

SIMPLE MAIL TRANSFER PROTOCOL



OVERVIEW

Introduction

Message Breakdown

Sample Messages

Extensions

MTA's and Mailbox Protocols

EMAIL STATISTICS

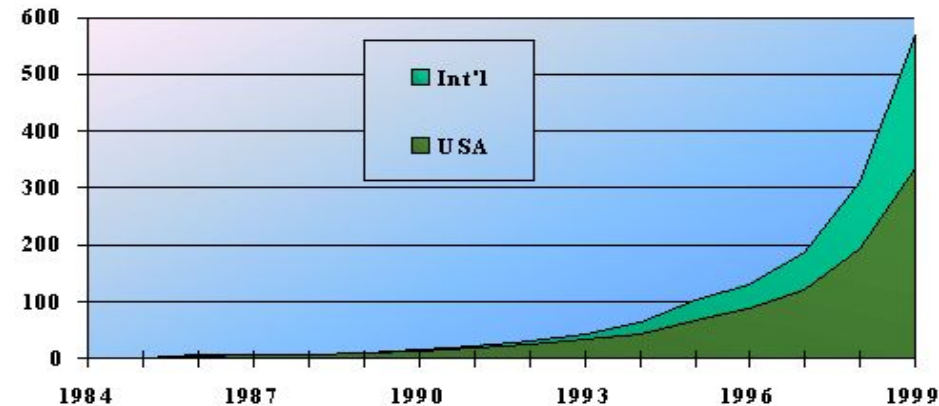
31 billion emails are sent daily,
expected to double by 2006

Email generates about one billion
Gigabytes of new “information”
per year

Spam accounts for about 40% of
all email traffic

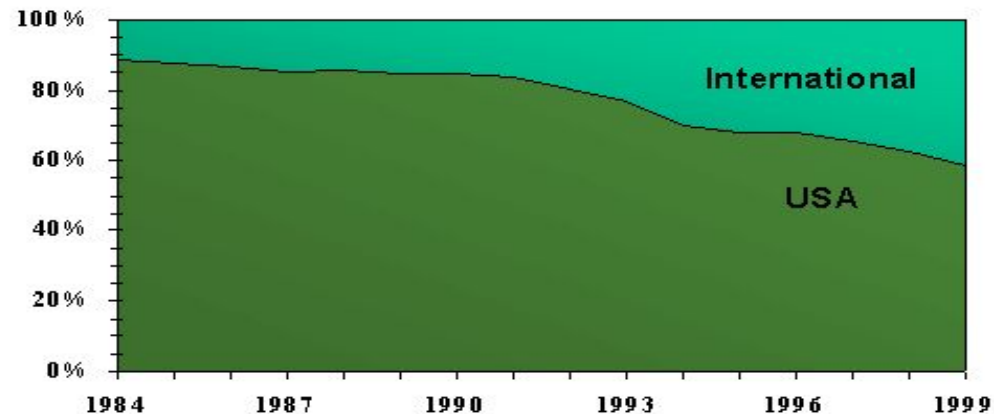
<http://www.spamfilterreview.com>

**Millions of Mailboxes Worldwide
1984 - 1999**



Source: Messaging Online

**Distribution of Mailboxes Worldwide
1984 - 1999**

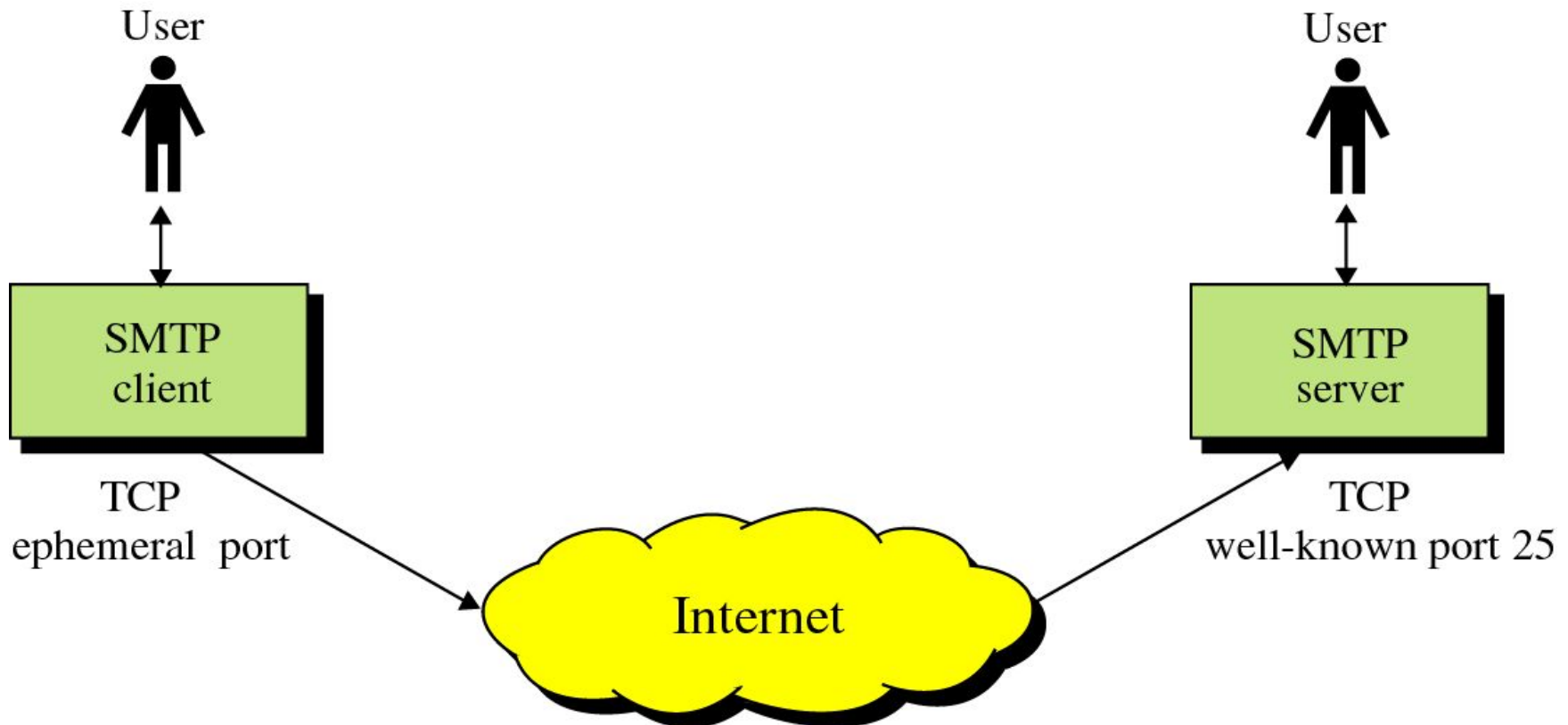


Source: Messaging Online

SMTP

Originated in 1982 (rfc0821, Jon Postel)

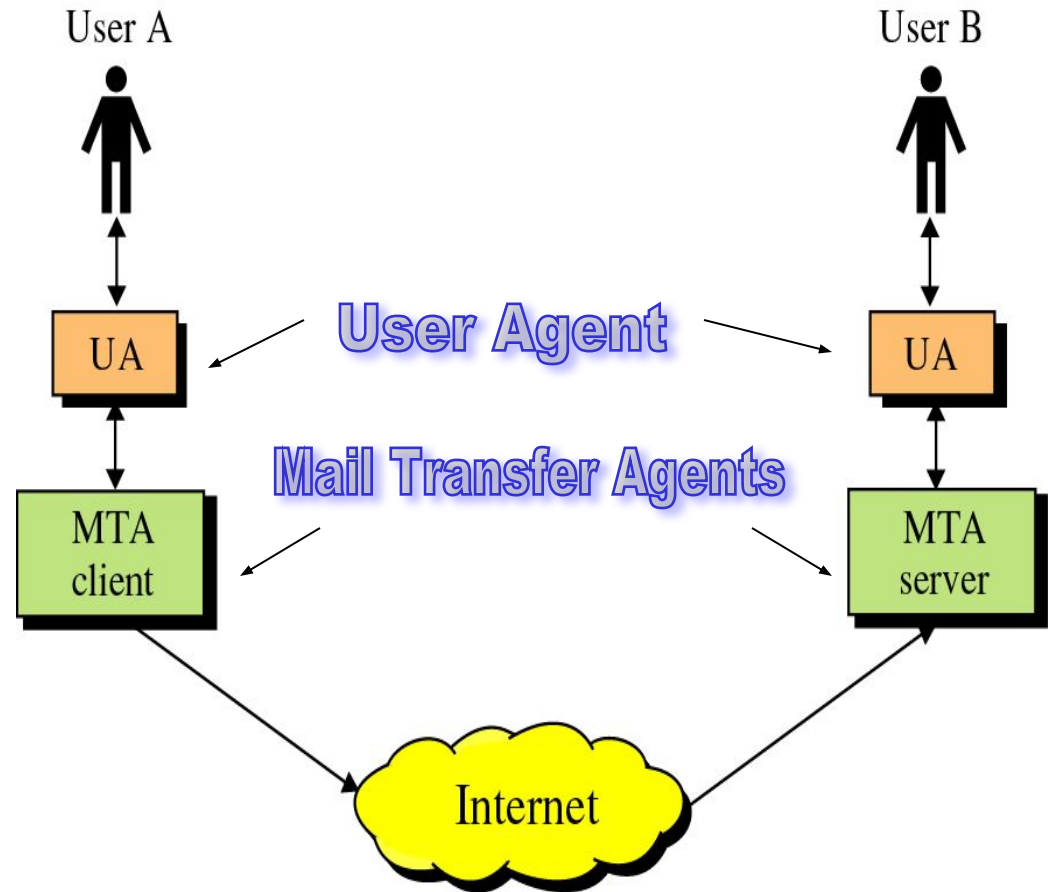
Goal: To transfer mail reliably and efficiently



SMTP

SMTP clients and servers have two main components

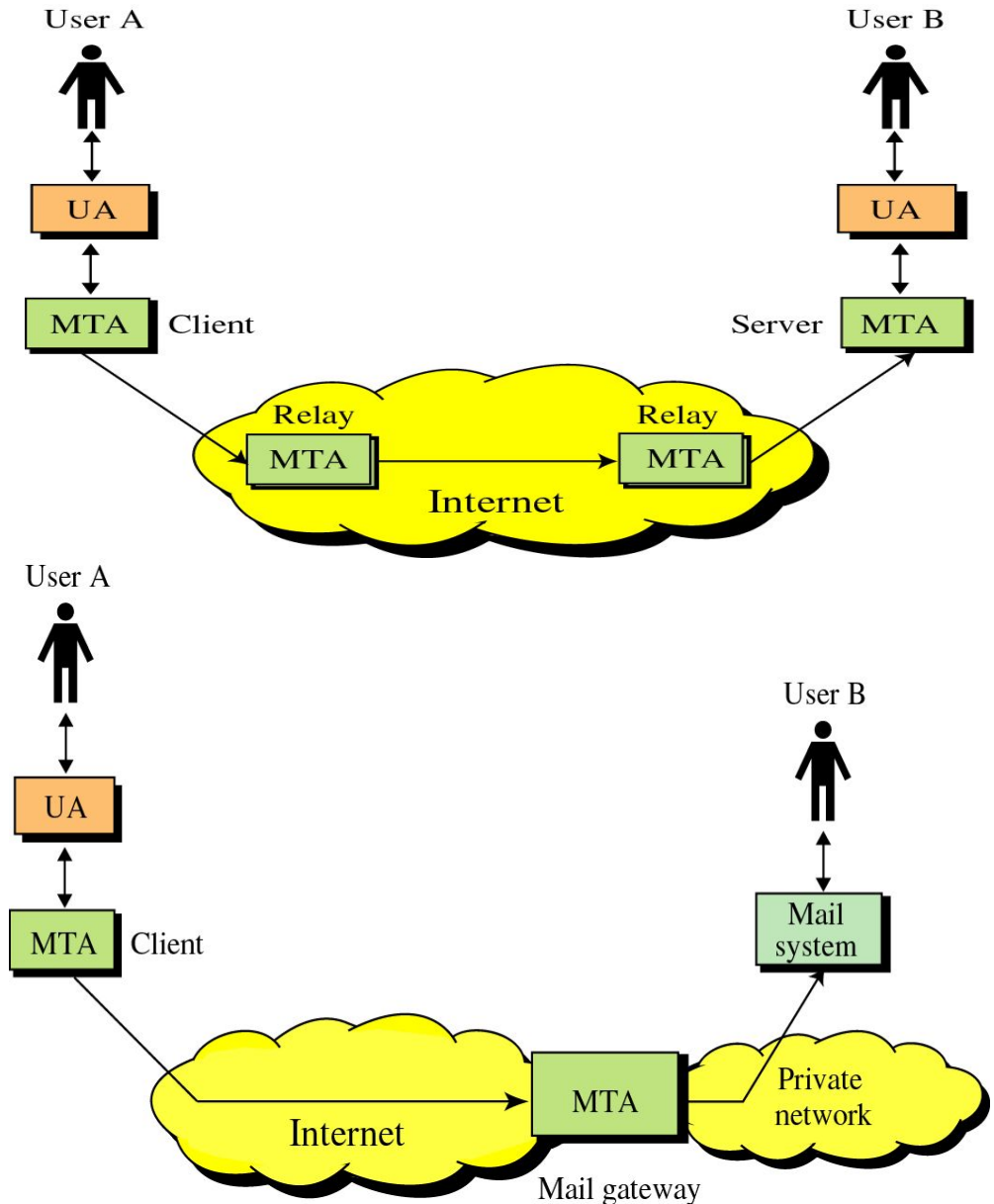
- User Agents – Prepares the message, encloses it in an envelope. (Eudora for example)
- Mail Transfer Agent – Transfers the mail across the internet



SMTP

SMTP also allows the use of Relays allowing other MTAs to relay the mail

Mail Gateways are used to relay mail prepared by a protocol other than SMTP and convert it to SMTP



WHAT IS MAIL?

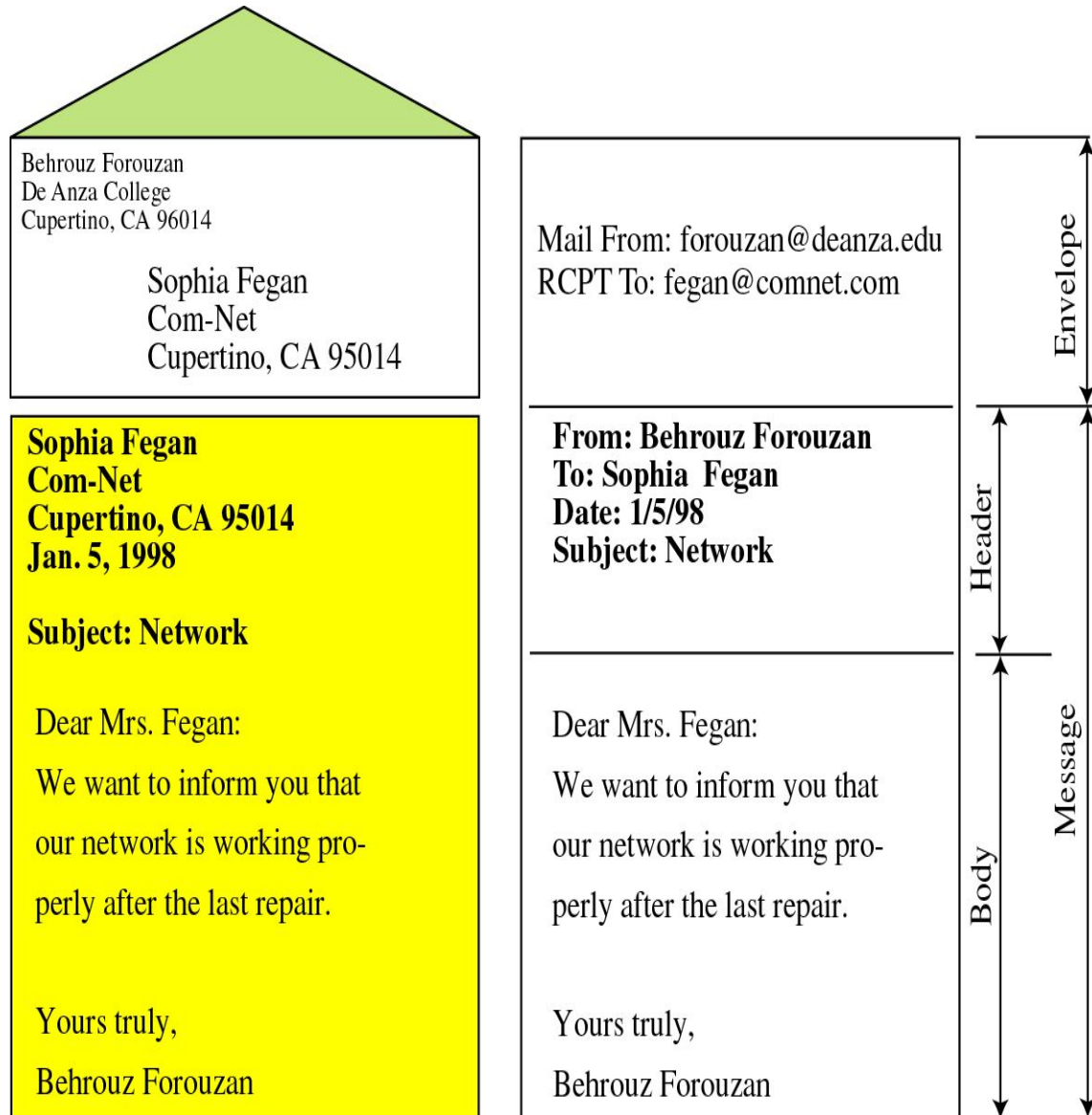
Mail is a text file

Envelope –

- sender address
- receiver address
- other information

Message –

- Mail Header – defines the sender, the receiver, the subject of the message, and some other information
- Mail Body – Contains the actual information in the message



Post Office
Mailbox

Return-Path: <Jwatson@cis.udel.edu>
Delivered-To: jwatson@cis.udel.edu

Received: by mail.eecis.udel.edu (Postfix, from userid
62)

id 17FBD328DE; Wed, 5 Nov 2003 11:27:02

Received: from mail.acad.ece.udel.edu

(devil-rays.acad.ece.udel.edu [128.4.60.10])

by mail.eecis.udel.edu (Postfix) with ESMTP id
5F41832893 for <Jwatson@cis.udel.edu>; Wed, 5 Nov
2003 11:27:01

Received: by mail.acad.ece.udel.edu (Postfix, from userid
62) id 47509456C; Wed, 5 Nov 2003 11:27:01

Received: from

stimp.eecis.udel.edu (stimp.eecis.udel.edu

[128.4.40.17]) by mail.acad.ece.udel.edu (Postfix) with

SMTP id 7C2943D79 for <Jwatson@cis.udel.edu>; Wed, 5
Nov 2003 11:26:34

Message-Id:

<20031105162634.7C2943D79@mail.acad.ece.udel.edu>

Date: Wed, 5 Nov 2003 11:26:34

From: Jwatson@cis.udel.edu

To: undisclosed-recipients: ;

MIME-Version: 1.0

This is a test.

Post office
and mail route

Receivers
Mailbox

HOW SMTP WORKS (A-PDU'S)

The Essentials

| Keyword | Arguments |
|----------------|-----------------------------|
| HELO | Sender's Host Domain Name |
| MAIL FROM: | Email Address of sender |
| RCPT TO: | Email of Intended recipient |
| DATA | Body of the message |
| QUIT | |

HOW SMTP WORKS (A-PDU'S)

The Extras

| Keyword | Arguments |
|----------------|------------------------|
| RSET | |
| VRFY | Name to be verified |
| NOOP | |
| TURN | |
| EXPN | Mailing list to expand |
| HELP | Command Name |

STATUS CODES

The Server responds with a 3 digit code that may be followed by text info

□ 2## - Success

□ 3## - Command can be accepted with

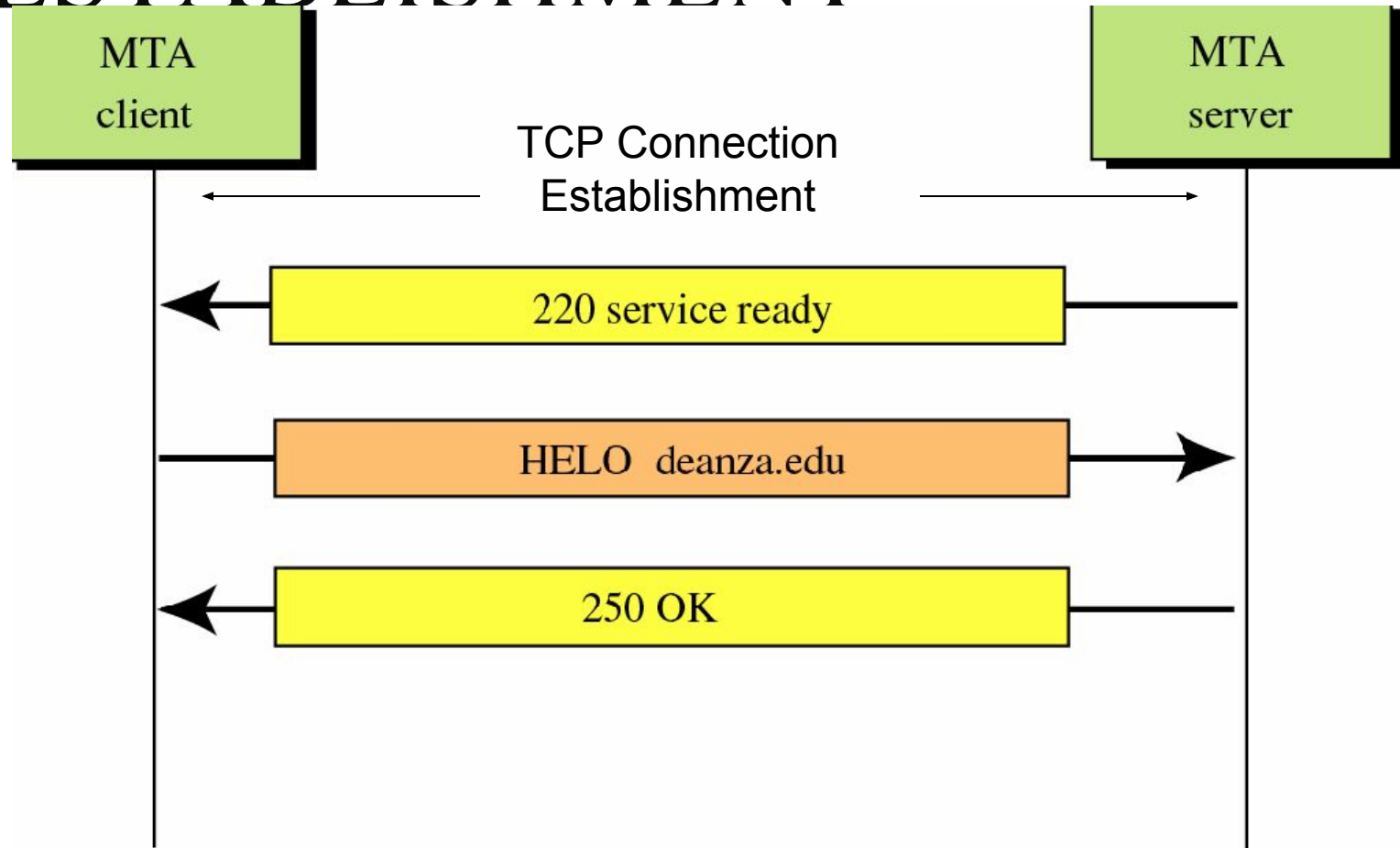
more information

□ 4## - Command was rejected, but error

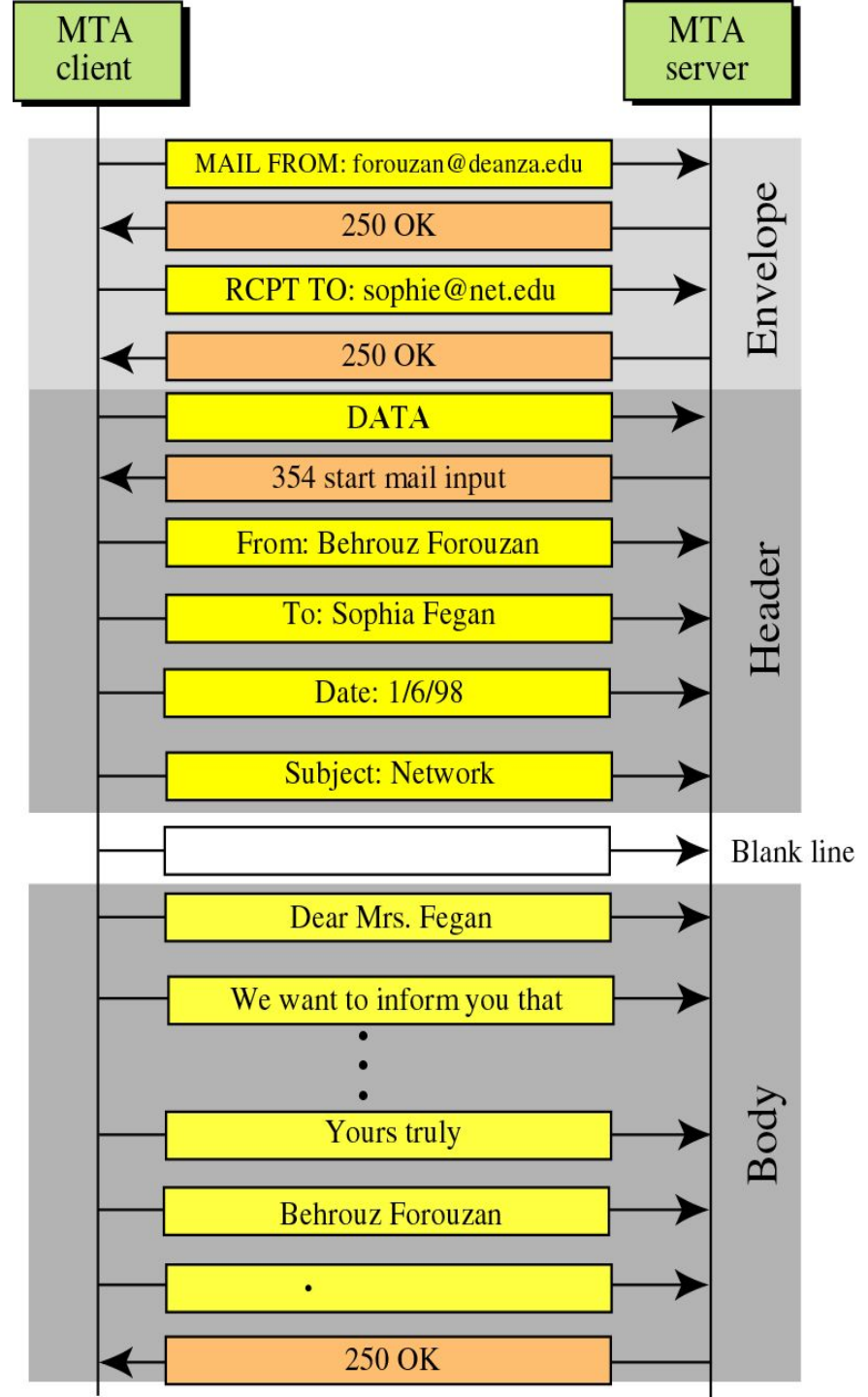
condition is temporary

□ 5## - Command rejected, Bad User!

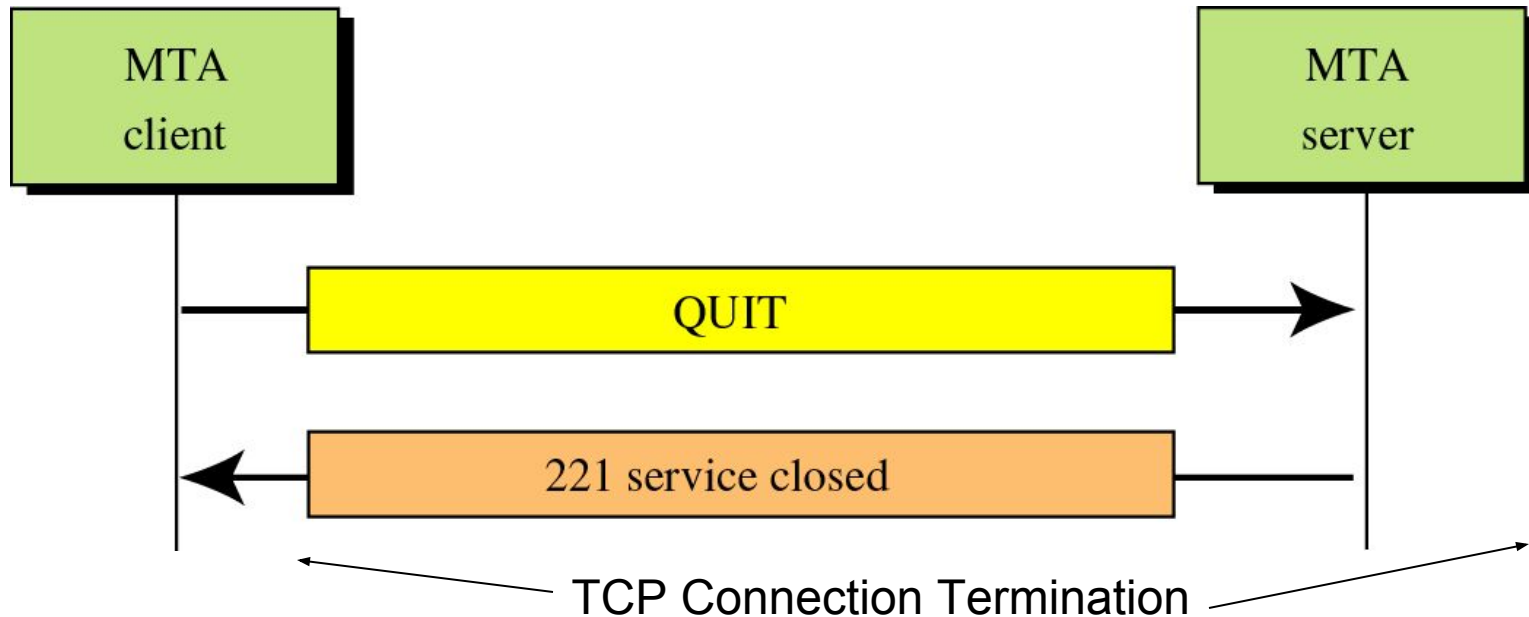
CONNECTION ESTABLISHMENT



MESSAGE PROGRESS



CONNECTION TERMINATION



PROBLEMS WITH SMTP

No security

- Authentication

- Encryption

Current Solutions:

- VRFY command

- Signature

Only uses NVT 7 bit ASCII format

E-MAILS CAN BE FORGED.....

HELO stimp.eecis.udel.edu

MAIL FROM: carberry@cis.udel.edu

RCPT TO: amer@cis.udel.edu

DATA

From: Dr. Sandra Carberry

To: Dr. Paul Amer

Subject: IT4102 Internet Programming

Dr. IB,

By department decree all students in your IT4102 Internet Programming class are hereby to be given automatic A+'s.

Thank you,

Dean Academic

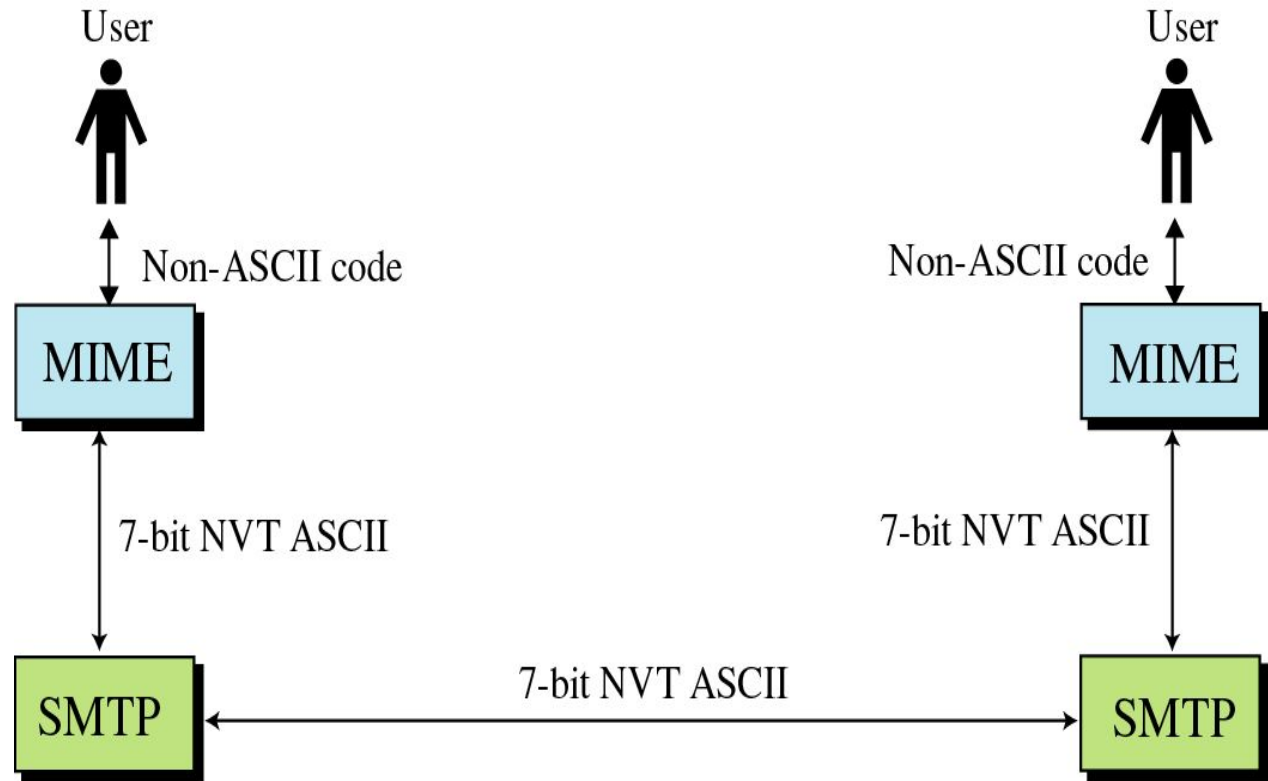
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QUIT

EXTENSIONS TO SMTP

MIME – Multipurpose Internet Mail Extensions

- Transforms non-ASCII data to NVT (Network Virtual Terminal) ASCII data
 - Text
 - Application
 - Image
 - Audio
 - Video



MIME HEADERS

Goes between the Email Header and Body

- MIME-Version: 1.1
- Content-Type
- Content-Transfer-Encoding
- Content-Id
- Content-Description

MIME HEADERS

Content-Type – Type of data used in the body of the message

- Text – plain, unformatted text; HTML
- Multipart – Body contains multiple independent parts
- Message – The body is whole mail message, part of a message, or a pointer to a message

MIME HEADERS

- Image – The message is a stationary image (JPEG or GIF)
- Video – The message is an animation (Mpeg)
- Audio – The message is 8 kHz standard audio data
- Application – The message is a type of data not previously defined

MIME HEADERS

Content-Transfer-Encoding – The method used to encode the messages

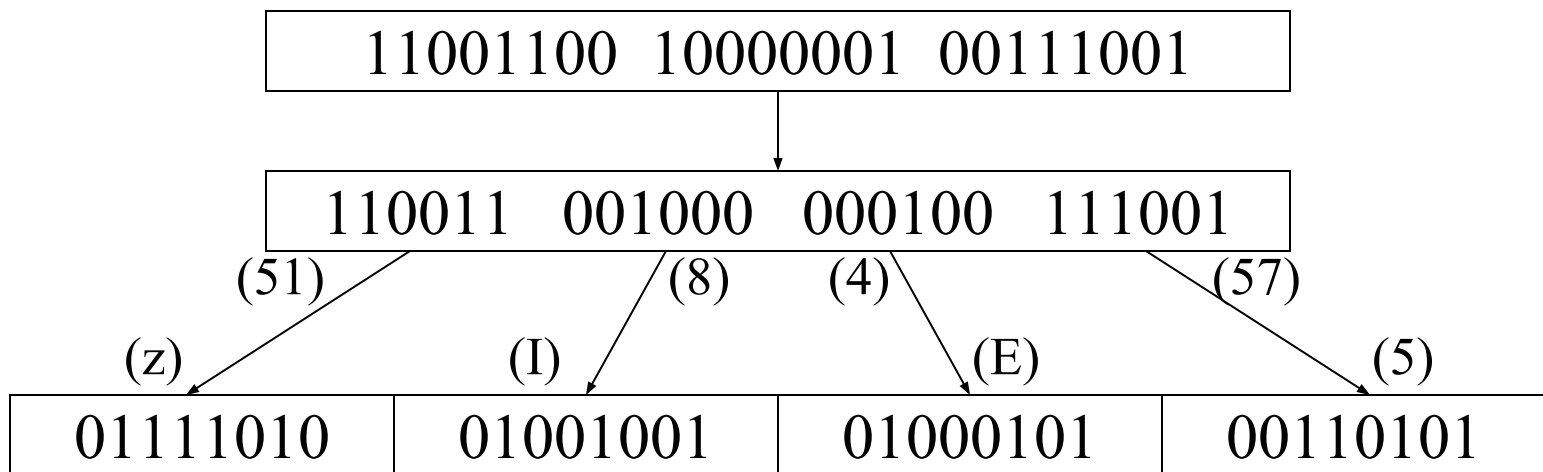
- 7 bit – no encoding needed
- 8 bit – Non-ASCII, short lines
- Binary – Non-ASCII, unlimited length lines
- Base64 – 6 bit blocks encoded into 8-bit ASCII
- Quoted-printable – send non-ASCII characters as 3 ASCII characters, =##, ## is the hex representation of the byte

BASE64 ENCODING

Divides binary data into 24 bit blocks

Each block is then divided into 6 bit chunks

Each 6-bit section is interpreted as one character
(Table 22.5 in Text), 25% overhead

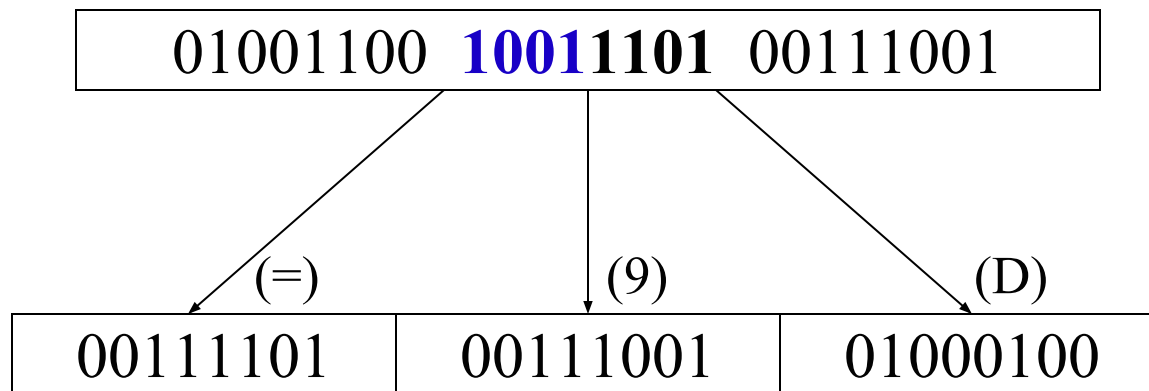


QUOTED-PRINTABLE ENCODING

Used when the data has a small non-ASCII portion

Non-ASCII characters are sent as 3 characters

First is '=', second and third are the hex representation of the byte



MIME HEADERS

Content-Id – Uniquely identifies the whole message in a multiple message environment

Content-Description – defines whether the body is image, audio, or video

A Multipart, Encoded MIME Message

From: joe_luthier@plucknplay.com

To: lchae@mfi.com

Subject: Info on Gibson guitar

MIME-Version: 1.0

Content-Type: multipart/mixed; boundary=17

- 17

Content-Type: text/enriched; charset="us-ascii"

Content-Transfer-Encoding: 8bit

Content-Description: Greetings

As promised, I'm getting back to you about the Gibson Southern Jumbo guitar you were Interested in. I've enclosed a spec sheet on the guitar, which is in Microsoft Word.

I guarantee that you'll love it!

- 17

Content-Type: application/octet-stream

Content-Transfer-Encoding: base64

Content-Description: Spec sheet saved as MS Word file

- 17 -

MIME EXAMPLE

Date: Wed, 04 Apr 2001 00:11:37 -0400
From: Meghna Naik <mnaik@UDel.Edu>
MIME-Version: 1.0
To: stoweg@hotmail.com
Subject: =?gb2312?B?1tDOxA==?= title
Content-Type: text/plain; charset=gb2312
Content-Transfer-Encoding: 7bit

a body text, blah, blah

```
Date: Wed, 04 Apr 2001 00:11:37 -0400
From: Meghna Naik <mnaik@UDel.Edu>
MIME-Version: 1.0
To: stoweg@hotmail.com
Subject: 中文 title
Content-Type: text/plain; charset=gb2312
Content-Transfer-Encoding: 7bit
```

```
a body text, blah, blah
```

MAIL TRANSFER AGENTS

MTAs do the actual mail transfers

MTAs are not meant to be directly accessed by users.

MMDF

SENDMAIL

MAIL ACCESS PROTOCOLS

The MTAs place the email in the user's mailbox

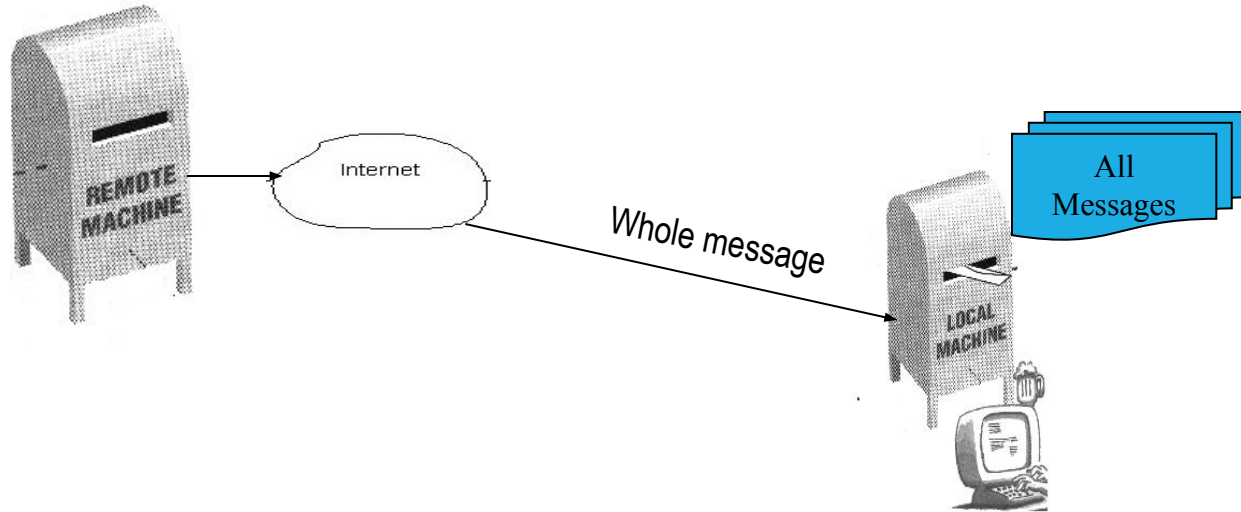
The Mail Access Protocols are used by the users to retrieve the email from the mailbox

- POP3

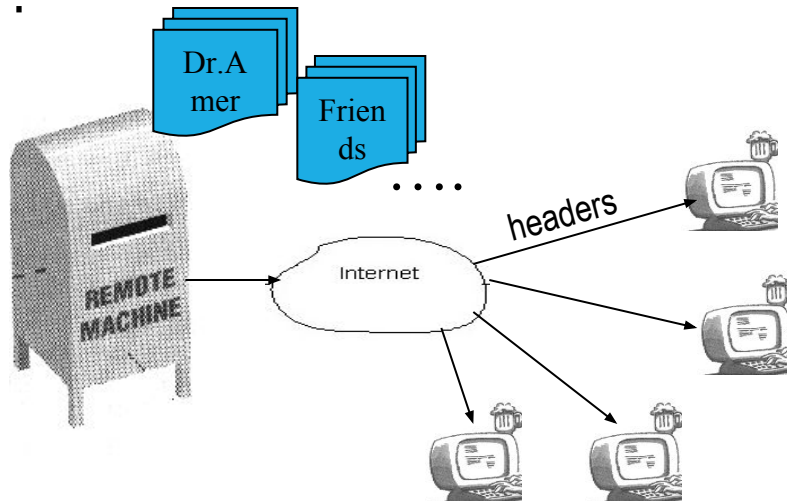
- IMAP4

POP vs. IMAP

POP3:



IMAP:



POST OFFICE PROTOCOL V3

Simple

Allows the user to obtain a list of their Emails

Users can retrieve their emails

Users can either delete or keep the email on their system

Minimizes server resources

INTERNET MAIL ACCESS PROTOCOL V4

Has more features than POP3

User can check the email header before downloading

Emails can be accessed from any location

Can search the email for a specific string of characters before downloading

User can download parts of an email

User can create, delete, or rename mailboxes on a server

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RFC0822 – David Crocker

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E-mail Explained – Sendmail.org

TCP/IP Protocol Suite – Behrouz Forouzan