

Cisco 360 CCIE R&S Exercise Workbook Introduction

The Cisco 360 CCIE® R&S Exercise Workbook contains 20 challenging scenarios at the CCIE level that can be used for rigorous self-paced practice.

Each lab provides an extensive answer key, Mentor Guide support, and verification tables and is designed to maximize learning by providing practical experience. Also, self-paced learning resources such as the Cisco 360 CCIE R&S Reference Library and Cisco 360 CCIE R&S lessons supplement the Exercise Workbook scenarios.

Cisco 360 CCIE R&S

Exercise Workbook Lab 7

Troubleshooting Section

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Activity Objectives

When performing any Practice Lab, it is recommended that you formulate a test-taking strategy that includes the following activities. Some of these activities should be conducted in the actual lab:

- Download the latest copy of a Practice Lab, then print it and read it carefully from beginning to end.
- Create a strategy for how to perform a Practice Lab.
- Draw diagrams if necessary.
- Create a checklist of general best practices to follow during the Practice Lab.
- Develop skill in finding issues in the lab so that you are able to uncover the hidden and complex internetworking issues.
- Carefully track your time so that you can develop good time-management techniques.
- Estimate the points that you have gained or lost to see where you are in your overall goal.

General Lab Instructions

Read the following instructions carefully. It is important to remember that if you misinterpret any directions, you could lose points. After you have read the “General Lab Instructions” section, read through the entire lab and look for connections between the tasks. Pay close attention to the “Restrictions and Goals” section because the information may reduce the configuration options that are available to you.

- Your pod should be cabled according to the example in the “Ethernet Switched Cabling Topology” figure and the IPv4 and IPv6 IGP diagrams.
- Each router should have an initial IP configuration loaded.
- You should be able to access all devices on your learner virtual pod via Telnet.
- To begin, check the following base configuration for each router and switch:
 - Configure a hostname on each device.
 - If a DNS server is being used in your pod, disable the DNS lookups.
 - Familiarize yourself with any Cisco IOS Software shortcuts.
 - Remember that some Cisco IOS command parameters and regular expressions are case-sensitive.
- Verify the following information on each router and switch:
 - Determine the Cisco IOS Software versions that are being used for the routers and the virtual switches.
- Review all the tasks in the scenario.

Difficulty Levels

Tasks are categorized as follows:

- **Basic:** These fundamental tasks are generally those that are needed to provide the basic functions of the protocol or feature. You must complete these tasks to provide reachability and to move forward in the lab.
- **Intermediate:** These tasks include protocol features like routing optimization, route filtering, optimal path selection, load sharing, and summarization. Failure to complete these tasks will usually not affect later lab sections.
- **Advanced:** This category includes new Cisco IOS Software features and IP services, complex optimizations, and fine-tuning.

Scenarios are categorized as follows based on task classifications:

- Basic
- Basic to Intermediate
- Intermediate
- Intermediate to Advanced
- Advanced

Exercise Workbook Lab 7

Troubleshooting Section

Grading and Duration

- Troubleshooting lab duration: 2 hours
- Troubleshooting lab maximum score: 24 points

Note You can assess your progress on the self-paced labs in this workbook by adding up the points that are assigned to sections and tasks. Consider taking the full Assessment Labs to assess your readiness level.

Difficulty Level

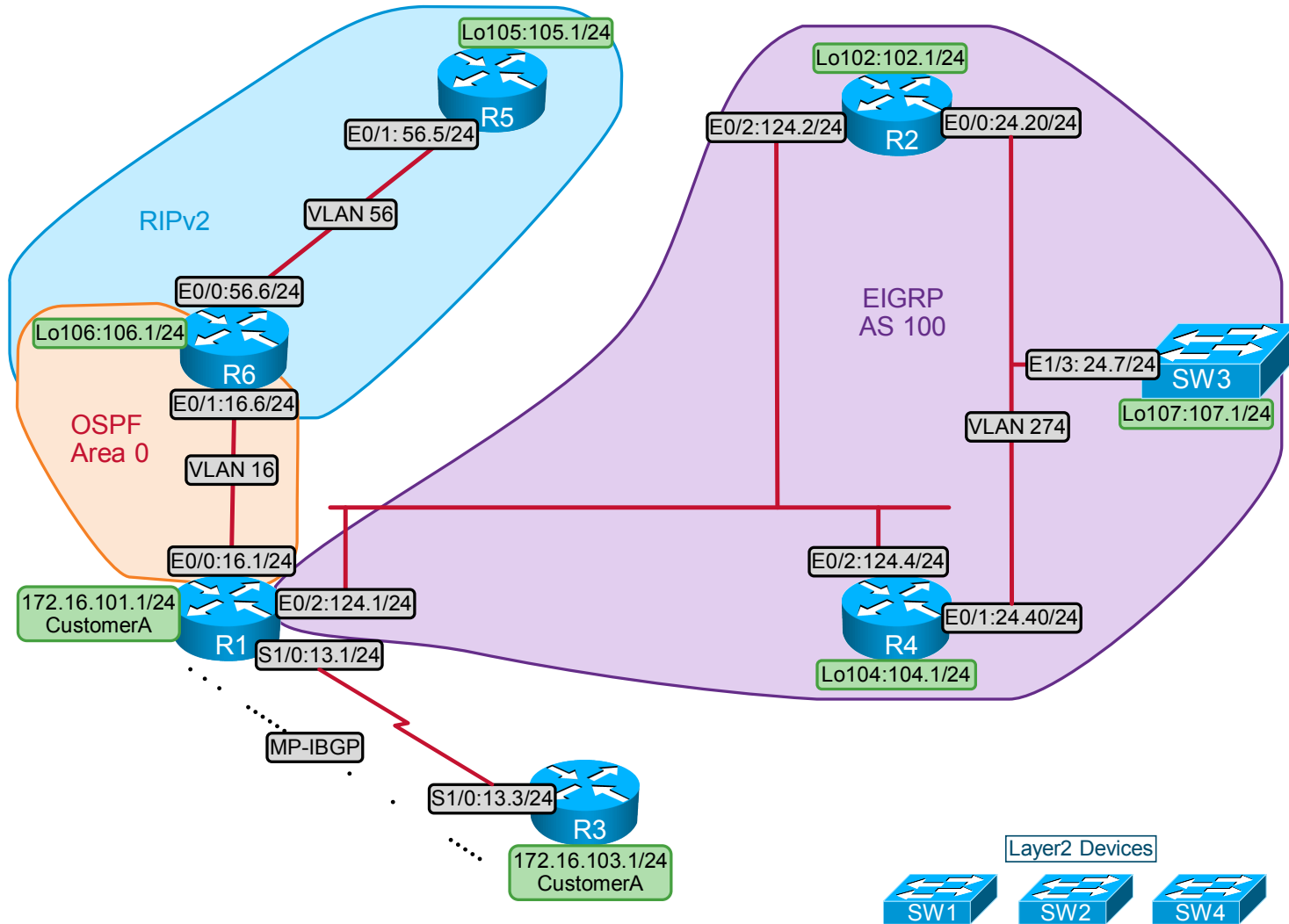
- Difficulty: Intermediate

Restrictions and Goals

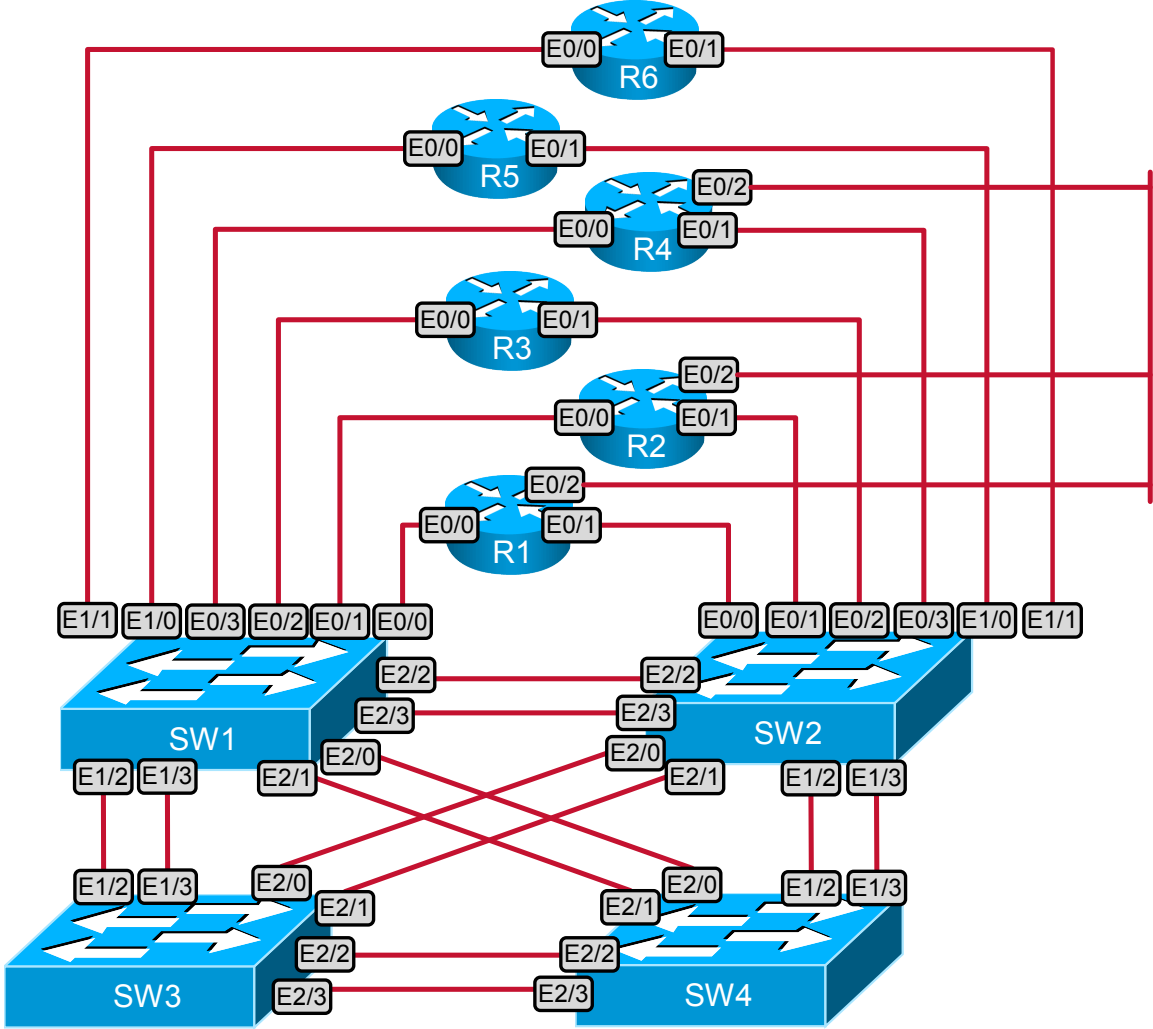
Note Read this section carefully.

- To receive credit for a subsection, you must fully complete the subsection per requirements. You will *not* receive partial credit for partially completed subsections.
- IPv4 subnets that are displayed in the IPv4 IGP diagram are /24 subnets of 158.10.0.0/16, except for CustomerA VRF, which is 172.16.0.0/16.
- *Points will be deducted from multiple sections for failing to assign correct IPv4 addresses.*
- Advertise loopback interfaces with their original masks.
- All IP addresses involved in this scenario must be reachable, unless explicitly specified otherwise.
- Unless the instructions explicitly specify otherwise, addresses and networks that are advertised in the Border Gateway Protocol (BGP) section need to be reachable by all BGP routers, but do not have to be reachable by routers that use only interior gateway protocol (IGP).
- Use conventional routing algorithms only, unless the instructions specify otherwise.
- Do not create new interfaces to fulfill IGP requirements, and do not summarize unless you are explicitly asked to do so.
- Do not modify the hostname, console, or vty configuration unless you are specifically asked to do so.
- Do not modify the initial interface or IP address numbering.

IPv4 IGP Diagram



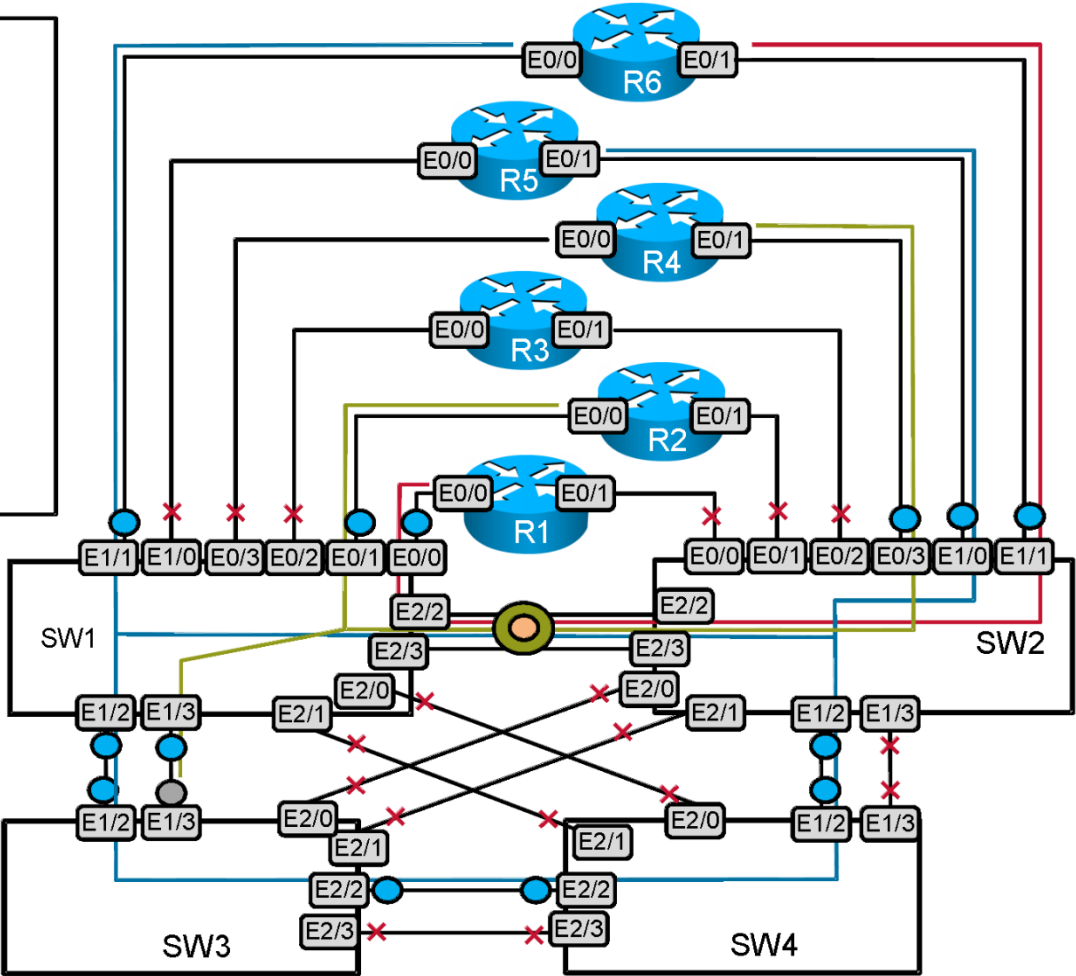
Ethernet Switched Cabling Topology



Layer 2 Diagram

Legend

- VLAN 16
- VLAN 56
- VLAN 274
- Dot1q
- Access
- Port Channel
- SVI
- Routed
- ✗ Shut Down



1. Switched Network Troubleshooting Section (Total: 3 points)

1.1. Troubleshooting Ticket

- Users reported that the switched network does not operate according to the requirements provided in the “Switched Network Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

1.2. Description of the Topology

- The switched Ethernet topology for this lab consists of the VLANs that are listed in the supplied “IPv4 IGP” diagram and the “Layer 2” diagram. Make sure that all VLANs are configured and all port designations fulfilled according to the diagrams.

1.3. Expected Behavior and Network Policies

- The trunk between SW1 and SW2 should permit only the required VLANs.
- The link between SW1 and SW2 must be LACP negotiated.

1.4. Special Goals and Restrictions

- Create only the necessary VLANs.
- All switches should be configured to be in VTP transparent mode.

2. IPv4 OSPF Troubleshooting Section (Total: 2 points)

2.1. Troubleshooting Ticket

- Users reported that the OSPF routing domain does not operate according to the requirements provided in the “IPv4 OSPF Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

2.2. Description of the Topology

- Only a single OSPF area needs to be configured. See the diagram.

2.3. Expected Behavior and Network Policies

- OSPF must provide stable reachability between all internal subnets and neighbors.

2.4. Special Goals and Restrictions

- Do not statically set the router ID on any OSPF-speaking routers.

3. IPv4 EIGRP Troubleshooting Section (Total: 3 points)

3.1. Troubleshooting Ticket

- Users reported that the EIGRP routing domain does not operate according to the requirements provided in the “IPv4 EIGRP Troubleshooting” section.

- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

3.2. Description of the Topology

- As shown in the IPv4 IGP diagram, EIGRP AS 100 should operate over the 158.10.124.0/24 subnet as well as over VLAN 274.
- R2 and R4 do not form the EIGRP AS 100 neighbor relationship. EIGRP communications are unicast on the 158.10.124.0/24 subnet.
- As indicated in the IPv4 IGP diagram, the EIGRP routing domain possesses redundant paths for routes that are learned within the domain.

3.3. Expected Behavior and Network Policies

- Because the EIGRP routing domain possesses redundant paths, make sure that all paths are used and load balancing is maintained on SW3 for the 158.10.124.0/24 subnet.

3.4. Special Goals and Restrictions

- No commands that are related to the EIGRP configuration on SW3 can be removed.

4. IPv4 RIP Troubleshooting Section (Total: 2 points)

4.1. Troubleshooting Ticket

- Users reported that the RIP routing domain does not operate according to the requirements provided in the “IPv4 RIP Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

4.2. Description of the Topology

- RIP version 2 operates between routers R5 and R6 on VLAN 56, as shown in the IPv4 IGP diagram.

4.3. Expected Behavior and Network Policies

- Both OSPF and EIGRP routes should be redistributed into RIP.

4.4. Special Goals and Restrictions

- Updates must be advertised using IP address 224.0.0.9. Ensure that as many interfaces as possible on RIP-speaking routers are made passive.

5. IPv4 Redistribution Troubleshooting Section (Total: 2 points)

5.1. Troubleshooting Ticket

- Users reported that the IPv4 IGP routing domain does not operate according to the requirements provided in the “IPv4 Redistribution Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

5.2. Description of the Topology

- A set of route redistribution commands has been configured to provide universal connectivity among all routers in this scenario.

5.3. Expected Behavior and Network Policies

- Ensure that there is universal connectivity among all routers in all routing domains.
- Make sure that all external routes are stable in all routing domains.

5.4. Special Goals and Restrictions

- Do not configure any static or default routes to attain universal connectivity.

6. BGP Troubleshooting Section (Total: 3 points)

6.1. Troubleshooting Ticket

- Users reported that the IPv4 BGP routing domain does not operate according to the requirements provided in the “BGP Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

6.2. Description of the Topology

- Multiprotocol BGP is set up on the link between R1 and R3, using the local serial interfaces.

6.3. Expected Behavior and Network Policies

- Redistribution is used to provide connectivity for IGP routes that are redistributed into BGP on R1.
- Make sure that R3 can reach all other addresses in the network.

6.4. Special Goals and Restrictions

- Only the BGP configuration can be used to ensure universal connectivity on R3.

7. MPLS Troubleshooting Section (Total: 3 points)

7.1. Troubleshooting Ticket

- Users reported that the MPLS network does not operate according to the requirements provided in the “MPLS Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

7.2. Description of the Topology

- Loopback 101 on R1 and Loopback 103 on R3 are in the CustomerA VPN. These loopbacks use addresses from the 172.16.0.0/16 range.
- Multiprotocol IBGP has been enabled using the outside serial interfaces as endpoints.

7.3. Expected Behavior and Network Policies

- BGP and LDP router IDs have been hardcoded.

7.4. Special Goals and Restrictions

- The VPN addresses do not have to be reachable from outside the VPN.
- Only ICMP and Telnet should be allowed as user data traffic between R1 and R3.

8. EEM Troubleshooting Section (Total: 2 points)

8.1. Troubleshooting Ticket

- Users reported that the Cisco IOS Embedded Event Manager (EEM) does not operate according to the requirements provided in the “EEM Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

8.2. Description of the Topology

- The EEM applet is preconfigured on R5.

8.3. Expected Behavior and Network Policies

- The EEM applet named CLEAR should clear the E0/1 interface counters.

8.4. Special Goals and Restrictions

- You should test the CLEAR applet by manually running it from the R5 CLI.

9. IP QoS Troubleshooting Section (Total: 2 points)

9.1. Troubleshooting Ticket

- Users reported that QoS does not operate according to the requirements provided in the “QoS Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

9.2. Description of the Topology

- Traffic shaping is configured on the Ethernet0/0 interface of R1.

9.3. Expected Behavior and Network Policies

- For the traffic marked with the DSCP value 45, ensure the following:
 - An average transmission rate of 256,000 b/s
 - No bursts above the transmission rate allowed
- For the FTP traffic, ensure the following:
 - CIR of 256,000 b/s
 - Bc value of 8000 b/s
 - Maximum burst at a rate of 768,000 b/s

9.4. Special Goals and Restrictions

- Make sure that this configuration is applied only to the specified traffic types that are listed above.

10. IP Multicast Troubleshooting Section (Total: 2 points)

10.1. Troubleshooting Ticket

- Users reported that the multicast network does not operate according to the requirements provided in the “IP Multicast Troubleshooting” section.
- While resolving this ticket, refer to the “Description of the Topology,” the “Expected Behavior and Network Policies,” and the “Special Goals and Restrictions” subsections to determine if your solution is appropriate.

10.2. Description of the Topology

- PIM sparse mode is configured on R1, R2, R4, and SW3.

10.3. Expected Behavior and Network Policies

- Make R6 the multicast source that is generating traffic for 239.255.1.1.
- Make SW3 the multicast receiver.
- Make sure that R6 gets a response to its multicast ping from SW3.
- R1 is the rendezvous point.

10.4. Special Goals and Restrictions

- Do not make any other router the rendezvous point.