

NBIOTBG96SHIELD_Azure

Firmware demo project for Azure connection using BG96 IoT Shield (NBIOTBG96SHIELD)

1 – Test setup

Hardware:

- NUCLEO-F401RE
- X-NUCLEO-IKS01A2
- NBIOTBG96SHIELD BG96 IoT Shield with antenna
- Mini USB cable



Software:

- PC terminal (such as RealTerm, HyperTerminal, ...)
- BG96_Azure_demo_pack (link??)
- Keil uVision5

2 – Getting started

- Compile the FW pack and download into your NUCLEO-F401RE
- Connect the PC terminal to USB virtual com port (115200, N, 8, 1)
- On IDE windows, starts the FW: on your terminal windows you can see as here below

```
RealTerm: Serial Capture Program 2.0.0.70
STMicroelectronics Azure_DM:
  Version 3.2.2
  STM32F401RE-Nucleo board
  Azure SDK Version 1.1.16
  BG96 IoT Shield demo version
IKS01A2 board
Ok Accelerometer Sensor
Ok Gyroscope Sensor
Ok Magnetometer Sensor
Ok Humidity Sensor
Ok Temperature Sensor1
Ok Temperature Sensor2
Ok Pressure Sensor
Enabled Accelerometer Sensor
Enabled Gyroscope Sensor
Enabled Magnetometer Sensor
Enabled Humidity Sensor
Enabled Temperature Sensor1
Enabled Temperature Sensor2
Enabled Pressure Sensor
<HAL 1.7.1.0>
Compiled May 3 2018 15:00:30 <KEIL>
Init Application's Timers
Init Random Number Generator
Enabled Free Fall
Init BG96's Timers
Init BG96's UART & GPIO

! META Data info !
Meta Data Manager read from Flash
Meta Data Manager version=0.8.0
Generic Meta Data found:
  BG96 Size=76 [bytes]
  AZURE Size=256 [bytes]

! GSM Credential !
  Saved SIM PIN : 1234
  Saved APN : internet.wind
Wait 3 seconds for allowing User Button Control for changing it
! Connection String !
  Saved Connection String :
  X
Wait 3 seconds for allowing User Button Control for changing it
GSM init... wait
```

Follow the screen directive to set SIM pin, APN name and Azure connection string

3 – How to obtain a connection string

Download and install Device Explorer <https://github.com/Azure/azure-iot-sdk-csharp/releases>

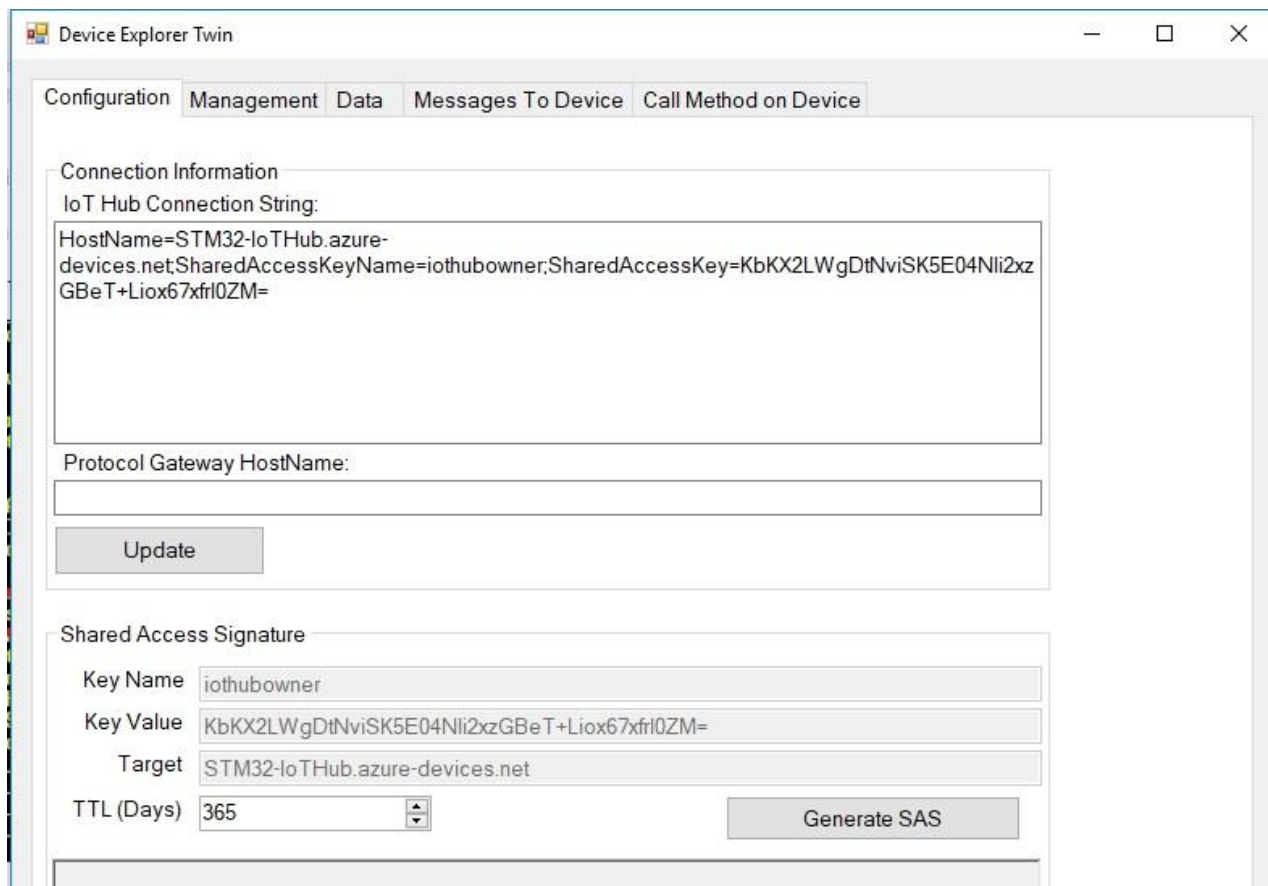
Search and note the MAC number from your test equipment

```
Wait 3 seconds for allowing User Button Control for changing it
GSM init... wait
[DBG96] power on!!
[DBG96] Reset
[DBG96] send PIN AT+CPIN=1234
[DBG96] Wait PIN
[DBG96] set APN & ACT
[DBG96] Module ready!!
GSM connected to network
GSM module configured and connected
-> MAC Address is: 00:80:b5:89:06:78
Init Real Time Clock 03 03 2018 13:37:04
Platform Init Done
Serializer Initialized
IoT Hub Client Handle Created
IoT Hub Client SetOption logtrace Ok
Model Instance Created
IoT Hub Client_LL SetMessageCallback...successful.
IoT Hub Client_LL SetDeviceMethodCallback...successful.
IoT Hub Client_LL SetOption(certificates)...successful.
IoT Hub Client_LL SetDeviceTwinCallback...successful.
```

Open the Device Explorer, set the configuration string to connect Avnet Iot Azure Hub Server:

HostName=STM32-IoTHub.azure-

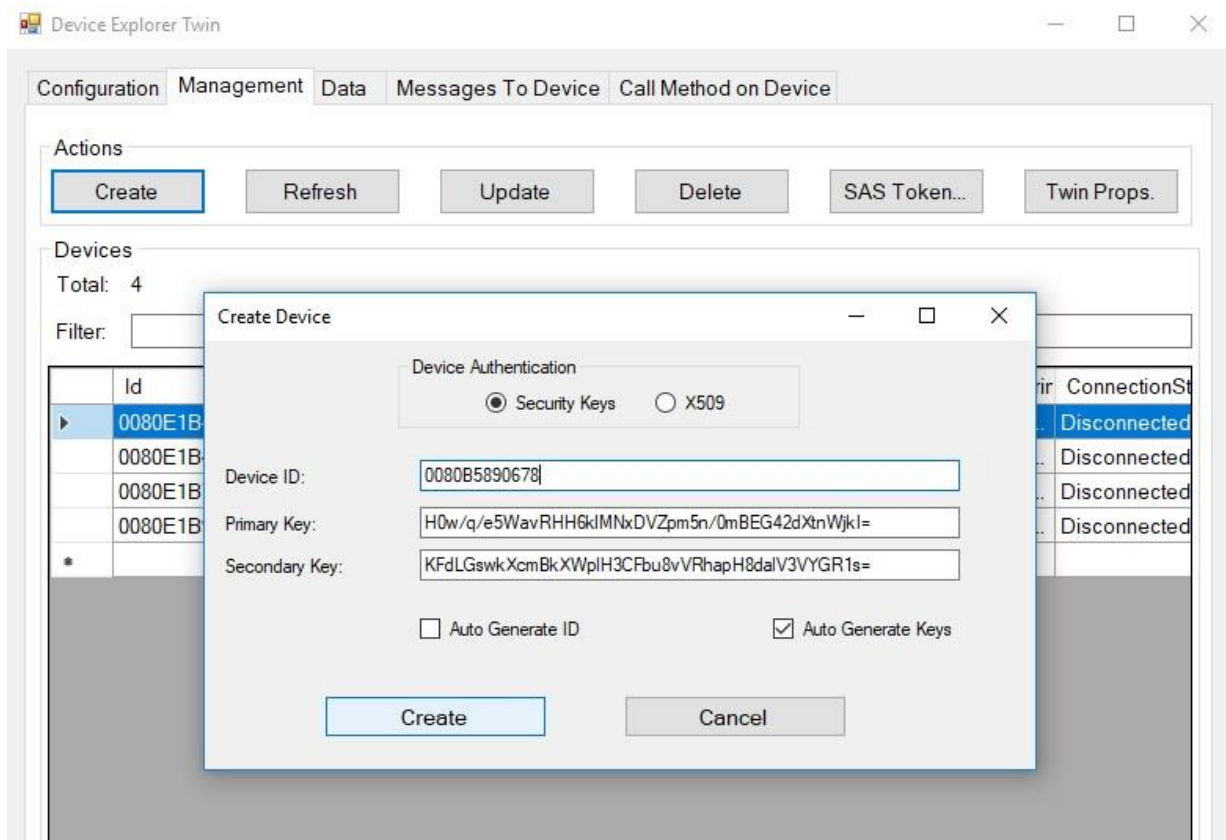
devices.net;SharedAccessKeyName=iothubowner;SharedAccessKey=KbKX2LWgDtNviSK5E04Nli2xzGBet+Liox67xfri0ZM=



more instruction for Device Explorer can be found at this link:

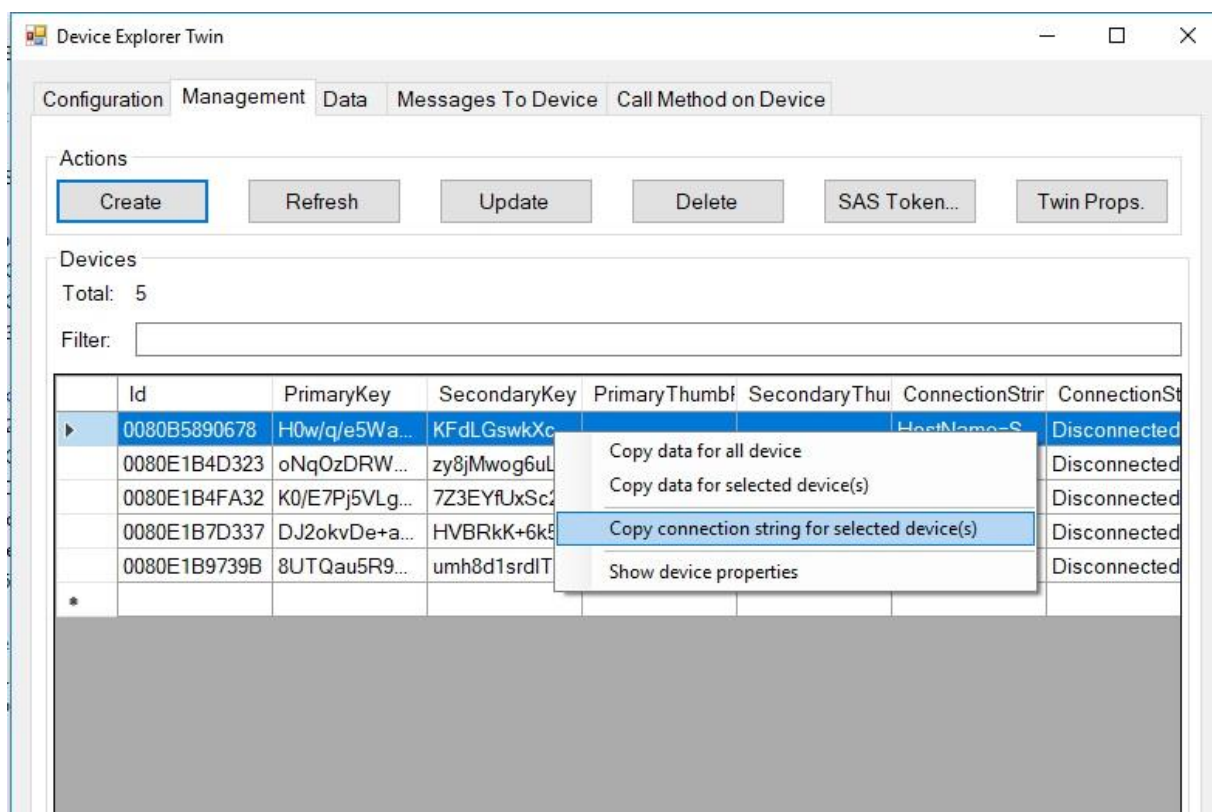
<https://github.com/Azure/azure-iot-sdk-csharp/tree/master/tools/DeviceExplorer>

Go to Management tab click “Create” button and insert the MAC inside Device ID field
(TAKE CARE, USE ONLY UPPERCASE!)



Click on “Create” button of popup you just insert the MAC, then click on “Done” button.

Right click on your device just created (see on the device list), select “Copy connection string for selected device(s)”



On the terminal, when asked, press User Button (blue button on NUCLEO board) and paste the connection string just copied.

```
RealTerm: Serial Capture Program 2.0.0.70
Meta Data Manager version=0.8.0
Generic Meta Data found:
  BG96 Size=76 [bytes]
  AZURE Size=256 [bytes]
-----
!   GSM Credential   !
-----
  Saved SIM PIN   : 1234
  Saved APN   : internet.wind
Wait 3 seconds for allowing User Button Control for changing it
-----
!   Connection String   !
-----
  Saved Connection String :
  X
Wait 3 seconds for allowing User Button Control for changing it
  Do you want to change it?(y/n)
Enter the Azure Connection String:
HostName=STM32-IoTHub.azure-devices.net;DeviceId=0080B5890678;SharedAccessKey=H0
w/q/e5WavRHH6k1MNxDUZpm5n/0mBEG42dXtnWjkl=
Updating the Generic Meta Data type=AZ
URE
Meta Data Manager erased in FLASH
Meta Data Manager Saved in FLASH
GSM init... wait
[DBG96] power on!!
[DBG96] Reset
[DBG96] send PIN AT+CPIN=1234
[DBG96] Wait PIN
[DBG96] set APN & ACT
[DBG96] Module ready!!
GSM connected to network
GSM module configured and connected
-> MAC Address is: 00:80:b5:89:06:78
Init Real Time Clock 05-03-2018 13:33:27
Platform Init Done
Serializer Initialized
IoTHubClientHandle Created
IoTHubClientSetOption logtrace Ok
Model Instance Created
IoTHubClient_LL_SetMessageCallback...successful.
IoTHubClient_LL_SetDeviceMethodCallback...successful.
IoTHubClient_LL_SetOption(certificates)...successful.
IoTHubClient_LL_SetDeviceTwinCallback...successful.
```

Connect to Avnet Azure IoT Hub <https://stm32ode-avnet.azurewebsites.net/>

Insert your MAC, then click on green button

STM32ODE web dashboard based on Microsoft Azure IoT for evaluation of FP-CLD-AZURE1 v3.0.0.

STM32 Open Development Environment

Internet of Things

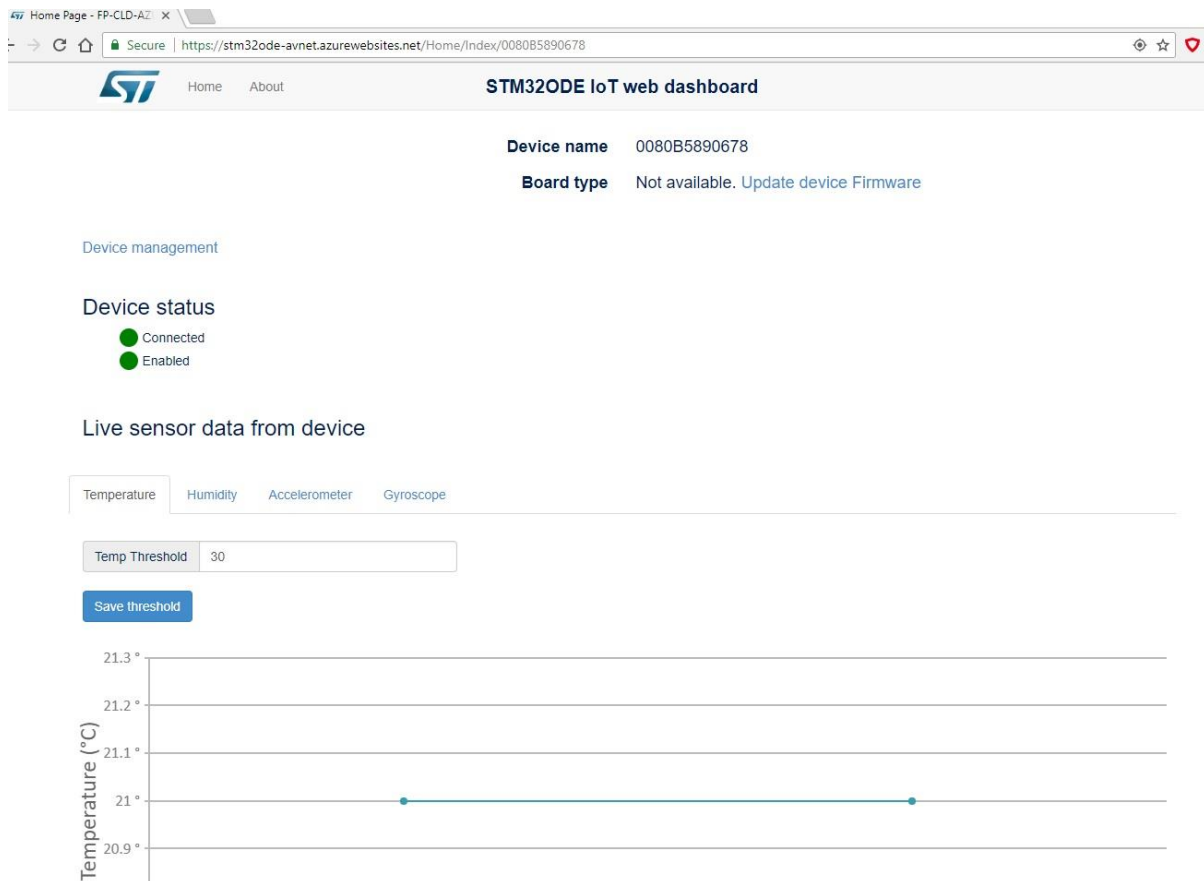
Microsoft Azure Certified

Follow instructions from FP-CLD-AZURE1 to learn how to build your STM32 Nucleo based IoT node; be sure to use **Firmware version 3.0.0** or above. Type in the box below the MAC address of your device.

Insert device identifier (MAC address)

00 80 B5 89 06 78

Now you can see your device dashboard



The screenshot shows the STM32CODE IoT web dashboard for device management. The browser address bar displays the URL <https://stm32code-avnet.azurewebsites.net/Home/DeviceManagement/0080B5890678>. The dashboard header includes the ST logo and navigation links for Home and About. The main content area displays the following information:

- Device name:** 0080B5890678
- Board type:** Not available. [Update device Firmware](#)
- Telemetry** section:
- Twin** section: A dropdown menu with "LedOff" selected, a "Send message to device" button, and a "Call Method" button.
- Control device** section: A dropdown menu with "Reboot" selected, a "Call Method" button, and a "Submit" button.
- Firmware updates are not availables** message.
- Filename:** A "Choose File" button and a "Submit" button.

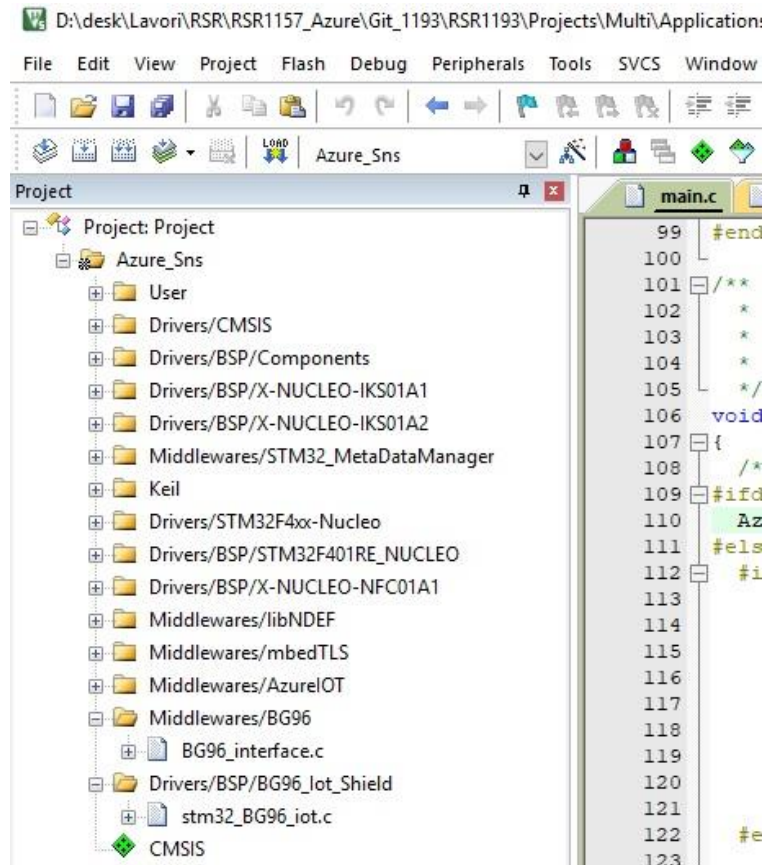
4 – Project files

BG96_interface.c

All functions needed to interface low layer BG96 communication and Azure_Sns application

Stm32_BG96_iot.c

HAL level interface (Uart and Timer)



The BG96 IoT Shield application is a modification of original FP-CLD-AZURE1

User can have more information about the main functionality following these links:

http://www.st.com/content/ccc/resource/sales_and_marketing/presentation/product_presentation/group0/1f/8c/03/3b/a4/da/49/b4/FP-CLD-AZURE1%20quick%20start%20guide/files/fp-cld-azure1_quick_start_guide.pdf/jcr:content/translations/en.fp-cld-azure1_quick_start_guide.pdf

http://www.st.com/content/ccc/resource/technical/document/user_manual/group0/07/bb/bb/fe/c/e/90/4c/a0/DM00280570/files/DM00280570.pdf/jcr:content/translations/en.DM00280570.pdf