

# **| JUNIPER SWITCHING | | LAB EXERCISE 2 |**

Initial and Secondary Configuration,  
Operational Monitoring and Maintenance,  
Interfaces, Virtual Chassis and Aggregation



# Juniper Networks

## Enterprise Switching Summer School

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### 9.b

Lab 2: Initial and Secondary Configuration,  
Operational Monitoring and Maintenance,  
Interfaces, Virtual Chassis and Aggregation

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*OJXE Summer School Detailed Lab Guide*

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## General Lab Instructions

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Your lab pod consists of two Juniper Networks EX-4200 switches. Switches are connected together over 3 GE interfaces: ge-0/0/10, Ge-0/0/11 and ge-0/0/12 according to the lab diagram. You do not need to configure additional physical interfaces in the lab exercises. Switches are also interconnected over the OoB Management Network via switches' me0 interfaces.

You gain access to the switches via three different ways:

- Console port, CLI
- Management interface, me0, CLI
- Management interface, me0, J-Web

Access to each of these user interfaces is explained in lab access instructions sent to you via e-mail. Make sure you do not change the IP address of the me0.0 logical interface. This would cut your telnet/HTTP session after committing the changes. If that should happen log in via the Console port and issue **rollback 1** command followed by **commit** command. Also be careful not to change the hostname of the switch. That will make it hard for you to follow the lab instructions in this Lab guide where we normally refer the pod switches as **POD\_NAME-S1** and **POD\_NAME-S2**. Pods are labeled **A, B, C** and **D** thus the individual switches are labeled **A-S1 & A-S2, B-S1 & B-S2, C-S1 & C-S2** and **D-S1 & D-S2**.

When given instructions to configure a switch, the instructions normally refer to both of your pod's switches. In special cases you only need to configure one of the two switches. In these sections the specific switch will be indicated in the lab exercise by name **S1** or **S2**.

Note that your lab login (password *lab123*) grants you all permissions needed to complete this lab; but some restrictions have been made to prevent loss of connectivity to the devices. Please be careful, and have fun!

The time needed to complete each of the 4 lab exercise sets may vary very much between each individual student. Some of you might finish the tasks in less than the scheduled two hours. Some of you might not have time to complete them. If you get stuck in an exercise or do not fully understand the meaning of a task use the Detailed Lab Guide where all commands and outputs as well the answers for all questions are presented for you.

# Lab 2

---

## Initial and Secondary Configuration, Operational Monitoring and Maintenance, Interfaces, Virtual Chassis and Aggregation (Detailed)

### Overview

---

In this lab you configure and monitor some of the recommended initial and secondary system parameters. Which parameters need to be configured in a switch in a real network depends of course on the network topology, features and functions in use etc. You will also configure and run some basic system monitoring and maintenance functions. You will also configure basic interface operations and an aggregated ethernet interface. Finally you will configure a some of the interfaces features such as aggregated Ethernet interface.

This lab is available in two formats: a high-level format that is designed to make you think through each step and a detailed format that offers step-by-step instructions complete with sample output from most commands.

By completing this lab, you will perform the following tasks:

- Loading factory default configuration.
- Reconfigure the network.
- Create a basic system configuration.
- Perform some system monitoring and maintenance tasks.
- Configure ethernet aggregation.

### Part 1: Performing Initial Configuration Using CLI (Detailed)

---

The objective of this lab part is to perform typical system installation tasks using the JUNOS software CLI. Since the user lab account is a restricted one most of the initial configuration tasks are already performed. This because we want to ensure that certain parts of the configuration cannot be changed by the users.

#### Step 1.1

Log in to your assigned switches (S1 & S2) via console port with user *lab* and password *lab123*. Next, enter configuration mode, and pipe your current configuration through the CLI's display set functionality to provide yourself with a visual aid for the command syntax you will need. The sample is taken from the S1 switch:

```
login: lab
Password:
```

```
--- JUNOS 9.2-20081126.1 built 2008-11-26 15:59:35 UTC
```

#### Step 1.2

A non-root user does start the CLI automatically. Enter the configuration mode.

```
lab@A-S1> configure
```

Entering configuration mode

```
[edit]
lab@A-S1#
```

### Step 1.3

Check the switch's current configuration by issuing the **show** command.

```
[edit]
lab@A-S1# show
## Last changed: 2009-06-09 22:21:55 CEST
version "9.2I0.1 [builder]";
system {
    host-name A-S1;
    time-zone Europe/Berlin;
    root-authentication {
        encrypted-password fjaB8p5lLXidI; ## SECRET-DATA
        ssh-dsa "ssh-dss
AAAAB3NzaC1kc3MAAACBAMQrfP2bZyBXJ6PC7XXZ+MzErI8Jl6jah5L4/O8BsfP2hc7EvRfNoX7Mqbr
tCX/9gUH9gChVuBCB+ERULMdgRvM5uGhC/gS4UX+4dBbfBgKYYwgmisM8EoT25m7qI8ybp12YZvHNzn
vO8h7kr4kpYuQEpkVgsTdH/Jle4Uqnjv7DAAAAAFQDZaqA6QAgbW30/zveaLCIDj6p0dwAAAIbLiL+kr
Wrxid8NppY+w4dWXEqav3bnobzPC4eyxQKBUCOr80Q5YBlWXVBHx9elwBWZwj0SF4hLKHznExnLerVs
MuTMA846RbQmSz62vM6kGM13HFonWeQvWia0TDr78+rOEgWF2KHBSIxL51lmIDW8Gq19hJfD/Dr/NKP
97w3L0wAAAIEAr3FkWU8XbYytQYEKxsIN9P1UQ1ERXB3G40YwqFO484SlyKyYcfaz+yNsaAJu2C8Ueb
DIR3GieyNcOAKf3inCG8jQwjLvZskuZwrVlsz/xtcxSoAh9axJcdUfSJYMW/g+mD26JK1Clw5rwp2n
H9kUrJxeI7IREdp4egNkM4i15o= configurator@server1.he"; ## SECRET-DATA
    }
    login {
        user lab {
            uid 2001;
            class super-user;
            authentication {
                encrypted-password "$1$L6qU68t8$n9kcm5m7SenAgggL3vE4n."; ##
SECRET-DATA
            }
        }
    }
    services {
        ftp;
        ssh;
        telnet;
        web-management {
            http;
        }
    }
    syslog {
        user * {
            any emergency;
        }
        file messages {
            any notice;
            authorization info;
        }
        file interactive-commands {
            interactive-commands any;
        }
    }
}
interfaces {
    me0 {
```

```

        description "MGMT INTERFACE - DO NOT DELETE";
        unit 0 {
            family inet {
                address 10.210.8.161/28;
            }
        }
    }
}
routing-options {
    static {
        route 0.0.0.0/0 next-hop 10.210.8.174;
    }
}
protocols {
    igmp-snooping {
        vlan all;
    }
    lldp {
        interface all;
    }
    lldp-med {
        interface all;
    }
    rstp;
}
ethernet-switching-options {
    storm-control {
        interface all {
            level 50;
        }
    }
}
poe {
    interface all;
}

[edit]
lab@A-S1#

```

## Step 1.4

Configure the correct time-zone (*Europe/Berlin* and the correct system time (an operational mode command, use the **run** command from the configurational mode).

```

[edit]
lab@A-S1# set system time-zone Europe/Berlin

[edit]
lab@A-S1# run set date 200906090858.00
Tue Jun  9 08:58:00 UTC 2009

[edit]
lab@A-S1#

```

## Step 1.5

Check your configuration by issuing the `show` command with the pipe **display set** command. Finally compare the candidate configuration with the active (running) configuration with the **show | compare** command.

```
[edit]
lab@A-S1# show | display set
set version "9.2I0.1 [builder]"
set system host-name A-S1
set system time-zone Europe/Berlin
set system root-authentication encrypted-password fjaB8p5lLXidI
set system root-authentication ssh-dsa "ssh-dss
AAAAB3NzaC1kc3MAAACBAMQrfP2bZyBXJ6PC7XXZ+MzErI8Jl6jah5L4/O8BsfP2hC7EvRfNoX7Mqbr
tCX/9gUH9gChVuBCB+ERULMdgRvM5uGhC/gS4UX+4dBbfBgKYYwgmisM8EoT25m7qI8ybp12YZvHNzn
v08h7kr4kpYuQEpkvgsTdH/Jle4Uqnjv7DAAAAFQDZaqA6QAgbW30/zveaLCIDj6p0dwAAAIbliL+kr
WrXiD8NppY+w4dWXEqav3bnobzPC4eyxQKBUCOr80Q5YBlWXVBHx9elwBWZwj0SF4hLKHznExnLerVs
MuTMA846RbQmSz62vM6kGM13HFonWeQvWia0TDr78+rOEgWF2KHBSIxL51lmIDW8Gq19hJfD/Dr/NKP
97w3L0wAAAIEAr3FkWU8XbYytQYEkxsIN9P1UQ1ERXB3G40YwqFO484SlyKyYcfaz+yNsaAJu2C8Ueb
DIR3GieyNcOAKf3inCG8jQwjLvZskuZwrVlsz/xtcxSoAh9axJcdUfSJYMW/g+mD26JK1Cliw5rwp2n
H9kUrJxeI7IREdp4egNkM4i15o= configurator@server1.he"
set system login user lab uid 2001
set system login user lab class super-user
set system login user lab authentication encrypted-password
"$1$L6quU68t8$N9kcm5m7SenAgggL3vE4n."
set system services ftp
set system services ssh
set system services telnet
set system services web-management http
set system syslog user * any emergency
set system syslog file messages any notice
set system syslog file messages authorization info
set system syslog file interactive-commands interactive-commands any
set interfaces me0 description "MGMT INTERFACE - DO NOT DELETE"
set interfaces me0 unit 0 family inet address 10.210.8.161/28
set routing-options static route 0.0.0.0/0 next-hop 10.210.8.174
set protocols igmp-snooping vlan all
set protocols lldp interface all
set protocols lldp-med interface all
set protocols rstp
set ethernet-switching-options storm-control interface all level 50
set poe interface all
```

```
[edit]
lab@A-S1# show | compare
[edit system]
+ time-zone Europe/Berlin;
```

```
[edit]
lab@A-S1#
```

## Part 2: Configuration of the Loopback Interface (Detailed)

---

### Step 2.1

Enter the configuration mode and configure the correct IP address on the *lo0* interface according the lab diagram.

```
[edit]
lab@A-S1# set interfaces lo0.0 family inet address 192.168.1.1
lab@A-S1# commit
```

### Step 2.2

Enter the **show interface lo0 terse** command to confirm that the IP address is assigned.

```
lab@A-S1# run show interfaces lo0 terse
Interface Admin Link Proto Local Remote
lo0 up up
lo0. up up inet 192.168.1.1 --> 0/0
```

## **Part 3: Configuring User Authentication and Authorization (Detailed)**

---

The purpose of this part is to perform user account, authentication and authorization tasks using the JUNOS CLI.

### **Step 3.1**

In your switch there is a user named *noc-user*. Here below you see (*do not try to configure this!*) the configuration of user *noc-user* who belongs to *login class NOC* and has view and view-configuration permissions. Password is set to *noc123*.

```
[edit system login]
lab@A-S1# set class NOC permissions view

[edit system login]
lab@A-S1# set class NOC permissions view-configuration

[edit system login]
lab@A-S1# set user noc-user class NOC authentication plain-text-password
New password:
Retype new password:

lab@A-S1# commit
```

### **Step 3.2**

Log in as user *noc-user*. Make sure you can issue show commands, including **show configuration** commands. You should not be able to enter configuration mode. To verify your permissions, use the **show cli authorization** command.

```
A-S1 (ttyu0)
login: noc-user
Password:
--- JUNOS 9.4R2.9 built 2009-03-25 08:13:15 UTC

noc-user@A-S1> show cli authorization
Current user: 'noc-user ' class 'NOC'
Permissions:
view -- Can view current values and statistics
view-configuration-- Can view all configuration (not including secrets)
Individual command authorization:
Allow regular expression: none
Deny regular expression: none
Allow configuration regular expression: none
Deny configuration regular expression: none
```

Question: Use the **?** at the operational mode prompt. List the command alternatives you can use.

---

---

Answer: List of the available commands: file, help, monitor, op, quit, request, set, show, start and test.

```
noc-user@A-S1> ?
Possible completions:
  file           Perform file operations
  help           Provide help information
  monitor        Show real-time debugging information
  op             Invoke an operation script
  quit           Exit the management session
  request        Make system-level requests
  set            Set CLI properties, date/time, craft interface message
  show           Show system information
  start          Start shell
  test           Perform diagnostic debugging
noc-user@A-S1>
```

### Step 3.3

Log in as *lab* user again.

```
noc-user@A-S1> exit
```

```
A-S1 (ttyu0)
```

```
login: lab
Password:
```

```
--- JUNOS 9.2-20081126.1 built 2008-11-26 15:59:35 UTC
lab@A-S1>
```

### Step 3.4

Enter the configuration mode.

In this Step you must use the console connection to the switch. You will configure a RADIUS server for use with user authentication. IP address to the RADIUS server is *10.210.8.173*.

The purpose of this exercise is to configure a RADIUS server and authentication order without having the configured RADIUS secret in the server. This will result to authentication reject by the RADIUS server. IF YOU DO NOT KEEP YOUR CONSOLE SESSION LIVE YOU CANNOT LOG IN TO THE SWITCH AGAIN.

```
lab@A-S1# set system radius-server 10.210.8.173 secret Juniper
lab@A-S1# set system authentication-order radius

[edit]
lab@A-S1# commit
commit complete
```

### Step 3.5

Start a new terminal session using Telnet to your switch. Log in as user *lab* with password *lab123*.

Question: What happens when you log in?

---

---

Answer: User lab cannot log in. The RADIUS server denies the access since user lab is not configured in it.

```
A-S1 (tty2)
login : lab
Password :
Login incorrect
```

### Step 3.6

Now you will change the IP address of the configured RADIUS server from *10.210.8.173* to *10.1.1.1*. Use the **rename** command. Do not forget to **commit** your changes.

```
lab@A-S1# rename system radius-server 10.210.8.173 to 10.1.1.1

[edit]
lab@A-S1# commit
commit complete
```

### Step 3.7

Using the second, Telnet terminal window, try to login as user lab again.

Question: What happens when you log in?

---

---

Answer: User lab can log in. The RADIUS cannot be contacted at *10.1.1.1* so the system automatically consults the local password database for user authentication.

### Step 3.8

Return to your console session and delete the `authentication-order` statement. Commit your configuration. You can also close the second terminal session

```
[edit]
lab@A-S1# delete system authentication-order
```

```
[edit]
lab@A-S1# commit
commit complete
```

## Part 4: Performing System Management Options (Detailed)

---

In this part you will perform some basic switch maintenance and management features. You will perform configuration of system logging and NTP configuration.

### Step 4.1

Log in to your switch and navigate yourself to the *system syslog* hierarchy. Check the current configuration at that level.

```
[edit]
lab@A-S1# edit system syslog

[edit system syslog]
lab@A-S1# show
user * {
    any emergency;
}
file messages {
    any notice;
    authorization info;
}
file interactive-commands {
    interactive-commands any;
}

[edit system syslog]
lab@A-S1#
```

Question: What facilities and severity levels are currently being logged to the `messages` log file?

---

---

Answer: As part of the baseline configuration, all facilities are being logged at the notice severity level and the authorization facility is being logged at the info severity level.

Question: What is the purpose of specifying a facility of `any`?

---

---

Answer: This option will log all facility levels.

## Step 4.2

Configure a new system log file on the local switch. Name the log file `config-changes`. Specify a facility of `change-log` and severity level of `info`.

```
[edit system syslog]
lab@A-S1# set file config-changes change-log info
```

## Step 4.3

Create a new system log that will send to a remote *syslog server*. Use `10.210.8.173` as the server address. Choose a correct facility that will log access attempts on the switch and a severity level of `info`. Do not forget to commit your changes.

```
[edit system syslog]
lab@A-S1# set host 10.210.8.173 authorization info
```

```
[edit system syslog]
lab@A-S1# commit
commit complete
```

## Step 4.4

Use the `file` command to verify that a log file was created in the `/var/log` directory.

```
[edit system syslog]
lab@A-S1# run file list /var/log/
```

```
/var/log/:
authd_sdb.log
chassisd
config-changes
cosd
dcd
default-log-messages
dfwc
dfwd
```

## Step 4.5

Configure the switch to synchronize its clock with an NTP server. Server's address is `10.210.8.173`. Use this server as both a *boot server* and a *synchronization server*. Do not forget to commit your changes.

```
[edit]
lab@A-S1# set system ntp boot-server 10.210.8.173
```

```
[edit]
lab@A-S1# set system ntp server 10.210.8.173
```

```
[edit]
lab@A-S1# commit
commit complete
```

## Step 4.6

Check the `config-changes` log file and verify that the latest configuration change was logged.

```
[edit]
lab@A-S1# run show log config-changes
Jun  9 13:00:39 A-S1 mgd[4100]: UI_CFG_AUDIT_OTHER: User 'lab' set: [system
ntp]
Jun  9 13:00:39 A-S1 mgd[4100]: UI_CFG_AUDIT_SET: User 'lab' set: [system ntp
boot-server] <unconfigured> -> "10.210.8.173"
Jun  9 13:00:50 A-S1 mgd[4100]: UI_CFG_AUDIT_OTHER: User 'lab' set: [system
ntp server 10.210.8.173]

[edit]
lab@A-S1#
```

## Step 4.7

Manually force synchronization with the NTP server by issuing the `set date ntp` operational-mode command.

```
lab@A-S1> set date ntp
11 Apr 13:01:15 ntpdate[4996]: step time server 10.210.8.173 offset 0.000110
sec
```

## Step 4.8

Verify synchronization with the NTP server by using the `show ntp associations` command. The switch is synchronized with the NTP server if you see the server address in the `remote` column with an asterisk (\*) next to it. Check the current system time by using the `show system uptime` command

```
[edit]
lab@A-S1# run show ntp associations
***Can't find host localhost
=====
remote          refid          st t when poll reach  delay  offset  jitter
=====
*10.210.8.173   192.87.106.3   2 u  20   64    7    0.318  -7.347  4.252

[edit]
lab@A-S1# run show system uptime
Current time: 2009-06-09 13:14:00 UTC
System booted: 2009-06-09 06:37:08 UTC (06:36:52 ago)
Protocols started: 2009-06-09 10:31:11 UTC (02:42:49 ago)
Last configured: 2009-06-09 13:00:58 UTC (00:13:02 ago) by lab
1:14PM up 6:37, 1 user, load averages: 0.05, 0.09, 0.11
```

Question: What does the \* symbol next to the NTP server address signify?

---

---

Answer: In the case that you have configured multiple NTP servers for synchronization, the \* symbol represents the peer that was chosen for synchronization.

## Part 5: Monitoring Chassis Operations (Detailed)

---

In this part you will use some key commands within CLI to monitor system and chassis operations.

### Step 5.1

Issue the `show system processes extensive` command to check the status of the Ethernet switching process. The process is named `eswd`.

```
lab@A-S1> show system processes extensive
last pid: 5003; load averages: 0.03, 0.03, 0.06 up 0+06:47:36 13:24:14
104 processes: 4 running, 81 sleeping, 19 waiting
```

```
Mem: 127M Active, 13M Inact, 77M Wired, 420K Cache, 97M Buf, 765M Free
Swap:
```

PID	USERNAME	THR	PRI	NICE	SIZE	RES	STATE	TIME	WCPU	COMMAND
11	root	1	171	52	0K	16K	RUN	353:57	90.48%	idle
530	root	1	101	0	12160K	3612K	RUN	34:03	5.03%	chassism
12	root	1	-40	-159	0K	16K	WAIT	0:53	0.24%	swi2: net
23	root	1	-68	-187	0K	16K	WAIT	0:27	0.24%	irq30: tsec0
1519	root	1	8	0	62004K	7352K	nanslp	4:35	0.15%	pfem
22	root	1	-68	-187	0K	16K	WAIT	0:18	0.10%	irq29: tsec0
13	root	1	-20	-139	0K	16K	RUN	1:59	0.00%	swi7: clock
531	root	2	44	-52	60244K	3896K	select	1:10	0.00%	sfid
80	root	1	-8	0	0K	16K	mdwait	0:12	0.00%	md3
1510	root	1	96	0	15448K	8972K	select	0:11	0.00%	chassisd
100	root	1	-8	0	0K	16K	mdwait	0:07	0.00%	md5
29	root	1	-52	-171	0K	16K	WAIT	0:07	0.00%	irq43: i2c0
i2c1										
1501	root	1	4	0	7868K	4156K	kqread	0:06	0.00%	eswd
1509	root	1	4	0	19608K	8856K	kqread	0:05	0.00%	rp3
1514	root	1	96	0	4716K	2176K	select	0:04	0.00%	ppmd
90	root	1	-8	0	0K	16K	mdwait	0:04	0.00%	md4
1495	root	1	96	0	16936K	12584K	select	0:04	0.00%	snmpd

Question: How can you make your search result more easily readable?

---

---

Answer: Use the `| match` option and match the keywords `PID` and `eswd`.

```
lab@A-S1> show system processes extensive | match "PID | eswd"
PID USERNAME THR PRI NICE SIZE RES STATE TIME WCPU COMMAND
1501 root 1 4 0 7868K 4156K kqread 0:06 0.00% eswd
```

Question: What is the weighted CPU usage of the Ethernet switching process (`eswd`)?

---

---

Answer: The answer can vary. In the sample output taken from s1, the weighted CPU usage is 0%. The weighted CPU column represents the CPU usage over a period of time.

## Step 5.2

Issue the **show system storage** command to view information regarding the device storage space.

```
lab@A-S1> show system storage
```

```
fpc0:
```

```
-----  
Filesystem      Size      Used      Avail  Capacity  Mounted on  
/dev/da0s1a    184M      83M      86M     49%      /  
devfs          1.0K      1.0K      0B     100%     /dev  
devfs          1.0K      1.0K      0B     100%     /dev/  
/dev/md0        31M      31M      0B     100%     /packages/mnt/jbase  
/dev/md1        13M      13M      0B     100%     /packages/mnt/jcrypto-ex-  
9.2-20081126.1  
/dev/md2        4.3M      4.3M      0B     100%     /packages/mnt/jdocs-ex-  
9.2-20081126.1  
/dev/md3        88M      88M      0B     100%     /packages/mnt/jkernel-ex-  
9.2-20081126.1  
/dev/md4        13M      13M      0B     100%     /packages/mnt/jpfe-ex42x-  
9.2-20081126.1  
/dev/md5        33M      33M      0B     100%     /packages/mnt/jroute-ex-  
9.2-20081126.1  
/dev/md6        12M      12M      0B     100%     /packages/mnt/jswitch-ex-  
9.2-20081126.1  
/dev/md7        15M      15M      0B     100%     /packages/mnt/jweb-ex-  
9.2-20081126.1  
/dev/md8        63M      8.0K      58M      0%      /tmp  
/dev/da0s1f    123M      1.3M     112M      1%      /var  
/dev/da0s3e     55M      86K      51M      0%      /config  
/dev/da0s3d    314M      3.1M     286M      1%      /var/tmp  
...  
-----
```

Question: How much free space is available in the `/var/tmp` directory?

---

Answer: The answer can vary. In the example above, 286 Megabytes are available.

## Step 5.3

Check the environmental status of the switch by using the **show chassis environment** command.

```
lab@A-S1> show chassis environment
```

```
Class Item                               Status      Measurement  
Power FPC 0 Power Supply 0              OK  
      FPC 0 Power Supply 1              Absent  
Temp  FPC 0 CPU                          OK          39 degrees C / 102 degrees F
```

```

FPC 0 EX-PFE1           OK           46 degrees C / 114 degrees F
FPC 0 EX-PFE2           OK           48 degrees C / 118 degrees F
FPC 0 GEPHY Front Left  OK           39 degrees C / 102 degrees F
FPC 0 GEPHY Front Right OK           39 degrees C / 102 degrees F
FPC 0 Uplink Conn       OK           39 degrees C / 102 degrees F
Fans FPC 0 Fan 1         OK           Spinning at normal speed
FPC 0 Fan 2             OK           Spinning at normal speed
FPC 0 Fan 3             OK           Spinning at normal speed

```

Question: What is the temperature and status of the routing engine (RE)?

---



---

Answer: The answer can vary. In the example above, the temperature is 39 degrees Celsius.

Question: Is there another command to display the temperature and status of the routing engine (RE)?

---



---

Answer: Use the **show chassis routing-engine** command.

```

lab@A-S1> show chassis routing-engine
Routing Engine status:
Slot 0:
  Current state           Master
  Temperature             38 degrees C / 100 degrees F
  DRAM                    1024 MB
  Memory utilization      24 percent
  CPU utilization:
    User                   6 percent
    Kernel                  2 percent
    Interrupt              0 percent
    Idle                    92 percent
  Model                   EX4200-24T, 8 POE
  Serial ID                BM0209191929
  Start time               2009-06-09 06:37:08 UTC
  Uptime                   7 hours, 3 minutes, 24 seconds
  Load averages:          1 minute   5 minute   15 minute
                          0.39         0.25         0.14

```

## Step 5.4

View details about the switch's hardware components using the **show chassis hardware** command.

```

lab@A-S1> show chassis hardware
Hardware inventory:
Item           Version  Part number  Serial number  Description
Chassis
FPC 0          REV 17   750-021256  BM0209191929  EX4200-24T, 8 POE

```

CPU		BUILTIN	BUILTIN	FPC CPU
PIC 0		BUILTIN	BUILTIN	24x 10/100/1000 Base-T
Power Supply 0	REV 03	740-020957	AT0508418704	PS 320W AC
Fan Tray				Fan Tray

## Part 6: Using Network Utilities and Monitoring Traffic (Detailed)

---

In this lab part, each team will use network utilities within the CLI and monitor local switch traffic.

### Step 6.1

Refer to the management diagram handout and ascertain the IP address of the second switch in your pod attached to your management network. Ping the switch. Specify 5 ICMP Echo Requests, a data size of 500 bytes and send requests rapidly.

```
lab@A-S1> ping 10.210.8.162 count 5 size 500 rapid
PING 10.210.8.162 (10.210.8.162): 500 data bytes
!!!!
--- 10.210.8.162 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.121/0.175/0.278/0.062 ms
```

### Step 6.2

Open a new terminal session to the other switch by using Telnet to access the me0 IP address associated with the switch. If needed, refer to the management network diagram handout. Log in to the switch with the *lab* user account and password *lab123*. You will use this separate terminal session to generate traffic to the other switch where you will monitor the traffic being received and sent by the routing engine.

Start a continuous ping from S2 to S1 using the S1 me0.0 IP address as the target address. Use the **CTRL+C** command to stop the continuous ping.

```
lab@A-S2> ping 10.210.8.161
PING 10.210.8.161 (10.210.8.161): 56 data bytes
64 bytes from 10.210.8.161: icmp_seq=0 ttl=64 time=0.273 ms
64 bytes from 10.210.8.161: icmp_seq=1 ttl=64 time=0.194 ms
64 bytes from 10.210.8.161: icmp_seq=2 ttl=64 time=0.219 ms
64 bytes from 10.210.8.161: icmp_seq=3 ttl=64 time=0.436 ms
...
```

Start the monitoring in S1. If no interface is defined the default is me0. Use the **CTRL+C** command to stop the continuous ping

```
lab@A-S1> monitor traffic
verbose output suppressed, use <detail> or <extensive> for full protocol decode
Address resolution is ON. Use <no-resolve> to avoid any reverse lookup delay.
Address resolution timeout is 4s.
Listening on me0, capture size 96 bytes
```

```
Reverse lookup for 10.14.8.6 failed (check DNS reachability).
Other reverse lookup failures will not be reported.
Use <no-resolve> to avoid reverse lookups on IP addresses.
```

```
14:04:04.371853 In IP 10.14.8.6 > 224.0.0.5: OSPFv2, Hello, length 44
```

```
14:04:04.467499 In IP 10.210.8.162 > 10.210.8.161: ICMP echo request, id 4852,
seq 26, length 64
14:04:04.467556 Out IP 10.210.8.161 > 10.210.8.162: ICMP echo reply, id 4852,
seq 26, length 64
14:04:04.717827 Out arp who-has 10.210.8.174 tell 10.210.8.161
14:04:05.459641 In STP 802.1w, Rapid STP, Flags [Proposal, Learn, Forward],
bridge-id 8000.00:23:9c:11:f2:00.8225, length 43
```

Question: How can you filter the output to show only the ICMP traffic?

---

---

Answer: Use matching option to filter by header information as shown in the output here below.

```
lab@A-S1> monitor traffic matching icmp
verbose output suppressed, use <detail> or <extensive> for full protocol decode
Address resolution is ON. Use <no-resolve> to avoid any reverse lookup delay.
Address resolution timeout is 4s.
Listening on me0, capture size 96 bytes
```

```
Reverse lookup for 10.210.8.162 failed (check DNS reachability).
Other reverse lookup failures will not be reported.
Use <no-resolve> to avoid reverse lookups on IP addresses.
```

```
14:07:07.795087 In IP 10.210.8.162 > 10.210.8.161: ICMP echo request, id 4853,
seq 9, length 64
14:07:07.795147 Out IP 10.210.8.161 > 10.210.8.162: ICMP echo reply, id 4853,
seq 9, length 64
```

Question: What command option allows you to view the source and destination MAC addresses for the captured packets?

---

---

Answer: Include the `layer2-headers` option to view Layer 2 header information, including the source and destination MAC addresses as shown here below.

```
lab@A-S1> monitor traffic matching icmp layer2-headers
verbose output suppressed, use <detail> or <extensive> for full protocol decode
Address resolution is ON. Use <no-resolve> to avoid any reverse lookup delay.
Address resolution timeout is 4s.
Listening on me0, capture size 96 bytes
```

```
Reverse lookup for 10.210.8.162 failed (check DNS reachability).
Other reverse lookup failures will not be reported.
Use <no-resolve> to avoid reverse lookups on IP addresses.
```

```
14:09:44.560588 In 0:23:9c:13:91:bf > 0:23:9c:13:91:81, ethertype IPv4
(0x0800), length 98: 10.210.8.162 > 10.210.8.161: ICMP echo request, id 4854,
seq 10, length 64
```

```
14:09:44.560648 Out 0:23:9c:13:91:81 > 0:23:9c:13:91:bf, ethertype IPv4
(0x0800), length 98: 10.210.8.161 > 10.210.8.162: ICMP echo reply, id 4854, seq
10, length 64
```

## Part 7: Interface Configuration (Detailed)

---

In this part you will configure 3 of the switch's interfaces: *ge-0/0/10* – *ge-0/0/12* for Ethernet switching operations. Later in subsequent labs you will also configure layer 3 routed VLAN interfaces. Note that the switch ports can also be configured to run layer 3 operations.

### Step 7.1

Check the current interface status by issuing the operational mode command **show interfaces terse**.

```
lab@A-S1> show interfaces terse
Interface           Admin Link Proto  Local           Remote
ge-0/0/0            up   up
...
ge-0/0/8            up   down
ge-0/0/9            up   down
ge-0/0/10           up   up
ge-0/0/11           up   up
ge-0/0/12           up   up
...
lo0                 up   up
lo0.0               up   up   inet    192.168.1.1     --> 0/0
lsi                 up   up
me0                 up   up
me0.0               up   up   inet    10.210.8.161/28
...

lab@A-S1>
```

### Step 7.2

Enter the configuration mode and move to the [edit interfaces] hierarchy level.

```
lab@A-S1> configure
Entering configuration mode

[edit]
lab@A-S1# edit interfaces

[edit interfaces]
lab@A-S1#
```

### Step 7.3

Configure interfaces *ge-0/0/10* – *ge-0/0/12* to support family ethernet-switching, i.e. layer 2 operations. Configure also *ge-0/0/11* and *ge-0/0/12* to speed lg under ether-options. Do not forget to commit your changes.

```
lab@A-S1# set ge-0/0/10 unit 0 family ethernet-switching

[edit interfaces]
lab@A-S1# set ge-0/0/11 unit 0 family ethernet-switching
```

```

[edit interfaces]
lab@A-S1# set ge-0/0/12 unit 0 family ethernet-switching

[edit interfaces]
lab@A-S1# set ge-0/0/11 ether-options speed 1g

[edit interfaces]
lab@A-S1# set ge-0/0/12 ether-options speed 1g

[edit interfaces]
lab@A-S1# commit
commit complete

```

## Step 7.4

Question: Check the interface status again. Do you see any changes in the `ge-0/0/10` - `ge-0/0/12` output?

---



---

Answer: As shown in the output, these interfaces have now also a logical interface configured for protocol ethernet switching.

```

[edit interfaces]
lab@A-S1# run show interfaces terse
Interface           Admin Link Proto   Local           Remote
ge-0/0/0             up   up
ge-0/0/1             up   up
ge-0/0/2             up   down
ge-0/0/3             up   down
ge-0/0/4             up   down
ge-0/0/5             up   up
ge-0/0/6             up   down
ge-0/0/7             up   down
ge-0/0/8             up   down
ge-0/0/9             up   down
ge-0/0/10            up   up
ge-0/0/10.0          up   up   eth-switch
ge-0/0/11            up   up
ge-0/0/11.0          up   up   eth-switch
ge-0/0/12            up   down
ge-0/0/12.0          up   down eth-switch
...

```

## Step 7.5

### S2

Configure the `ge-0/0/10` interface to be administratively disabled.

```

[edit interfaces]
lab@A-S2# set ge-0/0/10 disable

[edit interfaces]
lab@A-S2# commit

```

```
commit complete
```

```
[edit interfaces]  
lab@A-S2#
```

Question: What is the state of S1 interface `ge-0/0/10`? Is it the same as `ge-0/0/10` in S2?

---

---

Answer: No. S1 indicates both physical and logical link down while S2 indicates the physical interface administratively down resulting also to the physical and logical link being down.

```
[edit interfaces]  
lab@A-S1# run show interfaces terse |match ge-0/0/10  
ge-0/0/10          up    down  
ge-0/0/10.0       up    down eth-switch
```

```
[edit interfaces]  
lab@A-S2# run show interfaces terse |match ge-0/0/10  
ge-0/0/10          down  down  
ge-0/0/10.0       up    down eth-switch
```

## Part 8: Configuration and Monitoring of LAG for Layer 3 Operation (Detailed)

---

In this part, you will perform tasks generally associated with configuration and monitoring of a link aggregation group (LAG). This part illustrates the Layer 3 configuration of a LAG.

### Step 8.1

Issue the `show interfaces terse` command to check if any aggregated Ethernet interfaces exist in the switch. Hint: use `| match`.

```
[edit]  
lab@A-S1# run show interfaces terse | match ae
```

```
[edit]  
lab@A-S1#
```

Question: Are there any aggregated Ethernet (ae) interfaces configured in the switch?

---

---

Answer: No. There are not any aggregated Ethernet interfaces in the switch by default, only through configuration.

## Step 8.2

Move to the [edit chassis aggregated-devices] hierarchy level to configure one aggregated Ethernet interface. Do not forget to commit your changes. Do also verify that the newly created aggregated Ethernet interface exists.

```
[edit]
lab@A-S1# top edit chassis aggregated-devices

[edit chassis aggregated-devices]
lab@A-S1# set ethernet device-count 1

[edit chassis aggregated-devices]
lab@A-S1# commit
commit complete

[edit chassis aggregated-devices]
lab@A-S1# run show interfaces terse | match ae
ae0                up    down

[edit chassis aggregated-devices]
lab@A-S1#
```

Question: Does an aggregated Ethernet interface exist in the switch? What is the name of the aggregated Ethernet interface?

---

---

Answer: Yes. Its name is ae0.

Question: Which interfaces are created if you change the device-count to 7?

---

---

Answer: ae0, ae1,... , ae6.

Question: Which interfaces are created if you change the device-count to 70?

---

---

Answer: None. The maximum number of aggregated Ethernet interfaces is 64.

```
[edit chassis aggregated-devices]
lab@A-S2# set ethernet device-count 70
                                     ^
value 70 is not within range (1..64) at '70'

[edit chassis aggregated-devices]
lab@A-S2#
```

### Step 8.3

Use the interface and addressing details shown on the Lab diagram to configure the aggregated Ethernet interface along with the contributing member links. You need to get back to the [edit interfaces] hierarchy level. Observe that the ae0 interface will run layer 3 operations. Do not forget to commit your changes.

```
[edit chassis aggregated-devices]
lab@A-S1# top edit interfaces

[edit interfaces]
lab@A-S1# set ae0 unit 0 family inet address 172.18.35.1/24

[edit interfaces]
lab@A-S1# set ge-0/0/11 ether-options 802.3ad ae0

[edit interfaces]
lab@A-S1# set ge-0/0/12 ether-options 802.3ad ae0

[edit interfaces]
lab@A-S1#
```

Question: Does the configuration commit? If not, why?

---

---

Answer: No. Under previously entered interface configuration you did configure family ethernet-switching under the unit 0 on ge-0/0/11 and ge-0/0/12. Logical units are not allowed on aggregated Ethernet link's member links.

```
[edit interfaces]
lab@A-S1# commit
[edit interfaces ge-0/0/11]
  'unit 0'
    logical unit is not allowed on aggregated links
error: configuration check-out failed

[edit interfaces]
lab@A-S1# show ge-0/0/11
ether-options {
  speed {
    1g;
  }
  802.3ad ae0;
}
unit 0 {
  family ethernet-switching;
}

[edit interfaces]
lab@A-S1#
```

### Step 8.4

Remove the logical units from *ge-0/0/11* and *ge-0/0/12* and commit your changes.

```
[edit interfaces]
lab@A-S1# delete ge-0/0/11 unit 0
```

```
[edit interfaces]
lab@A-S1# delete ge-0/0/12 unit 0
```

```
[edit interfaces]
lab@A-S1# commit
commit complete
```

```
[edit interfaces]
lab@A-S1#
```

## Step 8.5

Check the aggregated Ethernet interface and its member link status.

Question: Are the *ae0* and the member interfaces up and running?

---

---

Answer: Yes, after removing the logical units the member links are now working properly.

```
[edit interfaces]
lab@A-S1# run show interfaces terse | match ae
ge-0/0/11.0          up    up    aenet    --> ae0.0
ge-0/0/12.0          up    up    aenet    --> ae0.0
ae0                  up    up
ae0.0                up    up    inet     172.18.35.1/24
```

```
[edit interfaces]
lab@A-S1#
```

## Step 8.6

Test the layer 3 connectivity by Pinging the S2 *ae0.0* interface IP address from S1.

Question: Is the Ping successful?

---

---

Answer: Yes, the Ping test should work as expected.

```
lab@A-S1# run ping 172.18.35.2 count 5 rapid
PING 172.18.35.2 (172.18.35.2): 56 data bytes
!!!!
--- 172.18.35.2 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
```

round-trip min/avg/max/stddev = 0.411/1.097/3.656/1.280 ms

[edit interfaces]

lab@A-S1#