MTX65i modems + MTXTunnel V7 software**

Config.txt configuration file:**MTXTunnel SERVER:**

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: internetestatico.movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is GPRS always connected
MTX_model: MTX65i	MTX-Terminal modem model used
MTX_mode: server	TCP server mode
TCP_port: 20010	TCP port used.

MTXTunnel CLIENT:

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is GPRS always connected
MTX_model: MTX65i	MTX-Terminal modem model used
MTX_mode: client	Client TCP mode
TCP_IP: 200.1.2.3	Fixed IP address if MTXTunnel is set as server mode
TCP_port: 20010	Remote MTXTunnel TCP port waiting for connection

Details.

1. - A SIM card with a fixed IP address is being used because it is more convenient, but the MTX Tunnel server could use DynDNS if needed.

COMPLEX SCENARIOS. EXAMPLE 2.8.

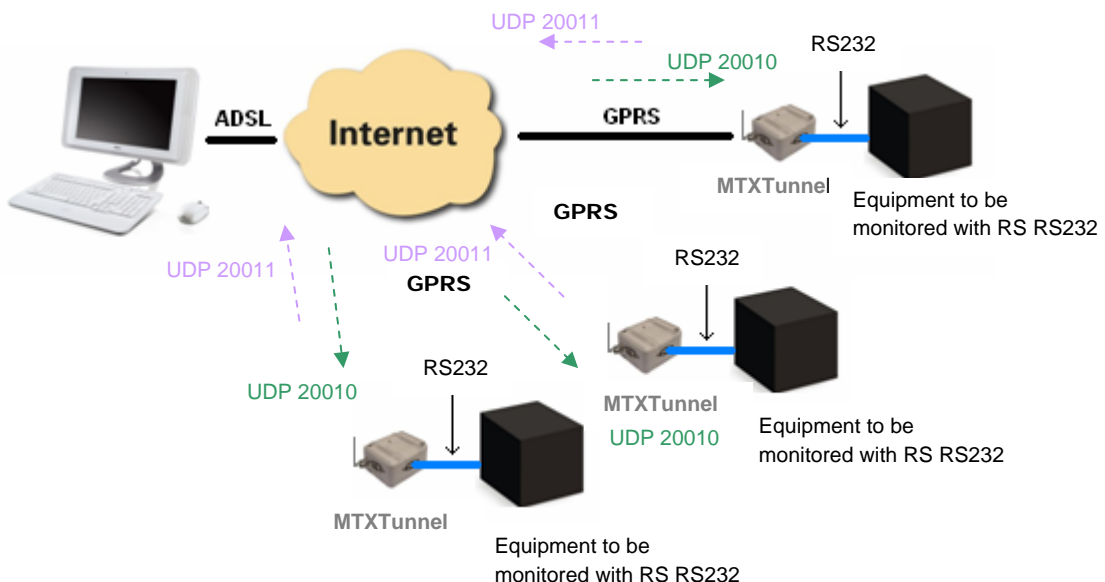
9.2.8. Serial GPRS- UDP Tunnel. MTX configured as Client/Server UDP connected permanently to GPRS and using a SIM card with a fixed IP address.

Scenario details:

- We have 3 devices with an RS232 port (configured as 115200, 8, N, 1 and HW flow control) and they need to be monitored from a PC which is located in a Central Control station with Internet access.
- It's important to have access to the RS232 devices at all times; therefore the modem is connected to the serial port device and must remain connected to GPRS at all times.
- The used protocol is not going to be orientated to the (TCP) connection because we want to use UDP for communications. The MTX Tunnel will be waiting for data packets on the UDP 20010 port sent from the PC of the Central Control. Every time a packet is received, it will be retransmitted by the serial port. Similarly the data packets received by a MTX through the RS232 serial port will be retransmitted to the PC Control via UDP using UDP 20011 port.
- SIM phone cards will be used with fixed IP addressing. The PC Control IP is fixed but with anticipation of possible future changes, the DNS "oficina.domino.com" will be used instead of their IP address. Then the MTX Tunnel must resolve the DNS.

Solution.

MTX65i modem + MTXTunnel V7 software



Config.txt configuration file:

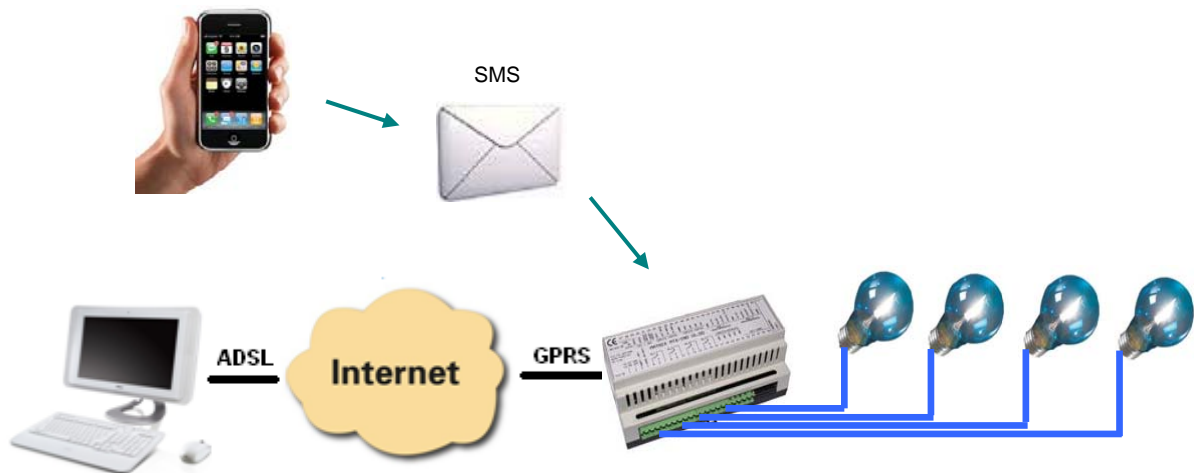
COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: internetestatico.movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	DNS server IP address
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65i	MTX-Terminal modem model used
MTX_mode: udp	UDP mode
MTX_urc: off	URC messages will not be sent
UDP_IP: oficina.dominio.com	Public IP address form central server
UDP_localPort: 20010	UDP modem local port waiting for incoming connections
UDP_remotePort: 20011	UDP server port waiting for incoming connections
FIREWALL_enabled: off	Firewall disabled: Any incoming connection form any IP address is allowed

Details.

1. - Remember that it is necessary to configure the router in the PC server location to use NAT with UDP port, NOT TCP port.

COMPLEX SCENARIOS. EXAMPLE 2.9.**9.2.9. Relay control by SMS message and MTXTunnel access by Web Browser****Scenario details:**

- It is necessary to control 4 relays by SMS for example to enable or disable some streetlights in a remote location
- The purpose when sending an SMS with the text ONx or OFFx (where x is 1, 2, 3 or 4) is so that the relays of every streetlight are either enabled or disabled. In order to do this, it's necessary to create ALIAS text string in the modem.
- Only the 100 phone numbers allowed by the company should be able to send an SMS, starting with 6662746XX
- We want to access the relays and also activate the WEBSERVER on MTXTunnel via SMS (sending SMS with "on" string or using a missed called). WebServer is only activated for 10 minute sessions which are long enough to perform maintenance tasks such as access to relays from a PC browser or change any other MTXTunnel configuration settings.

Solution.**MTX65IND modem + MTXTunnel V7 software**

Config.txt configuration file:

GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 10	GPRS Connected 10 minutes after no data traffic
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65IND	MTX-Terminal modem model
MTX_mode: none	GPRS-Serial tunnel is not needed. Feature disabled.
MTX_urc: off	URC messages will not be sent
WEBSERVER_enabled: on	WebServer service feature enabled
WEBSERVER_login: user	WebServer access login
WEBSERVER_password: 1234	WebServer access password
WEBSERVER_skin: http://www.mtxtunnel.com/webserverimg/	WebServer Skin
WEBSERVER_gsmScript: http://www.blogelectronica.com/gps/gsm.php	Script GSM positioning
FIREWALL_enabled: off	Firewall disabled: Any incoming connection form any IP address is allowed
SMS_allPhones: off	Some phone numbers are authorized
SMS_validPhone1: 6662746	This is common number string from authorized phones. There are 100 numbers
SMS_ATEnabled: on	AT commands sent by SMS feature enabled
SMS_ATResponse: on	The AT command response is returned by SMS
SMS_alias1: ON1>AT^SSIO=0,0	Relay1 is activated when SMS text is ON1
SMS_alias2: OFF1>AT^SSIO=0,1	Relay1 is deactivated when SMS text is OFF1
SMS_alias3: ON2>AT^SSIO=1,0	Relay2 is activated when SMS text is ON2
SMS_alias4: OFF2>AT^SSIO=1,1	Relay2 is deactivated when SMS text is OFF2
SMS_alias5: ON3>AT^SSIO=2,0	Relay3 is activated when SMS text is ON3
SMS_alias6: OFF3>AT^SSIO=2,1	Relay3 is deactivated when SMS text is OFF3
SMS_alias7: ON4>AT^SSIO=6,0	Relay7 is activated when SMS text is ON4
SMS_alias8: OFF4>AT^SSIO=6,1	Relay7 is deactivated when SMS text is OFF4
SMS_aliasOk: Command Ok	Text string sent if AT command execution is correct
SMS_aliasError: Command Error	Text string sent if AT command execution gets errors

Details.

1. - Remember the MTX65IND RL1, RL2, RL3 and RL7 are marked and correspond to the GPIO1, GPIO2, GPIO3 y GPIO7 respectively.

COMPLEX SCENARIOS. EXAMPLE 2.10.

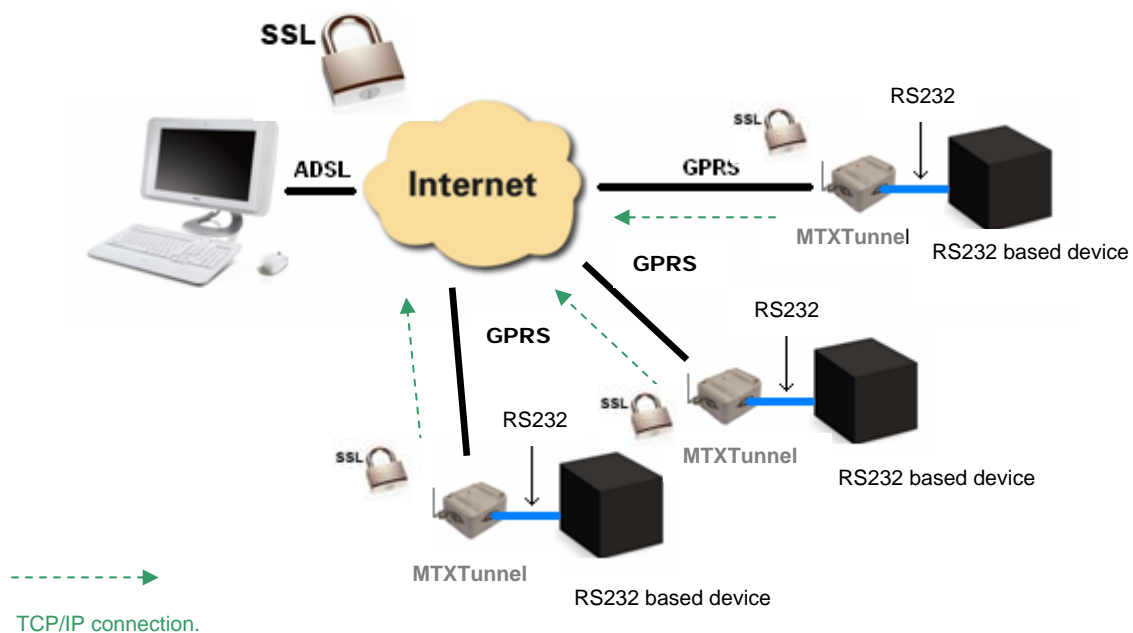
9.2.10. GPRS-Serial Tunnel with SSL security. MTXTunnel configured as TCP/IP Client connected to GPRS permanently using a SIM card with a dynamic IP address

Scenario details:

- There are three devices with RS232 (configured as 9600,8,N,1 and without flow control) which send some information on a regular basis through the serial port. We want to collect and store all of that information from a PC server located at the central office.
- The PC server waits for incoming connections from the different MTXTunnels. This means that the server PC does not connect with the MTX Tunnel, instead it is the MTX Tunnel which connects to the office IP address where the PC server is located; this is “oficina.midominio.com” and TCP 20010 port.
- The PC software control supports SSL socket communications and as the information sent is very sensitive. Therefore it’s important that we block access to this information, even if Ethernet sniffer is used (within the own LAN net where the PC server it is located).
- MTXTunnel modems must remain permanently connected to the PC server, as information is frequently sent. MTXTunnel connects to the central office IP address so it does not make sense to use a SIM with fixed IP. Instead, SIMs with dynamic IP addresses will be used which are much cheaper.

Solution.

MTX65i modem + MTXTunnel V7 software



Config.txt configuration file:

COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: off	CTS flow control disabled
COMM_autorts: off	RTS flow control disabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	DNS server IP address
GPRS_timeout: 0	GPRS is permanently connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65i	MTXTerminal modem model used
MTX_mode: client	TCP client mode
MTX_IDClient: equipoX	MTXTunnel identification string different for each modem
MTX_urc: off	URC messages will not be sent
MTX_clientSSL: on	SSL secure communication enabled
TCP_IP: oficina.midominio.com	Server IP address or DNS information
TCP_port: 20010	Server TCP port for connection

Details.

1. - Remember MTXTunnel can only make SSL connections if it's configured in "client" mode.
2. - The use of SSL should only be used in specific situations where security may be jeopardized, for example when the servers are hosted at an external company. The use of SSL involves slower communications due to higher volume of information being sent and also the processing load of the MTXTunnel during the encryption process.

COMPLEX SCENARIOS. EXAMPLE 2.11

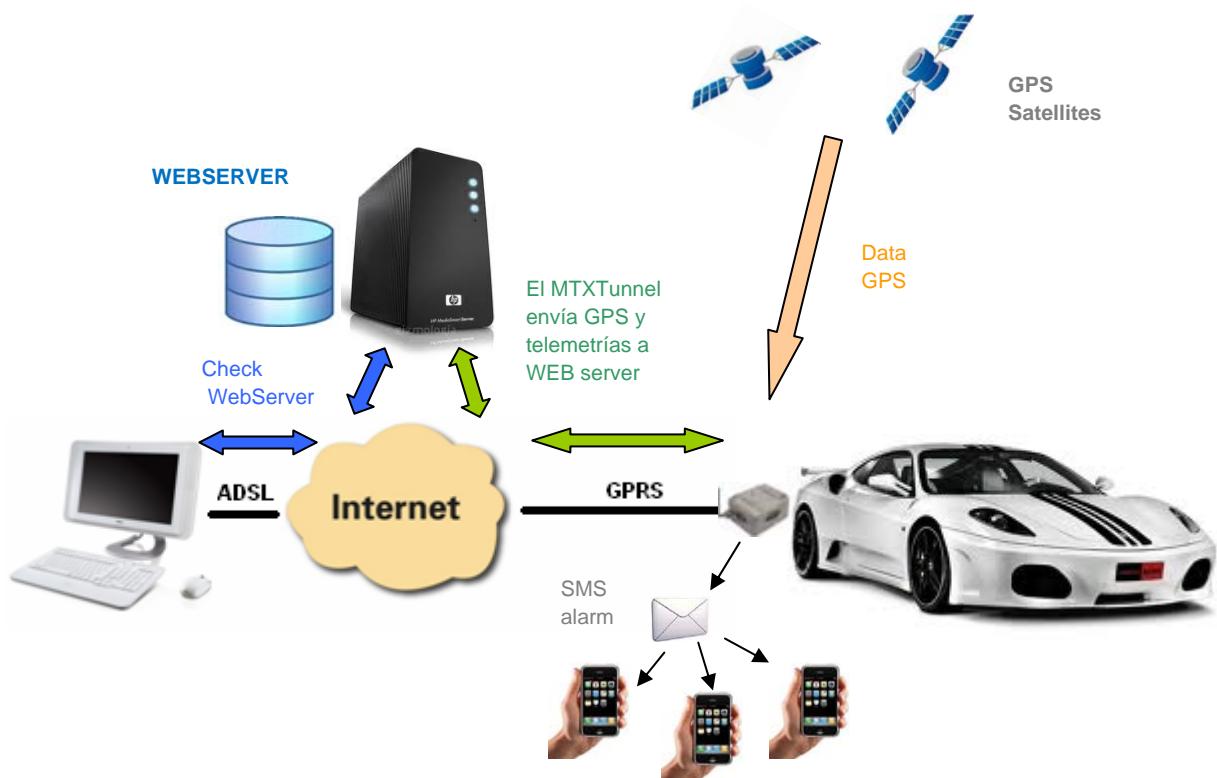
9.2.11. GPS position and telemetry information sent to a WebServer using HTTP.

Scenario details:

- There are several vehicles and we want to provide them with a security system using GPS positioning
- In case of vehicle theft, there will be an alarm sensor connected to a digital input of the modem. The MTXTunnel automatically sends an SMS to 3 different telephone numbers to indicate that there an alarm has gone off and also to start a GPRS session for 3 hours. Then, every 30 seconds, the MTXTunnel must send the vehicle telemetries and GPS position to a Web server located at the central office in order to follow the stolen vehicle.
- The MTXTunnel must also activate its own internal web server. If the stolen vehicle is put in a truck or goes into underground parking (i.e., there is no GPS coverage), then it has to be possible to access the MTXTunnel internal WebServer in order to see the GSM cell positioning (this will return an approximate position).
- Also, the MTXTunnel will have a digital output connected to the vehicle power system to stop it remotely if necessary.

Solution.

MTX65+G modem + MTXTunnel V7 software



Config.txt configuration file:

MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65+G	MTX-Terminal modem model: MTX65+g (with GPS)
MTX_mode: none	GPRS-Serial tunnel gateway is not needed
MTX_IDClient: equipoX	MTXTunnel identification string different for each modem
MTX_urc: off	URC messages will not be sent
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	DNS server IP address
GPRS_timeout: 60	GPRS Connected 60 minutes after no data traffic
TCP_port: 20010	TCP port used
FIREWALL_enabled: off	Firewall disabled
DNS_enabled: on	DNS service enabled
DNS_mode: http	GPRS IP address sent using HTTP GET
DNS_password: 12345678	Password string sent in DNS communication
DNS_server: www.miweb.com:8080/datosIP.asp	Server URL
DNS_extended: on	MTXTunnel send GPIO and ADCs values to DNS server
DNS_period: 30	

When alarm goes off, it connects to GPRS and sends telemetries/position every 30 seconds.

WEBSERVER_enabled: on	WebServer service feature enabled	
WEBSERVER_login: user	WebServer access login	
WEBSERVER_password: 1234	WebServer access password	
WEBSERVER_skin: http://www.mtxtunnel.com/webserverimg/		WebServer Skin
WEBSERVER_gsmScript: http://www.blogelectronica.com/gps/gsm.php		Script GSM positioning
WEBSERVER_gpsScript: http://www.blogelectronica.com/gps/gps.php		Script localiz. GPS
WAKEUP_gpioEnabled: on	GPRS connection when GPIO changes service enabled	
WAKEUP_gpioValue: 1	GPRS connection performed when GPIO1 level=1	
ALARM_gpioEnabled: on	SMS Alarm when GPIO changes service enabled	
ALARM_gpioValue: 1	SMS Alarm when GPIO1 changes	
ALARM_gpioMessage: ALARMA ROBO	Alarm SMS text string	
ALARM_gpioPause: 300	SMS is sent every 5 minutes	
ALARM_smsNumber1: 666274646	Phone number 1 SMS alarm text will be sent	
ALARM_smsNumber1: 666274647	Phone number 1 SMS alarm text will be sent	
ALARM_smsNumber1: 666274648	Phone number 1 SMS alarm text will be sent	

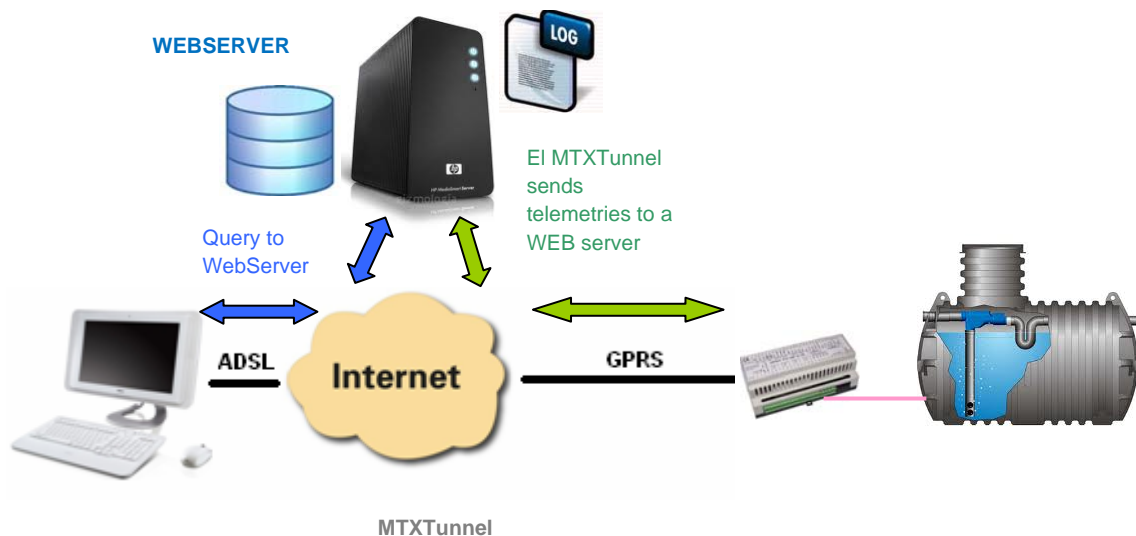
Details.

1 – Remember that the PIN used by the MTX65+G for WAKEUP is the GPIO5 (PIN5 RJ11 modem connector).

2. – The PIN used for SMS alarms on the modem MTX65+G is the GPIO9 which corresponds to the PIN 4 of the DB15 connector.

COMPLEX SCENARIOS. EXAMPLE 2.12.**9.2.12. Sending telemetries (GPIOs and ADCs values) to a Web server by HTTP.****Scenario details:**

- We want to monitor a water tank level. To do this, an analog input of a GPRS modem will be used. The modem will be always connected to GPRS and will use a dynamic IP address.
- The modem must take a measurement every 5 minutes and send it to a Web server via GPRS using HTTP GET to create a LOG file with the daily consumption statistics.
- Also, you need to be able to access the modem's internal web server to check the status of the deposit in real time. It must be possible, from the internal web server, to act over a relay which allows the flow entry into the deposit. The access to the web server will not have a firewall (from any IP) but will be protected by a username and password.

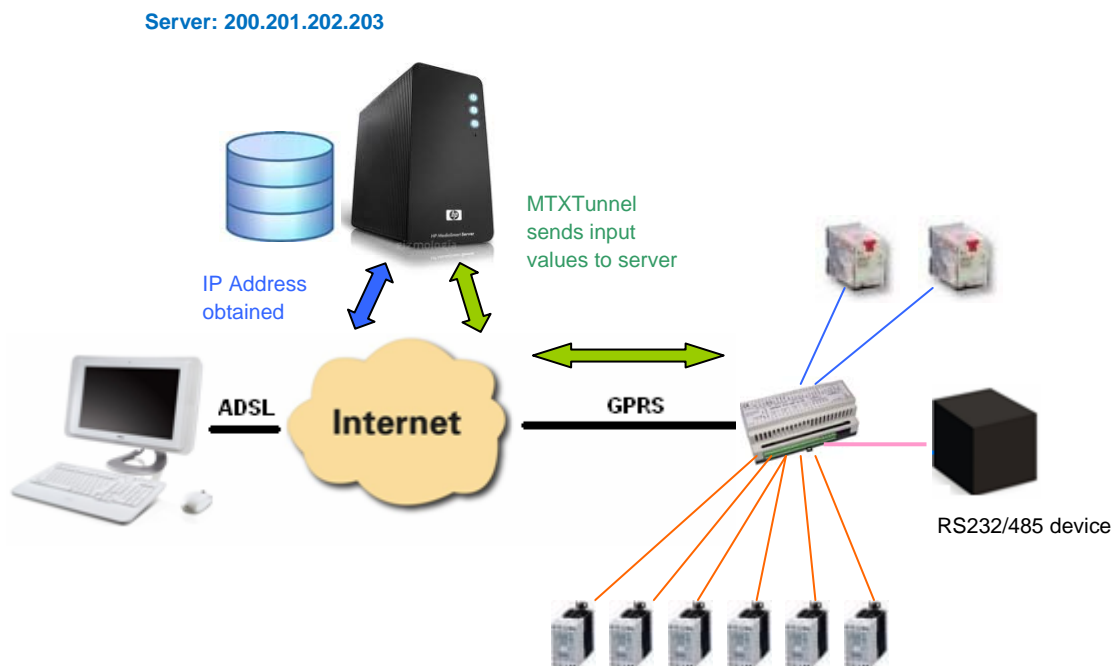
Solution.**MTX65IND modem + MTXTunnel V7 software**

Config.txt configuration file:

GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65IND	MTX-Terminal modem model MTX-IND
MTX_mode: none	No GPRS-SERIAL tunnel gateway is needed
MTX_urc: off	URC messages will not be sent
TCP_port: 20010	TCP port used
FIREWALL_enabled: off	Firewall disabled
WAKEUP_gpioEnabled: on	GPRS connection when digital input changes service enabled
WAKEUP_value: 0	GPRS connection done when digital input level="0"
DNS_enabled: on	DNS service enabled
DNS_mode: http	GPRS IP address sent using HTTP GET
DNS_password: 12345678	Password string sent in DNS communication
DNS_server: www.miweb.com:8080/datosIP.asp	Server URL
DNS_extended: on	MTXTunnel send GPIO and ADCs values to DNS server
DNS_period: 300	Every 300 seconds
WEBSERVER_enabled: on	WebServer service feature enabled
WEBSERVER_login: user	WebServer access login
WEBSERVER_password: 1234	WebServer access password
WEBSERVER_skin: http://www.mtxtunnel.com/webserverimg/	WebServer Skin
WEBSERVER_gsmScript: http://www.blogelectronica.com/gps/gsm.php	Script GSM positioning

COMPLEX SCENARIOS. EXAMPLE 2.13.**9.2.13. Receive telemetry input values (GPIOs y ADCs) when digital input level changes or analog input value is out of range.****Scenario details:**

- You need to receive 6 digital input level changes and 2 analog inputs.
- MTXTunnel will detect when one or several digital inputs have changed and send their value to a central server using TCP/IP socket via GPRS.
- 2 analog inputs are being monitored remotely. There are two out of range values, above 1200mV+250mV or below 1200mV-250mV. This data is sent to a server via GPRS.
- At the same time, a GPRS-serial RS232/RS485 tunnel gateway is needed. SIM cards are provisioned with dynamic IP addresses. Every time any input level changes or analog value is out of range, the actual IP address is sent to the server.

Solution.**MTX65IND modem + MTXTunnel v7 software**

Config.txt configuration file:

COMM_baudrate: 9600	RS232 Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65IND	MTX-Terminal modem model used: MTX65IND
MTX_mode: server	Modem Server Mode
MTX_urc: off	URC messages will not be sent
TCP_port: 20010	TCP port used
FIREWALL_enabled: off	Firewall disabled: All incoming connections allowed
DNS_enabled: on	DNS service enabled
DNS_mode: socket	DNS communication socket type TCP/IP
DNS_password: 12345678	Password string sent in DNS communication
DNS_server: 200.201.202.203	Server URL
DNS_port: 20011	DNS server port used del modem.
DNS_extended: on	MTXTunnel sends GPIO and ADCs values to DNS server
DNS_gpios: on	GPIO telemetry sent when GPIO changes
DNS_adc1: 1200	When ADC1 level changes on level 1200mV
DNS_adc2: 1200	When ADC2 level changes on level 1200mV

Details.

1. - Data information frame to be sent to server will have following format:

```
#IME#DNS_password#IPPublica#gpio1#gpio2#gpio3#gpio4#gpio5#gpio6#gpio7#
gpio8#gpio9#gpio10#ADC1#ADC2#
```

COMPLEX SCENARIOS. EXAMPLE 2.14

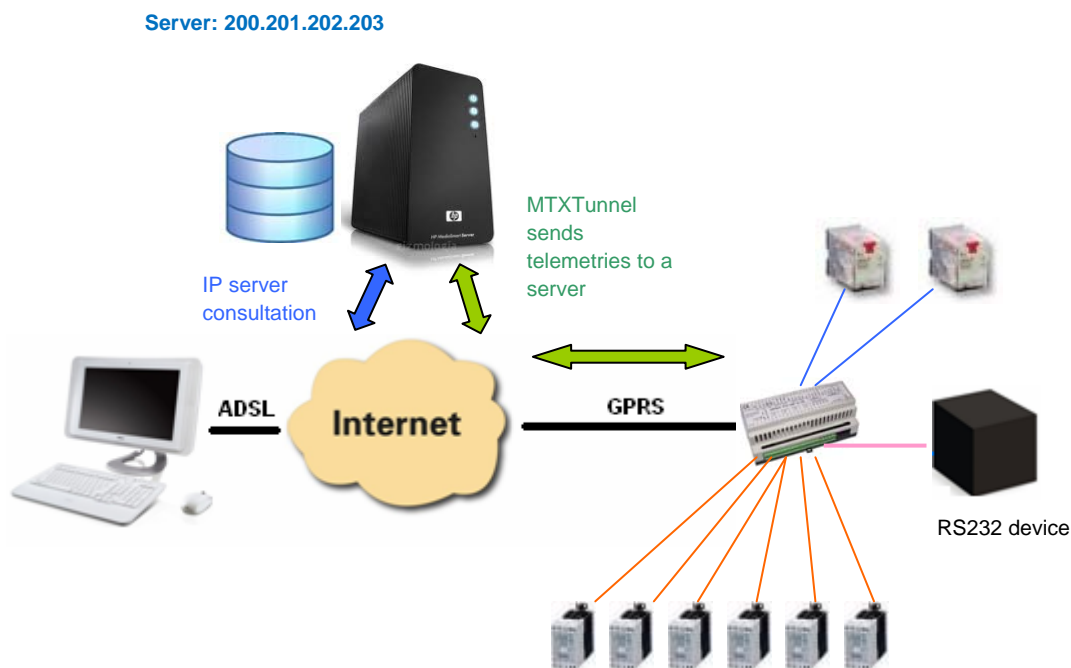
9.2.14. Digital and analogical input values periodically sent to a WEB server using JSON object.

Scenario details:

- 6 input digital levels and 2 analog inputs values are sent to a Web server using JSON object.
- MTX will collect digital and analog input values every 10 minutes and send them as a JSON object to a server. In case the GPRS network fails (due to coverage loss) or the server is down, MTX will store up to 1000 registers to memory.
- At the same time you need a GPRS-RS232 tunnel Gateway to control an external machine. In this example SIM cards are provisioned with fixed IP addressing.

Solution.

MTX65IND modem + MTXTunnel v7 software



Config.txt configuration file:

COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is GPRS always connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65IND2	MTX-Terminal modem modelIND2
MTX_mode: server	Modem Server mode
MTX_urc: off	URC messages will not be sent
TCP_port: 20010	TCP port used
FIREWALL_enabled: off	Firewall disabled All incoming connections allowed
LOGGER_enabled: on	Internal logger enabled
LOGGER_password: ID00001	Field frame
LOGGER_server: www.miservidorWeb.com/json.asp?data=	Server URL will collect JSON object
LOGGER_registerSize: 300	MTX register logger memory size
LOGGER_numRegistersFlash: 1000	Maximum MTX register logger memory size
LOGGER_ioPeriod: 600	Every 10 minutes reads GPIO and ADCs are performed

Details.

1. JSON object sent to server will have the following data format:

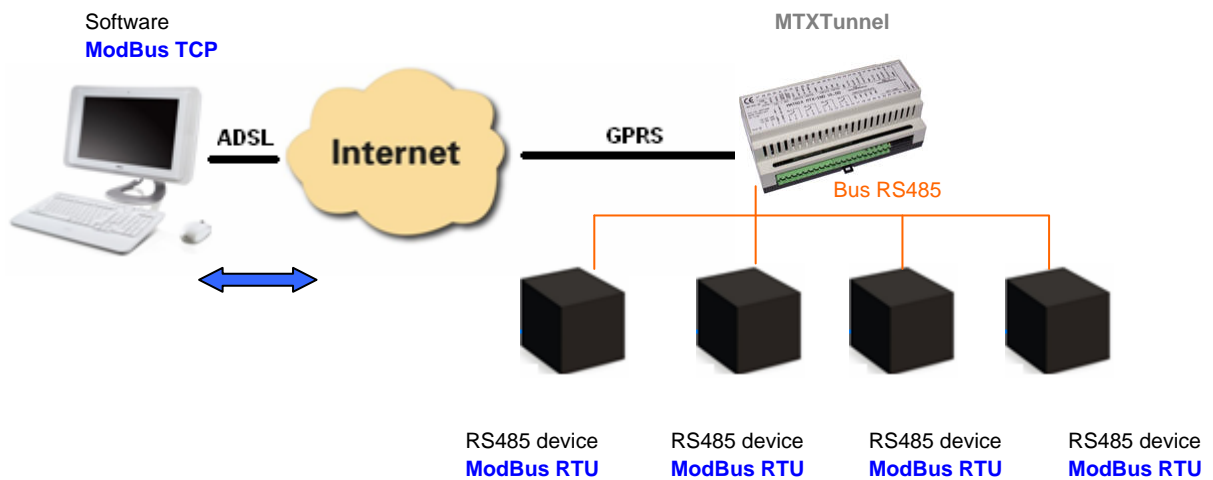
```
{"IMEI":353234028103206,"P":"ID00001","TS":"11/11/12  
08:31:44","IO1":1,"IO2":0,"IO3":1,"IO4":1,"IO5":0,"IO6":0,"IO7":1,"IO8":0,"IO9":1,"IO10":0,"AD1":  
1250,"AD2":1700}
```


COMPLEX SCENARIOS. EXAMPLE 2.15**9.2.15. ModBus TCP / ModBus RTU GPRS GATEWAY****Scenario details:**

- We need to monitor remote ModBus RTU devices with the RS485 port from a central Server which has a software application to control ModBus TCP. MTXTunnel will perform ModBus TCP / ModBus RTU GPRS gateway
- ModBus remote devices need to always be available, so the modem connected to those devices is permanently connected to the GPRS waiting for incoming requests in standard ModBus TCP port number 502.
- SIM provisioned with fixed IP addressing will be used, but we could also use dynamic IP addresses and DynDNS or own DNS server in same way.

Solution

MTX65IND modem + MTXTunnel v7 software

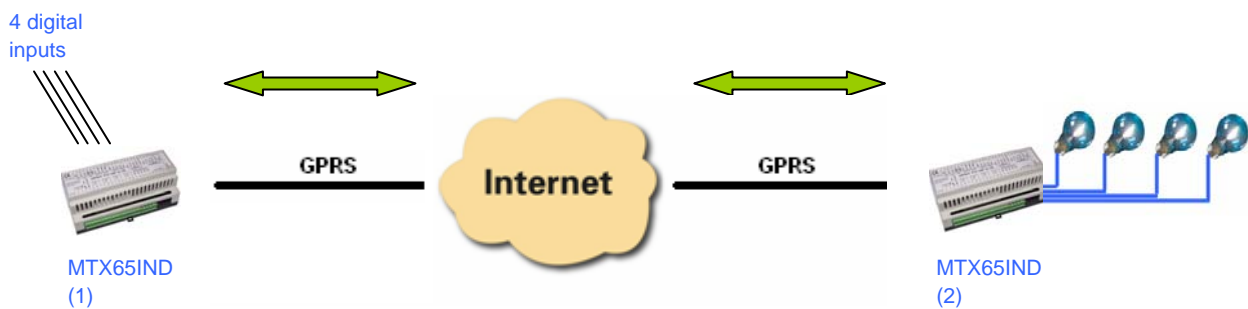


Config.txt configuration file:

COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: off	No flow control
COMM_autorts: off	No flow control
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: internetestatico.movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is GPRS always connected
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65IND	MTX-Terminal modem model
MTX_mode: server	TCP server mode
MTX_urc: off	URC messages will not be sent
MTX_gatewayModBus: on	ModBus TCP – ModBus RTU gateway enabled
TCP_port: 502	TCP port used . Standard ModBus
FIREWALL_enabled: off	Firewall disabled: Any incoming connection form any IP address is allowed

COMPLEX SCENARIOS. EXAMPLE 2.16**9.2.16. Sending replications of digital inputs in relays via GPRS****Scenario details:**

- You should be able to replicate the state of 4 digital inputs from MTX65IND modem (1) in the other remote MTX65IND (2) modem's relays.
- Every time that you change the state of one of the digital inputs, the MTX65IND (1) will send these changes to the other modem MTX65IND (2) in order to switch the appropriate relay.
- Although you could use DynDNS in the modem MTX65IND (2), for simplicity we will assume that you are going to use a SIM card with a fixed IP address.

Solution.**2 MTX65IND modems + MTXTunnel v7 software**

Config.txt configuration file for MTX65IND (1) modem:

GPRS_apn: movistar.es	GPRS APN from your GSM operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected.
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65IND	MTX-Terminal modem model MTX-IND
MTX_mode: server	The modem will be in server mode
MTX_ping: 35	To ensure a permanent connection
MTX_pingIP: 8.8.8.8	We will connect through Google when testing the PING
MTX_ATEEmbeddedPass: ABCD	Sets a password in order to be able to communicate with MTX65IND (2)
DNS_enabled: on	DNS activated for sending frames
DNS_mode: remoteat	Sends a special frame with a remote AT command from GPIOs
DNS_server: 80.11.12.13	MTX65IND (2) modem's fixed IP address
DNS_port: 20010	MTX65IND (2) modem's TCP port
DNS_period: 300	For security purposes, every 5 minutes inputs/outputs are sent
DNS_gpios: on	GPIO telemetry sent when GPIO changes

Config.txt configuration file for MTX65IND (2) modem:

GPRS_apn: internetestatico.movistar.es	GPRS APN from your GSM operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected.
MTX_PIN: 0000	If SIM card has no PIN security, use 0000 value
MTX_model: MTX65IND	MTX-Terminal modem model MTX-IND
MTX_mode: server	The modem will be in server mode
MTX_ping: 35	To ensure a permanent connection
MTX_pingIP: 8.8.8.8	We will connect through Google when testing the PING
MTX_ATEEmbedded: on	Enables you to be able to receive remote AT commands
MTX_ATEEmbeddedPass: ABCD	Sets a password in order to be able to communicate with MTX65IND (1)
TCP_port: 20010	TCP port ready
FIREWALL_enabled: off	Firewall doesn't need to be activated as we don't know the IP of modem (1)

Annex 3.

ULP (Ultra Low Power) configuration and example scenarios

ULTRA LOW POWER SCENARIO EXAMPLE 3.1

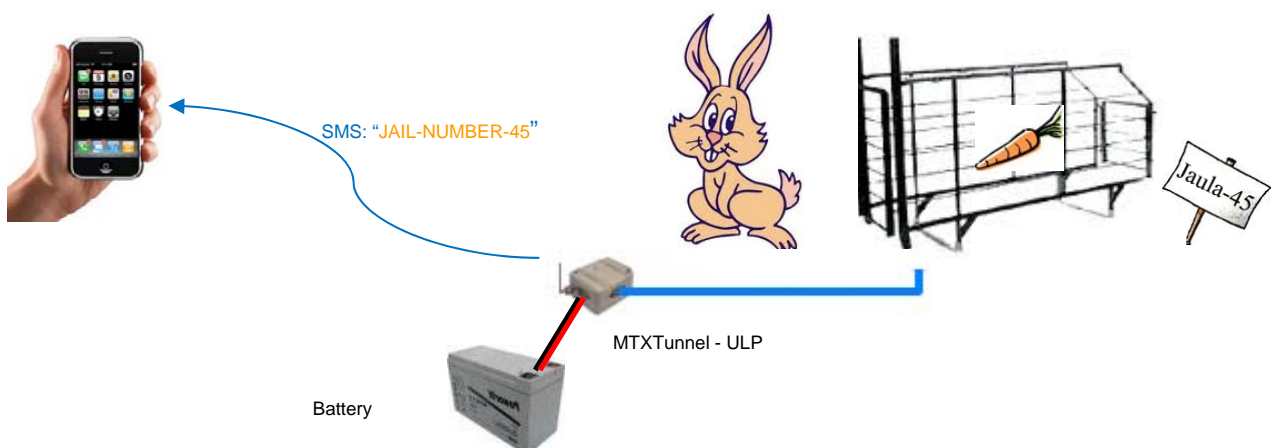
9.3.1. Sending an SMS alarm when the digital input is activated with ultra low power consumption.

Details.

- Some small cages have been placed on a hill to monitor a wild animal. An alarm SMS is sent when the jail door opens (connected to a Digital Input in MTX-65ULP modem)
- The modems are located in remote place where only batteries can be used. MTX65ULP will be in ULP –Ultra Low Power- means that it only consumes 2 uA. When the MTX65ULP digital input changes this means the wild animal is inside the jail. Then the MTX65ULP switches to normal power mode.
- So the MTX65ULP wakes up and after a few seconds (has to register to network), the SMS will be sent. The text alias will be “JAIL-NUMBER-45”.
- After SMS is sent the modem will change to Ultralow Power mode.
- If there is a problem sending the SMS, for example a low coverage GSM network, the modem will wake up in 30 minutes as programmed and it will retry sending the SMS.

Solution.

MTX65ULP modem + MTXTunnel V7 software



Config.txt configuration file:

MTX_model: MTX65ULP	MTX-Terminal modem model: MTX65ULP
MTX_mode: none	GPRS-Serial tunnel not needed
MTX_IDClient: PUERTA-45	SMS text sent when the door is open
ULP_mode: sms	Telemetry data sent by SMS, not GPRS
ULP_rtc: off	Wake up by interrupt tamper input
ULP_minutes: 30	If SMS delivery fails, it will retry in 30 minutes
ULP_smsNumber: 666274646	End user phone number to send SMS
ULP_smsExtended: off	GPIO and ADC values are not sent, just MTX_IDClient.

Details.

1.- SMS message has the following format:

MTX_IDClient

MTX_IDClient is a user configurable text string.

In example is "JAIL-NUMBER-45"

2.- Please note configuration variables are different as ALARM SMS example above. This is because MTXTUNNEL on MTX65ULP modem is special one. Please read all `ULP_mode` parameter description in this manual for more information.

3.- `ULP_minutes` parameter >0 is the time in minutes that the modem is in low power mode after wakeup and will try to resend failed SMS. This parameter is independent of `ULP_rtc` parameter value which can be "off".

ULTRA LOW POWER SCENARIO EXAMPLE 3.2

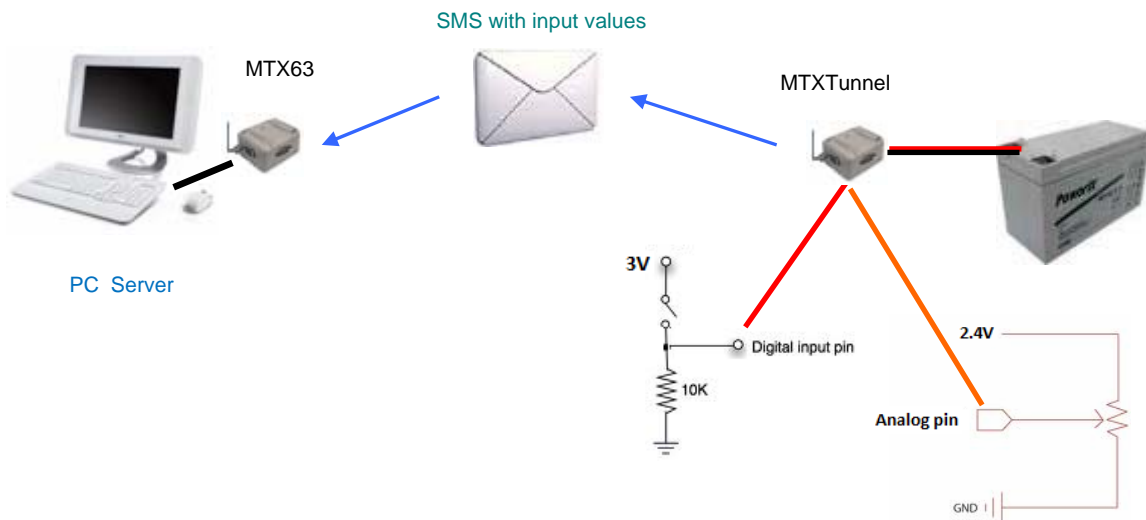
9.3.2. Periodically digital and analog input value telemetry sent by SMS using ultra low power modem.

Details:

- Some digital and analog inputs need to be remotely monitored using GSM modem.
- Modem is in a remote location and needs to be battery powered, so the modem has to be in ultra low power mode (2 uA) for 24 hours.
- After 24 hours, the modem has to wake up to take the value of digital and analog inputs and send their values via SMS to a server.
- After the SMS is sent, the modem has to go back into ultra low power mode for other 24 hours. This procedure will be repeated.

Solution.

MTX65ULP modem + MTXTunnel V7



Config.txt configuration file:

MTX_model: MTX65ULP	MTX-Terminal modem model: MTX65ULP
MTX_mode: none	GPRS-Serial tunnel not needed
MTX_IDClient: ABB123	User definable text
ULP_mode: sms	Telemetry data sent by SMS, not GPRS
ULP_sleepMode: minutes	Wake up every X minutes
ULP_minutes: 1440	Wake up schedule 1440 minutes = 24 hours
ULP_rtc: on	We need to use RTC as wakeup is time setup.
ULP_smsNumber: 666274646	End user phone number to send SMS
ULP_smsExtended: on	GPIOs and ADCs values sent by SMS

Details.

1.- SMS text sent has following format:

`MTX_IDClient#gpio1#gpio2# ... #gpio10#adc1#adc2#`

MTX_IDClient is user configurable text, gpiox is digital input and adcX is analog input.

2.- The time Schedule is not exact/precise at all. Keep in mind that modem takes a few minutes to start-up, register to the network, send the SMS and go back into low power mode again. This could take less than a minute.

3.- Difference on example 3.1 above is `ULP_rtc` parameter is "on". So, now, modem is woken up periodically every X seconds specified in "`ULP_minutes`" parameter.

If `ULP_rtc` is "off" MTX65ULP modem will just wake up if a digital input –GPIO- changes level. Then, `ULP_minutes` has different behaviour.

ULTRA LOW POWER SCENARIO EXAMPLE 3.3.

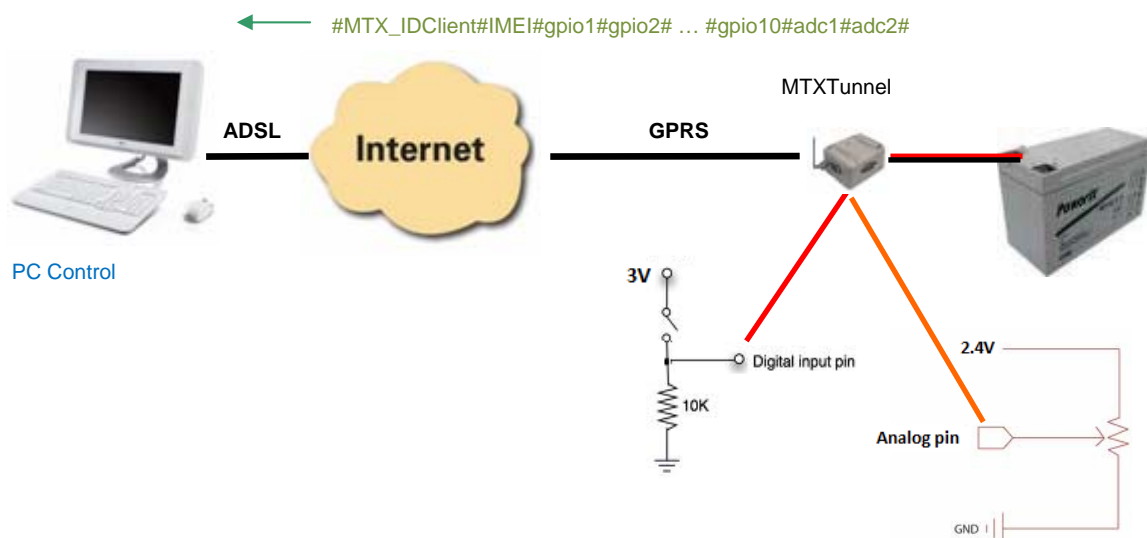
9.3.3. Periodically digital and analog input value telemetry by GPRS using ultra low power modem.

Details.

- Some digital and analog inputs need to be remotely monitored via GPRS.
- The modem is in a remote location and needs to be battery powered, so the modem has to be in ultra low power mode (2 uA) and only wake up to send input values using GPRS.
- Wake up is scheduled every 24 hours. MTXTunnel will read digital/analog inputs and send them via GPRS using a TCP/IP socket to a control server (IP: 80.11.22.33 y port TCP: 20010)
- After the information is sent, the modem will go back into ultra low power mode for 24h.

Solution.

MTX65ULP modem + MTXTunnel V7 software



Config.txt configuration file:

<http://www.mtxtunnel.com>

Eng 7.12 K06. Subject to change without prior notice

GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 60	GPRS Connected 1 minute after no data traffic
MTX_model: MTX65ULP	MTX-Terminal modem model: MTX65ULP
MTX_mode: client	Client TCP mode
MTX_IDClient: 123456	Modem user value string identifier
MTX_IDClientExtended: on	IMEI, GPIOs and ADCs telemetries will be sent
TCP_IP: 80.11.22.33	Server IP address
TCP_port: 20010	Server TCP port
ULP_sleepMode: minutes	Modem wakes up every X minutes
ULP_rtc: on	RTC timing must be enabled, mandatory
ULP_minutes: 1440	Time alarm 1440 minutes = 24 hours
ULP_mode: gprs	Telemetry sent by GPRS, not SMS.

Details.

1. - Data string will have the following format:

`#MTX_IDClient#IMEI#gpio1#gpio2# ... #gpio10#adc1#adc2#`

MTX_IDClient configuration parameter has some variables: IMEI is modem IMEI, gpioX is the digital input and adcX is the analog input.

2. - Please remember `GPRS_timeout` parameter is in seconds, not minutes.

3.-`ULP_minutes` parameter is the amount of time that MTXTunnel is on low power mode (sleep) starting just after the modems go back into low power mode.

ULTRA LOW POWER SCENARIO EXAMPLE 3.4

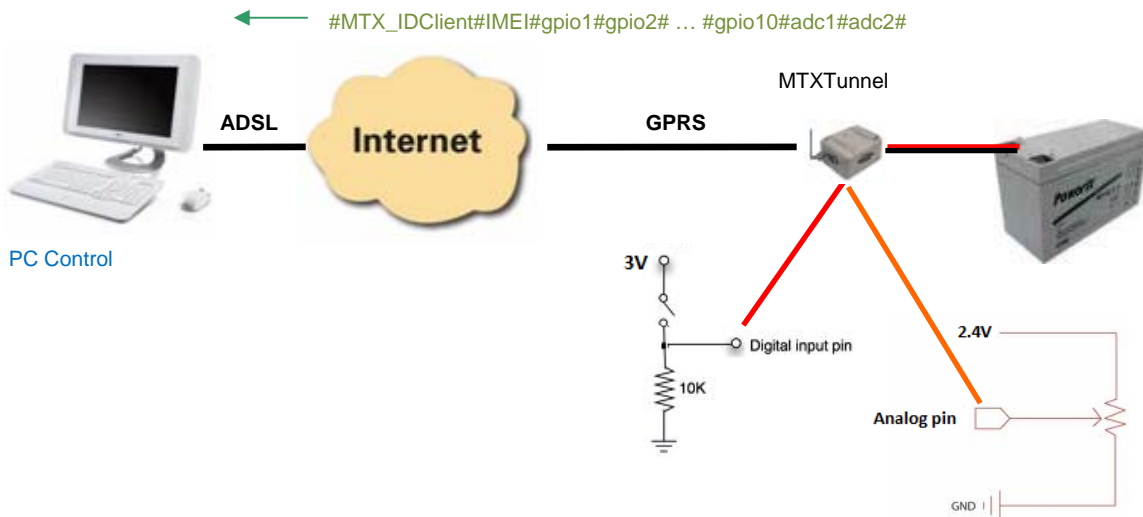
9.3.4. Event (None periodically) digital and analog input value telemetry by GPRS using ultra low power modem.

Details

- Some digital and analog inputs need to be remotely monitored via GPRS.
- MTX65ULP is powered by external batteries and remains in Low Power Mode (2 uA) until the level of digital inputs change (tamper). .
- When there is a change in tamper digital input level, the modem wakes up and changes to normal operation mode to read the digital and analog inputs. Those levels are sent to a server using GPRS via TCP/IP socket.
- After the information has been sent, modem goes back into ultra low power mode again until digital input level changes again.

Solution.

MTX65ULP modem + MTXTunnel V7



Config.txt configuration file:

<http://www.mtxtunnel.com>

Eng 7.12 K06. Subject to change without prior notice

GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 1	GPRS Connected one minute after no data traffic
MTX_model: MTX65ULP	MTX-Terminal modem model: MTX65ULP
MTX_mode: client	Client TCP mode
MTX_IDClient: 123456	Modem user string identifier
MTX_IDClientExtended: on	IMEI, GPIOs and ADCs telemetry is also sent
TCP_IP: 80.11.22.33	Server IP
TCP_port: 20010	Server TCP port
ULP_rtc: off	RTC is disabled because wakeup is not timing schedule, only by digital input
ULP_mode: gprs	Telemetry sent by GPRS, not SMS.

Details.

1.- Data string will have the following format:

```
#MTX_IDClient#IMEI#gpio1#gpio2# ... #gpio10#adc1#adc2#
```

MTX_IDClient configuration parameter has some variables: IMEI is modem IMEI, gpioX is the digital input and adcX is the analog input.

ULTRA LOW POWER SCENARIO EXAMPLE 3.5.**9.3.5. Timing alarm activation of GPRS-RS232 tunnel using MTX-ULP modem.****Scenario details:**

- We need to collect daily data of meteorological logger equipment with RS232 port using GPRS. We need to use a low power consumption modem as the main battery cannot be changed.
- The GPRS modem has to be in low power mode (2 uA) for 24 hours.
- Then, after 24 hours, the modem has to wake up and connect to the GPRS. The first task is sending their IP address to the server. The server stores this IP address in a data base. Another software task in the server detects the new IP address and connects to it. The GPRS-RS232 tunnel is created and meteorological data can be obtained daily.
- When process has finished, the modem goes back into ultra low power for another 24 hours and the entire process is repeated.

Solution.**MTX65ULP modem + MTXTunnel V7 Config.txt configuration file:**

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 120	GPRS Connected two minutes after no data traffic
MTX_model: MTX65ULP	MTX-Terminal modem model: MTX65ULP
MTX_mode: server	TCP server mode
TCP_port: 20010	TCP port used .
FIREWALL_enabled: off	MTXTunnel will accept incoming connections from any IP address
DNS_serverIP: 200.201.202.203	DNS server URL address
DNS_serverPort: 20000	Server DNS port
ULP_sleepMode: minutes	Wake up every X minutes
ULP_rtc: on	RTC is used as is time wake up schedule
ULP_minutes: 1440	Wake up schedule 1440 minutes = 24 hours
ULP_mode: gprs	Telemetry sent by GPRS, not SMS.

Details.

1.-Remote modem sends their IP address to the server using this text string format:

```
#IMEI#DNS_password#IPPublica#
```

IMEI is IMEI modem identifier. DNS_password is a user configurable parameter. IPPublica is the public IP address modem gets.

“DNS_extended: on” parameter can be also used for an extended text string format:

```
#IMEI#DNS_password#IPPublica#gpio1#gpio2# ... #gpio10#adc1#adc2#
```

2.- `GPRS_timeout` parameter value set to 120 which means that the GPRS connection is established for 120 seconds even if data is not present. For example if all data transfer takes 10 minutes, in 10+2 minutes, the modem goes back into low power mode.

3.- If you only need to access to the modem, remotely form an authorized IP address using `FIREWALL_enabled`, `FIREWALL_IP1`.... parameters.

ULTRA LOW POWER SCENARIO EXAMPLE 3.6.**9.3.6. GPRS-RS232/RS485 Tunnel using ultra low power consumption modem. Programmed timing activation.****Scenario details:**

- We need to remotely read a water counter once per day at 22.00. Ultra low power modem is needed because they will be powered by external batteries.
- Modem must be in ultra low power mode (2 uA) until 22.00 h.
- At this time, 22.00 h, the modem wakes up and automatically connects to GPRS. It sends their IP address to the server and stores it in a data base in the server. Another process in the server collects the IP and connects to it using the GPRS. Then the GPRS-RS232/485 tunnel is established from server and counter, getting the counter reading.
- After all counter data has been collected, the modem goes back into lower power consumption mode until 22.00 the next day. All processes are repeated.

Solution.**MTX65ULP modem + MTXTunnel V7****Config.txt configuration file:**

COMM_baudrate: 115200	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autocts: on	CTS hardware control enabled
COMM_autorts: on	RTS hardware control enabled
COMM_stopbits: 1	1 stop bit.
COMM_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 8.8.8.8	Google DNS. Must be used if TCP_IP is set to DNS
GPRS_timeout: 120	GPRS connected two minutes after no data traffic
MTX_model: MTX65ULP	MTX-Terminal modem model: MTX65ULP
MTX_mode: server	TCP server mode
MTX_TPServer: time-a.timefreq.bldrdoc.gov	Time Sever. See details
TCP_port: 20010	TCP port used .
FIREWALL_enabled: off	MTXTunnel will accept incoming connections from any IP address
DNS_enabled: on	DNS service enabled
DNS_mode: socket	DNS communication socket type TCP
DNS_password: 12345678	Password string sent in DNS communication
DNS_server: 83.53.241.198	DNS Server IP URL
DNS_port: 20000	DNS Server TCP port

ULP_sleepMode: date
ULP_mode: gprs
ULP_time1: XX2200

MTX65ULP Wake up made mode: time alarm
Telemetry sends by GPRS, not SMS.
MTX65ULP will wake up every day (XX) at 22.00h

Details

1.-Remote IP address modem is sent using this text string format:

#IMEI#

Extended text string format with "DNS_extended: on parameter can be used to get also GPIO digital and analog input values: #IMEI#DNS_password#IPPublica#gpio1#gpio2# ... #gpio10#adc1#adc2#

2.- GPRS_timeout parameter set to "2" which forces the GPRS connection to be active for 2 minutes with no data exchange between the server and the remote counter. If data exchange takes 10 minutes, in around 10+2 minutes the modem goes back into low power mode automatically.

3. - If you need access to remote modems using configured IP addresses, use [FIREWALL_enabled](#) parameter.

4. You need to use a timing server with TP protocol. So the [MTX_TPServer](#) parameter needs to be configured. Internal RTC modem has some deviations (4 to 5 seconds per day) so if this time synchronization is not used, there could be big differences in real time and modem time.

After power up, this time synchronization is needed to setup the internal modem time.

The end user can made themselves a simple timing server using TP protocol, but there are many free of charge public servers. The configuration manual details how you can find some of these servers.

Every wake up modem procedure synchronizes their internal time with the external server. If it cannot do it, it will retry the next day.

The modem's first wake up procedure will NOT enter into low power mode until time synchronization is complete. This is needed to get the local time. Do not worry about the amount of data or power consumption as both are low.

Annex 4.
API configurations and examples scenarios.

API CONFIGURATION EXAMPLE 4.1

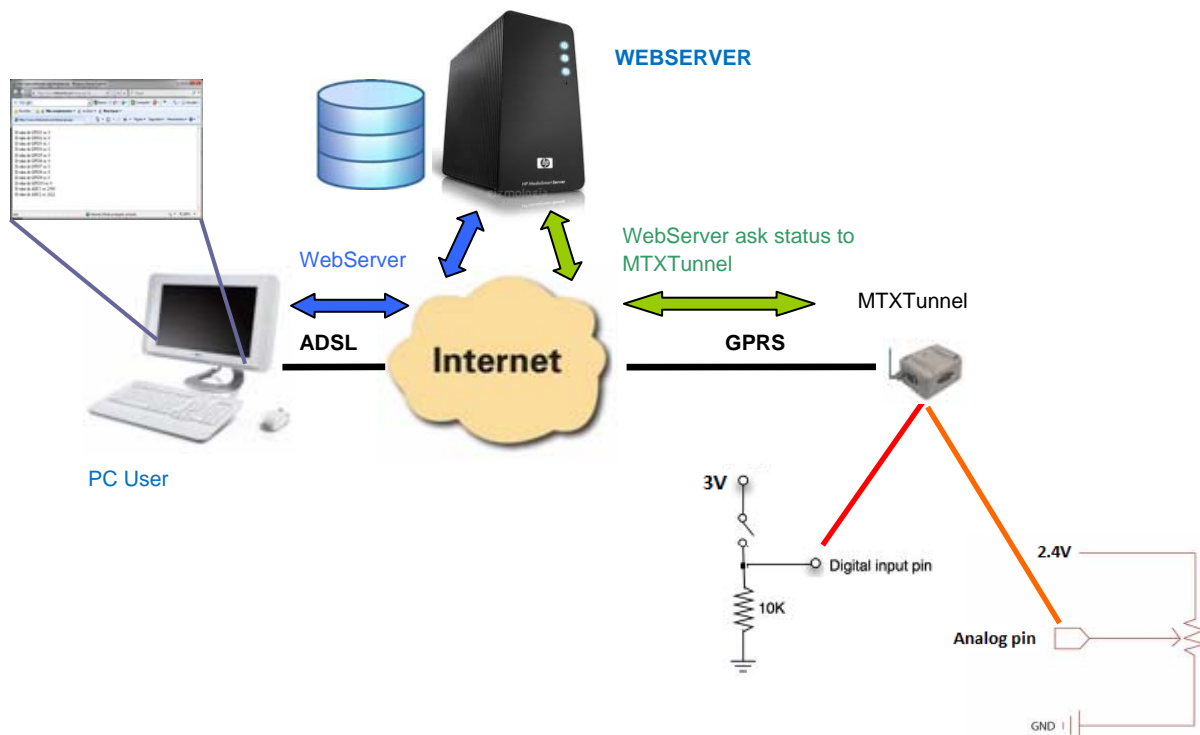
9.4.1. API used for reading MTXTunnel GPIOs and ADCs from third-party WEB page.

Scenario details:

- You need to remotely monitor the modem’s digital and analog inputs and present the values in a third-party or end customer web page.
- MTXTunnel has to be permanently connected to GPRS in server mode, waiting for HTTP GET connections coming from this web page.
- The end customer web page will be ASP language programmed and will collect all of the values and display them.

Solution.

MTX65i modem + MTXTunnel V7 software



Config.txt configuration file:

GPRS_apn: movistar.es	GPRS APN from your network operator	
GPRS_login: MOVISTAR	GPRS Login	
GPRS_password: MOVISTAR	GPRS Password	
GPRS_timeout: 0	Modem is permanently connected to GPRS	
MTX_model: MTX65i	MTXTerminal modem model used	
MTX_mode: server	TCP server mode	
WEBSERVER_enabled: on	WebServer service enable	
WEBSERVER_firewall: off	Firewall disabled	
WEBSERVER_login: user	WebServer Login	
WEBSERVER_password: 1234	WebServer Password	
WEBSERVER_skin: http://www.mtxtunnel.com/webserverimg/		WebServer Skin
WEBSERVER_gsmScript: http://www.blogoelectronica.com/gps/gsm.php		Script GSM positioning

ASP page programming example.

The ASP programming example for this scenario is very simple.

Basically, in ASP code we use AT commands that are executed remotely and collect the responses. The command used is AT^MTXTUNNEL=GETIOS which obtain all of the digital and analog input values in one shot.

The results of these values are shown in the web explorer:

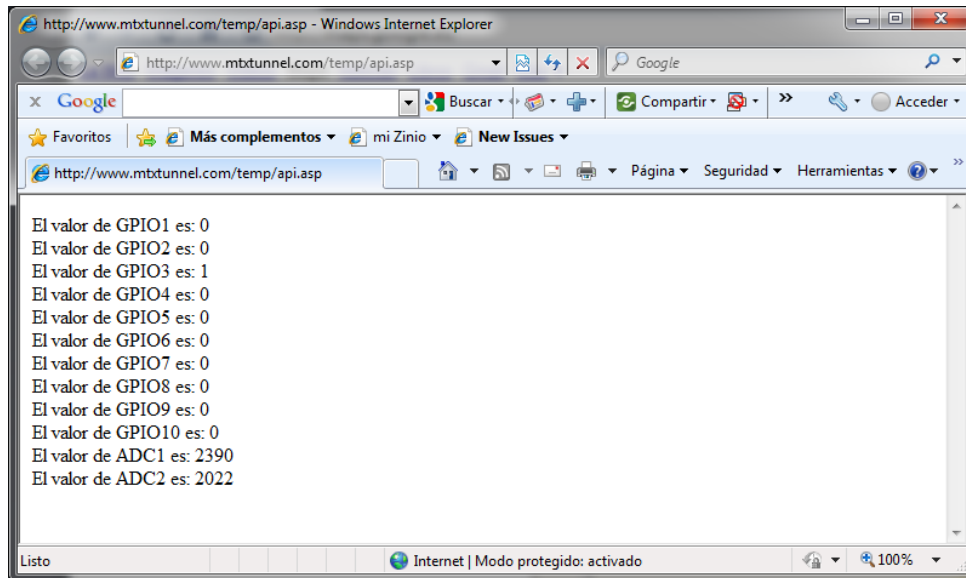
```
<%
    set XmlObj = Server.CreateObject("Microsoft.XMLHTTP")
    XmlObj.open "GET",
"http://mtxntunnel.dyndns.org/api.html?ATCOMMAND=AT%5EMTXTUNNEL=GETIOS&LOGIN=user&PASS=1234", false
    XmlObj.send
    datosDelMTXTunnel = XmlObj.responseText

    cadenaInicio="<MTXTUNNEL>AT^MTXTUNNEL=GETIOS "
    posiIni=instr(1,datosDelMTXTunnel,cadenaInicio)
    posiFin=instr(1,datosDelMTXTunnel,"</MTXTUNNEL>")
    datosIO=mid(datosDelMTXTunnel,len(cadenaInicio),posiFin-len(cadenaInicio))

    vectorDatos=split(datosIO,",")
    for i=0 to 9
        Response.write("El Value de GPIO" & i+1 & " es: " & vectorDatos(i) & "<br>")
    next
    Response.write("El Value de ADC1 es: " & vectorDatos(10) & "<br>")
    Response.write("El Value de ADC2 es: " & vectorDatos(11) & "<br>")
```

%>

The web page will show:



API CONFIGURATION EXAMPLE 4.2

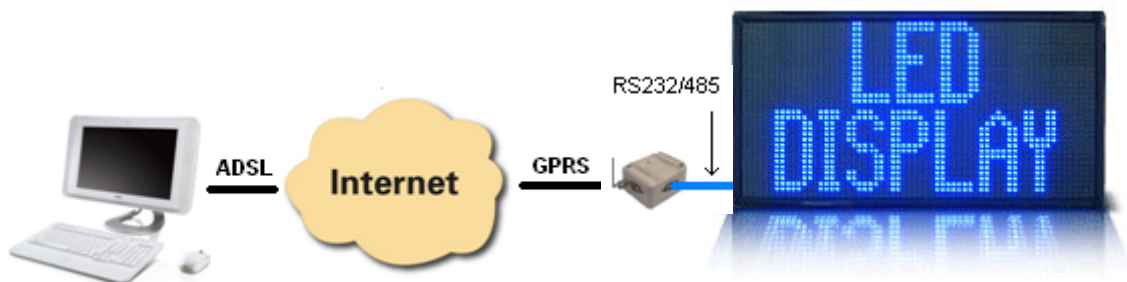
9.4.2. Using API to send data coming from a third-party Web Page form and output serial port MTXTunnel.

Scenario details:

- We have a special display/LCD with an RS232 serial. The data present in RS232 port is shown in the display.
- We need to remotely control the LCD using the MTXTunnel GPRS-Serial tunnel.
- We can control the LCD in several ways:
 - We could develop a code for the server PC and use the TCP/IP port socket to connect to MTXTunnel.
 - This example shows how to do this in any third-party web page using a form. The form will have a user defined entry box, so the text data captured will be resent to LCD using RS232 port. The LCD will answer with a code which will be displayed in the Web page form.

Solution.

MTX65i modem + MTXTunnel V7 software



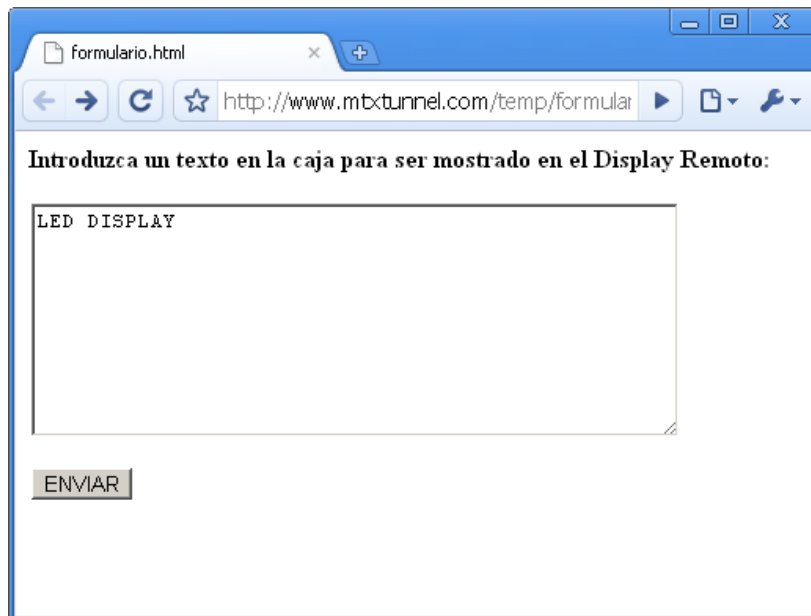
Config.txt configuration file:

GPRS_apn: movistar.es	GPRS APN from your network operator	
GPRS_login: MOVISTAR	GPRS Login	
GPRS_password: MOVISTAR	GPRS Password	
GPRS_DNS: 80.58.0.33	Network operator or DNS server IP address	
GPRS_timeout: 0	Modem is permanently connected to GPRS	
MTX_model: MTX65i	MTXTerminal modem model used	
MTX_mode: server	TCP server mode	
WEBSERVER_firewall: off	Firewall disabled	
WEBSERVER_enabled: on	Internal WebServer enabled	
WEBSERVER_login: user	WebServer Login	
WEBSERVER_password: 1234	WebServer Password	
WEBSERVER_skin: http://www.mt xtunnel.com/webserverimg/	WebServer Skin	
WEBSERVER_gsmScript: http://www.blogelectronica.com/gps/gsm.php	Script GSM positioning	

Third-party Web page form example:

This example has a very simple HTML code web page. It has a form with a text field and a button. HTML code also has a small script –JavaScript code- calling MTXTunnel.

This is the Web Page aspect:



HTML code for this webpage is as follows. Please ask gsm-support@matrix.es for the full code.

```
<html>
<head></head>
<body>

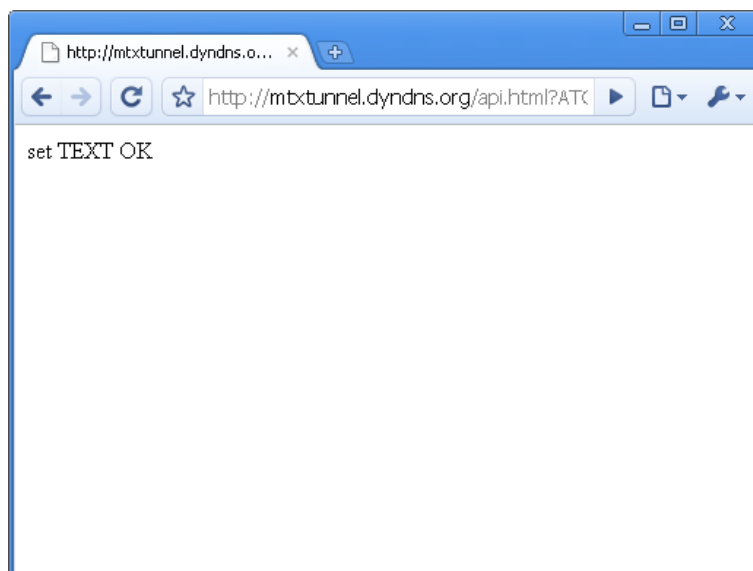
<script type="text/javascript">
  function enviar()
  {
    var texto = document.FORMU.TEXT0.value;
    document.location.href="http://mtxtunnel.dyndns.org/api.html?ATCOMMAND=AT%5EMTXTUNNEL=RS232,1," +
|texto + "&LOGIN=user&PASS=1234";
  }
</script>

<p><b>Introduzca un texto en la caja para ser mostrado en el Display Remoto:</b></p>
<form method="GET" action="http://mtxtunnel.dyndns.org/api.html" name="FORMU">
  <p><textarea rows="9" name="TEXT0" cols="49"></textarea></p>
  <p><input type="button" value="ENVIAR" name="B1" onclick="enviar()"></p>
</form>

</body>
</html>
```

This example "LED DISPLAY" text has been written in Webpage form and it is sent to remote MTXTunnel and GPRS-serial tunnel. After this the data is now in the R232 port which will be shown in the LCD display.

LCD screen response with "Set TEXT OK" code is now travelling in the opposite way, shown in the webpage form.



This is very simple example; in real application complex codes should be implemented.

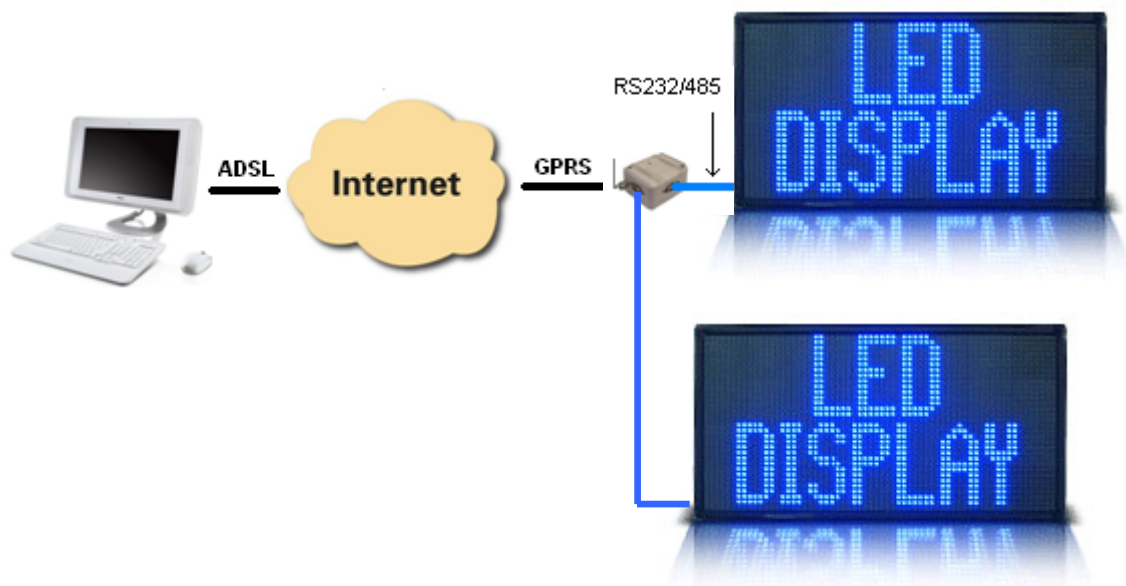
We can control two LCD screens with just one MTXTerminal modem with MTXTunnel installed.

Key is AT^MTXTUNNEL command.

In the example, we used AT^MTXTUNNEL=RS232,1

But this command can send data to COM2 changing the value parameter to 2

So we can control 2 LCD screens as follows:



API CONFIGURATION EXAMPLE 4.3

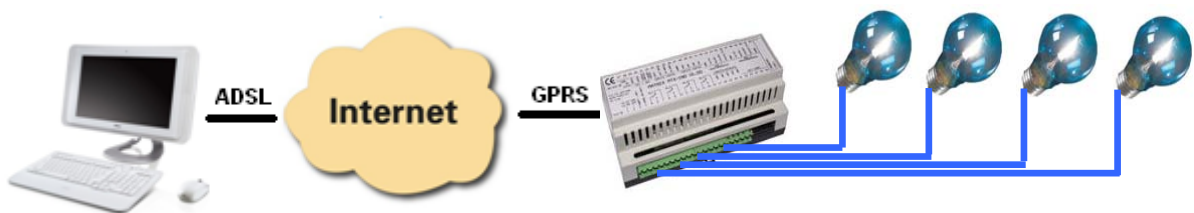
9.4.3. Using API to switch 4 relays from a third-party or end user Web page.

Scenario details:

- We want to program a web page and switch 4 relays, to switch lamps on/off.
- An end user will open the web page and will switch the external lamps on/off with a click of the mouse. MTXTunnel has to communicate the webpage data with modem's GPIO.
- We use the MTX-IND modem terminal but other models can be used to change the digital output level.

Solution.

MTX65IND modem + MTXTunnel V7 software



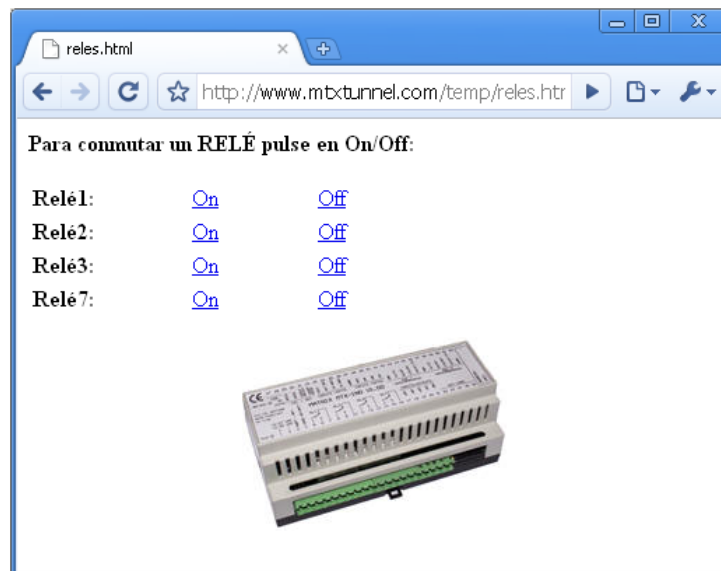
Config.txt configuration file:

GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_DNS: 80.58.0.33	Network operator DNS
GPRS_timeout: 0	Modem is permanently connected to GPRS
MTX_model: MTX65IND	MTX-Terminal modem model MTX-INDV2
MTX_mode: server	TCP server mode
WEBSERVER_firewall: off	Firewall disabled
WEBSERVER_enabled: on	Internal WebServer enabled
WEBSERVER_login: user	WebServer Login
WEBSERVER_password: 1234	WebServer Password
WEBSERVER_skin: http://www.mt xtunnel.com/webserverimg/	WebServer Skin
WEBSERVER_gsmScript: http://www.blogelectronica.com/gps/gsm.php	Script GSM positioning

HTML web page example code

We will switch the 4 relays inside MTX65IND. We will not show the initial relay state to simplify the example, if you need it simply add the code in Example 12 to this example.

The web page aspect is shown in the following picture. Only this simple HTML code translates the link in an AT command to be sent remotely. The AT command changes GPIO output level.



Source code

```
<html>
<head></head>
<body>

<p><b>Para conmutar un RELÉ pulse en On/Off:</b></p>
<table border="0" width="318" id="table1">
  <tr>
    <td width="110"><b>Relé1:</b></td>
    <td width="86"><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=0,0&LOGIN=user&PASS=1234">On</a></td>
    <td><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=0,1&LOGIN=user&PASS=1234">Off</a></td>
  </tr>
  <tr>
    <td width="110"><b>Relé2:</b></td>
    <td width="86"><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=1,0&LOGIN=user&PASS=1234">On</a></td>
    <td><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=1,1&LOGIN=user&PASS=1234">Off</a></td>
  </tr>
  <tr>
    <td width="110"><b>Relé3:</b></td>
    <td width="86"><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=2,0&LOGIN=user&PASS=1234">On</a></td>
    <td><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=2,1&LOGIN=user&PASS=1234">Off</a></td>
  </tr>
  <tr>
    <td width="110"><b>Relé7:</b></td>
    <td width="86"><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=6,0&LOGIN=user&PASS=1234">On</a></td>
    <td><a href="http://mtxunnel.dyndns.org/api.html?ATCOMMAND=AT^SSIO=6,1&LOGIN=user&PASS=1234">Off</a></td>
  </tr>
</table>

</body>
</html>
```

API CONFIGURATION EXAMPLE 4.4

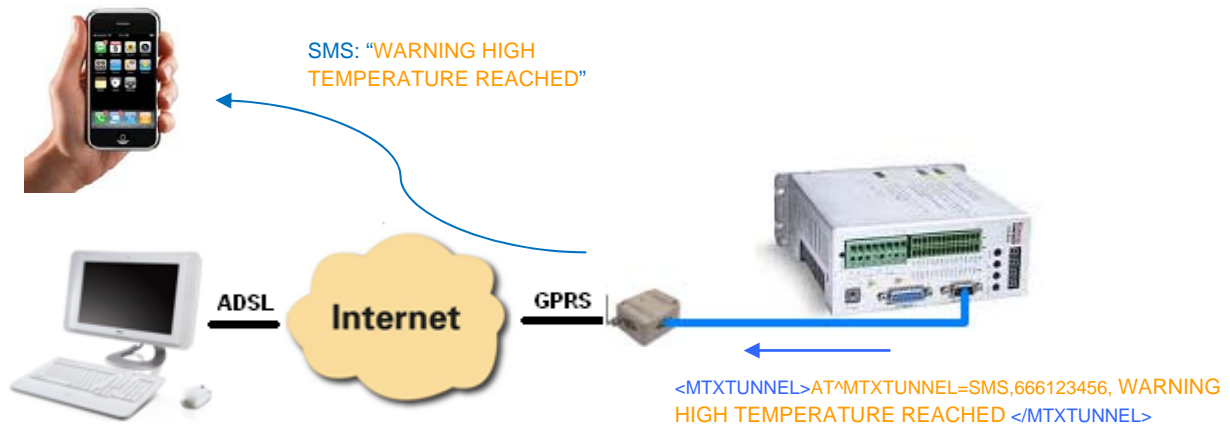
9.4.4. Using API to send SMS to external PLC device connected to COM1 at the same time as the Serial-GPRS tunnel is active.

Scenario details:

- MTXTunnel is used by the GPRS-Serial gateway to collect and send data from PLC serial port to a server. GPRS session is always active.
- PLC device can send an alarm SMS.
- Serial COM port is used in both cases, so somehow we need to assure that the GPRS-Serial is active and also be able to send an SMS using AT commands in the same COM port at the same time.

Solution.

MTX65i modem + MTXTunnel V7 software



Config.txt configuration file:

GPRS_apn: movistar.es	GPRS APN from your network operator	
GPRS_login: MOVISTAR	GPRS Login	
GPRS_password: MOVISTAR	GPRS Password	
GPRS_DNS: 80.58.0.33	Network operator or DNS server IP address	
GPRS_timeout: 0	Modem is permanently connected to GPRS	
MTX_model: MTX65IND	MTX-Terminal modem model MTX-INDV2	
MTX_mode: server	TCP server mode	
MTX_ATMux: on	AT multiplexing mode on serial port enabled	
WEBSERVER_firewall: off	Firewall disabled	
WEBSERVER_enabled: on	Internal WebServer enabled	
WEBSERVER_login: user	WebServer Login	
WEBSERVER_password: 1234	WebServer Password	
WEBSERVER_skin: http://www.mtxtunnel.com/webserverimg/	WebServer Skin	
WEBSERVER_gsmScript: http://www.blogelectronica.com/gps/gsm.php	Script GSM positioning	

Detailed explanation

The simplest way to solve this scenario is to use an AT command multiplexer. This allows you to send AT commands at same time as the GPRS-serial tunnel is established. Enable `MTX_ATMux` parameter to “on” to activate the multiplexer.

The AT commands must have a special format, between tags:

```
<MTXTUNNEL></MTXTUNNEL>
```

In the example, to send “WARNING HIGH TEMPERATURE REACHED” to the end phone number 666123456 the command will be:

```
<MTXTUNNEL>AT^MTXTUNNEL=SMS,666123456,WARNING HIGH TEMPERATURE
REACHED </MTXTUNNEL>
```

The command is interpreted and MTX TUNNEL executes it. The AT response will also be between the same tags.

Annex 5.

Wavenis communication examples and scenarios

What is Coronis Wavenis?

[Coronis](#) is a manufacturer of RF equipment and solutions whose products are distributed by Matrix Electronica and used in some MTX-Terminals to help your M2M design when you need the MESH network to read sensors or counters.

Basically Coronis radio cards used in MTXTunnel are:

- Waveflow:** RF 868MHz equipment can be connected to water/energy/gas counter to measure pulse counters.
- Wavetherm:** RF 868MHz temperature sensor
- Wavesense:** RF 868MHz analog input sensor (0-10V y 4-20mA)

All these equipments can have an internal battery in IP68 waterproof housing or can be main powered (220VAC) in IP65 housing.

MTX65IND2 MTX-Terminal modem has a special ordering code with Wavecard installed inside. This RF card is connected to COM2 and it's configured by default at 9600,8,N,1 no flow control.

How does this system work?

It is very easy to create mesh RF network and use MTX as a Gateway concentrator. It is possible to connect to MTXTunnel via TELNET and use AT commands to read/write remote RF wavenis card and then obtain temperature, analog values, pulses... You can also configure MTXTunnel in automatic and periodic way with it reading the sensors, storing values in an internal memory and sending them to a server using JSON object.

Please read the following examples, then you will understand how this system works.

Remote MESH example 5.1

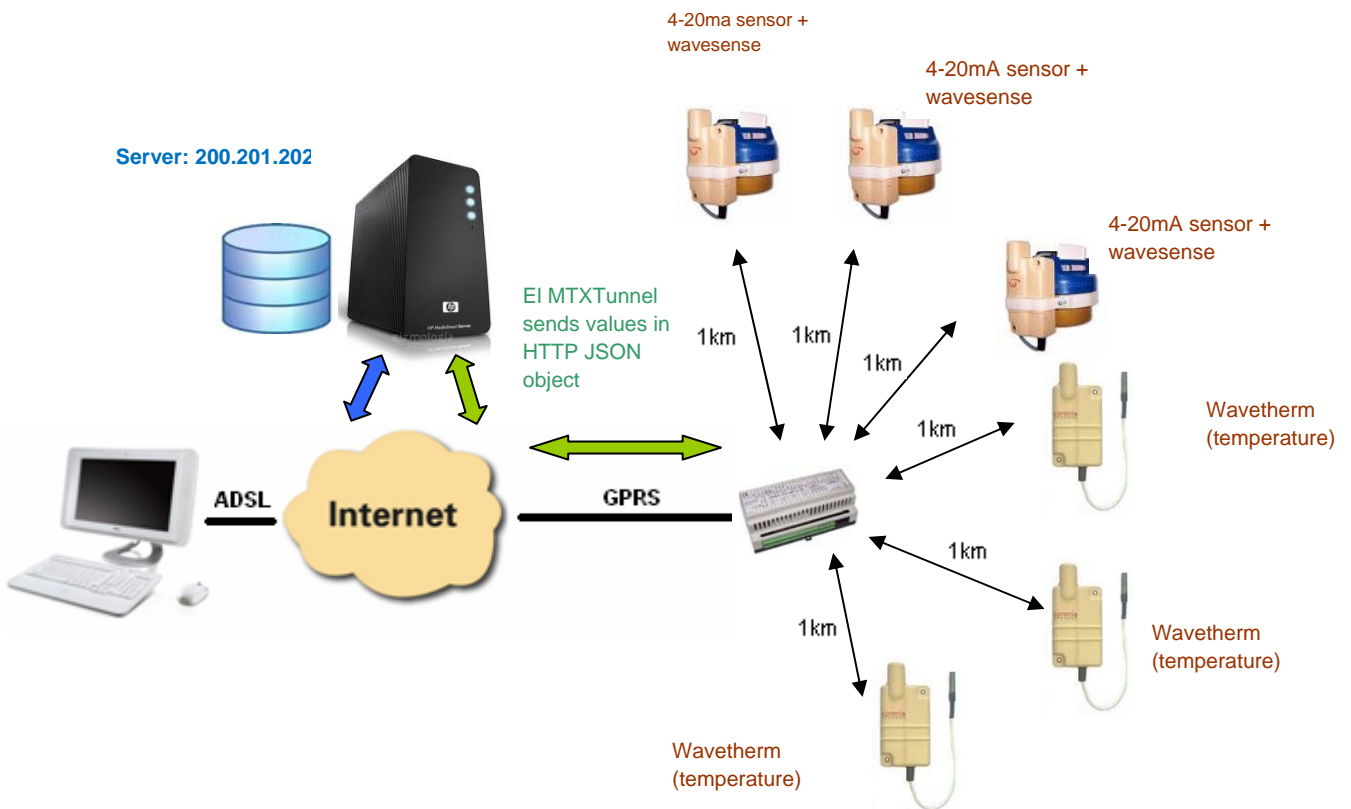
9.5.1. Read remote counters and current 4-20mA sensors

Scenario details:

- There are 6 remote sensors connected to the MTX-Terminal using RF network with MTX-Tunnel installed. 3 sensors measure the temperature and the other 3 sensors measure the analog current in 4-20 mA range. All data will be sent by GPRS network to a central server.
- We will use Coronis WaveSense and Wavetherm devices. This hardware equipment has IP68 housing in case the WaveSense has an analog input of 4-20mA and in case the Wavetherm has a Dallas temperature sensor. These devices can reach 1Km of range in direct vision. If this distance is not enough to get to MTXTunnel acting as gateway concentrator, we could use up to 3 Coronis Wavetalk repeaters. For simplicity, we will not use repeaters in this example.
- MTXTerminal MTX65INDV2 terminal modem with Coronis Wavecard hardware inside will be used. MTXTunnel will be installed and configured to read those sensors every 2 hours and send the values formatted in JSON object to a central server using the GPRS connection.

Solution.

Modem MTX65IND2 + software MTXTunnel v7



Config.txt configuration file:

COMM2_baudrate: 9600	Serial port baud rate
COMM2_bitsperchar: 8	8 bit data
COMM2_autocts: off	CTS flow control disabled don't needed for Wavenis
COMM2_autorts: off	RTS flow control disabled don't needed for Wavenis
COMM2_stopbits: 1	1 stop bit.
COMM2_parity: none	No parity.
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Modem is always GPRS connected.
MTX_model: MTX65IND2	MTX-Terminal modem model: MTX-IND-V2 (With Wavcard)
MTX_mode: none	GPRS-Serial tunnel not needed
MTX_urc: off	URC messages will be not output
MTX_portAux: wavenis	Com2 MTX65IND2 used for Wavcard.
MTX_TPServer: time-a.timefreq.blrdoc.gov	Time server
MTX_TPServer2: time-b.timefreq.blrdoc.gov	Backup time server
MTX_ATEEmbedded: on	Can write/read AT commands using Telnet
MTX_ping: 30	Every 30 seconds we send PING request
MTX_pingIP: 8.8.8.8	PING IP request address
FIREWALL enabled: off	MTXTunnel will accept incoming connections from any IP address
TELNET_enabled: on	Telnet service feature enabled
TELNET_login: user	Telnet Login
TELNET_password: 1234	Telnet Password
TELNET_firewall: off	Firewall disabled: TELNET remote session accepted from any IP address
SMS_sendIP: on	IP address will be sent to remote phone which has made lost call or "on" text SMS
SMS_alPhones: on	All number phones are authorized
SMS_ATEEnabled: on	Remote AT commands by SMS enabled
SMS_ATResponse: on	Modem response to AT command with SMS
LOGGER_enabled: on	Internal Datalogger enabled
LOGGER_password: ID001	Password field can be used as identification device
LOGGER_server: http://www.dominio.com/datos.asp?datos=	Server URL, will receive JSON data
LOGGER_registerSize: 250	Register size
LOGGER_numRegistersFlash: 300	Register size to be stored on NV memory for sending when services available.
WAVENIS_mac1: 0B2311300201	Wavesense MAC address device number1
WAVENIS_mac2: 0B2311300202	Wavesense MAC address device number2
WAVENIS_mac3: 0B2311300203	Wavesense MAC address device number3
WAVENIS_mac4: 0B19083000D3	Wavetherm MAC address device number1
WAVENIS_mac5: 0B19083000F4	Wavetherm MAC address device number2
WAVENIS_mac6: 0B19083000A2	Wavetherm MAC address device number3
WAVENIS_period: 7200	Read Wavenis remote card time: 200 seconds (2 hours)
WAVENIS_retries: 2	Retries in case of failures

Details.

1.- Every 2 hours the MTX65IND2 modem will take the measurements from every remote sensor. The reading value is translated into a JSON object and it is sent to a server which is already configured in LOGGER_server.

In case the GPRS network is lost or the server fails, MTXTunnel stores data in the internal memory in order to retry later.

2. - JSON object format is simple. For Wavetherm, JSON is as follows:

```
{"IMEI":357973041110401,"TS":"18/10/12
10:04:32","P":"ID001","A":0B19083000D3,"BAT":0,"T1":23.4375,"T2":0.
0 }
```

IMEI: Modem IMEI

TS: Time Stamp.

P: User defined field

A: MAC address of device read (wavesense1 in this example)

BAT: Battery indication: Low level (1) – Correct level (0)

T1: Wavetherm temperature from Dallas sensor.

T2: Wavetherm device supports up to 2 temperature sensors, this will have a value if the

second sensor is installed.

For wavesense (4-20mA) sensors JSON format is very similar:

```
{"IMEI":357973041110401,"TS":"18/10/12
10:04:37","P":"ID001","A":0B2311300201,"BAT":0,"CU":8.20}
```

JSON object information MTXTunnel sends:

IMEI: Modem IMEI

TS: Time Stamp.

P: User defined field

A: MAC address of device read (wavesense1 in this example)

BAT: Battery indication: Low level (1) – Correct level (0)

CU: Current reading from Wavesense

3. - It is possible to take a real time reading from any sensor at any moment. You need to send a remote AT command in order to do this. You can send remote AT commands via SMS or TELNET.

See chapter 7 to get detailed information about proprietary special AT commands to be used with Wavenis cards.

As an example, AT commands to get measurement from wavethem1 and wavesense1 sensors are:

```
AT^MTXTUNNEL= READWAVETHERM, 0B19083000D3
```

```
AT^MTXTUNNEL= READWAVESENSEC, 0B2311300201
```

Annex 6.

Examples and scenarios for automatic readings of MODBUS devices

MODBUS SCENARIO EXAMPLE 6.1

9.6.1. PLC MODBUS RTU periodically registers the readings. Sending them as JSON to a WebServer

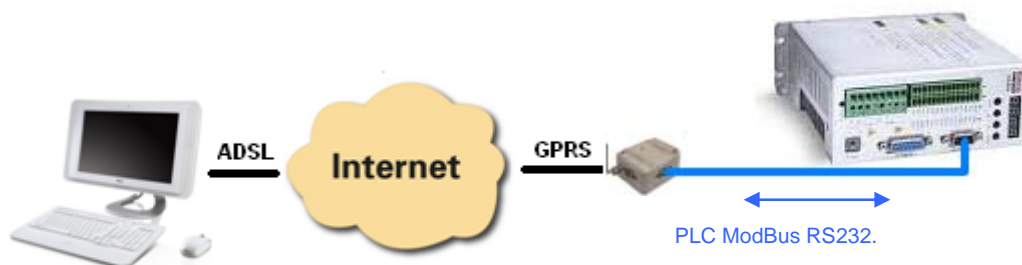
Scenario details:

- There is a Modbus RTU PLC. This PLC is registering some variables in their register memory table from external devices connected to it like temperature, pulses... We need to read them and send them to a WebServer.
- MTXTunnel will connect every 15 minutes to PLC serial port. The number for storing temperature is number 20. Pulse counters are stored in registers table number 21, 22 and 23 respectively.
- MTXTunnel will get all data values and will transform them in JSON objects in order to send them to a WebServer via HTTP GET procedure. In case the GPRS network or server fails, it needs to store up to 1500 readings in MTXTunnel's non volatile internal memory and then it can retry communicating later on.
- You also need to be able to access the PLC at any time in order to read register values in real time or write/change any of PLC's configuration parameters.

Solution.

MTX65i modem + MTXTunnel v7 software

MTX65i-RS485 or MTX-IND/MTX-IND V2 terminals are more suitable if PLC has RS485 port.



Config.txt configuration file:

COMM2_baudrate: 9600	Serial port baud rate
COMM2_bitsperchar: 8	8 bit data
COMM2_autorts: off	No flow control
COMM2_autocts: off	No flow control
COMM2_stopbits: 1	1 stop bit
COMM2_parity: none	No parity
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Modem is permanently connected to GPRS
MTX_PIN: 0000	SIM Card PIN
MTX_mode: none	MTXTunnel mode.
MTX_model: MTX65i	MTX-Terminal modem model MTX65i
MTX_portAux: modbusmaster	AUXILIAR COM port used as master modbus
MTX_TPServer: time-a.timefreq.bldrdoc.gov	Time server
MTX_TPServer2: ptbtime1.ptb.de	Backup time server
MTX_ping: 35	Every 35 minutes we send PING request
MTX_pingIP: 8.8.8.8	PING IP request address
MTX_radioBand: europe	If modem is installed on Europe
SMS_allPhones: on	All number phones are authorized
SMS_sendIP: on	IP address will be sent to remote phone which has made a missed call
or "on" text SMS	
SMS_ATEabled: on	Remote AT commands by SMS enabled
SMS_ATResponse: on	Modem response to AT command with SMS
FIREWALL_enabled: off	MTXTunnel will accept incoming connections from any IP address
TELNET_enabled: on	Telnet service feature enabled
TELNET_login: user	Telnet Login
TELNET_password: 1234	Telnet Password
TELNET_firewall: off	Any IP address can TELNET to MTXTunnel
LOGGER_enabled: on	Internal Datalogger enabled
LOGGER_password: ID00001	Password field can be used as identification device
LOGGER_server: www.miservidorWeb.com/json.asp?data=	Server URL, will receive JSON data
LOGGER_registerSize: 300	Register size
LOGGER_numRegistersFlash: 1500	Register size to be stored on NV memory for sending when services
available	
MODBUS_address: 1	ModBus equipment address
MODBUS_start: 20	ModBus register address to be read
MODBUS_numwords: 4	Number of registers read
MODBUS_period: 900	Timing -seconds- read is repeated

Details.

1.- MTX65i modem is used if PLC port is the RS232 type, but MTX65i-RS485 or MTX-IND/MTX-IND V2 terminals are more suitable if PLC has the RS485 port.

2.- Procedure

Every 15 minutes the modem reads a series of PLC ModBus records. They are translated to JSON objects and sent to a WebServer. WebServer URL is configured in LOGGER_server parameter.

In case there is no coverage in GPRS link or the server is down, MTXTunnel stores data in internal FLASH memory.

Using TELNET it is possible to remotely access the system and read or write any PLC records, readings or configuration parameter. Use AT^MTXTunnel=getmodbus and AT^MTXTUNNEL=setmodbus commands.

JSON object data sent to server has following syntax:

```
{"IMEI":353234028103206,"P":"ID00001","A":1,"TS":"20/08/12  
08:31:44","V1":23,"V2":275,"V3":274,"V4":32765}
```

WebServer receives JSON object with the following information:

IMEI: Modem IMEI identifier

:Password user definable field

A: ModBus address

TS: Timestamp

Vx are variables read

NOTE. You can also develop an easy modbusTCP / modbusRTU gateway as explained in [example number 2.15](#)

Scenario Example 6.2

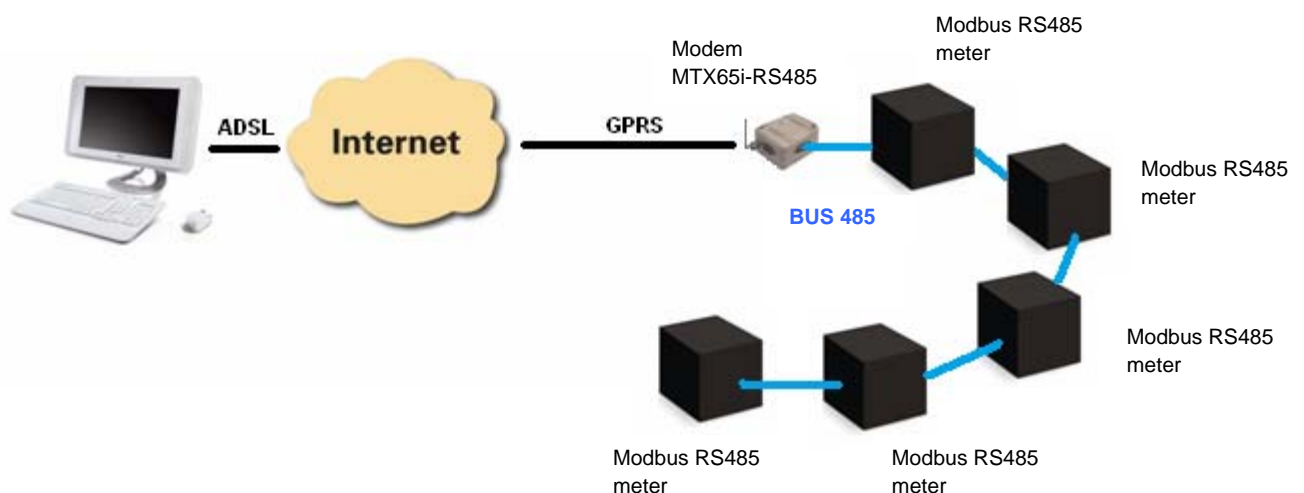
9.6.2. Periodically obtaining readings from 5 electronic meters and sending them to a Web Server using the ModBus RTU protocol.

Scenario details:

- We have 5 electric meters with ModBus RTU protocol. These meters have a series of readings in their internal memory (e.g. cumulative consumption and average consumption) which should be read and sent to a Web server periodically.
- Therefore every 15 minutes the MTXTunnel has to question the 5 meters to read the records via a serial port. The records to read are for the cumulative consumption (record nº20) and for average consumption (record nº 21).
- After every reading MTX tunnel has to send the records to a web server via HTTP GET using a JSON object. However it must be able to store up to 1500 readings in flash memory in case there is a communication failure with the GPRS so that it can send them when the connection is restored. For each meter, it will send a JSON frame where it indicates the Modbus address/identifier of the meter that has been read.
- You need to be able to access MTXTunnel at any moment to be able to read PLC records in real time as well as being able to write them and modify the PLC configuration records.

Solution.

MTX65iRS485 modem + MTXTunnel v7.12 software



config.txt configuration file:

COMM2_baudrate: 9600	Serial port baud rate
COMM2_bitsperchar: 8	8 bit data
COMM2_autorts: off	No flow control
COMM2_autocts: off	No flow control
COMM2_stopbits: 1	1 stop bit
COMM2_parity: none	No parity
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected
MTX_PIN: 0000	SIM card pin
MTX_mode: none	MTXTunnel mode
MTX_model: MTX65IRS485	MTX terminal model MTX65IRS485
MTX_portAux: modbusmaster	AUXILIAR COM port used as master modbus
MTX_TPServer: time-a.timefreq.bldrdoc.gov	Time server
MTX_TPServer2: ptbtime1.ptb.de	Backup time server
MTX_ping: 35	Every 35 minutes we send a PING request
MTX_pingIP: 8.8.8.8	PING IP request address
MTX_radioBand: europe	If modem is installed on Europe
SMS_allPhones: on	All number phones are authorized
SMS_sendIP: on	IP address will be sent to remote phone which has made a missed call
or "on" text SMS	
SMS_ATEnabled: on	Remote AT commands by SMS enabled
SMS_ATResponse: on	Modem response to AT command with SMS
FIREWALL_enabled: off	MTXTunnel will accept incoming connections from any IP address
TELNET_enabled: on	Telnet service feature enabled
TELNET_login: user	Telnet Login
TELNET_password: 1234	Telnet Password
TELNET_firewall: off	Any IP address can TELNET to MTXTunnel
LOGGER_enabled: on	Internal Datalogger enabled
LOGGER_password: ID00001	Password field can be used as identification device
LOGGER_server: www.miservidorWeb.com/json.asp?data=	Server URL, will receive JSON data
LOGGER_registerSize: 300	Register size
LOGGER_numRegistersFlash: 1500	Register size to be stored on NV memory for sending when services
available	
MODBUS_address: 1;2;3;4;5	ModBus equipment address
MODBUS_start: 20	ModBus register address to be read
MODBUS_numwords: 2	Number of registers read
MODBUS_period: 900	Timing -seconds- read is repeated

Details.

1.- The summary of this example is as follows: The modem will periodically read, every 15 minutes, two ModBus records from each counter and they will be sent to a web server via a JSON object (to the URL specified in the LOGGER_server parameter). In the case that you are not able to send the record (if there is no GPRS coverage or the server fails), it will store the data to memory in order to send it later on. With Telnet you can connect to the equipment directly in order to check/change the PLC records in real time (for this, search for AT^MTXTunnel=getmodbus and AT^MTXTUNNEL=setmodbus commands in this manual).

2.- JSON object sent to a specified URL in LOGGER_server is encoded in the following manner for example:

```
{"IMEI":353234028103206,"P":"ID00001","A":1,"TS":"20/04/13 08:31:44","V1":23,"V2":275}
```

This means that the web Server receives a JSON object with the modem's IMEI (IMEI), the password field (P) which can be used to identify the computer if you do not want to use the IMEI, the counter's modbus address (A) which distinguishes the counter that relates to the readings, the time stamp (TS) which indicates when the modbus data has been read by each counter and "V1"/"V2" which indicates the readings that have been taken.

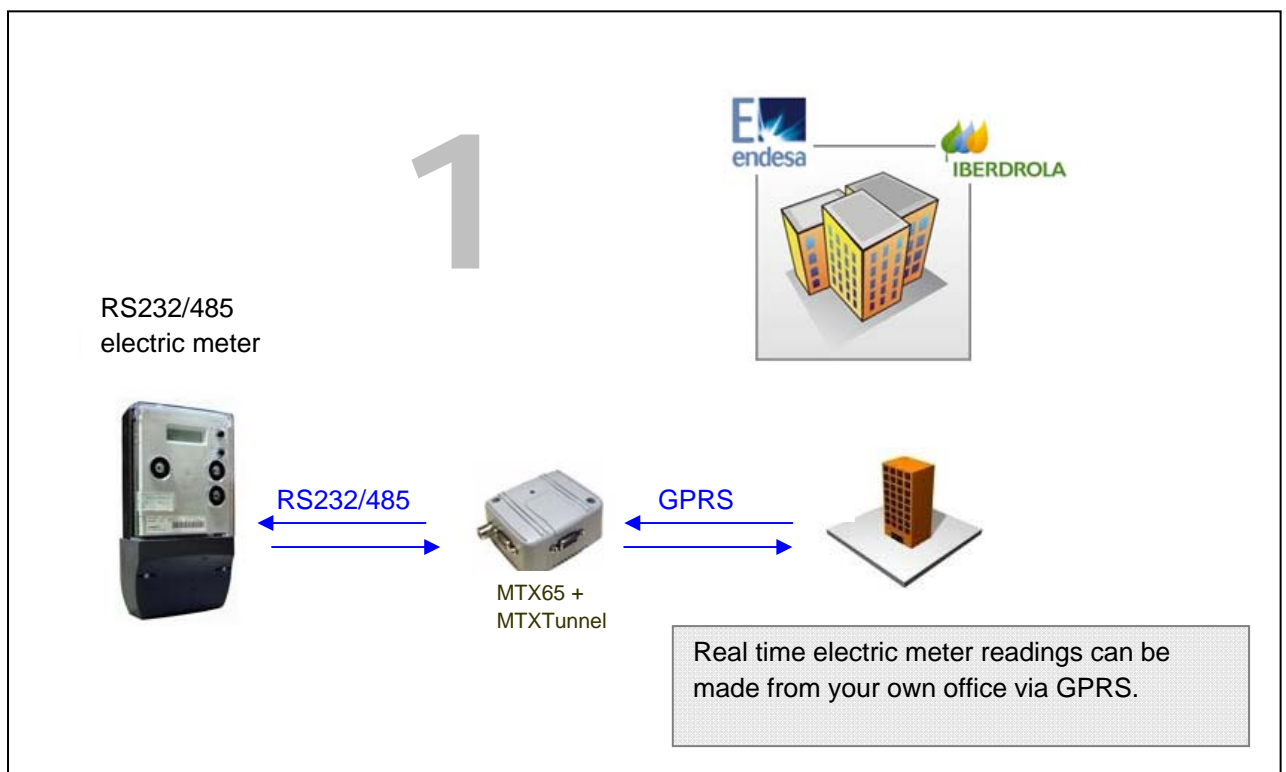
Annex 7. Metering Scenario Examples. Meter reading scenarios via GSM and GPRS

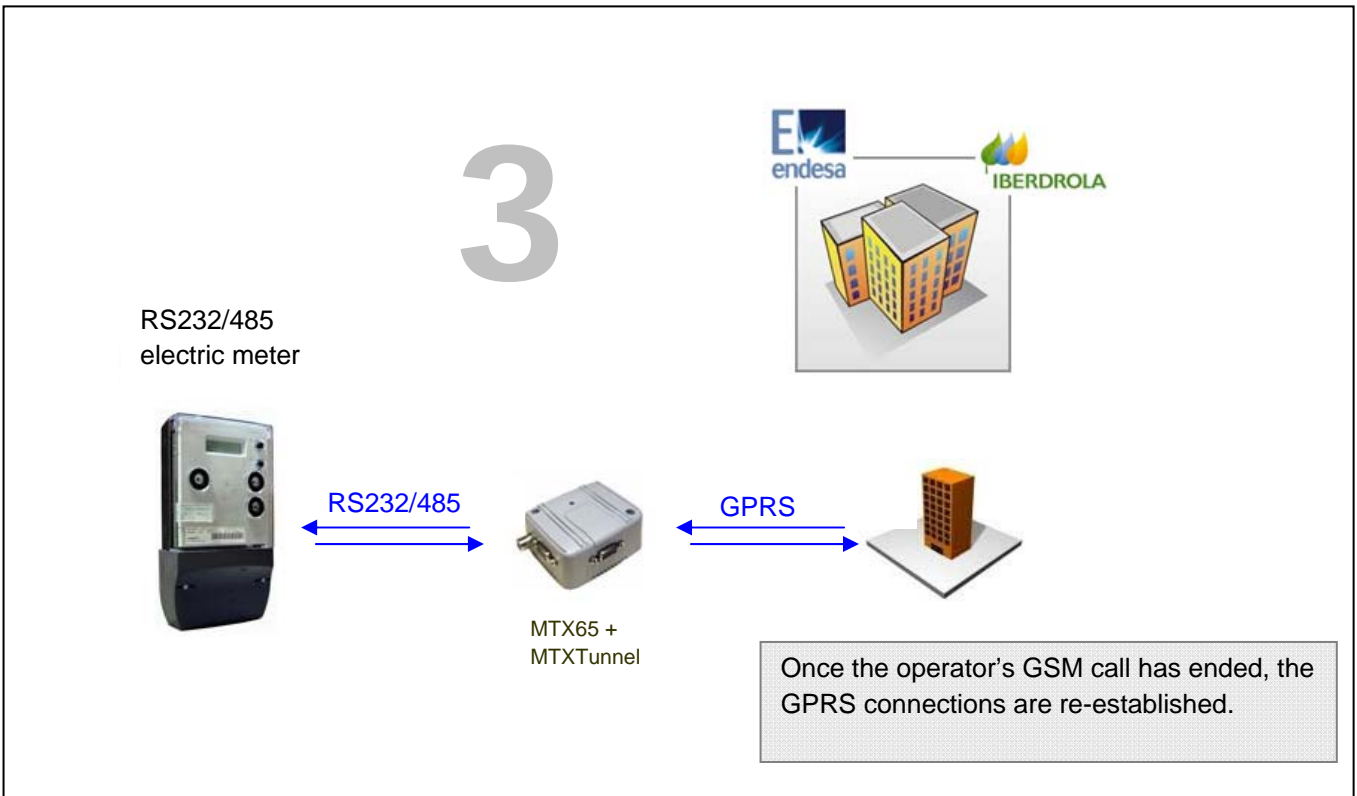
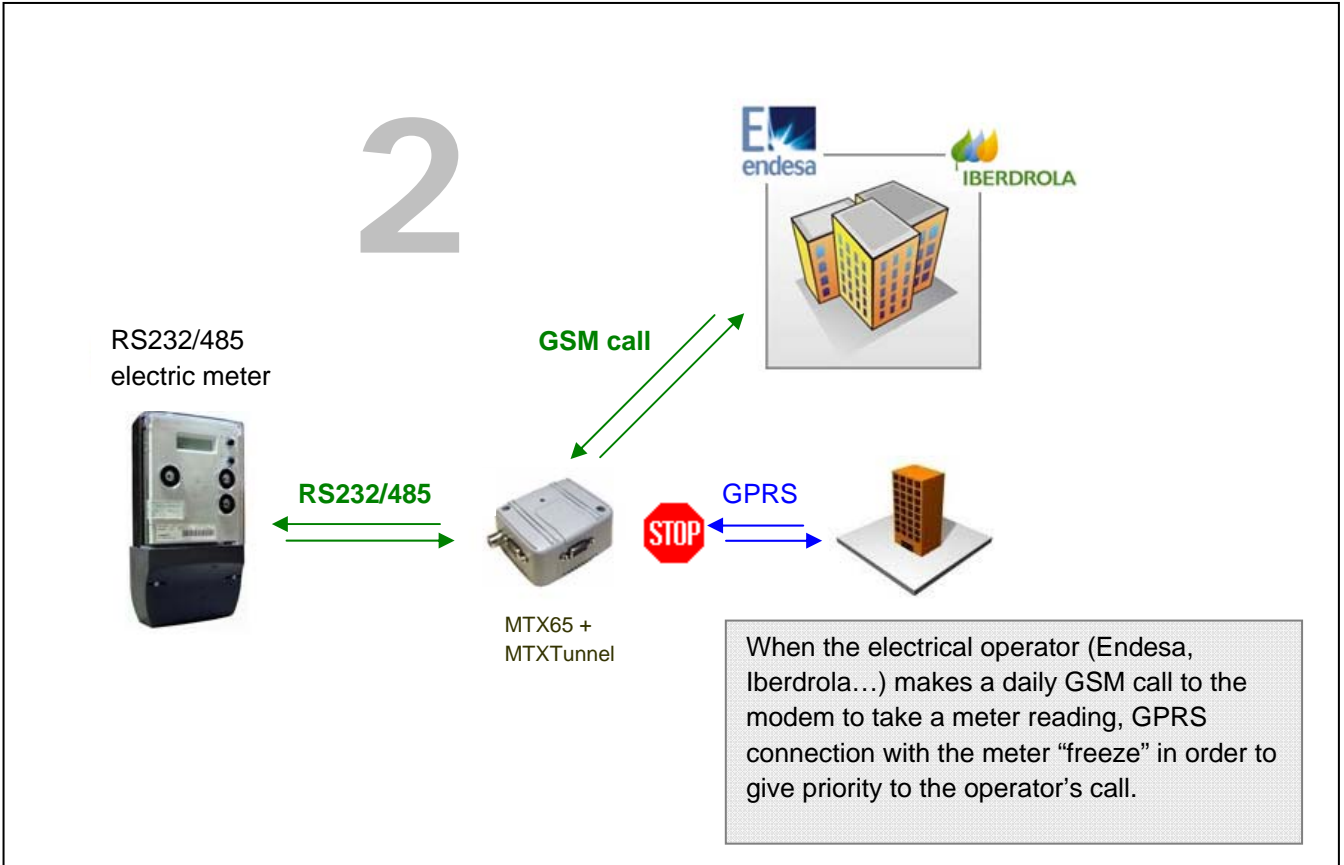
Scenario example 7.1

9.7.1. A basic example for meter reading with simultaneous GPRS connections and GSM calls

Description:

- The intention is to take electrical meter readings periodically, every 10 minutes. By obtaining readings so frequently you will access the meter via GPRS instead of with GSM calls in order to save costs.
- At the same time, the energy operator (Endesa, Iberdrola, ...) will obtain a reading once a day with a conventional GSM call.
- The GSM call will have priority. When the modem receives a call from the operator it will “freeze” GPRS connections to allow the operator to obtain readings. Once the GSM call has ended, GPRS connections are re-established.





config.txt configuration file:

COMM_baudrate: 9600	Serial port baud rate
COMM_bitsperchar: 8	8 bit data
COMM_autorts: off	No flow control
COMM_autocts: off	No flow control
COMM_stopbits: 1	1 stop bit
COMM_parity: none	No parity
GPRS_apn: movistar.es	GPRS APN from your network operator
GPRS_login: MOVISTAR	GPRS Login
GPRS_password: MOVISTAR	GPRS Password
GPRS_timeout: 0	Value 0 means MTXTunnel is always GPRS connected
MTX_mode: server	MTX Server mode
MTX_model: MTX65i	MTX terminal model MTX65i
MTX_ping: 35	Every 35 minutes we send a PING request
MTX_pingIP: 8.8.8.8	PING IP request address
MTX_radioBand: europe	If modem is installed on Europe
MTX_port: 20010	TCP port used to establish GPRS-serial Gateway and to read the energy meter
Firewall_enabled: off	MTXTunnel will accept incoming connections from any IP address
CSD_enabled: on	Able to accept GSM calls from energy operator (Iberdrola, Endesa, ...)

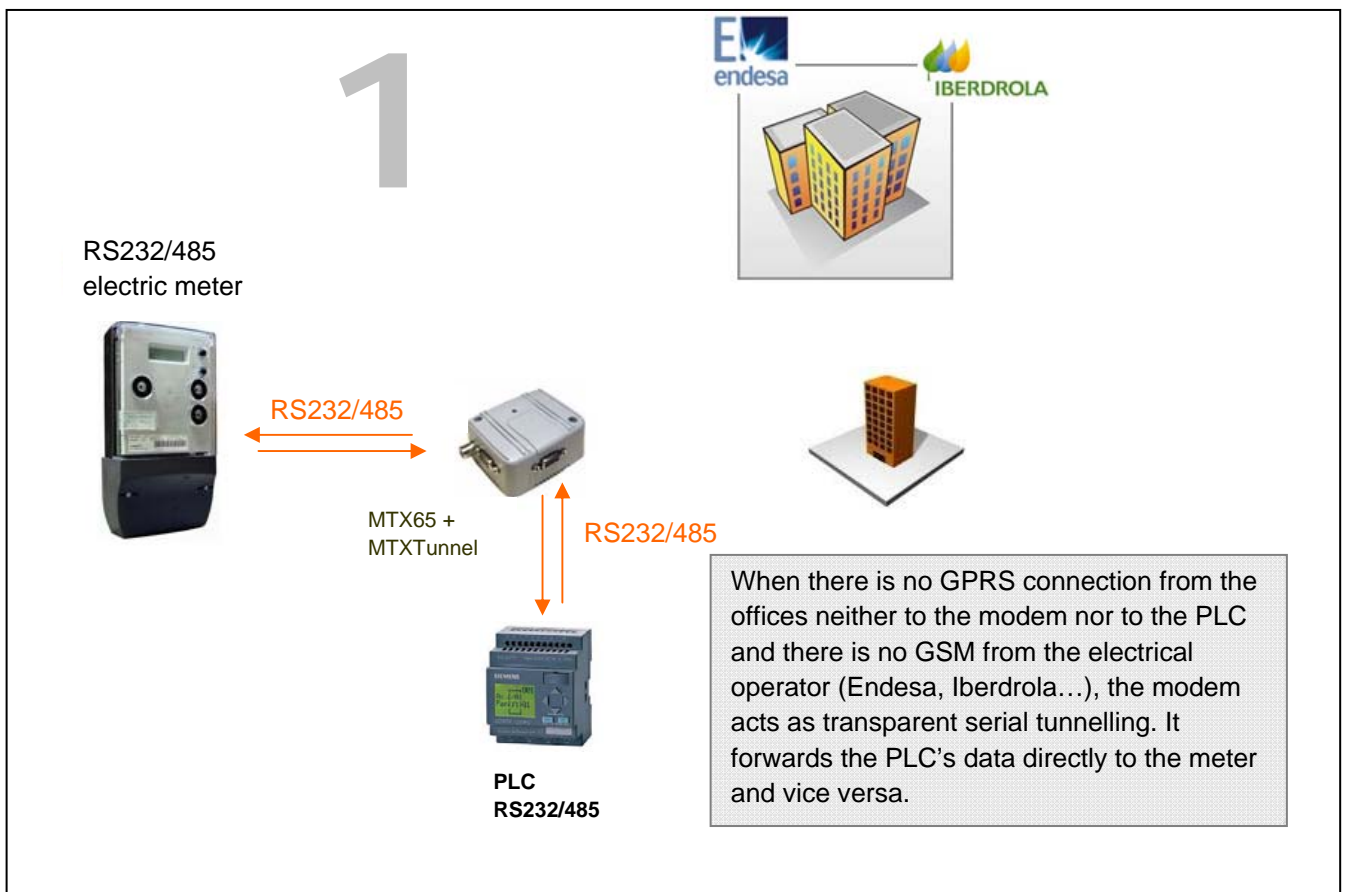
Scenario example 7.2

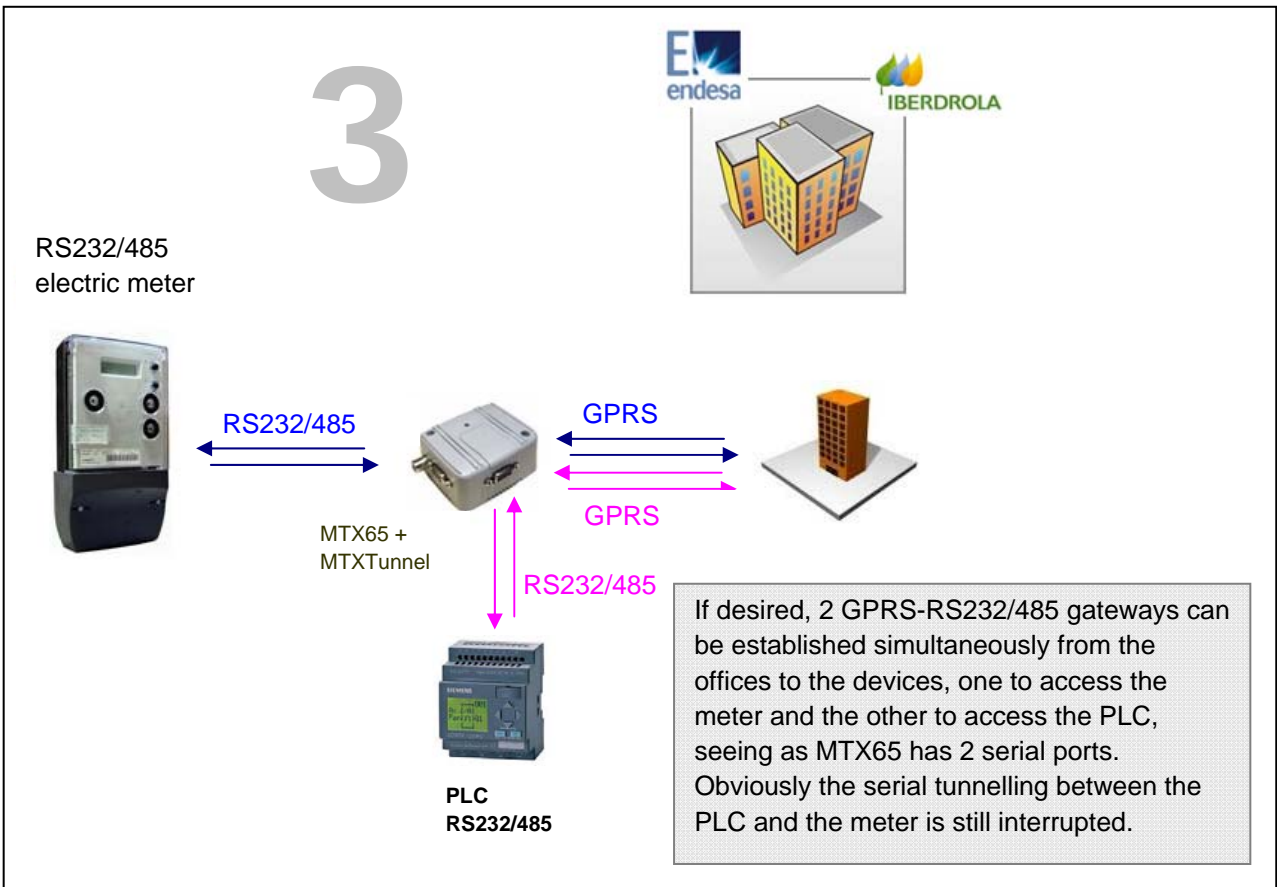
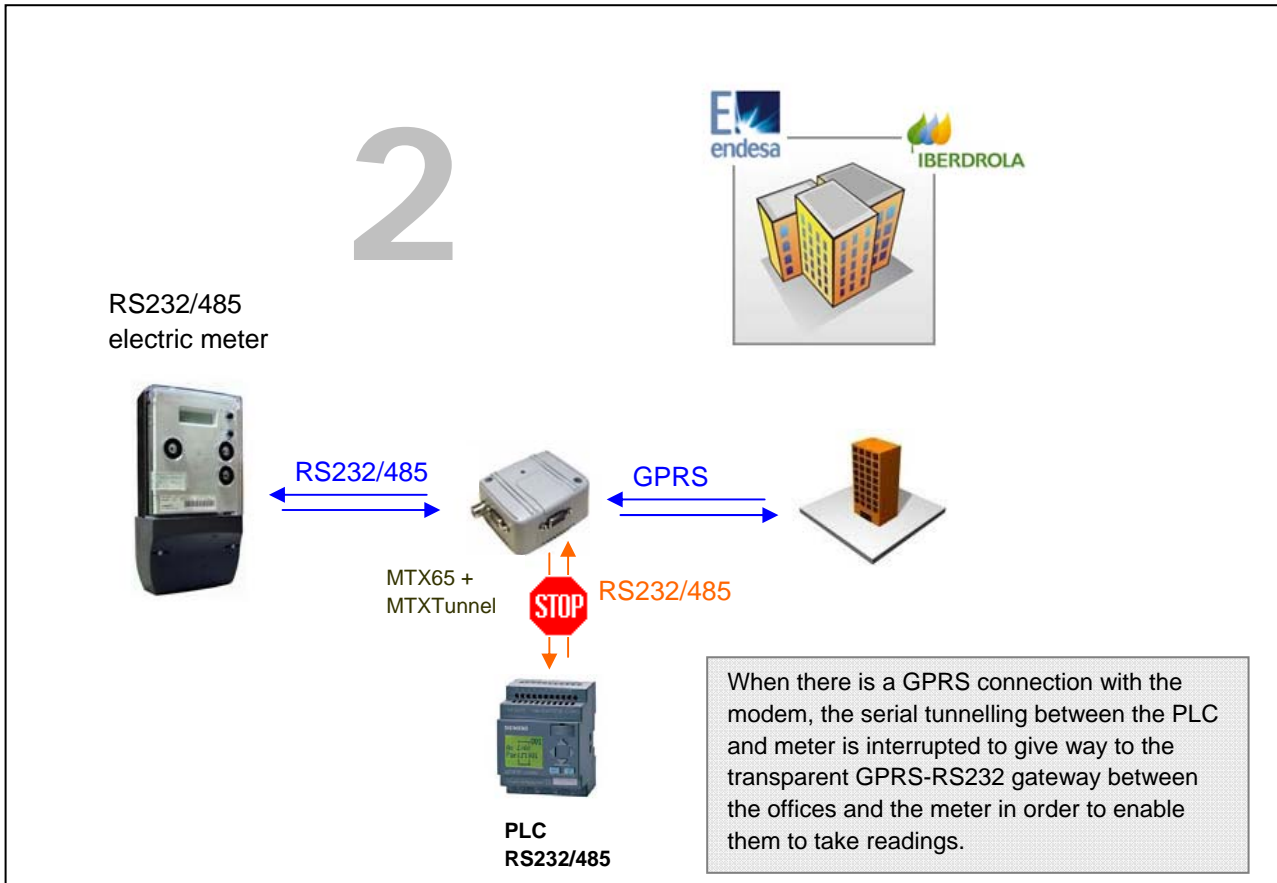
9.7.2. An advanced example for reading 2 serial devices using a single modem/SIM and simultaneously using GPRS connection and GSM calls.

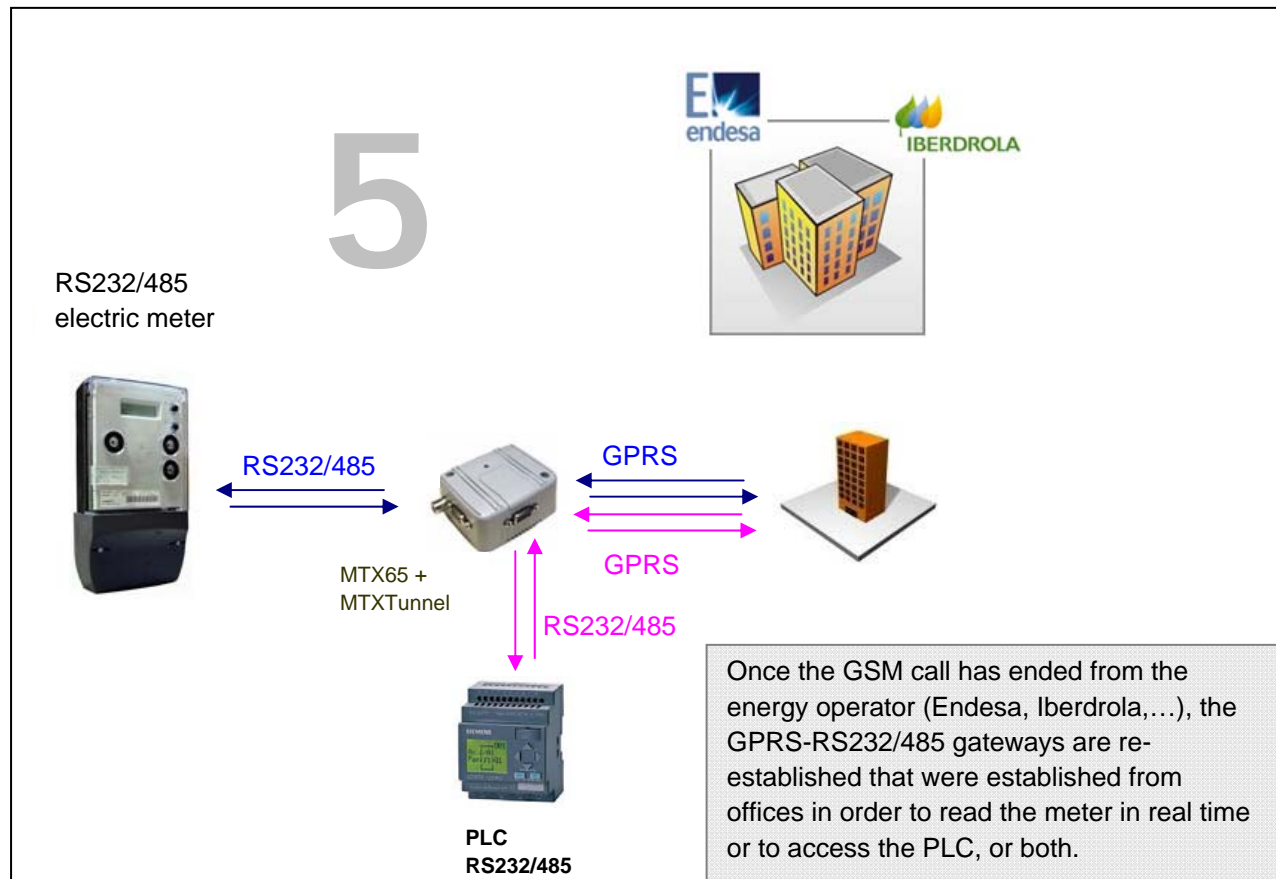
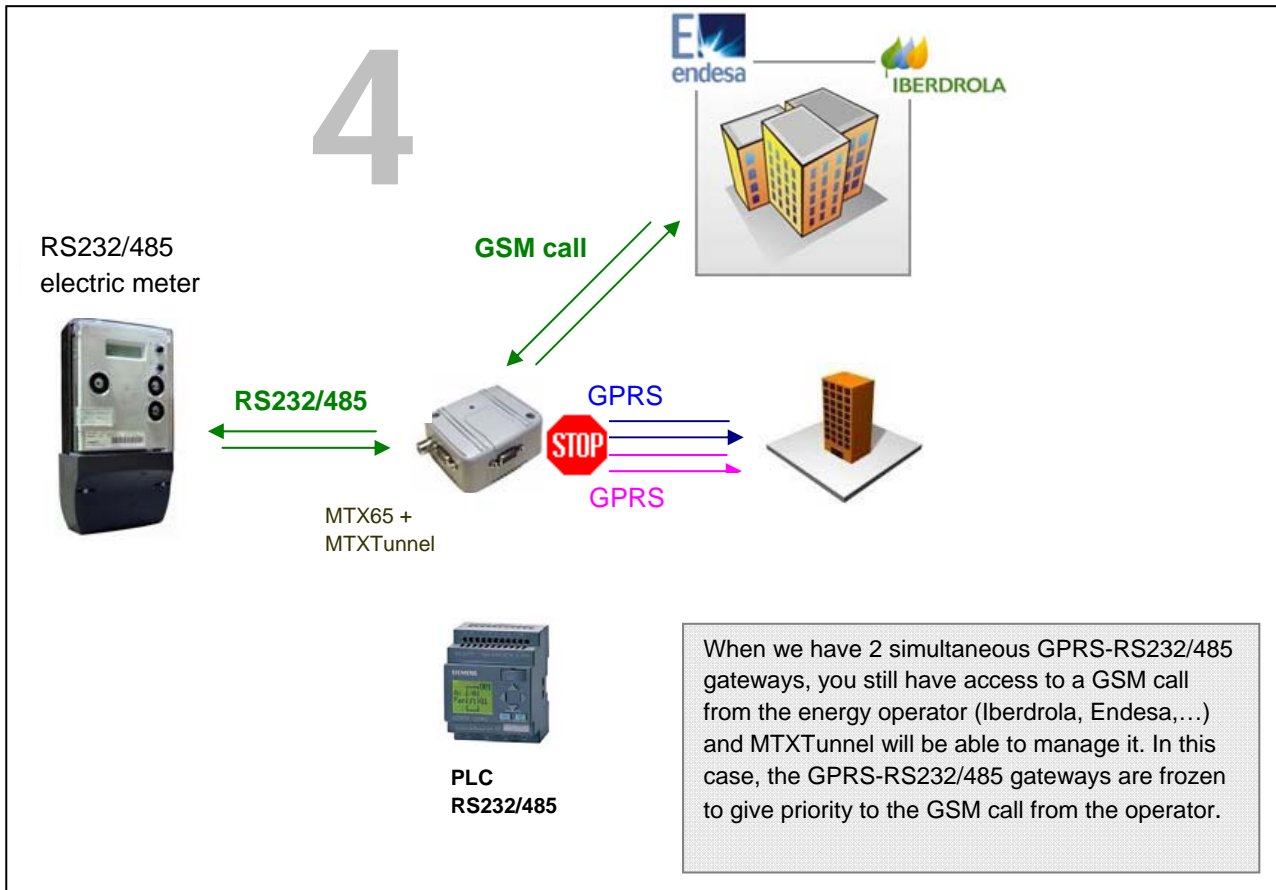
There is additional serial tunnelling when there are not GSM/ GPRS connections.

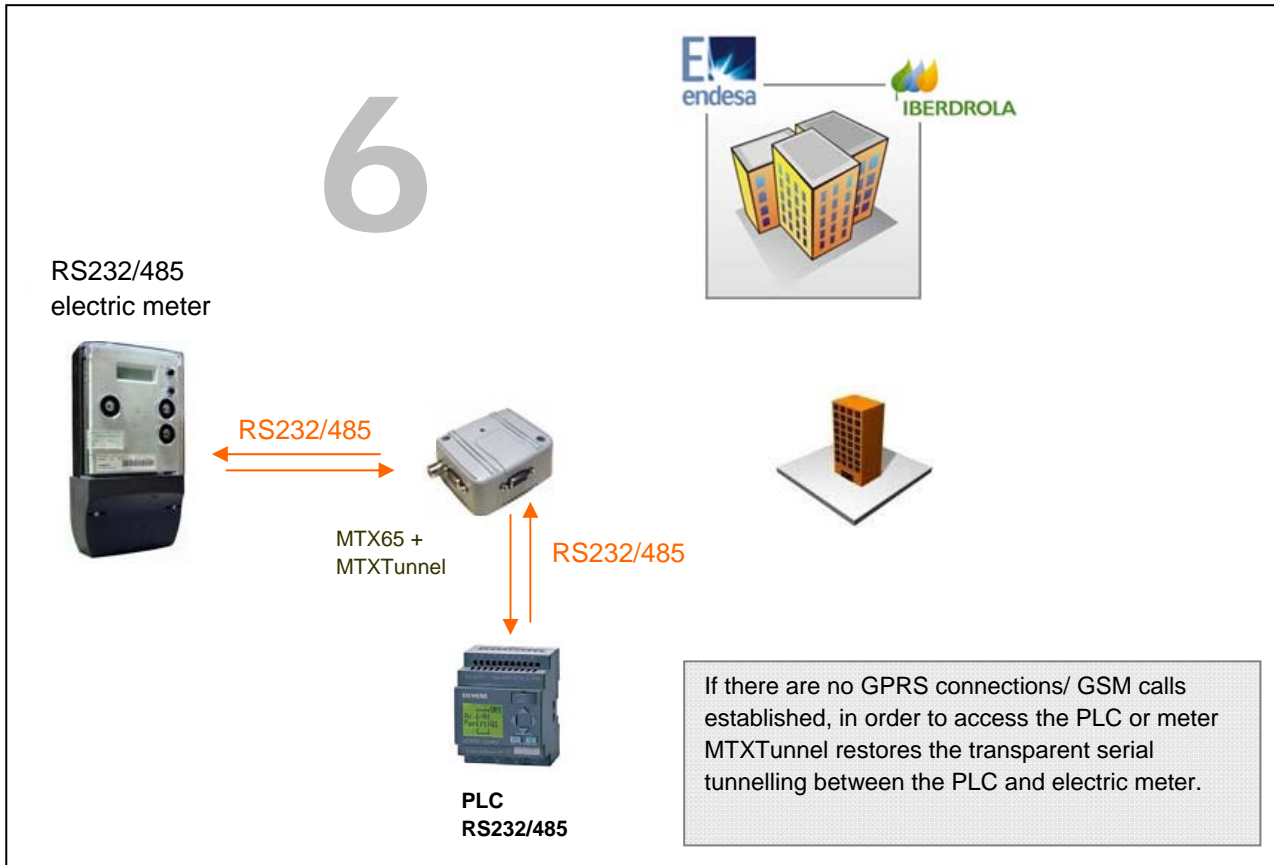
Description:

- In this scenario you have a modem with 2 serial ports. One serial port is connected to an energy meter; the other is connected to a PLC.
- When there isn't a GPRS connection with the modem and a GSM call has not been established by the operator, the modem acts as serial tunnelling. This means that all data that arrives at the modem from the PLC must be redirected to the energy meter and vice versa, all serial data that the energy meter sends should be redirected to the PLC.
- You should be able to establish 2 GPRS-serial gateways that function at the same time. Through one you will have access to the electric meter to take readings periodically; through the other you should be able to have access to modbus records from the PLC.
- Additionally, the energy operator (Iberdrola, Endesa, ...) will make a daily GSM call in order to read the meter's data. This GSM call must be a priority, freezing GPRS connections until the call is finished.









config.txt configuration file:

COMM_baudrate: 9600
 COMM_bitsperchar: 8
 COMM_autorts: off
 COMM_autocts: off
 COMM_stopbits: 1
 COMM_parity: none

Serial port baud rate
 8 bit data
 No flow control
 No flow control
 1 stop bit
 No parity

COMM2_baudrate: 9600
 COMM2_bitsperchar: 8
 COMM2_autorts: off
 COMM2_autocts: off
 COMM2_stopbits: 1
 COMM2_parity: none

Serial port baud rate
 8 bit data
 No flow control
 No flow control
 1 stop bit
 No parity

GPRS_apn: movistar.es
 GPRS_login: MOVISTAR
 GPRS_password: MOVISTAR
 GPRS_timeout: 0

GPRS APN from your network operator
 GPRS Login
 GPRS Password
 Value 0 means MTXTunnel is always GPRS connected

MTX_mode: server
 MTX_model: MTX65i
 MTX_ping: 35
 MTX_pingIP: 8.8.8.8
 MTX_radioBand: europe

MTXTunnel mode
 MTX terminal model MTX65i
 Every 35 minutes we send a PING request
 PING IP request address
 If modem is installed on Europe

MTX_portAux: gateway	Allows the serial tunnelling between the two serial ports when there are no external GPRS/GSM connections.
MTX_port: 20010	TCP port used to establish GPRS-serial Gateway and to read the energy meter
Firewall_enabled: off	MTXTunnel will accept incoming connections from any IP address
CSD_enabled: on	Able to accept GSM calls from energy operator (Iberdrola, Endesa, ...)
Telnet_enabled: on	Telnet is enabled for use as a secondary Gateway for PLC access.
Telnet_port: 20011	This is the TCP port that receives connections to access PLC (2nd GPRS-serial Gateway)
Telnet_bypass: on	Set to "on" to use Telnet as a second Gateway.

Details.

- 1.- This example uses Telnet as a secondary gateway. If the secondary gateway is was not established, you could use Telnet for configuration and monitoring the system remotely.
- 2.- If you use Telnet as a secondary Gateway (as shown throughout the example) you can still have remote access to the modem with the embedded commands between the tags `<MTXTUNNELR></MTXTUNNELR>` or more simply via SMS commands. For example via SMS you can check the modem's coverage and change or read a configuration.

Annex 8. MTXTunnel I/O Description

MTXTunnel + MTX65i

MTX65i Modem Input/output description

Description:

- MTX65i modem features 4 digital input/outputs and 2 analog to digital converters in the DB15 expansion connector.
- MTXTunnel software uses these inputs/outputs as follows:

TC65i	Location	Pin number	I/O	Function
GPIO1	DB15	4	Digital input	Wake up
GPIO2	DB15	11	Digital input	SMS alarm
GPIO3	DB15	5	Digital output	User
GPIO4	DB15	12	Digital output	User
ADC1	DB15	15	Analog input	User
ADC2	DB15	13	Analog input	User

- “TC65i” row references the internal TC65i GPIO module inside the MTX-65i terminal modem.
- “Location” row informs us which MTX-65i connector of is located in the I/O.
- “Pin number” row tells us the I/O connector pin number.
- “I/O” row tells us if GPIO is an input (digital or analog) or a digital output.
- “Function” row tells us if GPIO has a special feature in MTXTunnel, like “Wake up” and “SMS alarm”. If you do not need these special features in MTX-65i, you can use GPIO1 and GPIO2 as normal digital inputs/outputs.

MTXTunnel + MTX65ULP

MTX65ULP Modem Input/output description

Description:

- MTX65ULP modem features 5 digital input/outputs and 1 analog input in the DB15 expansion connector. There are 4 other –OR wired- digital tamper inputs intended to wake up the modem.
- MTXTunnel software uses these inputs/outputs as follows:

TC65	Connector	Pin number	I/O	Function
GPIO1	DB15	4	Digital input	Wake up
GPIO2	DB15	11	Digital input	SMS alarm
GPIO3	DB15	5	Digital output	User
GPIO4	DB15	12	Digital output	User
GPIO6	RJ12	2	Tamper input	Tamper1
GPIO7	RJ12	3	Tamper input	Tamper2
GPIO8	RJ12	4	Tamper output	Tamper3
GPIO9	RJ12	5	Tamper output	Tamper4
GPIO10	DB15	13	Digital input	User
ADC1	DB15	15	Analog input	User

- “TC65” row references the internal TC65 GPIO module inside the MTX65ULP terminal modem.
- “Location” row inform us which MTX65ULP connector is located in the I/O.
- “Pin number” row tells us I/O connector pin number.
- “I/O” row tells us if GPIO is an input (digital or analog) or a digital output.
- “Function” row tells us if GPIO has special feature in MTXTunnel, like “Wake up” and “SMS alarm”. If you do not need these special features in MTX65ULP, you can use GPIO1 and GPIO2 as normal digital inputs/outputs.

MTXTunnel + MTX65+G

MTX65+G Modem Input/output description

Description:

- MTX65+G modem features 5 digital inputs/outputs, 4 tamper (wake-up) digital inputs and 1 analog input.
- MTXTunnel software uses this inputs/outputs as follows:

XT65	Location	Pin number	I/O	Function
GPIO4	DB15	12	Digital output	User
GPIO5	RJ12	5	Digital input	Wake up
GPIO7	DB15	11	Digital input	User
GPIO8	DB15	5	Digital output	User
GPIO9	DB15	4	Digital input	SMS alarm
GPIO10	DB15	13	Digital input	User
ADC1	DB15	15	Analog input	User
ADC2	DB15	9	Analog input	User

- “XT65” row references the internal XT65 GPIO module inside the MTX-65+G terminal modem.
- “Location” row inform us which MTX65+G connector is located in the I/O.
- “Pin number” row tells us the I/O connector pin number.
- “I/O” row tells us if GPIO is an input (digital or analog) or a digital output.
- “Function” row tells us if GPIO has special features in MTXTunnel, like “Wake up” and “SMS alarm”. If you do not need these special features, you can use normal GPIO5 and GPIO9 as digital inputs.

MTXTunnel + MTX65IND or MTX65IND2

MTX65IND Modem Input/output description

Description:

- MTX65IND modem features the following digital inputs, generic and relay connected digital outputs and analog inputs:

TC65i	Location	Terminal block number	I/O	Function
GPIO1	Terminal block	5,6,7	Relay	User
GPIO2	Terminal block	8,9,10	Relay	User
GPIO3	Terminal block	11,12,13	Relay	User
GPIO4	Terminal block	41	Digital input	Wake up
GPIO5	Terminal block	17,18	Digital input	User
GPIO6	Terminal block	19,20	Digital input	User
GPIO7	Terminal block	14,15,16	Relay	User
GPIO8	Terminal block	40	Digital input	SMS alarm
GPIO9	Terminal block	39	Digital input	User
GPIO10	Terminal block	38	Digital input	User
ADC1	Terminal block	36	Analog input	User
ADC2	Terminal block	35	Analog input	User

- “TC65i” row references the internal TC65i GPIO module inside the MTX65IND terminal modem.
- “Location” row inform us which MTX65IND connector is located the I/O.
- “Pin number” row tells us the I/O terminal block or connector pin number.
- “I/O” row tells us if GPIO is an input (digital or analog) or a digital output.
- “Function” row tells us if GPIO has special features in MTXTunnel, like “Wake up” and “SMS alarm”. If you do not need these special features, you can use normal GPIO4 and GPIO8 as digital inputs/outputs.

MTXTunnel + MTX65iRS485

Description of the inputs and outputs used with the MTX65iRS485

Description:

The MTX65iRS485 modem does not have inputs/outputs. It only had the RS232 and RS485 serial ports. This device is solely intended for GPRS-serial gateways and GSM-serial gateways.

Annex 9. MTXTunnel Release notes

v5.0.

- First release MTXTunnel v5.

v5.1.

- Private VPN are supported using private APN (SIM cards must be provisioned).
- [MTX_msToSend](#) parameter description missed MTXTunnel v5.0 manual

v5.2.

- Text string modification to activate MTXTunnel.

Previous version: Just SMS with text string “on” was enough

Actual and next versions: Text string must be “mtxtunnel on” and has to be at the beginning of the SMS text string message.

- SMS remote AT commands

Previous versions: Any AT command was considered if SMS string text just began with “AT”.

Actual and next versions: Text SMS string must to be: “mtxtunnel [ATcommand]”.

- Default MTX parameter values are modified as follows:

SMS_allPhones: off
SMS_sendIP: off
SMS_ATEnabled: off
SMS_ATResponse: off
FIREWALL_enabled: on

- Fixed bug: After power up, if GPIO is configured as a high input level it cannot be detected without being changed to a lower input level.

v5.3.

- [DNS_gpios](#), [DNS_adc1](#) and [DNS_adc2](#) parameter added.

These new parameters allow us send a data string, after a programmed level trigger on an analog input or when digital input changes level, to a server using GPRS.

- On MTX65i MTX-Terminal, GPIO3 and GPIO4 are digital inputs if [DNS_gpios](#) parameter value is “on”

- See [Annex 2.13](#) example

v5.4.

- `MTX_gatewayModBus` parameter added.

This will allow you to configure modbus TCP / modbus RTU tunnel Gateway.

- See [Annex 2.14](#) example

v5.5.

- `ALARM_gpioEnabled` parameter corrected so you can use it with the MTX65IND terminal modem.

v5.6.

- RF Wavenis de Coronis protocol supported.

MTXTunnel can be used as a communications hub in GPRS-RF (868MHz) scenario.

Read [Annex 5](#) for more information. New commands: `AT^MTXTUNNEL=SETWAVENIS` y `AT^MTXTUNNEL=GETWAVENIS`.

v5.7.

- `GPRS_auto` parameter added.

`GPRS_auto` parameter at “on” value plus “operator.txt” file allows you to use any network operator without changing “config.txt” configuration file. This is intended for use if the SIM card is changed or if you send MTXTunnel without knowing which end operator you are going to use.

v5.8.

- `DYNDNS_period` parameter added.

MTXTunnel now upgrades the DynDNS servers periodically, so it is more robust in case DynDNS servers are down. Please remember MTXTunnel also accesses DynDNS servers when IP address changes.

V7.6.

Version 7 and the above are compatible with previous ones.

Now configuration file is “**config.txt**”. “**MTXTunnel.jad**” file is not used.

`AT^MTXTUNNEL=GETIOS` command is standardized and answers with OK as a normal AT command.

`MTX_IDClientExtended` has a new extra parameter value.

In socket client scenario, “imei” parameter option only the MTX-Terminal modem’s IMEI identification will be sent. GPIO and ADC values will NOT be sent.

`MTX_alwaysConnectedClient`_New parameter.

It only allows the socket client to establish a connection every X minutes/hours once.

Example: Modem will be connected to server every hour. After data exchange, the socket can close on the server's side. MTXTunnel will be not reconnected until after one hour.

- Added commands related with Wavenis 868MHz devices are included in the MTXIND-V2 terminal modem, which acts as a communication hub. Now you can read and control a mesh network of sensors like temperature, 0-10V or 4-20mA sensors or you can read pulses from a counter. Sensor readings can be taken in real time or periodically. A new feature is the fact that this data can be sent to a WEB server using JSON objects.

-In ModbusTCP / ModBusRTU Gateway, MTXTunnel V7 can now autonomously send modbus end equipment's memory tables to a Web server using JSON objects.

- In version 7 the new `LOGGER_ioPeriod` parameter can use JSON objects to send the readings of analog and digital inputs to a WebServer. Please remember you could use also `DNS_` parameters.

- `MTX_init1`, `MTX_init2`, `MTX_init3` parameters have been added to configure the MTX-Terminal modem in a way so that some AT commands will run after the power is turned on.

- `MTX_radioBand` is a new useful parameter that will allow you to select GSM European bands or American ones in order to make it faster to register to the network.

- `AT^MTXTUNNEL=TEMPORALCLIENT,<IP>,<Puerto>` is a new AT proprietary command which allows you to temporarily run TCP client and connect to a server. This is useful in case the network operator blocks incoming requests and Telnet cannot be used. Now using SMS, MTXTunnel can create a socket connection to our server and remotely send AT commands in order to change any configuration parameter or now even some network or modem statuses.

- New `AT^MTXTUNNEL=ATEmbedded` command AT commands can be sent remotely using client socket connection (which can be temporary). AT commands must be between `<MTXTUNNELR>` and `</MTXTUNNELR>`.special strings:

- `MTX_TPServer2` is a new parameter used to backup time synchronization in case the server is down. It needs to be synchronized periodically.

- `MTX_pingIP` is a new parameter that can define the PING IP in order to check communications. However you need to activate `MTX_PING` parameter to "on".

V7.7.

- The possibility to read 868MHz Wavelog devices was added in order to be able to remotely read digital inputs.

V7.8.

- You can no send encapsulated AT commands in GPRS-serial gateways, both in server and client mode.

- The `MTX_ATEmbeddedPass` parameter has been added in order to be able to set a password for encapsulated AT commands in GPRS-serial gateways.

- It incorporates `DNS_mode: remoteat` in order to be able to replicate a modem's digital inputs in the relays of another modem via GPRS.

- It includes the `MTX_flushSerialBuffers` parameter in order to clean serial buffers before a TCP/IP connection.
- `TCP_ICP2` and `TCP_port2` parameters are available to simultaneously establish 2 GPRS-serial gateways in client mode.
- `MTX_clientReconnection` configuration parameter included in order to be able to specify the client socket's reconnection time when having problems with the server.

V7.9.

- The `ALARM_gpioMessage1` was added so that it is possible to send a different alarm SMS when the digital input value is "1" or "0".

V7.11.

- `CSD_enabled` parameter allows the modem to pick up GSM calls at the same time as being connected to the GPRS. This is ideal for metering applications.
- The "Gateway" possibility has been added to the `MTX_portAux` parameter. This allows you to establish a serial gateway between the modem's two serial ports when there are no GPRS connections/ GSM calls.
- `MODBUS_onlyChanges` has been added. When the value is "on", it allows you to send data read from MODBUS equipment to a server only when one of the records, that has been read, has changed.

V7.12.

- It has allowed you to be able to read multiple Modbus devices, specifying a list of Modbus addresses in the parameter `MODBUS_address`.

Annex 10. MTXTunnel Configuration Parameters index

General configuration parameters “MTX_”	46
MTX_PIN.....	46
MTX_mode.....	46
MTX_urc.....	47
MTX_reset.....	48
MTX_resetHour.....	48
MTX_ping.....	49
MTX_pingIP.....	49
MTX_portAux.....	50
MTX_portAuxEcho.....	50
MTX_IDClient.....	51
MTX_IDClientExtended.....	51
MTX_IDClientPeriod.....	52
MTX_dtr.....	52
MTX_TPServer.....	53
MTX_TPServer2.....	54
MTX_ATMux.....	55
MTX_WatchdogOnExit.....	56
MTX_model.....	56
MTX_ATLimited.....	57
MTX_clientSSL.....	57
MTX_temporalClient.....	59
MTX_msToSend.....	60
MTX_gatewayModBus.....	60
MTX_alwaysConnectedClient.....	61
MTX_init1, MTX_init2, MTX_init3.....	61
MTX_ATEEmbedded.....	62
MTX_radioBand.....	62
MTX_invertedCom.....	63
MTX_flushSerialBuffers.....	63
MTX_ATEEmbeddedPass.....	64
MTX_clientReconnection.....	64
COMM_baudrate.....	65
COMM_autorts.....	65
COMM_autocts.....	66
COMM_bitsperchar.....	66
COMM_stopbits.....	67
COMM_parity.....	67
Configuration parameter related with COM2: “COMM2_”	68
COMM2_baudrate.....	68
COMM2_autorts.....	68
COMM2_autocts.....	69
COMM2_bitsperchar.....	70
COMM2_stopbits.....	70
COMM2_parity.....	71
Telnet Configuration parameters: “TELNET_”	72
TELNET_enabled.....	72

TELNET_login	73
TELNET_password	73
TELNET_firewall	74
TELNET_port	74
TELNET_bypass	75
WebServer configuration parameters: "WEBSERVER_"	76
WEBSERVER_enabled	76
WEBSERVER_login	77
WEBSERVER_password	77
WEBSERVER_firewall	78
WEBSERVER_port	78
WEBSERVER_skin	79
Wakeup configuration parameter: "WAKEUP_"	82
WAKEUP_gpioEnabled	82
WAKEUP_gpioValue	83
WAKEUP_adcEnabled	83
WAKEUP_adcValueMin	84
WAKEUP_adcValueMax	84
WAKEUP_timeEnabled	85
WAKEUP_time1	86
GPRS connection configuration parameters: "GPRS_"	87
GPRS_apn	87
GPRS_login	88
GPRS_password	88
GPRS_timeout	89
GPRS_dns	89
GPRS_auto	90
TCP Configuration parameters: "TCP_"	91
TCP_IP	91
TCP_port	91
TCP_IP2	92
TCP_port2	92
UDP configuration parameter: "UDP_"	93
UDP_IP	93
UDP_localPort	93
UDP_remotePort	94
ALARM Configuration parameter: "ALARM_"	95
ALARM_gpioEnabled	95
ALARM_gpioValue	96
ALARM_gpioMessage, ALARM_gpioMessage1	96
ALARM_gpioPause	97
ALARM_smsNumber1, ALARM_smsNumber2, ... , ALARM_smsNumber10	97
FIREWALL configuration parameters: "FIREWALL_"	98
FIREWALL_enabled	98
FIREWALL_IP1, FIREWALL_IP2, ... , FIREWALL_IP10	98
SMS Configuration parameter: "SMS_"	99
SMS_sendIP	99
SMS_ATEnabled	99
SMS_ATResponse	100
SMS_allPhones	100

SMS_validPhone1, SMS_validPhone2, ... , SMS_validPhone10	101
SMS_alias1, SMS_alias2, ... , SMS_alias10.....	101
SMS_aliasOk	102
SMS_aliasError	102
SMS_tunnelString.....	103
DynDNS configuration parameter: “DYNDNS_”	104
DYNDNS_enabled	104
DYNDNS_server	105
DYNDNS_hostname	105
DYNDNS_login	106
DYNDNS_password.....	106
DYNDNS_period.....	107
DNS Parameter configuration: “DNS_”	108
DNS_enabled	108
DNS_mode.....	109
DNS_password.....	109
DNS_server	110
DNS_port	110
DNS_extended.....	111
DNS_gpios.....	112
DNS_adc1, DNS_adc2	112
DNS_period	113
ULP Configuration parameter: “ULP_”	114
ULP_mode	114
ULP_sleepMode.....	115
ULP_minutes	115
ULP_time1, ULP_time2, ... , ULP_time10	116
ULP_smsExtended	117
ULP_smsNumber1, ULP_smsNumber2, ULP_smsNumber3.....	117
ULP_rtc	118
LOGGER configuration parameters: “LOGGER_”	119
LOGGER_password	119
LOGGER_server	120
LOGGER_registerSize.....	120
LOGGER_ioPeriod	122
MODBUS configuration parameter: “MODBUS_”	123
MODBUS_address	123
MODBUS_start	123
MODBUS_numWords.....	124
MODBUS_period	124
MODBUS_onlyChanges	125
WAVENIS configuration parameter: “WAVENIS_”	126
WAVENIS_mac1, WAVENIS_mac2, ... WAVENIS_mac32	126
WAVENIS_rep1, WAVENIS_rep2, ... WAVENIS_rep10	127
WAVENIS_period.....	127
WAVENIS_retries.....	128
CSD: “CSD_” Configuration Parameters	129
CSD_enabled	129

Annex 11. Alphabetic MTXTunnel configuration parameter

ALARM_gpioEnabled	95
ALARM_gpioMessage, ALARM_gpioMessage1	96
ALARM_gpioPause	97
ALARM_gpioValue	96
ALARM_smsNumber1, ALARM_smsNumber2, ..., ALARM_smsNumber10	97
COMM_autocts	66
COMM_autorts	65
COMM_baudrate	65
COMM_bitsperchar	66
COMM_parity	67
COMM_stopbits	67
COMM2_autocts	69
COMM2_autorts	68
COMM2_baudrate	68
COMM2_bitsperchar	70
COMM2_parity	71
COMM2_stopbits	70
CSD_enabled	129
DNS_adc1, DNS_adc2	112
DNS_enabled	108
DNS_extended	111
DNS_gpios	112
DNS_mode	109
DNS_password	109
DNS_period	113
DNS_port	110
DNS_server	110
DYNDNS_enabled	104
DYNDNS_hostname	105
DYNDNS_login	106
DYNDNS_password	106
DYNDNS_period	107
DYNDNS_server	105
FIREWALL_enabled	98
FIREWALL_IP1, FIREWALL_IP2, ... , FIREWALL_IP10	98
GPRS_apn	87
GPRS_auto	90
GPRS_dns	89
GPRS_login	88
GPRS_password	88
GPRS_timeout	89
LOGGER_ioPeriod	122
LOGGER_password	119
LOGGER_registerSize	120
LOGGER_server	120

MODBUS address	123
MODBUS numWords	124
MODBUS onlyChanges	125
MODBUS period	124
MODBUS start	123
MTX_alwaysConnectedClient	61
MTX ATEEmbedded	62
MTX ATEEmbeddedPass	64
MTX ATLimited	57
MTX ATMux	55
MTX clientReconnection	64
MTX clientSSL	57
MTX_dtr	52
MTX flushSerialBuffers	63
MTX gatewayModBus	60
MTX IDClient	51
MTX IDClientExtended	51
MTX IDClientPeriod	52
MTX init1, MTX init2, MTX init3	61
MTX invertedCom	63
MTX mode	46
MTX model	56
MTX msToSend	60
MTX_PIN	46
MTX ping	49
MTX pingIP	49
MTX portAux	50
MTX portAuxEcho	50
MTX radioBand	62
MTX reset	48
MTX resetHour	48
MTX temporalClient	59
MTX TPServer	53
MTX TPServer2	54
MTX urc	47
MTX WatchdogOnExit	56
SMS alias1, SMS alias2, ... , SMS alias10	101
SMS aliasError	102
SMS aliasOk	102
SMS allPhones	100
SMS ATEEnabled	99
SMS ATResponse	100
SMS sendIP	99
SMS tunnelString	103
SMS validPhone1, SMS validPhone2, ... , SMS validPhone10	101
TCP IP	91
TCP IP2	92
TCP port	91
TCP port2	92
TELNET bypass	75

TELNET enabled	72
TELNET firewall	74
TELNET login	73
TELNET password	73
TELNET port	74
UDP configuration parameter: "UDP "	93
UDP IP	93
UDP localPort	93
UDP remotePort	94
ULP minutes	115
ULP mode	114
ULP rtc	118
ULP sleepMode	115
ULP smsExtended	117
ULP smsNumber1, ULP smsNumber2, ULP smsNumber3	117
ULP time1, ULP time2, ... , ULP time10	116
WAKEUP adcEnabled	83
WAKEUP adcValueMax	84
WAKEUP adcValueMin	84
WAKEUP gpioEnabled	82
WAKEUP gpioValue	83
WAKEUP time1	86
WAKEUP timeEnabled	85
WAVENIS mac1, WAVENIS mac2, ... WAVENIS mac32	126
WAVENIS period	127
WAVENIS rep1, WAVENIS rep2, ... WAVENIS rep10	127
WAVENIS retries	128
WEBSERVER enabled	76
WEBSERVER firewall	78
WEBSERVER login	77
WEBSERVER password	77
WEBSERVER port	78
WEBSERVER skin	79

Annex 12. MTXTunnel AT Proprietary commands (API)

<u>AT^MTXTUNNEL=END</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=VERSION</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=SETBAUDRATE,port,speed</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=GETPARAM,parameter_name</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL= SETPARAM,parameter_name,ValueParametro</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=GETIOS</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=RS232,mode,data</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=SMS,phone_number,message</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=I2CSPI,mode,data</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=SETMODBUS,address;position1;data_1;data_2;...;data_n</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=GETMODBUS,address;position;numData</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=TEMPORALCLIENT,IPaddress,TCPport</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL=DELETEBDD</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL= READWAVETHERM, MACWavenisaddress</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL= READWAVEFLOW, MACWavenisaddress</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL= READWAVESENSESEC, MACWavenisaddress</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL= READWAVESENSEEV, MACWavenisaddress</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL= WAVENISRSSI, MACWavenisaddress</u>	¡Error! Marcador no definido.
<u>AT^MTXTUNNEL= REPEATERS, xxxxxxxxxxxxxxxxxxxx</u>	¡Error! Marcador no definido.