

Charter WiFi 6E MDU Router User Guide

- 2023/3/23

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1 Hardware Setup

1.1 Getting To Know Your WiFi 6E Router

This product is designed for the In-Home and Business WiFi services for Spectrum customers. With a custom industrial design, this WiFi Router can be placed in a central location to deliver superior WiFi network coverage.

The WiFi Router provides:

1. High performance:
 - Qualcomm IPQ9574A up to 2.2G/2GB DDR4 RAM.
 - Tri-Band wireless up to AX11000 (2.4G * 4 + 5G * 4 + 6E *4).
 - Three 2 x 2.5 Gigabit LAN Port + One 10 Gigabit WAN Port.
2. High security: Firewall/VPN supported.
3. Ease of setting up: Friendly wizard, visual setup & maintenance (Basic Mode), complete functions (Advanced Mode).

The WiFi Router is an ideal choice for residential and SMB (Small Business) users who can enjoy a variety of wireless applications and services.

This chapter contains the following contents:

- Unpacking the WiFi Router's Box
- Hardware Features
- Positioning Your WiFi Router

1.2 Unpacking the WiFi Router's Box

Open the box and remove the WiFi Router, PoE injector, Quick Start Guide, Ethernet cable, Bracket, and Label Plaque

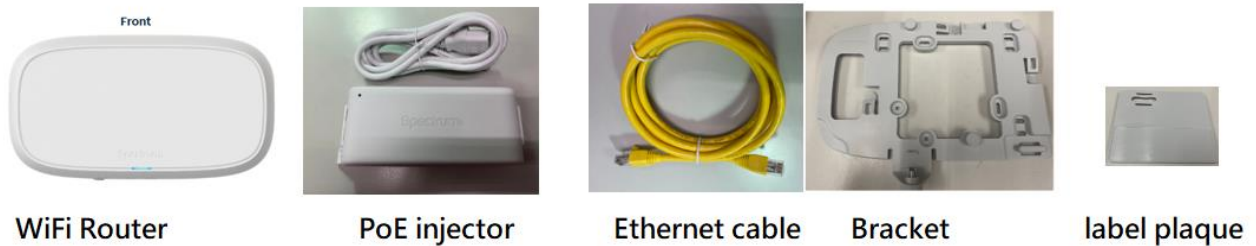


Figure 1. Check the box contents

The box contains the following items:

- WiFi Router
- Bracket
- PoE injector
- Quick Start Guide
- Ethernet cable
- Bracket and Label Plaque

If any items are missing or damaged, please contact Charter Communications. Please keep the original packaging materials in case you need to return the product for repairing.

1.3 Hardware Features

Before you cable your router, take a moment to become familiar with the front and rear panels. Pay particular attention to the LEDs on the front panel.

1.3.1 Front Panel

The WiFi Router front and back panels feature the status LED and buttons as shown in the following figures.

Figure 2. WiFi Router front view



Front panel LED status

- **Off** Device off.
- **Blue *Blinking*** with 600ms interval Booting up
- **Blue *Breathing*** with 5s interval Connecting to the Internet
- **Blue *Solid*** Connected to the Internet.
- **Red *Breathing*** with 5s interval Connectivity issues (no Internet connection).
- **Red and Blue cycle breathing** with 2.5s interval Updating firmware (or any scenario where device must not be restarted).
- **Red *Solid*** Critical issues (hardware or otherwise).

1.3.2 Rear Panel

The Ethernet and buttons are shown in the following figure.



Figure 3. WiFi Router rear view

- **Factory Reset (Reset):** Press and hold the Reset button for over 5 seconds, the WiFi Router will reset to factory setting.
- **Ethernet (LAN) Port:** Connect network cables into these ports to establish LAN connection.
- **Internet (WAN) Port:** Connect a network cable into this port to establish WAN connection.
- **Power:** Use the bundled AC adapter to connect your WiFi Router to a power source.

1.4 Positioning Your WiFi Router.

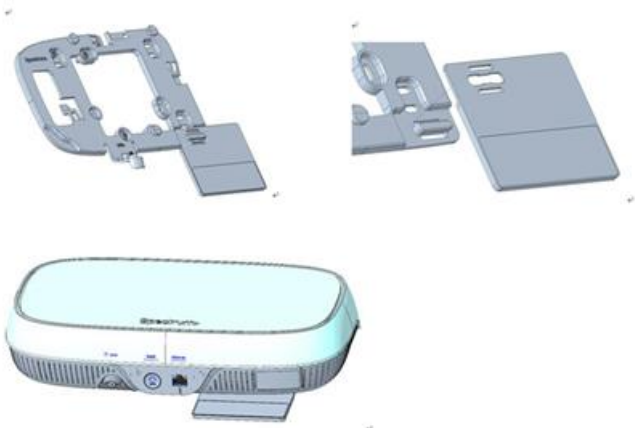
The WiFi Router lets you access your network from virtually anywhere within the operating range of your wireless network. However, the wireless communicating

distance varies significantly due to placement of the WiFi Router. For example, the thickness and number of walls the wireless signal passes through can affect and limit the range. For best results, WiFi Router is likely to be placed as follow:

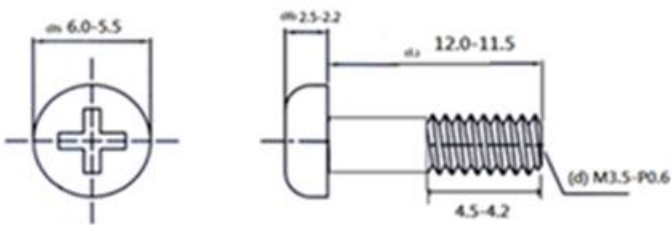
- Near the center of the area where your computers and other devices operate, and preferably within line of sight to your wireless devices.
- Accessible to an AC power outlet and near Ethernet cables for wired computers.
- In an elevated location such as a shelf, keeping the number of walls and ceilings between the WiFi Router and your other devices to a minimum.
- Away from electrical devices that are potential sources of interference. Equipment that might cause interference includes ceiling fans, home security systems, microwaves, computers, the base of a cordless phone, or a 2.4 GHz cordless phone.

Away from any large metal surfaces, such as a solid metal door or aluminum studs. Large expanses of other materials such as glass, insulated walls, fish tanks, mirrors, brick and concrete can also affect your wireless signal.

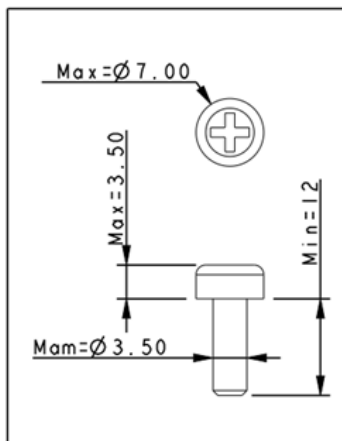
1)Mount the wall bracket to drywall using provided wall anchors and screws.



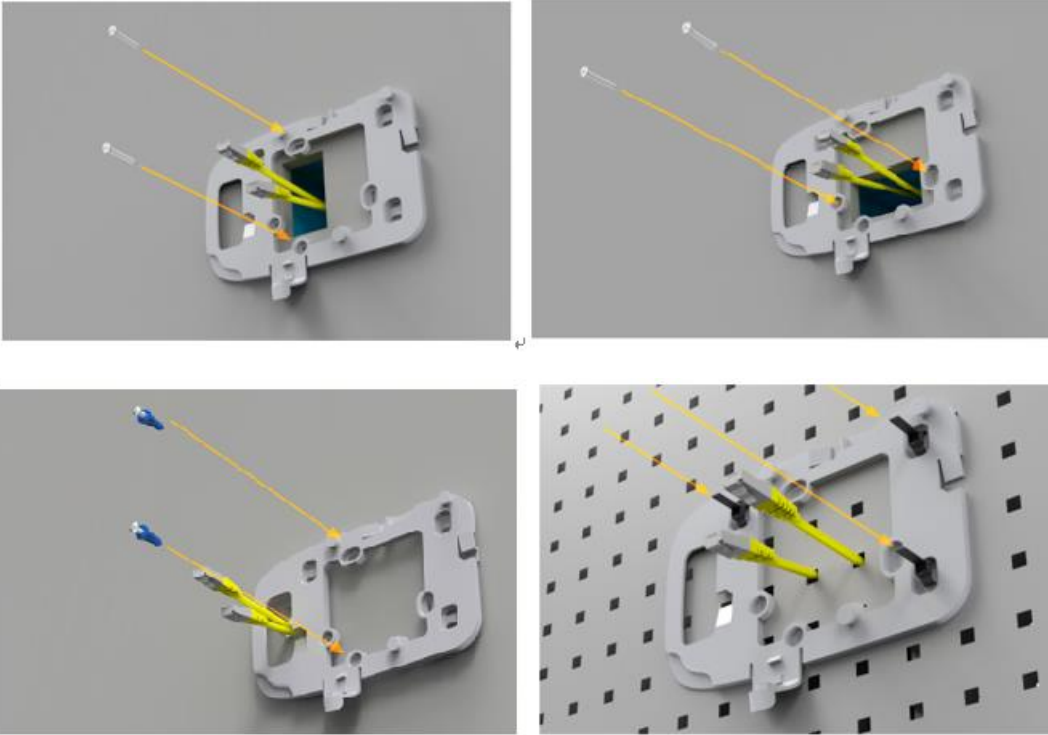
For Host



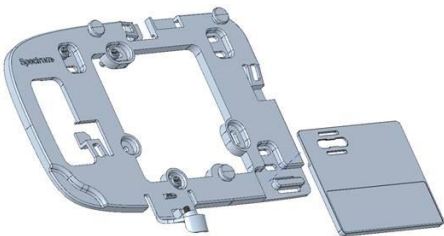
For Walls



The suggested dimensions for wall-mount screws



2)Align the wall bracket posts with to the a slot located on the back of the unit .



3)Slide device down to seat the device on to the bracket .



4) Tighten security locking screw located on bottom of device.



2 Sign-In Your WiFi Router Web GUI.

The WiFi Router contains an intuitive graphical user interface (GUI) based on web, which lets administrator easily configure its features through a web browser.

2.1 Sign-In.

1. Open a web browser, then key in the WiFi Router's default IP address: <https://192.168.1.1>, and click **Enter** key in the keyboard;
2. On the sign in webpage, type in its Username and password: root (R3MOT3ACC3\$\$), then click **Login** button.

OpenWrt

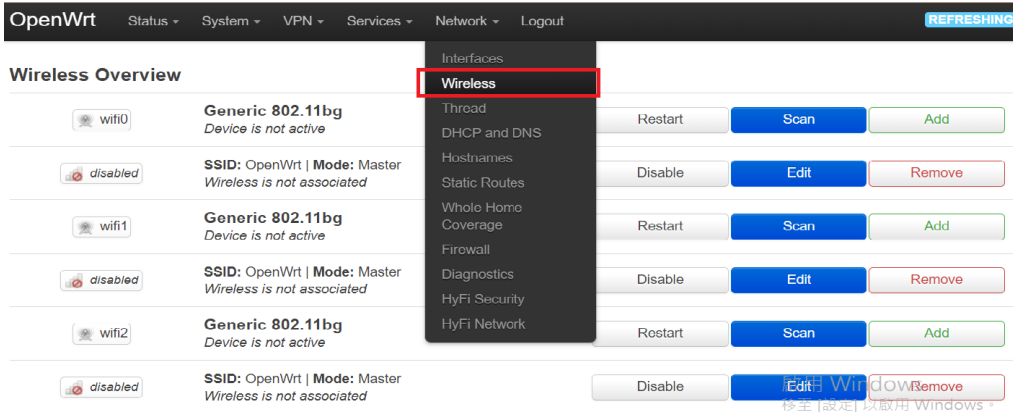
Authorization Required
Please enter your username and password.

Username

Password

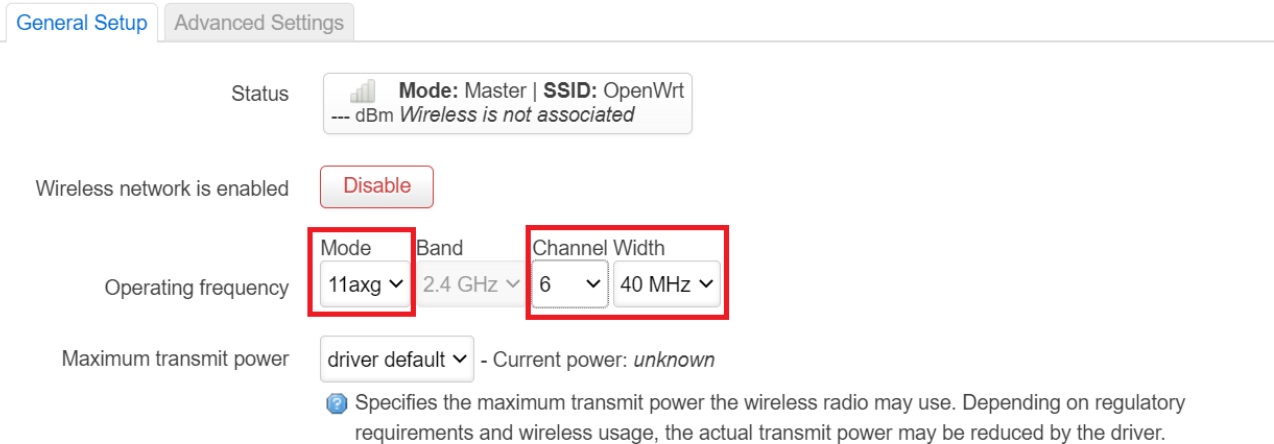
3. Configure wireless.

3.1 Click Network menu then click Wireless.



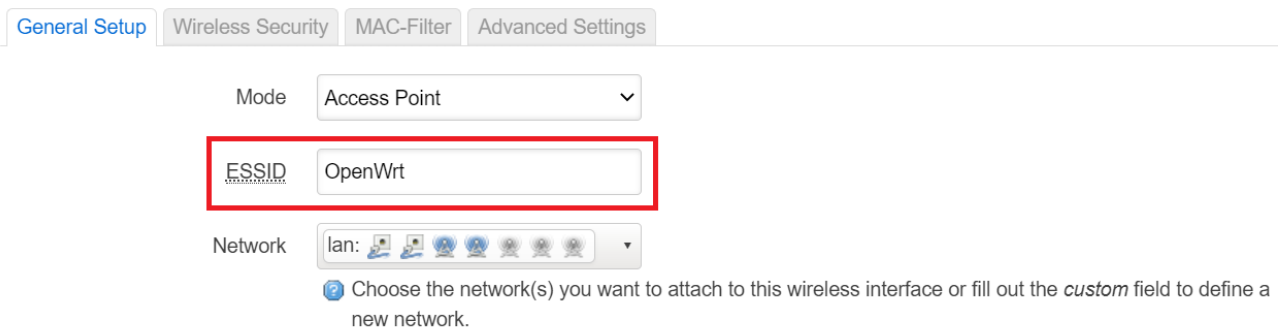
3.2 Device Configuration change wireless Mode , Channel , Width.

Device Configuration



3.3. Interface Configuration change ESSID.

Interface Configuration



3.4 Wireless Security change Encryption , Cipher and Key .

General Setup | **Wireless Security** | MAC-Filter | Advanced Settings

Encryption: WPA2-PSK (strong security) ▾

Cipher: Force CCMP (AES) ▾

Key: *

3.5 Wireless Overview click Save&Apply button.

Wireless Overview

wifi0	Generic 802.11bg <i>Device is not active</i>	Restart	Scan	Add
disabled	SSID: OpenWrt Mode: Master <i>Wireless is not associated</i>	Disable	Edit	Remove
wifi1	Generic 802.11bg <i>Device is not active</i>	Restart	Scan	Add
disabled	SSID: OpenWrt Mode: Master <i>Wireless is not associated</i>	Disable	Edit	Remove
wifi2	Generic 802.11bg <i>Device is not active</i>	Restart	Scan	Add
disabled	SSID: OpenWrt Mode: Master <i>Wireless is not associated</i>	Disable	Edit	Remove

Associated Stations

Network	MAC-Address	Host	Signal / Noise	RX Rate / TX Rate
<i>No information available</i>				

Save & Apply ▾ Save Reset

4. Configure WAN

4.1 Network select Interfaces WAN click Edit .

Interfaces

<p>LAN</p> <p>br-lan</p>	<p>Protocol: Static address Uptime: 16h 50m 9s MAC: 80:78:71:12:D8:60 RX: 14.83 MB (161608 Pkts.) TX: 22.95 MB (136659 Pkts.) IPv4: 192.168.1.1/24 IPv6: fd54:fce2:d5a7:0:8278:71ff:fe12:d860/64</p>	<p>Restart Stop Edit Delete</p>
<p>WAN</p> <p>br-wan</p>	<p>Protocol: DHCP client Uptime: 0h 4m 4s MAC: 80:78:71:12:D8:5F RX: 129.30 KB (1122 Pkts.) TX: 101.08 KB (1133 Pkts.) IPv4: 192.168.77.46/24</p>	<p>Restart Stop Edit Delete</p>
<p>WAN6</p> <p>br-wan</p>	<p>Protocol: DHCPv6 client MAC: 80:78:71:12:D8:5F RX: 129.30 KB (1122 Pkts.) TX: 101.08 KB (1133 Pkts.)</p>	<p>Restart Stop Edit Delete</p>

4.2 Protocol select WAN type.

Interfaces » WAN

General Settings Advanced Settings Physical Settings Firewall Settings

Status: Device: br-wan
 Uptime: 0h 5m 18s
 MAC: 80:78:71:12:D8:5F
 RX: 192.13 KB (1712 Pkts.)
 TX: 161.37 KB (1807 Pkts.)
 IPv4: 192.168.77.46/24

Protocol: DHCP client

Bring up on boot:

Hostname to send when requesting DHCP:

Dismiss Save

4.3 Interfaces click Save&Apply button.

OpenWrt Status System VPN Services Network Logout REFRESHING

Interfaces Global network options

Interfaces

<p>LAN</p> <p>br-lan</p>	<p>Protocol: Static address Uptime: 18h 17m 38s MAC: 80:78:71:12:D8:60 RX: 18.07 MB (186722 Pkts.) TX: 48.33 MB (157465 Pkts.) IPv4: 192.168.1.1/24 IPv6: fd54:fce2:d5a7:0:8278:71ff:fe12:d860/64</p>	<p>Restart Stop Edit Delete</p>
<p>WAN</p> <p>br-wan</p>	<p>Protocol: DHCP client Uptime: 1h 31m 33s MAC: 80:78:71:12:D8:5F RX: 4.90 MB (39430 Pkts.) TX: 3.84 MB (37304 Pkts.) IPv4: 192.168.77.46/24</p>	<p>Restart Stop Edit Delete</p>
<p>WAN6</p> <p>br-wan</p>	<p>Protocol: DHCPv6 client MAC: 80:78:71:12:D8:5F RX: 4.90 MB (39430 Pkts.) TX: 3.84 MB (37304 Pkts.)</p>	<p>Restart Stop Edit Delete</p>

Add new interface...

Save & Apply Save Reset

5. Configure BLE

Execute the `cpcd -b ecdh` command to generate the key file: (Except for burning DUT FW or IOT FW again, there is no need to bind the key again after binding, and `cpcd` can be started directly)

```
# cpcd -b ecdh
```

```
operator@MAX21K:/# cpcd -b ecdh
WARNING: in function 'property_get_secondary_app_version_callback' in file /workspace/sdk/qualcomm_sdk/qcdk/build_dir/target-aarch64/cpc_daemon-0.1/server_core/server_core.c at line #546 : Cannot get Secondary APP version (obsolete RCP firmware)
[09:30:59:827] Info : [CPCD v4.1.1.0] [Library API v2] [RCP Protocol v2]
[09:30:59:827] Info : Git commit: bb01e17dc5eb978bb5ddc8bf04142c8d24888d / branch:
[09:30:59:827] Info : Source hash: 52cc7d493865e4af5f0e0513429df9b10ed93a3d3c2b23fe48e7b9277a47
[09:30:59:827] Info : Reading cli arguments
[09:30:59:827] Info : cpcd -b ecdh
[09:30:59:828] Info : Reading configuration file
[09:30:59:828] Info : file: /usr/etc/cpcd.conf
[09:30:59:837] Info : instance_name: cpcd_0
[09:30:59:837] Info : bus_type: UART
[09:30:59:837] Info : spi_device_file: /dev/spidev0.0
[09:30:59:837] Info : spi_cs_gpio_chip: gpiochip0
[09:30:59:837] Info : spi_cs_gpio: 8
[09:30:59:837] Info : spi_rx_irq_gpio_chip: gpiochip0
[09:30:59:837] Info : spi_rx_irq_gpio: 22
[09:30:59:837] Info : spi_device_bitrate: 1000000
[09:30:59:837] Info : spi_device_mode: SPI_MODE_0
[09:30:59:837] Info : uart_device_file: /dev/ttyMEM3
[09:30:59:837] Info : uart_device_baud: 115200
[09:30:59:837] Info : uart_hardflow: true
[09:30:59:837] Info : bootloader_recovery_pins_enabled: false
[09:30:59:837] Info : bootloader_wake_gpio_chip: gpiochip0
[09:30:59:837] Info : bootloader_wake_gpio: 24
[09:30:59:837] Info : bootloader_reset_gpio: 23
[09:30:59:837] Info : bootloader_reset_gpio_chip: gpiochip0
[09:30:59:837] Info : stdout_trace: false
[09:30:59:837] Info : trace_to_file: false
[09:30:59:837] Info : traces_folder: /dev/shm/cpcd-traces
[09:30:59:837] Info : enable_frame_trace: false
[09:30:59:837] Info : rlimit_nofile: 2000
[09:30:59:837] Info : disable_encryption: false
[09:30:59:837] Info : binding_key_file: /etc/binding-key.key
[09:30:59:838] Info : Starting daemon in ECDH binding mode
[09:30:59:838] Info : Note: Please make sure the unbind functionality is implemented for your product. By default, unbinding requests will be refused, refer to CPC documentation for further details.
[09:30:59:840] Info : Connecting to Secondary...
[09:30:59:840] Info : Connected to Secondary
[09:30:59:841] Info : Secondary Protocol v2
[09:30:59:855] Info : Secondary CPC v4.1.0
[09:31:00:455] WARNING: in function 'property_get_secondary_app_version_callback' in file /workspace/sdk/qualcomm_sdk/qcdk/build_dir/target-aarch64/cpc_daemon-0.1/server_core/server_core.c at line #546 : Cannot get Secondary APP version (obsolete RCP firmware)
[09:31:00:455] Info : Daemon startup was successful. Waiting for client connections
[09:31:00:461] Info : Client is using library v2
[09:31:00:466] Info : Opened connection socket for ep#1
[09:31:00:466] Info : Endpoint socket #1: Client connected. 1 connections
operator@MAX21K:/#
```

Execute `cpcd &` and run `cpcd` in the background (There is no need to restart after the CPCD has been started)

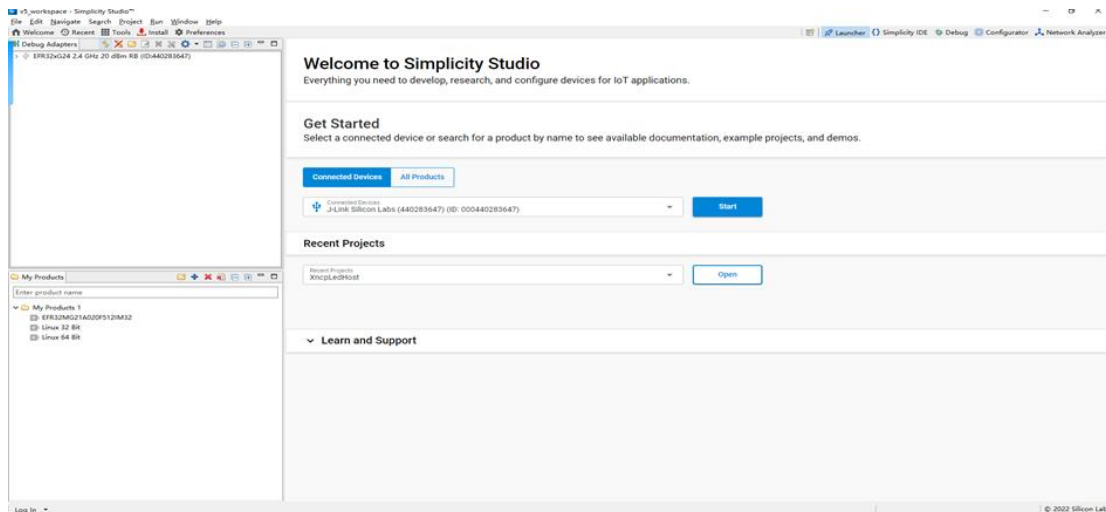
```
# cpcd &
```

```
operator@MAX21K:/# cpcd &
operator@MAX21K:/# WARNING: in function 'property_get_secondary_app_version_callback' in file /workspace/sdk/qualcomm_sdk/qcdk/build_dir/target-aarch64/cpc_daemon-0.1/server_core/server_core.c at line #546 : Cannot get Secondary APP version (obsolete RCP firmware)
[09:34:30:640] Info : [CPCD v4.1.1.0] [Library API v2] [RCP Protocol v2]
[09:34:30:640] Info : Git commit: bb01e17dc5eb978bb5ddc8bf04142c8d24888d / branch:
[09:34:30:640] Info : Source hash: 52cc7d493865e4af5f0e0513429df9b10ed93a3d3c2b23fe48e7b9277a47
[09:34:30:640] Info : Reading cli arguments
[09:34:30:640] Info : cpcd
[09:34:30:640] Info : Reading configuration file
[09:34:30:640] Info : file: /usr/etc/cpcd.conf
[09:34:30:640] Info : instance_name: cpcd_0
[09:34:30:640] Info : bus_type: UART
[09:34:30:640] Info : spi_device_file: /dev/spidev0.0
[09:34:30:640] Info : spi_cs_gpio_chip: gpiochip0
[09:34:30:641] Info : spi_cs_gpio: 8
[09:34:30:641] Info : spi_rx_irq_gpio_chip: gpiochip0
[09:34:30:641] Info : spi_rx_irq_gpio: 22
[09:34:30:641] Info : spi_device_bitrate: 1000000
[09:34:30:641] Info : spi_device_mode: SPI_MODE_0
[09:34:30:641] Info : uart_device_file: /dev/ttyMEM3
[09:34:30:641] Info : uart_device_baud: 115200
[09:34:30:641] Info : uart_hardflow: true
[09:34:30:641] Info : bootloader_recovery_pins_enabled: false
[09:34:30:641] Info : bootloader_wake_gpio_chip: gpiochip0
[09:34:30:641] Info : bootloader_wake_gpio: 24
[09:34:30:641] Info : bootloader_reset_gpio: 23
[09:34:30:641] Info : bootloader_reset_gpio_chip: gpiochip0
[09:34:30:641] Info : stdout_trace: false
[09:34:30:641] Info : trace_to_file: false
[09:34:30:641] Info : traces_folder: /dev/shm/cpcd-traces
[09:34:30:641] Info : enable_frame_trace: false
[09:34:30:641] Info : rlimit_nofile: 2000
[09:34:30:641] Info : disable_encryption: false
[09:34:30:641] Info : binding_key_file: /etc/binding-key.key
[09:34:30:641] Info : Starting daemon in normal mode
[09:34:30:651] Info : Connecting to Secondary...
[09:34:30:740] Info : Connected to Secondary
[09:34:30:743] Info : Secondary Protocol v2
[09:34:30:755] Info : Secondary CPC v4.1.0
[09:34:31:255] WARNING: in function 'property_get_secondary_app_version_callback' in file /workspace/sdk/qualcomm_sdk/qcdk/build_dir/target-aarch64/cpc_daemon-0.1/server_core/server_core.c at line #546 : Cannot get Secondary APP version (obsolete RCP firmware)
[09:34:31:255] Info : Daemon startup was successful. Waiting for client connections
[09:34:31:256] Info : Client is using library v2
[09:34:31:261] Info : Opened connection socket for ep#1
[09:34:31:261] Info : Endpoint socket #1: Client connected. 1 connections
operator@MAX21K:/#
```

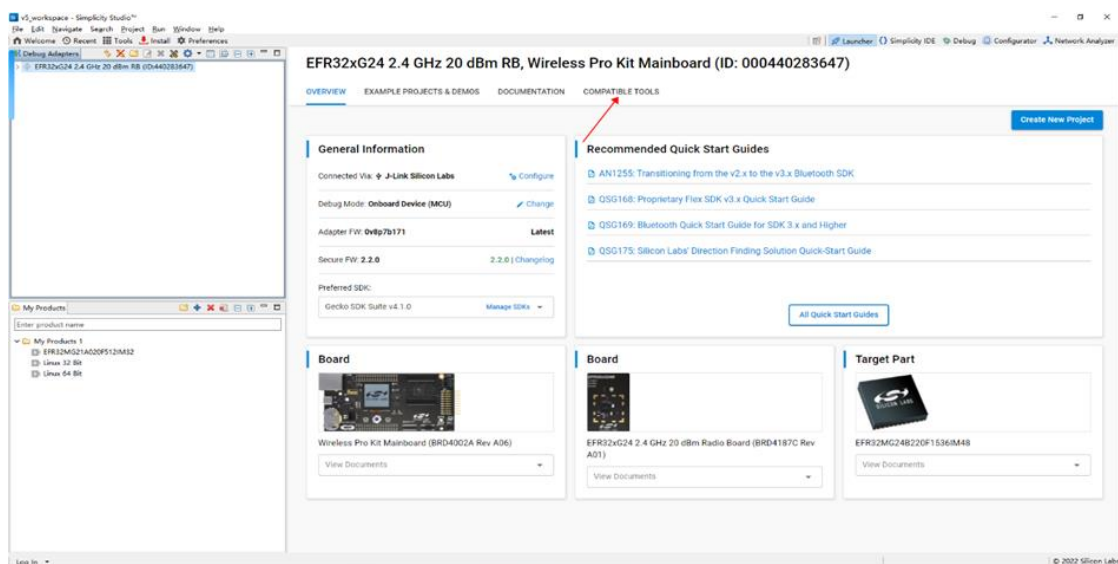
6. Configure Thread

Use the pc-side app: simplicity studio v5, which can be downloaded on the silabs official website (<https://cn.silabs.com/developers/simplicity-studio>)

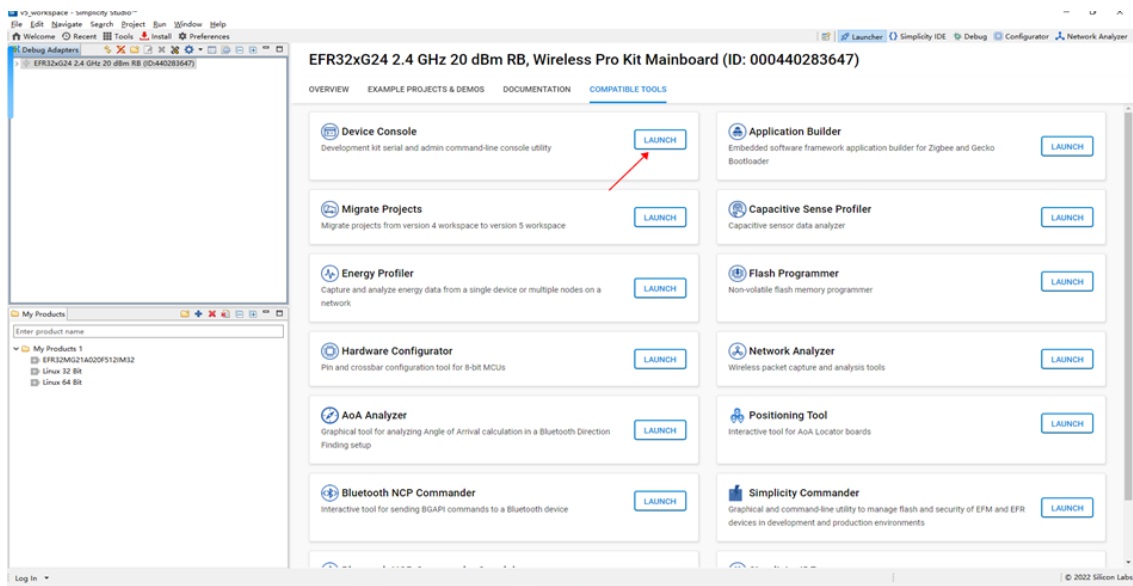
Open simple studio v5, and connect the XG24 EVB board that has burned ot-cli-mtd.s37 to the PC, and simple studio v5 will display the following interface :



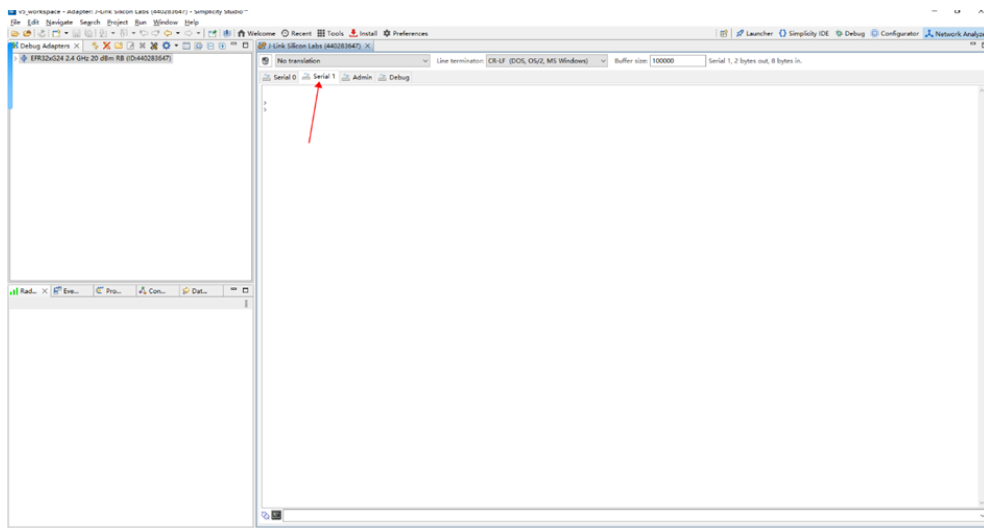
Click start to connect to the XG24 EVB board, and select the option indicated by the arrow below :



Select the Device Console tool and click LAUNCH :



Select Serial 1 and click enter to enter the thread cli command line :



Join to the Thread network through the networkkey of the leader device :

> dataset networkkey 3f976dd3411b0dda22c642c1a4196480

```
> dataset networkkey 3f976dd3411b0dda22c642c1a4196480
Done
```

Submit Activity Dataset :

> dataset commit active

Enable thread interface and start thread :

> ifconfig up

> thread start


```
> ifconfig up
Done
> thread start
Done
```

After joining, check whether the device has received the complete active operation dataset through the dataset active command

> dataset active

```
> dataset active
Active Timestamp: 1
Channel: 18
Channel Mask: 0x07fff800
Ext PAN ID: 9cb7d0b75532ce7a
Mesh Local Prefix: fdb6:f2ba:56c5:7340::/64
Network Key: 3f976dd3411b0dda22c642c1a4196480
Network Name: OpenThread-1494
PAN ID: 0x1494
PSKc: 79f49406343c02ca96bb160ce7876b91
Security Policy: 672 onrc
Done
```

View device status :

> state

```
> state
child
Done
```

The status of the device joining the network is child. If the status is detached after joining, please check later. There will be connection delay.

Get the IP address of the child device :

```
> ipaddr
fdb6:f2ba:56c5:7340:0:ff:fe00:f001
fdb6:f2ba:56c5:7340:e2f7:f8a9:63b:37cb
fe80:0:0:0:a079:a689:bac3:fba4
Done
```

7. Regulatory Compliance Notices

Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause

harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft, except that operation of this device is permitted in large aircraft while flying above 10,000 feet.

Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems. This device is restricted for indoor use.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 52cm between the radiator & your body.

- This equipment is to be connected to Power in PoE networks which would be not routing to outside plants.

- Power cord shall be connected to a socket-outlet with earthing connection.

- This product is intended to be supplied by a UL Listed Power Adapter or DC power source marked `L.P.S' or `Limited Power Source', rated 12Vdc, 3 A and Tma 40°C (min.). If you require further assistance, please contact your Askey Computer Corp representative.

- This product is intended to be supplied by a UL Listed PoE Injector or DC power source marked `L.P.S' or `Limited Power Source', rated 56Vdc, 0.714A and Tma 40°C (min.). If you require further assistance, please contact your Askey Computer Corp representative.

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