**Lab 8: Configure IPv6 on PCs and Routers**

**🧠 Scenario:**

You’ve joined an enterprise migrating from IPv4 to IPv6. You are assigned to set up basic IPv6 communication between branch PCs through two routers. This includes configuring **IPv6 addresses**, **enabling IPv6 routing**, and **testing end-to-end communication**.

**🧱 Topology:**

css

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[PC1] --- [Switch1] --- [Router1] --- [Router2] --- [Switch2] --- [PC2]

**🔧 Devices Required:**

* 2 Routers (R1, R2)
* 2 Switches (S1, S2)
* 2 PCs (PC1, PC2)

**🎯 Objectives:**

1. Assign IPv6 addresses to all router interfaces and PCs.
2. Enable IPv6 routing on both routers.
3. Configure static routes between networks.
4. Test connectivity using ping and traceroute.

**🧪 IPv6 Address Plan:**

| **Device** | **Interface** | **IPv6 Address** |
| --- | --- | --- |
| PC1 | NIC | 2001:DB8:1::10/64 |
| PC2 | NIC | 2001:DB8:3::10/64 |
| R1 | G0/0 | 2001:DB8:1::1/64 |
| R1 | G0/1 | 2001:DB8:2::1/64 |
| R2 | G0/0 | 2001:DB8:2::2/64 |
| R2 | G0/1 | 2001:DB8:3::1/64 |

**🛠️ Step-by-Step Configuration**

**✅ 1. Configure PC1 and PC2 IPv6:**

Go to **PC → Desktop → IPv6 Configuration** and set:

**PC1:**

yaml

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IPv6 address: 2001:DB8:1::10

Prefix: 64

Gateway: 2001:DB8:1::1

**PC2:**

yaml

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IPv6 address: 2001:DB8:3::10

Prefix: 64

Gateway: 2001:DB8:3::1

**✅ 2. Configure Router1 (R1):**

bash

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enable

configure terminal

interface g0/0

ipv6 address 2001:DB8:1::1/64

no shutdown

exit

interface g0/1

ipv6 address 2001:DB8:2::1/64

no shutdown

exit

ipv6 unicast-routing

**✅ 3. Configure Router2 (R2):**

bash

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enable

configure terminal

interface g0/0

ipv6 address 2001:DB8:2::2/64

no shutdown

exit

interface g0/1

ipv6 address 2001:DB8:3::1/64

no shutdown

exit

ipv6 unicast-routing

**✅ 4. Configure Static Routing**

**On R1:**

bash

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ipv6 route 2001:DB8:3::/64 2001:DB8:2::2

**On R2:**

bash

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ipv6 route 2001:DB8:1::/64 2001:DB8:2::1

**🔍 Verification**

1. From PC1, ping PC2:

bash

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ping 2001:DB8:3::10

1. On Router1:

bash

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show ipv6 route

1. On both routers:

bash

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show ipv6 interface brief

**🚨 Troubleshooting Tips**

* Check if interfaces are **no shutdown**
* Verify **prefix length** is /64
* Ensure **static routes** are correct
* Use traceroute to identify where the packet is dropping

**Output:**

C:\>ping 2001:DB8:3::10

Pinging 2001:DB8:3::10 with 32 bytes of data:

Reply from FE80::2E0:F9FF:FE3D:2101: Destination host unreachable.

Reply from FE80::2E0:F9FF:FE3D:2101: Destination host unreachable.

Reply from FE80::2E0:F9FF:FE3D:2101: Destination host unreachable.

Reply from FE80::2E0:F9FF:FE3D:2101: Destination host unreachable.

Ping statistics for 2001:DB8:3::10:

Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

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Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

Router#sh ipv6 ro

IPv6 Routing Table - 6 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

ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect

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

C 2001:DB8:1::/64 [0/0]

via GigabitEthernet0/0, directly connected

L 2001:DB8:1::1/128 [0/0]

via GigabitEthernet0/0, receive

C 2001:DB8:2::/64 [0/0]

via GigabitEthernet0/1, directly connected

L 2001:DB8:2::1/128 [0/0]

via GigabitEthernet0/1, receive

S 2001:DB8:3::/64 [1/0]

via 2001:DB8:2::2

L FF00::/8 [0/0]

via Null0, receive

Router#sh ipv6 int br

GigabitEthernet0/0 [up/up]

FE80::2E0:F9FF:FE3D:2101

2001:DB8:1::1

GigabitEthernet0/1 [up/up]

FE80::2E0:F9FF:FE3D:2102

2001:DB8:2::1

GigabitEthernet0/2 [administratively down/down]

unassigned

Vlan1 [administratively down/down]

unassigned