

Proof Of Concept (PoC)

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Task: Fully Secured Network using various security measures like port security, Access Control List (ACL), VLSM, etc.

Given Tasks

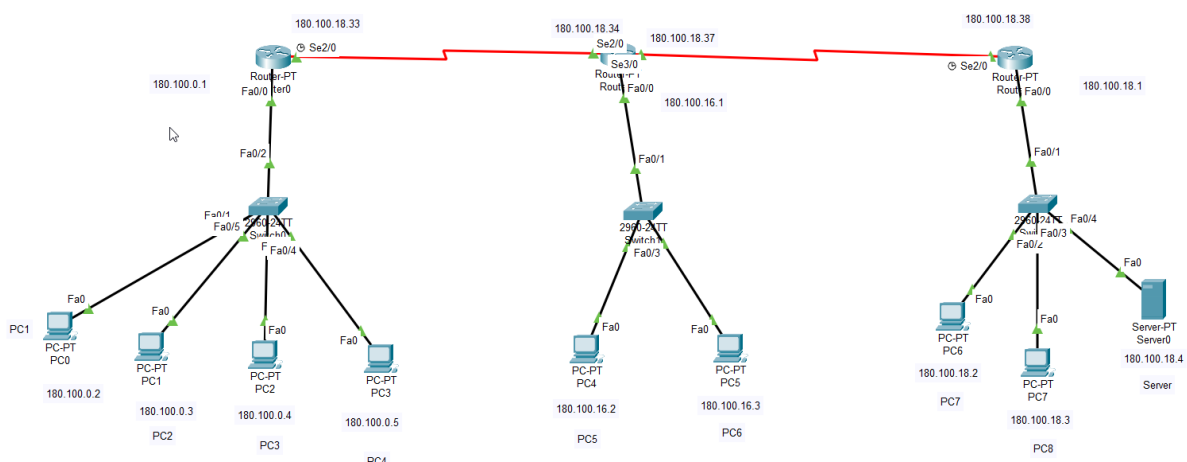
1. Using IP 180.100.0.0/16 divide IPs for the users 3000, 500, 20 respectively using VLSM (Variable Length Subnet Mask).
2. Apply routing, ACL (Access Control List), port security on the following PCs.
 - PC1- can't communicate with server
 - PC5- can't connect through HTTP
 - PC4- can't connect through FTP
 - PC3- Apply port security

❖ First, we will do the subnetting

1. In first network 3000 IPs are required
2. In second network 500 IPs are required
3. In third network 20 IPs are required
4. Fourth required 2 IPs (Router to Router)
5. Fifth requires 2 IPs (Router to Router)

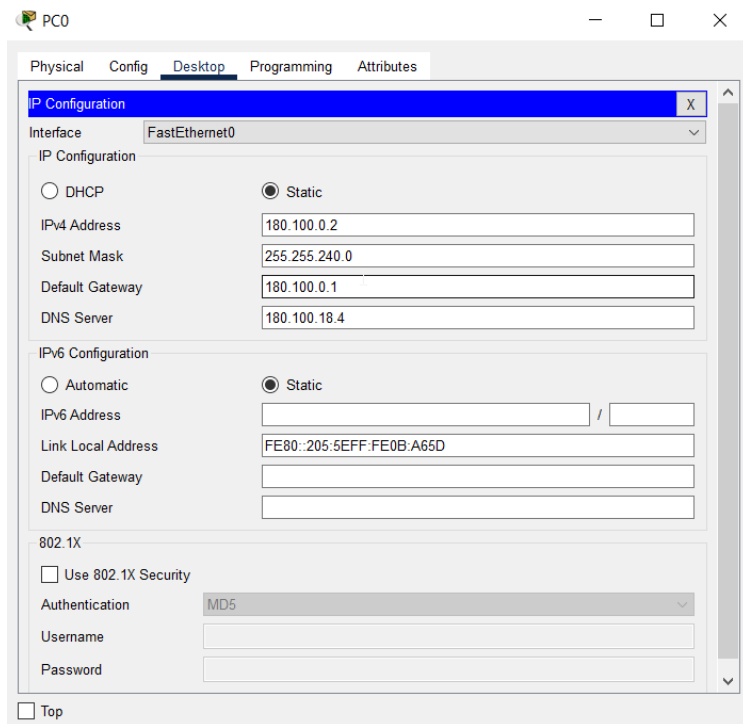
- For first network the range will be as follows
180.100.0.0 to 180.100.15.255 with subnet 255.255.240.0
- For second network the range will be as follows
180.100.16.0 to 180.100.17.255 with subnet 255.255.254.0
- For third network the range will be as follows
180.100.18.0 to 180.100.18.31 with subnet 255.255.255.224
- For fourth network the range will be as follows
180.100.18.32 to 180.100.18.35 with subnet 255.255.255.252
- For fifth network the range will be as follows
180.100.18.36 to 180.100.18.39 with subnet 255.255.255.252

❖ After all calculations we will make the connections using routers, switch and PCs. as follows in Cisco Packet Tracer which is a simulation.



Then we will configure all the PCs as follows

The Configuration of first PC is

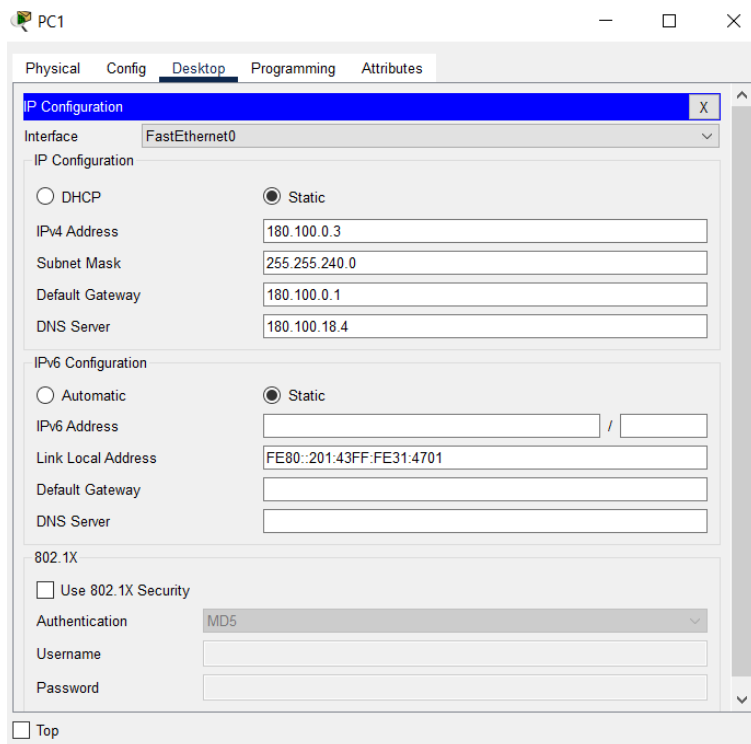


The screenshot shows the configuration window for PC0, specifically the 'Desktop' tab. The 'IP Configuration' section is expanded, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 settings are: IP Address 180.100.0.2, Subnet Mask 255.255.240.0, Default Gateway 180.100.0.1, and DNS Server 180.100.18.4. The IPv6 settings are: Automatic (unselected), Static (selected), IPv6 Address (empty), Link Local Address FE80::205:5EFF:FE0B:A65D, Default Gateway (empty), and DNS Server (empty). The '802.1X' section is also visible, with 'Use 802.1X Security' unchecked, 'Authentication' set to MD5, and 'Username' and 'Password' fields empty. A 'Top' button is located at the bottom left of the configuration area.

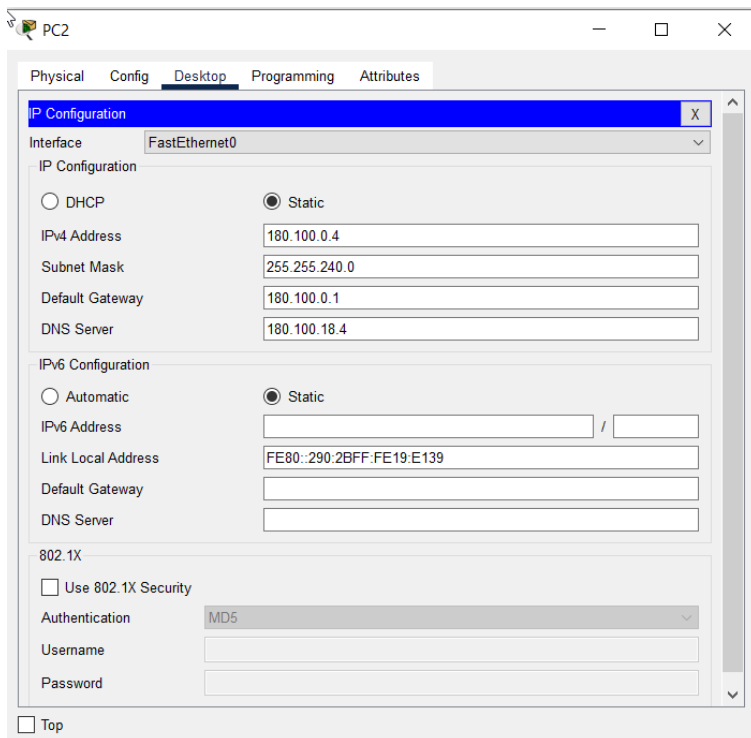
IP Configuration	
Interface: FastEthernet0	
IP Configuration	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IPv4 Address	180.100.0.2
Subnet Mask	255.255.240.0
Default Gateway	180.100.0.1
DNS Server	180.100.18.4
IPv6 Configuration	
<input type="radio"/> Automatic <input checked="" type="radio"/> Static	
IPv6 Address	/
Link Local Address	FE80::205:5EFF:FE0B:A65D
Default Gateway	
DNS Server	
802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

☐ Top

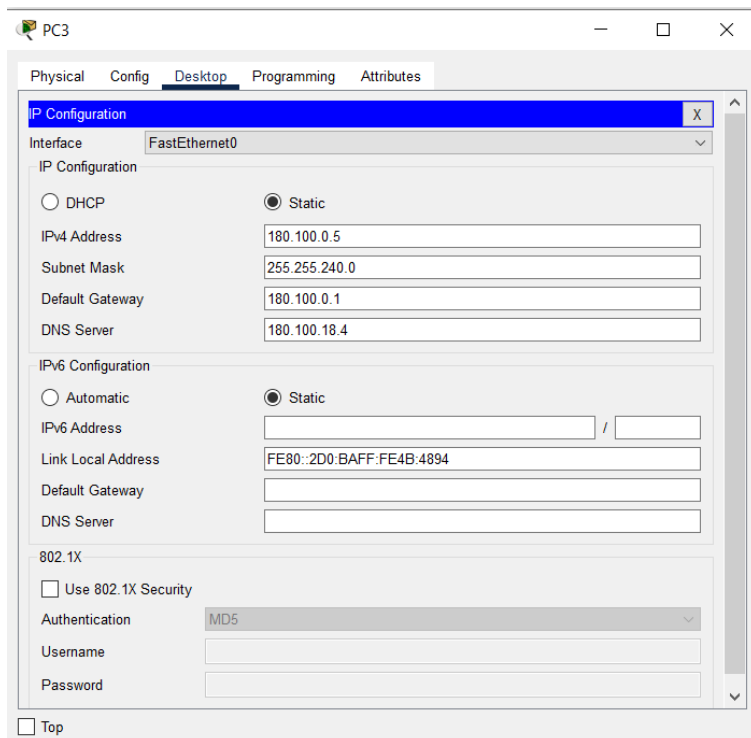
The configuration of second PC is



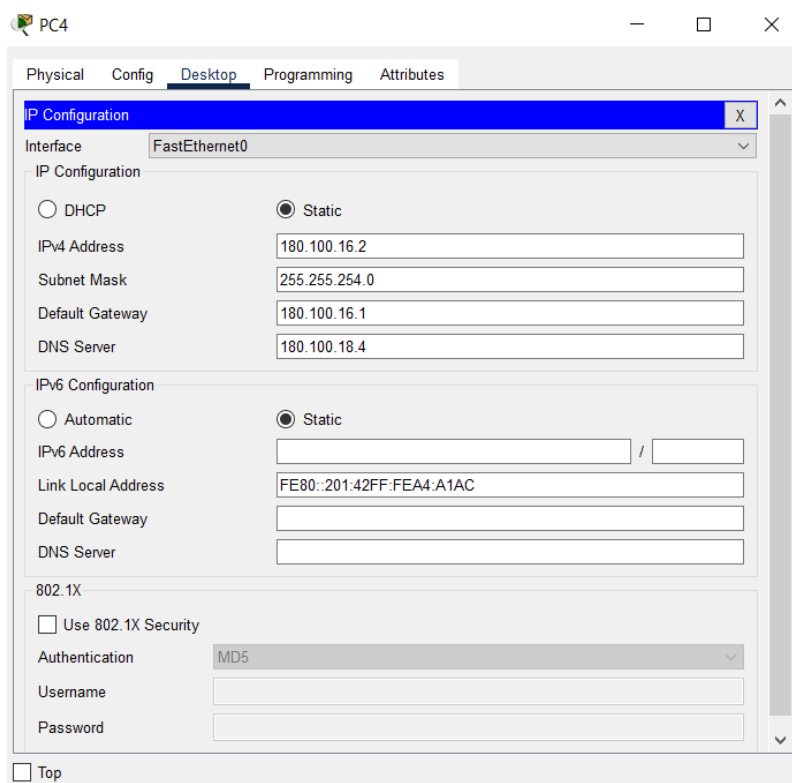
The configuration of third pc is



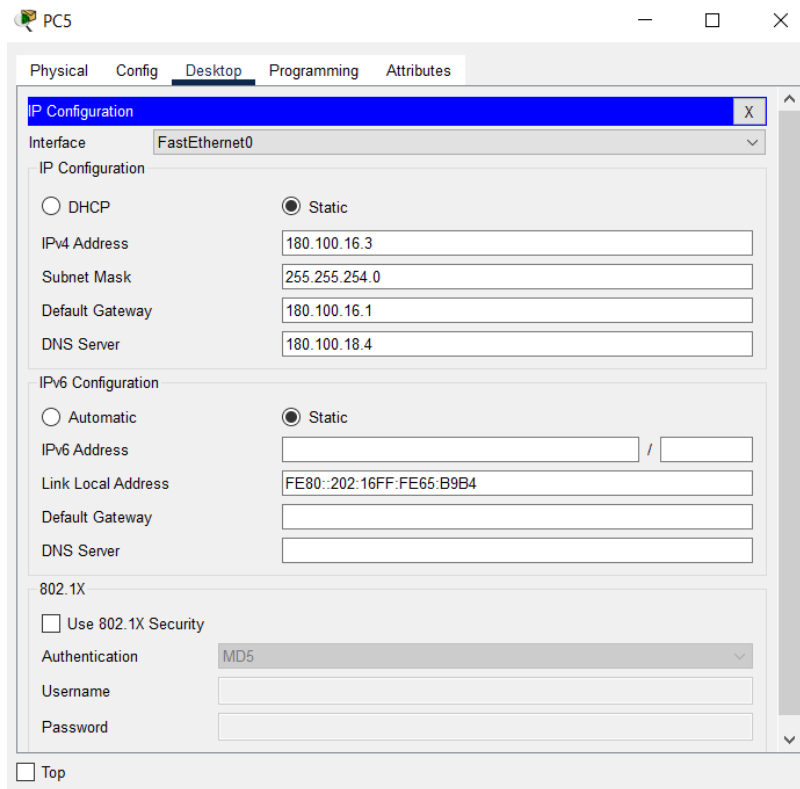
The configuration of fourth pc is



The configuration of fifth pc is

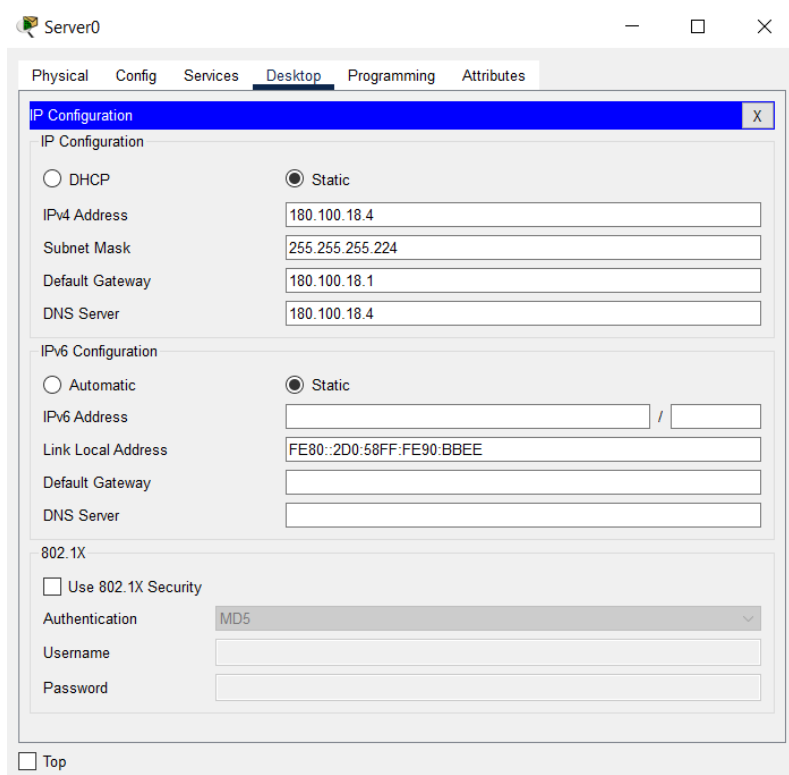


The configuration of sixth pc is



❖ Now we will configure the server

First, we will configure the IP of server



We will also configure DHCP, DNS and FTP services on the server

DHCP:

Server0

Physical Config **Services** Desktop Programming Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

DHCP

Interface **FastEthernet0** Service ☒ On ☐ Off

Pool Name

serverPool

Default Gateway

180.100.18.1

DNS Server

180.100.18.4

Start IP Address :

180

100

18

0

Subnet Mask:

255

255

255

224

Maximum Number of Users :

32

TFTP Server:

0.0.0.0

WLC Address:

0.0.0.0

Add

Save

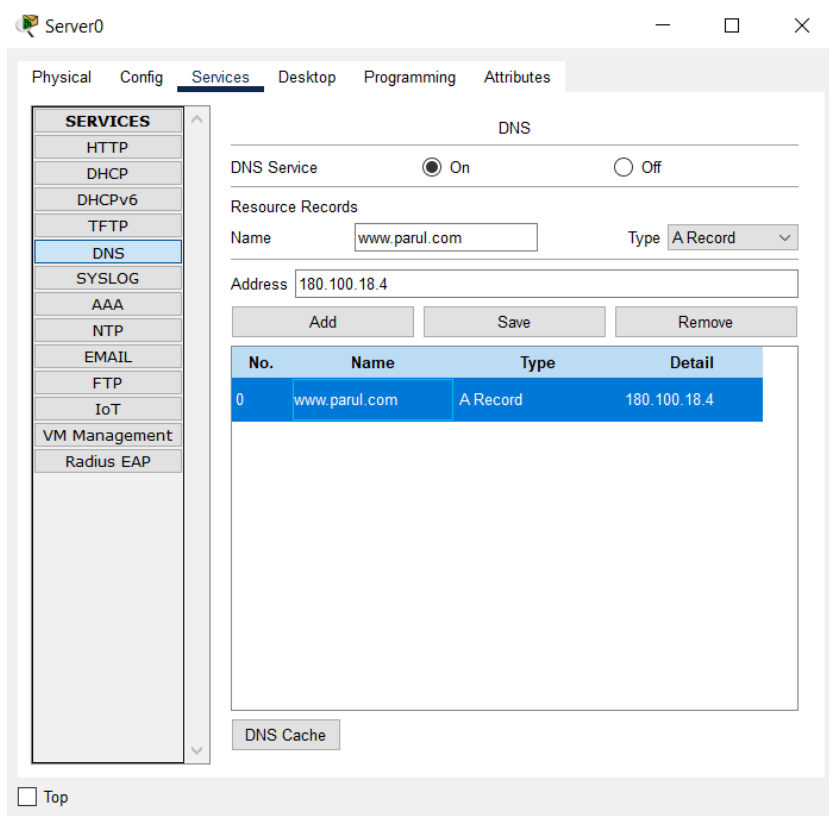
Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	180.10...	180.10...	180.10...	255.25...	32	0.0.0.0	0.0.0.0

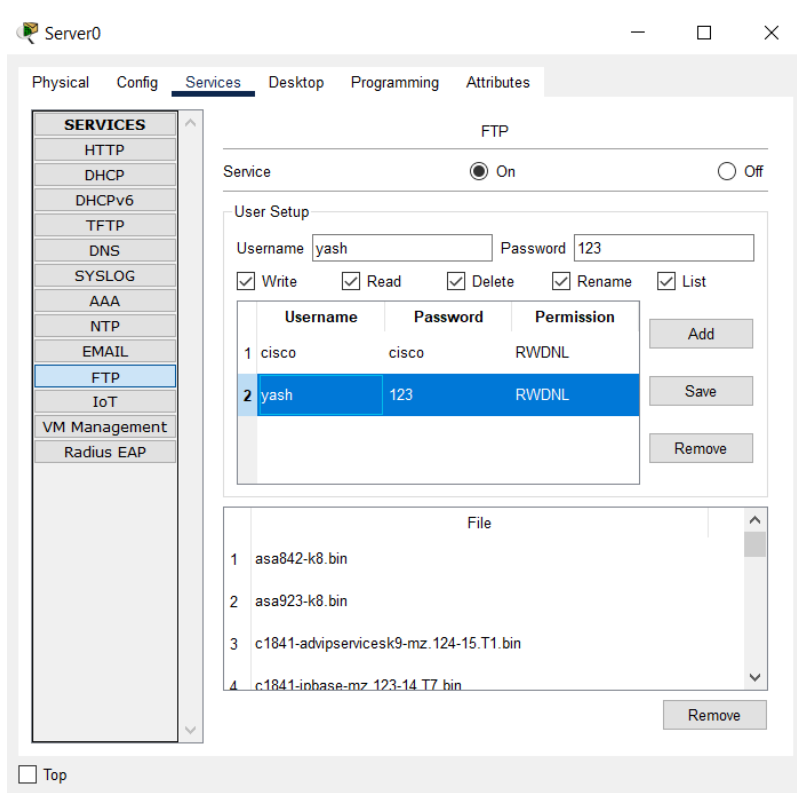
< >

☐ Top

DNS:

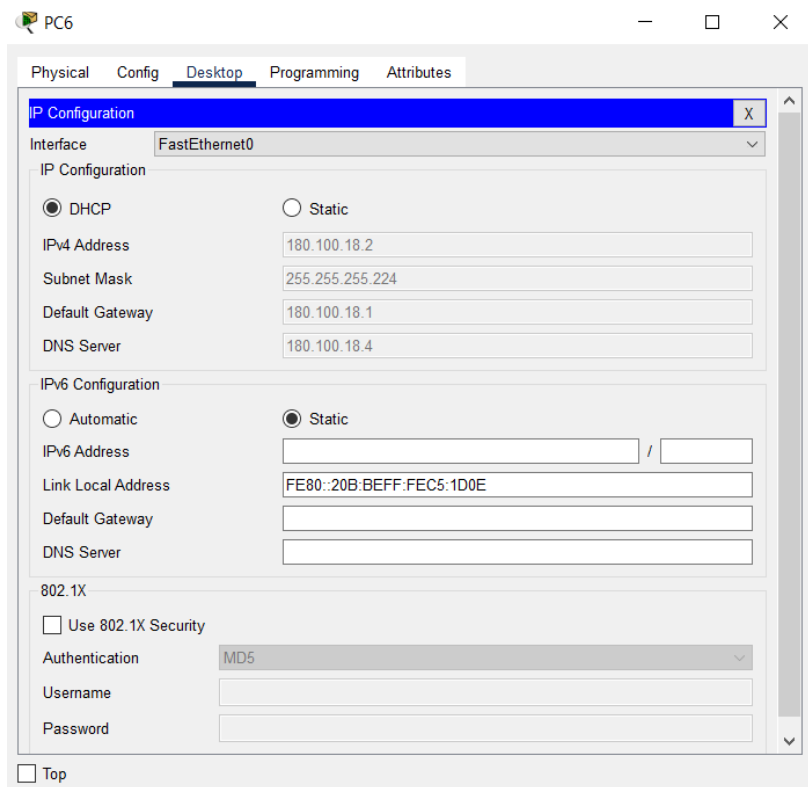


FTP:

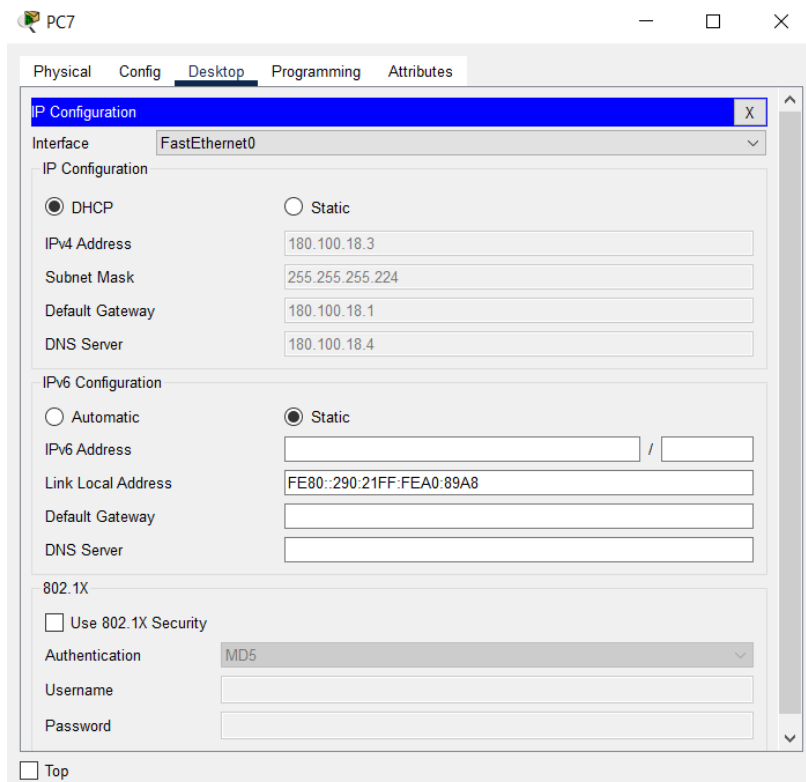


After configuring DHCP server we will provide IP configurations to PC7 and PC8 using DHCP

The configuration of seventh PC is

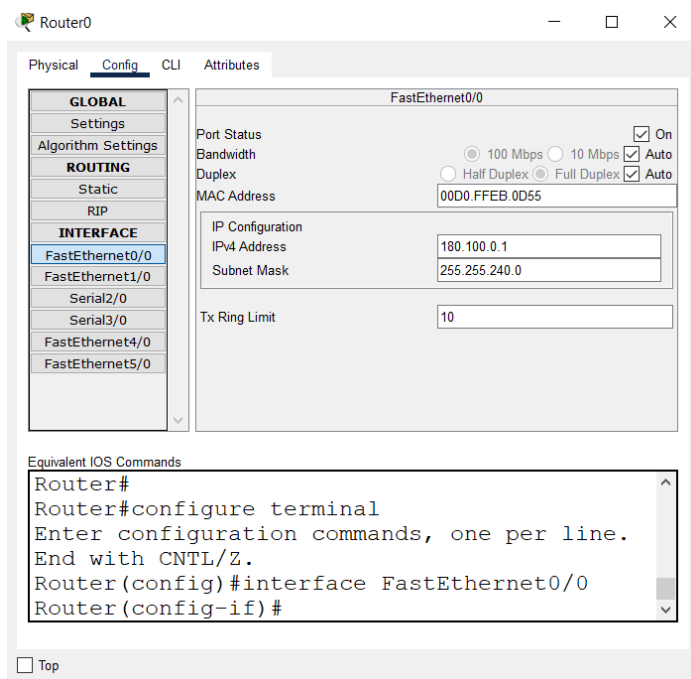


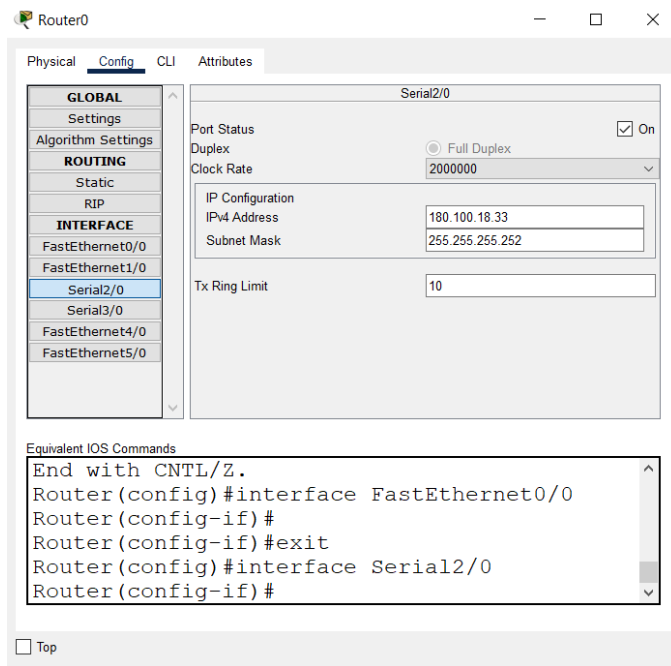
The configuration of eighth PC is



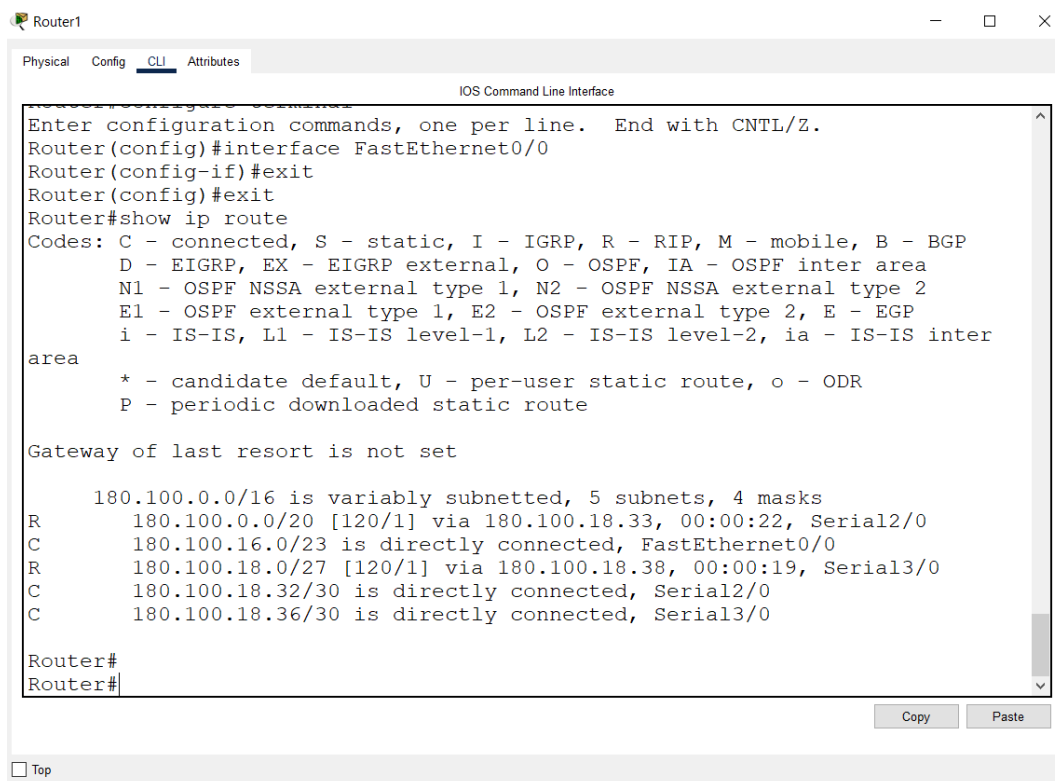
❖ Now we will configure first routers

First, adding IP address on connected ports





After this we will do routing



❖ Then we will configure second router

Router1

Physical
Config
CLI
Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0

FastEthernet0/0

Port Status
Bandwidth
Duplex
MAC Address

☒ On
☐ 100 Mbps
☐ 10 Mbps
☒ Auto
☐ Half Duplex
☒ Full Duplex
☒ Auto

0060.3E9D.A099

IP Configuration
IPv4 Address
Subnet Mask

180.100.16.1
255.255.254.0

Tx Ring Limit
10

Equivalent IOS Commands

```

* - candidate default, U - per-user static route, o -
ODR
P - periodic downloaded static route

Gateway of last resort is not set

180.100.0.0/16 is variably subnetted, 5 subnets, 4
masks
R    180.100.0.0/20 [120/1] via 180.100.18.33, 00:00:22,
Serial2/0
C    180.100.16.0/23 is directly connected,
FastEthernet0/0
R    180.100.18.0/27 [120/1] via 180.100.18.38, 00:00:19,

```

☐ Top

Router1

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet0/0

FastEthernet1/0

Serial2/0

Serial3/0

FastEthernet4/0

FastEthernet5/0

Serial2/0

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 1200

IP Configuration

IPv4 Address 180.100.18.34

Subnet Mask 255.255.255.252

Tx Ring Limit 10

Equivalent IOS Commands

```
Router#
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
```

☐ Top

Router1

Physical Config CLI Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

INTERFACE

FastEthernet0/0

FastEthernet1/0

Serial2/0

Serial3/0

FastEthernet4/0

FastEthernet5/0

Serial3/0

Port Status ☒ On

Duplex ☐ Full Duplex

Clock Rate 1200

IP Configuration

IPv4 Address 180.100.18.37

Subnet Mask 255.255.255.252

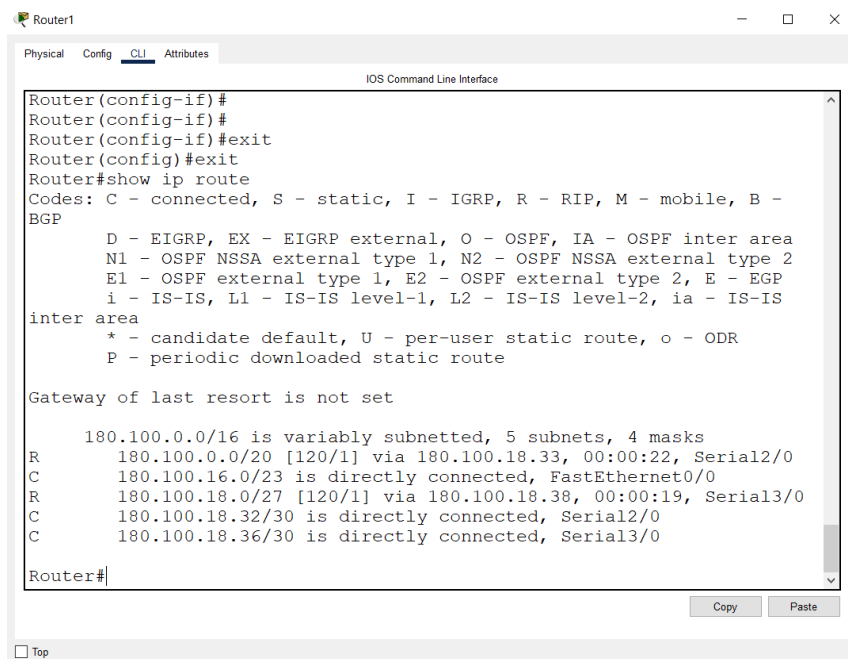
Tx Ring Limit 10

Equivalent IOS Commands

```
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
```

☐ Top

Then we will do routing



The screenshot shows the CLI of Router1. The user has entered the following commands: `Router(config-if)#`, `Router(config-if)#`, `Router(config-if)#exit`, `Router(config)#exit`, and `Router#show ip route`. The output displays the routing table, including codes for various protocols (C, S, I, R, M, B), a list of protocols (D, N1, E1, i, *), and a list of routes (R, C, R, C, C) with their respective metrics and next hops.

```
Router1
Physical Config CLI Attributes
IOS Command Line Interface

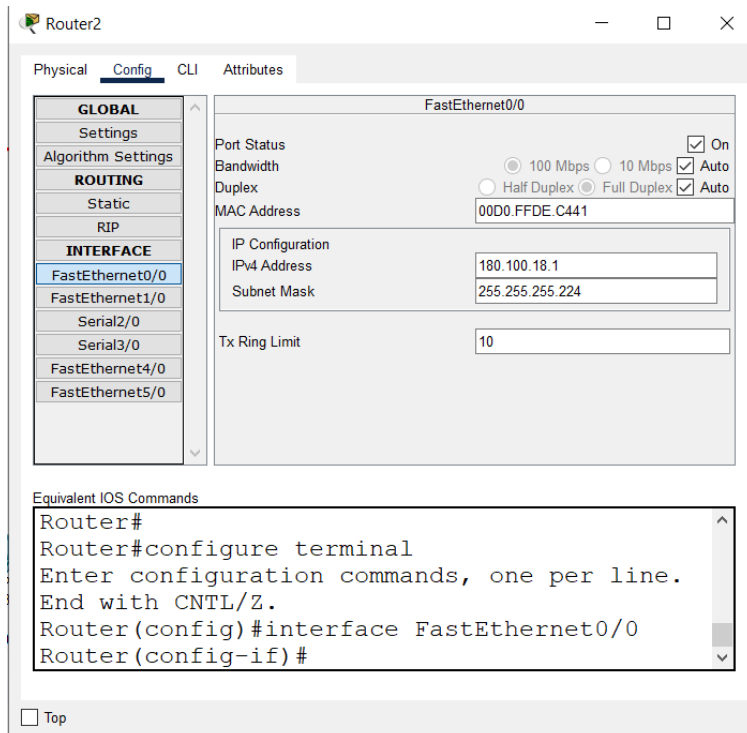
Router(config-if)#
Router(config-if)#
Router(config-if)#exit
Router(config)#exit
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B -
BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS
inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

      180.100.0.0/16 is variably subnetted, 5 subnets, 4 masks
R       180.100.0.0/20 [120/1] via 180.100.18.33, 00:00:22, Serial2/0
C       180.100.16.0/23 is directly connected, FastEthernet0/0
R       180.100.18.0/27 [120/1] via 180.100.18.38, 00:00:19, Serial3/0
C       180.100.18.32/30 is directly connected, Serial2/0
C       180.100.18.36/30 is directly connected, Serial3/0

Router#
```

❖ Now we will configure third router



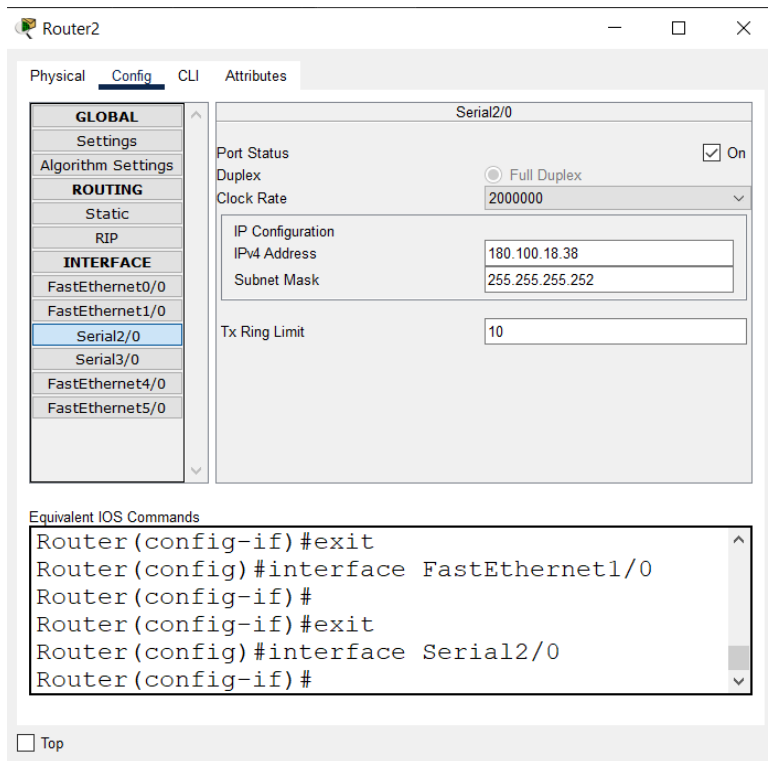
The screenshot shows the configuration interface of Router2. The 'Config' tab is selected, and the 'FastEthernet0/0' interface is chosen under the 'INTERFACE' section. The configuration fields show the following values: Port Status (On), Bandwidth (100 Mbps), Duplex (Full Duplex), MAC Address (00D0.FFDE.C441), IP Configuration (IPv4 Address: 180.100.18.1, Subnet Mask: 255.255.255.224), and Tx Ring Limit (10). Below the configuration fields, the 'Equivalent IOS Commands' section shows the following commands: `Router#`, `Router#configure terminal`, `Enter configuration commands, one per line.`, `End with CNTL/Z.`, `Router(config)#interface FastEthernet0/0`, and `Router(config-if)#`.

```
Router2
Physical Config CLI Attributes

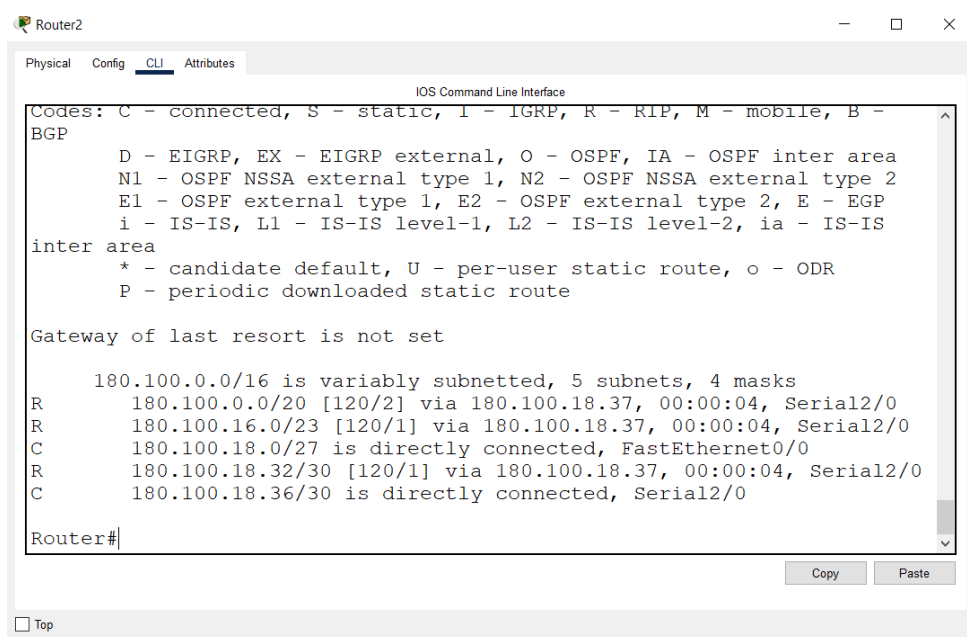
GLOBAL
  Settings
  Algorithm Settings
ROUTING
  Static
  RIP
INTERFACE
  FastEthernet0/0
  FastEthernet1/0
  Serial2/0
  Serial3/0
  FastEthernet4/0
  FastEthernet5/0

FastEthernet0/0
Port Status: [X] On
Bandwidth: [X] 100 Mbps [ ] 10 Mbps
Duplex: [ ] Half Duplex [X] Full Duplex
MAC Address: 00D0.FFDE.C441
IP Configuration:
  IPv4 Address: 180.100.18.1
  Subnet Mask: 255.255.255.224
Tx Ring Limit: 10

Equivalent IOS Commands
Router#
Router#configure terminal
Enter configuration commands, one per line.
End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
```



Now we will do routing



❖ Now we will apply port security

```
Switch(config-if)#
Switch(config-if)#do show history
int f0/4
switchport mode access
switchport port-security
switchport port-security maximum 1
switchport port-security mac-address 00D0.BC77.E6A2
do show port-security
do show history
Switch(config-if)#
```

Copy

Paste

Then we will configure access list on router 3 using following commands

- Router(config)#access-list 110 deny ip 180.100.0.2 0.0.0.0 180.100.18.4 0.0.0.0
- Router(config)#access-list 110 deny udp 180.100.16.2 0.0.0.0 180.100.18.4 0.0.0.0 eq domain
- Router(config)#access-list 110 deny tcp 180.100.0.5 0.0.0.0 180.100.18.4 0.0.0.0 eq ftp
- Router(config)#access-list 110 permit ip any any
- Router(config)#int f0/0
- Router(config-if)#ip access-group 110 out

```
Router2
Physical Config CLI Attributes
IOS Command Line Interface
180.100.0.0/16 is variably subnetted, 5 subnets, 4 masks
R 180.100.0.0/20 [120/2] via 180.100.18.37, 00:00:04, Serial2/0
R 180.100.16.0/23 [120/1] via 180.100.18.37, 00:00:04, Serial2/0
C 180.100.18.0/27 is directly connected, FastEthernet0/0
R 180.100.18.32/30 [120/1] via 180.100.18.37, 00:00:04, Serial2/0
C 180.100.18.36/30 is directly connected, Serial2/0

Router#
Router#
Router#
Router#show acc
Router#show access-lists
Extended IP access list 110
 10 deny ip host 180.100.0.2 host 180.100.18.4 (3 match(es))
 20 deny udp host 180.100.16.2 host 180.100.18.4 eq domain (4 match(es))
 30 deny tcp host 180.100.0.5 host 180.100.18.4 eq ftp (15 match(es))
 40 permit ip any any (37 match(es))

Router#
```

So here using all above commands we have finally created our secured network.