Lab 8 Postlab: Epipes

Or: Digging deeper into Epipe operation and verification

What you will do:

1. Review and repeat the SA Lab 2 on MySRLab
2. Extend SA Lab 2 by creating an additional service
3. Use additional "oam" service verification tools and examine the output
4. Save configs and enter your answers for each task on BrightSpace

Things that you will need to know or learn:

1. All CLI commands needed for Lab 8: Epipes
2. Additional CLI commands for oam service verification: oam sdp-ping and oam svc-ping

What you need to submit and when:

1. Complete the “Lab 8 Post-lab” exercise on BrightSpace with answers from your work, before your lab section's assigned due date.

Required Equipment:

- Credentials for booking a MySRLab session
- An actual MySRLab booking
- PC with internet access, a browser, Java, and terminal program (Provided by you)

In-Lab Marks:

This post-lab is worth 1/2 of the overall lab mark for Lab 8.

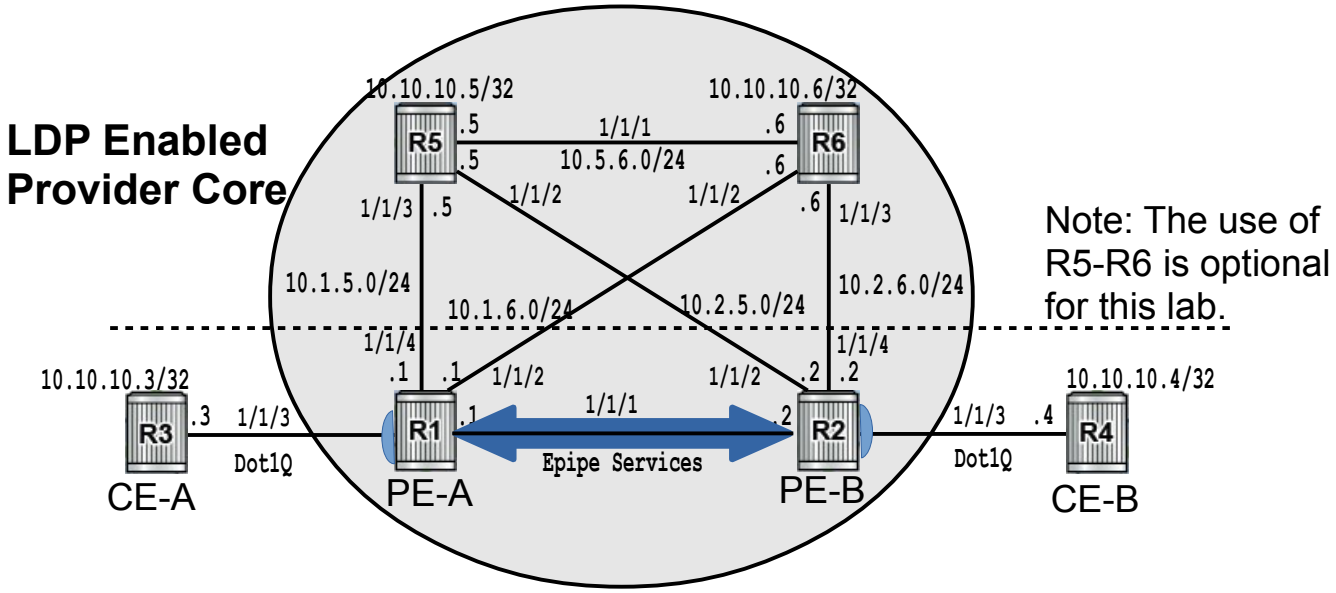
10% of your final mark is for labs done during the course of the semester.

References and Resources:

- Lab 8 – Epipe
- SA Module 2: implementing distributed Epipe service
- MySRLab: remote-access lab facility hosted at the Nokia Kanata campus
- NRS-II section 18.2 p. 1018-1030

Topology

This is the MySRLab network topology that is used for this lab. It is similar to the **bottom** half of the Edu topology from the weekly in-lab. **NOTE**: **only some** links are configured and activated!



Addressing Table for MySRLab Practice Labs

ALL routers are IPv4 addresses in the range **192.168.X.Y** with **X.Y** as given in the table below.

	PL3	PL4	PL5	PL6	PL7	PL8
R1	188.4	188.36	188.68	188.100	188.132	188.164
R2	188.5	188.37	188.69	188.101	188.133	188.165
R3	188.6	188.38	188.70	188.102	188.134	188.166
R4	188.7	188.39	188.71	188.103	188.135	188.167
R5	188.8	188.40	188.72	188.104	188.136	188.168
R6	188.9	188.41	188.73	188.105	188.137	188.169
PC1	188.10	188.42	188.74	188.106	188.138	188.170

The Ixia tester PC is accessed via the Remote Desktop Protocol (RDP), with clients available for Windows (built-in as "mstsc.exe"), Linux (rdesktop), and OSX (http://cord.sourceforge.net/)

Practice Lab	User ID	Password
PL3	See pages 4-5 of the *MySRLab Technical Primer* and page 8 of the *MySRLab Getting Started Guide* (available on BrightSpace) for connectivity & login details.	
PL4		
PL5		
PL6		
PL7		
PL8		

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

oam • sdp-ping {sdp-number} • [resp-sdp {far-end-return-sdp}] # Test the SDP(s)
oam • svc-ping {PE-IP} service {svc-num} • [local-sdp] • [remote-sdp] # Transport via LDP

show • router • arp # Similar to other OS's (extra)

Task 1: Configure base topology plus a pair of Epipe services

To start this post-lab, you'll need to re-do SA Lab #2. To make life easier, the base IP configs are available for copy & paste (see end of lab). Be sure to verify each step before going to the next!

Step 1. Copy and paste the base configurations for each router, then add the LDP config.
Step 2. Configure the first ePipe: VLAN 10, subnet 192.168.10.0/24 Remember the 4 parts:
1. Configure 802.1Q encapsulation on the CE network ports (1/1/3) facing the PE. Create an interface which uses the 802.1Q port (1/1/3) and configure an address.
2. Configure an access port (1/1/3) with 802.1Q encapsulation on both PE routers.
3. Create an SDP, using LDP for the transport, between PE routers.
4. Create an Epipe, consisting of 1 x SAP and 1 x spoke-SDP, between PE routers. (Ensure that the Vlan number matches on both the CE and PE SAP!)

Step 3. Test the connectivity by pinging between the CE devices. If it doesn't work, use the "show" commands from the in-lab to do some troubleshooting. LOOK for error messages!
Step 4. Configure the second ePipe on VLAN 20, subnet 192.168.20.0/24, and verify.
Step 5. On each of the CE devices, do a "show router arp" and record the results.
Step 6. On one of the PE devices, do "show service sdp" and record the results.
Step 7. Have a look at an error message! On R5 or R6, try to set the encapsulation type to dot1Q on port 1/1/3 when it is not shutdown. Record the exact output.
Step 8. Another error message: on a CE, try to create an interface on port 1/1/3 (no encap!)

Questions to answer:

- As far as the CE devices are concerned, how many routers exist between them?
- In the ARP table on CE-A, what is the value shown in the "type" column for the opposite CE?
- What is the value in the Delivery ("Del") column in the output of "show service sdp"? (Sometimes the SR OS version in the lab guide differs from what we're using.)
- Referring to the previous question about SDP delivery, what would the alternative be? Hint: think about it, then consult the SA Module 2 course notes!
- Still focusing on SDP delivery, what is the value for the LSP column?
- Referring to the previous question about the LSP column, what does the value *mean*? Hint: really now, what are the options for creating a Label Switched Path?
- What is the exact error message you get if you try to change the encapsulation type on port 1/1/3 when not shut?
- What's the exact error message from trying to create an interface with no encap on a port configured for dot1Q?

Task 2: Practice using OAM service verification tools

OAM means Operations, Administration, and Maintenance. These tools are an important part of verifying and troubleshooting all the components in a service. You've already used the tools "lsp-ping" and "lsp-trace". In this task, you'll use tools to verify the next two layers up: **sdp-ping** and **svc-ping**.

Step 1. On PE-A router, verify that the SDP to the far-end (PE-B) is functioning correctly:
oam sdp-ping {sdp-num} where: sdp-num is the SDP # to reach the far-end
Like "lsp-ping", this form of the command is a uni-directional test so the response is returned via regular IP routing. Record the output.

Step 2. On the same PE router, verify that the SDPs in both directions are working:
oam sdp-ping {PE-A-SDP-to-PE-B} resp-sdp {PE-B-SDP-to-PE-A}
The sdp-ping should be successful; if not, double check that you used the PE-A's SDP number for the first parameter, and PE-B's SDP number for the second parameter. Record the results. Compare the outputs from these two steps. Which version gives more info?

Step 3. How's a person supposed to know which SDPs are used to go back & forth? Glad you asked! Verify the next layer up by doing a ping of the service (ie. top level):
oam svc-ping {far-end-PE-IP} service {service-#}
If successful, the last line should read: "Request Result: Sent - Reply Received". Record the output then examine it: Which SDP was used to ping: the outbound, return, or neither? Hint: look for "SDP Path Used". Now look exactly one line below: What do you see?!!

Step 4. You can make svc-ping test specific SDPs by specifying them in the command:
oam svc-ping {far-end-PE-IP} service {service-#} **local-sdp**
oam svc-ping {far-end-PE-IP} service {service-#} **local-sdp remote-sdp**
Record and examine the output: for each command, was the outbound SDP used? The return SDP? Neither? Both?

Questions to answer:

- For a uni-directional sdp-ping, what is the value shown for "Response SDP Used"?
- For a bi-directional sdp-ping, what is the value shown for "Response SDP Used"?
- With the shortest form of svc-ping, is the outbound, return, or neither SDP used?
- What is the "title" of the line in svc-ping output that gives SDP #'s?
- In the longest form of svc-ping, is the outbound, return, or both SDPs used?

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Task 3: Verifying a service with asymmetric service-ID

There's more reasons than "Best practice" to use the same service-ID consistently throughout a service. In this task, we'll see what happens when we try to use svc-ping on a service that has different IDs on the two PEs.

Step 1. Configure another ePipe service, but be sure to use a **service ID** (eg. 101) on PE-A that's different from the service-ID on PE-B (eg. 102). There's no need to configure the CE devices, just the PE devices, so it should be very quick & easy.

Step 2. Verify that the service is admin and operationally Up/Up:

show service id {#} base

If necessary, troubleshoot and get the service working before continuing!

Step 3. Run all three forms of the svc-ping command (shortest, medium, longest). Record and examine the output carefully for all three versions; you should get the exact same result for the final line. To be clear, the output should begin with "Send - Reply Received". What does the rest of the message mean?! Is it better to be consistent with service ID?

Questions to answer:

– What is the last part of the svc-ping result when different service ID's differ"?

Task 4: Save your configs

As always, **save your final configs** so that you can refer to them later for practice and study.

save: admin save ftp://{mySRLabAlphaLogin}:{assignedPswd}@mysrlab/STD/**Rx**/Lab8.cfg
verify: file dir ftp://{mySRLabAlphaLogin}:{assignedPswd}@mysrlab/STD/**Rx**/

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
```

R1 Base Configuration

```
configure system name Lab8-Epipe-R1
configure router
#------------------------------------------------
echo "IP Configuration"
#------------------------------------------------
        interface "system"
            address 10.10.10.1/32
        exit
        interface "toR2"
            address 10.1.2.1/24
            port 1/1/1
        exit
        interface "toR5"
            address 10.1.5.1/24
            port 1/1/4
        exit
        interface "toR6"
            address 10.1.6.1/24
            port 1/1/2
        exit
        router-id 10.10.10.1
#------------------------------------------------
echo "OSPFv2 Configuration"
#------------------------------------------------
        ospf
            area 0.0.0.0
                interface "system"
                exit
                interface "toR2"
                    interface-type point-to-point
                exit
                interface "toR5"
                    interface-type point-to-point
                exit
                interface "toR6"
                    interface-type point-to-point
                exit
            exit
        exit
```

R2 Base Configuration

```
configure system name Lab8-Epipe-R2
configure router
#--------------------------------------------------
echo "IP Configuration"
#--------------------------------------------------
        interface "system"
            address 10.10.10.2/32
        exit
        interface "toR1"
            address 10.1.2.2/24
            port 1/1/1
        exit
        interface "toR5"
            address 10.2.5.2/24
            port 1/1/2
        exit
        interface "toR6"
            address 10.2.6.2/24
            port 1/1/4
        exit
        router-id 10.10.10.2
#--------------------------------------------------
echo "OSPFv2 Configuration"
#--------------------------------------------------
        ospf
            area 0.0.0.0
                interface "system"
                exit
                interface "toR1"
                    interface-type point-to-point
                exit
                interface "toR5"
                    interface-type point-to-point
                exit
                interface "toR6"
                    interface-type point-to-point
                exit
            exit
        exit
```

R3 Base Configuration

```
configure system name Lab8-Epipe-R3
configure router
#------------------------------------------------
echo "IP Configuration"
#------------------------------------------------
        interface "system"
            address 10.10.10.3/32
            no shutdown
        exit
        router-id 10.10.10.3
        exit
```

R4 Base Configuration

```
configure system name Lab8-Epipe-R4
configure router
#------------------------------------------------
echo "IP Configuration"
#------------------------------------------------
        interface "system"
            address 10.10.10.4/32
            no shutdown
        exit
        router-id 10.10.10.4
        exit
```

R5 Base Configuration

```
configure system name Lab8-Epipe-R5
configure router
#--------------------------------------------------
echo "IP Configuration"
#--------------------------------------------------
        interface "system"
            address 10.10.10.5/32
        exit
        interface "toR1"
            address 10.1.5.5/24
            port 1/1/3
        exit
        interface "toR2"
            address 10.2.5.5/24
            port 1/1/2
        exit
        interface "toR6"
            address 10.5.6.5/24
            port 1/1/1
        exit
        router-id 10.10.10.5
#--------------------------------------------------
echo "OSPFv2 Configuration"
#--------------------------------------------------
        ospf
            area 0.0.0.0
                interface "system"
                exit
                interface "toR1"
                    interface-type point-to-point
                exit
                interface "toR2"
                    interface-type point-to-point
                exit
                interface "toR6"
                    interface-type point-to-point
                exit
            exit
        exit
```

R6 Base Configuration

```
configure system name Lab8-Epipe-R6
configure router
#------------------------------------------------
echo "IP Configuration"
#------------------------------------------------
        interface "system"
            address 10.10.10.6/32
        exit
        interface "toR1"
            address 10.1.6.6/24
            port 1/1/2
        exit
        interface "toR2"
            address 10.2.6.6/24
            port 1/1/3
        exit
        interface "toR5"
            address 10.5.6.6/24
            port 1/1/1
        exit
        router-id 10.10.10.6
#------------------------------------------------
echo "OSPFv2 Configuration"
#------------------------------------------------
        ospf
            area 0.0.0.0
                interface "system"
                exit
                interface "toR1"
                    interface-type point-to-point
                exit
                interface "toR2"
                    interface-type point-to-point
                exit
                interface "toR5"
                    interface-type point-to-point
                exit
            exit
        exit
```