Intel Edison and Wi-fi

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In this document, we will illustrate how an ad-hoc network can be created among multiple Intel Edison boards and how we can exchange packet of different characteristics between them. We will also show how to connect your Intel Edison board to already available wi-fi networks.

1. Intel Edison

The Intel Edison is a tiny computer-on-module offered by Intel as a development system for wearable devices and Internet of Things devices. It is designed for expert makers, entrepreneurs, and some industrial IoT applications, the Intel Edison compute module provides ease-of-development for a range of prototyping projects or commercial ventures when performance matters.

Intel Edison specifications are as follows:

- Open source software development environment.
- High performance, dual core CPU and single core micro-controller supports complex data collection in a low power package.
- Integrated Wi-Fi, Bluetooth 4.0 support, 1GB DDR and 4GB flash memory.
- 40 multiplexed GPIO interfaces with expansion board options.

Intel Edison can be bought with an Arduino expansion kit which interfaces with a wide range of Arduino shields, allowing for quick and easy prototyping with open source hardware and software.

2. Getting Started with Intel Edison

2.1 Flashing Yocto

(taken from Intel website)

Note: While flashing OS to your board, use the inner micro USB port. Also put you board in the device mode by shifting the microswitch downwards (towards the micro-usb ports). When the flash is completed, to communicate with your board connect to the other (outer micro usb)port. Microswitch can stay in the same position if you are not using USB port to connect devices to your Edison board.

Linux:

Follow the following steps:

1. Install the dfu-util by typing the command sudo apt-get install dfu-util.

2. Download the latest Yocto image using wget https://software.intel.com/edison-image/latest

3. This will download a zip file. If you are using one of the newer versions (which has ongoing support) of Ubuntu, you can download unzip package by typing sudo apt-get install unzip and then unzip the downloaded file.

4. To start the flash process type ./flashall

5. This process may take time so please be patient.

Windows:

Steps are:

1. Download the pre-built Yocto complete image for your board from download page https://software.intel.com/iot/hardware/edison/downloads.

2. Extract the contents of image file.

3. Download the latest copy of dfu-util.exe and libusb-1.0dll from dfu-util site. Place them in same folder as extracted content.

4. Open up command prompt.

5. Navigate to the folder you extracted the image .zip file to and then type 'flashall.bat'

Or

There a simple GUI tool from intel that you may use to install all the drivers needed and flash Edison board with yocto OS. Steps are as follows:

1. Get the latest setup tool for Windows from software.intel.com/iot/hardware/edison/downloads listed under the installers heading.

2. Click downloaded exe file to launch the setup tool.

3. Follow on screen instructions and complete the flash process.

Note: Once the flashing process is complete, connect the Edison board via a serial communicator (as shown in section 2.3). Now after flashing OS, you need to set up the password for your root account. To set up your password, type 'configure_edison --setup' and setup your password and SSID name.


2.2 Connecting to Wi-fi as a client

Once you Edison board is flashed with yocto and completely boot up follow the following steps to connect to an existing wi-fi network as a Client:

1. Establish a serial communication to your edison board, using a serial communication utility like Putty as illustrated in section 2.3.

2. Once you get inside the Edison, type configure_edison --wifi
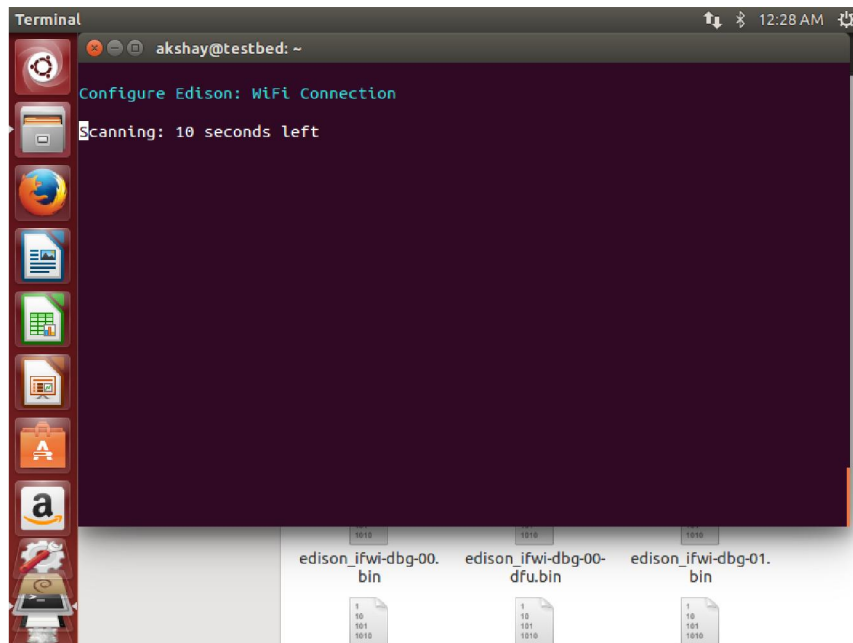
3. The scan process will start scanning all the available wi-fi connections in the vicinity.
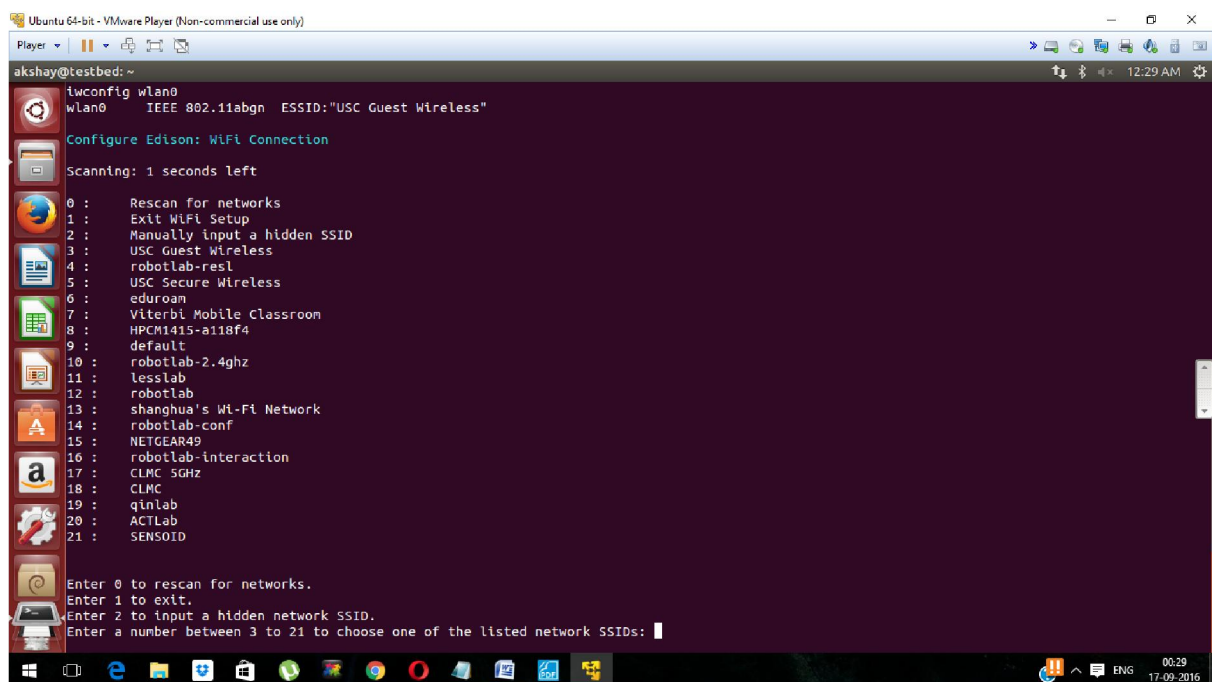
4. After the scan choose the wi-fi you wish to connect to. Enter the respective SSID.

5. You would be connected to the wi-fi.

6. To check the connection, you can type 'iwconfig wlan0'. This will the properties and name of the network you are connected to.

7. You can also ping to google or type ping 8.8.8.8 . If your network has access to internet, you would be able to get reply.

2.3 Creating an AdHoc Network

2.2.1 AdHoc Network

An ad hoc network consists of a collection of mobile wireless nodes that dynamically create a network among themselves without using any infrastructure or administrative support. Therefore, ad hoc networks have the potential to provide a free, non-operator controlled means of mobile communication. On the other hand, they also provide a low cost alternative to extend the reach of current wireless access networks. In this paper, the use of ad hoc networks for wireless Internet access is discussed.

2.2.2 AdHoc on Intel Edison

Follow the following steps to create an AdHoc network on Intel Edison:

I. Establishing AdHoc network:

1. Connect your Intel Edion board to your PC using a micro USB to USB cable. For Intel Edison, connect the microUSB port on the edge.

2. If proper drivers are installed on your PC, a COM Port would be visible a soon as you connect he Edison board.

3. Run a serial communicator software like Putty. Select the option Serial. Mention the appropriate COM Port number and give Baud rate (Speed) as 115200.
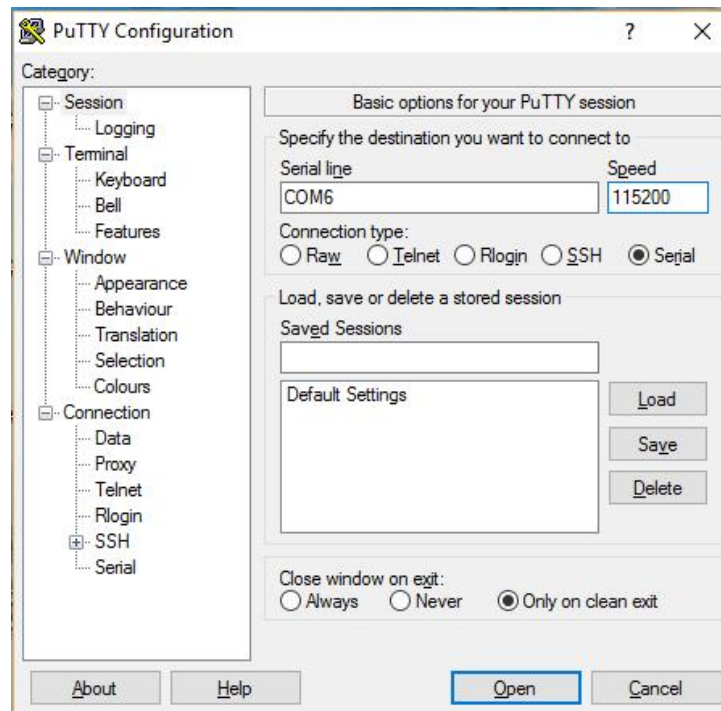
4. Click on Open. It will open the terminal for Intel Edison. Enter the login as 'root' and your password.

5. Run the wpacli_ibss_open.sh script by typing the command 'sh wpacli_ibss_open.sh WiFinetworkname'.

6. When you create an IBSS network or join an existing one, the DHCP client and DHCP server are not started, so you must manually assign the IP address of the wlan0 interface. You can statistically configure the IP address on the Intel Edison board using the ifconfig wlan0 <ip_address> command.

7. Once this is done, if you check WiFi networks available on your PC, you could see the name of your just created adhoc network. (Note: If you are using Windows 10, you might not see the adhoc network).

8. Take the second Intel Edison board. Follow the steps 1 to 6. Run 'sh wpacli_ibss_open.sh WiFinetworkname' command. Note that the WiFinetworkname should be same as the one mentioned on the previous Edison board.

9. Assign a different IP address to this second Edison board, same as Step 6.

10. Once done, you can check if both the Edison boards are connected to each other. You can ping one board from another by typing ping followed by IP address in the terminal. If the ping is successful, both the boards are connected to each other.

II. Transmitting Packets:

1. You can use a utility called Socat for transmitting packets. Socat is a command line based utility that establishes two bidirectional byte streams and transfers data between them.

2. Use the command :

echo "test package" | socat - udp-sendto:192.168.0.20:5000

for sending the packets. Here "test package" is the actual packet that we send, destination IP address is 192.168.0.20, and the port number is 5000.