

Lab 8: Basic Epipe Service

Or: Creating Access ports, SAPs, SDPs, and a distributed Epipe service

What you will do:

1. Configure an IGP and LDP for MPLS paths, to support a VPWS
2. Configure 802.1Q encapsulation for a router network port (aka sub-interface with Cisco)
3. Configure an interface which uses a 802.1Q port
4. Create an SDP, using LDP for the transport, between PE routers
5. Configure an access port with 802.1Q encapsulation on a PE router
6. Create an VPWS Epipe, consisting of a SAP and a spoke-SDP, between PE routers
7. Verify end-to-end connectivity using ping, and other commands, between CE routers

Things that you will need to know or learn:

1. CLI commands for configuring & verifying interfaces, OSPF, and LDP
2. CLI commands for configuring & verifying 802.1Q encapsulated network and access ports
3. CLI command for configuring & verifying a SDP using LDP transport
4. CLI commands for configuring & verifying an Epipe service
5. CLI commands for verifying arp, and SDP connectivity

What you need to submit and when:

1. There is no pre-lab for Lab 8.
2. Complete the in-lab part of the exercise (see below), **before** the end of your lab period.
3. Complete the "Lab 8 Post-lab" exercise on SDP and Epipe verification commands and submit to Blackboard, **before** your next lab period.

Required Equipment:

- USB memory stick to save results for post-lab questions
- Hard-cover lab notebook, for reference during SBA at the end of the course.
- PC with internet access, a browser, Java, and terminal program (Provided in T108)

In-Lab Marks:

- 1 mark: Demo of first successful Epipe service between CE routers
- 1 mark: Demo of second successful Epipe service between CE routers
- 1 mark: Correctly explain the correlation between the ARP tables of the two CE routers
- 1 mark: Written answers to the three questions at the end of ALU SA lab 2.

The in-lab is worth 1/2 of the overall lab mark; the post-lab is worth 1/2 of the overall lab mark.

10% of your final mark is for labs done during the course of the semester.

References and Resources:

- SA Module 2: notes on implementing distributed Epipe service
- SA Lab guide, Labs 1 and 2
- EDU Lab: remote-access lab facility hosted at the Nokia Kanata campus
<https://learningserviceslabs.nokia.com/>

Addressing & Login Table

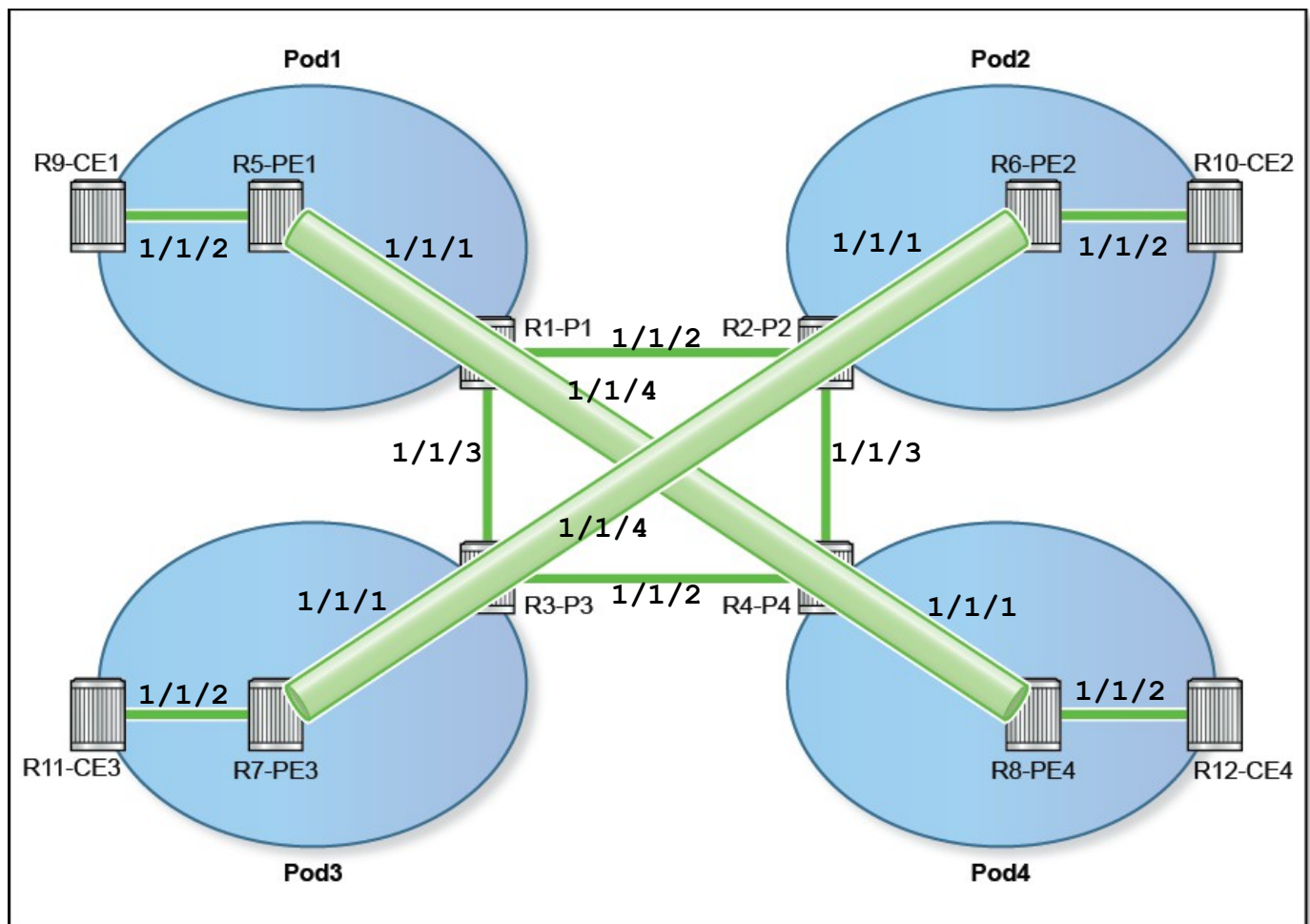
	Edu Lab 1	Edu Lab 2
R1	192.168.206.164	192.168.206.196
R2	192.168.206.165	192.168.206.197
R3	192.168.206.166	192.168.206.198
R4	192.168.206.167	192.168.206.199
R5	192.168.206.168	192.168.206.200
R6	192.168.206.169	192.168.206.201
R7	192.168.206.170	192.168.206.202
R8	192.168.206.171	192.168.206.203
R9	192.168.206.172	192.168.206.204
R10	192.168.206.173	192.168.206.205
R11	192.168.206.174	192.168.206.206
R12	192.168.206.175	192.168.206.207

Edu Lab 1 Login	Passwd	Edu Lab 2 Login	Passwd
aca001-328		aca002-318	
aca001-329		aca002-319	
aca001-330		aca002-320	
aca001-331		aca002-321	
aca001-332		aca002-322	
aca001-333		aca002-323	
aca001-334		aca002-324	
aca001-335		aca002-325	

See Blackboard for a list of passwords; write **yours** in the space above.

<https://learningserviceslabs.nokia.com/>

Topology Diagram



SRC_ASA3.1_LG_01_020

Image source: Nokia Services Architecture Lab Guide, p. 14

Command Reference (see SA Lab 2 for additional commands)

no shutdown	# Don't forget this!! Everywhere!
configure • port {portNum} • ethernet • encap-type dot1q	# Both network (CE) and access (PE)
configure • port {portNum} • ethernet • mode • access	# Only configured for the PE port
configure • service • sdp {number} • mpls create	# Transport via LDP
show • router • arp	# Similar to other OS's (extra)

Task 1: Configure and Verify supporting protocols for Services

SA Lab 1 consists of implementing the supporting protocols required for services: interfaces with suitable addresses, an IGP (we'll use OSPF), and LDP. It is probably safest and easiest to start by deconfiguring your routers from the previous lab (6PE).

- Step 1. Deconfigure each router, either using the rollback method or the manual deconfig.
- Step 2. Configure IPv4 addresses on R1-R8 **only**; do **not** configure the usual addresses on the links extending to the CE routers, R9-R12. Don't forget system interfaces.
- Step 3. Configure R1-R8 into OSPF area 0; configure link LDP on all routers as well.
- Step 4. Verify that all your setup is correct:
 - routes in the routing table (exactly 18)
 - active LDP bindings (exactly 15 for P routers, exactly 14 for PE routers)Troubleshoot by checking for the correct number of OSPF and LDP neighbors.

Task 2: Complete all steps for Epipe configuration

SA Lab 2 provides the steps for configuring an Epipe service. Although they are summarized below (in a slightly different order), you should consult the original lab for all steps in "Phase 1." Note that even though SDPs are uni-directional, the *service* will not come up until SDPs for both directions are up/up. This ePipe will be used to connect CE routers on subnet 192.168.10.0/24.

- Step 1. Configure 802.1Q encapsulation on the CE network port (1/1/2) which faces the PE. Create an interface which uses the 802.1Q port (1/1/2) and configure an address.
- Step 2. Configure an access port with 802.1Q encapsulation on a PE router. Ensure that a matching Vlan number is configured on *both* the CE and PE routers!
- Step 3. Create an SDP, using LDP for the transport, between diagonal PE routers.
- Step 4. Create an VPWS Epipe, consisting of a SAP and a spoke-SDP, between PE routers

CHECK POINT #1: Prove, with output on your screen, that you can ping between CE routers.

Task 3: Create a second Epipe

As stated in SA Lab 2, once your first Epipe is working, partners should switch CE / PE routers and configure a second Epipe. This second ePipe connects routers on subnet 192.168.20.0/24.

CHECK POINT #2: Prove, with output on your screen, that your second Epipe is functioning.

Task 4: Verify the operating parameters of all service components

SA Lab 2 provides **five** commands for examining and verifying the operating status of all service components: `show service sdp {x}` `show service sap-using` `show service id {x} base`
`show service id {x} labels` `show router ldp bindings`

Those 5 are sufficient for verifying the operation from a Service Provider's perspective. We'll add three extras, including one to verify the operation from the Subscriber's perspective.

Step 1. From a PE router, test the uni-directional connection provided by the SDP:
`oam sdp-ping {sdp-number}`

Examine the output to see how many fields make sense (already!)

Step 2. From a PE router, test the bi-directional connection provided by the SDP:

`oam sdp-ping {sdp-number} resp-sdp {far-end-return-sdp}`

Examine the output to see how many fields make sense (already!)

Step 3. Ping between CE routers. On each of the CE routers, examine the ARP table:

`show router arp`

Compare the display of the two routers' tables, and correlate the values you see.

CHECK POINT #3: Help the lab Professor understand what does and doesn't match, and why.

Task 5: Save your configs

As always, save the configs for your P, PE, and CE routers on the EDU ftp server:

use `edu1 / dEEtgx2Y` or `edu2 / dEEtgx2Y` for each 1/2 of the class; **Rxx = R01, R02, ...**

save: `admin save ftp://{acct}:{pswd}@192.168.181.81/Rxx/ande0001-L8.cfg`

check: `file dir ftp://{acct}:{pswd}@192.168.181.81/Rxx/`

restore: `exec ftp://{acct}:{pswd}@192.168.181.81/Rxx/ande0001-L8.cfg`

Task 6: Questions

Correct written answers to these three questions are the last required item for the in-lab.

1. You can see labels for the system address of P routers as well as PE routers by using the `show router ldp bindings` command. A label is required for the PE router because it is the end of the transport tunnel. Why do P routers need labels as well?

2. The `show router ldp bindings` command shows the LMTU and RMTU for the service. What is the meaning of these values? Why is the value 1500?

3. CE1, CE2, CE3 and CE4 are all in the same subnet. Why is it possible to ping CE4 from CE1, but not from CE2 or CE3?

CHECK POINT #4: Submit your written answers to the lab Professor.

Reverting to a different configuration

Identify a configuration file, then revert to it:

```
configure system rollback rescue-location ftp://rollback:rollback@192.168.181.81/13.0.R5/Initial
admin rollback revert rescue now
show card          [2017: card-type = iom3-xp]
configure card 1 card-type {card-type-from-show-command}
show mda           [2017: mda-type = m10-1gb-xp-sfp]
configure card 1 mda 1 mda-type {mda-type-from-show-command}
```

Manual De-configuration

```
exit all
configure router
ospf shutdown
no ospf
bgp shutdown
no bgp
ldp shutdown
no ldp
mpls shutdown
rsvp shutdown
no mpls
ospf3 shutdown
no ospf3
no autonomous-system
no router-id
```

Sample starting config to bring up all required ports

```
exit all
environment no more
configure system login-control idle-timeout disable
configure port 1/1/[1..4] no shut
configure router
/configure system name RXX-{algonquinNetID}
```

To repeat this lab using MySRLab, use the routers according to the following topology:
R5(CE) — R1(PE) – R3(P) – R4(P) – R2(PE) — R6(CE)

In case it's ever useful:

- SR OS ver on standard labs PL3-PL8 is ver 13.0R5