

Senior Project Testing Documentation

PERFORMING A VULNERABILITY
ASSESSMENT ON A SECURED NETWORK

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Table of Contents

PURPOSE OF TESTING DOCUMENTATION.....	4
END DEVICES TO DEFAULT GATEWAY	4
PC-1 TO ROUTER A'S DEFAULT GATEWAY	4
PC-2 TO ROUTER C'S DEFAULT GATEWAY	5
PC-3 TO ROUTER C'S DEFAULT GATEWAY	5
PC-4 TO ROUTER C'S DEFAULT GATEWAY	6
END DEVICE TO SUBNET	7
PC-1 TO ROUTER A'S WAN INTERFACE.....	7
PC-1 TO ROUTER B'S LAN INTERFACE	7
PC-1 TO ROUTER B'S WAN INTERFACE	8
PC-1 TO ROUTER C'S G0/0 INTERFACE	9
PC-1 TO ROUTER C'S G0/1.10 INTERFACE	10
PC-1 TO ROUTER C'S G0/1.20 INTERFACE	10
PC-2 TO ROUTER C'S G0/0 INTERFACE	11
PC-2 TO ROUTER C'S G0/1.20 INTERFACE	12
PC-2 TO ROUTER B'S WAN INTERFACE.....	13
PC-2 TO ROUTER A'S WAN INTERFACE.....	13
PC-2 TO ROUTER A'S LAN INTERFACE	14
PC-4 TO ROUTER C'S G0/1.10 INTERFACE	15
PC-4 TO ROUTER B'S WAN INTERFACE.....	16
PC-4 TO ROUTER A'S WAN INTERFACE.....	16
PC-1 TO PC-2	17
PC-1 TO PC-3	18
PC-1 TO PC-4	18
PC-2 TO PC-1	19
PC-2 TO PC-3	20
PC-2 TO PC-4	20
PC-3 TO PC-1	21
PC-3 TO PC-2	22
PC-3 TO PC-4	22
PC-4 TO PC-1	23
PC-4 TO PC-2	24
PC-4 TO PC-3	24
DEVICE FUNCTIONALITY	25
ROUTER C'S CONFIGURATION.....	25
SWITCH 1'S CONFIGURATION	29
PC-1 IP INFORMATION.....	32
PC-2 IP INFORMATION.....	33
PC-3 IP INFORMATION.....	34

PC-4 IP INFORMATION	35
BLOCKING ICMP PINGS FROM EXTERNAL_TRAFFIC	36

Purpose of Testing Documentation

The purpose of the testing documentation is to provide a detailed report of how network connectivity and device functionality tests were performed and the results of the tests.

End Devices to Default Gateway

To verify connectivity between each end device and their default gateways run the following tests.

PC-1 to Router A's Default Gateway

To verify connectivity between PC-1 and Router A's Default Gateway, follow the below procedural steps.

1. Open **Terminal** on PC-1.
2. Run the command **ping -c 4 172.18.0.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T1

PC-1 to Router A's Default Gateway

```
(kali㉿kali)-[~]
└─$ ping -c 4 172.18.0.1
PING 172.18.0.1 (172.18.0.1) 56(84) bytes of data.
64 bytes from 172.18.0.1: icmp_seq=1 ttl=64 time=0.804 ms
64 bytes from 172.18.0.1: icmp_seq=2 ttl=64 time=0.390 ms
64 bytes from 172.18.0.1: icmp_seq=3 ttl=64 time=0.534 ms
64 bytes from 172.18.0.1: icmp_seq=4 ttl=64 time=0.591 ms

--- 172.18.0.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3053ms
rtt min/avg/max/mdev = 0.390/0.579/0.804/0.148 ms
```

PC-2 to Router C's Default Gateway

To verify connectivity between PC-2 and Router C's Default Gateway, follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 192.168.10.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T2

PC-2 to Router C's Default Gateway

```
Pinging 192.168.10.1 with 32 bytes of data:
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC-3 to Router C's Default Gateway

To verify connectivity between PC-3 and Router C's Default Gateway, follow the below procedural steps.

1. Open **Command Prompt** on PC-3.
2. Run the command **ping 192.168.10.1**.
3. The output of the ping test should match the screen shot below which shows a successful ping test.

Figure T3

PC-3 to Router C's Default Gateway

```
C:\Users\Roundtable>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC-4 to Router C's Default Gateway

To verify connectivity between PC-4 and Router C's Default Gateway, follow the below procedural steps.

1. Open **Terminal** on PC-4.
2. Run the command **ping -c 4 192.168.20.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T4

PC-4 to Router C's Default Gateway

```
(kali㉿kali)-[~]
└─$ ping -c 4 192.168.20.1
PING 192.168.20.1 (192.168.20.1) 56(84) bytes of data.
64 bytes from 192.168.20.1: icmp_seq=1 ttl=255 time=0.349 ms
64 bytes from 192.168.20.1: icmp_seq=2 ttl=255 time=0.371 ms
64 bytes from 192.168.20.1: icmp_seq=3 ttl=255 time=0.397 ms
64 bytes from 192.168.20.1: icmp_seq=4 ttl=255 time=0.371 ms

--- 192.168.20.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3074ms
rtt min/avg/max/mdev = 0.349/0.372/0.397/0.017 ms
```

End Device to Subnet

To verify connectivity between end devices and specific network interfaces run the following tests.

PC-1 to Router A's WAN Interface

To verify connectivity between PC-1 and Router A's WAN Interface, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 10.0.0.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T5

PC-1 to Router A's WAN Interface

```
(kali㉿kali)-[~]
└─$ ping 10.0.0.1 -c 4
PING 10.0.0.1 (10.0.0.1) 56(84) bytes of data:
64 bytes from 10.0.0.1: icmp_seq=1 ttl=64 time=0.612 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=64 time=0.579 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=64 time=0.588 ms
64 bytes from 10.0.0.1: icmp_seq=4 ttl=64 time=0.612 ms

--- 10.0.0.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3068ms
rtt min/avg/max/mdev = 0.579/0.597/0.612/0.014 ms
```

PC-1 to Router B's LAN Interface

To verify connectivity between PC-1 and Router B's LAN Interface, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 10.0.0.2**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T6

PC-1 to Router B's LAN Interface

```
(kali㉿kali)-[~]
└─$ ping 10.0.0.2 -c 4
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=63 time=0.930 ms
64 bytes from 10.0.0.2: icmp_seq=2 ttl=63 time=0.708 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=63 time=1.01 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=63 time=1.29 ms

--- 10.0.0.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3038ms
rtt min/avg/max/mdev = 0.708/0.984/1.289/0.207 ms
```

PC-1 to Router B's WAN Interface

To verify connectivity between PC-1 and Router B's WAN Interface, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 10.0.0.5**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T7

PC-1 to Router B's WAN Interface

```
(kali㉿kali)-[~]
└─$ ping 10.0.0.5 -c 4
PING 10.0.0.5 (10.0.0.5) 56(84) bytes of data.
64 bytes from 10.0.0.5: icmp_seq=1 ttl=63 time=0.731 ms
64 bytes from 10.0.0.5: icmp_seq=2 ttl=63 time=0.801 ms
64 bytes from 10.0.0.5: icmp_seq=3 ttl=63 time=0.824 ms
64 bytes from 10.0.0.5: icmp_seq=4 ttl=63 time=0.686 ms

--- 10.0.0.5 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3067ms
rtt min/avg/max/mdev = 0.686/0.760/0.824/0.054 ms
```

PC-1 to Router C's G0/0 Interface

To verify connectivity between PC-1 and Router C's G0/0 Interface, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 10.0.0.6**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T8

PC-1 to Router C's G0/0 Interface

```
(kali㉿kali)-[~]
└─$ ping 10.0.0.6 -c 4
PING 10.0.0.6 (10.0.0.6) 56(84) bytes of data.
64 bytes from 10.0.0.6: icmp_seq=1 ttl=253 time=1.36 ms
64 bytes from 10.0.0.6: icmp_seq=2 ttl=253 time=0.904 ms
64 bytes from 10.0.0.6: icmp_seq=3 ttl=253 time=1.02 ms
64 bytes from 10.0.0.6: icmp_seq=4 ttl=253 time=1.23 ms

--- 10.0.0.6 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 0.904/1.127/1.355/0.176 ms
```

PC-1 to Router C's G0/1.10 Interface

To verify connectivity between PC-1 and Router C's G0/1.10 Interface, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 192.168.10.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T9

PC-1 to Router C's G0/1.10 Interface

```
(kali㉿kali)-[~]
└─$ ping 192.168.10.1 -c 4
PING 192.168.10.1 (192.168.10.1) 56(84) bytes of data:
64 bytes from 192.168.10.1: icmp_seq=1 ttl=253 time=1.19 ms
64 bytes from 192.168.10.1: icmp_seq=2 ttl=253 time=1.05 ms
64 bytes from 192.168.10.1: icmp_seq=3 ttl=253 time=1.02 ms
64 bytes from 192.168.10.1: icmp_seq=4 ttl=253 time=1.00 ms

--- 192.168.10.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 1.004/1.063/1.187/0.072 ms
```

PC-1 to Router C's G0/1.20 Interface

To verify connectivity between PC-1 and Router C's G0/1.20 Interface, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 192.168.20.4**.

3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T10

PC-1 to Router C's G0/1.20 Interface

```
(kali@kali)-[~]
└─$ ping 192.168.20.4 -c 4
PING 192.168.20.4 (192.168.20.4) 56(84) bytes of data.
64 bytes from 192.168.20.4: icmp_seq=1 ttl=61 time=1.60 ms
64 bytes from 192.168.20.4: icmp_seq=2 ttl=61 time=1.34 ms
64 bytes from 192.168.20.4: icmp_seq=3 ttl=61 time=1.43 ms
64 bytes from 192.168.20.4: icmp_seq=4 ttl=61 time=1.80 ms

--- 192.168.20.4 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 1.338/1.539/1.797/0.175 ms
```

PC-2 to Router C's G0/0 Interface

To verify connectivity between PC-2 and Router C's G0/0 Interface, follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 10.0.0.6**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T11

PC-2 to Router C's G0/0 Interface

```
C:\Users\sithi>ping 10.0.0.6

Pinging 10.0.0.6 with 32 bytes of data:
Reply from 10.0.0.6: bytes=32 time<1ms TTL=255
Reply from 10.0.0.6: bytes=32 time=12ms TTL=255
Reply from 10.0.0.6: bytes=32 time=20ms TTL=255
Reply from 10.0.0.6: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 20ms, Average = 8ms
```

PC-2 to Router C's G0/1.20 Interface

To verify connectivity between PC-2 and Router C's G0/1.20 Interface follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 192.168.20.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T12

PC-2 to Router C's G0/1.20 Interface

```
C:\Users\sithi>ping 192.168.20.1

Pinging 192.168.20.1 with 32 bytes of data:
Reply from 192.168.20.1: bytes=32 time<1ms TTL=255
Reply from 192.168.20.1: bytes=32 time<1ms TTL=255
Reply from 192.168.20.1: bytes=32 time<1ms TTL=255
Reply from 192.168.20.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC-2 to Router B's WAN Interface

To verify connectivity between PC-2 and Router B's WAN Interface follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 10.0.0.5**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T13

PC-2 to Router B's WAN Interface

```
C:\Users\sithi>ping 10.0.0.5

Pinging 10.0.0.5 with 32 bytes of data:
Reply from 10.0.0.5: bytes=32 time<1ms TTL=63
Reply from 10.0.0.5: bytes=32 time=1ms TTL=63
Reply from 10.0.0.5: bytes=32 time<1ms TTL=63
Reply from 10.0.0.5: bytes=32 time<1ms TTL=63

Ping statistics for 10.0.0.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC-2 to Router A's WAN Interface

To verify connectivity between PC-2 and Router A's WAN Interface, follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 10.0.0.1**.

3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T14

PC-2 to Router A's WAN Interface

```
C:\Users\sithi>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:
Reply from 10.0.0.1: bytes=32 time=6ms TTL=62
Reply from 10.0.0.1: bytes=32 time<1ms TTL=62
Reply from 10.0.0.1: bytes=32 time=2ms TTL=62
Reply from 10.0.0.1: bytes=32 time<1ms TTL=62

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 6ms, Average = 2ms
```

PC-2 to Router A's LAN Interface

To verify connectivity between PC-2 and Router A's LAN Interface, follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 172.18.0.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T15

PC-2 to Router A's LAN Interface

```
C:\Users\sithi>ping 172.18.0.1

Pinging 172.18.0.1 with 32 bytes of data:
Reply from 172.18.0.1: bytes=32 time=1ms TTL=62
Reply from 172.18.0.1: bytes=32 time<1ms TTL=62
Reply from 172.18.0.1: bytes=32 time=12ms TTL=62
Reply from 172.18.0.1: bytes=32 time<1ms TTL=62

Ping statistics for 172.18.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms
```

PC-4 to Router C's G0/1.10 Interface

To verify connectivity between PC-4 and Router C's G0/1.10 Interface, follow the below procedural steps.

1. Open **Terminal** on PC-4.
2. Run the command **ping -c 4 192.168.10.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T16

PC-4 to Router C's G0/1.10 Interface

```
(kali@kali)-[~]
└─$ ping -c 4 192.168.10.1
PING 192.168.10.1 (192.168.10.1) 56(84) bytes of data.
64 bytes from 192.168.10.1: icmp_seq=1 ttl=255 time=0.495 ms
64 bytes from 192.168.10.1: icmp_seq=2 ttl=255 time=0.365 ms
64 bytes from 192.168.10.1: icmp_seq=3 ttl=255 time=0.375 ms
64 bytes from 192.168.10.1: icmp_seq=4 ttl=255 time=0.450 ms

--- 192.168.10.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3077ms
rtt min/avg/max/mdev = 0.365/0.421/0.495/0.053 ms
```

PC-4 to Router B's WAN Interface

To verify connectivity between PC-4 and Router B's WAN Interface, follow the below procedural steps.

1. Open **Terminal** on PC-4.
2. Run the command **ping -c 4 10.0.0.5**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T17

PC-4 to Router B's WAN Interface

```
(kali㉿kali)-[~]
└─$ ping -c 4 10.0.0.5
PING 10.0.0.5 (10.0.0.5) 56(84) bytes of data:
64 bytes from 10.0.0.5: icmp_seq=1 ttl=63 time=0.577 ms
64 bytes from 10.0.0.5: icmp_seq=2 ttl=63 time=0.507 ms
64 bytes from 10.0.0.5: icmp_seq=3 ttl=63 time=0.479 ms
64 bytes from 10.0.0.5: icmp_seq=4 ttl=63 time=0.550 ms

--- 10.0.0.5 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3068ms
rtt min/avg/max/mdev = 0.479/0.528/0.577/0.037 ms
```

PC-4 to Router A's WAN Interface

To verify connectivity between PC-4 and Router A's WAN Interface, follow the below procedural steps.

1. Open **Terminal** on PC-4.
2. Run the command **ping -c 4 10.0.0.1**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T18

PC-4 to Router A's WAN Interface

```
(kali㉿kali)-[~]
└─$ ping -c 4 10.0.0.1
PING 10.0.0.1 (10.0.0.1) 56(84) bytes of data.
64 bytes from 10.0.0.1: icmp_seq=1 ttl=62 time=1.04 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=62 time=0.819 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=62 time=0.848 ms
64 bytes from 10.0.0.1: icmp_seq=4 ttl=62 time=0.822 ms

--- 10.0.0.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3030ms
rtt min/avg/max/mdev = 0.819/0.881/1.035/0.089 ms
```

PC-1 to PC-2

To verify connectivity between PC-1 and PC-2, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 192.168.10.2**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T19

PC-1 to PC-2

```
(kali㉿kali)-[~]
└─$ ping 192.168.10.2 -c 4
PING 192.168.10.2 (192.168.10.2) 56(84) bytes of data.
64 bytes from 192.168.10.2: icmp_seq=1 ttl=125 time=1.29 ms
64 bytes from 192.168.10.2: icmp_seq=2 ttl=125 time=13.0 ms
64 bytes from 192.168.10.2: icmp_seq=3 ttl=125 time=1.37 ms
64 bytes from 192.168.10.2: icmp_seq=4 ttl=125 time=1.51 ms

--- 192.168.10.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 1.293/4.288/12.987/5.022 ms
```

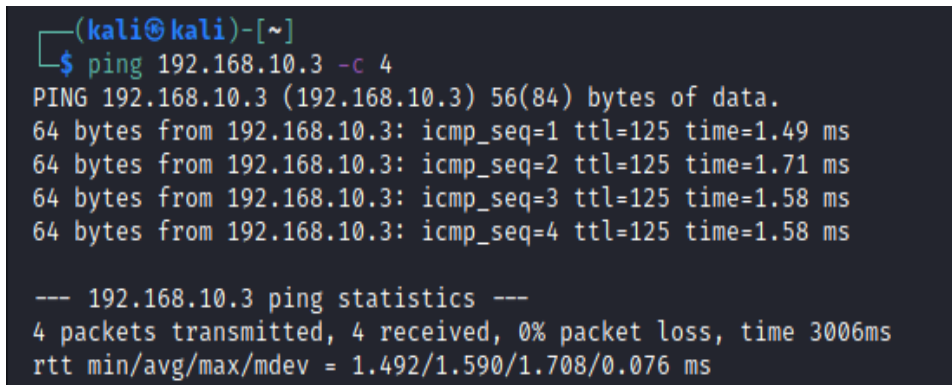
PC-1 to PC-3

To verify connectivity between PC-1 and PC-3, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 192.168.10.3**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T20

PC-1 to PC-3

A terminal window screenshot from a Kali Linux machine. The prompt is '(kali@kali)-[~]'. The user has entered the command '\$ ping 192.168.10.3 -c 4'. The output shows four successful ping responses from 192.168.10.3, each with 64 bytes of data, an icmp sequence number from 1 to 4, a TTL of 125, and response times between 1.49 ms and 1.71 ms. At the bottom, it shows ping statistics: 4 packets transmitted, 4 received, 0% packet loss, time 3006ms, and rtt min/avg/max/mdev = 1.492/1.590/1.708/0.076 ms.

```
(kali@kali)-[~]
└─$ ping 192.168.10.3 -c 4
PING 192.168.10.3 (192.168.10.3) 56(84) bytes of data:
64 bytes from 192.168.10.3: icmp_seq=1 ttl=125 time=1.49 ms
64 bytes from 192.168.10.3: icmp_seq=2 ttl=125 time=1.71 ms
64 bytes from 192.168.10.3: icmp_seq=3 ttl=125 time=1.58 ms
64 bytes from 192.168.10.3: icmp_seq=4 ttl=125 time=1.58 ms

--- 192.168.10.3 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 1.492/1.590/1.708/0.076 ms
```

PC-1 to PC-4

To verify connectivity between PC-1 and PC-4, follow the below procedural steps.

1. Open a terminal on PC-1.
2. Run the command **ping -c 4 192.168.20.4**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T21*PC-1 to PC-4*

```
(kali㉿kali)-[~]
└─$ ping 192.168.20.4 -c 4
PING 192.168.20.4 (192.168.20.4) 56(84) bytes of data.
64 bytes from 192.168.20.4: icmp_seq=1 ttl=61 time=1.60 ms
64 bytes from 192.168.20.4: icmp_seq=2 ttl=61 time=1.34 ms
64 bytes from 192.168.20.4: icmp_seq=3 ttl=61 time=1.43 ms
64 bytes from 192.168.20.4: icmp_seq=4 ttl=61 time=1.80 ms

--- 192.168.20.4 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 1.338/1.539/1.797/0.175 ms
```

PC-2 to PC-1

To verify connectivity between PC-2 and PC-1, follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 172.18.0.20**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T22*PC-2 to PC-1*

```
C:\Users\sithi>ping 172.18.0.20

Pinging 172.18.0.20 with 32 bytes of data:
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61

Ping statistics for 172.18.0.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

PC-2 to PC-3

To verify connectivity between PC-2 and PC-3, follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 192.168.10.3**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T23

PC-2 to PC-3

```
C:\Users\sithi>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:
Reply from 192.168.10.3: bytes=32 time=1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC-2 to PC-4

To verify connectivity between PC-2 and PC-4, follow the below procedural steps.

1. Open **Command Prompt** on PC-2.
2. Run the command **ping 192.168.20.4**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T24*PC-2 to PC-4*

```
C:\Users\sithi>ping 192.168.20.4

Pinging 192.168.20.4 with 32 bytes of data:
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63

Ping statistics for 192.168.20.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC-3 to PC-1

To verify connectivity between PC-3 and PC-1, follow the below procedural steps.

1. Open **Command Prompt** on PC-3.
2. Run the command **ping 172.18.0.20**.
3. The output of the ping test should match the screen shot below which shows a successful ping test.

Figure T25*PC-3 to PC-1*

```
C:\Users\Roundtable>ping 172.18.0.20

Pinging 172.18.0.20 with 32 bytes of data:
Reply from 172.18.0.20: bytes=32 time=3ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61

Ping statistics for 172.18.0.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 3ms, Average = 1ms
```

PC-3 to PC-2

To verify connectivity between PC-3 and PC-2, follow the below procedural steps.

1. Open **Command Prompt** on PC-3.
2. Run the command **ping 192.168.10.2**.
3. The output of the ping test should match the screen shot below which shows a successful ping test.

Figure T26

PC-3 to PC-2

```
C:\Users\Roundtable>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:
Reply from 192.168.10.2: bytes=32 time=1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC-3 to PC-4

To verify connectivity between PC-3 and PC-4, follow the below procedural steps.

1. Open **Command Prompt** on PC-3.
2. Run the command **ping 192.168.20.4**.
3. The output of the ping test should match the screen shot below which shows a successful ping test.

Figure T27*PC-3 to PC-4*

```
C:\Users\Roundtable>ping 192.168.20.4

Pinging 192.168.20.4 with 32 bytes of data:
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63
Reply from 192.168.20.4: bytes=32 time<1ms TTL=63

Ping statistics for 192.168.20.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC-4 to PC-1

To verify connectivity between PC-4 and PC-1, follow the below procedural steps.

1. Open **Terminal** on PC-4.
2. Run the command **ping -c 4 172.18.0.20**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T28*PC-4 to PC-1*

```
(kali㉿kali)-[~]
└─$ ping -c 4 172.18.0.20
PING 172.18.0.20 (172.18.0.20) 56(84) bytes of data.
64 bytes from 172.18.0.20: icmp_seq=1 ttl=61 time=4.22 ms
64 bytes from 172.18.0.20: icmp_seq=2 ttl=61 time=1.57 ms
64 bytes from 172.18.0.20: icmp_seq=3 ttl=61 time=1.36 ms
64 bytes from 172.18.0.20: icmp_seq=4 ttl=61 time=1.57 ms

--- 172.18.0.20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 1.355/2.179/4.223/1.182 ms
```

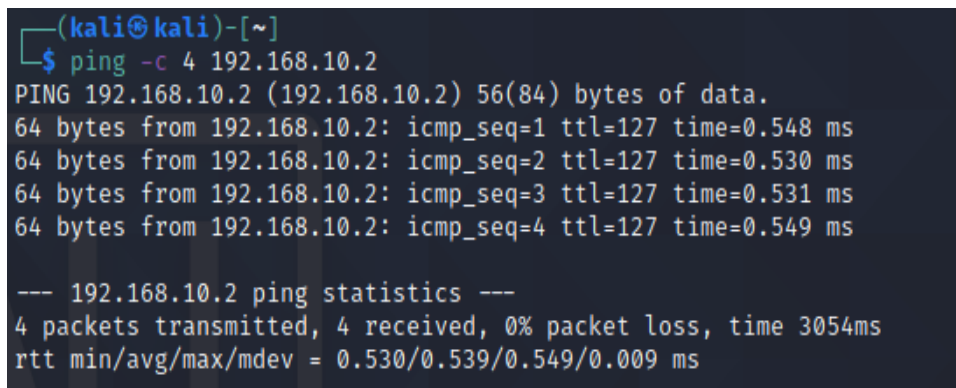
PC-4 to PC-2

To verify connectivity between PC-4 and PC-2, follow the below procedural steps.

1. Open **Terminal** on PC-4.
2. Run the command **ping -c 4 192.168.10.2**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T29

PC-4 to PC-2



```
(kali㉿kali)-[~]
└─$ ping -c 4 192.168.10.2
PING 192.168.10.2 (192.168.10.2) 56(84) bytes of data.
64 bytes from 192.168.10.2: icmp_seq=1 ttl=127 time=0.548 ms
64 bytes from 192.168.10.2: icmp_seq=2 ttl=127 time=0.530 ms
64 bytes from 192.168.10.2: icmp_seq=3 ttl=127 time=0.531 ms
64 bytes from 192.168.10.2: icmp_seq=4 ttl=127 time=0.549 ms

--- 192.168.10.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3054ms
rtt min/avg/max/mdev = 0.530/0.539/0.549/0.009 ms
```

PC-4 to PC-3

To verify connectivity between PC-4 and PC-3, follow the below procedural steps.

1. Open **Terminal** on PC-4.
2. Run the command **ping -c 4 192.168.10.3**.
3. The output of the ping test should match the screen shot which shows a successful ping test.

Figure T30*PC-4 to PC-3*

```
(kali㉿kali)-[~]
└─$ ping -c 4 192.168.10.3
PING 192.168.10.3 (192.168.10.3) 56(84) bytes of data.
64 bytes from 192.168.10.3: icmp_seq=1 ttl=127 time=0.791 ms
64 bytes from 192.168.10.3: icmp_seq=2 ttl=127 time=0.727 ms
64 bytes from 192.168.10.3: icmp_seq=3 ttl=127 time=0.693 ms
64 bytes from 192.168.10.3: icmp_seq=4 ttl=127 time=0.695 ms

--- 192.168.10.3 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3031ms
rtt min/avg/max/mdev = 0.693/0.726/0.791/0.039 ms
```

Device Functionality

To verify network functionality and configurations the following configuration commands were performed.

Router C's Configuration

The following is the content of the running configuration on Router C.

RouterC#show run

Building configuration...

Current configuration : 2016 bytes

!

! Last configuration change at 03:02:23 UTC Tue Mar 23 2021

version 15.2

service timestamps debug datetime msec

service timestamps log datetime msec

service password-encryption

!

```
hostname RouterC
!
boot-start-marker
boot-end-marker
!
!
enable password 7 02320C1A5E472276421D19391604
!
no aaa new-model
!
ip cef
!
!
!
!
!
!
no ipv6 cef
multilink bundle-name authenticated
!
!
!
license udi pid CISCO1921/K9 sn FTX1725Y07K
!
!
!
!
!
!
```

```
!  
interface Embedded-Service-Engine0/0  
no ip address  
shutdown  
!  
interface GigabitEthernet0/0  
ip address 10.0.0.6 255.255.255.252  
ip access-group EXTERNAL_TRAFFIC in  
duplex auto  
speed auto  
!  
interface GigabitEthernet0/1  
no ip address  
duplex auto  
speed auto  
!  
interface GigabitEthernet0/1.10  
encapsulation dot1Q 10  
ip address 192.168.10.1 255.255.255.0  
ip access-group WORK_TRAFFIC in  
!  
interface GigabitEthernet0/1.20  
encapsulation dot1Q 20  
ip address 192.168.20.1 255.255.255.0  
ip access-group PLAY_TRAFFIC in  
!  
interface Serial0/0/0  
no ip address  
shutdown  
!
```

```
interface Serial0/1/0
  no ip address
  shutdown
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.0.0.5
!
ip access-list extended EXTERNAL_TRAFFIC
  permit tcp any eq www any
  permit tcp any eq 443 any
  permit icmp any any
ip access-list extended PLAY_TRAFFIC
  permit tcp host 192.168.20.4 host 192.168.10.2 eq ftp
  permit icmp any any
  permit tcp host 192.168.20.4 host 192.168.10.2 eq ftp-data
  permit tcp host 192.168.20.4 host 192.168.10.2 eq 55400
  permit tcp host 192.168.20.4 host 192.168.10.2 eq 55401
  permit tcp host 192.168.20.4 host 192.168.10.2 eq 55402
  permit tcp host 192.168.20.4 host 192.168.10.3
ip access-list extended WORK_TRAFFIC
  permit ip any any
!
!
!
!
control-plane
```

```
!  
!  
banner motd ^CCAauthorized Users Only!!^C  
!  
line con 0  
line aux 0  
line 2  
no activation-character  
no exec  
transport preferred none  
transport input all  
transport output pad telnet rlogin lapb-ta mop udptn v120 ssh  
stopbits 1  
line vty 0 4  
login  
transport input all  
!  
scheduler allocate 20000 1000  
!  
end
```

Switch 1's Configuration

The following is the content of the running configuration on Switch C.

```
Switch1#show run
```

```
Building configuration...
```

```
Current configuration : 1205 bytes
```

```
!
```

```
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
service password-encryption
!
hostname Switch1
!
enable password 7 022B240E5E055F357B0F051D
!
ip subnet-zero
!
ip ssh time-out 120
ip ssh authentication-retries 3
!
spanning-tree mode pvst
no spanning-tree optimize bpdu transmission
spanning-tree extend system-id
!
!
!
!
interface FastEthernet0/1
  switchport access vlan 10
  switchport mode access
  switchport port-security mac-address sticky
!
interface FastEthernet0/2
  switchport access vlan 10
  switchport mode access
```

```
switchport port-security mac-address sticky
!
interface FastEthernet0/3
switchport access vlan 20
switchport mode access
switchport port-security mac-address sticky
!
interface FastEthernet0/4
shutdown
!
interface FastEthernet0/5
shutdown
!
interface FastEthernet0/6
shutdown
!
interface FastEthernet0/7
shutdown
!
interface FastEthernet0/8
shutdown
!
interface GigabitEthernet0/1
switchport trunk native vlan 90
switchport mode trunk
!
interface Vlan1
ip address 192.168.84.5 255.255.255.0
no ip route-cache
!
```

```
ip http server  
banner motd ^CAuthorized Users Only!!^C  
!  
line con 0  
line vty 0 4  
login  
line vty 5 15  
login  
!  
!  
end
```

PC-1 IP Information

1. Open **Terminal** on PC-1.
2. Run the command **ifconfig**.
3. The output of the **ifconfig** command should match the screen shot which shows the IP address of the eth0 interface as **172.18.0.20**.

Figure T31

PC-1 IP Information

```
(kali㉿kali)-[~]
└─$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.18.0.20 netmask 255.255.255.0 broadcast 172.18.0.255
    ether 00:05:1b:24:3b:89 txqueuelen 1000 (Ethernet)
    RX packets 25 bytes 1571 (1.5 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 32 bytes 2456 (2.3 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 8 bytes 440 (440.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 8 bytes 440 (440.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether 62:88:01:c7:98:d4 txqueuelen 1000 (Ethernet)
    RX packets 9794 bytes 9413106 (8.9 MiB)
    RX errors 0 dropped 3 overruns 0 frame 0
    TX packets 5098 bytes 1309989 (1.2 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

PC-2 IP Information

1. Open **Command Prompt** on PC-2.
2. Run the command **ipconfig**.
3. The output of the **ipconfig** command should match the screen shot which shows the IP address of the ethernet interface as **192.168.10.2**.

Figure T32*PC-2 IP Information*

```
C:\Users\sithi>ipconfig

Windows IP Configuration

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 3:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . :
    IPv4 Address. . . . . : 192.168.10.2
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.10.1
```

PC-3 IP Information

1. Open **Command Prompt** on PC-3.
2. Run the command **ipconfig**.
3. The output of the **ipconfig** command should match the screen shot which shows the IP address of the ethernet interface as **192.168.10.3**.

Figure T33*PC-3 IP Information*

```
C:\Users\Roundtable>ipconfig

Windows IP Configuration

Wireless LAN adapter Wireless Network Connection 2:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::9933:1b35:d71:627d%11
    Autoconfiguration IPv4 Address. . : 169.254.98.125
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . : 

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::c50a:3c2:662e:e7cd%10
    IPv4 Address. . . . . : 192.168.10.3
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.10.1

Tunnel adapter isatap.<C89C4223-6035-4965-AE06-E1237A05233F>:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Tunnel adapter Teredo Tunneling Pseudo-Interface:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Tunnel adapter isatap.<A15C6CB2-3931-4071-A3F2-505BAF55070C>:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
```

PC-4 IP Information

1. Open **Terminal** on PC-4.
2. Run the command **ifconfig**.
3. The output of the **ifconfig** command should match the screen shot which shows the IP address of the eth0 interface as **192.168.20.4**.

Figure T34

PC-4 IP Information

```
(kali@kali)-[~]
└─$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.20.4 netmask 255.255.255.0 broadcast 192.168.20.255
    ether 64:31:50:32:66:f1 txqueuelen 1000 (Ethernet)
    RX packets 3011 bytes 181914 (177.6 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 518 bytes 73076 (71.3 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0<*10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 86 bytes 7468 (7.2 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 86 bytes 7468 (7.2 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Blocking ICMP Pings from EXTERNAL_TRAFFIC

1. Open a terminal on PC-4.
2. Run the command **ping 192.168.10.3 -c 4**.
3. The output of the **ping 192.168.10.3 -c 4** command should match the screen shot which shows that the ping requests were denied.

Figure T35

Router C Denying PC-4 Ping Traffic

```
(kali@kali)-[~]
└─$ ping 192.168.10.3 -c 4
PING 192.168.10.3 (192.168.10.3) 56(84) bytes of data.
From 10.0.0.6 icmp_seq=2 Packet filtered

--- 192.168.10.3 ping statistics ---
4 packets transmitted, 0 received, +1 errors, 100% packet loss, time 3028ms
```

Permitting ICMP-Reply Traffic from EXTERNAL_TRAFFIC

1. Open command prompt on PC-3.

2. Run the command **ping 172.18.0.20**.
3. The output of the **ping 172.18.0.20** command should match the screen shot which shows that WORK_TRAFFIC and PLAY_TRAFFIC can receive ping reply packets from EXTERNAL_TRAFFIC devices.

Figure T36

Router C Permitting Echo-Reply from EXTERNAL_TRAFFIC

```
C:\Users\Roundtable>ping 172.18.0.20

Pinging 172.18.0.20 with 32 bytes of data:
Reply from 172.18.0.20: bytes=32 time=2ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61
Reply from 172.18.0.20: bytes=32 time=1ms TTL=61

Ping statistics for 172.18.0.20:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms
```

Figure T37

Router C's Access-list Displaying Successful Packets

```
RouterC#show ip access-lists
Extended IP access list EXTERNAL_TRAFFIC
 10 permit tcp any eq www any (624 matches)
 20 permit tcp any eq 443 any (12386 matches)
 30 permit icmp any any echo-reply (4 matches)
```