

VERSION 1.0  
FEBRUARY 23, 2022



# CLS-4-420-TH

TEST SET-UP INSTRUCTIONS

## CLS-4-420-TH

The purpose of this document is to provide the set-up instructions for powering up and configuring the CLS-4-420-TH for certification testing.

---

### REVISIONS

Revision	Author	Date	Changes
1.0	Engineering	February 23, 2022	Initial Release

---



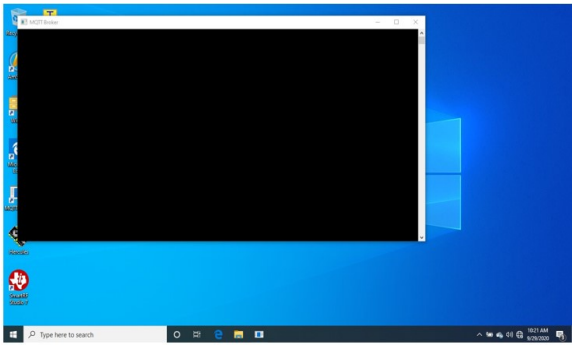

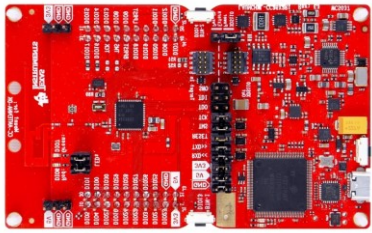

### ABBREVIATION

Acronym	Description
BLE	Bluetooth Low Energy
LED	Light Emitting Diode
MQTT	MQ Telemetry Transport

## TABLE OF CONTENTS

Test Set-Up Instructions .....	1
Revisions .....	1
Abbreviation.....	1
Tools .....	3
CLS-4-420-TH Operational Set-Up Instructions.....	4
4-20mA Current Measurement Set-Up.....	5
CLS-4-420-TH Internal Battery Charging .....	6
Gateway Operational Set-Up Instructions .....	7
Pairing a CLS-4-420-TH to a Gateway.....	9
CLS-4-420-TH FCC/ISED Test Set-Up.....	11

**TOOLS**

 <p>A small, black and silver electronic device with a red digital display showing '0000', a rotary knob, and a green terminal block.</p>	 <p>A yellow rectangular device with a speaker grille, a 'LAB' logo, and a 'GATEWAY' label with status LEDs.</p>
 <p>A screenshot of a Windows desktop with a black window titled 'MQTT Broker' open in the center.</p>	 <p>A flat ribbon cable with a black connector on one end and a multi-pin connector on the other.</p>
 <p>A red printed circuit board (PCB) populated with various electronic components, including a microcontroller and memory chips.</p>	 <p>A black cable with a standard USB-A connector on one end and a Micro USB-B connector on the other.</p>

#### 4-20MA CURRENT MEASUREMENT SET-UP

1. Connect the two (2) 6-pin Phoenix contact connector to available two (2) 6-pin Phoenix connector on the CLS-4-420-TH.



2. Turn the CLS-4-420-TH on by pressing and releasing the PWR button on the membrane. The orange PWR LED should turn on.



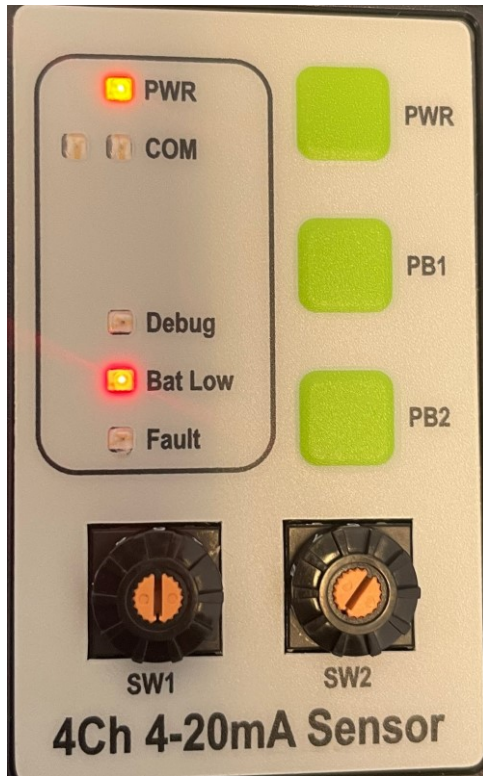
3. The CLS-4-420-TH is now ready to be paired to a Gateway. See the Gateway Operational Set-Up Instructions and Pairing a CLS-4-420-TH to a Gateway sections for preparing a Gateway and pairing the CLS-4-420-TH to the Gateway to start broadcasts.

### CLS-4-420-TH INTERNAL BATTERY CHARGING

The CLS-4-420-TH contains an internal lithium-ion battery. When the internal battery is drained to where less than 1000mAh capacity is remaining (approximately 30% state of charge), the **Red BAT LOW LED** will turn on.

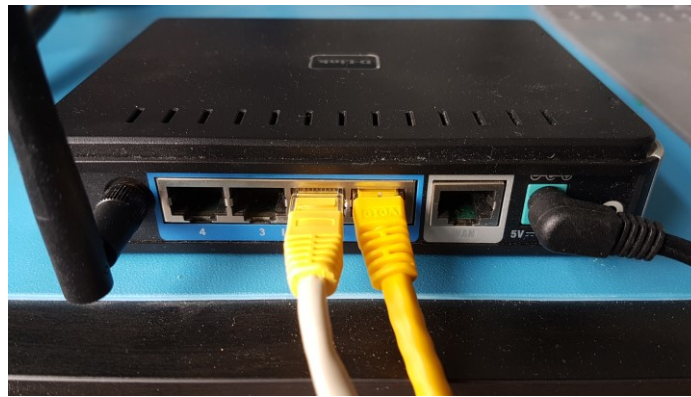
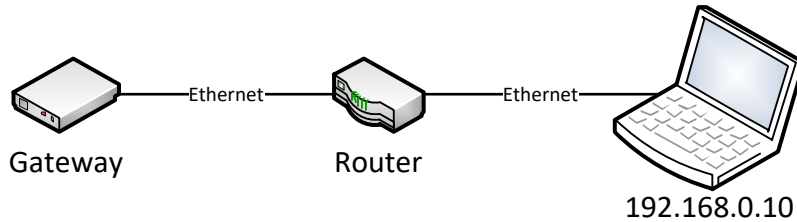
To re-charge the battery, connect the accompanying AC/DC adapter to the barrel jack at the bottom of the CLS-4-420-TH. The CLS-4-420-TH will automatically begin to charge.

The BAT LOW LED will turn off once the battery is charged to approximately 85% state of charge.



## GATEWAY OPERATIONAL SET-UP INSTRUCTIONS

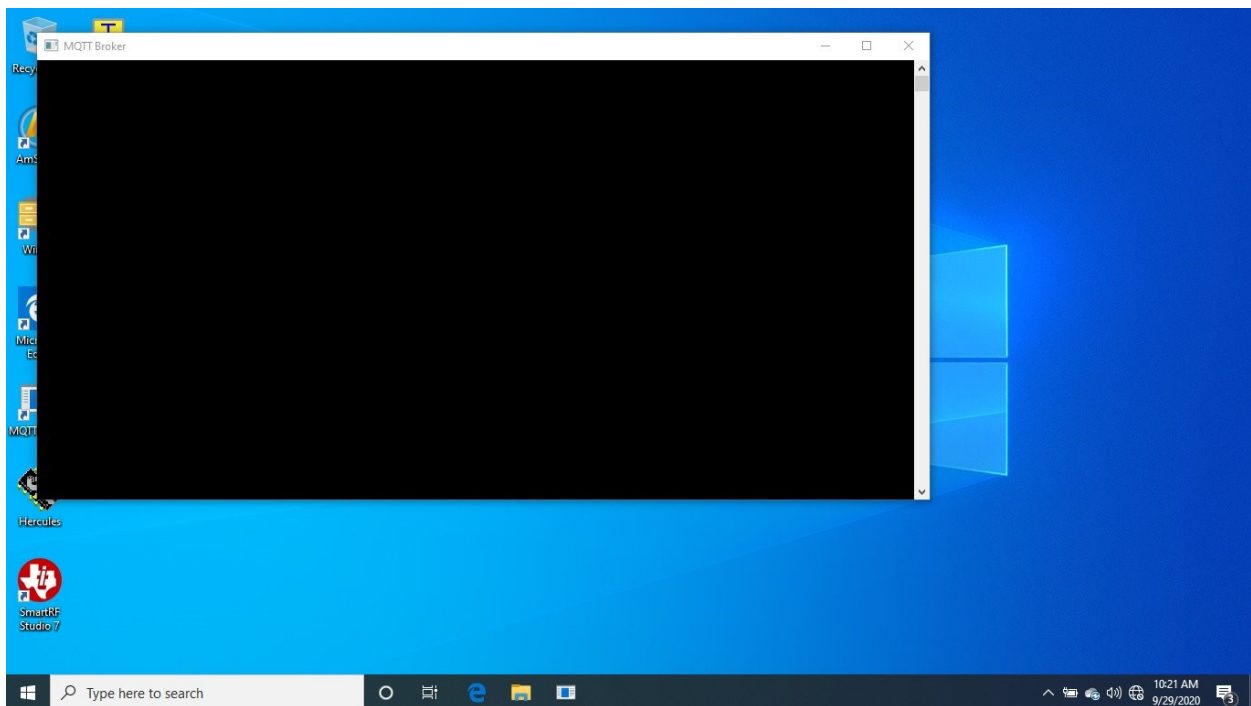
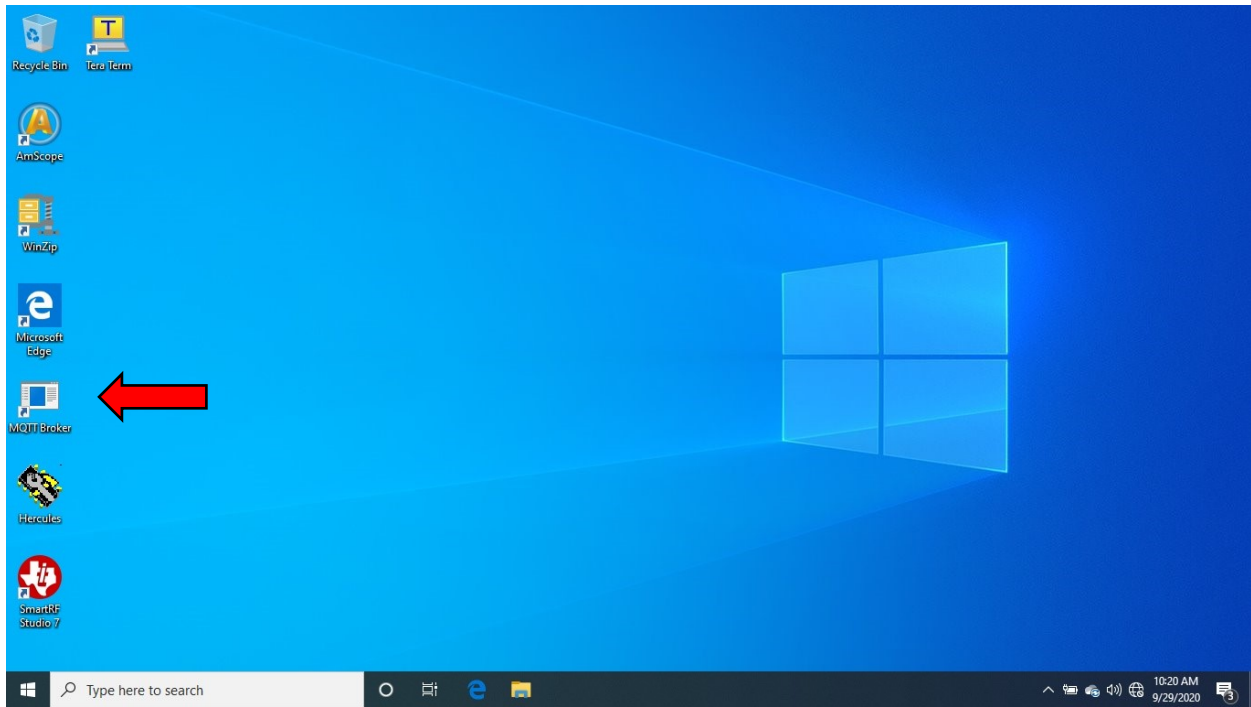
1. Connect the Gateway to one of the four (4) router LAN ports using an Ethernet cable. Connect one of the four LAN ports on the router to the laptop using an Ethernet cable. The Gateway has been pre-configured to operate with a MQTT Broker at 192.168.0.10.



2. Connect the AC/DC adapter to the Gateway. The Gateway will automatically turn on when power is applied. The Gateway orange 'PWR' LED will turn on and the red 'Fault' LED will blink every two seconds.



3. Start the MQTT Broker on the laptop by running "MQTT Broker" as an Administrator (Right-Click, select Run as administrator). The MQTT Broker will open up a blank command window.



4. The **Red 'Fault' LED** on the Gateway will turn off once a connection to the MQTT Broker is established. This may take up to 10 seconds.
5. The Gateway is now ready for CLS-4-420-TH pairing.



## PAIRING A CLS-4-420-TH TO A GATEWAY

To test RF functionality, a compatible Bluetooth device, a CLS-4-420-TH (Wireless Sensor) must be paired to the Gateway. The CLS-4-420-TH will broadcast an encrypted BLE data packet to the Gateway at predetermined intervals.

The rotary encoders set the broadcast interval of the CLS-4-420-TH in 20 second increments, from 01 (20 seconds) to 09, and in 200s increments, from 11 (200 seconds) to 91 (16200 seconds) Setting 92 to 99 is the same as 91. **Setting 00 or 10 disables broadcasts.**

Let **T** = target interval (in **seconds**), **H** = High switch setting, **L** = Low switch setting

Range 1: If  $T < 200s$ :  $H = 0$  and  $L = T / 20$

Range 2: If  $T \geq 200s$ :  $H = 1 + T / 2000$  and  $L = (T - (H - 1) \times 2000) / 200$

(NB: All above operations are based on integers only! (No decimal))

Note that the CLS-4-420-TH does not need to be connected to an external power source to transmit BLE data packets. The CLS-4-420-TH may be operated from the internal battery.

1. Place the Gateway in Pairing Mode by pressing and releasing the PB1 pushbutton on the Gateway. The **Green COM LED** will turn on.



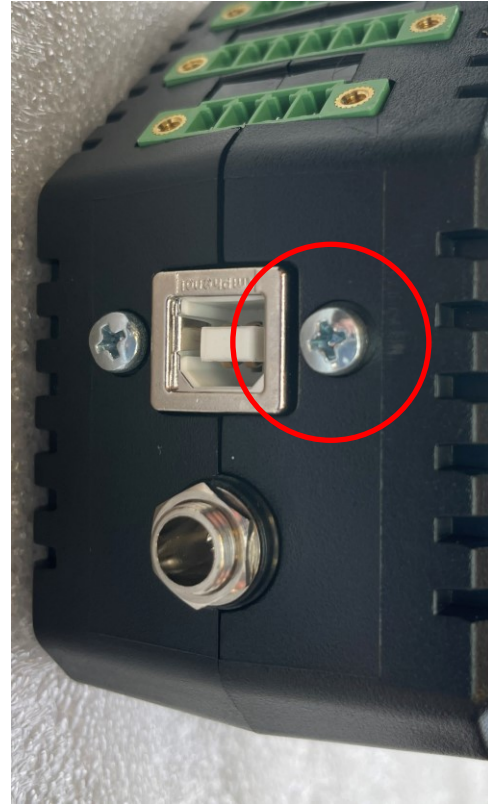
2. Press and hold the PB1 button on the CLS-4-420-TH. The **Red COM LED** on the CLS-4-420-TH will turn on for 1 second. Release the PB1 button on the CLS-4-420-TH.
3. If pairing was successful, the **Green COM LED** on the CLS-4-420-TH will then turn on for 1 second, and the **Green COM LED** on the Gateway will turn off. If pairing was not successful, the **Green COM**

**LED** on the CLS-4-420-TH will not turn on and the **Green COM LED** on the Gateway will remain on. If this occurs, simply reattempt step 2.

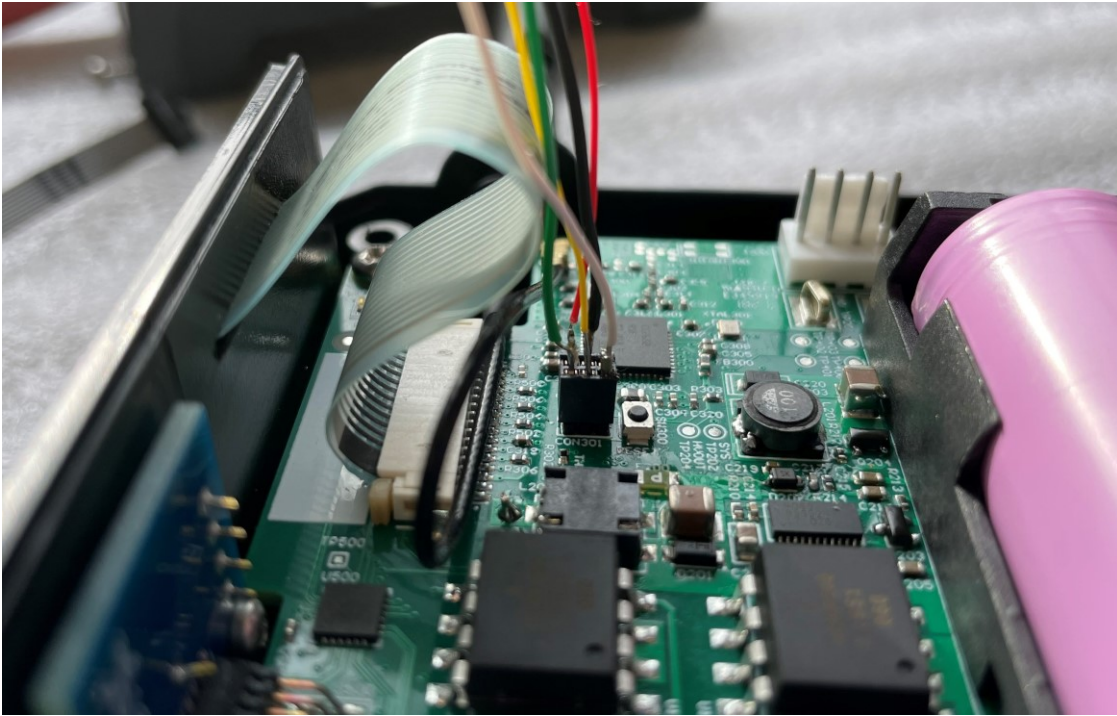
4. The CLS-4-420-TH is now paired with the Gateway. The CLS-4-420-TH will broadcast data packets to the Gateway at the interval set by the rotary encoders.

### CLS-4-420-TH FCC/ISED TEST SET-UP

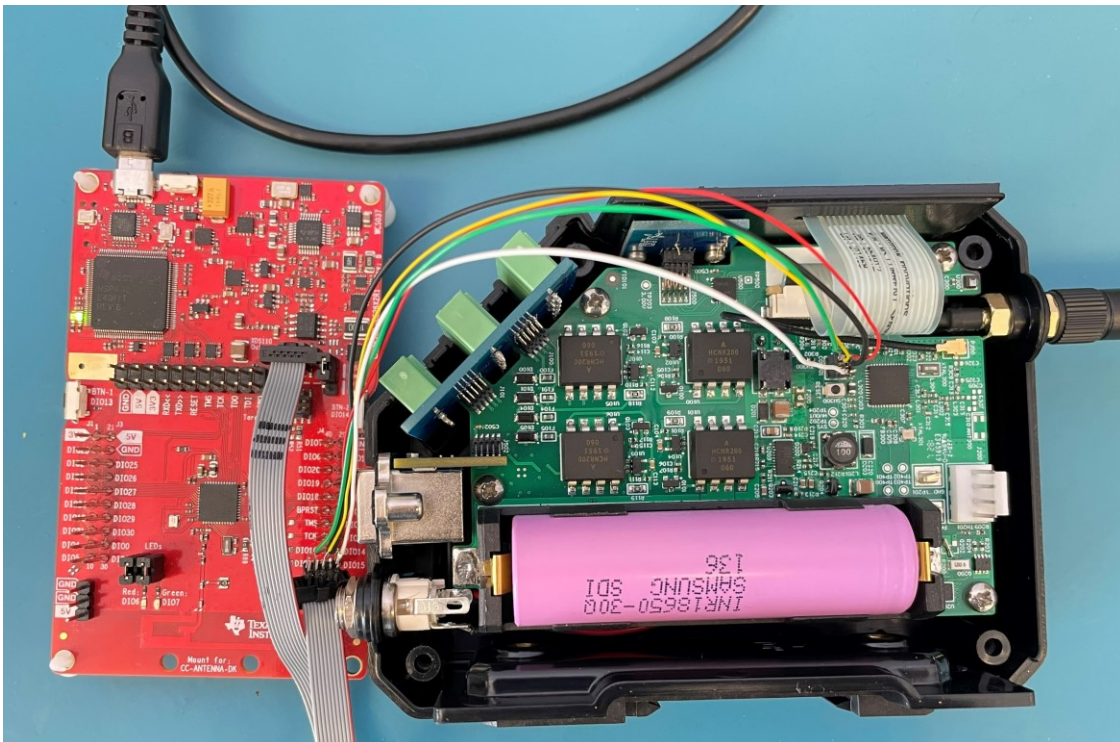
1. Remove the top cover of the CLS-4-420-TH by unscrewing the four (4) × T10 Torx screws and one (1) × M3 Phillips screw beside the USB connector. The battery cover does not need to be removed. The top cover will then lift off.



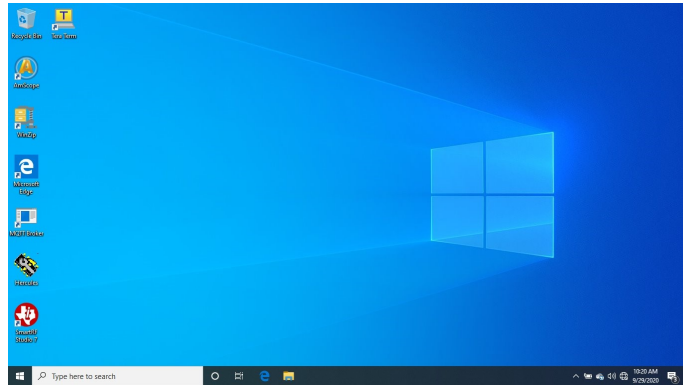
2. Connect the JTAG interface cable to CON301 on the main circuit board. The **Green** heat shrink on one wire should align with the pin 1 silkscreen dot adjacent to CON301.



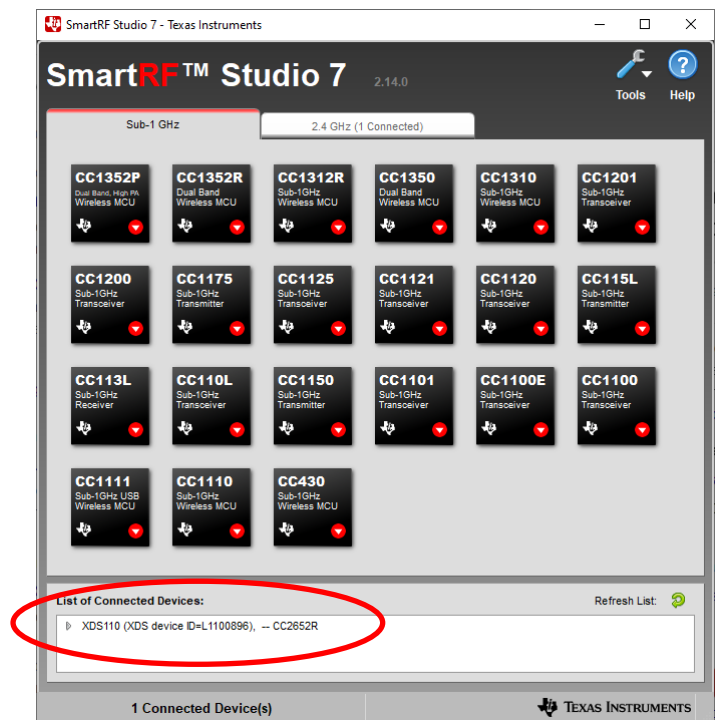
3. Connect the JTAG interface board to the laptop using a USB cable.



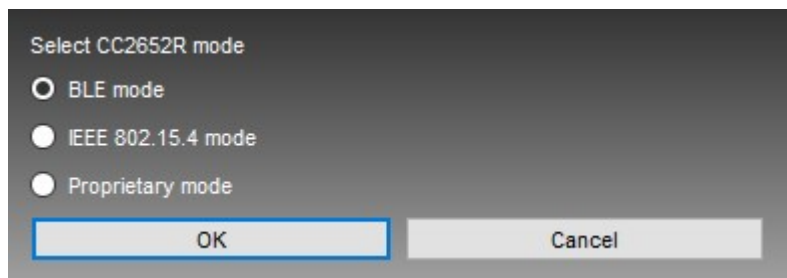
4. Launch the Texas Instruments SmartRF Studio 7 application.



5. The window shown on the left should open up. Double click on the 'CC2652R' shown at the bottom under List of Connected Devices.



6. A pop-up dialog will appear as shown on the left. Select 'BLE mode', and then select 'OK'.



- The main control window will appear. This window provides control over the 2.4 GHz RF front end of the CLS-4-420-TH.

