

Protocol Deep Dive: IGMP and MLD

INTRODUCTION TO IPV4 MULTICAST AND IGMPV1



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Agenda



What is multicast?

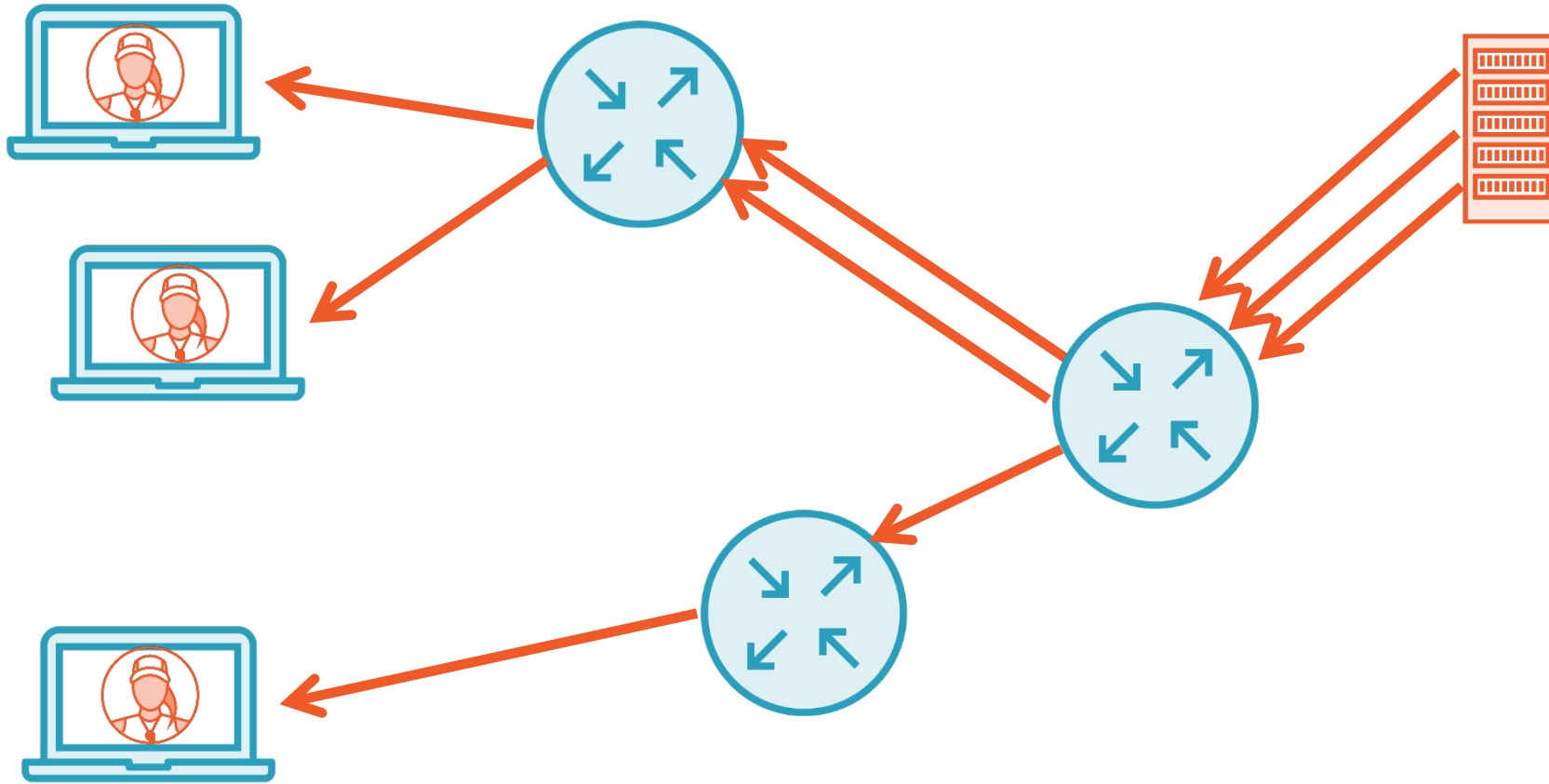
Exploring IGMPv1

PIM at a high-level

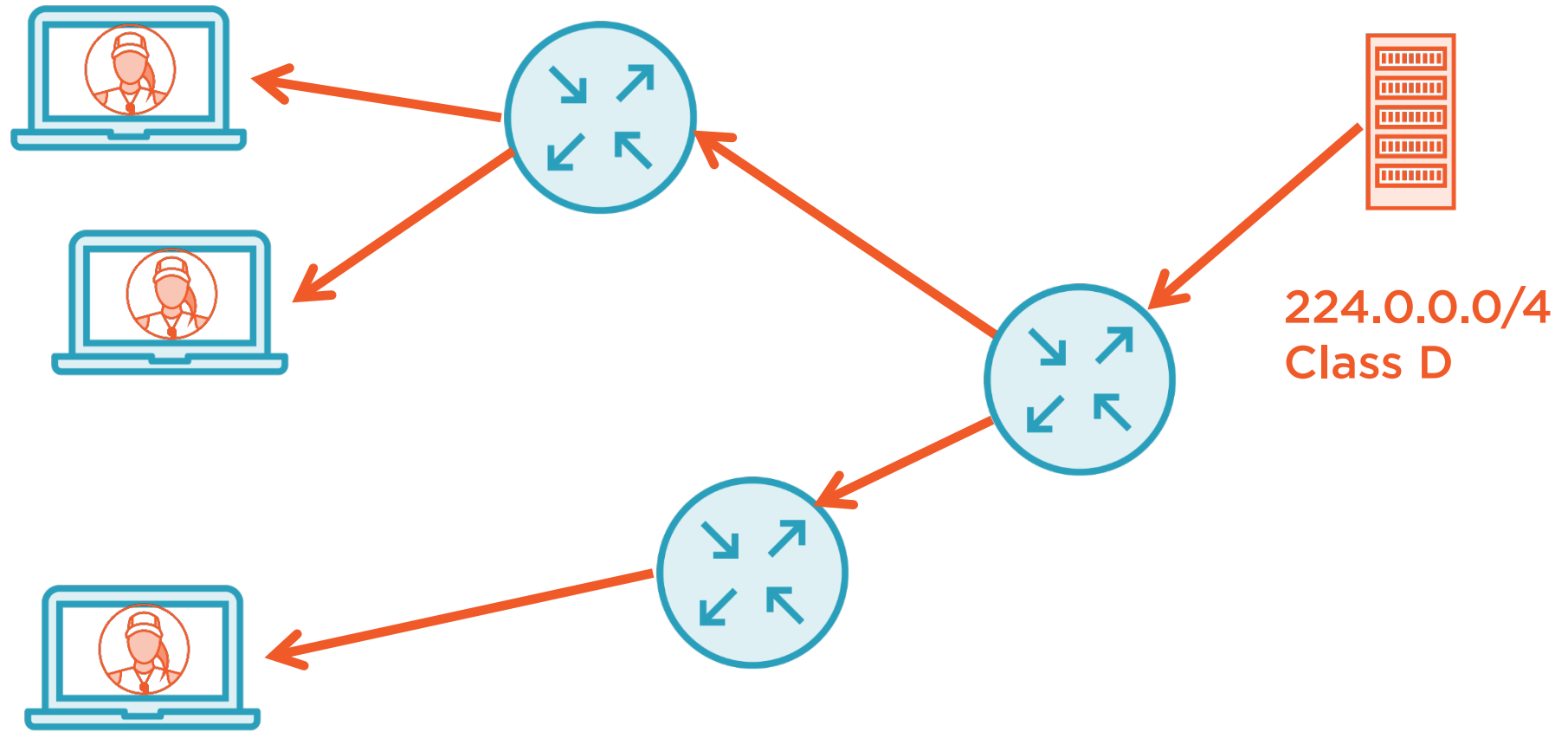
Putting it all together



Video via Unicast



Video via Multicast



What Protocols?

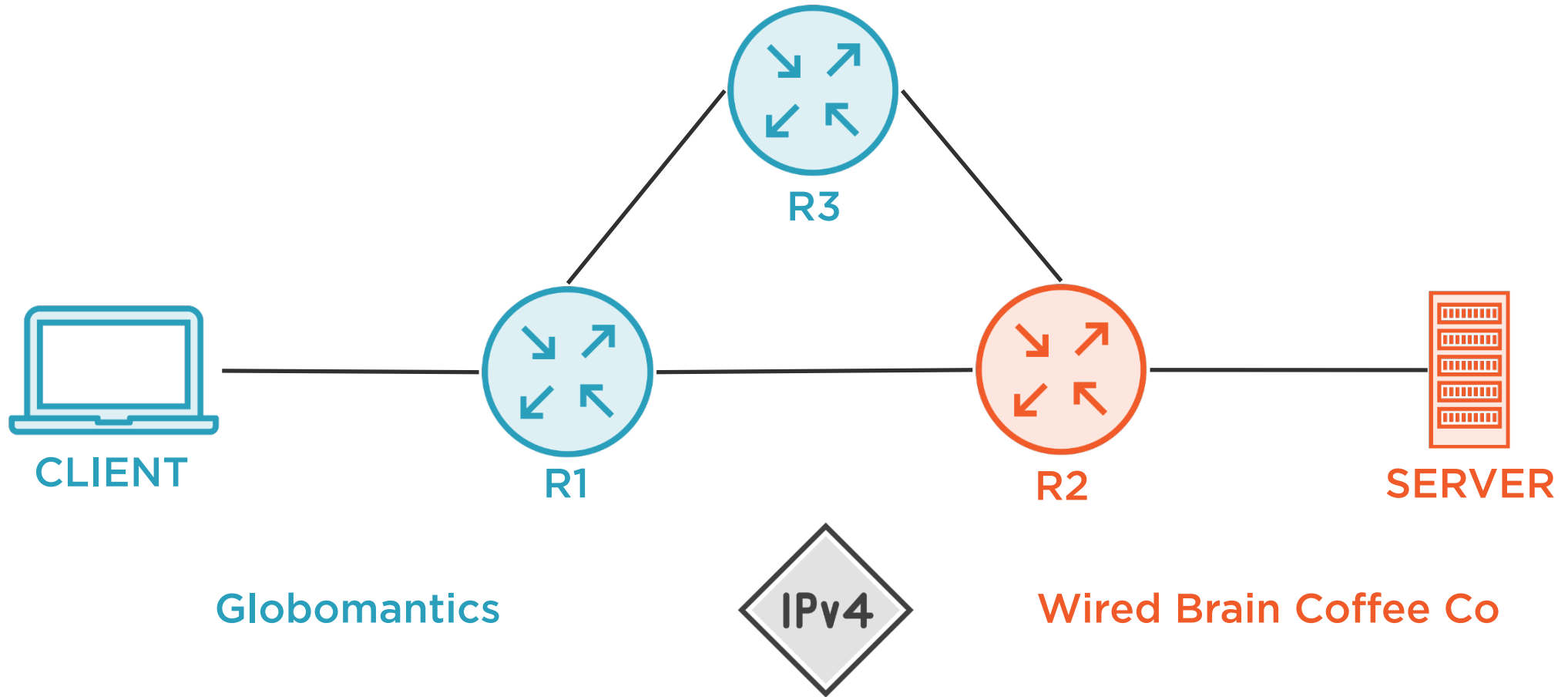
**Internet Group
Management
Protocol**

**Multicast Listener
Discovery**

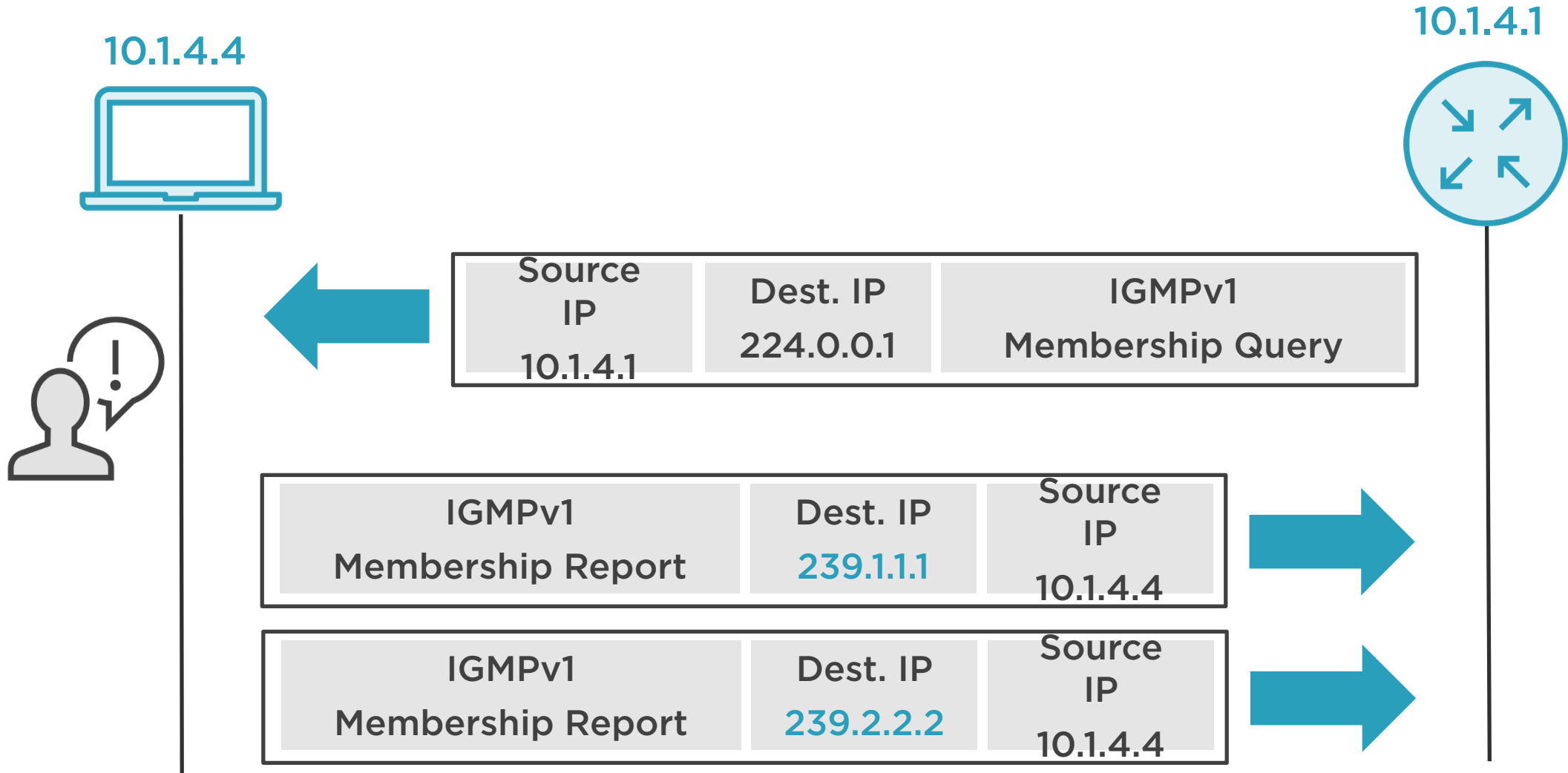
**Protocol
Independent
Multicast**



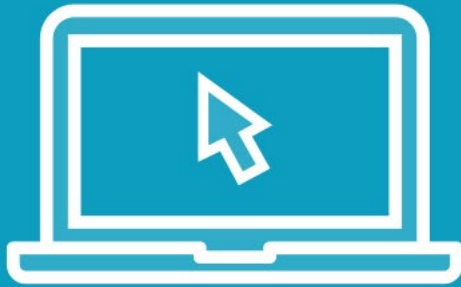
Our Network



IGMPv1 Operations



Demo



IGMPv1 in Action



Detour: Wireshark

No.	Time	Source	Destination	Protocol	Time to live	Info
0.012680	10.1.4.4	10.2.5.5	UDP	3	49160-33440	Len=0
0.013327	10.2.5.5	10.1.4.4	ICMP	253,1	Destination unreachable (Port unreachable)	
0.013513	10.1.4.4	10.2.5.5	UDP	3	49161-33441	Len=0
0.013760	10.2.5.5	10.1.4.4	ICMP	253,1	Destination unreachable (Port unreachable)	
0.018151	10.1.4.4	10.2.5.5	UDP	3	49162-33442	Len=0
0.018852	10.2.5.5	10.1.4.4	ICMP	253,1	Destination unreachable (Port unreachable)	

▶ Frame 14: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface 0

▶ Ethernet II, Src: 00:00:a6:16:00:01, Dst: 00:00:a6:16:00:04

▶ Internet Protocol Version 4, Src: 10.2.5.5, Dst: 10.1.4.4

▼ Internet Control Message Protocol

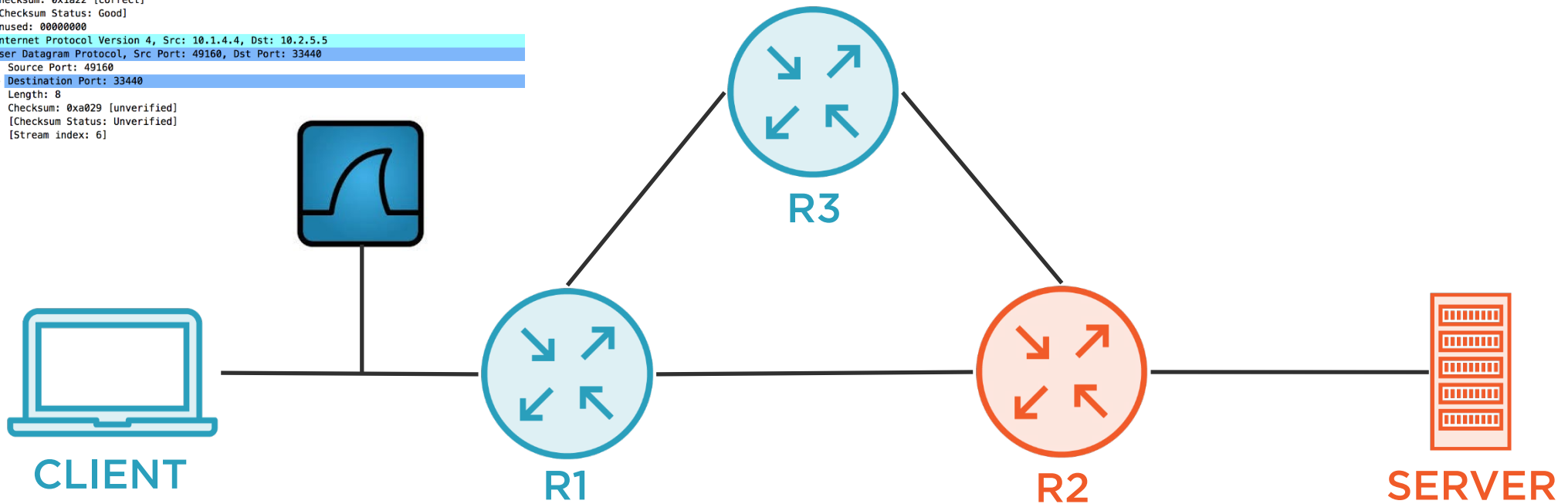
- Type: 3 (Destination unreachable)
- Code: 3 (Port unreachable)
- Checksum: 0x1a22 [correct]
- [Checksum Status: Good]
- Unused: 00000000

▶ Internet Protocol Version 4, Src: 10.1.4.4, Dst: 10.2.5.5

▼ User Datagram Protocol, Src Port: 49160, Dst Port: 33440

- Source Port: 49160
- ▶ Destination Port: 33440
- Length: 8
- Checksum: 0xa029 [unverified]
- [Checksum Status: Unverified]
- [Stream index: 6]

Free download:
wireshark.org



IGMPv1 Membership Query

No.	Time	Source	Destination	Protocol	Info
1	0.000000	10.1.4.1	224.0.0.1	IGMPv1	Membership Query
2	0.374944	10.1.4.4	239.2.2.2	IGMPv1	Membership Report
3	0.482481	10.1.4.4	239.1.1.1	IGMPv1	Membership Report

- ▶ Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
- ▶ Ethernet II, Src: 00:00:a6:16:00:01, Dst: 01:00:5e:00:00:01
- ▶ Internet Protocol Version 4, Src: 10.1.4.1, Dst: 224.0.0.1
- ▼ Internet Group Management Protocol

[IGMP Version: 1]

Type: Membership Query (0x11)

Reserved: 00

Checksum: 0xeeff [correct]

[Checksum Status: Good]

Multicast Address: 0.0.0.0



Type 0x11 (17) is "Query"



No specific group means "General Query"



IGMPv1 Membership Report

No.	Time	Source	Destination	Protocol	Info
1	0.000000	10.1.4.1	224.0.0.1	IGMPv1	Membership Query
2	0.374944	10.1.4.4	239.2.2.2	IGMPv1	Membership Report
3	0.482481	10.1.4.4	239.1.1.1	IGMPv1	Membership Report

- ▶ Frame 2: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
- ▶ Ethernet II, Src: 00:00:a6:16:00:04, Dst: 01:00:5e:02:02:02
- ▶ Internet Protocol Version 4, Src: 10.1.4.4, Dst: 239.2.2.2
- ▼ Internet Group Management Protocol

[IGMP Version: 1]

Type: Membership Report (0x12)

Reserved: 00

Checksum: 0xfcfa [correct]

[Checksum Status: Good]

Multicast Address: 239.2.2.2



Type 0x12 (18) is "Join"



Specific group means
"I want traffic for 239.2.2.2"



IGMPv1 Membership Report Again

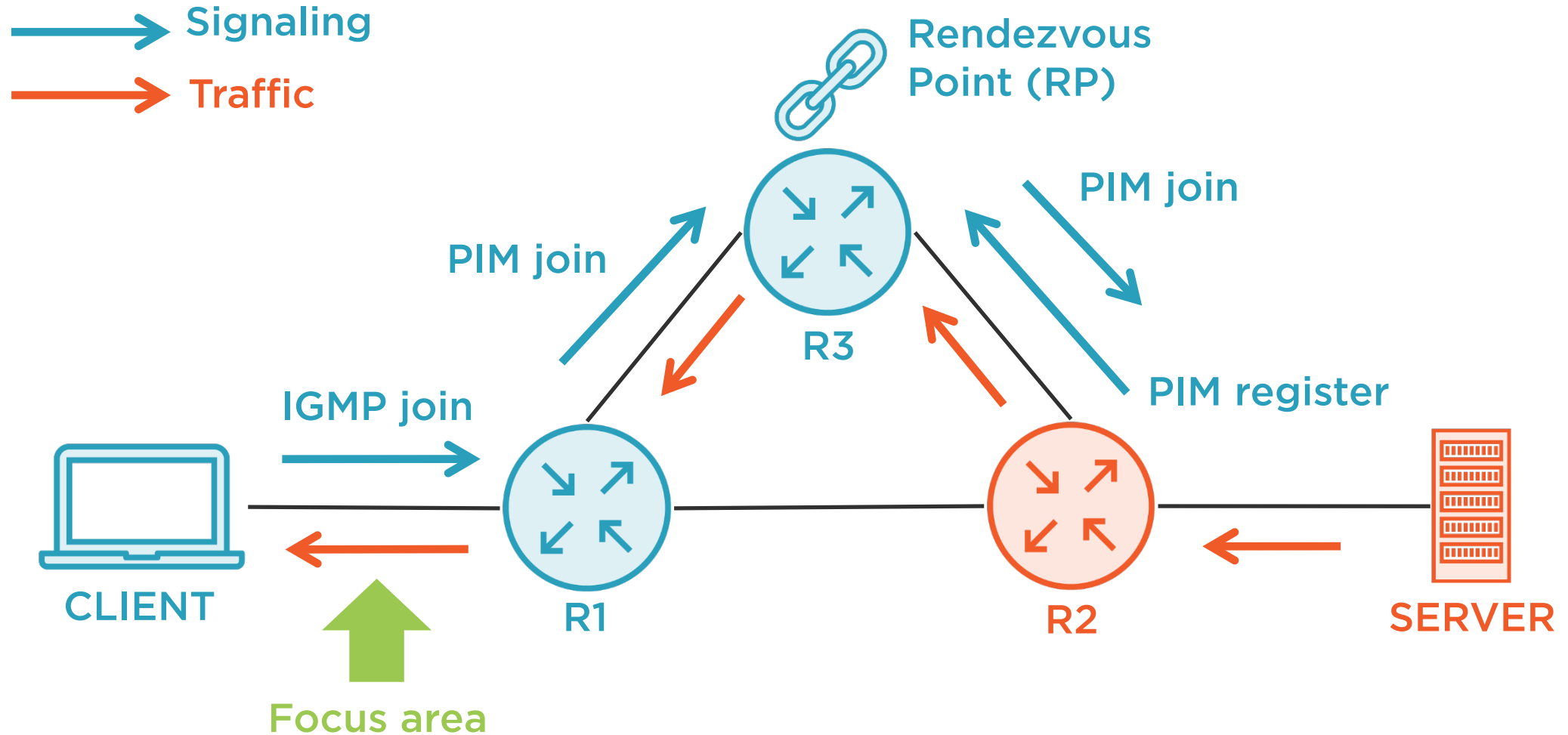
No.	Time	Source	Destination	Protocol	Info
1	0.000000	10.1.4.1	224.0.0.1	IGMPv1	Membership Query
2	0.374944	10.1.4.4	239.2.2.2	IGMPv1	Membership Report
3	0.482481	10.1.4.4	239.1.1.1	IGMPv1	Membership Report

- ▶ Frame 3: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
- ▶ Ethernet II, Src: 00:00:a6:16:00:04, Dst: 01:00:5e:01:01:01
- ▶ Internet Protocol Version 4, Src: 10.1.4.4, Dst: 239.1.1.1
- ▼ Internet Group Management Protocol
 - [IGMP Version: 1]
 - Type: Membership Report (0x12)
 - Reserved: 00
 - Checksum: 0xfdfc [correct]
 - [Checksum Status: Good]
 - Multicast Address: 239.1.1.1

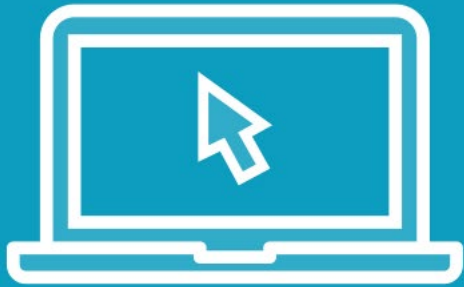
← **Specific group means
"I want traffic for 239.1.1.1"**



PIM Operations



Demo



Basic Multicast Flow



Multicast Basics in Review

**IGMP/MLD used
for host to router
signaling**

**PIM used for
router to router
signaling**

**Reverse Path
Forwarding (RPF)
governs flow**

