Lab 6: RIP Route Summarization and Passive Interface

Objective:

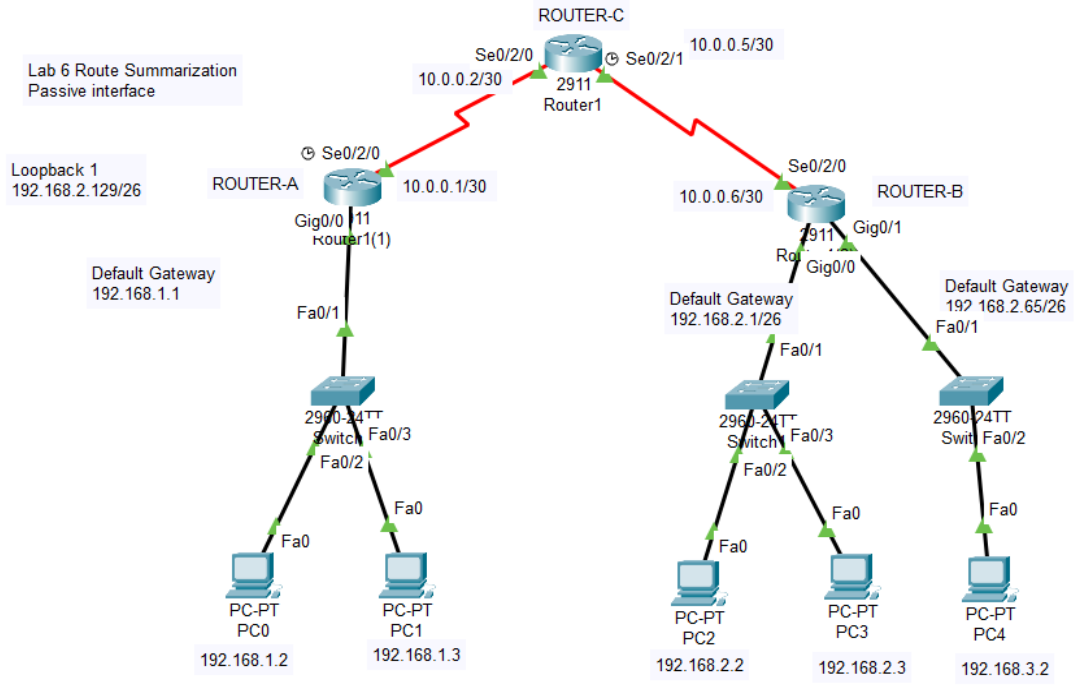
To demonstrate how route summarization works in RIP using `no auto-summary` and to configure passive interfaces to suppress unnecessary RIP updates.

Topology Overview:

Three routers: ROUTER-A, ROUTER-B, ROUTER-C

Connected Networks:

- ROUTER-A LAN: 192.168.1.0/24, 192.168.2.128/26 (loopback)
- ROUTER-B LAN: 192.168.2.0/26, 192.168.2.64/26
- Serial Connections:
    - ROUTER-A <–> ROUTER-c via 10.0.0.0/30
    - ROUTER-B <–> ROUTER-C via 10.0.0.4/30



IP Addressing Table:

Device	Interface	IP Address	Subnet Mask
ROUTER-A	Gig0/0	192.168.1.1	255.255.255.0
ROUTER-A	Se0/2/0	10.0.0.1	255.255.255.252
ROUTER-A	Loopback1	192.168.2.129	255.255.255.192
ROUTER-C	Se0/2/0	10.0.0.2	255.255.255.252
ROUTER-C	Se0/2/1	10.0.0.5	255.255.255.252
ROUTER-B	Se0/2/0	10.0.0.6	255.255.255.252
ROUTER-B	Gig0/0	192.168.2.1	255.255.255.192
ROUTER-B	Gig0/1	192.168.2.65	255.255.255.192

Part 1: Initial RIP Configuration

ROUTER-A:

```
router rip
version 2
auto-summary
network 192.168.1.0
network 10.0.0.0
Network 192.168.2.0
```

ROUTER-B:

```
router rip
version 2
auto-summary
network 10.0.0.0
network 192.168.2.0
```

ROUTER-C:

```
router rip
version 2
auto-summary
network 10.0.0.0
```

After this configuration, check the routing tables using `show ip route rip`.
Note: It is not necessary to give auto-summary as it automatically summarizes route by default.
In ROUTER-C

After applying command `show ip route rip` you will see the following output.

```
Router#show ip route rip
     10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
R    192.168.1.0/24 [120/1] via 10.0.0.1, 00:00:07, Serial0/2/0
     192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
R       192.168.2.0/24 [120/1] via 10.0.0.6, 00:00:14, Serial0/2/1
                       [120/1] via 10.0.0.1, 00:00:07, Serial0/2/0
R       192.168.2.128/26 [120/1] via 10.0.0.1, 00:02:53, Serial0/2/0
```

Observation:

- Routes are auto-summarized to their classful boundaries.
- For example: All `192.168.2.0/26, 192.168.2.64/26 and 192.168.2.128/26 (ROUTER-A)` subnets appear summarized as `192.168.2.0/24 in ROUTER-C .`

Since these subnets are configured in different routers this makes conflict while forwarding packet between two interfaces as given in the picture.

Outputs on ROUTER-C

```
R       192.168.2.0/24 [120/1] via 10.0.0.6, 00:00:14, Serial0/2/1
                       [120/1] via 10.0.0.1, 00:00:07, Serial0/2/0
```

Part 2: Add `no auto-summary` for Route Summarization

ROUTER-A:

```
router rip
no auto-summary
```

ROUTER-B:

```
router rip
no auto-summary
```

ROUTER-C:

```
router rip
no auto-summary
```

Now recheck the routing tables.

Observation:

- Routes appear in their specific subnet form such as:
  - `192.168.2.0/26`
  - `192.168.2.64/26`
  - `192.168.2.128/26`

```
Router(config)#do show ip route rip
     10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
R    192.168.1.0/24 [120/1] via 10.0.0.1, 00:00:22, Serial0/2/0
     192.168.2.0/26 is subnetted, 3 subnets
R       192.168.2.0 [120/1] via 10.0.0.6, 00:00:03, Serial0/2/1
R       192.168.2.64 [120/1] via 10.0.0.6, 00:00:03, Serial0/2/1
R       192.168.2.128 [120/1] via 10.0.0.1, 00:00:22, Serial0/2/0
```

This helps in precise routing and prevents issues caused by overlapping summarized routes.

Part 3: Passive Interface Configuration

To stop RIP advertisements on LAN interfaces where neighbors do not exist.

ROUTER-A:

```
router rip
passive-interface Gig0/0
```

ROUTER-C:

```
router rip
passive-interface Gig0/0
passive-interface Gig0/1
```

Use `show ip protocols` to verify passive interfaces.

Benefit:

- Prevents RIP updates from being sent on LAN interfaces, saving bandwidth and increasing security.

Final Notes:

- Without `no auto-summary`, RIP summarizes all subnets to their classful boundaries.
- `no auto-summary` is essential when using discontiguous subnets or needing fine-grained control.
- Passive interfaces help optimize RIP by disabling unnecessary update broadcasts.

Commands to Verify:

- `show ip route`
- `show ip route rip`
- `show ip protocols`
- `debug ip rip` (for advanced debugging)