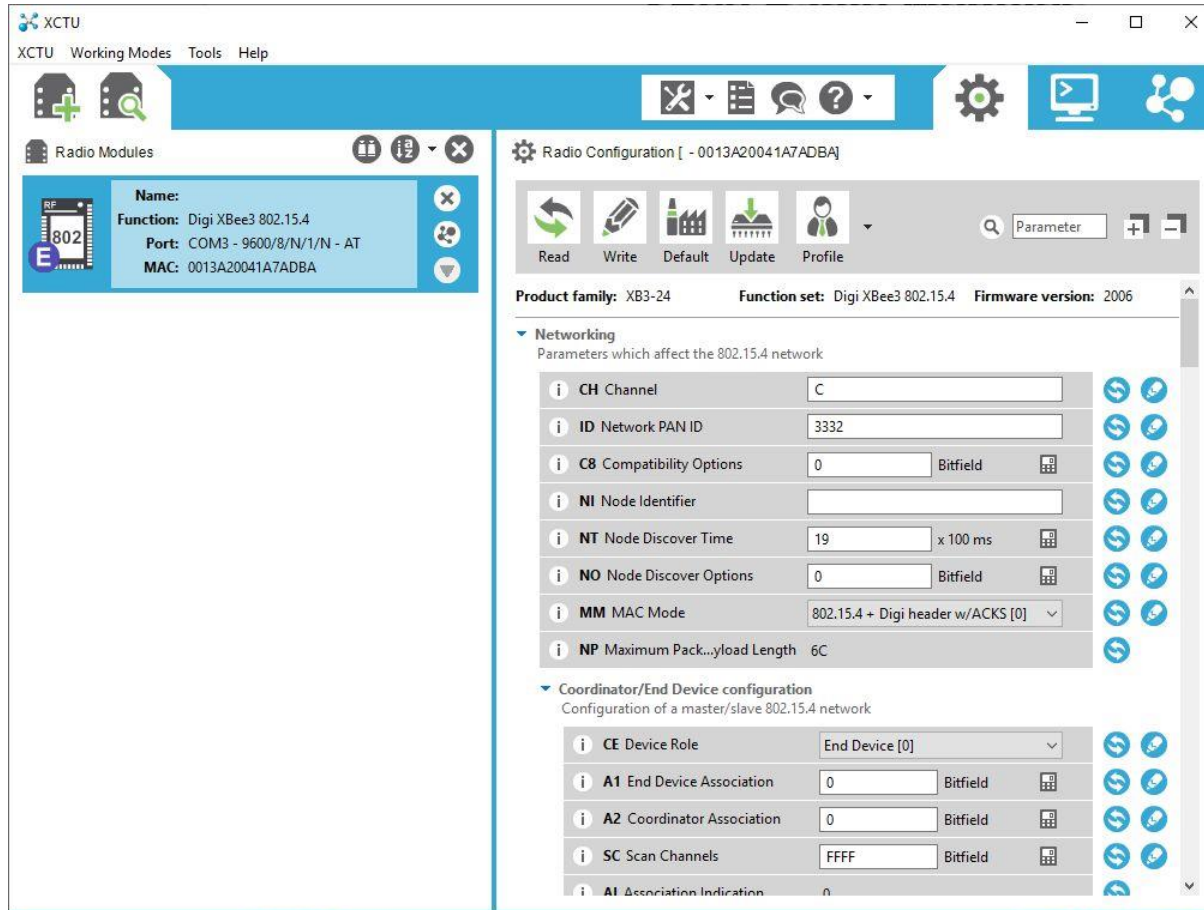


# XBee Radio Modules



## XBee Tool Box

January 27, 2020

Fred Eady

Presented by:

# XBee Radio Modules

## AGENDA

- Software – XCTU
- Hardware – XBee 3 Radio Module
- Hardware – XBee SMT Grove Dev Board
- Hardware – XBIB-CU-TH
- Hardware – XBIB-U-DEV
- Hardware – SparkFun XBee Explorer Dongle
- Hardware – SparkFun XBee Breakout Board
- Software – PyCharm
- Day 1 Summary



# XBee Radio Modules

## Software - XCTU

XCTU Working Modes Tools Help

Radio Modules

Name: **Digi XBee3 802.15.4**  
Function: Digi XBee3 802.15.4  
Port: COM3 - 9600/8/N/1/N - AT  
MAC: 0013A20041A7ADBA

Radio Configuration [ - 0013A20041A7ADBA]

Read Write Default Update Profile

Parameter

Product family: XB3-24 Function set: Digi XBee3 802.15.4 Firmware version: 2006

**Networking**  
Parameters which affect the 802.15.4 network

CH Channel	C	
ID Network PAN ID	3332	
C8 Compatibility Options	0	Bitfield
NI Node Identifier		
NT Node Discover Time	19	x 100 ms
NO Node Discover Options	0	Bitfield
MM MAC Mode	802.15.4 + Digi header w/ACKS [0]	
NP Maximum Pack...yload Length	6C	

**Coordinator/End Device configuration**  
Configuration of a master/slave 802.15.4 network

CE Device Role	End Device [0]	
A1 End Device Association	0	Bitfield
A2 Coordinator Association	0	Bitfield
SC Scan Channels	FFFF	Bitfield
A1 Association Indication	0	

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# XBee Radio Modules

## Software - XCTU

XCTU Working Modes Tools Help

Radio Modules

Name: Digi XBee3 802.15.4  
Function: Digi XBee3 802.15.4  
Port: COM3 - 9600/8/N/1/N - AT  
MAC: 0013A20041A7ADBA

XBee SMT Grove Development Board  
DIGI XBee

Model: XBee3 802.15.4  
Part: 0013A20041A7ADBA  
MAC: 0013A20041A7ADBA

Radio Configurati...

- Frames Generator
- Frames Interpreter
- XBee Recovery
- Load Console Session
- Range Test
- Firmware Explorer
- Serial Console
- Spectrum Analyzer
- Throughput
- MicroPython Terminal
- File System Manager
- Profile Editor

Product family: XB3...

Networking Parameters which...

- CH Channel
- ID Network
- C8 Compat
- NI Node Id
- NT Node D
- NO Node Discover Options
- MM MAC Mode
- NP Maximum Pack...yload Length

Coordinator/End Device configuration  
Configuration of a master/slave 802.15.4 network

- CE Device Role
- A1 End Device Association
- A2 Coordinator Association
- SC Scan Channels
- A1 Association Indication

# XBee Radio Modules

## Software - XCTU

The screenshot shows the XCTU software interface with the 'Update firmware' dialog box open. The dialog contains the following information:

**Update the radio module firmware**  
Configure the firmware that will be flashed to the radio module.

Select the product family of your device, the new function set and the firmware version to flash:

Product family	Function set	Firmware version
XB3-24	Digi XBee3 802.15.4 Digi XBee3 DigiMesh 2.4 Digi XBee3 Zigbee 3.0	2006 (Newest) 2005 2003 2002 2001

Can't find your firmware? [Click here](#) [View Release Notes](#)

Force the module to maintain its current configuration [Select current](#)

[Update](#) [Cancel](#)

# XBee Radio Modules

## Software - XCTU

The screenshot displays the XCTU software interface. On the left, a 'Radio Modules' list shows two modules with their respective configurations:

- Module 1:** Name: (blank), Function: Digi XBee3 802.15.4, Port: COM3 - 9600/8/N/1/N - AT, MAC: 0013A20041A7ADBA
- Module 2:** Name: (blank), Function: Digi XBee3 802.15.4, Port: COM4 - 9600/8/N/1/N - AT, MAC: 0013A20041A7AE40

The main window is titled 'Radio Configuration [ - 0013A20041A7AE40]'. It features a toolbar with 'Read', 'Write', 'Default', 'Update', and 'Profile' buttons. Below the toolbar, the configuration is organized into sections:

- Product family:** XB3-24
- Function set:** Digi XBee3 802.15.4
- Firmware version:** 2006
- Networking:** Parameters which affect the 802.15.4 network
  - CH Channel:** C
  - ID Network PAN ID:** 3332
  - C8 Compatibility Options:** 0 (Bitfield)
  - NI Node Identifier:** (empty)
  - NT Node Discover Time:** 19 x 100 ms
  - NO Node Discover Options:** 0 (Bitfield)
  - MM MAC Mode:** 802.15.4 + Digi header w/ACKS [0]
  - NP Maximum Pack...yload Length:** 6C
- Coordinator/End Device configuration:** Configuration of a master/slave 802.15.4 network
  - CE Device Role:** End Device [0]
  - A1 End Device Association:** 0 (Bitfield)
  - A2 Coordinator Association:** 0 (Bitfield)
  - SC Scan Channels:** FFFF (Bitfield)
  - A1 Association Indication:** 0

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# XBee Radio Modules

## Software - XCTU

The screenshot displays the XCTU software interface with the following components:

- Radio Modules Panel:** Shows two modules. The top module has Name: Digi XB...02.15.4, Function: Digi XB...02.15.4, Port: COM3 -...N - AT, and MAC: 0013A...7ADBA. The bottom module has Name: Digi XB...02.15.4, Function: Digi XB...02.15.4, Port: COM5 -...N - AT, and MAC: 0013A...7AE1E.
- Console log:** Displays a series of received packets in hexadecimal format:
 

```

      XBee CEC 30 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      XBee CEC 58 42 65 65 20 43 45 43 0D 0A
      
```
- Edit selected packet windows:** Two overlapping windows are shown. The top one has Packet name: packet\_cec and is set to ASCII. The bottom one has Packet name: packet\_cec and is set to HEX, showing the data: 58 42 65 65 20 43 45 43 0D 0A. The byte count is 10.
- Send packets table:**

Name	Data
packet_cec	XBee CEC
- Send a single packet:** A button labeled "Send selected packet".
- Send sequence:** Transmit interval (ms) is set to 1000. Options include "Repeat times 1" (selected) and "Loop infinitely". A "Stop sequence" button is also present.

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# XBee Radio Modules

## Software - XCTU

The screenshot displays the XCTU software interface. On the left, a 'Radio Modules' panel lists two modules:

- Module 1:** Name: Digi XB...02.15.4, Function: Digi XB...02.15.4, Port: COM3 -...N - AT, MAC: 0013A...7ADBA
- Module 2:** Name: Digi XB...02.15.4, Function: Digi XB...02.15.4, Port: COM5 -...N - AT, MAC: 0013A...7AE1E

The main interface shows two active modules: -0013A20041A7AE1E and -0013A20041A7ADBA. The top right displays transmission statistics: Tx Bytes: 0, Rx Bytes: 260. The console log shows the following data:

```
ADee LCC 30 42 03 03 20 43 43 43 00 0A
XBee CEC 58 42 65 65 20 43 45 43 0D 0A
XBee CEC 58 42 65 65 20 43 45 43 0D 0A
XBee CEC 58 42 65 65 20 43 45 43 0D 0A
XBee CEC 58 42 65 65 20 43 45 43 0D 0A
XBee CEC 58 42 65 65 20 43 45 43 0D 0A
XBee CEC 58 42 65 65 20 43 45 43 0D 0A
XBee CEC 58 42 65 65 20 43 45 43 0D 0A
XBee CEC 0A
```

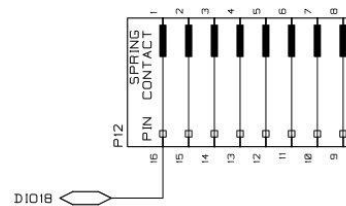
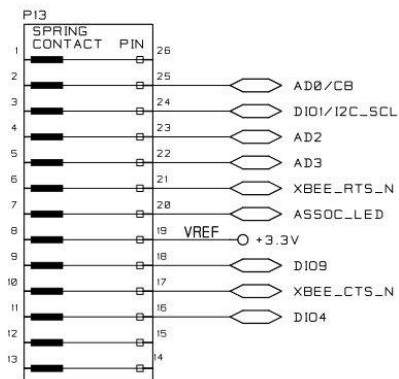
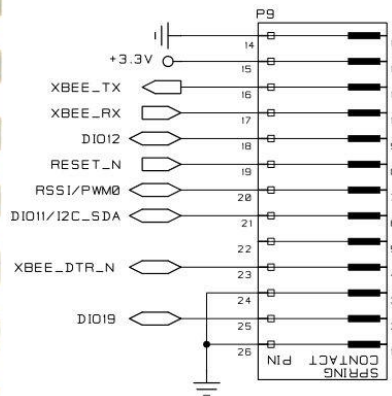
The 'Send packets' section includes a table for packet management and a 'Send a single packet' button. The 'Send sequence' section is configured with a transmit interval of 500 ms, 1 repeat time, and the 'Repeat times' option selected.

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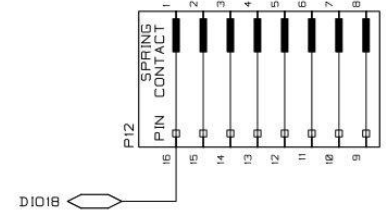
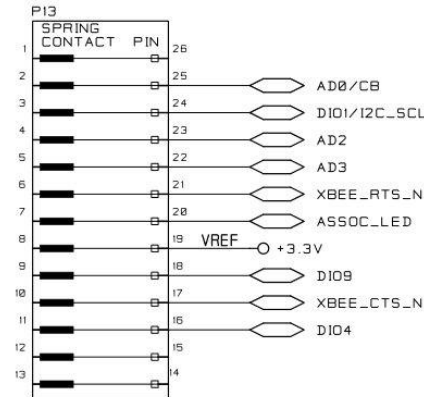
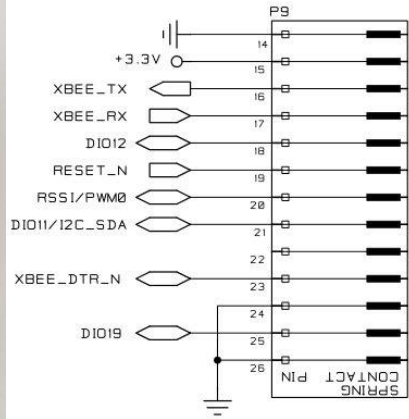
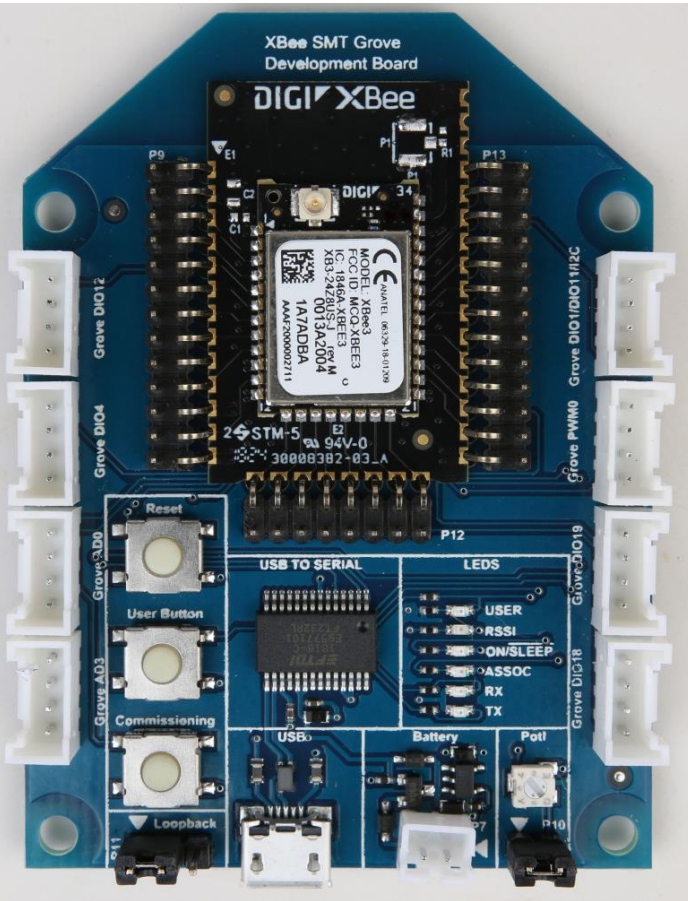
# XBee Radio Modules

## Hardware - XBee 3 Radio Module



# XBee Radio Modules

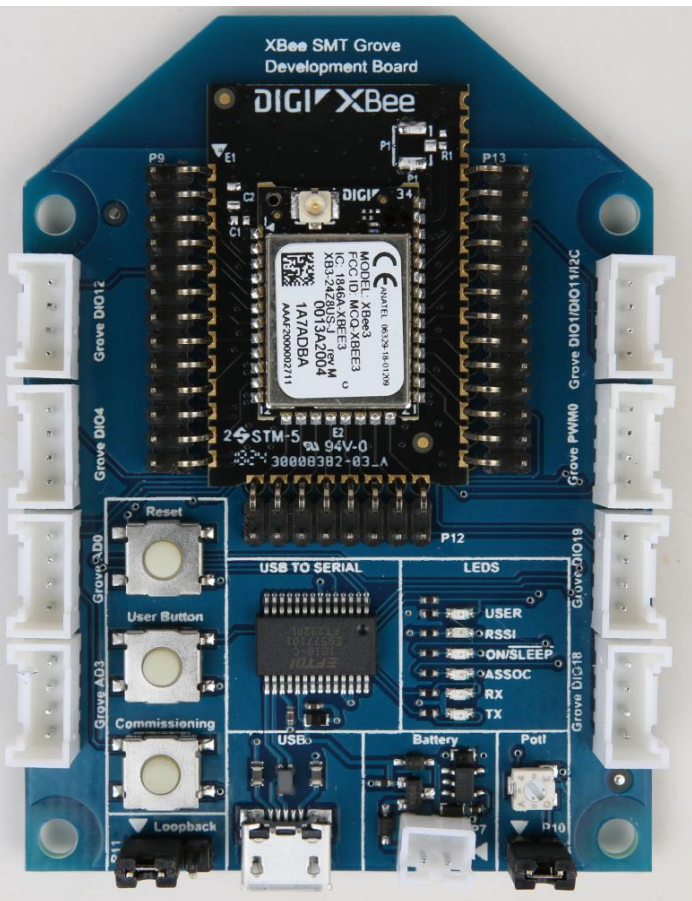
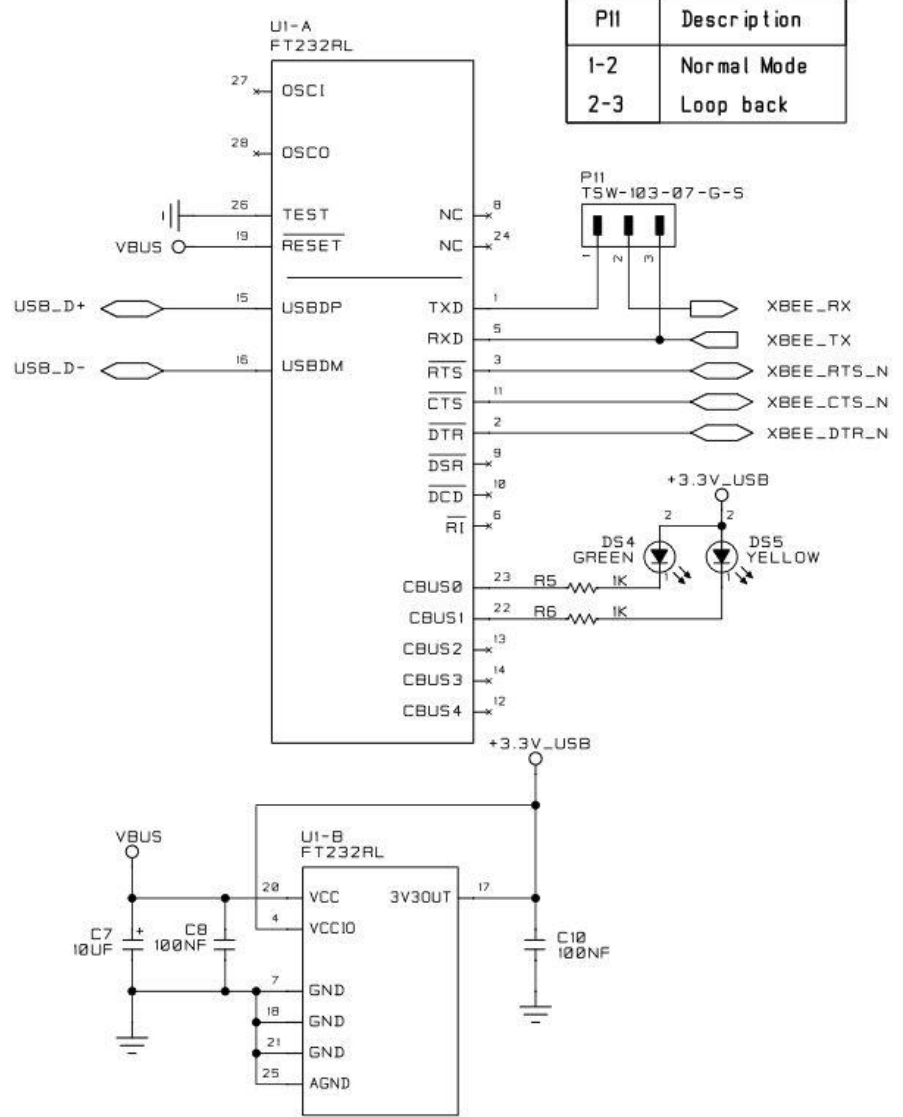
## Hardware - XBee SMT Grove Dev Board



# XBee Radio Modules

## Hardware - XBee SMT Grove Dev Board

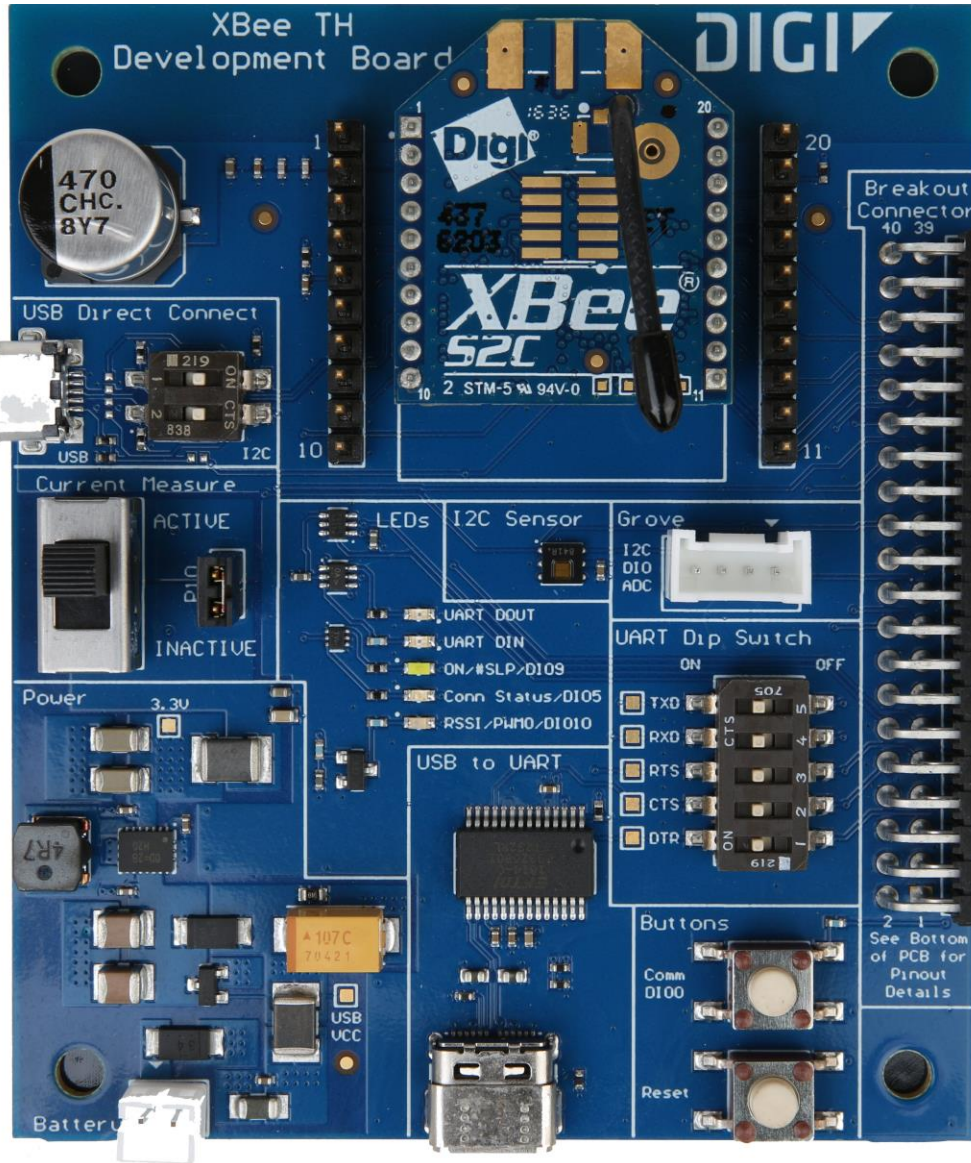
P11	Description
1-2	Normal Mode
2-3	Loop back





# XBee Radio Modules

## Hardware - XBIB-CU-TH



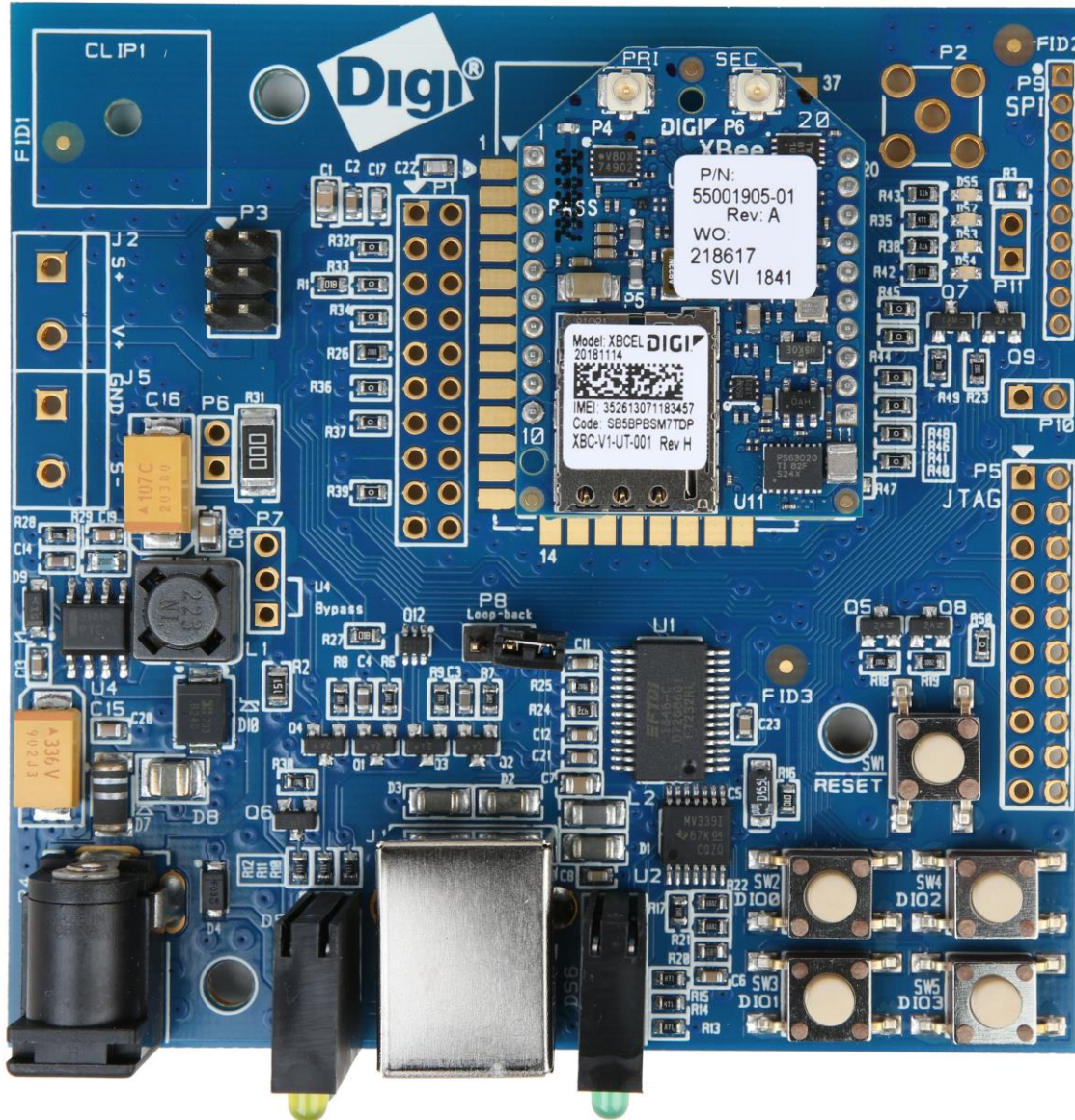
P1			
GND	1	2	GND
VCC_USB_5V	3	4	VCC_USB_5V
VCC_MAIN_3V3	5	6	GND
XBEE PRI UART DIN/DIO14	7	8	XBEE PRI UART DOUT/DIO13
XBEE PRI UART $\overline{RTS}$ /DIO6	9	10	XBEE PRI UART $\overline{CTS}$ /DIO7
XBEE PRI UART $\overline{DTR}$ /SLP RQ/DIO8	11	12	XBEE RESET
GND	13	14	VCC_MAIN_3V3
XBEE SPI MOSI/SEC UART TXD/DIO4	15	16	XBEE SPI MISO/SEC UART RXD/DIO12
XBEE SPI CLK/SEC UART $\overline{RTS}$ /AD2/DIO2	17	18	XBEE SPI $\overline{SSEL}$ /SEC UART $\overline{CTS}$ /AD3/DIO3
XBEE SPI $\overline{ATTN}$ /I2C SCL/AD1/DIO1	19	20	
VCC_MAIN_3V3	21	22	GND
XBEE SPI $\overline{ATTN}$ /I2C SCL/AD1/DIO1	23	24	XBEE I2C SDA/PWM1/DIO11
GND	25	26	VCC_MAIN_3V3
XBEE PIN 8	27	28	XBEE VREF
XBEE COMM/AD0/DIO0	29	30	XBEE SPI CLK/SEC UART $\overline{RTS}$ /AD2/DIO2
XBEE SPI $\overline{SSEL}$ /SEC UART $\overline{CTS}$ /AD3/DIO3	31	32	XBEE SPI MOSI/SEC UART TXD/DIO4
XBEE CONN STATUS/DIO5	33	34	XBEE ON/SLP/DIO9
XBEE USB BUS/RSSI/PWM0/DIO10	35	36	XBEE SPI MISO/SEC UART RXD/DIO12
VCC_USB_5V	37	38	VCC_USB_5V
GND	39	40	GND

TSW-102-08-G-S-RA



# XBee Radio Modules

## Hardware - XBIB-U-DEV



14



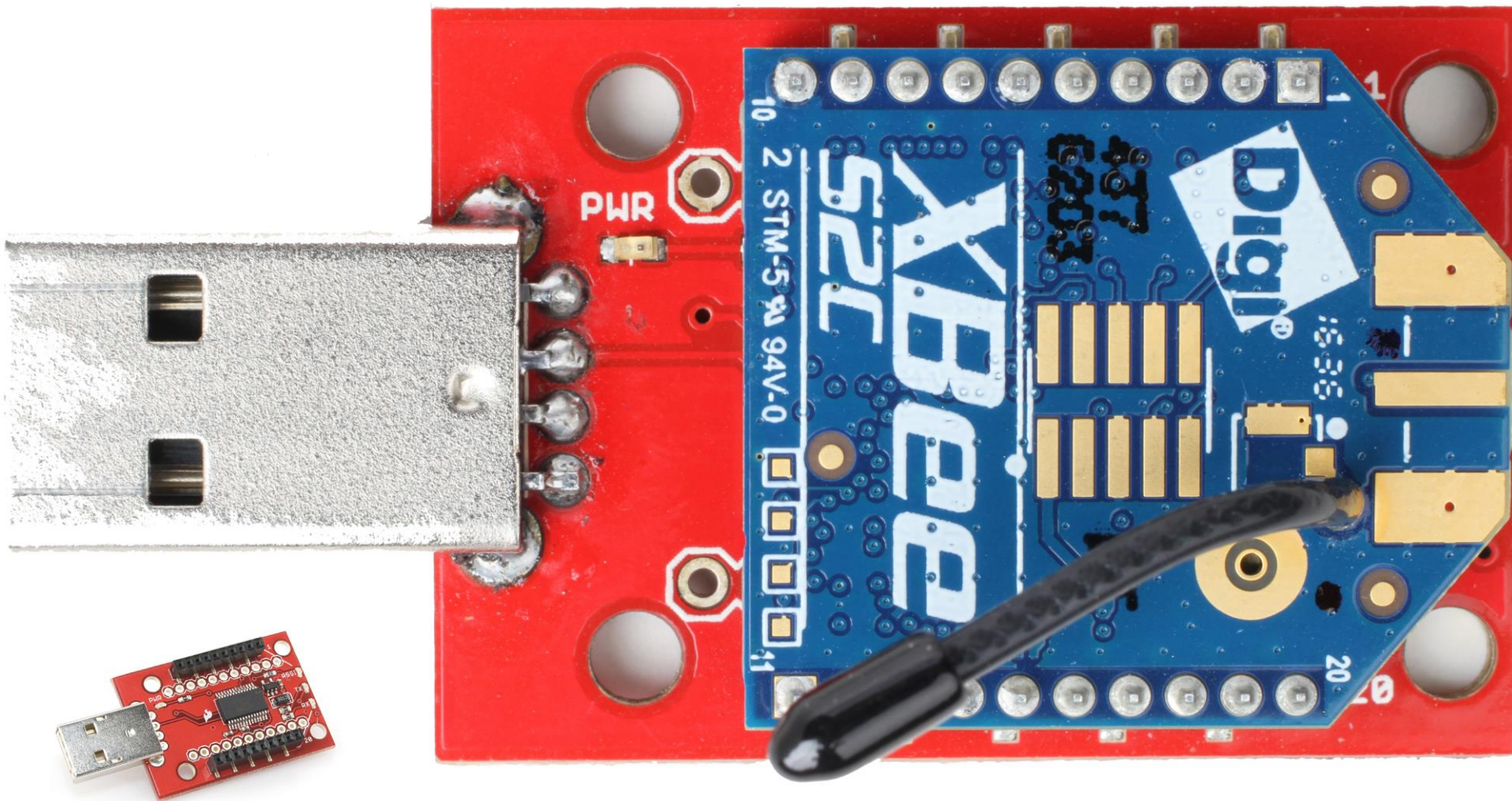
**CEC** CONTINUING  
EDUCATION  
CENTER

Presented by:



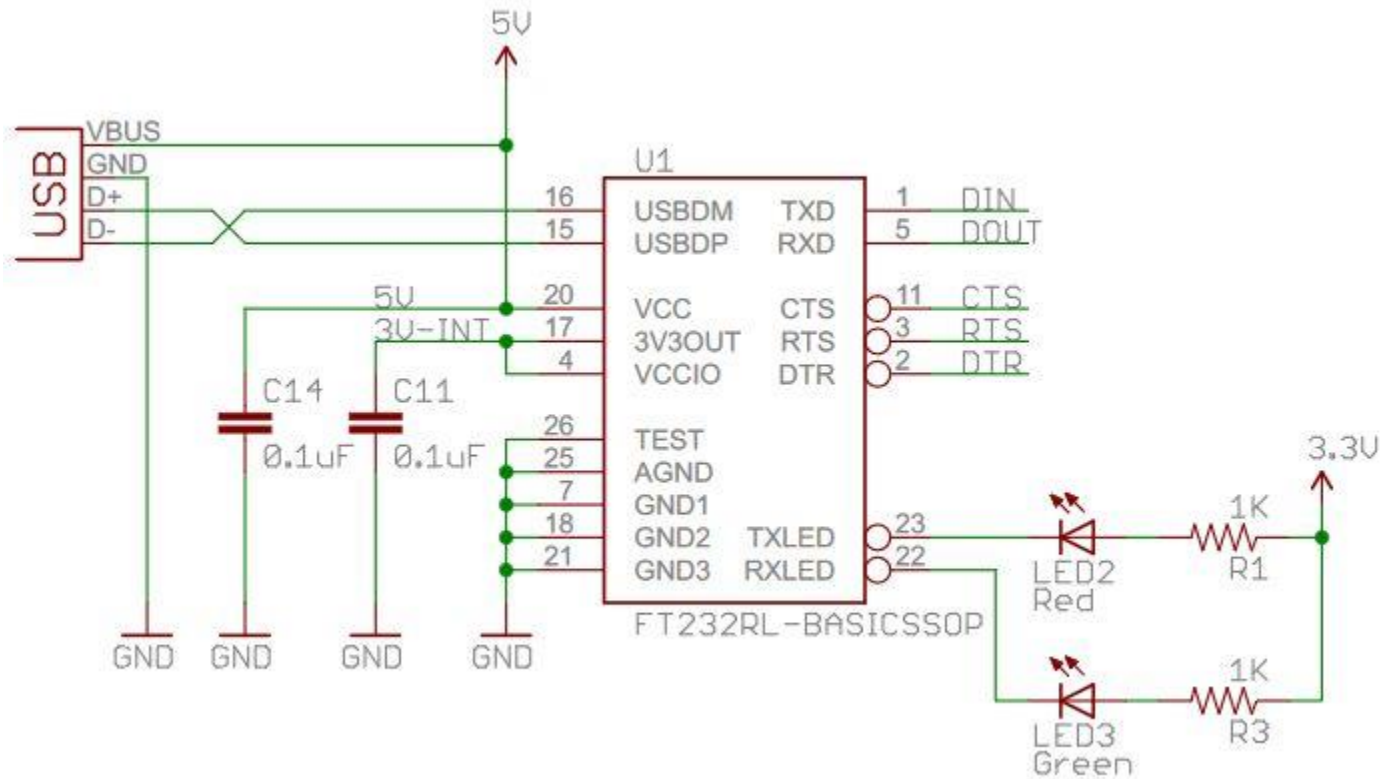
# XBee Radio Modules

Hardware - SparkFun XBee Explorer Dongle



# XBee Radio Modules

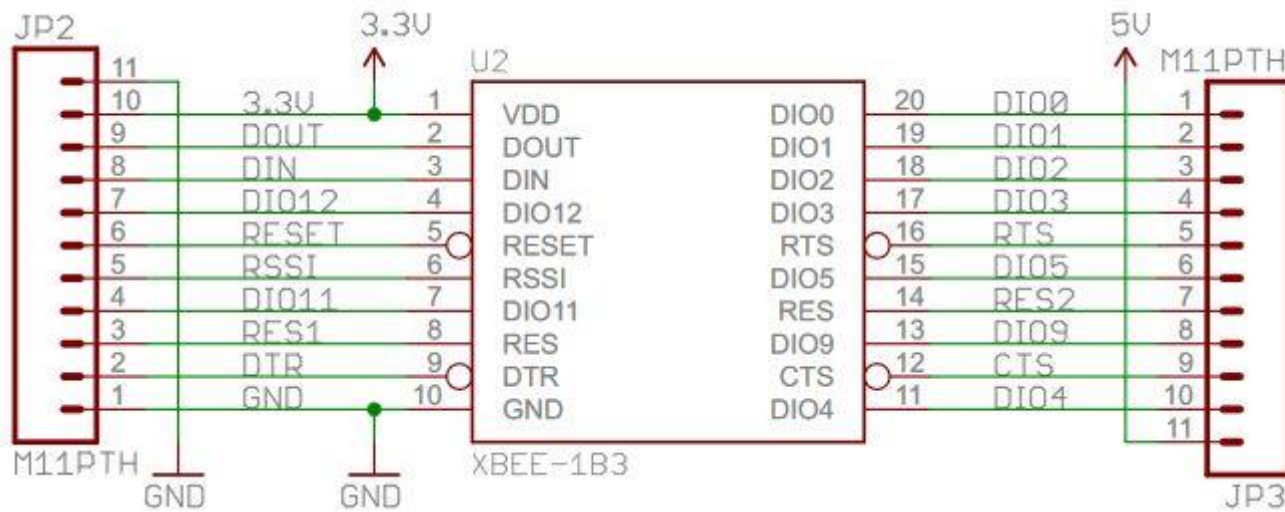
## Hardware - SparkFun XBee Explorer Dongle





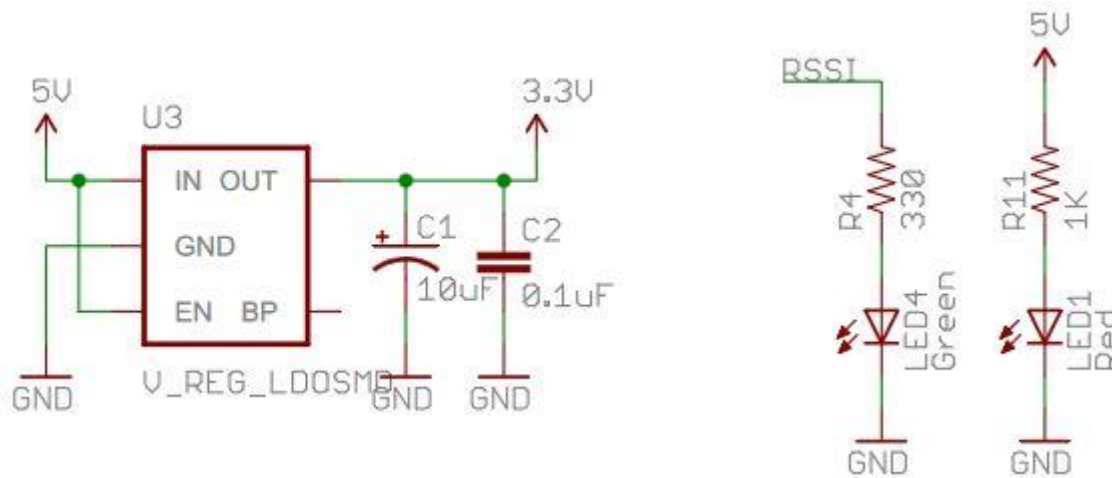
# XBee Radio Modules

## Hardware - SparkFun XBee Explorer Dongle



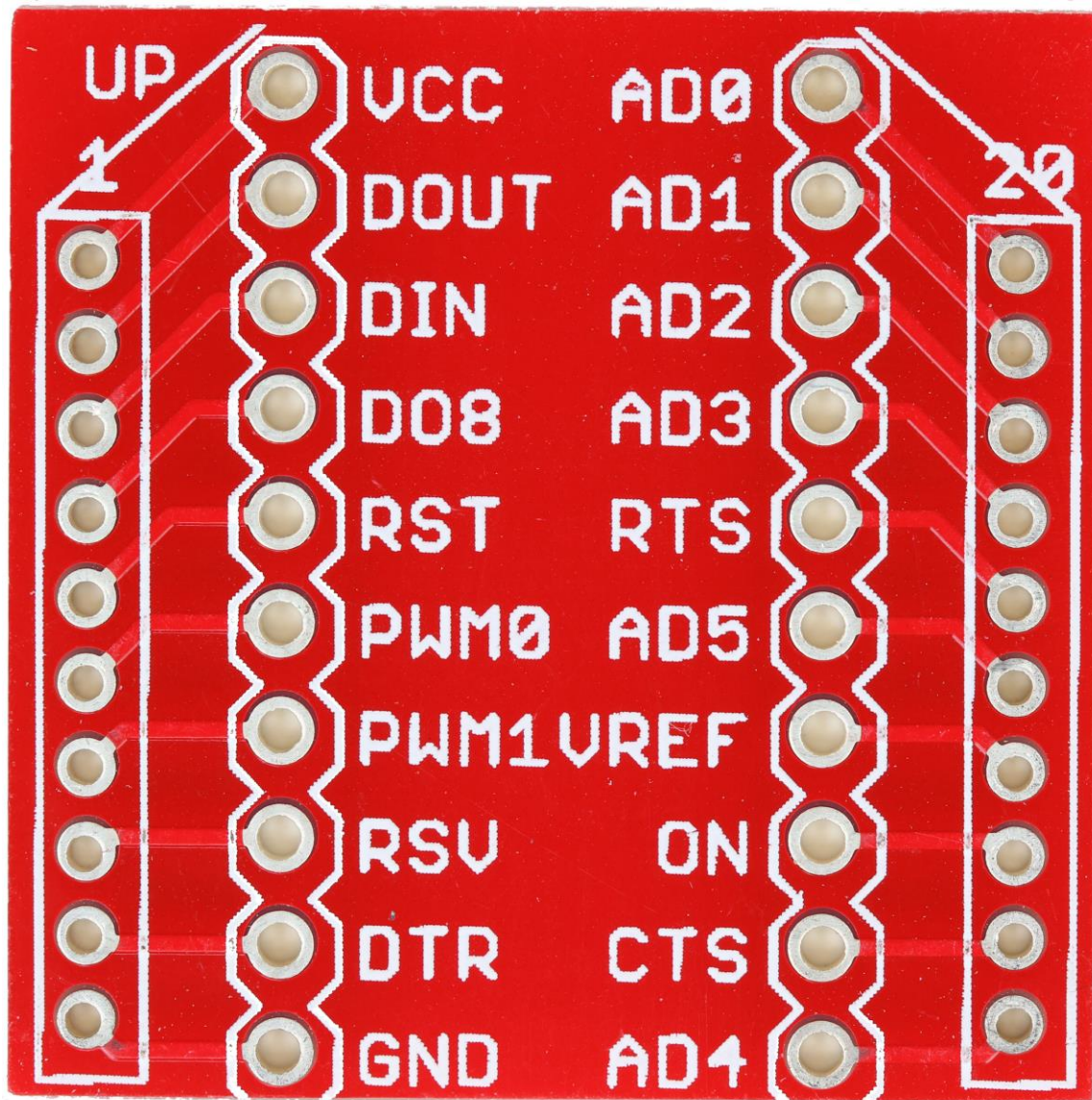
# XBee Radio Modules

## Hardware - SparkFun XBee Explorer Dongle



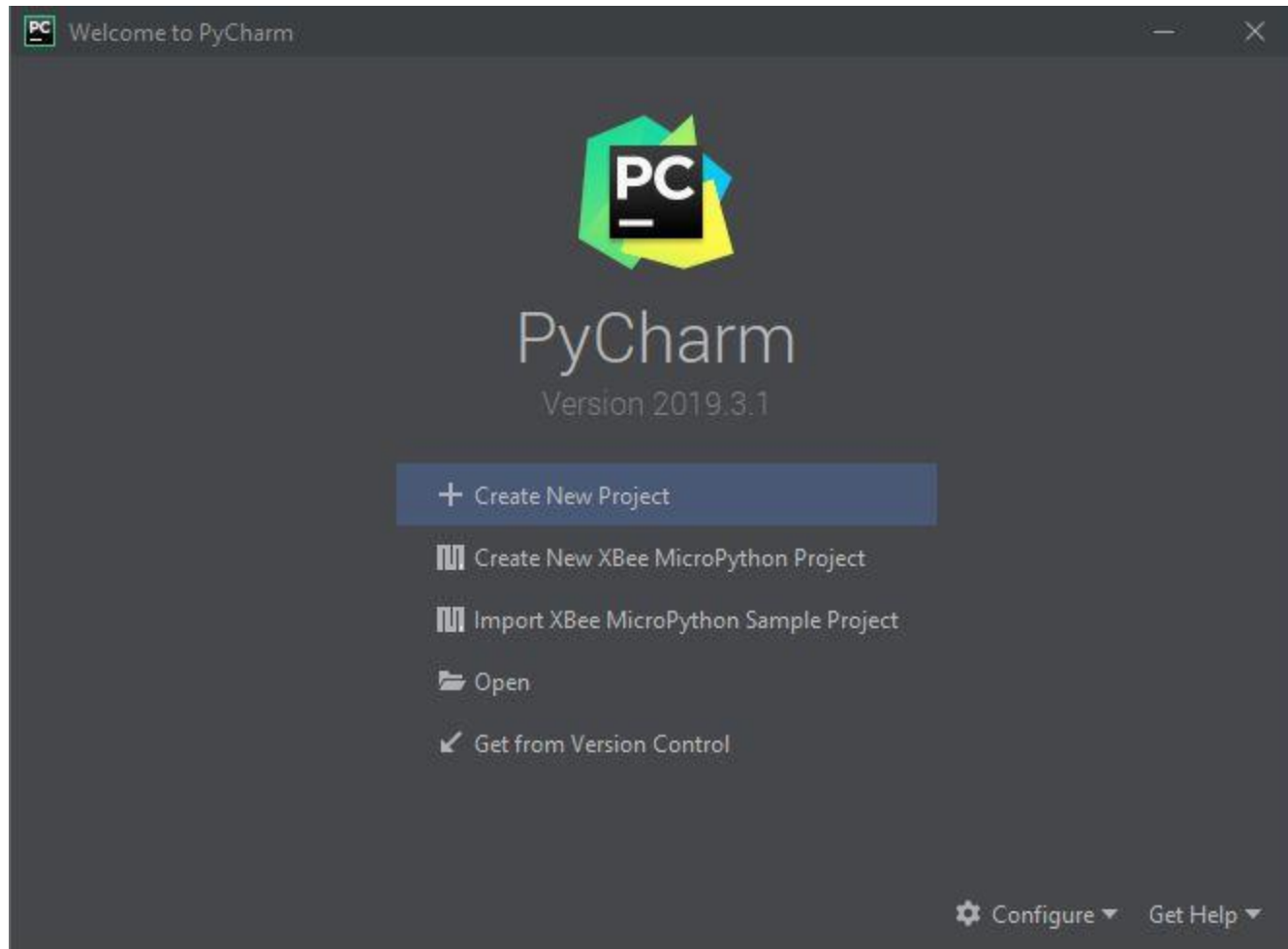
# XBee Radio Modules

Hardware - SparkFun XBee Breakout Board



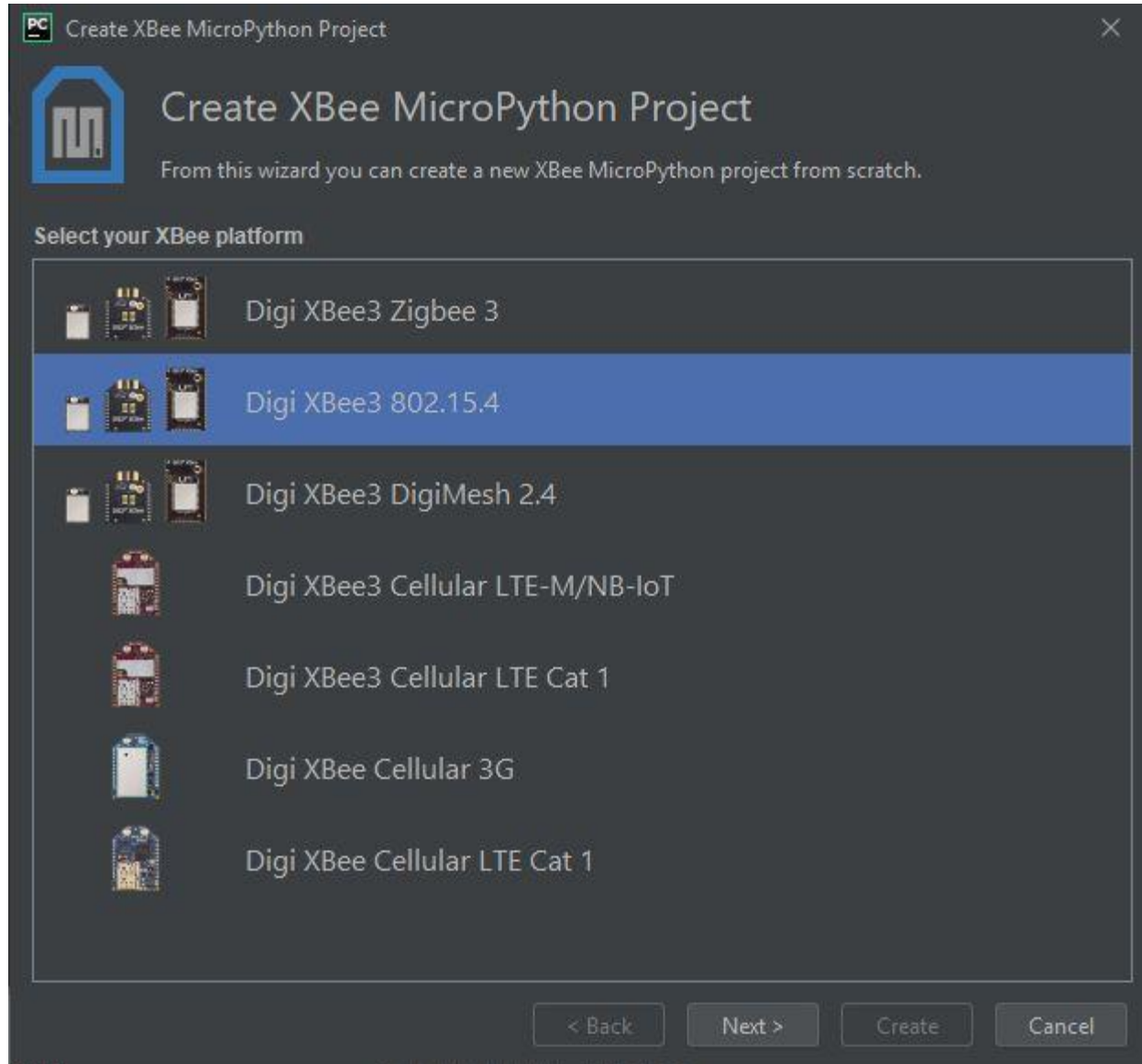
# XBee Radio Modules

## Software - PyCharm



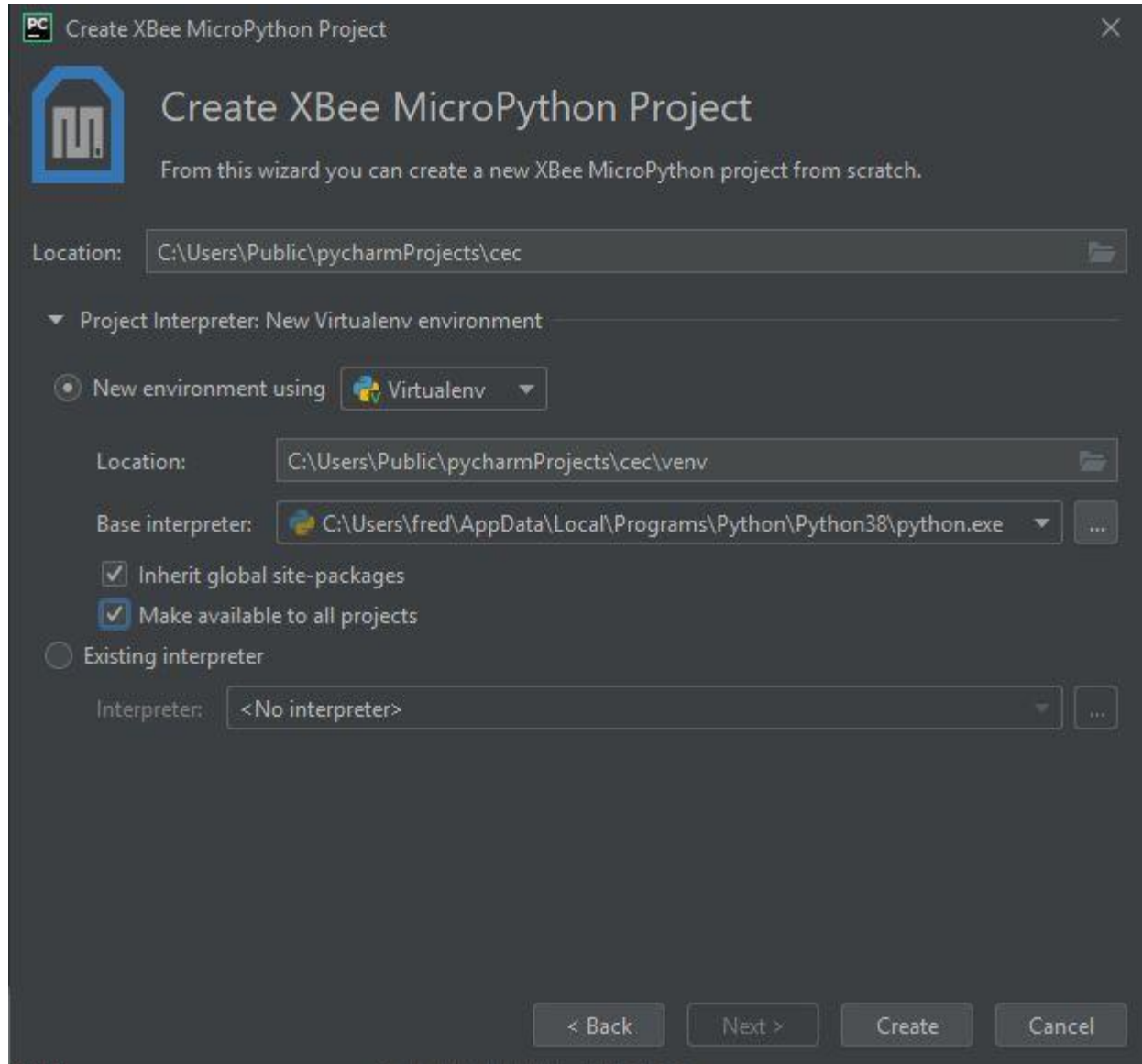
# XBee Radio Modules

## Software - PyCharm

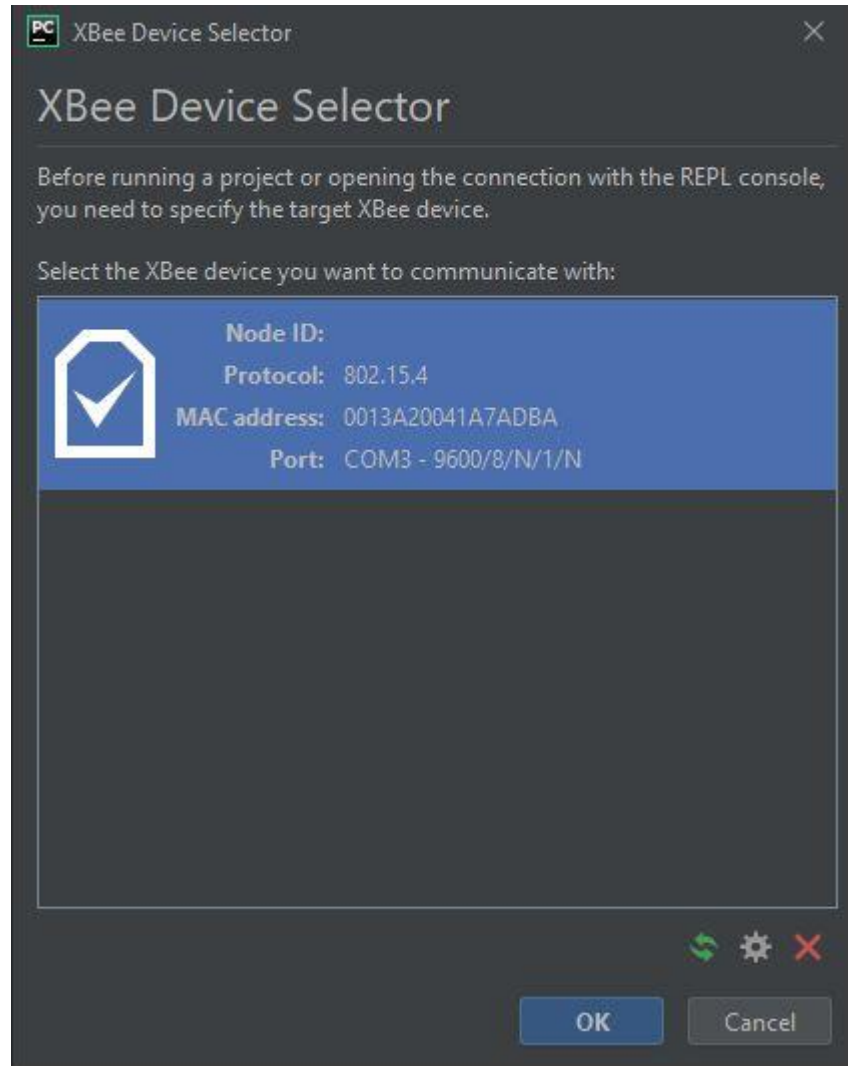


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# XBee Radio Modules Software - PyCharm



# XBee Radio Modules Software - PyCharm



# XBee Radio Modules Software - PyCharm

The screenshot displays the PyCharm IDE interface. The top menu bar includes File, Edit, View, Navigate, Code, Refactor, Build, Run, Tools, XBee, VCS, Window, and Help. The project name is 'cec' and the file being edited is 'main.py'. The code in the editor is as follows:

```
1 # Default template for XBee MicroPython projects
2
3 print("Hello World!")
4
```

The XBee REPL Console at the bottom shows the following output:

```
Selected XBee device: COM3 - 9600/8/N/1/N | 0013A20041A7ADBA
soft reboot
Loading /flash/main.mpy...
Running bytecode...
Hello World!

MicroPython v1.11-1238-g936401b on 2019-09-19; XBee3 802.15.4 with EFR32MG
Type "help()" for more information.
>>> █
```

The status bar at the bottom indicates the current configuration: Run selected configuration, 1:1 LF UTF-8 4 spaces Python 3.8 (venv) (2).

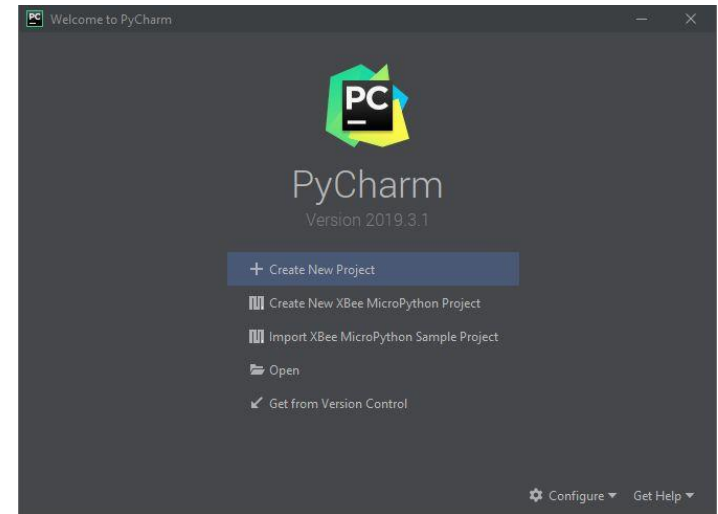
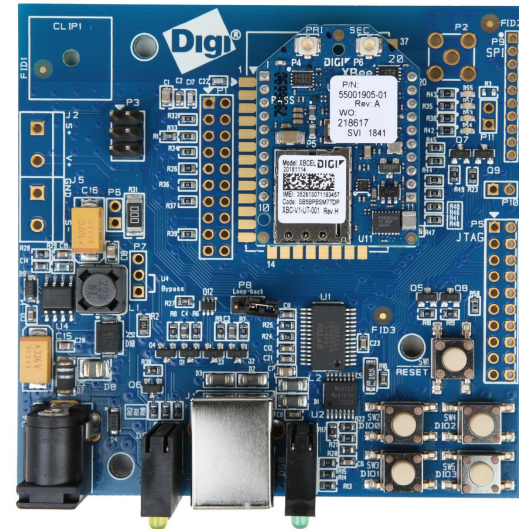
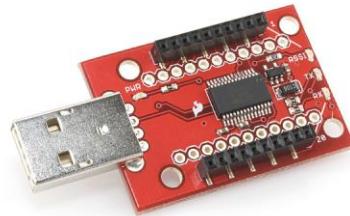
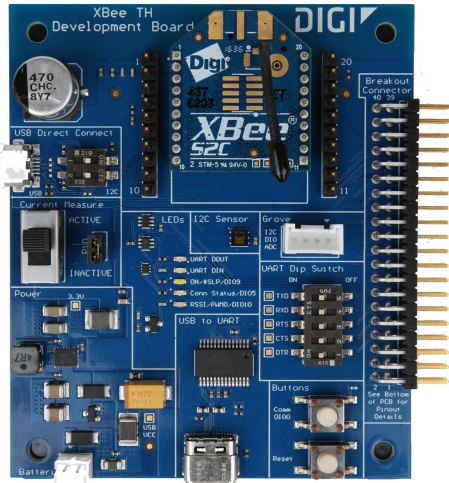
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# XBee Radio Modules

## Day 1 Summary



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