COMPUTER NETWORK

SECTION 02

PROJECT (TASK 4)

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GROUP NAME : NetSecret

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UPDATED TOPOLOGY

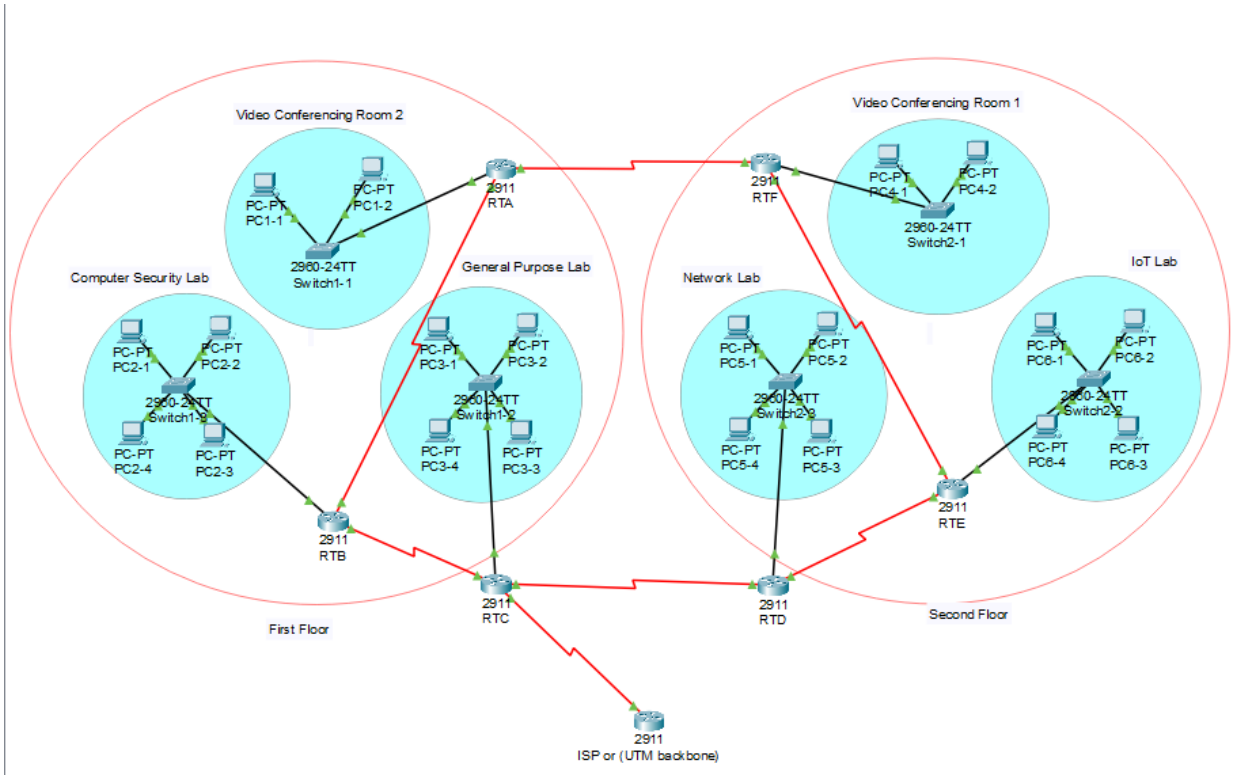

Figure 1.0 shows updated topology

Justification on updating the topology

Previously, our group used only one router on each floor. Using The topology it is not possible to show multiple routing protocols. In order to overcome the problem, we came with this new topology. Here, we have one router for every room which is a total of 7 routers (6 routers + 1 for ISP). Providing a router for each lan increases efficiency of our network.

Route highlights

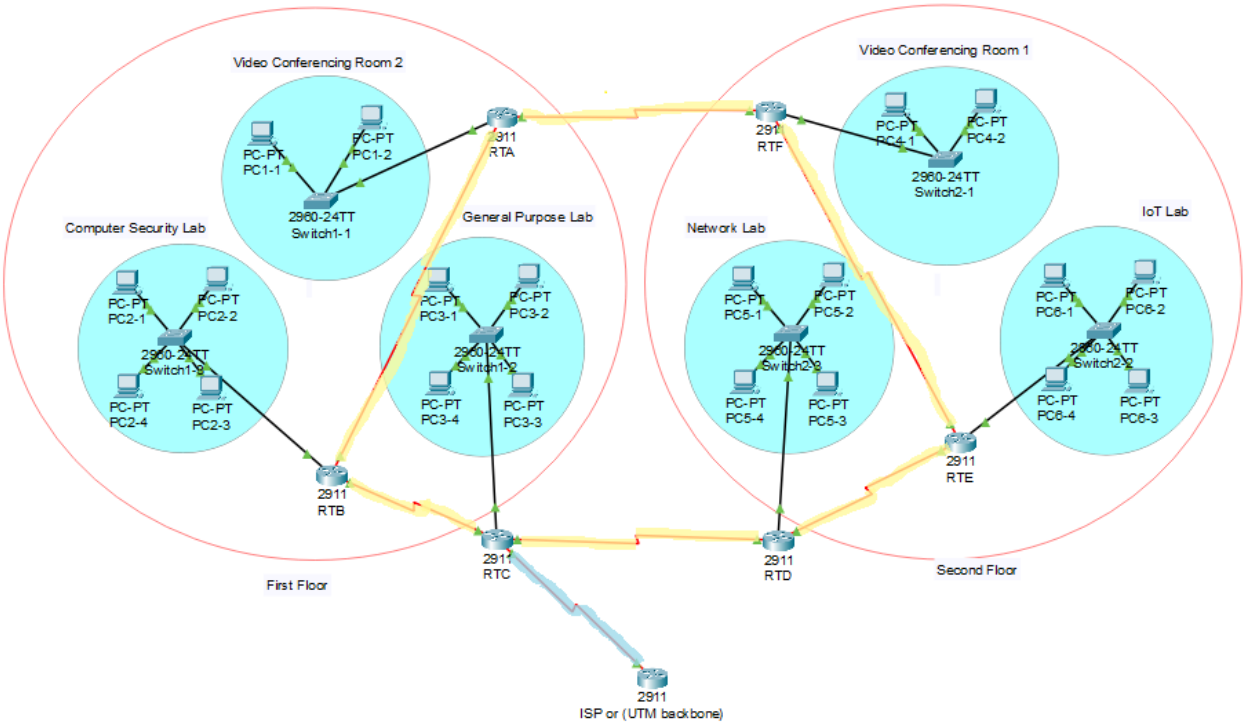

Figure 2.0 shows highlighted topology

Routes that are highlighted in orange in figure 2.0 are dynamic routes. Basically, in our topology routers that are inside the building (first floor and second floor) use dynamic routing. In detail, Route from RTA to RTB, RTB to RTC, RTC to RTD, RTD to RTE, RTE to RTF and RTF to RTA. These routes are using dynamic routing. Furthermore, these routes are using Enhanced Interway Gateway Routing Protocol (EIGRP) with an AS of 1.

Whereas, the router that connected outside of the building which is an ISP router was connected statically to RTC. This route highlighted in blue in the figure 2.0

Routing Tables

RTA:

```
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 16 subnets, 5 masks
D       172.16.32.0/26 [90/3196416] via 172.16.32.230, 00:19:43, Serial0/0/0
                       [90/3196416] via 172.16.32.209, 00:19:43, Serial0/0/1
D       172.16.32.64/26 [90/2684416] via 172.16.32.209, 00:19:43, Serial0/0/1
D       172.16.32.128/27 [90/2684416] via 172.16.32.230, 00:19:43, Serial0/0/0
D       172.16.32.160/27 [90/2172416] via 172.16.32.209, 00:19:46, Serial0/0/1
D       172.16.32.192/29 [90/2172416] via 172.16.32.230, 00:19:45, Serial0/0/0
C       172.16.32.200/29 is directly connected, GigabitEthernet0/0
L       172.16.32.203/32 is directly connected, GigabitEthernet0/0
C       172.16.32.208/30 is directly connected, Serial0/0/1
L       172.16.32.210/32 is directly connected, Serial0/0/1
D       172.16.32.212/30 [90/2681856] via 172.16.32.209, 00:19:43, Serial0/0/1
D       172.16.32.216/30 [90/3193856] via 172.16.32.209, 00:19:43, Serial0/0/1
D       172.16.32.220/30 [90/3193856] via 172.16.32.230, 00:19:43, Serial0/0/0
D       172.16.32.224/30 [90/2681856] via 172.16.32.230, 00:19:45, Serial0/0/0
C       172.16.32.228/30 is directly connected, Serial0/0/0
L       172.16.32.229/32 is directly connected, Serial0/0/0
D       172.16.32.232/30 [90/3193856] via 172.16.32.209, 00:19:43, Serial0/0/1
```

RTB:

```
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 16 subnets, 5 masks
D       172.16.32.0/26 [90/2684416] via 172.16.32.213, 00:21:10, Serial0/0/1
D       172.16.32.64/26 [90/2172416] via 172.16.32.213, 00:21:10, Serial0/0/1
D       172.16.32.128/27 [90/3196416] via 172.16.32.210, 00:21:10, Serial0/0/0
                         [90/3196416] via 172.16.32.213, 00:21:10, Serial0/0/1
C       172.16.32.160/27 is directly connected, GigabitEthernet0/0
L       172.16.32.165/32 is directly connected, GigabitEthernet0/0
D       172.16.32.192/29 [90/2684416] via 172.16.32.210, 00:21:12, Serial0/0/0
S       172.16.32.200/29 [1/0] via 172.16.32.210
C       172.16.32.208/30 is directly connected, Serial0/0/0
L       172.16.32.209/32 is directly connected, Serial0/0/0
C       172.16.32.212/30 is directly connected, Serial0/0/1
L       172.16.32.214/32 is directly connected, Serial0/0/1
D       172.16.32.216/30 [90/2681856] via 172.16.32.213, 00:21:10, Serial0/0/1
D       172.16.32.220/30 [90/3193856] via 172.16.32.213, 00:21:10, Serial0/0/1
D       172.16.32.224/30 [90/3193856] via 172.16.32.210, 00:21:12, Serial0/0/0
D       172.16.32.228/30 [90/2681856] via 172.16.32.210, 00:21:13, Serial0/0/0
D       172.16.32.232/30 [90/2681856] via 172.16.32.213, 00:21:10, Serial0/0/1
```

RTC

```
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     172.16.0.0/16 is variably subnetted, 17 subnets, 5 masks
D       172.16.32.0/26 [90/2172416] via 172.16.32.217, 00:21:54, Serial0/0/1
C       172.16.32.64/26 is directly connected, GigabitEthernet0/0
L       172.16.32.69/32 is directly connected, GigabitEthernet0/0
D       172.16.32.128/27 [90/2684416] via 172.16.32.217, 00:21:54, Serial0/0/1
D       172.16.32.160/27 [90/2172416] via 172.16.32.214, 00:21:53, Serial0/0/0
D       172.16.32.192/29 [90/3196416] via 172.16.32.217, 00:21:53, Serial0/0/1
                         [90/3196416] via 172.16.32.214, 00:21:53, Serial0/0/0
D       172.16.32.200/29 [90/2684416] via 172.16.32.214, 00:21:53, Serial0/0/0
D       172.16.32.208/30 [90/2681856] via 172.16.32.214, 00:21:53, Serial0/0/0
C       172.16.32.212/30 is directly connected, Serial0/0/0
L       172.16.32.213/32 is directly connected, Serial0/0/0
```

RTD

```
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 16 subnets, 5 masks
C       172.16.32.0/26 is directly connected, GigabitEthernet0/0
L       172.16.32.5/32 is directly connected, GigabitEthernet0/0
D       172.16.32.64/26 [90/2172416] via 172.16.32.218, 00:22:34, Serial0/0/0
D       172.16.32.128/27 [90/2172416] via 172.16.32.221, 00:22:36, Serial0/0/1
D       172.16.32.160/27 [90/2684416] via 172.16.32.218, 00:22:33, Serial0/0/0
D       172.16.32.192/29 [90/2684416] via 172.16.32.221, 00:22:33, Serial0/0/1
D       172.16.32.200/29 [90/3196416] via 172.16.32.221, 00:22:33, Serial0/0/1
                         [90/3196416] via 172.16.32.218, 00:22:33, Serial0/0/0
D       172.16.32.208/30 [90/3193856] via 172.16.32.218, 00:22:33, Serial0/0/0
D       172.16.32.212/30 [90/2681856] via 172.16.32.218, 00:22:34, Serial0/0/0
C       172.16.32.216/30 is directly connected, Serial0/0/0
L       172.16.32.217/32 is directly connected, Serial0/0/0
C       172.16.32.220/30 is directly connected, Serial0/0/1
L       172.16.32.222/32 is directly connected, Serial0/0/1
D       172.16.32.224/30 [90/2681856] via 172.16.32.221, 00:22:33, Serial0/0/1
D       172.16.32.228/30 [90/3193856] via 172.16.32.221, 00:22:33, Serial0/0/1
D       172.16.32.232/30 [90/2681856] via 172.16.32.218, 00:22:34, Serial0/0/0
```

RTE

```
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 16 subnets, 5 masks
D       172.16.32.0/26 [90/2172416] via 172.16.32.222, 00:23:14, Serial0/0/0
D       172.16.32.64/26 [90/2684416] via 172.16.32.222, 00:23:12, Serial0/0/0
C       172.16.32.128/27 is directly connected, GigabitEthernet0/0
L       172.16.32.133/32 is directly connected, GigabitEthernet0/0
D       172.16.32.160/27 [90/3196416] via 172.16.32.225, 00:23:11, Serial0/0/1
                         [90/3196416] via 172.16.32.222, 00:23:11, Serial0/0/0
D       172.16.32.192/29 [90/2172416] via 172.16.32.225, 00:23:11, Serial0/0/1
D       172.16.32.200/29 [90/2684416] via 172.16.32.225, 00:23:11, Serial0/0/1
D       172.16.32.208/30 [90/3193856] via 172.16.32.225, 00:23:11, Serial0/0/1
D       172.16.32.212/30 [90/3193856] via 172.16.32.222, 00:23:12, Serial0/0/0
D       172.16.32.216/30 [90/2681856] via 172.16.32.222, 00:23:14, Serial0/0/0
C       172.16.32.220/30 is directly connected, Serial0/0/0
L       172.16.32.221/32 is directly connected, Serial0/0/0
C       172.16.32.224/30 is directly connected, Serial0/0/1
L       172.16.32.226/32 is directly connected, Serial0/0/1
D       172.16.32.228/30 [90/2681856] via 172.16.32.225, 00:23:11, Serial0/0/1
D       172.16.32.232/30 [90/3193856] via 172.16.32.222, 00:23:12, Serial0/0/0
```

RTF

```
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     172.16.0.0/16 is variably subnetted, 16 subnets, 5 masks
D       172.16.32.0/26 [90/2684416] via 172.16.32.226, 00:23:57, Serial0/0/0
D       172.16.32.64/26 [90/3196416] via 172.16.32.226, 00:23:57, Serial0/0/0
                        [90/3196416] via 172.16.32.229, 00:23:57, Serial0/0/1
D       172.16.32.128/27 [90/2172416] via 172.16.32.226, 00:23:57, Serial0/0/0
D       172.16.32.160/27 [90/2684416] via 172.16.32.229, 00:23:59, Serial0/0/1
C       172.16.32.192/29 is directly connected, GigabitEthernet0/0
L       172.16.32.195/32 is directly connected, GigabitEthernet0/0
D       172.16.32.200/29 [90/2172416] via 172.16.32.229, 00:23:59, Serial0/0/1
D       172.16.32.208/30 [90/2681856] via 172.16.32.229, 00:23:59, Serial0/0/1
D       172.16.32.212/30 [90/3193856] via 172.16.32.229, 00:23:57, Serial0/0/1
D       172.16.32.216/30 [90/3193856] via 172.16.32.226, 00:23:57, Serial0/0/0
D       172.16.32.220/30 [90/2681856] via 172.16.32.226, 00:23:57, Serial0/0/0
C       172.16.32.224/30 is directly connected, Serial0/0/0
L       172.16.32.225/32 is directly connected, Serial0/0/0
C       172.16.32.228/30 is directly connected, Serial0/0/1
L       172.16.32.230/32 is directly connected, Serial0/0/1
D       172.16.32.232/30 [90/3705856] via 172.16.32.226, 00:23:57, Serial0/0/0
                         [90/3705856] via 172.16.32.229, 00:23:57, Serial0/0/1
```

Neighbor Table

To show EIGRP routing configuration

RTA

```
Router#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address         Interface       Hold Uptime    SRTT   RTO   Q   Seq
                                    (sec)          (ms)       Cnt Num
0   172.16.32.209   Se0/0/1         13   00:20:10  40     1000  0   35
1   172.16.32.230   Se0/0/0         10   00:20:09  40     1000  0   24
```

RTB

```
Router#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address         Interface       Hold Uptime    SRTT   RTO   Q   Seq
                                    (sec)          (ms)       Cnt Num
0   172.16.32.210   Se0/0/0         11   00:21:17  40     1000  0   30
1   172.16.32.213   Se0/0/1         13   00:21:14  40     1000  0   28
```

RTC

```
Router#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address         Interface       Hold Uptime    SRTT   RTO   Q   Seq
                                    (sec)          (ms)       Cnt Num
0   172.16.32.217   Se0/0/1         11   00:21:59  40     1000  0   26
1   172.16.32.214   Se0/0/0         10   00:21:57  40     1000  0   36
```

RTD

```
Router#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address         Interface       Hold Uptime    SRTT   RTO   Q   Seq
                                    (sec)          (ms)       Cnt Num
0   172.16.32.221   Se0/0/1         12   00:22:44  40     1000  0   23
1   172.16.32.218   Se0/0/0         13   00:22:42  40     1000  0   27
```

RTE

```
Router#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address         Interface       Hold Uptime    SRTT   RTO   Q   Seq
                                    (sec)          (ms)       Cnt Num
0   172.16.32.222   Se0/0/0         12   00:23:18  40     1000  0   25
1   172.16.32.225   Se0/0/1         13   00:23:15  40     1000  0   23
```

RTF

```
Router#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address         Interface       Hold Uptime    SRTT   RTO   Q   Seq
                                    (sec)          (ms)       Cnt Num
0   172.16.32.229   Se0/0/1         13   00:23:55  40     1000  0   29
1   172.16.32.226   Se0/0/0         11   00:23:53  40     1000  0   24
```

End-to-end connection

1. From Computer Security Lab LAN to Video Conferencing Room 2 LAN

```
C:\>ping 172.16.32.202

Pinging 172.16.32.202 with 32 bytes of data:

Reply from 172.16.32.202: bytes=32 time=1ms TTL=126
Reply from 172.16.32.202: bytes=32 time=18ms TTL=126
Reply from 172.16.32.202: bytes=32 time=1ms TTL=126
Reply from 172.16.32.202: bytes=32 time=13ms TTL=126

Ping statistics for 172.16.32.202:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 18ms, Average = 8ms
```

2. From Video Conferencing Room LAN 2 to General Purpose Lab LAN

```
C:\>ping 172.16.32.67

Pinging 172.16.32.67 with 32 bytes of data:

Reply from 172.16.32.67: bytes=32 time=35ms TTL=125
Reply from 172.16.32.67: bytes=32 time=30ms TTL=125
Reply from 172.16.32.67: bytes=32 time=42ms TTL=125
Reply from 172.16.32.67: bytes=32 time=2ms TTL=125

Ping statistics for 172.16.32.67:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 42ms, Average = 27ms
```

3. From General Purpose Lab LAN to Network Lab LAN

```
C:\>ping 172.16.32.1

Pinging 172.16.32.1 with 32 bytes of data:

Reply from 172.16.32.1: bytes=32 time=1ms TTL=126
Reply from 172.16.32.1: bytes=32 time=1ms TTL=126
Reply from 172.16.32.1: bytes=32 time=1ms TTL=126
Reply from 172.16.32.1: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.32.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

4. From RTC to ISP (UTM Backbone)

```
Router#ping 172.16.32.234

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.32.234, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/13/27 ms
```

APPENDIX

Minute Meetings 1

DATE	22 May 2023
TIME	2:15pm-2:30pm
VENUE	Google meet
DESCRIPTION	Dividing task for each member: Pravin - Doing routing protocols Azim - Configuring the routers, switches and PCs in the topology Mohommad Hussein - Redesign the topology, so it suits more than one routing protocol and do the subnetting needed between new routers. Sadik - Doing the Routing Table and Appendix
ATTENDANCE	4 / 4

Minute Meetings 2

DATE	26 May 2023
TIME	3:15pm-4:00pm
VENUE	Google meet
DESCRIPTION	Finalize the workings for each individual while checking and correcting all mistakes that have been done in the Packet Tracer file. Doing the report and finalizing it.
ATTENDANCE	4 / 4