Network Design

The mesh network is created using Batman-adv, a kernel level routing protocol. This program communicates through a configured wireless interface and handles all packet routing for the network. It utilizes layer 2 Ethernet packets so that the system thinks it is an IBSS LAN network.

Files in NodeCommon:

- network_setup.py
  - handles mesh network setup
  - wlan1 is configured in such a way to allow batman to communicate
  - pulls IP address and the mesh network name from network_settings.cfg, allows api to modify IP and network name for easy configuration
- network_settings.cfg
  - contains various settings for the nodes, including:
    - IP address
    - The Name of the network to connect to
    - The type of node that it is (Relay, Base Station, Sensor, etc.)
    - The name of the node (in the format <Number in [1, 100]>)
- node-api.py
  - This api allows the base station as well as a [possible] local web interface to configure/display the node's information in an easy to use way, requires flask to use
  - Can modify and display any of the settings found in network_settings.cfg
- dhcpcd.conf, dnsmasq.conf, hostapd.conf, sysctl.conf
  - Handles configuration of the wireless access point to allow for demonstrator computer to connect to each node -Install.sh -this is the file that will install all of the required dependencies and configure the access point -Start.sh -this is the file that handles configuration of the mesh network, as well as startup of the access point and node api (there are issues with the way python modules work, will not work when started in the file, only on command line

Issues

currently to get the bridge working correctly, Start.sh must be run, then run the command `sudo ip link set dev wlan0 nomaster` ping the computer you connect to it, then you can run `sudo ip link set dev wlan master mesh-bridge` and then to get the mesh network working again `sudo ip link set dev bat0 nomaster`, ping another node in the mesh network, then run `sudo ip link set dev bat0 master mesh-bridge`. This should then allow the host computer to connect the mesh network directly from the command line. Currently also must have the computer have a static ip address on the node1 network.

For some reason once you try to connect to the website, the bridge will fail and if you want to connect again, you must redo the process described above. More debugging will have to occur to fix this.

The way we currently have deployment setup is not ideal to say the least, in the future, the script should only need to be run once as the commands for setting up the interface should be replaced with directly modifying the /etc/network/interfaces file

#Resources Used For Mesh Network https://www.open-mesh.org/projects/batman-adv/wiki/Quick-start-guide https://medium.com/swlh/setting-up-an-ad-hoc-mesh-network-with-raspberry-pi-3b-using-batman-adv-1c08ee565165

#Resources Used For Wireless AP https://www.raspberrypi.org/documentation/configuration/wireless/access-point-routed.md https://thepi.io/how-to-use-your-raspberry-pi-as-a-wireless-access-point/