SCHOOL NETWORK DESIGN HOME LAB

USING CISCO PACKET TRACER

Network Design Home Lab

Date: October 4, 2023

Overview

This report details the network design for a home lab with the given network address 10.3.99.0 The network is divided into 6 subnets as follows:

Subnet Name	Subnet Mask	Subnet Address	Default Gateway	Broadcast Address	Usable Host Range
Admissions	255.255.255.224	10.3.99.0	10.3.99.1	10.3.99.31	10.3.99.2 - 10.3.99.30
Administration	255.255.255.224	10.3.99.32	10.3.99.33	10.3.99.63	10.3.99.34 - 10.3.99.62
Faculty	255.255.255.224	10.3.99.64	10.3.99.65	10.3.99.95	10.3.99.66 - 10.3.99.94
Student	255.255.255.224	10.3.99.96	10.3.99.97	10.3.99.127	10.3.99.98 - 10.3.99.126
Housing	255.255.255.224	10.3.99.128	10.3.99.129	10.3.99.159	10.3.99.130 - 10.3.99.158
Library	255.255.255.224	10.3.99.160	10.3.99.161	10.3.99.191	10.3.99.162 - 10.3.99.190

Subnet Designs

The Administration and Housing subnets each contain 2 computers and 1 DHCP server.

The Admission contain 2 computers and 2 servers (DHCP and FTP)

The Faculty subnet contains 1 server, 2 laptops, and 4 computers.

The Student subnet contains 1 computer, 1 DHCP server supporting up to 20 devices, and 10 laptops.

The Library subnet contains 2 computers, 1 wireless router with 4 wireless devices.

All servers are assigned the last usable IP address in each subnet. All computers are assigned the first usable IP address. The wireless router is assigned the last usable IP address.

ACL Implementation

The ACLs were enabled and tested by pinging from a wireless device in the Library subnet to verify connectivity, then lack of connectivity when ACLs enabled, and restored connectivity when ACLs disabled.

4 ACLs were created:

- ACL 20 blocks Admissions servers

```
Reply from 10.3.99.30: bytes=32 time=33ms TTL=126
Reply from 10.3.99.30: bytes=32 time=35ms TTL=126
Reply from 10.3.99.30: bytes=32 time=25ms TTL=126
Reply from 10.3.99.30: bytes=32 time=10ms TTL=126
Reply from 10.3.99.30: bytes=32 time=27ms TTL=126
Reply from 10.3.99.30: bytes=32 time=11ms TTL=126
Reply from 10.3.99.30: bytes=32 time=16ms TTL=126
Reply from 10.3.99.30: bytes=32 time=28ms TTL=126
Reply from 10.3.99.30: bytes=32 time=34ms TTL=126
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Reply from 10.3.99.30: bytes=32 time=5ms TTL=126
Reply from 10.3.99.30: bytes=32 time=23ms TTL=126
Reply from 10.3.99.30: bytes=32 time=22ms TTL=126
Reply from 10.3.99.30: bytes=32 time=6ms TTL=126
Reply from 10.3.99.30: bytes=32 time=27ms TTL=126
Reply from 10.3.99.30: bytes=32 time=23ms TTL=126
Reply from 10.3.99.30: bytes=32 time=26ms TTL=126
Reply from 10.3.99.30: bytes=32 time=23ms TTL=126
Reply from 10.3.99.30: bytes=32 time=14ms TTL=126
```

- ACL 30 blocks Administration servers

```
Pinging 10.3.99.94 with 32 bytes of data:

Reply from 10.3.99.94: bytes=32 time=46ms TTL=126
Reply from 10.3.99.94: bytes=32 time=21ms TTL=126
Reply from 10.3.99.94: bytes=32 time=32ms TTL=126
Reply from 10.3.99.94: bytes=32 time=36ms TTL=126
Reply from 10.3.99.94: bytes=32 time=8ms TTL=126
Reply from 10.3.99.94: bytes=32 time=23ms TTL=126
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Reply from 10.3.99.94: bytes=32 time=11ms TTL=126
Reply from 10.3.99.94: bytes=32 time=10ms TTL=126
Reply from 10.3.99.94: bytes=32 time=35ms TTL=126
Reply from 10.3.99.94: bytes=32 time=22ms TTL=126
Reply from 10.3.99.94: bytes=32 time=31ms TTL=126
Reply from 10.3.99.94: bytes=32 time=36ms TTL=126
Reply from 10.3.99.94: bytes=32 time=14ms TTL=126
```

- ACL 40 blocks Faculty servers

```
Reply from 10.3.99.126: bytes=32 time=53ms TTL=126
Reply from 10.3.99.126: bytes=32 time=15ms TTL=126
Reply from 10.3.99.126: bytes=32 time=35ms TTL=126
Reply from 10.3.99.126: bytes=32 time=23ms TTL=126
Reply from 10.3.99.126: bytes=32 time=9ms TTL=126
Reply from 10.3.99.126: bytes=32 time=5ms TTL=126
Reply from 10.3.99.126: bytes=32 time=22ms TTL=126
Reply from 10.3.99.126: bytes=32 time=14ms TTL=126
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Reply from 10.3.99.126: bytes=32 time=10ms TTL=126
Reply from 10.3.99.126: bytes=32 time=37ms TTL=126
Reply from 10.3.99.126: bytes=32 time=27ms TTL=126
Reply from 10.3.99.126: bytes=32 time=28ms TTL=126
Reply from 10.3.99.126: bytes=32 time=22ms TTL=126
Reply from 10.3.99.126: bytes=32 time=39ms TTL=126
Reply from 10.3.99.126: bytes=32 time=24ms TTL=126
Reply from 10.3.99.126: bytes=32 time=19ms TTL=126
```

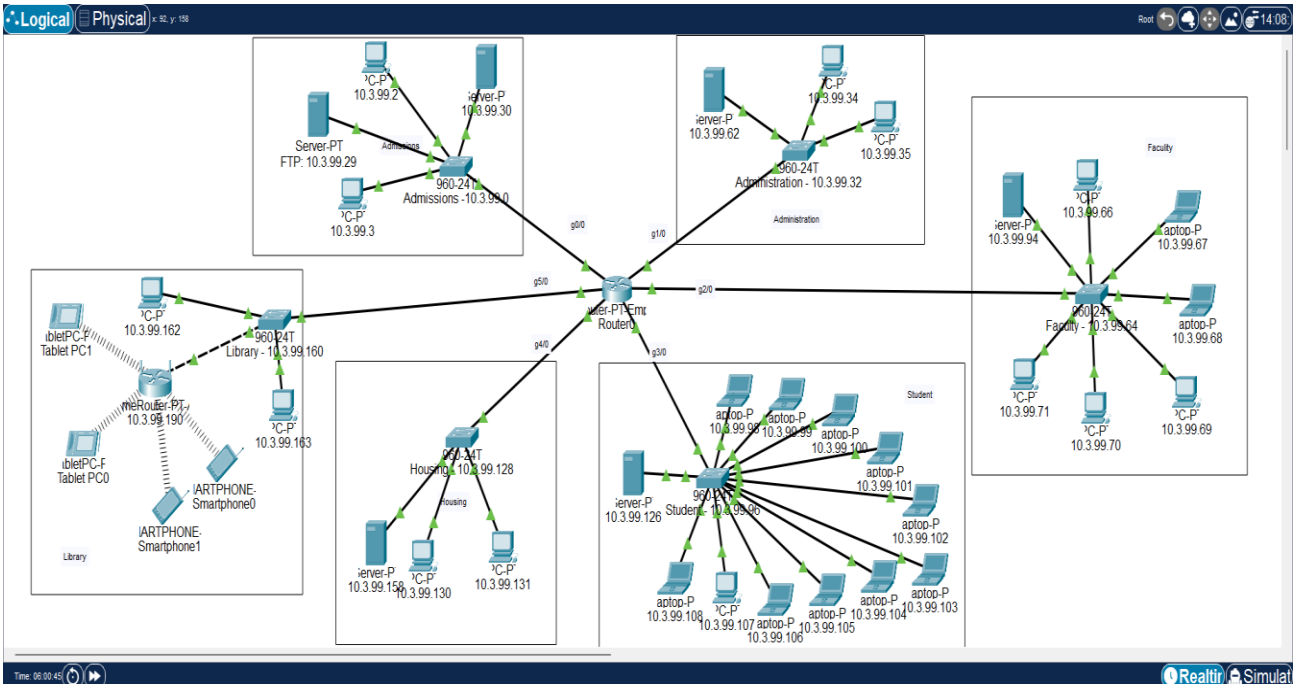
- ACL 50 blocks Student servers

```
Reply from 10.3.99.158: bytes=32 time=42ms TTL=126
Reply from 10.3.99.158: bytes=32 time=36ms TTL=126
Reply from 10.3.99.158: bytes=32 time=29ms TTL=126
Reply from 10.3.99.158: bytes=32 time=15ms TTL=126
Reply from 10.3.99.158: bytes=32 time=35ms TTL=126
Reply from 10.3.99.158: bytes=32 time=9ms TTL=126
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Reply from 10.3.99.158: bytes=32 time=6ms TTL=126
Reply from 10.3.99.158: bytes=32 time=16ms TTL=126
Reply from 10.3.99.158: bytes=32 time=8ms TTL=126
Reply from 10.3.99.158: bytes=32 time=40ms TTL=126
Reply from 10.3.99.158: bytes=32 time=15ms TTL=126
Reply from 10.3.99.158: bytes=32 time=22ms TTL=126
```

The network was designed and configured according to the provided specifications. Connectivity testing validated the configuration and ACL implementations. Further optimization or changes to the design can be implemented as required.

Network Topology Diagram

[packet tracer topology diagram screenshot]



Device Configurations

Admissions Subnet:

Server (FTP): 10.3.99.29

Server (DHCP): 10.3.99.30

Computer 1: 10.3.99.2

Computer 2: 10.3.99.3

Administration Subnet:

Server (DHCP): 10.3.99.62

Computer 1: 10.3.99.34

Computer 2: 10.3.99.35

Faculty Subnet:

Server: 10.3.99.94

Laptop 1: 10.3.99.67

Laptop 2: 10.3.99.68

Computer 1: 10.3.99.66

Computer 2: 10.3.99.69

Computer 3: 10.3.99.70

Computer 4: 10.3.99.71

Student Subnet:

Server (DHCP): 10.3.99.126

Computer: 10.3.99.107

Laptop 1: 10.3.99.98 | Laptop 6: 10.3.99.103

Laptop 2: 10.3.99.99 | Laptop 7: 10.3.99.104

Laptop 3: 10.3.99.100 | Laptop 8: 10.3.99.105

Laptop 4: 10.3.99.101 | Laptop 9: 10.3.99.106

Laptop 5: 10.3.99.102 | Laptop 10: 10.3.99.108

Library Subnet:

Computer 1: 10.3.99.162

Computer 2: 10.3.99.163

Wireless Router: 10.3.99.190

Wireless Device 1: DHCP assigned.

Wireless Device 2: DHCP assigned.

Wireless Device 3: DHCP assigned.

Wireless Device 4: DHCP assigned.

Housing Subnet:

Server (DHCP): 10.3.99.158

Computer 1: 10.3.99.130

Computer 2: 10.3.99.131

CONNECTION TEST

PINGING EACH DEVEICES

```
Pinging 192.168.0.165 with 32 bytes of data:

Reply from 192.168.0.165: bytes=32 time=12ms TTL=128
Reply from 192.168.0.165: bytes=32 time<1ms TTL=128
Reply from 192.168.0.165: bytes=32 time<1ms TTL=128
Reply from 192.168.0.165: bytes=32 time=5ms TTL=128

Ping statistics for 192.168.0.165:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 4ms

C:\>
```

```
Pinging 192.168.0.161 with 32 bytes of data:

Reply from 192.168.0.161: bytes=32 time=57ms TTL=128
Reply from 192.168.0.161: bytes=32 time=39ms TTL=128
Reply from 192.168.0.161: bytes=32 time=25ms TTL=128
Reply from 192.168.0.161: bytes=32 time=27ms TTL=128

Ping statistics for 192.168.0.161:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 57ms, Average = 37ms
```

```
Pinging 192.168.0.162 with 32 bytes of data:

Reply from 192.168.0.162: bytes=32 time=62ms TTL=128
Reply from 192.168.0.162: bytes=32 time=12ms TTL=128
Reply from 192.168.0.162: bytes=32 time=26ms TTL=128
Reply from 192.168.0.162: bytes=32 time=34ms TTL=128

Ping statistics for 192.168.0.162:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 62ms, Average = 33ms
```

```
Pinging 192.168.0.167 with 32 bytes of data:

Reply from 192.168.0.167: bytes=32 time=70ms TTL=128
Reply from 192.168.0.167: bytes=32 time=27ms TTL=128
Reply from 192.168.0.167: bytes=32 time=26ms TTL=128
Reply from 192.168.0.167: bytes=32 time=19ms TTL=128

Ping statistics for 192.168.0.167:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 19ms, Maximum = 70ms, Average = 35ms
```

```
Pinging 10.3.99.190 with 32 bytes of data:

Reply from 10.3.99.190: bytes=32 time=48ms TTL=255
Reply from 10.3.99.190: bytes=32 time=20ms TTL=255
Reply from 10.3.99.190: bytes=32 time=28ms TTL=255
Reply from 10.3.99.190: bytes=32 time=21ms TTL=255

Ping statistics for 10.3.99.190:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 48ms, Average = 29ms
```

```
Pinging 10.3.99.131 with 32 bytes of data:

Reply from 10.3.99.131: bytes=32 time=25ms TTL=126
Reply from 10.3.99.131: bytes=32 time=21ms TTL=126
Reply from 10.3.99.131: bytes=32 time=50ms TTL=126
Reply from 10.3.99.131: bytes=32 time=33ms TTL=126

Ping statistics for 10.3.99.131:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 21ms, Maximum = 50ms, Average = 32ms
```

```
Pinging 10.3.99.163 with 32 bytes of data:

Request timed out.
Reply from 10.3.99.163: bytes=32 time=23ms TTL=127
Reply from 10.3.99.163: bytes=32 time=8ms TTL=127
Reply from 10.3.99.163: bytes=32 time=22ms TTL=127

Ping statistics for 10.3.99.163:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 23ms, Average = 17ms
```

```
Pinging 10.3.99.158 with 32 bytes of data:

Reply from 10.3.99.158: bytes=32 time=15ms TTL=126
Reply from 10.3.99.158: bytes=32 time=5ms TTL=126
Reply from 10.3.99.158: bytes=32 time=19ms TTL=126
Reply from 10.3.99.158: bytes=32 time=26ms TTL=126

Ping statistics for 10.3.99.158:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 5ms, Maximum = 26ms, Average = 16ms
```

```
Pinging 10.3.99.162 with 32 bytes of data:

Request timed out.
Reply from 10.3.99.162: bytes=32 time=22ms TTL=127
Reply from 10.3.99.162: bytes=32 time=28ms TTL=127
Reply from 10.3.99.162: bytes=32 time=16ms TTL=127

Ping statistics for 10.3.99.162:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 16ms, Maximum = 28ms, Average = 22ms
```

```
Pinging 10.3.99.160 with 32 bytes of data:

Reply from 192.168.0.1: bytes=32 time=19ms TTL=255
Reply from 192.168.0.1: bytes=32 time=25ms TTL=255
Reply from 192.168.0.1: bytes=32 time=19ms TTL=255
Reply from 192.168.0.1: bytes=32 time=26ms TTL=255

Ping statistics for 10.3.99.160:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 19ms, Maximum = 26ms, Average = 22ms
```

```
Reply from 10.3.99.130: bytes=32 time=27ms TTL=126
Reply from 10.3.99.130: bytes=32 time=30ms TTL=126
Reply from 10.3.99.130: bytes=32 time=13ms TTL=126
Reply from 10.3.99.130: bytes=32 time=15ms TTL=126

Ping statistics for 10.3.99.130:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 13ms, Maximum = 30ms, Average = 21ms
```

```
Pinging 10.3.99.3 with 32 bytes of data:

Request timed out.
Reply from 10.3.99.3: bytes=32 time=20ms TTL=126
Reply from 10.3.99.3: bytes=32 time=20ms TTL=126
Reply from 10.3.99.3: bytes=32 time=20ms TTL=126

Ping statistics for 10.3.99.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 20ms, Maximum = 20ms, Average = 20ms
```