LEW840X, OpenSource Multiple Network Gateways

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IP65 Gateway, Market Ready Enclosure

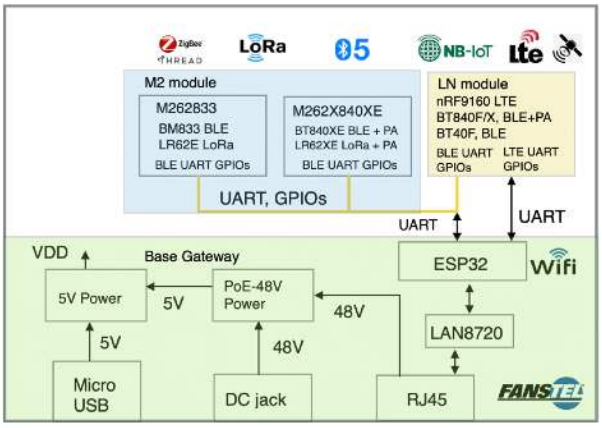
LEW840X Series gateways are developed for commercial, industrial, and agriculture applications. Enclosure has either Ingress Protection IP65 or IP51. An IP65 gateway can be deployed outdoor.

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.

Multiple Network, Radio Gateways

LEW840X gateway consists of three blocks:

- The Gateway Base (in green shadow) has an ESP32M16 WiFi module to support PoE Ethernet and WiFi interfaces. It has two M.2 connectors for an LN Series module and an M2 Series module.
- LN module (in yellow shadow): LN60G840F Series module can be LTE and BLE combo, LTE only, or BLE only. When an M2 module is installed, LTE only module shall be used.
- M2 module (in blue shadow): BLE and LoRa combo module, or BLE only module.



Open Source IoT Gateway supporting multiple radios, multiple networks

Demonstration quality source codes for connecting sensors to AWS, Google, or MicroSoft cloud servers are available. They can reduce your development time and cost, allowing shorter time to market.

Miscellaneous

- Size: 107x141x40mm
- Private label available
- Available: POE048, single line PoE power injector. For use with a non-PoE switch.

Hardware for Firmware Development

- Nordic nRF9160-DK
- For BT40F/BT40E module: Nordic nRF5340 DK
- PK-LEW840X for programming WiFi module and monitoring LTE traffic data.

MultiNetwork, MultiProtocol Gateways with Ingress Protection						Gateway base	Gateway base
Ingress protect/color	IP51/black	IP51/black	IP51/black	IP65/yellow	IP65/yellow	IP51/black	IP65/yellow
Gateway	EW840F5P	LEWR840E5P	LEW40E5P	LEWRX840XE6P	LEW40E6P	LEW5P-3	LEW6P-3
WiFi/Ethernet	ESP32M16	ESP32M16	ESP32M16	ESP32M16	ESP32M16	ESP32M16	ESP32M16
LN Module		LN60G	LN60E40E	LN60G	LN60E40E		
M2 Module	M2840F	M262840E		M262X840XE			
External antenna	0	3	2	3	2	3, not included	3, SMA mounted
GPS		Integrated	Need ext. antenna	Integrated	Need ext. antenna		
Optional power	USB, not included	USB, not included	USB,not included	48V, not included	48V, not included	USB, not included	48V, not included
Operating temp.	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C	-40°C to +85°C	-40°C to +85°C	-40°C to +80°C	-40°C to +85°C
Certifications							
QDID	108621	108621		108621			
Availability	Sample	Sample	Sample 04/21	Sample 04/21	Sample 04/21	Sample 04/21	Sample 04/21

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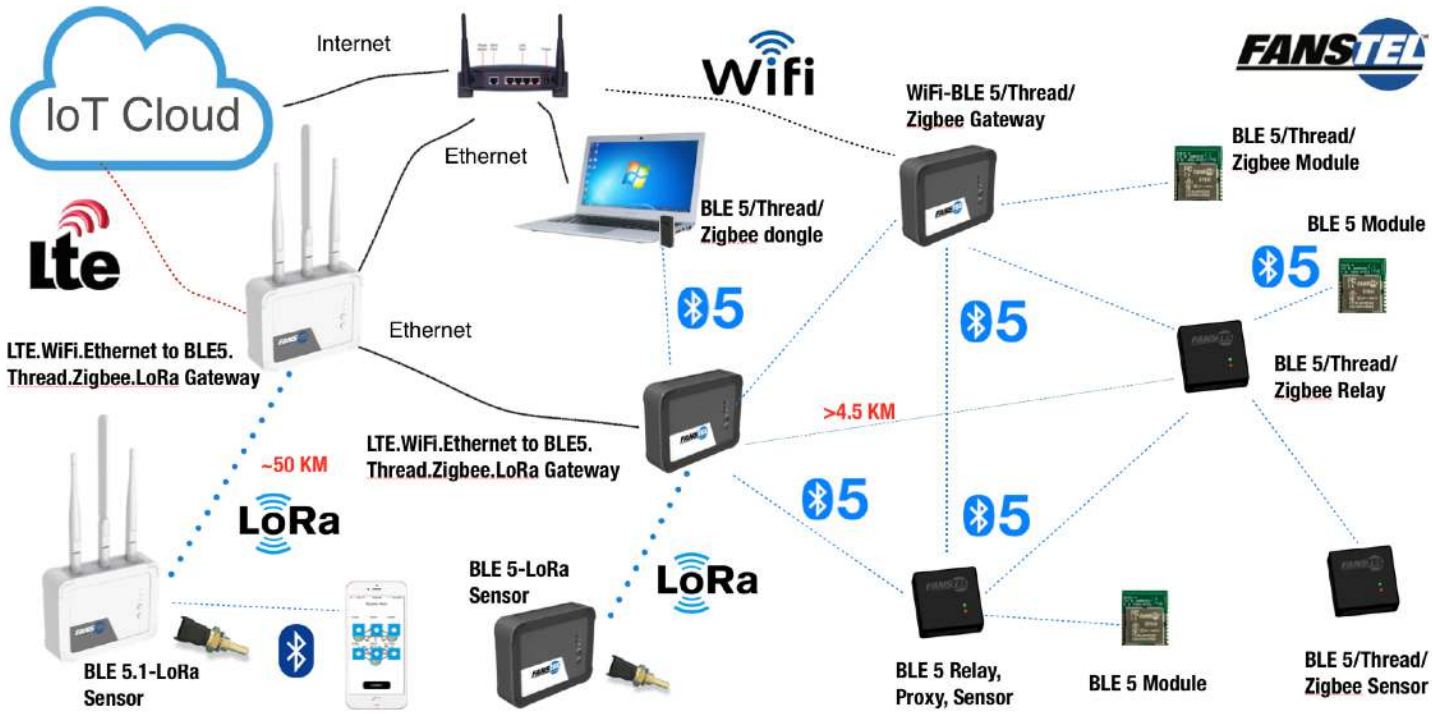
1. Introduction

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, you 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, 5.2 Thread, Zigbee, and LoRa on the device side.

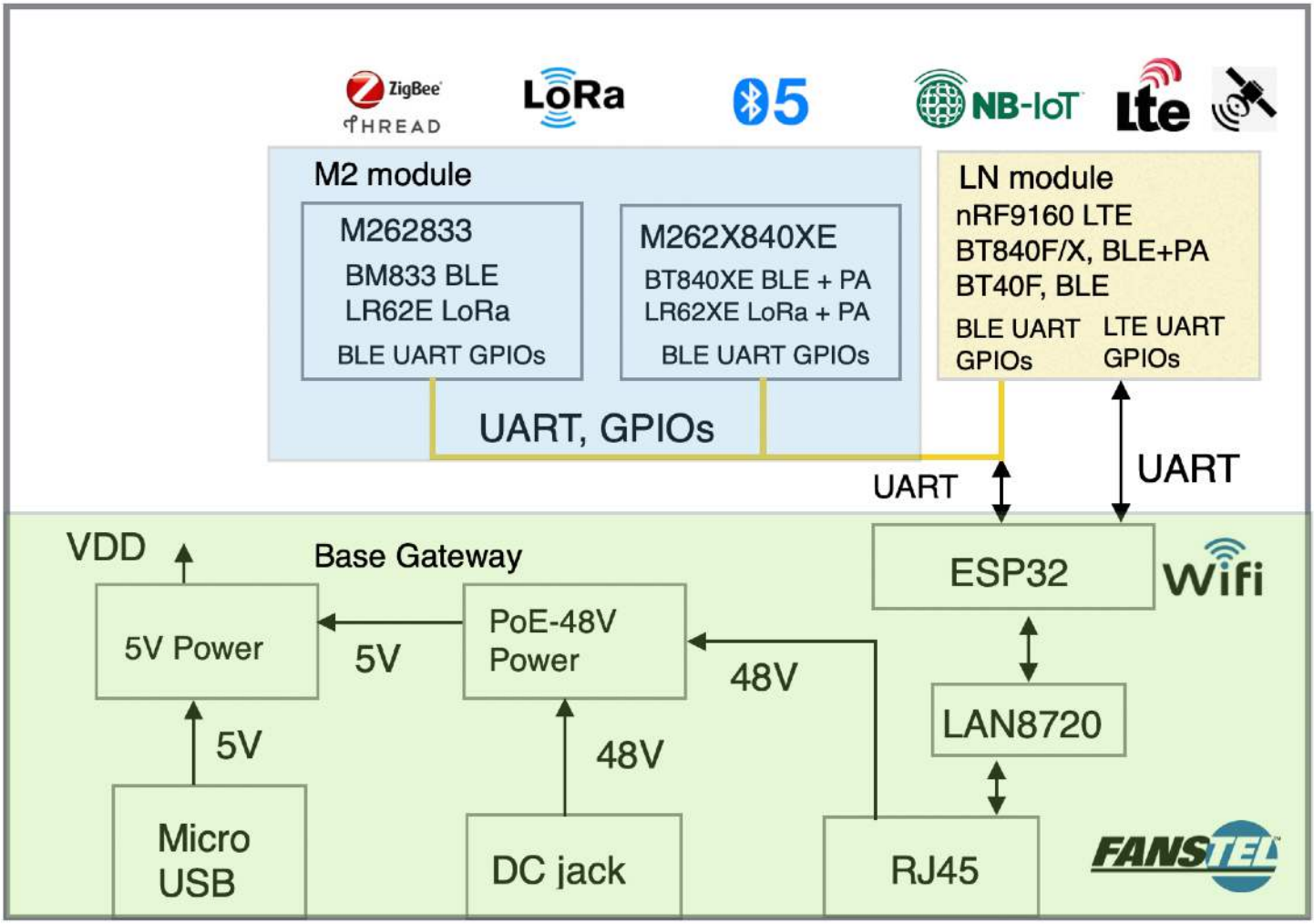
2. Specifications

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 a BLE 5 module using a second UART. A BLE module controls LoRa module LR62E through an SPI interface.

The BLE module, can be an nRF52840 module (BT840F Series), an nRF 5340 module (BT40F Series), or an nRF52833 module (BM833 Series). They supports 802.15.4 Thread and Zigbee radio protocols. A BLE module control LoRa transceiver module when long range is required.

Gateway can be powered by a 5V micro USB AC adapter, a 48V DC power supply, or powered through



Open Source IoT Gateway supporting multiple radios, multiple networks

Ethernet cable

LEW840X Part Numbers

Possible part numbers of LEW840X Series are listed below.

L E W R 840E 6 P

MultiNetwork, MultiRadio Gateway Part Number
L: **L**TE-M/NB-IoT, Nordic nRF9160; Missing: not supported
E: **E**thernet, ESP32 module/LAN8720 PHY
W: **W**iFi, ESP32 with integrated antenna; **E**: with **E**xternal antenna
R: LoRa, L**R**62E; **RX**: L**R**62**X**E with PA. Missing: not supported
840E: BLE module, BT**840E** ; BT**840F**; BT**840XE**; BT**840X;** BT**40F**; BT**40E**; BM**833**; BM**833E**.
6: IP**6**5 Ingress Protection, yellow enclosure; **5**: IP**5**1 black enclosure.
P: **P**ower over Ethernet. Missing: 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 8 BLE 5, 5.1, or 5.2 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.

LEW840X Configurations

The following table has a list of gateway bases can be manufactured.
- We keep sample stock for gateway bases in **bold**. Others are made to order with MOQ.
- LEW5P-3 has 3 holes for external antenna mounting. Holes are sealed with silicone rubber plugs. No external antenna is included.
- LEW6P-3 has 3 IP67 adapter cable's SMA connectors installed. The u.FL connector sides are un-connected.
- You can build a gateway with a base and an LN module, an M2 module, or both modules. When an M2 module is installed, only LN60G or LN60E can be used.

WiFi, PoE Ethernet Gateway Bases with 2 M.2 Connectors				
Ingress protect/color	IP51/black	IP51/black	IP65/yellow	IP65/yellow
Gateway	LEW5P-0	**LEW5P-3**	LEW6P-0	**LEW6P-3**
WiFi/Ethernet	ESP32M16	ESP32M16	ESP32M16	ESP32M16
Ext. antenna, supported	0	3	0	3
Ext. antenna included	None	None	None	ANT000/030P/015P/060P
Power over Ethernet	Yes	Yes	Yes	Yes
Optional power	USB, not included	USB, not included	48V, not included	48V, not included
Operating temp.	-40°C to +80°C	-40°C to +80°C	-40°C to +85°C	-40°C to +85°C

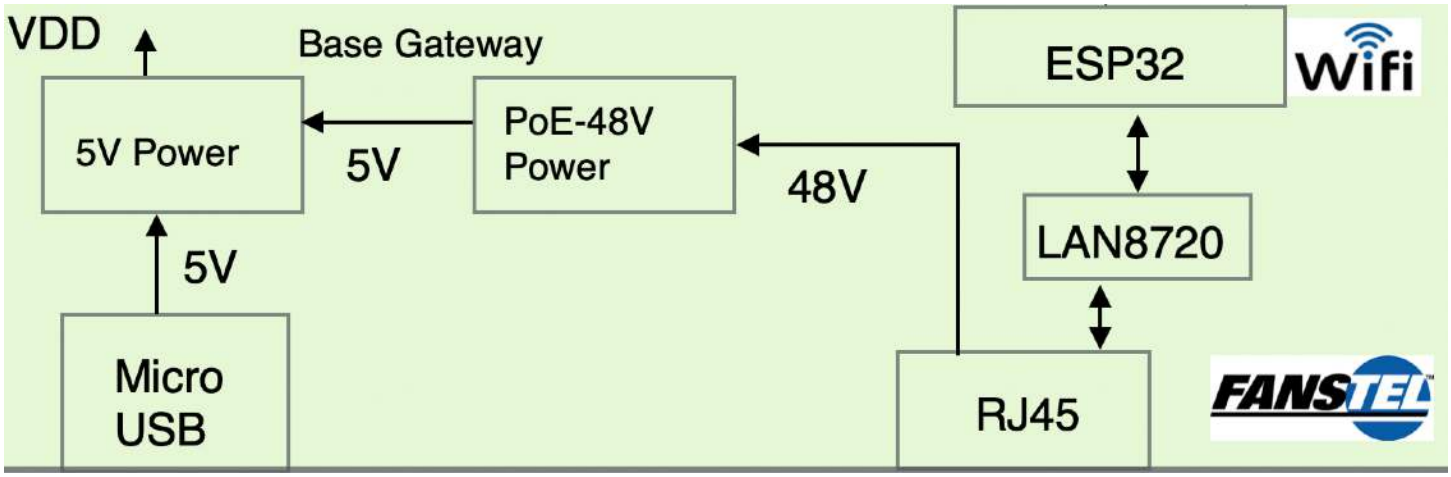
The following table has a list of gateways can be manufactured.
- We keep sample stock of gateway models in **bold**. Others are made to order with MOQ.

MultiNetwork, MultiProtocol Gateways				
Gateway	Base	LN Module	M2 Module	Notes
EW840F5P	LEW5P-0	None	M2840F	BT840F, nRF52840 BLE to PoE, WiFI gateway
EW840X5P	LEW5P-0	None	M2840X	BT840X BLE to PoE, WiFI gateway
EW40F5P	LEW5P-0	None	M240F	BT40F, nRF5340 BLE to WiFi gateway
EW840E5P	LEW5P-3	None	M2840E	BT840E to PoE, WiFi gateway. 6 dBi ext. antenna, best BLE receiver sensitivity.
EW840XE5P	LEW5P-3	None	M2840XE	BT840XE to PoE, WiFi gateway. The longest BLE range to another BT840XE.
EW40E5P	LEW5P-3	None	M240E	BT40E BLE to WiFi gateway, external BLE antenna
LEW840F5P	LEW5P-3	LN60G840F	None	BT840F BLE to LTE, PoE, WiFI gateway. Integreated GPS
LEW840X5P	LEW5P-3	LN60G840X	None	BT840X BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEW40F5P	LEW5P-3	LN60G40F	None	BT40F BLE to LTE, PoE, WiFI gateway. Integreated GPS
LEW840E5P	LEW5P-3	LN60E840E	None	BT840E to LTE, PoE, WiFi gateway. 6 dBi ext. antenna, best BLE receiver sensitivity.
LEW840XE5P	LEW5P-3	LN60E840XE	None	BT840XE to LTE, PoE, WiFI gateway. The longest BLE range to another BT840XE.
LEW40E5P	LEW5P-3	LN60E40E	None	BT40E BLE to LTE, PoE, WiFI gateway. Integreated GPS. Ext. BLE antenna
EWR840F5P	LEW5P-3	None	M262840F	LR62E-BT840F, LoRa-BLE to PoE, WiFi gateway
EWR840X5P	LEW5P-3	None	M262840X	LR62E-BT840X, LoRa-BLE to PoE, WiFi gateway
EWRX840X5P	LEW5P-3	None	M262X840X	LR62XE-BT840X, LoRa-BLE to PoE, WiFI gateway
EWR40F5P	LEW5P-3	None	M26240F	LR62E-BT40F, LoRa-BLE to PoE, WiFi gateway
EWR8335P	LEW5P-3	None	M262833	LR62E-BM833, LoRa-BLE to PoE, WiFI gateway
EWR840E5P	LEW5P-3	None	M262840E	LR62E-BT840E, LoRa-BLE to PoE, WiFI gateway. Best BLE receiver sensitivity.
EWR840XE5P	LEW5P-3	None	M262840XE	LR62E-BT840XE, LoRa-BLE to PoE, WiFI gateway.
EWRX840XE5P	LEW5P-3	None	M262X840XE	LR62XE-BT840XE, LoRa-BLE to PoE, WiFI gateway. The longest BLE and LoRa ranges.
EW40E5P	LEW5P-3	None	M240E	LR62E-BT40E, LoRa-BLE to PoE, WiFi gateway
EWR833E5P	LEW5P-3	None	M262833E	LR62E-BM833E, LoRa-BLE to PoE, WiFI gateway
LEWR840F5P	LEW5P-3	LN60E	M262840F	LR62E-BT840F, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWR840X5P	LEW5P-3	LN60E	M262840X	LR62E-BT840X, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWRX840X5P	LEW5P-3	LN60E	M262X840X	LR62XE-BT840X, LoRa-BLE to LTE, PoE, WiFI gateway.

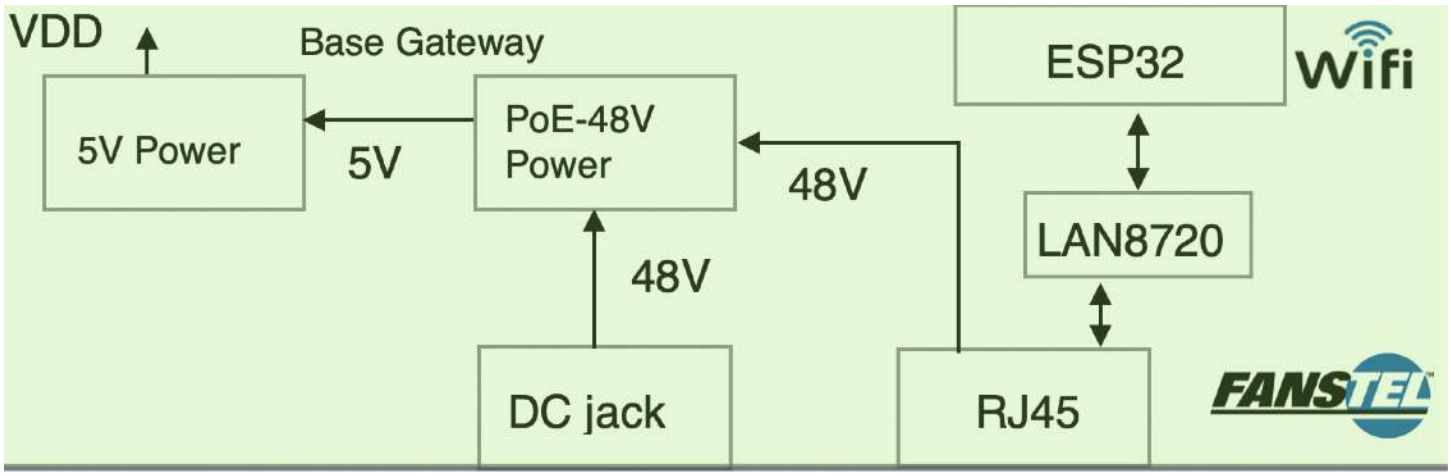
LEWR40F5P	LEW5P-3	LN60E	M26240F	LR62E-BT40F, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWR8335P	LEW5P-3	LN60E	M262833	LR62E-BM833, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWR840E5P	LEW5P-3	LN60G	M262840E	LR62E-BT840E, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWR840XE5P	LEW5P-3	LN60G	M262840XE	LR62E-BT840XE, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWRX840XE5P	LEW5P-3	LN60G	M262X840XE	LR62XE-BT840XE, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWR40XE5P	LEW5P-3	LN60G	M26240E	LR62E-BT40E, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWR833E5P	LEW5P-3	LN60G	M262833E	LR62E-BM833E, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
EW840F6P	LEW6P-0	None	M2840F	BT840F, nRF52840 BLE to PoE, WiFI gateway
EW840X6P	LEW6P-0	None	M2840X	BT840X BLE to PoE, WiFI gateway
EW40F6P	LEW6P-0	None	M240F	BT40F, nRF5340 BLE to WiFi gateway
EW840E6P	LEW5P-3	None	M2840E	BT840E to PoE, WiFi gateway. 6 dBi ext. antenna, best BLE receiver sensitivity.
EW840XE6P	LEW5P-3	None	M2840XE	BT840XE to PoE, WiFi gateway. The longest BLE range to another BT840XE.
EW40E6P	LEW5P-3	None	M240E	BT40E BLE to WiFi gateway, external BLE antenna
LEW840F6P	LEW5P-3	LN60G840F	None	BT840F BLE to LTE, PoE, WiFI gateway. Integreated GPS
LEW840X6P	LEW5P-3	LN60G840X	None	BT840X BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEW40F6P	LEW5P-3	LN60G40F	None	BT40F BLE to LTE, PoE, WiFI gateway. Integreated GPS
LEW840E6P	LEW5P-3	LN60E840E	None	BT840E to LTE, PoE, WiFi gateway. 6 dBi ext. antenna, best BLE receiver sensitivity.
LEW840XE6P	LEW5P-3	LN60E840XE	None	BT840XE to LTE, PoE, WiFI gateway. The longest BLE range to another BT840XE.
LEW40E6P	LEW5P-3	LN60E40E	None	BT40E BLE to LTE, PoE, WiFI gateway. Integreated GPS. Ext. BLE antenna
EWR840F6P	LEW5P-3	None	M262840F	LR62E-BT840F, LoRa-BLE to PoE, WiFi gateway
EWR840X6P	LEW5P-3	None	M262840X	LR62E-BT840X, LoRa-BLE to PoE, WiFi gateway
EWRX840X6P	LEW5P-3	None	M262X840X	LR62XE-BT840X, LoRa-BLE to PoE, WiFI gateway
EWR40F6P	LEW5P-3	None	M26240F	LR62E-BT40F, LoRa-BLE to PoE, WiFi gateway
EWR8336P	LEW5P-3	None	M262833	LR62E-BM833, LoRa-BLE to PoE, WiFI gateway
EWR840E6P	LEW5P-3	None	M262840E	LR62E-BT840E, LoRa-BLE to PoE, WiFI gateway. Best BLE receiver sensitivity.
EWR840XE6P	LEW5P-3	None	M262840XE	LR62E-BT840XE, LoRa-BLE to PoE, WiFI gateway.
EWRX840XE6P	LEW5P-3	None	M262X840XE	LR62XE-BT840XE, LoRa-BLE to PoE, WiFI gateway. The longest BLE and LoRa ranges.
EW40E6P	LEW5P-3	None	M240E	LR62E-BT40E, LoRa-BLE to PoE, WiFi gateway
EWR833E6P	LEW5P-3	None	M262833E	LR62E-BM833E, LoRa-BLE to PoE, WiFI gateway
LEWR840F6P	LEW5P-3	LN60E	M262840F	LR62E-BT840F, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWR840X6P	LEW5P-3	LN60E	M262840X	LR62E-BT840X, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWRX840X6P	LEW5P-3	LN60E	M262X840X	LR62XE-BT840X, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWR40F6P	LEW5P-3	LN60E	M26240F	LR62E-BT40F, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWR8336P	LEW5P-3	LN60E	M262833	LR62E-BM833, LoRa-BLE to LTE, PoE, WiFI gateway.
LEWR840E6P	LEW5P-3	LN60G	M262840E	LR62E-BT840E, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWR840XE6P	LEW5P-3	LN60G	M262840XE	LR62E-BT840XE, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWRX840XE6P	LEW5P-3	LN60G	M262X840XE	LR62XE-BT840XE, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWR40XE6P	LEW5P-3	LN60G	M26240E	LR62E-BT40E, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.
LEWR833E6P	LEW5P-3	LN60G	M262833E	LR62E-BM833E, LoRa-BLE to LTE, PoE, WiFI gateway. Integrated GPS.

Gateway Bases with PoE Ethernet and WiFi

The gateway base(in green shadow) consists of power supply circuit, an ESP32M16 module with Ethernet PHY LAN8720 to provide Ethernet and WiFi interfaces. IP51 gateway base has a micro USB connector for 5V DC power as below.



IP65 gateway base has a barrel type connector for 48V DC power input as below.



All gateway bases support PoE (Power over Ethernet).

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 interfaces 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

Power Supply and Power over Ethernet

- Most AC adapters have operating temperature range of 0°C to +40°C. This will limit operating temperature of gateway if an AC adapter is used.
- A gateway with PoE can be powered by a PoE switch from 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.
- IP65 enclosure has a barrel type, IP67 DC jack. AnAC adapter is not included.

The gateway base has two B-key M.2 connectors for up to 30x42mm size modules.

LN Module: The **L**te-**N**biot module has 3 variations. Size is 30 x 42mm.

- LTE-M/NB-IoT only module with an integrated **G**PS receiver antenna (LN60**G**) or with an u.FL connector for an **E**xternal GPS antenna (LN60**E**). There is an u.FL connector for an external LTE antenna.
- BLE only module can be with an nRF52840 module (BT840F, BT840E, BT840X, BT840XE), an nRF5340 module (BT40F, BT40E).
- LTE-BLE combo module. Both BLE and LTE modules are on an LN module.

An M2 module is always with a BLE module. When an M2 module is installed in an LEW840X gateway, the LN module must be without a BLE features (LN60G or LN60E).

M2 Module: There are a few M2 module designs. Size can be 22x42mm or 30x42mm.

- M262X840XE is a high TX power BLE-LoRa combo module. Both BLE and LoRa modules can be with Power Amplifier (PA). Module size is 30x42mm.
- M262833 is a low cost nRF52833 BLE 5.1 and LoRa combo module. Module size is 22x42mm.

LN Module with LTE-M/NB-IoT and Bluetooth Interfaces

The following table has a list of available LN Series modules.

- Size of LN Series module is 30x42mm, for M.2 connector, B key.
- nRF9160 SICA is a Nordic LTE-M/NB-IoT module with GPS receiver.
- All modules have an u.FL connector for an external LTE antenna.
- LN60G Series module has a GPS receiver amplifier and a GPS antenna integrated on board.
- LN60E Series module has an u.FL connector for an external GPS antenna with amplifier.
- nRF52840 module can be BT840F, BT840E, BT840X, or BT840XE.
- nRF5340 module can be BT40F or BT40E.

LN Module	LTE module	GPS antenna	BLE module	Description
LN60G	nRF9160 SICA	Integrated	None	nRF9160 LTE module with an integrated GPS antenna.
LN60E	nRF9160 SICA	u.FL	None	nRF9160 LTE module with an u.fl for an external GPS antenna.
LN60G840F	nRF9160 SICA	Integrated	BT840F	nRF9160-BT840F, LTE-BLE module, integrated BLE antenna. GPS
LN60G840E	nRF9160 SICA	Integrated	BT840E	nRF9160-BT840E, LTE-BLE module, u.FL for external BLE antenna. GPS
LN60G840X	nRF9160 SICA	Integrated	BT840X	nRF9160-BT840X, LTE-BLE+PA module, integrated BLE antenna. GPS
LN60G840XE	nRF9160 SICA	Integrated	BT840XE	nRF9160-BT840XE, LTE-BLE+PA module, u.FL for external BLE antenna. GPS
LN60E840F	nRF9160 SICA	u.FL	BT840F	nRF9160-BT840F, LTE-BLE module, integrated BLE antenna.
LN60E840E	nRF9160 SICA	u.FL	BT840E	nRF9160-BT840E, LTE-BLE module, u.FL for external BLE antenna.
LN60E840X	nRF9160 SICA	u.FL	BT840X	nRF9160-BT840X, LTE-BLE+PA module, integrated BLE antenna.
LN60E840XE	nRF9160 SICA	u.FL	BT840XE	nRF9160-BT840XE, LTE-BLE+PA module, u.FL for external BLE antenna.
LN60G40F	nRF9160 SICA	Integrated	BT40F	nRF9160-BT40F, LTE-BLE module, integrated BLE antenna. GPS
LN60G40E	nRF9160 SICA	Integrated	BT40E	nRF9160-BT40E, LTE-BLE module, u.FL for external BLE antenna. GPS
LN60E40F	nRF9160 SICA	u.FL	BT40F	nRF9160-BT40F, LTE-BLE module, integrated BLE antenna.
LN60E40E	nRF9160 SICA	u.FL	BT40E	nRF9160-BT40E, LTE-BLE module, u.FL for external BLE antenna.

Nordic nRF9160 SICA Modules

Brief specifications of nRF9160 SICA are below. Full product specifications are available at:
https://www.nordicsemi.com/Products/Low-power-cellular-IoT/nRF9160

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

nR52840 Bluetooth 5.2 Modules

nRF52840 Bluetooth 5.2 module supports Bluetooth 5.2, Thread, and Zigbee radio interfaces. One of four Bluetooth 5.2 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).

Full product specifications of nRF52840 can be downloaded at:
https://www.nordicsemi.com/Products/Low-power-short-range-wireless/nRF52840

Full product specifications of BT840F Series modules.
https://www.fanstel.com/download-document

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

nRF5340 Bluetooth 5.2 Modules

Bluetooth 5.2 module supports Bluetooth 5.2, Thread, and Zigbee radio interfaces. One of Bluetooth 5.2 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, with both an integrated antenna and an u.FL connector.

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.

Full product specifications of Nordic nRF5340 SoC can be downloaded from:
https://www.nordicsemi.com/Products/Low-power-short-range-wireless/nRF5340

Full product specifications of BT40F Series modules can be downloaded from:
https://www.fanstel.com/download-document

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
SoC	nRF5340	nRF5340	nRF5340
Size	15x20.8x1.9mm	14x16x1.9mm	15x28.0x1.9mm
BT Antenna	PCB trace	u.FL	PCB trace + PA + u.FL
Max TX			
Operating temp.	-40°C to +105°C	-40°C to +105°C	-40°C to +105°C
Availability	02/21 production	02/21 production	Sample 2Q21

M262X840XE Series High Power Bluetooth and LoRa Modules

The following table has a list of modules available in the M262X840XE high power Bluetooth and LoRa modules.

- Size of M262X840XE Series module is 30x42mm, for M.2 connector, B key.
- LoRa module LR62E is a Semtech SX1262 module.
- LR62XE is a Semtech SX1262 module with a Power Amplifier (PA).
- Bluetooth module manages LoRa module and must be on board.
- When an M262X840XE module is installed in the gateway, LN module must be without Bluetooth feature, LN60G or LN60E only,
- nRF52840 module can be BT840F, BT840E, BT840X, or BT840XE.
- nRF5340 module can be BT40F or BT40E.

M2 Module	LoRa module	BLE module	M262X840XE High Power Series
M262840F	LR62E	BT840F	LoRa - BLE module
M262840E	LR62E	BT840E	LoRa-BLE module, u.FL
M262840X	LR62E	BT840X	LoRa-BLE+PA module
M262840XE	LR62E	BT840XE	LoRa-BLE+PA module, u.FL
M262X840F	LR62XE	BT840F	LoRa+PA-BLE module
M262X840E	LR62XE	BT840E	LoRa+PA-BLE module, u.FL
M262X840X	LR62XE	BT840X	LoRa+PA-BLE+PA module
M262X840XE	LR62XE	BT840XE	LoRa+PA-BLE+PA module, u.FL
M26240F	LR62E	BT40F	LoRa - BLE module
M26240E	LR62E	BT40E	LoRa-BLE module, u.FL
M262X40F	LR62XE	BT40F	LoRa+PA-BLE module
M262X40E	LR62XE	BT40E	LoRa+PA-BLE module, u.FL

LR62E specifications:

- LR62E module with Semtech SX1262 transceiver and an u.FL connector.
- Up to +20 dBm transceiver (USA version) at 902 to 928 MHz.
- LoRa stacks for cloud connection are managed by a BT840F Series or a BT40F series module.

LR62XE specifications:

- LR62XE module with Semtech SX1262 transceiver, a power amplifier, and and.FL connector.
- Up to TBD dBm transceiver (USA version) at 902 to 928 MHz.
- LoRa stacks for cloud connection are managed by a BT840F Series or a BT40F series module.

M262833 Series Low Cost BLE 5.1 and LoRa Modules

M262833 integrates a low cost Nordic nRF52833 module, BM833 with LoRa module LR62E.

- Size of M26833 Series module is 22x42mm, for M.2 connector, B key.
- LoRa module LR62E is a Semtech SX1262 module.
- Bluetooth module manages LoRa module and must be on board.
- When an M262833 module is installed in the gateway, LN module must be without Bluetooth feature, LN60G or LN60E only,
- nRF52833 module can be BM833 or BM833E.

M2 Module	LoRa module	BLE module	M262833 Low Cost Series
M262833	LR62E	BM833	LoRa - BLE module
M262833E	LR62E	BM833E	LoRa-BLE module, u.FL

Product specifications of nRF52833 is available at:

https://www.nordicsemi.com/Products/Low-power-short-range-wireless/nRF52833/Downloads

Product specifications of BM833 can be downloaded from:

https://www.fanstel.com/download-document

Brief **BM833** specifications:

- Nordic nRF52833 with ARM Cortex M4F at 64 MHz, 512KB flash and 128KB RAM.
- Supported data rate:
  - BLE 5.1: 2Mbps, 1Mbps, 500kbps, 125kbps
  - IEEE 802.15.4-2006: 250 kbps
  - Proprietary 2.4 GHz: 2 Mbps, 1Mbps
- Angle-of-Arrival (AoA) and Angle-of-Departure (AoD) direction finding using Bluetooth.
- RSSI, 1 dB resolution
- Serial Wire Debug (SWD)
- NFC A tag for OOB pairing.
- Nordic SoftDevice Ready
- Over-the-Air (OTA) firmware update
- Secure boot ready
- USB2.0 full speed controller.
- 42 General purpose I/O pins
- 12 bit/200KSPS ADC, 8 configurable channels with programmable gain.
- 2X SPI Master/Slave (8Mbps)
- 4-channel pulse width modulator (PWM)
- Low power comparator
- 2-wire Master/Slave (I^2C compatible)
- Digital microphone interface (PDM)
- UART (with CTS/RTS and DMA)
- 20 channel CPU independent Programmable Peripheral Interconnect (PPI).
- Quadrature Demodulator (QDEC)
- AES HW encryption
- 3 x 32 bit timer with counter mode
- 2x realtime counter
- SoC receiver Sensitivity: -97 dBm at 1Mbps; -104 dBm at 125 kbps

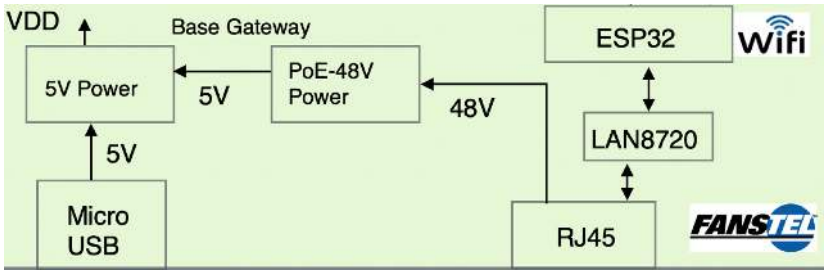
- SoC TX power: +/- 0 dBm; programmable 4 dBm to -20dBm in 4 dB steps.
- Operation voltage: 1.7V to 5.5V
- 4.6 mA peak current at RX or +0dBm TX.
- Integrated DC-DC converter.
- Embedded inductors for DCDC converter

module	BM833	BM833E
SoC	nRF52833 QIAA	nRF52833 QIAA
Flash/RAM	512KB/128KB	512KB/128KB
Size	10.2x15x1.9mm	10.2x15x1.9mm
GPIO	42	42
Operating temp.	-40°C to +105°C	-40°C to +105°C
Max. TX, FCC	+8.16 dBm	+8.16 dBm
Antenna	PCB trace	u.FL
Est. BLE Range	1400M at 125 Kbps	3400M at 125 Kbps
FCC ID	X8WBM833F	X8WBM833F
ISED	4100A-BM833F	4100A-BM833F
TELEC	201-19838/00	201-19838/00
CE, RCM	Certified	Certified
QDID	138767	138767

3. Hardware Description

LEW5P-3 Base Gateway

LEW5P-3 and LEW5P-0 are non-water-proof base gateways. Ingress Protection IP51 is the target design specification. It is not tested by a third party test lab.

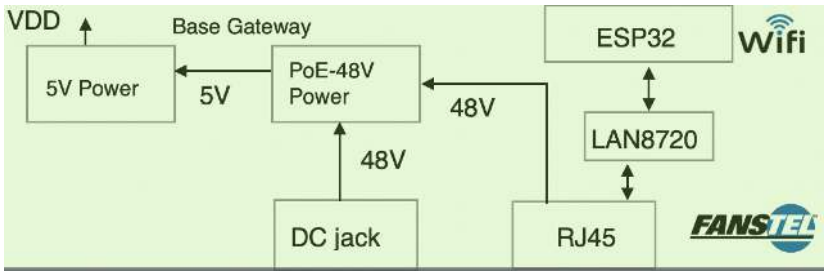


Features:

- LEW5P-3 has 3 mounting holes for 3 external antennas. Antenna is not included.
- A micro USB connector for an external micro USB, 5V power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- 2 M.2 connectors.
- Enclosure color: black
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40ºC to +80ºC when using PoE power.

LEW6P-3 IP65 Base Gateway

LEW6P-3 is an IP65 base gateways. IP65 gateways will be tested by a third party test lab.

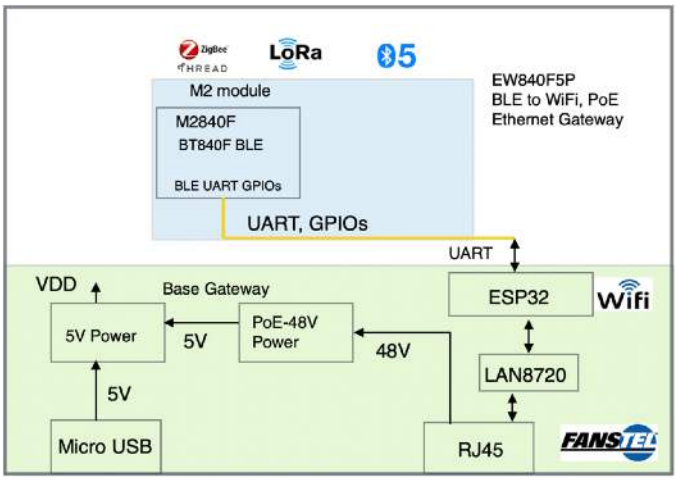


Features:

- LEW6P-3 has 3 mounting holes for external antennas. SMA connectors of three adapter cables are mounted.
- IP67 antennas are included in samples.
- A barrel type DC jack for an external 48V DC power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- 2 M.2 connectors.
- Enclosure color: yellow.
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted. IP67 antenna direction is not adjustable. RF transmission performance is not optimum for typical deployment for desk or ceiling mounting.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40ºC to +85ºC when using PoE power.

EW840F5P, BLE to WiFi PoE Gateway

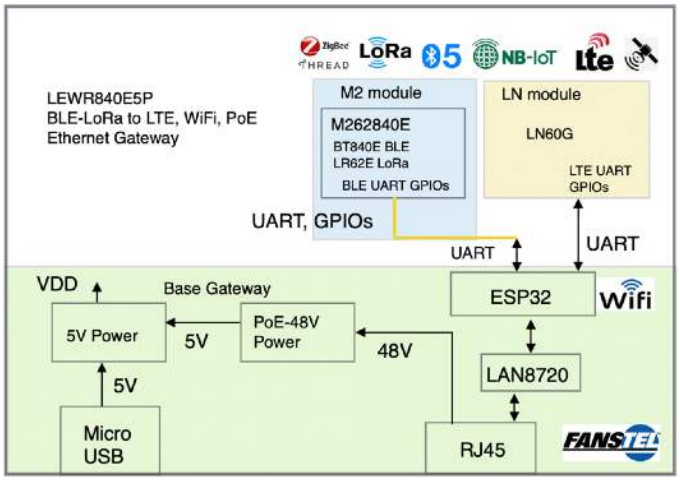
EW840F5P is a LEW5P-0 with a basic BLE module, M2840F installed.



Features:

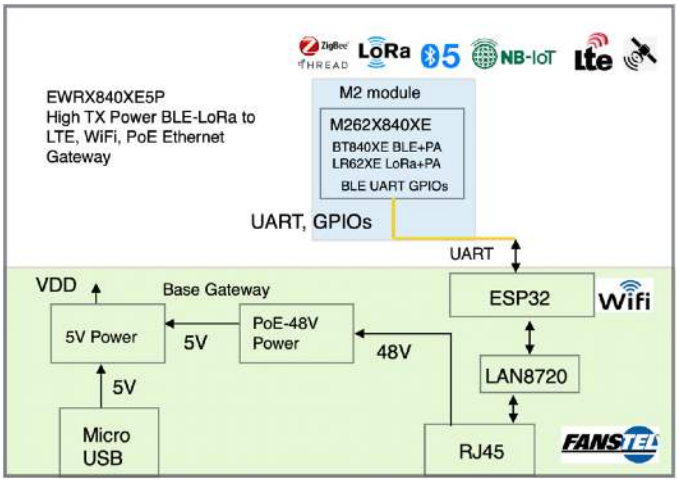
- LEW5P-0 base without a mounting hole for an external antenna.
- A micro USB connector for an external micro USB, 5V power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- **M2 Connector**: M280F with BT840F is installed.
- Supports BLE 5.2, Thread, and Zigbee radio interfaces.
- **LN Connector**: Empty. Upgrade is not possible because of no external antenna mounting hole.
- Enclosure color: black
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40^{o}C to +80^{o}C when using PoE power.

LEWR840E5P, BLE-LoRa to LTE, WiFi, PoE Gateway



Features:
- LEW5P-3 base with three mounting holes for up to three external antennas.
- A micro USB connector for an external micro USB, 5V power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- **M2 Connector**: M262840E with BT840E BLE 5.2 module and LR62E LoRa module is installed.
- Supports BLE 5.2, Thread, and Zigbee radio interfaces.
- Include an ANT060, a 6 dBi external BLE antenna.
- Includes an ANT015P, a LoRa antenna.
- **LN Connector**: An LN60G LTE module is installed.
- A nano SIM card connector on LN60G module. SIM card is not included.
- Supports LTE-M and NB-IoT.
- Integrated GPS receiver amplifier and antenna.
- Enclosure color: black
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40°C to +80°C when using PoE power.

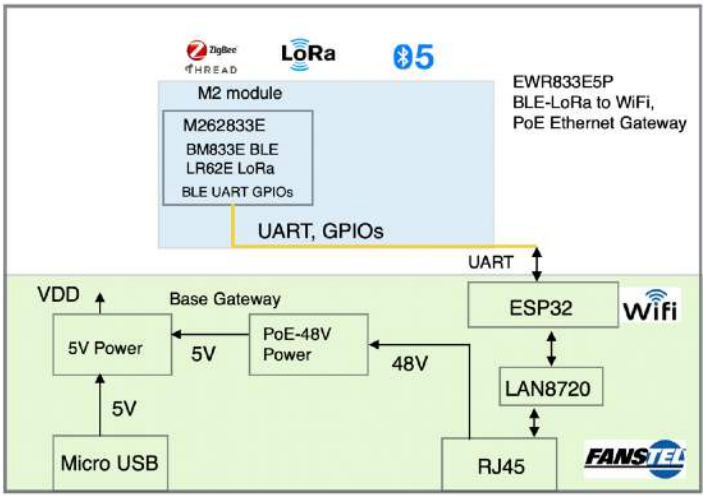
EWRX840XE5P, High Power BLE-LoRa to WiFi, PoE Gateway



Features:

- LEW5P-3 base with three mounting holes for up to three external antennas.
- A micro USB connector for an external micro USB, 5V power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- **M2 Connector**: M262X840XE with BT840XE BLE 5.2 module with a PA and LR62XE LoRa module with a PA is installed.
- Supports BLE 5.2, Thread, and Zigbee radio interfaces.
- Include an ANT000, a 0 dBi external BLE antenna.
- Includes an ANT015P, a LoRa antenna.
- **LN Connector**: Empty. Upgrade is possible by installing an LN60G or an LN60E LTE module.
- Enclosure color: black
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40°C to +80°C when using PoE power.

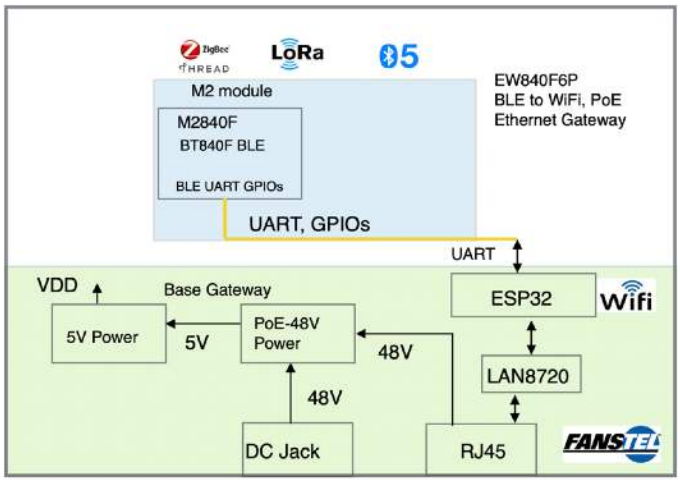
EWR833E5P, Low Cost BLE-LoRa to WiFi, PoE Gateway



Features:

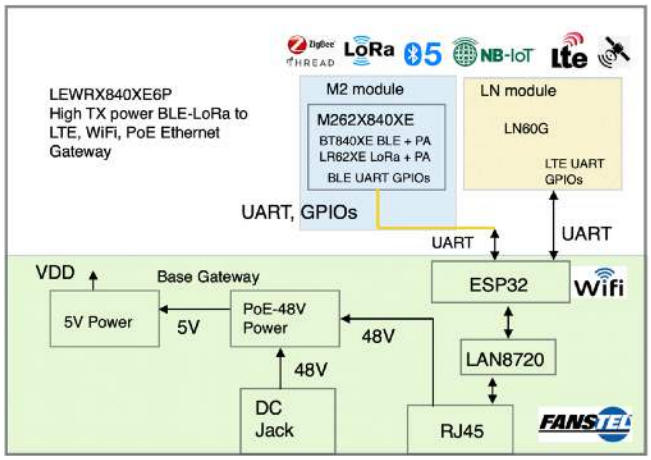
- LEW5P-3 base with three mounting holes for up to three external antennas.
- A micro USB connector for an external micro USB, 5V power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- **M2 Connector**: M262833E with BM833E BLE 5.2 module and LR62E LoRa module is installed.
- Supports BLE 5.2, Thread, and Zigbee radio interfaces.
- Include an ANT060, a 6 dBi external BLE antenna.
- Includes an ANT015P, a LoRa antenna.
- **LN Connector**: Empty. Upgrade is possible by installing an LN60G or an LN60E LTE module.
- Enclosure color: black
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40°C to +80°C when using PoE power.

EW840F6P, IP65 BLE to WiFi, PoE Gateway



Features:
- LEW6P-0 base without a mounting hole for an external antenna.
- A barrel type DC jack for an external 48V DC power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- **M2 Connector**: M2840F with BT840F, BLE 5.2 module is installed.
- Supports BLE 5.2, Thread, and Zigbee radio interfaces.
- **LN Connector**: Empty. Upgrade is not possible because of no mounting hole for an external antenna.
- Enclosure color: yellow.
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40^{o}C to +85^{o}C when using PoE power.

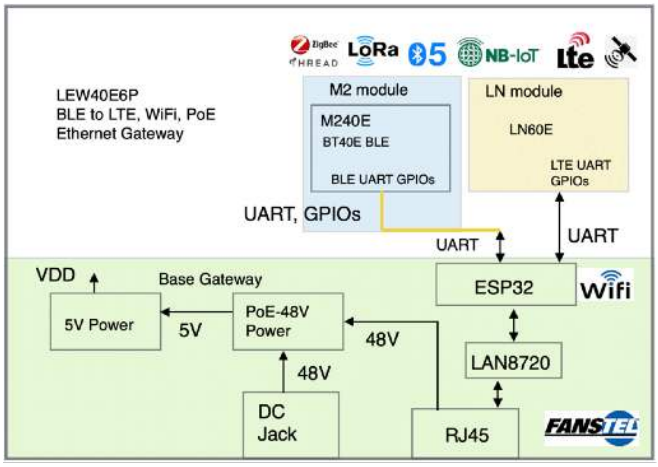
LEWRX840XE6P, IP65 High Power BLE-LoRa to LTE WiFi PoE Gateway



Features:

- LEW6P-3 base with three mounting holes for up to three external antennas.
- A barrel type DC jack for an external 48V DC power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- **M2 Connector**: M262X840XE with BT840XE BLE 5.2 module with a PA and LR62XE LoRa module with a PA is installed.
- Supports BLE 5.2, Thread, and Zigbee radio interfaces.
- Include an ANT000, a 0 dBi external BLE antenna.
- Includes an ANT015P, a LoRa antenna.
- **LN Connector**: An LN60G LTE module is installed.
- A nano SIM card connector on LN60G module. SIM card is not included.
- Supports LTE-M and NB-IoT.
- Integrated GPS receiver amplifier and antenna.
- Enclosure color: yellow.
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40°C to +85°C when using PoE power.

LEW40E6P, IP65 BLE to LTE, WiFi, PoE Gateway



Features:

- LEW6P-3 base with three mounting holes for up to three external antennas.
- A barrel type DC jack for an external 48V DC power supply. Power supply is not included.
- Powered by PoE (Power-over-Ethernet).
- Ethernet interface
- WiFi interface
- **M2 Connector**: M240E with BT40E, nRF5340, dual core Cortex M33, BLE 5.2 module is installed.
- Supports BLE 5.2, Thread, and Zigbee radio interfaces.
- Include an ???, a ??? dBi external BLE antenna.
- **LN Connector**: An LN60E LTE module is installed.
- A nano SIM card connector on LN60E module. SIM card is not included.
- Supports LTE-M and NB-IoT.
- Needs an external GPS antenna with amplifier, not included.
- Enclosure color: yellow.
- Enclosure size: 107x141x40mm
- Gateway can be desk, wall, ceiling, or pole mounted.
- Includes a piece of 2-sided type for mounting.
- Operating temperature: -40°C to +85°C when using PoE power.

Private Label and Custom Hardware

Logo and button names are printed on a membrane. They can be customized with 1000 pcs MOQ.

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

4. 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.

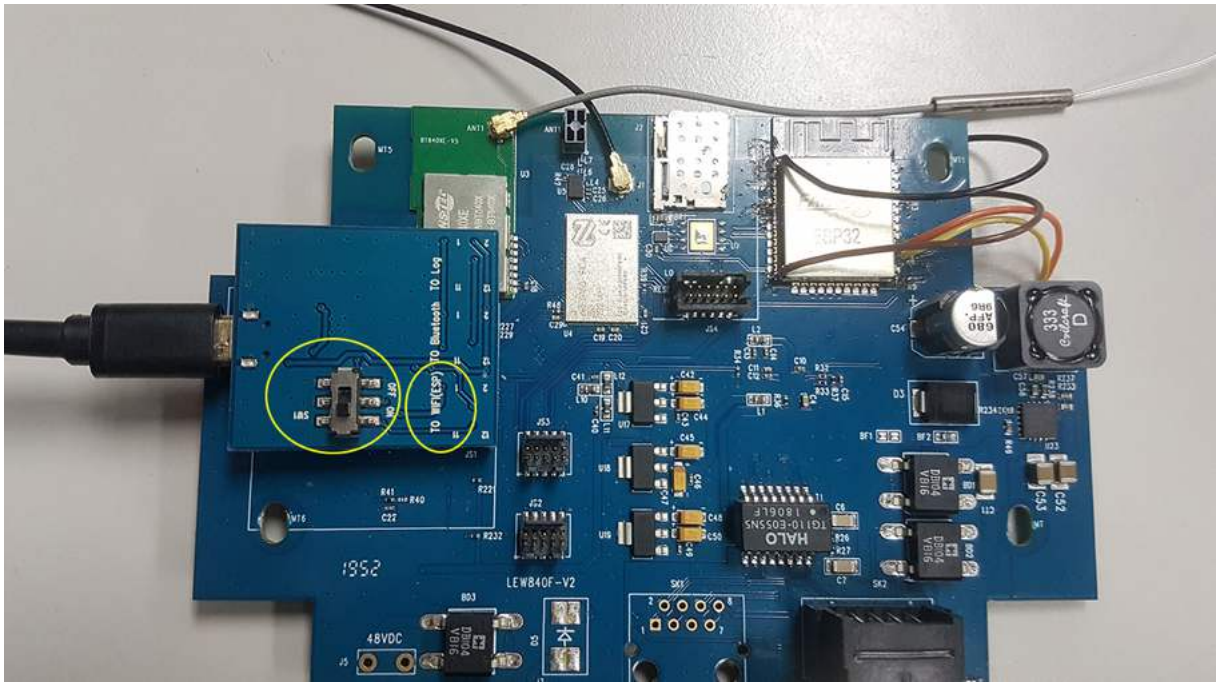
MQTT tool or MQTT APP<->MQTT broker <->LEW840F<->BLE Sensor

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.

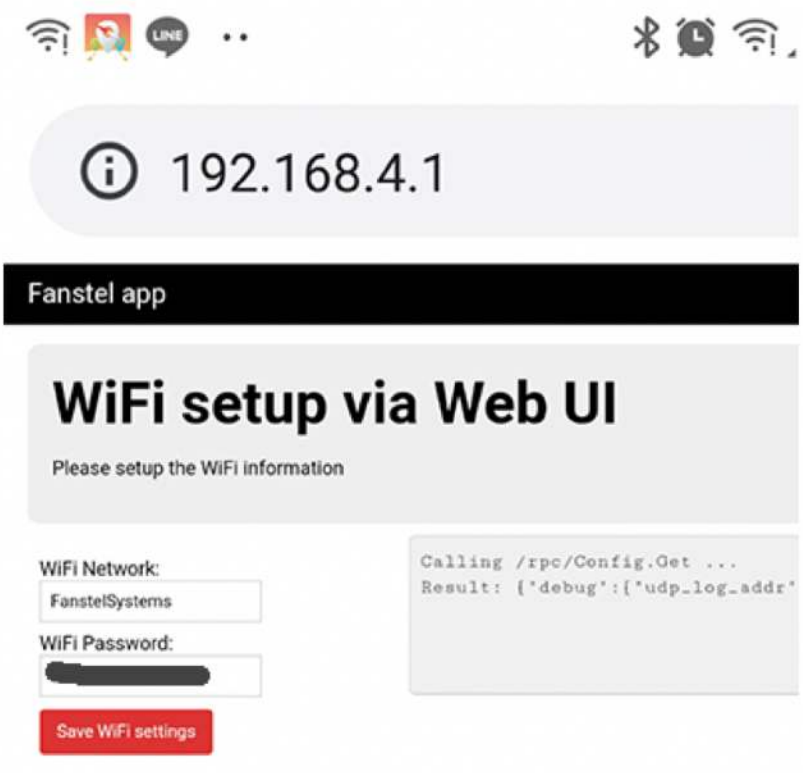
```
esp32_bt_gap.c:100      BT device name esp32_ED5509, addr 45:b5:82:9c:06:ff,2<LF>
esp32_bt_gatts.c:394    Starting BT service 5f6d4f53-5f44-4247-5f53-56435f49445f<LF>
esp32_bt_gap.c:280      BLE advertising started<LF>
esp32_bt_gatts.c:394    Starting BT service 5f6d4f53-5f52-5043-5f53-56435f49445f<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>
```

- Gateway should get DHCP IP address.

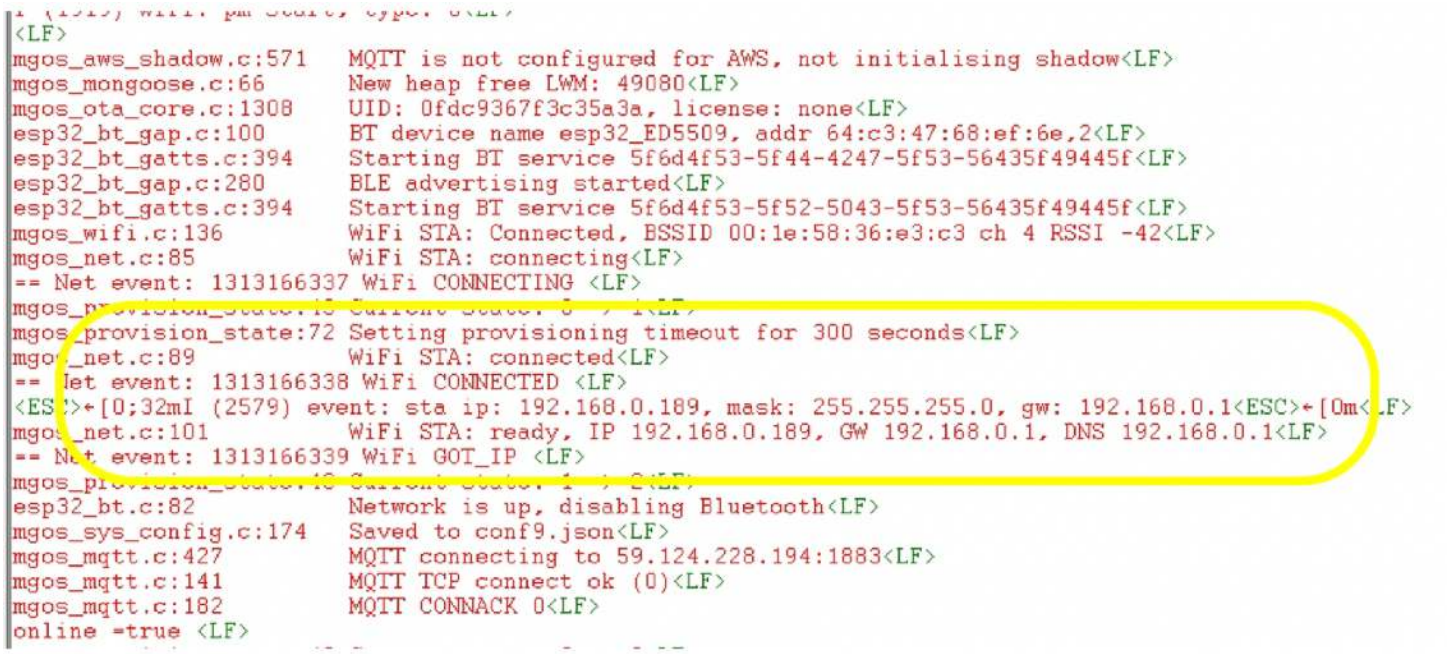
Check WiFi, setup network first.

- 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.

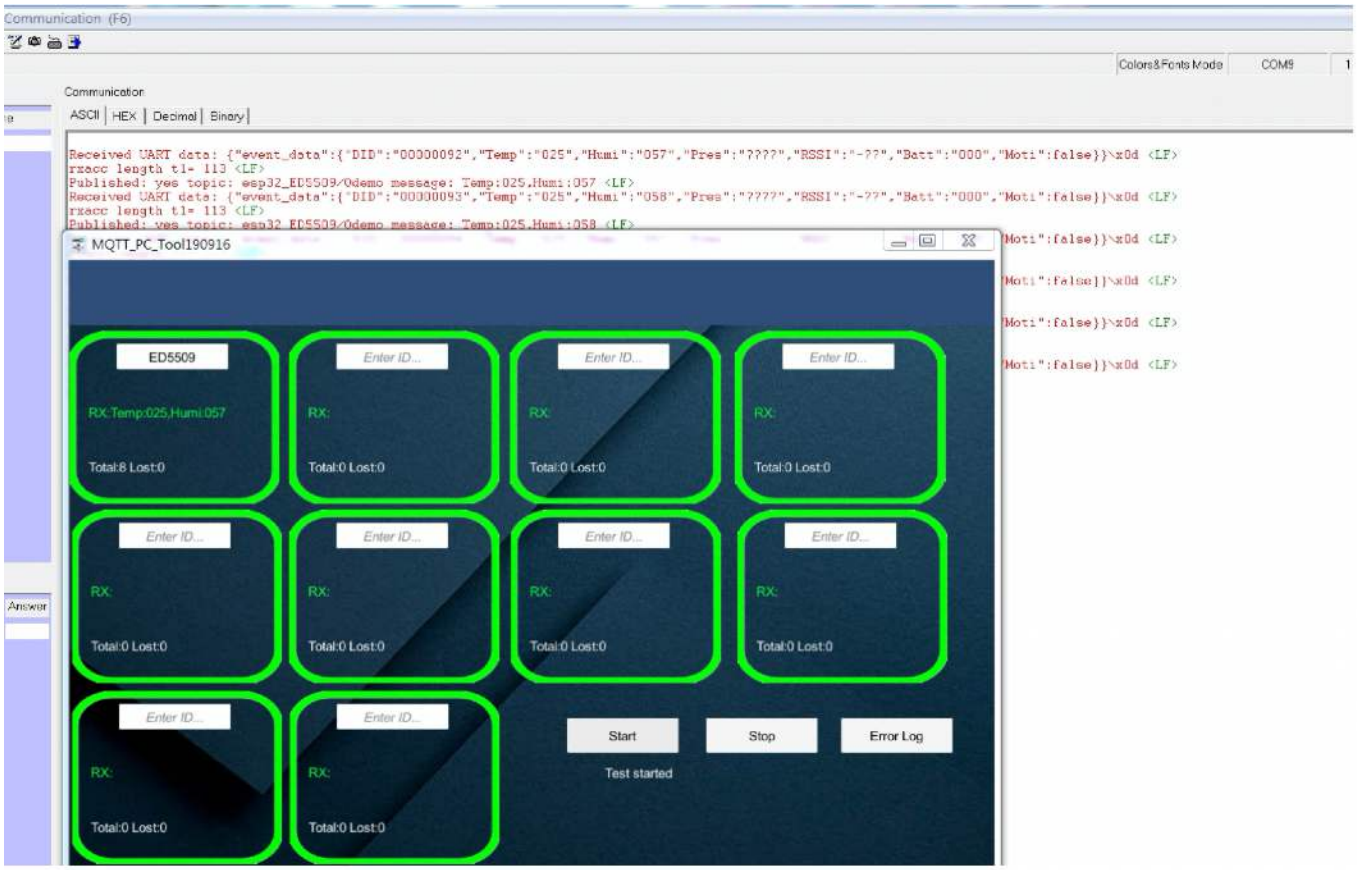
Setup the SSID and password for your router.



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



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”

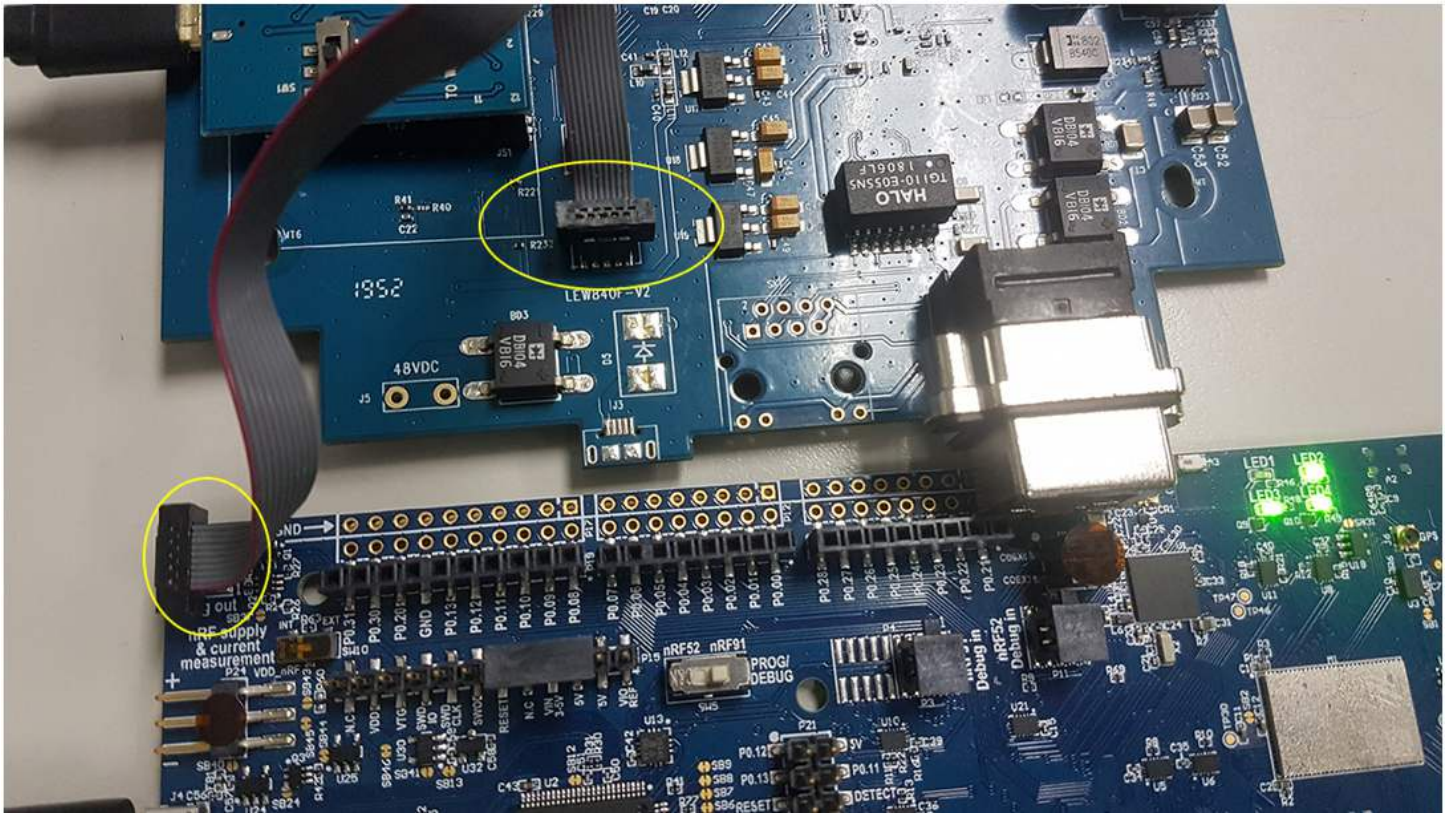
```
C:\mos\mqtt_sensorWiFi_Ethernet_esp32>mos build --platform esp32
Connecting to https://mongoose.cloud, user test
Uploading sources (17866 bytes)
Firmware saved to C:\mos\mqtt_sensorWiFi_Ethernet_esp32\build\fw.zip
```

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.

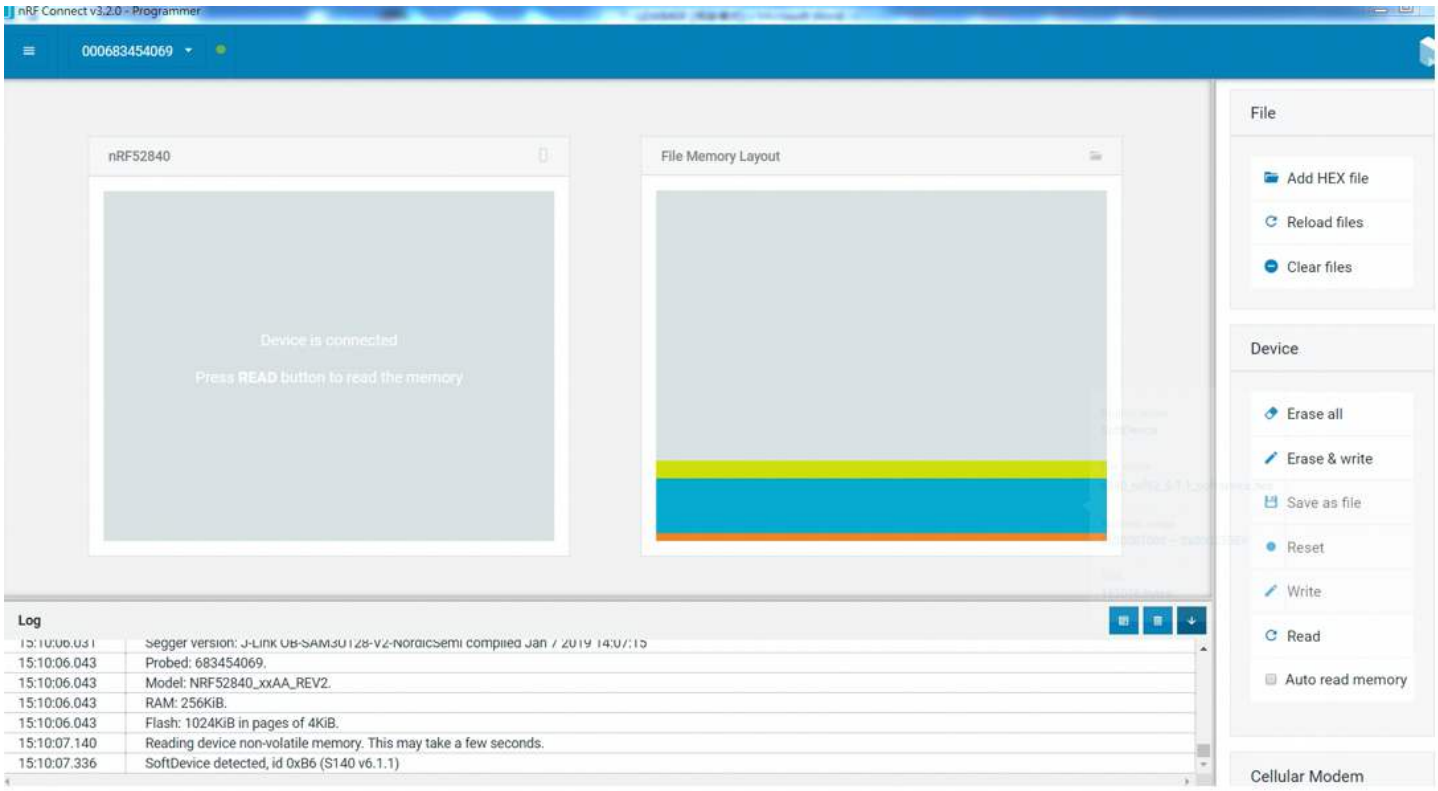
Connected nRF52 DK debug out to LEW840F JS2



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

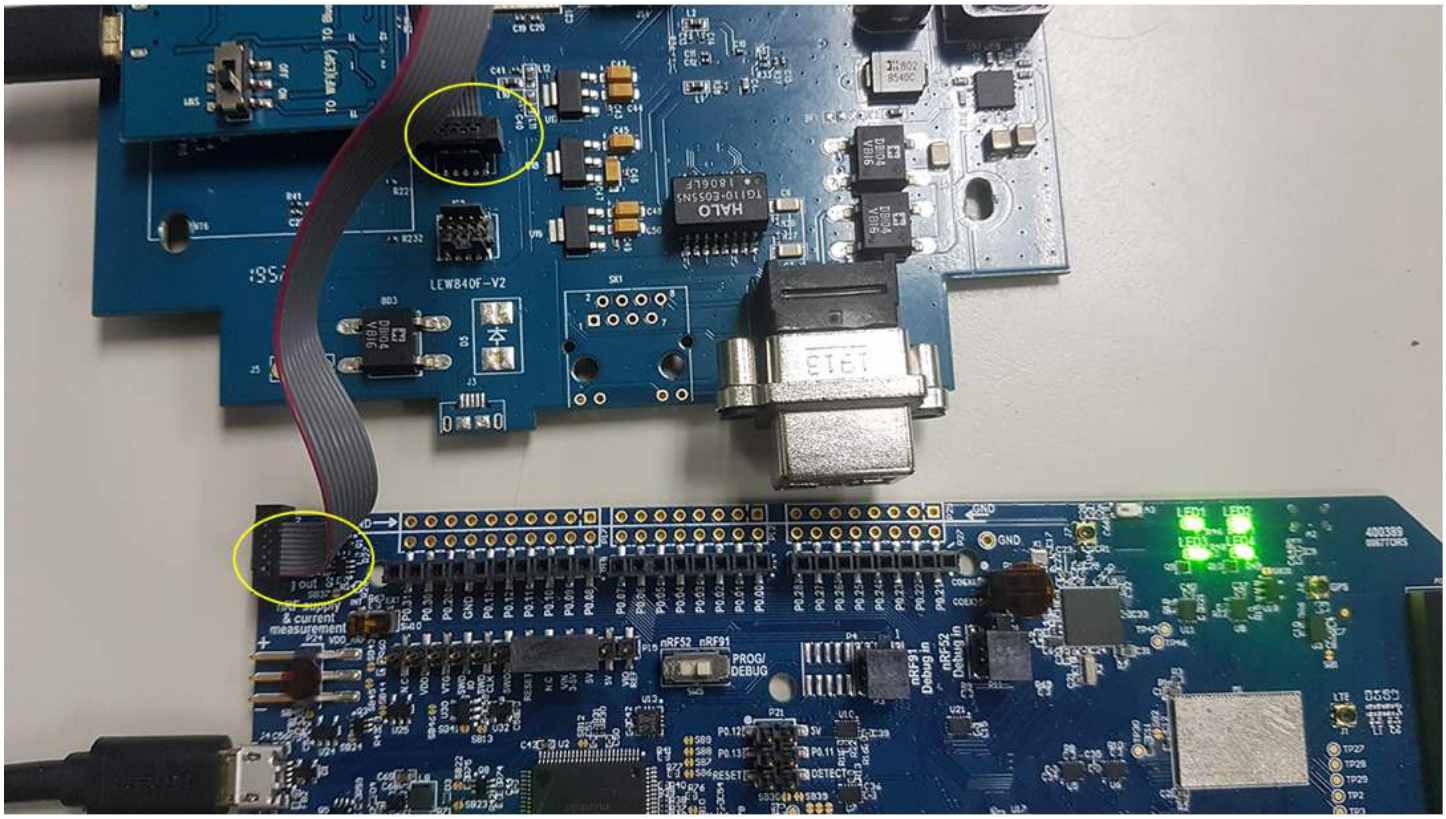
Download and install Nrf5x-Command-Line Tools
https://www.nordicsemi.com/eng/nordic/Products/nRF52840/nRF5x-Command-Line-Tools-Win32/58850

Download and install nRF Connect

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

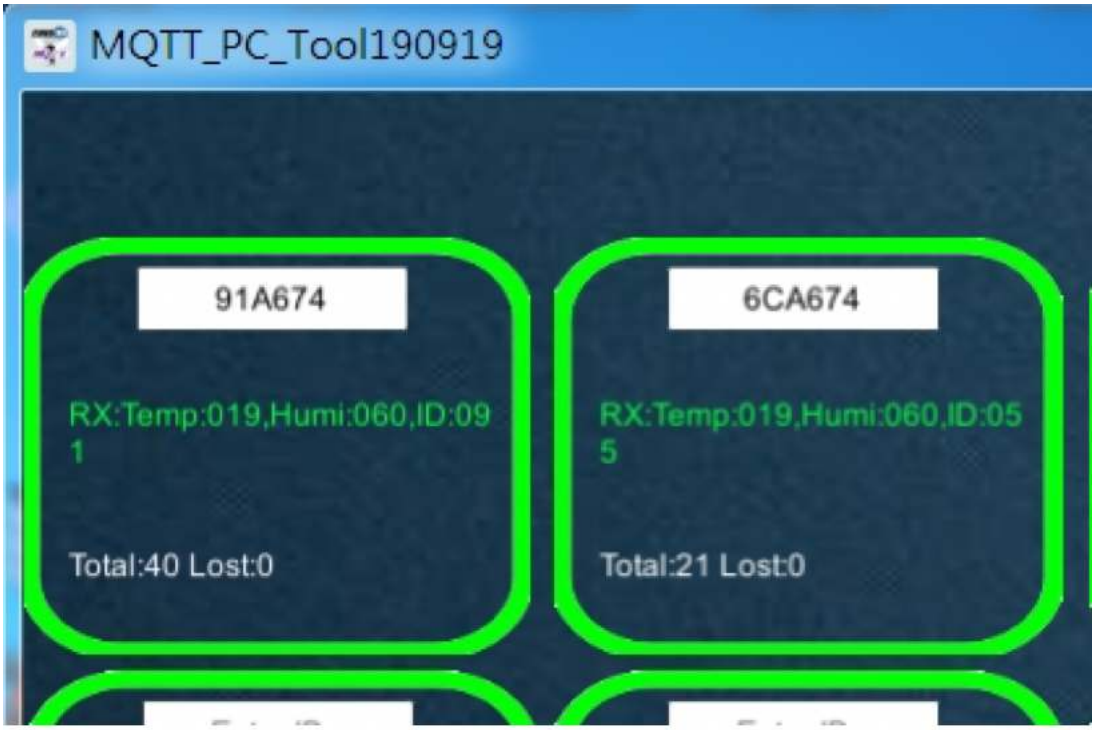
Programming the nRF9160 Module

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/AADYfNmQ2eC7gmI3f7gU6Npla?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
- Feb. 2021, Ver. 0.90: Hardware revision to use M.2 modules.

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