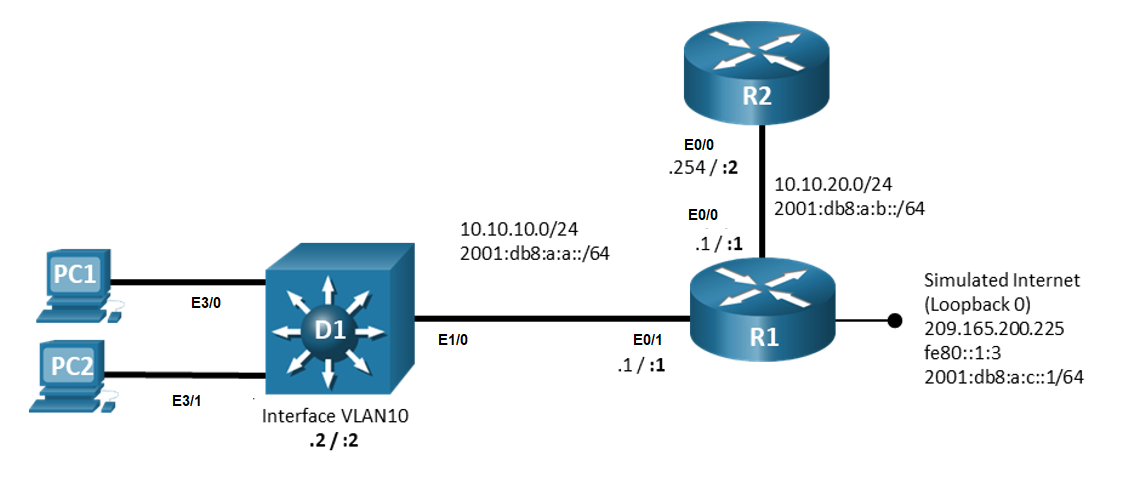
Lab - Troubleshoot IPv4 and IPv6 Addressing Issues (Instructor Version)

**Instructor Note**: Red font color or gray highlights indicate text that appears in the instructor copy only.

# Topology



# Addressing Table

| Device | Interface | IPv4 Address/Mask | IPv6 Address/Prefix | IPv6 Link Local |
| --- | --- | --- | --- | --- |
| R1 | E0/0 | 10.10.20.1/24 | 2001:db8:a:b::1/64 | fe80::1:1 |
| R1 | E0/1 | 10.10.10.1/24 | 2001:db8:a:a::1/64 | fe80::1:2 |
| R1 | Lo0 | 209.165.200.225/29 | 2001:db8:a:c::1/64 | fe80::1:3 |
| R2 | E0/0 | 10.10.20.254/24 | 2001:db8:a:b::1/64 | fe80::2:1 |
| D1 | VLAN 10 | 10.10.10.2/24 | 2001:db8:a:a::2/64 | fe80::d1:1 |
| PC1 | NIC | DHCP | SLAAC | EUI-64 |
| PC2 | NIC | DHCP | SLAAC | EUI-64 |

# Objectives

Troubleshoot network issues related to IPv4 and IPv6 Addressing.

# Background / Scenario

In this topology, router R1 provides connectivity to a simulated internet for VLAN 10. R2 serves as a DHCP server. Switch D1 provides connectivity for VLAN 10. 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 switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

**Instructor Note**: Refer to the Instructor Lab Manual for the procedures to initialize and reload devices.

# Required Resources

* 2 Routers (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
* 1 Switch (Cisco 3560 with Cisco IOS XE Release 16.9.4 universal image or comparable)
* 2 PCs (Choice of operating system with terminal emulation program installed)
* Console cables to configure the Cisco IOS devices via the console ports
* Ethernet cables as shown in the topology

# Instructions

## Trouble Ticket 1.1.2.1

Scenario:

PC1 is unable to access resources on web server 209.165.200.225.

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

**Instructor Note**: Commands for uploading the configuration are provided at the end of this document.

|  |  |
| --- | --- |
| Device | Command |
| R1 | **copy flash:/enarsi/1.1.2.1-r1-config.txt run** |
| R2 | **copy flash:/enarsi/1.1.2.1-r2-config.txt run** |
| D1 | **copy flash:/enarsi/1.1.2.1-d1-config.txt run** |

* PC1 and PC2 should be configured for and receive an address from an IPv4 DHCP server.
* Passwords on all devices are **cisco12345**. If a username is required, use **admin**.
* When 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 **reset.now** privileged EXEC command**.** This script will clear your configurations and reload the devices.

**Instructor Notes:**

This trouble ticket contains 1 intentional error. The default-router command on the DHCP server is assigning the wrong default-gateway address.

The commands used to fix these errors should be:

R2(config)# **ip dhcp pool LAN4\_10**

R2(config-router)# **no default-router 10.10.20.254**

R2(config-router)# **default-router 10.10.10.1**

R2(config-router)# **end**

## Trouble Ticket 1.1.2.2

Scenario:

PC1 and PC2 are unable to lease IPv4 addresses from the DHCP server.

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

**Instructor Note**: Commands for creating these files are at the end of this document.

|  |  |
| --- | --- |
| Device | Command |
| R1 | **copy flash:/enarsi/1.1.2.2-r1-config.txt run** |
| R2 | **copy flash:/enarsi/1.1.2.2-r2-config.txt run** |
| D1 | **copy flash:/enarsi/1.1.2.2-d1-config.txt run** |

* PC1 and PC2 should be configured for and receive an address from an IPv4 DHCP server.
* Passwords on all devices are **cisco12345**. If a username is required, use **admin**.
* When 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 **reset.now** privileged EXEC command**.** This script will clear your configurations and reload the devices.

**Instructor Notes:**

This trouble ticket contains 1 intentional error. The **ip helper-address** command has been configured on the wrong interface on R1.

The commands used to fix these errors should be:

R1(config)# **interface E0/0**

R1(config-if)# **no** ip helper-address 10.10.20.254

R1(config-if)# **exit**

R1(config)# **interface E0/1**

R1(config-if)# **ip helper-address 10.10.20.254**

R1(config-if)# **end**

## Trouble Ticket 1.1.2.3

Scenario:

PC1 and PC2 are unable to resolve IPv6 addresses to hostnames. Upon investigation, it appears that they are not receiving DNS server information from the DHCPv6 server.

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

**Instructor Note**: Commands for creating these files are at the end of this document.

|  |  |
| --- | --- |
| Device | Command |
| R1 | **copy flash:/enarsi/1.1.2.3-r1-config.txt run** |
| R2 | **copy flash:/enarsi/1.1.2.3-r2-config.txt run** |
| D1 | **copy flash:/enarsi/1.1.2.3-d1-config.txt run** |

* PC1 and PC2 should be configured to assign an address via SLAAC.
* Passwords on all devices are **cisco12345**. If a username is required, use **admin**.
* When 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 **reset.now** privileged EXEC command. This script will clear your configurations and reload the devices.

**Instructor Notes:**

This trouble ticket contains 1 intentional error. The **ipv6 nd other-config-flag** command is not present in the R1 configuration.

R1(config)# **interface E0/1**

R1(config-if)# **ipv6 nd other-config-flag**

R1(config-if)# end

# 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) |
| 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 (E0/0) | Gigabit Ethernet 0/0/1 (E0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |
| 4300 | Gigabit Ethernet 0/0/0 (E0/0) | Gigabit Ethernet 0/0/1 (E0/1) | 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.

End of document

Uploading Configuration Files

Use the commands below to create the configuration files on the lab devices for each trouble ticket in this lab. The TCL script commands help create and copy the configurations. However, the configuration commands could also be copied and pasted directly into global config mode on each device. Simply remove the TCL script commands, enter the enable and configure t commands on the device, and copy and paste the configuration commands.

Important: The device requires a folder in flash named enarsi. Use the dir command to verify. If the folder is missing, then create it using the **mkdir flash:/enarsi** privileged EXEC command. For all switches, make sure the vlan.dat file is set to the default. Use the delete vlan.dat privileged EXEC command, if necessary.

Reset scripts

These TCL scripts will completely clear and reload the device in preparation for the next ticket. Copy and paste the appropriate script to the appropriate device.

Router Reset Script

tclsh

puts [ open "flash:/enarsi/reset.tcl" w+ ] {

typeahead "\n"

copy running-config startup-config

typeahead "\n"

erase startup-config

puts "Reloading the router"

typeahead "\n"

reload

}

tclquit

D1/D2 (Cisco 3650) Reset Script - The default 3650 SDM template supports IPv6, so it is not set by this script.

tclsh

puts [ open "flash:/enarsi/reset.tcl" w+ ] {

typeahead "\n"

copy running-config startup-config

typeahead "\n"

erase startup-config

delete /force vlan.dat

puts "Reloading the switch"

typeahead "\n"

reload

}

tclquit

A1 (Cisco 2960 Script) - The default 2960 SDM template does not support IPv6, so this script includes that setting.

tclsh

puts [ open "flash:/enarsi/reset.tcl" w+ ] {

typeahead "\n"

copy running-config startup-config

typeahead "\n"

erase startup-config

delete /force vlan.dat

delete /force multiple-fs

ios\_config "sdm prefer lanbase-routing"

typeahead "\n"

puts "Reloading the switch"

typeahead "\n"

reload

}

Tclquit

**R1 Configuration File Scripts**

!R1 - Trouble Ticket # 1

tclsh

puts [ open "flash:/enarsi/1.1.2.1-r1-config.txt" w+ ] {

hostname R1

banner motd # This is R1, Trouble Ticket 1.1.2.1 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

ipv6 unicast-routing

interface E0/0

ip address 10.10.20.1 255.255.255.0

ipv6 address fe80::1:1 link-local

ipv6 address 2001:db8:a:b::1/64

no shutdown

exit

interface E0/1

ip address 10.10.10.1 255.255.255.0

ipv6 address fe80::1:2 link-local

ipv6 address 2001:db8:a:a::1/64

ipv6 nd other-config-flag

ip helper-address 10.10.20.254

ipv6 dhcp relay destination 2001:db8:a:b::2

no shutdown

exit

interface loopback0

ip address 209.165.200.225 255.255.255.248

ipv6 address fe80::1:3 link-local

ipv6 address 2001:db8:a:c::1/64

no shutdown

exit

ip route 0.0.0.0 0.0.0.0 loopback0

ipv6 route ::/0 loopback0

line con 0

exec-timeout 0 0

logging synchronous

exit

line vty 0 4

login local

transport input telnet

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

!R1 - Trouble Ticket # 2

tclsh

puts [ open "flash:/enarsi/1.1.2.2-r1-config.txt" w+ ] {

hostname R1

banner motd # This is R1, Trouble Ticket 1.1.2.2 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

ipv6 unicast-routing

interface E0/0

ip address 10.10.20.1 255.255.255.0

ipv6 address fe80::1:1 link-local

ipv6 address 2001:db8:a:b::1/64

ip helper-address 10.10.20.254

no shutdown

exit

interface E0/1

ip address 10.10.10.1 255.255.255.0

ipv6 address fe80::1:2 link-local

ipv6 address 2001:db8:a:a::1/64

ipv6 nd other-config-flag

ipv6 dhcp relay destination 2001:db8:a:b::2

no shutdown

exit

interface loopback0

ip address 209.165.200.225 255.255.255.248

ipv6 address fe80::1:3 link-local

ipv6 address 2001:db8:a:c::1/64

no shutdown

exit

ip route 0.0.0.0 0.0.0.0 loopback0

ipv6 route ::/0 loopback0

line con 0

exec-timeout 0 0

logging synchronous

exit

line vty 0 4

login local

transport input telnet

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

!R1 - Trouble Ticket # 3

tclsh

puts [ open "flash:/enarsi/1.1.2.3-r1-config.txt" w+ ] {

hostname R1

banner motd # This is R1, Trouble Ticket 1.1.2.3 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

ipv6 unicast-routing

interface E0/0

ip address 10.10.20.1 255.255.255.0

ipv6 address fe80::1:1 link-local

ipv6 address 2001:db8:a:b::1/64

no shutdown

exit

interface E0/1

ip address 10.10.10.1 255.255.255.0

ip helper-address 10.10.20.254

ipv6 address fe80::1:2 link-local

ipv6 address 2001:db8:a:a::1/64

ipv6 dhcp relay destination 2001:db8:a:b::2

no shutdown

exit

interface loopback0

ip address 209.165.200.225 255.255.255.248

ipv6 address fe80::1:3 link-local

ipv6 address 2001:db8:a:c::1/64

no shutdown

exit

ip route 0.0.0.0 0.0.0.0 loopback0

ipv6 route ::/0 loopback0

line con 0

exec-timeout 0 0

logging synchronous

exit

line vty 0 4

login local

transport input telnet

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

**R2 Configuration File Scripts**

!R2 - Trouble Ticket # 1

tclsh

puts [ open "flash:/enarsi/1.1.2.1-r2-config.txt" w+ ] {

hostname R2

banner motd # This is R2, Trouble Ticket 1.1.2.1 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

ipv6 unicast-routing

ip dhcp excluded-address 10.10.10.1 10.10.10.100

ip dhcp pool LAN4\_10

network 10.10.10.0 255.255.255.0

default-router 10.10.10.254

domain-name ccnp4lab.com

dns-server 10.10.20.254

exit

ipv6 dhcp pool LAN6\_A

dns-server 2001:db8:a:b::1

domain-name ccnp6lab.om

exit

interface E0/0

ip address 10.10.20.254 255.255.255.0

ipv6 address fe80::2:1 link-local

ipv6 address 2001:db8:a:b::2/64

ipv6 dhcp server LAN6\_A

no shutdown

exit

ip route 0.0.0.0 0.0.0.0 10.10.20.1

ipv6 route ::/0 2001:db8:a:b::1

line con 0

exec-timeout 0 0

logging synchronous

exit

line vty 0 4

login local

transport input telnet

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

!R2 - Trouble Ticket # 2

tclsh

puts [ open "flash:/enarsi/1.1.2.2-r2-config.txt" w+ ] {

hostname R2

banner motd # This is R2, Trouble Ticket 1.1.2.2 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

ipv6 unicast-routing

ip dhcp excluded-address 10.10.10.1 10.10.10.100

ip dhcp pool LAN4\_10

network 10.10.10.0 255.255.255.0

default-router 10.10.10.1

domain-name ccnp4lab.com

dns-server 10.10.20.1

exit

ipv6 dhcp pool LAN6\_A

dns-server 2001:db8:a:b::1

domain-name ccnp6lab.om

exit

interface E0/0

ip address 10.10.20.254 255.255.255.0

ipv6 address fe80::2:1 link-local

ipv6 address 2001:db8:a:b::2/64

ipv6 dhcp server LAN6\_A

no shutdown

exit

ip route 0.0.0.0 0.0.0.0 10.10.20.1

ipv6 route ::/0 2001:db8:a:b::1

line con 0

exec-timeout 0 0

logging synchronous

exit

line vty 0 4

login local

transport input telnet

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

!R2 - Trouble Ticket # 3

tclsh

puts [ open "flash:/enarsi/1.1.2.3-r2-config.txt" w+ ] {

hostname R2

banner motd # This is R2, Trouble Ticket 1.1.2.3 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

ipv6 unicast-routing

ip dhcp excluded-address 10.10.10.1 10.10.10.100

ip dhcp pool LAN4\_10

network 10.10.10.0 255.255.255.0

default-router 10.10.10.1

domain-name ccnp4lab.com

dns-server 10.10.20.1

exit

ipv6 dhcp pool LAN6\_A

dns-server 2001:db8:a:b::1

domain-name ccnp6lab.om

exit

interface E0/0

ip address 10.10.20.254 255.255.255.0

ipv6 address fe80::2:1 link-local

ipv6 address 2001:db8:a:b::2/64

ipv6 dhcp server LAN6\_A

no shutdown

exit

ip route 0.0.0.0 0.0.0.0 10.10.20.1

ipv6 route ::/0 2001:db8:a:b::1

line con 0

exec-timeout 0 0

logging synchronous

exit

line vty 0 4

login local

transport input telnet

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

**R3 Configuration File Scripts - Not Used in This Lab**

**D1 Configuration File Scripts**

!D1 - Trouble Ticket # 1

tclsh

puts [ open "flash:/enarsi/1.1.2.1-d1-config.txt" w+ ] {

hostname D1

banner motd # This is D1, Trouble Ticket 1.1.2.1 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

interface range g1/0/1 - 24

switchport mode access

shutdown

exit

interface g1/0/11

switchport mode access

switchport access vlan 10

no shutdown

exit

interface range g3/0-24

switchport mode access

switchport access vlan 10

no shutdown

exit

interface vlan 10

ip address 10.10.10.2 255.255.255.0

no shutdown

exit

ip default-gateway 10.10.10.1

line con 0

exec-timeout 0 0

logging synchronous

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

!D1 - Trouble Ticket # 2

tclsh

puts [ open "flash:/enarsi/1.1.2.2-d1-config.txt" w+ ] {

hostname D1

banner motd # This is D1, Trouble Ticket 1.1.2.2 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

interface range g1/0/1 - 24

switchport mode access

shutdown

exit

interface g1/0/11

switchport mode access

switchport access vlan 10

no shutdown

exit

interface range g3/0-24

switchport mode access

switchport access vlan 10

no shutdown

exit

interface vlan 10

ip address 10.10.10.2 255.255.255.0

no shutdown

exit

ip default-gateway 10.10.10.1

line con 0

exec-timeout 0 0

logging synchronous

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

!D1 - Trouble Ticket # 3

tclsh

puts [ open "flash:/enarsi/1.1.2.3-d1-config.txt" w+ ] {

hostname D1

banner motd # This is D1, Trouble Ticket 1.1.2.3 #

enable secret cisco12345

username admin privilege 15 algorithm-type scrypt secret cisco12345

interface range g1/0/1 - 24

switchport mode access

shutdown

exit

interface g1/0/11

switchport mode access

switchport access vlan 10

no shutdown

exit

interface range g3/0-24

switchport mode access

switchport access vlan 10

no shutdown

exit

interface vlan 10

ip address 10.10.10.2 255.255.255.0

no shutdown

exit

ip default-gateway 10.10.10.1

line con 0

exec-timeout 0 0

logging synchronous

exit

alias exec reset.now tclsh flash:/enarsi/reset.tcl

end

}

tclquit

**D2 Configuration File Scripts - Not Used in This Lab**

**A1 Confgiuration Fiel Scripts - Not Used in This Lab**