

REDES E SERVIÇOS

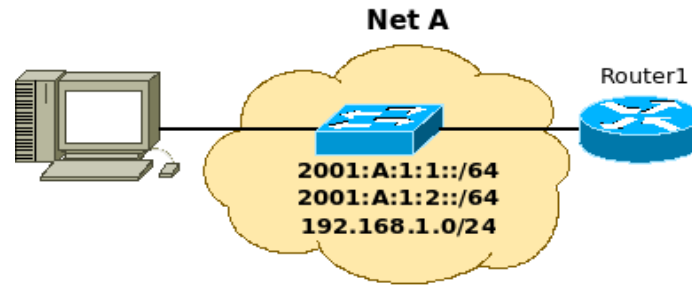
Objetivos

- Mecanismos básicos do protocolo IPv4
- Mecanismos básicos do protocolo IPv6
- Rotas estáticas IPv4 e IPv6

Duração

1 aula

IPv6 Basic Mechanisms



1. Connect the above depicted network. At the VPCS, type the command `show ipv6`. Start a capture with Wireshark, power on Router1 and configure its interface to network A.

```
Router1(config)# ipv6 unicast-routing
Router1(config)# interface <if-name>
Router1(config-if)# ipv6 enable
Router1(config-if)# no shutdown
```

Verify router's interfaces configuration:

```
Router1# show ipv6 interface
Router1# show ipv6 interface brief
```

Stop the capture and analyze the IPv6 packets and the equipments information. Use the command (`show ipv6 interface brief`) to verify interfaces' IPv6 addressing and the command (`show ipv6 route`) to verify router's IPv6 routing table.

2. Restart the capture and configure the Router interface with a manually defined IPv6 global address from network 2001:A:1:1::/64.

```
Router1(config)# interface <if-name>
Router1(config-if)# ipv6 address 2001:A:1:1::100/64
Router1(config-if)# no shutdown
```

Verify the PC Ethernet interface information. Stop the capture and analyze the IPv6 packets. Verify the IPv6 addresses of the Router interface and the router IPv6 routing table.

3. Restart the capture and configure the Router interface with a EUI-64 based IPv6 global address from network 2001:A:1:2::/64.

```
Router1(config)# interface <if-name>
Router1(config-if)# ipv6 address 2001:A:1:2::/64 eui-64
Router1(config-if)# no shutdown
```

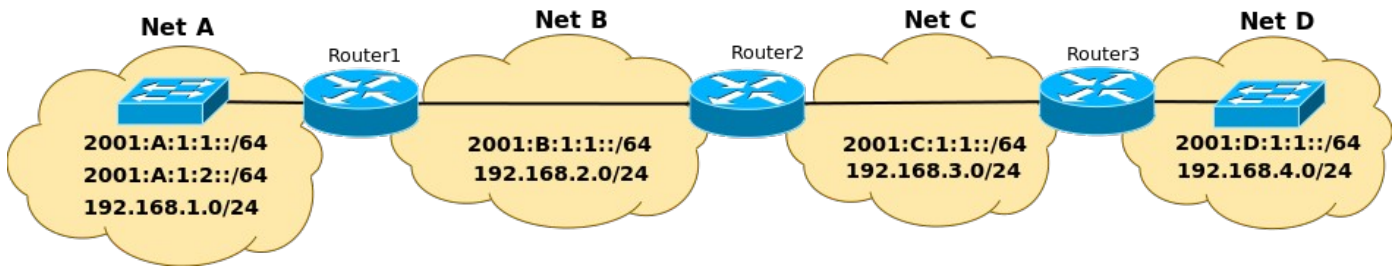
Verify the PC Ethernet interface information. Stop the capture and analyze the IPv6 packets. Verify the IPv6 addresses of the Router interface and the router IPv6 routing table.

4. Restart the capture. At the VPCS, perform a ping to:

- a) the Router's Link-Local address.
- b) the Router's Global address from network 2001:A:1:1::/64.

Stop the capture and analyze the IPv6/ICMPv6 packets. Explain the hardware addresses resolution process in IPv6.

IPv4 and IPv6 Static Routing



5. Assemble the above depicted network **using GNS3** and configure all IPv4 and IPv6 addresses. Verify the interfaces' configurations, routing tables, IPv4 ARP tables and IPv6 NDP tables (neighbors):

```
Router1# show ip interface brief
Router1# show ip route
Router1# show ip arp
---
Router1# show ipv6 interface brief
Router1# show ipv6 route
Router1# show ipv6 neighbors
```

Execute multiple ping commands to test the connectivity between the equipments.

6. Configure all necessary static routes to achieve full IPv4 connectivity:

```
Router1(config)# ip route <ipv4-net-id> <ipv4-net-mask> <ipv4_next_hop>
```

Reverify the routing tables and retest the connectivity between the equipments.

7. Configure all necessary static routes to achieve full IPv6 connectivity:

```
Router1(config)# ipv6 route <ipv6-netid/mask> <ipv6_next_hop>
```

Reverify the routing tables and retest the connectivity between the equipments.

8. Try to simplify your static routes using default routes (IPv4: 0.0.0.0/0, IPv6: ::/0) where appropriate. Reverify the routing tables and retest the connectivity between the equipments.

9. Execute a ping from Router1 to Router3. After capturing packets in NetB and NetC:

- Analyze the Ethernet headers of the packets, namely the source and destination addresses. Explain the differences of the Ethernet headers.
- Analyze the IPv4 *TTL* field and IPv6 *Hop Counter* field. Explain the purpose of these header fields.