COMPUTER NETWORKNG

PROJECT TITLE:

Network Design

SOFTWARE USED:

Cisco Packet Tracer (Version 6.2.0.0052)

DEVICES USED IN PROJECT:

- **ROUTERS**
- **SWITCHES**
- **CABLES**
- **SERVERS**
- **PCs**
- **LAPTOPS**

SERVER USED IN PROJECT:

- **DHCP SERVER**
  DHCP (Dynamic Host Configuration Protocol) Is Performed on Routers To Assign An IP Address, Default Gateway Subnet Mask To The Host Systems.
- **DNS SERVER**
  DNS Server resolves Host name into IP address. we can access a Network Host using its IP Address but DNS makes it easier to access and remember the domain.
- **SMTP SERVER**
  SMTP (Simple Mail Transfer Protocol) is used by Mail Servers to Send ,Receive, relay outgoing Mail between email senders and Receivers.
- **POP3 (MAIL SERVER)**
  POP3 (Post Office Protocol) is an older protocol that was designed to be used only one computer and POP3 supports one-way email synchronization, only allowing users to download emails from the server to a client. POP3 only allows a single device at a time to access the emails and IMAP allows multiple devices at a time to access and read available mails.
- **HTTP/HTTPS**
  HTTP with an encryption is the HTTPS. The difference is HTTPS uses SSL Encryption for HTTP Request and Response sop HTTPS is more secure than HTTP.
- **TELNET AND SSH**

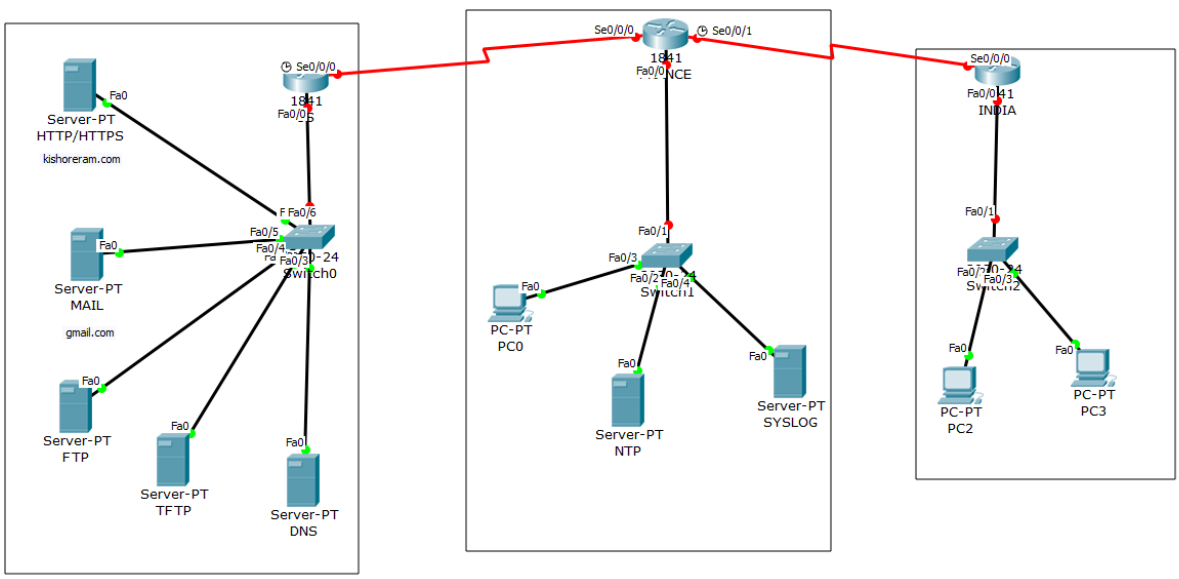
Feature	**Telnet**	**SSH**
Security	Less Secure	Highly secured
Port Number	TCP port number 23	TCP port number 22
Authentication	Telnet uses no authentication mechanisms	SSH uses public key encryption in order to authenticate the remote users
Bandwidth usage	Low bandwidth usage	High bandwidth usage

Data Privacy	Usernames and Passwords can be prone to malicious attack	Data sent using this protocol cannot be easily interpreted by the hackers.

- **SYSLOG LOG SEVER**
  Syslog stands for System Logging Protocol and is a standard protocol used to send system log or event messages to a specific server, called a syslog server. It is used to collect various device logs from several different machines in a central location for monitoring
- **NTP SERVER**
  Network Time Protocol (NTP) is a protocol that helps the computers clock times to be synchronized in a network. This protocol is an application protocol that is responsible for the synchronization of hosts on a TCP/IP network .NTP time servers work within the TCP/IP suite and rely on User Datagram Protocol (UDP) port 123.
- **FTP SERVER**
  FTP server is used to facilitate file transfer across the internet and the files can be easily accessed from server.
- **TFTP SERVER**
  Trivial File Transfer Protocol (TFTP) is a simple protocol that provides basic file transfer function with no user authentication. FTP works on Port 20 and 21. Port 20 is used for data and Port 21 is used for connection control. TFTP is lighter than FTP and is used when a file transfer functionality is needed without FTP features.

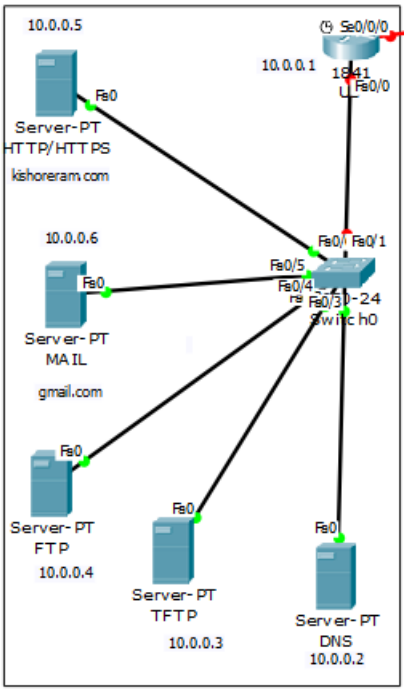
Configuration:

- **Connect all the devices**
- **NOTE:**
  I ASSUMED INDIA,FRANCE AND US AS ROUTER NAMES U CAN NAME WHATEVER YOU WANT AS IT IS LOCATED FAR I USED THESE NAMES!

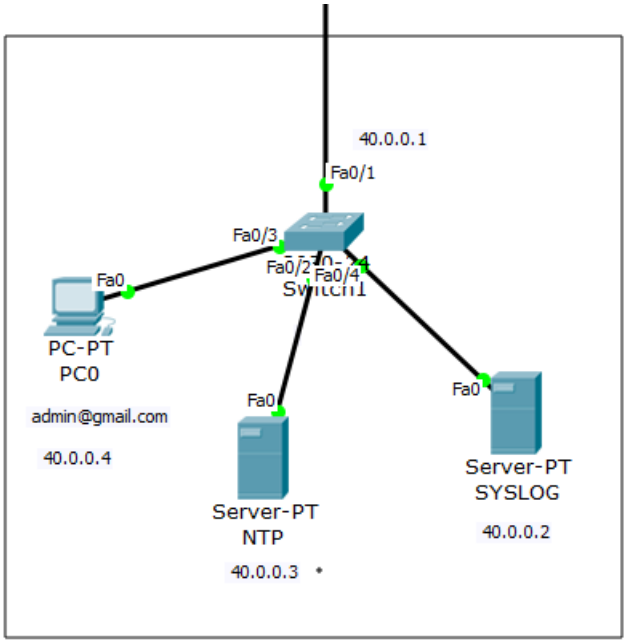


- **Totally there are 5 networks**
  They are 10.0.0.0 ,20.0.0.0 ,30.0.0.0 ,40.0.0.0 and 50.0.0.0

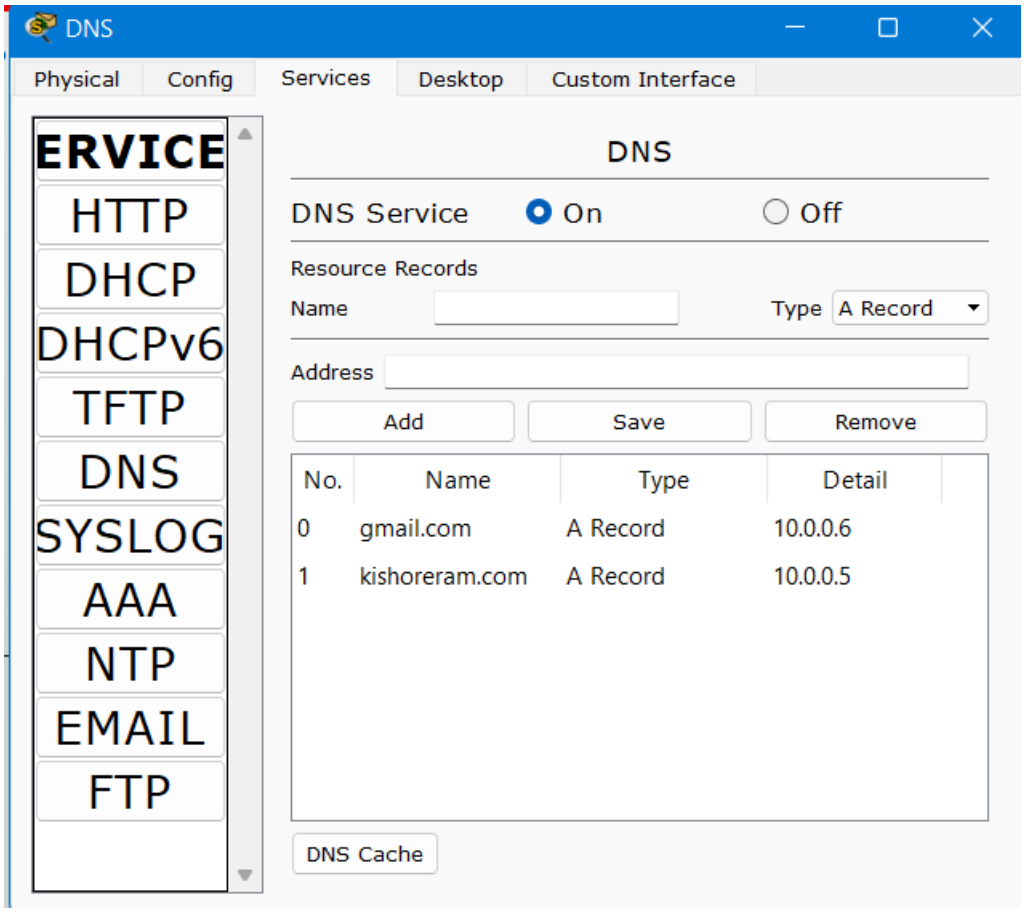
Configuring The Ip Address, Subnet Mask and DNS Server For Each Device In 10.0.0.0 Network



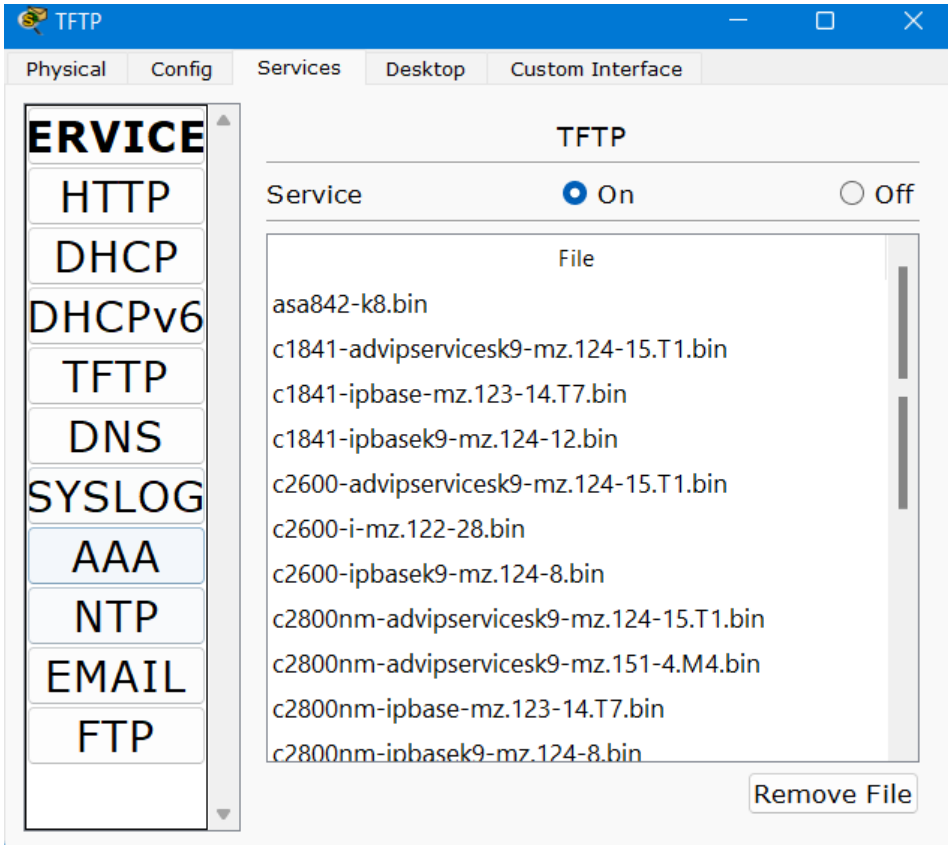
Configuring The Ip Address, Subnet Mask and DNS Server For Each Device In 40.0.0.0 Network



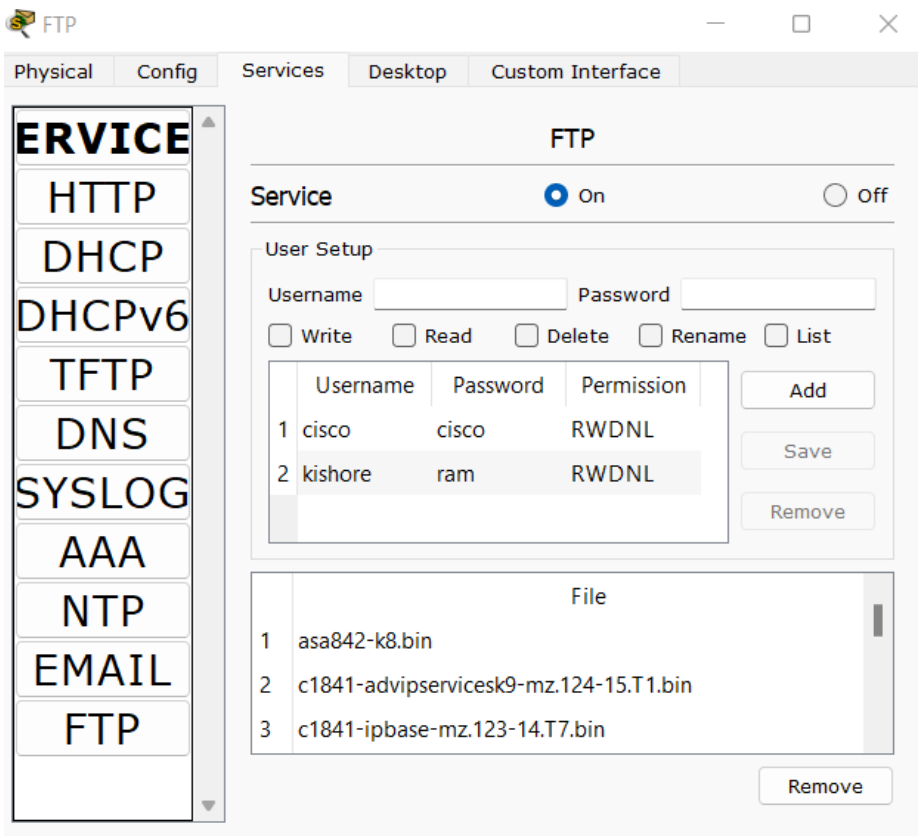
Configure the DNS SERVER



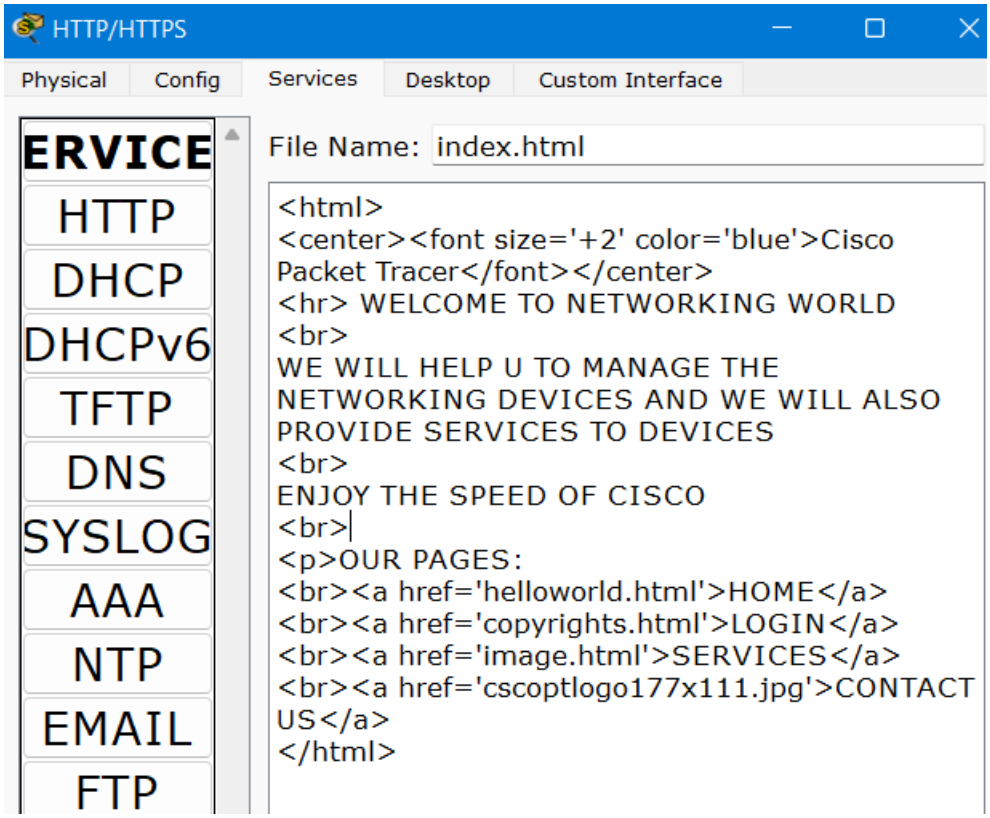
TURN ON TFTP SERVER



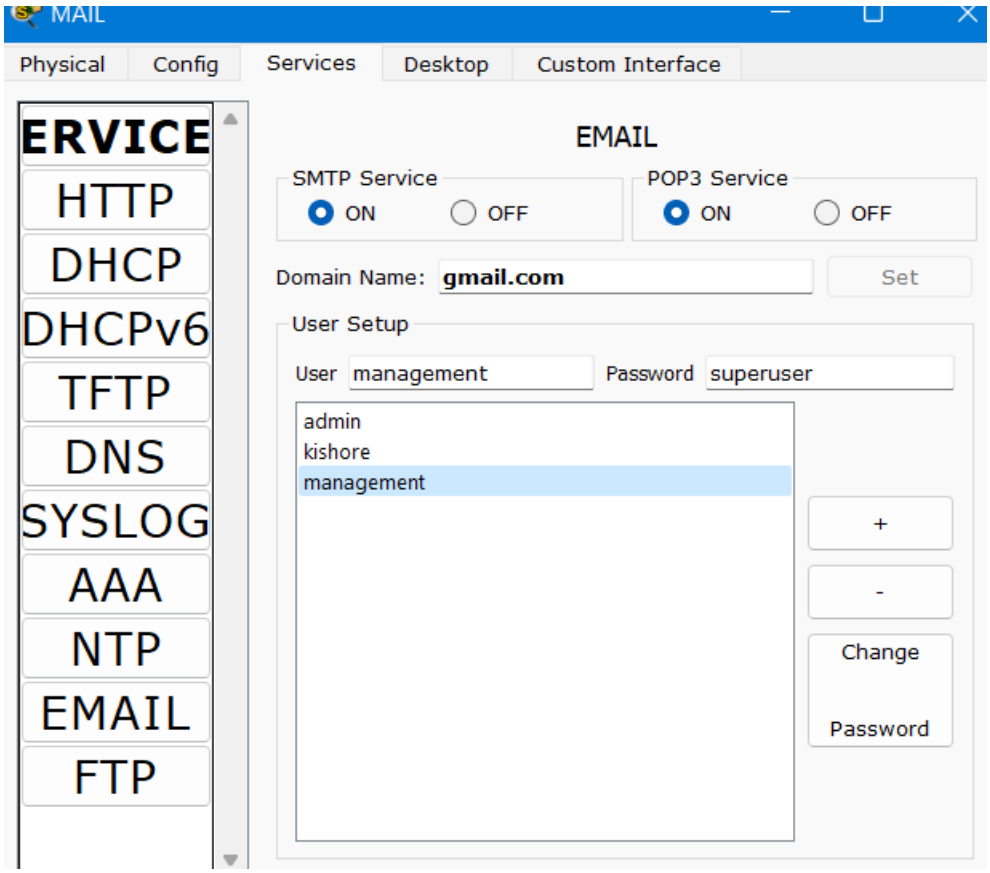
Configure the FTP server



Change the index.html and check the http/https server is on



Configure the MAIL Server



CONFIGURE ROUTER 1(INDIA)

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname INDIA
INDIA(config)#int fa0/0
INDIA(config-if)#ip address 10.0.0.1 255.0.0.0
INDIA(config-if)#no shutdown

INDIA(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

INDIA(config-if)#exit
INDIA(config)#int se0/0/0

INDIA(config-if)#ip address 20.0.0.1 255.0.0.0
INDIA(config-if)#clock rate 64000
INDIA(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
INDIA(config-if)#exit

INDIA(config)#ip ftp username kishore
INDIA(config)#ip ftp password ram
INDIA(config)#
```

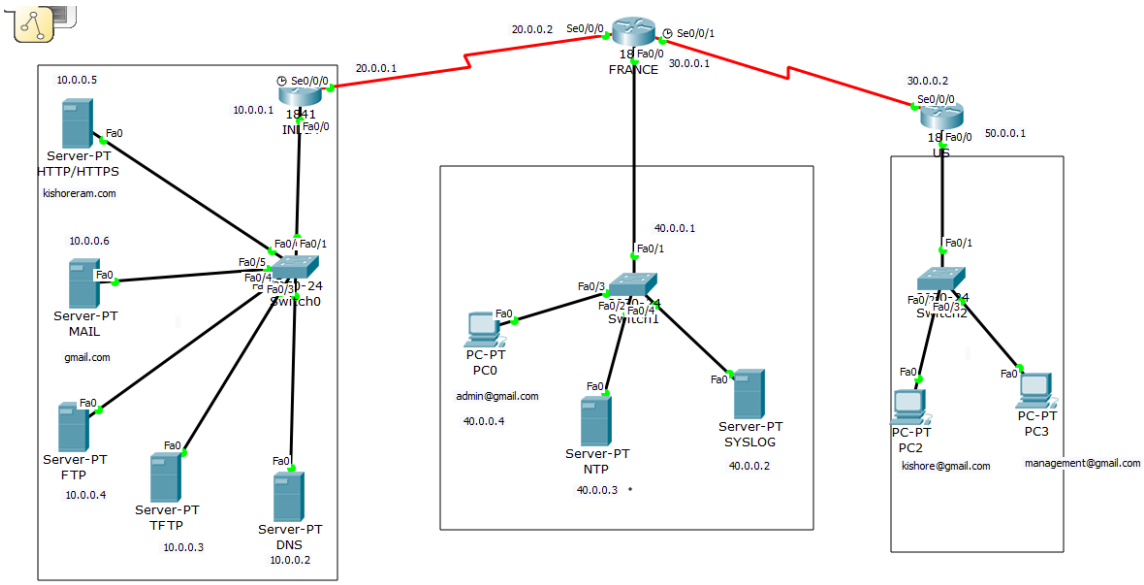
CONFIGURE ROUTER2 (FRANCE)

```
Router>
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname FRANCE
FRANCE(config)#int fa0/0
FRANCE(config-if)#ip address 40.0.0.1 255.0.0.0
FRANCE(config-if)#no shutdown

FRANCE(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

FRANCE(config-if)#exit
FRANCE(config)#int se0/0/0
FRANCE(config-if)#ip address 20.0.0.2 255.0.0.0
```

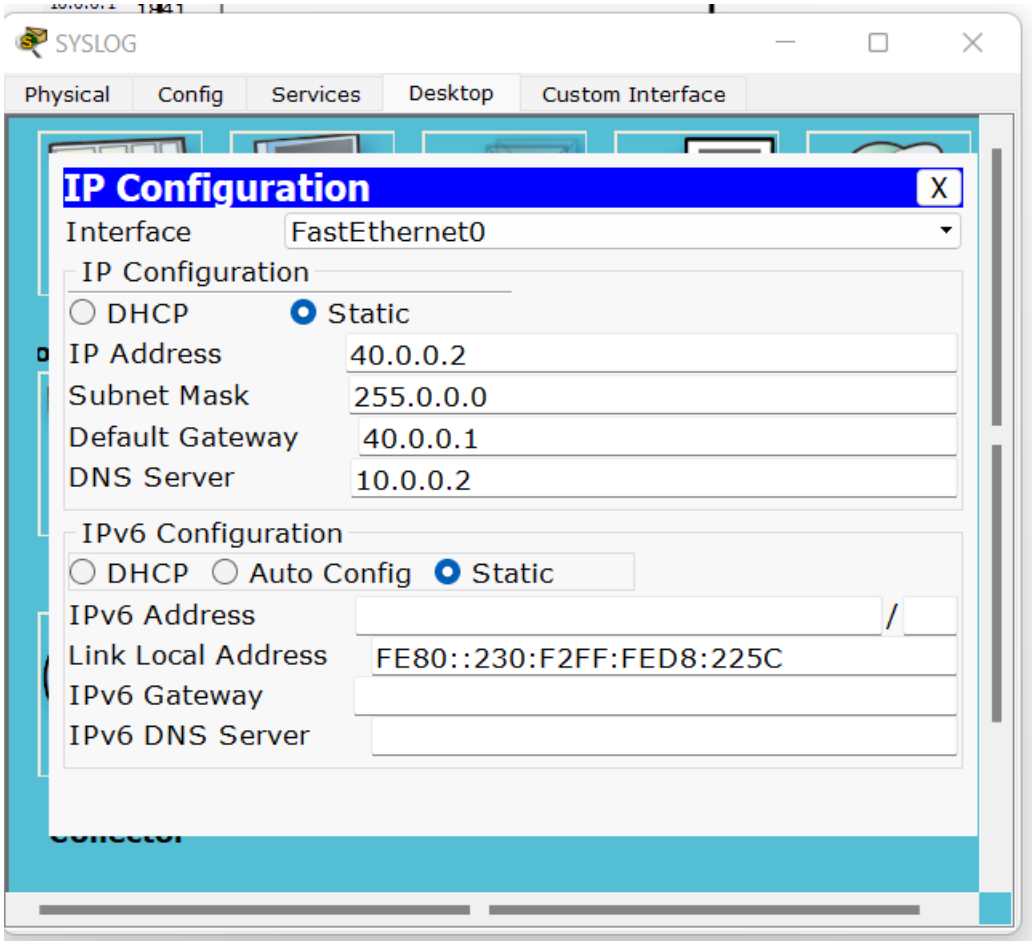
```
FRANCE(config-if)#exit
FRANCE(config)#int se0/0/1
FRANCE(config-if)#ip address 30.0.0.1 255.0.0.0
FRANCE(config-if)#clock rate 64000
FRANCE(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/1, changed state to down
FRANCE(config-if)#exit
FRANCE(config)#

FRANCE(config)#ip ftp username kishore
FRANCE(config)#ip ftp password ram
FRANCE(config)#
```

CONFIGURE ROUTER3 (US)

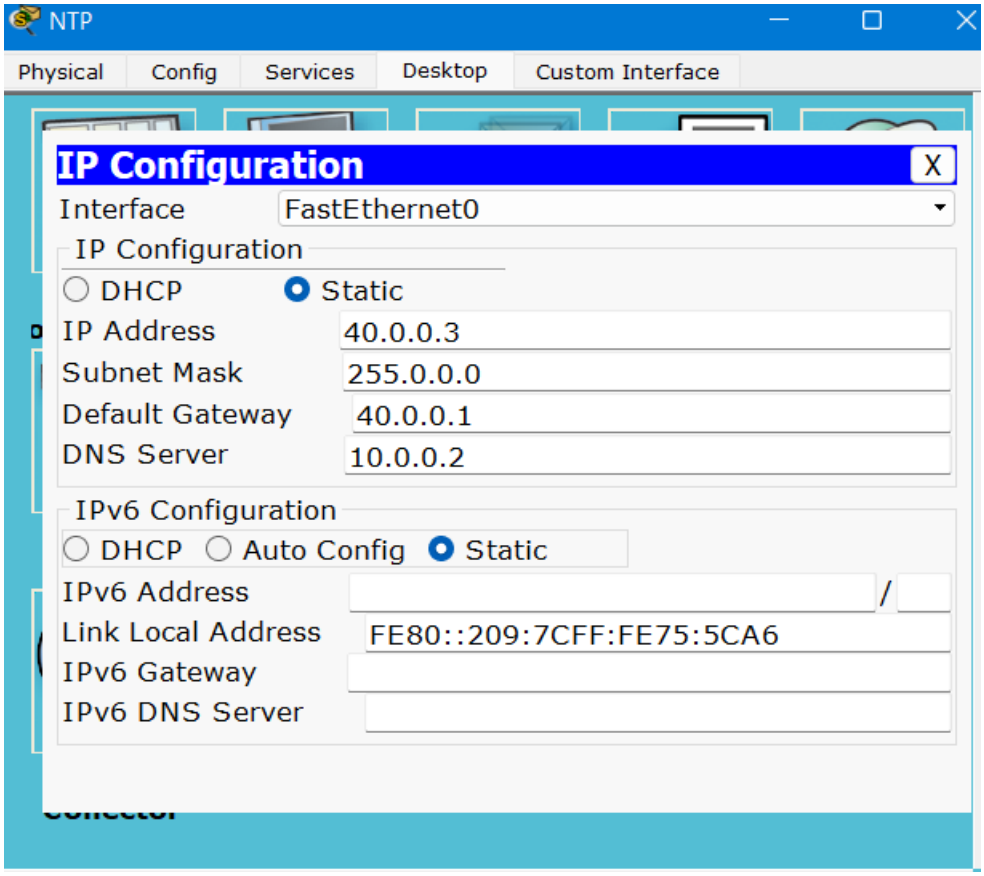
```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname US
US(config)#int fa0/0
US(config-if)#ip address 50.0.0.1 255.0.0.0
US(config-if)#no shutdown

US(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

US(config-if)#exit
US(config)#int se0/0/0
US(config-if)#ip address 30.0.0.2 255.0.0.0

US(config-if)#no shutdown

US(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to
up
US(config-if)#exit
US(config)#ip ftp username kishore
US(config)#ip ftp password ram
US(config)#
```



CONFIGURE THE SYSLOG SERVER



CONFIGURE NTP SERVER



CONFIGURE STATIC ROUTING

Router 1(INDIA)

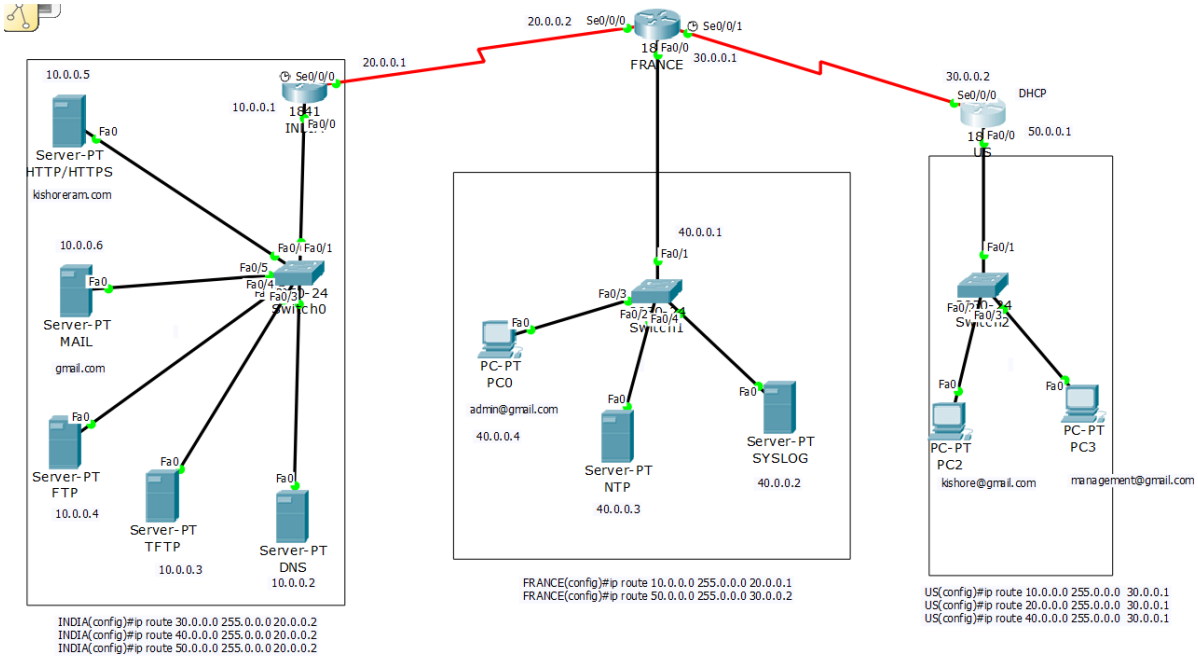
INDIA(config)#ip route 30.0.0.0 255.0.0.0 20.0.0.2
INDIA(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.2
INDIA(config)#ip route 50.0.0.0 255.0.0.0 20.0.0.2

ROUTER 2(FRANCE)

FRANCE(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.1
FRANCE(config)#ip route 50.0.0.0 255.0.0.0 30.0.0.2

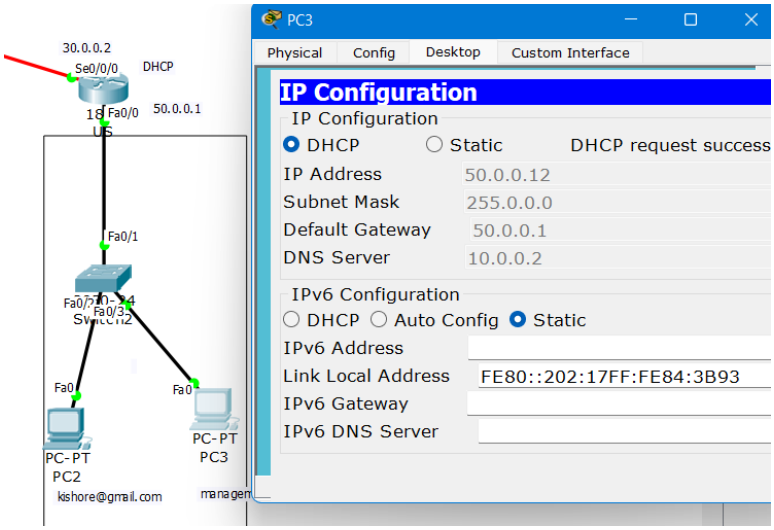
ROUTER 3(US)

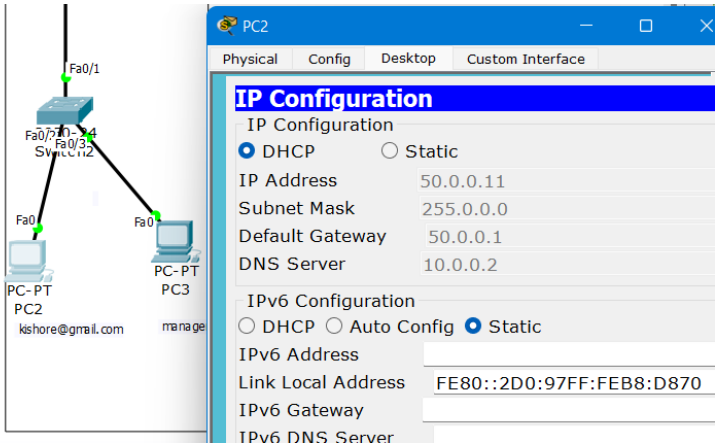
US(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.1
US(config)#ip route 20.0.0.0 255.0.0.0 30.0.0.1
US(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.1



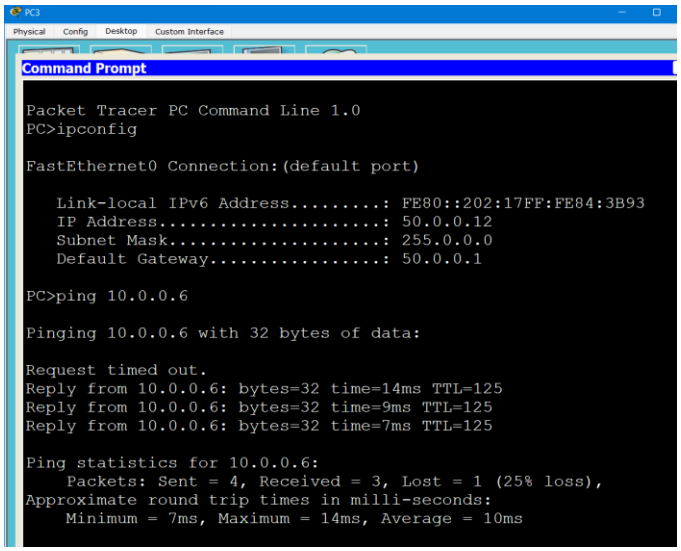
CONFIGURE DHCP SERVER ON ROUTER 3

US(config)#ip dhcp excluded-address 50.0.0.1 50.0.0.10
US(config)#ip dhcp pool KISHORE
US(dhcp-config)#default-router 50.0.0.1
US(dhcp-config)#dns-server 10.0.0.2
US(dhcp-config)#network 50.0.0.0 255.0.0.0





PINGING :



FIRST PING WILL FAIL DUE TO ROUTER IN THAT LAN HAS TO PUT THE PING REQUEST ON HOLD TO SEND OUT AN ARP BROADCAST TO LEARN THE MAC ADDRESS OF THE REMOTE DEVICE, THEN WAIT FOR A RESPONSE, AND THEN SEND THE FIRST PING THROUGH. THIS DELAY IS USUALLY TOO LONG.

```
PC>ping 10.0.0.6

Pinging 10.0.0.6 with 32 bytes of data:

Reply from 10.0.0.6: bytes=32 time=14ms TTL=125
Reply from 10.0.0.6: bytes=32 time=10ms TTL=125
Reply from 10.0.0.6: bytes=32 time=7ms TTL=125
Reply from 10.0.0.6: bytes=32 time=15ms TTL=125

Ping statistics for 10.0.0.6:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 15ms, Average = 11ms

PC>
```

CONFIGURE THE NTP SERVER

- **Before configuration of NTP SERVER ,**

```
INDIA#show clock
*0:25:30.256 UTC Mon Mar 1 1993
INDIA#
```

The clock is not synchronized.

- **After configuration of NTP SERVER ,**

```
INDIA#show clock
*0:25:30.256 UTC Mon Mar 1 1993
INDIA#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
INDIA(config)#ntp server 40.0.0.3
INDIA(config)#exit
INDIA#
%SYS-5-CONFIG_I: Configured from console by console

INDIA#show clock
*21:33:35.417 UTC Sun Aug 28 2022
INDIA#
```

The clock gets synchronized

```
US>enabl
US#conf t
Enter configuration commands, one per line.  End v
US(config)#ntp server 40.0.0.3
US(config)#exit
US#
%SYS-5-CONFIG_I: Configured from console by consol

US#show clock
*21:36:23.185 UTC Sun Aug 28 2022
```

CONFIGURATION OF SYSLOG SERVER

FRANCE>ENABL
FRANCE#conf t
Enter configuration commands, one per line. End with CNTL/Z.
FRANCE(config)#logging host 40.0.0.2
FRANCE(config)#logging trap debugging
FRANCE(config)#exit
FRANCE#
%SYS-5-CONFIG_I: Configured from console by console

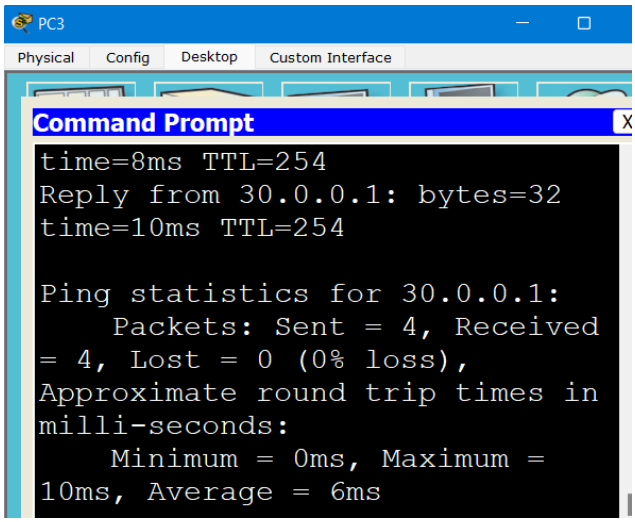
%SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 40.0.0.2 port 514 started - CLI initiated

FRANCE#debug ip icmp
ICMP packet debugging is on
FRANCE#
ICMP: echo reply sent, src 30.0.0.1, dst 50.0.0.12

ICMP: echo reply sent, src 30.0.0.1, dst 50.0.0.12

ICMP: echo reply sent, src 30.0.0.1, dst 50.0.0.12

ICMP: echo reply sent, src 30.0.0.1, dst 50.0.0.12




```
FRANCE>ENABL
FRANCE#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
FRANCE(config)#logging host 40.0.0.2
FRANCE(config)#logging trap debugging
FRANCE(config)#exit
FRANCE#
%SYS-5-CONFIG_I: Configured from console by console
%SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 40.0.0.2 port 514 started - CLI initiated

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ICMP: echo reply sent, src 30.0.0.1, dst 50.0.0.12
```
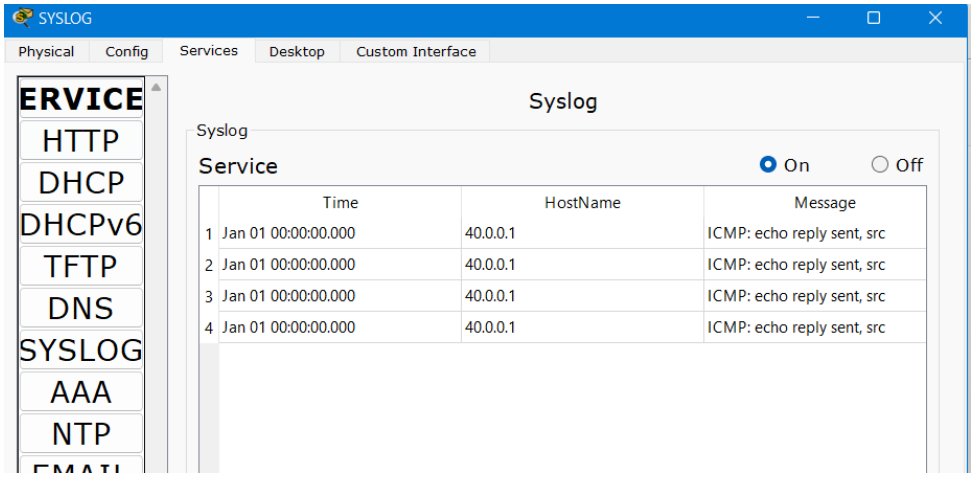
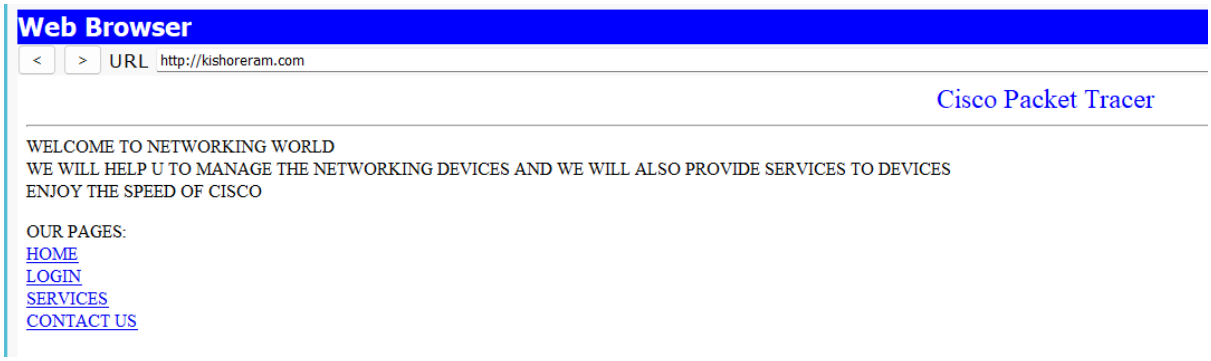
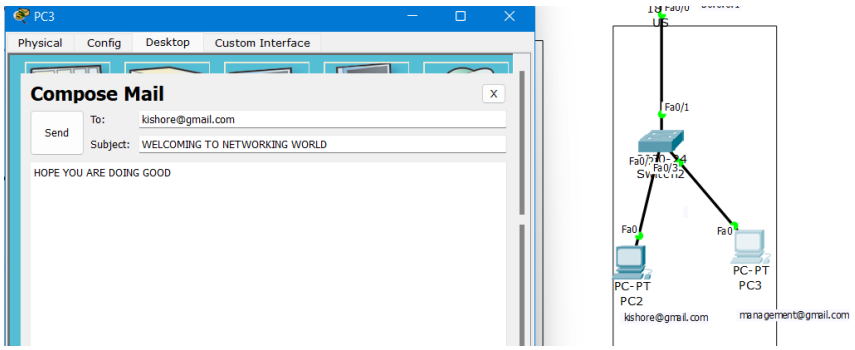



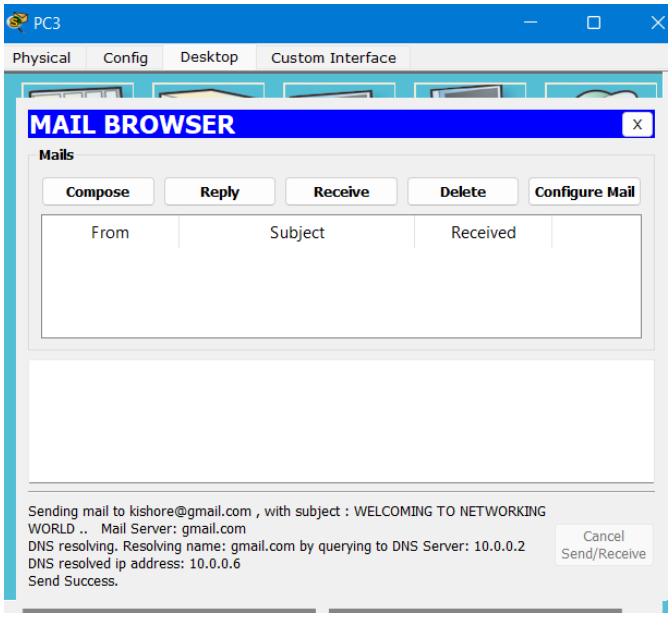
HTTP SERVER

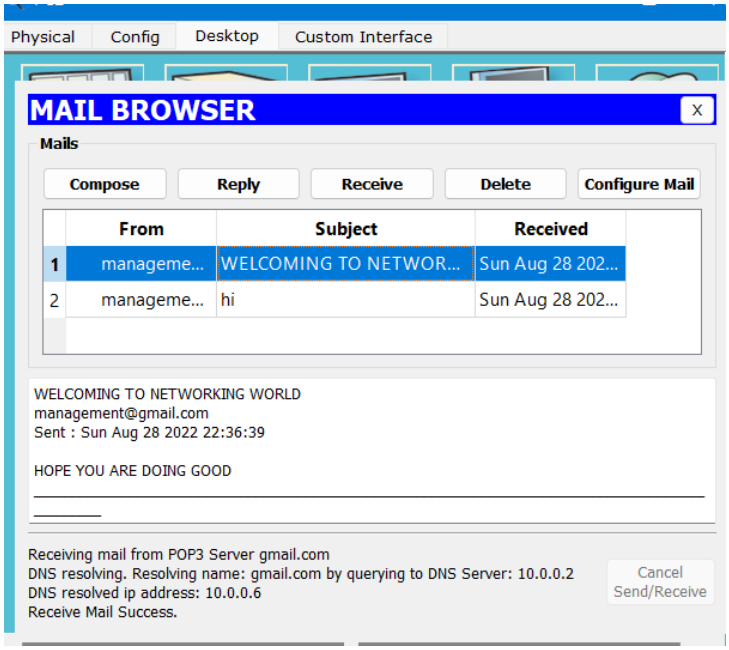


We can modify the index.html as we want for our website. I changed little Bit to show how to access the HTTP Server

MAIL SERVER

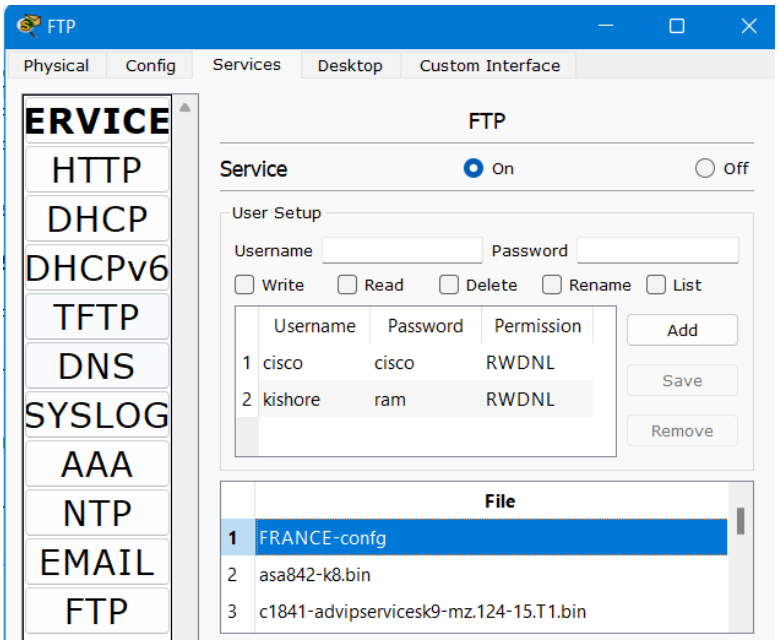



PC3
Physical
Config
Desktop
Custom Interface
MAIL BROWSER
X
Mails
Compose
Reply
Receive
Delete
Configure Mail
From
Subject
Received
Sending mail to kishore@gmail.com , with subject : WELCOMING TO NETWORKING WORLD .. Mail Server: gmail.com
DNS resolving. Resolving name: gmail.com by querying to DNS Server: 10.0.0.2
DNS resolved ip address: 10.0.0.6
Send Success.
Cancel Send/Receive


Physical
Config
Desktop
Custom Interface
MAIL BROWSER
X
Mails
Compose
Reply
Receive
Delete
Configure Mail
From
Subject
Received
1
manageme...
WELCOMING TO NETWOR...
Sun Aug 28 202...
2
manageme...
hi
Sun Aug 28 202...
WELCOMING TO NETWORKING WORLD
management@gmail.com
Sent : Sun Aug 28 2022 22:36:39
HOPE YOU ARE DOING GOOD
Receiving mail from POP3 Server gmail.com
DNS resolving. Resolving name: gmail.com by querying to DNS Server: 10.0.0.2
DNS resolved ip address: 10.0.0.6
Receive Mail Success.
Cancel Send/Receive

FTP SERVER

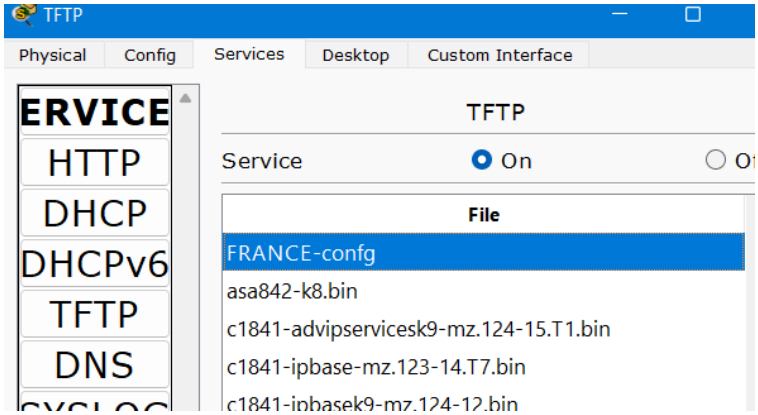
```
FRANCE(config)#ip ftp username cisco
FRANCE(config)#ip ftp password cisco
FRANCE(config)#exit
FRANCE#
%SYS-5-CONFIG_I: Configured from console by console

FRANCE#copy running-config ftp
Address or name of remote host []? 10.0.0.4
Destination filename [FRANCE-confg]?

Writing running-config...
[OK - 861 bytes]

861 bytes copied in 0.022 secs (39000 bytes/sec)
FRANCE#
```



The File is backed up using FTP server

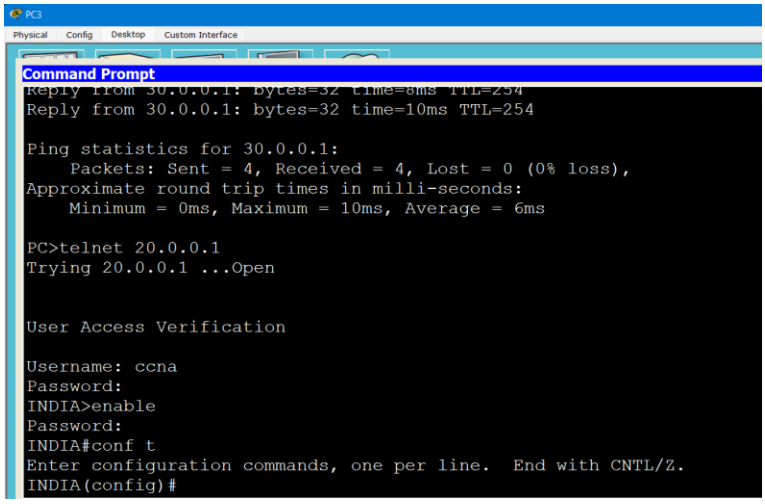
TFTP SERVER

```
FRANCE#copy running-config tftp
Address or name of remote host []? 10.0.0.3
Destination filename [FRANCE-confg]?

Writing running-config....!!
[OK - 861 bytes]

861 bytes copied in 3.01 secs (286 bytes/sec)
FRANCE#
```



TELNET

INDIA(config)#ENABLE PASSWORD cisco
INDIA(config)#username kishore password kishore
INDIA(config)#username cisco password cisco
INDIA(config)#username ccna password ccna
INDIA(config)#line vty 0 4
INDIA(config-line)#login local
INDIA(config-line)#exit




```
INDIA#show users
    Line       User       Host(s)              Idle       Location
   0 con 0                 idle                 00:08:38
*196 vty 0     ccna       idle                 00:00:00 50.0.0.12

  Interface    User               Mode         Idle     Peer Address
INDIA#
```

Remotely logged into router 1(INDIA) from the pc3 of the router3(US)

FTP SERVER ACCESSING

```
Packet Tracer PC Command Line 1.0
PC>ftp 10.0.0.4
Trying to connect...10.0.0.4
Connected to 10.0.0.4
220- Welcome to PT Ftp server
Username:cisco
331- Username ok, need password
Password:
230- Logged in
(passive mode On)
ftp>dir
```

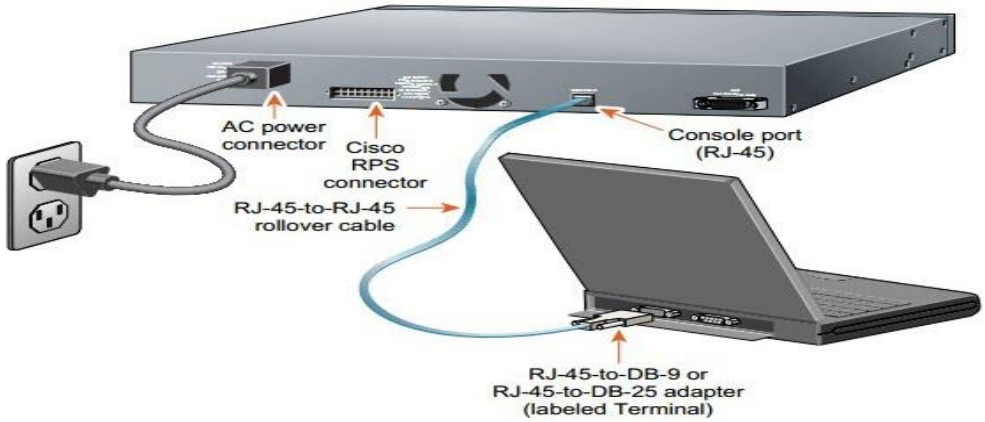
```
Listing /ftp directory from 10.0.0.4:
0    : FRANCE-confg
1    : asa842-k8.bin
2    : c1841-advipservicesk9-mz.124-15.T1.bin
3    : c1841-ipbase-mz.123-14.T7.bin
4    : c1841-ipbasek9-mz.124-12.bin
5    : c2600-advipservicesk9-mz.124-15.T1.bin
6    : c2600-i-mz.122-28.bin
7    : c2600-ipbasek9-mz.124-8.bin
8    : c2800nm-advipservicesk9-mz.124-15.T1.bin
9    : c2800nm-advipservicesk9-mz.151-4.M4.bin
10   : c2800nm-ipbase-mz.123-14.T7.bin
11   : c2800nm-ipbasek9-mz.124-8.bin
12   : c2950-i6q4l2-mz.121-22.EA4.bin
13   : c2950-i6q4l2-mz.121-22.EA8.bin
14   : c2960-lanbase-mz.122-25.FX.bin
15   : c2960-lanbase-mz.122-25.SEE1.bin
16   : c2960-lanbasek9-mz.150-2.SE4.bin
17   : c3560-advipservicesk9-mz.122-37.SE1.bin
18   : pt1000-i-mz.122-28.bin
19   : pt3000-i6q4l2-mz.121-22.EA4.bin
```

```
ftp>?
        ?
        cd
        delete
        dir
        get
        help
        passive
        put
        pwd
        quit
        rename
ftp>put kishore.txt

Writing file kishore.txt to 10.0.0.4:
File transfer in progress...

[Transfer complete - 14 bytes]

14 bytes copied in 0.012 secs (1166 bytes/sec)
ftp>dir
```

```
9   : c2800nm-advipservicesk9-mz.151-4.M4.bin
10  : c2800nm-ipbase-mz.123-14.T7.bin
11  : c2800nm-ipbasek9-mz.124-8.bin
12  : c2950-i6q4l2-mz.121-22.EA4.bin
13  : c2950-i6q4l2-mz.121-22.EA8.bin
14  : c2960-lanbase-mz.122-25.FX.bin
15  : c2960-lanbase-mz.122-25.SEE1.bin
16  : c2960-lanbasek9-mz.150-2.SE4.bin
17  : c3560-advipservicesk9-mz.122-37.SE1.bin
18  : kishore.txt
19  : pt1000-i-mz.122-28.bin
20  : pt3000-i6q4l2-mz.121-22.EA4.bin
ftp>rename kishore.txt ccna.txt

Renaming kishore.txt
ftp>
[OK Renamed file successfully from kishore.txt to ccna
ftp>
```

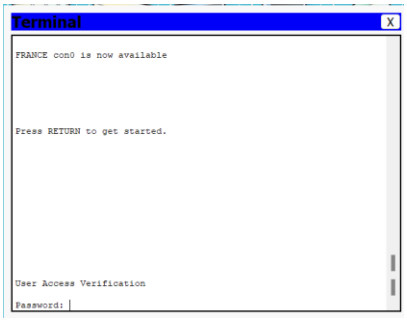
First Time Configuration In Router:

To configure the initial router settings by using the Cisco IOS CLI, you must set up a console connection.



CONSOLE SECURITY

Console password setup:



FRANCE(config)#line console 0
FRANCE(config-line)#password cisco
FRANCE(config-line)#login
FRANCE(config-line)#exit

ENABLE PASSWORD

```
User Access Verification

Password:

FRANCE>en
Password:
FRANCE#
```

FRANCE(config)#enable password cisco

ENABLE SECRET

FRANCE(config)#enable secret kishore

```
!
enable secret 5 $1$mERr$LO9q.aLa/5lxLvwCFA4U4.
enable password 7 0822455D0A16
```

AUXILIARY PASSWORD

AUX port is usually used to get dial-in access to the router. You connect one end of the console cable to the router, and other end to the serial interface of your PC

FRANCE(config)#line aux 0
FRANCE(config-line)#password cisco
FRANCE(config-line)#

TYPE 7 Password setup/removal

FRANCE(config)#username kishore password kct
FRANCE(config)#username admin password kct
FRANCE(config)#line vty 0 4
FRANCE(config-line)#login local
FRANCE(config-line)#exit

```
hostname FRANCE
!
!
!
enable password cisco
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
username admin password 0 kct
username kishore password 0 kct
!
```

Able to see the password as plain text

To enable type 7 password

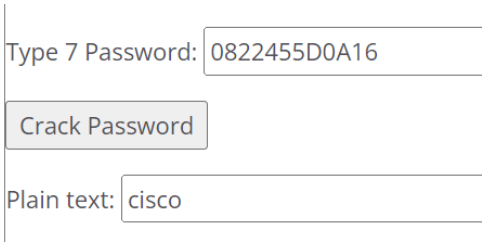
FRANCE(config)#service password-encryption

FRANCE(config)#no service password-encryption(disable)

```
hostname FRANCE
!
!
!
enable password 7 0822455D0A16
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
username admin password 7 082A4F5A
username kishore password 7 082A4F5A
```

TYPE 7 PASSWORD CRACKING

enable password 7 0822455D0A16
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
username admin password 7 082A4F5A
username kishore password 7 082A4F5A



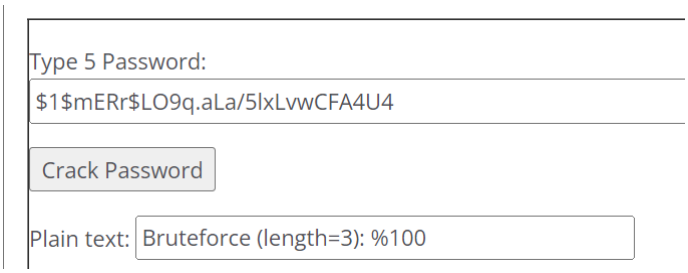
Reference: https://www.ifm.net.nz/cookbooks/passwordcracker.html

MD5 Password

1mERr$LO9q.aLa/5lxLvwCFA4U4.

$ hashing algorithm $ salt-value $ encrypted value

It can also be cracked using brute forcing but hard to crack and takes time

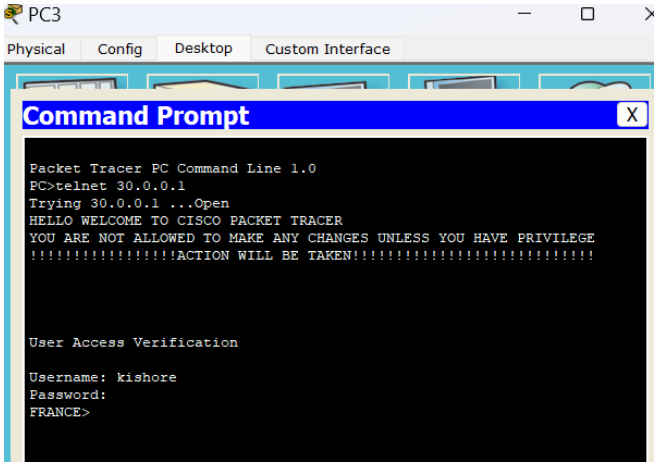


BANNER SETUP

Banner motd #messgae

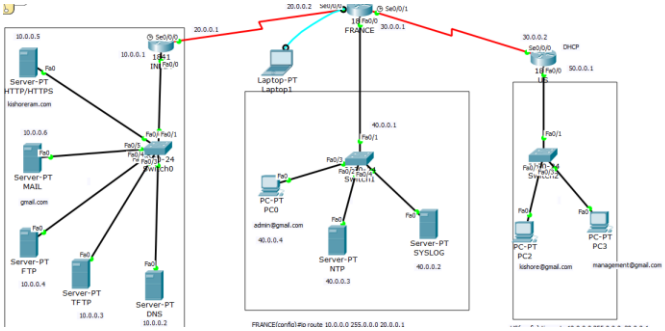
#

```
HELLO WELCOME TO CISCO PACKET TRACER
YOU ARE NOT ALLOWED TO MAKE ANY CHANGES UNLESS YOU HAVE PRIVILEGE
!!!!!!!!!!!!!!!!!ACTION WILL BE TAKEN!!!!!!!!!!!!!!!!!!!!!!!!!!!!


User Access Verification

Password:
```



telnet from other network

DESCRIPTION




```
FRANCE#show int fa0/0
FastEthernet0/0 is up, line protocol is up (connected)
  Hardware is Lance, address is 00d0.d3c7.9401 (bia 00d0.d3c7.9401)
  Description: connected with syslog and ntp server
  Internet address is 40.0.0.1/8
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
```

MINIMUM PASSWORD LENGTH

FRANCE(config)#security passwords min-length 8

```
FRANCE(config)#security passwords min-length 8
FRANCE(config)#enable password cisco
% Password too short - must be at least 8 characters. Password not configured.
FRANCE(config)#
```