**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
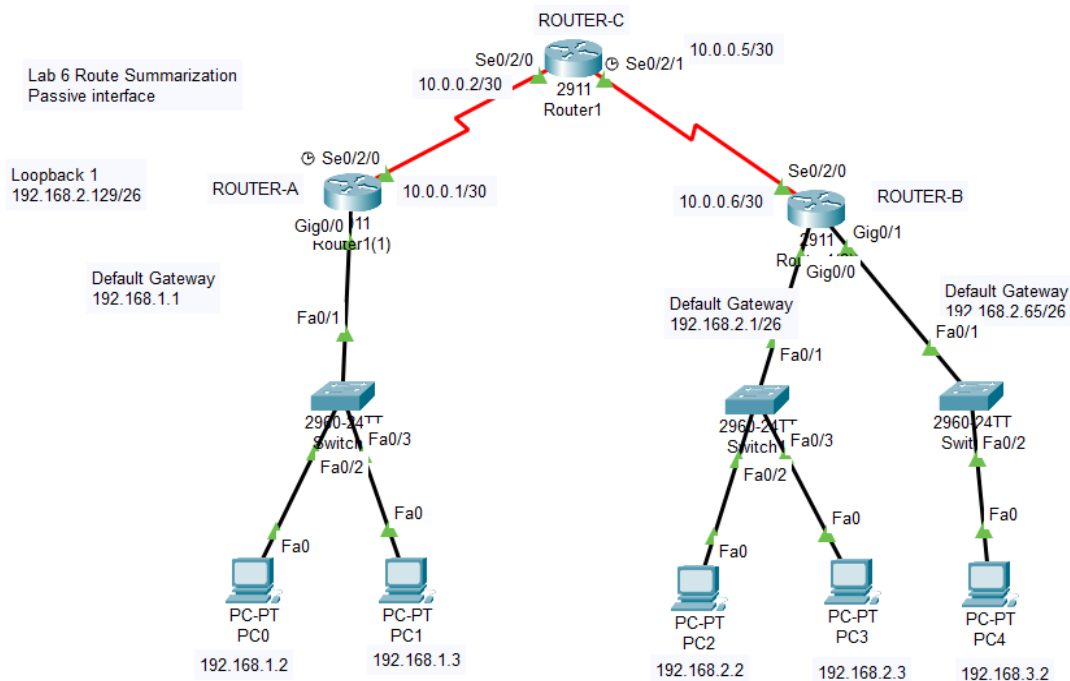
## IP Addressing Table:

| 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-B | Se0/2/0 | 10.0.0.2 | 255.255.255.252 |
| ROUTER-B | Se0/2/1 | 10.0.0.5 | 255.255.255.252 |
| ROUTER-C | Se0/2/0 | 10.0.0.6 | 255.255.255.252 |
| ROUTER-C | Gig0/0 | 192.168.2.1 | 255.255.255.192 |
| ROUTER-C | 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)