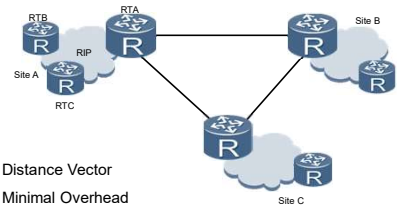
Distance Vector Routing with RIP

Objectives

Upon completion of this section, trainees will be able to:

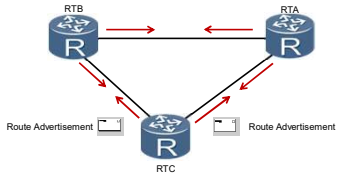
- Describe the behavior of the Routing Information Protocol.
- Successfully configure RIP routing and associated attributes.

Routing Information Protocol



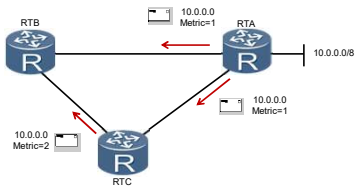
- Distance Vector
- Minimal Overhead
- Suited to Small Networks
- Simple implementation

Principle Behavior



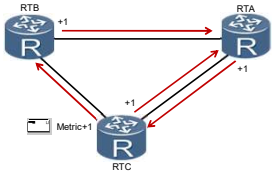
- Route Advertisements are sent periodically.
- Advertised information is used to discover the best routes.

Metrics



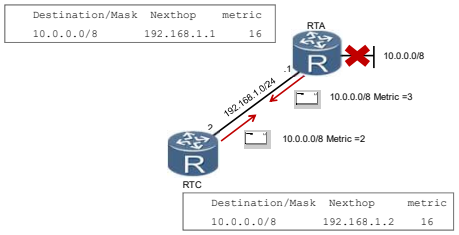
- Metric is used to measure the distance to a given network.
- Calculation is based on hops representing a metric of 1.

Routing Loops and Hop Limits



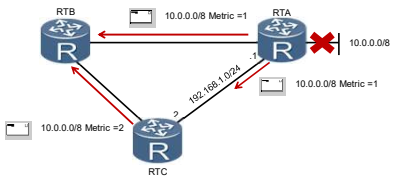
- Metric is incremented by 1 before advertisement is forwarded.
- A limit of 15 hops is defined to prevent infinite forwarding.

Loop Formation



- When a network fails, the next best route may generate a loop.
- A metric of 16 represents an unreachable route.

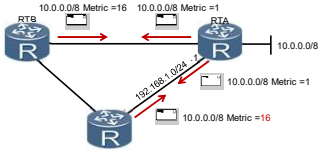
Loop Prevention-Split Horizon



- A route cannot be advertised on the interface via which it was learned.

Loop Prevention-Poisoned Reverse

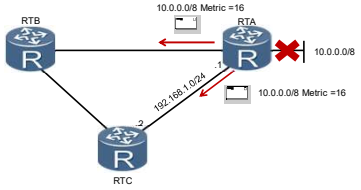
- Poison reverse allows a RIP interface to set the cost of a route learned from a neighbor to 16 (indicating that the route is unreachable) and then send this route back to the neighbor.
- If a router's RIP routing table contains a route with the destination/mask z/y and the route is learned from the router's Interface-x, poison reverse allows the router to set the cost of the route to 16 before sending responses that contain the route with the destination/mask z/y through Interface-x



Destination/Mask Nexthop metric
10.0.0.0/8 192.168.1.1 16

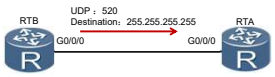
- Poisoned Reverse improves convergence time, however generates additional overhead due to extra route information.

Loop Prevention-Triggered Updates



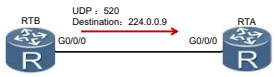
- Updates are sent by default approximately every 30 seconds.
- Triggered updates allow updates to be sent almost instantly.

RIP Messaging



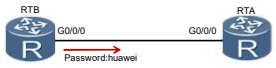
Command	Version	Must be Zero
Address Family Identifier		Must be Zero
IP Address		
Must be Zero		
Must be Zero		
Metric		

RIP Extensions



Command	Version	Unused
Address Family Identifier		Route Tag
IP Address		
Subnet Mask		
Next Hop		
Metric		

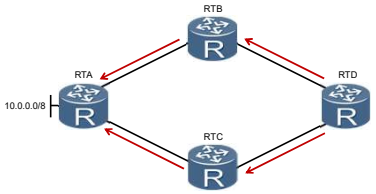
RIP Extensions – Authentication



Command	Version	Unused
0XFFFF		Authentication Type
Authentication		

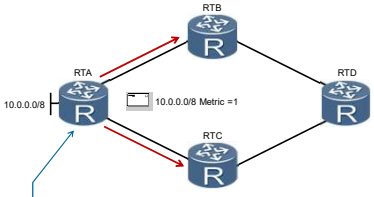
- RIP version 2 allows for authentication between peers.
- Supports plaintext and cryptographic authentication.

RIP Load Balancing



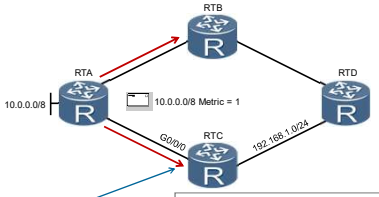
- Load balancing can be used in RIP to utilize redundant links.
- AR2200 supports up to 8 equal cost routes by default.

RIP Network Advertisement




```
[RTA]rip
[RTA-rip-1]version 2
[RTA-rip-1]network 10.0.0.0
```

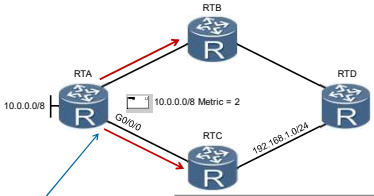

RIP Metricin



Destination/Mask	Nexthop	metric
10.0.0.0/8	192.168.1.1	3

```
[RTC]interface GigabitEthernet 0/0/0
[RTC-GigabitEthernet0/0/0]rip metricin 2
```

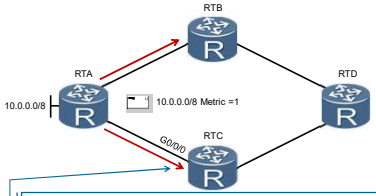

RIP Metricout



Destination/Mask	Nexthop	metric
10.0.0.0/8	192.168.1.1	2

```
[RTA]interface GigabitEthernet 0/0/0
[RTA-GigabitEthernet0/0/0]rip metricout 2
```


Split Horizon & Poisoned Reverse




```
[RTC]interface GigabitEthernet 0/0/0
[RTC-GigabitEthernet0/0/0]rip split-horizon
[RTC-GigabitEthernet0/0/0]rip poison-reverse
```

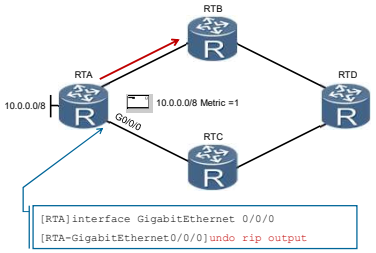
- If both are enabled, only *rip poison-reverse* will take effect.

Configuration Validation

```
[RTC] display rip 1 interface GigabitEthernet0/0/0 verbose
 GigabitEthernet0/0/0(192.168.1.2)
  State           : UP          MTU     : 500
  Metricin        : 2
  Metricout       : 1
  Input           : Enabled     Output : Enabled
  Protocol        : RIPv2 Multicast
  Send version    : RIPv2 Multicast Packets
  Receive version : RIPv2 Multicast and Broadcast Packets
  Poison-reverse                : Enabled
  Split-Horizon                 : Enabled
  Authentication type           : None
  Replay Protection             : Disabled
```

- Both show as enabled but only "*Poison-reverse*" will take effect.

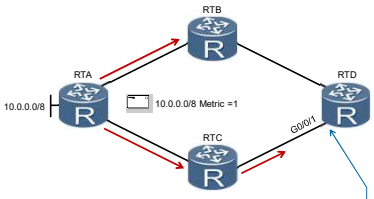
RIP Output




```
[RTA]interface GigabitEthernet 0/0/0
[RTA-GigabitEthernet0/0/0]undo rip output
```

- Outbound RIP advertisements restricted on the G0/0/0 interface.

RIP Input



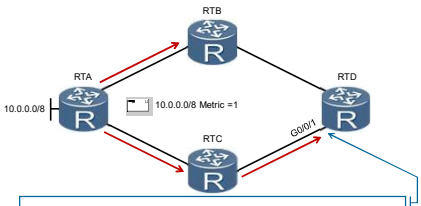

```
[RTD]interface GigabitEthernet 0/0/1
[RTD-GigabitEthernet0/0/1]undo rip input
```

- Inbound RIP advertisements restricted on the G0/0/1 interface.

Configuration Validation

```
[RTD] display rip 1 interface GigabitEthernet0/0/1 verbose
 GigabitEthernet0/0/1(192.168.1.2)
  State           : UP          MTU     : 500
  Metricin        : 1
  Metricout       : 1
  Input           : Disabled    Output : Enabled
  Protocol        : RIPv2 Multicast
  Send version    : RIPv2 Multicast Packets
  Receive version : RIPv2 Multicast and Broadcast Packets
  Poison-reverse                : Enabled
  Split-Horizon                 : Enabled
  Authentication type           : None
  Replay Protection             : Disabled
```


Silent Interface




```
[RTD]rip
[RTD-rip-1]silent-interface GigabitEthernet 0/0/1
```

- Interface will not participate in RIP, but will receive RIP routes.
- Takes precedence over *rip input* and *rip output* commands.

Configuration Validation

```
[RTD] display rip
Public VPN-instance
    RIP process : 1
       RIP version    : 2
       Preference     : 100
       Checkzero      : Enabled
       Default-cost   : 0
       Summary        : Enabled
       Host-route     : Enabled
       Maximum number of balanced paths : 8
       Update time    : 30 sec              Age time : 180 sec
       Garbage-collect time : 120 sec
       Graceful restart  : Disabled
       BFD               : Disabled
       Silent-interfaces : GigabitEthernet0/0/1
```

Summary

- At which point is the metric incremented for advertised routes?
- What configuration is required in order to advertise RIP routes?

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Thank you

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