Student notes for

David Bombal's

Packet Tracer Labs Course

David Bombal

THANK YOU!

These student notes have been kindly shared by @DJninjaNZ

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These are not official student notes and are not officially supported, but are shared with the hope that they will help you with your CCNA studies.

If you want to share your notes with others on the course, please submit them to sales@ConfigureTerminal.com and we will review them for addition to the course.

Remember: You will probably learn more by making notes like these and sharing them for the benefit of others.

All the best!

David Bombal

Contents

Brief

This lab is for configuring IPv6 addresses and host names according to the topology.

Static Routing basics

Static routing is manual route configuration providing fixed routes between hosts and routers.

Uses

- Backup route in case of dynamic route failure
- Default route for all traffic to exit the router towards the internet
- Between small networks of one or two routers
- Networks that are not expected to grow significantly

Advantages

- Simple network table in small networks
- Easy implementation in small networks
- Fairly easy to troubleshoot
- Require less overhead
- Secure as static routes do not advertise
- Predictable traffic as the route to the destination is always the same
- Less CPU intensive as static routing does not require any routing algorithm and calculations.

Disadvantages

- Must be manually configured, human error can cause mistakes.
- All routers must have the routes configured which can take long amounts of time.
- Static routes cannot reroute traffic in case of link failures
- Managing static configurations can become time consuming

IPv6

IPv6 Basics

- IPv6 uses 128 bit instead of IPv4 32 bit
- IPv6 uses hex instead of binary
- IPv6 has to be enabled with ipv6 unicast-routing
- 2^32 Addresses
- Stateless and stateful auto configuration (DHCP-Like)

Lab requirements

IPv6

1. Hostnames
2. Configure IPv6 unicast routing on all devices
3. IPv6 IP addresses on all interfaces
4. Static routes between R1 to R4

Lab Topology

Here we have four routers that we need to turn on and configure with IPv6 addresses use IPv6 unicast-routing to enable IPv6 on the routers. Separated into three networks for simplifying the static route configuration.

Configurations and Verification

IPv6 Config
Router1 ! interface GigabitEthernet0/0/0 ipv6 address 2001:1::1/64 ! **Router2** ! interface GigabitEthernet0/0/0 ipv6 address 2001:1::2/64 ! interface GigabitEthernet0/0/1 ipv6 address 2001:2::1/64 ! **Router3** ! interface GigabitEthernet0/0 ipv6 address 2001:3::1/64 ! interface GigabitEthernet0/1 ipv6 address 2001:2::2/64 ! **Router4** ! interface GigabitEthernet0/0 ipv6 address 2001:3::2/64 !
Configuring the first static route between R1 → R3 and R1 ← R3 R1 //does not know about network 2 labelled on diagram R3 //does not know about network 1 *Without the use of dynamic routing protocols static routing must be configured using the destination network and the IP address of the connected interface as the next hop.* **Router1** ipv6 route 2001:2::/64 2001:1::2 **Router3** ipv6 route 2001:1::/64 2001:2::1 *Now we can ping between R1 and R3* **Router1#ping 2001:2::2** Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 2001:2::2, timeout is 2 seconds: !!!!! Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms **Router3#ping 2001:1::1** Type escape sequence to abort. Sending 5, 100-byte ICMP Echos to 2001:1::1, timeout is 2 seconds: !!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

Configuring the first static route between R1 →R4 and R1 ← R4

R1 //does not know about network 3 it knows about previously configured 2
R2 //does not know about network 3
R3 //does not know about network 2
R4 //does not know about network 1 and network 2

Router1
ipv6 route 2001:3::/64 2001:1::2
Router2
ipv6 route 2001:3::/64 2001:2::2
Router3
ipv6 route 2001:1::/64 2001:2::1
Router4
ipv6 route 2001:1::/64 2001:3::1
ipv6 route 2001:2::/64 2001:3::1

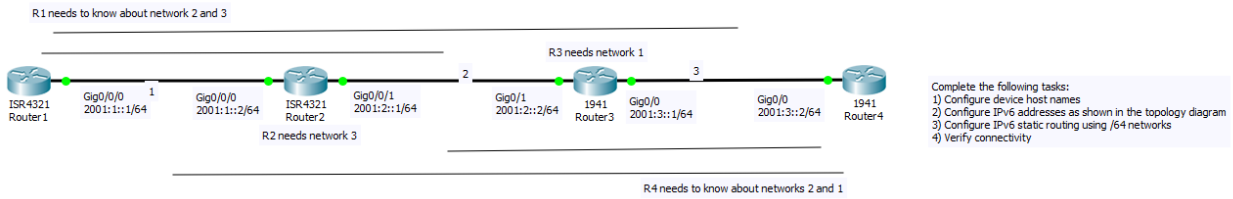
Verification commands and outputs

Router4#show ipv6 route
IPv6 Routing Table - 5 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, M - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
S 2001:1::/64 [1/0]//to network 1 through R3
via 2001:3::1
S 2001:2::/64 [1/0]//to network 2 R3
via 2001:3::1
C 2001:3::/64 [0/0]
via GigabitEthernet0/0, directly connected
L 2001:3::2/128 [0/0]
via GigabitEthernet0/0, receive
L FF00::/8 [0/0]
via Null0, receive

Router4#ping 2001:1::1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:1::1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/1 ms

Router1#show ipv6 route
S 2001:2::/64 [1/0]//to network 2 through R2
via 2001:1::2
S 2001:3::/64 [1/0]//to network 3 through R2
via 2001:1::2

Router1#ping 2001:3::2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:3::2, timeout is 2 seconds:
!!!!!



1. Route for R1 to 2001:2 NW
2. Route for R3 to 2001:1 NW

3. Routes for R4 to 2001:1 NW
4. Routes for R4 2001:2 NW

5. Routes for R2 to 2001:3 NW

6. Routes for R1 to 2001:3 NW

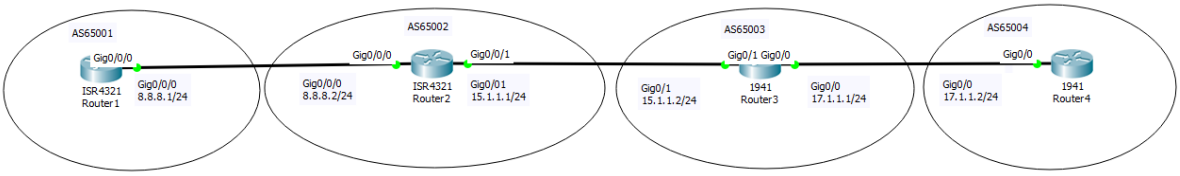
ipv6 route 2001:2::/64 2001:1::2 //next hop
ipv6 route 2001:1::/64 2001:2::1 //next hop

ipv6 route 2001:1::/64 2001:3::1
ipv6 route 2001:2::/64 2001:3::1

ipv6 route 2001:3::/64 2001:2::2

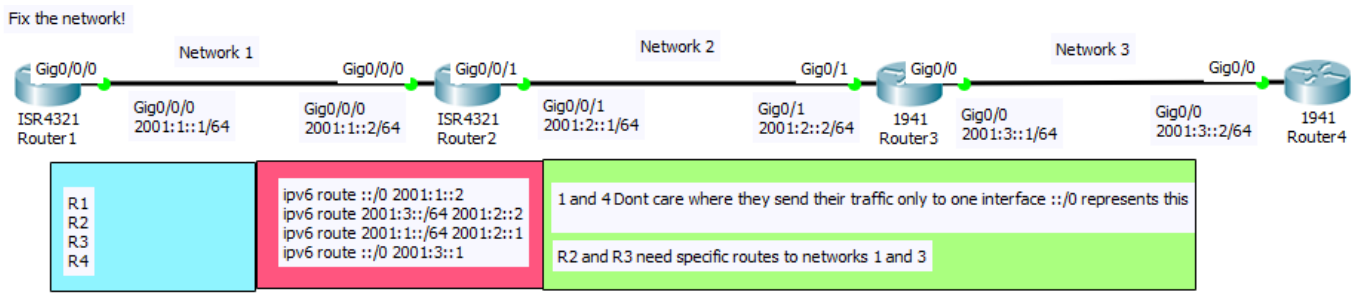
ipv6 route 2001:3::/64 2001:1::2

Lab Topology T-Shoot



Here we have four routers that we will check which could be incorrectly configured or not configured at all for IPv6 static routing.

IPv6 T-Shoot
R2 ! No ipv6 route ::/0 2001:1::1 ! ipv6 route 2001:3::/64 2001:2::2 !



Extra Examples and Resources

Cisco IPv6

https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipv6_basic/configuration/xe-3s/ip6b-xe-3s-book/ip6-add-basic-conn-xe.html

https://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3750/software/release/12-2_55_se/configuration/guide/scg3750/swipv6.html

https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipv6_fhsec/configuration/15-sy/ip6-nd-inspect.html