

Routing Lab

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Agenda

- Routing: Introduction
- Static Routing
- Lab Scenario
- Router Configuration
- Some Commands

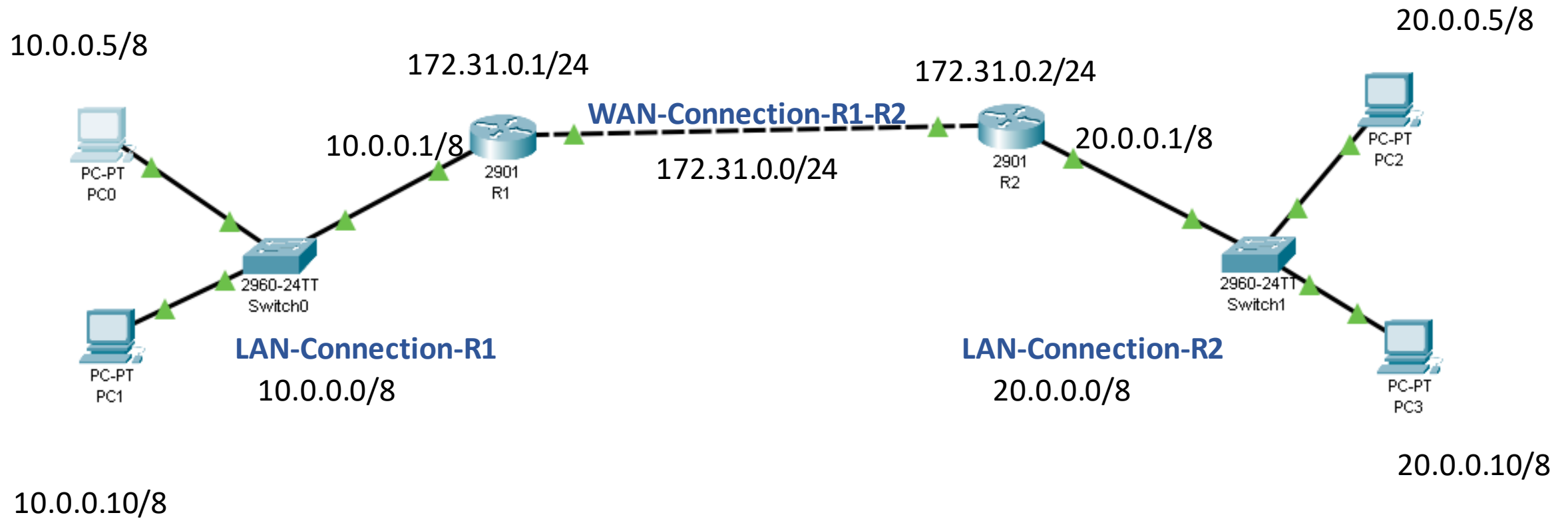
Routing

- Routing activity is the action performed by a Router to identify the best route based on certain metric value to the destination network.
- Routers are Layer 3 (i.e. the Network Layer) devices of the layer OSI Model.
- Routing protocols determine how your data gets to its destination and helps to make that process as smooth as possible.
- Few popular Routing Protocols are:-
 - Routing Information Protocol (RIP)
 - Interior Gateway Protocol (IGRP)
 - Open Shortest Path First (OSPF)
 - Exterior Gateway Protocol (EGP)
 - Enhanced Interior Gateway Routing Protocol (EIGRP)
 - Border Gateway Protocol (BGP)
 - Intermediate System-to-Intermediate System (IS-IS)

Static Routing

- Static routing is a form of routing that uses a manually-configured routing entry.
- Static routes are fixed and do not change if the network is changed or reconfigured.
- Both dynamic routing and static routing are usually used on a router to maximise routing efficiency.
- Static routing can be used to define an exit point from a router when no other routes are available or necessary. This is called a default route.
- Static routing can be used for small networks that require less routes.

Lab -- Scenario



Lab -- Static Routing Router - Configs

```
Router>enable
Router#configure terminal
Router#show running-config
Router#show ip interface brief
Router(config)#hostname R1
R1(config)#interface fastethernet 0/0
R1(config-if)#ip address 172.31.0.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#description WAN-Connection-R1-R2
R1(config-if)#interface fastethernet 0/1
R1(config-if)#ip address 10.0.0.1 255.0.0.0
R1(config-if)#no shutdown
R1(config-if)#description LAN-Connection-R1
R1(config)#ip route 20.0.0.0 255.0.0.0 172.31.0.2
R1#write
R1#show running-config
R1#show ip route
```

```
Router>enable
Router#configure terminal
Router#show running-config
Router#show ip interface brief
Router(config)#hostname R2
R2(config)#interface fastethernet 0/0
R2(config-if)#ip address 172.31.0.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#description WAN-Connection-R2-R1
R2(config-if)#interface fastethernet 0/1
R2(config-if)#ip address 20.0.0.1 255.0.0.0
R2(config-if)#no shutdown
R2(config-if)#description LAN-Connection-R1
R2(config)#ip route 10.0.0.0 255.0.0.0 172.31.0.1
R2#write
R2#show running-config
R2#show ip route
```

Lab -- Static Routing

PC - Configs

PC0

Physical **Config** Desktop Programming Attributes

GLOBAL

INTERFACE

FastEthernet0

Bluetooth

FastEthernet0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 00D0.D3B5.2634

IP Configuration

☐ DHCP

☒ Static

IPv4 Address 10.0.0.5

Subnet Mask 255.0.0.0

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

Link Local Address: FE80::2D0:D3FF:FE85:2634

PC0

Physical **Config** **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.0.0.5

Subnet Mask 255.0.0.0

Default Gateway 10.0.0.1

DNS Server 0.0.0.0

Lab -- Static Routing



R1

Physical

Config

CLI

Attributes

IOS Command Line Interface

```
R1#
R1#
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B -
BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.0.0.0/8 is directly connected, GigabitEthernet0/1
L       10.0.0.1/32 is directly connected, GigabitEthernet0/1
S       20.0.0.0/8 [1/0] via 172.31.0.2
    172.31.0.0/16 is variably subnetted, 2 subnets, 2 masks
C       172.31.0.0/24 is directly connected, GigabitEthernet0/0
L       172.31.0.1/32 is directly connected, GigabitEthernet0/0
R1#
```


Lab -- Static Routing

R2

Physical Config **CLI** Attributes

IOS Command Line Interface

```
down down
R2#
R2#
R2#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B -
BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

S    10.0.0.0/8 [1/0] via 172.31.0.1
    20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    20.0.0.0/8 is directly connected, GigabitEthernet0/1
L    20.0.0.1/32 is directly connected, GigabitEthernet0/1
    172.31.0.0/16 is variably subnetted, 2 subnets, 2 masks
C    172.31.0.0/24 is directly connected, GigabitEthernet0/0
L    172.31.0.2/32 is directly connected, GigabitEthernet0/0

R2#
```

Ctrl+F6 to exit CLI focus

Copy Paste

Some Routing Commands

Router>enable

Router#configure terminal

Router#show running-config

Router#show clock

Router#show protocols

Router#show ip route

Router#show ip interface brief

Router#copy running-config startup-config

Router#show running-config

Router(config)#hostname <provide host name>

Router(config)#interface <int name>

Router(config-if)#ip address <IP Address> <Subnet Mask>

Router(config-if)#no shutdown

Router(config-if)#description <provide interface description>

Router(config-if)#ip route <Network Address> <Network Subnet Mask> <Next Hope IP Address or Interface>