



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

COMPUTER NETWORKS LAB

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Lab	11
Course	Computer Networks
Date	8 th -December-25
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IN LAB TASKS

Warm up Task [30 Minutes]

Answer each question in your own words (3 to 4 lines)

1. What is an Access Control List (ACL)?

An ACL is a set of rules applied to network devices that determine whether traffic is allowed or denied. It works by filtering packets based on criteria like IP addresses, protocols, or ports, helping enforce security and manage traffic flow.

2. Differentiate between Standard ACL and Extended ACL.

- Standard ACLs filter traffic only by source IP address.
 - Extended ACLs provide more control, filtering by source/destination IP, protocol type, and port numbers.
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3. How are ACLs processed in a router?

Routers process ACLs sequentially from top to bottom. Once a packet matches a rule, the action (permit or deny) is applied immediately. If no rule matches, the packet is denied by default.

4. What is the wildcard mask in ACLs?

A wildcard mask specifies which bits of an IP address should be checked. It allows flexible matching by marking certain bits as “don’t care,” making ACLs efficient for ranges of addresses.

5. How does an ACL differ from a Firewall?

An ACL is a basic rule set applied on routers to filter traffic at the network layer. A firewall is more advanced, offering deep packet inspection, stateful filtering, and protection across multiple layers of the network.

6. What are Inbound ACL and Outbound ACL?

- Inbound ACLs filter traffic entering the router interface before routing decisions.
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- Outbound ACLs filter traffic leaving the router interface after routing decisions.
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7. What is the purpose of an ACL in the context of network security?

ACLs secure networks by restricting unauthorized access and controlling traffic flow. They enforce policies, prevent malicious activity, and ensure only legitimate communication passes through.

In Lab Task

By using Drag and Drop draw the topology diagram as Shown below and attach a screenshot of each step.

Configuration of ACL Steps

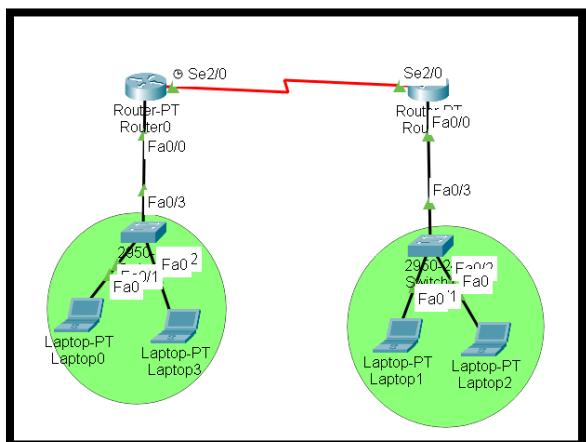
Step 1: Assign IP Addresses to each network.

Step2: Use RIP for communication of each network

Step 3: Take a Screenshot of successful communication(simulation).

Step4: Apply Standard ACL

- Standard ACL number will be your Nutech IDs last two digits.
- Deny one IP address of admin Block
- Permit one IP address of admin Block



ROUTER 1:

```
Ayeshal(config)#int fa0/0
Ayeshal(config-if)#ip address 192.168.1.1 255.255.255.0
Ayeshal(config-if)#no shut

Ayeshal(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Ayeshal(config-if)#exit
Ayeshal(config)#int se2/0
Ayeshal(config-if)#ip address 10.0.0.1 255.0.0.0
Ayeshal(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Ayeshal(config-if)#exit
Ayeshal(config)#router rip
Ayeshal(config-router)#network 192.168.1.0 255.255.255.0
                           ^
% Invalid input detected at '^' marker.

Ayeshal(config-router)#network 192.168.1.0
Ayeshal(config-router)#network 192.168.2.0
Ayeshal(config-router)#network 10.0.0.0
Ayeshal(config-router)#exit
Ayeshal(config)#access-list 19 deny 192.168.2.2
Ayeshal(config)#access-list 19 permit 192.168.2.3
Ayeshal(config)#exit
Ayeshal#
%SYS-5-CONFIG_I: Configured from console by console

Ayeshal#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Ayeshal#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Ayeshal#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Ayeshal(config)#int se2/0
```

```
Ayeshal#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Ayeshal(config)#int se2/0
Ayeshal(config-if)#ip access-group 19 in
Ayeshal(config-if)#exit
Ayeshal(config)#exit
Ayeshal#
%SYS-5-CONFIG_I: Configured from console by console
```

ROUTER 2:

```

Router>enable
Router#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Ayesha2
Ayesha2(config)#int fa0/0
Ayesha2(config-if)#ip address 192.168.2.1 255.255.255.0
Ayesha2(config-if)#no shut

Ayesha2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Ayesha2(config-if)#exit
Ayesha2(config)#int se2/0
Ayesha2(config-if)#ip address 10.0.0.2 255.0.0.0
Ayesha2(config-if)#no shut

Ayesha2(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Ayesha2(config-if)#exit
Ayesha2(config)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Ayesha2(config)#router rip
Ayesha2(config-router)#network 192.168.2.0
Ayesha2(config-router)#network 10.0.0.0
Ayesha2(config-router)#exit
Ayesha2(config)#exit
Ayesha2#
%SYS-5-CONFIG_I: Configured from console by console

Ayesha2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Ayesha2#

```

Ping pc 3 with pc 1 and 2 of Network 1: (Denied)

```

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Reply from 10.0.0.1: Destination host unreachable.

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\>

```

Ping Pc 4 with pc 1 and 2 of network 1: (Permitted)

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=1ms TTL=126
Reply from 192.168.1.2: bytes=32 time=4ms TTL=126

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 4ms, Average = 1ms

C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.3: bytes=32 time=2ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126
Reply from 192.168.1.3: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 2ms, Average = 1ms

C:\>
```

Packets from network 1 are going only in pc 192.168.2.3:

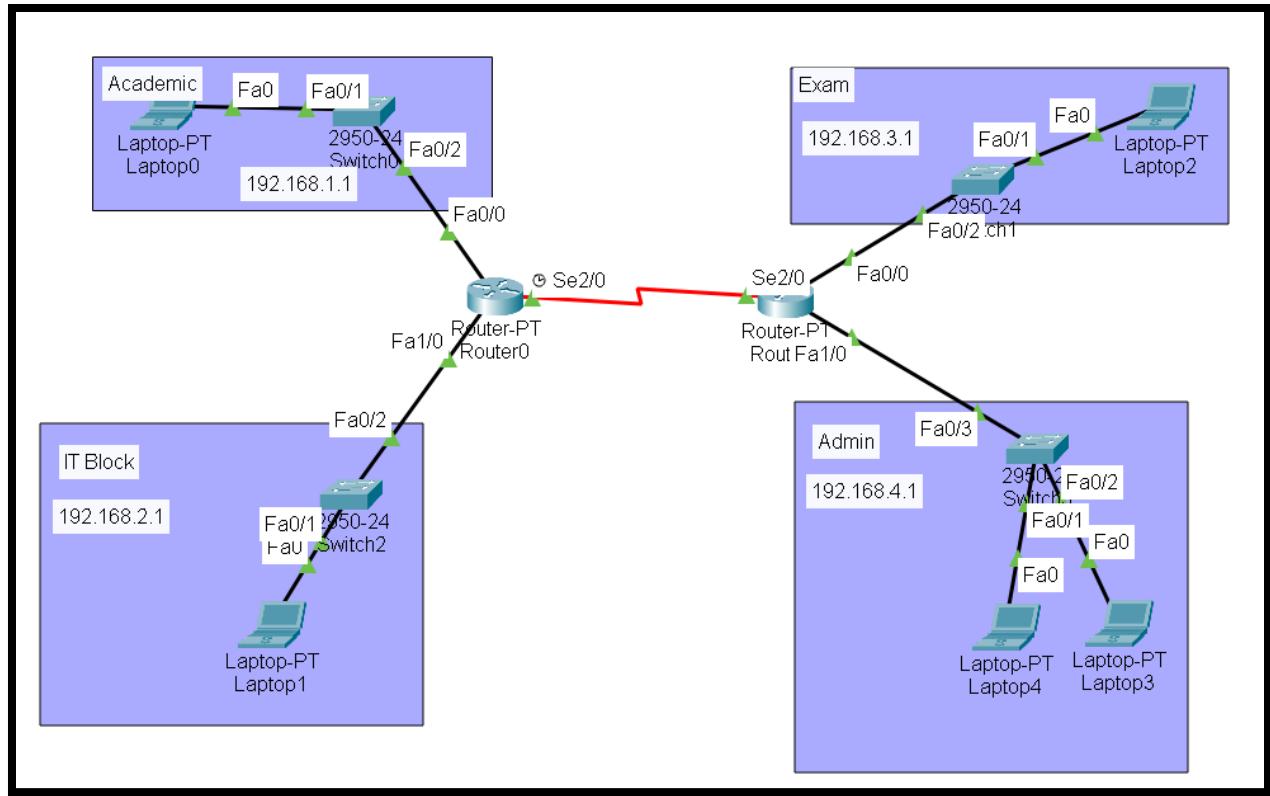
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic
	Successful	Laptop0	Laptop2	ICMP		0.000	N
	Successful	Laptop3	Laptop2	ICMP		0.000	N

Trying to send on pc 192.168.2.2:

Realtime										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Failed	Laptop1	Laptop0	ICMP		0.000	N	2	(edit)	(del)
	Failed	Laptop0	Laptop1	ICMP		0.000	N	3	(edit)	(del)

Post Lab Task

By using Drag and Drop draw the topology diagram as Shown below and attach screenshot of each step.



Router 1:

```

Router>enable
Router#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Ayeshal
Ayeshal(config)#int fa0/0
Ayeshal(config-if)#ip address 192.168.1.1 255.255.255.0
Ayeshal(config-if)#no shut

Ayeshal(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Ayeshal(config-if)#exit
Ayeshal(config)#int fa1/0
Ayeshal(config-if)#ip address 192.168.2.1 255.255.255.0
Ayeshal(config-if)#no shut

Ayeshal(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Ayeshal(config-if)#exit
Ayeshal(config)#int se2/0
Ayeshal(config-if)#ip address 10.0.0.1 255.0.0.0
Ayeshal(config-if)#no shut

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Ayeshal(config-if)#exit
Ayeshal(config)#router rip
Ayeshal(config-router)#network 192.168.1.0
Ayeshal(config-router)#network 192.168.2.0
Ayeshal(config-router)#network 192.168.3.0
Ayeshal(config-router)#network 192.168.4.0
Ayeshal(config-router)#network 10.0.0.0
Ayeshal(config-router)#exit
Ayeshal(config)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Ayeshal(config)#config ter

```

```

Ayeshal(config)#config ter
%Invalid hex value
Ayeshal(config)#access-list 19 deny 192.168.1.0 0.0.0.255
Ayeshal(config)#access-list 19 deny 192.168.3.0 0.0.0.255
Ayeshal(config)#access-list 19 Permit 192.168.4.2
Ayeshal(config)#access-list 19 Permit 192.168.2.0 0.0.0.255
Ayeshal(config)#int fa1/0
Ayeshal(config-if)#ip access-group 19 in
Ayeshal(config-if)#exit
Ayeshal(config)#exit
Ayeshal#
%SYS-5-CONFIG_I: Configured from console by console

Ayeshal#copy running-config startup-config
Destination filename [startup-config]

```

Router 2:

```

Router>enable
Router#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Ayesha2
Ayesha2(config)#int fa0/0
Ayesha2(config-if)#ip address 192.168.3.1 255.255.255.0
Ayesha2(config-if)#no shut

Ayesha2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Ayesha2(config-if)#exit
Ayesha2(config)#int fa1/0
Ayesha2(config-if)#ip address 192.168.4.1 255.255.255.0
Ayesha2(config-if)#no shut

Ayesha2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up

Ayesha2(config-if)#exit
Ayesha2(config)#int se2/0
Ayesha2(config-if)#ip address 10.0.0.2 255.0.0.0
Ayesha2(config-if)#no shut

Ayesha2(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Ayesha2(config-if)#exit
Ayesha2(config)#router rip
Ayesha2(config-router)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

% Ambiguous command: "n"
Ayesha2(config-router)#network 192.168.2.0
Ayesha2(config-router)#network 192.168.1.0
Ayesha2(config-router)#network 192.168.3.0
Ayesha2(config-router)#network 192.168.1.4
Ayesha2(config-router)#network 192.168.4.0
Ayesha2(config-router)#network 10.0.0.0
Ayesha2(config-router)#exit

```

```

Ayesha2>enable
Ayesha2#config ter
Enter configuration commands, one per line. End with CNTL/Z.
Ayesha2(config)#access-list 19 permit 192.168.1.0 0.0.0.255
Ayesha2(config)#access-list 19 permit 192.168.4.2
Ayesha2(config)#access-list 19 deny 192.168.2.0 0.0.0.255
Ayesha2(config)#int fa0/0
Ayesha2(config-if)#ip access-group 19 out
Ayesha2(config-if)#exit
Ayesha2(config)#exit
Ayesha2#
%SYS-5-CONFIG_I: Configured from console by console

Ayesha2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...

```

Fail from Exam to IT:

Realtime Simulation											
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete	
	Failed	Laptop2	Laptop1	ICMP	■	0.000	N	0	(edit)	(delete)	
	Failed	Laptop1	Laptop2	ICMP	■	0.000	N	1	(edit)	(delete)	

Academic Can Only Communicate With Exam Block:

Realtime Simulation											
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete	
	Successful	Laptop0	Laptop2	ICMP	■	0.000	N	0	(edit)	(delete)	

IT Can Communicate With Every Block:

Realtime Simulation											
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete	
	Successful	Laptop1	Laptop0	ICMP	■	0.000	N	0	(edit)	(delete)	
	Successful	Laptop1	Laptop4	ICMP	■	0.000	N	1	(edit)	(delete)	
	Successful	Laptop1	Laptop3	ICMP	■	0.000	N	2	(edit)	(delete)	
	Failed	Laptop1	Laptop2	ICMP	■	0.000	N	3	(edit)	(delete)	

Admin only 1 laptop can communicate with IT:

Realtime Simulation											
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete	
	Successful	Laptop3	Laptop1	ICMP	■	0.000	N	0	(edit)	(delete)	
	Successful	Laptop4	Laptop1	ICMP	■	0.000	N	1	(edit)	(delete)	
	Failed	Laptop2	Laptop1	ICMP	■	0.000	N	2	(edit)	(delete)	

Exam Block can communicate only with Academic Block and One IP Address of Admin Block.

Realtime Simulation											
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete	
	Failed	Laptop2	Laptop3	ICMP	■	0.000	N	0	(edit)	(delete)	
	Failed	Laptop2	Laptop3	ICMP	■	0.000	N	1	(edit)	(delete)	
	Successful	Laptop2	Laptop4	ICMP	■	0.000	N	2	(edit)	(delete)	

