IPv6 Routing

- IPv6 routing works the same way as IPv4 routing, but the processes are separate, and there are separate IPv4 and IPv6 routing tables
- If a router receives an IPv4 packet, it will route it according to its IPv4 routing table
- If a router receives an IPv6 packet, it will route it according to its IPv6 routing table
- The routing tables are built in the same way, through static routes or dynamic routing protocols

IPv6 Routing Protocol Support

- Updated versions of the existing IPv4 routing protocols were released to support IPv6.
- The configuration and operation is very similar for IPv6 as for IPv4.
  - RIPng (RIP next generation)
  - EIGRP for IPv6
  - OSPFv3
  - IS-IS
  - MP-BGP4 (MultiProtocol BGP-4)

IPv6 Routing

- IPv4 routing is enabled by default on a Cisco IOS router
- IPv6 routing is disabled by default
- Enter the command '`ipv6 unicast-routing`' to enable it
- You can still configure IPv6 addresses on a router without ipv6 unicast-routing enabled and send and receive IPv6 traffic, but the router will not forward IPv6 traffic to other networks

Connected and Local Routes

- The administrator configures IP addresses on the router's interfaces

```
R1#show run

interface FastEthernet0/0
 ip address 10.10.1.1 255.255.255.0
 duplex full
 ipv6 address 2001:DB8:0:1::1/64
!
interface FastEthernet2/0
 ip address 10.10.0.1 255.255.255.0
 duplex full
 ipv6 address 2001:DB8::1/64
```

show ip route – IPv4 Routes

- This will automatically enter connected and local routes in the routing table.
- Local IPv4 routes always have a /32 mask and show the IP address configured on the interface

```
R1#show ip route
C        10.10.0.0/24 is directly connected, FastEthernet2/0
C        10.10.1.0/24 is directly connected, FastEthernet0/0
L        10.10.0.1/32 is directly connected, FastEthernet2/0
L        10.10.1.1/32 is directly connected, FastEthernet0/0
! truncated
```

show ipv6 route - Connected Routes

- Local routes always have a /128 mask and show the IP address configured on the interface

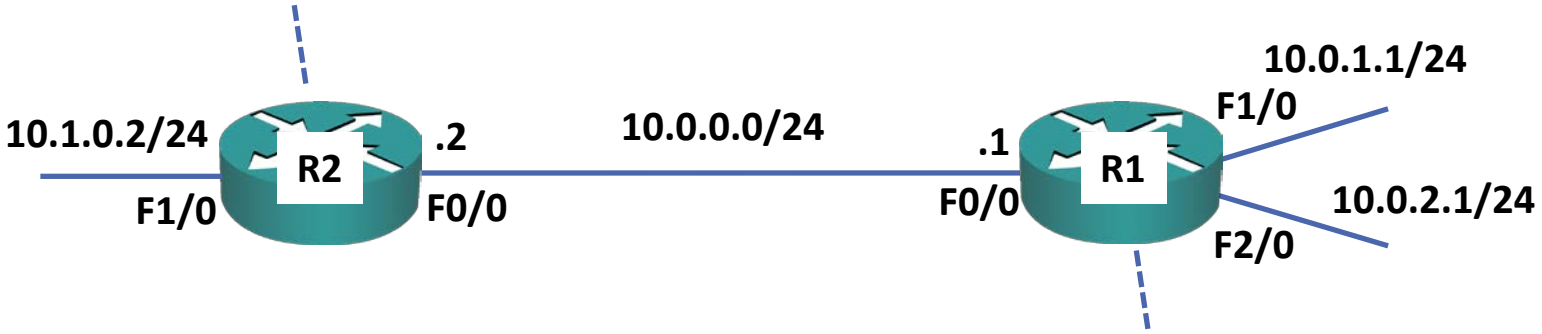
```
R1#show ipv6 route
C   2001:DB8::/64 [0/0]
     via FastEthernet2/0, directly connected
C   2001:DB8:0:1::/64 [0/0]
     via FastEthernet0/0, directly connected
L   2001:DB8::1/128 [0/0]
     via FastEthernet2/0, receive
L   2001:DB8:0:1::1/128 [0/0]
     via FastEthernet0/0, receive
! truncated
```

Routing

- If a router receives traffic for a network which it is not directly attached to, it needs to know how to get there in order to forward the traffic
- An administrator can manually add a static route to the destination, or the router can learn it via a routing protocol

IPv4 Static Routes

```
ip route 10.0.1.0 255.255.255.0 10.0.0.1
ip route 10.0.2.0 255.255.255.0 10.0.0.1
```




```
ip route 10.1.0.0 255.255.255.0 10.0.0.2
```

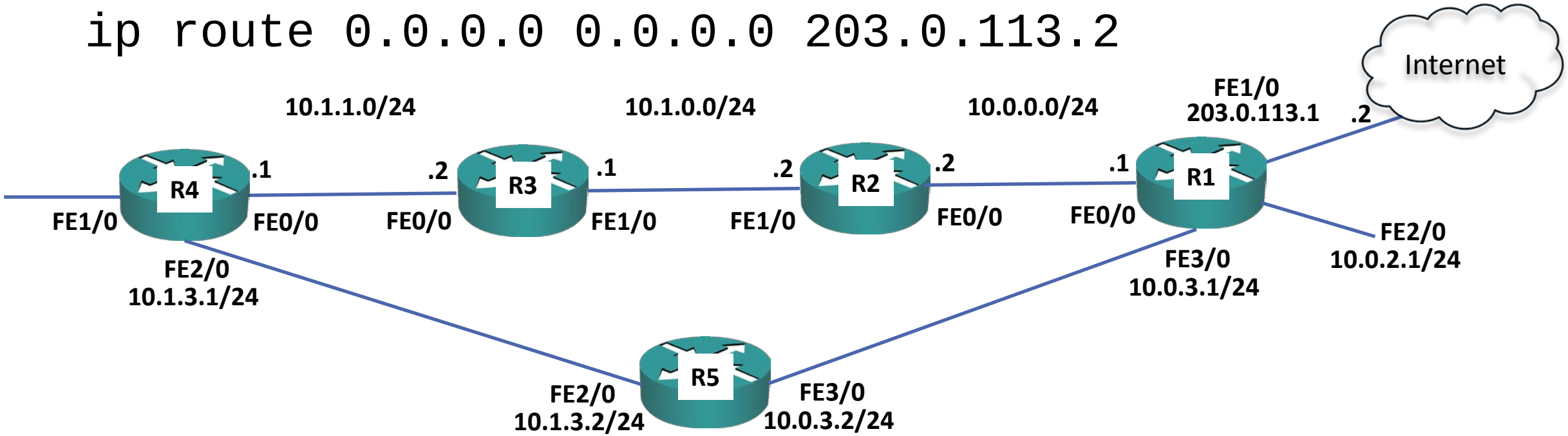
IPv6 Static Routes

```
ipv6 route 2001:DB8:0:2::/64 2001:DB8:0:1::1
ipv6 route 2001:DB8:0:3::/64 2001:DB8:0:1::1
```

```
ipv6 route 2001:DB8::/64 2001:DB8:0:1::2
```

IPv4 Summary and Default Route

```
ip route 10.1.0.0 255.255.0.0 10.0.0.2
ip route 10.1.3.0 255.255.255.0 10.0.3.2
ip route 0.0.0.0 0.0.0.0 203.0.113.2
```



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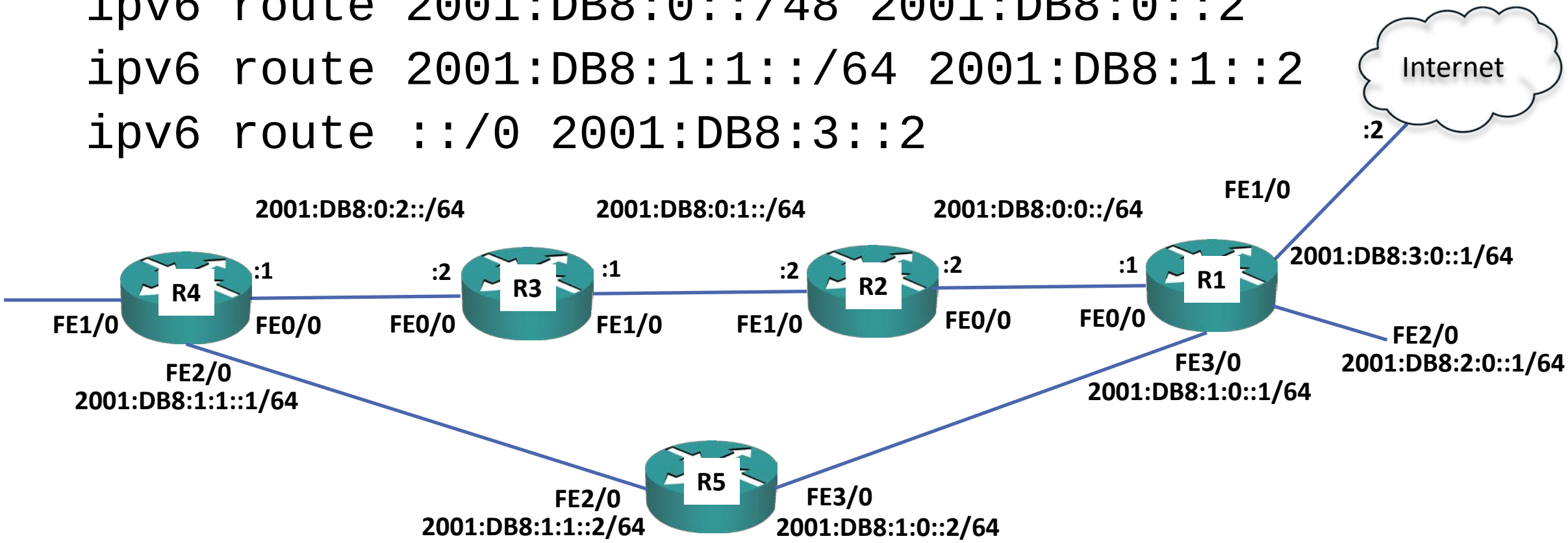
IPv6 Summary and Default Route

```
ipv6 route 2001:DB8:0::/48 2001:DB8:0::2
ipv6 route 2001:DB8:1:1::/64 2001:DB8:1::2
ipv6 route ::/0 2001:DB8:3::2
```



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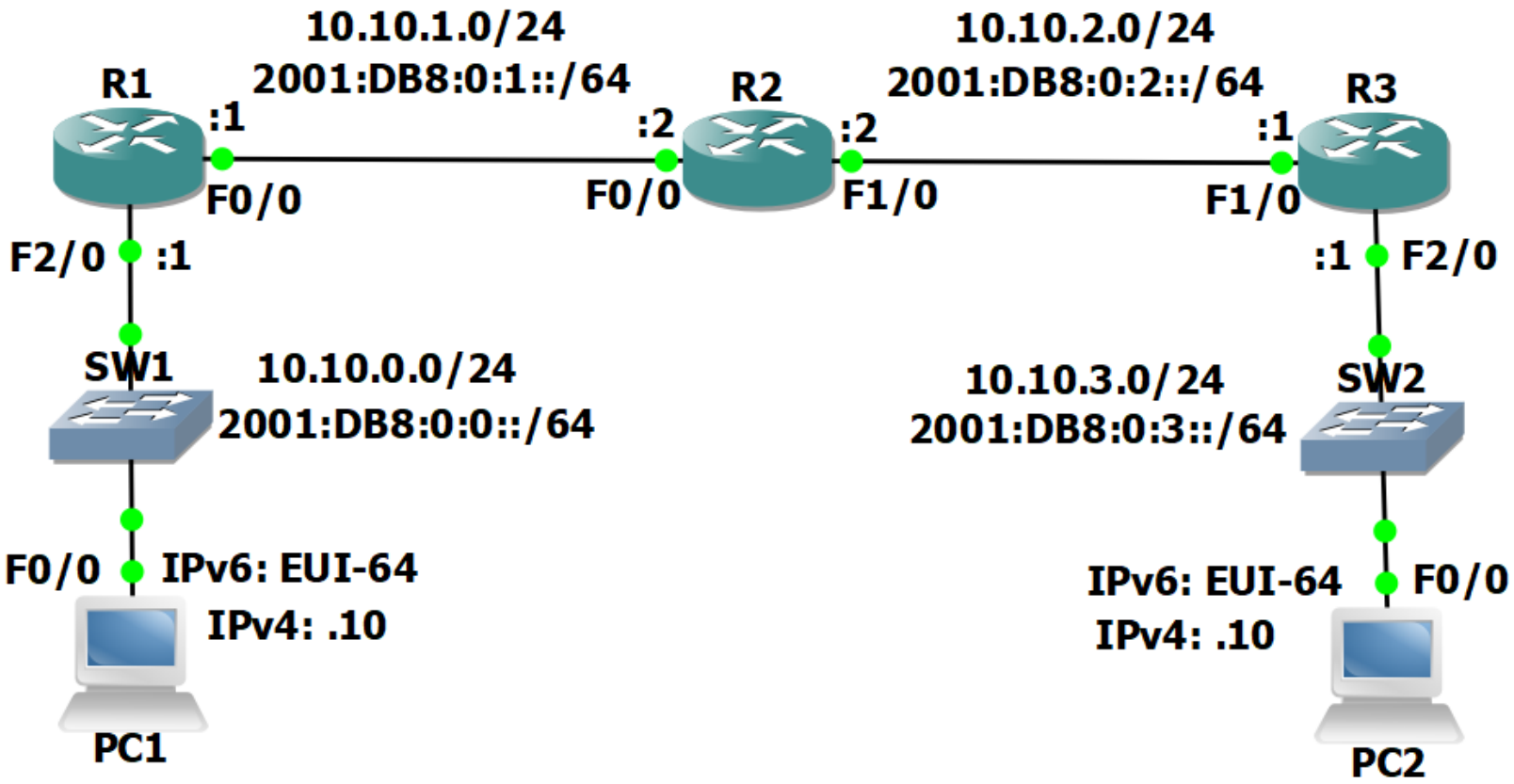
Lab


10.10.1.0/24
2001:DB8:0:1::/64
10.10.2.0/24
2001:DB8:0:2::/64
R1
R2
R3
:1
:2
:2
:1
F0/0
F0/0
F1/0
F1/0
F2/0
:1
:1
F2/0
SW1
10.10.0.0/24
2001:DB8:0:0::/64
10.10.3.0/24
2001:DB8:0:3::/64
SW2
F0/0
IPv6: EUI-64
IPv4: .10
IPv6: EUI-64
IPv4: .10
F0/0
PC1
PC2