

Linnaeus University

Faculty of Technology – Department of Computer Science

1DV701 - Computer Networks – an introduction

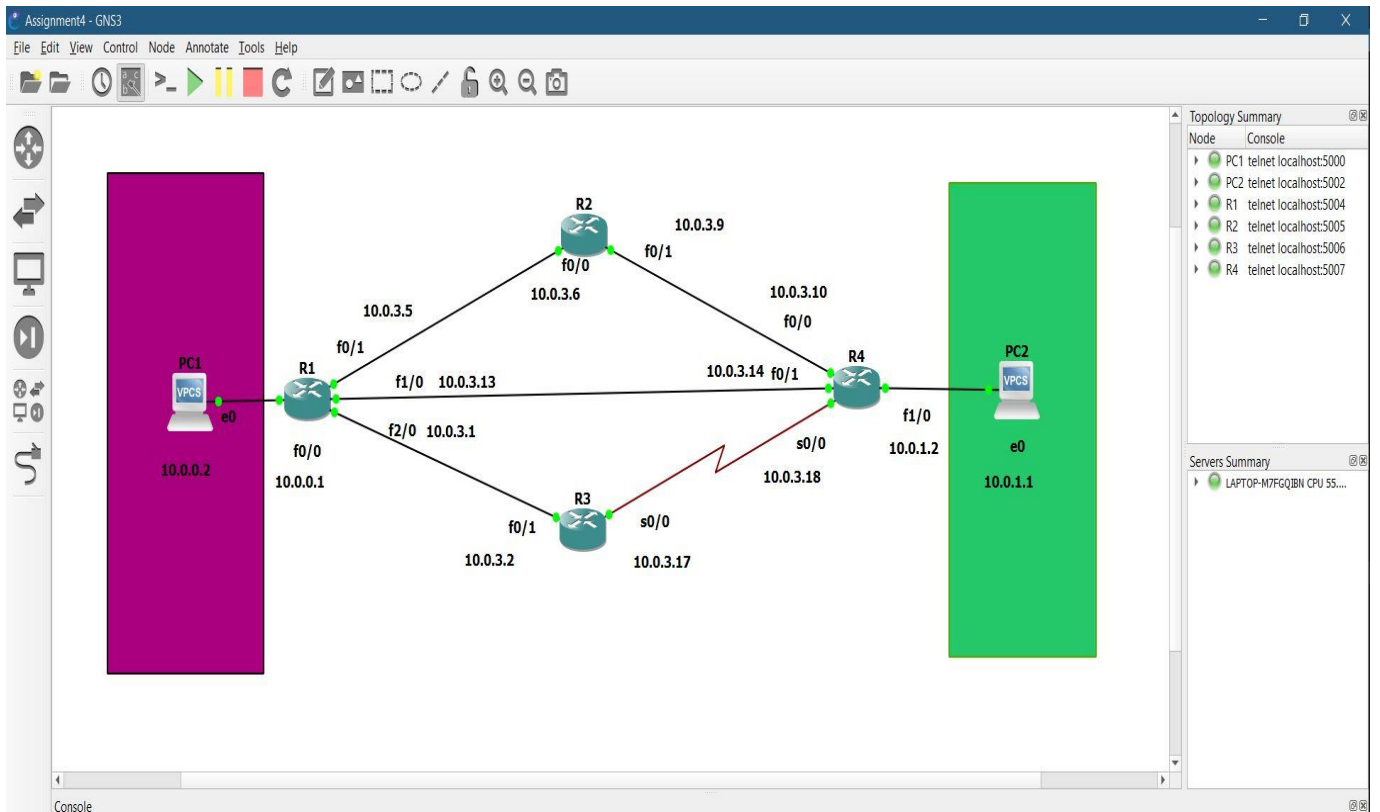
Student: Mohammadali Rashidfarokhi



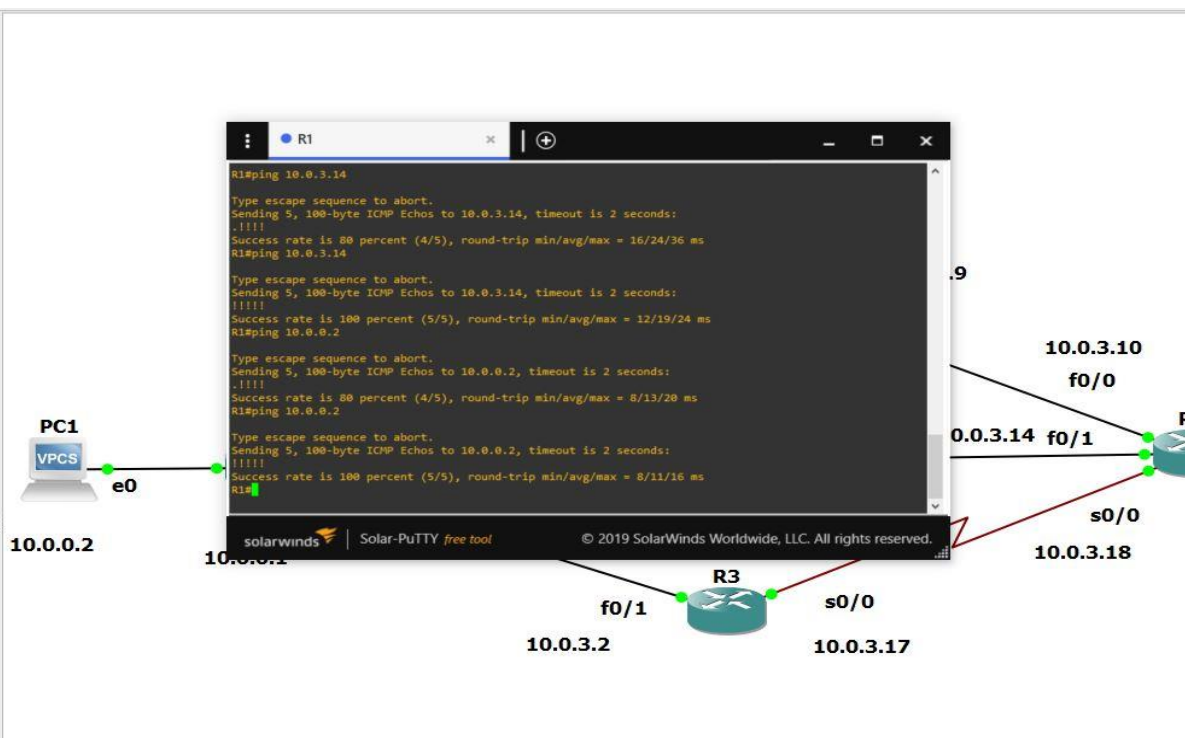
Assignment 4

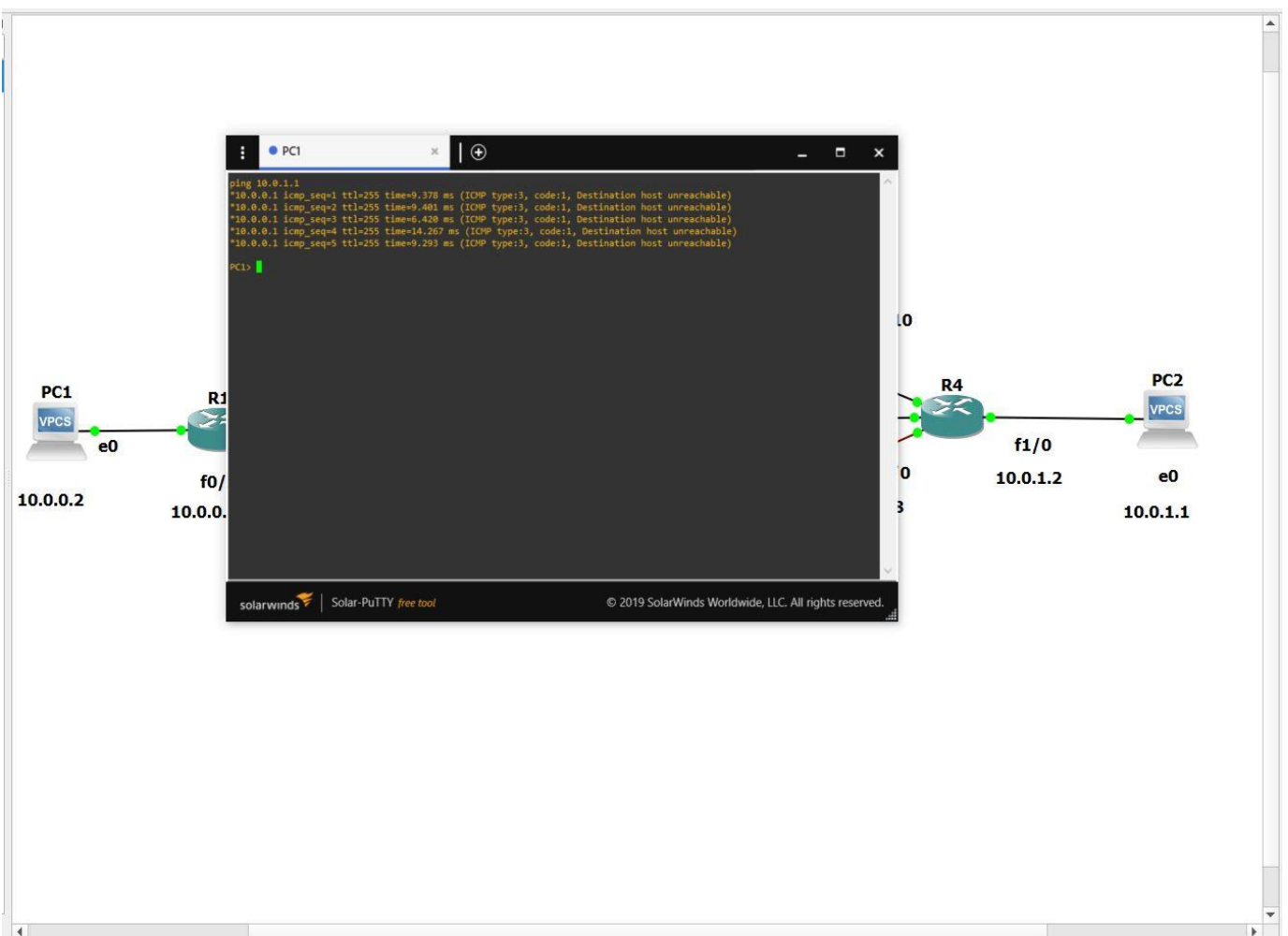
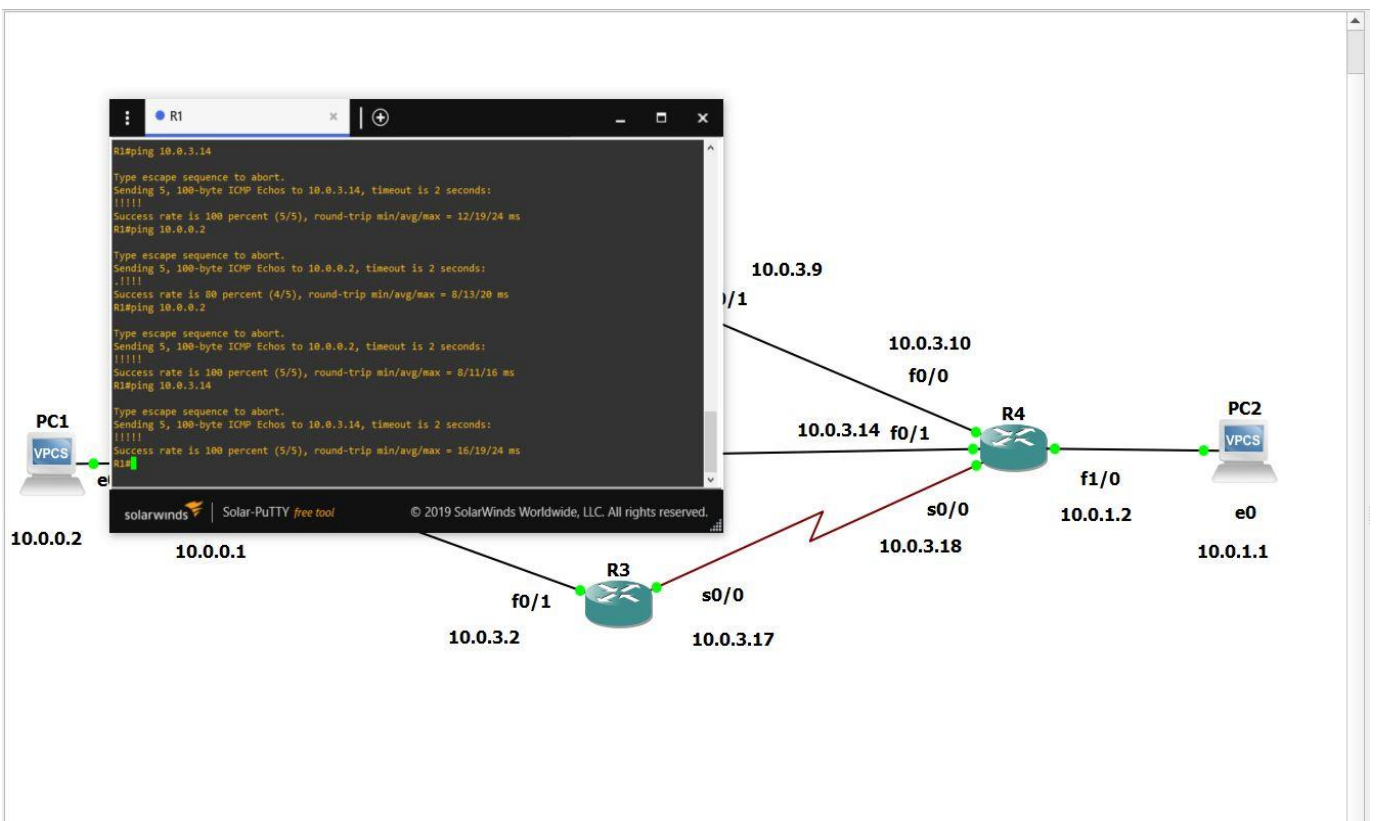
1. Problem 1

1.



2.





3.

❖ NM-1FE-TX

When it comes to the NM-1FE-TX, its brand name will be Cisco. However, based on the marketing information, it (1-port Fast Ethernet) will propose a single autosensing 10/100TX connection by using an Rj-45 connector. Consequently, it has the capability of supporting enormous interworking features. The prominent one is LAN. As it can support VLAN deployment, it can smoothly insert, eliminate, and shift within the network.

❖ WIC-1T

The WIC-1T is referred to as a 1-port serial WAN interface card. Therefore, it has the capability of providing a serial connection to remote sites. Also, it can support and provide a serial connection to inaccessible legacy serial networks. The prominent ones are alarm systems, data link control concentrators, and packet over SONET gadgets.

Reasons for using these modules:

- NM-1FE-TX

First and foremost, not much port is required. Moreover, the NM-4T has not the capability of supporting async mode. However, there is an issue regarding the NM-NAM which is about the shortage of required services.

- WIC-1T

Apart from the fact that the WIC-2T has the capability of endorsing a speed of 8 Mbps per port maximum, still, not many ports are required.

4.

Firstly, both are having different netmasks.

/30 255.255.255.252

/24 255.255.255.0

Also, subnet 24 is considered to have 254 host addresses. On the other hand, subnet 30, can be referred to as the tiniest subnet as it has 2 host addresses. As a result, subnet 30 will become more profitable since it the necessity of having more hosts in a private link.

2. Problem 2

1. Parameter's definitions:

❖ Ip

It will be referred to as the Ip address of the router which is expected to be connected to.

❖ Mask

It will be referred to as the subset of the Ip address. In our case, we have two subnets which are 24 and 30.

❖ Router interface

It will be referred to as the interface of the Ip address which is expected to be used by a router for establishing a connection. Simply, it can be recognized by the following examples:

F0/0, s0/0, f0/1, etc.

❖ Metric:

To evaluate the importance and priority, a metric which is a process number will be used.

2.



The screenshot shows a Solar-PuTTY terminal window with tabs for R1, R2, R3, R4, and PC1. The PC1 tab is active. The terminal output shows the following commands and results:

```
Checking for duplicate address...
PC1 : 10.0.0.2 255.255.255.0 gateway 10.0.0.1

PC1> ping 10.0.1.1
10.0.1.1 icmp_seq=1 timeout
10.0.1.1 icmp_seq=2 timeout
10.0.1.1 icmp_seq=3 timeout
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=60.986 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=63.123 ms

PC1> ping 10.0.1.1
84 bytes from 10.0.1.1 icmp_seq=1 ttl=61 time=63.130 ms
84 bytes from 10.0.1.1 icmp_seq=2 ttl=61 time=60.404 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=61.384 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=64.207 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=50.075 ms

PC1> trace 10.0.1.1
trace to 10.0.1.1, 8 hops max, press Ctrl+C to stop
 1  10.0.0.1    6.095 ms  10.354 ms  10.370 ms
 2  10.0.3.6   31.191 ms  20.123 ms  19.257 ms
 3  10.0.3.10  43.046 ms  43.310 ms  31.164 ms
 4  *10.0.1.1  41.169 ms (ICMP type:3, code:3, Destination port unreachable)

PC1>
```

The bottom of the window shows the SolarWinds logo and the text "Solar-PuTTY free tool" and "© 2019 SolarWinds Worldwide, LLC. All rights reserved."

As can be observed in the above picture, the route has been initiated from PC1. Therefore, it has reached R1. Therefore, it will go to the R2(100Mbps) with the Ip address of 10.0.3.6. Then, it will go to the next router which is R3. As a result, it will go to the R4 with the Ip address of 10.0.3.10. Eventually, it will reach PC2.

3.

The screenshot shows a SolarWinds Solar-PuTTY terminal window with tabs for R1, PC1, and R4. The PC1 tab is active, displaying the output of a series of ping commands to the IP address 10.0.1.1. The first five pings (seq=1 to 5) all result in 'Destination host unreachable' (ICMP type:3, code:1). The next five pings (seq=6 to 10) show successful responses with varying TTLs (61) and times (ranging from 55.502 ms to 78.213 ms). The final command is a continuous ping (-c 99), which shows successful responses for the first seven sequences (seq=1 to 7) and then a mix of 'Destination host unreachable' and successful responses for the remaining sequences (seq=8 to 15).

```

PC1> ping 10.0.1.1
10.0.1.1 icmp_seq=1 timeout
*10.0.0.1 icmp_seq=2 ttl=255 time=10.759 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=3 ttl=255 time=8.254 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=4 ttl=255 time=10.999 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=5 ttl=255 time=3.304 ms (ICMP type:3, code:1, Destination host unreachable)

PC1> ping 10.0.1.1
10.0.1.1 icmp_seq=1 timeout
10.0.1.1 icmp_seq=2 timeout
10.0.1.1 icmp_seq=3 timeout
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=62.323 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=62.895 ms

PC1> ping 10.0.1.1
84 bytes from 10.0.1.1 icmp_seq=1 ttl=61 time=55.502 ms
84 bytes from 10.0.1.1 icmp_seq=2 ttl=61 time=57.583 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=78.213 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=60.506 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=61.267 ms

PC1> ping 10.0.1.1 -c 99
84 bytes from 10.0.1.1 icmp_seq=1 ttl=61 time=62.486 ms
84 bytes from 10.0.1.1 icmp_seq=2 ttl=61 time=55.521 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=64.323 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=63.212 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=58.546 ms
84 bytes from 10.0.1.1 icmp_seq=6 ttl=61 time=56.138 ms
84 bytes from 10.0.1.1 icmp_seq=7 ttl=61 time=57.803 ms
10.0.1.1 icmp_seq=8 timeout
*10.0.0.1 icmp_seq=9 ttl=255 time=17.791 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=10 ttl=255 time=7.806 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=11 ttl=255 time=11.271 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=12 ttl=255 time=1.193 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=13 ttl=255 time=5.617 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=14 ttl=255 time=1.885 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=15 ttl=255 time=5.808 ms (ICMP type:3, code:1, Destination host unreachable)

PC1>

```

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4.

The screenshot shows a SolarWinds Solar-PuTTY terminal window with tabs for R1, R2, R3, R4, and PC1. The PC1 tab is active, displaying the output of a continuous ping (-c 99) and a trace command to the IP address 10.0.1.1. The ping command shows successful responses for the first seven sequences (seq=3 to 9) and then a mix of 'Destination host unreachable' and successful responses for the remaining sequences (seq=10 to 20). The trace command shows the path from PC1 to 10.0.1.1, with 8 hops max, and the results for the first three hops.

```

PC1> ping 10.0.1.1 -c 99
10.0.1.1 icmp_seq=1 timeout
10.0.1.1 icmp_seq=2 timeout
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=59.648 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=59.033 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=58.520 ms
84 bytes from 10.0.1.1 icmp_seq=6 ttl=61 time=61.762 ms
84 bytes from 10.0.1.1 icmp_seq=7 ttl=61 time=61.163 ms
*10.0.0.1 icmp_seq=8 ttl=255 time=17.506 ms (ICMP type:3, code:1, Destination host unreachable)
10.0.1.1 icmp_seq=9 timeout
10.0.1.1 icmp_seq=10 timeout
10.0.1.1 icmp_seq=11 timeout
10.0.1.1 icmp_seq=12 timeout
84 bytes from 10.0.1.1 icmp_seq=13 ttl=62 time=37.888 ms
84 bytes from 10.0.1.1 icmp_seq=14 ttl=62 time=41.216 ms
84 bytes from 10.0.1.1 icmp_seq=15 ttl=62 time=26.803 ms
84 bytes from 10.0.1.1 icmp_seq=16 ttl=62 time=32.830 ms
84 bytes from 10.0.1.1 icmp_seq=17 ttl=62 time=38.263 ms
84 bytes from 10.0.1.1 icmp_seq=18 ttl=62 time=43.301 ms
84 bytes from 10.0.1.1 icmp_seq=19 ttl=62 time=35.209 ms
84 bytes from 10.0.1.1 icmp_seq=20 ttl=62 time=43.860 ms

PC1> trace 10.0.1.1
trace to 10.0.1.1, 8 hops max, press Ctrl+C to stop
 1  10.0.0.1   3.400 ms  10.185 ms  10.431 ms
 2  10.0.3.14  41.056 ms  31.236 ms  30.052 ms
 3  *10.0.1.1  41.266 ms (ICMP type:3, code:3, Destination port unreachable)

PC1>

```

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After shutting down the routes of two sides, a new route has been chosen which has been shown by using the traceroute command. What it means is that, in the new path, the middle way has been chosen (10.0.3.14).

3. Problem 3

1.



The screenshot shows a SolarWinds Solar-PuTTY terminal window with tabs for R1, R2, R3, R4, and PC1. The terminal output is as follows:

```
Press '?' to get help.
Executing the startup file

Checking for duplicate address...
PC1 : 10.0.0.2 255.255.255.0 gateway 10.0.0.1

PC1> ping 10.0.1.1
10.0.1.1 icmp_seq=1 timeout
84 bytes from 10.0.1.1 icmp_seq=2 ttl=62 time=26.288 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=62 time=28.891 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=62 time=23.398 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=62 time=30.006 ms

PC1> ping 10.0.1.1
84 bytes from 10.0.1.1 icmp_seq=1 ttl=62 time=44.320 ms
84 bytes from 10.0.1.1 icmp_seq=2 ttl=62 time=39.343 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=62 time=35.438 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=62 time=38.651 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=62 time=35.985 ms

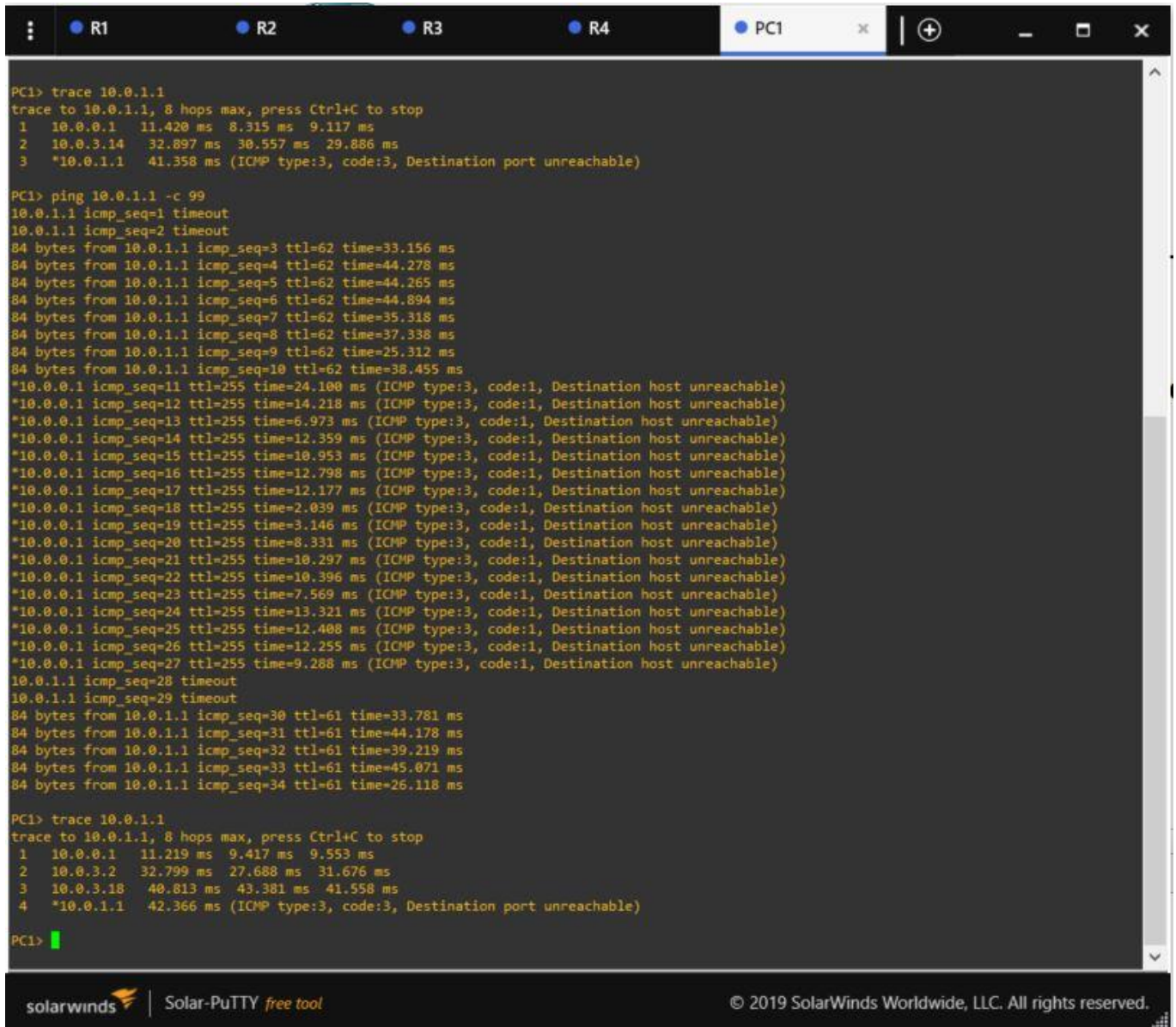
PC1> trace 10.0.1.1
trace to 10.0.1.1, 8 hops max, press Ctrl+C to stop
 1  10.0.0.1   11.420 ms  8.315 ms  9.117 ms
 2  10.0.3.14  32.897 ms  30.557 ms  29.886 ms
 3  *10.0.1.1  41.358 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> 
```

The footer of the terminal window displays the SolarWinds logo, "Solar-PuTTY free tool", and the copyright notice "© 2019 SolarWinds Worldwide, LLC. All rights reserved."

As can be seen in the above screenshot, I have ping PC1 to PC2. Consequently, I have used the traceroute command to find out about the route. As a result, the path is from PC1 to R1 to R4 and finally to PC2.

2.



```
PC1> trace 10.0.1.1
trace to 10.0.1.1, 8 hops max, press Ctrl+C to stop
 1  10.0.0.1  11.420 ms  8.315 ms  9.117 ms
 2  10.0.3.14  32.897 ms  30.557 ms  29.886 ms
 3  *10.0.1.1  41.358 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> ping 10.0.1.1 -c 99
10.0.1.1 icmp_seq=1 timeout
10.0.1.1 icmp_seq=2 timeout
84 bytes from 10.0.1.1 icmp_seq=3 ttl=62 time=33.156 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=62 time=44.278 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=62 time=44.265 ms
84 bytes from 10.0.1.1 icmp_seq=6 ttl=62 time=44.894 ms
84 bytes from 10.0.1.1 icmp_seq=7 ttl=62 time=35.318 ms
84 bytes from 10.0.1.1 icmp_seq=8 ttl=62 time=37.338 ms
84 bytes from 10.0.1.1 icmp_seq=9 ttl=62 time=25.312 ms
84 bytes from 10.0.1.1 icmp_seq=10 ttl=62 time=38.455 ms
*10.0.0.1 icmp_seq=11 ttl=255 time=24.100 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=12 ttl=255 time=14.218 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=13 ttl=255 time=6.973 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=14 ttl=255 time=12.359 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=15 ttl=255 time=10.953 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=16 ttl=255 time=12.798 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=17 ttl=255 time=12.177 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=18 ttl=255 time=2.039 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=19 ttl=255 time=3.146 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=20 ttl=255 time=8.331 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=21 ttl=255 time=10.297 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=22 ttl=255 time=10.396 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=23 ttl=255 time=7.569 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=24 ttl=255 time=13.321 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=25 ttl=255 time=12.408 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=26 ttl=255 time=12.255 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=27 ttl=255 time=9.288 ms (ICMP type:3, code:1, Destination host unreachable)
10.0.1.1 icmp_seq=28 timeout
10.0.1.1 icmp_seq=29 timeout
84 bytes from 10.0.1.1 icmp_seq=30 ttl=61 time=33.781 ms
84 bytes from 10.0.1.1 icmp_seq=31 ttl=61 time=44.178 ms
84 bytes from 10.0.1.1 icmp_seq=32 ttl=61 time=39.219 ms
84 bytes from 10.0.1.1 icmp_seq=33 ttl=61 time=45.071 ms
84 bytes from 10.0.1.1 icmp_seq=34 ttl=61 time=26.118 ms

PC1> trace 10.0.1.1
trace to 10.0.1.1, 8 hops max, press Ctrl+C to stop
 1  10.0.0.1  11.219 ms  9.417 ms  9.553 ms
 2  10.0.3.2  32.799 ms  27.688 ms  31.676 ms
 3  10.0.3.18  40.813 ms  43.381 ms  41.558 ms
 4  *10.0.1.1  42.366 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> █
```

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Similarly, to the previous picture initially, the route will be PC1 to R1 to R4 to PC2. However, after taking a continuous path and shutting the routers the path will change and it will choose a new path. That is, it kicks off from PC1 to R1 to R3 to R4 until it reaches PC2. However, this is not the efficient path that was chosen by the RIPV2. On the other hand, this is the alternative path again chosen by the RIPV2 randomly.

4. Problem 4

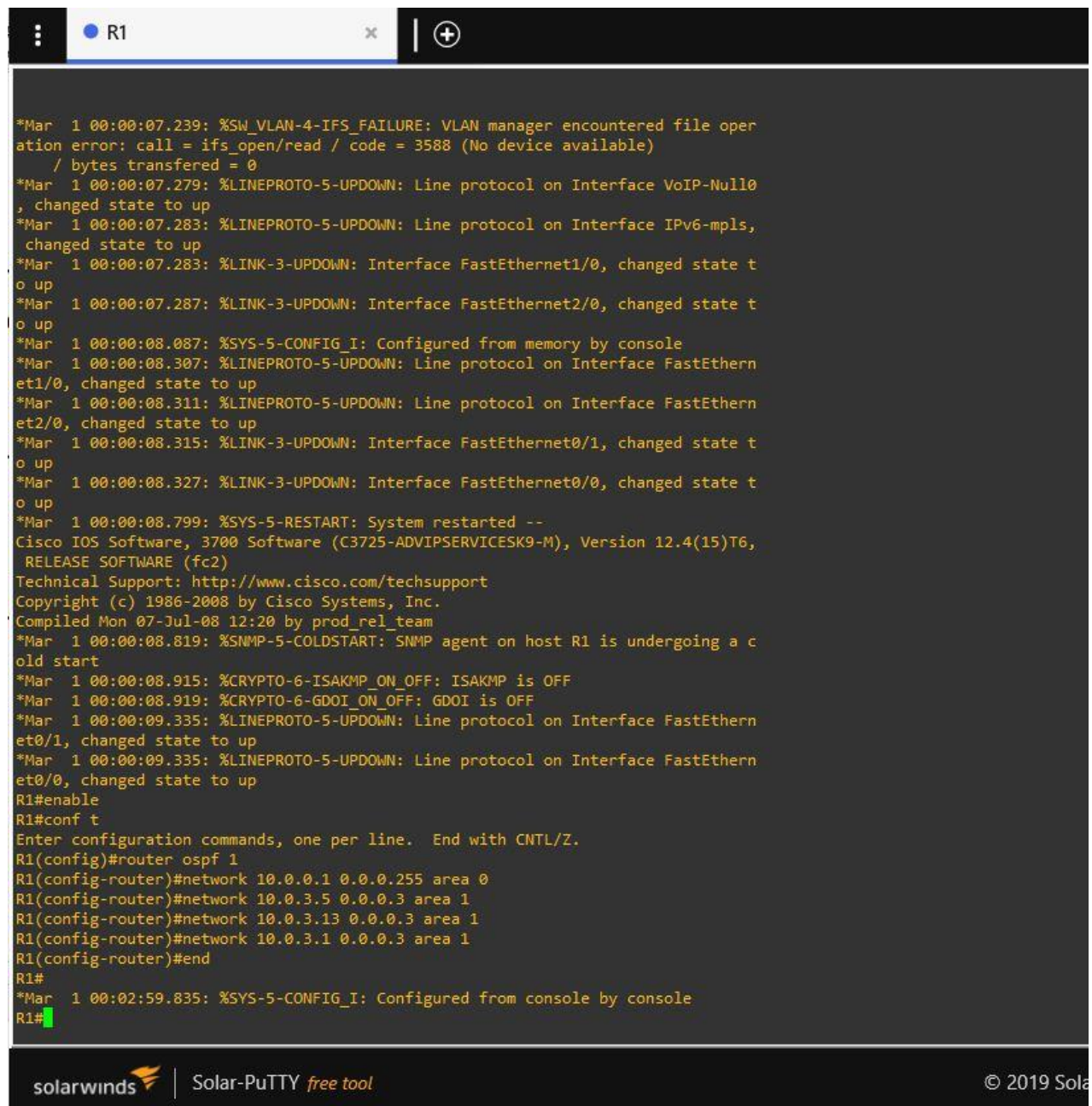
1.

When it comes to the selection of the most convenient path by the OSPF, if a route has the lowest worth of the cost, it will be chosen as the best route. The way for calculating the cost is based on the bandwidth. Also, two wild card masks have been used which are:

0.0.0.255

0.0.0.3

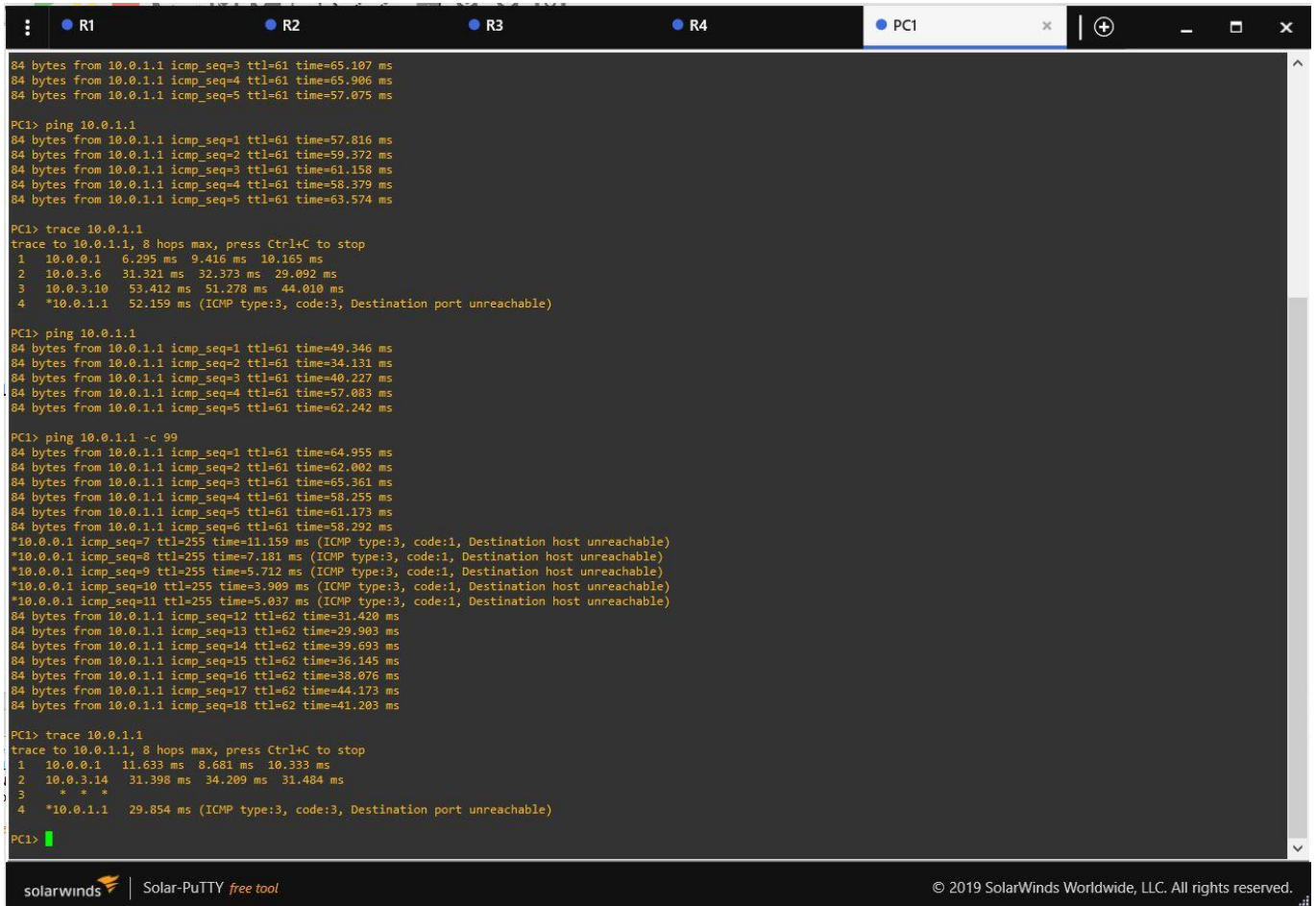
For example, the following screen shot will clearly demonstrate the above statement in more details.



```
*Mar 1 00:00:07.239: %SW_VLAN-4-IFS_FAILURE: VLAN manager encountered file oper
ation error: call = ifs_open/read / code = 3588 (No device available)
/ bytes transferred = 0
*Mar 1 00:00:07.279: %LINEPROTO-5-UPDOWN: Line protocol on Interface VoIP-Null0
, changed state to up
*Mar 1 00:00:07.283: %LINEPROTO-5-UPDOWN: Line protocol on Interface IPv6-mpls,
changed state to up
*Mar 1 00:00:07.283: %LINK-3-UPDOWN: Interface FastEthernet1/0, changed state t
o up
*Mar 1 00:00:07.287: %LINK-3-UPDOWN: Interface FastEthernet2/0, changed state t
o up
*Mar 1 00:00:08.087: %SYS-5-CONFIG_I: Configured from memory by console
*Mar 1 00:00:08.307: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et1/0, changed state to up
*Mar 1 00:00:08.311: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et2/0, changed state to up
*Mar 1 00:00:08.315: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state t
o up
*Mar 1 00:00:08.327: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Mar 1 00:00:08.799: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 3700 Software (C3725-ADVIPSERVICESK9-M), Version 12.4(15)T6,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2008 by Cisco Systems, Inc.
Compiled Mon 07-Jul-08 12:20 by prod_rel_team
*Mar 1 00:00:08.819: %SNMP-5-COLDSTART: SNMP agent on host R1 is undergoing a c
old start
*Mar 1 00:00:08.915: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Mar 1 00:00:08.919: %CRYPTO-6-GDOI_ON_OFF: GDOI is OFF
*Mar 1 00:00:09.335: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/1, changed state to up
*Mar 1 00:00:09.335: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
R1#enable
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#network 10.0.0.1 0.0.0.255 area 0
R1(config-router)#network 10.0.3.5 0.0.0.3 area 1
R1(config-router)#network 10.0.3.13 0.0.0.3 area 1
R1(config-router)#network 10.0.3.1 0.0.0.3 area 1
R1(config-router)#end
R1#
*Mar 1 00:02:59.835: %SYS-5-CONFIG_I: Configured from console by console
R1#
```

Moving on, different areas have been used based on each router configuration such as area 0, and area 1. More detail about the path will be written in the next part.

2.



```
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=65.107 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=65.906 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=57.075 ms

PC1> ping 10.0.1.1
84 bytes from 10.0.1.1 icmp_seq=1 ttl=61 time=57.816 ms
84 bytes from 10.0.1.1 icmp_seq=2 ttl=61 time=59.372 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=61.158 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=58.379 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=63.574 ms

PC1> trace 10.0.1.1
trace to 10.0.1.1, 8 hops max, press Ctrl+C to stop
 1  10.0.0.1    6.295 ms  9.416 ms  10.165 ms
 2  10.0.3.6    31.321 ms 32.373 ms 29.092 ms
 3  10.0.3.10   53.412 ms 51.278 ms 44.010 ms
 4  *10.0.1.1   52.159 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> ping 10.0.1.1
84 bytes from 10.0.1.1 icmp_seq=1 ttl=61 time=49.346 ms
84 bytes from 10.0.1.1 icmp_seq=2 ttl=61 time=34.131 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=40.227 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=57.083 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=62.242 ms

PC1> ping 10.0.1.1 -c 99
84 bytes from 10.0.1.1 icmp_seq=1 ttl=61 time=64.955 ms
84 bytes from 10.0.1.1 icmp_seq=2 ttl=61 time=62.002 ms
84 bytes from 10.0.1.1 icmp_seq=3 ttl=61 time=65.361 ms
84 bytes from 10.0.1.1 icmp_seq=4 ttl=61 time=58.255 ms
84 bytes from 10.0.1.1 icmp_seq=5 ttl=61 time=61.173 ms
84 bytes from 10.0.1.1 icmp_seq=6 ttl=61 time=58.292 ms
*10.0.0.1 icmp_seq=7 ttl=255 time=11.159 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=8 ttl=255 time=7.181 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=9 ttl=255 time=5.712 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=10 ttl=255 time=3.909 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=11 ttl=255 time=5.037 ms (ICMP type:3, code:1, Destination host unreachable)
84 bytes from 10.0.1.1 icmp_seq=12 ttl=62 time=31.420 ms
84 bytes from 10.0.1.1 icmp_seq=13 ttl=62 time=29.903 ms
84 bytes from 10.0.1.1 icmp_seq=14 ttl=62 time=39.693 ms
84 bytes from 10.0.1.1 icmp_seq=15 ttl=62 time=36.145 ms
84 bytes from 10.0.1.1 icmp_seq=16 ttl=62 time=38.076 ms
84 bytes from 10.0.1.1 icmp_seq=17 ttl=62 time=44.173 ms
84 bytes from 10.0.1.1 icmp_seq=18 ttl=62 time=41.203 ms

PC1> trace 10.0.1.1
trace to 10.0.1.1, 8 hops max, press Ctrl+C to stop
 1  10.0.0.1    11.633 ms 8.681 ms 10.333 ms
 2  10.0.3.14   31.398 ms 34.209 ms 31.484 ms
 3  * * *
 4  *10.0.1.1   29.854 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> 
```

In the above picture, initially, the path is PC1 to R1 to R2 to R4 and eventually to PC2. However, after shutting down the routers (1,4), a new path will be replaced. However, before the new path has been replaced, it is noticeable that the destination host is unreachable by shutting down the routers.

5. Problem 5

Differences between static, RIPv2, and OSPF routing methods:

Static routing:

- ✓ Its routing will be done manually.
- ✓ It will be implemented in the small networks.
- ✓ User will define the routes in static routing.
- ✓ It will not use complicated routing algorithms.
- ✓ It will result in better and higher security.
- ✓ In case of link collapsing, the rerouting will be affected.
- ✓ There is no need for extra resources.

Reference:

<https://www.geeksforgeeks.org/difference-between-static-and-dynamic-routing/>

RIPv2:

- ✓ It can be referred to as distance-vector routing protocol.
- ✓ It can support class-full and classless networks.
- ✓ It will send off-subnet masks to routing tables.
- ✓ It can be supportive for manual route summarization.
- ✓ The limitation of hop count is 15.
- ✓ It can bring about trigger updates.
- ✓ Oppose to the RIPv1 it is more secure.
- ✓ It will take advantage of Multicast traffic for the updates.
- ✓ It can support verification.

Reference:

<https://www.geeksforgeeks.org/differences-between-ripv1-and-ripv2/>

OSPF:

- ✓ It is known as open shortest path first.
- ✓ Its functionality can be seen on the Dijkstra algorithm.
- ✓ The distance of its administration is 110.
- ✓ The protocol for which it is working is IP.
- ✓ Unlike RIP, OSPF is considered a more intelligent routing protocol.
- ✓ The calculation of the metric will be done by the terms of bandwidth.
- ✓ The classification of the networks is like areas, sub-areas, autonomous systems, and backbone areas.
- ✓ When it comes to the hop count, no restrictions can be found.
- ✓ Larger size organization will be in the network will be used.
- ✓ Since it is a state protocol, it will examine different criteria such as speed, cost, and path congestion while identifying the shortest path.

Reference:

<https://www.geeksforgeeks.org/difference-between-rip-and-ospf/>