Vadodara Institute of Engineering

Computer Engineering - 1

Active Learning Assignment

Sub :- Computer Networks (2140709)

Topic:-Simple Mail Transfer Protocol

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Content:

- Introduction
- Working of SMTP
- SMTP Commands
- SMTP Response
- Mail Transfer Phases
- Comparison with HTTP

Introduction

- **Simple Mail Transfer Protocol** (**SMTP**) is an Internet standard for electronic mail (email) transmission.

- First defined by RFC 821in 1982, it was last updated in 2008 with Extended SMTP additions by RFC 5321, which is the protocol in widespread use today.

- An electronic mail (e-mail) allows users to send mails across an internet. E-mail is one of the most widely used application services in internet and widely used in business activities.

- 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 uses TCP port number 25 for his service.

Introduction

- The communication between a SMTP client and SMTP server is by human readable ASCII text.

- To send a mail, a system must have a client MTA, and to receive a mail, a system must have a server MTA.

- SMTP transfers this message from client MTA to server MTA.

- SMTP uses commands and responses to transfer the message between an MTA client and MTA server In order to send a mail, SMTP is used two times:

- one between the sender and the sender's mail server, and the other between the two mail servers.

- Each command or response ends with two characters (CR and LF) CR stands for Carriage Return and LF stands for Line Feed.

Working of SMTP

- SMTP is a simple ASCII protocol that is based on client-server model. After establishing the TCP connection, the sending machine, operating as the client, waits for the receiving machine, operating as the server, to talk first.

- The server starts by sending a line of text giving its identity and telling whether or not it is prepared to receive mail.

- If it is not, the client releases the connection and tries again later.

- If the server is willing to accept e-mail, the client announces whom the e-mail is coming from and destination, the server gives the client the go ahead to send the message.

- Then the client sends the message and the server acknowledges it.

Session Establishment and Termination
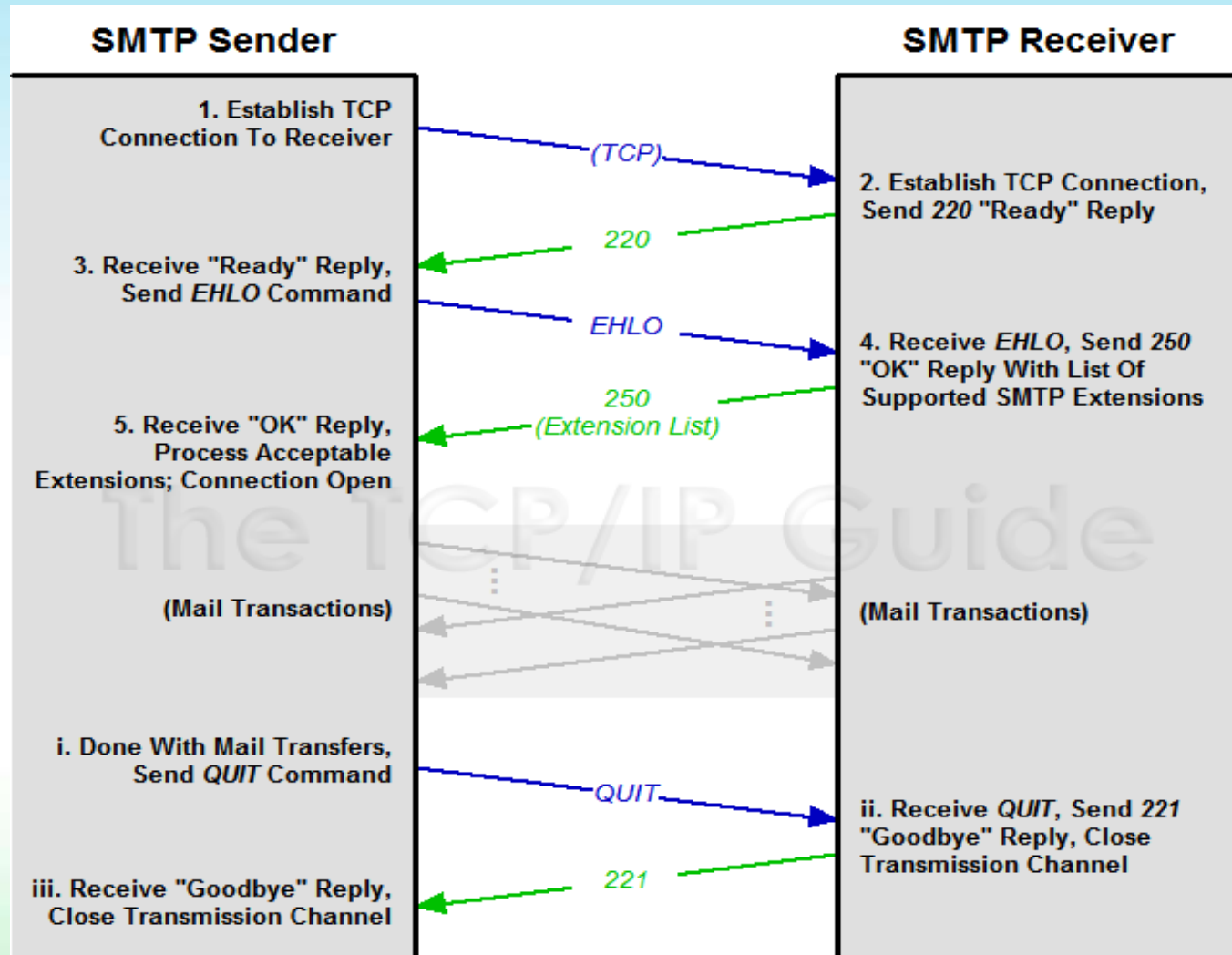
- To illustrate the basic operation of SMTP, let's walk through a common scenario. Suppose Alice wants to send Bob a simple ASCII message.
1. Alice invokes her user agent for e-mail, provides Bob's e-mail address (for example, bob@someschool.edu), composes a message, and instructs the user agent to send the message.
2. Alice's user agent sends the message to her mail server, where it is placed in a message queue.
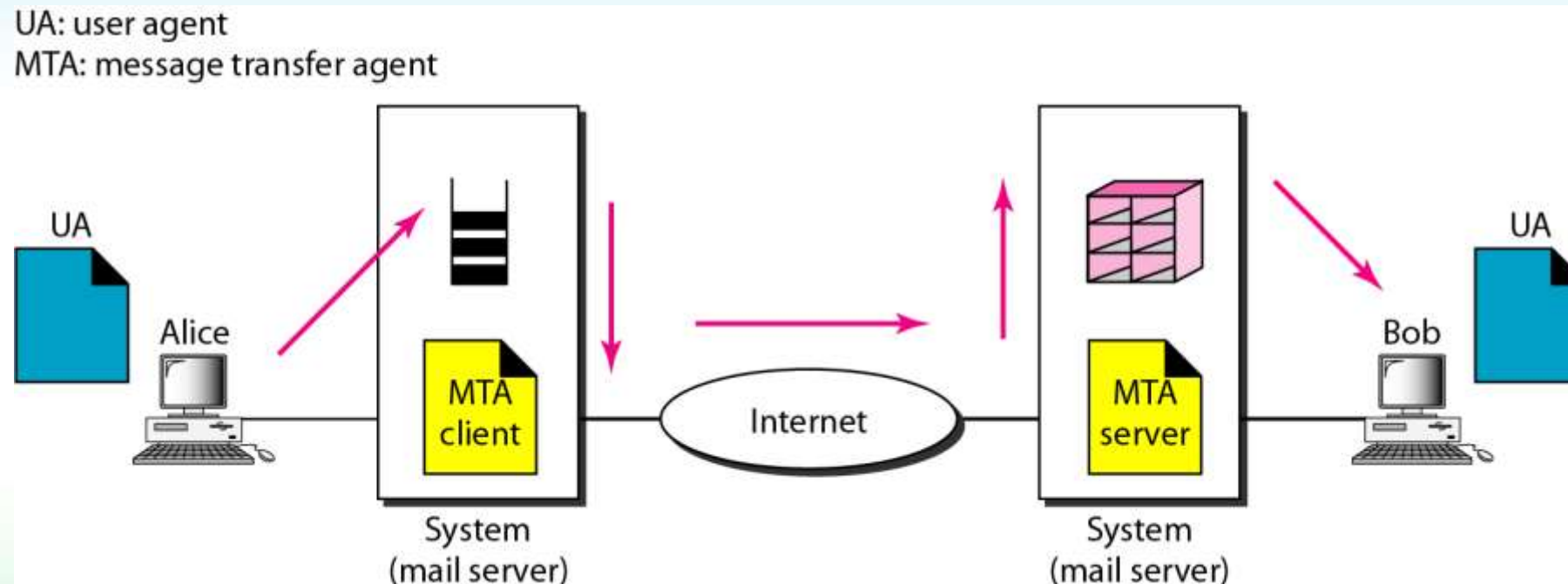
3. The client side of SMTP, running on Alice's mail server, sees the message in the message queue. It opens a TCP connection to an SMTP server, running on Bob's mail server.

4. After some initial SMTP handshaking, the SMTP client sends Alice's message into the TCP connection.

5. At Bob's mail server, the server side of SMTP receives the message. Bob's mail server then places the message in Bob's mailbox.

6. Bob invokes his user agent to read the message at his convenience.

SMTP Commands

- SMTP commands are sent from the client to the server.

- Each command consists of a keyword or command name followed by zero or more argument. It means some keywords do not contain any argument.

- The format of command is:

                    Keyword: argument(s)

- the client issued five commands: HELO (an abbreviation for HELLO), MAIL FROM, RCPT TO, DATA, and QUIT.

SMTP Responses

- SMTP responses are sent from server to client.
- Each response begins with a three digit code and may be followed by additional textual information.
- The leading digits indicate the category of the response.
- The difference categories of response are:
- 1. **Positive completion reply**. It indicates that the requested action has been successfully completed. A new request may be initiated.
- 2. **Positive Intermediate reply**. It indicates that the command has been accepted, but the requested action is being held in abeyance, pending receipt of further information.
- 3. **Transient Negative Completion reply**. It indicates that the command was not accepted and the requested action did not occur. However, the error condition is temporary and the action may be requested.
- 4. **Permanent Negative Completion reply**. It indicates the command was not accepted and the requested action did not occur.

Mail Transfer Phases

- The basic SMTP operation occurs in three phases:

1. Connection set up

2. Mail transfer

3. Connection termination

➤ Connection Setup

- An SMTP sender will attempt to set up a TCP connection with a target host when it has one or more mail message to deliver to that host. The following sequence occurs during connection setup:

- 1. The sender opens a TCP connection with the receiver.

- 2. Once the connection is established, the receiver identifies itself with '220 Service Ready".

- 3. The sender identifies itself with the HELO command.

- 4. The receiver accepts the sender's identification with "250 'OK".

- 5. If the mail service on the destination is not available, the destination host returns a "421 Service Not Available" reply in step 2 and the process is terminated.

➢Mail transfer

• Once the connection has been established, the SMTP sender may send one or more messages to the SMTP receiver.

• There are three logical phases to the transfer of a message :

1. A MAIL command identifies the originator of the message.

2. One or more RCPT commands identify the recipients of this message.

3. A DATA command transfers the message text.

➢ **Connection termination**

• The SMTP sender closes the connection in the following manner:

• 1. The sender sends a QUIT command and waits for a reply.

• 2. Sender initiates TCP close operation for the TCP connection.

• 3. The receiver initiates its TCP close after sending is reply to the QUIT command.

Comparison with HTTP

- Let's now briefly compare SMTP with HTTP. Both protocols are used to transfer files from one host to another:

- HTTP transfers files (also called objects) from a Web server to a Web client (typically a browser); SMTP transfers files (that is, e-mail messages) from one mail server to another mail server.

- When transferring the files, both persistent HTTP and SMTP use persistent connection.

- HTTP is mainly a **pull protocol**—someone loads information on a Web server and users use HTTP to pull the information from the server at their convenience.

- In particular, the TCP connection is initiated by the machine that wants to receive the file.

- On the other hand, SMTP is primarily a **push protocol**—the sending mail server pushes the file to the receiving mail server.

- In particular, the TCP connection is initiated by the machine that wants to send the file.

- SMTP requires each message, including the body of each message, to be in 7-bit ASCII format.
  If the message contains characters that are not 7-bit ASCII (for example, French characters with accents) or contains binary data (such as an image file), then the message has to be encoded into 7-bit ASCII.

- HTTP data does not impose this restriction.

Reference:

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- http://www.omnisecu.com/tcpip/smtp-simple-mail-transfer-protocol-how-smtp-works.php

- Reference Book:

     COMPUTER NETWORKING BY James F. Kurose and Keith W. Ross

THANK YOU