Linnéuniversitetet
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Report

Assignment 4

1DV701

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1 Problem 1

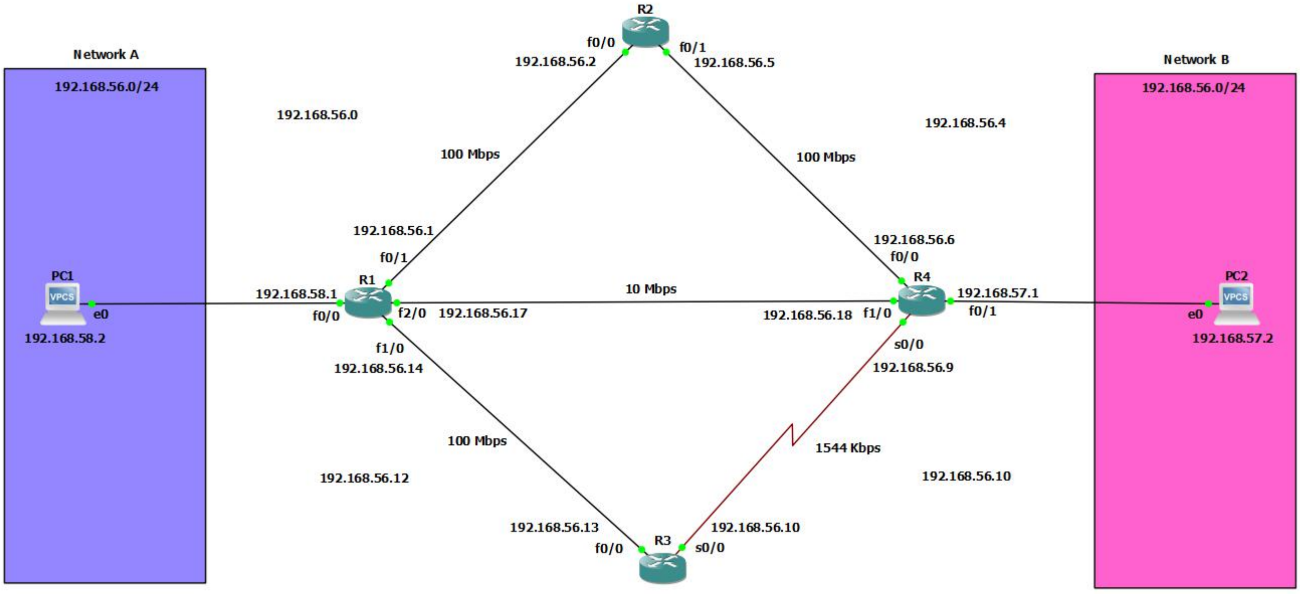

Figure 1. Topology picture from GNS3


```
FastEthernet0/0          192.168.58.1    YES NVRAM  up                    up
Serial0/0                unassigned      YES NVRAM  administratively down down
FastEthernet0/1          192.168.56.1    YES NVRAM  up                    up
Serial0/1                unassigned      YES NVRAM  administratively down down
Serial0/2                unassigned      YES NVRAM  administratively down down
FastEthernet1/0          192.168.56.14   YES NVRAM  up                    up
FastEthernet2/0          192.168.56.17   YES NVRAM  up                    up
R1#ping 192.168.56.18

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.56.18, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 40/65/76 ms
R1#ping 192.168.58.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.58.2, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1#ping 192.168.58.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.58.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 4/10/20 ms
R1#ping 192.168.58.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.58.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/12/28 ms
R1#
```

Figure 2. Ping from R1 to VPC1

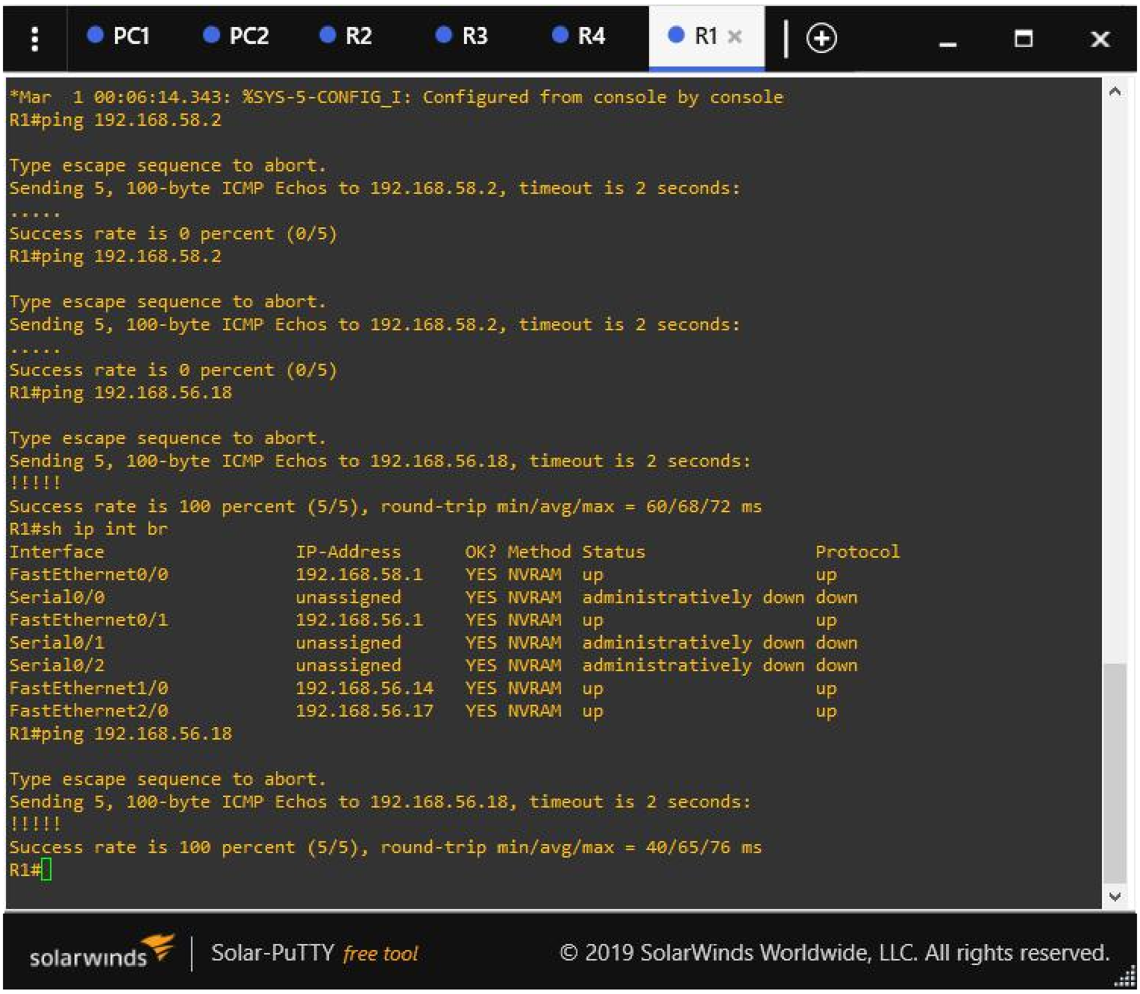

Figure 3. Ping from R1 to R4

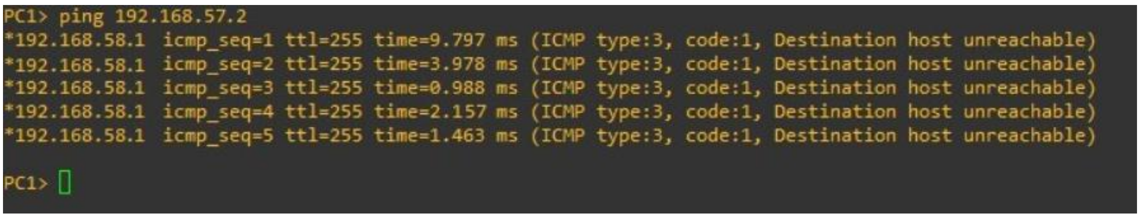

Figure 4. Ping from VPC1 to VPC2

1.1 Discussion

NM-1FE-TX

NM-1FE-TX is a network module with one port fast Ethernet that offers a single auto sensing 10/100 TX connection with the use of an RJ-45 Connector and its interface is used on the Cisco 3600 and 3700 series routers. It also supports VLAN deployment in order to make groups work flow way more easy that enables to move and switch within the network.

We use NM-1FE-TX because NM-4T doesnt support async mode and NM-16ESW has 16 ports thats way more than what we need, NM-NAM doesnt have an external console port and NM-CIDS can only be configured with IDS (promiscuous mode).

WIC-1T

WIC-1T means 1-Port Serial WAN Interface Card that grants serial connections to remote destinations, such as websites or legacy serial netwrok devices.

We use WIC-1T because WIC-2T supports 8Mbps max speed per port

Difference between /24 and /30 subnet?

/30 stands for 255.255.255.252
/24 stands for 255.255.255.0

So /30 is way more efficent because whenever we need to connect to the network we wont be wasting any IP addresses.

2 Problem

Figure 5. Ping from VPC1 to VPC2

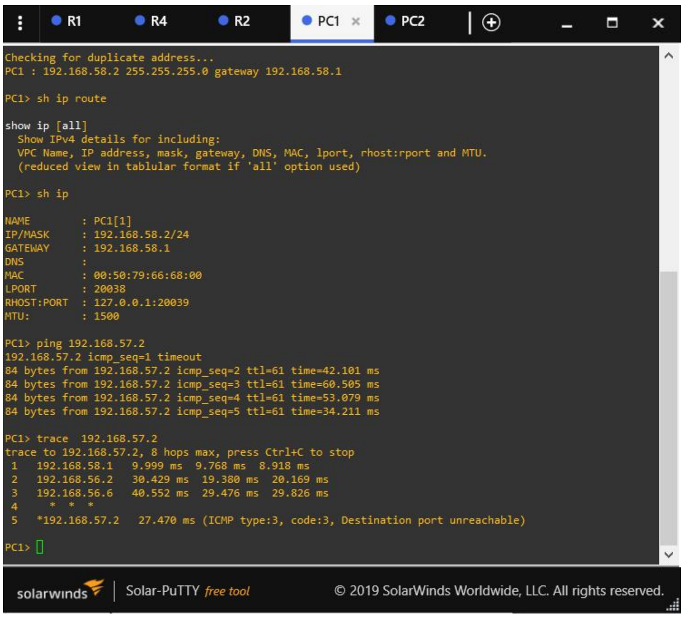

Figure 6. Tracing from VPC1 to VPC2

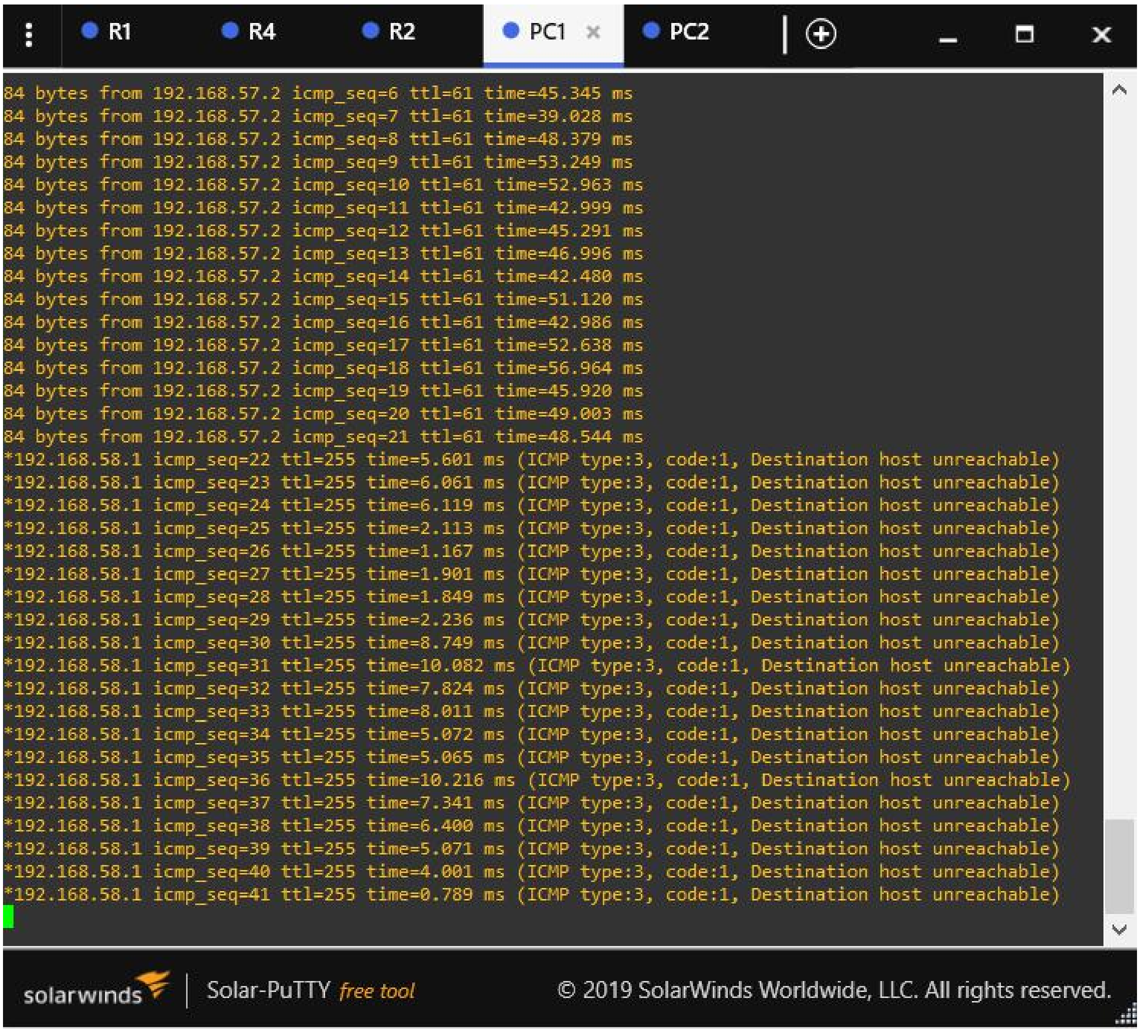

Figure 7. Shut down of the only active route

```
PC1> ping 192.168.57.2 -t
192.168.57.2 icmp_seq=1 timeout
192.168.57.2 icmp_seq=2 timeout
192.168.57.2 icmp_seq=3 timeout
192.168.57.2 icmp_seq=4 timeout
84 bytes from 192.168.57.2 icmp_seq=5 ttl=62 time=31.036 ms
84 bytes from 192.168.57.2 icmp_seq=6 ttl=62 time=32.131 ms
84 bytes from 192.168.57.2 icmp_seq=7 ttl=62 time=24.151 ms
84 bytes from 192.168.57.2 icmp_seq=8 ttl=62 time=31.136 ms
84 bytes from 192.168.57.2 icmp_seq=9 ttl=62 time=32.093 ms
84 bytes from 192.168.57.2 icmp_seq=10 ttl=62 time=23.341 ms
84 bytes from 192.168.57.2 icmp_seq=11 ttl=62 time=25.500 ms
84 bytes from 192.168.57.2 icmp_seq=12 ttl=62 time=25.439 ms
84 bytes from 192.168.57.2 icmp_seq=13 ttl=62 time=34.109 ms
84 bytes from 192.168.57.2 icmp_seq=14 ttl=62 time=35.620 ms
84 bytes from 192.168.57.2 icmp_seq=15 ttl=62 time=32.855 ms
192.168.57.2 icmp_seq=16 timeout
192.168.57.2 icmp_seq=17 timeout
192.168.57.2 icmp_seq=18 timeout
192.168.57.2 icmp_seq=19 timeout
192.168.57.2 icmp_seq=20 timeout
192.168.57.2 icmp_seq=21 timeout
192.168.57.2 icmp_seq=22 timeout
192.168.57.2 icmp_seq=23 timeout
84 bytes from 192.168.57.2 icmp_seq=24 ttl=61 time=26.327 ms
84 bytes from 192.168.57.2 icmp_seq=25 ttl=61 time=21.867 ms
84 bytes from 192.168.57.2 icmp_seq=26 ttl=61 time=33.303 ms
84 bytes from 192.168.57.2 icmp_seq=27 ttl=61 time=28.786 ms
84 bytes from 192.168.57.2 icmp_seq=28 ttl=61 time=21.147 ms
84 bytes from 192.168.57.2 icmp_seq=29 ttl=61 time=33.729 ms
84 bytes from 192.168.57.2 icmp_seq=30 ttl=61 time=31.928 ms
84 bytes from 192.168.57.2 icmp_seq=31 ttl=61 time=32.413 ms
84 bytes from 192.168.57.2 icmp_seq=32 ttl=61 time=31.800 ms
84 bytes from 192.168.57.2 icmp_seq=33 ttl=61 time=21.853 ms
192.168.57.2 icmp_seq=34 timeout
*192.168.58.1 icmp_seq=35 ttl=255 time=4.404 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=36 ttl=255 time=1.243 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=37 ttl=255 time=4.193 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=38 ttl=255 time=3.612 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=39 ttl=255 time=1.415 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=40 ttl=255 time=4.501 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=41 ttl=255 time=3.275 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=42 ttl=255 time=1.565 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=43 ttl=255 time=2.221 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=44 ttl=255 time=1.210 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=45 ttl=255 time=2.400 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=46 ttl=255 time=1.806 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=47 ttl=255 time=6.587 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=48 ttl=255 time=3.207 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=49 ttl=255 time=1.301 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=50 ttl=255 time=9.448 ms (ICMP type:3, code:1, Destination host unreachable)
^C
```

Figure 8. Shut down of every single route 1 by 1

```
PC1> trace 192.168.57.2
trace to 192.168.57.2, 8 hops max, press Ctrl+C to stop
 1   192.168.58.1   9.374 ms  10.578 ms  9.921 ms
 2     *192.168.56.2   25.569 ms  15.650 ms
 3     *192.168.56.6   42.328 ms  52.295 ms
 4     *  *  *
 5   *192.168.57.2  49.167 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> trace 192.168.57.2
trace to 192.168.57.2 8 hops max, press Ctrl+C to stop
 1  192.168.58.1    4.357 ms  9.909 ms  9.098 ms
 2     *192.168.56.18   25.067 ms  32.434 ms
 3   *192.168.57.2  39.567 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> trace 192.168.57.2
trace to 192.168.57.2, 8 hops max, press Ctrl+C to stop
 1   192.168.58.1   9.581 ms  9.872 ms  9.315 ms
 2     *192.168.56.13   12.295 ms  19.729 ms
 3   192.168.56.9   18.562 ms  31.158 ms  29.296 ms
 4     *  *  *
 5   *192.168.57.2  36.867 ms (ICMP type:3, code:3, Destination port unreachable)

PC1>
```

Figure 9. Tracing VPC2 from VPC1

2.1 Discussion

```
ip route [ip] [mask] [router_interface] [metric]
```

Ip - Ip address of the router you want to connect
Mask - Subnet mask of the correspondent Ip
Router_interface - Interface where the router is connected to (ex. f0/0, f1/1..)
Metric - Number that decides priority

3 Problem 3

```
PC1> trace 192.168.57.2
trace to 192.168.57.2, 8 hops max, press Ctrl+C to stop
 1   192.168.58.1   9.524 ms  9.194 ms  9.691 ms
 2   192.168.56.18   19.360 ms  19.563 ms  29.787 ms
 3     *  *  *
 4   *192.168.57.2   37.619 ms (ICMP type:3, code:3, Destination port unreachable)
```

Figure 10. Tracing VPC1 to VPC2 **(before)**

```
R2    R1    PC1 ×    PC2    R4    R3
84 bytes from 192.168.57.2 icmp_seq=25 ttl=62 time=39.506 ms
84 bytes from 192.168.57.2 icmp_seq=26 ttl=62 time=33.375 ms
84 bytes from 192.168.57.2 icmp_seq=27 ttl=62 time=32.921 ms
84 bytes from 192.168.57.2 icmp_seq=28 ttl=62 time=31.849 ms
84 bytes from 192.168.57.2 icmp_seq=29 ttl=62 time=37.682 ms
84 bytes from 192.168.57.2 icmp_seq=30 ttl=62 time=40.463 ms
84 bytes from 192.168.57.2 icmp_seq=31 ttl=62 time=34.209 ms
84 bytes from 192.168.57.2 icmp_seq=32 ttl=62 time=35.986 ms
84 bytes from 192.168.57.2 icmp_seq=33 ttl=62 time=38.408 ms
84 bytes from 192.168.57.2 icmp_seq=34 ttl=62 time=39.837 ms
84 bytes from 192.168.57.2 icmp_seq=35 ttl=62 time=40.208 ms
84 bytes from 192.168.57.2 icmp_seq=36 ttl=62 time=31.450 ms
84 bytes from 192.168.57.2 icmp_seq=37 ttl=62 time=38.933 ms
*192.168.58.1 icmp_seq=38 ttl=255 time=1.977 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=39 ttl=255 time=10.121 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=40 ttl=255 time=3.753 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=41 ttl=255 time=10.118 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=42 ttl=255 time=6.729 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=43 ttl=255 time=4.547 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=44 ttl=255 time=3.225 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=45 ttl=255 time=2.832 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=46 ttl=255 time=1.143 ms (ICMP type:3, code:1, Destination host unreachable)
192.168.57.2 icmp_seq=47 timeout
192.168.57.2 icmp_seq=48 timeout
192.168.57.2 icmp_seq=49 timeout
192.168.57.2 icmp_seq=50 timeout
192.168.57.2 icmp_seq=51 timeout
192.168.57.2 icmp_seq=52 timeout
192.168.57.2 icmp_seq=53 timeout
192.168.57.2 icmp_seq=54 timeout
192.168.57.2 icmp_seq=55 timeout
192.168.57.2 icmp_seq=56 timeout
192.168.57.2 icmp_seq=57 timeout
192.168.57.2 icmp_seq=58 timeout
84 bytes from 192.168.57.2 icmp_seq=59 ttl=61 time=41.168 ms
84 bytes from 192.168.57.2 icmp_seq=60 ttl=61 time=48.522 ms
84 bytes from 192.168.57.2 icmp_seq=61 ttl=61 time=46.660 ms
84 bytes from 192.168.57.2 icmp_seq=62 ttl=61 time=42.858 ms
84 bytes from 192.168.57.2 icmp_seq=63 ttl=61 time=49.976 ms
84 bytes from 192.168.57.2 icmp_seq=64 ttl=61 time=41.325 ms
84 bytes from 192.168.57.2 icmp_seq=65 ttl=61 time=32.827 ms
84 bytes from 192.168.57.2 icmp_seq=66 ttl=61 time=37.167 ms
84 bytes from 192.168.57.2 icmp_seq=67 ttl=61 time=27.337 ms
^C
PC1>
```

Figure 11. Shut down of continuous ping between VPC1 and VPC2

```
PC1> trace 192.168.57.2
trace to 192.168.57.2, 8 hops max, press Ctrl+C to stop
 1   192.168.58.1   10.064 ms  8.955 ms  9.056 ms
 2   192.168.56.13   30.411 ms  30.773 ms  30.103 ms
 3   192.168.56.9   29.292 ms  29.241 ms  19.091 ms
 4     *  *  *
 5   *192.168.57.2   28.215 ms (ICMP type:3, code:3, Destination port unreachable)
```

Figure 12.Tracing VPC1 to VPC2 **(after)**

3.1 Discussion

RIPv2 is a Distance Vector Routing Protocol and it uses hops as a mesure to know the router path, any number above 15 hops its considered unreachable.

Steps:
- Ping VPC1 - VPC2
- Shutdown R1 interface f0/1
- Shutdown R4 interface f0/0

This will make a significant packet lost due to the timeout to change paths.
Afte the timeout it will find a new path to reach VPC2.

4 Problem 4

```
PC1> trace 192.168.57.2
trace to 192.168.57.2, 8 hops max, press Ctrl+C to stop
 1   192.168.58.1   2.707 ms  22.556 ms  8.008 ms
 2   192.168.56.2   30.070 ms  19.607 ms  29.452 ms
 3   192.168.56.6   30.793 ms  30.324 ms  30.306 ms
 4   *192.168.57.2   41.653 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> ping 192.168.57.2 -t
84 bytes from 192.168.57.2 icmp_seq=1 ttl=61 time=38.911 ms
84 bytes from 192.168.57.2 icmp_seq=2 ttl=61 time=42.533 ms
84 bytes from 192.168.57.2 icmp_seq=3 ttl=61 time=50.952 ms
84 bytes from 192.168.57.2 icmp_seq=4 ttl=61 time=44.449 ms
*192.168.58.1 icmp_seq=5 ttl=255 time=24.529 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=6 ttl=255 time=6.319 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=7 ttl=255 time=9.982 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=8 ttl=255 time=3.014 ms (ICMP type:3, code:1, Destination host unreachable)
*192.168.58.1 icmp_seq=9 ttl=255 time=4.476 ms (ICMP type:3, code:1, Destination host unreachable)
84 bytes from 192.168.57.2 icmp_seq=10 ttl=62 time=34.996 ms
84 bytes from 192.168.57.2 icmp_seq=11 ttl=62 time=23.384 ms
84 bytes from 192.168.57.2 icmp_seq=12 ttl=62 time=37.591 ms
84 bytes from 192.168.57.2 icmp_seq=13 ttl=62 time=32.908 ms
^C
PC1> trace 192.168.57.2
trace to 192.168.57.2, 8 hops max, press Ctrl+C to stop
 1   192.168.58.1   9.580 ms  8.976 ms  9.830 ms
 2   192.168.56.18   29.811 ms  19.160 ms  19.129 ms
 3   *192.168.57.2   29.280 ms (ICMP type:3, code:3, Destination port unreachable)

PC1>
```

Figure 13.Shutdown R1 and R4 interface

4.1 Discussion

OSPF is a link-state routing protocol that sends a packet from the router to discover and memorize all the designed neighbour routers, that first packet contains the list with all the neighbours as well as the link state data.
Also for instace, R1 acts as an ABR (Area Border Router) that means that this router is gonna have the task to forward all the routing information through all the next areas. OSPF uses the bandwidth as a mesurement to calculate the cost of a certain path what it makes easier to know what path is the fastest.

5 Problem 5

Conclusion

Static
Its based on given configuration what makes it easier to setup while being a bit time consuming.
In case of failure, the package lost is very high (~=70%)
It is more efficient if used on a small network

RIPv2
Its based on distance vector that uses the Distance Vectoring Protocol what makes it take the shortest routing path but not the fastest, despite of that it is easier and faster to setup. The ideal scenario for this method is when all the networks have the same speed but different paths where it can mange really well all the path priorities.
In case of failure, the package lost is average (~=40%)
It is more efficient if used on a small network which are not very dynamic and have less than 15 hops, after 15 hops will show that the network was unreachable.

OSPF
Its based on link-state what makes it a bit harder but can be manged farelly quick. This method calculates the cost of reaching from one destination to another making it choosing the fastest path to a specific destination what makes it so definitly the most complex out of the three methods used.
In case of failure, the package lost is really low what makes it really reliable (~=10%)
It is the most efficient to use on both small and large networks.