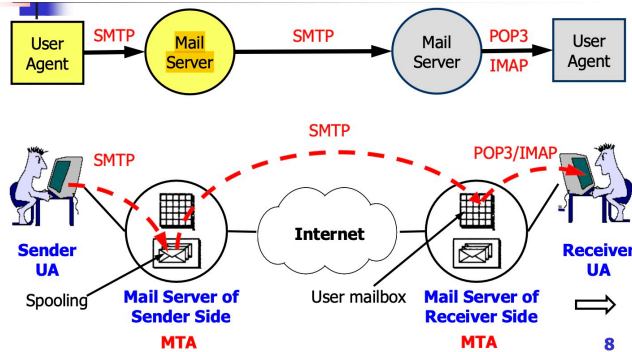


EMAIL

Email System

Email System: provides a means to send electronic messages from one person to another **asynchronously**

Components of Email System



UA

- UA (User Agent): end-user mail program
- Interface between the end users and the email servers

Mail Server

- Mail Server: responsible for **transmitting/receiving** emails and **reporting status** about mail transferring to the mail sender
- **Both a client and server**

Email Protocols

- SMTP: used for sending an email
- POP3/IMAP: used for receiving an email

Basic Functions of Email System (创作, 传输, 状态, 显示, 处理)

- **Composition**: create messages and answers
- **Transfer**: moving messages from originator to the recipient
- **Reporting**: informing originator what happened to the message
- **Displaying**: showing the message
- **Disposition**: what happened to the message after it has been read

Mailboxes: created by the user to **store incoming email**

Mailing lists: means of sending **identical emails** to a group

MTA (Mail Transfer Agent): SMTP servers and clients provide a **mail transport service**

Email address

Email address: **mailboxname@domain**

- Each email address is **unique**
 - Reason: **Domain name** is unique on the **Internet**
 - Reason: **Mailboxname** is unique on **domain name**

Email Format

- Headers: from, to, subject, date, ..
- **Blank line**
- Body: actual message

Header: consists of field name, colon, value (from:abc@gmail.com)

Header is everything up to the blank line, body is everything after blank line

Header的作用:

- In normal usage, **the User Agent builds a message and passes it to MTA**
- The **MTA** then uses some of the **header fields** to **construct the actual envelope**

SMTP

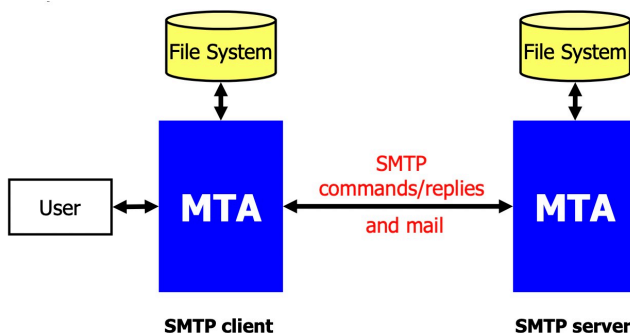
SMTP feature

Source establishes **TCP** connection to **Port 25** of the **destination machine**

Listening to his port is a SMTP server (destination machine):

- Accepts connections
- Receives messages
- If message cannot be delivered, **an error report containing the first part of the undeliverable message** is returned to the sender
- Simple **ASCII** protocol
- The sending machine (client), waits for **server to talk first**

SMTP Basic Model



1. Connection establish
2. Mail transfer
3. Connection release

SMTP Basic commands

- HELO: identifies sender's Domain name
- MAIL FROM: starts a mail transaction and identifies the mail originator
- RCPT TO: identifies individual recipient (multiple)
- DATA: sender ready to transmit body of the message. Each line ends with \r\n, **a line containing only a period "."** → end of the data (**<CR><LF>.<CR><LF>**)
- QUIT: close the connection

Status Codes

- 2 — success
- 3 — command can be accepted with more information
- 4 — command rejected, temporary error
- 5 — command rejected, permanent error

Limitations in SMTP

- Only uses **ASCII** format
- **No authentication** mechanisms
- Messages are sent **un-encrypted**
- Susceptible to **misuse** (spamming, ...)

MIME (Multipurpose Internet Mail Extension)

MIME features

Additional mail headers define content

- **Type and subtype**
- **Encoding** (ASCII, base64) handle arbitrary binary data, when system can only handle normal ASCII chars

New Headers

- **MIME-Version**: identify MIME version
- **Content-Description**: human readable string telling what is in the message
- **Content-Id**: Unique identifier
- **Content-Type**: type and subtype of the message
- **Content-Transfer-Encoding**: how the body is wrapped for transmission

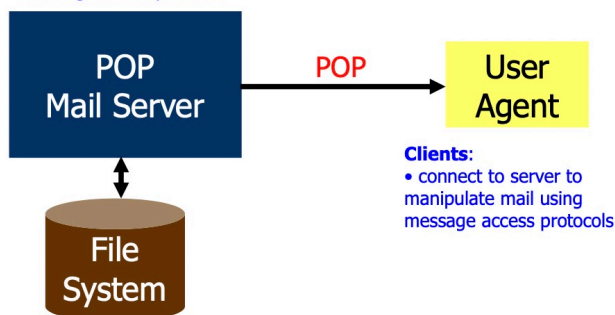
Main Content Type

Text, Image, Video,

POP/IMAP — Basic model

Used to transfer mail from a mail server to a UA

POP Mail Access Server:
• runs the POP3 service by
listening on TCP port 110



POP (**POST OFFICE PROTOCOL**)

POP features

- **TCP port 110**
- Mail is stored on the server until the clients connects and then is **downloaded to the client**
- **Simple** protocol
- Very **bad for mobile users**

POP3 Commands

- **STAT** — get mailbox status (number of messages in the mailbox)
- **LIST** — get a list of messages and sizes (one per line, **termination line contains “.” only**)
- **RETR** — retrieve a message

- QUIT — remove marked messages and close the (TCP) connection

POP3 reply

- Commands and replies are ASCII lines
- Replies start with “+OK” or “-ERR”

IMAP (Internet Message Access Protocol)

Features

- Folders and messages can be stored either on the server or on the local computer
- Since folders can remain on server, it is possible to access your same mail store even using a dumb terminal character
- Much better for mobile users than POP
- Can selectively copy messages from the server to the local client based on many criteria

Comparison of POP and IMAP

Feature	POP3	IMAP
Where is protocol defined?	RFC 1939	RFC 2060
Which TCP port is used?	110	143
Where is email stored?	User's PC	Server
Where is email read?	Off-line	On-line
Mail Syncing	No	Yes
Direction	One-direction	Bi-directional
Good for mobile users?	No	Yes
Partial message downloads?	No	Yes
Speed	Fast	Low