

TITAN

Application Note 37

Using MQTT – RS232/RS485 Gateways

Using MQTT – RS232/RS485 Gateways

1. Scenario Details

TITAN-based devices have all the typical functionalities of 4G/3G/2G routers, as well as a series of added features that make them one of the most feature-packed routers on the market.

One of the added features is its ability to create several simultaneous IP – RS232/RS485 gateways. In other words, TITAN-based devices can implement gateways of the following types:

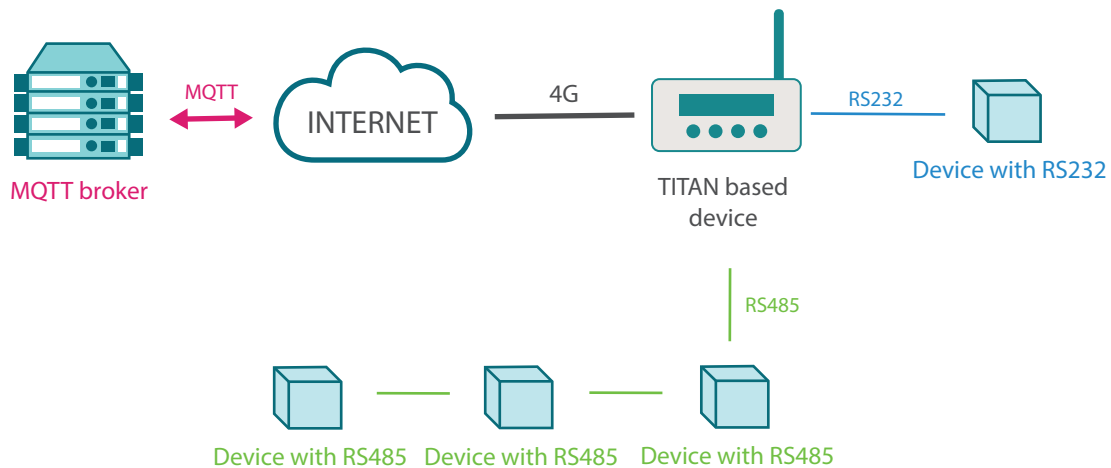
Ethernet <> RS232 / RS485

Wi-Fi <> RS232 / RS485

4G/3G/2G <> RS232 / RS485

This means that if you have one or more remote devices with RS232 and/or RS485 ports, you can access them remotely as if they were local. There are several ways to implement Serial IP Gateways in the family of TITAN-based devices: TCP Server mode, TCP Client mode or MQTT. This application note will detail how to implement 2 MQTT Serial gateways simultaneously in order to control, using an MQTT broker, an RS232 device and the devices connected to an RS485 bus (up to 64).

2. Description of the Example



As mentioned above, the purpose of this application note is to describe how to connect multiple serial devices (RS232 and RS485) to an MQTT broker via 4G/3G/2G, with transparent data flow. As such, the data received by one of the TITAN-based device's serial ports (RS232, RS485) must be transparently sent to an MQTT broker and, vice versa, it must be possible to send information transparently from an MQTT broker to any of the serial ports of the TITAN-based device (RS232, RS485), and therefore to the devices connected to them.

3. Configuration of the Associated RS232 and RS485 Ports

The configuration required for each of the serial ports is very simple. To configure the COM1 port (RS232), go to the “Serial Settings” > “Serial Port1-232” menu and configure the properties of the serial port (baudrate, parity, etc.) according to the external device being connected to it.

The screenshot shows a web browser window with the URL `192.168.1.2/serial-settings.php?id=1`. The page header includes the webdyn logo, "powered by TITAN", and the flexitron group logo. A left sidebar contains a menu with categories: Mobile, Ethernet, Wifi, Firewall, Serial Settings, and External Devices. The "Serial Settings" category is expanded, and "Serial Port1-RS232" is selected. The main content area is titled "Serial Gateway > Com1 Settings". It contains a table of configuration parameters for the serial port, with a red box highlighting the Baudrate, Data bits, Parity, Stop bits, Flow Control, and Timeout ms fields. Below the table are three checkboxes: "Allow local embedded AT commands", "Allow remote embedded AT commands", and "Allow incoming GSM call (CSD Data Call)". At the bottom, there is a radio button for "Function: Nothing or used by External Device or Script".

Parameter	Value	Description
Baudrate:	9600	Baudrate of serial port
Data bits:	8	Number of data bit
Parity:	none	Parity
Stop bits:	1	Number of stop bits
Flow Control:	none	Flow control of serial port
Timeout ms:	0	msec without serial data before sending (default: 50)

☐ Allow local embedded AT commands Ex.: <MTXTUNNEL>AT</MTXTUNNEL>

☐ Allow remote embedded AT commands Ex.: <MTXTUNNELR>AT</MTXTUNNELR>

☐ Allow incoming GSM call (CSD Data Call) Only TCP Server and TCP Client functions or Nothing

☐ Function: Nothing or used by External Device or Script

Next, at the bottom of the same configuration screen, enter the "TX Mqtt Topic" and "RX Mqtt Topic" configuration parameters, which are the key parameters for this working scenario. Then click on the "Save Config" button.

Intelligent Router

No es seguro | 192.168.1.2/serial-settings.php?id=1

- Backup / Factory
- Firmware Upgrade
- Reboot
- Logout

TCP Local Port: 502
Listening TCP Port (1 ... 65535). Normally 502

SSL/TLS enabled ☐
SSL/TLS Enabled (SSL Certs needed)

Function: Serial - IP Gateway (MQTT)

TX Mqtt Topic: COM1TX
RX Mqtt Topic: COM1RX

All data received by RS232 will be retransmitted to this MQTT topic
All data received by IP in this MQTT topic will be retransmitted by the serial port.

Function: Serial - IP Gateway (UDP)

Remote IP: 0.0.0.0
Address of remote IP server (can be included several IP between ';')

Remote UDP Port: 20010
Remote UDP port (1 ... 65535)

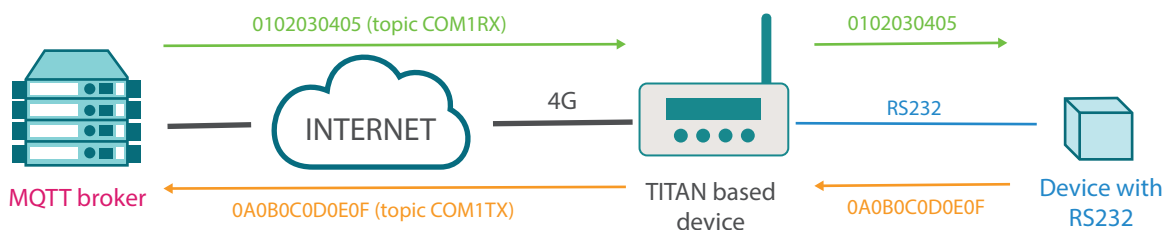
Local UDP Port: 20010
Local UDP port (1 ... 65535)

SAVE CONFIG

What are the implications of entering COM1TX and COM1RX values in the configuration in this example?

It implies that all data streams received by the TITAN-based device's RS232 COM1 serial port are forwarded (transparently) to the MQTT broker under the TOPIC "COM1TX". The MQTT broker will then receive the INPUT data stream from the TITAN-based device's RS232 COM1 port in that topic. Conversely, if we need to send an OUTPUT data stream through the TITAN-based device's COM1 RS232 port from the MQTT broker, this data stream must be sent to the "COM1RX" topic, as this is the topic the TITAN-based device will subscribe to for these types of actions.

Schematically, it could be represented as follows:



The same configuration process must be performed on the RS485 serial port using its configuration menu. The properties of the serial port must be correctly configured and the topics for receiving (RX) and transmission (TX) must be configured.

For example, the configuration for the topics of all the serial ports could be as follows:

COM1 (RS232): COM1TX | COM1RX
COM2 (RS485): COM2TX | COM2RX

4. Configuring the MQTT Client

The MQTT client section must also be configured, it is this configuration that will cause the TITAN-based device to connect to the desired MQTT broker. This must be done from the “Other > MQTT” configuration menu

The screenshot shows the 'Intelligent Router' web interface. The browser address bar shows '192.168.1.2/other-mqtt.php'. The left sidebar contains a menu with categories: NAT, Authorized IPs, Serial Settings, External Devices, and Other. The 'Other' category is selected, and the 'MQTT Client' sub-menu is active. The main content area is titled 'Other > MQTT Client' and contains a configuration form. A red box highlights the form fields. A red arrow points to the 'SAVE CONFIG' button at the bottom of the form.

Field	Value	Description
Enabled:	<input checked="" type="checkbox"/>	Enable MQTT client
MQTT Broker	tcp://broker.mqttdashboard.	Destination MQTT Broker. Examples: tcp://test.mosquitto.org:1883, ssl://test.mosquitto.org:8883 (certificate needed), ssl://test.mosquitto.org:8884 (certificates needed)
MQTT Username		MQTT Username (blank if not used)
MQTT Password		MQTT Password (blank if not used)
MQTT ID	[IMEI]	Device identification
MQTT Qos	1	MQTT Quality Of Service (0 ... 2)
MQTT Keepalive	60	Seconds for keepalive (30 ... 3600)
MQTT Persistence	<input type="checkbox"/>	Data persistence
MQTT AT Topic	/AT	This topic will be subscribed for receiving AT Commands (usefull for individual device)
MQTT AT Resp Topic	/ATR	This topic will be used for publishing the AT Command Responses of AT Topic
MQTT AT Topic 2		This topic will be subscribed for receiving AT Commands (usefull for groups)
MQTT AT Resp Topic 2		This topic will be used for publishing the AT Command Responses of AT Topic 2
MQTT AT Topic 3		This topic will be subscribed for receiving AT Commands (usefull for all devices)
MQTT AT Resp Topic 3		This topic will be used for publishing the AT Command Responses of AT Topic 3
MQTT Script Topic 1		When data is received in this topic the 'Topic Script' will be executed.
MQTT Script Topic 2		When data is received in this topic the 'Topic Script' will be executed.

SAVE CONFIG

Check with your MQTT broker for the appropriate parameters in this section. Once configured, click on the “SAVE CONFIG” button.

5. Configuring the WAN Section

In order for the TITAN-based device to connect to the Internet, and therefore be able to access the MQTT broker via 4G/3G/2G, the “WAN > Basic Settings” section must also be configured. In this section, enter the SIM card’s PIN (if there is one), enter the APN, and the Username and Password for the operator, etc. Once done, click on the “SAVE CONFIG” button. Lastly, reboot the TITAN-based device with the new settings.

The screenshot shows a web browser window with the address bar displaying "192.168.1.2/wan-settings.php". The page header features the "webdyn" logo, "powered by TITAN", and the "flexitron group" logo. A left sidebar contains a menu with categories: Mobile, Ethernet, Wifi, Firewall, Serial Settings, External Devices, and Other. The "Mobile" category is expanded, showing "Status", "Basic Settings" (highlighted with a red box), and "Keep Online". The main content area is titled "Mobile Basic Settings" and contains a form for configuring the Mobile WAN interface. The form includes fields for Mobile WAN status, SIM Mode, SIM1 and SIM2 APN, Username, Password, and Pin, as well as Authentication, Network selection, and DNS selection. The "Basic Settings" section is highlighted with a red border.

Mobile Basic Settings		
Mobile WAN	Enabled (IP active) <input type="button" value="v"/>	Enable Wireless WAN interface
Sim Mode	SIM1 + SIM2 (backup) <input type="button" value="v"/>	Sim selection
SIM1 APN:	<input type="text" value="movistar.es"/>	APN of SIM card 1
SIM1 Username:	<input type="text" value="MOVISTAR"/>	Username of SIM card 1
SIM1 Password:	<input type="password" value="*****"/>	Password of SIM card 1
SIM1 Pin:	<input type="text"/>	PIN of SIM card 1
SIM2 APN:	<input type="text" value="movistar.es"/>	APN of SIM card 2
SIM2 Username:	<input type="text" value="MOVISTAR"/>	Username of SIM card 2
SIM2 Password:	<input type="password" value="*****"/>	Password of SIM card 2
SIM2 Pin:	<input type="text"/>	PIN of SIM card 2
Authentication:	Auto <input type="button" value="v"/>	Authentication method
Network selection:	Auto (4G/3G/2G) <input type="button" value="v"/>	Network selection
DNS selection:	Get DNS from Operator <input type="button" value="v"/>	
DNS1:	<input type="text" value="8.8.8.8"/>	Preferred DNS1