Exp01: BATMAN-adv mesh Raspberry Pi 3 B+, Not Using External Router

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OBJECTIVE

- Make sure that the Raspberries do not connect to each other through the office Wi-Fi router , but through the mesh, on their own Wi-Fi hardware

Devices used

- 3 x Raspberry Pi 3 B+
- PuTTy terminal software
- 3 x USB to TTL RS232 Cables for serial communication
- 3 x USB to micro USB Cables for power
- 3 x 8 GB San Disk SD cards with Raspian Stretch lite operating system released 8th of April 2019
- One or more laptops, with a total of 6 USB ports

Steps

1. Download Image for SD cards here [https://downloads.raspberrypi.org/raspbian_lite_latest], and burn it onto SD cards

2. Insert SD cards into Raspberry Pis

3. Install BATMAN-adv mesh like this:

   - First, we must install two requirements for batctl

     ```
     [ sudo apt install libnl-3-dev libnl-genl-3-dev ]
     [ apt-get update ]
     [ apt-get install libnl-3-dev libnl-genl-3-dev vim screen git ]
     ```

   - Next, download, compile, and install batctl

     ```
     [ git clone https://git.open-mesh.org/batctl.git ]
     [ cd batctl ]
     [ sudo make install ]
     ```

   - A script can be used to activate and configure batman-adv

     ```
     [ sudo modprobe batman-adv ]
     [ sudo ip link set wlan0 down ]
     [ sudo iwconfig wlan0 mode ad-hoc ]
     [ sudo iwconfig wlan0 essid my-mesh-network ]
     [ sudo iwconfig wlan0 ap any ]
     [ sudo iwconfig wlan0 channel 8 ]
     [ sleep 1s ]
     [ sudo ip link set wlan0 up ]
     [ sleep 1s ]
     [ sudo batctl if add wlan0 ]
     [ sleep 1s ]
     [ sudo ifconfig bat0 up ]
     ```

Use different IPv4 addresses for each device
[sudo ifconfig bat0 172.27.0.1/16]

- Run ifconfig and note the IPv4 and HWaddr assigned to wlan0 on each device. You should see something similar to the following

```
[ sudo ifconfig ]
bat0      Link encap:Ethernet  HWaddr 42:2e:2b:60:34:cc
          inet addr:172.27.0.1  Bcast:172.27.255.255  Mask:255.255.0.0
          inet6 addr: fe80::f9bd:542:ea7e:e801/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:170 errors:0 dropped:0 overruns:0 frame:0
          TX packets:43 errors:0 dropped:61 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:13811 (13.4 KiB)  TX bytes:9950 (9.7 KiB)

wlan0     Link encap:Ethernet  HWaddr b8:27:eb:3a:ab:5e
          UP BROADCAST MULTICAST  MTU:1532  Metric:1
          RX packets:2513 errors:0 dropped:1 overruns:0 frame:0
          TX packets:2519 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:146297 (142.8 KiB)  TX bytes:242467 (236.7 KiB)
```

We can test to find out if the devices are talking to each other.

```
 [ sudo batctl o ]

 [B.A.T.M.A.N. adv 2016.4, MainIF/MAC: wlan0/b8:27:eb:3a:ab:5e
 (bat0/42:2e:2b:60:34:cc BATMAN_IV)]
 Originator        last-seen (#/255) Nexthop          [outgoingIF]
 * b8:27:eb:7e:08:f0    0.200s   (255) b8:27:eb:7e:08:f0 [     wlan0]

 [ sudo ping 172.27.0.2 ]

  PING 172.27.0.2 (172.27.0.2) 56(84) bytes of data.
  64 bytes from 172.27.0.2: icmp_seq=1 ttl=64 time=152 ms
  64 bytes from 172.27.0.2: icmp_seq=2 ttl=64 time=23.1 ms
  64 bytes from 172.27.0.2: icmp_seq=3 ttl=64 time=11.6 ms
  ^C
  --- 172.27.0.2 ping statistics ---
  3 packets transmitted, 3 received, 0% packet loss, time 2002ms
  rtt min/avg/max/mdev = 11.603/62.364/152.388/63.829 ms
```

4. Connecting power and serial terminal to all the three Pi's at once ,Make sure Unit 1 pings Unit 3 through Unit 2 on the Batman mesh.

5. Move the computer out of range of the office Wi-Fi router (TOPDECK3)

6. Repeat step 4.

Results

If step 4 fails, the experiment is *Spoilt*

If step 4 works and step 6 fails, then the outcome of the experiment is *Failed*

If step 4 and step 6 works, then the outcome of the experiment is *Success*

OUTCOME:_____   DATE OF TEST:_____

DONE BY:_____