Exp02: BATMAN-adv mesh Raspberry Pi 3 B+,Testing connection between unit 1 and 3 through unit 2

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OBJECTIVE

- Make sure that the Raspberries Pi 3's Unit 1 and Unit 3 can ping each other through unit 2 When they are not in range with each other but both are in range with unit 2.

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
```

Stage 1

1. Place the units on static places and make sure unit 2 is placed between unit 1 and unit 3

Stage 2

1. Power up all the units and test the connection between them.
2. Power down unit 2, test connection between unit 1 and unit 3.
3. Distance Unit 1 and Unit 3 away from each other until they can't ping.
4. Power up unit 2 in the middle of Unit 1 and Unit 3.
5. Make sure Unit 1 and Unit 3 can communicate through unit 2 by using it as the next hop.

Results

1. If all the units fail to ping each other, then the experiment is ***spoilt.***
2. If unit 1 fails to communicate with unit 3 through unit 2 when they are not in range with each other (Unit 1 and unit 3), then the experiment is ***spoilt***.
3. If unit 1 is able to communicate with unit 3 through unit 2 when they are not in range with each other (Unit 1 and unit 3), then the experiment is a ***success***.

OUTCOME:_____ DATE OF TEST:_____

DONE BY:_____