NETWORK PROTOCOLS & SECURITY
23EC2210 R/A/E

Topic:

EMAIL, SMTP

Session - 32

AIM OF THE SESSION

To familiarize students with the basic concept of Application Layer Protocols

INSTRUCTIONAL OBJECTIVES

This Session is designed to:

1. Introduction to Application Layer.
2. Basic components of E-mail-SMTP,POP3.

LEARNING OUTCOMES

At the end of this session, you should be able to:

1. Write a short note on E-Mail and SMTP.
2. Describe POP3.
3. List out various protocols in application layer

Application Layer Protocols

The application layer is present at the top of the OSI model. It is the layer through which users interact. It provides services to the user.

- E-mail
- SMTP
- POP3
- IMAP
- HTTP

EMAIL ARCHITECTURE AND SERVICES

- Typically, e-mail systems support five basic functions.

1. **Composition** refers to the process of creating messages and answers.

2. **Transfer** refers to moving messages from the originator to the recipient.

3. **Reporting** has to do with telling the originator what happened to the message. Was it delivered? Was it rejected? Was it lost?

4. **Displaying** incoming messages is needed so people can read their e-mail.

5. **Disposition** is the final step and concerns what the recipient does with the message after receiving it.

Email Architecture

Three major components:

- User Agents (UA)
- Mail servers
- Simple Mail Transfer Protocol: SMTP

User Agent

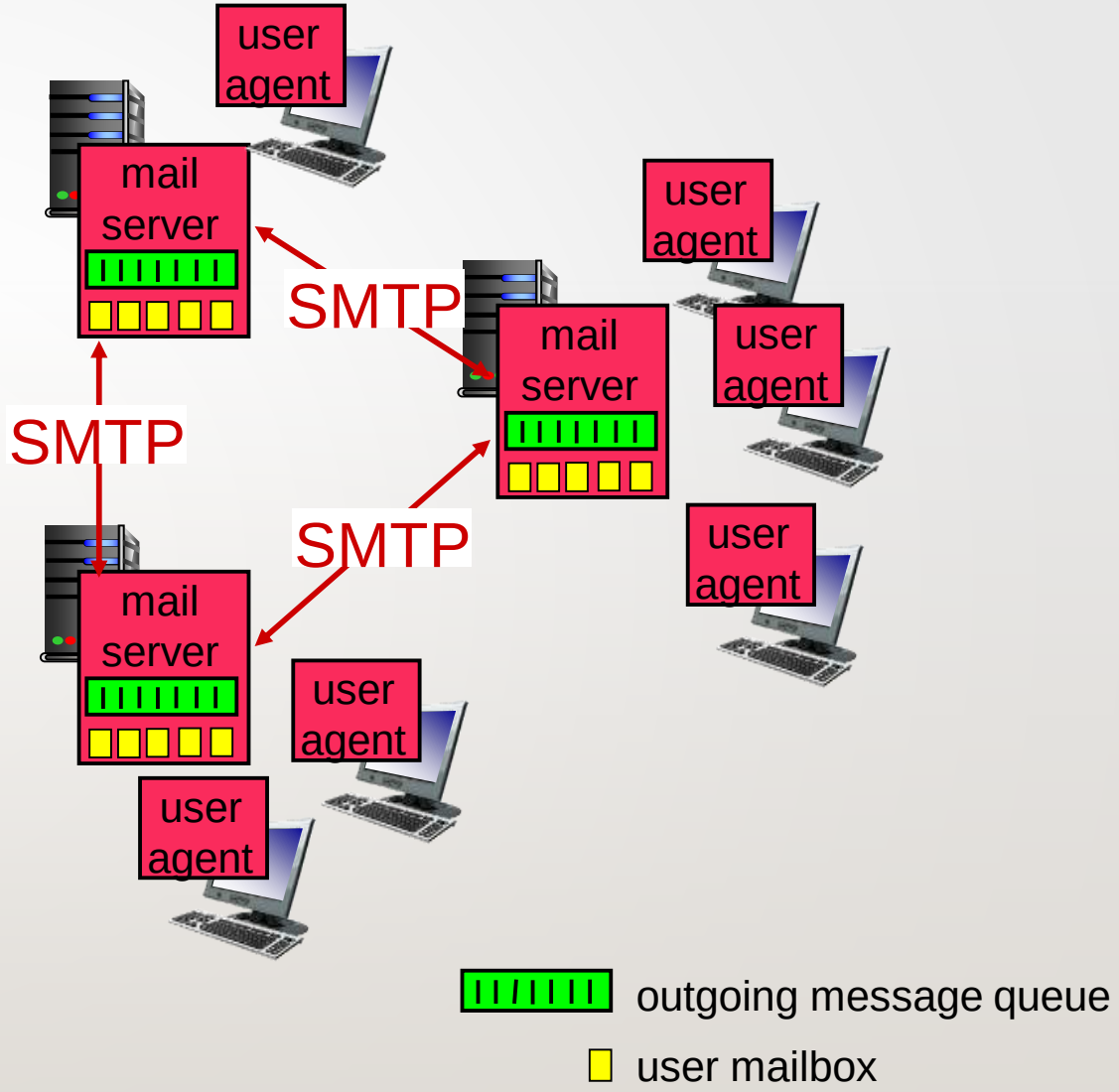
- a.k.a. "mail reader"
- composing, editing, reading mail messages

Mail servers:

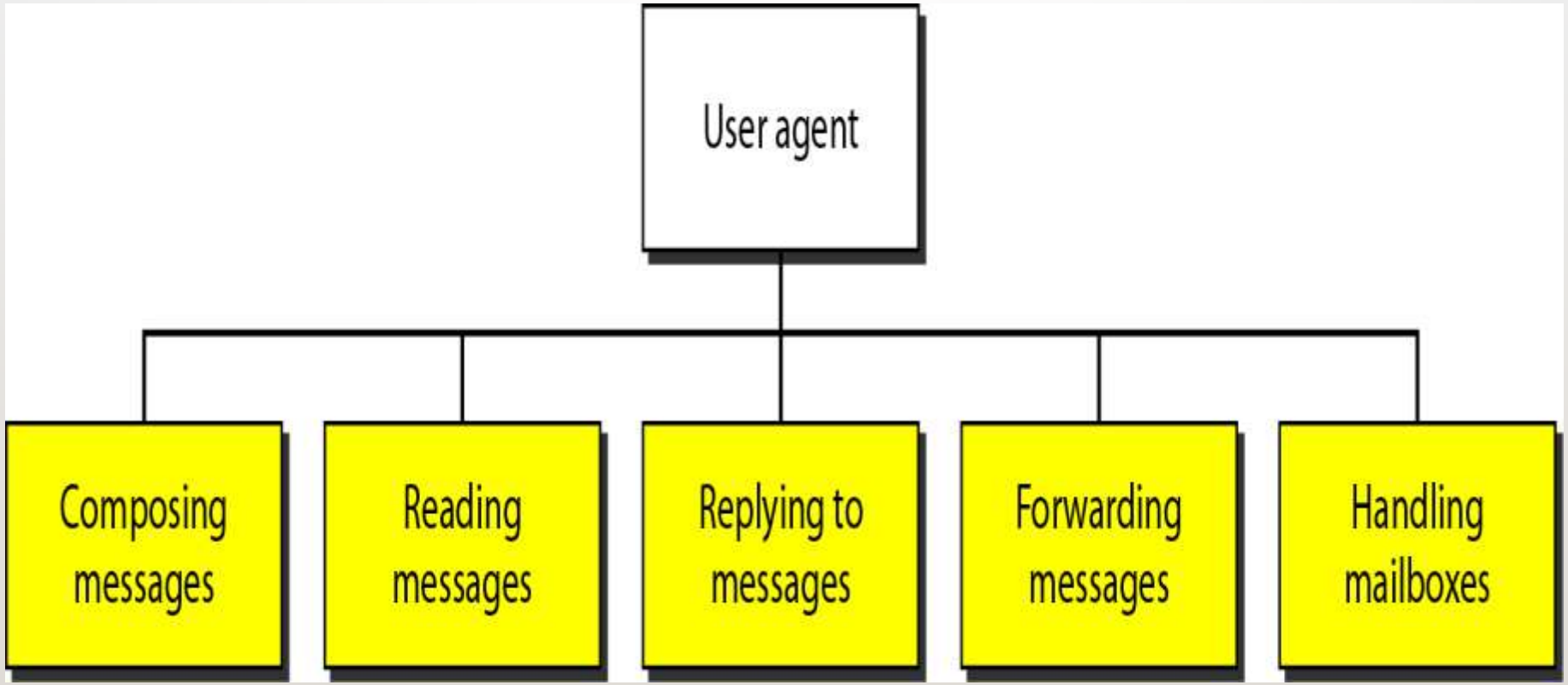
- *mailbox* contains incoming messages for user
- *message queue* of outgoing (to be sent) mail messages

SMTP protocol:

- Used between mail servers to send email messages
- *client:* sending mail server
- *server:* receiving mail server



SERVICES OF USER AGENT

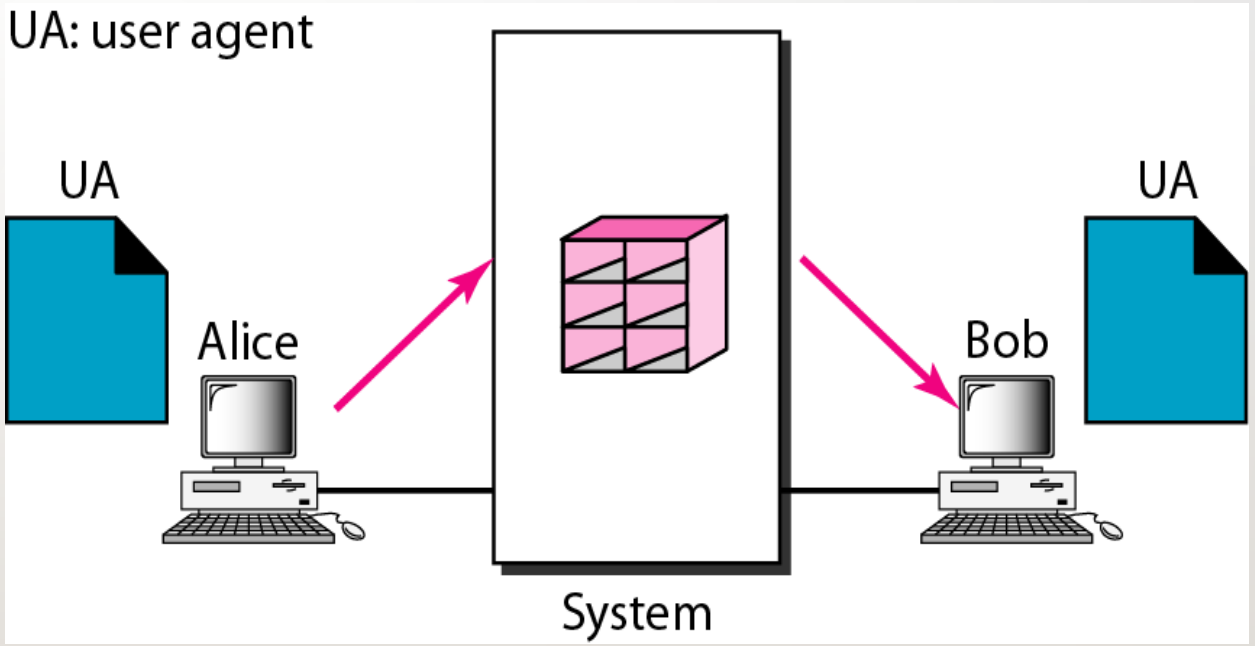


ELECTRONIC MAIL: SMTP [RFC 2821]

- Uses TCP to reliably transfer email message from client to server, port 25
- Direct transfer: sending server to receiving server
- Three phases of transfer
  - Handshaking (greeting)
  - Transfer of messages
  - Closure
- messages must be in 7-bit ASCI

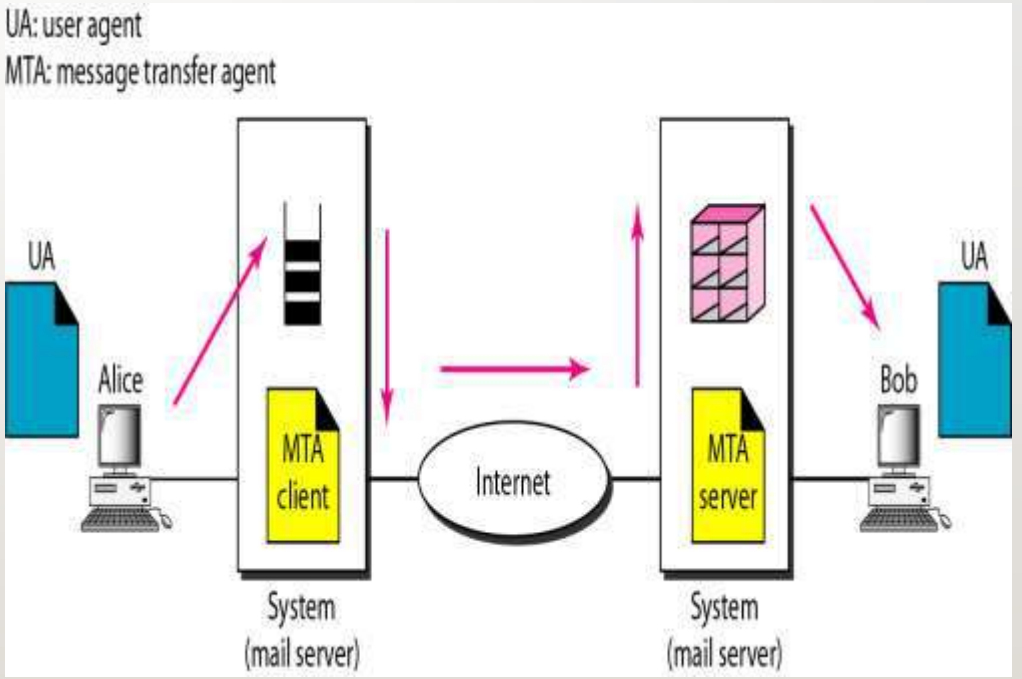
FIRST SCENARIO IN ELECTRONIC MAIL

- When the sender and the receiver of an e-mail are on the same system, we need only two user agents.



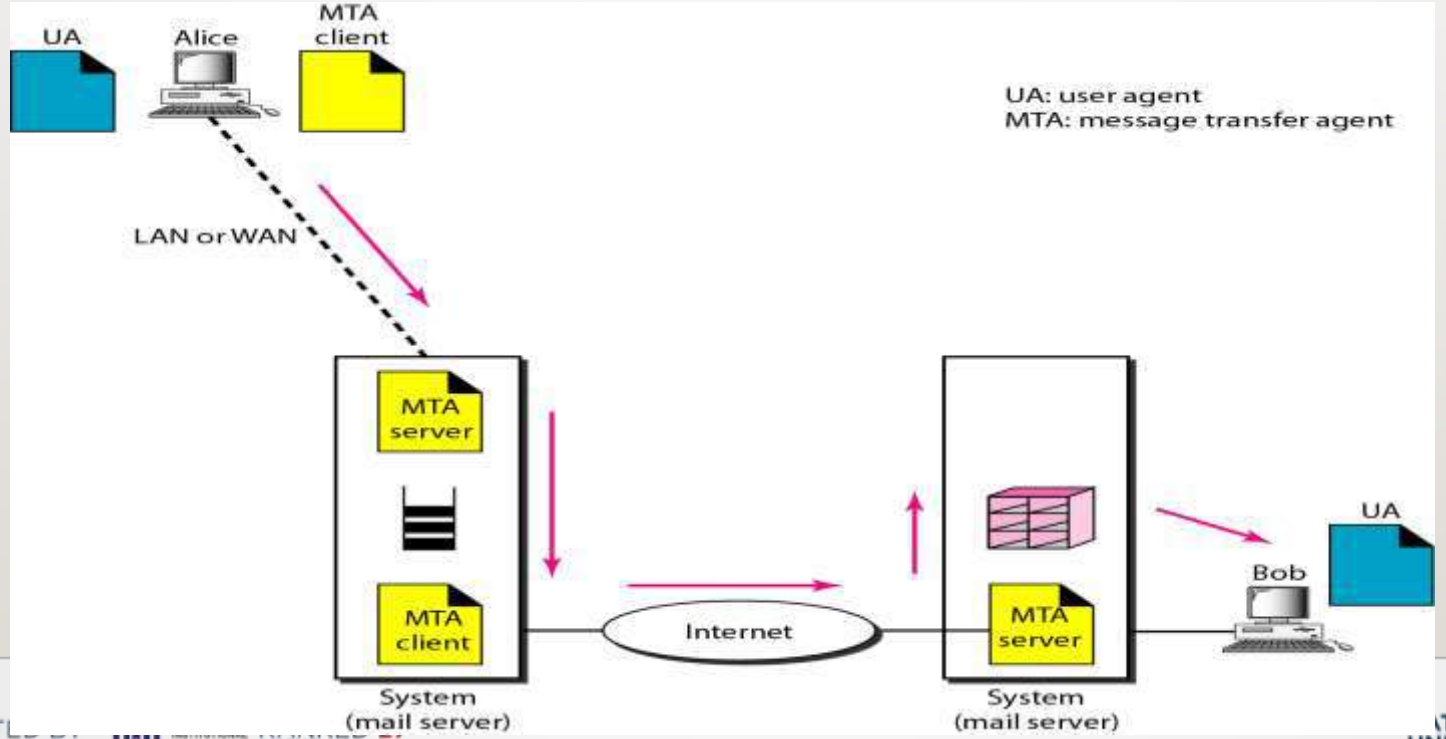
SECOND SCENARIO IN ELECTRONIC MAIL

- When the sender and the receiver of an e-mail are on different systems, we need two UAs and a pair of MTAs (client and server).



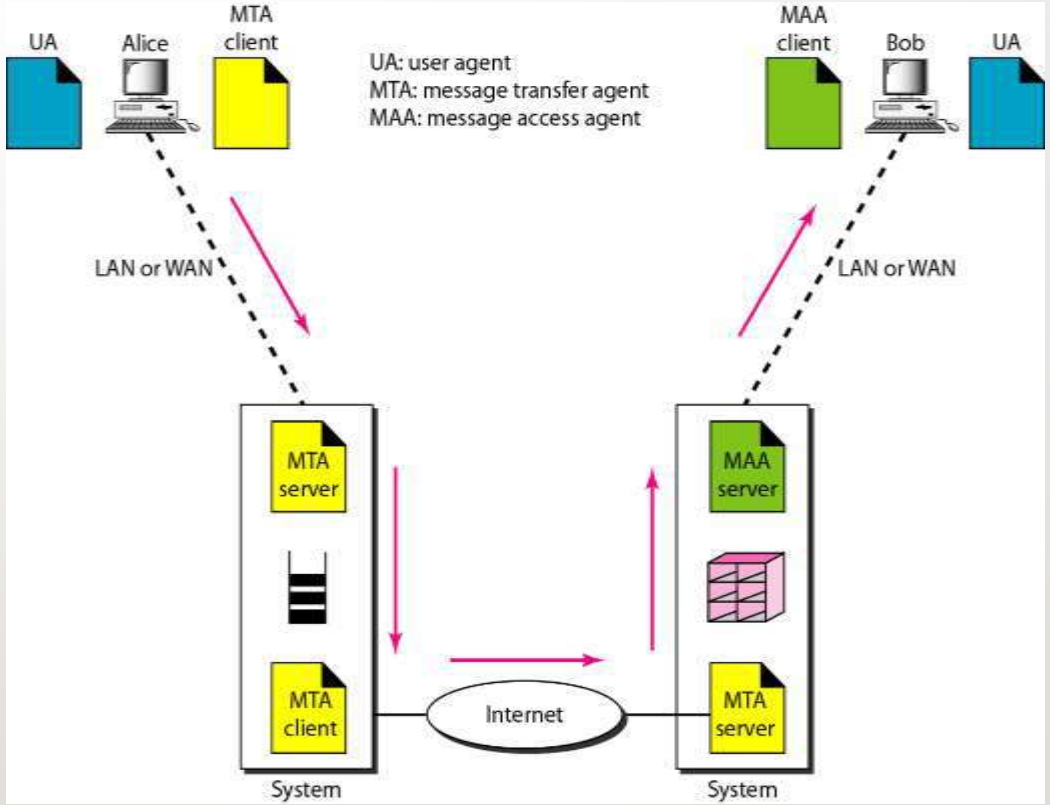
THIRD SCENARIO IN ELECTRONIC MAIL

- When the sender is connected to the mail server via a LAN or a WAN, we need two UAs and two pairs of MTAs (client and server).

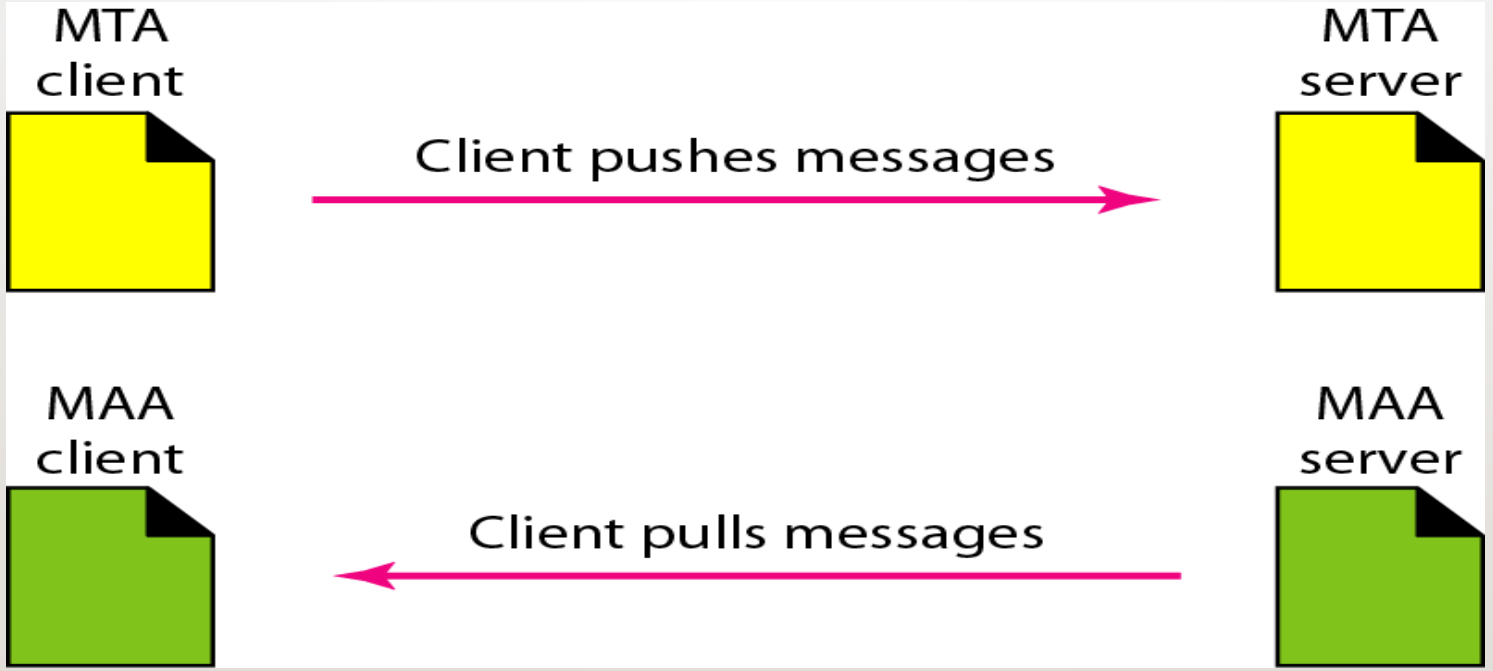


FOURTH SCENARIO IN ELECTRONIC MAIL

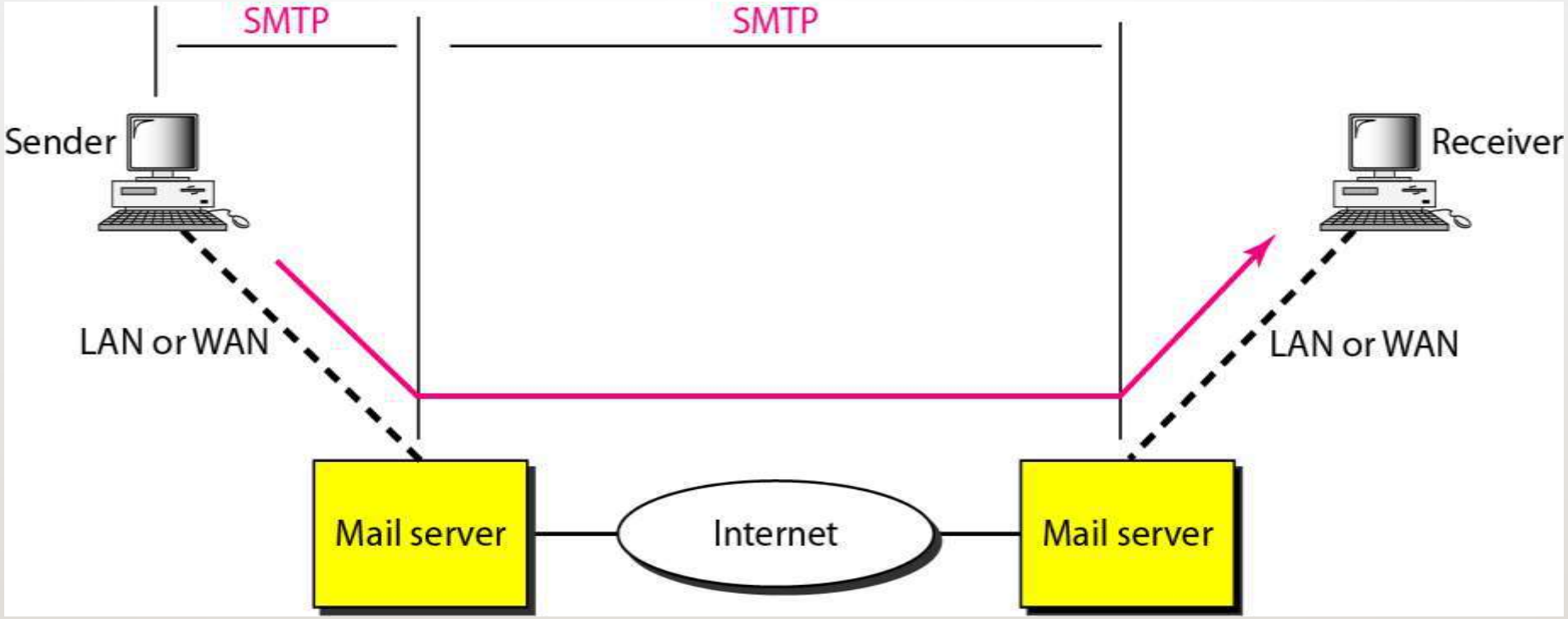
- When both sender and receiver are connected to the mail server via a LAN or a WAN, we need two UAs, two pairs of MTAs and a pair of MAAs.
- This is the most common situation today.



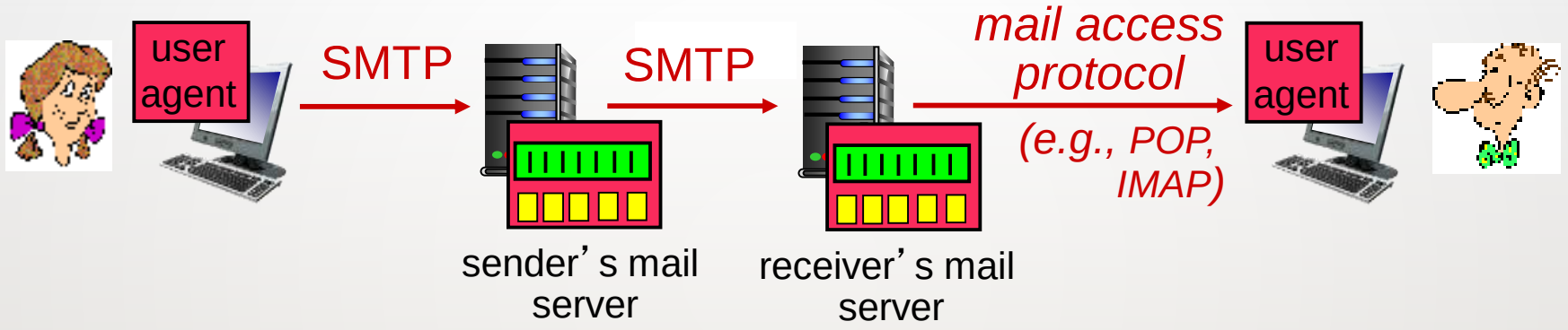
PUSH VERSUS PULL IN ELECTRONIC EMAIL



SMTP RANGE


SMTP
SMTP
Sender
Receiver
LAN or WAN
LAN or WAN
Mail server
Internet
Mail server

MAIL ACCESS PROTOCOLS



- SMTP: Delivery/Storage to Receiver's Server.
- **Mail Access protocol:** Retrieval from server
  - POP (Post Office Protocol): Authorization, download
  - IMAP (Internet Mail Access Protocol): More features, including manipulation of stored messages on server.

POP3 (POST OFFICE PROTOCOL VERSION3)

- POP stands for Post Office Protocol. It is generally used to support a single client.
- There are several versions of POP but the POP 3 is the current standard.
- POP is an application layer internet standard protocol.
- Since POP supports offline access to the messages, thus requires less internet usage time.
- POP does not allow search facility.
- In order to access the messages, it is necessary to download them.
- It allows only one mailbox to be created on server.
- It is not suitable for accessing non mail data.
- POP commands are generally abbreviated into codes of three or four letters. Eg. STAT.

IMAP (INTERNET MESSAGE ACCESS PROTOCOL)

- **IMAP** stands for **Internet Message Access Protocol.** It was first proposed in 1986.
- IMAP allows the client program to manipulate the e-mail message on the server without downloading them on the local computer.
- The e-mail is hold and maintained by the remote server.
- It enables us to take any action such as downloading, delete the mail without reading the mail. It enables us to create, manipulate and delete remote message folders called mail boxes.
- IMAP enables the users to search the e-mails.
- It allows concurrent access to multiple mailboxes on multiple mail servers.

COMPARISON BETWEEN POP AND IMAP

S.No	POP	IMAP
1	Generally used to support single client.	Designed to handle multiple clients.
2	Messages are accessed offline.	Messages are accessed online although it also supports offline mode.
3	POP does not allow search facility.	It offers ability to search emails.
4	All the messages have to be downloaded.	It allows selective transfer of messages to the client.
5	Only one mailbox can be created on the server.	Multiple mailboxes can be created on the server.
6	Not suitable for accessing non-mail data.	Suitable for accessing non-mail data i.e. attachment.
7	POP commands are generally abbreviated into codes of three or four letters. Eg. STAT.	IMAP commands are not abbreviated, they are full. Eg. STATUS.
8	It requires minimum use of server resources.	Clients are totally dependent on server.
9	Mails once downloaded cannot be accessed from some other location.	Allows mails to be accessed from multiple locations.
10	The e-mails are not downloaded automatically.	Users can view the headings and sender of e-mails and then decide to download.
11	POP requires less internet usage time.	IMAP requires more internet usage time.

SUMMARY

1. This unit provides a complete overview of application layer of TCP/IP.

2. Till now we have studied that there are various kinds of application layer related protocols. Some of them have been discussed in this unit, e.g., DNS, E-mail, SMTP, POP3, and IMAP.

SELF-ASSESSMENT QUESTIONS

1.Gmail.com, yahoo.com, yahoo.co.in, rediffmail.com, etc. are popular_____

a. email servers
b. FTP servers
c. social media sites
d. None

2.SMTP stands for_____

a. Simple Main Transfer Protocol
b. Short mail transmission protocol
c. Server Mail Transfer Protocol
d. Small mail transmission protocol

3.Post office protocol works on _____

a. application layer
b. network layer
c. transport layer
d. data link layer

TERMINAL QUESTIONS

1.Write a note on email.

2. Explain about e-mail architecture and service.

3.What is (POP3) protocols.

4.Write the difference between IMAP and POP3. Why they are uses?

REFERENCES FOR FURTHER LEARNING OF THE SESSION

Reference Books:

1. Data and Computer Communications (5th Ed.)" – W. Stallings – PHI/ Pearson Education
2. Network for Computer Scientists & Engineers, Zheng & Akhtar, OUP
3. Data & Computer Communication, Black, PHI

Sites and Web links:

1. http://nptel.ac.in/courses/106105081/31
2. http://nptel.ac.in/courses/106105081/28
3. http://nptel.ac.in/courses/106105081/39

THANK YOU

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