KTH/CSC

RIP lab

Juniper version

Group Nr	
Name1	
Name2	
Name3	
Name4	
Date	
Grade	
Instructor's Signature	

Table of Contents

1 Goals

The goal with this lab is to introduce you to RIP and to distance vector routing.

After the lab you should have reached an understanding in the following areas:

1. Understand the benefits of dynamic routing and RIP in particular.
2. Creation and use of null-routes.
3. Adding a simple policy for redistribution of static routes.
4. Aggregation of routes.
5. Monitoring and investigating the state of a dynamic routing protocol.

This lab instruction contains a number of questions as well as configuration milestones. You should complete the questions. At the configuration milestones, you should display a working network to an assistant.

The scenario of the routing lab is that you are managing an ISP network with a number of customers. The routers constitute your network, and the hosts are customers. You will also create more virtual customer networks, to make this scenario more realistic.

2 Preparations

Before you begin this lab, please consult documents [1] and [2]. Ensure that you have the network map of topology 1 [3]. You should also have read the RFC about RIP [4].

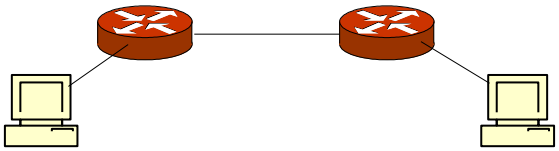
Before you come to the lab you should have completed the following assignments in writing.

How do you...

- configure RIP if you have RIP neighbours on interface fe-1/0/0 and fe-1/0/1?
- check the RIP neighbours?
- check the RIP statistics?
- show the RIP routes?
- check which routes you are advertising to your neighbours?
- turn on monitoring of rip?
- write a (1) policy option for accepting all static routes and (2) export them to RIP.

Milestone 1: Preparations.
Signature: _____

3 RIP in pairs



First start working in pairs, RTX1 with RTX4 and RTX2 with RTX3.

Configure the hosts with IP addresses according to the topology map and appropriate static routes .

Configure the interface to the host and the interface between the two routers as shown in the Figure above. Do not configure any other interfaces.

Investigate the state of the router before you start RIP. In particular note all routes and be sure that you have understood which routes exists in the routing table, since RIP will introduce new routes.

Control question: be sure you understand all local, direct and static routes present in the routing table.

Start RIP by declaring which interfaces have a neighbouring RIP router.

Try to ping between your hosts. Does it work?

You shall now check the state of RIP. What are the status of the following commands?

RIP neighbours.

_____
_____

RIP statistics.

_____
_____

RIP routes (do you see any?)

_____
_____

Which routes are advertised to your neighbours (if any)?

_____
_____

Now turn on monitoring of rip.

If the monitoring clutters your screen, open a new connection and window to the router.

What is happening here? How do you interpret the results? Does it seem that RIP is running OK? If not, why not?

_____
_____
_____
_____

4 Simple policy-options

In the Juniper implementation of RIP you have to explicitly tell the protocol which routes to include and advertise to its neighbours. The rules on how to do this is slightly different between different routing protocols, but it allows us to start thinking about routing policies at an early stage.

We should start by telling RIP to advertise the *directly connected* networks to our neighbours.

For this, you should create a policy-statement that states that all direct routes should be accepted.

You then create an export statement in RIP that applies your policy as a RIP export policy: That is, all directly connected networks are being advertised in RIP.

Now try to ping and traceroute between the two hosts. Have a continuous ping between the hosts.

Investigate the state of the routers again and explain each route that you see in the routing table, and the routes that you advertise.

RIP neighbours.

_____
_____

RIP statistics.

_____
_____

RIP routes

_____
_____

Which routes are advertised to your neighbours (if not any, why not?)

_____
_____

While checking the monitoring, disable the Ethernet interface between one of the routers and its associated host. Check on the other router how long it takes until the route disappears. (You can check with the extensive option to the route command to get more information about a specific route.)

_____
_____

Re-enable the interface and see how long it takes before the network appears again, and how long it takes before the ping works. Observe in the monitoring.

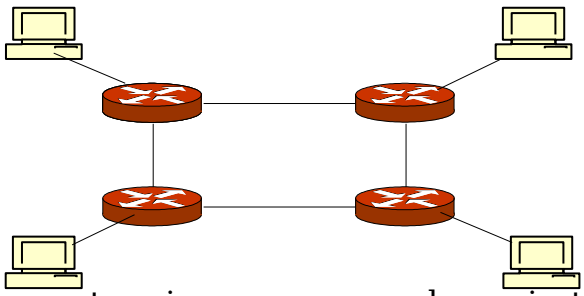
_____
_____

Try to explain what happened . What mechanism in RIP is going on here?

_____
_____

Milestone 2: Show a working pair in RIP.
Signature: _____

5 RIP in square



Connect all four routers in a square as shown in the Figure above, and configure all four routers to talk RIP. Do not connect the shared network 192.168.15.0/24.

Check connections with ping and traceroutes.

Which new RIP routes have appeared (if any?)

_____
_____

For this to work properly you need to add another policy-option (RIP is slightly strange in this respect): You need to tell RIP that all routes learned via RIP, needs to be exported by RIP. Extend your previous policy to include protocol RIP.

RIP neighbours.

_____
_____

RIP statistics.

_____
_____

RIP routes

_____
_____

Which routes are advertised to your neighbours

_____
_____

ping record-route from your host to the diagonal host. Which path is used (check return path too).

_____
_____

Check the diagonal routes in the routing table. Does this match the observation of the pings?

_____

Milestone 3: Show a working square in RIP.
Signature: _____

6 Creating extra networks

You shall now create three extra routes and advertise them with RIP. Create three new networks as secondary addresses to fe-0/0/0. The addresses are according to the topology map (the remaining three 10.X.Y.0/24 networks). Do this by adding the .1 address to fe-0/0/0.

Set your router-id to the loopback interface address in the netmap.

Also add one other address (e.g., 10.X.Y.2 – one of the three remaining) to the loopback interface (`lo0`). You can only assign a /32 address to a loopback interface.

Why would you set the router-id to an address on a loopback interface?

_____

Now ensure that your router so that it distributes your four new networks.

Check that this works by pinging, and trace-routing from the host to the other's new loopback addresses.

Try tracerouting the loopback addresses on the diagonal router. Do they take different paths? Why/why not?

_____
_____

7 Aggregating the routes and advanced policy

The four extra routes that you created in the previous section shall now be aggregated (summarized) into one single aggregated route. The aim is to reduce the number of routes in the network – and reduce the routing tables.

Create such an aggregated route, and ensure that it is distributed to the other routers.

Now rewrite your policy (or write several) so that you get the following behaviour:

1. The aggregated route should be announced
2. All RIP routes learnt from other routers should be announced
3. The direct 10.X.Y.0 routes should not be announced.
4. The direct 192.168.X.Y networks should be announced
5. The loopback addresses should not be announced

How have you defined your policy?

_____
_____
_____
_____
_____
_____

Show the configuration to the lab assistant and demonstrate a working network.

Milestone 4: Quad in RIP: aggregation.
Signature: _____

8 Load balancing[1]

You should have two RIP routes to the diagonal customer network and loopback addresses. Try to make the traffic load balanced. Use ping record-route.

In order to achieve load-balancing you need to create a “per-packet” policy and export this policy into the *forwarding-table*. This will cause layer-3 load-balancing which causes address-pairs (and pings) to take separate paths.

Milestone 5: Quad in RIP: load balancing.
Signature: _____

9 Clean-up

Reset the configuration by loading (using override) the /root/labconf configuration.
Also do not forget to log out from your hosts.

10 References

[1] KTH/CSC Router lab Introduction - Juniper version
[2] KTH/CSC Router lab Reference - Juniper version
[3] KTH/CSC Router lab Netmap - Topology 1
[4] IETF RFC 2453, RIP Version 2

1 Optional, but useful for future labs