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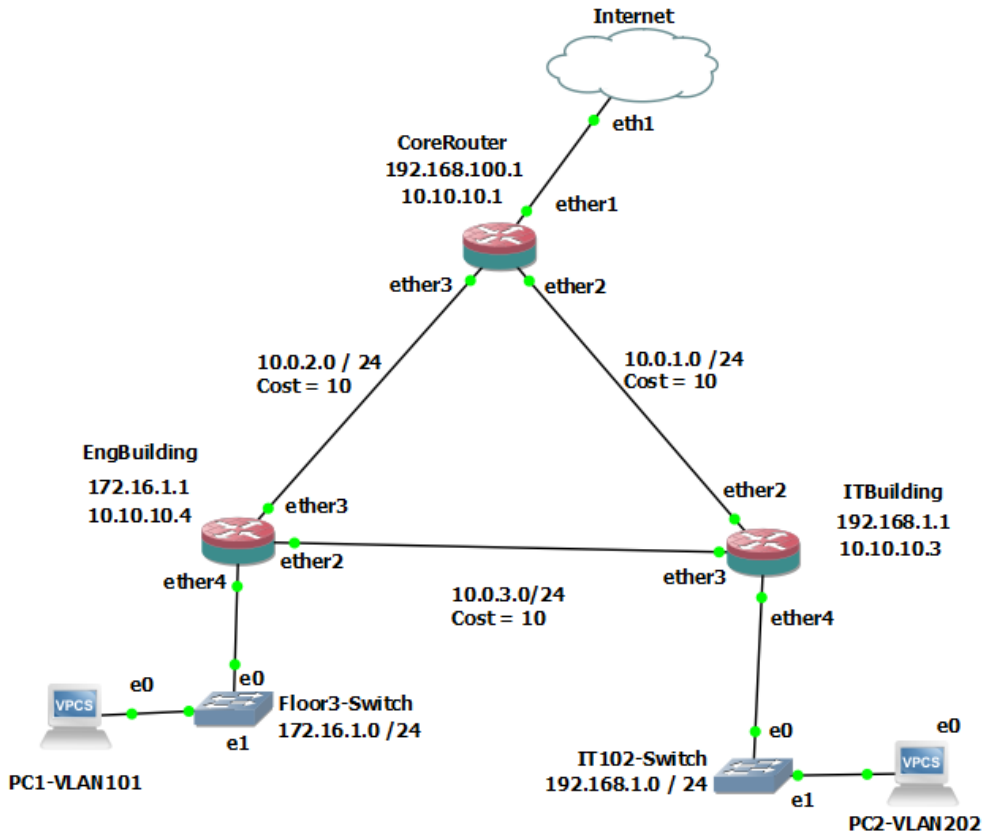
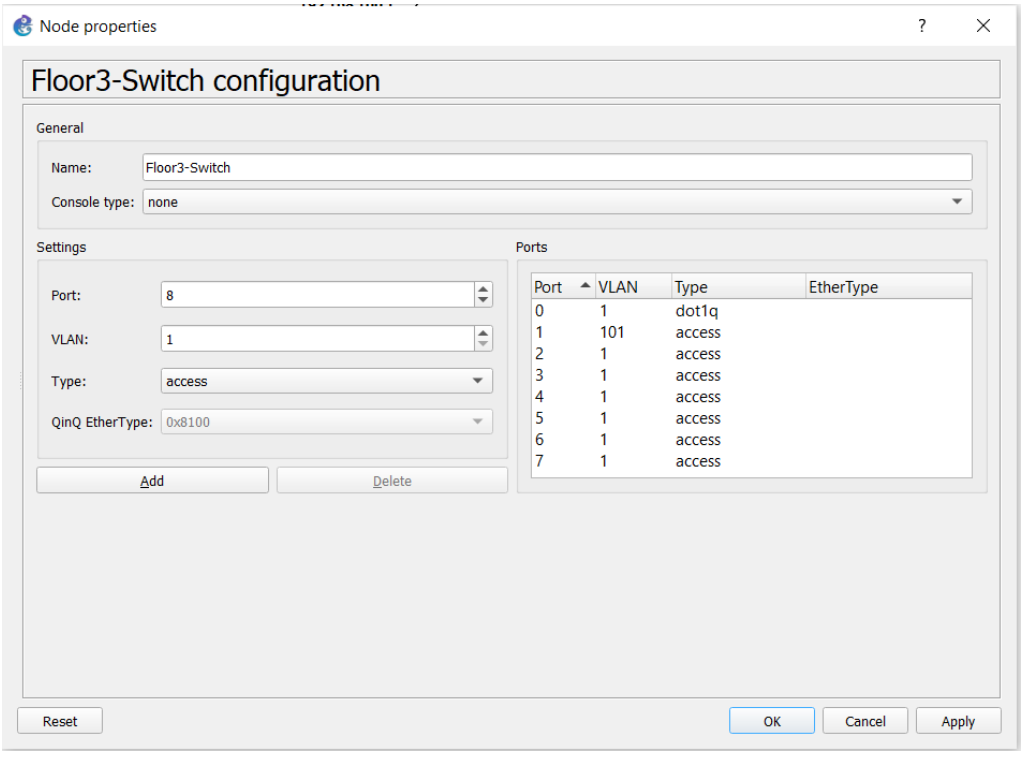
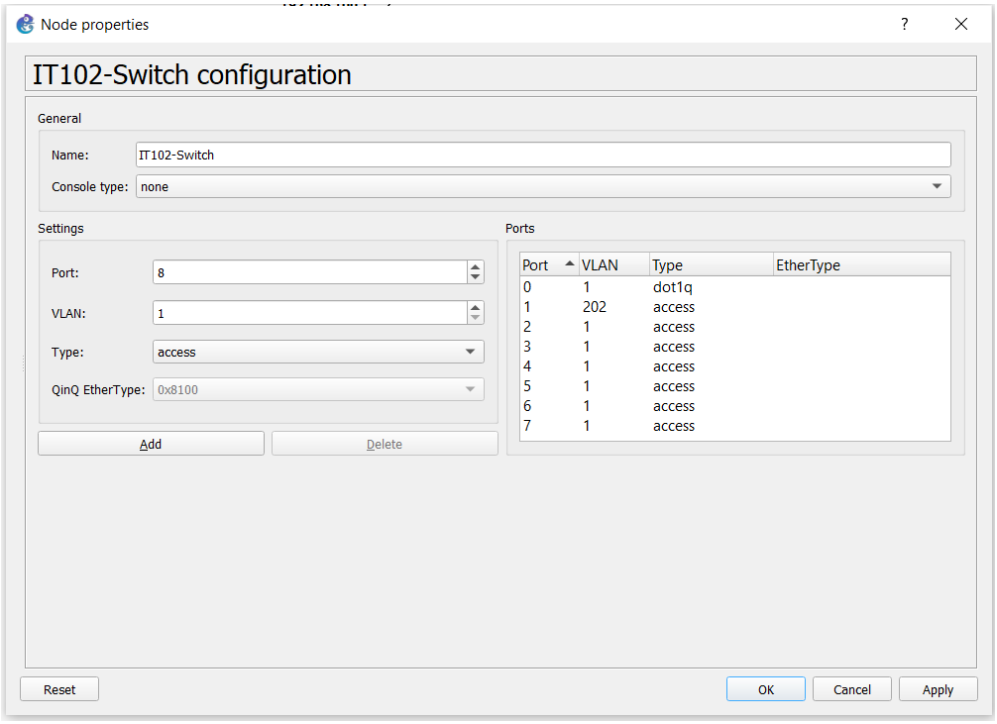
Network








```
/interface bridge
add name=Loopback
/interface ethernet
set [ find default-name=ether1 ] disable-running-check=no
set [ find default-name=ether2 ] disable-running-check=no
set [ find default-name=ether3 ] disable-running-check=no
set [ find default-name=ether4 ] disable-running-check=no
set [ find default-name=ether5 ] disable-running-check=no
set [ find default-name=ether6 ] disable-running-check=no
set [ find default-name=ether7 ] disable-running-check=no
set [ find default-name=ether8 ] disable-running-check=no
/interface wireless security-profiles
set [ find default=yes ] supplicant-identity=MikroTik
/ip pool
add name=dhcp_pool0 ranges=192.168.100.2-192.168.100.254
/ip dhcp-server
add address-pool=dhcp_pool0 disabled=no interface=ether4 name=dhcp1
/routing ospf instance
set [ find default=yes ] distribute-default=if-installed-as-type-1 redistribute-connected=as-type-1 router-id=10.10.10.1
/ip address
add address=192.168.100.1/24 interface=ether4 network=192.168.100.0
add address=10.0.1.1/24 interface=ether2 network=10.0.1.0
add address=10.0.2.1/24 interface=ether3 network=10.0.2.0
add address=10.10.10.1 interface=Loopback network=10.10.10.1
/ip dhcp-client
add disabled=no interface=ether1
/ip dhcp-server network
add address=192.168.100.0/24 dns-server=8.8.8.8 gateway=192.168.100.1
/ip firewall nat
add action=masquerade chain=srcnat out-interface=ether1
add action=masquerade chain=srcnat out-interface=ether1
/routing ospf interface
add dead-interval=5s hello-interval=1s interface=ether3
add dead-interval=5s hello-interval=1s interface=ether2
/routing ospf network
add area=backbone network=10.0.1.0/24
add area=backbone network=10.0.2.0/24
/system identity
set name=CoreRouter
```

```
/interface bridge
add name=Loopback
/interface ethernet
set [ find default-name=ether1 ] disable-running-check=no
set [ find default-name=ether2 ] disable-running-check=no
set [ find default-name=ether3 ] disable-running-check=no
set [ find default-name=ether4 ] disable-running-check=no
set [ find default-name=ether5 ] disable-running-check=no
set [ find default-name=ether6 ] disable-running-check=no
set [ find default-name=ether7 ] disable-running-check=no
set [ find default-name=ether8 ] disable-running-check=no
/interface vlan
add interface=ether4 name=VLAN101 vlan-id=101
/interface wireless security-profiles
set [ find default=yes ] supplicant-identity=MikroTik
/ip pool
add name=dhcp_pool0 ranges=172.16.1.2-172.16.1.254
/ip dhcp-server
add address-pool=dhcp_pool0 disabled=no interface=VLAN101 name=dhcp0
/routing ospf instance
set [ find default=yes ] redistribute-connected=as-type-1 router-id=10.10.10.4
/ip address
add address=172.16.1.1/24 interface=VLAN101 network=172.16.1.0
add address=10.0.3.2/24 interface=ether2 network=10.0.3.0
add address=10.0.2.2/24 interface=ether3 network=10.0.2.0
add address=10.10.10.4 interface=Loopback network=10.10.10.4
/ip dhcp-client
add disabled=no interface=ether1
/ip dhcp-server network
add address=172.16.1.0/24 dns-server=8.8.8.8 gateway=172.16.1.1
/routing ospf interface
add dead-interval=5s hello-interval=1s interface=ether3
add dead-interval=5s hello-interval=1s interface=ether2
/routing ospf network
add area=backbone network=10.0.2.0/24
add area=backbone network=10.0.3.0/24
/system identity
set name=EngBuilding
```

```
/interface bridge
add name=Loopback
/interface ethernet
set [ find default-name=ether1 ] disable-running-check=no
set [ find default-name=ether2 ] disable-running-check=no
set [ find default-name=ether3 ] disable-running-check=no
set [ find default-name=ether4 ] disable-running-check=no
set [ find default-name=ether5 ] disable-running-check=no
set [ find default-name=ether6 ] disable-running-check=no
set [ find default-name=ether7 ] disable-running-check=no
set [ find default-name=ether8 ] disable-running-check=no
/interface vlan
add interface=ether4 name=VLAN202 vlan-id=202
/interface wireless security-profiles
set [ find default=yes ] supplicant-identity=MikroTik
/ip pool
add name=dhcp1_pool0 ranges=192.168.1.2-192.168.1.254
/ip dhcp-server
add address-pool=dhcp1_pool0 disabled=no interface=VLAN202 name=dhcp0
/routing ospf instance
set [ find default=yes ] redistribute-connected=as-type-1 router-id=10.10.10.3
/ip address
add address=10.0.3.1/24 interface=ether3 network=10.0.3.0
add address=10.0.1.2/24 interface=ether2 network=10.0.1.0
add address=10.10.10.3 interface=Loopback network=10.10.10.3
add address=192.168.1.1/24 interface=VLAN202 network=192.168.1.0
/ip dhcp-client
add disabled=no interface=ether1
/ip dhcp-server network
add address=192.168.1.0/24 dns-server=8.8.8.8 gateway=192.168.1.1
/routing ospf interface
add dead-interval=5s hello-interval=1s interface=ether3
add dead-interval=5s hello-interval=1s interface=ether2
/routing ospf network
add area=backbone network=10.0.3.0/24
add area=backbone network=10.0.1.0/24
/system identity
set name=ITBuilding
```

Verify the routers can ping each other

It Building Router Pinging Other Routers

```
[admin@ITBuilding] > ping 172.16.1.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 172.16.1.1                                 56  64 0ms
    1 172.16.1.1                                 56  64 0ms
    2 172.16.1.1                                 56  64 0ms
    3 172.16.1.1                                 56  64 0ms
    4 172.16.1.1                                 56  64 0ms
    5 172.16.1.1                                 56  64 3ms
    6 172.16.1.1                                 56  64 0ms
    sent=7 received=7 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=3ms

[admin@ITBuilding] > ping 192.168.100.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 192.168.100.1                              56  64 1ms
    1 192.168.100.1                              56  64 2ms
    2 192.168.100.1                              56  64 0ms
    3 192.168.100.1                              56  64 2ms
    4 192.168.100.1                              56  64 1ms
    5 192.168.100.1                              56  64 0ms
    sent=6 received=6 packet-loss=0% min-rtt=0ms avg-rtt=1ms max-rtt=2ms
```

Engineering Router pinging other routers

```
[admin@EngBuilding] > ping 192.168.100.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 192.168.100.1                              56  64 0ms
    1 192.168.100.1                              56  64 0ms
    2 192.168.100.1                              56  64 0ms
    3 192.168.100.1                              56  64 2ms
    4 192.168.100.1                              56  64 0ms
    sent=5 received=5 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=2ms

[admin@EngBuilding] > ping 192.168.1.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 192.168.1.1                                56  64 0ms
    1 192.168.1.1                                56  64 0ms
    2 192.168.1.1                                56  64 0ms
    3 192.168.1.1                                56  64 0ms
    sent=4 received=4 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms
```

Core Router pinging other routers

```
[admin@CoreRouter] > ping 192.168.1.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 192.168.1.1                                56  64 1ms
    1 192.168.1.1                                56  64 0ms
    2 192.168.1.1                                56  64 0ms
    3 192.168.1.1                                56  64 0ms
    sent=4 received=4 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=1ms

[admin@CoreRouter] > ping 172.16.1.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 172.16.1.1                                 56  64 0ms
    1 172.16.1.1                                 56  64 0ms
    2 172.16.1.1                                 56  64 2ms
    3 172.16.1.1                                 56  64 0ms
    sent=4 received=4 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=2ms
```

Verify routers can ping Loopback address

```
[admin@CoreRouter] > ping 10.10.10.4
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 10.10.10.4                                 56  64 0ms
    1 10.10.10.4                                 56  64 0ms
    2 10.10.10.4                                 56  64 1ms
    3 10.10.10.4                                 56  64 1ms
    4 10.10.10.4                                 56  64 1ms
    sent=5 received=5 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=1ms

[admin@CoreRouter] > ping 10.10.10.3
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 10.10.10.3                                 56  64 1ms
    1 10.10.10.3                                 56  64 2ms
    2 10.10.10.3                                 56  64 1ms
    3 10.10.10.3                                 56  64 2ms
    sent=4 received=4 packet-loss=0% min-rtt=1ms avg-rtt=1ms max-rtt=2ms
```

```
[admin@EngBuilding] > ping 10.10.10.3
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 10.10.10.3                                 56  64 0ms
    1 10.10.10.3                                 56  64 0ms
    2 10.10.10.3                                 56  64 0ms
    3 10.10.10.3                                 56  64 0ms
    sent=4 received=4 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms

[admin@EngBuilding] > ping 10.10.10.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 10.10.10.1                                 56  64 0ms
    1 10.10.10.1                                 56  64 0ms
    2 10.10.10.1                                 56  64 0ms
    3 10.10.10.1                                 56  64 0ms
    sent=4 received=4 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms
```

```
[admin@ITBuilding] > ping 10.10.10.4
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 10.10.10.4                                 56  64 0ms
    1 10.10.10.4                                 56  64 0ms
    2 10.10.10.4                                 56  64 0ms
    3 10.10.10.4                                 56  64 0ms
    sent=4 received=4 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms

[admin@ITBuilding] > ping 10.10.10.1
  SEQ HOST                                     SIZE TTL TIME  STATUS
    0 10.10.10.1                                 56  64 0ms
    1 10.10.10.1                                 56  64 0ms
    2 10.10.10.1                                 56  64 0ms
    3 10.10.10.1                                 56  64 0ms
    sent=4 received=4 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=0ms
```

Verify PCs can ping each other

```
VPCS> ip dhcp
DORA IP 172.16.1.254/24 GW 172.16.1.1

VPCS> ping 192.168.1.254

84 bytes from 192.168.1.254 icmp_seq=1 ttl=62 time=0.909 ms
84 bytes from 192.168.1.254 icmp_seq=2 ttl=62 time=0.891 ms
84 bytes from 192.168.1.254 icmp_seq=3 ttl=62 time=0.869 ms
84 bytes from 192.168.1.254 icmp_seq=4 ttl=62 time=0.852 ms
84 bytes from 192.168.1.254 icmp_seq=5 ttl=62 time=0.904 ms
```

```
VPCS> ip dhcp
DORA IP 192.168.1.254/24 GW 192.168.1.1

VPCS> ping 172.16.1.254

84 bytes from 172.16.1.254 icmp_seq=1 ttl=62 time=0.799 ms
84 bytes from 172.16.1.254 icmp_seq=2 ttl=62 time=0.988 ms
84 bytes from 172.16.1.254 icmp_seq=3 ttl=62 time=0.983 ms
84 bytes from 172.16.1.254 icmp_seq=4 ttl=62 time=0.966 ms
84 bytes from 172.16.1.254 icmp_seq=5 ttl=62 time=0.988 ms
```

Verify that the internet is reachable from all devices and explain the meaning of each entry in the routing table of the Core Router

```
[admin@ITBuilding] > ping 8.8.8.8
  SEQ HOST                                          SIZE TTL TIME  STATUS
    0 8.8.8.8                                         56 127 200ms
    1 8.8.8.8                                                timeout
    2 8.8.8.8                                         56 127 920ms
    3 8.8.8.8                                                timeout
    4 8.8.8.8                                         56 127 741ms
[admin@EngBuilding] > ping 8.8.8.8
  SEQ HOST                                          SIZE TTL TIME  STATUS
    0 8.8.8.8                                         56 127 19ms
    1 8.8.8.8                                         56 127 41ms
    2 8.8.8.8                                         56 127 14ms
    3 8.8.8.8                                         56 127 66ms
[admin@CoreRouter] > ping 8.8.8.8
  SEQ HOST                                        SIZE TTL TIME  STATUS
    0 8.8.8.8                                       56 128 31ms
    1 8.8.8.8                                       56 128 14ms
    2 8.8.8.8                                       56 128 13ms
    3 8.8.8.8                                       56 128 14ms
    sent=4 received=4 packet-loss=0% min-rtt=13ms avg-rtt=18ms max-rtt=31ms
VPCS> ip dhcp
DORA IP 192.168.1.254/24 GW 192.168.1.1

VPCS> ping 8.8.8.8

84 bytes from 8.8.8.8 icmp_seq=1 ttl=126 time=15.004 ms
84 bytes from 8.8.8.8 icmp_seq=2 ttl=126 time=15.168 ms
84 bytes from 8.8.8.8 icmp_seq=3 ttl=126 time=21.300 ms
84 bytes from 8.8.8.8 icmp_seq=4 ttl=126 time=31.074 ms
84 bytes from 8.8.8.8 icmp_seq=5 ttl=126 time=20.411 ms
VPCS> ip dhcp
DORA IP 172.16.1.254/24 GW 172.16.1.1

VPCS> ping 8.8.8.8

84 bytes from 8.8.8.8 icmp_seq=1 ttl=126 time=26.461 ms
84 bytes from 8.8.8.8 icmp_seq=2 ttl=126 time=19.967 ms
84 bytes from 8.8.8.8 icmp_seq=3 ttl=126 time=15.167 ms
84 bytes from 8.8.8.8 icmp_seq=4 ttl=126 time=22.045 ms
84 bytes from 8.8.8.8 icmp_seq=5 ttl=126 time=14.371 ms
```

```
[admin@CoreRouter] > ip route print
Flags: X - disabled, A - active, D - dynamic, C - connect, S - static,
 #      DST-ADDRESS        PREF-SRC        GATEWAY            DISTANCE
 0 ADS  0.0.0.0/0                          192.168.26.2              1
 1 ADC  10.0.1.0/24        10.0.1.1        ether2                    0
 2 ADC  10.0.2.0/24        10.0.2.1        ether3                    0
 3 ADo  10.0.3.0/24                        10.0.2.2                110
                                           10.0.1.2
 4 ADC  10.10.10.1/32      10.10.10.1      Loopback                  0
 5 ADo  10.10.10.3/32                      10.0.1.2                110
 6 ADo  10.10.10.4/32                      10.0.2.2                110
 7 ADo  172.16.1.0/24                      10.0.2.2                110
 8 ADo  192.168.1.0/24                     10.0.1.2                110
 9 ADC  192.168.26.0/24    192.168.26.132  ether1                    0
10  DC  192.168.100.0/24   192.168.100.1   ether4                  255
```

1. The default route with address 0.0.0.0/0 shows that any traffic with no other specific route will be sent to the 192.168.26.2 gateway
2. Entry #1 and #2 in the table are connected networks with connected routes as indicated by 'ADC'. The destination addresses are 10.0.1.0/24 and 10.0.2.0/24 respectively. The pref-src are the source addresses used to send traffic from these networks. The gateways (ether2 and ether3) are the interfaces used. This is where the traffic for these networks is sent out through.
3. Entry #3 in the table is a static route with 2 possible gateways. The use of 2 gateways means if one fails, the router can use the backup route. It has a distance of 110 meaning it is less preferred.
4. Entry #4 is another connected route. It is for the loopback interface and has a distance of 0. The loopback IP address is 10.10.10.1/32 with a preferred source address of 10.10.10.1.
5. Entries #5, #6, #7 and #8 are all static routes to various networks. Each entry has different destination addresses for the routes, with each route configured for a specific network. They have a distance of 110 indicating a less preferred route.
6. Entry #9 is a connected route for 192.168.26.0/24. The traffic is routed through the ether1 interface.
7. Entry #10 is a dynamic route for the address 192.168.100/24. Traffic is routed through ether4. It is a dynamic route, likely through a routing protocol. It has a high distance of 255.

Explain what would happen if each router was not setup to redistribute connected networks

The router would not be able to automatically connect to the connected networks in its routing table.

Trace from PC1-VLAN101 to PC2-VLAN202 using ICMP

```
VPCS> trace 192.168.1.253 -P 1
trace to 192.168.1.253, 8 hops max (ICMP), press Ctrl+C to stop
 1   172.16.1.1   0.265 ms  0.192 ms  0.251 ms
 2   10.0.3.1   0.856 ms  0.432 ms  0.434 ms
 3   192.168.1.253   1.011 ms  0.588 ms  1.102 ms
```

The trace route using ICMP from the PC1 to PC2 goes from 172.16.1.253 to 192.168.1.253.
The first hop is to 172.16.1.1. This is the IP address of the engineering building router that the VPC is connected to. The round-trip time is measured.
Hop #2 is to 10.0.3.1, which is the IP address on the IT building router with the ether3 interface. This router is connected to VPC2.
The final Hop is to the destination specified in the trace route command.

Run Long Ping and Suspend

```
VPCS> ping 192.168.1.253 -c 30

84 bytes from 192.168.1.253 icmp_seq=1 ttl=62 time=1.065 ms
84 bytes from 192.168.1.253 icmp_seq=2 ttl=62 time=0.899 ms
84 bytes from 192.168.1.253 icmp_seq=3 ttl=62 time=0.801 ms
84 bytes from 192.168.1.253 icmp_seq=4 ttl=62 time=1.066 ms
84 bytes from 192.168.1.253 icmp_seq=5 ttl=62 time=1.122 ms
192.168.1.253 icmp_seq=6 timeout
84 bytes from 192.168.1.253 icmp_seq=7 ttl=61 time=1.933 ms
84 bytes from 192.168.1.253 icmp_seq=8 ttl=61 time=1.551 ms
84 bytes from 192.168.1.253 icmp_seq=9 ttl=61 time=1.337 ms
84 bytes from 192.168.1.253 icmp_seq=10 ttl=61 time=1.382 ms
84 bytes from 192.168.1.253 icmp_seq=11 ttl=61 time=1.299 ms
84 bytes from 192.168.1.253 icmp_seq=12 ttl=61 time=1.596 ms
84 bytes from 192.168.1.253 icmp_seq=13 ttl=61 time=1.165 ms
84 bytes from 192.168.1.253 icmp_seq=14 ttl=61 time=1.384 ms
84 bytes from 192.168.1.253 icmp_seq=15 ttl=61 time=1.651 ms
84 bytes from 192.168.1.253 icmp_seq=16 ttl=61 time=1.391 ms
84 bytes from 192.168.1.253 icmp_seq=17 ttl=61 time=1.465 ms
84 bytes from 192.168.1.253 icmp_seq=18 ttl=61 time=1.561 ms
84 bytes from 192.168.1.253 icmp_seq=19 ttl=61 time=1.325 ms
84 bytes from 192.168.1.253 icmp_seq=20 ttl=61 time=1.430 ms
84 bytes from 192.168.1.253 icmp_seq=21 ttl=61 time=1.525 ms
84 bytes from 192.168.1.253 icmp_seq=22 ttl=61 time=1.332 ms
84 bytes from 192.168.1.253 icmp_seq=23 ttl=61 time=1.376 ms
84 bytes from 192.168.1.253 icmp_seq=24 ttl=61 time=1.572 ms
84 bytes from 192.168.1.253 icmp_seq=25 ttl=61 time=1.303 ms
84 bytes from 192.168.1.253 icmp_seq=26 ttl=61 time=1.448 ms
```

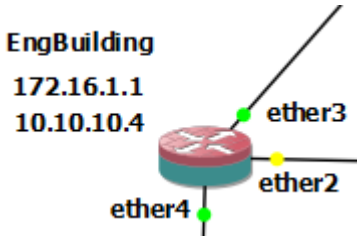
The sequence 6 ping is dropped, as seen above. That is the point at which I suspended the link between the VPCs. The ping then found another route to the VPC and the ping worked again at sequence 7. It is noted that the new route is longer as the time increases after the link is suspended. The TTL also decrements after the suspension of the link, indicating the ICMP packets are taking another route to the destination.

Redo Trace

```
VPCS> trace 192.168.1.253 -P 1
trace to 192.168.1.253, 8 hops max (ICMP), press Ctrl+C to stop
 1   172.16.1.1   0.756 ms  0.460 ms  0.232 ms
 2   10.0.2.1   0.932 ms  0.451 ms  0.449 ms
 3   10.0.1.2   1.290 ms  1.034 ms  0.778 ms
 4   192.168.1.253   1.169 ms  0.868 ms  1.073 ms
```

There is now another hop In the trace while the link is suspended. This is due to the packets using another route to get to the destination.

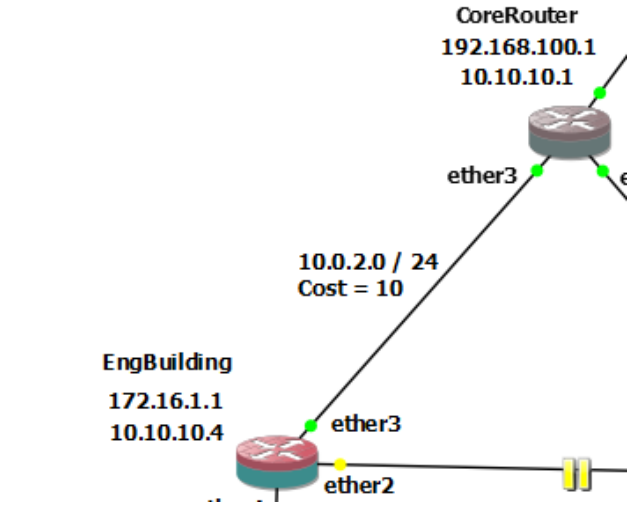
The first hop is to the engineering building router for the VLAN101.



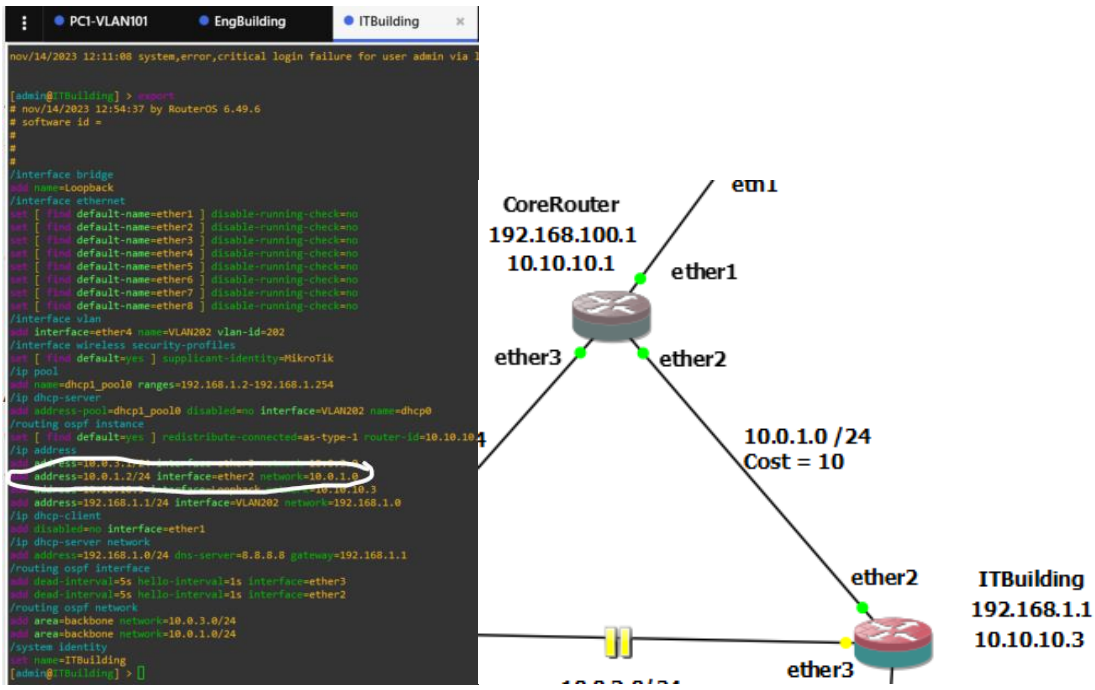
The second hop (10.0.2.1) is the new route the packets must take due to the suspended link. It goes to the core router first as this is the available route to the PC2. It goes to that IP address as 10.0.2.1 is the address of the ether3 interface, which is the link between engineering building router and core

router. The screenshots below show the link between the routers and the correct address the packets take for the second hop.

```
/ip address
add address=192.168.100.1/24 interface=ether4 network=192.168.100.0
add address=10.0.1.1/24 interface=ether2 network=10.0.1.0
add address=10.0.2.1/24 interface=ether3 network=10.0.2.0
```

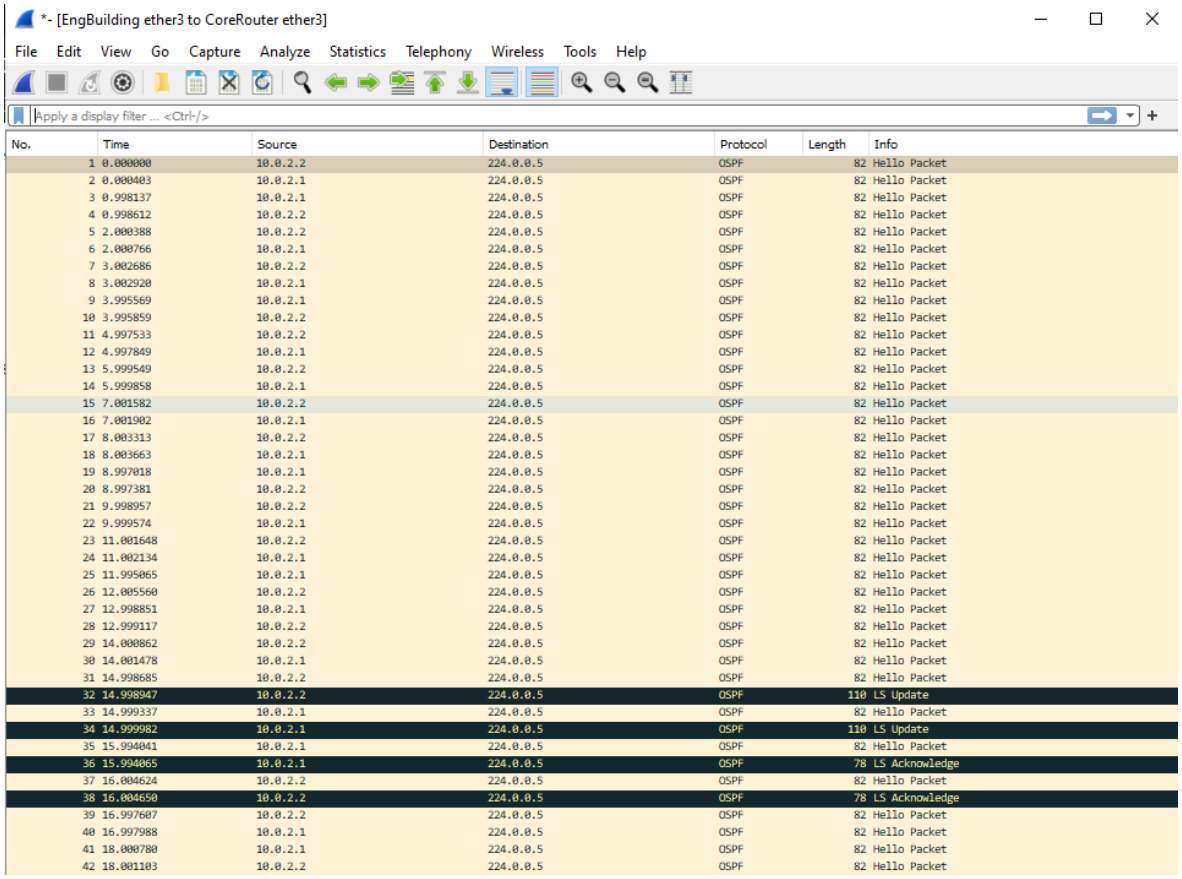


The third hop is from the core router to the it building router. Because the link from core router to it router is on ether2, the packets are sent to the address 10.10.1.2 as that is the address on the ether2 interface on the it building router. The screenshots below show that the hop goes to the correct address based on the configuration.



The final hop is to the VPC, which is the target destination. In conclusion, the extra hop is needed due to the new route taken because of the suspended link.

Wireshark Packet Capture



No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
2	0.000403	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
3	0.998137	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
4	0.998612	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
5	2.000388	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
6	2.000766	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
7	3.002686	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
8	3.002920	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
9	3.995569	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
10	3.995859	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
11	4.997533	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
12	4.997849	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
13	5.999549	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
14	5.999858	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
15	7.001582	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
16	7.001902	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
17	8.003313	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
18	8.003663	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
19	8.997018	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
20	8.997381	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
21	9.998957	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
22	9.999574	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
23	11.001648	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
24	11.002134	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
25	11.995065	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
26	12.005560	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
27	12.998851	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
28	12.999117	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
29	14.000862	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
30	14.001478	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
31	14.998685	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
32	14.998947	10.0.2.2	224.0.0.5	OSPF	110	LS Update
33	14.999337	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
34	14.999982	10.0.2.1	224.0.0.5	OSPF	110	LS Update
35	15.994041	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
36	15.994065	10.0.2.1	224.0.0.5	OSPF	78	LS Acknowledge
37	16.004624	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
38	16.004650	10.0.2.2	224.0.0.5	OSPF	78	LS Acknowledge
39	16.997607	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet
40	16.997988	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
41	18.000780	10.0.2.1	224.0.0.5	OSPF	82	Hello Packet
42	18.001103	10.0.2.2	224.0.0.5	OSPF	82	Hello Packet

THE LS updates are used to distribute routing information between OSPF routers. Within the content of the capture there is a link state id, where the 10.10.10.4 router is advertising the link details to the router interface with the IP address 10.0.2.2.

```
▼ LSA-type 1 (Router-LSA), len 48
      .000 0000 0000 0001 = LS Age (seconds): 1
      0... .... .... .... = Do Not Age Flag: 0
    > Options: 0x02, (E) External Routing
      LS Type: Router-LSA (1)
      Link State ID: 10.10.10.4
      Advertising Router: 10.10.10.4
      Sequence Number: 0x80000012
      Checksum: 0x0ea1
      Length: 48
    > Flags: 0x02, (E) AS boundary router
      Number of Links: 2
    > Type: Stub     ID: 10.0.3.0       Data: 255.255.255.0   Metric: 10
    ▼ Type: Transit  ID: 10.0.2.2       Data: 10.0.2.2        Metric: 10
          Link ID: 10.0.2.2 - IP address of Designated Router
          Link Data: 10.0.2.2
```

The link state acknowledges packets acknowledge the receipt of the link state update packets. The