NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCE
Computer Network Lab (CL-307)
Lab Session 06

Awais Ahmed || Faizan Yousuf || Munim Ali
awais.ahmed@nu.edu.pk || faizan.yousuf@nu.edu.pk || munim.ali@nu.edu.pk

APPLICATION LAYER PROTOCOL (cont.)

OBJECTIVE

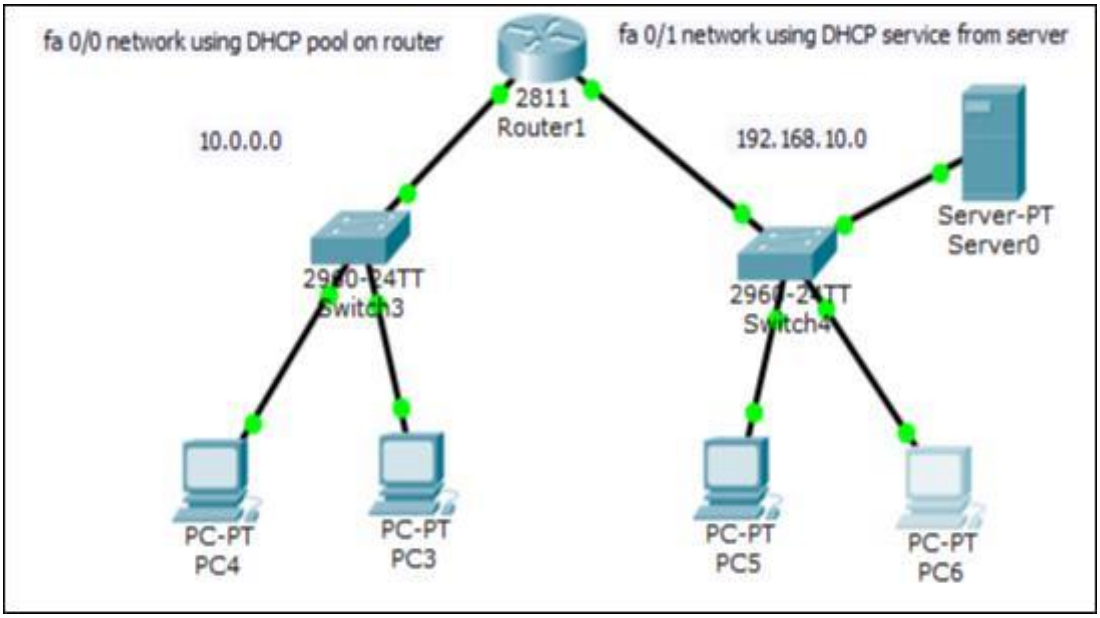
1. Dynamic Host Configuration Protocol
2. File Transfer Protocol
3. Simple Mail Transfer Protocol and Post Office Protocol version3

DYNAMIC HOST CONFIGURATION PROTOCOL

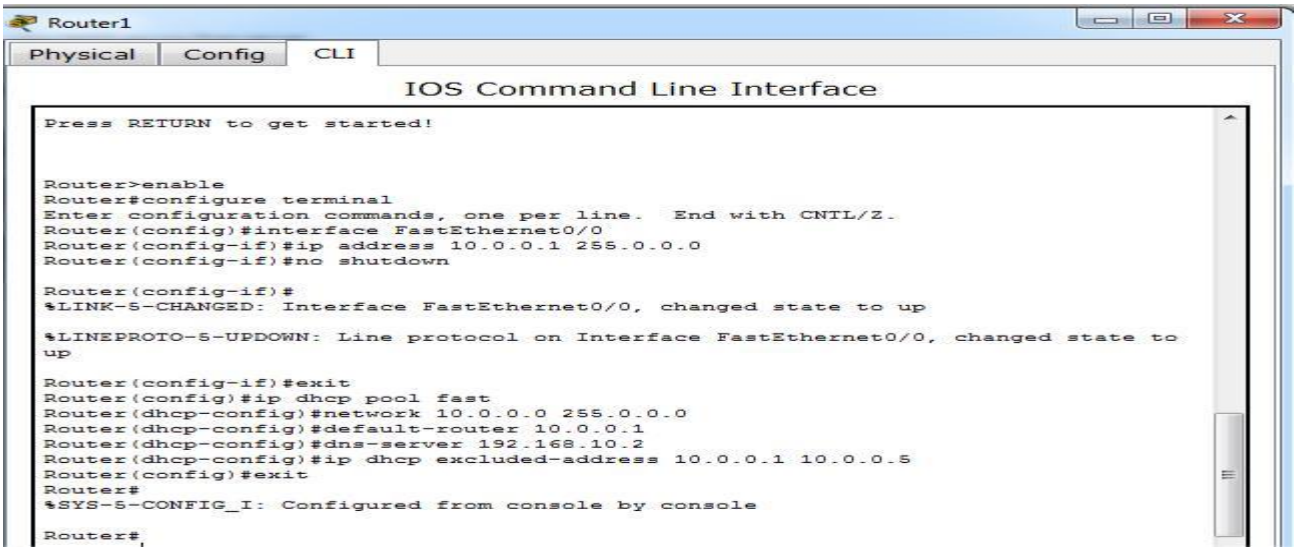
The Dynamic Host Configuration Protocol is used by computers for requesting Internet Protocol parameters, such as an IP address from a network server. The protocol operates based on the client-server model. DHCP is very common in all modern networks ranging in size from home networks to large campus networks and regional Internet service provider networks. Most residential network routers receive a globally unique IP address within the provider network. Within a local network, DHCP assigns a local IP address to devices connected to the local network.

When a computer or other networked device connects to a network, its DHCP client software in the operating system sends a broadcast query requesting necessary information. Any DHCP server on the network may service the request. The DHCP server manages a pool of IP addresses and information about client configuration parameters such as default gateway, domain name, the name servers, time servers. On receiving a request, the server may respond with specific information for each client, as previously configured by an administrator, or with a specific address and any other information valid for the entire network, and the time period for which the allocation (*lease*) is valid. A host typically queries for this information immediately after booting, and periodically thereafter before the expiration of the information. When an assignment is refreshed by the client computer, it initially requests the same parameter values, but may be assigned a new address from the server, based on the assignment policies set by administrators.

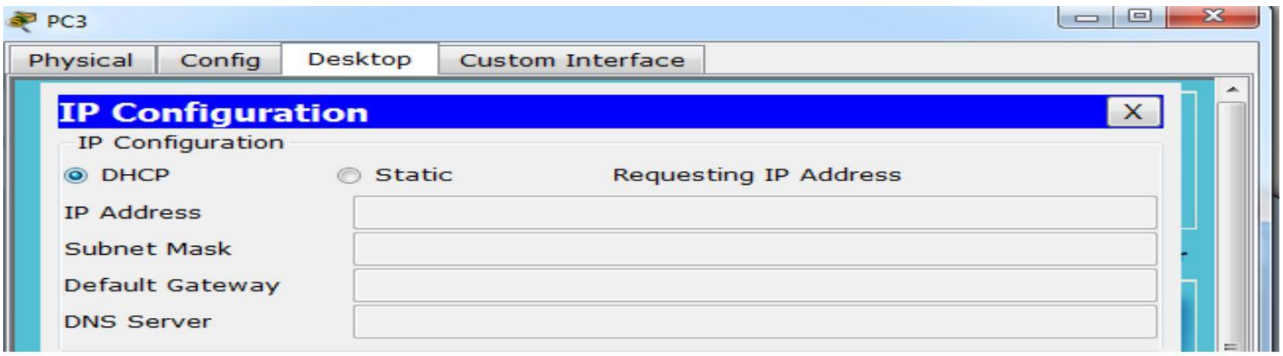
We can use DHCP service from router as well as from Server.

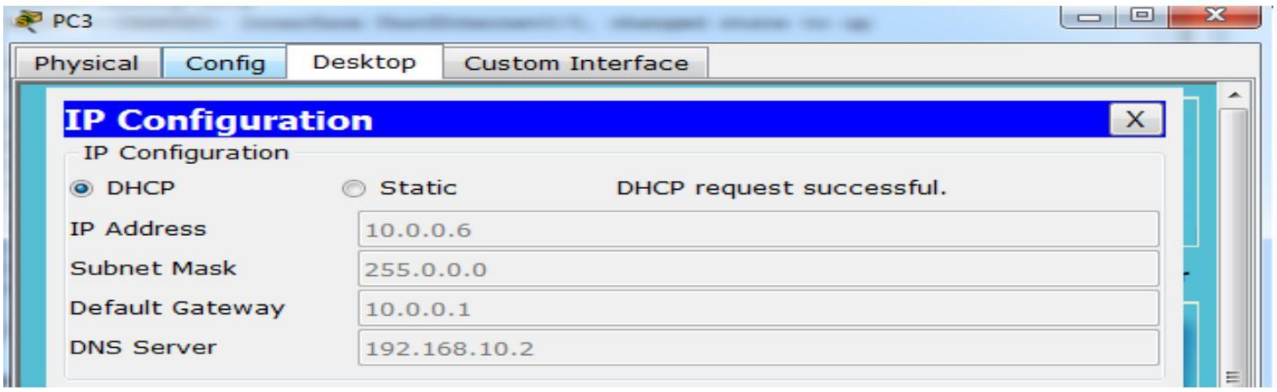


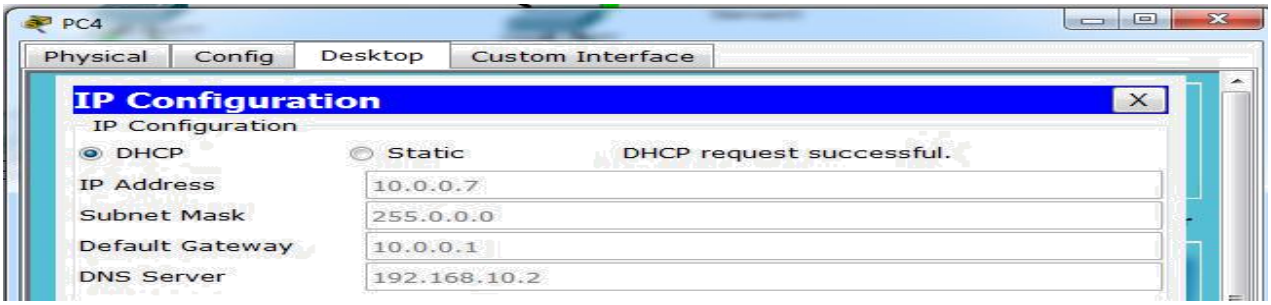
Now configuring network on Fa 0/0.



Now assigning IP to PC3 and PC4.







You can check the status of assigned IP addresses as shown below.

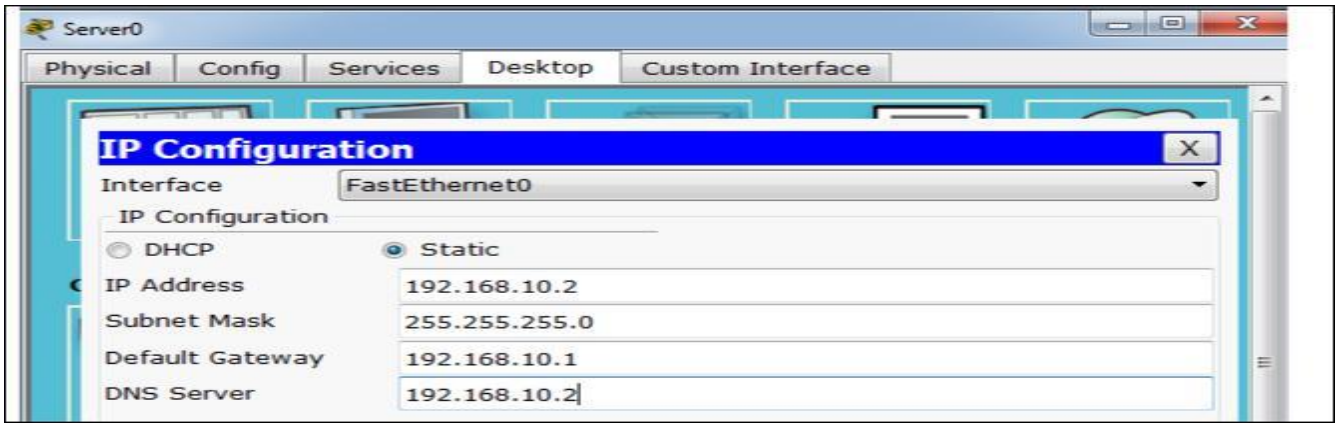
```
Router#
Router#show ip dhcp binding
IP address       Client-ID/              Lease expiration        Type
                 Hardware address
10.0.0.6         000A.F385.2E85          --                      Automatic
10.0.0.7         0060.5C58.2C01          --                      Automatic
```

Now configuring network on Fa 0/1.

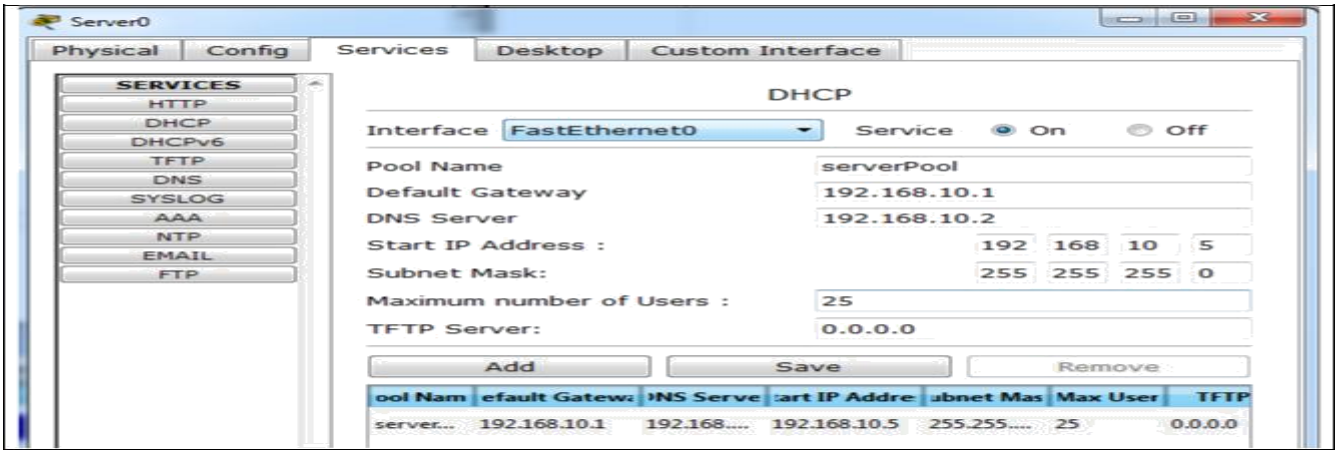
Click on router and assign IP address.

```
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 FastEthernet0/1
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
up
```

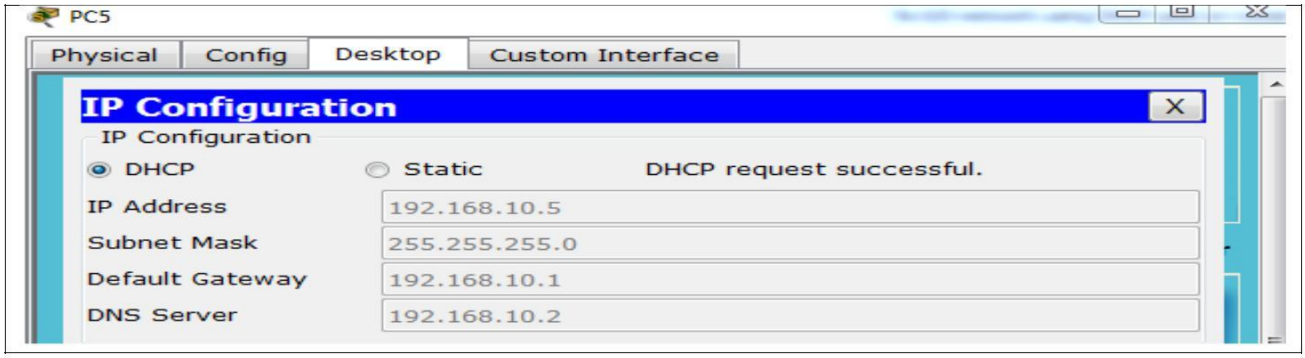
Click on server and assign IP address.

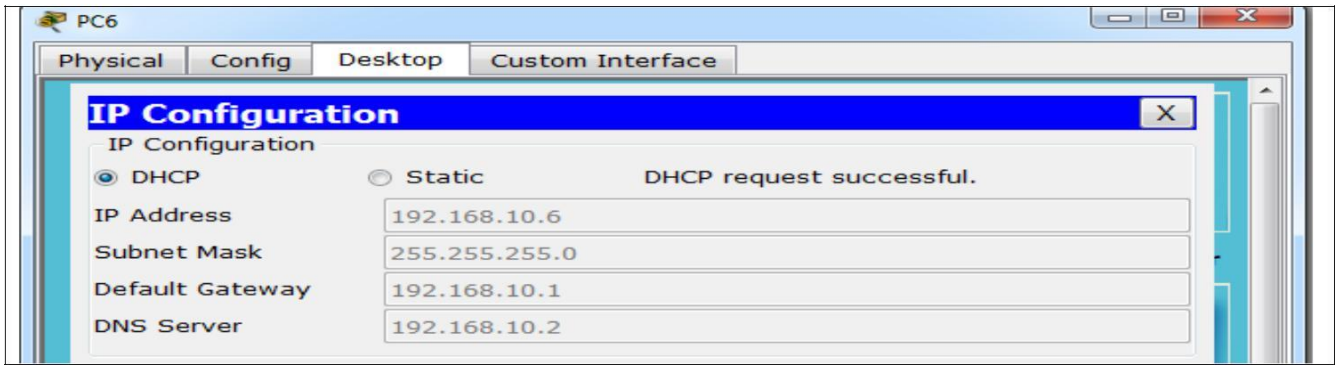


Now assigning DHCP pool on Server. Go to server →services →DHCP



Now assigning IP to PC5 and PC6.





SIMULATION

a) Now click on simulation icon in the right bottom of packet Tracer.

b) Now click on auto capture /play icon for packet capturing.

c) Click on the PC and go to Desktop →IP configuration → DHCP

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type	Info
	0.000	--	PC5	DHCP	
	0.000	--	PC5	DHCP	
	0.001	PC5	Switch4	DHCP	
	0.001	--	PC5	DHCP	
	0.002	PC5	Switch4	DHCP	
	0.002	Switch4	Router1	DHCP	
	0.002	Switch4	PC6	DHCP	
	0.002	Switch4	Server0	DHCP	
	0.003	Switch4	Router1	DHCP	

Now click on the DHCP packet see how it lease IP address.

PDU Information at Device: Server0

OSI Model | Inbound PDU Details

At Device: Server0
Source: PC5
Destination: 255.255.255.255

In Layers	Out Layers
Layer 7: DHCP Frame Server: 0.0.0.0, Client: 0.0.0.0	Layer7
Layer6	Layer6
Layer5	Layer5
Layer 4: UDP Src Port: 68, Dst Port: 67	Layer4
Layer 3: IP Header Src. IP: 192.168.10.5, Dest. IP: 255.255.255.255	Layer3
Layer 2: Ethernet II Header 0030.F217.9616 >> FFFF.FFFF.FFFF	Layer2
Layer 1: Port FastEthernet0	Layer1

DHCP

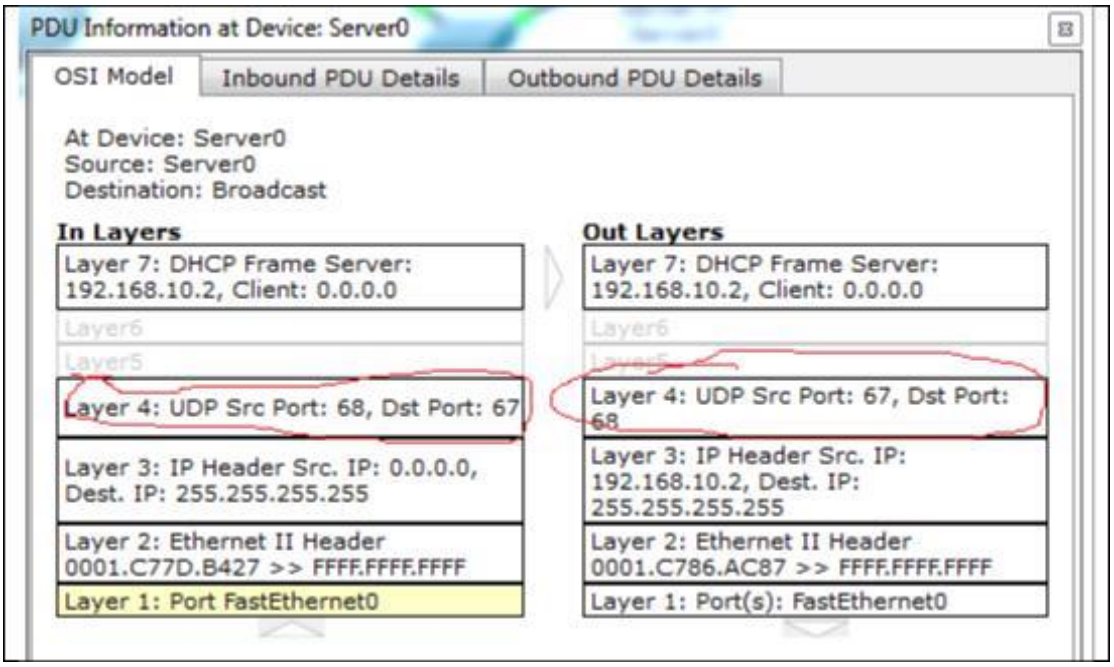
0	8	16	31 Bits
OP: 0x1	HW TYPE	HW LEN	HOPS
TRANSACTION ID (4 BYTES)			
SECS		FLAGS	
CLIENT ADDRESS: 0.0.0.0			
"YOUR" CLIENT ADDRESS: 0.0.0.0			
SERVER ADDRESS: 0.0.0.0			
RELAY AGENT ADDRESS: 0.0.0.0			
CLIENT HARDWARE ADDRESS: 0030.F217.9616			
SERVER HOSTNAME (64 BYTES)			
FILE (128 BYTES)			
OPTIONS (312 BYTES)			

DHCP

0	8	16	31 Bits
OP: 0x2	HW TYPE	HW LEN	HOPS
TRANSACTION ID (4 BYTES)			
SECS		FLAGS	
CLIENT ADDRESS: 0.0.0.0			
"YOUR" CLIENT ADDRESS: 192.168.10.7			
SERVER ADDRESS: 192.168.10.2			
RELAY AGENT ADDRESS: 0.0.0.0			
CLIENT HARDWARE ADDRESS: 0030.F217.9616			
SERVER HOSTNAME (64 BYTES)			
FILE (128 BYTES)			
OPTIONS (312 BYTES)			

Show OSI layers involved in transmission

The popped up window (below) will enable you to trace the content of the message through the OSI layer and what changes will occur at each layer (use next and previous buttons to trace each layer content).



File Transfer Protocol

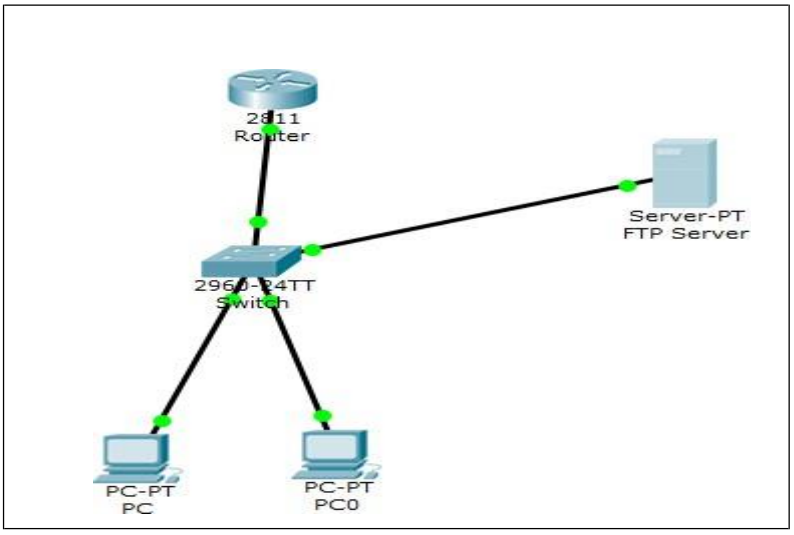
The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files between a client and server on a computer network. FTP is built on a client-server model architecture and uses separate control and data connections between the client and the server.

Objectives: In this activity, you will configure FTP services. You will then use the FTP services to transfer files between clients and the server.

Part 1: Configure FTP Services on Servers

Part 2: Upload a File to the FTP Server

Part 3: Download a File from the FTP Server



Part 1: Configure FTP Services on Servers

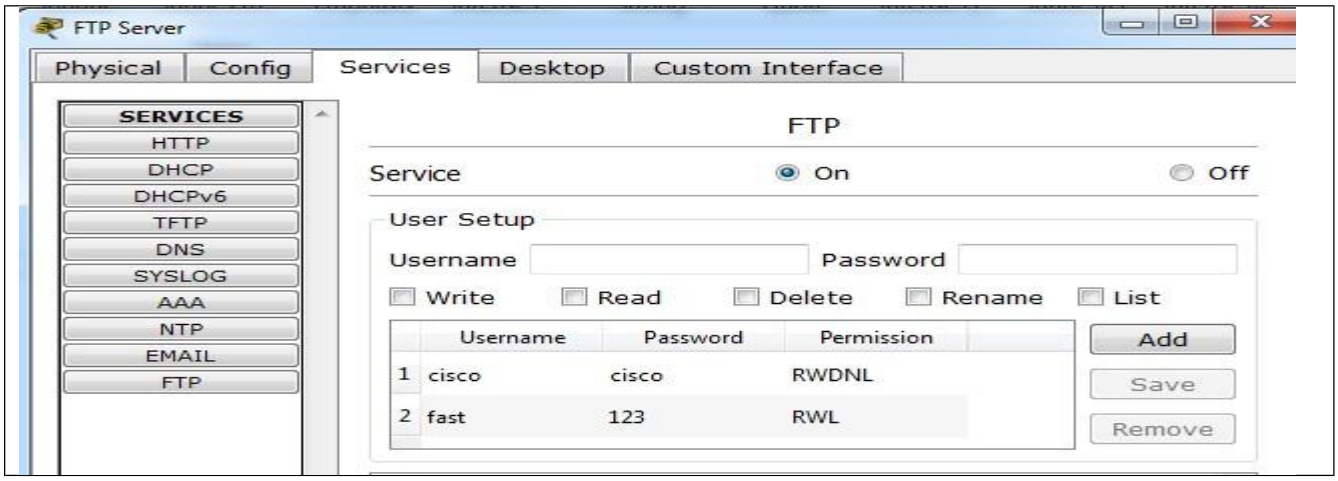
Step 1: Configure the FTP service on Server.

a. Click Server > Config tab > FTP.

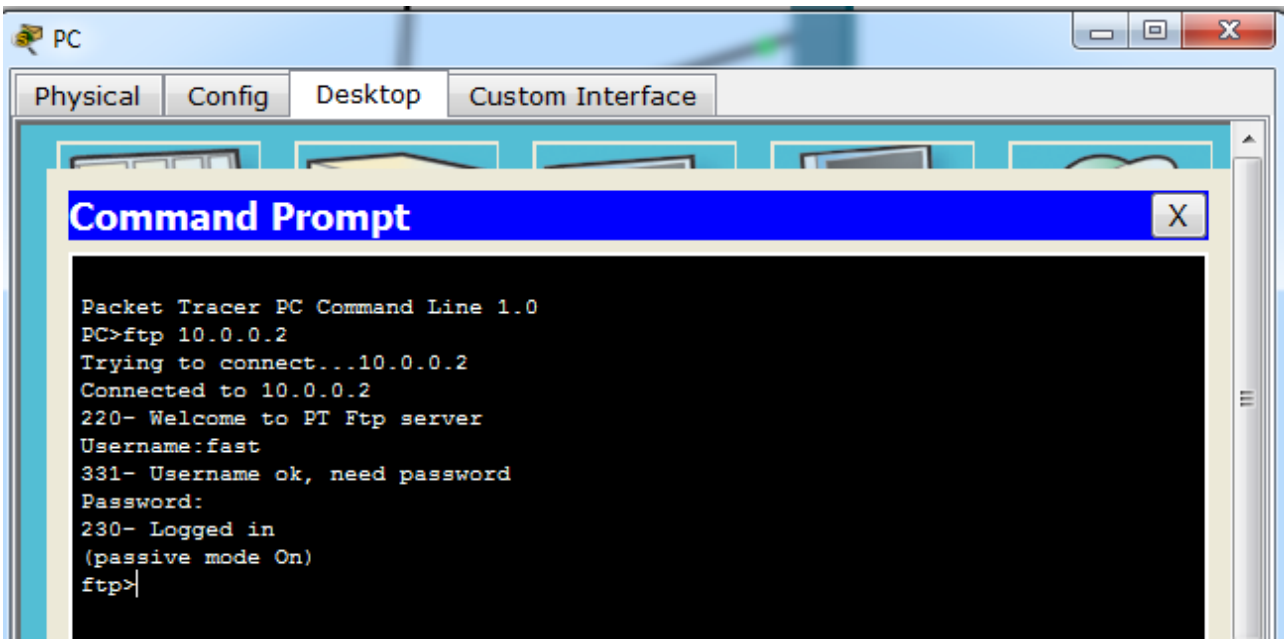
b. Click On to enable FTP service.

c. In User Setup, create the following user accounts. Click the + button to add the account:

Username	Password	Permissions
fast	123	limited to Read, write and List

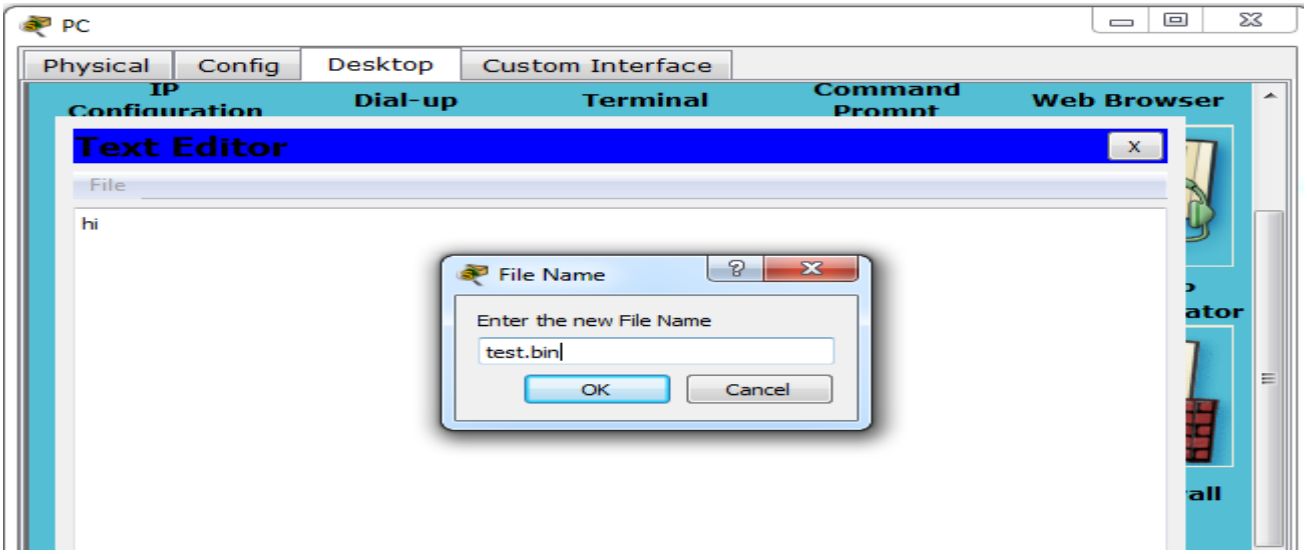


Now go to PC→Desktop →command prompt

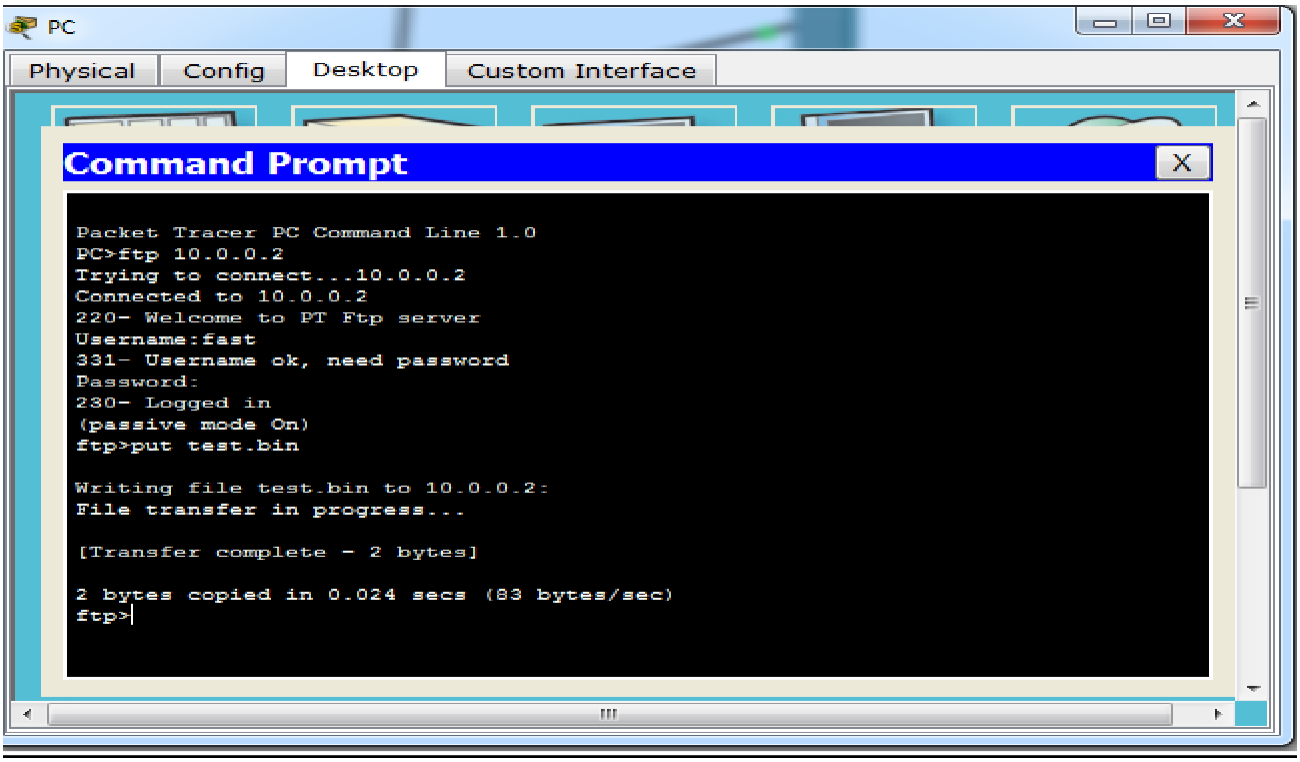


Part 2: Upload a File to the FTP Server

Now go to PC →Desktop →text editor →create file named test.bin

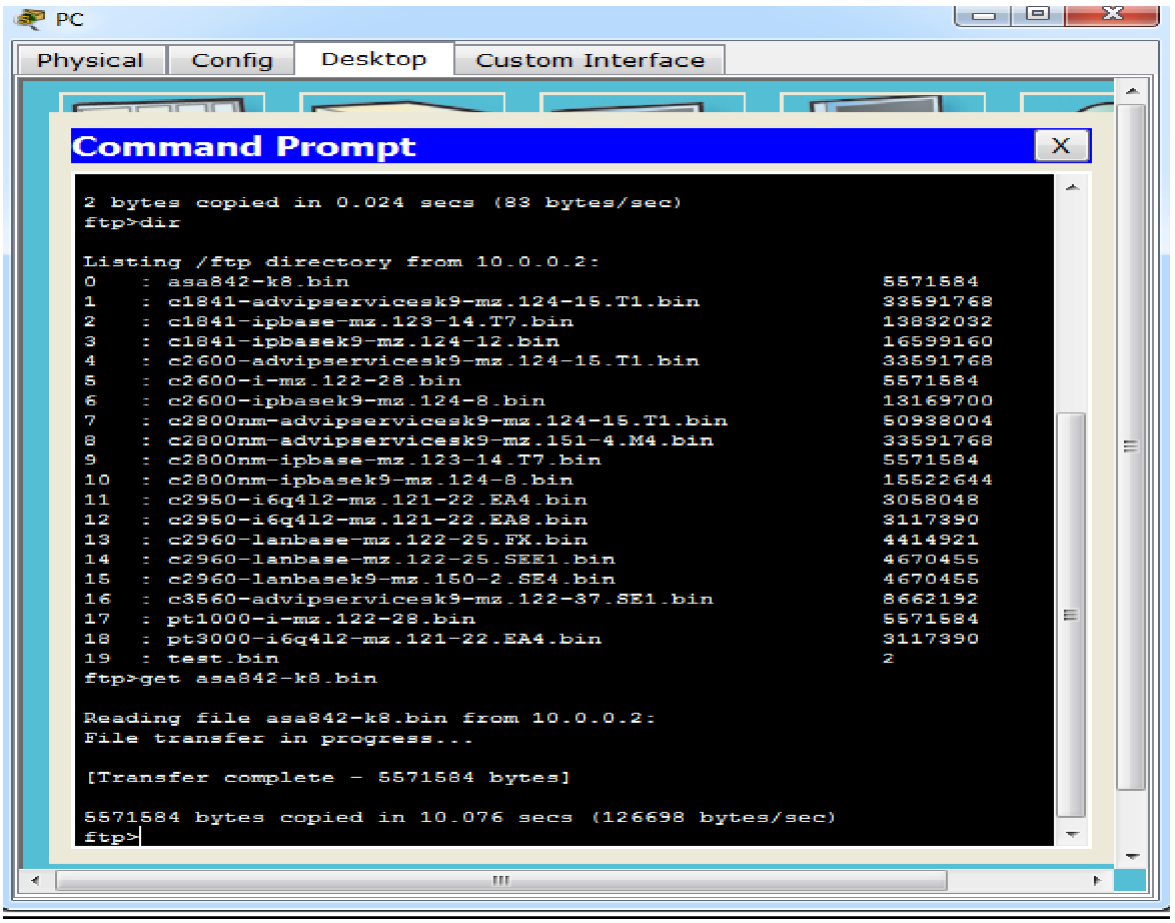


Now go to PC →Desktop →command prompt

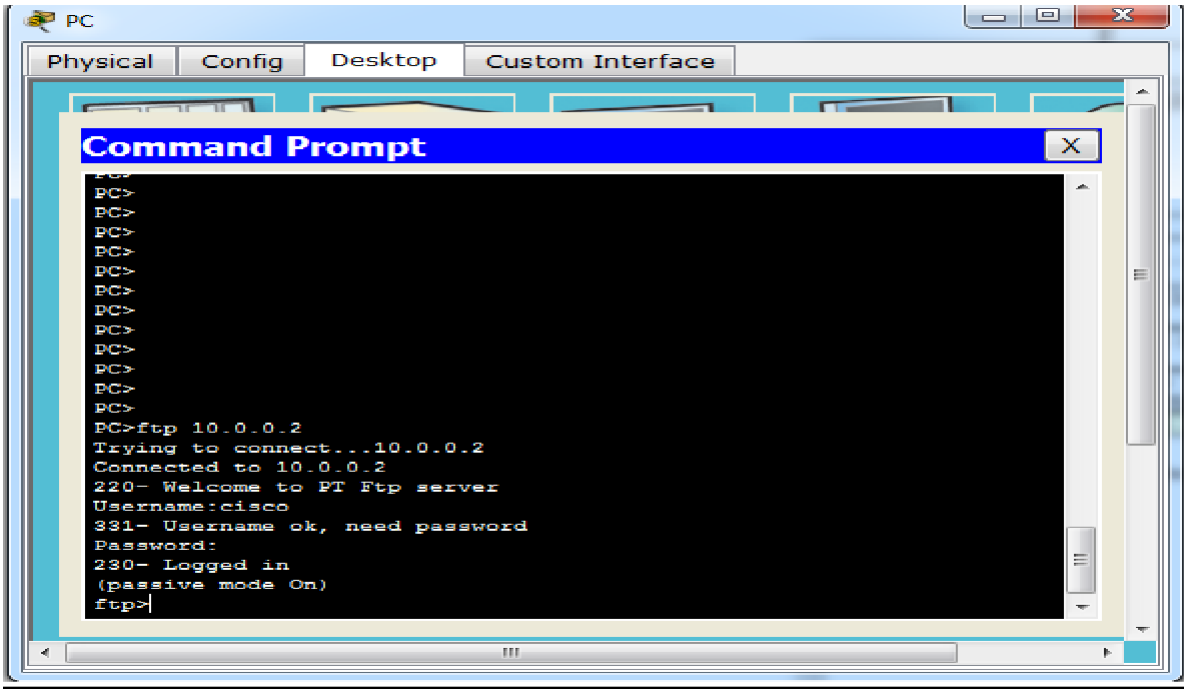


Part 3: Download a File from the FTP Server

Now go to PC →Desktop →command prompt

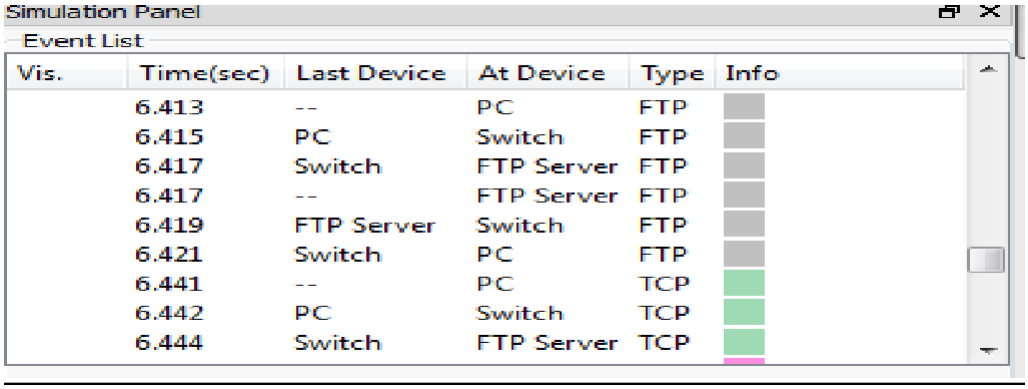


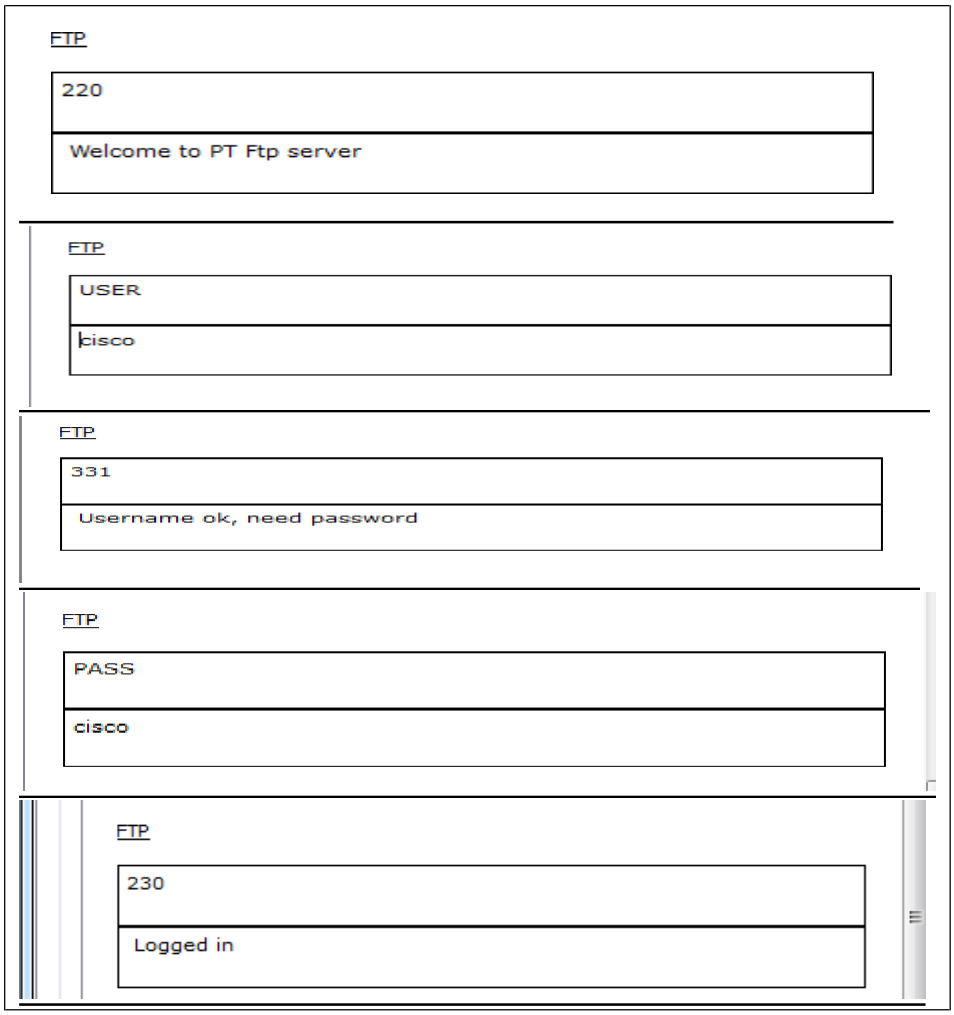
SIMULATION: Now click on PC and go to Desktop →command prompt. Now type ftp 10.0.0.2



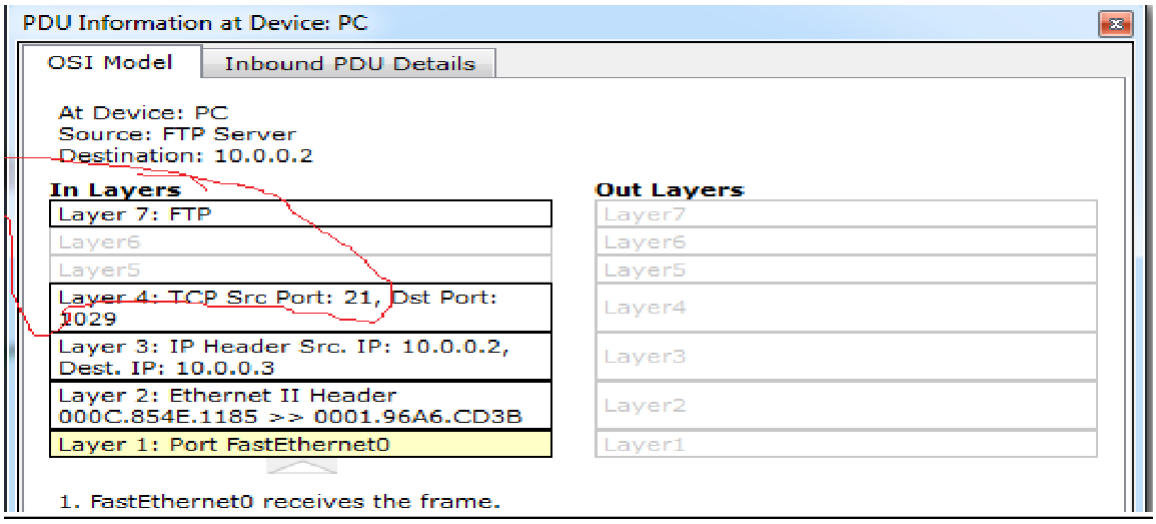
Now to note the FTP header format information go to simulation mode →edit filters and click on FTP check box then click on capture/forward button.

How FTP server resolve the login request.

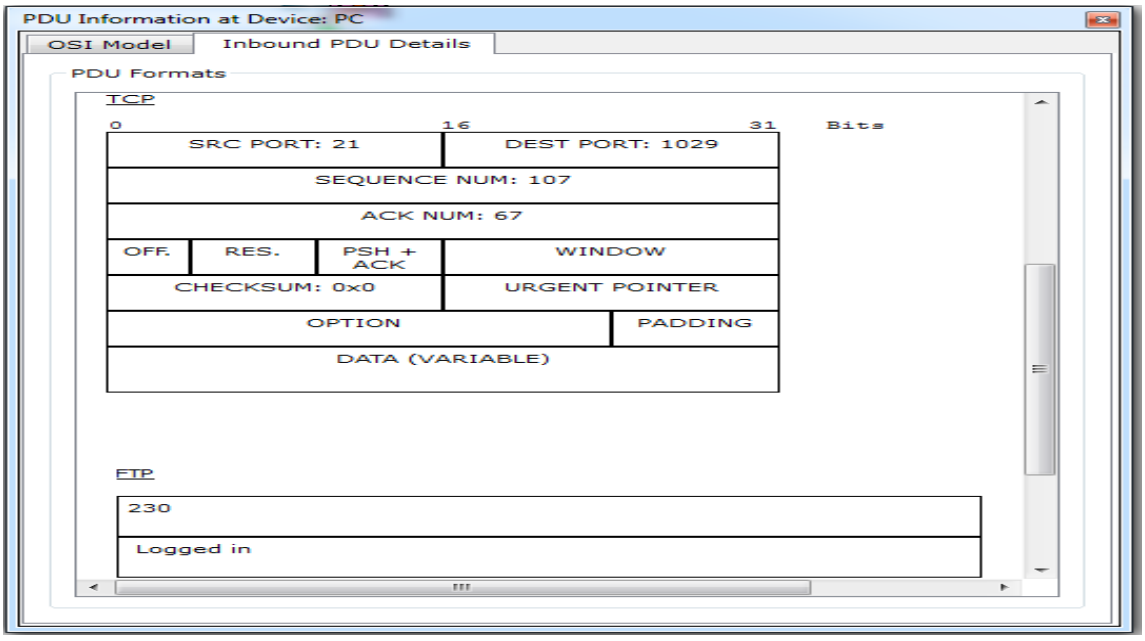




Now click on the FTP packet, you can note that the destination port is 21.



Now scroll the Outbound PDU Details, you can see the FTP PDU.

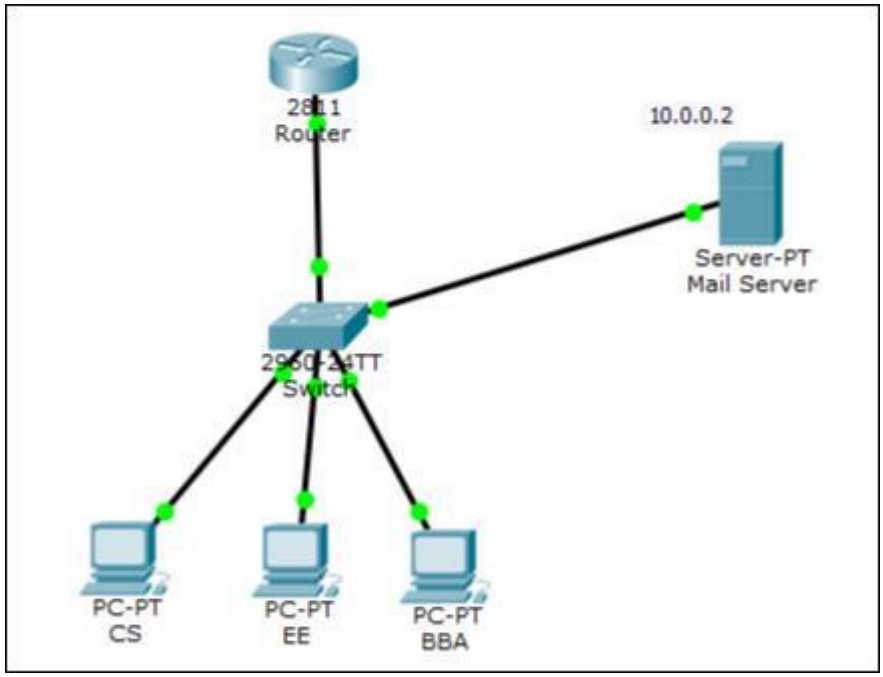


SMTP &POP3

Simple Mail Transfer Protocol (SMTP) is an Internet standard for electronic mail (email) transmission. First defined by RFC 821 in 1982, it was last updated in 2008 with Extended SMTP additions by RFC 5321, which is the protocol in widespread use today. Although electronic mail servers and other mail transfer agents use SMTP to send and receive mail messages, user-level client mail applications typically use SMTP only for sending messages to a mail server for relaying. For retrieving messages, client applications usually use either IMAP or POP3.

SMTP communication between mail servers uses port 25. Mail clients on the other hand, often submit the outgoing emails to a mail server on port 587. Despite being deprecated, mail providers sometimes still permit the use of nonstandard port 465 for this purpose.

Topology

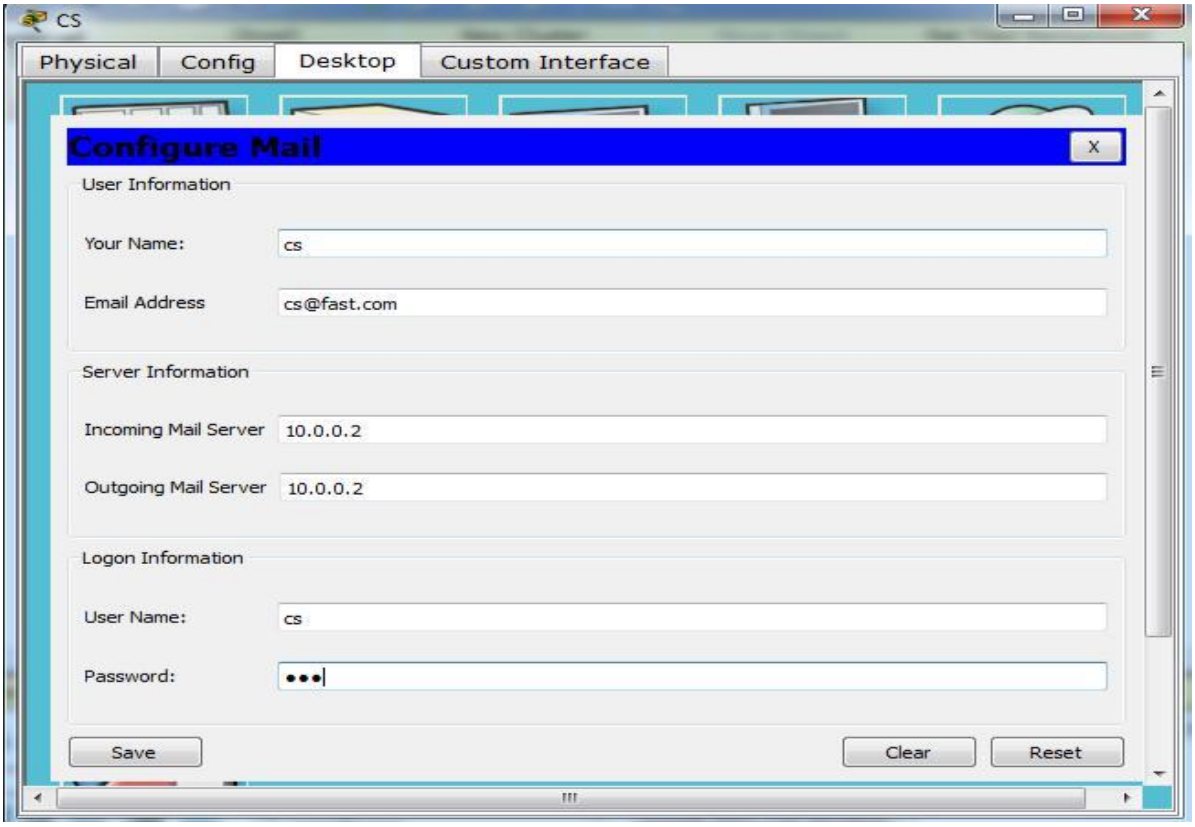


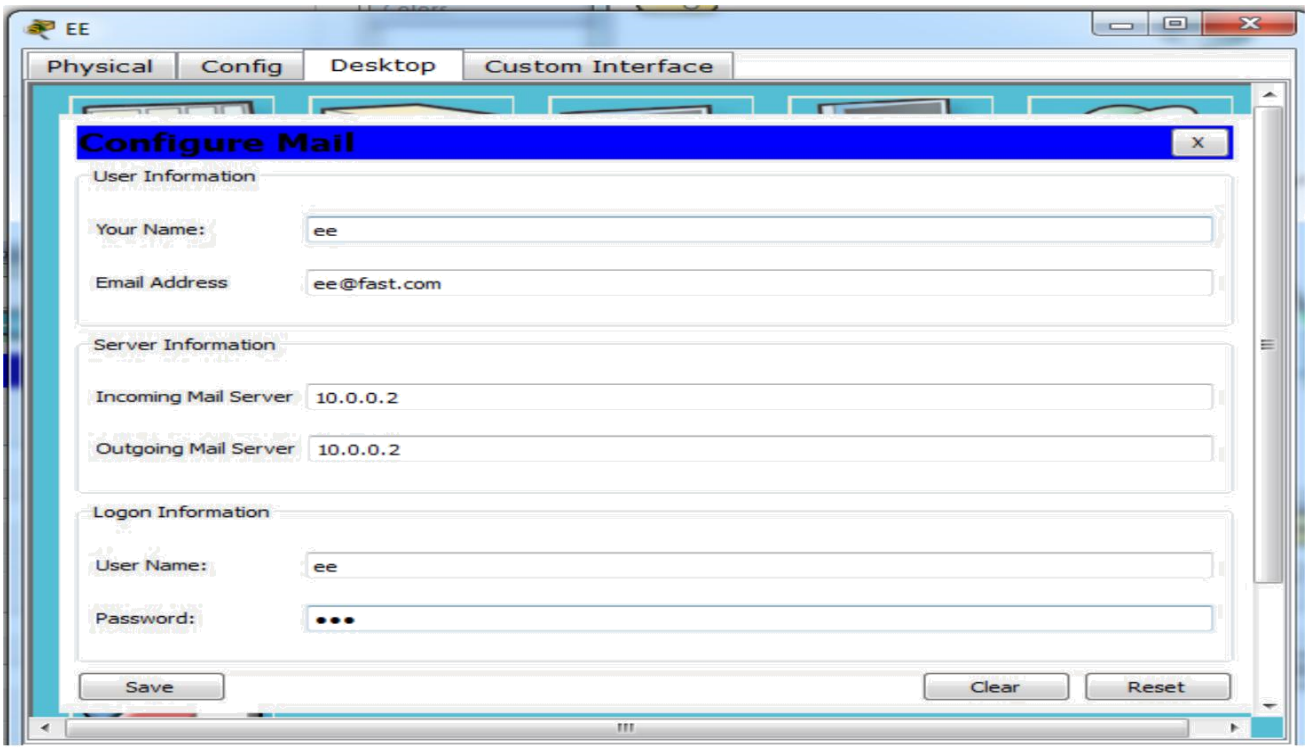
Objectives: Configure and Verify Email Services

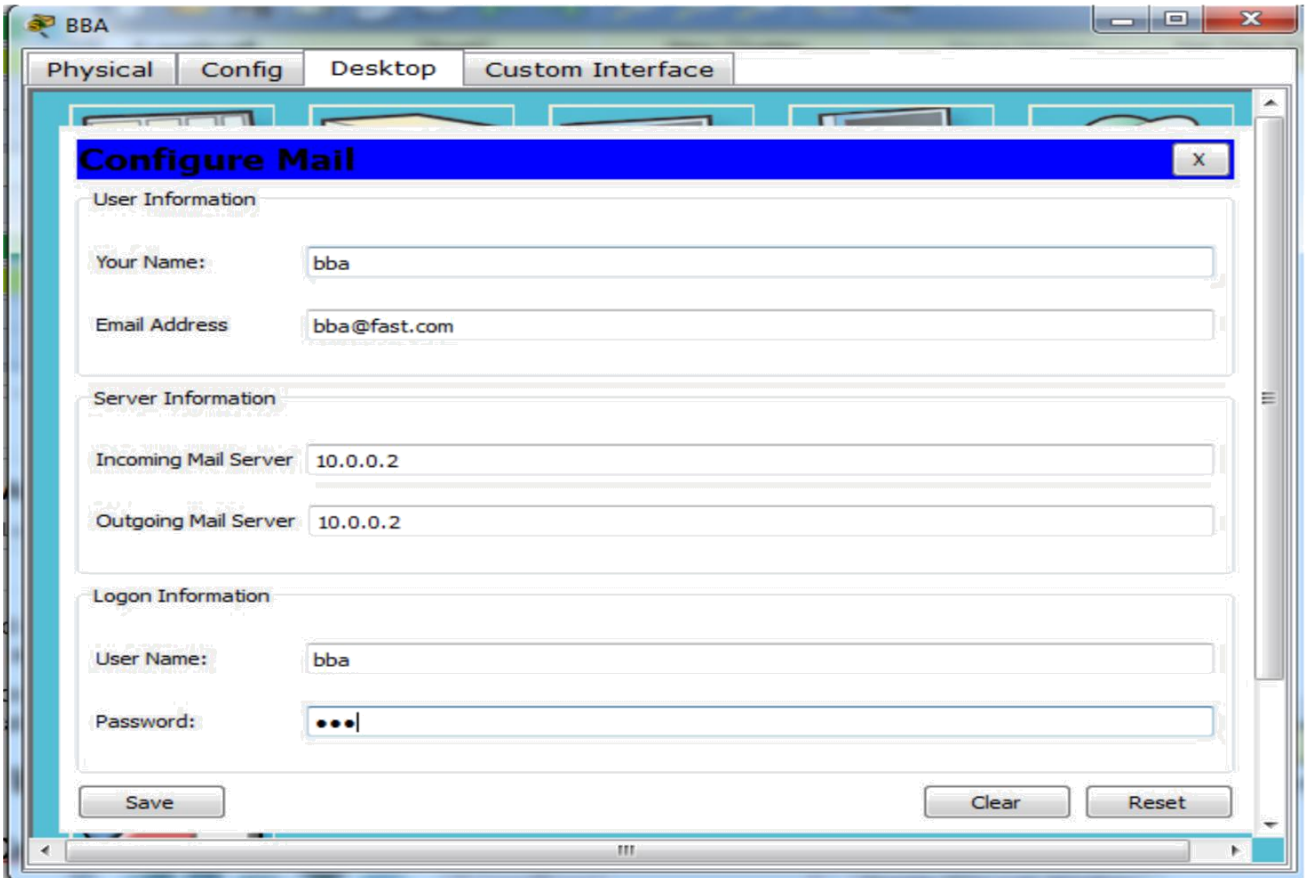
Click on Mail server →services →EMAIL Enable SMTP & POP3 Service
Set Domain Name:fast.com Add
users.

User name	**password**
cs	123
ee	123
bba	123

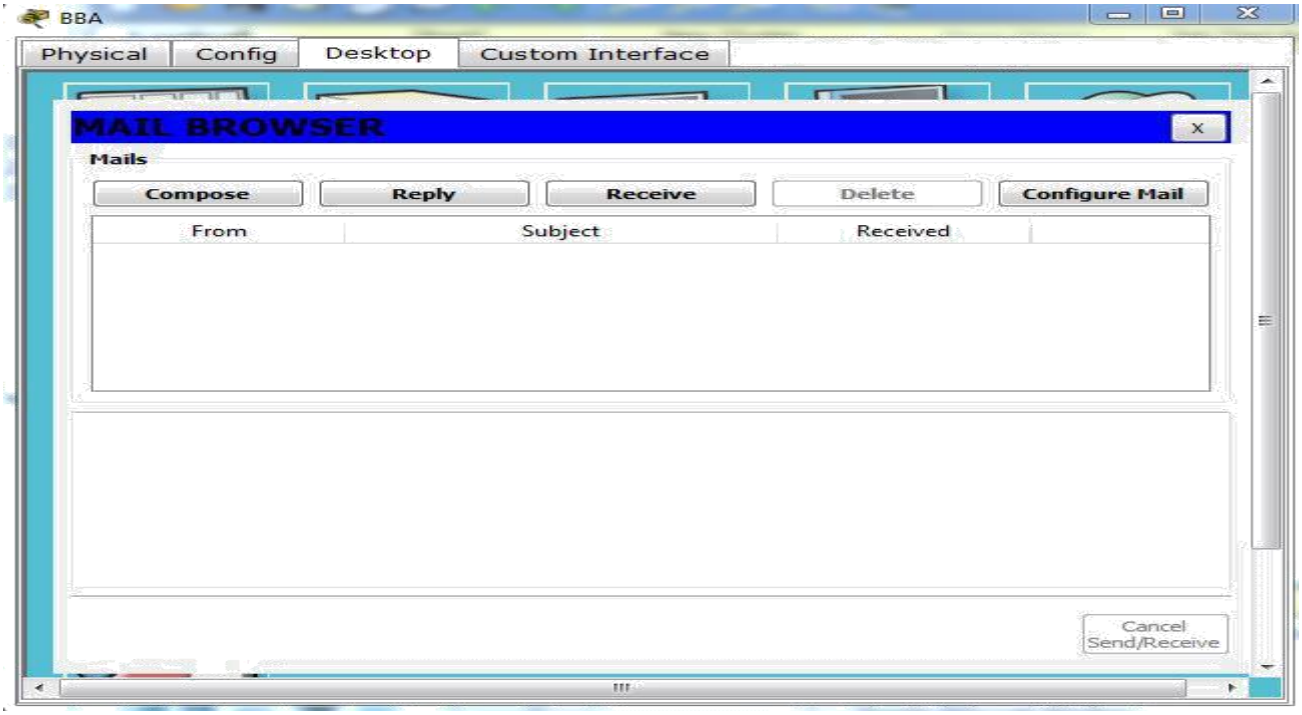
Now configuring user email account.
Go to pc →desktop →Email



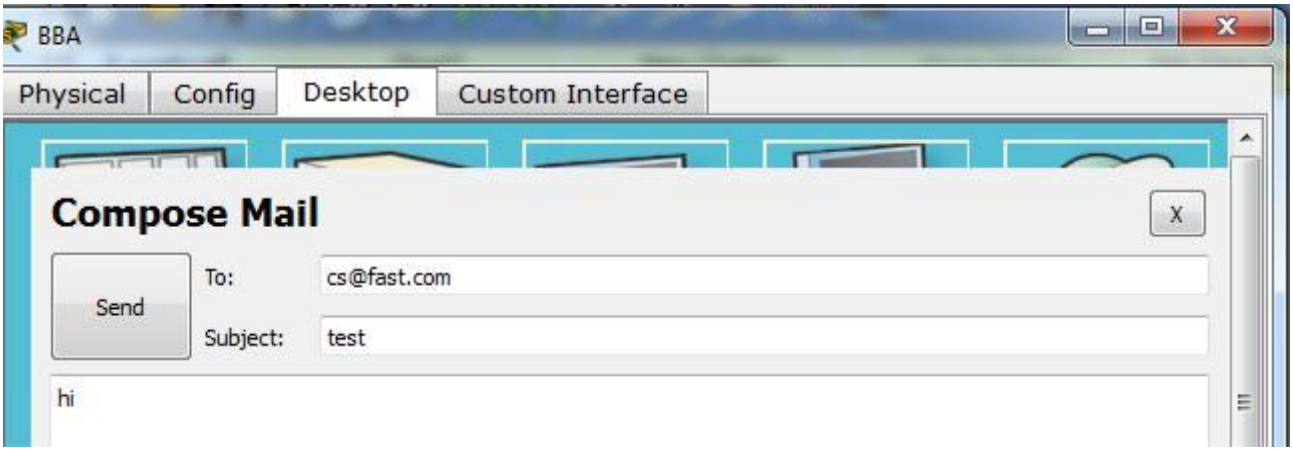



BBA
Physical
Config
Desktop
Custom Interface
Configure Mail
X
User Information
Your Name:
bba
Email Address
bba@fast.com
Server Information
Incoming Mail Server
10.0.0.2
Outgoing Mail Server
10.0.0.2
Logon Information
User Name:
bba
Password:
Save
Clear
Reset

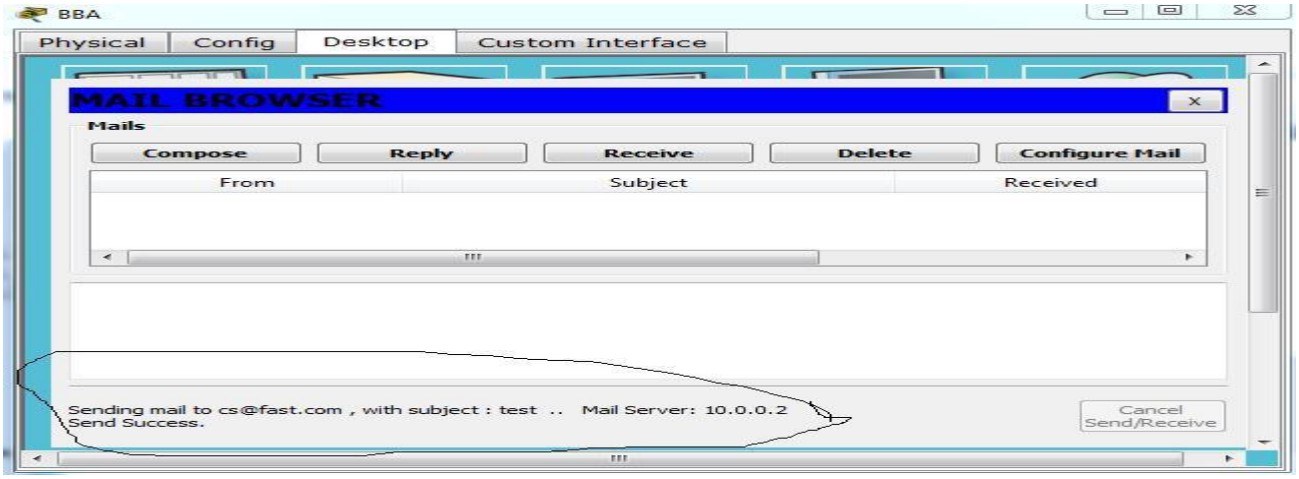
Click save


BBA
Physical
Config
Desktop
Custom Interface
MAIL BROWSER
X
Mails
Compose
Reply
Receive
Delete
Configure Mail
From
Subject
Received
Cancel
Send/Receive

Now compose email → cs@fast .com

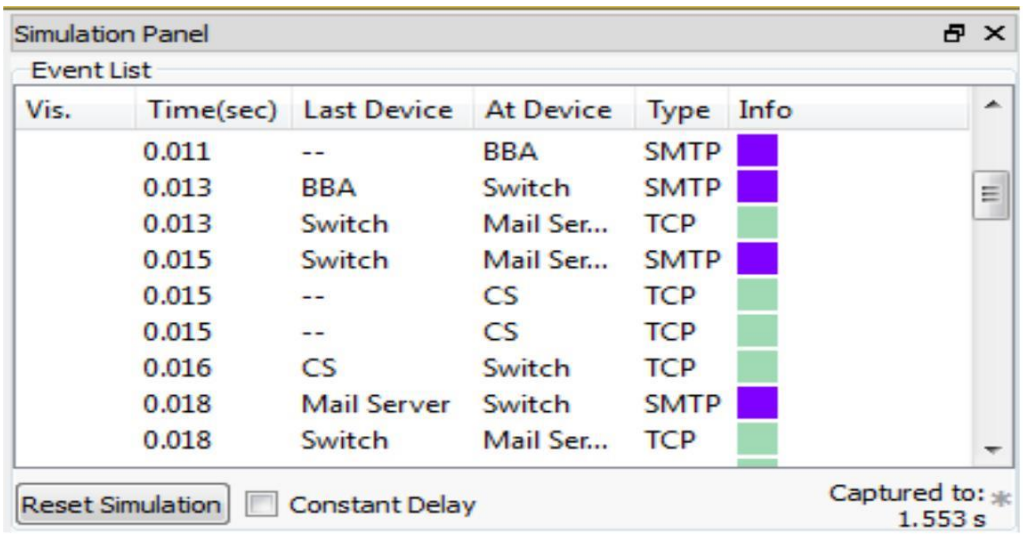


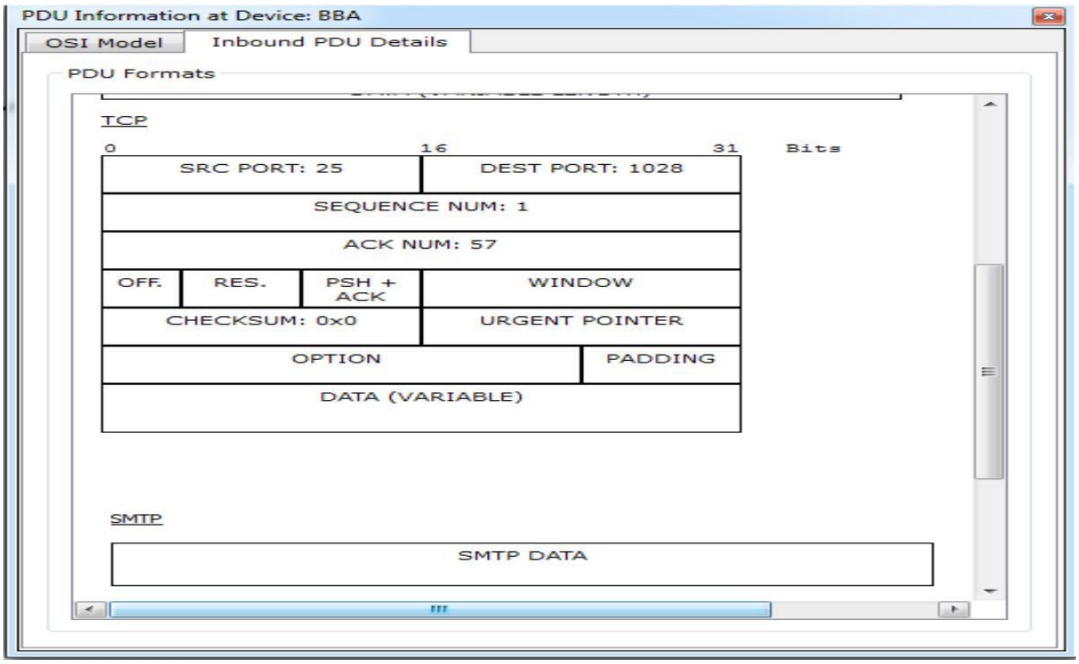
Click on send.

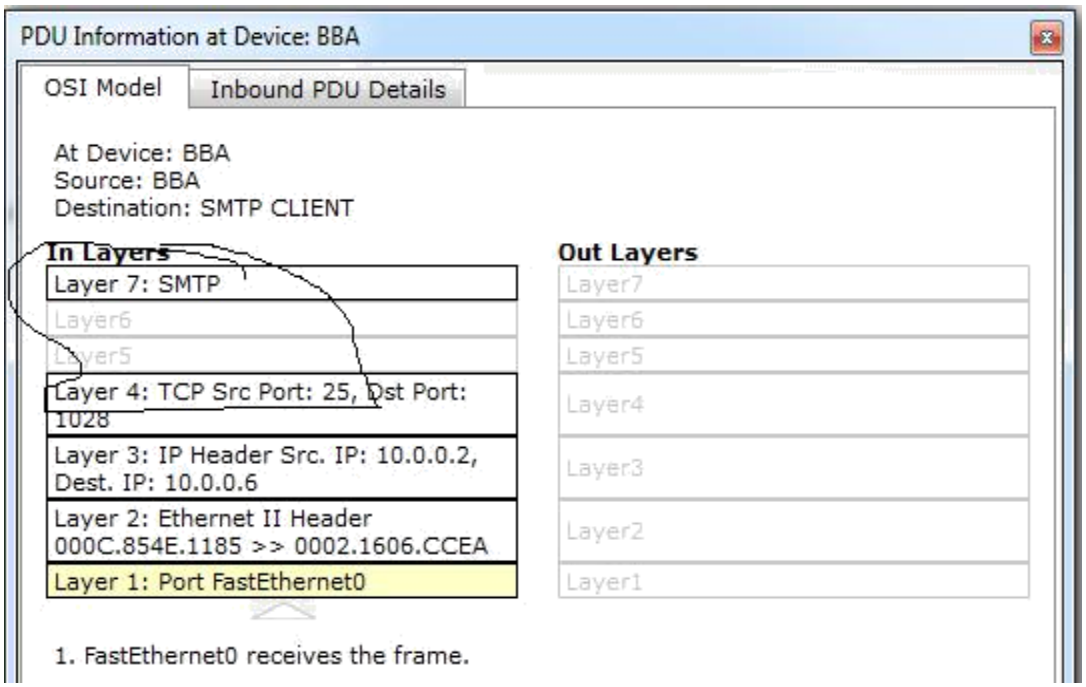


SIMULATION

Now to note the POP3 header format information go to simulation mode →edit filters and click on SMTP &POP3 check box then click on capture/forward button. Now see how mail server works.







Now go CS account and click on receive: