

Experiment-3.3

Student Name: Praduman Kumar

UID: 20BCS9446

Branch: BE-CSE

Section/Group: 20BCS-DM-714/A

Semester: 6

Subject Code: 20CSP-358

Subject Name: Internet of Things Lab

Date of Performance: 11-05-2023

Aim: Study the Implementation of Zigbee Protocol using Raspberry Pi/Arduino.

Objective:

- Learn about interfacing.
- Learn about IoT programming

Hardware: 2 XBee Pro S2 Transceiver, 2 UART to USB adapter board, 1 USB Cord

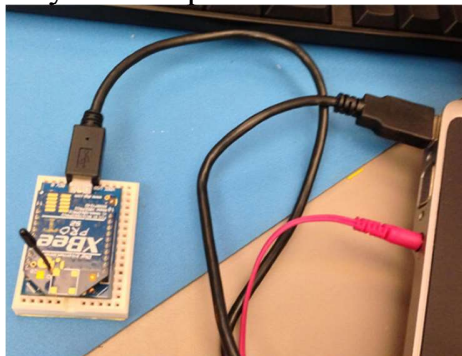
About Zigbee:

Zigbee is a wireless communication protocol targeted for battery powered devices. It generally operates in the 2.4GHz range and supports data ranges from 20 to 250 kbits/s.

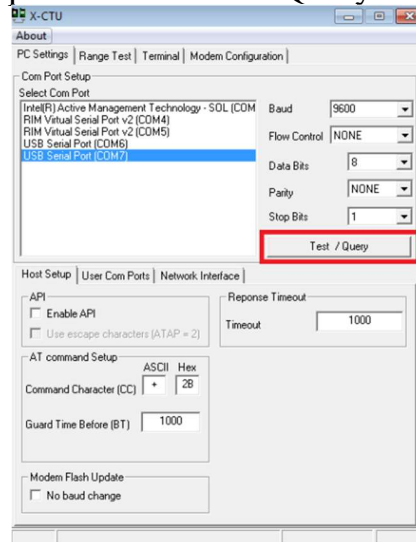
XBee Wireless Communication Setup

Step 1: Download X-CTU Software: The X-CTU software is free to download and provides a simple interface to configure and update XBee transceivers.

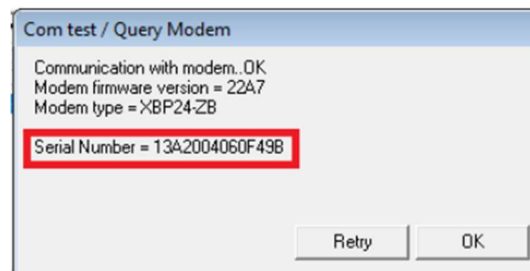
Step 2: Put together your XBee breakout board: The breakout board has a UART to USB conversion circuit and allows the XBee to be connected to the computer and X-CTU software easily. After your adapter board is assembled, plug your XBee into it and then connect it to your computer.



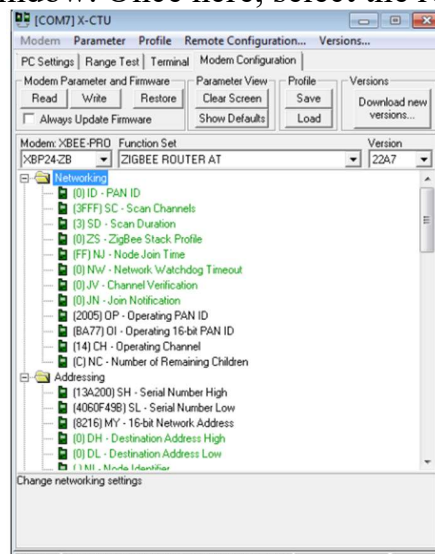
Step 3: Configure 1st XBee as a coordinator: When opening the X-CTU software, select the proper COM port click the Test/Query button.



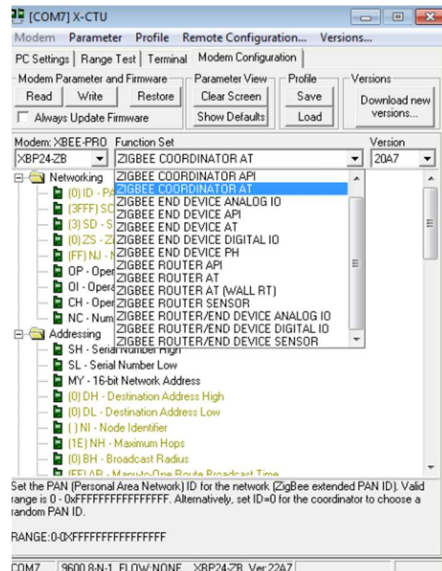
To record the serial number shown as it will be needed in a couple minutes.



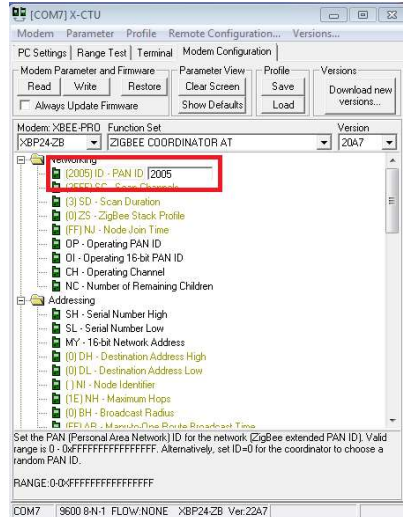
After recording the serial number, click OK. Next, select the Modem Configuration tab at the top of the window. Once here, select the read button.



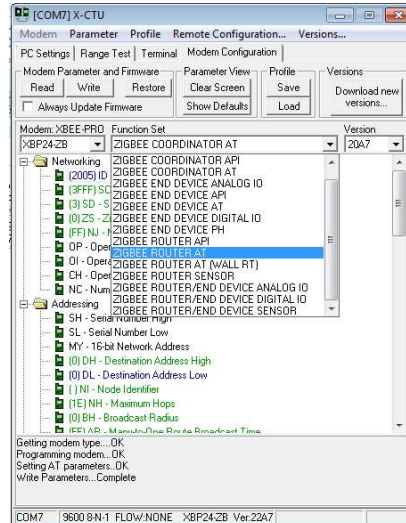
Select Zigbee Coordinator AT in the function set drop down menu.



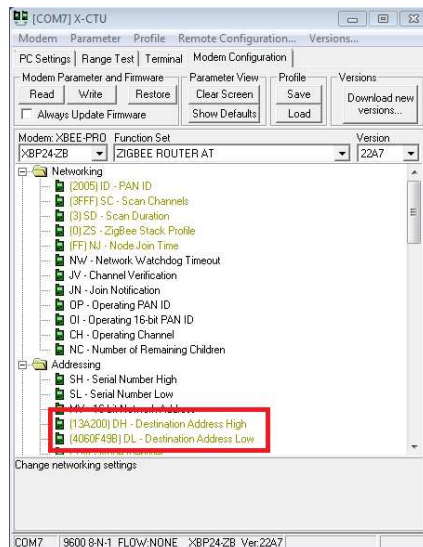
After selecting the coordinator function set, set the PAN ID. Click the “Write” button. This will update and configure the XBee. Disconnect the XBee and plug in the second XBee.



Step 4: Configure 2nd XBee as Router: To configure the 2nd XBee, follow the same process as for the coordinator with one change of function set chosen. For the second XBee set this as Zigbee Router AT.



After setting the PAN ID and the function set for the router put the recorded serial numbers to use. Then select the “Write” button to update the configuration settings for the router. Disconnect the router and reconnect the coordinator to the computer.



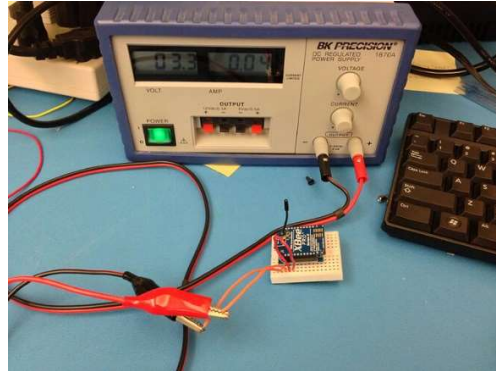
After re-connecting the coordinator to the computer, go into the Modem Configuration tab, click the read button. Set the Destination Address to the serial number of the Router XBee. Click the write button to update the coordinator XBee settings. You are ready to use your XBees and communicate wirelessly.

Step 5: Test the configuration: A simple test can be done to be sure the two XBees are communicating properly. Connect either one of the XBees to the computer. Then, connect the second XBee to 3.3V power and connect the Dout and Din pins together. This will cause the XBee to automatically retransmit any data it receives.



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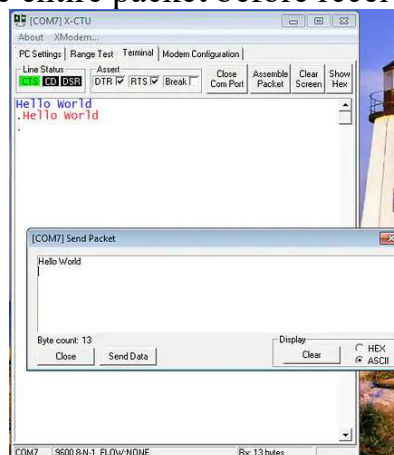
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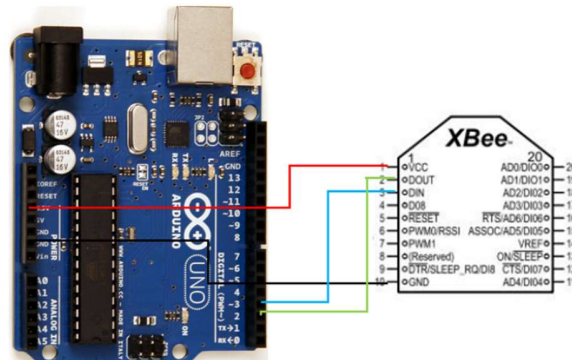
When both XBees are connected, go to the Terminal tab in the X-CTU window. If the XBees are configured correctly, every character typed should be mirrored in red.



Click the “Assemble Packet” button, type the wanted string into the box, click send data. This will send the entire packet before receiving the same packet back.



Circuit:



Code:

On the transmitting side, the code will be –

```
#include <SoftwareSerial.h>
SoftwareSerial xbeeSerial(2,3); //RX, TX
void setup() {
    Serial.begin(9600);
    xbeeSerial.begin(9600);
}
void loop() {
    if(Serial.available() > 0){
        char input = Serial.read();
        xbeeSerial.print(input);
    }
}
```

The code for the receiving side is –

```
#include <SoftwareSerial.h>
SoftwareSerial xbeeSerial(2,3); //RX, TX
void setup() {
    Serial.begin(9600);
    xbeeSerial.begin(9600);
}
void loop() {
    if(xbeeSerial.available() > 0){
        char input = xbeeSerial.read();
        Serial.print(input);
    }
}
```