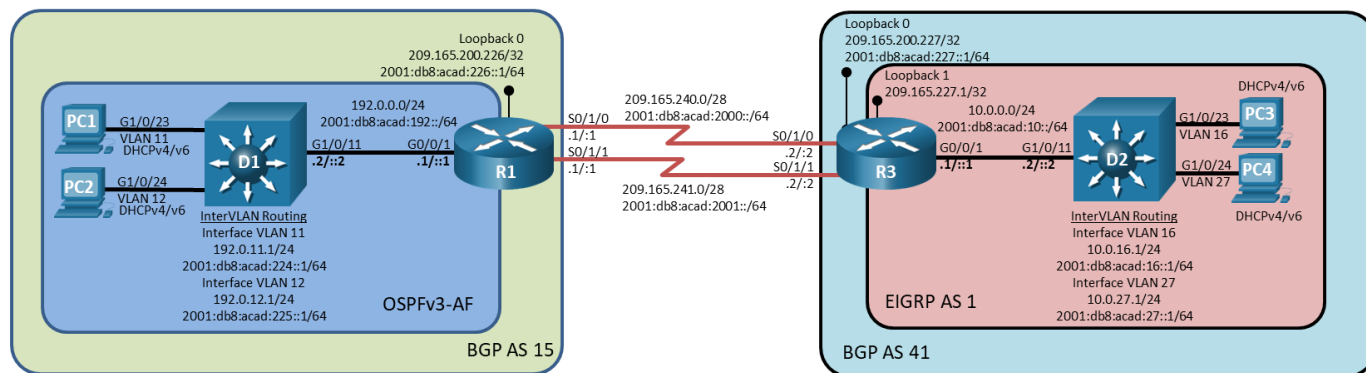# Lab - Troubleshoot Prefix Lists

Topology

Addressing Table

Device	Interface	IPv4 Address/Prefix Length	IPv6 Address/Prefix Length	Link-Local Address
R1	G0/0/1	192.0.0.1/24	2001:db8:acad:192::1/64	fe80::1:1
	S0/1/0	209.165.240.1/28	2001:db8:acad:2000::1/64	fe80::1:2
	S0/1/1	209.165.241.1/28	2001:db8:acad:2001::1/64	fe80::1:3
	Loopback 0	209.165.200.226/32	2001:db8:acad:226::1/64	fe80::1:4
R3	G0/0/1	10.0.0.1/24	2001:db8:acad:10::1/64	fe80::3:1
	S0/1/0	209.165.240.2/28	2001:db8:acad:2000::2/64	fe80::3:2
	S0/1/1	209.165.241.2/28	2001:db8:acad:2001::/2/64	fe80::3:3
	Loopback 0	209.165.200.227/32	2001:db8:acad:227::1/65	fe80::3:4
	Loopback 1	209.165.227.1/32	N/A	N/A
D1	G1/0/11	192.0.0.2/24	2001:db8:acad:192::2/64	fe80::d1:1
	VLAN 11	192.0.11.1/24	2001:db8:acad:224::1/64	fe80::d1:2
	VLAN 12	192.0.12.1/24	2001:db8:acad:225::1/64	fe80::d1:3
D2	G1/0/11	10.0.0.2/24	2001:db8:acad:10::2/64	fe80::d2:1
	VLAN 16	10.0.16.1/24	2001:db8:acad:16::1/64	fe80::d2:2
	VLAN 27	10.0.27.1/24	2001:db8:acad:27::1/64	fe80::d2:3

Objectives

Troubleshoot network issues related to the configuration and operation of prefix lists.

Background / Scenario

In this topology, R1 and R3 are multi-hop MP-BGP neighbors, with an established adjacency using both IPv4 and IPv6. R1 and D1 have an OSPFv3 adjacency, and D1 is providing interVLAN routing. R3 and D2 have a Named-EIGPR adjacency, and D1 is providing InterVLAN routing. R3 is performing NAT for all networks in BGP AS 41, overloading onto the IPv4 address of Loopback 0. You will be loading configurations with intentional errors onto the network. Your tasks are to FIND the error(s), document your findings and the command(s) or method(s) used to fix them, FIX the issue(s) presented here, and then test the network to ensure both of the following conditions are met:

1) the complaint received in the ticket is resolved

2) full reachability is restored

Note: The routers used with CCNP hands-on labs are Cisco 4221 with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 3650 with Cisco IOS XE Release 16.9.4 (universalk9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

Note: Make sure that the devices have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

- 2 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)

- 2 Switches (Cisco 3560 with Cisco IOS XE Release 16.9.4 universal image or comparable)

- 4 PCs (With terminal emulation program, such as Tera Term)

- Console cables to configure the Cisco IOS devices via the console ports

- Ethernet and serial cables as shown in the topology

Part 1: Trouble Ticket 21.1.4.1

Scenario:

You are the senior network engineer for BGP AS 41. Budget cuts have taken a toll on your network. Therefore, Switch D2 is not the most robust system available, even though it performs a critical function in the network. You tasked the night shift to reduce the amount of information switch D2 has to deal with. You have come in to work to find that, although the D2 routing table is now very small, your network is unable to communicate with networks in BGP AS 15. You have to get this fixed!

Use the commands listed below to load the configuration files for this trouble ticket:

Device	Command
R1	`copy flash:/enarsi/21.1.4.1-r1-config.txt run`
R3	`copy flash:/enarsi/21.1.4.1-r3-config.txt run`
D1	`copy flash:/enarsi/21.1.4.1-d1-config.txt run`
D2	`copy flash:/enarsi/21.1.4.1-d2-config.txt run`

- PCs 1, 2, 3, and 4 should be configured to receive dynamically assigned addresses (both IPv4 and IPv6).

- Passwords on all devices are **cisco12345**. If a username is required, use **admin**.

- After you have fixed the ticket, change the MOTD on EACH DEVICE using the following command:

  banner motd # This is $(hostname) FIXED from ticket <ticket number> #

- Then save the configuration by issuing the **wri** command (on each device).

- Inform your instructor that you are ready for the next ticket.

- After the instructor approves your solution for this ticket, issue the privileged EXEC command **reset.now**. This script will clear your configurations and reload the devices.

Part 2: Trouble Ticket 21.1.4.2

Scenario:

You are the senior network engineer for BGP AS 41. After careful review of bandwidth utilization on the two links between AS 15 and AS 41, you have suggested to management that some adjustments be put in place to equalize the utilization of the two circuits. Specifically, you want to cause IPv6 traffic to use the S0/1/1 link. Management was so pleased with the suggestion that you were told to forgo the normal change control procedures and get this implemented as soon as possible. Just as you were starting to plan the changes, you were called away to an urgent budget meeting. You left your second-in-charge with the task to develop and implement the solution. When you returned, you found that things were not working in the way you had stipulated.

Use the commands listed below to load the configuration files for this trouble ticket:

Device	Command
R1	`copy flash:/enarsi/21.1.4.2-r1-config.txt run`
R3	`copy flash:/enarsi/21.1.4.2-r3-config.txt run`
D1	`copy flash:/enarsi/21.1.4.2-d1-config.txt run`
D2	`copy flash:/enarsi/21.1.4.2-d2-config.txt run`

- PCs 1, 2, 3, and 4 should be configured to receive dynamically assigned addresses (both IPv4 and IPv6.)

- Passwords on all devices are **cisco12345**. If a username is required, use **admin**.

- After you have fixed the ticket, change the MOTD on EACH DEVICE using the following command:

  banner motd # This is $(hostname) FIXED from ticket <ticket number> #

- Then save the configuration by issuing the **wri** command (on each device).

- Inform your instructor that you are ready for the next ticket.

- After the instructor approves your solution for this ticket, issue the privileged EXEC command **reset.now**. This script will clear your configurations and reload the devices.

Router Interface Summary Table

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
4221	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
4300	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.