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**Computer Network- *Experiential Learning***

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***Scenario 2***

***Email Server***

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## **1. Introduction to Cisco packet tracer**

Cisco Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Packet Tracer makes use of a drag and drop user interface, allowing users to add and remove simulated network devices as they see fit. The software is mainly focused towards Certified Cisco Network Associate Academy students as an educational tool for helping them learn fundamental CCNA concepts.

Packet Tracer allows users to create simulated network topologies by dragging and dropping routers, switches and various other types of network devices. A physical connection between devices is represented by a 'cable' item. Packet Tracer supports an array of simulated Application Layer protocols, as well as basic routing with RIP, OSPF, EIGRP, BGP, to the extents required by the current CCNA curriculum. As of version 5.3, Packet Tracer also supports the Border Gateway Protocol.

In addition to simulating certain aspects of computer networks, Packet Tracer can also be used for collaboration. As of Packet Tracer 5.0, Packet Tracer supports a multi-user system that enables multiple users to connect multiple topologies together over a computer network. Packet Tracer also allows instructors to create activities that students have to complete. Packet Tracer is often used in educational settings as a learning aid.

Packet Tracer allows students to design complex and large networks, which is often not feasible with physical hardware, due to costs. Packet Tracer is commonly used by CCNA Academy students, since it is available to them for

free. However, due to functional limitations, it is intended by CISCO to be used only as a learning aid, not a replacement for Cisco routers and switches. The application itself only has a small number of features found within the actual hardware running a current Cisco IOS version. Thus, Packet Tracer is unsuitable for modelling production networks. It has a limited command set, meaning it is not possible to practice all of the IOS commands that might be required. Packet Tracer can be useful for understanding abstract networking concepts, such as the Enhanced Interior Gateway Routing Protocol by animating these elements in a visual form. Packet Tracer is also useful in education by providing additional components, including an authoring system, network protocol simulation and improving knowledge an assessment system

Cisco registered a new PTTP URI scheme with IANA to extend Packet Tracer 7.2.2 capabilities and make it interact with Cisco CSR virtual routers. Cisco CSR routers are cloud based IOX-XE routers deployed on x86 virtual machines.

Cisco Packet Tracer provides two operating modes to visualize the behavior of a network—real-time mode and simulation mode. In real-time mode the network behaves as real devices do, with immediate real-time response for all network activities. The real-time mode gives students a viable alternative to real equipment and allows them to gain configuration practice before working with real equipment. In simulation mode the user can see and control time intervals, the inner workings of data transfer, and the propagation of data across a network. This helps students understand the fundamental concepts behind network operations. A solid understanding of network fundamentals can help accelerate learning about related concepts.

## **2. Introduction to Email Servers**

Electronic mail is a method of exchanging messages ("mail") between people using electronic devices. Email entered limited use in the 1960s, but users could only send to users of the same computer, and some early email systems required the author and the recipient to both be online simultaneously, similar to instant messaging. Ray Tomlinson is credited as the inventor of email; in 1971, he developed the first system able to send mail between users on different hosts across the ARPANET, using the @ sign to link the user name with a destination server. By the mid-1970s, this was the form recognized as email. Email operates across computer networks, primarily the Internet.

Messages are exchanged between hosts using the Simple Mail Transfer Protocol with software programs called mail transfer agents (MTAs); and delivered to a mail store by programs called mail delivery agents (MDAs, also sometimes called local delivery agents, LDAs). Accepting a message obliges an MTA to deliver it, and when a message cannot be delivered, that MTA must send a bounce message back to the sender, indicating the problem.

Users can retrieve their messages from servers using standard protocols such as POP or IMAP, or, as is more likely in a large corporate environment, with a proprietary protocol specific to Novell Groupwise, Lotus Notes or Microsoft Exchange Servers. Programs used by users for retrieving, reading, and managing email are called mail user agents (MUAs).

Mail can be stored on the client, on the server side, or in both places. Standard formats for mailboxes include Maildir and mbox. Several prominent email clients use their own proprietary format and require conversion software to transfer email between them. Server-side storage is often in a proprietary format but since access is through a standard protocol such as IMAP, moving email from one server to another can be done with any MUA supporting the protocol.

Many current email users do not run MTA, MDA or MUA programs themselves, but use a web-based email platform, such as Gmail or Yahoo! Mail, that performs the same tasks. Such webmail interfaces allow users to access their mail with any standard web browser, from any computer, rather than relying on an email client.

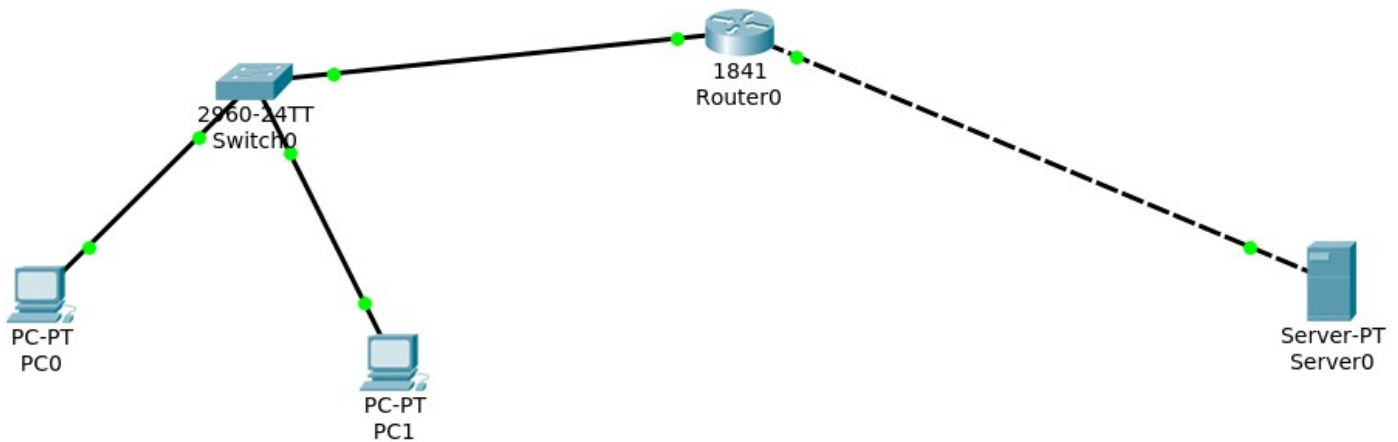
Types are web-based email, POP3 email servers, IMAP, MAPI. In this project the POP3 server is used.

### POP3 email servers

The Post Office Protocol 3 (POP3) is a mail access protocol used by a client application to read messages from the mail server. Received messages are often deleted from the server. POP supports simple download-and-delete requirements for access to remote mailboxes (termed maildrop in the POP RFC's).

### 3. Implementation details

#### a) Topology



In above diagram, we have made all connections using Fast Ethernet cables. The PCs are connected to each other on a switch which is then connected to a router which in turn is connected to an email server on the internet.

#### b) Commands used and their purpose.

Firstly, we make the connections as shown. For each PC and server we assign an IP address, subnet mask and a default gateway respectively in Desktop → IP Configuration. A default gateway is the node in a computer network using the internet protocol suite that serves as the forwarding host (router) to other networks when no other route specification matches the destination IP address of a packet.

PC	IP Address	Subnet Mask	Default Gateway
PC0	192.168.1.2	255.255.255.0	192.168.1.1
PC1	192.168.1.3	255.255.255.0	192.168.1.1
Server	192.168.2.2	255.255.255.0	192.168.2.1

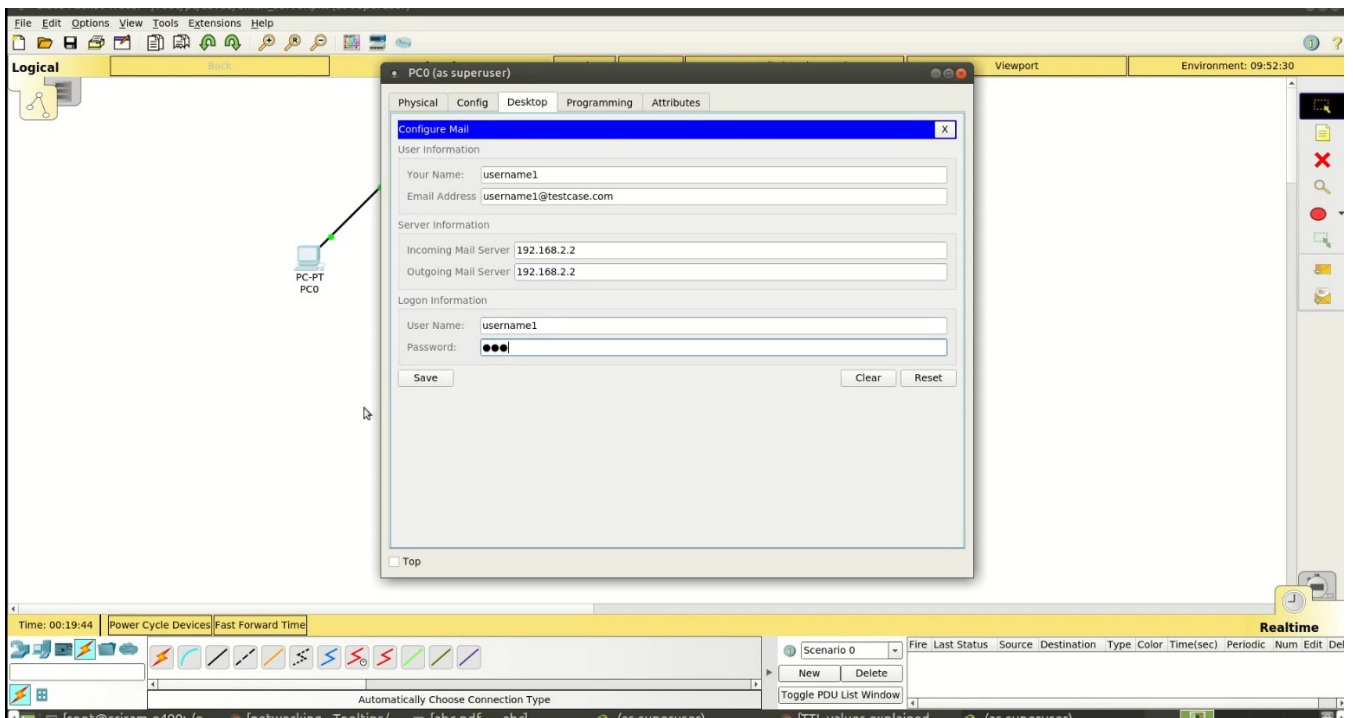
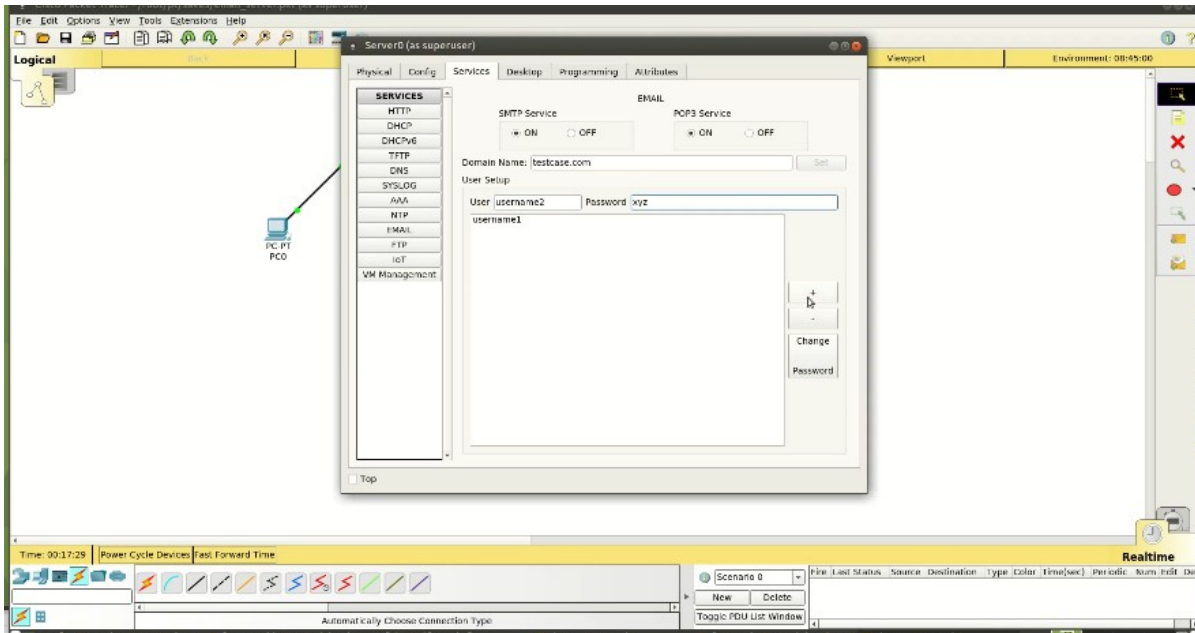
Now we need to set up the IP address of each interface in router0. We will use the CLI for this.

## Router0

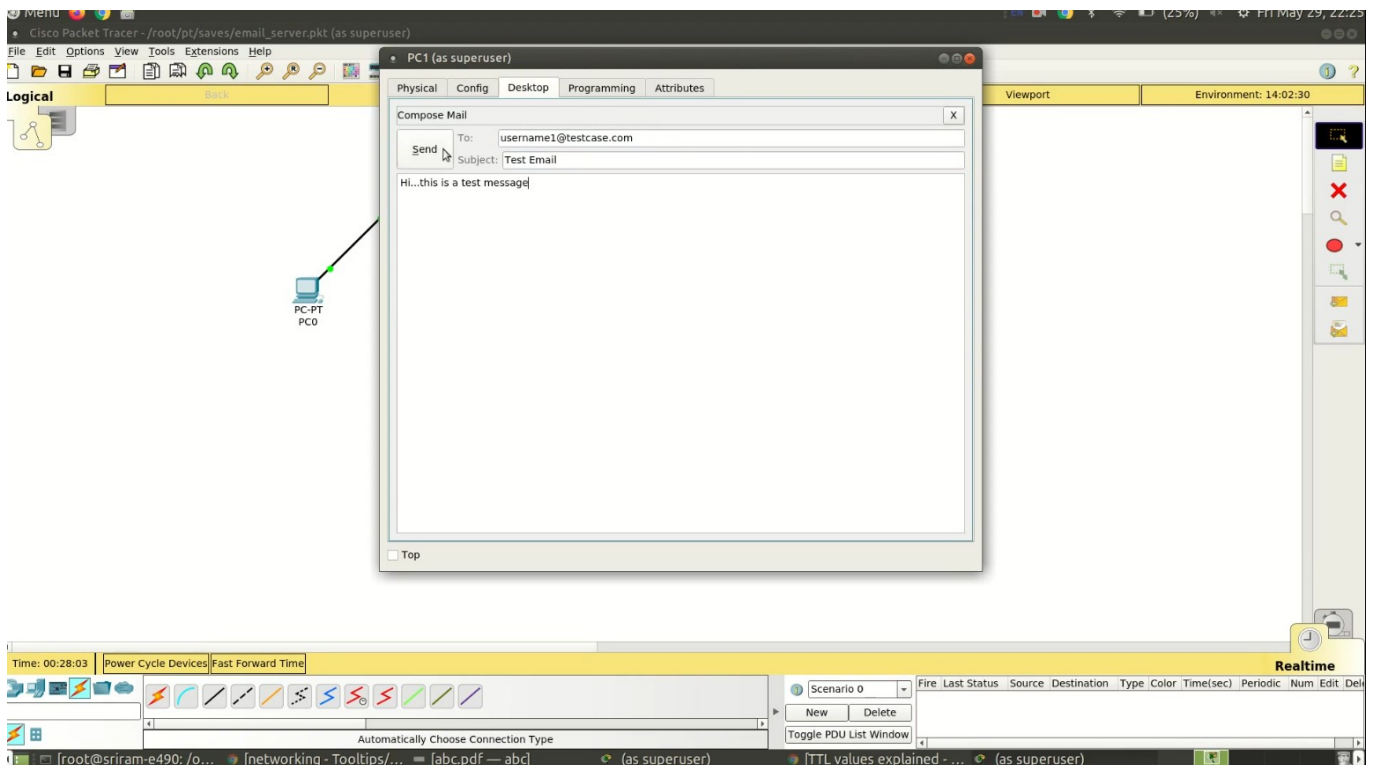
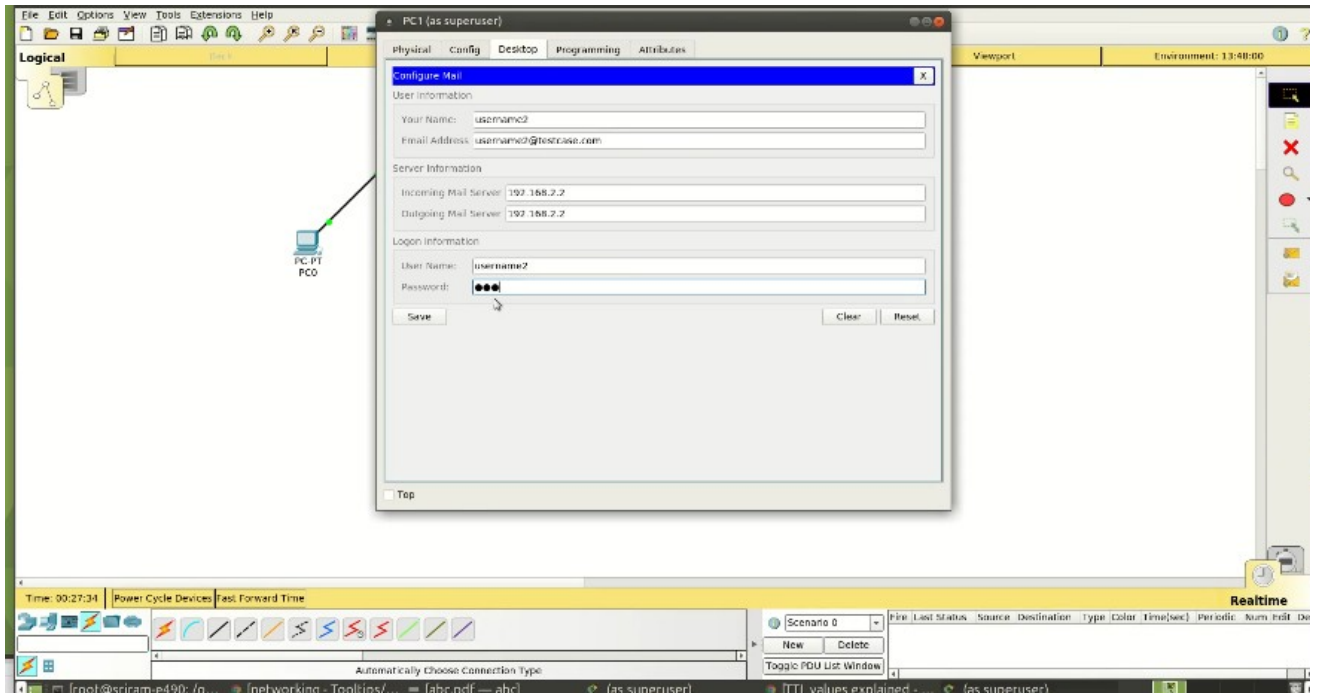
Command	Explanation
enable	Enters privileged EXEC mode
show ip int brief	Shows configured interfaces
configure terminal	Enters global configuration mode
interface FastEthernet0/0	Enters interface for Fast Ethernet connection 0/0
ip address 192.168.1.1 255.255.255.0	Configures ip address and subnet mask of router for ethernet connection (to switch), equal to gateway address of PC0 and PC1
no shutdown	Enables the interface, changing its state from administratively down to administratively up.
exit	Exits configuration mode for the interface and returns to global configuration mode.
interface FastEthernet0/1	Enters interface for Fast Ethernet connection 0/1
ip address 192.168.2.1 255.255.255.0	Configures ip address and subnet mask of router for ethernet connection (to switch), equal to gateway address of email server
no shutdown	Enables the interface, changing its state from administratively down to administratively up.
exit	Exits configuration mode for the interface and returns to global configuration mode.

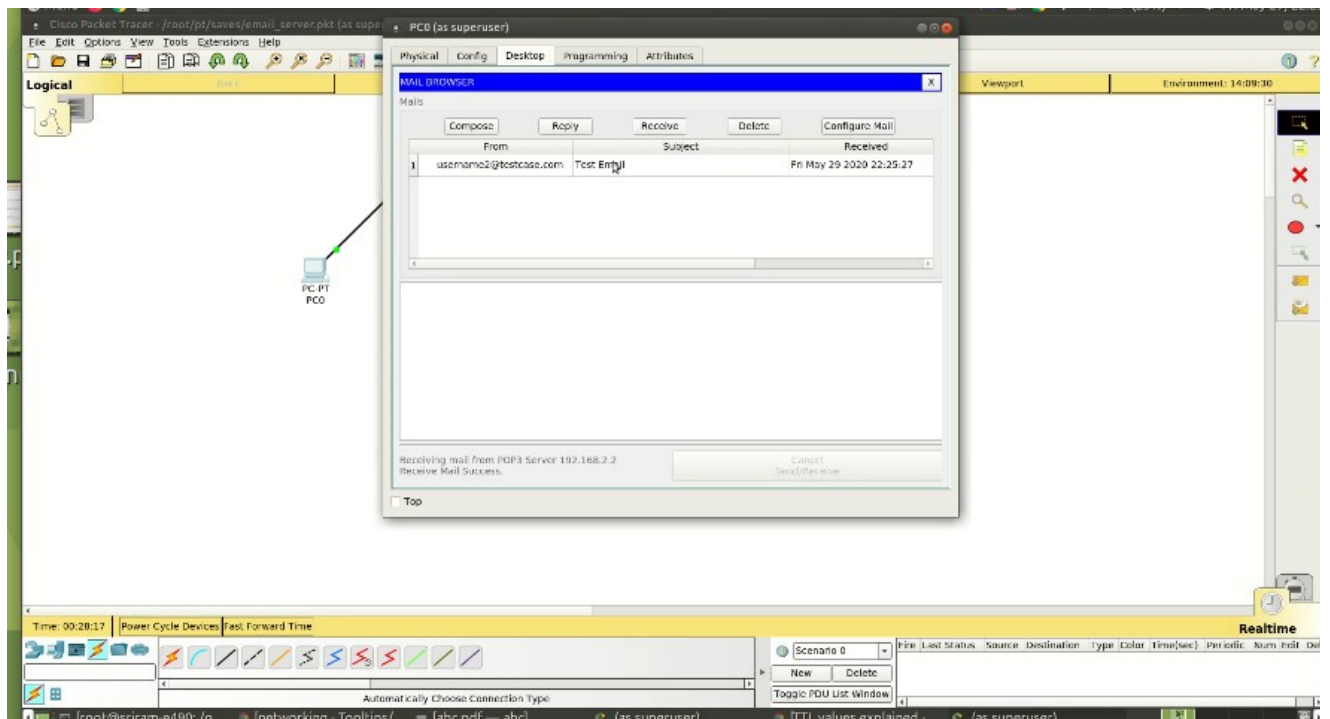
Now we can send the emails as seen in the next section.

## 4. Results and Screenshots









## **5. Conclusion**

- Mails are not stored or are deleted on POP3 server.
- Emails require knowledge of IP addresses of clients that must be stored on the server.
- Sending an email even on the same network requires to be sent via the internet to the email server.
- Any number of usernames or accounts can be used on a given IP address.