Advanced Networking Lab 4: MPLS

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1 Task 1 - Discover the Topology

1.1 Task 1: Hand in the topology with the details filled in. It should be possible to rebuild the network from scratch using your diagram (while already knowing how to configure a juniper router of course).

We must display the following: **addresses, prefixes, interface details, routing protocol, etc.**.

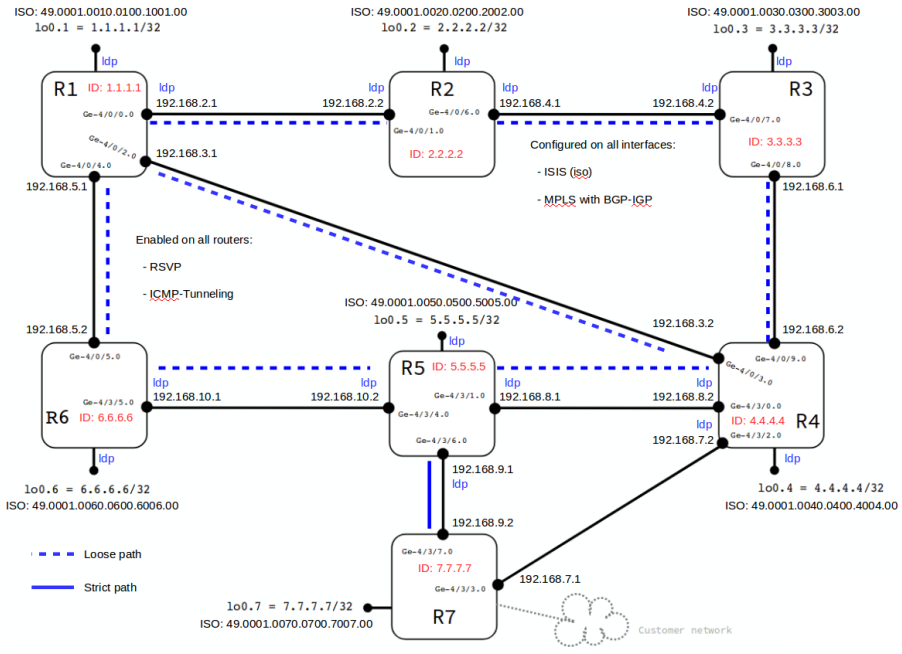

Figure 1: Detailed Topology Diagram

2 Task 2 - Discover the Topology

2.1 Question - How is MPLS configured on the routers? Which commands were used to set it up?

In order to configure MPLS on the routers:

1- MPLS protocol is enabled on logical-systems on routers (Some have configured path and some only enable it).

Path not configured example configuration:

```
set logical-systems R2 protocols mpls icmp-tunneling
set logical-systems R2 protocols mpls interface all

set logical-systems R5 protocols mpls icmp-tunneling
set logical-systems R5 protocols mpls interface all

set logical-systems R7 protocols mpls icmp-tunneling
set logical-systems R7 protocols mpls interface all
```

Path configured example configuration:

```
set logical-systems R1 protocols mpls traffic-engineering bgp-igp
set logical-systems R1 protocols mpls icmp-tunneling
set logical-systems R1 protocols mpls label-switched-path toR6 to 6.6.6.6
set logical-systems R1 protocols mpls label-switched-path toR6 ldp-tunneling
set logical-systems R1 protocols mpls label-switched-path toR6 no-cspf
set logical-systems R1 protocols mpls label-switched-path toR7 to 7.7.7.7
set logical-systems R1 protocols mpls label-switched-path toR7 install 145.125.0.0/24 acti
set logical-systems R1 protocols mpls label-switched-path toR7 bandwidth 500m
set logical-systems R1 protocols mpls label-switched-path toR7 no-cspf
set logical-systems R1 protocols mpls label-switched-path toR7 primary VISIT-R5
set logical-systems R1 protocols mpls path VISIT-R5 5.5.5.5 loose
set logical-systems R1 protocols mpls interface all

set logical-systems R3 protocols mpls icmp-tunneling
set logical-systems R3 protocols mpls label-switched-path toR4 to 4.4.4.4
set logical-systems R3 protocols mpls label-switched-path toR4 ldp-tunneling
set logical-systems R3 protocols mpls label-switched-path toR4 no-cspf
set logical-systems R3 protocols mpls interface all

set logical-systems R4 protocols mpls icmp-tunneling
set logical-systems R4 protocols mpls label-switched-path toR3 to 3.3.3.3
set logical-systems R4 protocols mpls label-switched-path toR3 ldp-tunneling
set logical-systems R4 protocols mpls label-switched-path toR3 no-cspf
set logical-systems R4 protocols mpls interface all
```

```
set logical-systems R6 protocols mpls icmp-tunneling
set logical-systems R6 protocols mpls label-switched-path toR1 to 1.1.1.1
set logical-systems R6 protocols mpls label-switched-path toR1 ldp-tunneling
set logical-systems R6 protocols mpls label-switched-path toR1 no-cspf
set logical-systems R6 protocols mpls interface all
```

Then, MPLS enabled on all interfaces for each router.

Example configuration on all routers:

```
set logical-systems R1 interfaces ge-4/0/0 unit 0 family mpls
set logical-systems R1 interfaces ge-4/0/2 unit 0 family mpls
set logical-systems R1 interfaces ge-4/0/4 unit 0 family mpls

set logical-systems R2 interfaces ge-4/0/1 unit 0 family mpls
set logical-systems R2 interfaces ge-4/0/6 unit 0 family mpls

set logical-systems R3 interfaces ge-4/0/7 unit 0 family mpls
set logical-systems R3 interfaces ge-4/0/8 unit 0 family mpls

set logical-systems R4 interfaces ge-4/0/3 unit 0 family mpls
set logical-systems R4 interfaces ge-4/0/9 unit 0 family mpls
set logical-systems R4 interfaces ge-4/3/0 unit 0 family mpls
set logical-systems R4 interfaces ge-4/3/2 unit 0 family mpls

set logical-systems R5 interfaces ge-4/3/1 unit 0 family mpls
set logical-systems R5 interfaces ge-4/3/4 unit 0 family mpls
set logical-systems R5 interfaces ge-4/3/6 unit 0 family mpls

set logical-systems R6 interfaces ge-4/0/5 unit 0 family mpls
set logical-systems R6 interfaces ge-4/3/5 unit 0 family mpls

set logical-systems R7 interfaces ge-4/3/3 unit 0 family mpls
set logical-systems R7 interfaces ge-4/3/7 unit 0 family mpls
```

2.2 Question - Which routing protocol is configured? List the relevant details from the configuration for that protocol and explain what they mean?

The routing protocol that configured is ***IS-IS***. The relevant details from the configuration:

```
set logical-systems R1 interfaces ge-4/0/0 unit 0 family iso
set logical-systems R1 interfaces ge-4/0/2 unit 0 family iso
set logical-systems R1 interfaces ge-4/0/4 unit 0 family iso
set logical-systems R1 interfaces lo0 unit 1 family iso address 49.0001.0010.0100.1001.00
set logical-systems R1 protocols isis overload timeout 100
set logical-systems R1 protocols isis level 1 disable
```

```
set logical-systems R1 protocols isis level 2 wide-metrics-only
set logical-systems R1 protocols isis interface ge-4/0/0.0 point-to-point
set logical-systems R1 protocols isis interface ge-4/0/2.0 point-to-point
set logical-systems R1 protocols isis interface ge-4/0/4.0 point-to-point
set logical-systems R1 protocols isis interface lo0.1 passive

set logical-systems R2 interfaces ge-4/0/1 unit 0 family iso
set logical-systems R2 interfaces ge-4/0/6 unit 0 family iso
set logical-systems R2 interfaces lo0 unit 2 family iso address 49.0001.0020.0200.2002.00
set logical-systems R2 protocols isis overload timeout 100
set logical-systems R2 protocols isis level 1 disable
set logical-systems R2 protocols isis level 2 wide-metrics-only
set logical-systems R2 protocols isis interface ge-4/0/1.0 point-to-point
set logical-systems R2 protocols isis interface ge-4/0/6.0 point-to-point
set logical-systems R2 protocols isis interface lo0.2 passive

set logical-systems R3 interfaces ge-4/0/7 unit 0 family iso
set logical-systems R3 interfaces ge-4/0/8 unit 0 family iso
set logical-systems R3 interfaces lo0 unit 3 family iso address 49.0001.0030.0300.3003.00
set logical-systems R3 protocols isis overload timeout 100
set logical-systems R3 protocols isis level 1 disable
set logical-systems R3 protocols isis level 2 wide-metrics-only
set logical-systems R3 protocols isis interface ge-4/0/7.0 point-to-point
set logical-systems R3 protocols isis interface ge-4/0/8.0 point-to-point
set logical-systems R3 protocols isis interface lo0.3 passive

set logical-systems R4 interfaces ge-4/0/3 unit 0 family iso
set logical-systems R4 interfaces ge-4/0/9 unit 0 family iso
set logical-systems R4 interfaces ge-4/3/0 unit 0 family iso
set logical-systems R4 interfaces ge-4/3/2 unit 0 family iso
set logical-systems R4 interfaces lo0 unit 4 family iso address 49.0001.0040.0400.4004.00
set logical-systems R4 protocols isis overload timeout 100
set logical-systems R4 protocols isis level 1 disable
set logical-systems R4 protocols isis level 2 wide-metrics-only
set logical-systems R4 protocols isis interface ge-4/0/3.0 point-to-point
set logical-systems R4 protocols isis interface ge-4/0/9.0 point-to-point
set logical-systems R4 protocols isis interface ge-4/3/0.0 point-to-point
set logical-systems R4 protocols isis interface ge-4/3/2.0 point-to-point
set logical-systems R4 protocols isis interface lo0.4 passive



set logical-systems R5 interfaces ge-4/3/1 unit 0 family iso
set logical-systems R5 interfaces ge-4/3/4 unit 0 family iso
set logical-systems R5 interfaces ge-4/3/6 unit 0 family iso
set logical-systems R5 interfaces lo0 unit 5 family iso address 49.0001.0050.0500.5005.00
set logical-systems R5 protocols isis overload timeout 100
set logical-systems R5 protocols isis level 1 disable
set logical-systems R5 protocols isis level 2 wide-metrics-only
set logical-systems R5 protocols isis interface ge-4/3/1.0 point-to-point
```

```
set logical-systems R5 protocols isis interface ge-4/3/4.0 ldp-synchronization
set logical-systems R5 protocols isis interface ge-4/3/4.0 point-to-point
set logical-systems R5 protocols isis interface ge-4/3/6.0 point-to-point
set logical-systems R5 protocols isis interface lo0.5 passive


set logical-systems R6 interfaces ge-4/0/5 unit 0 family iso
set logical-systems R6 interfaces ge-4/3/5 unit 0 family iso
set logical-systems R6 interfaces lo0 unit 6 family iso address 49.0001.0060.0600.6006.00
set logical-systems R6 protocols isis overload timeout 100
set logical-systems R6 protocols isis level 1 disable
set logical-systems R6 protocols isis level 2 wide-metrics-only
set logical-systems R6 protocols isis interface ge-4/0/5.0 point-to-point
set logical-systems R6 protocols isis interface ge-4/3/5.0 point-to-point
set logical-systems R6 protocols isis interface lo0.6 passive


set logical-systems R7 interfaces ge-4/3/3 unit 0 family iso
set logical-systems R7 interfaces ge-4/3/7 unit 0 family iso
set logical-systems R7 interfaces lo0 unit 7 family iso address 49.0001.0070.0700.7007.00
set logical-systems R7 protocols isis export putintoisis
set logical-systems R7 protocols isis overload timeout 100
set logical-systems R7 protocols isis level 1 disable
set logical-systems R7 protocols isis level 2 wide-metrics-only
set logical-systems R7 protocols isis interface ge-4/3/3.0 point-to-point
set logical-systems R7 protocols isis interface ge-4/3/7.0 point-to-point
set logical-systems R7 protocols isis interface lo0.7 passive
```

Explanation:

Following command on all routers means (own IS-IS address) It contains the following Area Address, System ID, and NSAP Selector.

```
Example: set logical-systems R1 interfaces lo0 unit 1 family iso address 49.0001.0010.
```

Following command on all routers means the IS-IS Protocol is enabled on the logical tunnel interfaces with the family iso statement.

```
set logical-systems R# interfaces ge-4/X/X unit Z family iso
```

Following command on all routers means the router would advertise max metric for a duration of 100 sec after the OSPF startup.

```
set logical-systems R# protocols isis overload timeout 100
```

Following command on all routers means Disable IS-IS on the routing device, on an interface, or on a level. By default, IS-IS is enabled for IS-IS areas on all interfaces on which the ISO protocol family is enabled. To disable IS-IS at any particular level on an interface, include the disable statement.

```
set logical-systems R# protocols isis level 1 disable
```

Following command on all routers means To configure IS-IS to generate only the new pair of TLVs and thus to allow the wider range of metric values. When wide-metrics-only is configured for a level, Junos suppresses the generation of narrow-style-metric TLV's.

```
set logical-systems R# protocols isis level 2 wide-metrics-only
```

Following command on all routers means configure an IS-IS interface to behave like a point-to-point connection. You can use the point-to-point statement to configure a LAN interface to act like a point-to-point interface for IS-IS.

```
set logical-systems R# protocols isis interface ge-4/X/X.0 point-to-point
```

Following command on all routers means Advertise the direct interface addresses on an interface or into a level on the interface without actually running IS-IS on that interface or level. This statement effectively prevents IS-IS from running on the interface.

```
set logical-systems R# protocols isis interface lo0.X passive
```

Following command means that the Logical system R7 has an additional policy statement. It's used for exporting the static routes information into IS-IS:

```
set logical-systems R7 protocols isis export putintoisis
set logical-systems R7 policy-options policy-statement putintoisis term 1 from protoco
set logical-systems R7 policy-options policy-statement putintoisis term 1 then accept
```

2.3 Question - Between which routers are LDP sessions established? How is this configured? Which LSPs have been set up with LDP? List the relevant details of these LSPs to explain how you discovered this. (Pick one of the LSPs to explain all details about it.) Look at the label database and the FECs and check the routing table(s).

The routers interfaces that LDP is configured on are the following:

```
R1:
Lo0.1 = 1.1.1.1/32 in unit 1 (ldp)
ge-4/0/0.0 = address 192.168.2.1/30 in unit 0 (ldp)

R2:
lo0.2 = 2.2.2.2/32 in unit 2 (ldp)
ge-4/0/1.0 = address 192.168.2.2/30 in unit 0 (ldp)
ge-4/0/6.0 = address 192.168.4.1/30 in unit 0 (ldp)

R3:
lo0.3 = 3.3.3.3/32 in unit 3 (ldp)
ge-4/0/7.0 = address 192.168.4.2/30 in unit 0 (ldp)
```

```
R4:
lo0.4 = 4.4.4.4/32 in unit 4 (ldp)
ge-4/3/0.0 = address 192.168.8.2/30 in unit 0 (ldp)
ge-4/3/2.0 = address 192.168.7.2/30 in unit 0 (ldp)

R5:
lo0.5 = 5.5.5.5/32 in unit 5 (ldp)
ge-4/3/1.0 = address 192.168.8.1/30 in unit 0 (ldp)
ge-4/3/4.0 = address 192.168.10.2/30 in unit 0 (ldp)
ge-4/3/6.0 = address 192.168.9.1/30 in unit 0 (ldp)

R6:
lo0.6 = 6.6.6.6/32 in unit 6 (ldp)
ge-4/3/5.0 = address 192.168.10.1/30 in unit 0 (ldp)


R7:
lo0.7 = 7.7.7.7/32 in unit 7 (ldp)
ge-4/3/7.0 = address 192.168.9.2/30 in unit 0 (ldp)
ge-4/3/3.0 = address 192.168.7.1/30 in unit 0 (ldp)
```

The configuration:

```
set logical-systems R1 protocols ldp interface ge-4/0/0.0
set logical-systems R1 protocols ldp interface lo0.1
set logical-systems R2 protocols ldp interface all
set logical-systems R3 protocols ldp interface ge-4/0/7.0
set logical-systems R3 protocols ldp interface lo0.3
set logical-systems R4 protocols ldp interface ge-4/3/0.0
set logical-systems R4 protocols ldp interface ge-4/3/2.0
set logical-systems R4 protocols ldp interface lo0.4
set logical-systems R5 protocols ldp interface all
set logical-systems R6 protocols ldp interface ge-4/3/5.0
set logical-systems R6 protocols ldp interface lo0.6
set logical-systems R7 protocols ldp interface all
```

List the relevant details of these LSPs:

```
student@chico:R1> show ldp session
  Address           State        Connection     Hold time
2.2.2.2             Operational  Open             26
6.6.6.6             Operational  Open             21


student@chico:R2> show ldp session
  Address           State        Connection     Hold time
1.1.1.1             Operational  Open             23
3.3.3.3             Operational  Open             29

student@chico:R3> show ldp session
```

```
  Address           State        Connection     Hold time
2.2.2.2             Operational  Open             20
4.4.4.4             Operational  Open             25

student@chico:R4> show ldp session
  Address           State        Connection     Hold time
3.3.3.3             Operational  Open             24
5.5.5.5             Operational  Open             24
7.7.7.7             Operational  Open             24

student@chico:R5> show ldp session
  Address           State        Connection     Hold time
4.4.4.4             Operational  Open             29
6.6.6.6             Operational  Open             29
7.7.7.7             Operational  Open             29

student@chico:R6> show ldp session
  Address           State        Connection     Hold time
1.1.1.1             Operational  Open             23
5.5.5.5             Operational  Open             28

student@chico:R7> show ldp session
  Address           State        Connection     Hold time
4.4.4.4             Operational  Open             28
5.5.5.5             Operational  Open             28
```

The links are the following:

```
Router 1 >> Router 4 and Router 6
Router 3 >> Router 4
```

The command used to configure LDP on interface is:

```
set logical-systems R# protocols ldp interface <interface number>
```

The LDP sessions per logical system are the following:

```
Router 1 <<>> Router 2 and Router 6
Router 2 <<>> Router 3
Router 3 <<>> Router 4
Router 4 <<>> Router 5 and Router 7
Router 5 <<>> Router 6 and Router 7
```

The LSPs toR2, toR3, toR4 and toR6 are configured with LDP:

```
set logical-systems R6 protocols mpls label-switched-path toR1 ldp-tunneling
set logical-systems R4 protocols mpls label-switched-path toR3 ldp-tunneling
set logical-systems R3 protocols mpls label-switched-path toR4 ldp-tunneling
set logical-systems R1 protocols mpls label-switched-path toR6 ldp-tunneling
```

```
LSP on Router 4:
set logical-systems R4 protocols mpls label-switched-path toR3 to 3.3.3.3
set logical-systems R4 protocols mpls label-switched-path toR3 ldp-tunneling
set logical-systems R4 protocols mpls label-switched-path toR3 no-cspf
```

As we see above, The no-cspf command shows that the constrained-path LSP computation has been disabled.

The label database are the following:

```
    student@chico:R4> show ldp database brief
Input label database, 4.4.4.4:0--3.3.3.3:0
  Label     Prefix
 299808     1.1.1.1/32
 299776     2.2.2.2/32
      3     3.3.3.3/32
 299792     4.4.4.4/32
 299840     5.5.5.5/32
 299824     6.6.6.6/32
 299856     7.7.7.7/32

Output label database, 4.4.4.4:0--3.3.3.3:0
  Label     Prefix
 299824     2.2.2.2/32
 299776     3.3.3.3/32
      3     4.4.4.4/32
 299792     5.5.5.5/32
 299856     6.6.6.6/32
 299808     7.7.7.7/32

Input label database, 4.4.4.4:0--5.5.5.5:0
  Label     Prefix
 299872     1.1.1.1/32
 299840     2.2.2.2/32
 299824     3.3.3.3/32
 299792     4.4.4.4/32
      3     5.5.5.5/32
 299808     6.6.6.6/32
 299776     7.7.7.7/32

Output label database, 4.4.4.4:0--5.5.5.5:0
  Label     Prefix
 299824     2.2.2.2/32
 299776     3.3.3.3/32
      3     4.4.4.4/32
 299792     5.5.5.5/32
 299856     6.6.6.6/32
 299808     7.7.7.7/32

Input label database, 4.4.4.4:0--7.7.7.7:0
```

```
  Label     Prefix
 299824     2.2.2.2/32
 299808     3.3.3.3/32
 299792     4.4.4.4/32
 299776     5.5.5.5/32
 299840     6.6.6.6/32
      3     7.7.7.7/32

Output label database, 4.4.4.4:0--7.7.7.7:0
  Label     Prefix
 299824     2.2.2.2/32
 299776     3.3.3.3/32
      3     4.4.4.4/32
 299792     5.5.5.5/32
 299856     6.6.6.6/32
 299808     7.7.7.7/32
```

The previous output shows all labels and its corresponding to a specific destination.

Now, routing table for Router 4: This routing table shows the labels, including IP-addresses, destination and the LSP that is related to the specific route.

```
student@chico:R4> show route

mpls.0: 12 destinations, 12 routes (12 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both

0                  *[MPLS/0] 1d 01:19:36, metric 1
                      Receive
1                  *[MPLS/0] 1d 01:19:36, metric 1
                      Receive
2                  *[MPLS/0] 1d 01:19:36, metric 1
                      Receive
299776             *[LDP/9] 1d 01:18:42, metric 1
                    > to 192.168.6.1 via ge-4/0/9.0, label-switched-path toR3
299776(S=0)        *[LDP/9] 1d 01:18:42, metric 1
                    > to 192.168.6.1 via ge-4/0/9.0, label-switched-path toR3
299792             *[LDP/9] 1d 01:18:17, metric 1
                    > to 192.168.8.1 via ge-4/3/0.0, Pop
299792(S=0)        *[LDP/9] 1d 01:18:17, metric 1
                    > to 192.168.8.1 via ge-4/3/0.0, Pop
299808             *[LDP/9] 1d 01:18:14, metric 1
                    > to 192.168.7.1 via ge-4/3/2.0, Pop
299808(S=0)        *[LDP/9] 1d 01:18:14, metric 1
                    > to 192.168.7.1 via ge-4/3/2.0, Pop
299824             *[LDP/9] 1d 01:17:55, metric 1
                    > to 192.168.6.1 via ge-4/0/9.0, label-switched-path toR3
299856             *[LDP/9] 1d 01:17:14, metric 1
                    > to 192.168.8.1 via ge-4/3/0.0, Swap 299808
```

```
299888             *[RSVP/7/1] 23:32:10, metric 1
                    > to 192.168.8.1 via ge-4/3/0.0, label-switched-path toR7
```

The router-IDs or Loopback interface addresses are used as FEC. They are a set of prefixes treated similarly.

2.4 Question - Which LSPs are configured with RSVP? How are they configured? Determine as many details about the LSPs as you are able to find?

RSVP is enabled for all LSPs. RSVP is enabled per interface but it is not specifically defined within the LSP.

LSPs are configures:

```
student@chico:R1> show rsvp session
Ingress RSVP: 2 sessions
To              From            State   Rt Style Labelin Labelout LSPname
6.6.6.6         1.1.1.1         Up       0  1 FF       -        3 toR6
7.7.7.7         1.1.1.1         Up       0  1 FF       -   299888 toR7
Total 2 displayed, Up 2, Down 0

Egress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
1.1.1.1         6.6.6.6         Up       0  1 FF       3        - toR1
Total 1 displayed, Up 1, Down 0

Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

student@chico:R2> show rsvp session
Ingress RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

Egress RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0


student@chico:R3> show rsvp session
Ingress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
4.4.4.4         3.3.3.3         Up       0  1 FF       -        3 toR4
Total 1 displayed, Up 1, Down 0

Egress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
3.3.3.3         4.4.4.4         Up       0  1 FF       3        - toR3
```

```
Total 1 displayed, Up 1, Down 0

Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

student@chico:R4> show rsvp session
Ingress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
3.3.3.3         4.4.4.4         Up       0  1 FF       -        3 toR3
Total 1 displayed, Up 1, Down 0

Egress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
4.4.4.4         3.3.3.3         Up       0  1 FF       3        - toR4
Total 1 displayed, Up 1, Down 0

Transit RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
7.7.7.7         1.1.1.1         Up       0  1 FF  299888   299904 toR7
Total 1 displayed, Up 1, Down 0


student@chico:R5> show rsvp session
Ingress RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

Egress RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

Transit RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
7.7.7.7         1.1.1.1         Up       0  1 FF  299904        3 toR7
Total 1 displayed, Up 1, Down 0

student@chico:R6> show rsvp session
Ingress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
1.1.1.1         6.6.6.6         Up       0  1 FF       -        3 toR1
Total 1 displayed, Up 1, Down 0

Egress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
6.6.6.6         1.1.1.1         Up       0  1 FF       3        - toR6
Total 1 displayed, Up 1, Down 0

Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0

student@chico:R7> show rsvp session
Ingress RSVP: 0 sessions
```

```
Total 0 displayed, Up 0, Down 0

Egress RSVP: 1 sessions
To              From            State   Rt Style Labelin Labelout LSPname
7.7.7.7         1.1.1.1         Up       0  1 FF       3        - toR7
Total 1 displayed, Up 1, Down 0

Transit RSVP: 0 sessions
Total 0 displayed, Up 0, Down 0
```

RSVP Configurations:

```
set logical-systems R1 protocols rsvp interface all
set logical-systems R2 protocols rsvp interface all
set logical-systems R3 protocols rsvp interface all
set logical-systems R4 protocols rsvp interface all
set logical-systems R5 protocols rsvp interface all
set logical-systems R6 protocols rsvp interface all
set logical-systems R7 protocols rsvp interface all
```

3 Task 3 - Prepare the config to add a new router

3.1 Task 3: Give your prepared configuration for router R8. Including explanations for each command you use.

```
x name of the router: R8
- R8 needs to be connected to R1 and R3 (see drawing next page)
x GE interfaces to be used on R8: Ge-4/3/8 and Ge-4/3/9
x Loopback address: 8.8.8.8
- Assign prefixes to the links (pick appropriately sized subnets)
x R8 should become part of the MPLS core
x R8 must run LDP
- An RSVP signalled LSP to R6 with reserved bandwidth of 200M should be built
- Another RSVP LSP to R4 with reserved bandwidth of 300M should be built
```

References

[1] K. Grove-Rasmussen og Jesper Nygård, *Kvantefænomener i Nanosystemer*. Niels Bohr Institute & Nano-Science Center, Københavns Universitet