# Lab5 Access Control Lists ACLs

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## Lab Theory

### *What Access Lists Do*

Access lists ***filter*** network traffic by controlling whether routed packets should be ***forwarded or blocked*** at the router's interfaces.

Routers ***examine*** each packet to determine whether to forward or drop the packet, on the basis of the criteria specified within the access lists.

Access list criteria could be the ***source address*** of the traffic, the ***destination address*** of the traffic, the ***upper-layer protocol***, or other ***information***. Note that sophisticated users can sometimes successfully evade or fool basic access lists because no authentication is required.*(1)*

## Lab Objectives

1. To understand how to configure web servers
2. To understand how to configure ACLs on routers
3. To understand how to test ACLs



*(1) https://www.cisco.com/en/US/docs/ios-xml/ios/sec_data_acl/configuration/15-2mt/sec-acl-ov-gdl.html*

## Network Topology

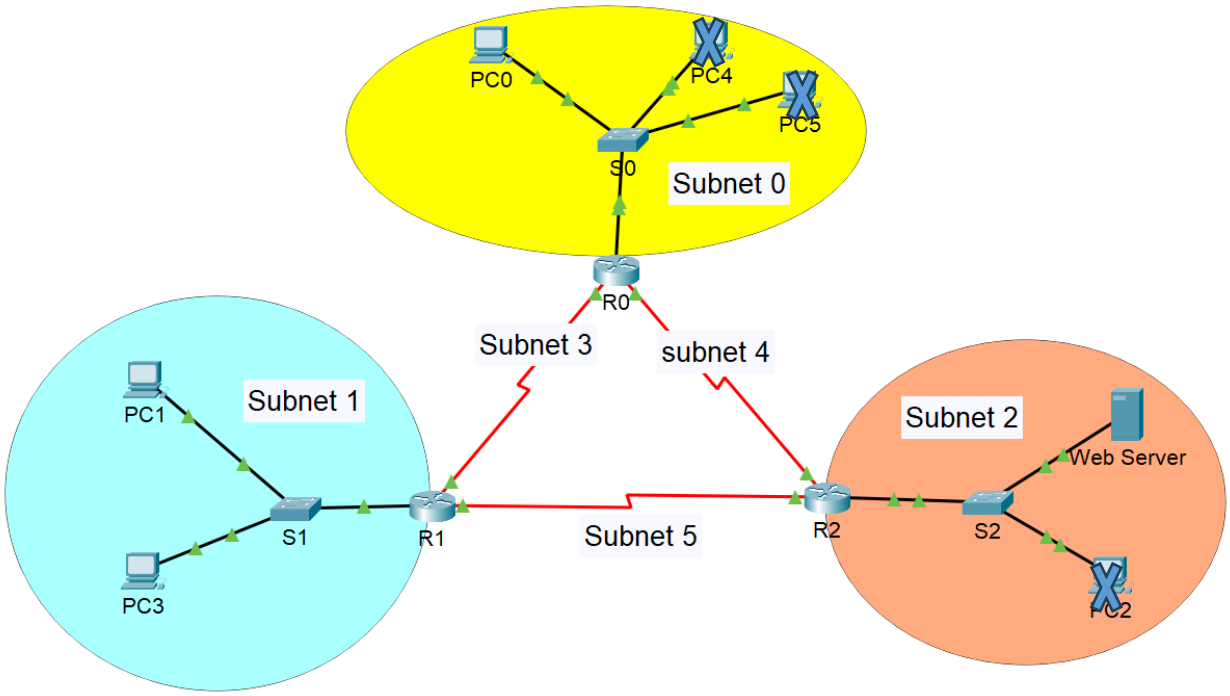



Fig1 Network Topolgy

## Procedure

1. Use the following major network address where X is your group number: X.X.0.0/16
2. The networks in the diagram above have the following requirements

| Network | Number of hosts |
|---|---|
| Subnet 0 | 55 |
| Subnet 1 | 99 |
| Subnet 2 | 22 |
| All other subnets | 2 |

3. Use VLSM to assign addresses to routers and devices
4. Assign the **first available IP address of a range** in a LAN **to the router**.
5. For the serial links, assign the **lower IP address to the router with lower index**
6. Cable diagram in the lab using **1941 routers** and **2960 switches**. Put only one PC in subnet 0 (PC0), Two PCs in Subnet 1 (PC1 and PC3), and one in Subnet 2 (the server).
7. Since we are not adding PC2, PC4 and PC5 to the network, you can disregard S0 and S2 as well.
8. Assign the second available IP address in Subnet1 to PC3 and the last available IP address to PC1.
   Assign the last available IP addresses in the corresponding ranges to the web server and to PC0.
9. Label your diagram with appropriate IP addresses. It may be easier to draw your diagram using Packet Tracer.
10. Insert this labeled diagram below. ***[1 marks]***

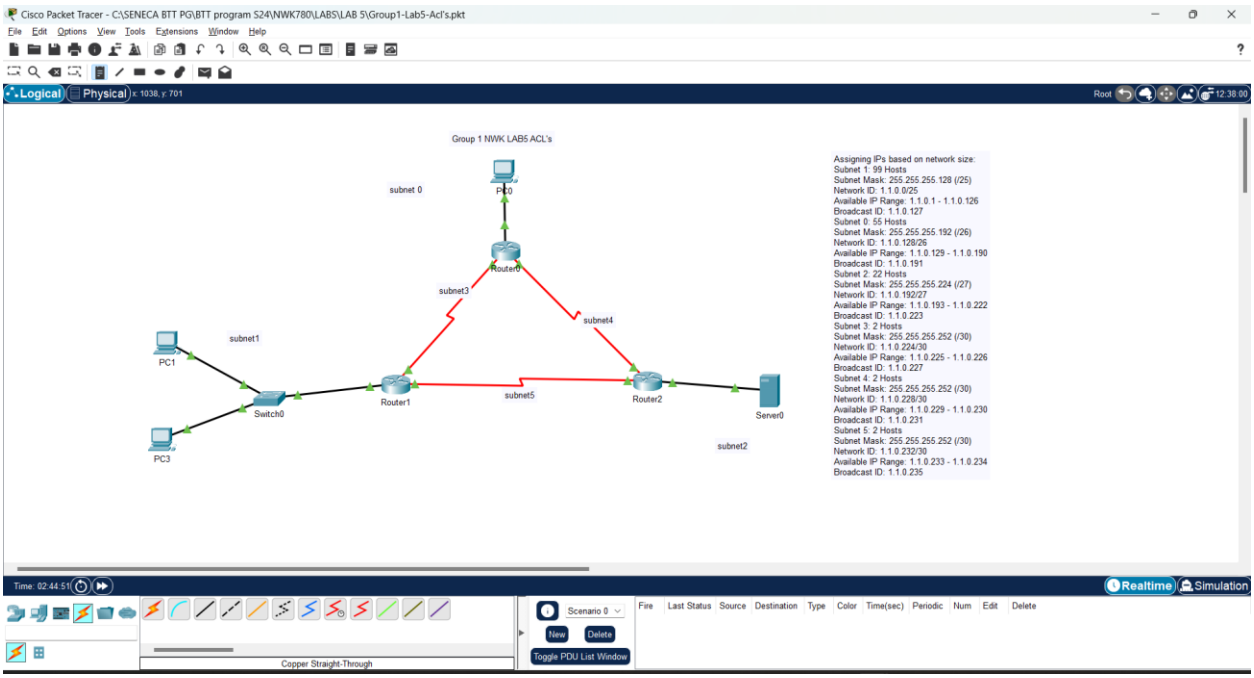



Fig2: Labeled Diagram

11. Use OSPF on all routers to ensure connectivity. Do not proceed further if you don't have full connectivity yet.
12. Install an Apachi Web Server on one of your PCs, designated as Web Server in Subnet 2.
13. Edit the index.htm file to add your full names to it.
14. Access the webserver from PC1 using a Web Browser (Use ***http://[IP_address_of_Server]***)
15. Take a screen capture of the output and insert it below ***[1 mark]***

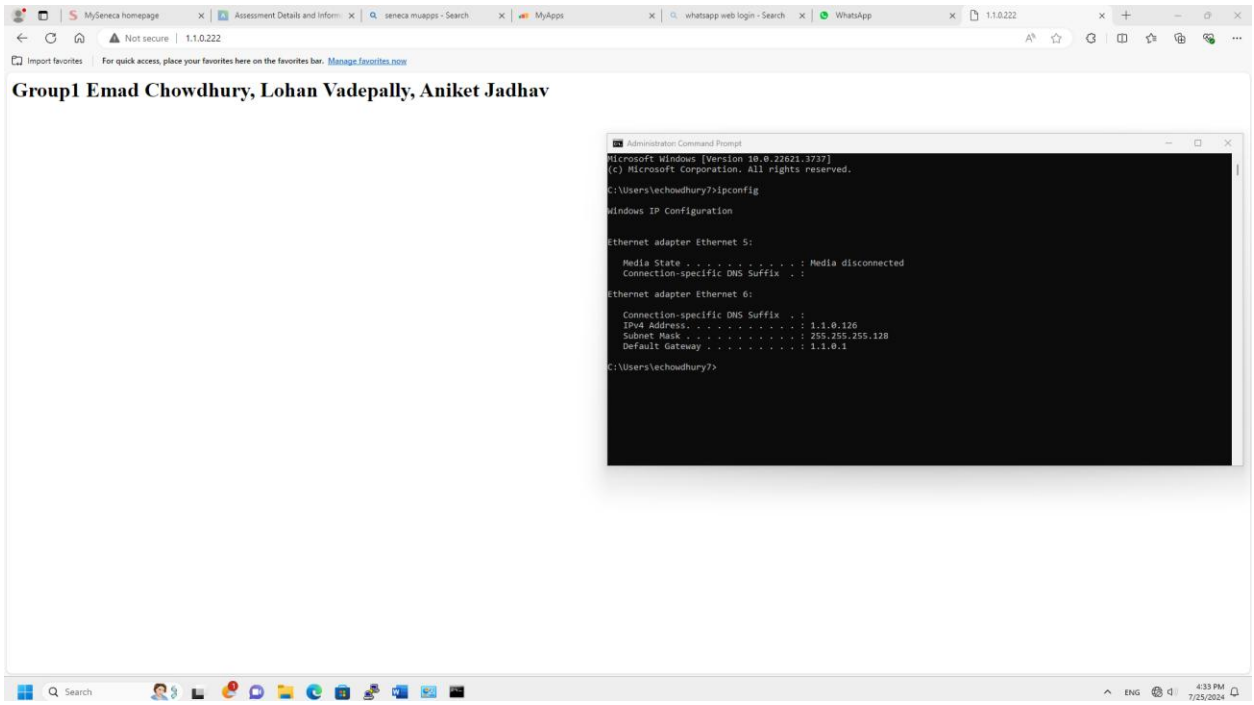



Fig3: Web Browser

## Task1

16. ***Allow only*** PINGs from Subnet 0 to any other network. All other traffic must be blocked.
17. Insert the necessary ACL statements as a note on your diagram. You can copy/paste the relevant statements from the running configuration (not all of the running configuration). Where is the best place to deploy your ACL(s)?
18. Check your work:
    a. Ping the web server in Subnet 2 from subnet 0. It must succeed.
    b. Try connecting to the Apache server using a browser. This must fail.
19. Take screen captures of these outputs and insert them below along with the diagram showing the ACL statements. ***[1 mark]***

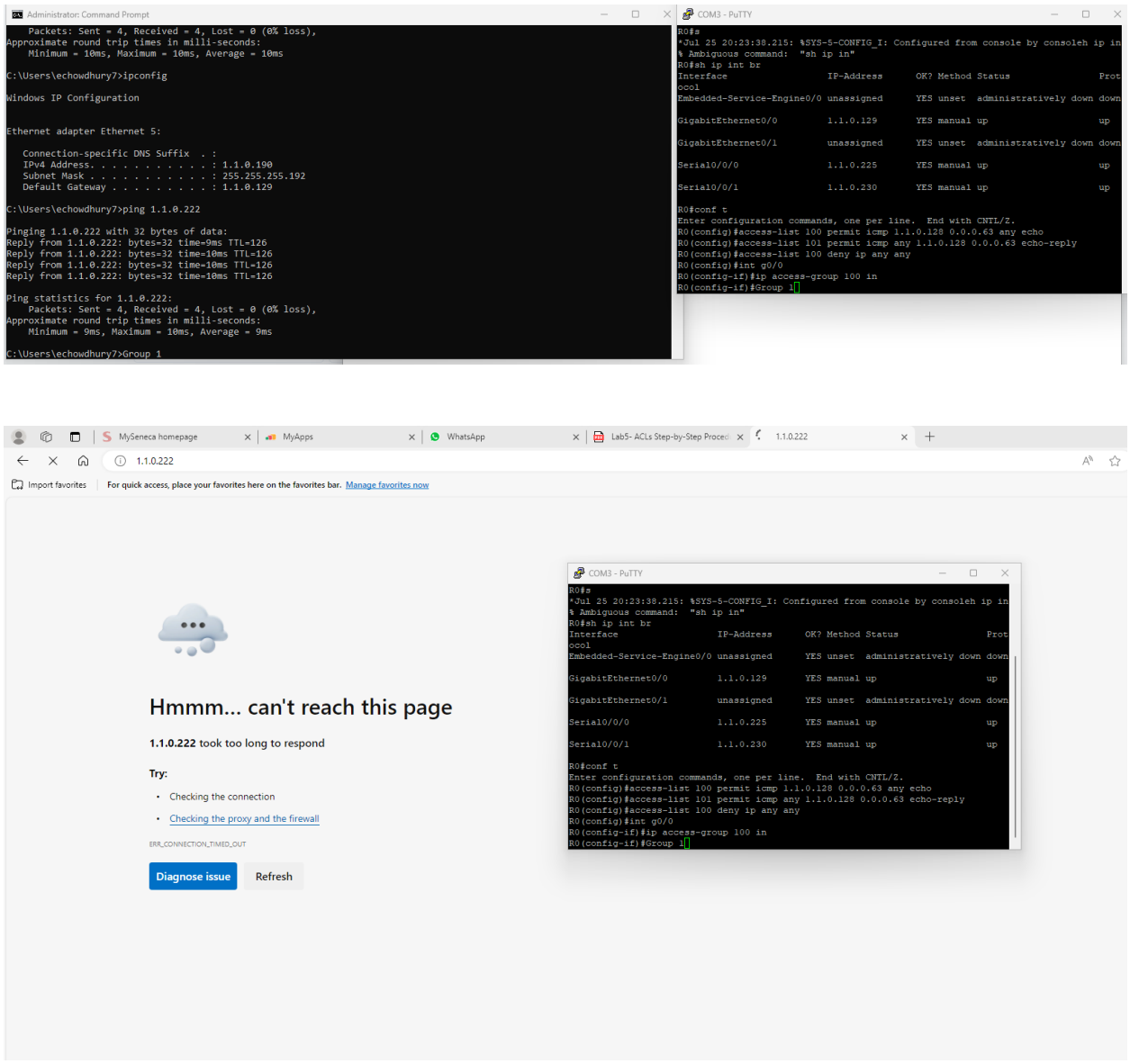



Fig4: Task1

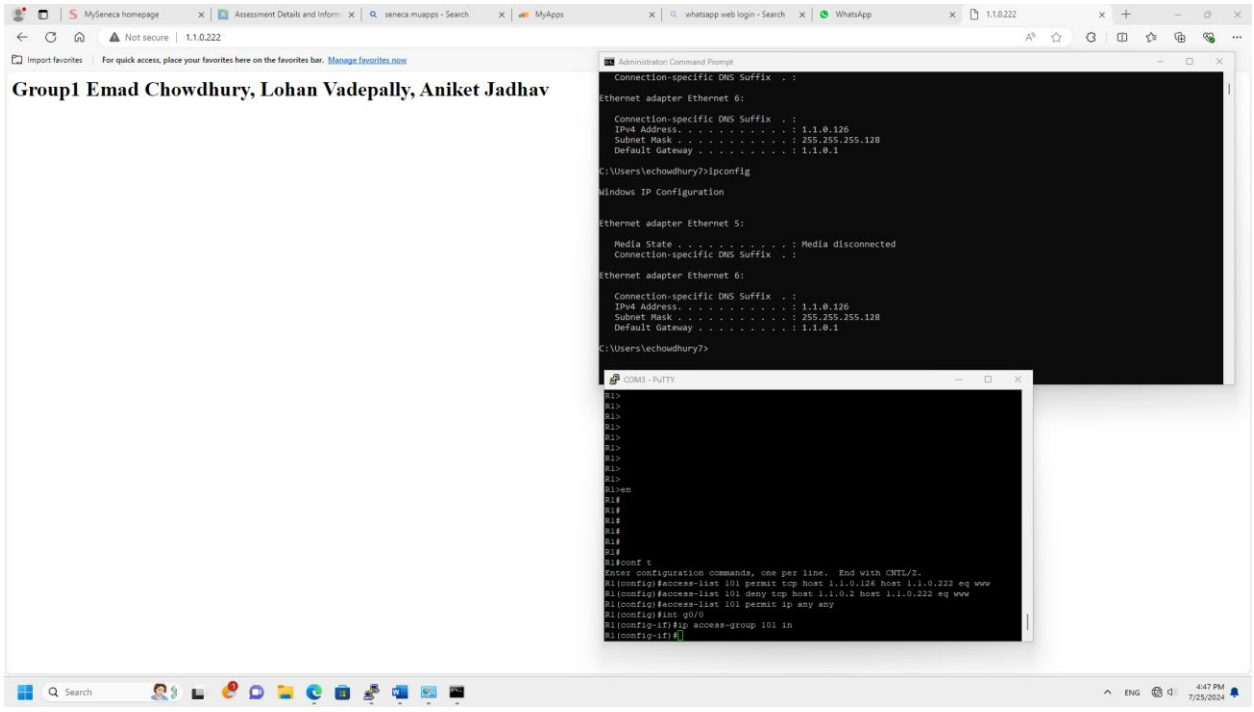
## Task2

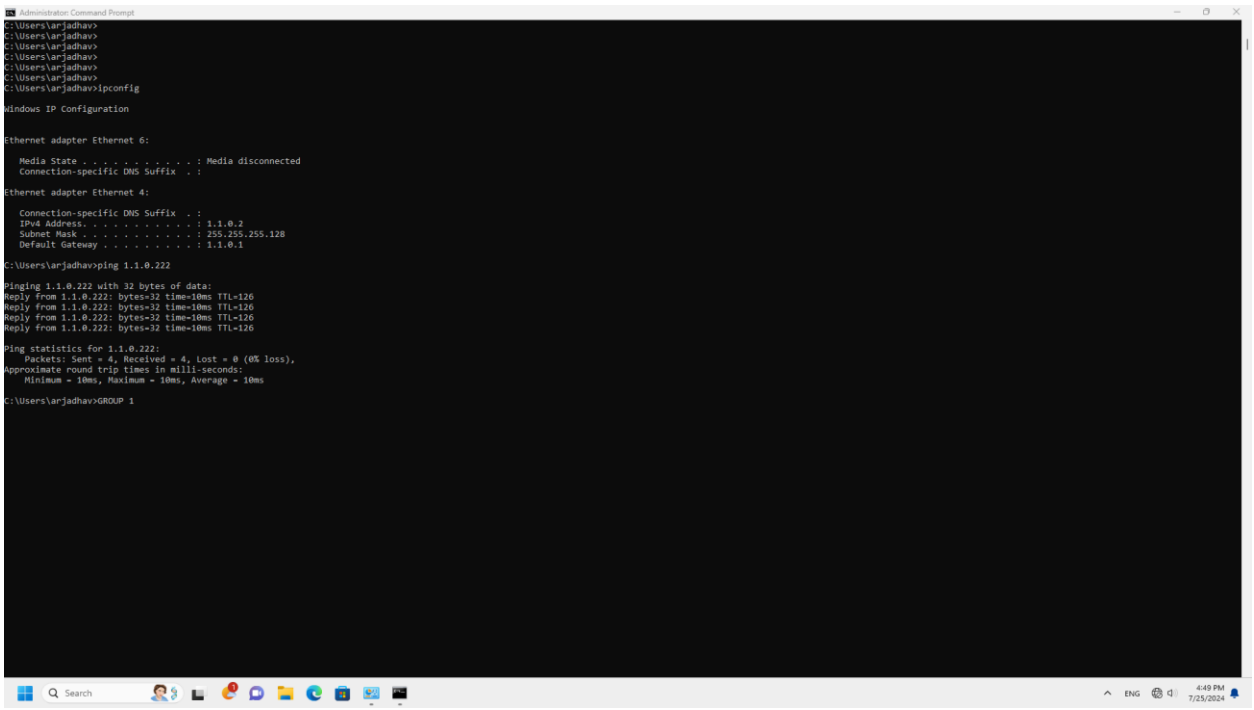
20. ***Allow only*** PC1 from Subnet1 to access the Web Server on Subnet2.
21. All other PCs in Subnet 1 should be able to ping the Web Server but not access the web pages on it.
22. Insert the necessary ACL statements as a note on your diagram as you did in Task1. Where is the best place to deploy your ACL(s)?

23. Check your work:
    a. Access the server from PC1 using a web browser. This should work.

b. Ping the server from PC3. It should work.
c. Access the server from PC3 using a web browser. This should fail.

24. Take screen capture(s) of these outputs and insert them below as well as the diagram showing the ACL statements. ***[1 mark]***



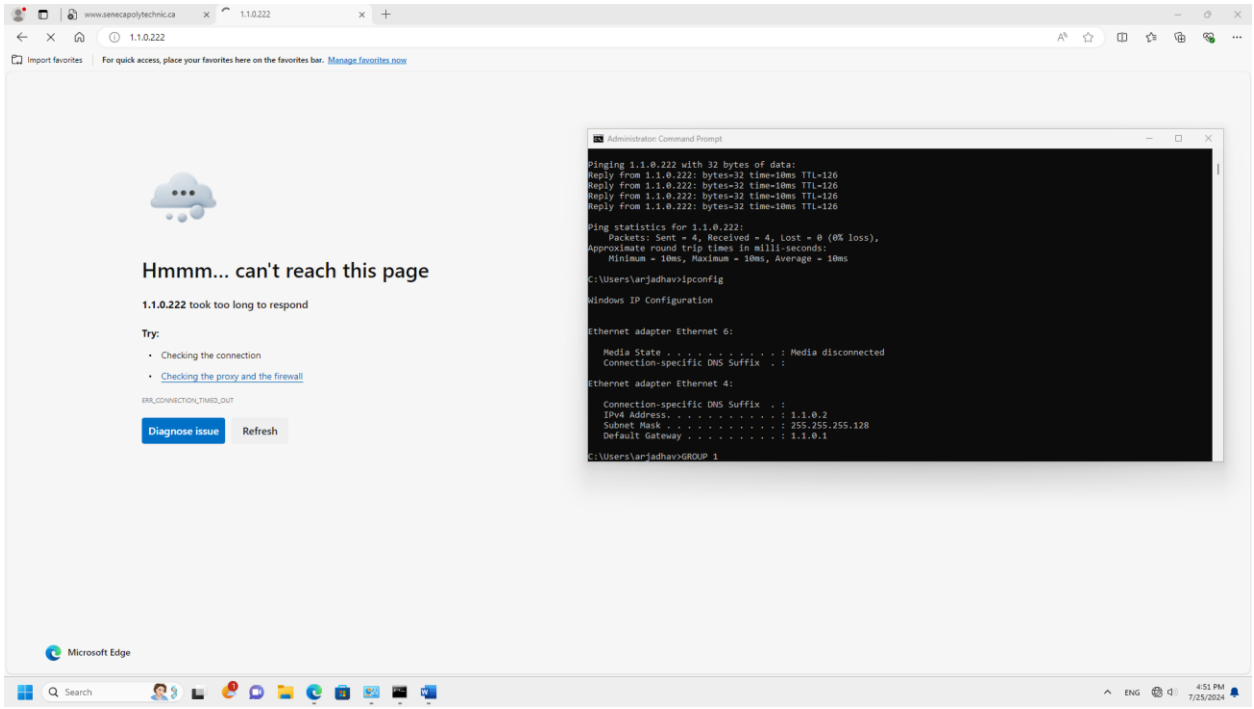
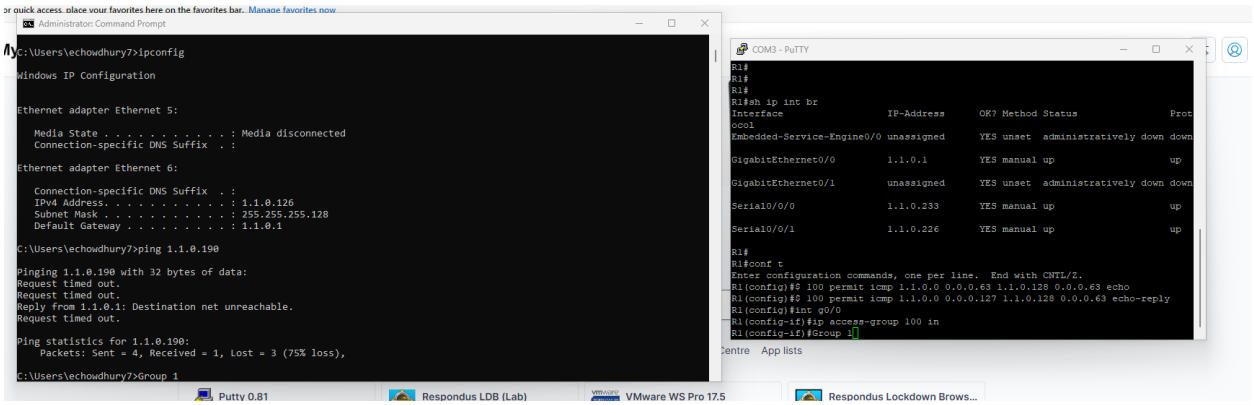


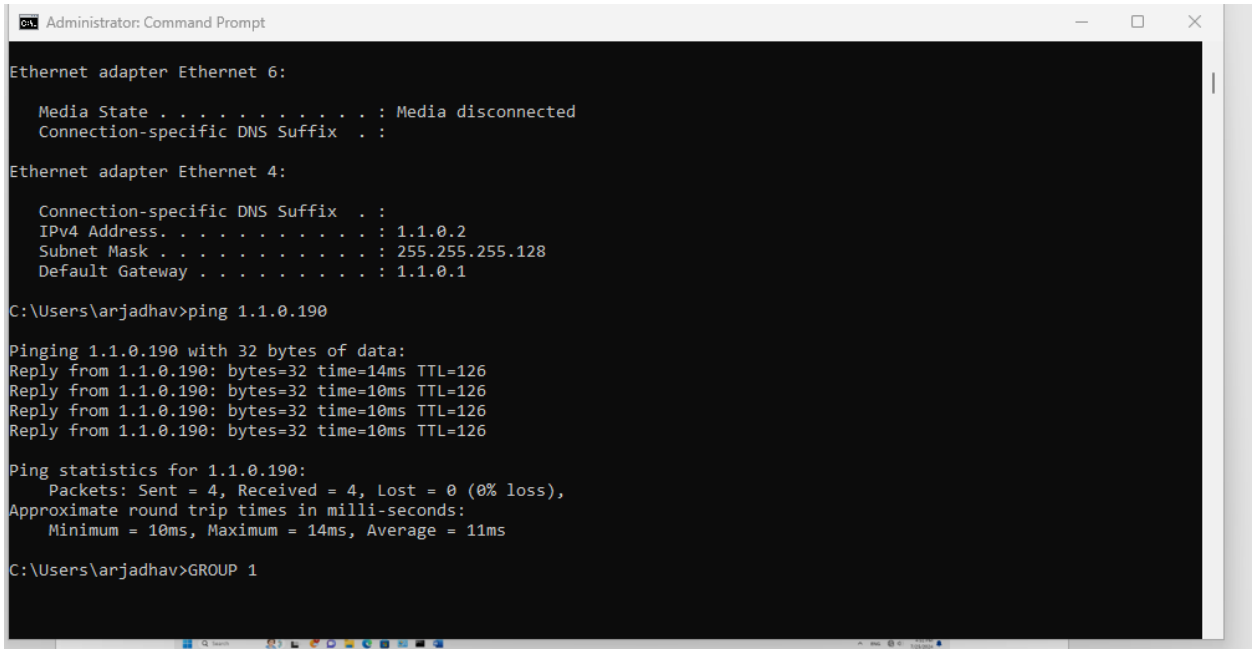

Fig5: Task2

## Task3

25. ***Allow*** only the ***first half*** of Subnet 1 to PING Subnet 0. All the PCs of Subnet 0 should be able to PING all PCs of Subnet 1.
26. Insert the necessary ACL statements as a note on your diagram.
27. Remove the previous ACL(s) from R2.
28. Check your work:
    a. Ping from PC1 to PC0 must fail.
    b. Ping from PC3 to PC0 must succeed.
    c. Pings from PC0 to PC1 and PC3 must succeed.

29. Take screen capture(s) of these outputs as well as the diagram showing the syntax of your ACL statements and, insert them below ***[2 marks]***


Administrator: Command Prompt
C:\Users\echowdhury7>ipconfig
Windows IP Configuration
Ethernet adapter Ethernet 5:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Ethernet 6:
Connection-specific DNS Suffix . :
IPv4 Address. . . . . : 1.1.0.126
Subnet Mask . . . . . : 255.255.255.128
Default Gateway . . . . . : 1.1.0.1
C:\Users\echowdhury7>ping 1.1.0.190
Pinging 1.1.0.190 with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 1.1.0.1: Destination net unreachable.
Request timed out.
Ping statistics for 1.1.0.190:
Packets: Sent = 4, Received = 1, Lost = 3 (75% loss),
C:\Users\echowdhury7>Group 1
COM3 - PuTTY
R1#sh ip int br
Interface IP-Address OK? Method Status Protocol
Embedded-Service-Engine0/0 unassigned YES unset administratively down down
GigabitEthernet0/0 1.1.0.1 YES manual up up
GigabitEthernet0/1 unassigned YES unset administratively down down
Serial0/0/0 1.1.0.233 YES manual up up
Serial0/0/1 1.1.0.226 YES manual up up
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)# 100 permit icmp 1.1.0.0 0.0.0.63 1.1.0.128 0.0.0.63 echo
R1(config)# 100 permit icmp 1.1.0.0 0.0.0.127 1.1.0.128 0.0.0.63 echo-reply
R1(config)#int g0/0
R1(config-if)#ip access-group 100 in
R1(config-if)#Group 1
Putty 0.81
Respondus LDB (Lab)
VMware WS Pro 17.5
Respondus Lockdown Brows...


Administrator: Command Prompt
Ethernet adapter Ethernet 6:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Ethernet 4:
Connection-specific DNS Suffix . :
IPv4 Address. . . . . : 1.1.0.2
Subnet Mask . . . . . : 255.255.255.128
Default Gateway . . . . . : 1.1.0.1
C:\Users\arjadhav>ping 1.1.0.190
Pinging 1.1.0.190 with 32 bytes of data:
Reply from 1.1.0.190: bytes=32 time=14ms TTL=126
Reply from 1.1.0.190: bytes=32 time=10ms TTL=126
Reply from 1.1.0.190: bytes=32 time=10ms TTL=126
Reply from 1.1.0.190: bytes=32 time=10ms TTL=126
Ping statistics for 1.1.0.190:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 10ms, Maximum = 14ms, Average = 11ms
C:\Users\arjadhav>GROUP 1

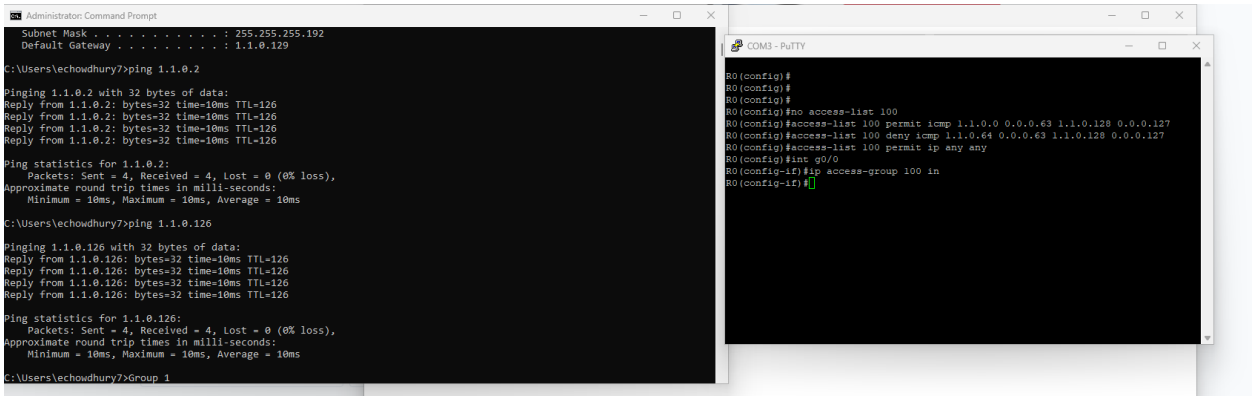

Administrator: Command Prompt
Subnet Mask . . . . . : 255.255.255.192
Default Gateway . . . . . : 1.1.0.129
C:\Users\echowdhury7>ping 1.1.0.2
Pinging 1.1.0.2 with 32 bytes of data:
Reply from 1.1.0.2: bytes=32 time=10ms TTL=126
Reply from 1.1.0.2: bytes=32 time=10ms TTL=126
Reply from 1.1.0.2: bytes=32 time=10ms TTL=126
Reply from 1.1.0.2: bytes=32 time=10ms TTL=126
Ping statistics for 1.1.0.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 10ms, Maximum = 10ms, Average = 10ms
C:\Users\echowdhury7>ping 1.1.0.126
Pinging 1.1.0.126 with 32 bytes of data:
Reply from 1.1.0.126: bytes=32 time=10ms TTL=126
Reply from 1.1.0.126: bytes=32 time=10ms TTL=126
Reply from 1.1.0.126: bytes=32 time=10ms TTL=126
Reply from 1.1.0.126: bytes=32 time=10ms TTL=126
Ping statistics for 1.1.0.126:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 10ms, Maximum = 10ms, Average = 10ms
C:\Users\echowdhury7>Group 1
COM3 - PuTTY
R0(config)#
R0(config)#
R0(config)#
R0(config)#no access-list 100
R0(config)#access-list 100 permit icmp 1.1.0.0 0.0.0.63 1.1.0.128 0.0.0.127
R0(config)#access-list 100 deny icmp 1.1.0.64 0.0.0.63 1.1.0.128 0.0.0.127
R0(config)#access-list 100 permit ip any any
R0(config)#int g0/0
R0(config-if)#ip access-group 100 in
R0(config-if)#

Fig6: Task3

## Appendix

1. Follow the instructions in the following video to install the Apache server on a PC.

https://www.youtube.com/watch?v=tYPQFztqV4I&ab_channel=DarcyDeClute

2. Task1 Hints:

   # access-list 101 permit icmp *subnet-id wildcard-mask* any echo

   # access-list 102 permit icmp any *subnet-id wildcard-mask* echo-reply

   (interface)# ip access-group 101 in

   (interface)# ip access-group 102 out