Chương 5
Routing Information Protocol

- GV : ThS.Nguyễn Duy
- Email : duyn@uit.edu.vn

Nội Dung

- RIPv1
- RIPv2

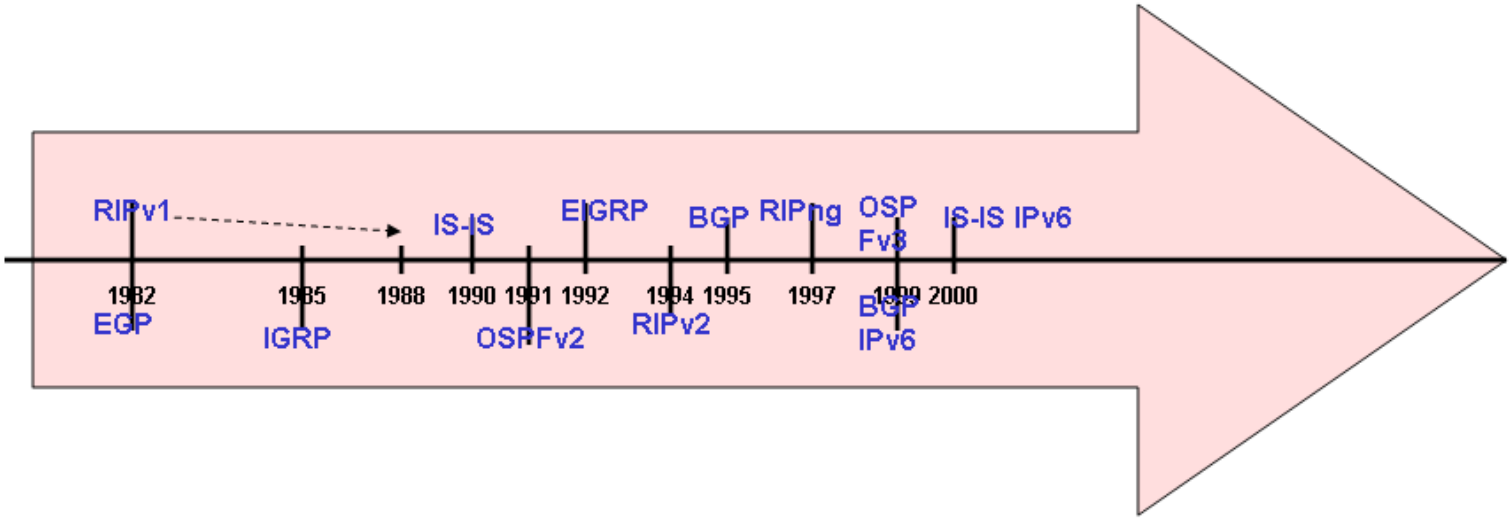
Nội Dung

- **RIPv1**
- RIPv2

RIPv1

- Đặc điểm của RIPv1
- Message của RIPv1
- Cơ chế hoạt động của RIPv1
- Cấu hình RIPv1
- Passive Interface
- Summarization trong RIPv1
- RIPv1, Static Route và Default Route

Quá trình phát triển của Routing Protocol



	Interior Gateway Protocols				Exterior Gateway Protocols
	Distance Vector Routing Protocols		Link State Routing Protocols		Path Vector
Classful	RIPv1	IGRP			EGP
Classless	RIPv2	EIGRP	OSPFv2	IS-IS	BGPv4
IPv6	RIPng	EIGRP for IPv6	OSPFv3	IS-IS for IPv6	BGPv4 for IPv6

Đặc điểm của RIPv1

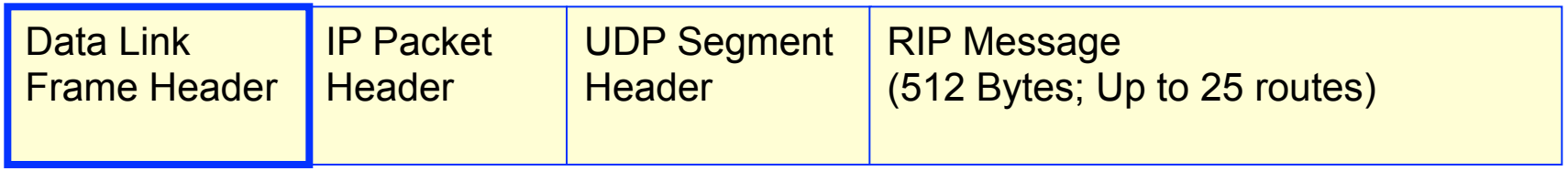
RIPv1

- Distance Vector (DV) Routing Protocol
- Classful routing protocol
- Metric = Hop Count
  - Max = 15 Hops
- Không hỗ trợ VLSM
- Cập nhật và gởi thông tin định tuyến cho Router láng giềng theo chu kỳ 30s
- Administrative Distance of RIP is 120

Encapsulated RIP Message

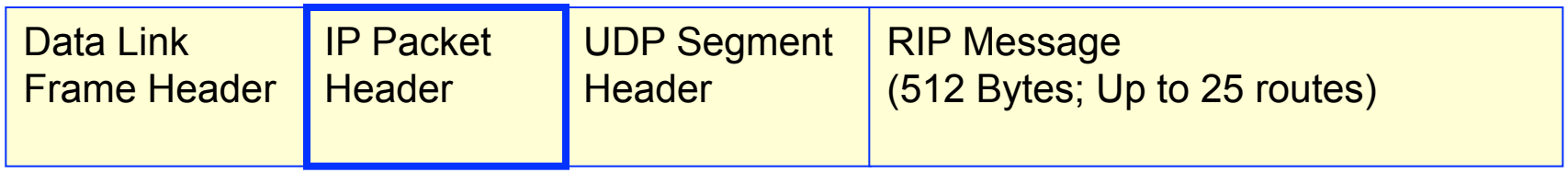
Data Link Frame Header	IP Packet Header	UDP Segment Header	RIP Message (512 Bytes; Up to 25 routes)

Encapsulated RIP Message



Data Link Frame
MAC Destination Address = Broadcast: FF-FF-FF-FF-FF-FF
MAC Source Address = Address of sending interface

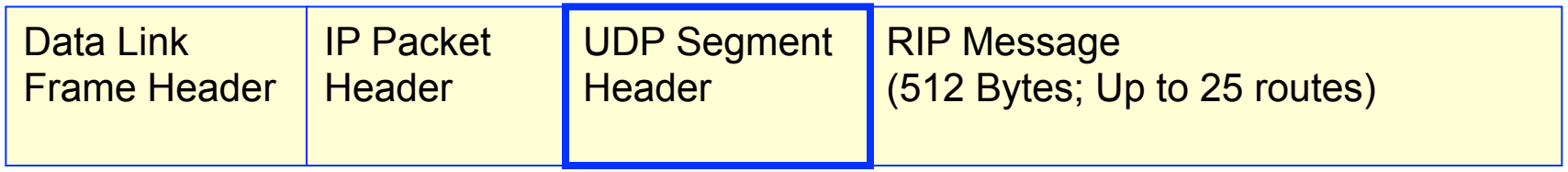
Encapsulated RIP Message



Data Link Frame
MAC Destination Address = Broadcast: FF-FF-FF-FF-FF-FF
MAC Source Address = Address of sending interface

IP Packet
IP Source Address = Address of sending interface
IP Destination Address = Broadcast: 255.255.255.255
Protocol field = 17 for UDP

Encapsulated RIP Message

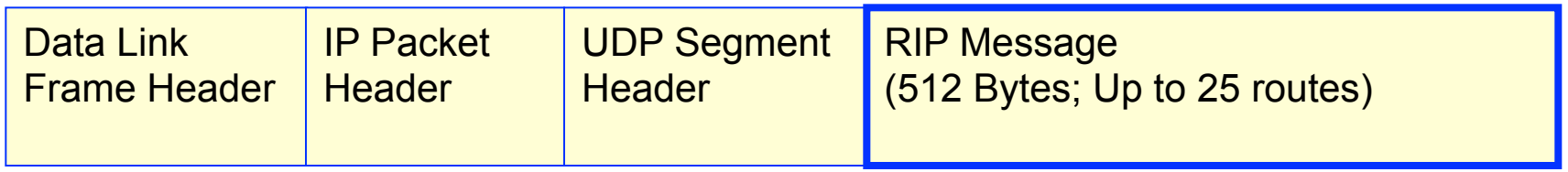


Data Link Frame
MAC Destination Address = Broadcast: FF-FF-FF-FF-FF-FF
MAC Source Address = Address of sending interface

IP Packet
IP Source Address = Address of sending interface
IP Destination Address = Broadcast: 255.255.255.255
Protocol field = 17 for UDP

UDP Segment
Source Port = 520
Destination Port = 520

Encapsulated RIP Message



Data Link Frame
MAC Destination Address = Broadcast: FF-FF-FF-FF-FF-FF
MAC Source Address = Address of sending interface

IP Packet
IP Source Address = Address of sending interface
IP Destination Address = Broadcast: 255.255.255.255
Protocol field = 17 for UDP

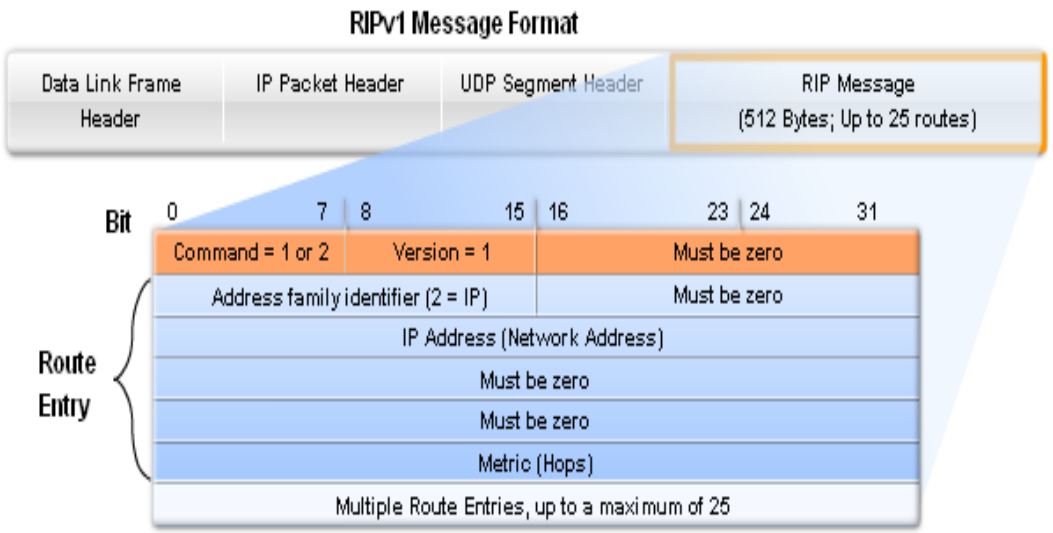
UDP Segment
Source Port = 520
Destination Port = 520

RIP Message:
Command: Request (1); Response (2)
Version = 1
Routes: Network IP Address
Metric: Hop Count

Message của RIPv1

RIPv1

- RIP Header :
  - Command field
  - Version field
  - Must be zero
- Route Entry :
  - Address family identifier
  - IP address
  - Metric



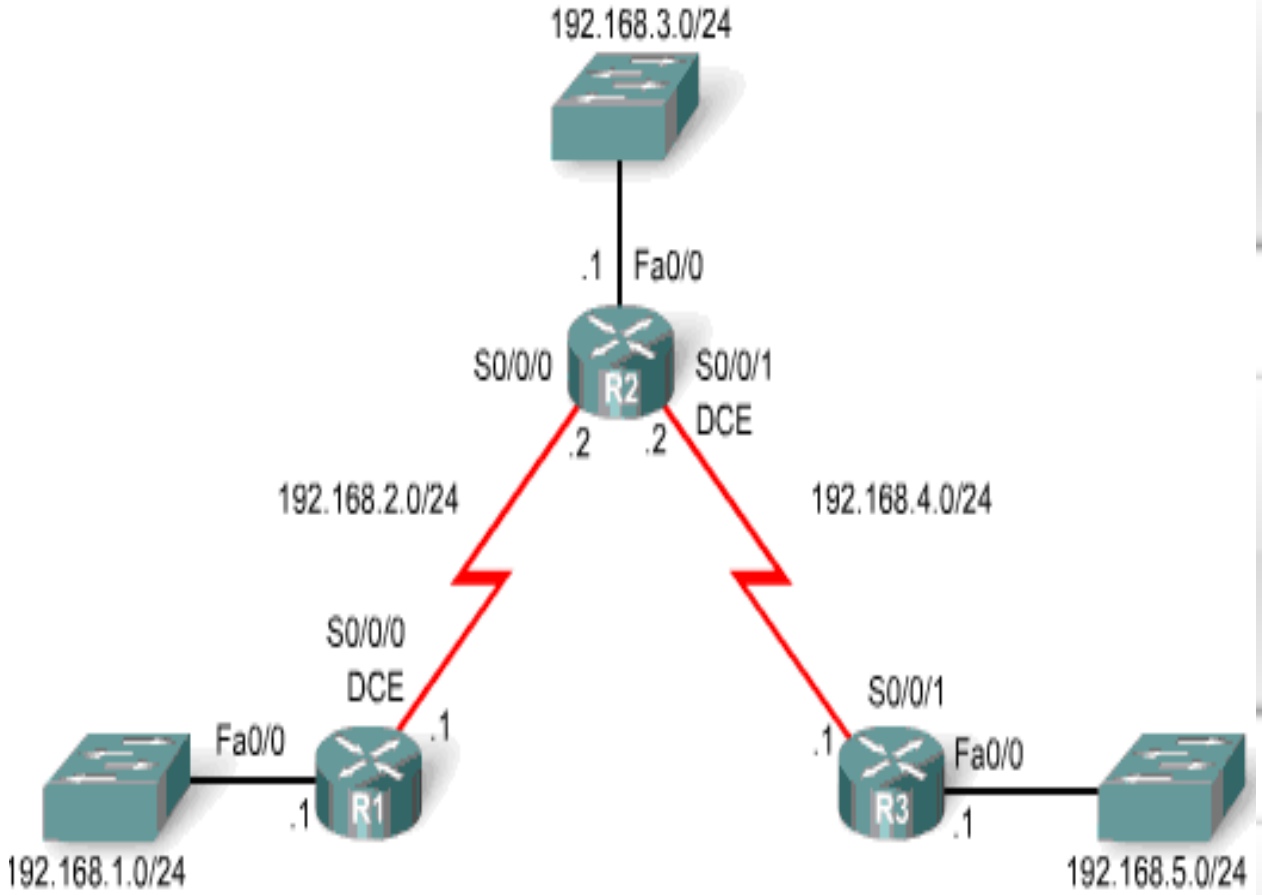
Command	1 for a Request or 2 for a Reply.
Version	1 for RIP v 1 or 2 for RIP v 2.
Address Family Identifier	2 for IP unless a Request is for the full routing table in which case, set to 0.
IP Address	The address of the destination route, which may be a network, subnet, or host address.
Metric	Hop count between 1 and 16. Sending router increases the metric before sending out message.

Cơ chế hoạt động của RIPv1

- RIPv1 sử dụng 2 loại message :
  - Request Message :
    - Được gởi đi mỗi khi Router khởi động
    - Chỉ được gởi trên interface bật RIP
    - Gởi yêu cầu đến tất cả các Router láng giềng đang chạy giao thức RIP về thông tin định tuyến
  - Response Message :
    - Nội dung bảng định tuyến được gởi đến Requesting Router

Cấu hình RIPv1

RIPv1




```
R1(config)#router rip
R1(config-router)#network 192.168.1.0
R1(config-router)#network 192.168.2.0
```

```
R2(config)#router rip
R2(config-router)#network 192.168.2.0
R2(config-router)#network 192.168.3.0
R2(config-router)#network 192.168.4.0
```

```
R3(config)#router rip
R3(config-router)#network 192.168.4.0
R3(config-router)#network 192.168.5.0
```

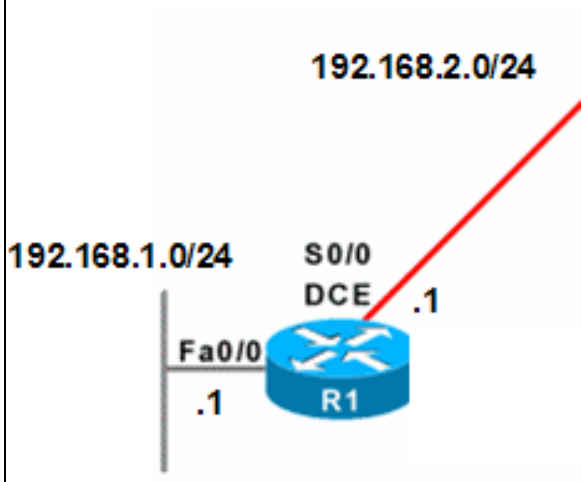
Passive Interface

- Khi Interface trên Router được bật tính năng Passive Interface thì Interface đó chỉ có ***khả năng nhận thông tin định tuyến và không có khả năng gởi thông tin định tuyến***

```
R1(config)#router rip
R1(config-router)#passive-interface fa 0/0

R2(config)#router rip
R2(config-router)#passive-interface fa 0/0

R3(config)#router rip
R3(config-router)#passive-interface fa 0/0
```



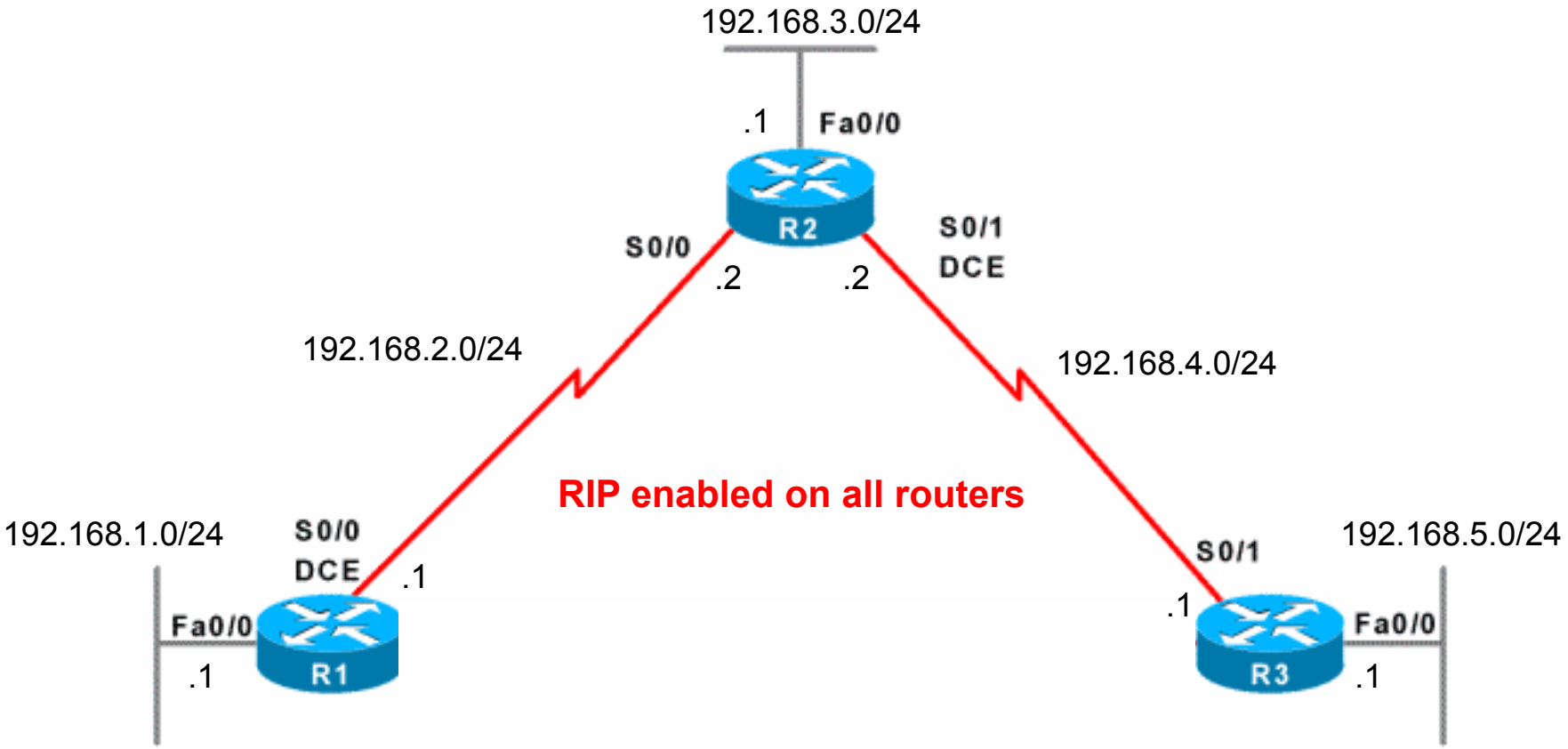
Passive Interface

```
R1#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 10 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: rip
  Default version control: send version 1, receive any version
    Interface              Send  Recv  Triggered RIP  Key-chain
    Serial0/0              1     1 2
  Automatic network summarization is in effect
  Maximum path: 4
  Routing for Networks:
    192.168.1.0
    192.168.2.0
  Passive Interface(s):
    FastEthernet0/0
  Routing Information Sources:
    Gateway         Distance      Last Update
    192.168.2.2           120      00:00:04
  Distance: (default is 120)

R1#
```

Summarization trong RIPv1

RIPv1



Summarization trong RIPv1

RIPv1

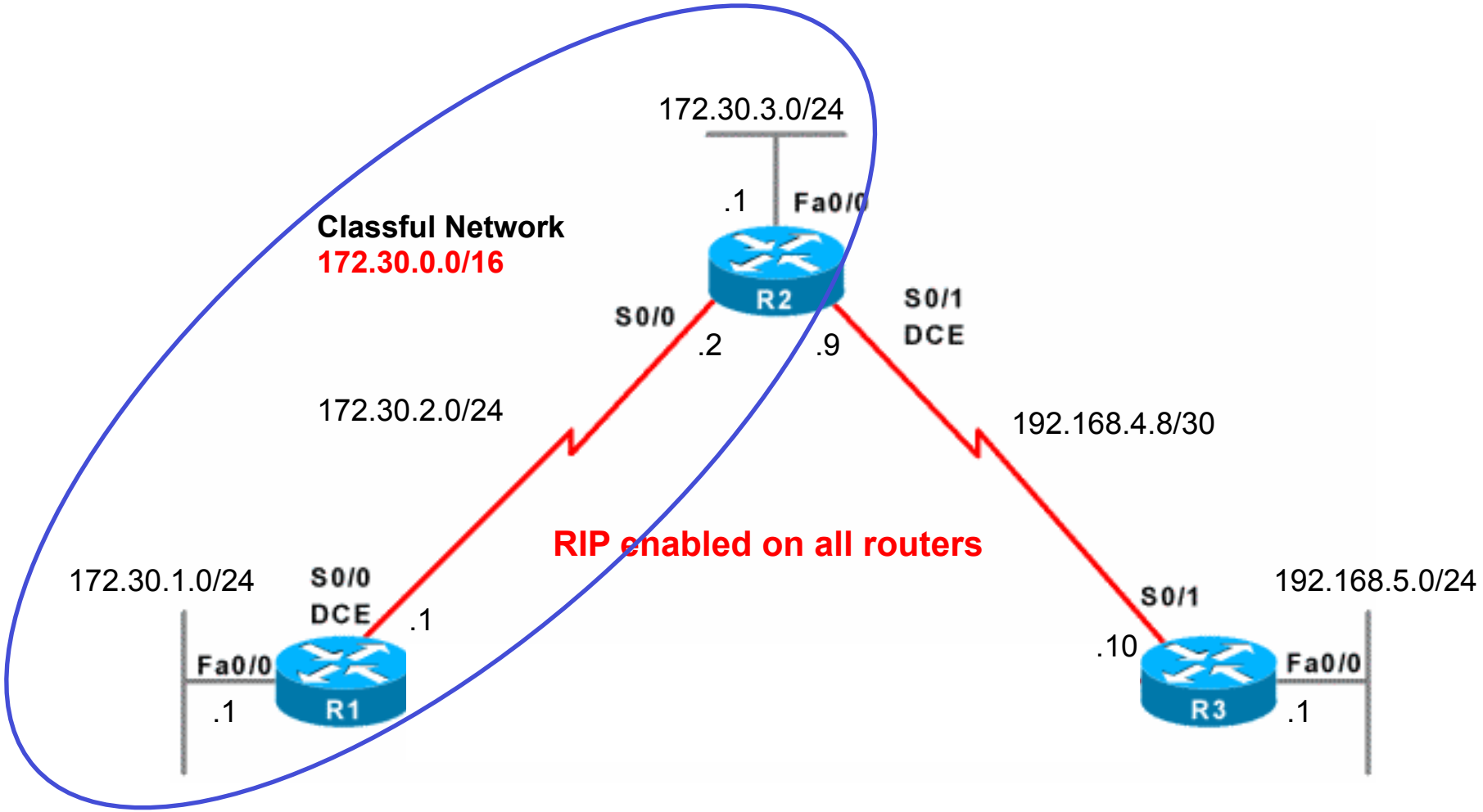
```
R1
router rip
 network 192.168.1.0
 network 192.168.2.0
 passive-interface fa 0/0

R2
router rip
 network 192.168.2.0
 network 192.168.3.0
 network 192.168.4.0
 passive-interface fa 0/0

R3
router rip
 network 192.168.4.0
 network 192.168.5.0
 passive-interface fa 0/0
```

Summarization trong RIPv1

RIPv1



Summarization trong RIPv1

RIPv1

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#inter fa 0/0
R1(config-if)#ip add 172.30.1.1 255.255.255.0
R1(config-if)#exit
R1(config)#inter ser 0/0
R1(config-if)#ip add 172.30.2.1 255.255.255.0
R1(config-if)#exit
R1(config)#no router rip      ! Removes RIP process
R1(config)#router rip
R1(config-router)#network 172.30.0.0
R1(config-router)#passive-interface fa 0/0
```

Summarization trong RIPv1

RIPv1

```
R1
interface FastEthernet0/0
 ip address 172.30.1.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 172.30.2.1 255.255.255.0
 clockrate 64000
!
interface Serial0/1
 no ip address
 shutdown
!
router rip
 passive-interface FastEthernet0/0
 network 172.30.0.0
```

Summarization trong RIPv1

RIPv1

```
R2(config)#inter s 0/0
R2(config-if)#ip add 172.30.2.2 255.255.255.0
R2(config-if)#exit
R2(config)#inter fa 0/0
R2(config-if)#ip add 172.30.3.1 255.255.255.0
R2(config-if)#inter ser 0/1      ! No need for "exit"
R2(config-if)#ip add 192.168.4.9 255.255.255.252
R2(config-if)#exit
R2(config)#no router rip
R2(config)#router rip
R2(config-router)#network 172.30.2.0
R2(config-router)#network 172.30.3.0
R2(config-router)#network 192.168.4.8
R2(config-router)#passive-interface fa 0/0
```

Summarization trong RIPv1

RIPv1

```
R2
interface FastEthernet0/0
 ip address 172.30.3.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/0
 ip address 172.30.2.2 255.255.255.0
!
interface Serial0/1
 ip address 192.168.4.9 255.255.255.252
 clockrate 64000
!
router rip
 passive-interface FastEthernet0/0
 network 172.30.0.0
 network 192.168.4.0
```

Summarization trong RIPv1

RIPv1

```
R3(config)#inter fa 0/0
R3(config-if)#ip add 192.168.5.1 255.255.255.0
R3(config-if)#exit
R3(config)#inter ser 0/1
R3(config-if)#ip add 192.168.4.10 255.255.255.252
R3(config-if)#exit
R3(config)#no router rip
R3(config)#router rip
R3(config-router)#network 192.168.4.0
R3(config-router)#network 192.168.5.0
R3(config-router)#passive-interface fa 0/0
```

Summarization trong RIPv1

RIPv1

```
R3
interface FastEthernet0/0
 ip address 192.168.5.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/1
 ip address 192.168.4.10 255.255.255.252
!
router rip
 passive-interface FastEthernet0/0
 network 192.168.4.0
 network 192.168.5.0
```

Summarization trong RIPv1

RIPv1

```
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,

     172.30.0.0/24 is subnetted, 3 subnets
C       172.30.2.0 is directly connected, Serial0/0
R       172.30.3.0 [120/1] via 172.30.2.2, 00:00:18, Serial0/0
C       172.30.1.0 is directly connected, FastEthernet0/0
R    192.168.4.0/24 [120/1] via 172.30.2.2, 00:00:18, Serial0/0
R    192.168.5.0/24 [120/2] via 172.30.2.2, 00:00:18, Serial0/0
R1#
```

Summarization trong RIPv1

RIPv1

```
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,

     172.30.0.0/24 is subnetted, 3 subnets
C       172.30.2.0 is directly connected, Serial0/0
C       172.30.3.0 is directly connected, FastEthernet0/0
R       172.30.1.0 [120/1] via 172.30.2.1, 00:00:17, Serial0/0
     192.168.4.0/30 is subnetted, 1 subnets
C       192.168.4.8 is directly connected, Serial0/1
R    192.168.5.0/24 [120/1] via 192.168.4.10, 00:00:04, Serial0/1
R2#
```

Summarization trong RIPv1

RIPv1

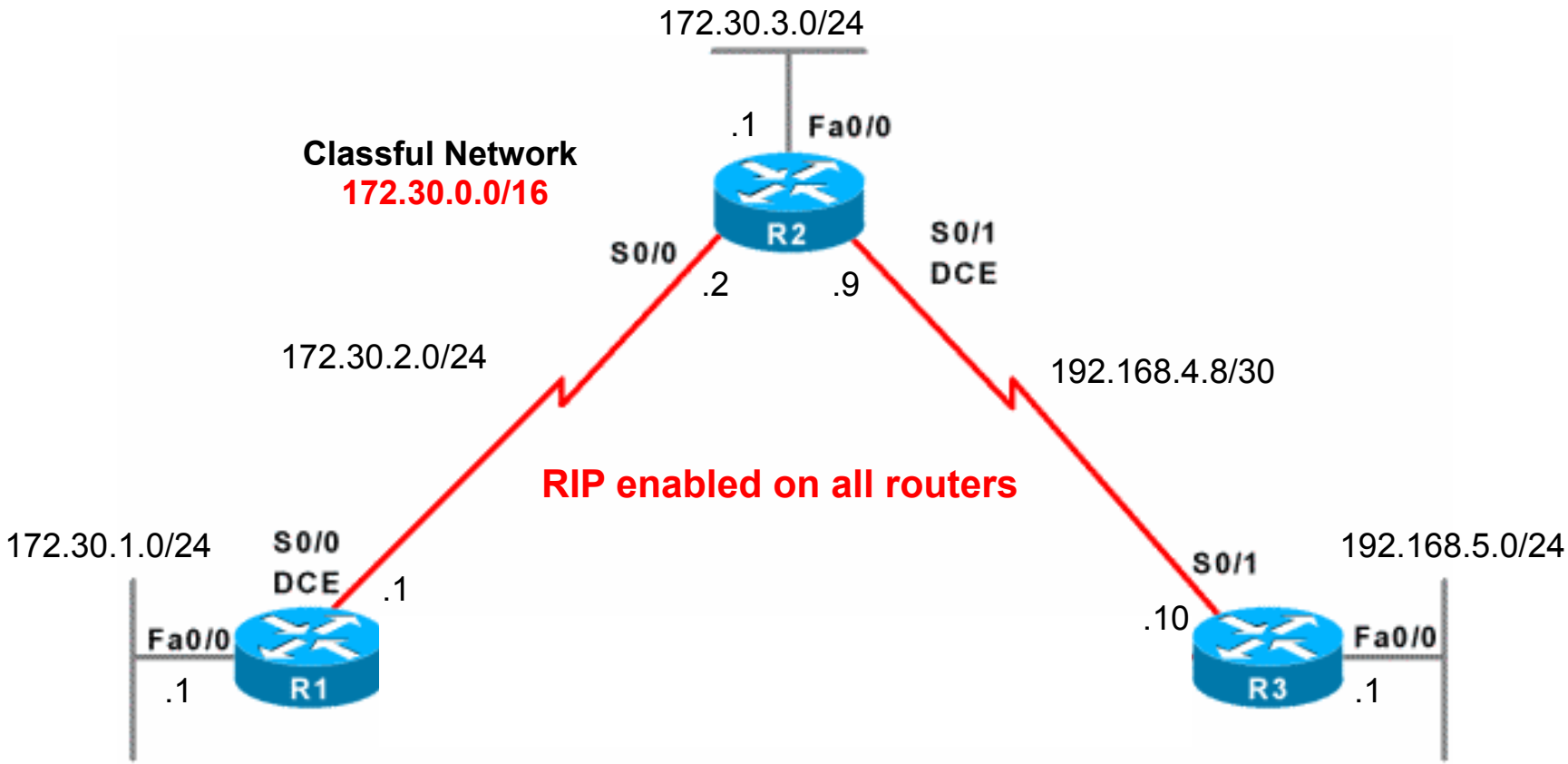
```
R3#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,

R    172.30.0.0/16 [120/1] via 192.168.4.9, 00:00:00, Serial0/1
     192.168.4.0/30 is subnetted, 1 subnets
C       192.168.4.8 is directly connected, Serial0/1
C    192.168.5.0/24 is directly connected, FastEthernet0/0
R3#
```

- No routes to subnets from 172.30.0.0/16:
  - 172.30.1.0/24
  - 172.30.2.0/24
  - 172.30.3.0/24
- Summary Route to 172.30.0.0/16

Summarization trong RIPv1 : Boundary Router

RIPv1



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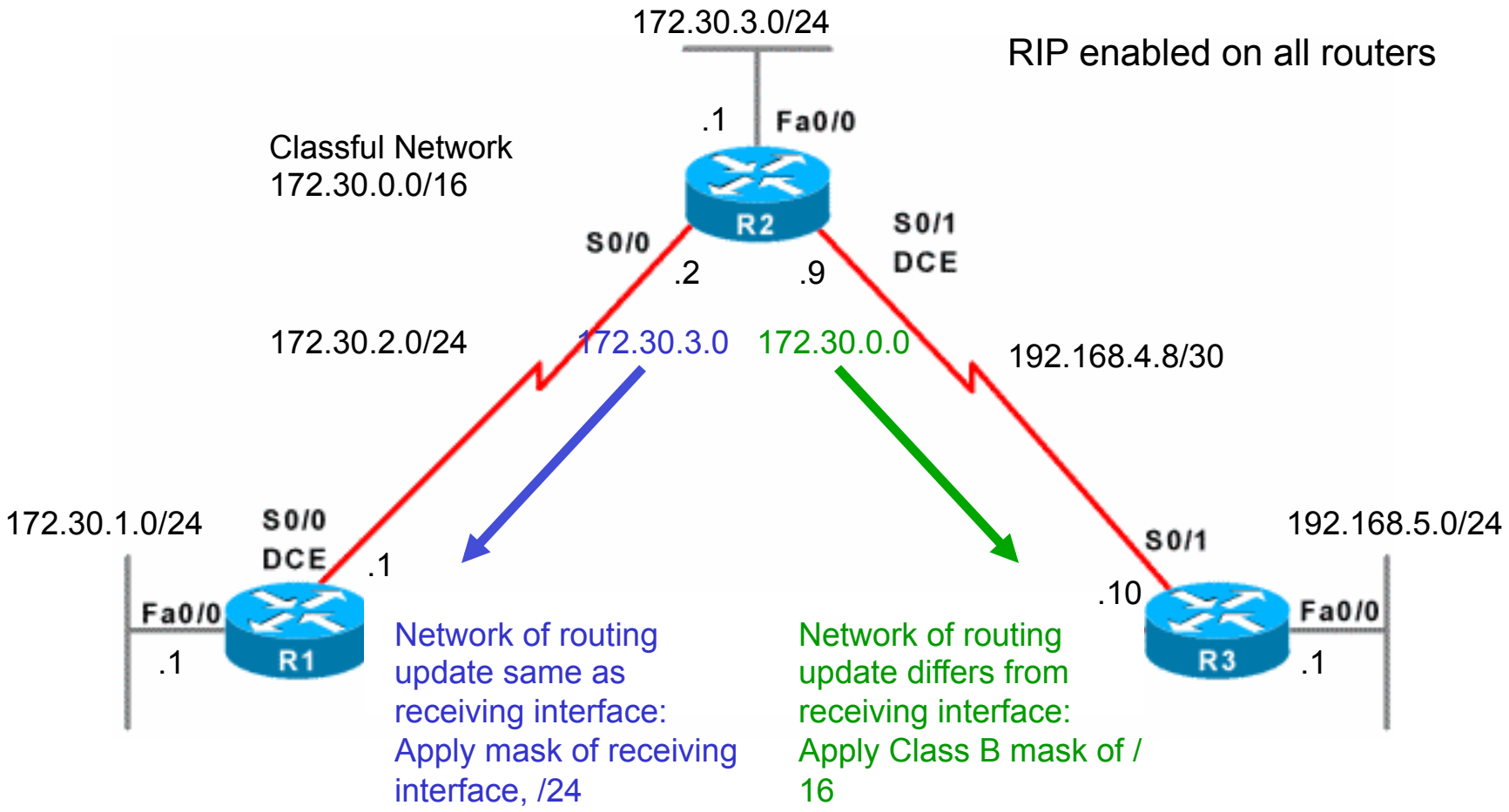
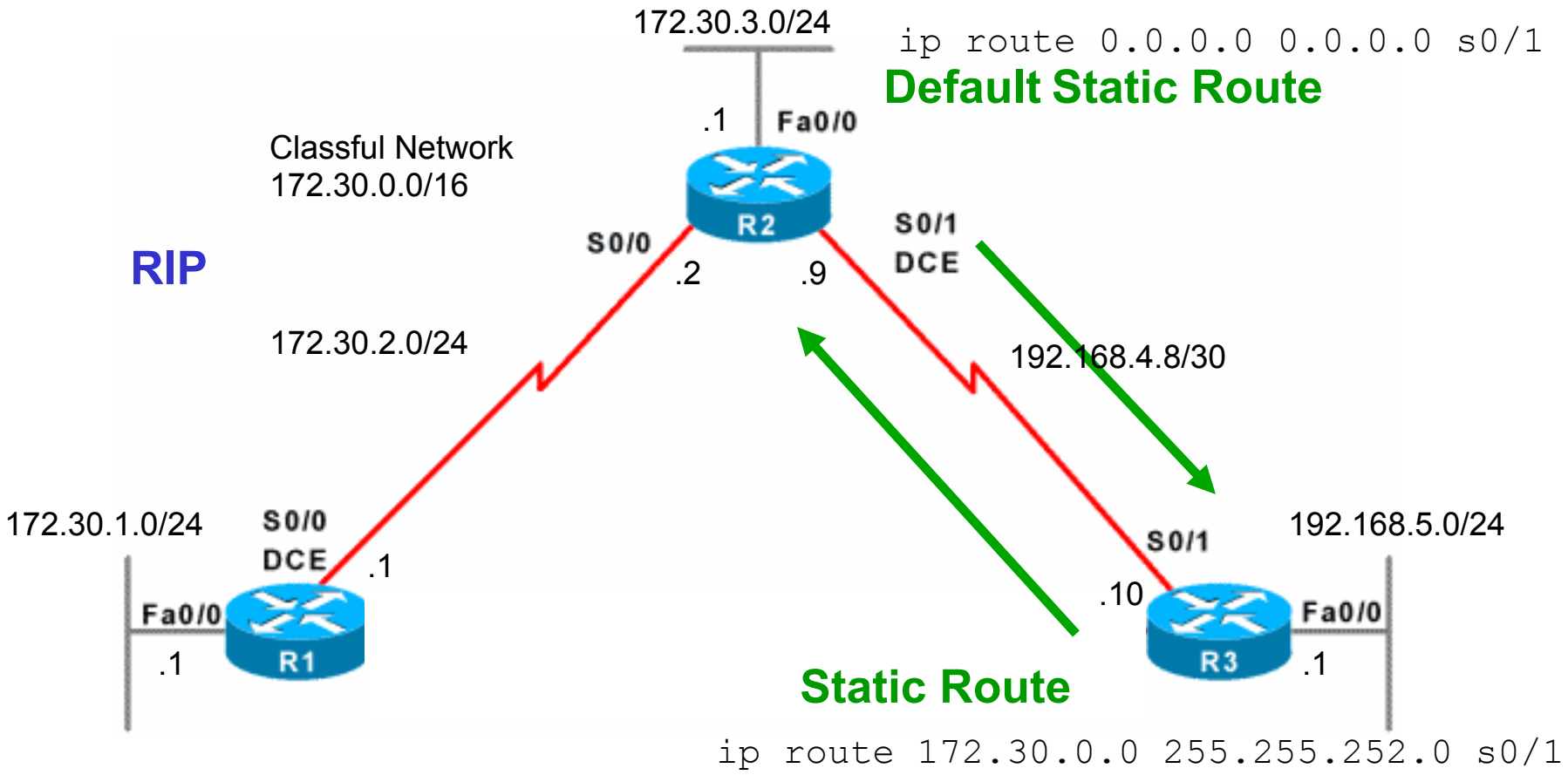
Summarization trong RIPv1

RIPv1



RIPv1, Static Route và Default Route

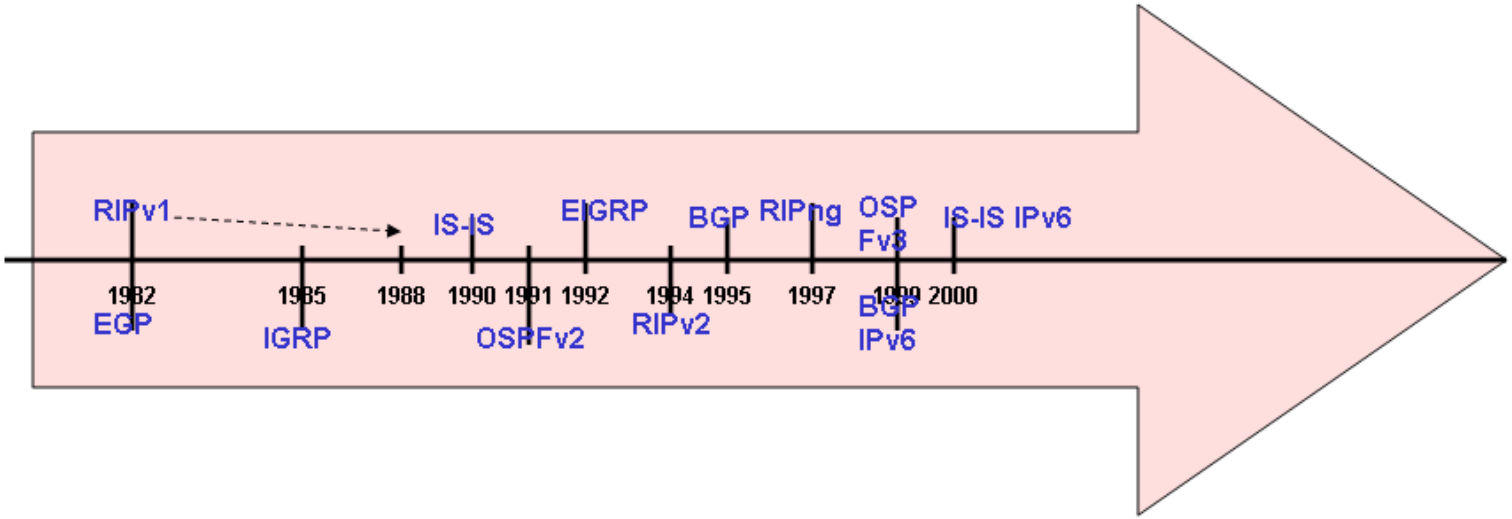
RIPv1



RIPv2

- Đặc điểm của RIPv2
- Message của RIPv2
- Cơ chế hoạt động của RIPv2
- Cấu hình RIPv2
- Summarization trong RIPv2

Quá trình phát triển của Routing Protocol



	Interior Gateway Protocols				Exterior Gateway Protocols
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Classful	RIPv1	IGRP			EGP
Classless	RIPv2	EIGRP	OSPFv2	IS-IS	BGPv4
IPv6	RIPng	EIGRP for IPv6	OSPFv3	IS-IS for IPv6	BGPv4 for IPv6

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Đặc điểm của RIPv2

- Distance Vector (DV) Routing Protocol
- Classless routing protocol
- Metric = Hop Count
  - Max = 15 Hops
- Hỗ trợ VLSM
- Cập nhật và gởi thông tin định tuyến cho Router láng giềng theo chu kỳ 30s
- Administrative Distance of RIP is 120

Message của RIPv2

RIPv2

RIPv1

0 – 7	8 – 15	16 – 23	24 – 31
Command = 1 or 2	Version = 1	Must be zero	
Address family identifier (2 = IP)		Must be zero	
IP Address (Network Address)			
Must be zero			
Must be zero			
Metric (Hops)			
Multiple Route Entries, up to a maximum of 25			

RIPv2

0 – 7	8 – 15	16 – 23	24 – 31
Command = 1 or 2	Version = 2	Must be zero	
Address family identifier (2 = IP)		Route Tag	
IP Address (Network Address)			
Subnet Mask			
Next Hop			
Metric (Hops)			
Multiple Route Entries, up to a maximum of 25			

Cơ chế hoạt động của RIPv2

- RIPv2 sử dụng 2 loại message :
  - Request Message :
    - Được gởi đi mỗi khi Router khởi động
    - Chỉ được gởi trên interface bật RIP
    - Gởi yêu cầu đến tất cả các Router láng giềng đang chạy giao thức RIP về thông tin định tuyến
  - Respondse Message :
    - Nội dung bảng định tuyến được gởi đến Requesting Router

Cấu hình RIPv2

RIPv2

Router# config t

Router(config)#)#router rip

Router(config)#version 2

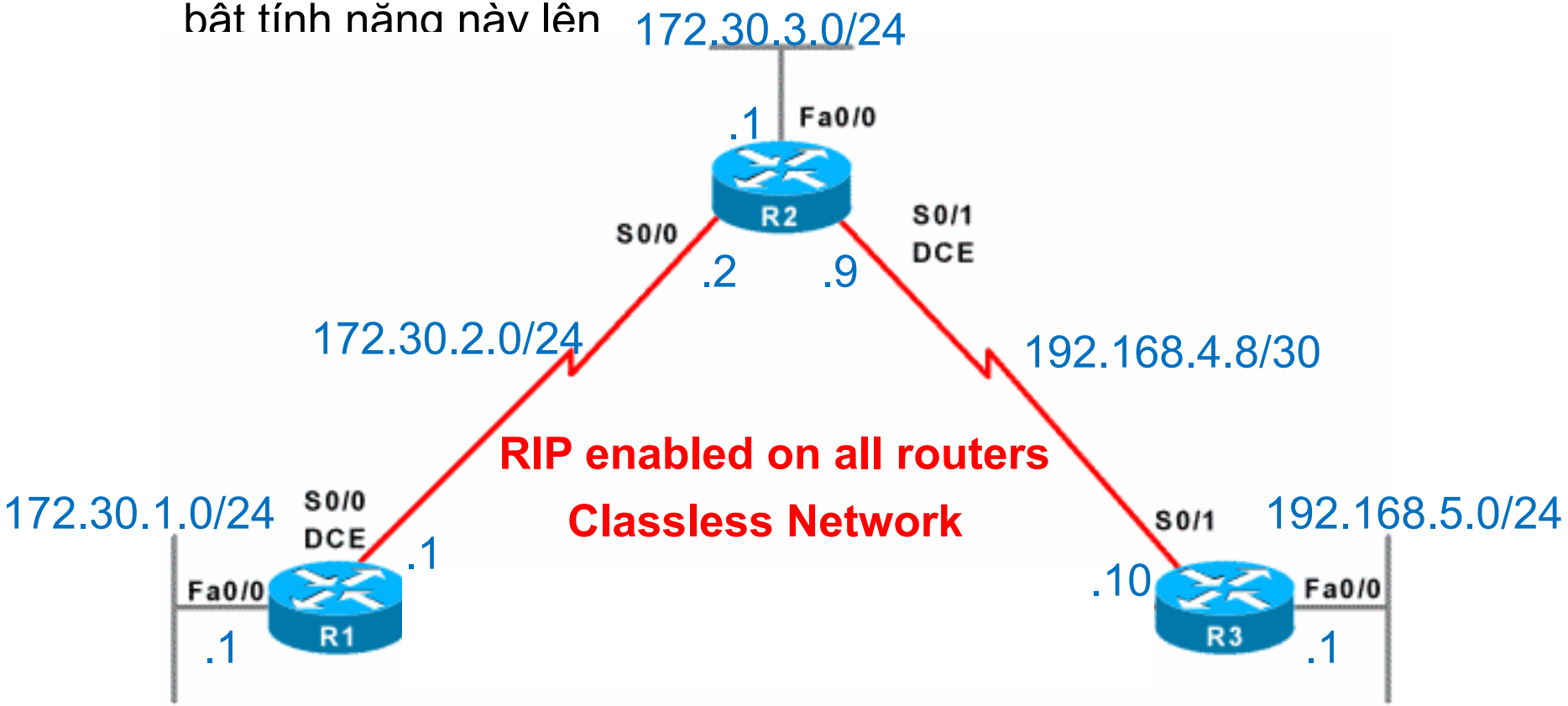
Router(config)#network *network_ID*

Router(config)#network *network_ID*

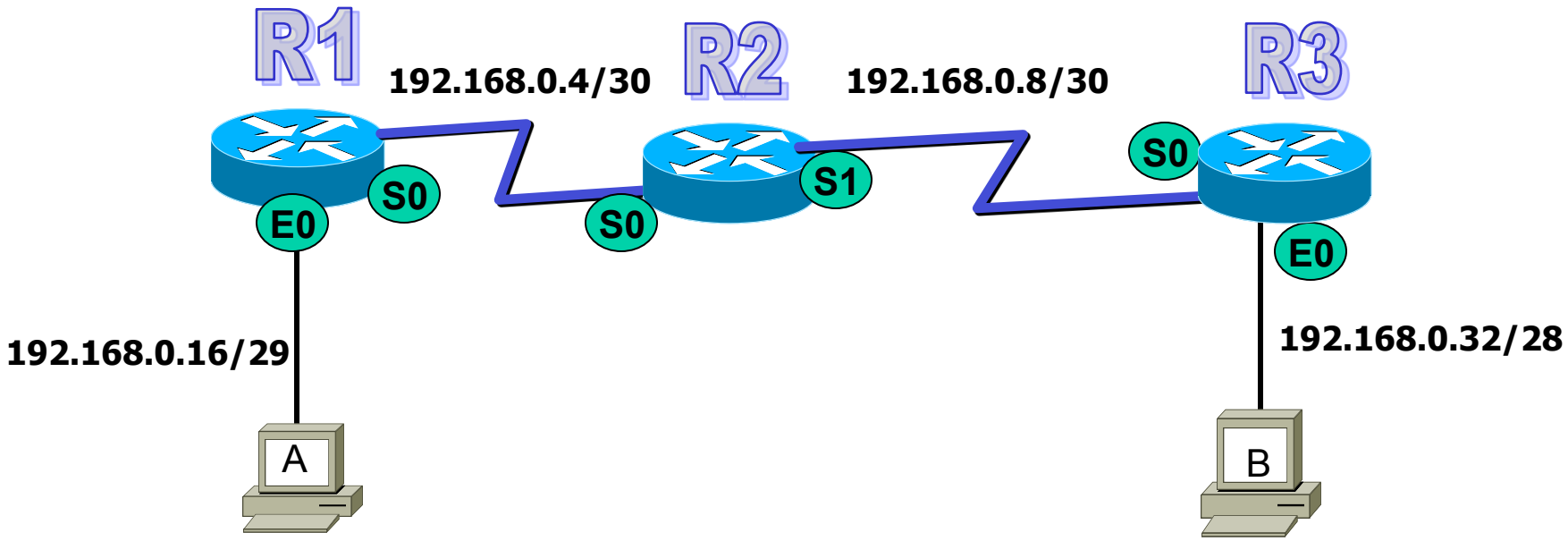
Router(config)#no auto-summary

Summarization trong RIPv2

- No Summarization mặc định không được bật lên trong RIPv2. Vì vậy khi cấu hình phải dùng câu lệnh “no auto-summary” để bật tính năng này lên

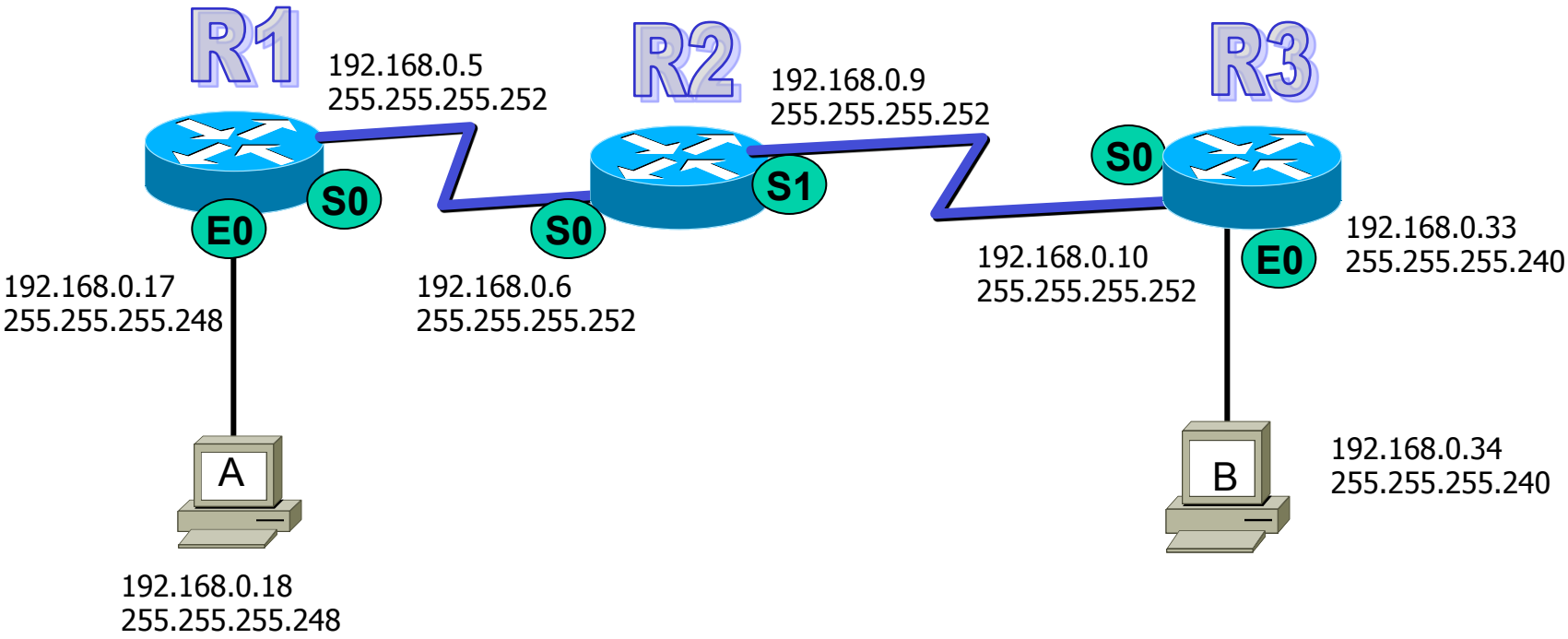


Exercise - RIP Version 2 Configuration

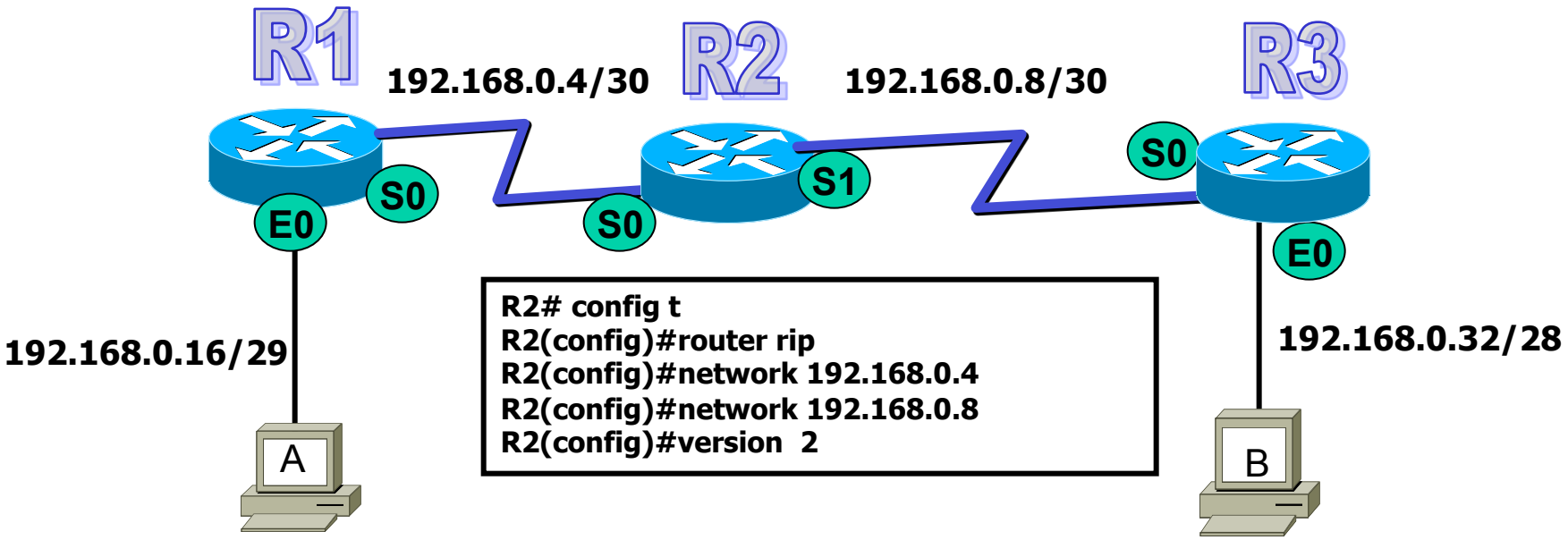


1. Find out the IP Address and SNM of each interfaces

Exercise - RIP Version 2 Configuration



Exercise - RIP Version 2 Configuration




```
R2# config t
R2(config)#router rip
R2(config)#network 192.168.0.4
R2(config)#network 192.168.0.8
R2(config)#version  2
```

```
R1# config t
R1(config)# )#router rip
R1(config)#network 192.168.0.4
R1(config)#network 192.168.0.16
R1(config)#version  2
```

```
R3# config t
R3(config)# )#router rip
R3(config)#network 192.168.0.8
R3(config)#network 192.168.0.32
R3(config)#version  2
```

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Câu hỏi ôn tập

1) Tính năng auto-summary trong RIPv1 nghĩa là gì ?

2) So sánh RIPv1 và RIPv2