DAY 11 - Routing Fundamental

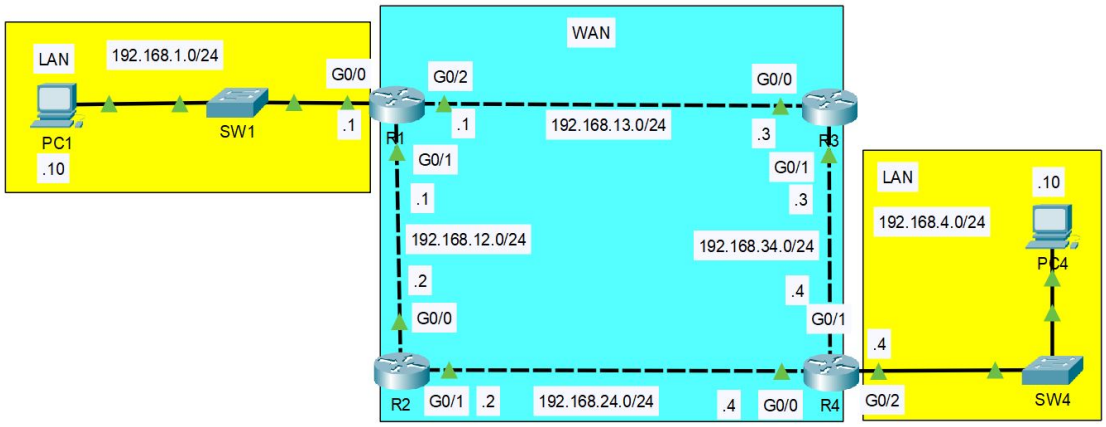
Purinat33

Routing Fundamental

What is Routing

1. Routing is the process that routers use to determine the path that IP packets should take over a network to reach their destination.
   (a) Routers store routes to all of their known destinations in a **Routing Table**.
   (b) When routers receive packets, they look in their **Routing Table** to find the best route to forward that packet.
2. There are *two* main routing methods (methods that routers use to learn routes):
   (a) **Dynamic Routing**: Routers use Dynamic Routing Protocols (eg. `OSPF`) to share routing information with each other automatically and build their routing tables.
   (b) **Static Routing**: A network engineer/admin manually configures routes on the router.
3. A route tells the router: *To send a packet to* `Destination X` *, it should send the packet to* `Next Hop Y` .
   (a) Or, if the destination is directly connected to the router, send the packet directly to the **Destination**.
   (b) Or, if the destination is the router's own IP address, then **Receive the Packet for Yourself** (and don't forward).

Example Topology:



Pre-routing setup:

- Example:
  - `R1> en`
  - `R1# conf t`
  - `R1(config)# interface g0/0`
  - `R1(config-if)# ip address 192.168.1.1 255.255.255.0`
  - `R1(config-if)# no shutdown`
- Repeat for all PC, Routers & Interfaces.
  - **R1**:

```
R1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     192.168.1.1     YES NVRAM  up                    up
GigabitEthernet0/1     192.168.12.1    YES NVRAM  up                    up
GigabitEthernet0/2     192.168.13.1    YES NVRAM  up                    up
```

  - **R2**:

```
R2#show ip int br
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     192.168.12.2    YES NVRAM  up                    up
GigabitEthernet0/1     192.168.24.2    YES NVRAM  up                    up
GigabitEthernet0/2     unassigned      YES NVRAM  administratively down down
```

  - **R3**:

```
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     192.168.13.3    YES manual up                    up
GigabitEthernet0/1     192.168.34.3    YES manual up                    up
GigabitEthernet0/2     unassigned      YES unset  administratively down down
```

  - **R4**:

```
R4#show ip int brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     192.168.24.4    YES manual up                    up
GigabitEthernet0/1     192.168.34.4    YES manual up                    up
GigabitEthernet0/2     192.168.4.4     YES manual up                    up
```

View Routing Table using `show ip route` :

```
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

     192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
     192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.12.0/24 is directly connected, GigabitEthernet0/1
L       192.168.12.1/32 is directly connected, GigabitEthernet0/1
     192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.13.0/24 is directly connected, GigabitEthernet0/2
L       192.168.13.1/32 is directly connected, GigabitEthernet0/2
```