Networking Project Report Template

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C25-08Cybersecurity

1. Introduction

This project demonstrates the configuration and implementation of network security measures in a simulated environment using Cisco Packet Tracer. The focus is on:

- Firewall configuration on the server
- ACLs to control access to critical resources
- Hardening of network devices
- Defense against ARP spoofing attacks
- Testing and verification of network security

2. Network Topology

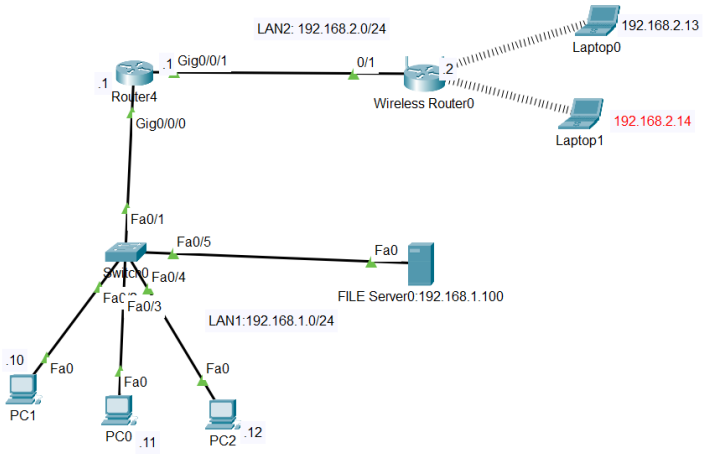


Diagram:

3. IP Addressing Table

Device	Interface	IP Address	Subnet Mask	Gateway	Notes
PC1	NIC	192.168.1.10	255.255.255.0	192.168.1.1	LAN1 client
PC2	NIC	192.168.1.11	255.255.255.0	192.168.1.1	LAN1 client
PC3	NIC	192.168.1.12	255.255.255.0	192.168.1.1	LAN1 client
File Server	NIC	192.168.1.100	255.255.255.0	192.168.1.1	File/HTTP/FTP
Router1	G0/0/0	192.168.1.1	255.255.255.0	—	LAN1 Gateway
Router1	G0/0/1	192.168.2.1	255.255.255.0	—	LAN2 Gateway
Laptop0	Wireless	192.168.2.13	255.255.255.0	192.168.2.1	LAN2 client
Laptop1	Wireless	192.168.2.14	255.255.255.0	192.168.2.1	LAN2 client

5. Router1 ACL Configuration

access-list 101 permit tcp 192.168.1.0 0.0.0.255 host 192.168.1.100 eq 21
access-list 101 permit tcp 192.168.1.0 0.0.0.255 host 192.168.1.100 eq 80
access-list 101 deny ip 192.168.2.0 0.0.0.255 host 192.168.1.100

access-list 101 permit ip any any

interface g0/0/1
 ip access-group 101 in

6. Device Hardening Steps

- **Router1**:
  - Configured SSH login only
  - Deny Telnet
  - Set strong local user authentication

```
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#line vty 0 4
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#transport input ssh
Router(config-line)#exit
Router(config)#service password-encryption
Router(config)#banner motd #UNAUTHORIZED ACCESS WILL BE PROSECUTED#
Router(config)#
```

Showing IP SSH is configured(Router1):

```
UNAUTHORIZED ACCESS WILL BE PROSECUTED

Router1>en
Router1#show ip ssh
SSH Enabled - version 1.99
Authentication timeout: 120 secs; Authentication retries: 3
Router1#
```

7. Security Simulation – ARP Spoofing Defense

- Configured **Port Security** to restrict number of MAC addresses per port.
- Enabled **MAC address sticky learning** to prevent spoofing.
- Verified that unauthorized devices are blocked.

Switche:

Enabled port security (sticky MAC, violation restrict):

```
Switch>EN
Switch#CONFIG T
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#INERFACE RANGE FA0/6 - 24
               ^
% Invalid input detected at '^' marker.

Switch(config)#INTERFACE RANGE FA0/6 - 24
Switch(config-if-range)#switchport mode access
Switch(config-if-range)# switchport port-security
Switch(config-if-range)# switchport port-security maximum 2
Switch(config-if-range)# switchport port-security violation restrict
Switch(config-if-range)# switchport port-security mac-address sticky
Switch(config-if-range)#SHUT DOWN
                        ^
% Invalid input detected at '^' marker.

Switch(config-if-range)#SHUTDOWN
```

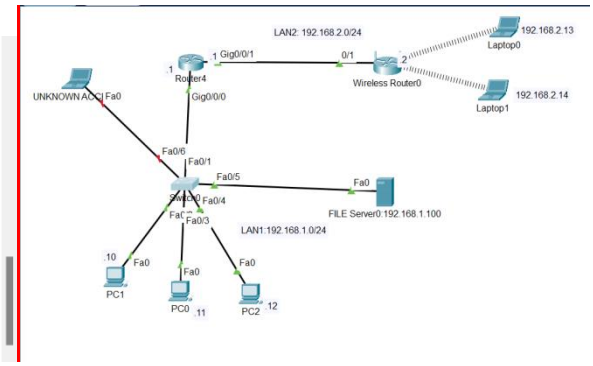
Disabled unused ports

```
Switch(config-if-range)#SHUTDOWN
%LINK-5-CHANGED: Interface FastEthernet0/6, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/7, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/8, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/9, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/11, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/12, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/13, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/14, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/15, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/16, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/17, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/18, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/19, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/20, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/21, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/22, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/23, changed state to administratively down
%LINK-5-CHANGED: Interface FastEthernet0/24, changed state to administratively down
Switch(config-if-range)#EXIT
Switch(config)#EXIT
```

7. Security Simulation – ARP Spoofing Defense

See unknown Computer trying to access switch port FA06 without success:

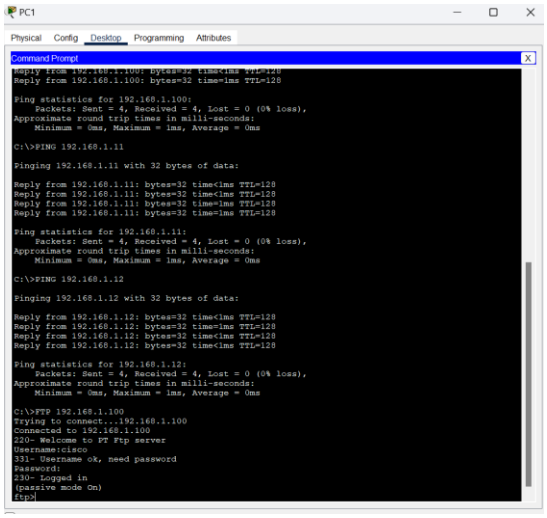
```
SW0#SHOW
% Incomplete command.
SW0#
SW0#SHOW PORT-SECURITY
Secure Port MaxSecureAddr CurrentAddr SecurityViolation Security Action
             (Count)       (Count)       (Count)
---------------------------------------------------------------------------
        Fa0/6       2             0                0         Restrict
        Fa0/7       2             0                0         Restrict
        Fa0/8       2             0                0         Restrict
        Fa0/9       2             0                0         Restrict
       Fa0/10       2             0                0         Restrict
       Fa0/11       2             0                0         Restrict
       Fa0/12       2             0                0         Restrict
       Fa0/13       2             0                0         Restrict
       Fa0/14       2             0                0         Restrict
       Fa0/15       2             0                0         Restrict
       Fa0/16       2             0                0         Restrict
       Fa0/17       2             0                0         Restrict
       Fa0/18       2             0                0         Restrict
       Fa0/19       2             0                0         Restrict
       Fa0/20       2             0                0         Restrict
       Fa0/21       2             0                0         Restrict
       Fa0/22       2             0                0         Restrict
       Fa0/23       2             0                0         Restrict
       Fa0/24       2             0                0         Restrict
---------------------------------------------------------------------------
SW0#
```



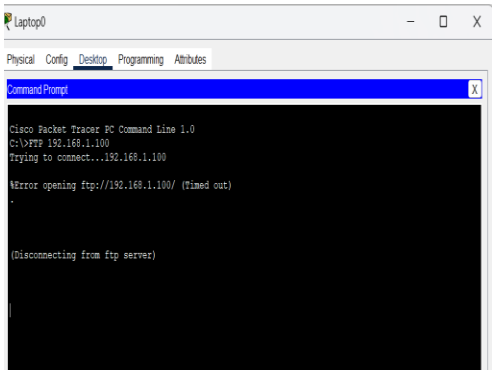
8. Testing & Verification

Port Security Tests (Switch1)		
Test Description	**Action Performed**	**Actual Result**
PC (sticky MAC learned)	PC1 reconnected	Connection successful ☑
Connect unauthorized device (new MAC)	Rogue Laptop	Port security violation, no access ✗
Verify port security config	show port-security	Displays learned/sticky MAC ☑

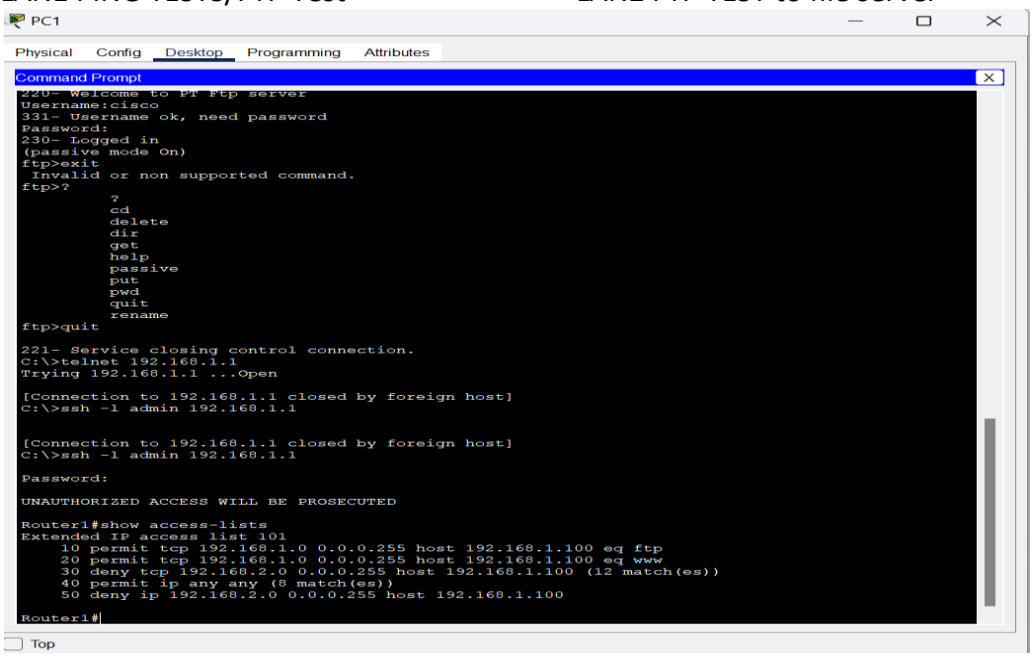
Test	Source Device	Destination	Expected Result	Actual Result
Ping File Server	PC1	192.168.1.100	Success ✅	Success ✅
FTP to File Server	PC2	192.168.1.100	Success ✅	Success ✅
HTTP access to File Server	PC3	192.168.1.100	Success ✅	Success ✅
Ping File Server	Laptop0	192.168.1.100	Blocked ✗	Blocked ✗
Telnet File Server (Port 80)	Laptop1	192.168.1.100	Blocked ✗	Blocked ✗
SSH Access to Router1	Admin PC1	Router1	Success ✅	
Telnet Access to Router1	Any	Router1	Blocked ✗	



LAN1 PING TESTS/FTP Test



LAN2 FTP TEST to file server



SSH Access to Router1 from PC1 as admin.

9. Conclusion

The project successfully demonstrated:

- Implementation of ACLs to protect a File Server
- Server firewall configuration
- Hardening of network devices against unauthorized access
- Defense against ARP spoofing using switch port security
- Validation through successful and failed connectivity tests

This simulation highlights the importance of layered security controls in ensuring availability, integrity, and confidentiality in a network environment.