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## INTRODUCTION

Lab5.txt in the Model Editor

The screenshot displays the SPHERE BETA Research Infrastructure Model Editor. The interface includes a left sidebar with navigation options: Dashboard, Users, Organizations, Projects, Experiments (with sub-options: Manage, Reservations, Activations), XDCs, Model Editor (highlighted), Resources, and Tutorials. The main workspace is titled 'Models' and contains a Python script for a network topology. The script defines a network, sets up stations, satellites, and ground segments, and builds the network segments. The script is as follows:

```
1 from mergexp import *
2 # This is a topology for testing the multiplexer
3 net = Network('orbital')
4 station_names = ['seoul', 'singapore', 'stockholm', 'sydney', 'honolulu', 'boardman', 'capetown', 'dubai']
5 stations = [net.node(i, image == '2004') for i in station_names]
6 station_base = '10.1'
7 sat_names = ['landsat9', 'landsat8', 'landsat7']
8 sats = [net.node(i, image == '2004') for i in sat_names]
9 soc = net.node('soc', image == '2004')
10 soc_gw = net.node('socgw', image == '2004')
11 sat_base = '10.2'
12 scm_gd_base = '10.3'
13 scm_space_base = '10.4'
14 soc_gw_base = '10.5.1'
15 soc_base = '10.5.2'
16 scm = net.node('scm01', image == '2004')
17 # Build the ground segment
18 for index, sn in enumerate(stations):
19     link = net.connect([sn, scm])
20     link[sn].socket.addrns = ip4("%s.%d.1/24" % (station_base, index))
21     link[scm].socket.addrns = ip4("%s.%d.1/24" % (scm_gd_base, index))
22 # Build the space segment
23 for index, satn in enumerate(sats):
24     link = net.connect([satn, scm])
25     link[satn].socket.addrns = ip4("%s.%d.1/24" % (sat_base, index))
26     link[scm].socket.addrns = ip4("%s.%d.1/24" % (scm_space_base, index))
27 # Link in the SIAB
28 soc_gw_net = net.connect([soc_gw] + stations)
29 soc_gw_net[soc_gw].socket.addrns = ip4("%s.1/24" % (soc_gw_base))
30 for index, sn in enumerate(stations):
31     soc_gw_net[sn].socket.addrns = ip4("%s.%d/24" % (soc_gw_base, index + 2))
32 soc_net = net.connect([soc_gw, soc])
33 soc_net[soc_gw].socket.addrns = ip4("%s.1/24" % soc_base)
34 soc_net[soc].socket.addrns = ip4("%s.2/24" % soc_base)
35 experiment(net)
```

## Push Model to Experiment



Experiment \*

jacksonsamanthalab5.csci4306

Branch

master

Tag

Push

View of the Topology in jacksonsamanthalab5

Revision: csc14306/jacksonsamanthalab5/9eb1745f748845aa802ec757fa07bdb021c998c1

Reserve Revision

TopologyModelXIRGraphviz

Revision  
Details

ID: orbital

Model View

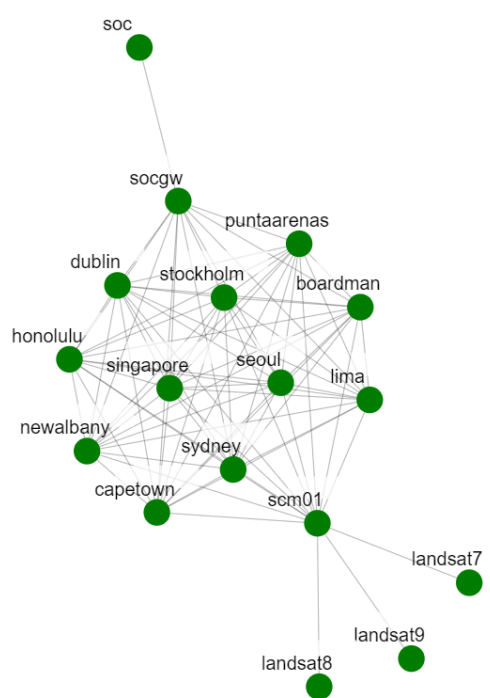
- Nodes
- Nodes & LANs
- Nodes & Interfaces

Topology View

- 2D
- 3D

Topology Display

- Node Size: 3
- Font Scale: 20



View of the project details

Search Materialization...							
Name	Experiment Addresses	Infranet Add...	Kind	Resour...	Image	Facility	Actions
landsat9	10.2.0.1/24	172.30.0.17	VirtualMachine	md07	2004	moddeter	
puntaarenas	10.1.10.1/24, 10.5.1.12/24	172.30.0.20	VirtualMachine	md06	2004	moddeter	
seoul	10.1.0.1/24, 10.5.1.2/24	172.30.0.22	VirtualMachine	md03	2004	moddeter	
scm01	10.3.0.1/24, 10.3.1.1/24, 10.3.2.1/24, 10.3.3.1/24, 10.3.4.1/24, 10.3.5.1/24, 10.3.6.1/24, 10.3.7.1/24, 10.3.8.1/24, 10.3.9.1/24, 10.3.10.1/24, 10.4.0.1/24, 10.4.1.1/24, 10.4.2.1/24	172.30.0.21	VirtualMachine	md07	2004	moddeter	
landsat7	10.2.2.1/24	172.30.0.15	VirtualMachine	md07	2004	moddeter	
stockholm	10.1.2.1/24, 10.5.1.4/24	172.30.0.26	VirtualMachine	md05	2004	moddeter	
soc	10.5.2.2/24	172.30.0.24	VirtualMachine	md07	2004	moddeter	
newalbany	10.1.9.1/24, 10.5.1.11/24	172.30.0.19	VirtualMachine	md06	2004	moddeter	
socgw	10.5.1.1/24, 10.5.2.1/24	172.30.0.25	VirtualMachine	md07	2004	moddeter	
singapore	10.1.1.1/24, 10.5.1.3/24	172.30.0.23	VirtualMachine	md03	2004	moddeter	
capetown	10.1.6.1/24, 10.5.1.8/24	172.30.0.12	VirtualMachine	md06	2004	moddeter	
sydney	10.1.3.1/24, 10.5.1.5/24	172.30.0.27	VirtualMachine	md06	2004	moddeter	
dublin	10.1.7.1/24, 10.5.1.9/24	172.30.0.13	VirtualMachine	md06	2004	moddeter	
landsat8	10.2.1.1/24	172.30.0.16	VirtualMachine	md07	2004	moddeter	
honolulu	10.1.4.1/24, 10.5.1.6/24	172.30.0.14	VirtualMachine	md06	2004	moddeter	
lima	10.1.8.1/24, 10.5.1.10/24	172.30.0.18	VirtualMachine	md06	2004	moddeter	
boardman	10.1.5.1/24, 10.5.1.7/24	172.30.0.11	VirtualMachine	md06	2004	moddeter	
Ingresses							
Ingress	Protocol	Hostname	Host Port	Host Address	Gateway	Gateway Port	

XDC Information with file attached

Projects > csci4306 > XDCs > jacksonsamanthab05

XDC Information

Name	Project	Type	Attached	URL	SSH Name	Creator	Memory Limit	CPU Limit	Image
jacksonsamanthab05	csci4306	0	sjack2 jacksonsamanthab05-csci4306	Jupyter	jacksonsamanthab05-csci4306	csci3306jbzo	2	2	xdc-base-v1.3.19

Status

Name	Description	Status	Creation	Last Updated
▼ XDC: jacksonsamanthab05-csci4306	Manage XDC: jacksonsamanthab05-csci4306	Success	10/3/2024, 3:58:00 AM	10/3/2024, 9:51:23 PM
> imergefs/Creds	MergeFS Credentials Management	Success	10/3/2024, 3:58:01 AM	10/3/2024, 3:58:02 AM
> ixdcpodinit	Initialize XDCs	Success	10/3/2024, 3:58:47 AM	10/3/2024, 3:58:52 AM
> iwgsvc/WigXDCAttach	Manage wig xdc attachment	Success	10/3/2024, 3:58:51 AM	10/3/2024, 9:50:58 PM
> iwgsvc/XdcWigClient	Manage wireguard xdc connections	Success	10/3/2024, 9:51:18 PM	10/3/2024, 9:51:19 PM
> iwgsvc/WigIf	Manage wireguard interfaces	Success	10/3/2024, 9:43:55 PM	10/3/2024, 9:51:19 PM
> ioredmgr/XDCCreds	Host credentials management	Success	10/3/2024, 3:58:00 AM	10/3/2024, 9:51:19 PM
> imergefs/XdcFS	MergeFS XDC Management	Success	10/3/2024, 3:58:00 AM	10/3/2024, 9:51:19 PM
> ixdcXdcos	Manage XDCs	Success	10/3/2024, 3:58:00 AM	10/3/2024, 9:51:23 PM

NET-TOOL PACKAGE INSTALLATIONS

In Jupyter, installed the net-tools package into socgw

```
csci3306jbzo@socgw:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
 net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 0s (481 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@socgw:~$
```

Installed the net-tools package into soc

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh soc
Warning: Permanently added 'soc' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

csci3306jbzo@soc:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 0s (474 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@soc:~$
```

## Installed the net-tools package into dublin

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh dublin
Warning: Permanently added 'dublin' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/pro
```

The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/\*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo\_root" for details.

```
csci3306jbzo@dublin:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (245 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@dublin:~$
```

## Installed the net-tools package into puntaarenas

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh puntaarenas
Warning: Permanently added 'puntaarenas' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/pro
```

The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/\*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo\_root" for details.

```
csci3306jbzo@puntaarenas:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (359 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@puntaarenas:~$ █
```

## Installed the net-tools package into stockholm

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh stockholm
Warning: Permanently added 'stockholm' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

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individual files in /usr/share/doc/*/copyright.

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applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

csci3306jbzo@stockholm:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (209 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@stockholm:~$
```

## Installed the net-tools package into honolulu

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh honolulu
Warning: Permanently added 'honolulu' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

csci3306jbzo@honolulu:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 0s (410 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@honolulu:~$ █
```

## Installed the net-tools package into boardman

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh boardman
Warning: Permanently added 'boardman' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

csci3306jbzo@boardman:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (250 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@boardman:~$ █
```

## Installed the net-tools package into singapore

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh singapore
Warning: Permanently added 'singapore' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

csci3306jbzo@singapore:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 0s (480 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@singapore:~$
```



## Installed the net-tools package into seoul

```
csci3306jbzo@jacksonsamanthalab5:~$ ssh seoul
Warning: Permanently added 'seoul' (ED25519) to the list of known hosts.
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.4.0-182-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/pro
```

The programs included with the Ubuntu system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/\*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo\_root" for details.

```
csci3306jbzo@seoul:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (241 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@seoul:~$
```

## Installed the net-tools package into lima

```
csci3306jbzo@lima:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 0s (474 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@lima:~$
```

## Installed the net-tools package into newalbany

```
csci3306jbzo@newalbany:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 0s (477 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@newalbany:~$
```

## Installed the net-tools package into sydney

```
csci3306jbzo@sydney:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 0s (477 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@sydney:~$
```

## Installed the net-tools package into capetown

```
csci3306jbzo@capetown:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (244 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@capetown:~$ █
```

## Installed the net-tools package into scm01

```
csci3306jbzo@scm01:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (244 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@scm01:~$ █
```

## Installed the net-tools package into landsat7

```
csci3306jbzo@landsat7:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (242 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@landsat7:~$ █
```

## Installed the net-tools package into landsat9

```
csci3306jbzo@landsat9:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (244 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@landsat9:~$
```

## Install the net-tools package into landsat8

```
csci3306jbzo@landsat8:~$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 196 kB of archives.
After this operation, 864 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu focal/main amd64 net-tools amd64 1.60+git20180626.aebd88e-1ubuntu1 [196 kB]
Fetched 196 kB in 1s (244 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 105037 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20180626.aebd88e-1ubuntu1_amd64.deb ...
Unpacking net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Setting up net-tools (1.60+git20180626.aebd88e-1ubuntu1) ...
Processing triggers for man-db (2.9.1-1) ...
csci3306jbzo@landsat8:~$
```

# ROUTE AND IFCONFIG

## SOCGW

IP: 10.3.1.1

Three ethernet connections at the 172.30.0.0 via eth0, 10.5.1.0 via eth1 and 10.5.2.0 via eth2. Traffic going through the network goes through 172.30.0.1 on eth0; there is also a route to 192.168.254.0 from the same gateway. This makes eth0 the most active interface.

```
csci3306jbzo@socgw:~$ route
Kernel IP routing table
Destination    Gateway      Genmask      Flags Metric Ref    Use Iface
default        172.30.0.1  0.0.0.0      UG    512    0      0 eth0
10.5.1.0       0.0.0.0     255.255.255.0 U    0      0      0 eth1
10.5.2.0       0.0.0.0     255.255.255.0 U    0      0      0 eth2
172.30.0.0     0.0.0.0     255.255.0.0  U    0      0      0 eth0
172.30.0.1     0.0.0.0     255.255.255.255 UH   512    0      0 eth0
192.168.254.0  172.30.0.1  255.255.255.0 UG    99     0      0 eth0

csci3306jbzo@socgw:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.25 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::a8c0:d6ff:fe28:a09e prefixlen 64 scopeid 0x20<link>
    ether 72:f7:a9:c7:65:92 txqueuelen 1000 (Ethernet)
    RX packets 1077 bytes 565083 (565.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 467 bytes 53677 (53.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.1 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::a8c0:d6ff:fe28:a09e prefixlen 64 scopeid 0x20<link>
    ether aa:c0:d6:28:a0:9e txqueuelen 1000 (Ethernet)
    RX packets 231 bytes 18106 (18.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 19 bytes 1506 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.2.1 netmask 255.255.255.0 broadcast 10.5.2.255
    inet6 fe80::6884:efff:feeb:f4b0 prefixlen 64 scopeid 0x20<link>
    ether 6a:84:ef:cb:f4:b0 txqueuelen 1000 (Ethernet)
    RX packets 22 bytes 1696 (1.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 19 bytes 1506 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 172 bytes 16208 (16.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 172 bytes 16208 (16.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## SOC

### IP: 10.3.0.1

Two ethernet connections eth1 at 10.5.2.0 (likely a secondary network as it receives hardly any packages and has no gateway). Eth0 is connected to 172.30.0.0 and routes traffic through the 172.30.0.01 gateway, 192.168.254.0 is also routed through this gateway.

Eth0 is handling external traffic and eth1 is handling local network communication.

```
csci3306jbzo@soc:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.5.2.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@soc:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.24 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::e82c:f6ff:fe78:5c16 prefixlen 64 scopeid 0x20<link>
    ether ea:2c:f6:78:5c:16 txqueuelen 1000 (Ethernet)
    RX packets 1095 bytes 565732 (565.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 442 bytes 50107 (50.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.2.2 netmask 255.255.255.0 broadcast 10.5.2.255
    inet6 fe80::70e5:64ff:fece:c043 prefixlen 64 scopeid 0x20<link>
    ether 72:e5:64:ce:c0:43 txqueuelen 1000 (Ethernet)
    RX packets 23 bytes 1786 (1.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 19 bytes 1506 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## DUBLIN

IP: 10.3.2.1

Three ethernet connections. Eth1 at 10.1.7.1 and eth2 at 10.5.1.9 are acting as local networks. Eth0 at 172.30.0.0 acts as the external interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@dublin:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.7.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0       0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@dublin:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.13 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::c2e:2aff:fe9:52d1 prefixlen 64 scopeid 0x20<link>
    ether 0e:2e:2a:f9:52:d1 txqueuelen 1000 (Ethernet)
    RX packets 1080 bytes 564057 (564.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 436 bytes 49725 (49.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.7.1 netmask 255.255.255.0 broadcast 10.1.7.255
    inet6 fe80::28e1:33ff:fe71:775 prefixlen 64 scopeid 0x20<link>
    ether 2a:e1:33:71:07:75 txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2136 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 19 bytes 1506 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.9 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::b8dc:4eff:fed2:c23 prefixlen 64 scopeid 0x20<link>
    ether ba:dc:4e:d2:0c:23 txqueuelen 1000 (Ethernet)
    RX packets 233 bytes 18226 (18.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 19 bytes 1506 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## PUNTAARENAS

### IP: 10.3.5.1

Three ethernet connections. Eth1 at 10.1.10.1 and eth2 at 10.5.1.12 are acting local networks. Eth0 at 172.30.0.1 acts as the external interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@puntaarenas:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.10.0      0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0       0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@puntaarenas:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.20 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::a0d5:28ff:febf:5619 prefixlen 64 scopeid 0x20<link>
    ether a2:d5:28:bf:56:19 txqueuelen 1000 (Ethernet)
    RX packets 1081 bytes 564198 (564.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 436 bytes 50251 (50.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.10.1 netmask 255.255.255.0 broadcast 10.1.10.255
    inet6 fe80::a6:e6ff:fe5a:863e prefixlen 64 scopeid 0x20<link>
    ether 02:a6:e6:5a:86:3e txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2136 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.12 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::f49a:7aff:feac:8050 prefixlen 64 scopeid 0x20<link>
    ether f6:9a:7a:ac:80:50 txqueuelen 1000 (Ethernet)
    RX packets 235 bytes 18386 (18.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



# STOCKHOLM

## IP: 10.3.3.1

Three ethernet connections. Eth1 at 10.1.2.1 and eth2 at 10.5.1.4 are acting as local networks. Eth0 at 172.30.0.26 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@stockholm:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.2.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0       0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@stockholm:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.26 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::e8a7:e5ff:fe68:c697 prefixlen 64 scopeid 0x20<link>
    ether ea:a7:e5:68:c6:97 txqueuelen 1000 (Ethernet)
    RX packets 1078 bytes 564076 (564.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 441 bytes 50260 (50.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.2.1 netmask 255.255.255.0 broadcast 10.1.2.255
    inet6 fe80::7414:76ff:fe64:8fe1 prefixlen 64 scopeid 0x20<link>
    ether 76:14:76:64:8f:e1 txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2136 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.4 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::fc6c:5fff:fe85:3029 prefixlen 64 scopeid 0x20<link>
    ether fe:6c:5f:85:30:29 txqueuelen 1000 (Ethernet)
    RX packets 237 bytes 18526 (18.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



# HONOLULU

## IP: 10.3.6.1

Three ethernet connections. Eth1 at 10.1.4.1 and eth2 at 10.5.1.6 are acting as local networks. Eth0 at 172.30.0.14 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@honolulu:~$ route
Kernel IP routing table
Destination      Gateway         Genmask         Flags Metric Ref    Use Iface
default          172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.4.0         0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0         0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0       0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1       0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0    172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@honolulu:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.14 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::24e0:91ff:fe2d:7985 prefixlen 64 scopeid 0x20<link>
    ether 26:e0:91:2d:79:85 txqueuelen 1000 (Ethernet)
    RX packets 1085 bytes 564285 (564.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 440 bytes 50095 (50.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.4.1 netmask 255.255.255.0 broadcast 10.1.4.255
    inet6 fe80::105f:cdff:fe47:b1d4 prefixlen 64 scopeid 0x20<link>
    ether 12:5f:cd:47:b1:d4 txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2136 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.6 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::7c5d:34ff:fed8:7808 prefixlen 64 scopeid 0x20<link>
    ether 7e:5d:34:d8:78:08 txqueuelen 1000 (Ethernet)
    RX packets 237 bytes 18506 (18.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## BOARDMAN

### IP: 10.3.4.1

Three ethernet connections. Eth1 at 10.1.5.1 and eth2 at 10.5.1.7 are acting as local networks. Eth0 at 172.30.0.11 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@boardman:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1      0.0.0.0         UG    512    0      0 eth0
10.1.5.0       0.0.0.0         255.255.255.0   U     0      0      0 eth1
10.5.1.0       0.0.0.0         255.255.255.0   U     0      0      0 eth2
172.30.0.0     0.0.0.0         255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0         255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1      255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@boardman:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.11 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::54db:83ff:fe23:baf7 prefixlen 64 scopeid 0x20<link>
    ether 56:db:83:23:ba:f7 txqueuelen 1000 (Ethernet)
    RX packets 1164 bytes 574330 (574.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 542 bytes 67528 (67.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.5.1 netmask 255.255.255.0 broadcast 10.1.5.255
    inet6 fe80::14c6:1bff:fe7a:4aa7 prefixlen 64 scopeid 0x20<link>
    ether 16:c6:1b:7a:4a:a7 txqueuelen 1000 (Ethernet)
    RX packets 29 bytes 2206 (2.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.7 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::a0b9:dbff:febf:2674 prefixlen 64 scopeid 0x20<link>
    ether a2:b9:db:bf:26:74 txqueuelen 1000 (Ethernet)
    RX packets 237 bytes 18506 (18.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## SINGAPORE

IP: 10.3.7.1

Three ethernet connections. Eth1 at 10.1.1.1 and eth2 at 10.5.1.3 are acting as local networks. Eth0 at 172.30.0.23 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@singapore:~$ route
```

```
Kernel IP routing table
```

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
default	172.30.0.1	0.0.0.0	UG	512	0	0	eth0
10.1.1.0	0.0.0.0	255.255.255.0	U	0	0	0	eth1
10.5.1.0	0.0.0.0	255.255.255.0	U	0	0	0	eth2
172.30.0.0	0.0.0.0	255.255.0.0	U	0	0	0	eth0
172.30.0.1	0.0.0.0	255.255.255.255	UH	512	0	0	eth0
192.168.254.0	172.30.0.1	255.255.255.0	UG	99	0	0	eth0

```
csci3306jbzo@singapore:~$ ifconfig
```

```
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.23 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::ccac:10ff:fee9:5637 prefixlen 64 scopeid 0x20<link>
    ether ce:ac:10:e9:56:37 txqueuelen 1000 (Ethernet)
    RX packets 1104 bytes 565812 (565.8 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 455 bytes 51577 (51.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.1.1 netmask 255.255.255.0 broadcast 10.1.1.255
    inet6 fe80::1c88:48ff:fe86:23b7 prefixlen 64 scopeid 0x20<link>
    ether 1e:88:48:86:23:b7 txqueuelen 1000 (Ethernet)
    RX packets 29 bytes 2206 (2.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.3 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::c58:e3ff:fe8e:26a8 prefixlen 64 scopeid 0x20<link>
    ether 0e:58:e3:8e:26:a8 txqueuelen 1000 (Ethernet)
    RX packets 239 bytes 18666 (18.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## SEOUL

IP: 10.3.8.1

Three ethernet connections. Eth1 at 10.1.0.1 and eth2 at 10.5.1.2 are acting as local networks. Eth0 at 172.30.0.22 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@seoul:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1      0.0.0.0         UG    512    0      0 eth0
10.1.0.0        0.0.0.0         255.255.255.0   U     0      0      0 eth1
10.5.1.0        0.0.0.0         255.255.255.0   U     0      0      0 eth2
172.30.0.0      0.0.0.0         255.255.0.0     U     0      0      0 eth0
172.30.0.1      0.0.0.0         255.255.255.255 UH    512    0      0 eth0
192.168.254.0   172.30.0.1      255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@seoul:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.22 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::1454:70ff:fe38:1151 prefixlen 64 scopeid 0x20<link>
    ether 16:54:70:38:11:51 txqueuelen 1000 (Ethernet)
    RX packets 1088 bytes 564748 (564.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 456 bytes 51242 (51.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.0.1 netmask 255.255.255.0 broadcast 10.1.0.255
    inet6 fe80::3c0f:5ff:fe7d:ec79 prefixlen 64 scopeid 0x20<link>
    ether 3e:0f:05:7d:ec:79 txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2136 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.2 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::bc90:1ff:fea0:c1eb prefixlen 64 scopeid 0x20<link>
    ether be:90:01:a0:c1:eb txqueuelen 1000 (Ethernet)
    RX packets 239 bytes 18666 (18.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## LIMA

IP: 10.3.9.1

Three ethernet connections. Eth1 at 10.1.8.1 and eth2 at 10.5.1.10 are acting as local networks. Eth0 at 172.30.0.18 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@lima:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.8.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0       0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@lima:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.18 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::a4d4:6bff:feab:abab prefixlen 64 scopeid 0x20<link>
    ether a6:d4:6b:ab:ab:ab txqueuelen 1000 (Ethernet)
    RX packets 1238 bytes 577084 (577.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 546 bytes 61369 (61.3 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.8.1 netmask 255.255.255.0 broadcast 10.1.8.255
    inet6 fe80::8c5f:e0ff:fe77:3610 prefixlen 64 scopeid 0x20<link>
    ether 8e:5f:e0:77:36:10 txqueuelen 1000 (Ethernet)
    RX packets 29 bytes 2206 (2.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.10 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::c8c0:bbff:fe09:95cd prefixlen 64 scopeid 0x20<link>
    ether ca:c0:bb:09:95:cd txqueuelen 1000 (Ethernet)
    RX packets 237 bytes 18506 (18.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## NEWALBANY

IP: 10.3.10.1

Three ethernet connections. Eth1 at 10.1.9.1 and eth2 at 10.5.1.11 are acting as local networks. Eth0 at 172.30.0.19 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@newalbany:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.9.0        0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0        0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0      0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@newalbany:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.19 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::3071:49ff:feae:c595 prefixlen 64 scopeid 0x20<link>
    ether 32:71:49:ae:c5:95 txqueuelen 1000 (Ethernet)
    RX packets 1074 bytes 563397 (563.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 444 bytes 50892 (50.8 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.9.1 netmask 255.255.255.0 broadcast 10.1.9.255
    inet6 fe80::78bd:f8ff:feaa:1e14 prefixlen 64 scopeid 0x20<link>
    ether 7a:bd:f8:aa:1e:14 txqueuelen 1000 (Ethernet)
    RX packets 29 bytes 2206 (2.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.11 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::9c1f:47ff:fe98:972d prefixlen 64 scopeid 0x20<link>
    ether 9e:1f:47:98:97:2d txqueuelen 1000 (Ethernet)
    RX packets 238 bytes 18596 (18.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



## SYDNEY

IP: 10.3.11.1

Three ethernet connections. Eth1 at 10.1.3.1 and eth2 at 10.5.1.5 are acting as local networks. Eth0 at 172.30.0.27 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@sydney:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.3.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0       0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@sydney:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.27 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::285a:9ff:fe5b:7e92 prefixlen 64 scopeid 0x20<link>
    ether 2a:5a:09:5b:7e:92 txqueuelen 1000 (Ethernet)
    RX packets 1089 bytes 564351 (564.3 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 454 bytes 51245 (51.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.3.1 netmask 255.255.255.0 broadcast 10.1.3.255
    inet6 fe80::e447:16ff:fe8c:d8b1 prefixlen 64 scopeid 0x20<link>
    ether e6:47:16:8c:d8:b1 txqueuelen 1000 (Ethernet)
    RX packets 29 bytes 2206 (2.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.5 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::44eb:edff:fedd:16c1 prefixlen 64 scopeid 0x20<link>
    ether 46:eb:ed:dd:16:c1 txqueuelen 1000 (Ethernet)
    RX packets 239 bytes 18646 (18.6 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## CAPETOWN

IP: 10.3.12.1

Three ethernet connections. Eth1 at 10.1.6.1 and eth2 at 10.5.1.8 are acting as local networks. Eth0 at 172.30.0.12 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@capetown:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.1.6.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
10.5.1.0       0.0.0.0        255.255.255.0   U     0      0      0 eth2
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1    255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@capetown:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.12 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::44d7:6dff:fe6c:ea28 prefixlen 64 scopeid 0x20<link>
    ether 46:d7:6d:6c:ea:28 txqueuelen 1000 (Ethernet)
    RX packets 1102 bytes 565583 (565.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 462 bytes 52615 (52.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.1.6.1 netmask 255.255.255.0 broadcast 10.1.6.255
    inet6 fe80::2cd0:f6ff:fe9b:e91 prefixlen 64 scopeid 0x20<link>
    ether 2e:d0:f6:9b:0e:91 txqueuelen 1000 (Ethernet)
    RX packets 29 bytes 2206 (2.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.5.1.8 netmask 255.255.255.0 broadcast 10.5.1.255
    inet6 fe80::b4be:1cff:fe25:c21c prefixlen 64 scopeid 0x20<link>
    ether b6:be:1c:25:c2:1c txqueuelen 1000 (Ethernet)
    RX packets 240 bytes 18736 (18.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```



## SCM01

IP: 10.3.13.1 → associated with all Landsat nodes

Several ethernet connections are associated with IP addresses from different nodes in the network. Eth0 at 172.30.0.21 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@scm01:~$ route
```

```
Kernel IP routing table
```

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
default	172.30.0.1	0.0.0.0	UG	512	0	0	eth0
10.3.0.0	0.0.0.0	255.255.255.0	U	0	0	0	eth1
10.3.1.0	0.0.0.0	255.255.255.0	U	0	0	0	eth2
10.3.2.0	0.0.0.0	255.255.255.0	U	0	0	0	eth3
10.3.3.0	0.0.0.0	255.255.255.0	U	0	0	0	eth4
10.3.4.0	0.0.0.0	255.255.255.0	U	0	0	0	eth5
10.3.5.0	0.0.0.0	255.255.255.0	U	0	0	0	eth6
10.3.6.0	0.0.0.0	255.255.255.0	U	0	0	0	eth7
10.3.7.0	0.0.0.0	255.255.255.0	U	0	0	0	eth8
10.3.8.0	0.0.0.0	255.255.255.0	U	0	0	0	eth9
10.3.9.0	0.0.0.0	255.255.255.0	U	0	0	0	eth10
10.3.10.0	0.0.0.0	255.255.255.0	U	0	0	0	eth11
10.4.0.0	0.0.0.0	255.255.255.0	U	0	0	0	eth12
10.4.1.0	0.0.0.0	255.255.255.0	U	0	0	0	eth13
10.4.2.0	0.0.0.0	255.255.255.0	U	0	0	0	eth14
172.30.0.0	0.0.0.0	255.255.0.0	U	0	0	0	eth0
172.30.0.1	0.0.0.0	255.255.255.255	UH	512	0	0	eth0
192.168.254.0	172.30.0.1	255.255.255.0	UG	99	0	0	eth0

```
csci3306jbzo@scm01:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.21 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::c86:bdff:feeb:8fdd prefixlen 64 scopeid 0x20<link>
    ether 0e:86:bd:cb:8f:dd txqueuelen 1000 (Ethernet)
    RX packets 1111 bytes 566584 (566.5 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 484 bytes 55627 (55.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.0.1 netmask 255.255.255.0 broadcast 10.3.0.255
    inet6 fe80::40b5:6aff:fe05:901a prefixlen 64 scopeid 0x20<link>
    ether 42:b5:6a:05:90:1a txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2116 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth2: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.1.1 netmask 255.255.255.0 broadcast 10.3.1.255
    inet6 fe80::8061:79ff:fe02:56b prefixlen 64 scopeid 0x20<link>
    ether 82:61:79:02:05:6b txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2116 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.2.1 netmask 255.255.255.0 broadcast 10.3.2.255
    inet6 fe80::f0ab:cff:fe9f:83f5 prefixlen 64 scopeid 0x20<link>
    ether f2:ab:0c:9f:83:f5 txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2116 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth4: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.3.1 netmask 255.255.255.0 broadcast 10.3.3.255
    inet6 fe80::c458:b6ff:feff:fc43 prefixlen 64 scopeid 0x20<link>
    ether c6:58:b6:ff:fc:43 txqueuelen 1000 (Ethernet)
    RX packets 27 bytes 2046 (2.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth5: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.4.1 netmask 255.255.255.0 broadcast 10.3.4.255
    inet6 fe80::302b:17ff:feed:a814 prefixlen 64 scopeid 0x20<link>
    ether 32:2b:17:ed:a8:14 txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2116 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth6: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.5.1 netmask 255.255.255.0 broadcast 10.3.5.255
    inet6 fe80::7ca1:72ff:fe6b:aebf prefixlen 64 scopeid 0x20<link>
    ether 7e:a1:72:6b:ae:bf txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2116 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth7: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.6.1 netmask 255.255.255.0 broadcast 10.3.6.255
    inet6 fe80::c91:a8ff:feb3:65dc prefixlen 64 scopeid 0x20<link>
    ether 0e:91:a8:b3:65:dc txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2116 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth8: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.7.1 netmask 255.255.255.0 broadcast 10.3.7.255
    inet6 fe80::28da:d6ff:fe91:575f prefixlen 64 scopeid 0x20<link>
    ether 2a:da:d6:91:57:5f txqueuelen 1000 (Ethernet)
    RX packets 27 bytes 2046 (2.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
```

```
eth9: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.8.1 netmask 255.255.255.0 broadcast 10.3.8.255
    inet6 fe80::544d:22ff:fed9:dc19 prefixlen 64 scopeid 0x20<link>
    ether 56:4d:22:d9:dc:19 txqueuelen 1000 (Ethernet)
    RX packets 28 bytes 2116 (2.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth10: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.9.1 netmask 255.255.255.0 broadcast 10.3.9.255
    inet6 fe80::d4b5:f0ff:fe15:63dc prefixlen 64 scopeid 0x20<link>
    ether d6:b5:f0:15:63:dc txqueuelen 1000 (Ethernet)
    RX packets 27 bytes 2046 (2.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth11: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.3.10.1 netmask 255.255.255.0 broadcast 10.3.10.255
    inet6 fe80::6f:b1ff:fe70:e131 prefixlen 64 scopeid 0x20<link>
    ether 02:6f:b1:70:e1:31 txqueuelen 1000 (Ethernet)
    RX packets 27 bytes 2046 (2.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth12: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.4.0.1 netmask 255.255.255.0 broadcast 10.4.0.255
    inet6 fe80::8883:f2ff:fed2:3779 prefixlen 64 scopeid 0x20<link>
    ether 8a:83:f2:d2:37:79 txqueuelen 1000 (Ethernet)
    RX packets 23 bytes 1766 (1.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth13: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.4.1.1 netmask 255.255.255.0 broadcast 10.4.1.255
    inet6 fe80::ac3f:feff:fe84:7a2d prefixlen 64 scopeid 0x20<link>
    ether ae:3f:fe:84:7a:2d txqueuelen 1000 (Ethernet)
    RX packets 24 bytes 1836 (1.8 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth14: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.4.2.1 netmask 255.255.255.0 broadcast 10.4.2.255
    inet6 fe80::b081:fcff:fe76:158c prefixlen 64 scopeid 0x20<link>
    ether b2:81:fc:76:15:8c txqueuelen 1000 (Ethernet)
    RX packets 23 bytes 1766 (1.7 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## LANDSAT7

Two ethernet connections. Eth1 at 10.2.2.1 is acting as a local network. Eth0 at 172.30.0.15 acts as the external network interface as it receives the most packages and routes through 172.30.0.1.

```
csci3306jbzo@landsat7:~$ route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default 172.30.0.1 0.0.0.0 UG 512 0 0 eth0
10.2.2.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
172.30.0.0 0.0.0.0 255.255.0.0 U 0 0 0 eth0
172.30.0.1 0.0.0.0 255.255.255.255 UH 512 0 0 eth0
192.168.254.0 172.30.0.1 255.255.255.0 UG 99 0 0 eth0

csci3306jbzo@landsat7:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.15 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::6886:cff:febe:6088 prefixlen 64 scopeid 0x20<link>
    ether 6a:86:0c:be:60:88 txqueuelen 1000 (Ethernet)
    RX packets 1097 bytes 565156 (565.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 455 bytes 51848 (51.8 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.2.2.1 netmask 255.255.255.0 broadcast 10.2.2.255
    inet6 fe80::bc82:73ff:fe50:77aa prefixlen 64 scopeid 0x20<link>
    ether be:82:73:50:77:aa txqueuelen 1000 (Ethernet)
    RX packets 24 bytes 1856 (1.8 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## LANDSAT9

Two ethernet connections. Eth1 at 10.2.0.1 is acting as a local network. Eth0 at 172.30.0.17 acts as the external network interface, receiving the most packages and routes through 172.30.0.1.

```
csci3306jbzo@landsat9:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.2.0.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@landsat9:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.17 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::bc69:6ff:fef1:a63e prefixlen 64 scopeid 0x20<link>
    ether be:69:06:f1:a6:3e txqueuelen 1000 (Ethernet)
    RX packets 1086 bytes 564103 (564.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 454 bytes 51786 (51.7 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.2.0.1 netmask 255.255.255.0 broadcast 10.2.0.255
    inet6 fe80::1462:13ff:fe3c:e936 prefixlen 64 scopeid 0x20<link>
    ether 16:62:13:3c:e9:36 txqueuelen 1000 (Ethernet)
    RX packets 25 bytes 1926 (1.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 20 bytes 1576 (1.5 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## LANDSAT8

Two ethernet connections. Eth1 at 10.2.1.1 is acting as a local network. Eth0 at 172.30.0.16 acts as the external network interface, receiving the most packages and routes through 172.30.0.1.

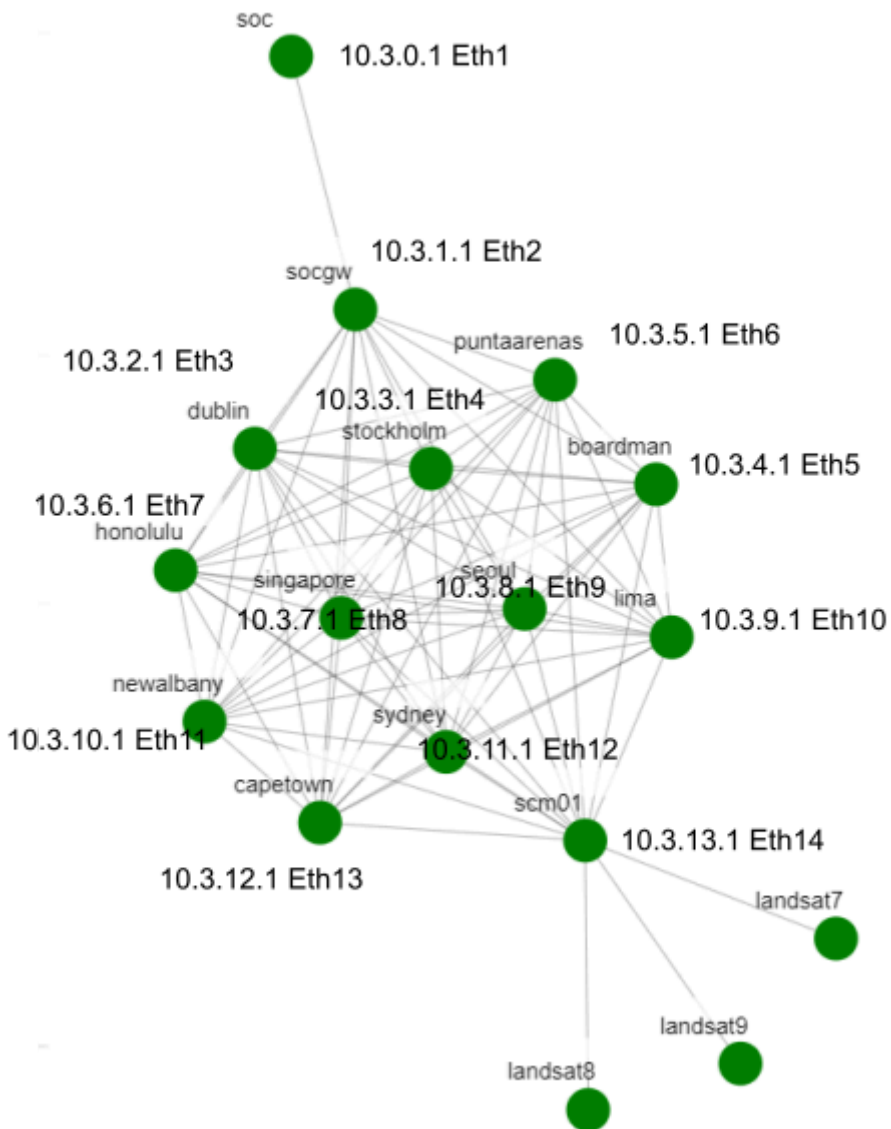
```
csci3306jbzo@landsat8:~$ route
Kernel IP routing table
Destination    Gateway         Genmask         Flags Metric Ref    Use Iface
default        172.30.0.1     0.0.0.0         UG    512    0      0 eth0
10.2.1.0       0.0.0.0        255.255.255.0   U     0      0      0 eth1
172.30.0.0     0.0.0.0        255.255.0.0     U     0      0      0 eth0
172.30.0.1     0.0.0.0        255.255.255.255 UH    512    0      0 eth0
192.168.254.0  172.30.0.1     255.255.255.0   UG    99     0      0 eth0

csci3306jbzo@landsat8:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.30.0.16 netmask 255.255.0.0 broadcast 172.30.255.255
    inet6 fe80::d407:e1ff:fea0:9753 prefixlen 64 scopeid 0x20<link>
    ether d6:07:e1:a0:97:53 txqueuelen 1000 (Ethernet)
    RX packets 1081 bytes 564080 (564.0 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 451 bytes 51686 (51.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.2.1.1 netmask 255.255.255.0 broadcast 10.2.1.255
    inet6 fe80::ec27:aff:fe37:39ff prefixlen 64 scopeid 0x20<link>
    ether ee:27:0a:37:39:ff txqueuelen 1000 (Ethernet)
    RX packets 25 bytes 1926 (1.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 21 bytes 1646 (1.6 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

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 160 bytes 15200 (15.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 160 bytes 15200 (15.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

# NETWORK TOPOLOGY



SOC: 10.3.0.1 eth1

SOCGW: 10.3.1.1 eth2

DUBLIN: 10.3.2.1 eth3

STOCKHOLM: 10.3.3.1 eth4

BOARDMAN: 10.3.4.1 eth5

PUNTAARENAS: 10.3.5.1 eth6

HONOLULU: 10.3.6.1 eth7

SINGAPORE: 10.3.7.1 eth8

SEOUL: 10.3.8.1 eth9

LIMA: 10.3.9.1 eth10

NEWALBANY: 10.3.10.1 eth11  
SYDNEY: 10.3.11.1 eth12  
CAPETOWN: 10.3.12.1 eth13  
LANDSATs: 10.3.13.1 eth14



# CONNECTIVITY

```
csci3306jbzo@soc:~$ sudo route add -net 10.5.2.0 netmask 255.255.255.0 gw 10.5.2.1 dev eth1
csci3306jbzo@soc:~$ ping 10.5.2.1
PING 10.5.2.1 (10.5.2.1) 56(84) bytes of data.
64 bytes from 10.5.2.1: icmp_seq=1 ttl=64 time=0.448 ms
64 bytes from 10.5.2.1: icmp_seq=2 ttl=64 time=0.359 ms
^Z
[2]+  Stopped                  ping 10.5.2.1
csci3306jbzo@soc:~$ █
```

```
csci3306jbzo@puntaarenas:~$ sudo route add -net 10.5.1.0 netmask 255.255.255.0 gw 172.30.0.25 dev eth0
csci3306jbzo@puntaarenas:~$ ping 10.5.2.1
PING 10.5.2.1 (10.5.2.1) 56(84) bytes of data.
^Z
[2]+  Stopped                  ping 10.5.2.1
csci3306jbzo@puntaarenas:~$ ping 172.30.0.25
PING 172.30.0.25 (172.30.0.25) 56(84) bytes of data.
64 bytes from 172.30.0.25: icmp_seq=1 ttl=64 time=1.00 ms
64 bytes from 172.30.0.25: icmp_seq=2 ttl=64 time=0.471 ms
64 bytes from 172.30.0.25: icmp_seq=3 ttl=64 time=0.512 ms
```

```
[3]+  Stopped                  ping 172.30.0.25
csci3306jbzo@puntaarenas:~$ █
```

```
csci3306jbzo@honolulu:~$ sudo route add -net 10.5.1.0 netmask 255.255.255.0 gw 172.30.0.22 dev eth0
csci3306jbzo@honolulu:~$ ping 172.30.0.22
PING 172.30.0.22 (172.30.0.22) 56(84) bytes of data.
64 bytes from 172.30.0.22: icmp_seq=1 ttl=64 time=0.882 ms
64 bytes from 172.30.0.22: icmp_seq=2 ttl=64 time=0.478 ms
64 bytes from 172.30.0.22: icmp_seq=3 ttl=64 time=0.498 ms
^Z
[1]+  Stopped                  ping 172.30.0.22
csci3306jbzo@honolulu:~$ █
```

```
csci3306jbzo@boardman:~$ sudo route add -net 10.5.1.0 netmask 255.255.255.0 gw 172.30.0.21 dev eth0
csci3306jbzo@boardman:~$ ping 172.30.0.21
PING 172.30.0.21 (172.30.0.21) 56(84) bytes of data.
64 bytes from 172.30.0.21: icmp_seq=1 ttl=64 time=0.961 ms
64 bytes from 172.30.0.21: icmp_seq=2 ttl=64 time=0.481 ms
64 bytes from 172.30.0.21: icmp_seq=3 ttl=64 time=0.479 ms
64 bytes from 172.30.0.21: icmp_seq=4 ttl=64 time=0.498 ms
^Z
[1]+  Stopped                  ping 172.30.0.21
csci3306jbzo@boardman:~$ █
```

```
csci3306jbzo@singapore:~$ sudo route add -net 10.5.1.0 netmask 255.255.255.0 gw 172.30.0.25 dev eth0
csci3306jbzo@singapore:~$ ping 172.30.0.25
PING 172.30.0.25 (172.30.0.25) 56(84) bytes of data.
64 bytes from 172.30.0.25: icmp_seq=1 ttl=64 time=0.851 ms
64 bytes from 172.30.0.25: icmp_seq=2 ttl=64 time=0.464 ms
64 bytes from 172.30.0.25: icmp_seq=3 ttl=64 time=0.445 ms
^Z
[1]+  Stopped                  ping 172.30.0.25
csci3306jbzo@singapore:~$
```

```
csci3306jbzo@lima:~$ sudo route add -net 10.5.1.0 netmask 255.255.255.0 gw 172.30.0.25 dev eth0
csci3306jbzo@lima:~$ ping 172.30.0.25
PING 172.30.0.25 (172.30.0.25) 56(84) bytes of data.
64 bytes from 172.30.0.25: icmp_seq=1 ttl=64 time=1.03 ms
64 bytes from 172.30.0.25: icmp_seq=2 ttl=64 time=0.487 ms
64 bytes from 172.30.0.25: icmp_seq=3 ttl=64 time=0.450 ms
^Z
[1]+  Stopped                  ping 172.30.0.25
csci3306jbzo@lima:~$ █
```

There are a few differences between GNS3 and Linux but one of the most major differences is that GNS3 has a graphical user interface whereas Linux uses command line.

Linux provides more flexibility in managing network routes but can be significantly more complex because it uses a command line. Furthermore, routes are not persistent and need to be manually saved.

GNS3 provides an easier GUI interface compared to Linux. GNS3 supports routing protocols like RIP and OSPF, which makes creating networks significantly faster. Furthermore, routes are persistent in GNS3.

## CLOSING

In this lab, I learned more about network topology. I learned to use the route and ifconfig commands to analyze network configurations. I learned how to use route commands to enable connectivity between nodes that otherwise did not have connectivity. I have become more familiar with using Linux for networks, especially with sudo commands. This lab was quite lengthy and somewhat challenging so I became significantly more familiar with using Jupyter and Sphere.