

IPv6 101 - Hands-On Lab

Basic Configuration: Static IPv6 Addressing and Routing

SomNOG Capacity Building Series - SomNOG × ISOC Somalia Chapter

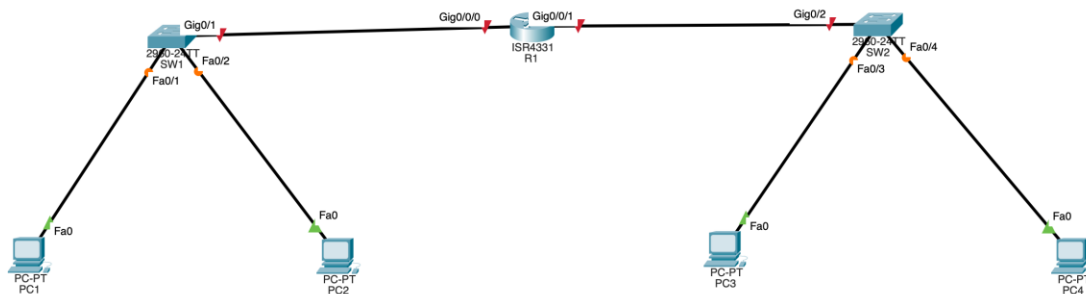
Companion lab to: IPv6 101 - Addressing Fundamentals and Basic Configuration

Objective

Build a small, fully static IPv6 network in Packet Tracer: two LANs, each behind a Layer 2 switch, joined by a single router. By the end of this lab, participants will be able to assign static IPv6 addresses to hosts and router interfaces, enable IPv6 routing on a Cisco router, and verify end-to-end reachability across both LANs.

Topology

Four PCs, two Layer 2 switches, and one router. The switches are left at their default configuration - nothing needs to be typed into SW1 or SW2 for this lab; all the work happens on the PCs and on R1.



R1 (ISR4331) connects to SW1 on GigabitEthernet0/0/0 and to SW2 on GigabitEthernet0/0/1. PC1 and PC2 sit behind SW1 on LAN 1; PC3 and PC4 sit behind SW2 on LAN 2.

Addressing Plan

Addresses use the IPv6 documentation prefix 2001:db8::/32 (RFC 3849) - reserved for exactly this purpose, so nothing here overlaps real, routable space.

Device	Interface	IPv6 Address	Default Gateway
R1	Gig0/0/0 (→ SW1)	2001:db8:1::1/64	-
R1	Gig0/0/1 (→ SW2)	2001:db8:2::1/64	-
PC1	FastEthernet0	2001:db8:1::10/64	2001:db8:1::1
PC2	FastEthernet0	2001:db8:1::11/64	2001:db8:1::1
PC3	FastEthernet0	2001:db8:2::10/64	2001:db8:2::1

PC4	FastEthernet0	2001:db8:2::11/64	2001:db8:2::1
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Devices Used

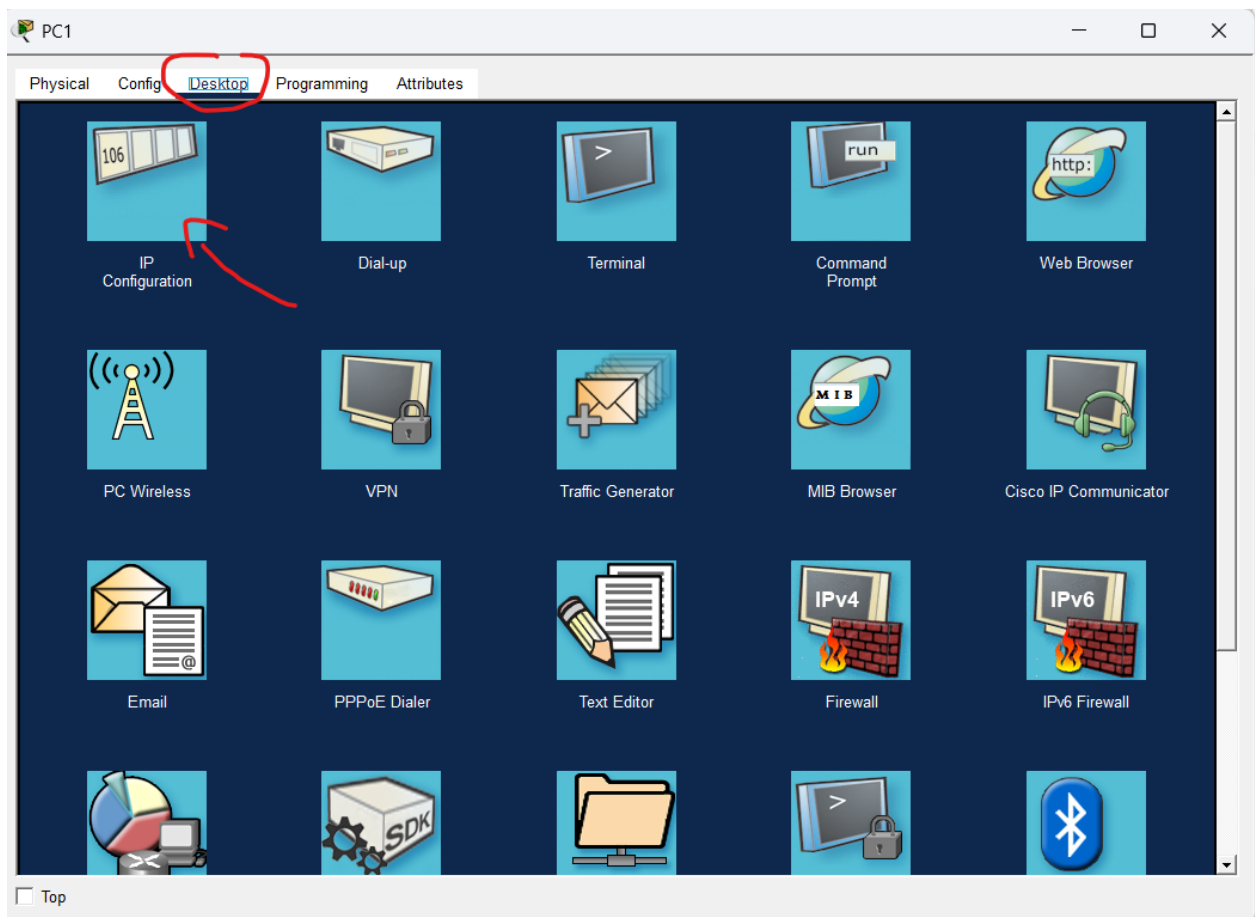
- 1 × Router - ISR4331 (R1)
- 2 × Switch - 2960-24TT (SW1, SW2) - left at default settings; no configuration is required for this lab
- 4 × PC-PT end devices (PC1–PC4)
- Copper straight-through cabling, as shown in the topology diagram above

Step-by-Step Configuration

Part 1 - LAN 1 hosts (PC1 and PC2)

Configure PC1

1. Click on PC1 in the topology to open its device window, then select Desktop tab, then click IP Configuration.



2. Select Static in ipv6 configuration, then enter IPv6 Address: of 2001:db8:1::10 and Prefix Length: 64 IPv6 then put the Gateway: as 2001:db8:1::1, then Close the IP Configuration window.

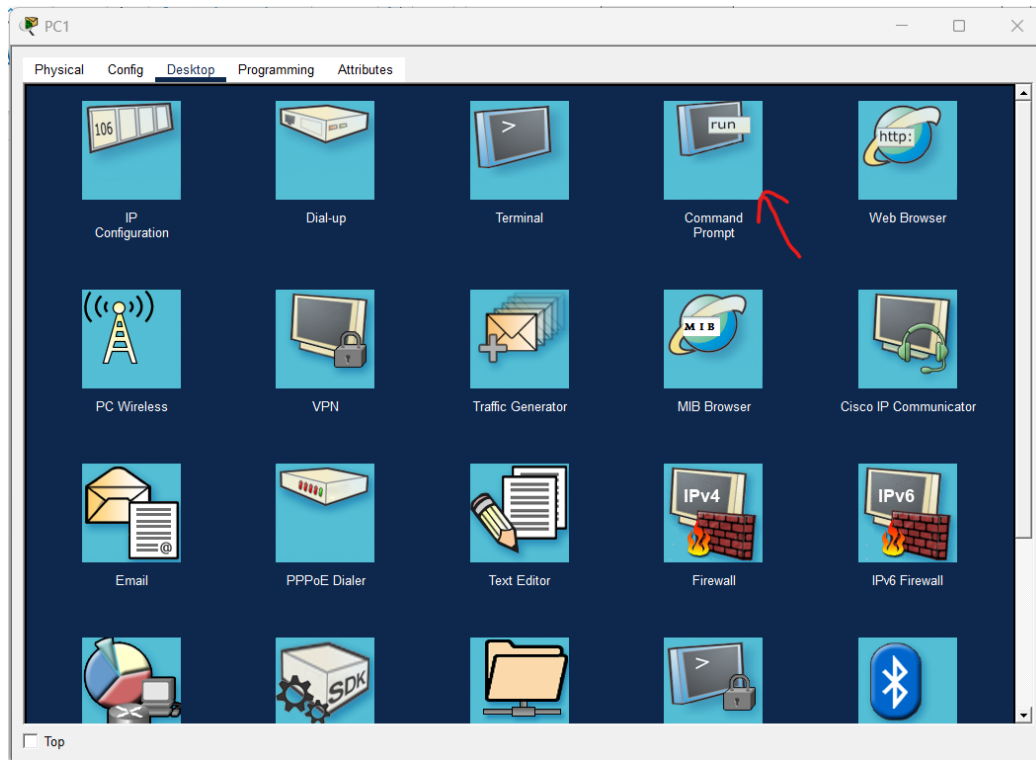
The screenshot shows the 'PC1' configuration window with the 'Config' tab selected. The 'Interface' dropdown is set to 'FastEthernet0'. The 'IP Configuration' section has 'Static' selected. The 'IPv6 Configuration' section also has 'Static' selected. The 'IPv6 Address' field contains '2001:db8:1::10' and the 'Prefix Length' field contains '64'. A red arrow points to the 'Static' radio button in the IPv6 section, and a red circle highlights the prefix length '64'. The 'Link Local Address' field contains 'FE80::260:3EFF:FE8:58E7'. The 'Default Gateway' field contains '2001:db8:1::1'. The '802.1X' section has 'Use 802.1X Security' unchecked, 'Authentication' set to 'MD5', and 'Username' and 'Password' fields empty. A 'Top' button is at the bottom left.

Section	Option	Value
IP Configuration	DHCP	☐
	Static	☒
	IPv4 Address	
	Subnet Mask	
	Default Gateway	0.0.0.0
IPv6 Configuration	Automatic	☐
	Static	☒
	IPv6 Address	2001:db8:1::10
	Link Local Address	FE80::260:3EFF:FE8:58E7
	Default Gateway	2001:db8:1::1
802.1X	Use 802.1X Security	☐
	Authentication	MD5
	Username	
	Password	

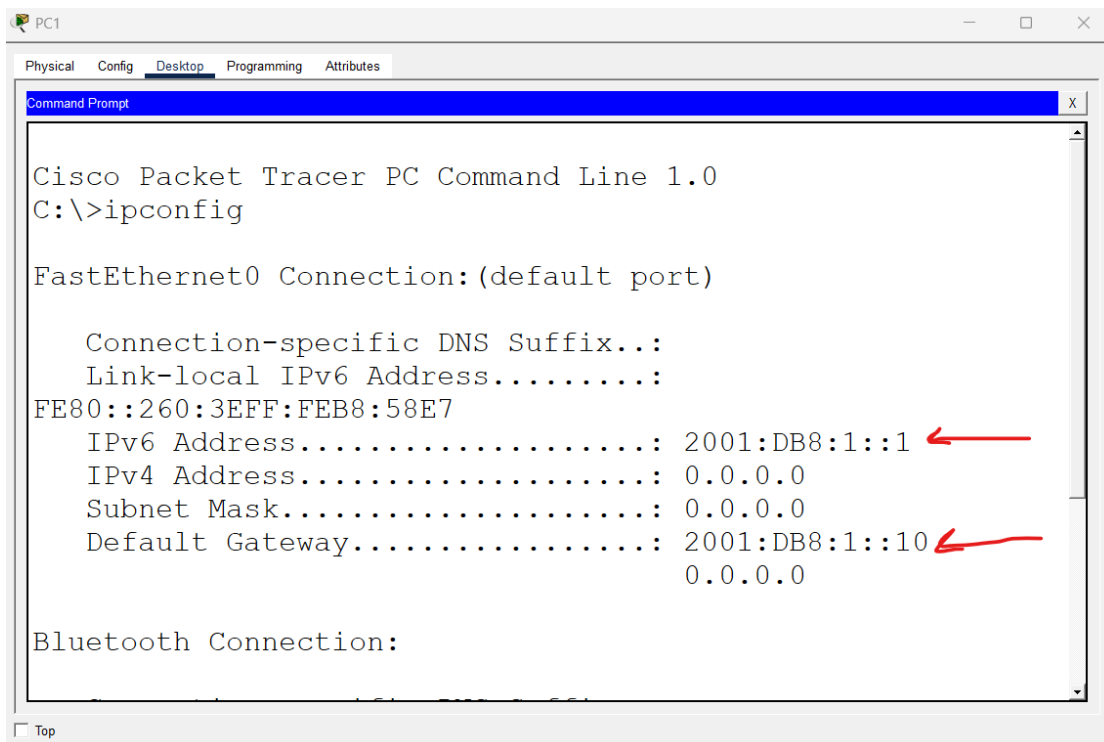
 Make sure there is no space in the address or else you'll face issues

Verify PC1's address

1. Still on PC1, open Desktop, click Command Prompt,



2. then type **ipconfig** and press Enter, search and Confirm the IPv6 Address line shows 2001:db8:1::10



MAKE SURE YOU DO THIS PROCESS ON ALL LAN PCS SAME AS THE ILLUSTRATED ABOVE

Configure PC2

3. Click on PC2 in the topology to open its device window.
4. Open the Desktop tab, then click IP Configuration.
5. Select Static.
6. Enter IPv6 Address: **2001:db8:1::11** Prefix Length: **64** IPv6 Gateway: **2001:db8:1::1**
7. Close the IP Configuration window.

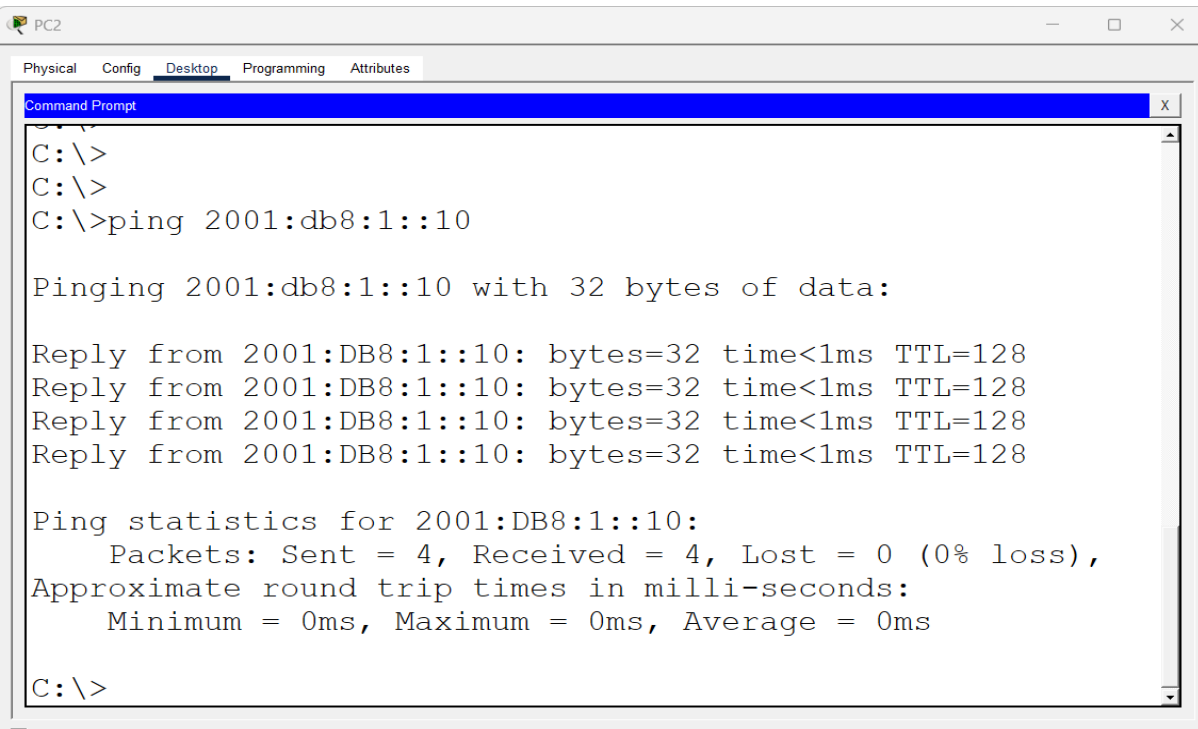
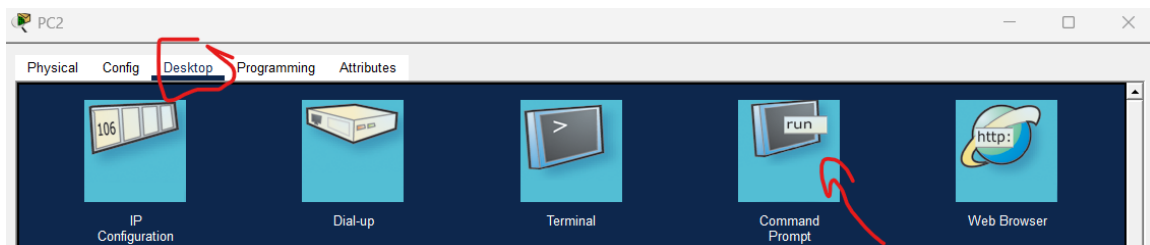
Verify PC2's address

8. Still on PC2, open Desktop → Command Prompt.
9. Type ipconfig and press Enter.
10. Confirm the IPv6 Address line shows 2001:db8:1::11.

NOW WE'LL ILLUSTRATE HOW THESE LANS CAN PING FOLLOW THIS ALL FOR LANS.

Test connectivity - PC2 to PC1 (same LAN)

11. On PC2, open Desktop , select Command Prompt, then Run: ping 2001:db8:1::10



Part 2 - LAN 2 hosts (PC3 and PC4)

Configure PC3

12. Click on PC3 in the topology to open its device window.
13. Open the Desktop tab, then click IP Configuration.
14. Select Static.
15. Enter IPv6 Address: 2001:db8:2::10 Prefix Length: 64 IPv6 Gateway: 2001:db8:2::1
16. Close the IP Configuration window.

 on PC3 YOU NEED TO FOLLOW THE PROCESS SAME AS PC1 → IP Configuration (Static, 2001:db8:2::10)

Verify PC3's address

17. Still on PC3, open Desktop → Command Prompt.
18. Type ipconfig and press Enter.
19. Confirm the IPv6 Address line shows 2001:db8:2::10.

 ALSO MAKE SURE YOU SEE THE IP YOU Configured - PC3: Command Prompt → ipconfig output

Configure PC4

20. Click on PC4 in the topology to open its device window.
21. Open the Desktop tab, then click IP Configuration.
22. Select Static.
23. Enter IPv6 Address: 2001:db8:2::11 Prefix Length: 64 IPv6 Gateway: 2001:db8:2::1
24. Close the IP Configuration window.

 ON PC YOU NEED TO FOLLOW SAME US PC1 STYLE OF CONFIGURATIONS: Desktop → IP Configuration (Static, 2001:db8:2::11)

Verify PC4's address

25. Still on PC4, open Desktop → Command Prompt.
26. Type ipconfig and press Enter.
27. Confirm the IPv6 Address line shows 2001:db8:2::11.

 MAKE SURE YOU SEE THE IP YOU CONFIGURED- PC4: Command Prompt → ipconfig output

Test connectivity - PC4 to PC3 (same LAN)

28. On PC4, open Desktop → Command Prompt.
29. Run: ping 2001:db8:2::10
30. Expect four successful replies from 2001:db8:2::10, again via SW2 alone.

 NOW YOU CAN TEST IF YOU CAN REACH YOUR COUNTER PC 3 - PC4: ping 2001:db8:2::10 result

Part 3 - Confirm the router is still needed

Try pinging across LANs before R1 is configured

31. On PC1, open Desktop → Command Prompt.
32. Run: ping 2001:db8:2::10
33. Expect "Request timed out." PC1 and PC3 are on different LANs, and R1 has no IPv6 addresses or routing enabled yet, so there's nothing to forward the packet.

 CONSIDRE THIS ROUTE FIALS DUE TO NO ROUTING ESTABLISHED - PC1: ping 2001:db8:2::10 result

Part 4 - Configure the router (R1)

Assign interface addresses and enable IPv6 routing

34. Click R1, open the CLI tab (or Terminal, then CLI).
35. Enter the commands below.

```
enable
configure terminal
hostname R1
ipv6 unicast-routing

interface GigabitEthernet0/0/0
  ipv6 address 2001:db8:1::1/64
  no shutdown

interface GigabitEthernet0/0/1
  ipv6 address 2001:db8:2::1/64
  no shutdown
```

ipv6 unicast-routing is the one command that matters here. Without it, Cisco IOS won't forward IPv6 packets between interfaces even though both LANs are directly attached. Once it's enabled, R1 already knows how to reach LAN 1 and LAN 2 - they appear automatically in the routing table as directly connected routes. There's no static route to type in; the router doesn't need one for networks that are already directly attached to it.

Verify the router

36. Run: show ipv6 interface brief - confirm Gig0/0/0 and Gig0/0/1 are up/up with the correct addresses.
37. Run: show ipv6 route - confirm both /64 networks appear as C (connected).

Part 5 - Confirm end-to-end connectivity

Retest - PC1 to PC3

38. On PC1, open Desktop → Command Prompt.
39. Run: ping 2001:db8:2::10
40. Expect four successful replies this time - R1 is now routing between LAN 1 and LAN 2.

NOW YOU'LL SEE THE PING IS SUCCESS BECAUSE THE ROUTE HAS BEEN ESTABLISHED