I649E

Raspberry Pi 3 Guide

Installation

1. 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/
2. Extract files into your SD card
3. Put the SD card back to Raspberry Pi
4. Boot and install (first item). It takes around 30 minutes to complete.

** If you want to connect Raspberry Pi to JAIST wireless network, don't 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.

Connect Raspberry Pi Through SSH

Raspberry Pi Configuration

1. Start > Preferences > Raspberry Pi Configuration
2. Set Hostname e.g. node3
3. Interface tab > Enable SSH
4. You can enable VNC for remote desktop capability though VNC Viewer
5. Use this for login as

   User: pi
   Password: raspberry

Windows

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

```
node5.local
10.10.0.5
```

Mac and Linux

1. Open terminal
2. Type

```
ssh pi@<IP address>
ssh pi@<Hostname>

ssh pi@10.10.0.4
ssh pi@node4.local
```

Update and Install Essential Software

```
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
```

Raspberry Pi wlan0 Ad-Hoc Setup

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

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

2. 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
```

3. Reboot Raspberry Pi to take effect.

Optimized Link State Routing Protocol Daemon (OLSRD)

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

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

2. Check the communication by using ping command

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

3. 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
```

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

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

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>
```