

## Lab 11 Postlab: Resilience

Or: Investigating SRLG

### What you will do:

1. Complete the material from MPLS Lab 6.2 on MySRLab:
  - Create Shared Risk Link Groups (SRLG)
  - Configure the LSP primary path and secondary paths with SRLG
2. Use "show" commands to verify the actual hops in both primary & secondary paths
3. Selectively disable links and monitor the actual hops for both primary and secondary paths
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 MPLS lab 6.1 – Enabling Primary and Secondary LSPs
2. CLI commands for creating and applying SRLG definitions to links

### What you need to submit and when:

1. Complete the "Lab 10 Post-lab" exercise on Blackboard with answers from your work, before your next lab period.

### 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 10.

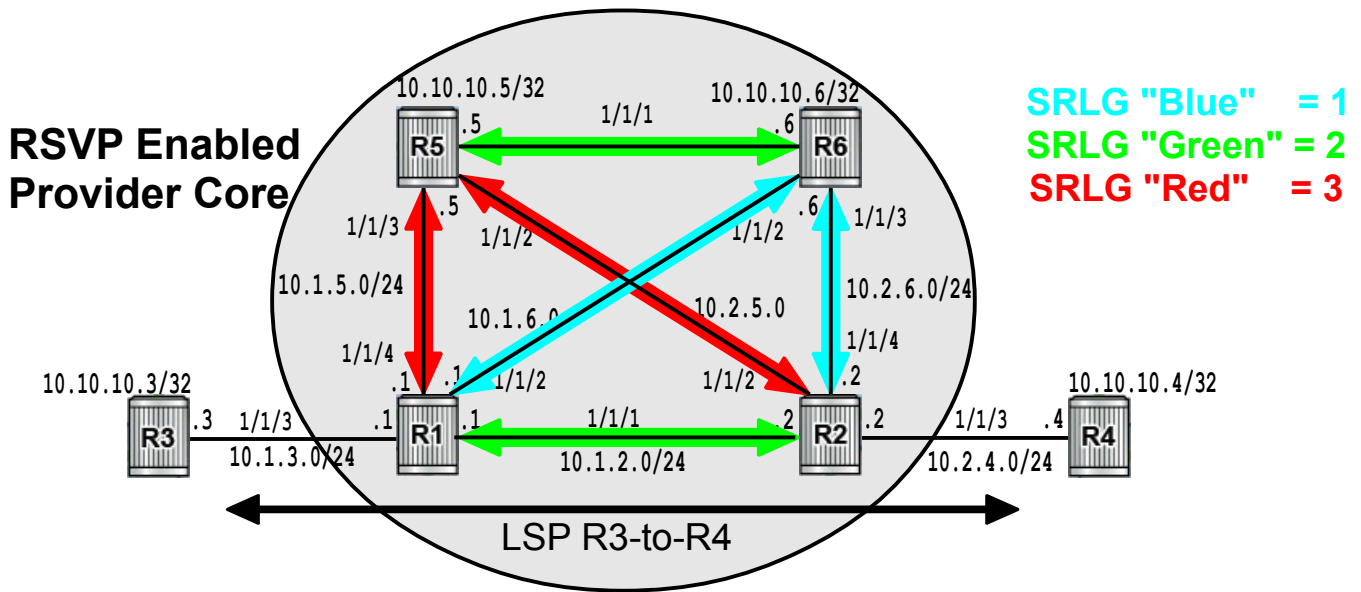
10% of your final mark is for labs done during the course of the semester.

### References and Resources:

- MPLS Lab 6.1 – Enabling Primary and Secondary LSPs
- MPLS Lab 6.2 – Using SRLG for Path Resiliency
- MySRLab: remote-access lab facility hosted at Nokia's Kanata campus
- NRS-II section 16.2 p. 865-875
- NRS-II Labs 16.2-16.4

## 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 <i>MySRLab Technical Primer</i> and page 8 of the <i>MySRLab Getting Started Guide</i> (available on Blackboard) for connectivity & login details.	
PL4		
PL5		
PL6		
PL7		
PL8		



## Command Reference (see MPLS Labs 6.1 and 6.2 for additional commands)

### no shutdown

# Don't forget this!! Everywhere!

```
configure • router • if-attribute • srlg-group <name> value {number} # Definition of the group
configure • router • mpls • interface <name> • srlg-group <name> # Define link membership
configure • router • mpls • lsp <name> • cspf # Enable CSPF; NEEDED!
configure • router • mpls • lsp <name> • secondary <path> • srlg # Enable use of SRLG
```

```
show • router • mpls • lsp [lsp-name] • path [path-name] # Basic 1-line info on path(s) states
show • router • mpls • lsp [lsp-name] • path [path-name] detail # Full path details, including hops
```

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## Task 1: Configure base topology and SRLG membership

This postlab follows the general structure of MPLS Lab 6.2 but has been changed to more clearly show SRLG operation. To see SRLG in operation, full MPLS LSP configuration is required. The SRLG membership commands are quite simple, but accuracy is important in order to get the expected results. Use care & attention to be sure you have the right configuration!

- Step 1. Implement the topology shown above (addressing, OSPF, MPLS, RSVP). Make sure MPLS is properly enabled, everywhere!
- Step 2. Assign SRLG to all core links as shown: srlg-green, srlg-blue, srlg-red. Also assign **admin** groups to those same core links as shown: ag-green, ag-blue, ag-red.
- Step 3. **Double-check** to be sure you got it right!! (I didn't on my first try.) From the config-router-mpls context, use the "info" command to ensure that there is exactly one SRLG for each core interface, and that it's the correct SRLG.
- Step 4. On R3, define **two** totally loose paths, with different names. (They'll be used as the primary and secondary paths for an LSP to the opposite side, but don't use them yet!). Use **show router mpls path** to display the state of the paths. Record the output. Does a path need to be assigned to an LSP to show as admin Up?
- Step 5. Create an LSP to R4 (opposite side), using the two paths just defined. Activate CSPF on the LSP, **and** standby **and** SRLG protection on the secondary path.
- Step 6. Wait a few moments, then check that the LSP and both paths are Up/Up. If not, troubleshoot until everything is Up/Up. Display & **record** the output of the LSP path **detail**. There's several questions about the output and you'll need to compare it in Task 2!
- Step 7. Now, experiment to understand all about SRLG operation. Don't know how to see what's happening? ... Then complete the next task!

### Questions to answer:

- Does a path need to be assigned to an LSP to show as admin Up?
- What extra 1-letter symbol appears after each ComputedHops of both the primary and secondary LSPs? What does it mean?
- In the path detail, compare the lines after the ComputedHops for both the primary and secondary paths. Which path has extra lines of information?
- What is the value shown for the line titled "Srlg"?
- What is the value shown for the line titled "SrlgDisjoint"? What does it mean?
- What is the CSPF Metric for the primary path?
- What is the CSPF Metric for the secondary path?
- Why are the metrics different for the two paths?

## Task 2: Determine Primary & Secondary path behavior with SRLG enabled

In this task, the behaviour of both primary and secondary paths is examined when vertical and horizontal links are selectively disabled and re-enabled. Be sure to record & save all your output!

- Step 1. What command can you type that will give you **full** information on the state and routing of all LSP paths? You'll need this command throughout this task.
- Step 2. Take note of what route the primary and secondary paths are following. Is there any link (which has SRLG info) where the two paths are common? Note the SRLG group ID that is "acceptable" to each of the paths.
- Step 3. Disable the vertical link that the secondary path is taking. Use the *tools perform ... resignal* command from MPLS Lab 5.1/p. 29, or wait for the timers to re-establish the path. Display and **record** the output of the path details. What routes are the paths following? Note the SRLG group ID that is "acceptable" to the paths.
- Step 4. **Re-enable** the vertical link. Disable the horizontal link between R1-R2. Ensure reconvergence by resignalling the LSP, display and **record** the path details. What routes are the paths following? Note which SRLG group ID is "acceptable" to the paths.
- Step 5. Again, disable the vertical link so that there are now two links down. Again, ensure the LSP paths are resigned and reconverged, then display and **record** the output of the path details. What routes are the paths following? Now note the SRLG group ID that is "acceptable" to the paths. Has the "acceptability" of any of the SRLG ID's or routes changed for either of the two paths?

Questions to answer:

- What command gives the **full** information for all paths of all LSPs?
- In step 3 with a vertical link down, check for even more extra lines of information after "ComputedHops". Which path has the extra lines, primary or secondary?
- What 3-letter acronym is the main topic of the extra lines (below "Last Resignal")?
- What is the meaning of this 3-letter acronym? Hint: search for it plus "Global resignal" in a slide title in MPLS Ch 6, then *read* the slide!
- What is shown as the State for the (3-letter acronym) operation? Why?
- Is CSPF doing anything for us during this entire time? A good indication is the answer to the following question: Is the value for "CSPF Queries" the same for both primary and secondary paths?
- In step 5 with both links down, what is the exact value for "Failure Code" on the secondary path?
- In step 5, what is the exact value for "SrlgDisjoint" on the secondary path?
- Between steps 4-5, how many tries did CSPF make for the secondary? 0, 1, many?
- During the various steps in this task, which SRLG links did the primary path use? Choose all that apply.
- During the various steps in this task, which SRLG links did the secondary path use? Choose all that apply.
- During the various steps throughout both tasks, did the secondary path every use the same links (simultaneously) as the primary?
- Is any SRLG link fundamentally "unacceptable" to either the primary or secondary path?
- Do you understand the essential, important difference between Admin Groups & SRLG? If not, repeat some of the above steps using Admin Groups instead of SRLG!

## Task 3: Save your configs (You know how!)