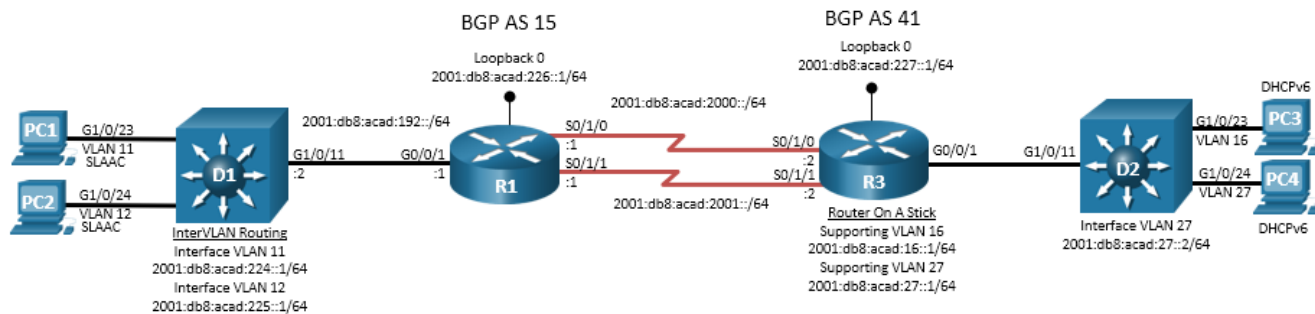


Lab - Troubleshoot IPv6 ACLs (Instructor Version)

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

Topology



Addressing Table

Device	Interface	IPv6 Address/Prefix Length	Link-Local Address
R1	G0/0/1	2001:db8:acad:192::1/64	fe80::1:1
	S0/1/0	2001:db8:acad:2000::1/64	fe80::1:2
	S0/1/1	2001:db8:acad:2001::1/64	fe80::1:3
	Loopback 0	2001:db8:acad:226::1/64	fe80::1:4
R3	G0/0/1.16	2001:db8:acad:16::1/64	fe80::3:1
	G0/0/1.27	2001:db8:acad:27::1/64	fe80::3:2
	Loopback 1	2001:db8:acad:227::1/64	fe80::3:3
D1	G1/0/11	2001:db8:acad:192::2/64	fe80::d1:1
	VLAN 11	2001:db8:acad:224::1/64	fe80::d1:2
	VLAN 12	2001:db8:acad:225::1/64	fe80::d1:3
D2	VLAN 27	2001:db8:acad:27::2/64	fe80::d2:1
	G1/0/11	2001:db8:1d1::2/64	fe80::d1:1
	Loopback 0	2001:db8:acad:1000::1/64	fe80::d1:2
	Loopback 1	2001:db8:acad:1001::1/64	fe80::d1:3
PC1	NIC	SLAAC	EUI-64/CGA
PC2	NIC	SLAAC	EUI-64/CGA
PC3	NIC	DHCPv6	EUI-64/CGA
PC4	NIC	DHCPv6	EUI-64/CGA

Objectives

Troubleshoot network issues related to the configuration and operation of IPv6 ACLs.

Background / Scenario

In this topology, R1 and R3 are BGP neighbors. R1 speaks for BGP ASN 15, while R3 speaks for BGP ASN 41. They are peered via their respective Loopback 0 interface using BGP Multi-hop across the serial interfaces that connect them. R1 and D1 have an OSPFv3 adjacency, with R1 providing a default route. R3 is performing Router-On-A-Stick for VLANs 16 and 27. The host connected to D1 is using SLAAC to determine their IPv6 Global Unicast Address (GUA), while the host connected to D2 is using DHCPv6 to determine their IPv6 GUA. 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.

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)
- 2 Switches (Cisco 3560 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 4 PCs (Choice of operating system with terminal emulation program installed)
- 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 21.1.3.1

Scenario:

The night shift completed work in an attempt to secure the network. Network hosts, represented by PC1 and PC2 in this topology, are now unable to generate an IPv6 GUA.

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	<code>copy flash:/enarsi/21.1.3.1-r1-config.txt run</code>
R3	<code>copy flash:/enarsi/21.1.3.1-r3-config.txt run</code>
D1	<code>copy flash:/enarsi/21.1.3.1-d1-config.txt run</code>
D2	<code>copy flash:/enarsi/21.1.3.1-d2-config.txt run</code>

- PCs 1, 2, 3, and 4 should be configured for dynamic acquisition of an IPv6 address.
- Passwords on all devices are **cisco12345**. If a username is required, use **admin**.
- After you have corrected the ticket, change the MOTD on EACH DEVICE using the following command:
banner motd # This is \$(hostname) FIXED from ticket <ticket number> #
- 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.

Instructor Notes:

This trouble ticket contains 1 intentional error. The ACL applied to D1 interface VLAN 11 and VLAN 12 does not allow for ICMPv6 ND and NA messages; the administrator that added the ACLs did not take ND or NA messages into account when adding the deny ipv6 any any ACE.

The commands used to fix this error should be:

```
D1(config)# ipv6 access-list CLIENT-CONTROL-VLAN11
D1(config-ipv6-acl)# sequence 31 permit icmp any any nd-na
D1(config-ipv6-acl)# sequence 32 permit icmp any any nd-ns
D1(config-ipv6-acl)# exit
D1(config)# ipv6 access-list CLIENT-CONTROL-VLAN12
D1(config-ipv6-acl)# sequence 31 permit icmp any any nd-na
D1(config-ipv6-acl)# sequence 32 permit icmp any any nd-ns
D1(config-ipv6-acl)# exit
```

Note: The permit icmp any any eq echo-request and permit icmp any any eq echo-reply ACE are necessary for a later ticket. They were added in this ticket to normalize their presence.

Note: Host behavior may be different amongst operating systems. For example, while Windows 10 honors the /no-autoconfig flag, it seems that Ubuntu 18.0.4 LTS ignores the lack of an A flag in the RA creates the GUA anyway.

Part 2: Trouble Ticket 21.1.3.2

Scenario:

The night shift completed work in an attempt to secure the network. This morning it was discovered that PC3 and PC4 are no longer able to reach D1 interfaces VLAN 11 and VLAN 12 using the ping command. This must be fixed to allow for normal business operations.

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	<code>copy flash:/enarsi/21.1.3.2-r1-config.txt run</code>
R3	<code>copy flash:/enarsi/21.1.3.2-r3-config.txt run</code>
D1	<code>copy flash:/enarsi/21.1.3.2-d1-config.txt run</code>
D2	<code>copy flash:/enarsi/21.1.3.2-d2-config.txt run</code>

- PCs 1, 2, 3, and 4 should be configured for dynamic acquisition of an IPv6 address.
- Passwords on all devices are **cisco12345**. If a username is required, use **admin**.
- Once 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.

Instructor Notes:

This trouble ticket contains 1 intentional error repeated in two places. The ACL applied to the R1 serial interfaces has a broad deny statement in place blocking hosts from the 2001:db8:acad:16::/64 and 2001:db8:acad:27::/64 networks from communicating with the interior of ASN 15.

There are several possible ways to fix this error and allow traffic from the 2001:db8:acad:16::/64 and 2001:db8:acad:27::/64 networks to pass. The commands used to fix this error in the most specific manner are:

```
R1(config)# ipv6 access-list BOGON-MARTIAN
R1(config-ipv6-acl)# sequence 11 permit ipv6 2001:db8:acad:16::/64 any
R1(config-ipv6-acl)# sequence 12 permit ipv6 2001:db8:acad:27::/64 any
R1(config-ipv6-acl)# exit
```

Part 3: Trouble Ticket 21.1.3.3

Scenario:

The night shift completed work in an attempt to secure the network. It was discovered this morning that PC3 and PC4 are no longer able to obtain DHCPv6 addresses. This must be fixed to allow for normal business operations.

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	<code>copy flash:/enarsi/21.1.3.3-r1-config.txt run</code>
R3	<code>copy flash:/enarsi/21.1.3.3-r3-config.txt run</code>
D1	<code>copy flash:/enarsi/21.1.3.3-d1-config.txt run</code>
D2	<code>copy flash:/enarsi/21.1.3.3-d2-config.txt run</code>

- PCs 1, 2, 3, and 4 should be configured for dynamic acquisition of an IPv6 address.
- Passwords on all devices are **cisco12345**. If a username is required, use **admin**.
- Once 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.

Instructor Notes:

This trouble ticket contains 1 intentional error repeated in two places. The ACL applied to the R3 sub-interfaces is allowing the wrong UDP ports for DHCPv6. The ACL is allowing UDP ports 67 and 68, while DHCPv6 uses UDP ports 546 and 547.

There are several possible ways to fix this error and allow DHCPv6 traffic to pass. The commands used to fix this error in the most specific manner are:

```
R3(config)# ipv6 access-list CONTROL-UDP-TRAFFIC
R3(config)# no sequence 10
R3(config)# sequence 10 permit udp any any range 546 547
R3(config)# exit
```

Note: Host behavior may be different amongst operating systems. For example, while Windows 10 honors the /no-autoconfig flag, it seems that Ubuntu 18.0.4 LTS ignores the lack of an A flag in the RA creates the GUA anyway.

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 (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.

Uploading Configuration Files

Use the commands below to create the configuration files for each trouble ticket in this lab on the lab devices. 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 by default, 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: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 in 1 minute, type reload cancel to halt"
typeahead "\n"
reload
}
tclquit
```

R1 Configuration File Scripts

! R1 - Trouble Ticket # 1

```
tclsh
puts [ open "flash:/enarsi/21.1.3.1-r1-config.txt" w+ ] {
hostname R1
no ip domain lookup
ipv6 unicast-routing
banner motd # This is R1, Trouble Ticket 21.1.3.1 #
enable secret cisco12345
username admin privilege 15 algorithm-type scrypt secret cisco12345
interface g0/0/1
    ipv6 address fe80::1:1 link-local
    ipv6 address 2001:db8:acad:192::1/64
    no shutdown
    exit
interface s0/1/0
    ipv6 address fe80::1:2 link-local
    ipv6 address 2001:db8:acad:2000::1/64
    no shutdown
    exit
interface s0/1/1
    ipv6 address fe80::1:3 link-local
    ipv6 address 2001:db8:acad:2001::1/64
    no shutdown
    exit
interface loopback 0
    ipv6 address fe80::1:4 link-local
    ipv6 address 2001:db8:acad:226::1/64
    no shutdown
    exit
ipv6 route 2001:db8:acad:227::1/64 s0/1/0 2001:db8:acad:2000::2
ipv6 route 2001:db8:acad:227::1/64 s0/1/1 2001:db8:acad:2001::2
router ospfv3 1
```

```
router-id 1.1.1.1
address-family ipv6 unicast
  default-information originate always
exit
exit
router bgp 15
  bgp router-id 1.1.1.1
  neighbor 2001:db8:acad:227::1 remote-as 41
  neighbor 2001:db8:acad:227::1 update-source loopback 0
  neighbor 2001:db8:acad:227::1 ebgp-multihop 3
  address-family ipv6 unicast
    neighbor 2001:db8:acad:227::1 activate
    network 2001:db8:acad:224::/64
    network 2001:db8:acad:225::/64
    network 2001:db8:acad:192::/64
  exit
exit
interface g0/0/1
  ospfv3 1 ipv6 area 0
exit
line con 0
  logging synchronous
  exec-timeout 0 0
exit
line vty 0 4
  login local
  transport input telnet
  exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

! R1 - Trouble Ticket # 2

```
tclsh
puts [ open "flash:/enarsi/21.1.3.2-r1-config.txt" w+ ] {
hostname R1
no ip domain lookup
ipv6 unicast-routing
banner motd # This is R1, Trouble Ticket 21.1.3.2 #
enable secret cisco12345
username admin privilege 15 algorithm-type scrypt secret cisco12345
interface g0/0/1
  ipv6 address fe80::1:1 link-local
  ipv6 address 2001:db8:acad:192::1/64
```



```
no shutdown
exit
interface s0/1/0
  ipv6 address fe80::1:2 link-local
  ipv6 address 2001:db8:acad:2000::1/64
  no shutdown
  exit
interface s0/1/1
  ipv6 address fe80::1:3 link-local
  ipv6 address 2001:db8:acad:2001::1/64
  no shutdown
  exit
interface loopback 0
  ipv6 address fe80::1:4 link-local
  ipv6 address 2001:db8:acad:226::1/64
  no shutdown
  exit
ipv6 route 2001:db8:acad:227::1/64 s0/1/0 2001:db8:acad:2000::2
ipv6 route 2001:db8:acad:227::1/64 s0/1/1 2001:db8:acad:2001::2
router ospfv3 1
  router-id 1.1.1.1
  address-family ipv6 unicast
    default-information originate always
  exit
exit
router bgp 15
  bgp router-id 1.1.1.1
  neighbor 2001:db8:acad:227::1 remote-as 41
  neighbor 2001:db8:acad:227::1 update-source loopback 0
  neighbor 2001:db8:acad:227::1 ebgp-multihop 3
  address-family ipv6 unicast
    neighbor 2001:db8:acad:227::1 activate
    network 2001:db8:acad:224::/64
    network 2001:db8:acad:225::/64
    network 2001:db8:acad:192::/64
  exit
exit
interface g0/0/1
  ospfv3 1 ipv6 area 0
  exit
ipv6 access-list BOGON-MARTIAN
  permit ipv6 2001:db8:acad:227::/64 any
  deny ipv6 2001:db8:acad::/48 any
  permit ipv6 any any
exit
```

```
interface s0/1/0
  ipv6 traffic-filter BOGON-MARTIAN in
exit
interface s0/1/1
  ipv6 traffic-filter BOGON-MARTIAN in
exit
line con 0
  logging synchronous
  exec-timeout 0 0
  exit
line vty 0 4
  login local
  transport input telnet
  exec-timeout 5 0
  exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

! R1 - Trouble Ticket # 3

```
tclsh
puts [ open "flash:/enarsi/21.1.3.3-r1-config.txt" w+ ] {
hostname R1
no ip domain lookup
ipv6 unicast-routing
banner motd # This is R1, Trouble Ticket 21.1.3.3 #
enable secret cisco12345
username admin privilege 15 algorithm-type scrypt secret cisco12345
interface g0/0/1
  ipv6 address fe80::1:1 link-local
  ipv6 address 2001:db8:acad:192::1/64
  no shutdown
  exit
interface s0/1/0
  ipv6 address fe80::1:2 link-local
  ipv6 address 2001:db8:acad:2000::1/64
  no shutdown
  exit
interface s0/1/1
  ipv6 address fe80::1:3 link-local
  ipv6 address 2001:db8:acad:2001::1/64
  no shutdown
  exit
interface loopback 0
  ipv6 address fe80::1:4 link-local
```

```
ipv6 address 2001:db8:acad:226::1/64
no shutdown
exit
ipv6 route 2001:db8:acad:227::1/64 s0/1/0 2001:db8:acad:2000::2
ipv6 route 2001:db8:acad:227::1/64 s0/1/1 2001:db8:acad:2001::2
router ospfv3 1
router-id 1.1.1.1
address-family ipv6 unicast
default-information originate always
exit
exit
router bgp 15
bgp router-id 1.1.1.1
neighbor 2001:db8:acad:227::1 remote-as 41
neighbor 2001:db8:acad:227::1 update-source loopback 0
neighbor 2001:db8:acad:227::1 ebgp-multihop 3
address-family ipv6 unicast
neighbor 2001:db8:acad:227::1 activate
network 2001:db8:acad:224::/64
network 2001:db8:acad:225::/64
network 2001:db8:acad:192::/64
exit
exit
interface g0/0/1
ospfv3 1 ipv6 area 0
exit
ipv6 access-list BOGON-MARTIAN
permit ipv6 2001:db8:acad:227::/64 any
permit ipv6 2001:db8:acad:16::/64 any
permit ipv6 2001:db8:acad:27::/64 any
deny ipv6 2001:db8:acad::/48 any
permit ipv6 any any
exit
interface s0/1/0
ipv6 traffic-filter BOGON-MARTIAN in
exit
interface s0/1/1
ipv6 traffic-filter BOGON-MARTIAN in
exit
line con 0
logging synchronous
exec-timeout 0 0
exit
line vty 0 4
login local
```

```
transport input telnet
exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

R2 Configuration File Scripts - Not Used In This Lab

R3 Configuration File Scripts

! R3 - Trouble Ticket # 1

```
tclsh
puts [ open "flash:/enarsi/21.1.3.1-r3-config.txt" w+ ] {
hostname R3
no ip domain lookup
ipv6 unicast-routing
banner motd # This is R3, Trouble Ticket 21.1.3.1  #
enable secret cisco12345
username admin privilege 15 algorithm-type scrypt secret cisco12345
interface g0/0/1
no ipv6 address
no shutdown
exit
interface g0/0/1.16
encapsulation dot1q 16
ipv6 address fe80::3:1 link-local
ipv6 address 2001:db8:acad:16::1/64
ipv6 nd prefix 2001:db8:acad:16::/64 no-autoconfig
no shutdown
exit
interface g0/0/1.27
encapsulation dot1q 27
ipv6 address fe80::3:2 link-local
ipv6 address 2001:db8:acad:27::1/64
ipv6 nd prefix 2001:db8:acad:27::/64 no-autoconfig
no shutdown
exit
interface s0/1/0
ipv6 address fe80::3:3 link-local
ipv6 address 2001:db8:acad:2000::2/64
no shutdown
exit
interface s0/1/1
ipv6 address fe80::3:4 link-local
```

```
ipv6 address 2001:db8:acad:2001::2/64
no shutdown
exit
interface loopback 0
ipv6 address fe80::3:5 link-local
ipv6 address 2001:db8:acad:227::1/64
no shutdown
exit
ipv6 route 2001:db8:acad:226::1/64 s0/1/0 2001:db8:acad:2000::1
ipv6 route 2001:db8:acad:226::1/64 s0/1/1 2001:db8:acad:2001::1
router bgp 41
bgp router-id 3.3.3.3
neighbor 2001:db8:acad:226::1 remote-as 15
neighbor 2001:db8:acad:226::1 update-source loopback 0
neighbor 2001:db8:acad:226::1 ebgp-multihop 3
address-family ipv6 unicast
neighbor 2001:db8:acad:226::1 activate
network 2001:db8:acad:16::/64
network 2001:db8:acad:27::/64
exit
exit
ipv6 dhcp pool LAN16
address prefix 2001:db8:acad:16::/64
exit
ipv6 dhcp pool LAN27
address prefix 2001:db8:acad:27::/64
exit
interface g0/0/1.16
ipv6 nd managed-config-flag
ipv6 dhcp server LAN16
exit
interface g0/0/1.27
ipv6 nd managed-config-flag
ipv6 dhcp server LAN27
exit
line con 0
logging synchronous
exec-timeout 0 0
exit
line vty 0 4
login local
transport input telnet
exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
```

```
end
}
tclquit
```

! R3 - Trouble Ticket # 2

```
tclsh
puts [ open "flash:/enarsi/21.1.3.2-r3-config.txt" w+ ] {
hostname R3
no ip domain lookup
ipv6 unicast-routing
banner motd # This is R3, Trouble Ticket 21.1.3.2  #
enable secret cisco12345
username admin privilege 15 algorithm-type scrypt secret cisco12345
interface g0/0/1
  no ipv6 address
  no shutdown
  exit
interface g0/0/1.16
  encapsulation dot1q 16
  ipv6 address fe80::3:1 link-local
  ipv6 address 2001:db8:acad:16::1/64
  ipv6 nd prefix 2001:db8:acad:16::/64 no-autoconfig
  no shutdown
  exit
interface g0/0/1.27
  encapsulation dot1q 27
  ipv6 address fe80::3:2 link-local
  ipv6 address 2001:db8:acad:27::1/64
  ipv6 nd prefix 2001:db8:acad:27::/64 no-autoconfig
  no shutdown
  exit
interface s0/1/0
  ipv6 address fe80::3:3 link-local
  ipv6 address 2001:db8:acad:2000::2/64
  no shutdown
  exit
interface s0/1/1
  ipv6 address fe80::3:4 link-local
  ipv6 address 2001:db8:acad:2001::2/64
  no shutdown
  exit
interface loopback 0
  ipv6 address fe80::3:5 link-local
  ipv6 address 2001:db8:acad:227::1/64
  no shutdown
  exit
```

```
ipv6 route 2001:db8:acad:226::1/64 s0/1/0 2001:db8:acad:2000::1
ipv6 route 2001:db8:acad:226::1/64 s0/1/1 2001:db8:acad:2001::1
router bgp 41
  bgp router-id 3.3.3.3
  neighbor 2001:db8:acad:226::1 remote-as 15
  neighbor 2001:db8:acad:226::1 update-source loopback 0
  neighbor 2001:db8:acad:226::1 ebgp-multihop 3
  address-family ipv6 unicast
    neighbor 2001:db8:acad:226::1 activate
    network 2001:db8:acad:16::/64
    network 2001:db8:acad:27::/64
  exit
exit
ipv6 dhcp pool LAN16
  address prefix 2001:db8:acad:16::/64
exit
ipv6 dhcp pool LAN27
  address prefix 2001:db8:acad:27::/64
exit
interface g0/0/1.16
  ipv6 nd managed-config-flag
  ipv6 dhcp server LAN16
exit
interface g0/0/1.27
  ipv6 nd managed-config-flag
  ipv6 dhcp server LAN27
exit
line con 0
  logging synchronous
  exec-timeout 0 0
exit
line vty 0 4
  login local
  transport input telnet
  exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

! R3 - Trouble Ticket # 3

```
tclsh
puts [ open "flash:/enarsi/21.1.3.3-r3-config.txt" w+ ] {
hostname R3
no ip domain lookup
```

```
ipv6 unicast-routing
banner motd # This is R3, Trouble Ticket 21.1.3.3 #
enable secret cisco12345
username admin privilege 15 algorithm-type scrypt secret cisco12345
interface g0/0/1
  no ipv6 address
  no shutdown
  exit
interface g0/0/1.16
  encapsulation dot1q 16
  ipv6 address fe80::3:1 link-local
  ipv6 address 2001:db8:acad:16::1/64
  ipv6 nd prefix 2001:db8:acad:16::/64 no-autoconfig
  no shutdown
  exit
interface g0/0/1.27
  encapsulation dot1q 16
  ipv6 address fe80::3:2 link-local
  ipv6 address 2001:db8:acad:27::1/64
  ipv6 nd prefix 2001:db8:acad:27::/64 no-autoconfig
  no shutdown
  exit
interface s0/1/0
  ipv6 address fe80::3:3 link-local
  ipv6 address 2001:db8:acad:2000::2/64
  no shutdown
  exit
interface s0/1/1
  ipv6 address fe80::3:4 link-local
  ipv6 address 2001:db8:acad:2001::2/64
  no shutdown
  exit
interface loopback 0
  ipv6 address fe80::3:5 link-local
  ipv6 address 2001:db8:acad:227::1/64
  no shutdown
  exit
ipv6 route 2001:db8:acad:226::1/64 s0/1/0 2001:db8:acad:2000::1
ipv6 route 2001:db8:acad:226::1/64 s0/1/1 2001:db8:acad:2001::1
router bgp 41
  bgp router-id 3.3.3.3
  neighbor 2001:db8:acad:226::1 remote-as 15
  neighbor 2001:db8:acad:226::1 update-source loopback 0
  neighbor 2001:db8:acad:226::1 ebgp-multihop 3
  address-family ipv6 unicast
```



```
neighbor 2001:db8:acad:226::1 activate
network 2001:db8:acad:16::/64
network 2001:db8:acad:27::/64
exit
exit
ipv6 dhcp pool LAN16
address prefix 2001:db8:acad:16::/64
exit
ipv6 dhcp pool LAN27
address prefix 2001:db8:acad:27::/64
exit
interface g0/0/1.16
ipv6 nd managed-config-flag
ipv6 dhcp server LAN16
exit
interface g0/0/1.27
ipv6 nd managed-config-flag
ipv6 dhcp server LAN27
exit
ipv6 access-list CONTROL-UDP-TRAFFIC
permit udp any any range 67 68
permit udp any any gt 1024
deny udp any any
permit ipv6 any any
exit
interface g0/0/1.16
ipv6 traffic-filter CONTROL-UDP-TRAFFIC in
exit
interface g0/0/1.27
ipv6 traffic-filter CONTROL-UDP-TRAFFIC in
exit
line con 0
logging synchronous
exec-timeout 0 0
exit
line vty 0 4
login local
transport input telnet
exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

D1 Configuration File Scripts

! D1 - Trouble Ticket # 1

```
tclsh
puts [ open "flash:/enarsi/21.1.3.1-d1-config.txt" w+ ] {
hostname D1
no ip domain lookup
ip routing
ipv6 unicast-routing
banner motd # This is D1, Trouble Ticket 21.1.3.1  #
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
    no switchport
    ipv6 address fe80::d1:1 link-local
    ipv6 address 2001:db8:acad:192::2/64
    no shutdown
    exit
interface vlan 11
    ipv6 address fe80::d1:2 link-local
    ipv6 address 2001:db8:acad:224::1/64
    no shutdown
    exit
interface vlan 12
    ipv6 address fe80::d1:3 link-local
    ipv6 address 2001:db8:acad:225::1/64
    no shutdown
    exit
interface g1/0/23
    switchport mode access
    switchport access vlan 11
    spanning-tree portfast
    no shutdown
    exit
interface g1/0/24
    switchport mode access
    switchport access vlan 12
    spanning-tree portfast
    no shutdown
    exit
router ospfv3 1
```

```
router-id 0.0.13.1
address-family ipv6 unicast
  passive-interface vlan 11
  passive-interface vlan 12
exit
exit
interface g1/0/11
  ospfv3 1 ipv6 area 0
exit
interface vlan 11
  ospfv3 1 ipv6 area 0
exit
interface vlan 12
  ospfv3 1 ipv6 area 0
exit
ipv6 access-list CLIENT-CONTROL-VLAN11
  permit ipv6 2001:db8:acad:224::/64 any
  permit icmp any any echo-request
  permit icmp any any echo-reply
  deny ipv6 any any
exit
interface vlan11
  ipv6 traffic-filter CLIENT-CONTROL-VLAN11 in
exit
ipv6 access-list CLIENT-CONTROL-VLAN12
  permit ipv6 2001:db8:acad:225::/64 any
  permit icmp any any echo-request
  permit icmp any any echo-reply
  deny ipv6 any any
exit
interface vlan12
  ipv6 traffic-filter CLIENT-CONTROL-VLAN12 in
exit
line con 0
  logging synchronous
  exec-timeout 0 0
exit
line vty 0 4
  login local
  transport input telnet
  exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
```

```
tclquit
```

! D1 - Trouble Ticket # 2

```
tclsh
puts [ open "flash:/enarsi/21.1.3.2-d1-config.txt" w+ ] {
hostname D1
no ip domain lookup
ip routing
ipv6 unicast-routing
banner motd # This is D1, Trouble Ticket 21.1.3.2  #
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
    no switchport
    ipv6 address fe80::d1:1 link-local
    ipv6 address 2001:db8:acad:192::2/64
    no shutdown
    exit
interface vlan 11
    ipv6 address fe80::d1:2 link-local
    ipv6 address 2001:db8:acad:224::1/64
    no shutdown
    exit
interface vlan 12
    ipv6 address fe80::d1:3 link-local
    ipv6 address 2001:db8:acad:225::1/64
    no shutdown
    exit
interface g1/0/23
    switchport mode access
    switchport access vlan 11
    spanning-tree portfast
    no shutdown
    exit
interface g1/0/24
    switchport mode access
    switchport access vlan 12
    spanning-tree portfast
    no shutdown
    exit
router ospfv3 1
    router-id 0.0.13.1
```

```
address-family ipv6 unicast
  passive-interface vlan 11
  passive-interface vlan 12
  exit
exit
interface g1/0/11
  ospfv3 1 ipv6 area 0
  exit
interface vlan 11
  ospfv3 1 ipv6 area 0
  exit
interface vlan 12
  ospfv3 1 ipv6 area 0
  exit
ipv6 access-list CLIENT-CONTROL-VLAN11
  permit ipv6 2001:db8:acad:224::/64 any
  permit icmp any any echo-request
  permit icmp any any echo-reply
  permit icmp any any nd-na
  permit icmp any any nd-ns
  deny ipv6 any any
  exit
interface vlan11
  ipv6 traffic-filter CLIENT-CONTROL-VLAN11 in
  exit
ipv6 access-list CLIENT-CONTROL-VLAN12
  permit ipv6 2001:db8:acad:225::/64 any
  permit icmp any any echo-request
  permit icmp any any echo-reply
  permit icmp any any nd-na
  permit icmp any any nd-ns
  deny ipv6 any any
  exit
interface vlan12
  ipv6 traffic-filter CLIENT-CONTROL-VLAN12 in
  exit
line con 0
  logging synchronous
  exec-timeout 0 0
  exit
line vty 0 4
  login local
  transport input telnet
  exec-timeout 5 0
  exit
```

```
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

! D1 - Trouble Ticket # 3

```
tclsh
puts [ open "flash:/enarsi/21.1.3.3-d1-config.txt" w+ ] {
hostname D1
no ip domain lookup
ip routing
ipv6 unicast-routing
banner motd # This is D1, Trouble Ticket 21.1.3.3  #
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
    no switchport
    ipv6 address fe80::d1:1 link-local
    ipv6 address 2001:db8:acad:192::2/64
    no shutdown
    exit
interface vlan 11
    ipv6 address fe80::d1:2 link-local
    ipv6 address 2001:db8:acad:224::1/64
    no shutdown
    exit
interface vlan 12
    ipv6 address fe80::d1:3 link-local
    ipv6 address 2001:db8:acad:225::1/64
    no shutdown
    exit
interface g1/0/23
    switchport mode access
    switchport access vlan 11
    spanning-tree portfast
    no shutdown
    exit
interface g1/0/24
    switchport mode access
    switchport access vlan 12
    spanning-tree portfast
    no shutdown
```

```
exit
router ospfv3 1
  router-id 0.0.13.1
  address-family ipv6 unicast
    passive-interface vlan 11
    passive-interface vlan 12
  exit
exit
interface g1/0/11
  ospfv3 1 ipv6 area 0
exit
interface vlan 11
  ospfv3 1 ipv6 area 0
exit
interface vlan 12
  ospfv3 1 ipv6 area 0
exit
ipv6 access-list CLIENT-CONTROL-VLAN11
  permit ipv6 2001:db8:acad:224::/64 any
  permit icmp any any echo-request
  permit icmp any any echo-reply
  permit icmp any any nd-na
  permit icmp any any nd-ns
  deny ipv6 any any
exit
interface vlan11
  ipv6 traffic-filter CLIENT-CONTROL-VLAN11 in
exit
ipv6 access-list CLIENT-CONTROL-VLAN12
  permit ipv6 2001:db8:acad:225::/64 any
  permit icmp any any echo-request
  permit icmp any any echo-reply
  permit icmp any any nd-na
  permit icmp any any nd-ns
  deny ipv6 any any
exit
interface vlan12
  ipv6 traffic-filter CLIENT-CONTROL-VLAN12 in
exit
line con 0
  logging synchronous
  exec-timeout 0 0
exit
line vty 0 4
  login local
```

```
transport input telnet
exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

D2 Configuration File Scripts

! D2- Trouble Ticket # 1

```
tclsh
puts [ open "flash:/enarsi/21.1.3.1-d2-config.txt" w+ ] {
hostname D2
no ip domain lookup
ip routing
ipv6 unicast-routing
banner motd # This is D2, Trouble Ticket 21.1.3.1  #
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 trunk
    switchport nonegotiate
    no shutdown
    exit
interface g1/0/23
    switchport mode access
    switchport access vlan 16
    spanning-tree portfast
    no shutdown
    exit
interface g1/0/24
    switchport mode access
    switchport access vlan 27
    spanning-tree portfast
    no shutdown
    exit
interface vlan 27
    ipv6 address fe80::d2:1 link-local
    ipv6 address 2001:db8:acad:27::2/64
    no shutdown
    exit
```



```
ipv6 route ::/0 2001:db8:acad:27::1
line con 0
  logging synchronous
  exec-timeout 0 0
  exit
line vty 0 4
  login local
  transport input telnet
  exec-timeout 5 0
  exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

! D2- Trouble Ticket # 2

```
tclsh
puts [ open "flash:/enarsi/21.1.3.2-d2-config.txt" w+ ] {
hostname D2
no ip domain lookup
ip routing
ipv6 unicast-routing
banner motd # This is D2, Trouble Ticket 21.1.3.2  #
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 trunk
  switchport nonegotiate
  no shutdown
  exit
interface g1/0/23
  switchport mode access
  switchport access vlan 16
  spanning-tree portfast
  no shutdown
  exit
interface g1/0/24
  switchport mode access
  switchport access vlan 27
  spanning-tree portfast
  no shutdown
  exit
```

```
interface vlan 27
  ipv6 address fe80::d2:1 link-local
  ipv6 address 2001:db8:acad:27::2/64
  no shutdown
  exit
ipv6 route ::/0 2001:db8:acad:27::1
line con 0
  logging synchronous
  exec-timeout 0 0
  exit
line vty 0 4
  login local
  transport input telnet
  exec-timeout 5 0
  exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
```

tclquit

! D2- Trouble Ticket # 3

```
tclsh
puts [ open "flash:/enarsi/21.1.3.3-d2-config.txt" w+ ] {
hostname D2
no ip domain lookup
ip routing
ipv6 unicast-routing
banner motd # This is D2, Trouble Ticket 21.1.3.3  #
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 trunk
  switchport nonegotiate
  no shutdown
  exit
interface g1/0/23
  switchport mode access
  switchport access vlan 16
  spanning-tree portfast
  no shutdown
  exit
interface g1/0/24
```

```
switchport mode access
switchport access vlan 27
spanning-tree portfast
no shutdown
exit
interface vlan 27
ipv6 address fe80::d2:1 link-local
ipv6 address 2001:db8:acad:27::2/64
no shutdown
exit
ipv6 route ::/0 2001:db8:acad:27::1
line con 0
logging synchronous
exec-timeout 0 0
exit
line vty 0 4
login local
transport input telnet
exec-timeout 5 0
exit
alias exec reset.now tclsh flash:/enarsi/reset.tcl
end
}
tclquit
```

A1 Configuration File Scripts - Not Used In This Lab