Linnéuniversitetet
Kalmar Växjö

Linnaeus University

Faculty of Technology – Department of Computer Science

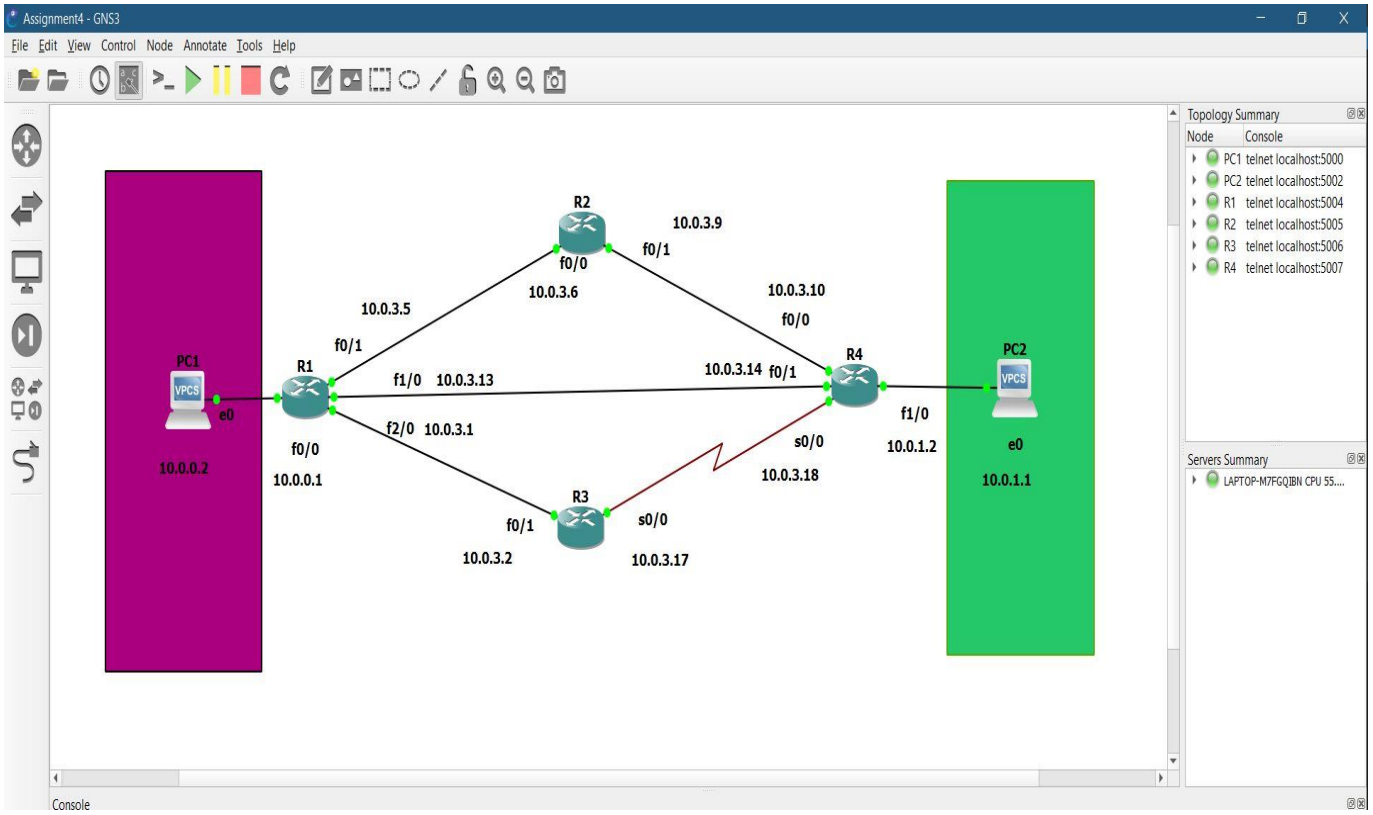
1DV701 - Computer Networks – an introduction

Student: Mohammadali Rashidfarokhi

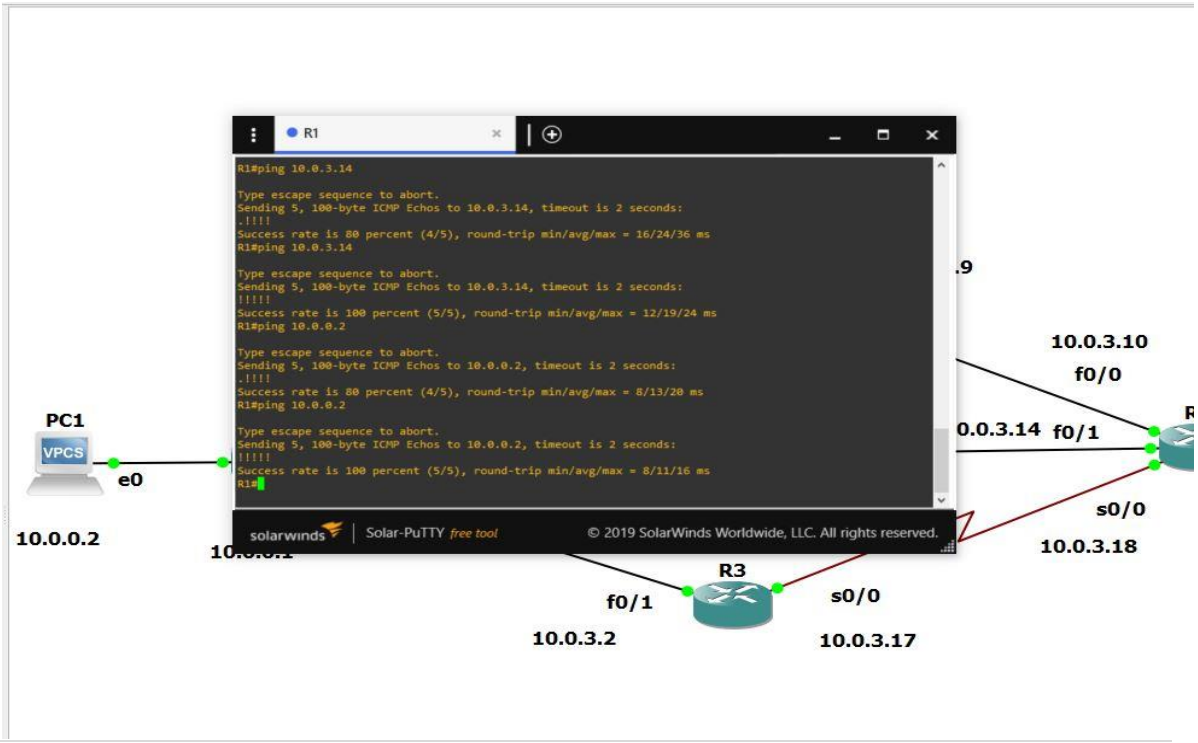
Assignment 4

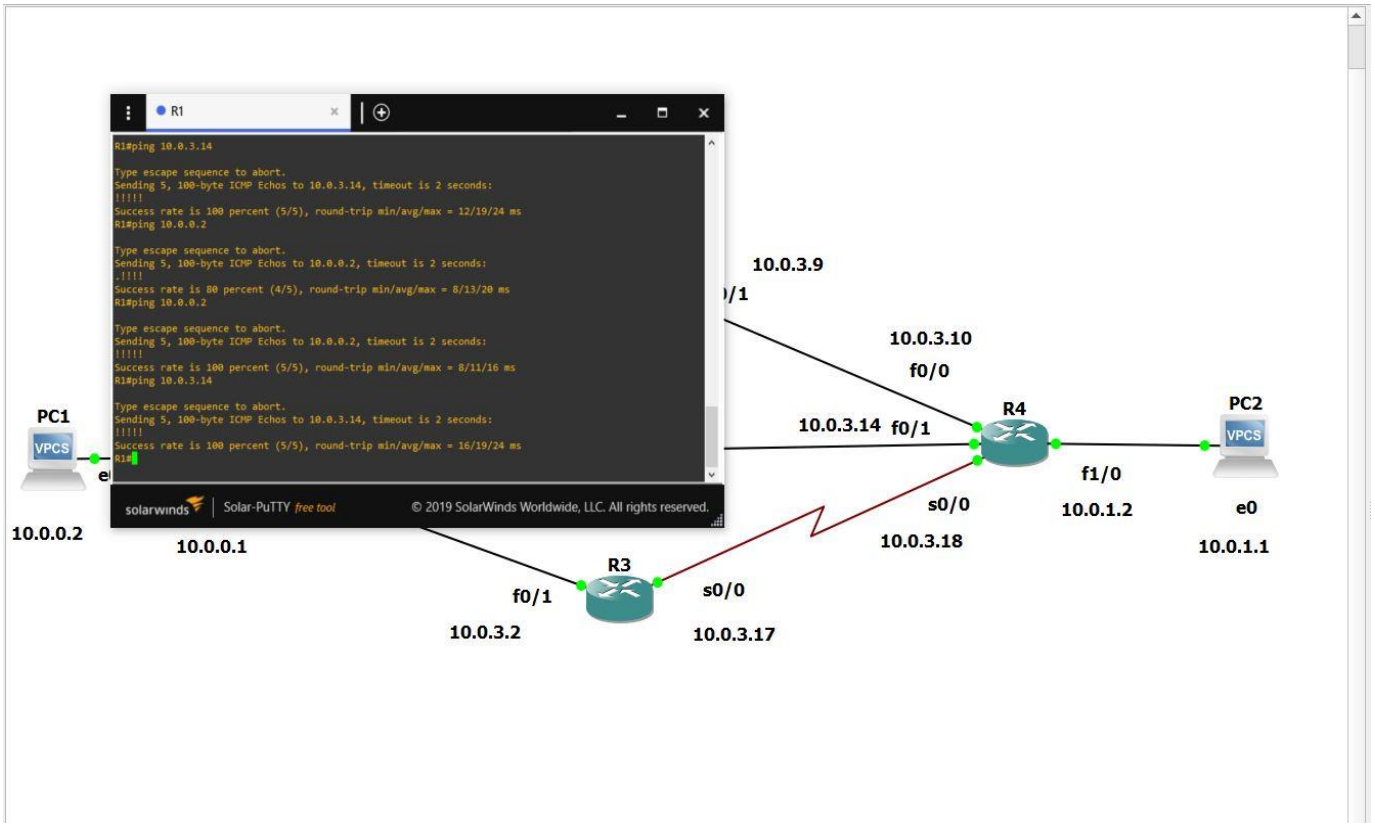
1. Problem 1

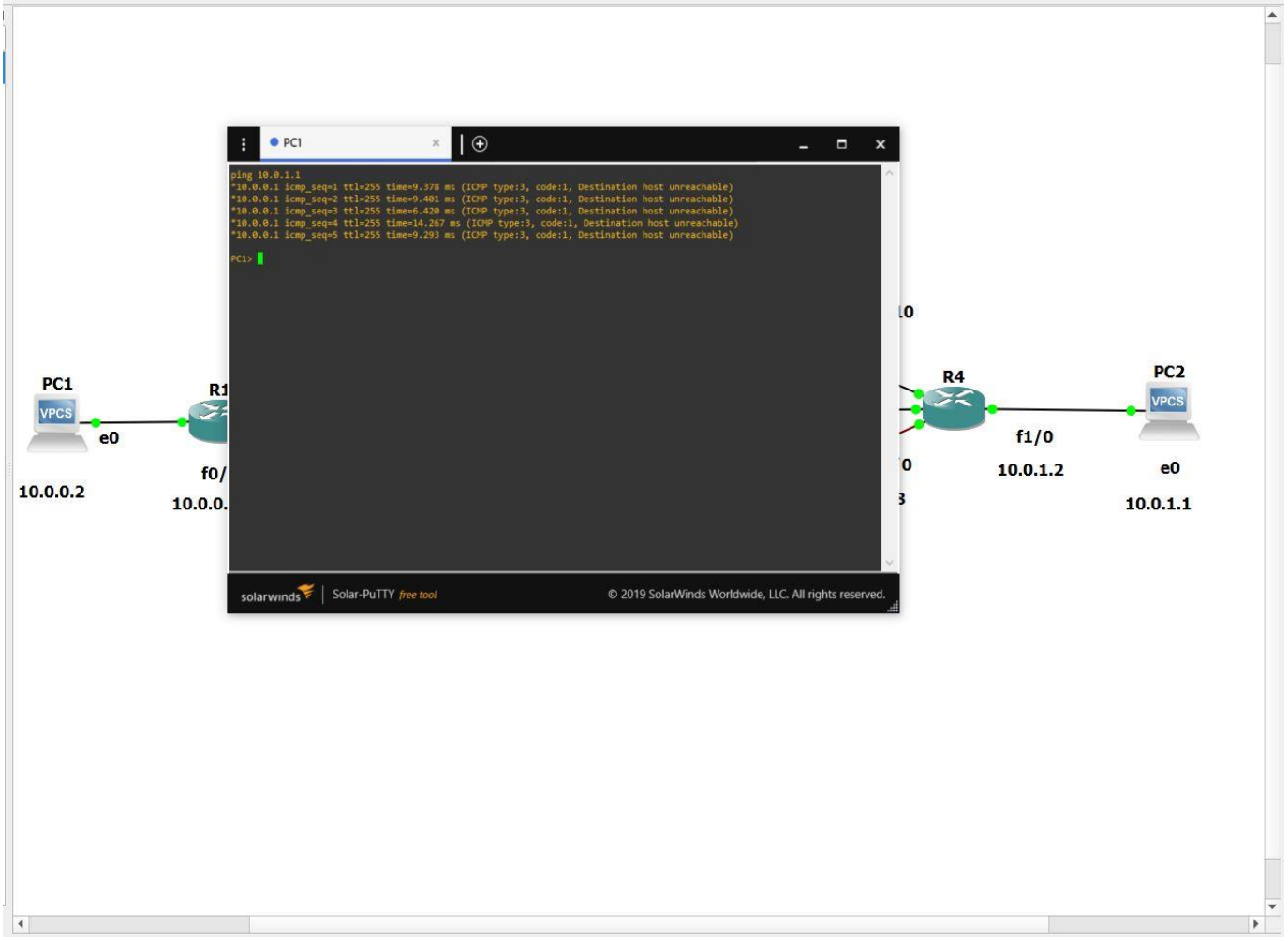
1.



2.




R1
R1#ping 10.0.3.14
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.3.14, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/19/24 ms
R1#ping 10.0.0.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/13/20 ms
R1#ping 10.0.0.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/11/16 ms
R1#ping 10.0.3.14
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.3.14, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/19/24 ms
R1#
solarwinds | Solar-PuTTY free tool
© 2019 SolarWinds Worldwide, LLC. All rights reserved.
10.0.3.9
10.0.3.10
f0/0
10.0.3.14
f0/1
R4
PC2
VPCS
f1/0
10.0.1.2
e0
10.0.1.1
PC1
VPCS
10.0.0.2
10.0.0.1
s0/0
10.0.3.18
R3
f0/1
10.0.3.2
s0/0
10.0.3.17


PC1
ping 10.0.1.1
*10.0.0.1 icmp_seq=1 ttl=255 time=9.378 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=2 ttl=255 time=9.401 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=3 ttl=255 time=6.420 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=4 ttl=255 time=14.267 ms (ICMP type:3, code:1, Destination host unreachable)
*10.0.0.1 icmp_seq=5 ttl=255 time=9.293 ms (ICMP type:3, code:1, Destination host unreachable)
PC1>
solarwinds | Solar-PuTTY free tool
© 2019 SolarWinds Worldwide, LLC. All rights reserved.
PC1
VPCS
e0
10.0.0.2
R4
PC2
VPCS
f1/0
10.0.1.2
e0
10.0.1.1

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.

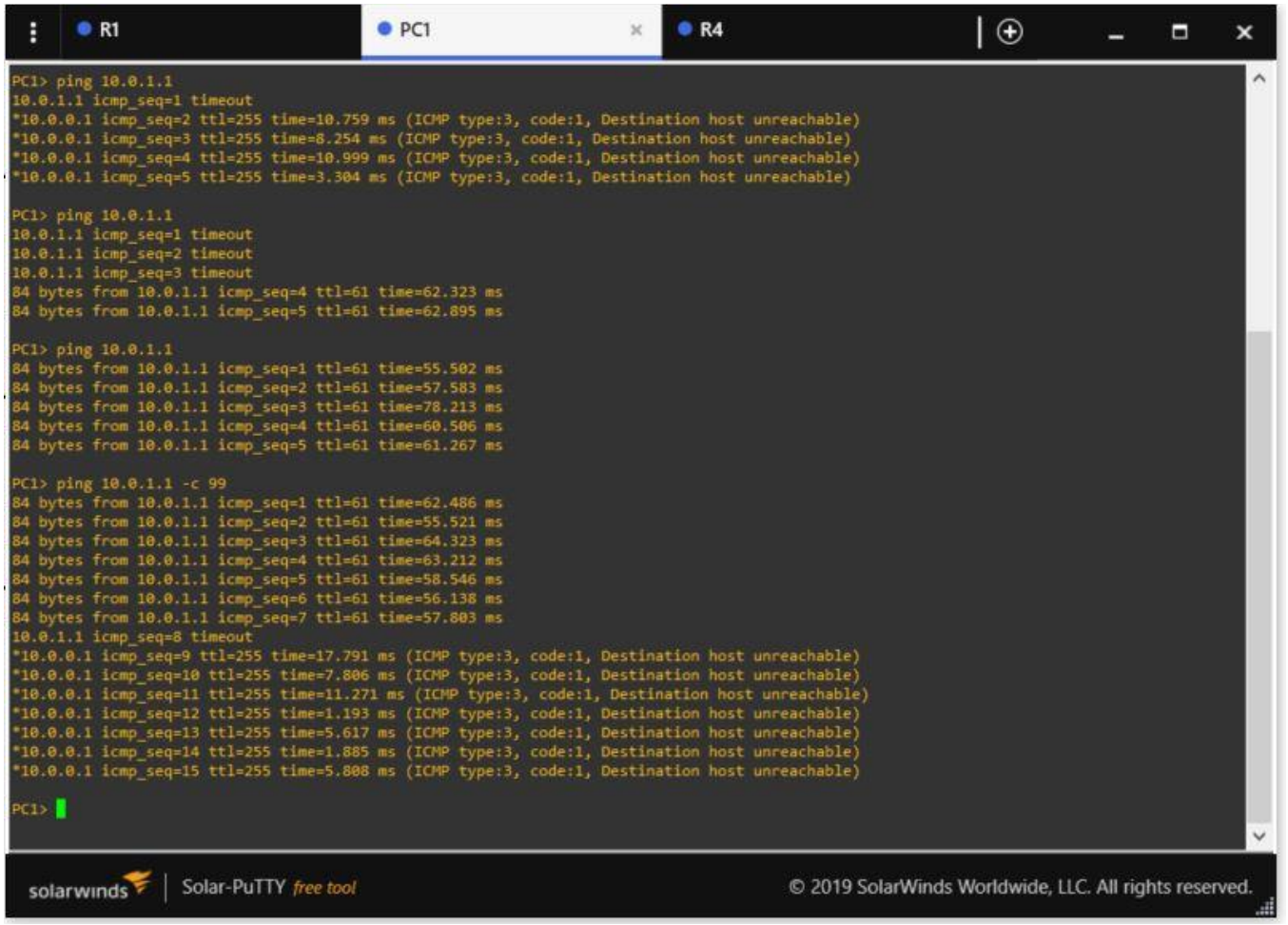
- Metric:

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

2.

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.


R1
PC1
R4
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>
solarwinds
Solar-PuTTY free tool
© 2019 SolarWinds Worldwide, LLC. All rights reserved.

4.


R1
R2
R3
R4
PC1
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>
solarwinds
Solar-PuTTY free tool
© 2019 SolarWinds Worldwide, LLC. All rights reserved.

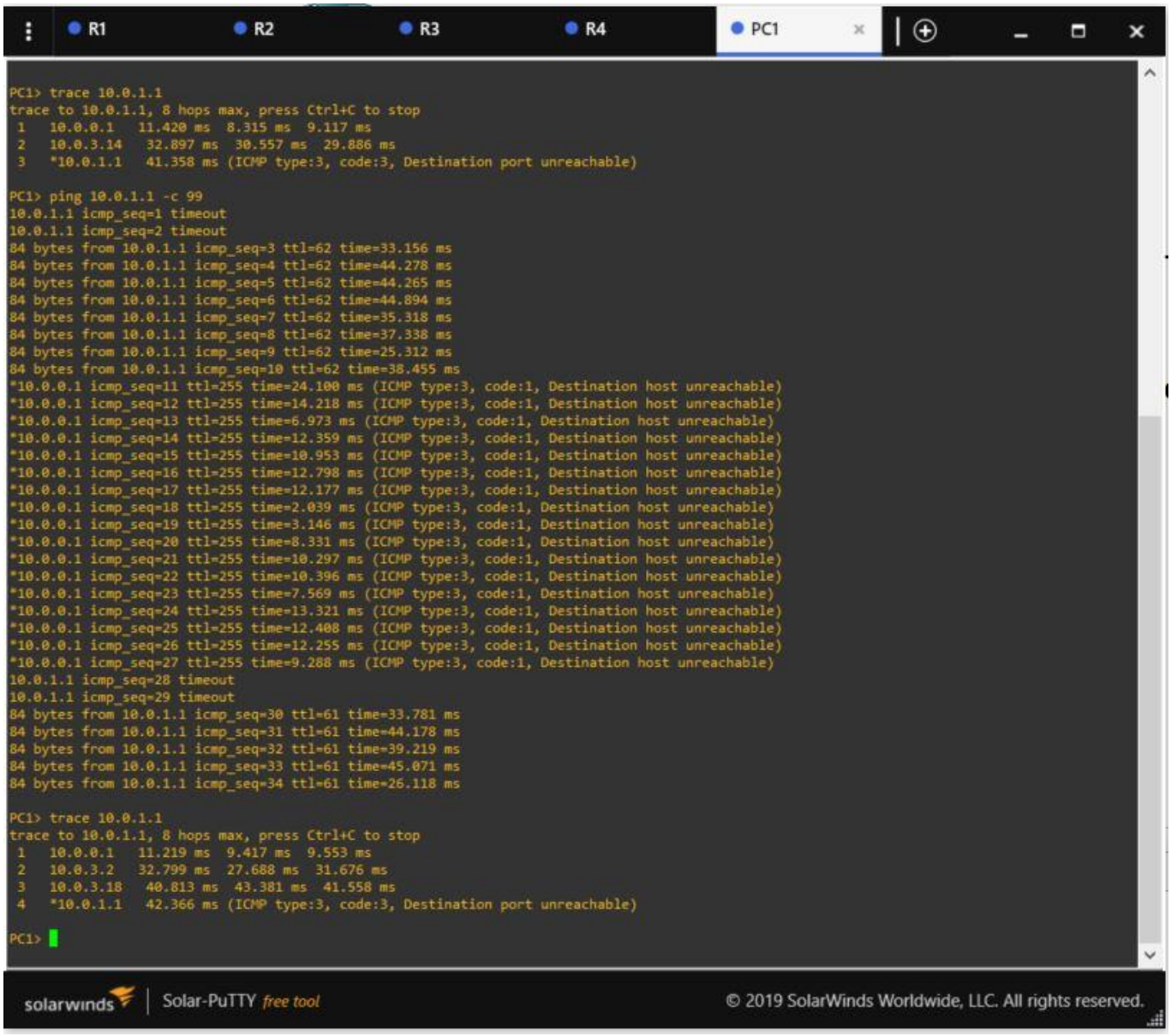
After shutting down the routes of two sides, a new route has been chosen which has been shown by using the traceroute command. What it means is that, in the new path, the middle way has been chosen (10.0.3.14).

3. Problem 3

1.

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.



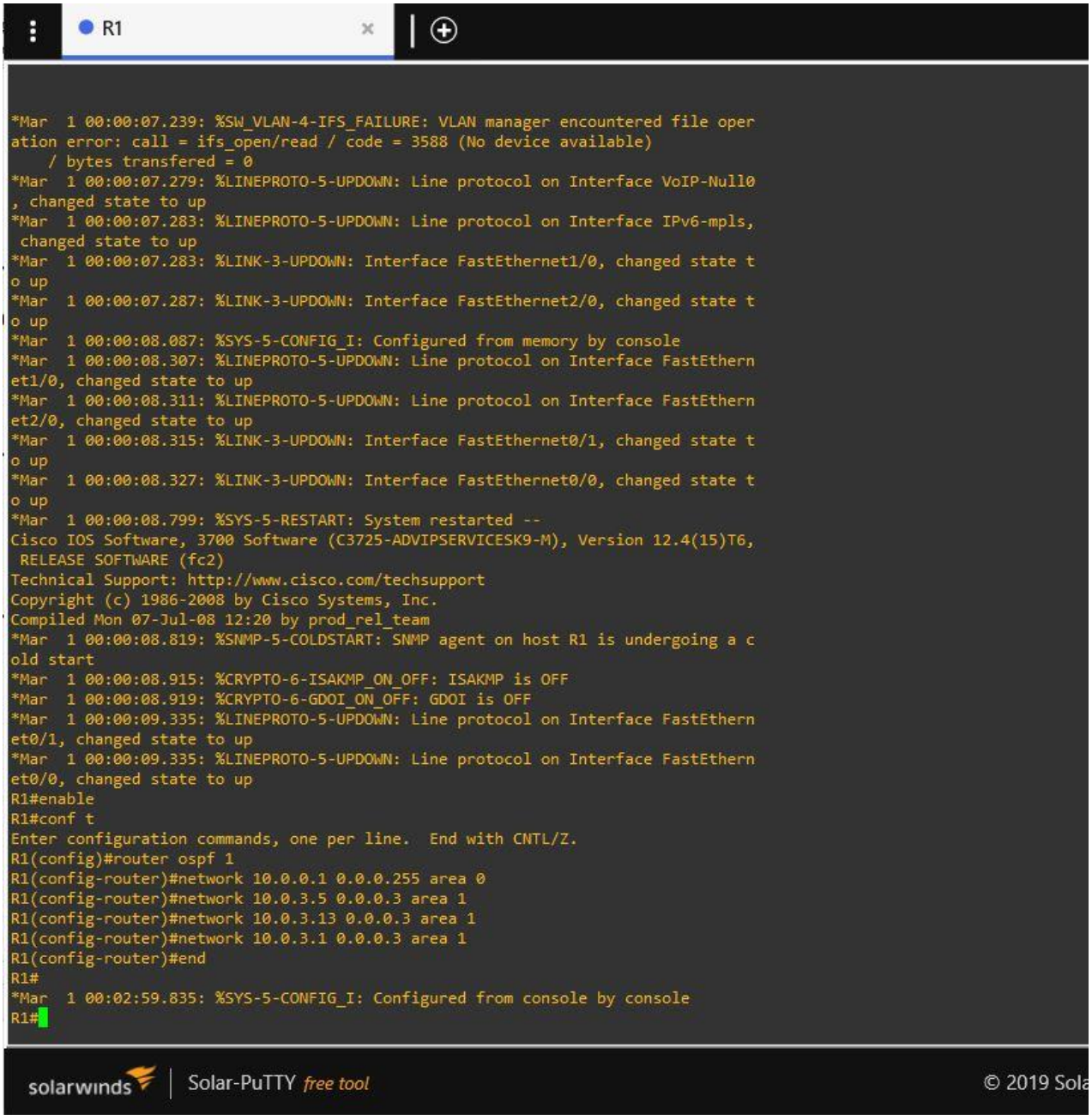
Similarly, to the previous picture initially, the route will be PC1 to R1 to R4 to PC2. However, after taking a continuous path and shutting the routers the path will change and it will choose a new path. That is, it kicks off from PC1 to R1 to R3 to R4 until it reaches PC2. However, this is not the 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.

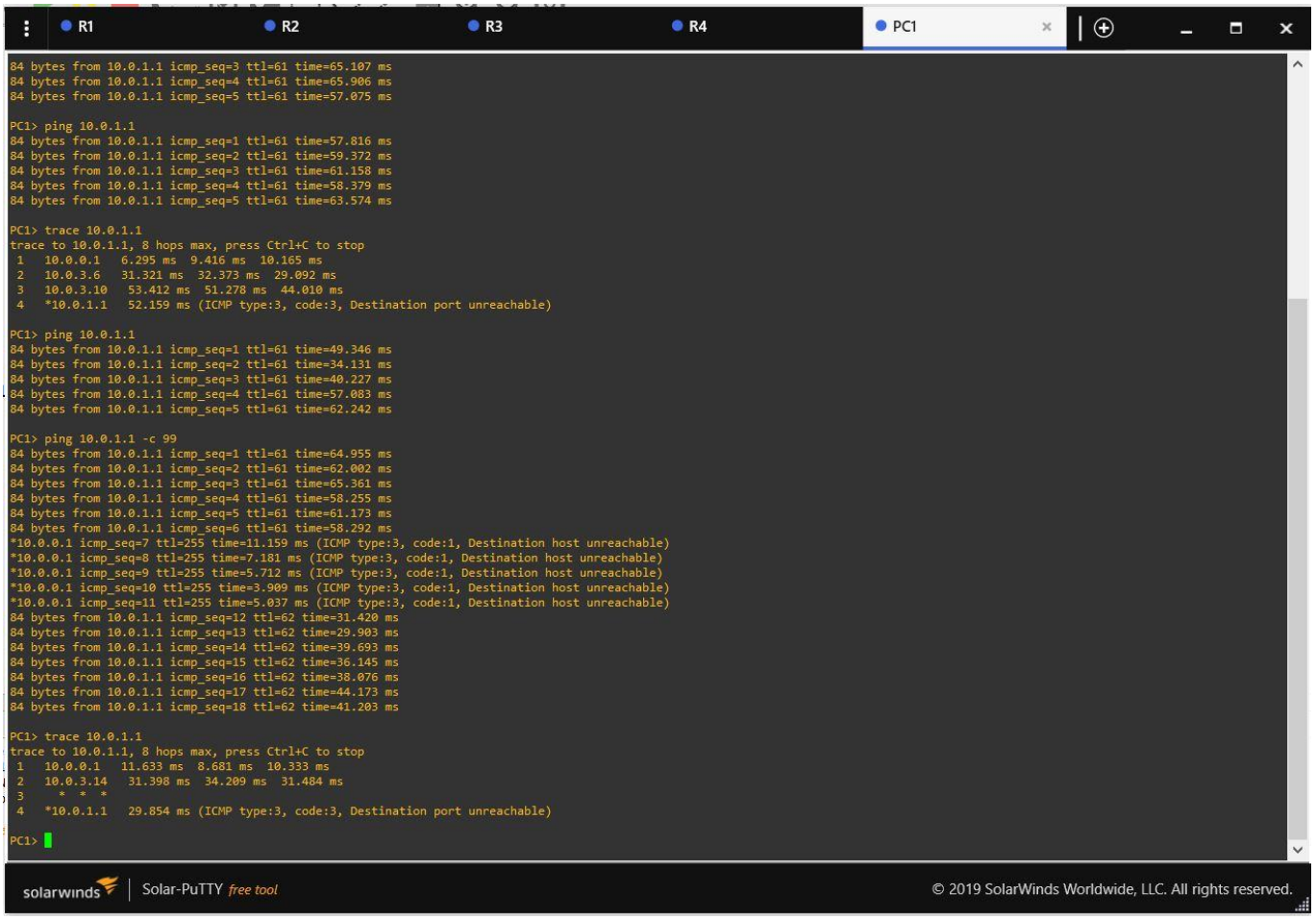
When it comes to the selection of the most convenient path by the OSPF, if a route has the lowest worth of the cost, it will be chosen as the best route. The way for calculating the cost is based on the bandwidth. Also, two wild card masks have been used which are:
0.0.0.255
0.0.0.3

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



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.



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/