I649E Wireless Sensor Networks

Getting Started Guide

Raspberry Pi 3 Model B

1. Installation

   i.   Download NOOB's Raspberry Pi OS from
https://www.raspberrypi.org/downloads/noobs/
or from mirror at JAIST
http://ftp.jaist.ac.jp/pub/raspberrypi/NOOBS/images/
  ii.   Extract files into your SD card
 iii.   Put the SD card back to Raspberry Pi
 iv.   Boot and install (first item). It takes around 30 minutes to complete.

Note: If you want to connect Raspberry Pi to JAIST wireless network, please do not forget to add MAC address of wlan0 interface (using command `ifconfig` in terminal to see Raspberry Pi network information) in https://rcaci.jaist.ac.jp/apply_wifi_macauth.

2. Connect Raspberry Pi through SSH

2.1 Raspberry Pi Configuration

   i.   Start > Preferences > Raspberry Pi Configuration
  ii.   Set Hostname e.g. node3
 iii.   Interface tab > Enable SSH
 iv.   You can enable VNC for remote desktop capability though VNC Viewer
  v.   Use this for login as
        User: pi
        Password: raspberry

2.1.1 Windows

   i.   Download PuTTY and install from https://putty.org
  ii.   Enter Hostname.local or IP address

```
node5.local
10.10.0.5
```

2.1.2 Mac and Linux

   i.   Open terminal
  ii.   Type

```
ssh pi@<IP address>
ssh pi@<Hostname>
ssh pi@10.10.0.4
ssh pi@node4.local
```

3. Update and Install Essential Software

i.   Type

```
sudo apt-get update -y
sudo apt-get upgrade -y
sudo apt-get dist-upgrade -y
sudo pip install --upgrade pip
sudo apt-get install olsrd iperf wavemon python-numpy python-scipy
python-matplotlib -y
```

4. Raspberry Pi wlan0 Ad-Hoc Setup

i.   Edit the interfaces file in /etc/network/

```
sudo nano /etc/network/interfaces
```

ii. Add the following

```
auto wlan0
iface wlan0 inet static
    address <IP address>
    netmask 255.255.255.0
    mtu 1500
    wireless-channel <channel>
    wireless-essid <network name>
    wireless-mode ad-hoc
    wireless-ap any
```

iii. Reboot Raspberry Pi to take effect.

5. Optimized Link State Routing Protocol Daemon (OLSRD)

i.   Start OLSRD using wlan0 interface on Raspberry Pi with debug level 1

```
sudo olsrd -i wlan0 -d 1
```

ii. Check the communication by using ping command

```
ping <IP address>
ping 10.10.0.5
```

iii. For multi-hop capability. You need to force two nodes to use a gateway by using firewall to block each other. There is no direct implementation on OLSRD.

```
sudo iptables -A INPUT -m mac --mac-source XX:XX:XX:XX:XX:XX -j DROP
```

iv. Use the command `route or traceroute` to see if they use a gateway

```
route
traceroute <IP address>
```

6. Throughput Measurement

The command is `iperf`. `iperf` is a tool for active measurements of the maximum achievable bandwidth on IP networks.

- Server side

  ```
  sudo iperf -s
  ```

- Client side

  ```
  sudo iperf -c <IP address> -t <time in second>
  ```

Revised on 12 June 2018