

**EE / Cpre / SE 492 - sdmay 36**

**Self Healing 5-G**

**Week 3 Report**

*March 2 - March 15*

*Faculty Advisor: Mohamed Selim*

**Team Members:**

Matthew Johnson

Adam Tiedeman

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Amber Chin

Yuin-Choon Ng (Austin)

**Weekly summary**

This week we met up with a Rutgers professor to discuss some of the problems that we have been having with ORBIT. We went over the structure of orbit as well as how we should organize our experiments in the future.

**Past Week Accomplishments**

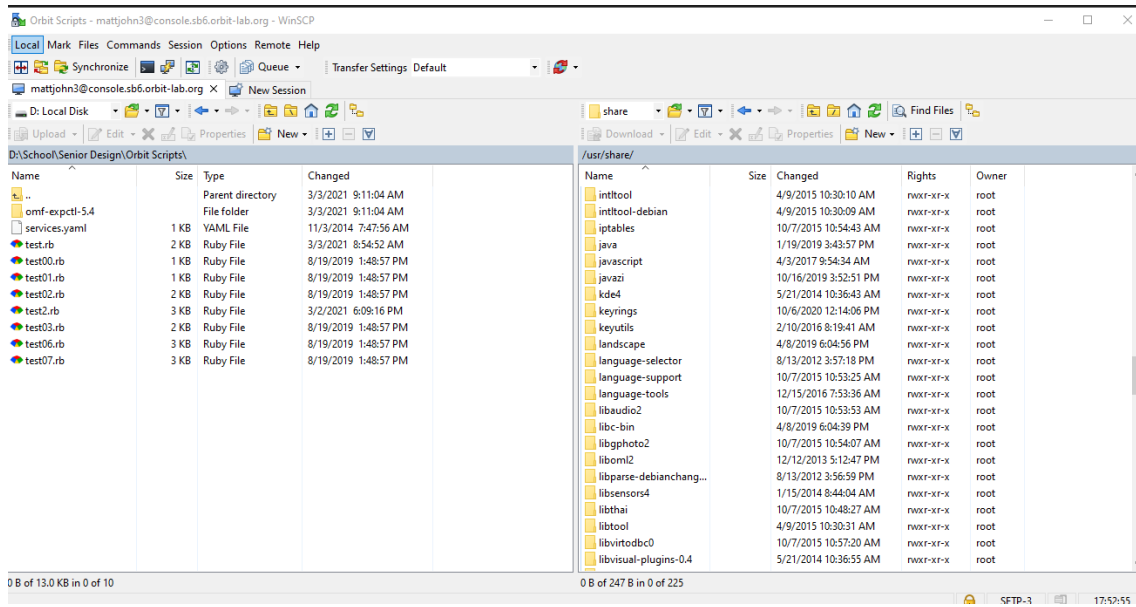
Met up with Ivan Seskar, a staff from Rutgers on further clarification and getting help with understanding ORBIT. From there, we realized that OMF works differently for both wired and wireless connections, which is the main issue that we have apparently not known sooner.

We discovered that our current understanding of OMF was flawed and that it would be easier to configure nodes individually through bash rather than using the predefined applications of OMF.

We began experimentation with configuring a single node to act as a host and attempted to connect as a client from different network nodes.

We also created and presented our PIRM presentation.

Other than that, we were able to access the file systems of the ORBIT testbeds using WinSCP which is shown in the screenshot below. This allows us to get a much better understanding of how the machines function, rather than being a black box, we can actually begin to understand why our experiments are failing.



*WinSCP with orbit central controller*

## Pending Issues

We need to work on understanding the broader implications of hostapd to be able to properly configure a normal network card to act as a host.

The screenshot below shows that the nodes in the ORBIT testbed are not exactly very reliable when we tried to load the image to the nodes.

```
Domain: outdoor.orbit-lab.org
Node: node3-6.outdoor.orbit-lab.org   State: NOT REGISTERED
Node: node3-3.outdoor.orbit-lab.org   State: POWEROFF
Node: node2-10.outdoor.orbit-lab.org  State: POWEROFF
Node: node1-10.outdoor.orbit-lab.org  State: POWEROFF
Node: node1-8.outdoor.orbit-lab.org   State: POWERON
Node: node1-6.outdoor.orbit-lab.org   State: POWERON
Node: node3-2.outdoor.orbit-lab.org   State: POWEROFF
Node: node3-1.outdoor.orbit-lab.org   State: POWEROFF
Node: node1-3.outdoor.orbit-lab.org   State: POWERON
Node: node3-5.outdoor.orbit-lab.org   State: POWEROFF
Node: node2-5.outdoor.orbit-lab.org   State: NOT REGISTERED
Node: node1-2.outdoor.orbit-lab.org   State: POWERON
```

---

We have begun attempting to configure and use hostapd but have run into some issues regarding the wireless interfaces. When running the ifconfig command we can only see the wired connections, however if we list the hardware we can see that the wireless hardware clearly exists. Currently we are testing various images, configurations etc. to see how we can get the wireless portions of our nodes operational.

```

root@node1-2:~# ifconfig
enp1s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet6 fe80::203:1dff:fe0a:3b77 prefixlen 64 scopeid 0x20<link>
ether 00:09:1d:0a:3b:77 txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 15 bytes 2718 (2.7 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 19 memory 0xc0900000-c0920000

enp1s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet6 fe80::21b:21ff:febe:6f08 prefixlen 64 scopeid 0x20<link>
ether 00:1b:21:be:6f:08 txqueuelen 1000 (Ethernet)
RX packets 2 bytes 172 (172.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 17 bytes 2800 (2.8 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 16 memory 0xc00c0000-c00e0000

enp9s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 10.16.1.2 netmask 255.255.0.0 broadcast 10.16.255.255
inet6 fe80::203:1dff:fe0a:3b76 prefixlen 64 scopeid 0x20<link>
ether 00:09:1d:0a:3b:76 txqueuelen 1000 (Ethernet)
RX packets 335 bytes 226701 (226.7 KB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 215 bytes 27745 (27.7 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 18 memory 0xc0500000-c0520000

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
inet 127.0.0.1 netmask 255.0.0.0
inet6 ::1 prefixlen 128 scopeid 0x10<host>
loop txqueuelen 1000 (Local Loopback)
RX packets 116 bytes 8913 (8.9 KB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 116 bytes 8913 (8.9 KB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@node1-2:~# iw list
root@node1-2:~#

```

### Network interface list (ifconfig)

```

resources: irq:27 memory:c0000000-c031ffff ioport:3000(size=32) memory:c0200000-c023ffff memory:c0524000-c05247ff
*network
description: Ethernet interface
product: 82574L Gigabit Network Connection
vendor: Intel Corporation
physical id: 0
bus info: pci@0000:0b:00.0
logical name: enp1s0
version: 00
serial: 00:09:1d:0a:3b:77
size: 10bit/s
capacity: 10bit/s
width: 32 bits
clock: 33MHz
capabilities: pm msi pciexpress msix bus_master cap_list rom ethernet physical tp 10bt 10bt-fd 100bt 100bt-fd 1000bt-fd autonegotiation
configuration: autonegotiation=on broadcast=yes driver=e1000e driverversion=3.2.6-k duplex=full firmware=3.1-1 latency=0 link=yes multicast=yes port=twisted pair speed=10bit/s
resources: irq:28 memory:c0000000-c091ffff ioport:4000(size=32) memory:c0920000-c0923fff memory:c0924000-c09247ff
*network UNCLAIMED
description: Network controller
product: Centrino Advanced-N + WiMAX 6250 [Kilmer Peak]
vendor: Intel Corporation
physical id: 0
bus info: pci@0000:0d:00.0
version: 5e
width: 64 bits
clock: 33MHz
capabilities: pm msi pciexpress bus_master cap_list
configuration: latency=0
resources: memory:c0d00000-c0d01fff
*network UNCLAIMED
description: Network controller
product: PRO/Wireless 2015ABG [Calexico2] Network Connection
vendor: Intel Corporation
physical id: 8
bus info: pci@0000:11:08.0
version: 05
width: 32 bits
clock: 33MHz
capabilities: pm bus_master cap_list
configuration: latency=32 maxlatency=24 mingnt=3
resources: memory:c1100000-c1100fff

```

### Wireless hardware listed

### **Individual Contributions**

**Adam Tiedeman** : Looked through ORBIT files to understand ruby scripts. Researched differences between omf version 5.4 and 6

**Parnumart Hanthiradej** : Arranged meeting with Rutgers Professor, try configuring a single node.

**Yuin Choon Ng** : Arranged meeting with Rutgers Professor, try configuring a single node.

**Amber Chin** : Researched differences between omf version 5.4 and 6

**Matthew Johnson** : Arranged meeting with Rutgers Professor, worked on configuring node.

<b><u>Team Member</u></b>	<b><u>Contribution</u></b>	<b><u>Weekly hours</u></b>	<b><u>Total Hours</u></b>
<b>Adam Tiedeman</b>	Looked through ORBIT files to understand ruby scripts	<b>7</b>	<b>30.5</b>
<b>Amber Chin</b>	Researched differences between omf version 5.4 and 6	<b>7</b>	<b>30</b>
<b>Matthew Johnson</b>	Arranged meeting with Rutgers Professor, worked on configuring nodes.	<b>8</b>	<b>35</b>
<b>Parnumart Hanthiradej</b>	Arranged meeting with Rutgers Professor, try configuring a single node	<b>7</b>	<b>30.5</b>
<b>Yuin-Choon Ng</b>	Arranged meeting with Rutgers Professor, try configuring a single node.	<b>7</b>	<b>29.5</b>

**\*Counted total hours for only this semester**

### **Plan for coming week**

- We need to fully configure a network node to act as a host for our broader experiment needs.
- From there we need to begin to design a bash algorithm to run our self healing algorithm we designed in GENI.
- We then need to fully test the bash algorithm for errors and issues.
- If we are unable to get wireless capabilities we will start on implementing the ORBIT experiment by using the existing ethernet connections