

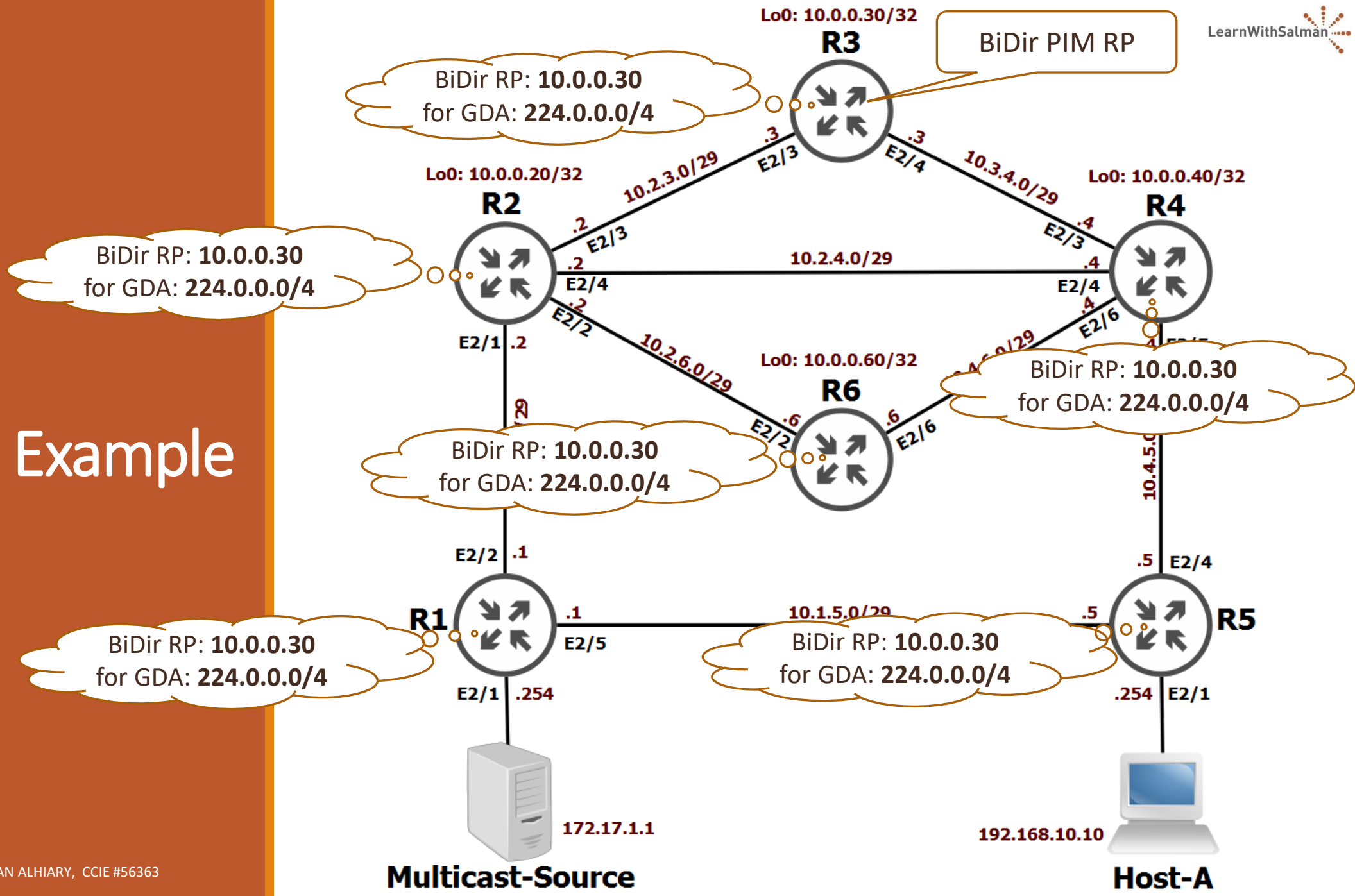
CCIE DATA CENTER MULTICAST

BiDir - PIM

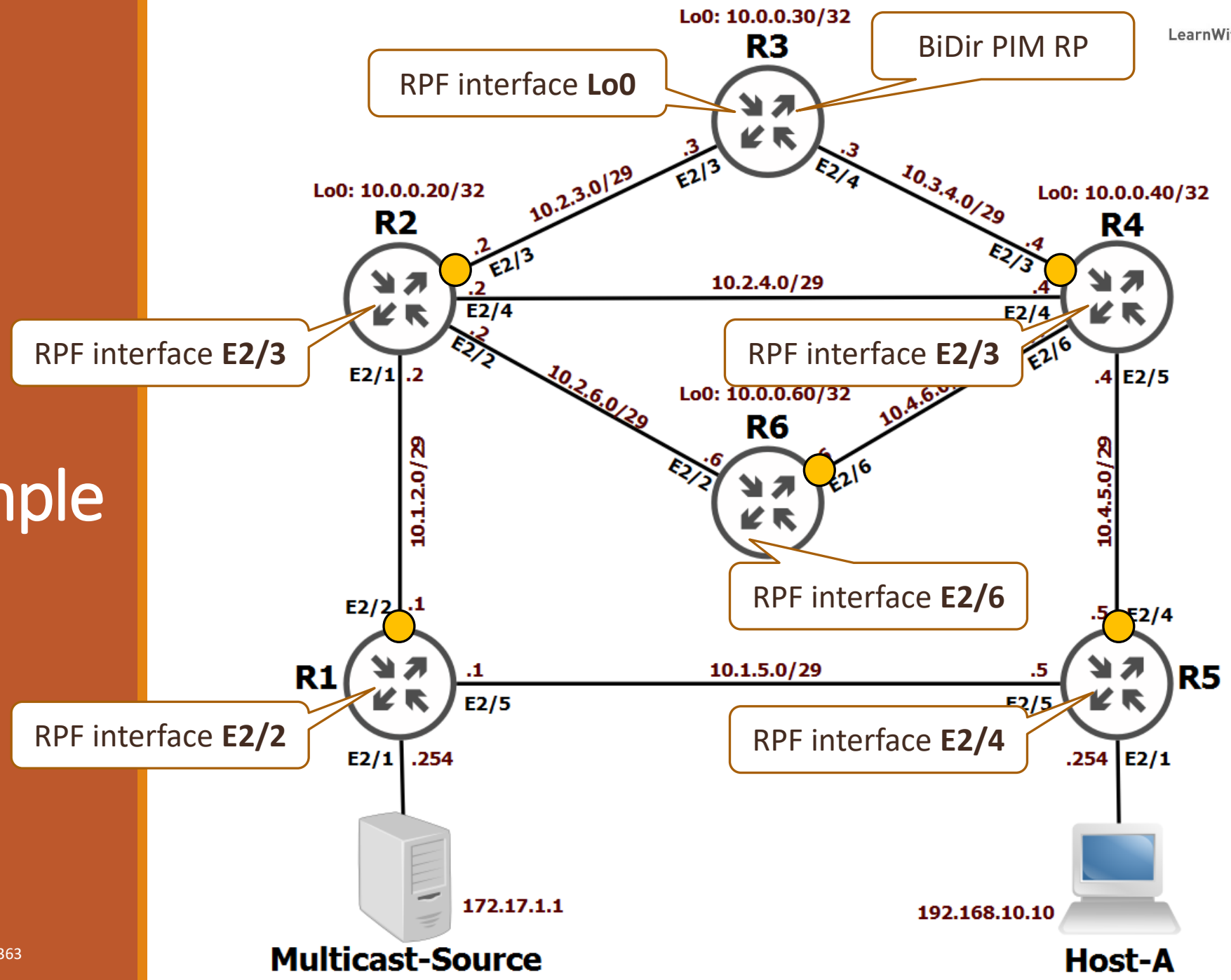
Bidirectional PIM (BiDir-PIM) Overview

- ASM works efficiently with a relatively small number of multicast senders. However, it becomes less efficient with a large number of senders & receivers.
- Bidirectional PIM (RFC-5015) solves this relative inefficiency by slightly changing the rules used by PIM-SM ASM:
 - BiDir uses bidirectional shared trees, whereas ASM relies on unidirectional shared and source trees.
 - ASM must maintain (S, G) state for every source sending traffic to a group address. However, BiDir doesn't use any (S, G) state; it uses only (*, G) states.
 - BiDir doesn't need any source registration process, which reduces processing overhead.
 - Both ASM and BiDir must have every group mapped to an RP. The RP in BiDir does not do any packet processing.
 - In BiDir, the RP address (RPA) is a route vector used as a reference point for forwarding up or down the shared tree.
 - BiDir uses the concept of a Designated Forwarder (DF) that is elected on every link in the PIM domain used in loop prevention.

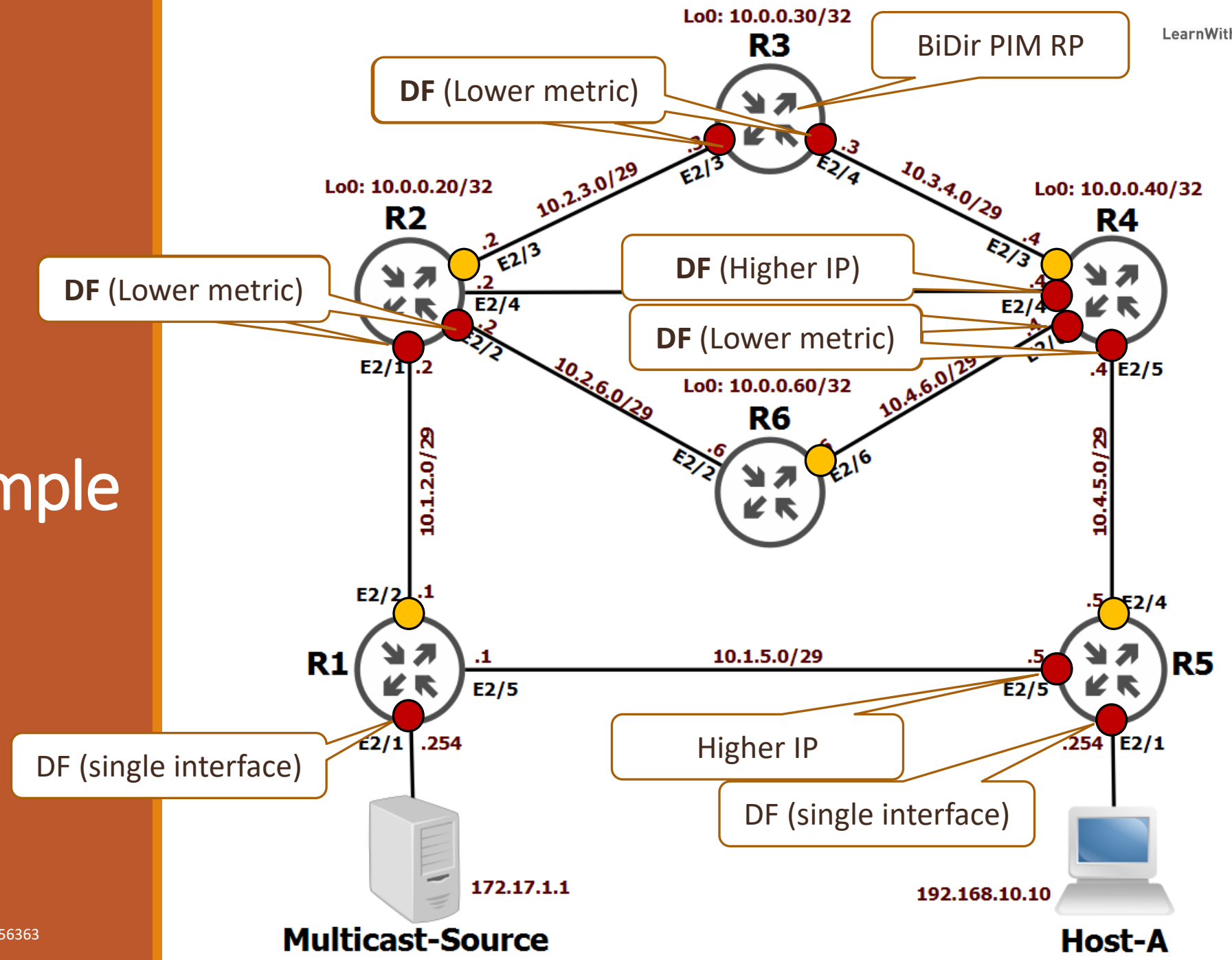
BiDir PIM Example



BiDir PIM Example



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BiDir PIM Example

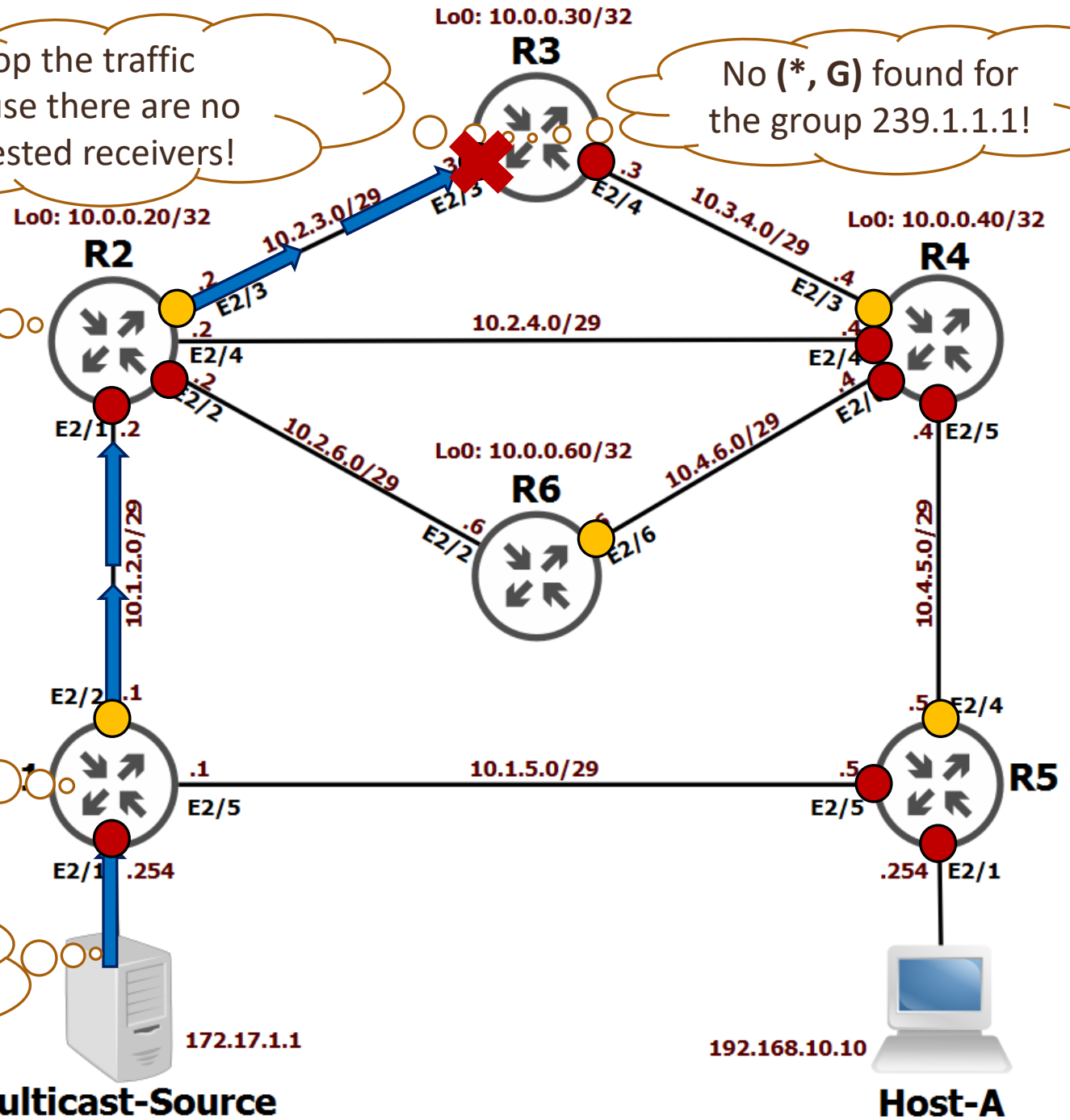
I have to send the multicast traffic to the RP out from the RPF interface.

I have to send the multicast traffic to the RP out from the RPF interface.

sending multicast traffic for group **239.1.1.1**, sourced from **172.17.1.1**

Drop the traffic because there are no interested receivers!

No (*, G) found for the group 239.1.1.1!



```
R3# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"
```

```
R2# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"
```

```
(* , 224.0.0.0/4) , bidir, uptime: 00:25:23, pim ip
Incoming interface: loopback0, RPF nbr: 10.0.0.30
Outgoing interface list: (count: 0)
```

10/32

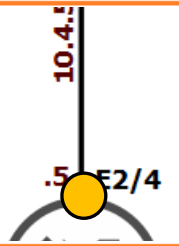
```
(* , 224.0.0.0/4) , bidir, uptime: 00:25:22, pim ip
Incoming interface: Ethernet2/3, RPF nbr: 10.3.4.3
Outgoing interface list: (count: 1)
Ethernet2/3, uptime: 00:25:22, pim, (RPF)
```

```
R4# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"
```

```
(* , 224.0.0.0/4) , bidir, uptime: 00:25:23, pim ip
Incoming interface: Ethernet2/3, RPF nbr: 10.3.4.3
Outgoing interface list: (count: 1)
Ethernet2/3, uptime: 00:25:23, pim, (RPF)
```

```
R6# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"
```

```
(* , 224.0.0.0/4) , bidir, uptime: 00:25:26, pim ip
Incoming interface: Ethernet2/6, RPF nbr: 10.4.6.4
Outgoing interface list: (count: 1)
Ethernet2/6, uptime: 00:25:26, pim, (RPF)
```



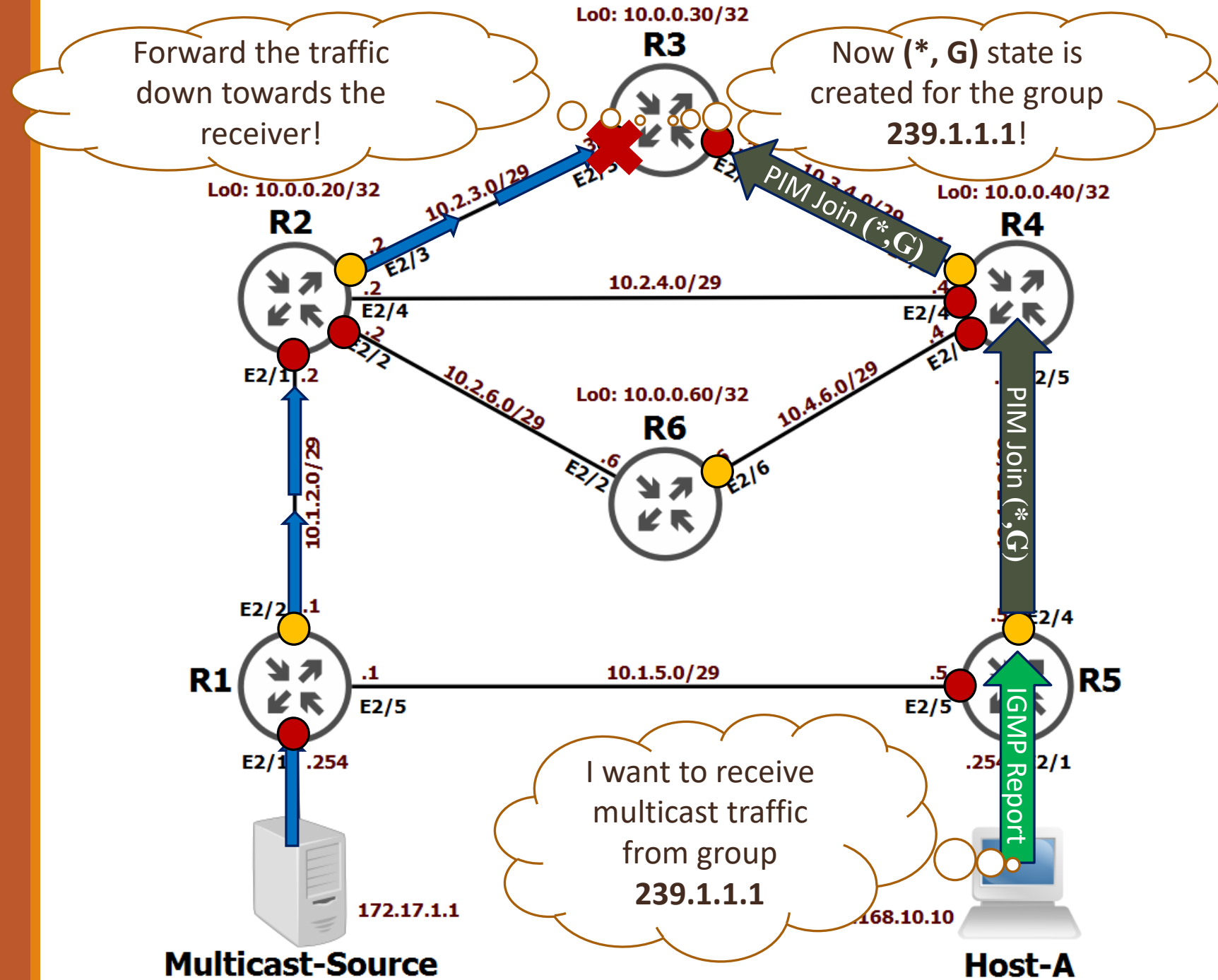
```
R1# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"
```

```
(* , 224.0.0.0/4) , bidir, uptime: 00:25:20, pim ip
Incoming interface: Ethernet2/2, RPF nbr: 10.4.5.4
Outgoing interface list: (count: 1)
Ethernet2/2, uptime: 00:25:20, pim, (RPF)
```

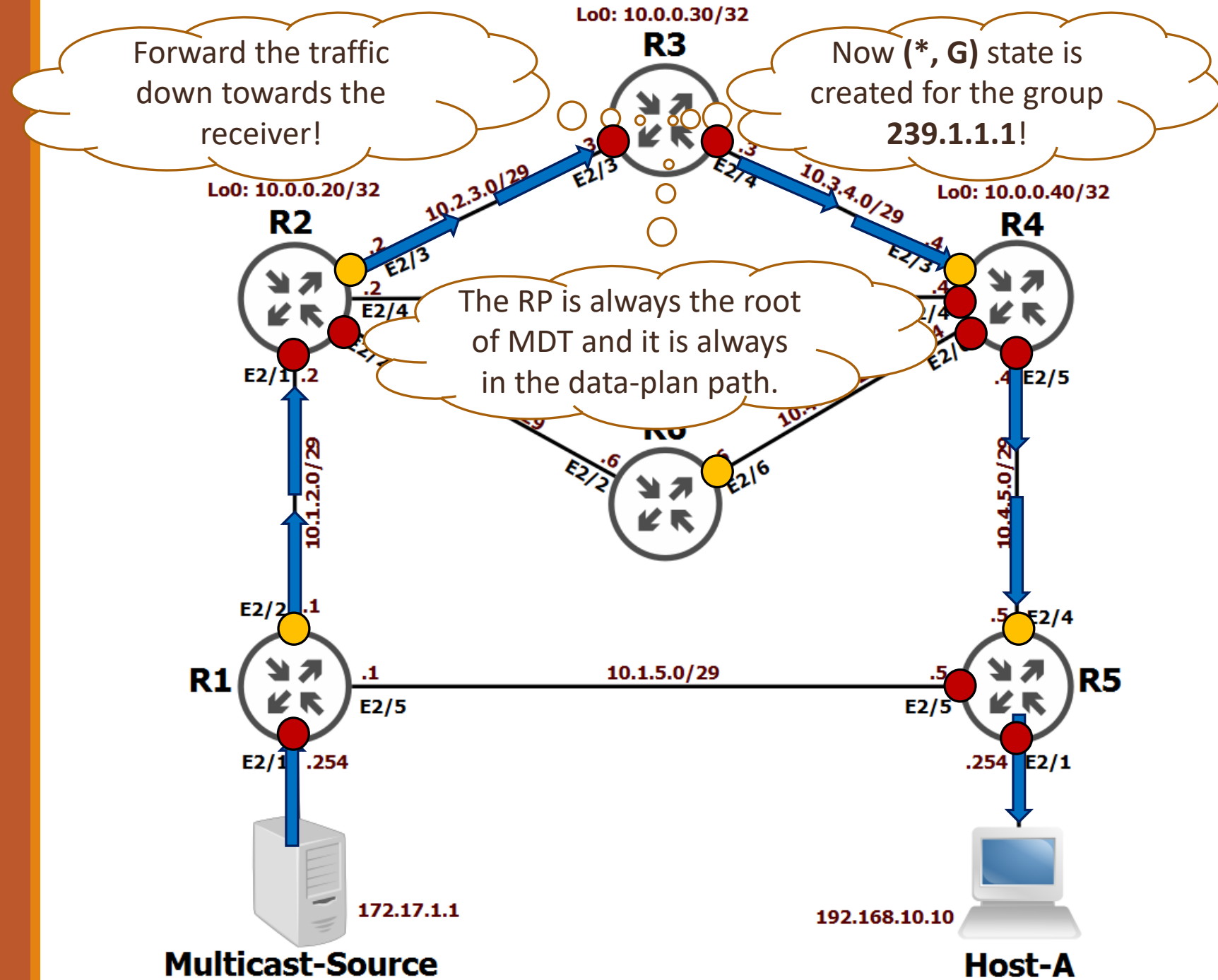
```
R5# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"
```

```
(* , 224.0.0.0/4) , bidir, uptime: 00:25:24, pim ip
Incoming interface: Ethernet2/4, RPF nbr: 10.4.5.4
Outgoing interface list: (count: 1)
Ethernet2/4, uptime: 00:25:24, pim, (RPF)
```


BiDir PIM Example



BiDir PIM Example



```
R3# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"

(*, 239.1.1.1/32), bidir, uptime: 00:00:48
  Incoming interface: loopback0, RPF nbr:
  Outgoing interface list: (count: 1)
    Ethernet2/4, uptime: 00:00:48, pim
```

```
R4# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"

(*, 239.1.1.1/32), bidir, uptime: 00:00:52, pim ip
  Incoming interface: Ethernet2/3, RPF nbr: 10.3.4.3
  Outgoing interface list: (count: 2)
    Ethernet2/5, uptime: 00:00:52, pim
    Ethernet2/3, uptime: 00:00:52, pim, (RPF)
```

```
R6# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"

(*, 224.0.0.0/4), bidir, uptime: 00:38:57, pim ip
  Incoming interface: Ethernet2/6, RPF nbr: 10.4.6.4
  Outgoing interface list: (count: 1)
    Ethernet2/6, uptime: 00:38:57, pim, (RPF)
```

```
R2# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"

(*, 224.0.0.0/4), bidir, uptime: 00:38
  Incoming interface: Ethernet2/3, RPF
  Outgoing interface list: (count: 1)
    Ethernet2/3, uptime: 00:38:42, pim,
```

```
R5# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"
```

```
R1# show ip mroute 239.1.1.1
IP Multicast Routing Table for VRF "default"

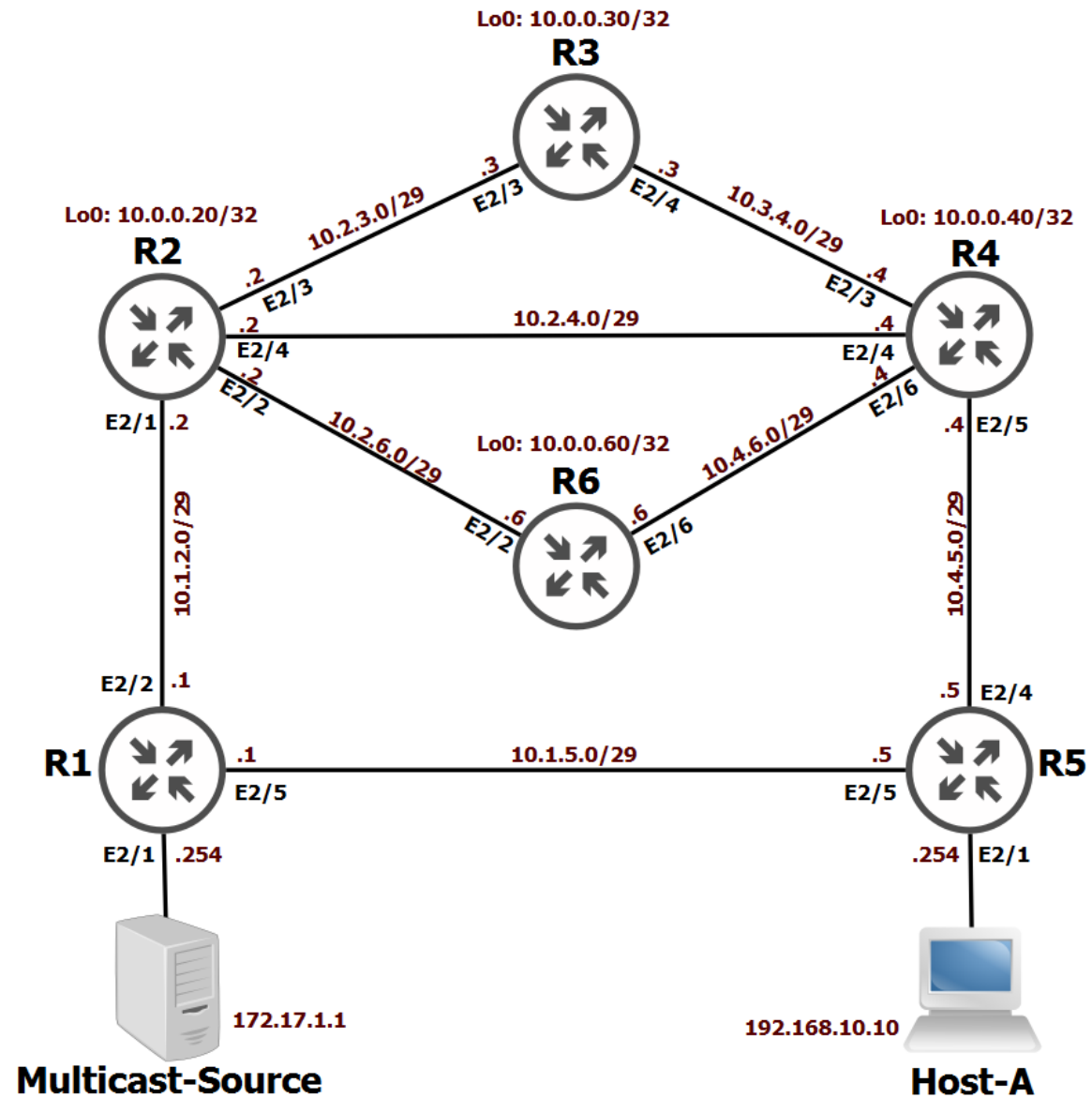
(*, 224.0.0.0/4), bidir, uptime: 00:38:
  Incoming interface: Ethernet2/2, RPF
  Outgoing interface list: (count: 1)
    Ethernet2/2, uptime: 00:38:38, pim, (RPF)
```

```
(*, 239.1.1.1/32), bidir, uptime: 00:00:54, igmp pim ip
  Incoming interface: Ethernet2/4, RPF nbr: 10.4.5.4
  Outgoing interface list: (count: 2)
    Ethernet2/4, uptime: 00:00:54, pim, (RPF)
    Ethernet2/1, uptime: 00:00:54, igmp
```

192.168.10.10

BiDir PIM Configuration and Verification

- PIM sparse mode must be enabled on all interfaces. The BiDir capable bit is set in PIM hello messages by default, so no interface-level command is required to specifically enable BiDir PIM.
- An RP is designated as a BiDir RP when it is configured with the **bidir** keyword:
 - Static RP: **ip pim rp-address a.b.c.d group-list a.b.c.d/LEN bidir**
 - Auto-RP: **ip pim auto-rp rp-candidate <intf> group-list a.b.c.d/LEN bidir**
 - BSR: **ip pim bsr rp-candidate <intf> group-list a.b.c.d/LEN bidir**
- For verification:
 - **show ip pim interface brief**
 - **show ip pim neighbor**
 - **show ip pim rp**
 - **show ip mroute**
 - **show run pim**
 - **Show ip pim df** // Display Bidir Designated Forwarders



Thanks for watching!

