Lab 10 PostLab: VPLS Spoke Termination to an IES

Or: What's an SVI anyway?

What you will do:

1. Re-do the SA Lab 8 on MySRLab to create a spoke termination for a VPLS to an IES
2. Use additional commands to examine the IES operation
3. Confirm proper operation of OSPF connecting with an IES, and resolving any MTU issues
4. Save configs and enter your answers for each task on Blackboard

Things that you will need to know or learn:

1. All CLI commands needed for SA Labs 3 (VPLS) and 4 (Spoke Termination)
2. All CLI commands needed for SA Lab 8 (VPLS Spoke Termination on IES)

What you need to submit and when:

1. Complete the “Lab 10 Post-lab” exercise on Blackboard 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)

Post-Lab Marks:

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

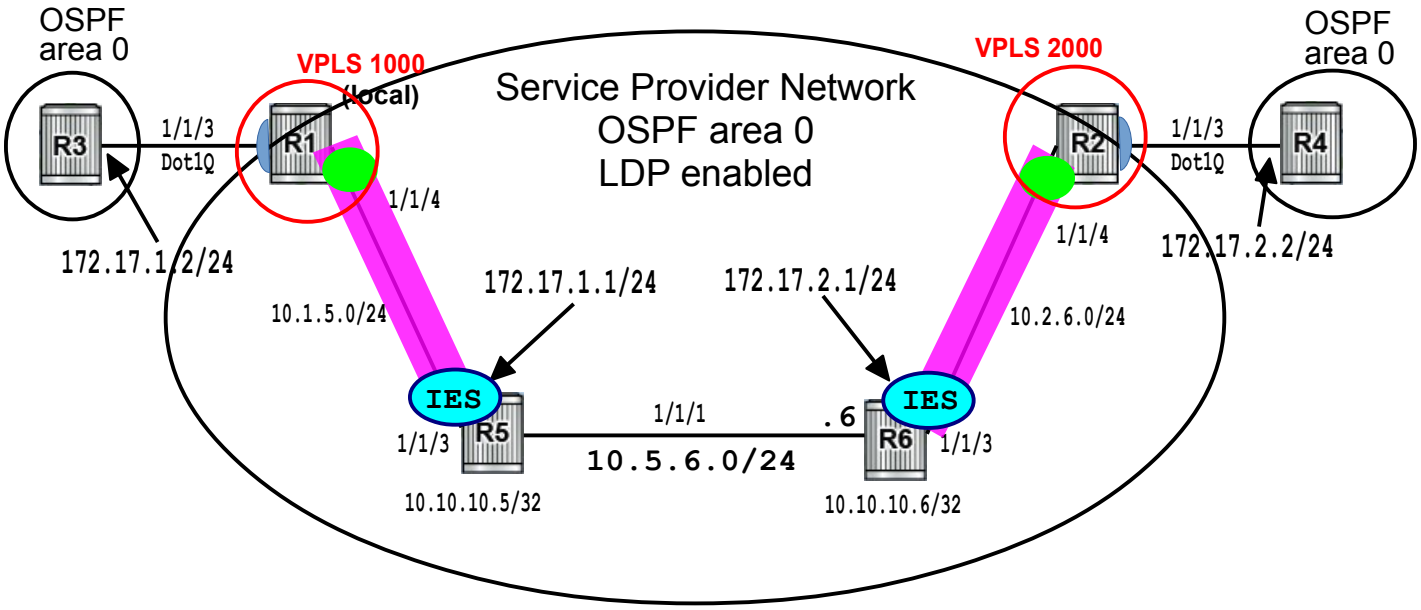
10% of your final mark is for labs done during the course of the semester.

References and Resources:

- IES configuration: SA Module 5 on L3 VPN services
- SA Lab guide, Lab 8 – VPLS Spoke Termination on IES
- MySRLab: remote-access lab facility hosted at Nokia's Kanata campus

Topology

This is the MySRLab network topology that is used for this lab. It is similar to the top half of the Edu topology from the weekly in-lab. **NOTE**: that **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 Blackboard) for connectivity & login details.	
PL4		
PL5		
PL6		
PL7		
PL8		

Command Reference (see SA Lab 8 for additional commands)

no shutdown # Don't forget this!! Everywhere!

configure • router • ospf • area {num} • interface <int-name> • mtu {bytes} # OSPF MTU

configure • service • ies {svc-#} • interface <int-name> • create # Create a L3 i/f
configure • service • ies {svc-#} • interface <int-name> • address {IP-address} # (base router!)
configure • service • ies {svc-#} • interface <int-name> • spoke-sdp {sdp-id:vc-id} # Like an SVI !
configure • service • ies {svc-#} • interface <int-name> • ip-mtu {mtu} # "Kinda like" SAP MTU

show • router [**svc-id**] • status # Show **all** running proto's
show • router • ldp • bindings
show • service id {svc-id} • base # Quick check for Up/Up
show • service id {svc-id} • sdp {svc-id:vc-id} • [detail] # All details for an SDP
show • service id {svc-id} • all # ALL details on the service

show • log • log-id 99 # Default system log

oam • cpe-ping service {num} destination {customer-IP} source 0.0.0.0

Task 1: Configure new VPLS on each PE routers

Redo the in-Lab exercise: build two new VPLS's that connect to the CE routers (using Dot1Q).

- Ensure full IGP reachability thoughout the Service Provider network.
- On each PE router, configure a VPLS service **X**000, where **X** is the pod number.
- Bind a SAP for the CE router to the VPLS using VLAN ID 70.
- On the CE router, configure an interface with address 172.17.**X**.**2**/24 (where **X** is the pod number) and a VLAN ID of 70.
- On the CE router, add the interface to OSPF area 0.
- For both VPLS's, verify connectivity to the CE router using **`oam cpe-ping`** followed by **`show service fdb-mac`** Ensure that connectivity is correctly established.

Questions to answer:
- How many entries appear in each MAC address table?

Task 2: Configure VPLS Spoke Termination to an IES

Configure an IES on a P router which is connected via a SDP to the VPLS on the PE.

- Configure link LDP throughout the core network to provide transport LSPs.
- On the PE routers, configure a spoke SDP from the VPLS to the IES on the P router.
- On the P routers, configure an IES service with an address of 172.17.**X**.**1**/24, where **X** is the pod number. Bind the IES interface to a spoke SDP to the PE router.
- On both P and PE routers, **don't** change MTUs and use show commands to check the status of the two VPLS services and their component SAPs & SDPs: (Save all output!!)
  - show service id {x000} base (Note the sdp admin/oper states)
  - show router ldp bindings [fec-type] services (Note type of service, LMTU, RMTU)
  - show service id {x000} sdp {y:x000} detail (Note "flags" entry)
  - show service id {x000} interface detail (Note "IP MTU" and "IP Oper MTU")
- Show the status of all ports; pay particular attention to the operating MTU of PE-P ports
- On the P routers, have a look at the interfaces: show router interfaces

Questions to answer:

- For the router interfaces, what is listed as the "Mode" for the newly created interface?
- In the base service info, what is the initial state of the spoke-sdp?
- In the base service info, what is the initial operating MTU of the spoke-sdp?
- What is the operating MTU of the ports for PE-P links?
- What uses the bytes, causing a difference in these two MTUs?
  (Maybe SA Module 5, slide 23 is helpful for the SDP MTU?)
- In the LDP service bindings, what is the MTU for the P side (ie. IES)?
- Again, why the difference in spoke-sdp MTU and service MTU?
  (Maybe SA Module 5, slide 23 is helpful for the VC MTU?)
- In the LDP service bindings, what is the type of service at the PE side?
- In the LDP service bindings, what is the type of service at the P side?
- In the LDP service bindings, does the legend identify the actual type of service?
- In the LDP service bindings, what is the full text for the attribute for the Egress Label?
- In the service SDP details, what are the two errors in the flags field?
- In the service interface details, what are the values for IP MTU and IP Oper MTU?

Task 3: Matching MTUs for Both Ends

Create matching MTUs so that the spoke-SDP gains Up/Up status: adjust the IES MTU to match the MTU on the VPLS side.

- Once you have everything fully operational, examine the results again: (Save all output!!)
  - show service id {x000} base (Note the sdp admin/oper states)
  - show router ldp bindings [fec-type] services (Note type of service, LMTU, RMTU)
  - show service id {x000} sdp {y:x000} detail (Note "flags" entry)
  - show service id {x000} interface detail (Note "IP MTU" and "IP Oper MTU")

Questions to answer:

- In the output of the service SDP details, what is now listed in the flags field?
- In the service interface details, what are the values for IP MTU and IP Oper MTU?
- In the LDP service bindings, what is the full text for the attribute for the Egress Label?

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Task 4: Full connectivity

Remember that an IES interface becomes part of the "base" router configuration. You'll need to do some thinking & troubleshooting to ensure that the IES fully participates in the P router routing.

- Configure the CE routers with OSPF area 0; include only the system interface and the new 172.17.**X**.**2**/24 interfaces.
- On the core routers, add the new IES to the existing OSPF area.
- Check the OSPF neighbouring: show router ospf neighbor
- Examine the default log (log-id 99) for some hints on any potential mis-matches between the IES and other network port to which it connects. Are the log messages the same on both sides of the connection?
- Based on the info in the log messages, dig into OSPF on each of the CE and P routers: search through all the settings of the interfaces joining them for relevant details:
  `show router OSPF interface {xxxx} detail`
- Answer the questions below **before** fixing the MTU issue.

Questions to answer:

- On the CE device, what is shown for the neighbor state?
- On the PE device, what is shown for the neighbor state?
- Are the log messages the same on both sides?
- Which side has the more helpful log messages, CE or PE?
- Now think about: the side with which MTU is more helpful: lower or higher?
- What is the exact identifier for the field that identifies the MTU in use?

Task 5: Full Participation

- For the sake of simplicity, handle any MTU mis-matches by changing the MTU advertised by OSPF on the **CE** Router configuration.
- Verify full connectivity: examine all routing tables, and traceroute from each CE to it's closest PE (e.g. R3-R1). According to traceroute, how many hops is it between the pair?
- [Optional] If you're really good, delete the MTU change you just made. Get things going again by making a suitable change to the port MTU (1/1/3) on the CE. Does the MTU value make sense to you??

Questions to answer:

- What was the required MTU setting on the CE router OSPF context?
- According to traceroute (or ping), how many hops is it from CE to PE?
- How many routes appear in the routing table? Is it the same everywhere?

Task 6: 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**/Lab10.cfg
verify: file dir ftp://{mySRLabAlphaLogin}:{assignedPswd}@mysrlab/STD/**Rx**/

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