## Key Characteristics

<table>
<thead>
<tr>
<th>Type: Distance Vector</th>
<th>Load Balancing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm: Bellman Ford</td>
<td>RIP only support only equal cost load balancing</td>
</tr>
<tr>
<td>Standard: RFC 1058 (Version 1), RFC 2453 (Version 2)</td>
<td>Routes with equal hop count are installed automatically in the IP routing table</td>
</tr>
<tr>
<td>Administrative Distance: 120</td>
<td>RIP Versions</td>
</tr>
<tr>
<td>Metric: Hop Count (16 is infinite)</td>
<td>RIP has two version</td>
</tr>
<tr>
<td>Transport Protocol/Port Number: UDP/520</td>
<td>RIP version 1: classful protocol updates are broadcast</td>
</tr>
<tr>
<td>Routed Protocol Support: IP</td>
<td>no support for summarization</td>
</tr>
<tr>
<td>Support for IPv6: Yes (RIPv2 and RIPng only)</td>
<td>no authentication support</td>
</tr>
<tr>
<td>Supports VLSM &amp; Route Summarization: Yes (RIPv2 and RIPng only)</td>
<td>RIP version 2: classless protocol updates are multicast to address 224.0.0.9 support for VLSM and summarization (major network boundary)</td>
</tr>
<tr>
<td>Authentication: Yes (MD5 supported with RIPv2 and RIPng only)</td>
<td>MD5 authentication support</td>
</tr>
<tr>
<td>Convergence: Slower</td>
<td>Supports Triggered updates and Route tags</td>
</tr>
<tr>
<td>Metric Calculation</td>
<td>The RIP version can be changed with “version &lt;1</td>
</tr>
</tbody>
</table>

### Updates Types

- RIP sends periodic updates at a specified timer interval
- These updates include full routing table

#### Disadvantages of Periodic Updates:
- If updates are sent too frequently it will cause unnecessary bandwidth and CPU utilization.
- If sent too less, convergence takes longer and routing loops could occur

### Routing Loop Avoidance Techniques

- **Split Horizon:** Updates received in an interface can’t be sent out the same interface.
- **Split Horizon with Poison Reverse:** Updates sent back with infinite metric (hop count 16) for every update received in an interface
- **Count to Infinity:** To avoid continuous looping of a (bad) routing update. RIP sets the count to infinity with a hop count of 16.
- **Triggered Updates:** supported with RIPv2. Also known as the flash updates. If a metric is changed it is immediately advertised to neighbors without waiting for the regular scheduled update timer

### Timers

- **Update:** send every 30 seconds
- **Invalid:** Interval of time in seconds after which a route is declared invalid; it should be at least three times the value of the update argument. A route becomes invalid when there is an absence of updates that refresh the route. Default 180 seconds
- **Holddown:** Interval in seconds during which routing information regarding better paths is suppressed. Default 180 seconds
- **Flush:** Also called the garbage collector timer. It is set to 240 seconds (60 seconds longer than invalid timer). It specifies the time after which route is removed from routing table

The “timers <basic update invalid holddown flush>” command is used to change default values
Configuration Example: RIP version 1

Router R1:
interface loopback 0
  ip address 10.1.1.1 255.255.255.255
!
interface serial 0/0
  ip address 192.168.12.1 255.255.255.0
!
router rip
  network 192.168.12.0
  network 10.0.0.0

Router R2:
interface loopback 0
  ip address 172.16.2.2 255.255.255.0
!
interface serial 0/0
  ip address 192.168.12.2 255.255.255.0
!
router rip
  network 192.168.12.0
  network 172.16.0.0

R1#sh ip route | be Gateway
Gateway of last resort is not set

C  192.168.12.0/24 is directly connected, Serial0/0
R  172.16.0.0/16 [120/1] via 192.168.12.2, 00:00:17, Serial0/0 [Due to auto summarization]
    10.0.0.0/24 is subnetted, 1 subnets
    C 10.1.1.0 is directly connected, Loopback0

Configuration Example: RIP version 2

Router R1:
interface loopback 0
  ip address 10.1.1.1 255.255.255.255
!
interface serial 0/0
  ip address 192.168.12.1 255.255.255.0
!
router rip
  version 2
  network 192.168.12.0
  network 10.0.0.0

Router R2:
interface loopback 0
  ip address 172.16.2.2 255.255.255.0
!
interface serial 0/0
  ip address 192.168.12.2 255.255.255.0
!
router rip
  version 2
  network 192.168.12.0
  network 172.16.0.0

R1#sh ip route | be Gateway
Gateway of last resort is not set

C  192.168.12.0/24 is directly connected, Serial0/0
R  172.16.0.0/16 [120/1] via 192.168.12.2, 00:00:58, Serial0/0 [Due to auto summarization]
    10.0.0.0/24 is subnetted, 1 subnets
    C 10.1.1.0 is directly connected, Loopback0

Troubleshooting Commands

1. show ip protocols
2. show ip route
3. debug ip rip
4. debug ip rip events
5. debug ip rip database