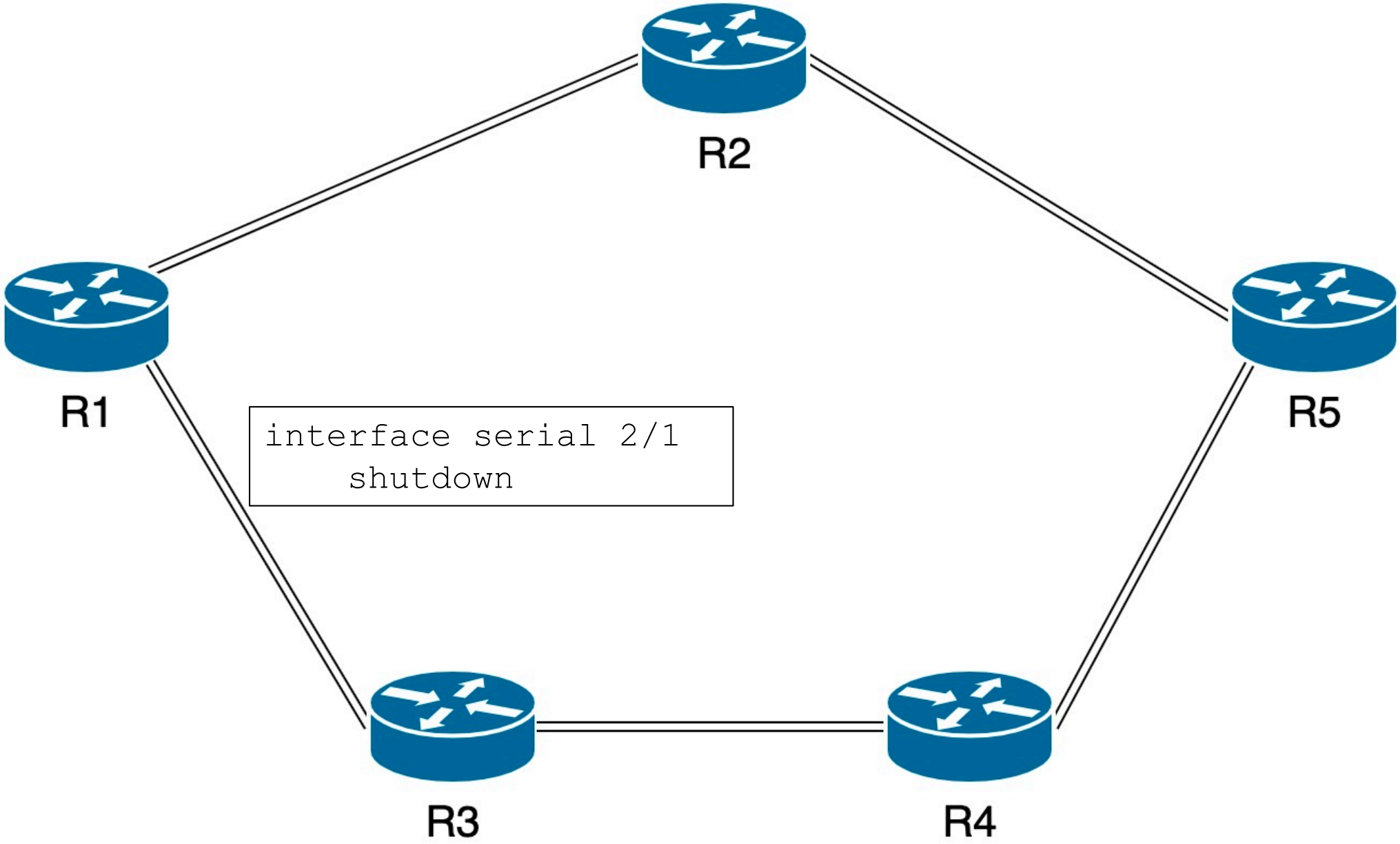
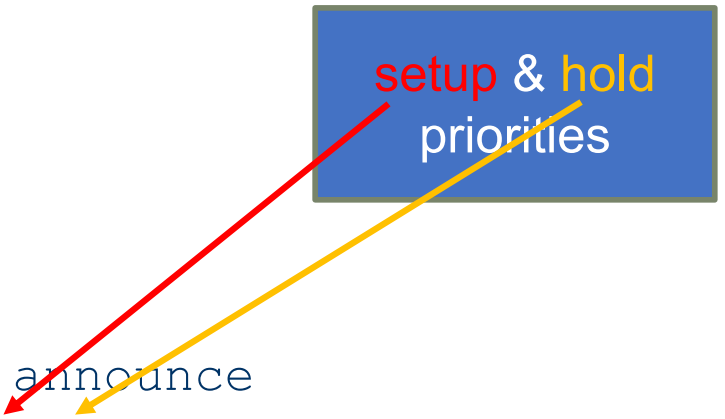



```
show mpls traffic-eng topology brief
```

MPLS TE – Dynamic Tunnels

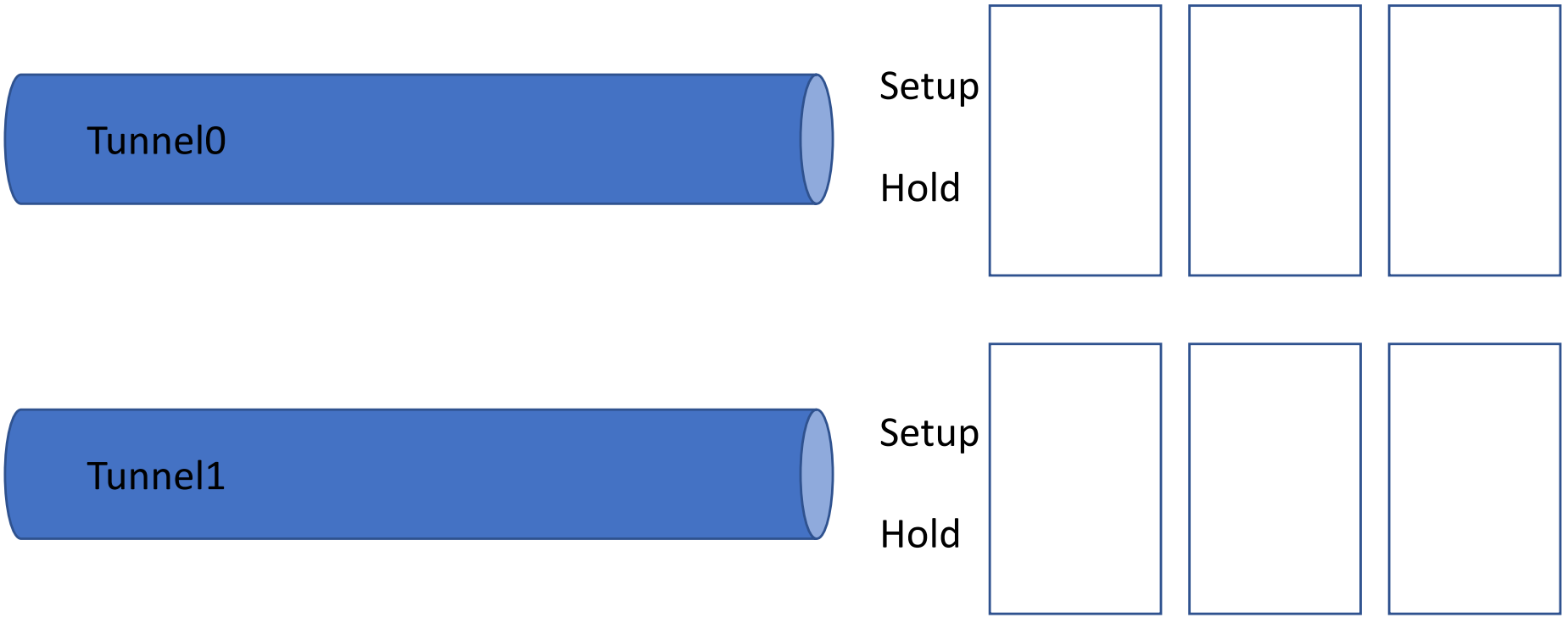
- Define a tunnel (headend) with dynamic path:
  - `interface Tunnel1`
  - `ip unnumbered Loopback1`
  - `tunnel destination 172.16.1.5`
  - `tunnel mode mpls traffic-eng`
  - `tunnel mpls traffic-eng autoroute announce`
  - `tunnel mpls traffic-eng priority 5 5`
  - `tunnel mpls traffic-eng bandwidth 400`
  - `tunnel mpls traffic-eng path-option 1 dynamic`



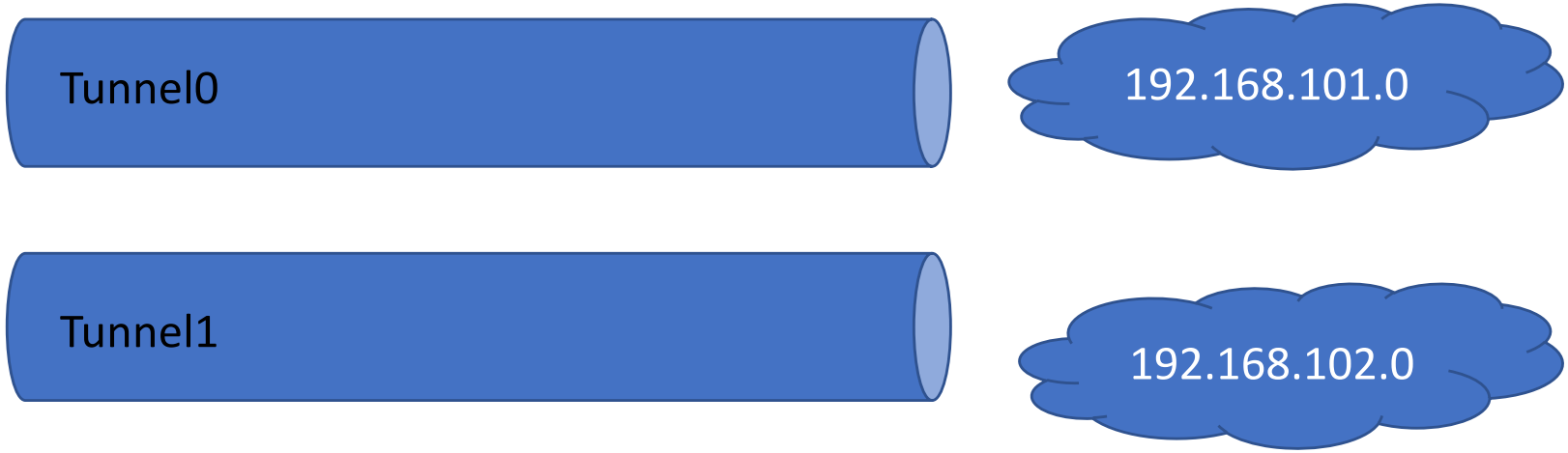
- Check tunnel status
  - `show mpls traffic-eng tunnels brief`

MPLS TE – Dynamic Tunnels (2)

shutdown interface s2/1 on R1, then play with the following priorities



Differentiate routing



- To differentiate routing you can set static routes (e.g. for load balancing):
  - `ip route 192.168.101.0 255.255.255.0 Tunnel0`
  - `ip route 192.168.102.0 255.255.255.0 Tunnel1`

Test 1

- Generate tunnel0 (priority 2 2)
- Generate tunnel1 (priority 3 3)

- Turn on `serial 2/1` on R1
- Increase priority of tunnel1 to 1 1

- Check tunnel status at each step
- Observe traffic

MPLS TE – Explicit-path Tunnels

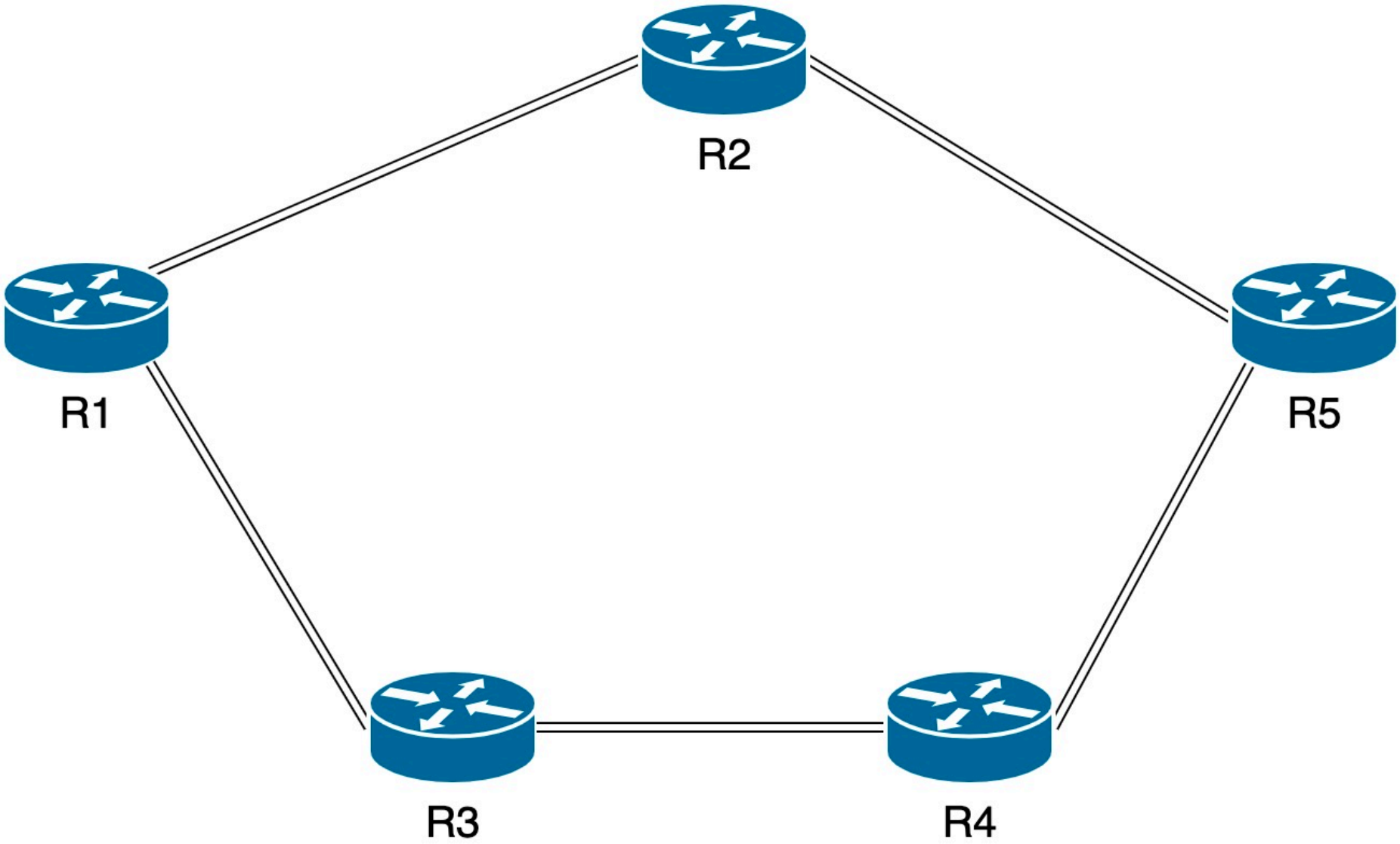
- Define a tunnel (headend) with explicit path:

```
interface Tunnel2
  ip unnumbered Loopback0
  tunnel destination 172.16.1.5
  tunnel mode mpls traffic-eng
  tunnel mpls traffic-eng autoroute announce
  tunnel mpls traffic-eng priority 2 2
  tunnel mpls traffic-eng bandwidth 400
  tunnel mpls traffic-eng path-option 1 explicit name longpath
  tunnel mpls traffic-eng path-option 2 dynamic bandwidth 400
  tunnel mpls traffic-eng path-option 3 dynamic bandwidth 0
```

- Define the path:

```
ip explicit-path name longpath enable
    next-address 10.2.2.2
    next-address 10.3.3.2
    next-address 10.4.4.2
```

```
tunnel mpls traffic-eng path-option 1 explicit name longpath
tunnel mpls traffic-eng path-option 2 dynamic bandwidth 400
tunnel mpls traffic-eng path-option 3 dynamic bandwidth 0
```



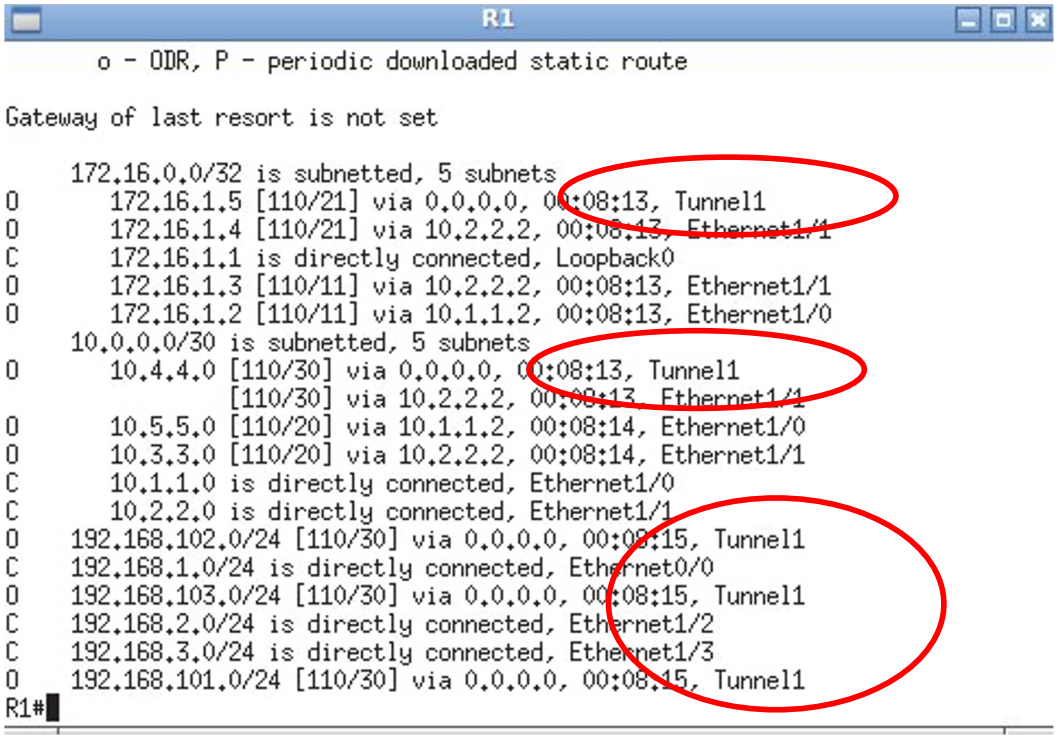
Test 2

- Remove either tunnel0 or tunnel1
- Create tunnel2

- Check where traffic is going

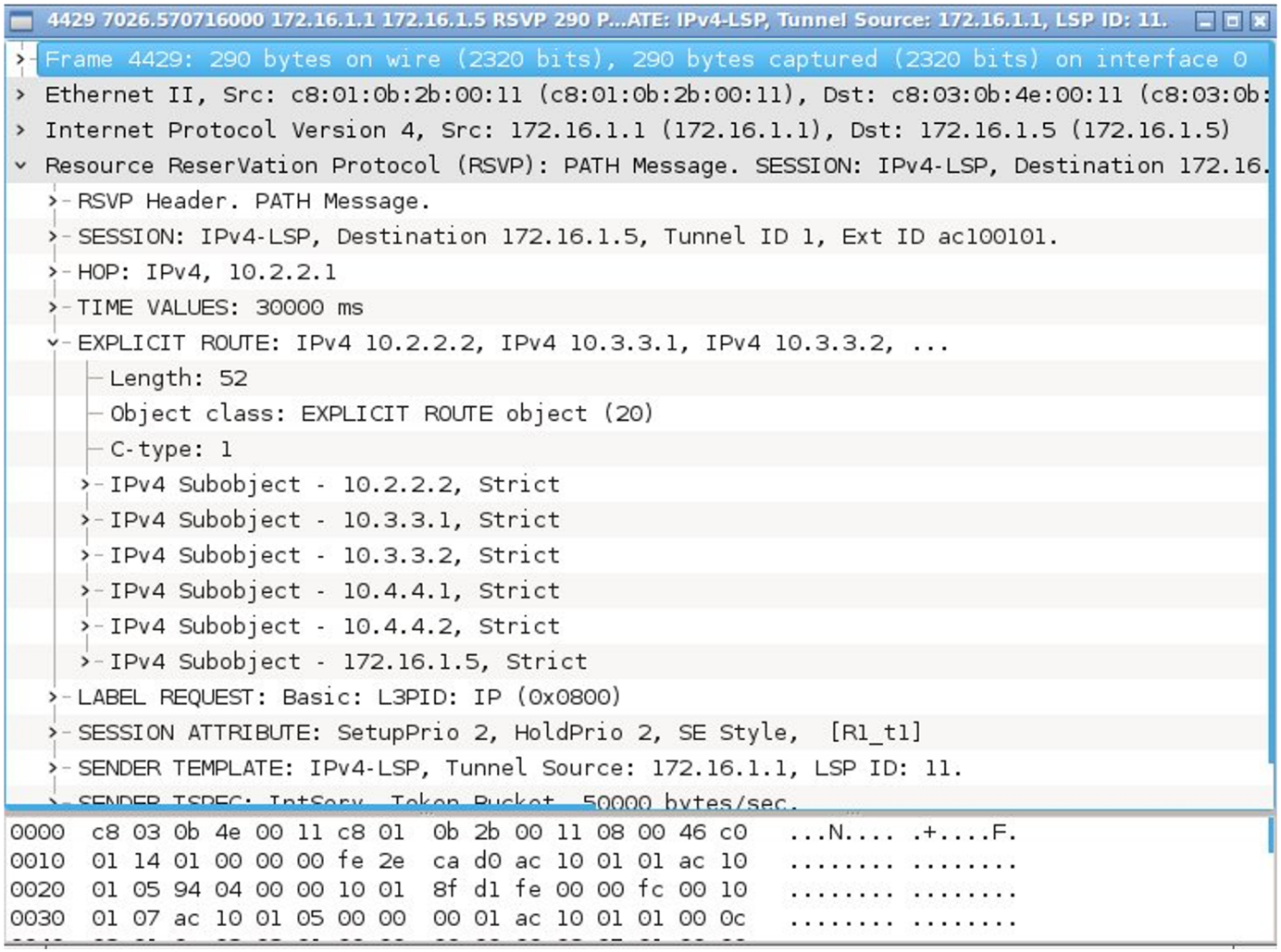
Test 2

- show ip route



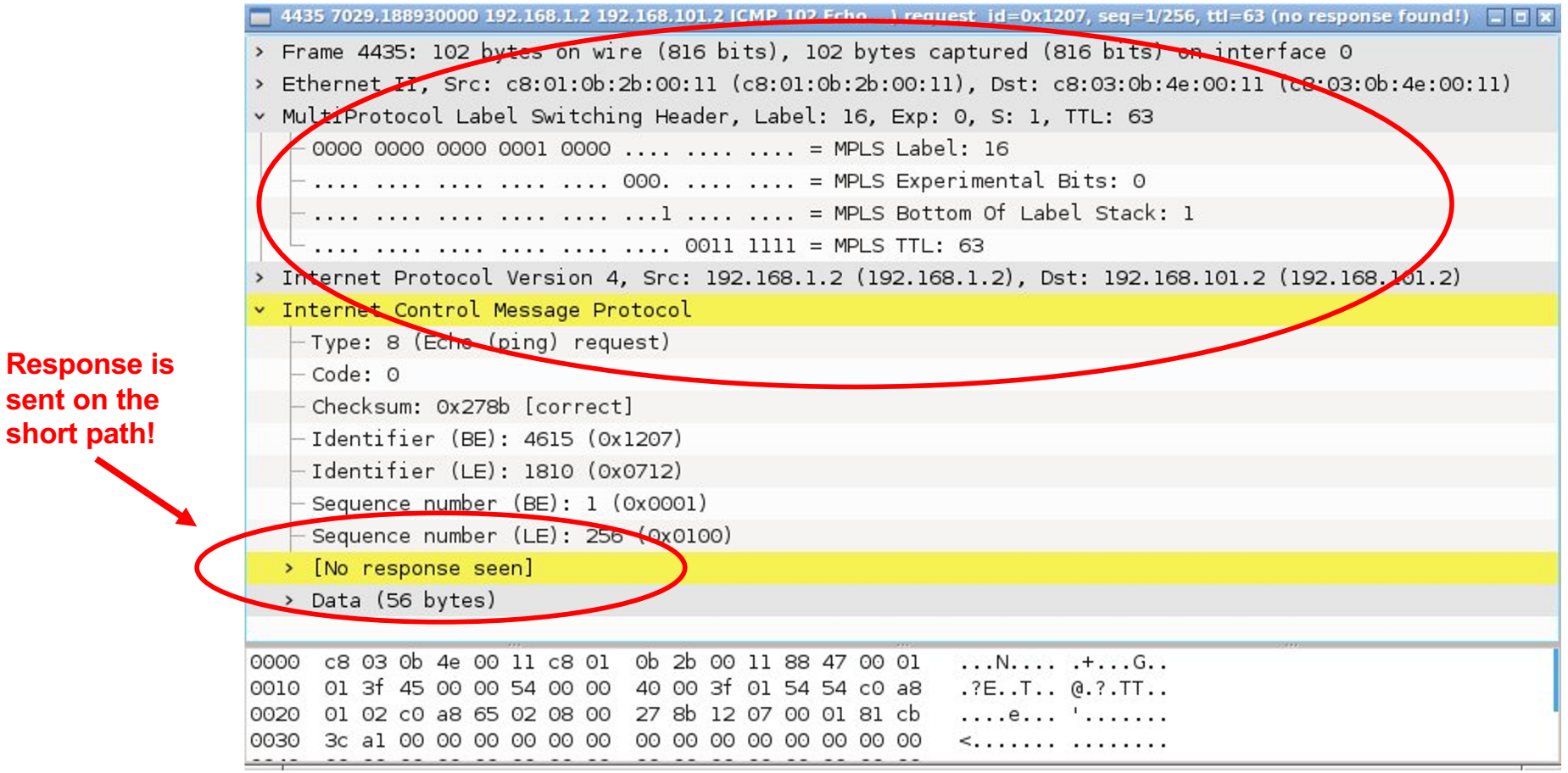
Test 2

- RSVP messages can be seen



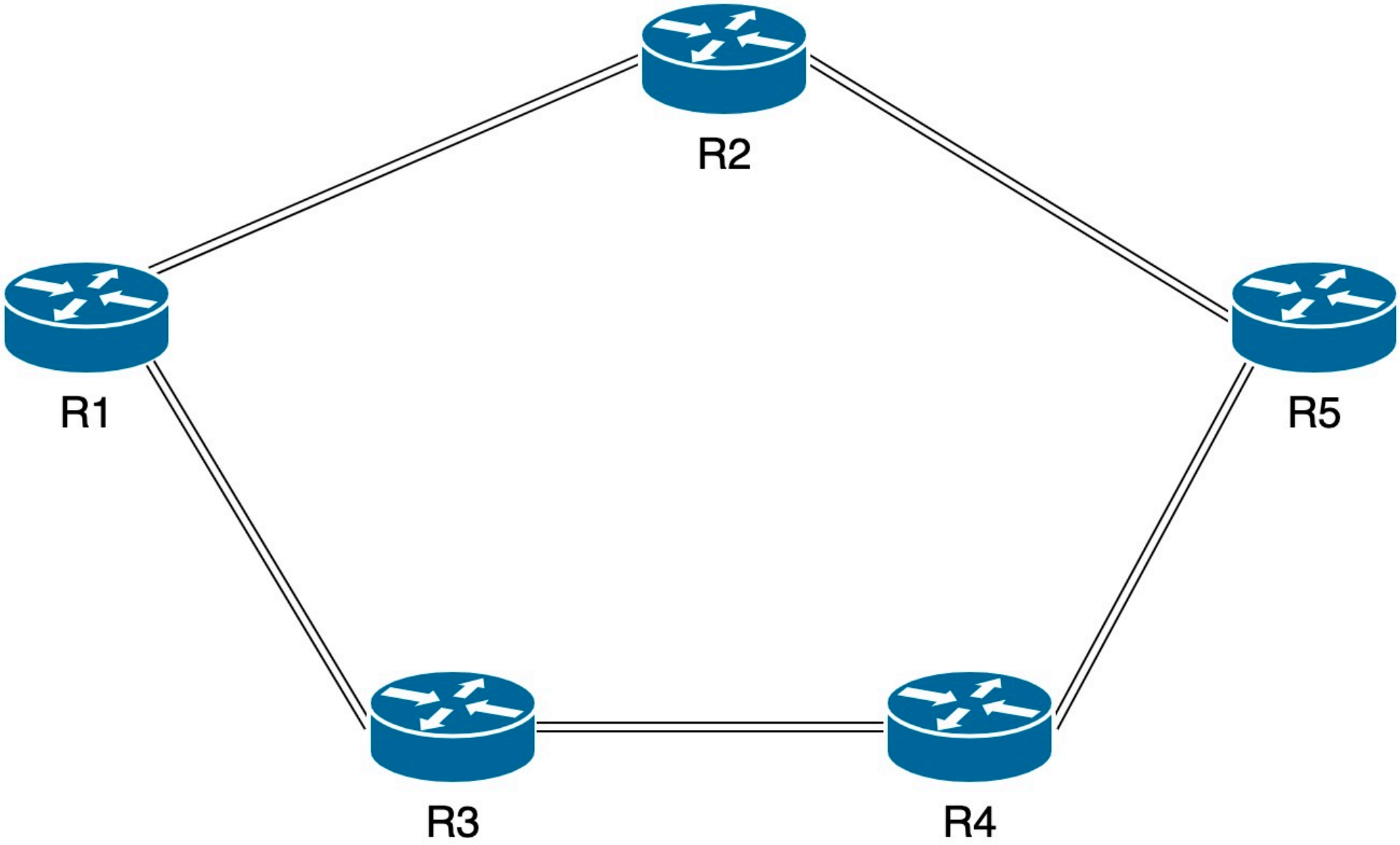
Test 2

- Open Wireshark on one of the links in the long path and try to ping a Server from a Client



Response is sent on the short path!

Path protection



Path protection (2)

```
interface tunnel2
   …
   tunnel mpls traffic-eng path-option 1 dynamic bandwidth 400
   tunnel mpls traffic-eng path-option protect 10 explicit name longpath
```

Test 3

- Create a tunnel between R1 and R5
- Use a dynamic path as primary
- Use an explicit path R1-R3-R4-R5 as secondary
- create a static route through the tunnel

- Observe traffic

- Shutdown any interface of R2
- Observe traffic again