LEW840X, OpenSource Multiple Network Gateways

IP65 Gateway, Market Ready Enclosure

LEW840X Series gateways are developed for commercial, industrial, and agriculture applications. Enclosure has either Ingress Protection IP65 or IP51. An IP65 gateway can be deployed outdoor.
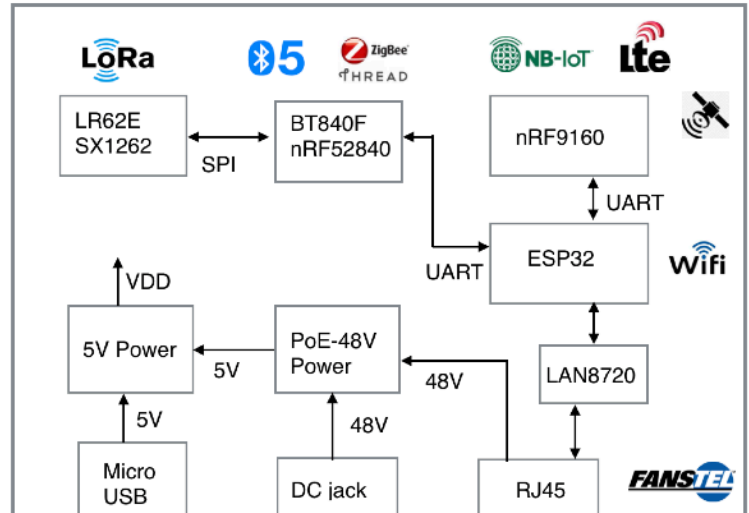
Multiple Network, Radio Gateways

LTE, WiFi, and Ethernet interfaces are supported simultaneously. One gateway can be deployed globally to interface with networks available locally. Operation and maintenance supports are simplified. When multiple networks are available, back-up routing can assure of cloud connection during one or more networks failures.

- nRF9160: LTE-M and NB-IoT module with GPS receiver
- ESP32M16 WiFi module: WiFi, Ethernet with Power over Ethernet
- BT840F(nRF52840): BLE 5, Thread, Zigbee (IEEE 802.15.4) module; supports mesh.
- BT40F(nRF5340): BLE5.1, Thread, Zigbee (IEEE 802.15.4) module; supports mesh, directional finding.
- LR62E (SX1262): LoRa supporting cloud connection.

Demonstration quality source codes for connecting sensors to AWS, Google, or MicroSoft cloud servers are

Open Source IoT Gateway supporting multiple radios, multiple networks

available. They can reduce your development time and cost, allowing shorter time to market.

Nordic nRF52840, nRF5340 and nRF9160 have CryptoCell coprocessor embedded. Secure connection can be established from Bluetooth mesh to cloud server.

Private label and custom hardware can be supported.

Some BLE 5 Gateways will be upgraded to BLE 5.1 in the near future.

MultiNetwork, MultiProtocol Gateways with Ingress Protection							
Ingress protect/	IP51/black	IP51/black	IP51/black	IP51/black	IP65/white	IP65/white	IP65/white
Gateway	EW840F5	EW840F5P	LEWR840E5P	EE840XE5P	EW840F6P	LEE840E6P	LEWR840E6P
Size, mm	107x141x40	107x141x40	107x141x40	107x141x40	107x141x40	107x141x40	107x141x40
WiFi/Ethernet	ESP32M16	ESP32M16	ESP32M16	ESP32E16.	ESP32M16	ESP32E16.	ESP32M16
LTE Module			nRF9160			nRF9160	nRF9160
BLE Module	BT840F	BT840F	BT840E	BT840XE	BT840F	BT840E	BT840E
LoRa module			LR62E				LR62E
External antenna	0	0	3	2	0	3	3
PoE	No	Yes	Yes	Yes	Yes	Yes	Yes
Optional power	USB, included	USB, not included	USB, not included	USB,not included	48V, not included	48V, not included	48V, not included
Operating temp.	0ºC to +40ºC	-40ºC to +80ºC	-40ºC to +80ºC	-40ºC to +80ºC	-40ºC to +85ºC	-40ºC to +85ºC	-40ºC to +85ºC
Mounting	Desk, wall, pole	Desk, wall, pole	Desk, wall, pole	Desk, wall, pole	Wall, pole	Wall, pole	Wall, pole
Certifications							
QDID	108621	108621	108621	108621	108621	108621	108621
1K price, each	$50.59	$54.82	$108.31	$72.38	$76.69	$125.00	$139.89
Availability	Non-stock	Sample 03/20	Sample 03/20	Sample 03/20	Non-stock	Non-stock	Non-stock

Table Of Contents

1. Introduction

One LEW840X Series gateway can be deployed globally to interface with networks available locally. Operation and maintenance supports are simplified. When multiple networks are available, back-up routing can assure of cloud connection during one or more networks failures.

Alternatively, your can select a single network interface to reduce product cost.

LEW840X Series supports LTE-M, NB-IoT, WiFi, and Ethernet interfaces. It supports Bluetooth 5, 5.1, Thread, Zigbee, and LoRa on the device side.

2. Specifications

At the heart of LEW840X Series gateway is an ESP32M16 module with an ESP32 D0WD SoC. It has an Xtensa dual core 32 bit LX6 microprocessors, up to 600 MIPS. A Microchip LAN8720 is the Ethernet PHY interface.

ESP32 communicates with nRF9160 LTE-M/NB/IoT module using an UART interface. It also communicates with BT840F BLE 5 module using a second UART. BT840F controls LoRa module LR62E through an SPI interface.

BT840F supports 802.15.4 Thread and Zigbee radio protocols. It can be replaced with BT40F, an RF5340 module supporting BLE 5.1, Thread, and Zigbee.

Gateway can be powered by a 5V micro USB AC adapter, a 48V DC power supply, or powered through Ethernet cable
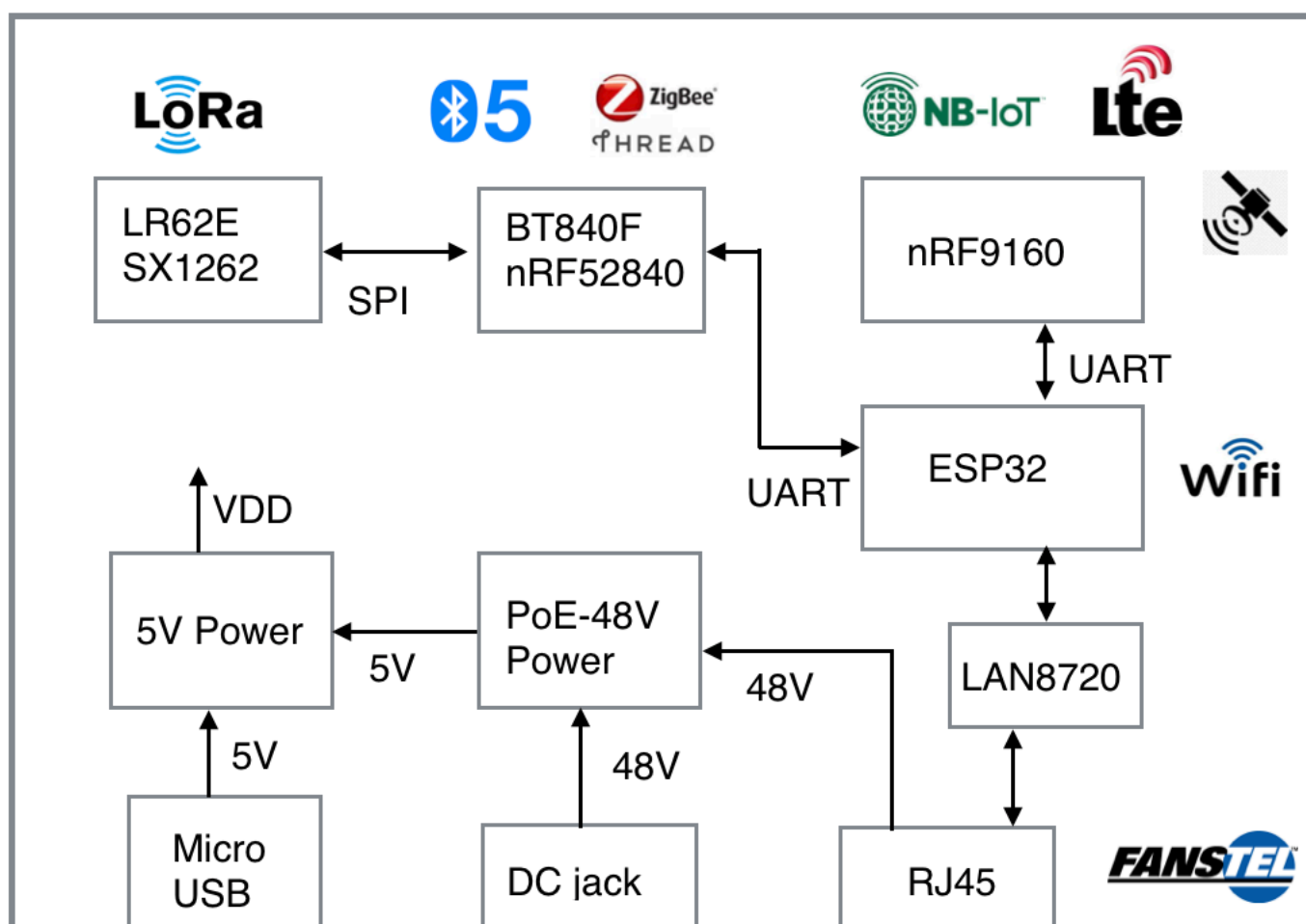
Open Source IoT Gateway supporting multiple radios, multiple networks

LEW840X Part Numbers

Possible part numbers of LEW840X Series are listed below.

L E W R 840E 6

L: **L**TE-M/NB-IoT, Nordic nRF9160; Missing: not supported

E: **E**thernet, ESP32 module/LAN8720 PHY

W: **W**iFi with integrated antenna; **E**: WiFi with an u.FL for **E**xternal antenna.

R: Lo**R**a, LR62E, SX1262 module; Missing: not supported.

840E: BLE 5 module, BT**840E**, BT**840F**, BT**840XE**, BT**840X**; BLE 5.1 module, BT**40E**, BT**40F**, BT**40XE**, BT**40X**.

6: IP**6**5 Ingress Protection; **5**: IP**5**1 Ingress Protection.

P: **P**ower over Ethernet; Missing: PoE not supported.

- LTE-M/NB-IoT interface needs an external antenna. It is an optional feature.
- Ethernet interface is always supported.
- Bluetooth interface is supported by one of 4 BLE 5 modules or 4 BLE 5.1 modules. Module can be with an integrated antenna, with an external antenna, and with an integrated power amplifier to boost TX power to +21 dBm. IEEE 802.15.4 Thread and Zigbee interfaces are supported by BLE modules.
- WiFi interface is supported with an integrated antenna or an external antenna.
- LoRa interface is an optional feature. An external antenna is required.
- Enclosure can be IP65 or IP51 rated.
- Power over Ethernet (PoE) can be supported for all gateways. IP51 gateway without PoE is powered by a micro USB AC adapter. IP65 gateway without PoE is powered by 48V DC.
- Up to 3 external antennas can be supported. LTE and LoRa interfaces need external antennas. Integrated antenna and external antenna can be supported for both BLE and WiFi.

LTE-M/NB-Iot Interfaces

LEW840X gateway uses a Nordic nRF9160 SICA module supporting LTE-M, NB/IoT and with GPS receiver. An external LTE antenna is used. GPS receiver amplifier and antenna is integrated.

Microcontroller:
- ARM® Cortex® -M33
- 1 MB flash, 256 kB low leakage RAM
- ARM® Trustzone®
- ARM® Cryptocell 310
- Up to 4x SPI master/slave
- Up to 4x I2C compatible two-wire master/slave.
- Up to 4x UART (CTS/RTS)
- I2S
- Digital microphone interface (PDM)
- 4x pulse width modulator (PWM) unit
- 12-bit, 200 ksps ADC - 8 configurable channels with programmable gain
- 3x 32-bit timer with counter mode
- 2x real-time counter (RTC)
- Programmable peripheral interconnect (PPI)
- 32 general purpose I/O pins

LTE modem:
- Transceiver and baseband

- 3GPP LTE release 13 Cat-M1 and Cat-NB1 compliant
  - 3GPP release 13 coverage enhancement
- 3GPP LTE release 14 Cat-NB2 compliant
- GPS receiver
  - GPS L1 C/A supported
  - GPS antenna and amplifier integrated
- RF transceiver for global coverage
  - Up to 23 dBm output power
  - -108 dBm sensitivity (LTE-M) for low band, -107 dBm for mid band
  - An u.FL connector for external LTE antenna
- LTE band support in hardware:
  - Cat-M1: B1, B2, B3, B4, B5, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28, B66
  - Cat-NB1/NB2: B1, B2, B3, B4, B5, B8, B12, B13, B17, B18, B20, B25, B26, B28, B66
- Nano SIM card connector on-board.
- Power saving features: DRX, eDRX, PSM
- IP v4/v6 stack
- Secure socket (TLS/DTLS) API

WiFi or Ethernet Interfaces

ESP32M16 WiFi module with an Expressif ESP32 D0WD, dual core Xtensa 32 bit processor establishes and maintains connection to a cloud server.

Mongoose OS OpenSource codes for connecting to Fanstel development server and to **Google Cloud IoT Core, AWS, and Microsoft** cloud servers are available. They can be used as a base to develop interface with other servers.

Link to download additional document and source codes:
http://www.fanstel.com/download-opensource/

Brief descriptions of WiFi module ESP32M16:
- Expressif ESP32 D0WD, Xtensa dual core 32 bit LX6 microprocessors, up to 600 MIPS.
- 448KB ROM, 520KB SRAM, 16 MB flash
- 16KB SRAM in RTC
- 802.11 b/g/n, 802.11n (2.4 GHz), up to 150 Mbps

Bluetooth 5, Thread, Zigbee Interfaces

Bluetooth 5 module supports Bluetooth 5, Thread, and Zigbee radio interfaces. It also manages LoRa module LR62E. One of four Bluetooth 5 modules can be installed.

- BT840F, an nRF52840 module. It is FCC certified with max. TX power of +8.46 dBm.

- BT840E, an nRF52840 module with an u.FL connector, panel mounted SMA connector for an external antenna. It passes FCC certification testing with ANT060, a 6 dBi antenna.

- BT840X, an nRF52840 module with SKY66112 power amplifier. It passes FCC testings at +21 dBm TX.

- BT840XE, an nRF52840 + SKY66112 module with an u.FL connector, panel mounted SMA connector for an external antenna. It passes FCC testings with ANT000, a 0 dBi antenna.

Maximum TX power of BT840X is about 13.8 dB higher than that of BT840F. The receiver gain of SKY66112 is measured at 1.5 dB. Comparing to BT840F, BT840X has 15 dB more link budget. In free space (antenna high above ground and without obstruction), 15 dB link budget can more than quadruple range. Or, it is enough to penetrate 2 dry walls in typical house in the U.S.A.

If you are developing a mesh network or sensor using BT840X/XE, a gateway with BT840X/XE will provide the longest possible Bluetooth, Thread or Zigbee range.

If this gateway is to receive data from various (Fanstel and non Fanstel) sensors, beacons, BT840E with ANT060 antenna will provide the best receiver sensitivity if antennas are deployed in parallel (horizontal polarization).

Brief specifications of BT840F Series modules.
- nRF52840 QIAA, ARM Cortex M4F, 64 MHz
- ARM® TrustZone® Cryptocell-310 co-processor
- BLE 5 data rate: 2Mbps, 1Mbps, 500kbps,125kbps.
- IEEE 802.15.4 Thread and Zigbee data rate: 250 Kbps
- 2.4 GHz proprietary data rate: 2 Mbps, 1 Mbps
- Serial Wire Debug (SWD)
- Nordic SoftDevice Ready
- Over-the-Air (OTA) firmware update
- Flash/RAM: 1MB/256KB.
- 48 General purpose I/O pins
- Type 2 NFC-A tag with wake-on field, Touch-to-pair support
- Integrated PCB trace antenna or u.FL connector

module	BT840F	BT840E	BT840X	BT840XE
SoC	nRF52840-QIAA	nRF52840-QIAA	nRF52840-QIAA	nRF52840-QIAA
Size	15x20.8x1.9mm	14x16x1.9mm	15x28.0x1.9mm	15x28.0x1.9mm
BT Antenna	PCB trace	ANT060	PCB trace + PA	PA+ANT000
Max TX includes antenna gain	+8.8dBm	+14.4 dBm	+22.6 dBm	+21.0 dBm
32.768 sleep crystal	External	External	Integrated	Integrated
BT range,1 Mbps, LMPI	1000 meters		1170 meters	1170 meters
BT range, 1Mbps, 1.52m	390 meters		900 meters	1170 meters
BT range, 125 Kbps, LMPI.	2300 meters	3400 meters, est.	>4500 meters	>4500 meters
BT range, 125 kBps, 1.52m	640 meters		1240 meters	1920 meters
FCC ID	X8WBT840F	X8WBT840F	X8WBT840X	X8WBT840X
IC ID	4100A-BT840F	4100A-BT840F	4100A-BT840X	4100A-BT840X
CE	Certified	Certified	Certified	Certified
RCM	Certified	Certified	Certified	Certified
TELEC	201-190710/00	201-190710/00		
Availability	Production	Production	Production	Production

Bluetooth 5.1, Thread, Zigbee Interfaces

Bluetooth 5.1 module supports Bluetooth 5, Thread, and Zigbee radio interfaces. It also manages LoRa module LR62E. One of Bluetooth 5.1 modules can be installed.

- BT40F, an nRF5340 module.

- BT40E, an nRF5340 module with an u.FL connector, panel mounted SMA connector for an external antenna.

- BT40X, an nRF52840 module with nRF21540 power amplifier.

- BT40XE, an nRF52840 + nRF21540 module with an u.FL connector, panel mounted SMA connector for an external antenna.

Nordic nRF5340 SoC has a dual core ARM Cortex™ M33 MCU. BT40F Series modules are footprint compatible with BT840F series. Firmware configuration of GPIO pins is required.

The application core ARM Cortex™ M33 can operate at 128 MHz. It has a Floating Point Unit (FPU) and hardware DSP instruction sets. It can handle Bluetooth profiles needing processing power, e.g., BLE 5.1 directional finding, audio.

Brief Specifications BT40F Series modules.

- nRF5340 QKAA, dual core ARM® Cortex M33
- Application Core
  - 128/64 MHz Cortex M33 with FPU and DSP instructions
  - 1MB flash, 512KB RAM
  - 8KB 2-way set associate cache
  - ARM® TrustZone® Cryptocell-312 co-processor
- Network core:
  - 64 MHz Cortex M33 with 2KB instruction cache
  - 256KB flash, 64KB RAM
  - 2.6 mA in RX and 3.2 mA in 0dBm TX
  - Receiver Sensitivity: -97.5 dBm at 1Mbps
  - TX power: programmable +3dBm to -20dBm
  - BLE 5.1 data rate: 2Mbps, 1Mbps, 500kbps, 125kbps.
  - EEE 802.15.4 data rate: 250 Kbps
  - 2.4 GHz proprietary data rate: 2 Mbps, 1 Mbps
- Serial Wire Debug (SWD)
- Nordic SoftDevice Ready
- Over-the-Air (OTA) firmware update
- Type 2 NFC-A tag with wake-on field, Touch-to-pair support

module	BT40F	BT40E	BT40X	BT40XE
SoC	nRF5340	nRF5340	nRF5340	nRF5340
Size	15x20.8x1.9mm	14x16x1.9mm	15x28.0x1.9mm	15x28.0x1.9mm
BT Antenna	PCB trace	u.FL	PCB trace + PA	PA + u.FL
Max TX				
Operating temp.	-40ºC to +105ºC	-40ºC to +105ºC	-40ºC to +105ºC	-40ºC to +105ºC
Availability	Sample 03/20	Sample 04/20	Sample 3Q20	Sample 3Q20

LoRa Interfaces

- LR62E module with Semtech SX1262 transceiver, u.FL connector.
- Up to +22 dBm transceiver (USA version) at 902 to 928 MHz.
- Panel mounted SMA connector for external antenna
- LoRa stacks for cloud connection are managed by BT840F Series or BT40F Series BLE modules.

Power Supply and Power over Ethernet

- Most of USB AC adapter has operating temperature range of 0oC to +40oC. AC adapter included in non-PoE IP51 gateway has this operating temperature range.
- A gateway with PoE can be powered by an PoE switch at up to 328 feet or 100 meters away.
- Fanstel single line PoE power injector, POE048 can power a gateway from 100 meters or 328 feet away. POE048 includes an AC adapter operating from -20oC to +60oC.
- IP65 enclosure has a barrel type, IP67 DC jack.

Operating Temperature Range

BLE 5 Gateways

Electronic components used in BLE 5 gateways has minimum operating temperature range of -40oC to +85oC. The followings limit operating temperature of gateways.

- Operating temperature range of USB AC adapter is 0oC to +40oC. Non PoE IP51 gateway includes an USB AC adapter. Operating temperature range is 0oC to +40oC.
- The enclosure material (ABS) used in IP51 gateway has operating temperature range, -40oC to +80oC. PoE IP51 gateway has operating temperature range of -40oC to +80oC.
- Operating temperature range of 48V DC power supply is -20oC to +60oC. Non PoE IP65 gateway has operating temperature range of -20oC to +60oC.
- The enclosure material (Sabic EXL9330) used in IP65 gateway has operating temperature range to over 125oC. PoE IP65 gateway has operating temperature range of -40oC to +85oC.

BLE5.1 Gateways

ESP32M16 and BLE 5.1 modules have operating temperature range of -40oC to +105oC. LTE module, LoRa module, and LAN8720 Ethernet PHY has operating temperature range of -40oC to +85oC. It is possible to develop limited feature gateway to operate to 105oC.

Private Label and Custom Hardware

Logo and button names are printed on a membrane. They can be customized.

Custom enclosure design and electronic hardware are available. Please contact Fanstel.

PK-LEW840X Programming Kit

To load firmware into LEW840X Series gateway, a Programming Kit PK-LEW840X is required. In addition, you need the following hardware:

- nRF52840-DK, Development Kit for nRF52840 modules. Or, nRF5340-DK, Development Kit for nRF5340 modules.
- nRF9160-DK if you have LTE interface

3. Firmware Development and Programming

LEW840X gateways is pre-loaded with WiFi+Ethernet+LTE M (Optional) demonstration codes.

When connected to internet, LEW840X gateway sends temperature and humidity sensor data to Fanstel MQTT server. You can use Fanstel MQTT PC tool or mobile APP to monitor data.
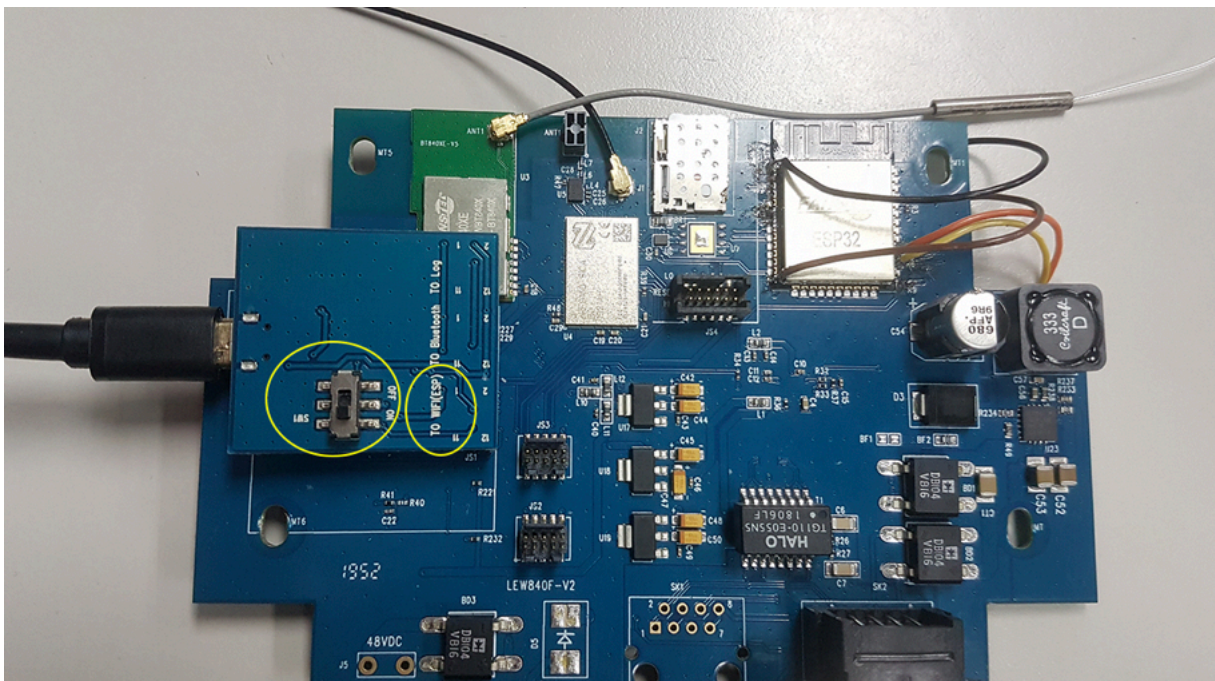
MQTT tool or MQTT APP<->MQTT broker <->LEW840F<->BLE Sensor

It is easier to test gateway and load firmware by removing gateway PCBA from enclosure.

Ethernet and WiFi

Check the Ethernet.
• Connect UART_Bridge Board "TO WIFI(ESP)" into the JS1 of LEW840X PCBA.
• Make sure the switch on Bridge board is turn off.
• Connect micro USB to PC and open the teminal tool.

- Plug in the Ethernet and reset the board.
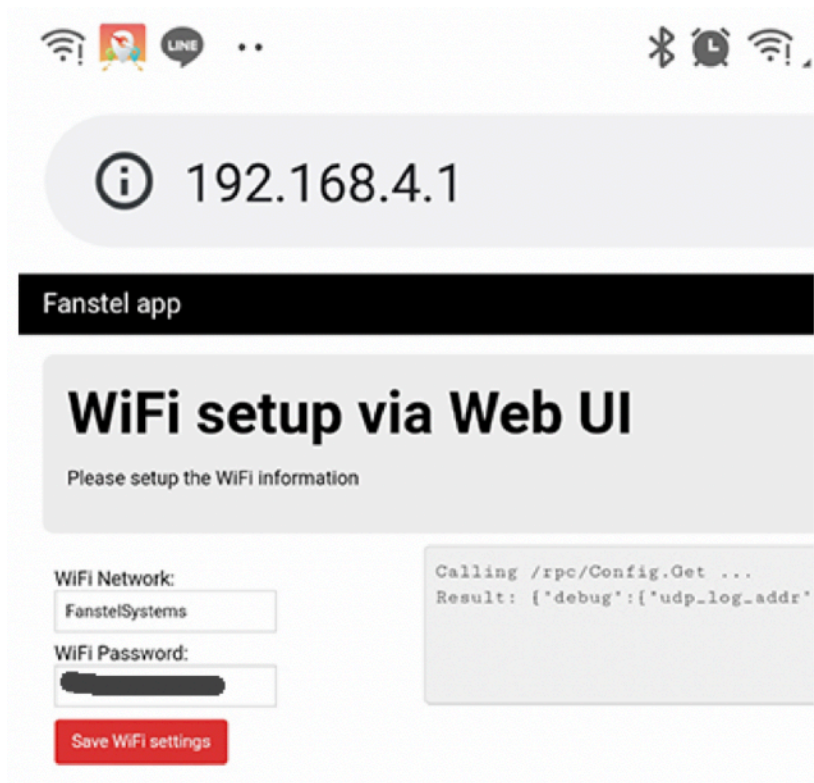- Gateway should get DHCP IP address.

```
esp32_bt_gap.c:100      BT device name esp32_ED5509, addr 45:b5:82:9c:06:ff,2<LF>
esp32_bt_gatts.c:394    Starting BT service 5f6d4f53-5f44-4247-5f53-56435f49445f<LF>
esp32_bt_gap.c:280      BLE advertising started<LF>
esp32_bt_gatts.c:394    Starting BT service 5f6d4f53-5f52-5043-5f53-56435f49445f<LF>
mgos_net.c:85           WiFi STA: connecting<LF>
== Net event: 1313166337 WiFi CONNECTING <LF>
mgos_provision_state:43 Current state: 0 -> 1<LF>
mgos_provision_state:72 Setting provisioning timeout for 300 seconds<LF>
I (2859) wifi: state: assoc -> init (400)<LF>
I (2869) wifi: n:4 0, o:4 0, ap:255 255, sta:4 0, prof:1<LF>
mgos_wifi.c:119         WiFi STA: Disconnected, reason: 4<LF>
mgos_net.c:81           WiFi STA: disconnected<LF>
== Net event: 1313166336 WiFi DISCONNECTED <LF>
mgos_net.c:89           ETH: connected<LF>
== Net event: 1313166338 WiFi CONNECTED <LF>
<ESC>+[0;32mI (5569) event: eth ip: 192.168.0.188, mask: 255.255.255.0, gw: 192.168.0.1<ESC>+[0m<LF>
mgos_net.c:101          ETH: ready, IP 192.168.0.188, GW 192.168.0.1, DNS 192.168.0.1<LF>
== Net event: 1313166339 WiFi GOT_IP <LF>
mgos_provision_state:43 Current state: 1 -> 2<LF>
esp32_bt.c:82           Network is up, disabling Bluetooth<LF>
mgos_sys_config.c:174   Saved to conf9.json<LF>
mgos_mqtt.c:427         MQTT connecting to 59.124.228.194:1883<LF>
mgos_mqtt.c:141         MQTT TCP connect ok (0)<LF>
mgos_mqtt.c:182         MQTT CONNACK 0<LF>
online =true <LF>
mgos_provision_state:43 Current state: 2 -> 3<LF>
mgos_provision_state:66 Reached stable state (3)<LF>
mgos_sys_config.c:174   Saved to conf9.json<LF>
mgos_mqtt.c:125         Subscribing to 'esp32_ED5509/Idemo' (QoS 1)<LF>
mgos_mqtt.c:125         Subscribing to 'esp32_ED5509/rpc/#' (QoS 1)<LF>
mgos_mqtt.c:125         Subscribing to 'esp32_ED5509/rpc' (QoS 1)<LF>
Waiting Sensor data! <LF>
```

Check WiFi, setup network first.
- Hold SW1 when resetting.
- The LEW840X will enter AP mode.
- Use a smartphone and into the Setup-WiFi ..
- FanstelGW_XXXXX appear.
- Connect it and open browser goto 192.168.4.1.

Setup the SSID and password for your router.

Check the log.
The WiFi should be got ID and connected.

```
I (1919) wifi: pm Scare, type: 0<LF>
<LF>
mgos_aws_shadow.c:571    MQTT is not configured for AWS, not initialising shadow<LF>
mgos_mongoose.c:66       New heap free LWM: 49080<LF>
mgos_ota_core.c:1308     UID: 0fdc9367f3c35a3a, license: none<LF>
esp32_bt_gap.c:100       BT device name esp32_ED5509, addr 64:c3:47:68:ef:6e,2<LF>
esp32_bt_gatts.c:394     Starting BT service 5f6d4f53-5f44-4247-5f53-56435f49445f<LF>
esp32_bt_gap.c:280       BLE advertising started<LF>
esp32_bt_gatts.c:394     Starting BT service 5f6d4f53-5f52-5043-5f53-56435f49445f<LF>
mgos_wifi.c:136          WiFi STA: Connected, BSSID 00:1e:58:36:e3:c3 ch 4 RSSI -42<LF>
mgos_net.c:85            WiFi STA: connecting<LF>
== Net event: 1313166337 WiFi CONNECTING <LF>
mgos_provision_state:45 Current State: 0 -> 1<LF>
mgos_provision_state:72 Setting provisioning timeout for 300 seconds<LF>
mgos_net.c:89            WiFi STA: connected<LF>
== Net event: 1313166338 WiFi CONNECTED <LF>
<ESC>+[0;32mI (2579) event: sta ip: 192.168.0.189, mask: 255.255.255.0, gw: 192.168.0.1<ESC>+[0m<LF>
mgos_net.c:101           WiFi STA: ready, IP 192.168.0.189, GW 192.168.0.1, DNS 192.168.0.1<LF>
== Net event: 1313166339 WiFi GOT_IP <LF>
mgos_provision_state:45 Current State: 1 -> 2<LF>
esp32_bt.c:82           Network is up, disabling Bluetooth<LF>
mgos_sys_config.c:174   Saved to conf9.json<LF>
mgos_mqtt.c:427         MQTT connecting to 59.124.228.194:1883<LF>
mgos_mqtt.c:141         MQTT TCP connect ok (0)<LF>
mgos_mqtt.c:182         MQTT CONNACK 0<LF>
online =true <LF>
```
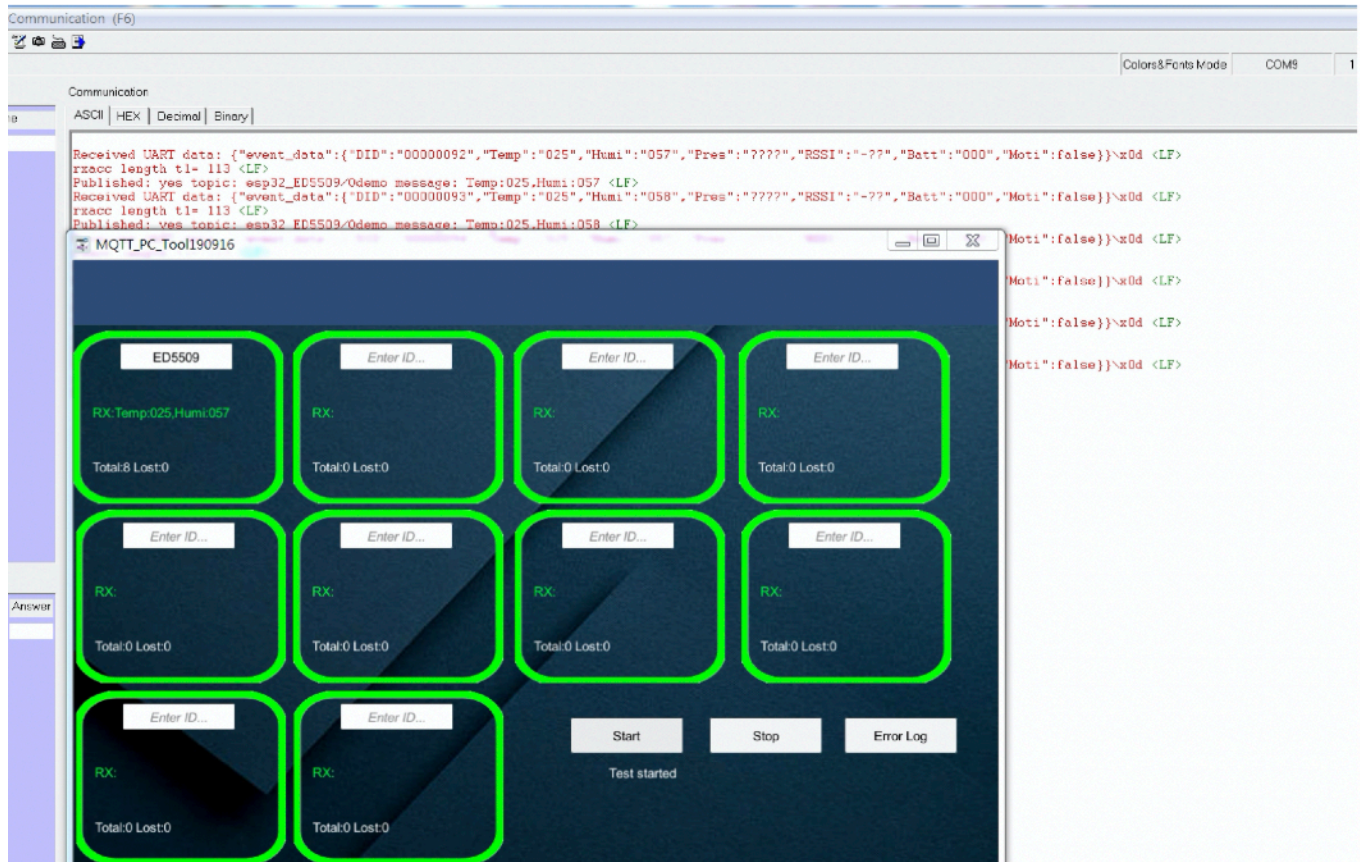
Check MQTT
Connect UART_Bridge Board "To Log" into the JS1.
Open the MQTT PC tool and type the ID.
The ID is esp32_XXXXXX and same as AP name.
You should able see the ID in the log.
The temperature and humidity was send to MQTT broker and publish to PC tool.

Build and programming ESP32 firmware.
Open mos.yml in folder mqtt_sensorWiFi_Ethernet_esp32
Change the SSID and password to match your router.
- ["wifi.sta.ssid", "FanstelSystems"]
 - ["wifi.sta.pass", "1234567890"]
Save the file and go to command line tool.
use command "mos build - -platform esp32"

```
C:\mos\mqtt_sensorWiFi_Ethernet_esp32>mos build --platform esp32
Connecting to https://mongoose.cloud, user test
Uploading sources (17866 bytes)
Firmware saved to C:\mos\mqtt_sensorWiFi_Ethernet_esp32\build\fw.zip
```

Programming the ESP32.
Connect UART_Bridge Board "TO WIFI(ESP)" into the JS1.
Make sure the switch on Bridge board is turn on.
Type command "mos flash - -port COM9"
The port number is up to your PC.

```
C:\mos\mqtt_sensorWiFi_Ethernet_esp32>mos flash --port COM9
Loaded mqtt_sensorWiFi_Ethernet_esp32/esp32 version 1.0 (20190916-061723)
Opening COM9 @ 115200...
Connecting to ESP32 ROM, attempt 1 of 10...
  Connected, chip: ESP32D0WDQ6 R1
Running flasher @ 921600...
  Flasher is running
Flash size: 16777216, params: 0x024f (dio,128m,80m)
Flash encryption: disabled, scheme: None
Secure boot: disabled
Deduping...
    22848 @ 0x1000 -> 0
     3072 @ 0x8000 -> 0
    16384 @ 0x9000 -> 12288
     8192 @ 0xd000 -> 0
  1559408 @ 0x10000 -> 0
   262144 @ 0x190000 -> 110592
Writing...
    12288 @ 0x9000
    12288 @ 0x190000
     4096 @ 0x194000
     8192 @ 0x19a000
     8192 @ 0x1ae000
    16384 @ 0x1b5000
    61440 @ 0x1ba000
Wrote 122880 bytes in 1.58 seconds (609.14 KBit/sec)
Verifying...
    22848 @ 0x1000
     3072 @ 0x8000
    16384 @ 0x9000
     8192 @ 0xd000
  1559408 @ 0x10000
   262144 @ 0x190000
Booting firmware...
All done!
```

Programming the nRF52840 Module.

Connected nRF52 DK debug out to LEW840F JS2
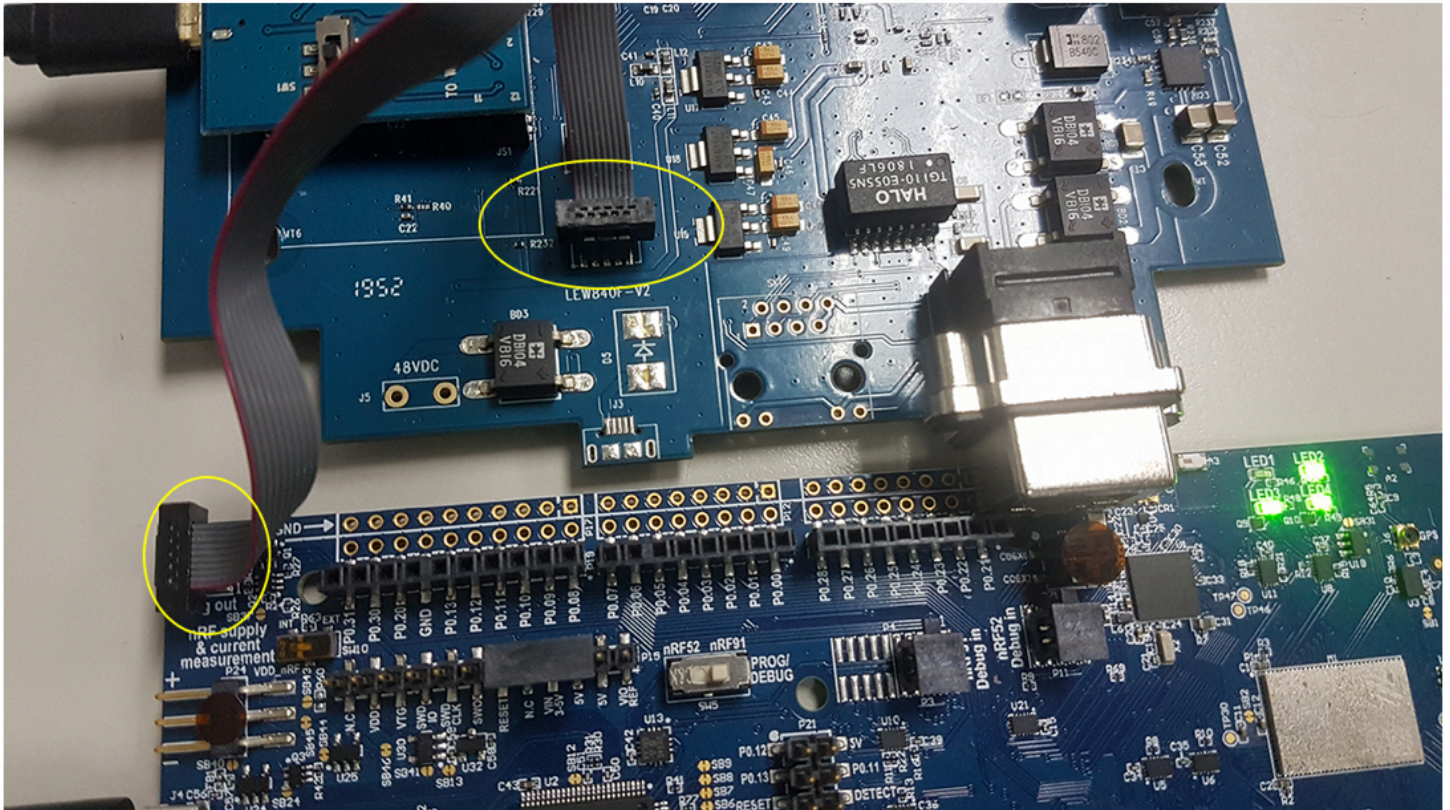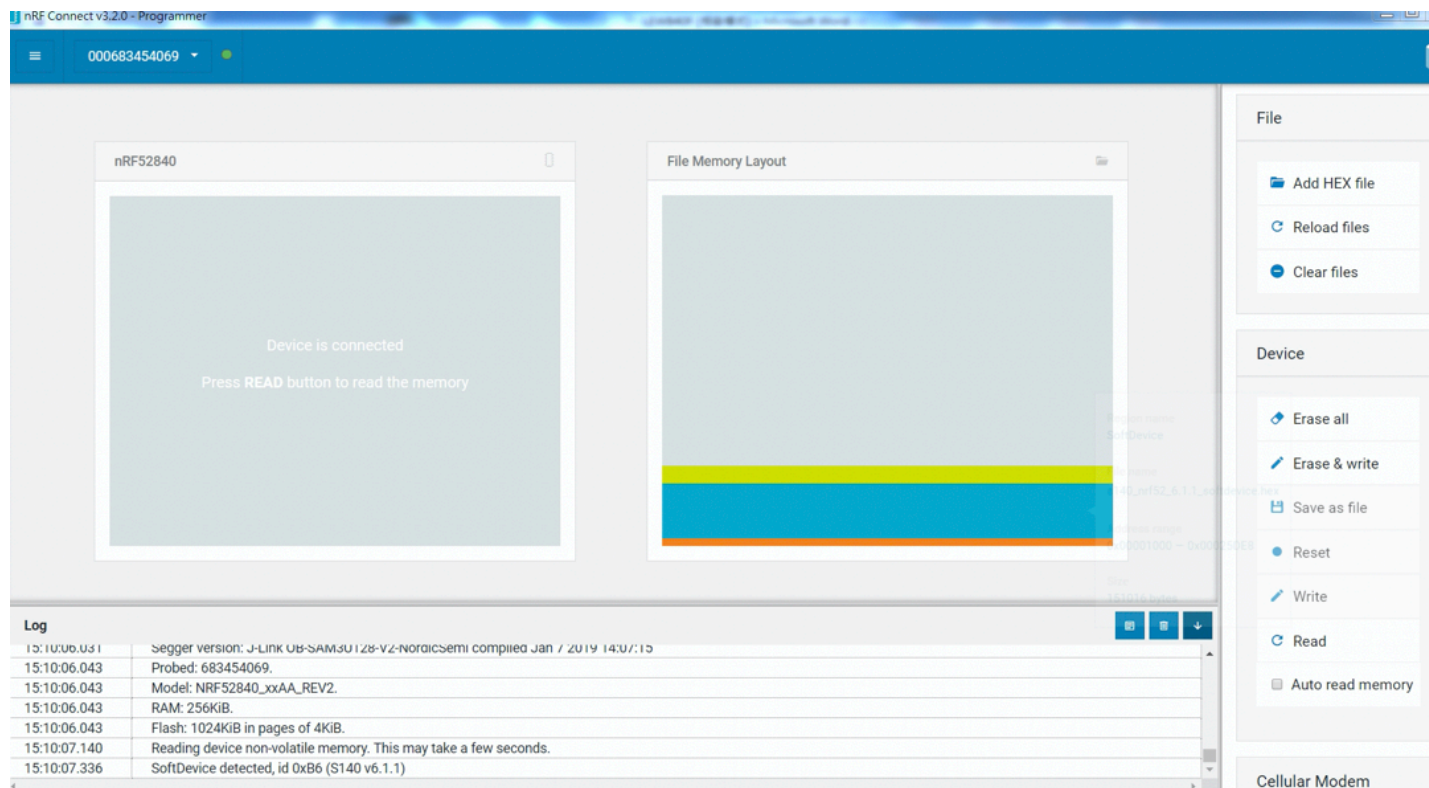

Download and install Nrf5x-Command-Line Tools
https://www.nordicsemi.com/Software-and-Tools/Development-Tools/nRF5-Command-Line-Tools

Download the nRF Connect desk top version
https://www.nordicsemi.com/Software-and-Tools/Development-Tools/nRF-Connect-for-desktop

Open nRF connect /programmer and load the softdevice and application.
Erase and write.

Nordic Development Environment

Nordic Semiconductor provides a complete range of hardware and software development tools for the nRF52 Series devices. nRF52840 DK board is recommended for firmware development. Document and Software development tools can be downloaded by the following links.

Get start with Nordic chip and all online documents.

http://infocenter.nordicsemi.com/index.jsp?topic=/com.nordic.infocenter.nrf52/dita/nrf52/development/nrf52_dev_kit.html&cp=1_1

Nordic SDK with many example projects.

https://developer.nordicsemi.com/nRF5_SDK/

Nordic development zone. You can search or ask a question there.

https://devzone.nordicsemi.com/tutorials/b/getting-started/posts/development-with-gcc-and-eclipse

Programming the Nordic chip
Download and install Nrf5x-Command-Line Tools
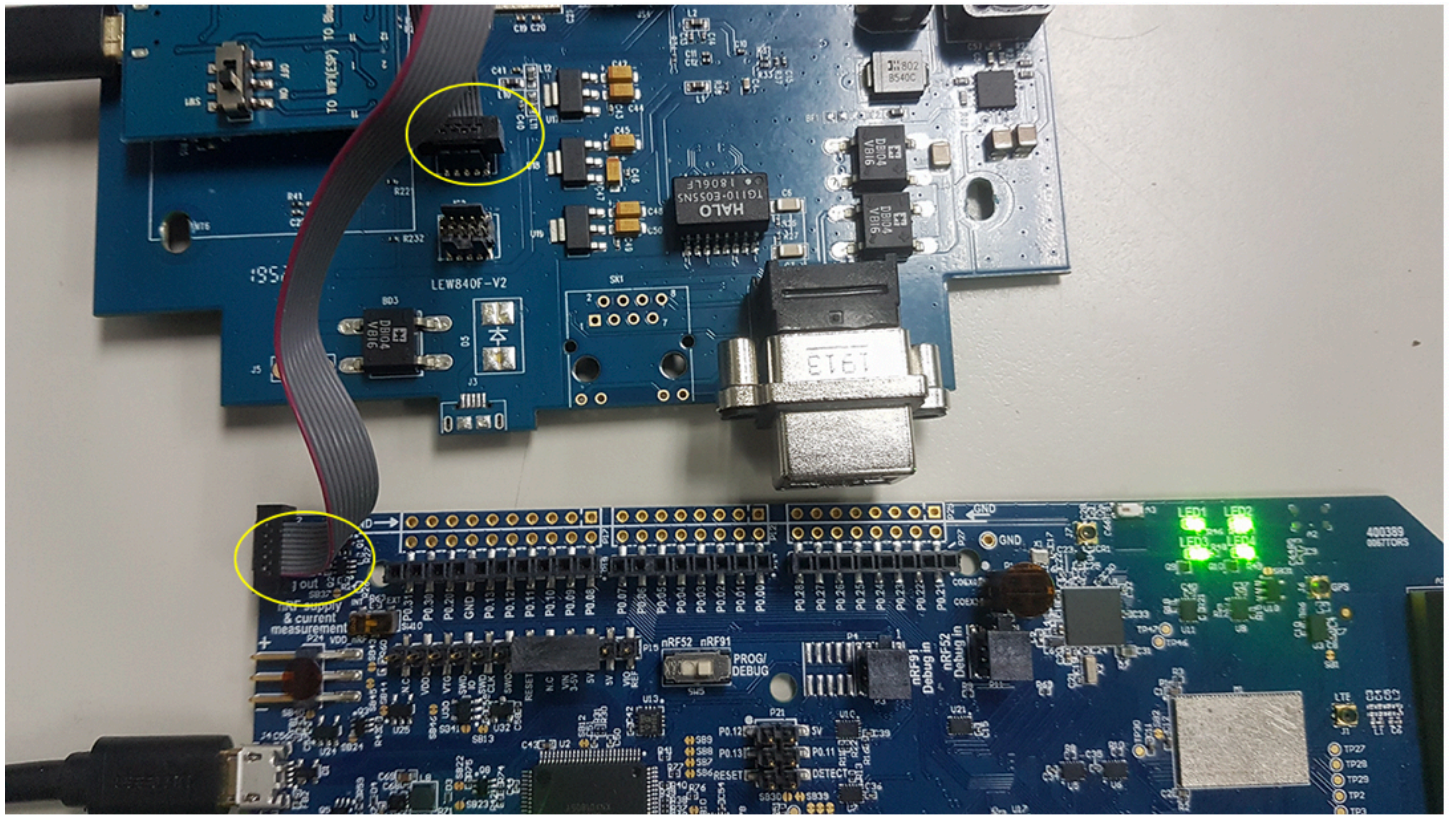https://www.nordicsemi.com/eng/nordic/Products/nRF52840/nRF5x-Command-Line-Tools-Win32/58850

Download and install nRF Connect

https://www.nordicsemi.com/?sc_itemid={B935528E-8BFA-42D9-8BB5-83E2A5E1FF5C}

Programming the nRF9160 Module

Connected nRF9160 DK debug out to LEW840F JS3

Open nRF connect /programmer and load the softdevice and application.
Erase and write.
The MQTT ID for nRF9160 is always started at "91".

For example the ESP32 ID is 6CA674
The Nrf9160 ID is 91A674.

Arduino ESP32 driver
https://github.com/espressif/arduino-esp32/blob/master/docs/arduino-ide/windows.md

Mongoose quick start guide.
https://mongoose-os.com/docs/mongoose-os/quickstart/setup.md
https://mongoose-os.com/docs/mongoose-os/quickstart/develop-in-c.md
Mongoose forum
https://community.mongoose-os.com/

Nordic online document.
https://infocenter.nordicsemi.com/index.jsp?topic=/com.nordic.infocenter.nrf52/dita/nrf52/development/nrf52_dev_kit.html&cp=1_1
Nordic SDK
https://developer.nordicsemi.com/nRF5_SDK/nRF5_SDK_v15.x.x/
Nordic development zone
https://devzone.nordicsemi.com/

All pre-loaded and test tools .
https://www.dropbox.com/sh/i5i3iluw2mkexs7/AADYfNmQ2eC7gmI3f7gU6NpIa?dl=0

Revision History

• Jan. 2020, Ver. 0.10: Initial draft release

• Feb. 2020, Ver. 0.20: Add draft programming information

• Mar. 2020, Ver 0.21: Update sample stock table