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Operations and Security Report

Farmbot

IN700-BIT Project

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Things learnt:

Check any previous documentation that is available and see if any of it connects

Think big picture i.e. I would have known that the private network wouldn’t have worked if inside of drawing a diagram of the network I drew a diagram of the whole network

Record documentation in multiple places i.e. in the GitHub repo for Farmbot they had a GitLab repo but it wasn't there and when I asked Vaughn about it, it was "deleted" from a previous group, since the Ops team was helping the Farmbot team we will also record this for our own records

Attempt 1 - Creating Private Network

My initial thought was that I could setup a private network inside the polytech using a raspberry pi to create a wireless access point and hope that would allow the bypassing of the polytech policies.

I used these 2 guides to quickly set it up

https://howtoraspberrypi.com/create-a-wi-fi-hotspot-in-less-than-10-minutes-with-pi-raspberry/

https://github.com/billz/raspap-webgui

I then needed to enable forwarding of packets by uncommenting #net.ipv4.ip\_forward=1 in /etc/sysctl.conf this then allowed users to connect to the raspberry pi wireless network and access the internet through it, at this point I believed that this would work to get Farmbot to work.

# Attempt 2 - VPN

Kane and I attempted to setup a VPN on the gateway device so that it would encrypt the traffic when it sent it out so that it would bypass OP's policies but most of the VPN software we tried was either blocked or didn’t work, I even subscribed to NordVPN and downloaded the Raspbian package for it but it wouldn’t establish a connect to the VPN servers most likely because the packets that were being sent out or received were blocked

Attempt 3 - Installing software packages

At this point I was running out of ideas to do so I decided to download the software that was associated with the ports Farmbot needed this was a huge waste of time as the RabbitMQ-server that was needed on port

5672 also required a erlang dependency but the version that you could get on the raspberry pi was not compatible with the version of RabbitMQ you downloaded so a lot of researching into source lists you could use for apt-get was done but some of the configuration that was needed wouldn’t work with the Raspbian device.

# Attempt 4 – Tunnelling / Traffic Monitoring

SSHuttle to create a tunnel but what I learnt from Faisal is even if you create a tunnel out how does the traffic get back in without creating a proxy which may have worked but would have required more hardware?

After talking with Faisal and explaining the Farmbot and what I was my Attempt at getting it to work he then drew a diagram which encompassed the whole network and that I should try Wireshark or tcpdump in order to see if the packets were being sent or received in order to determine what is happening.

From this I then proceeded to use a combination of iptraf, tcpdump and iftop to see what was happening with the network traffic. When looking at iptraf I saw that the traffic was being sent and received for Farmbot https but was only being sent for Farmbot amqp which lead me to google the port for which amqp resided on which is 5672. I then recalled that I saw that number on the network documentation which lead me on the track towards my 5th attempt which turned out to be the one to fix Farmbot

# Solution - Fixed

After all my previous attempts to get Farmbot running I went back to the FarmBot2020 GitHub repo https://github.com/Lockam1/FarmBot2020 and investigated the network documentation that was from previous semesters.

After looking at WirelessConnection-MAY19.pdf I saw that Rob had requested a key from ITS for the MAC address associated with the Farmbot device and they then mention that it is on the OP-Mobile network, after seeing this I then went over the other files and saw in ConnectionIssues-OCT19.pdf that there was a mention of checking if it will work eduroam network. In the document 2019LAN-WiFi%20connection-Pre-Showcase.pdf they mentioned that they but the MAC address of the Farmbot device on wireless vlan 35 which doesn't have any port restrictions.

So after reading all this I went to check with Rob if maybe the reason it didn’t work was because the device the students were using was not also in the same network / vlan as the Farmbot device I also asked if the previous Farmbot group had tried this solution which he was unsure of. I also checked in with Vaughn to update him on the plan as well as asked him about if he knew if the previous group had attempted something similar to which he was unsure of (this gave me some hope that it was going to work).

I then proceeded to take myself and Damian over to ITS to get his device placed on vlan 35 in the OP-Mobile network, but Perrin was unavailable so instead I sent an email to him. While I was waiting for a response I flashed the SD with a fresh install of Farmbot and was going to place the key onto the Farmbot device so it would be set to go as soon as we heard back from Perrin with the key for Damian's device, when I was about to set the Wi-Fi to "OP-Mobile" I noticed that it didn’t have a key icon next to it and went to talk to rob about this, I then had the idea of manually setting the network to "OP-Mobile" this then asked me to input the key which I did.

For some reason I then thought maybe 50/50 this might work so I connected my mobile phone to the eduroam network and went to my.farm.bot which then proceeded to work but in order to actually confirm that I could move Farmbot from the app I then had to plug it in with the help of James Wood, we pressed the arrows on the web app and BAM it worked but in order to see if it was actually working and not a fluke we got James to connect to Farmbot on his device and see if he could also operate it which he could.

The answer was in the documentation all along, but it was spread out over different docs we will now condense the solution in order to make future groups life a bit easier.

# Farmbot Setup Instructions

This is for Farmbot on Wi-Fi

Farmbot is to be connected to the OP-Mobile network using the psk of "bpdyHDPnBjWR"

The key used above is specific to the Farmbot MAC address (if you purchase a new pi for Farmbot you will have to request a new key for that pi's MAC address), this key will place the device on vlan 35 of OP-Mobile which gives the device unrestricted port access

The students will then connect their devices to the "eduroam" network using their polytech login -student i.e. pangdw1@op.ac.nz instead of pangdw1@student.op.ac.nz

The password is also the same as their polytech password

From a fresh install you will need to

Part One:

- Connect to the Farmbot Wi-Fi

- Open a browser and enter 192.168.24.1 to connect to Farmbot

- Choose Wi-Fi

- Because for some reason when you see the available networks there will be no key required for the OP-Mobile network you will instead have to. Click on manual input and type in "OP-Mobile"

- You will then be asked to put in a key (use the key listed above in quotes"

- You will then be asked to supply a Farmbot account, whichever account you use in this step will need to be shared with the Farmbot group as they will need to use that account in order to connect

- Farmbot will then proceed to connect to the OP-Mobile network

Part Two:

- The students will then need to connect to the eduroam network on their device

- Once connected you can then enter "my.farm.bot" \*you could change the name when you first set the Farmbot up but how many Farmbot will there be at polytech\* into your devices web browser to connect to Farmbot

- Once on the Farmbot browser you will need to go to the device tab and change it to the Arduino/RAMPS firmware

One might think because the Farmbot is on OP-Mobile and the device is in eduroam network that they won’t be able to connect but they can \*it’s cool when you think about it :)\*

# FARMBOT SETUP – Print Out

1) Flash a fresh Farmbot OS onto the SD Card

2) Insert SD Card into Farmbot Device

3) Power on Farmbot Device

4) On your mobile/laptop device go to Wi-Fi and select Farmbot

5) Go to your browser and enter 192.168.24.1

6) Select Wi-Fi option

7) Click on manual input and enter “OP-Mobile”

8) Use the key “bpdyHDPnBjWR”

9) Enter your Farmbot account

10) Farmbot will now deactivate its own Wi-Fi and connect to OP-Mobile

11) Connect to “eduroam” on your mobile/laptop device

12) Open a browser and go to “my.farm.bot”

13) Wait for it to sync

14) Go to device tab and select the Arduino/RAMPS firmware

15) Wait for it to install may take a minute or two

16) You’re a go

# Previous Documentation

Original files can still be found in the github repo but this is more to condense everything into a single document    