CAREL – Confidential



**REQUIREMENTS SPECIFICATION**

Gateway Middle End

rev. 0.01

DRAFT CONFIDENTIAL

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Revision

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Definitions, acronyms, and abbreviations

GME = Gateway Middle End  
GSM = refer to 2G connection  
FW = firmware

IoT = Internet of Things

MonDev = the device connected to the GME through the RS485 interface

OTA = Over The Air

SW = software

CAREL server = the cloud system of CAREL  
CCL = CAREL Cloud Library

1. Introduction
   1. Scope of RS

This is the requirement specification for the Gateway Middle End (GME) that will be available in two version 2G and WiFi, in short this device will be able to:

1. monitoring one (1) device through an RS485 port
2. log some variables in the internal memory (RAM) for a very limited time slot,  
   this to reduce the number of transfer to the cloud
3. transfer the logged variables to the CAREL cloud through MQTT
4. Receive some variables values from the CAREL cloud MQTT and transmit it to the connected device.
5. Transfer data to a target via Modbus file transfer
6. receive a device model definition file from the CAREL cloud,  
   this file contain the map of the variables that the GME read from the connected target
7. receive security certificate file from the CAREL cloud
8. Hardware Requirement Specification
   1. Memory summary

A quick recap of the required memory previously agreed and common to all models.

|  |  |
| --- | --- |
| **Use** | **Available Area Size** |
| Security certificate | 4K bytes (2 x 2K bytes) |
| Device model | 2K bytes |
| Space to store some CAREL information in a file format.  ie. Configuration parameters | TBD: USR give us available maximum space, today CAREL require xxxx bytes of space. |

* 1. 2G Model

As already agreed with USR the idea is to implement a device based/like the USR-GPRS-730 model but with the GM35/V2 module inside, this to meet the memory requirement needed to fit our application (ie. OTA).  
Other requirements are:

1. A new polycarbonate (graphic design by CAREL)
2. RS485 with 3 pole removable screw terminal 3.81mm type (or 5.08mm)  
   CAREL standard. The RS232 port is not required, as previously agreed.
3. A back label with some informations (see label documentation <GME_Labeling.ppt>):
   * Product Code
   * Serial number (serialized by USR)
   * IMEI
   * Carel Control Code
   * QR Code
4. All the rest of the characteristics are the same of the USR-GPRS-730
5. A magnetic antenna with up to 3 meters of cable is part of the offer.
6. The SIM card will be provided by CAREL and installed by USR.
7. The HW must be certified for CE/RED.
   1. WiFi Model

The WiFi model will use the current CAREL model GTW000WT hardware.   
  
Other requirements are:

1. A new polycarbonate (graphic design by CAREL)
2. A back label with some informations (see label documentation <GME_Labeling.ppt>):
   * Product Code
   * Serial number (serialized by USR)
   * MAC address
   * Carel Control Code
   * QR Code
3. The HW is already certified CE/RED and FCC/IC but we wish to be reassured that there are no certification problems when changing FW and product code.
4. FW Requirement Specification - common

Part of the FW is based on the CAREL Cloud Library ([CCL](#CCL)) that CAREL give to USR in source code format.   
The library is HW agnostic, it require some basic functionality to work but these ones are theoretically already present or easy implementable.

In the <GME_CAREL_Library_OverView.ppt> is possible to see the organization of the library and the required FW part to work with it, some FW functionality are in charge to USR, these are listed below splitted for each model.   
Other detailed informations about CCL are collected in the file <GME_RS_FW_Eng.docx>.

1. FW Requirement Specification - WiFi
   1. WiFi Gateway FW OTA Upgrade

Same considerations of the 2G model.

The [CCL](#CCL) already support the possibility to retrieve the certificate and the device model via HTTPS, is possible to use the same method also for the WiFi Gateway firmware ?

Anyway the possibility to upgrade the FW through RS485 must be provided, and a demo in source code “C” or Python of a Windows application that perform the serial upgrade must be provided.

* 1. Reset button

If pressed for a short time (< 5 sec) reboot the system.

* 1. Factory reset button

If pressed for a long time (>=5 sec) at power up the entire system is reverted to a default status, this means that for all the model we :

1. Delete the installed model profile
2. Reset all connection parameters;  
   all the wireless configuration parameters will be resetted (AP, password, …) these means that the user must be reconfigure the system.
   1. Led indicator

There are two leds on the GTW000WT, one for power indication (green) and one red for connection indication.

The connection indication led perform the :

1. Is off if not connected to an AP
2. Will blink at 1 sec. rate if connected to an AP but not to the CAREL MQTT server
3. Is always on if connected to CAREL MQTT server.
   1. The WiFi configuration

As already agree the WiFi model don’t have enough space to host an internal Webserver, so that, a method to configure the GWME through an APP must be provided   
A very common method used in some WiFi appliance is the one described below that require a smartphone APP that :

1. search the available AP and recognize the special AP of the GWME.
2. It ask the user about which AP we want to use to connect to internet and the relative password
3. Send these data to the GWME
4. The GME switch enable the STA mode with the provided credential and connect to the AP
5. The APP connect to the same AP and check for the presence of the GME.

A demo APP for Android that show the protocol used is required.

The WiFi configuration APP will be able to :

* + Select the AP name to be connected to
  + Set the AP password
  + Select the mode WPA/WPA2
  + Select a fixed IP address or use DHCP
  + Select the default gateway
  + Select the proxy name and port, ….

1. FW Requirement Specification 2G
   1. 2G Gateway FW OTA Upgrade

As already agreed we need the possibility to update the FW via OTA, this operation must be fail safe and a recovery method of a wrong transfer must be provided.  
This means that if for some reason an upgrade will be interrupt in the middle, after a power on/off the system is able, at least, to restart with the previous FW.

The [CCL](#CCL) already support the possibility to retrieve the certificate and the device model via HTTPS, is possible to use the same method also for the FW of the 2G Gateway ?   
  
In any case the possibility to upgrade the FW through RS485 or USB must be provided.   
A demo in source code “C” or Python of a Windows application that perform the serial upgrade must be provided.

* 1. Reset button

If pressed for a short time (< 5 sec) reboot the system.

* 1. Factory reset button

If pressed for a long time (>=5 sec) at power up the entire system is reverted to a default status, this means that for all the model we :

1. Delete the installed model profile
2. Reset all connection parameters;  
   for example the APN .
   1. Led indicators

There are five leds on the USR-GPRS-730, one for power indication (red) and four green for connections indication.

The connections leds perform (if feasible) these indications, we will refer to the current led name:

1. (WORK) Blink when the GME receive data via RS485.  
   This is useful to detect communication trouble.
2. (GPRS) Is on if the connections with the GSM provider was successfully performed.
3. (LINKA) Is on if the connections with CAREL MQTT server was successfully performed.
4. (LINKB) Is under the control of the CCL library, USR provide the code to drive it.   
   In short the led will show the status of the configuration, ie. Model present.  
   1. The 2G configuration

Due to its nature this devices are reachable only through the cell phone network, so that,

to configure some parameters we need a way to initially send these data to the device.  
Any suggestion are welcomed; here in CAREL we thought that the simplest method is to use SMS.  
In fact is possible to send an SMS with APN name and other data to the GME and reconfigure it, this due to the fact that the SMS don’t use a data connection.   
The above GSM configuration parameters must be stored inside the GSM module, so that, after a power off/on cycle these data are retrieved.

To prevent unauthorized reconfiguration the SMS is protected with a password unique to each device, this password is the same out of production for all the device (ie:12345678) and changeable via SMS, so that, the 1st SMS set the new password and store it in the cloud, the 2nd SMS will configure the GME and use the new password.

Example 1st SMS – change Password

OLDPWD:12345678 NEWPWD:73216651

Example 2nd SMS – change APN

PWD:73216651 APN:……

Obviously is possible to call “SMS – change Password” every time we need not only the first time.

If you have already implemented a system like this please send us the documentation.

Other implementation details

* 1. TBD

TBD

About

TBD