



## Chapter 7

# RIP Version 2 (RIPv2)

## Note for Instructors

- These presentations are the result of a collaboration among the instructors at St. Clair College in Windsor, Ontario.
- Thanks must go out to Rick Graziani of Cabrillo College. His material and additional information was used as a reference in their creation.
- If anyone finds any errors or omissions, please let me know at:
  - [tdame@stclaircollege.ca](mailto:tdame@stclaircollege.ca).

## RIP Version 2 (RIPv2)

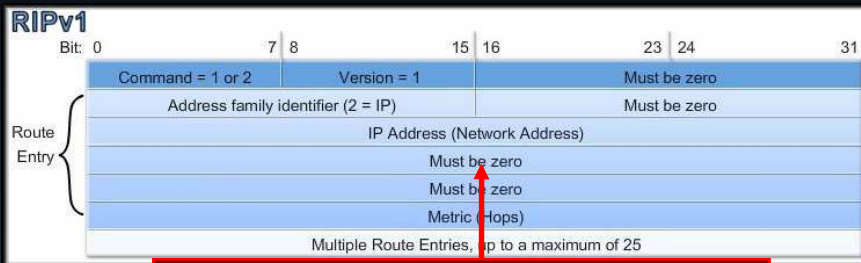
### RIPv1 Limitations

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

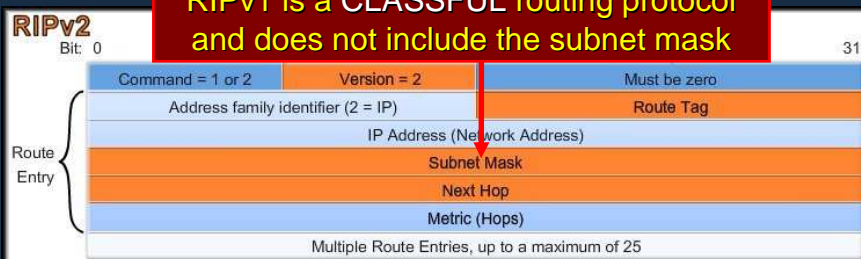
### RIPv1 Limitations

- **RIPv1 (a classful routing protocol)** is used as an example, so we can see how **RIPv2 (a classless routing protocol)** does **not have** these same limitations.
- Classful routing protocols have **three major limitations**:
  - Does not support discontinuous networks.
  - Does not support VLSM.
  - Does not support CIDR.

## RIPv1 Limitations - Discontiguous Networks



**RIPv1 is a CLASSFUL routing protocol and does not include the subnet mask**



## RIPv1 Limitations - Discontiguous Networks

```
R2# sh ip route
<output omitted>
```

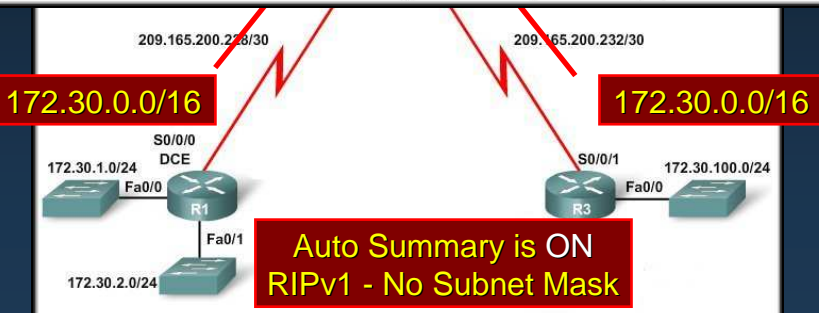
Gateway of last resort is not set

**R2 will load balance**

```

10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
R    172.30.0.0/16 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
      [120/1] via 209.165.200.230, 00:00:08, Serial0/0/0
209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1

```



## RIPv1 Limitations - Discontiguous Networks

- **Solution:**
  - Use **RIPv2** to include the subnet mask.
  - Turn off auto summarization.
- **How do we do that?**

```
R2>en
R2#conf t
R2 (config)#router rip

R2 (config-router)#version 2

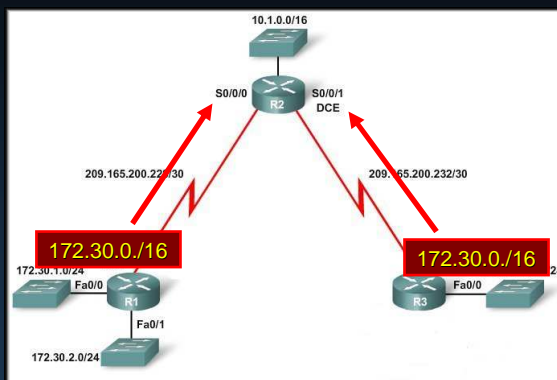
R2 (config-router)#no auto-summary

R2 (config-router)#
```

Changes on R1, R2 and R3.....

## Auto Summary and RIPv2

- By default, RIPv2 automatically summarizes networks at major network boundaries, just like RIPv1.
- **R1 and R3 will still advertise the summarized routes for their networks.**
- R2 will still have the summarized route for 172.30.0.0/16 with the same two equal cost paths.
- **Auto-summary must be disabled.**



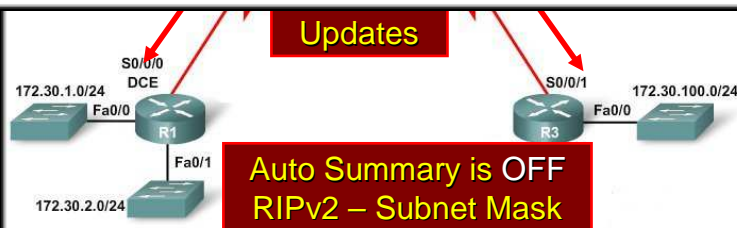
## RIPv1 Limitations - Discontiguous Networks

```
R2# sh ip route
<output omitted>
```

R2 now has the proper routes.

Gateway of last resort is not set

```
10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
172.30.0.0/16 is variably subnetted, 3 subnets
R    172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:20, Serial0/0/0
R    172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:20, Serial0/0/0
R    172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:01, Serial0/0/1
209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1
R2#
```



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## RIPv1 Limitations - Discontiguous Networks

```
R2# sh ip route
<output omitted>
```

R2 will load balance

Gateway of last resort is not set

```
10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
R    172.30.0.0/16 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R    172.30.0.0/16 [120/1] via 209.165.200.230, 00:00:08, Serial0/0/0
209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1
R2#
```

RIPv1

```
R2# sh ip route
<output omitted>
```

R2 now has the proper routes.

Gateway of last resort is not set

```
10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
172.30.0.0/16 is variably subnetted, 3 subnets
R    172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:20, Serial0/0/0
R    172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:20, Serial0/0/0
R    172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:01, Serial0/0/1
209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1
R2#
```

RIPv2

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## RIPv1 Limitations – No VLSM

- RIPv1 does not support VLSM:
  - To illustrate it, we will be adding Loopback Interfaces.
- Loopback Interface:
  - Software-only interface.
  - Used to emulate a physical interface.
  - Can be assigned an IP address.
  - Can be pinged.
  - Subnet can be advertised in routing updates.
  - Useful in a lab environment to create additional networks without having to add more physical interfaces.
- *More in chapter 11.*

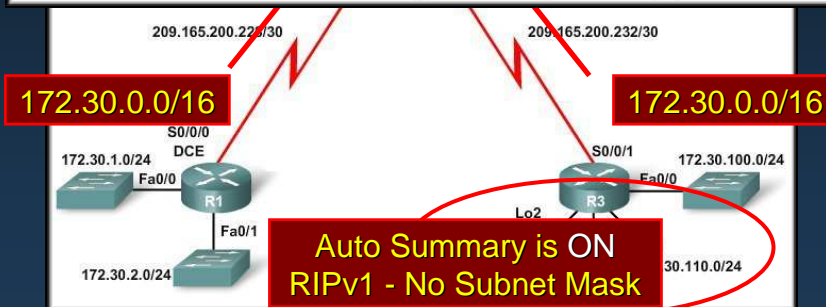
## RIPv1 Limitations – No VLSM

```
R2# sh ip route  
<output omitted>
```

Gateway of last resort is not set

```
10.0.0.0/16 is subnetted, 1 subnets  
C 10.1.0.0 is directly connected, FastEthernet0/0  
R 172.30.0.0/16 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1  
[120/1] via 209.165.200.230, 00:00:08, Serial0/0/0  
209.165.200.0/30 is subnetted, 2 subnets  
C 209.165.200.228 is directly connected, Serial0/0/0  
C 209.165.200.232 is directly connected, Serial0/0/1
```

R2 will load balance



## RIPv1 Limitations – No VLSM

```

R2#sh ip route
<output omitted>

Gateway of last resort is not set

  10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
R    172.30.0.0/16 is variably subnetted, 7 subnets, 3 masks
R      172.30.0.0/16 [120/1] via 209.165.200.234, 00:01:30, Serial0/0/1
      [120/1] via 209.165.200.230, 00:01:29, Serial0/0/0
R      172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:07, Serial0/0/0
R      172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:07, Serial0/0/0
R      172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R      172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R      172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R      172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
  209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1
R2#
    
```



**Auto Summary is OFF**  
**RIPv2 – Subnet Mask**

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## RIPv1 Limitations – No VLSM

```

R2# sh ip route
<output omitted>

Gateway of last resort is not set

  10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
R    172.30.0.0/16 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
      [120/1] via 209.165.200.230, 00:00:08, Serial0/0/0
  209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1
R2#
    
```

**RIPv1**

**RIPv2**

```

Gateway of last resort is not set

  10.0.0.0/16 is subnetted, 1 subnets
C    10.1.0.0 is directly connected, FastEthernet0/0
R    172.30.0.0/16 is variably subnetted, 7 subnets, 3 masks
R      172.30.0.0/16 [120/1] via 209.165.200.234, 00:01:30, Serial0/0/1
      [120/1] via 209.165.200.230, 00:01:29, Serial0/0/0
R      172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:07, Serial0/0/0
R      172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:07, Serial0/0/0
R      172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R      172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R      172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
R      172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:08, Serial0/0/1
  209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial0/0/0
C    209.165.200.232 is directly connected, Serial0/0/1
R2#
    
```

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## RIPv1 Limitations – No CIDR

- RIPv1 does not support CIDR:
  - To illustrate it, we will be adding a static summary route to R2 and telling R2 to redistribute that route to other routers in the network.
  - **Static Summary Route:**
    - This route is a summary of all of the 192.168.0.0/24 networks.
    - The **null0** argument lets us add the route without affecting any interface.

```
R2#conf t
R2 (config)#ip route 192.168.0.0 255.255.0.0 null0
```

## RIPv1 Limitations – No CIDR

- RIPv1 does not support CIDR:
  - To illustrate it, we will be adding a static summary route to R2 and telling R2 to redistribute that route to other routers in the network.
  - **Redistribution:**
    - For now, just realize that this summary route will cause problems with RIPv1 because **192.168.0.0/16 is not a major classful address** and includes all of the /24 versions of 192.168.0.0/16.

```
R2 (config)#router rip
R2 (config-router)#redistribute static
```



## RIPv1 Limitations – No CIDR

```

R2#sh ip route
<output omitted>

Gateway of last resort is not set

 10.0.0.0/16
C    10.1.0.0
R    172.30.0.0/16 [120/1] via 209.165.200.234, 00:00:17, Serial10/0/1
S    192.168.0.0/16 is directly connected, Null0
    209.165.200.0/30 is subnetted, 2 subnets
C    209.165.200.228 is directly connected, Serial10/0/0
C    209.165.200.232 is directly connected, Serial10/0/1
R2#
    
```

**R2: Static Route appears in the routing table.**

```

R2 (config)#router rip
R2 (config-router)#redistribute static
    
```



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## RIPv1 Limitations – No CIDR

```

R2#sh ip route
<output omitted>

Gateway of last resort is not set

R3#sh ip route
<output omitted>

Gateway of last resort is not set

R   10.0.0.0/8 [120/1] via 209.165.200.233, 00:00:10, Serial10/0/1
    172.30.0.0/16 is variably subnetted, 4 subnets, 2 masks
C    172.30.100.0/24 is directly connected, FastEthernet0/0
C    172.30.110.0/24 is directly connected, Loopback0
C    172.30.200.16/28 is directly connected, Loopback1
C    172.30.200.32/28 is directly connected, Loopback2
    209.165.200.0/30 is subnetted, 2 subnets
R    209.165.200.228 [120/1] via 209.165.200.233, 00:00:10, Serial10/0/1
C    209.165.200.232 is directly connected, Serial10/0/1
R3#
    
```

**Static Route NOT redistributed to R3**



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## RIPv1 Limitations – No CIDR

- **Static Route NOT redistributed to R3:**
  - The static route 192.168.0.0 has a /16 mask.
  - What class is it? – **Class C**
  - RIPv1 is a **CLASSFUL** routing protocol.
    - The mask **does not match the class** or a subnet of the class.
    - RIPv1 will not include this route in its updates to other routers.
  - RIPv1 and other classful routing protocols cannot support CIDR routes that are **summarized routes with a smaller subnet mask** than the classful mask of the route.

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## RIPv1 Limitations – No CIDR

```
R3#sh ip route
<output omitted>

Gateway of last resort is not set

10.0.0.0/16 is subnetted, 1 subnets
R   10.1.0.0 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R   172.30.1.0/24 [120/2] via 209.165.200.233, 00:00:14, Serial0/0/1
R   172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:14, Serial0/0/1
C   172.30.100.0/24 is directly connected, FastEthernet0/0
C   172.30.110.0/24 is directly connected, Loopback0
C   172.30.200.16/28 is directly connected, Loopback1
C   172.30.200.32/28 is directly connected, Loopback2
R   192.168.0.0/16 [120/1] via 209.165.200.233, 00:00:09, Serial0/0/1
209.165.200.0/30 is subnetted, 2 subnets
R   209.165.200.228 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1
C   209.165.200.232 is directly connected, Serial0/0/1
R3#
```



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## RIPv1 Limitations – No CIDR

```
R3#sh ip route
<output omitted>
```

Gateway of last resort is not set

```
R 10.0.0.0/8 [120/1] via 209.165.200.233, 00:00:10, Serial0/0/1
  172.30.0.0/16 is variably subnetted, 4 subnets, 2 masks
C 172.30.100.0/24 is directly connected, FastEthernet0/0
C 172.30.110.0/24 is directly connected, Loopback0
C 172.30.200.16/28 is directly connected, Loopback1
C 172.30.200.32/28 is directly connected, Loopback2
  209.165.200.0/30 is subnetted, 2 subnets
R 209.165.200.228 [120/1] via 209.165.200.233, 00:00:10, Serial0/0/1
C 209.165.200.232 is directly connected, Serial0/0/1
R3#
```

RIPv1

```
10.0.0.0/16 is subnetted, 1 subnets
R 10.1.0.0 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1
  172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.30.1.0/24 [120/2] via 209.165.200.233, 00:00:14, Serial0/0/1
R 172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:14, Serial0/0/1
C 172.30.100.0/24 is directly connected, FastEthernet0/0
C 172.30.110.0/24 is directly connected, Loopback0
C 172.30.200.16/28 is directly connected, Loopback1
C 172.30.200.32/28 is directly connected, Loopback2
R 192.168.0.0/16 [120/1] via 209.165.200.233, 00:00:09, Serial0/0/1
  209.165.200.0/30 is subnetted, 2 subnets
R 209.165.200.228 [120/1] via 209.165.200.233, 00:00:14, Serial0/0/1
C 209.165.200.232 is directly connected, Serial0/0/1
R3#
```

RIPv2

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## RIP Version 2 (RIPv2)

### Configuring RIPv2

	Distance Vector Routing Protocols		Link State Routing Protocols		Path Vector
Classful	RIP	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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## Enabling and Verifying RIPv2

- By default, when a RIP process is configured on a Cisco router, it is running RIPv1.
- Even though the router only sends RIPv1 messages, it can interpret both RIPv1 and RIPv2 messages.
- A RIPv1 router will just ignore the RIPv2 fields in the route entry.

```
R2>en
R2#conf t
R2 (config)#router rip
R2 (config-router)#version 2
```

## Enabling and Verifying RIPv2

- **Verifying:** `ip protocols` command.

RIPv1

```
R2# show ip protocols
<output omitted>
Default version control: send version 1, receive any version
  Interface      Send  Recv  Triggered RIP Key-chain
  Serial0/0/0    1     1 2
  Serial0/0/1    1     1 2
Automatic network summarization is in effect
<output omitted >
```

RIPv2

```
R2# show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 1 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is
  Incoming update filter list for all interfaces is
  Redistributing: static, rip
  Default version control: send version 2, receive version 2
  Interface      Send  Recv  Triggered RIP Key-chain
  Serial0/0/0    2     2
  Serial0/0/1    2     2
Automatic network summarization is in effect
<output omitted>
```

## Verifying RIPv2 Updates

- RIPv2 Fully Converged Network:

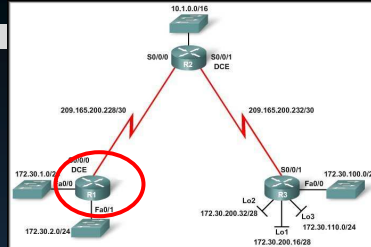
```
Router#conf t
Router(config)# router rip

Router(config-router)#version 2

Router(config-router)#no auto-summary
```

```
R1# show ip route
<output omitted>

10.0.0.0/16 is subnetted, 1 subnets
R 10.1.0.0 [120/1] via 209.165.200.229, 00:00:02, Serial0/0/0
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
R 172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
C 172.30.2.0/24 is directly connected, Loopback0
C 172.30.1.0/24 is directly connected, FastEthernet0/0
R 172.30.100.0/24 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
R 172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
R 192.168.0.0/16 [120/1] via 209.165.200.229, 00:00:02, Serial0/0/0
209.165.200.0/30 is subnetted, 2 subnets
R 209.165.200.232 [120/1] via 209.165.200.229, 00:00:02, Serial0/0/0
C 209.165.200.228 is directly connected, Serial0/0/0
```



## Verifying RIPv2 Updates

- RIPv2 Fully Converged Network:

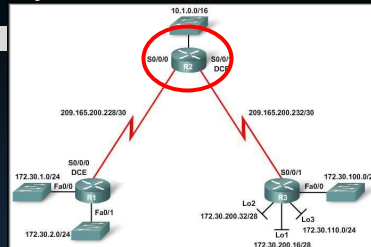
```
Router#conf t
Router(config)# router rip

Router(config-router)#version 2

Router(config-router)#no auto-summary
```

```
R2# show ip route
<output omitted>

10.0.0.0/16 is subnetted, 1 subnets
C 10.1.0.0 is directly connected, FastEthernet0/0
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.30.200.32/28 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
R 172.30.200.16/28 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
R 172.30.2.0/24 [120/1] via 209.165.200.230, 00:00:03, Serial0/0/0
R 172.30.1.0/24 [120/1] via 209.165.200.230, 00:00:03, Serial0/0/0
R 172.30.100.0/24 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
R 172.30.110.0/24 [120/1] via 209.165.200.234, 00:00:09, Serial0/0/1
S 192.168.0.0/16 is directly connected, Null0
209.165.200.0/30 is subnetted, 2 subnets
C 209.165.200.232 is directly connected, Serial0/0/1
C 209.165.200.228 is directly connected, Serial0/0/0
```



## Verifying RIPv2 Updates

- RIPv2 Fully Converged Network:

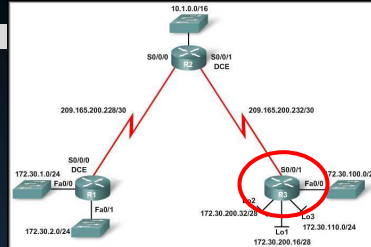
```
Router#conf t
Router(config)# router rip

Router(config-router)#version 2

Router(config-router)#no auto-summary
```

```
R3# show ip route
<output omitted>

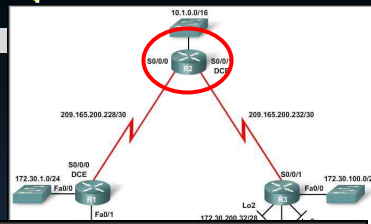
10.0.0.0/16 is subnetted, 1 subnets
R   10.1.0.0 [120/1] via 209.165.200.233, 00:00:02, Serial0/0/1
172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
C   172.30.200.32/28 is directly connected, Loopback2
C   172.30.200.16/28 is directly connected, Loopback1
R   172.30.2.0/24 [120/2] via 209.165.200.233, 00:00:01, Serial0/0/1
R   172.30.1.0/24 [120/2] via 209.165.200.233, 00:00:01, Serial0/0/1
C   172.30.100.0/24 is directly connected, FastEthernet0/0
C   172.30.110.0/24 is directly connected, Loopback0
R   192.168.0.0/16 [120/1] via 209.165.200.233, 00:00:02, Serial0/0/1
209.165.200.0/30 is subnetted, 2 subnets
C   209.165.200.232 is directly connected, Serial0/0/1
R   209.165.200.228 [120/1] via 209.165.200.233, 00:00:02, Serial0/0/1
```



## Verifying RIPv2 Updates

- Using the **debug** command, the update process can be verified.

```
R2# debug ip rip
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
172.30.100.0/24 via 0.0.0.0 in 1 hops
172.30.110.0/24 via 0.0.0.0 in 1 hops
172.30.200.16/28 via 0.0.0.0 in 1 hops
172.30.200.32/28 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
10.1.0.0/16 via 0.0.0.0, metric 1, tag 0
172.30.100.0/24 via 0.0.0.0, metric 2, tag 0
172.30.110.0/24 via 0.0.0.0, metric 2, tag 0
172.30.200.16/28 via 0.0.0.0, metric 2, tag 0
172.30.200.32/28 via 0.0.0.0, metric 2, tag 0
192.168.0.0/16 via 0.0.0.0, metric 1, tag 0
209.165.200.232/30 via 0.0.0.0, metric 1, tag 0
```



## Verifying RIPv2 Updates

```

172.30.200.32/28 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
10.1.0.0/16 via 0.0.0.0, metric 1, tag 0
    
```

- Finally, **remember** that updates under RIPv2 are sent as a **multicast to address 224.0.0.9**.
- RIPv1 sends updates as a broadcast (255.255.255.255).
- **In general:**
  - Multicasts can take up less bandwidth on the network.
  - Multicasting updates require less processing by devices that are not RIP enabled.

## RIP Version 2 (RIPv2)

### Verifying and Troubleshooting RIPv2

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

## Verifying and Troubleshooting RIPv2

- **Begin with the basics:**
  - Make sure all of the **links** (interfaces) are **up and operational**.
  - Check the **cabling**.
  - Check to make sure you have the **correct IP address and subnet mask** on each interface.
  - **Remove any unnecessary configuration commands** that are no longer necessary or have been replaced by other commands.

## Verifying and Troubleshooting RIPv2

- **show ip route** command:

```
Router# show ip route
<output omitted>

Gateway of last resort is not set

 10.0.0.0/16 is subnetted, 1 subnets
R   10.1.0.0 [120/1] via 209.165.200.229, 00:00:02, Serial0/0/0
 172.30.0.0/16 is variably subnetted, 6 subnets, 2 masks
C   172.30.1.0/24 is directly connected, FastEthernet0/0
C   172.30.2.0/24 is directly connected, Loopback0
R   172.30.100.0/24 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
R   172.30.110.0/24 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
R   172.30.200.16/28 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
R   172.30.200.32/28 [120/2] via 209.165.200.229, 00:00:01, Serial0/0/0
R   192.168.0.0/16 [120/1] via 209.165.200.229, 00:00:02, Serial0/0/0
 209.165.200.0/30 is subnetted, 2 subnets
R   209.165.200.232 [120/1] via 209.165.200.229, 00:00:02, Serial0/0/0
C   209.165.200.228 is directly connected, Serial0/0/0
```

First command to check for convergence.  
Look for 'expected' routes.



## Verifying and Troubleshooting RIPv2

- **show ip interface brief** command:

```
R1# show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	172.30.1.1	YES	NVRAM	up	up
FastEthernet0/1	172.30.2.1	YES	NVRAM	up	up
Serial0/0/0	209.165.200.230	YES	NVRAM	up	up
Serial0/0/1	unassigned	YES	NVRAM	down	down

If a network is missing from the routing table, it is often because an interface is down or incorrectly configured.

The **show ip interface brief** command quickly verifies the status of all interfaces.

## Verifying and Troubleshooting RIPv2

- **show ip protocols** command:

```
R1# show ip protocols
```

```
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 29 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 2, receive version 2
  Interface          Send    Recv    Triggered RIP Key-chain
  FastEthernet0/0    2       2
  FastEthernet0/1    2       2
  Serial0/0/0        2       2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
  172.30.0.0
  209.165.200.0
Routing Information Sources:
  Gateway            Distance    Last Update
  209.165.200.229    120        00:00:18
Distance: (default is 120)
```

RIP

enabled?

RIP Version?

Auto-Summary Enabled?

What Networks?

## Verifying and Troubleshooting RIPv2

- **debug ip rip** command:

```
R2# debug ip rip
RIP: received v2 update from 209.165.200.234 on Serial0/0/1
  172.30.100.0/24 via 0.0.0.0 in 1 hops
  172.30.110.0/24 via 0.0.0.0 in 1 hops
  172.30.200.16/28 via 0.0.0.0 in 1 hops
  172.30.200.32/28 via 0.0.0.0 in 1 hops
RIP: sending v2 update to 224.0.0.9 via Serial0/0/0 (209.165.200.229)
RIP: build update entries
  10.1.0.0/16 via 0.0.0.0, metric 1, tag 0
  172.30.100.0/24 via 0.0.0.0, metric 2, tag 0
  172.30.110.0/24 via 0.0.0.0, metric 2, tag 0
  172.30.200.16/28 via 0.0.0.0, metric 2, tag 0
```

An excellent command to use to examine the contents of the routing updates that are sent and received by a router.

There can be times when a route is received by a router but is not added to the routing table.

## Verifying and Troubleshooting RIPv2

- **ping** command:

```
R2# ping 172.30.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.2.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/28/28 ms
R2# ping 172.30.100.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.30.100.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/28/28 ms
```

An easy way to test end-to-end connectivity.

## Verifying and Troubleshooting RIPv2

- **show running-config** command:

```
R1# show running-config
!
hostname R1
!
interface FastEthernet0/0
 ip address 172.30.1.1 255.255.255.0
!
interface FastEthernet0/1
 ip address 172.30.2.1 255.255.255.0
!
interface Serial10/0/0
 ip address 209.165.200.230 255.255.255.252
 clock rate 64000
!
<output omitted>

router rip
 version 2
 network 172.30.0.0
 network 209.165.200.0
 no auto-summary
!
```

Verify IP Address and interface assignments.

Verify RIP configuration.

## Verifying and Troubleshooting RIPv2

- **Common RIPv2 Issues:**

- **Version:**

- Although RIPv1 and RIPv2 can be made compatible with additional commands beyond the scope of this course, RIPv1 does not support discontinuous subnets, VLSM, or CIDR supernet routes.

- **Automatic Summarization:**

- If there is a need or expectation for sending specific subnets and not just summarized routes, make sure that automatic summarization has been disabled with the **no auto-summary** command.

## Verifying and Troubleshooting RIPv2

- **Common RIPv2 Issues:**
  - **Network Statements:**
    - Incorrectly configured or missing network statements configured with the **network** command.
    - The **network** command does two things:
      - It **enables the routing protocol to send and receive updates** on any local interfaces that belong to that network.
      - It **includes the configured network in its routing updates** to its neighboring routers.
    - A missing or incorrect network statement will result in missed routing updates and routing updates not being sent or received on an interface.