nRF9160: Gurux DLMS server example

Hi,

I am absolutely new to this DLMS and in the course of exploring some kind of opensource DLMS stack I came across this Gurux and fortunately NORDIC did some kind implementation a year ago, and which I thought will be good start.

https://github.com/Gurux/GuruxDLMS.c/tree/master/NordicSemiconductor/GuruxDLMSServerExample

I can build to build the project with some changes (see attachments), but not sure how to proceed further, so can you please help me with some documentation on 'how to test' this sample project?

GuruxDLMSServerExample.zip

Regards

KK

KK kk2mkk
over 1 year ago

Hi KK

DLMS is quite a complex protocol:
"DLMS/COSEM (IEC 62056, EN13757-1) is the global standard for smart energy metering, control and management. It specifies an object-oriented data model, an application layer protocol and media-specific communication profiles" https://www.dlms.com/dlms-cosem/overview.

The very nice aspect of DLMS COSEM is that it is a standard. So, if you have an head-end system supporting DLMS Cosem, you can connect a DLMS COSEM meter to it, with relatively little effort.

For sure Gurux can help you more with DLMS/Cosem and with how to test it. You can contact them direct here http://www.gurux.fi/AboutUs or we can help putting you in contact with them.

Nordic does not support directly the examples provided by Gurux, but we can help pointing in the right direction.

Generally, also with DLMS you have a server-client architecture, where:

- The server application is inside the meters
  Gurux provides examples and helps to implement a Server App into MCUs, including Nordic ARM based SoC
- The client application is on the head-end system.
  Gurux provides an app for PC called "Gurux DLMS Director" for this http://www.gurux.fi/Download

Client and server will use DLMS /Cosem to communicate. Note: we can say it is transport agnostic

From the client, you can open a connection to the server (meter). Then you can poll data (e.g .OBIS) from the meter.

Frames are sent by the client to the server, and then it will wait for a reply.

(Note: here I refer to Client and Server are at application level. At TCP/IP level, you could have different architecture: Server at meter & Client at the head end - or you could have a client at both sides and using an MQTT broker or you can have some custom approach - where client is at the meter as well)

Note: even if DLMS /COSEM is a standard, there are still some variations from meter to meter. So an example may work ok with a meter, but not with another.

So, how to get started if you want to add connectivity and support DLMS?

CASE A

If you have a meter that supports DLMS/COSEM (server app) from one of its ports (optical port, RS232/RS485, UART...), you could potentially use the Client app on your PC (Gurux DLMS Director) to read the meter .
Example: you connect a Optical to USB cable from your meter to your PC and you can read the meter over serial.
(as mentioned above, you should check which meters are supported by Gurux DLMS Director)

What if you want to read remotely, over LTE-M or NB-IoT?

We suggest to use nRF9160, which integrates an MCU and an LTE-M /NB-IoT modem in same chipset. In this case, you can connect the meter, which includes already a Server DLMS/COSEM app, to the nRF9160DK by UART interface.
The nRF9160 can act as a bridge (UART to LTE-M).
A smart way to implement such a bridge is by using an MQTT broker. (see image below).

The Client app (Gurux DLMS Director in your PC), to initiate the connection, will publish the DLMS message with a TOPIC (specific to the meter).

the nRF9160, which has subscribed to that topic, will receive the message and send via UART to the meter in proper format.

the answer from the meter will be received by the nRF9160, which will publish it to the same broker with same topic. The client app will receive it.

The example we suggest to use in combination with nRF9160 is not the one you point out in your ticket, but this one:

https://github.com/Gurux/Gurux.MQTT/tree/master/Nordic_Semiconductor
This implements an MQTT bridge on the nRF9160. And it handles properly the DLMS/COSEM packages and the communication between the meter and the nRF9160DK.
Note: this is just an example. Not a reference design for production.
Note: please check with Gurux for licences

The code will need to be adapted to the meter you are testing (both depending on the interfaces you are using on the DK and to the specific serial communication of the meter). Some additional HW may be needed if your meter uses RS232 /RS485 (you need converters to UART)
You should also choose a suitable broker for your testing (there are several open source online).

CASE B

If you don't have a meter, you can still test this out: you just need to simulate the Meter (Server app) in a PC. Hereafter is how.

You could run a software on your PC that simulates a meter (Server Application). Gurux (on his

GitHub) has examples for that. (please check with Gurux which is best example for this). Then you can have the same setup as before, but instead of connecting the DK to the real meter, you connect it to a PC that simulates the meter (it will send serial data out over USB port of the PC)

You can connect the PC to the DK using the normal USB to microUSB cable (note: the nRF91 cannot be USB host).
The microUSB port in the DK (via the Segger chip) is connected to a uart in the nRF9160 Sip (UART_0). The code (as is now in the example) takes by default data from this UART_0. In this way, the nRF9160 in the DK will receive the serial data coming from the PC.
On nRF9160 you need to run the example provided by Gurux (Gurux MQTT bridge – same link as above).

On another PC (or even on the same one) connected to internet, you will run the client APP (Gurux DLMS Director, described above), with right settings (MQTT settings and meter settings). This will not change compared to previous case.

At this point you are good to start: the Client app will send info over internet to the MQTT broker. The nRF9160 receives it over LTE-M (or NB), and sends it via UART_0 (microUSB port) to the Server App (simulating the meter) running on the PC. The answer will be sent it back in similar way.

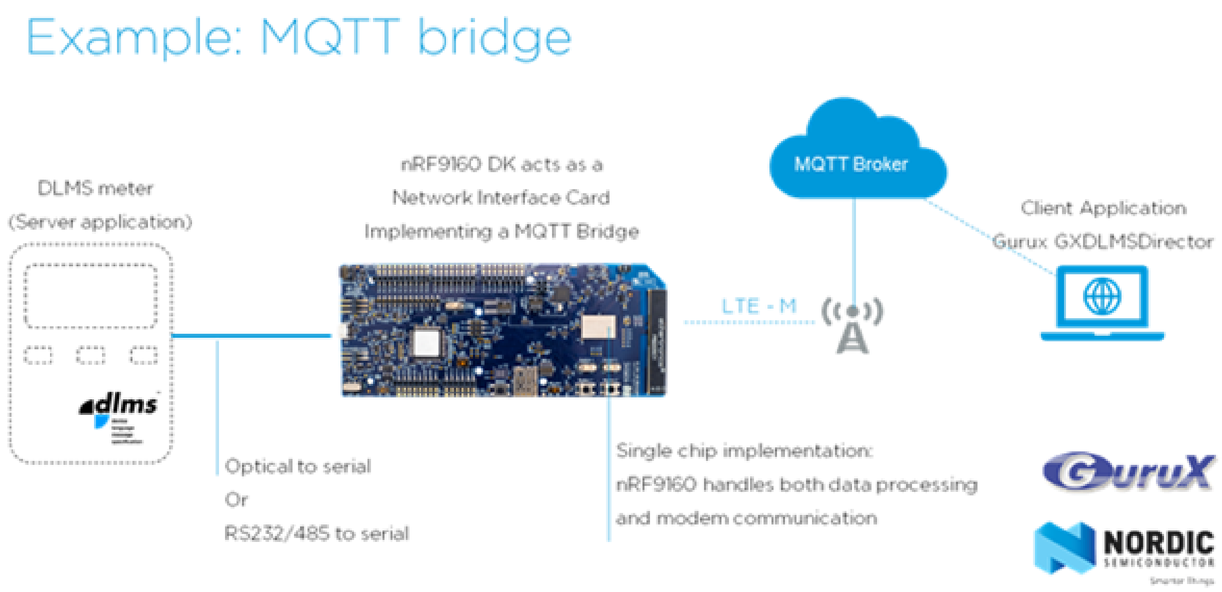
Here the video: https://youtu.be/x03-UK_-cic
In this case, both client app and server app are connected to the same PC, to which DK is connected. However, the messages are travelling between server and client apps over internet and LTE-M/NB.

CASE C

If you have a meter, but it does not support DLMS/COSEM, and you want to add support for it on your product together with wireless connectivity, without touching the other meter components/MCUs, you can take advantage of the Dual core architecture of nRF9160, and use the ARM Cortex M33 MCU inside nRF9160 to implement the Server APP. Basically, by adding nRF9160, you could potentially add support for DLMS/COSEM and LTE-M/NB-IoT connectivity at the same time.
In such a case, nRF9160 could take info from your metrology unit over UART, buffering it internally, transforming it into DLSM/COSEM messages ready to be sent over LTE-M or NB-IoT. Basically, the nRF9160 would also be used to run the DLMS/COSEM Server App.

Currently we don't have this example ready for this scenario, but please let us know if interested in this.

I hope this helps.
However, I know it is a lot of information. So please come back with questions or doubts
Lorenzo



Example: MQTT bridge

nLorami ✓
over 1 year ago

First of all thanks a lot nLorami for your detail explanation, i really appreciate you efforts on detailing this topic.

After going through you notes I started working on the use case to run the DLMS server on nRF91(Similar to the **CASE C** above), and this project https://github.com/Gurux/GuruxDLMS.c/tree/master/NordicSemiconductor/GuruxDLMSServerExample is exact fit for this scenario.

I run this application i.e. DLMS server on nRF9160-DK over UART0 interface and used DLMS client "GXDLMSDirector" to connect to the server, it works like charm!

Now I can extend this example by adding TCP/IP interface by taking the advantage of integrated CatM/NB modem.

thank you

ragrds

KK

KK kk2mkk ✓
over 1 year ago in reply to nLorami

Hi,

I am trying to make the same setup work. The DLMS server on nrf9160 over UART0 seems to work fine. But the device is not showing in the GXDLMS director app. What settings did you enter in the GXDLMSDirector to connect to the DLMS server?

Cheers,
ziml

ziml
12 months ago in reply to kk2mkk

Hi,

This is the project settings file for GXDLMS director app /cfs-file/__key/communityserver-discussions-components-files/4/test.gxc.txt which i have made for my testing.

Please get rid of .txt extension.

regards

KK

KK

kk2mkk
12 months ago in reply to ziml

Hi KK,

Thanks for your answer.
It is working now and I can read the Objects.

ziml
12 months ago in reply to kk2mkk

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