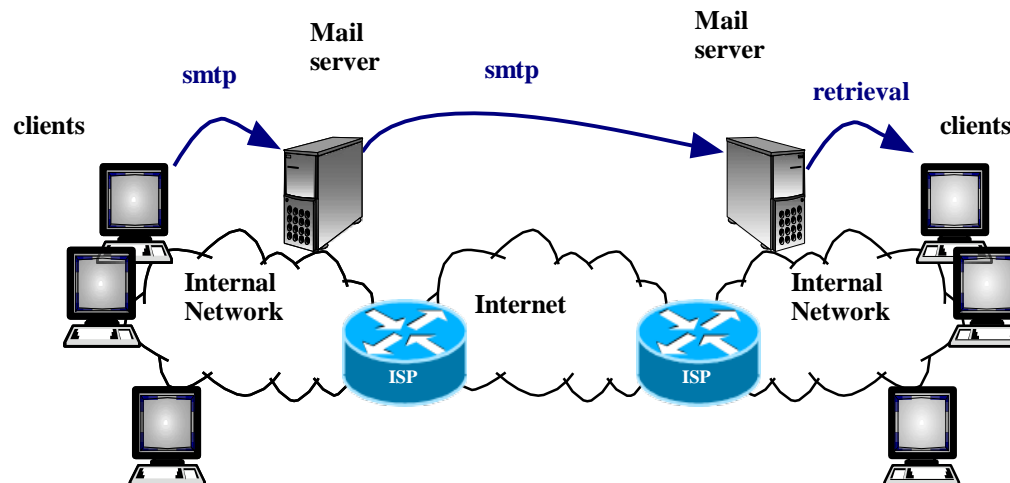


# Outline

- DNS
- Charsets
- **Email**
- Web
- HTML

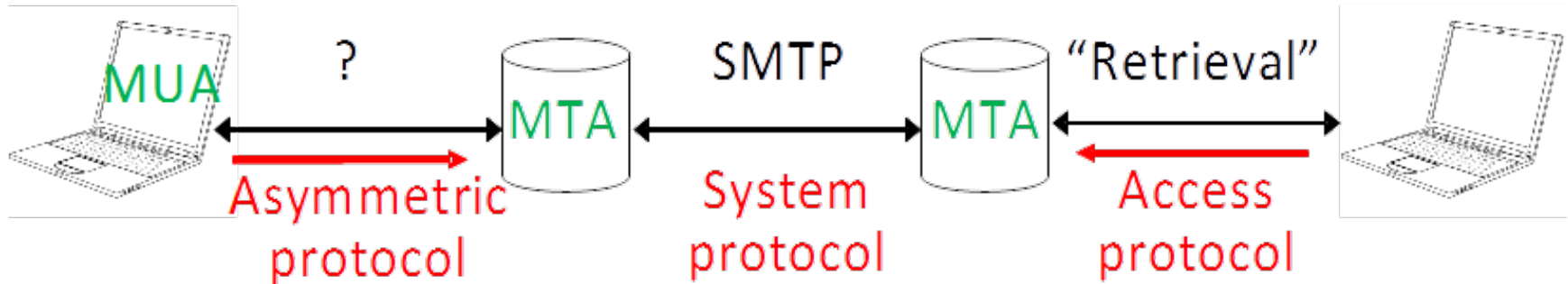
# Email

- **Electronic mail** (email): One of the first applications used in the Internet to electronic messaging.
- **Components:**
  - Transport layer: **TCP**, well-known port: **25**.
  - Application layer protocol: Simple Mail Transfer Protocol (**SMTP**). First defined by RFC-821 (Y 1982) and last updated by RFC-5321 (Y 2008).
  - Retrieval protocols (**IMAP, POP, HTTP**).



# Unit 5. Network applications

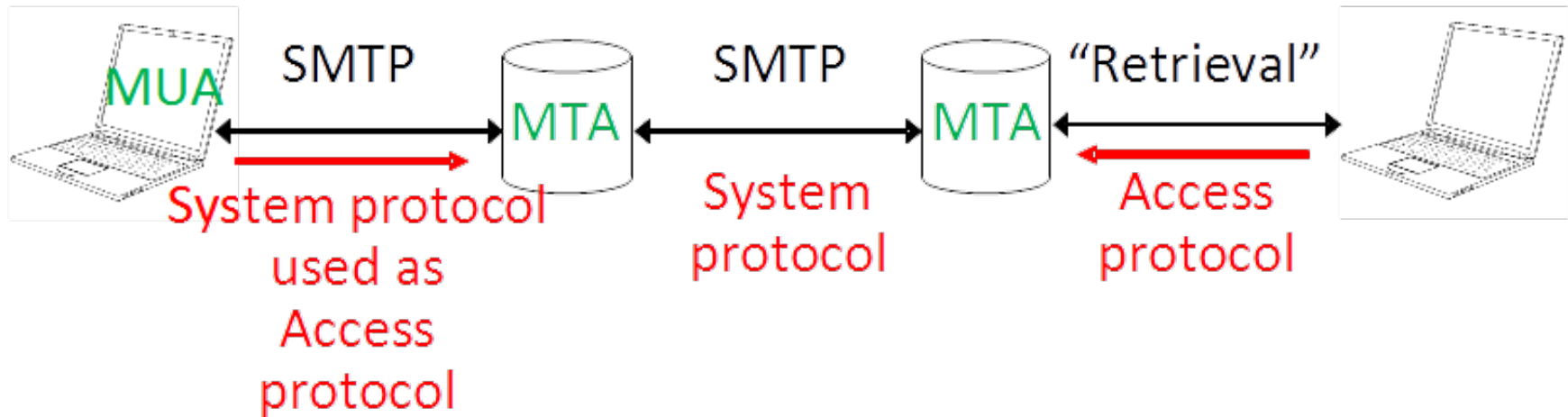
## Email - Architecture



- MUA: Mail User Agent
- MTA: Mail Transfer Agent
- *SMTP: Simple Mail Transfer Protocol*

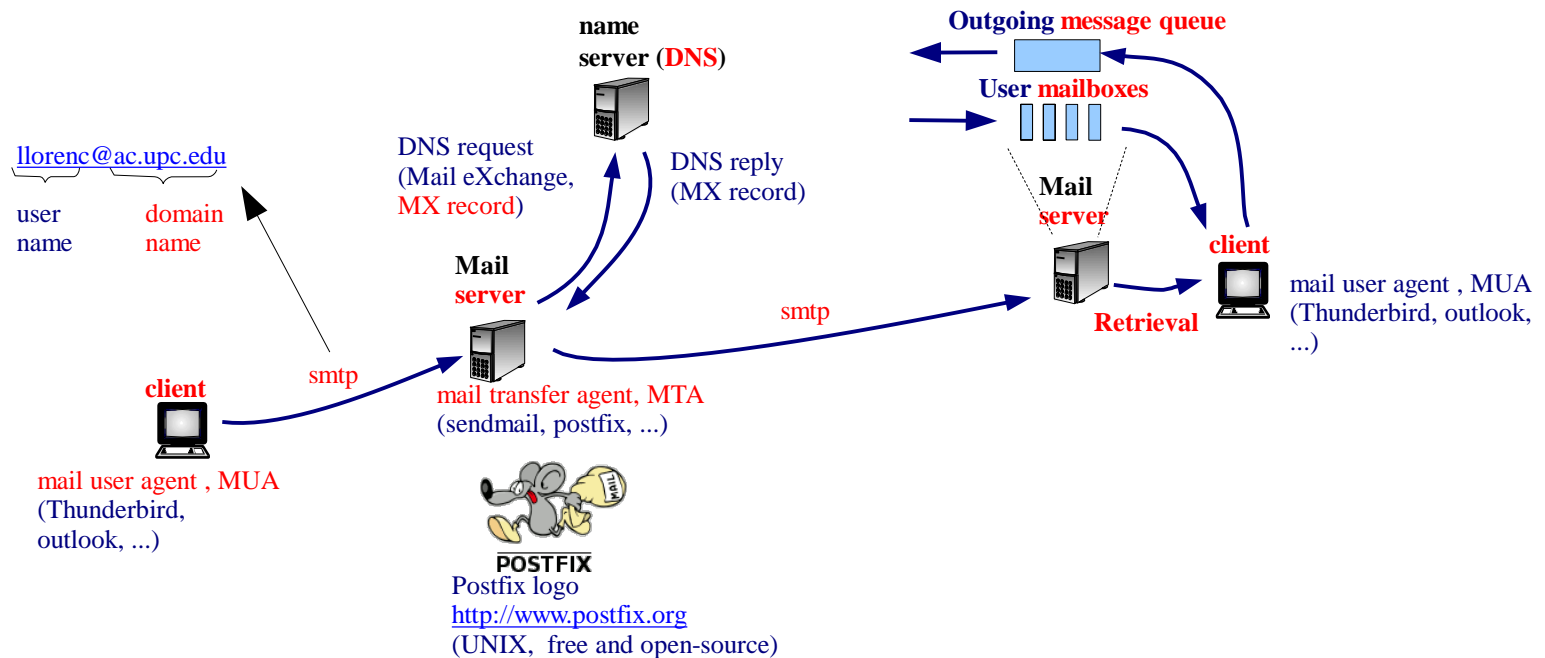
# Unit 5. Network applications

## Email - Protocols



- “Retrieval” protocols (mailbox access):
  - POP3 (*Post Office Protocol*)
  - IMAP (*Internet Message Access Protocol*)
- SMTP: Simple Mail Transfer Protocol

# Email - SMTP processing model



# Email - SMTP protocol (RFC-821, last update RFC-5321)

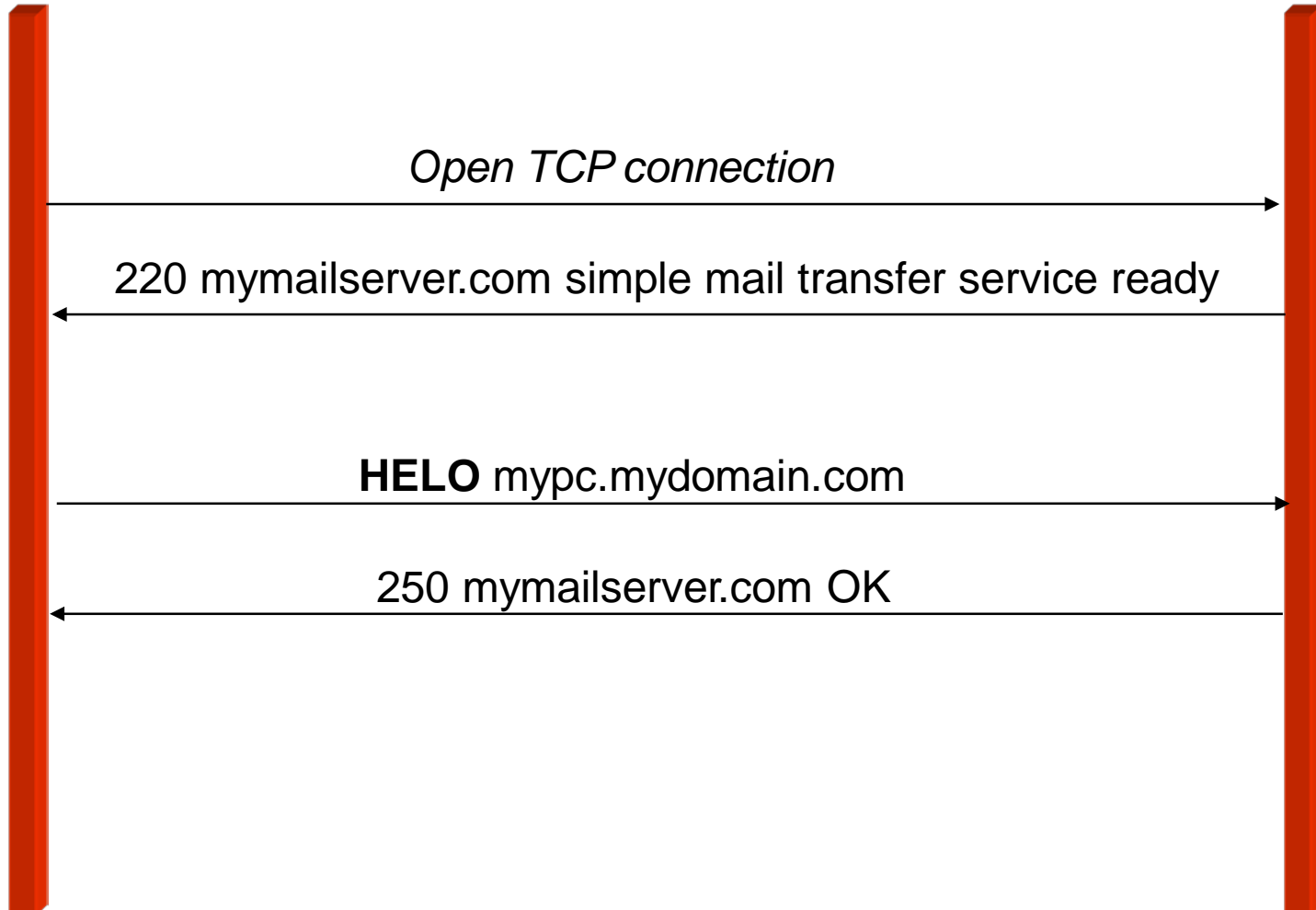
- Designed as a simple (few commands) and **text-based protocol** (ASCII).
- **Client basic commands:** **HELO** (identify SMTP client), **MAIL FROM:** (identify sender mailbox), **RCPT TO:** (identify recipient mailbox), **DATA** (mail message), **QUIT** (close transaction).
- **Server replies:** **Three digit** number (identify what state the client to enter next), and a **human understandable message**.

# SMTP protocol

Sender

Receiver

“Connection” establishment

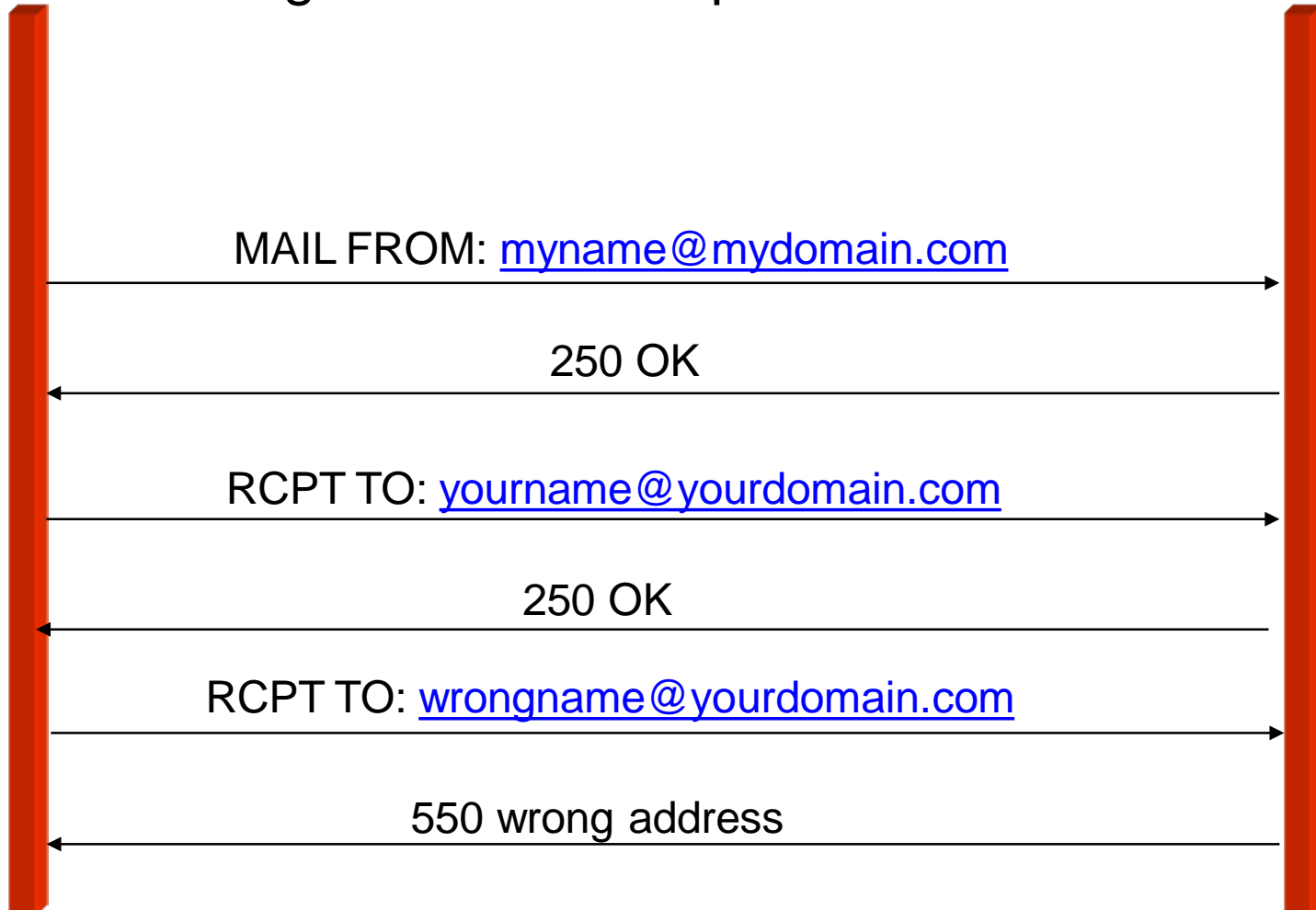


# SMTP protocol

Sender

Originator and Recipient information

Receiver



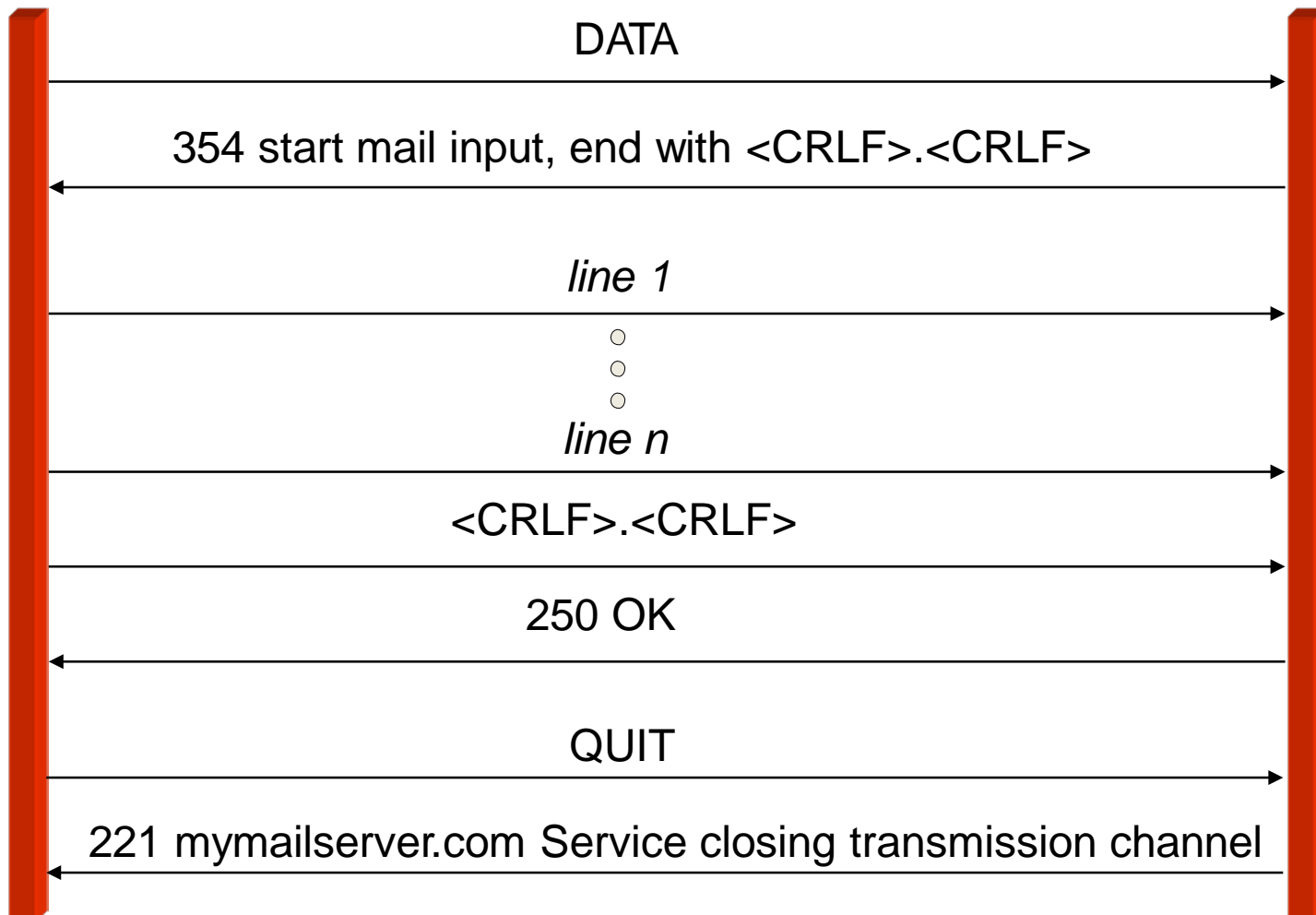


# SMTP protocol

Sender

Message transmission and Close

Receiver



# Email – message formats

- Format described in RFC-822 (update RFC-5322) **Internet Message Format**
- Example (extracted from the RFC):

```
From: John Doe <jdoe@machine.example>  
To: Mary Smith <mary@example.net>  
Subject: Saying Hello  
Date: Fri, 21 Nov 1997 09:55:06 0600  
MessageID: <1234@local.machine.example>
```

```
This is a message just to say hello. So,  
"Hello".
```

**Header:** gives information about the message. Fields defined in RFC-5322

**Empty line**

**Body**

# Email - SMTP protocol (RFC-5321, originally RFC-821)

Example: Manually send an email using telnet to port 25.

**CLIENT** linux ~> telnet relay.upc.edu 25  
Trying 147.83.2.12...  
Connected to relay.upc.edu.  
Escape character is '^['.

SMTP transaction

<b>SERVER</b>	220 dash.upc.es ESMTP Sendmail 8.14.1/8.13.1; Fri, 4 Feb 2011 14:57:15 +0100
<b>COMMANDS</b>	<b>HELO</b> linux.ac.upc.edu
	250 dash.upc.es Hello linux.ac.upc.edu [147.83.34.125], pleased to meet you
	<b>MAIL FROM:</b> <llorenc@ac.upc.edu>
	250 2.1.0 <llorenc@ac.upc.edu>... Sender ok
	<b>RCPT TO:</b> <albert@ac.upc.edu>
	250 2.1.5 <albert@ac.upc.edu>... Recipient ok
	<b>DATA</b>
	354 Enter mail, end with "." on a line by itself
	 Hello world . 250 2.0.0 p14DvFOQ008320 Message accepted for delivery
	<b>QUIT</b>
	221 2.0.0 dash.upc.es closing connection
	Connection closed by foreign host.
	linux ~>

Encrypted SMTP: port 465

# Multipurpose Internet Mail Extensions: MIME

- Used in mail, web, etc.
- Specification for “Transport” of composite multimedia objects
  - Transport type information (receiver can automatically present)
  - Encoding to enable/facilitate the transfer
- The internal format becomes invisible to users
- Include one or more objects, text in diverse alphabets, large objects (fragments, refs), alternatives, etc.

# MIME: examples

From: Nathaniel Borenstein <[nsb@thumper.bellcore.com](mailto:nsb@thumper.bellcore.com)>  
To: Ned Freed <[ned@innosoft.com](mailto:ned@innosoft.com)>  
Subject: Plain old email

This is a plain old email message.  
It contains ASCII text, nothing more.

.....

From: Nathaniel Borenstein <[nsb@thumper.bellcore.com](mailto:nsb@thumper.bellcore.com)>  
To: Ned Freed <[ned@innosoft.com](mailto:ned@innosoft.com)>  
Subject: Plain text mail  
Content-type: text/plain; charset=us-ascii

This is plain text mail.

.....

...Subject: French mail  
Content-type: text/plain; charset=iso-8859-1  
Content-transfer-encoding: quoted-printable  
Le courrier =E9lectronique =E0 la fran=E7aise ...

...Content-type: image/gif base64  
Content-Transfer-Encoding:

R0lGODdhSgGgAfUAAENDQ01NTTw8PEVF...

# MIME: example multipart

From: Nathaniel Borenstein <[nsb@bellcore.com](mailto:nsb@bellcore.com)>  
To: Ned Freed <[ned@innosoft.com](mailto:ned@innosoft.com)>  
Subject: A multipart example  
Content-Type: multipart/mixed; boundary=CUT\_HERE

--CUT\_HERE

Content-type: text/plain

Hey, Ned, look at this neat picture:

--CUT\_HERE

Content-type: image/gif

Content-Transfer-Encoding: base64

5WVlZ6enqqqqr....

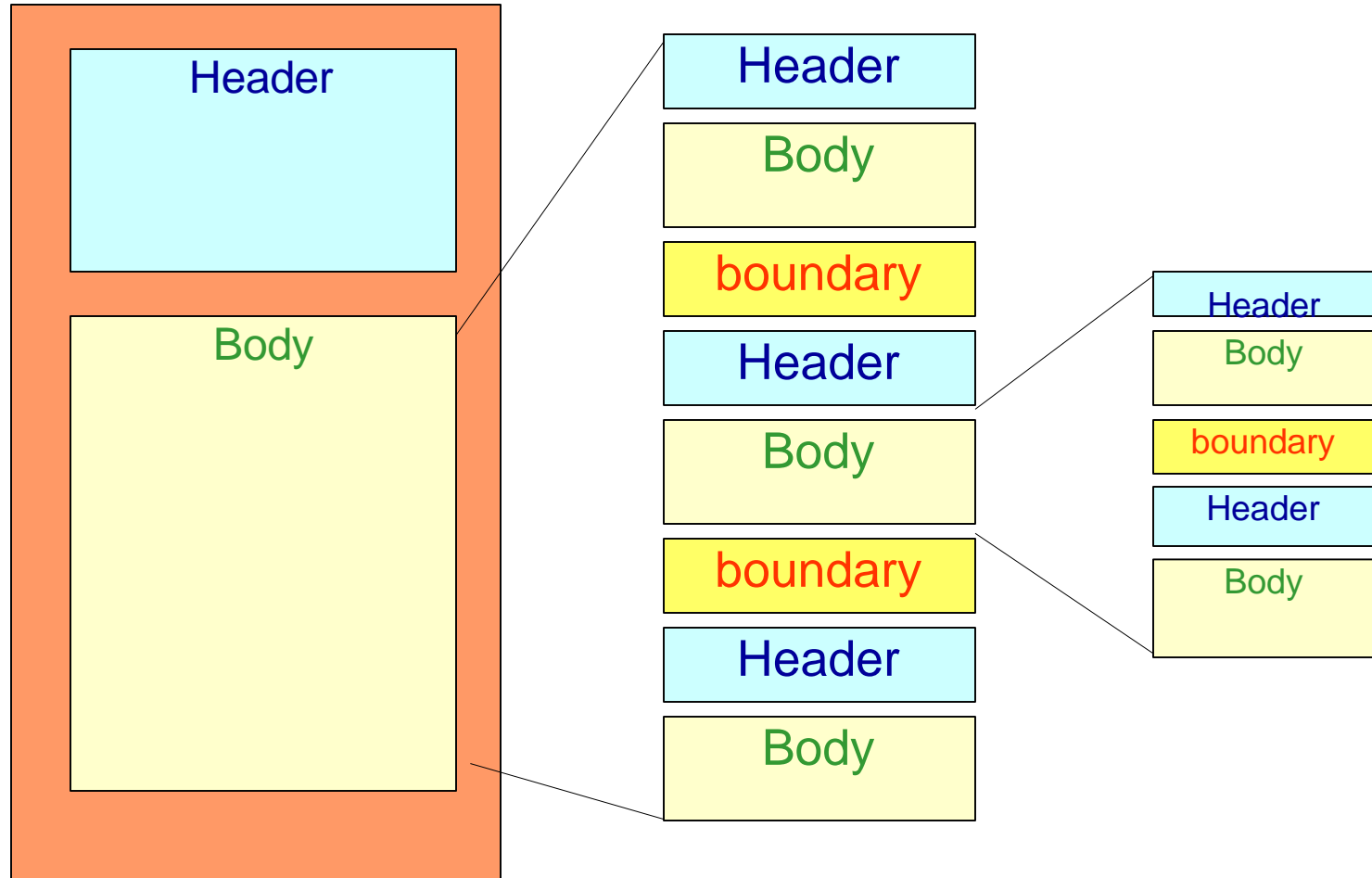
--CUT\_HERE

Content-type: text/plain

Wasn't that neat?

--CUT\_HERE--

# MIME multipart message



# MIME: content type

- Text: ...
  - Attribute: charset=iso-8859-1 text/plain
  - (simple text), text/html ...
- Image: image/gif, image/jpeg, image/png ...
- Audio: sound, voice, music ... Application:
  - application specific content
    - Application/octet-stream: data without any associated application
    - Application/organization-product
- Multipart: a set of objects
  - Mixed: a combination of several objects
  - Alternative: an object in several formats to select one (text/html/rtf)
  - Parallel: several objects for simultaneous presentation (e.g. audio+video)
  - Digest: collection of messages
  - Related: set of objects part of a single object (web page)
- Message:
  - RFC822: a complete message (eg. resent message) Partial:
    - a fragment ...
  - External-Body: a reference to an external object

Registration scheme  
Type/subtype:  
maintained by IANA



# MIME content types

- Content-Type element structure:
  - **type/subtype**
- Examples of type/subtype:
  - application/pdf, application/msword, application/soap+xml, application/vnd.ms-powerpoint, application/vnd.nokia.radio-preset, ...
  - audio/GSM, audio/mpeg, audio/vnd.dolby.mps, ...
  - image/gif, image/jpeg, image/png, image/vnd.adobe.photoshop, ...
  - text/plain, text/html, text/vnd.dvb.subtitle, ...
  - message/rfc822, message/http, ...
  - model/iges, ...
  - multipart/mixed, multipart/alternative, ...
  - video/H264, video/mp4, video/vnd.nokia.videovoip, ...

# MIME: transfer encoding

Ways to encode content: (to “get through” a 7 bit transport)

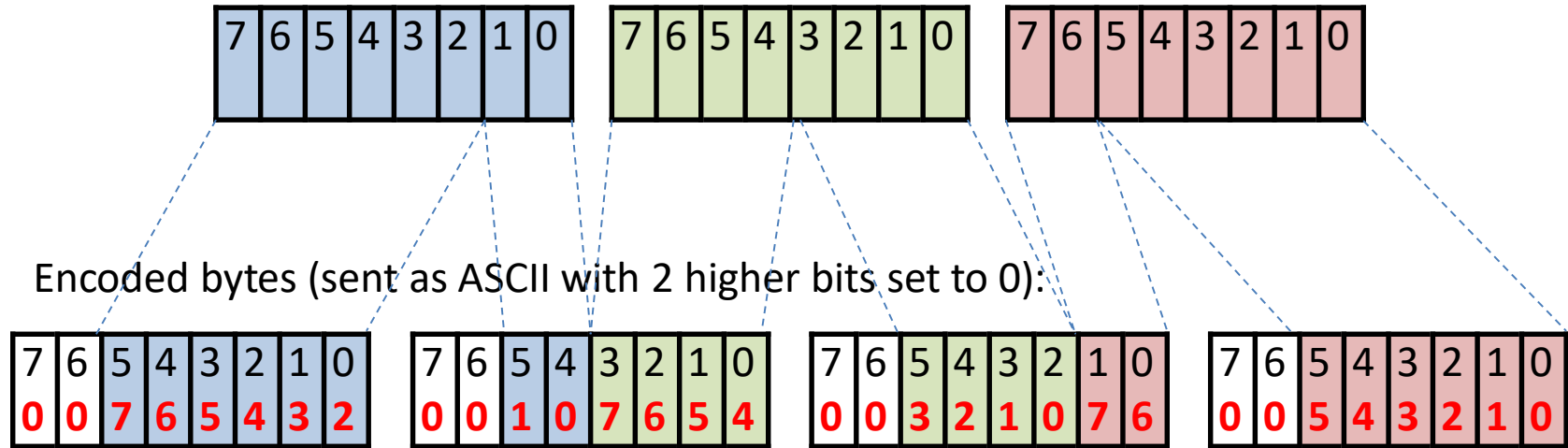
- Quoted-Printable:
  - The majority of text is 7 bits, transform some characters € → =E4
  - The result “almost” legible without decoding. Depends on table (charset)
- Base64:
  - 3 bytes (24 bits) <=> 4 ASCII (32 bits)
  - A-Za-z0-9+/=
  - '=' as padding, other are ignored (\r, \n, ...)
- Binary: No encoding: any character and lines of any length
- 7Bit: No character encoding (all 7 bits) and lines of appropriate length
- 8Bit: No character encoding (8 bits) and lines of appropriate length
- In the heading:

MIME-Version: 1.0

Subject: =?iso-8859-1?Q?acentuaci=F3n=20t=EDpica?=

# Base64 encoding

Bytes to transmit (8 bits either 0 or 1):



Only ASCII values from 0 to 63  
(**64** possible values)

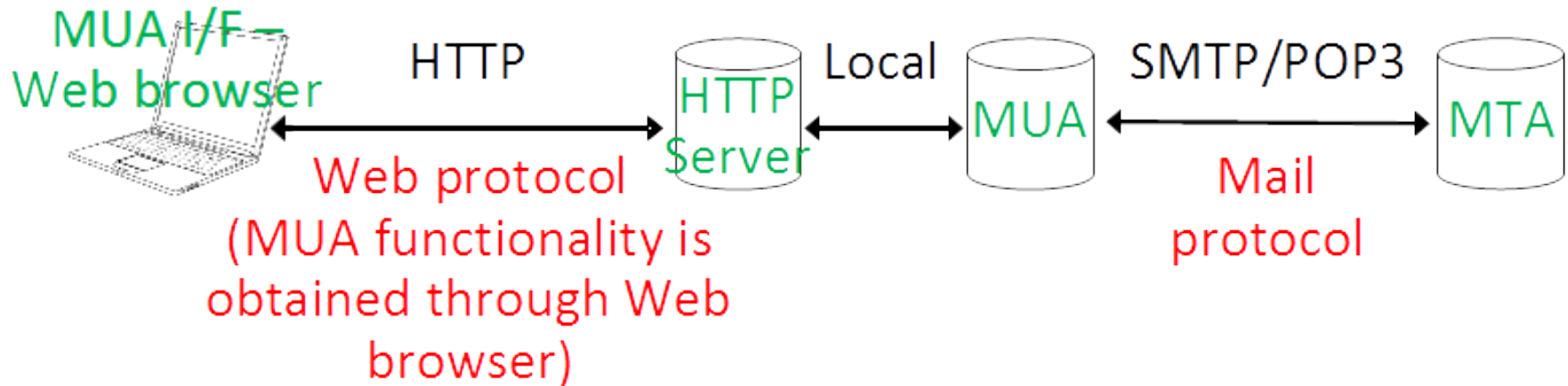
Inefficiency: 4 bytes transmitted for every 3 bytes!

# Mailbox Access protocols

- Post Office Protocol (POP) version 3 (POP3)
  - RFC 1939 (1996)
  - Client-server protocol (Asymmetric)
  - Messages retrieved from the mail server (copied locally).
- Internet Message Access Protocol (IMAP)
  - RFC 3501 (2003). 1<sup>st</sup> version 4 in RFC 1730 (1994). 1<sup>st</sup> RFC (version 2) in 1988 (RFC 1064).
  - Client-server protocol (Asymmetric)
  - Messages accessed and managed (folders, ...) at the server

# Unit 5. Network applications

## Email - Webmail



- Web front-end for mail services. The MUA is a web browser.
- Real protocol to access the services: HTTP (web).
- The HTTP server machine uses SMTP or POP3, as required.

# Unit 5. Network applications

## Email - retrieval protocols

- Post Office Protocol (**POP**), RFC-1939:
  - POP server listens on **well-known port 110**
  - **POPS port 995**
  - User normally **deletes messages** upon retrieval
- Internet Message Access Protocol (**IMAP**) RFC-3501:
  - IMAP server listens on **well-known port 143 (IMAPS port 993)**
  - **Messages remain on the server** until the user explicitly deletes them.
  - Provide **commands** to create folders, move messages, download only parts of the messages (e.g. only the headers)
- **Web based Email (HTTP)**
  - A web server handles users mailboxes. User agent is a web browser, thus, using HTTP to send and retrieve email messages.

## CORREO ENTRANTE

### IMAP

**Nombre de usuario / email:**

antonio.garcia@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 143

**Nombre del Servidor:** pop.tudominio.ext

### POP3

**Nombre de usuario / email:**

antonio.garcia@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 110

**Nombre del Servidor:** pop.tudominio.ext

## CORREO SALIENTE

### SMTP (correo electrónico)

**Nombre de usuario / email:**

antonio.garcia@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 25

**Nombre del Servidor:** authsmtp.tudominio.ext

### SMTP (dominio)

**Nombre de usuario / email:** smtp@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 25

**Nombre del Servidor:** authsmtp.tudominio.ext

No SSL ☒ SSL

[¿Qué es SSL?](#)

## CORREO ENTRANTE

### IMAP

**Nombre de usuario / email:**

antonio.garcia@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 993

**Nombre del Servidor:** pop.securemail.pro

### POP3

**Nombre de usuario / email:**

antonio.garcia@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 995

**Nombre del Servidor:** pop.securemail.pro

## CORREO SALIENTE

### SMTP (correo electrónico)

**Nombre de usuario / email:**

antonio.garcia@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 465

**Nombre del Servidor:** authsmtp.securemail.pro

### SMTP (dominio)

**Nombre de usuario / email:** smtp@tudominio.ext

**Contraseña:** la que escogiste durante la activación

**Puerta:** 465

**Nombre del Servidor:** authsmtp.securemail.pro

No SSL  SSL

[¿Qué es SSL?](#)

SSL (Secure Sockets Layer) es un protocolo para transmitir información de manera segura.



**Baixada POP:**  
[Més informació](#)

**1. Estat: POP està inhabilitat**

- ☐ Activa POP per a tots els missatges
- ☐ Activa POP als missatges que arribin a partir d'ara

**2. Quan s'accedeix als missatges a través de POP** conserva la còpia de Gmail a la Safata d'entrada ▼

**3. Configureu el vostre client de correu electrònic** (per exemple, Outlook, Eudora, Netscape Mail)  
[Instruccions de configuració](#)

**Accés IMAP:**  
(accedeix a Gmail des d'altres clients amb IMAP)  
[Més informació](#)

**Estat: IMAP està habilitat**

- ☒ Activa IMAP
- ☐ Desactiva IMAP

**Quan marco un missatge a IMAP com a suprimir:**

- ☒ Eliminació automàtica activada: actualitza immediatament el servidor. (predeterminat)
- ☐ Eliminació automàtica desactivada: s'espera que el client actualitzi el servidor.

**Quan un missatge es marca com a suprimir i s'elimina de l'última carpeta IMAP visible:**

- ☒ Arxiva el missatge (predeterminat)
- ☐ Mou el missatge a la Paperera
- ☐ Suprimeix el missatge de manera immediata i definitiva

**Limits de mida de les carpetes**

- ☒ No limitis el nombre de missatges en una carpeta IMAP (predeterminat)
- ☐ Limita les carpetes IMAP perquè continguin aquesta quantitat de missatges com a màxim 1.000 ▼

**Configureu el vostre client de correu electrònic** (per exemple, Outlook, Thunderbird, iPhone)  
[Instruccions de configuració](#)

Utilitzeu la taula següent per actualitzar el vostre client amb la informació correcta. Si necessiteu ajuda per actualitzar la configuració d'IMAP, cerqueu les instruccions al Centre d'ajuda del client de correu electrònic corresponent.

Servidor de correu entrant (IMAP)	imap.gmail.com  Requereix SSL: sí  Port: 993
Servidor de correu sortint (SMTP)	smtp.gmail.com  Requereix SSL: sí  Requereix TLS: sí (si està disponible)  Requereix autenticació: sí  Port per a SSL: 465  Port per a TLS/STARTTLS: 587
Nom complet o visible	El vostre nom
Nom del compte, nom d'usuari o adreça electrònica	La vostra adreça electrònica completa
Contrasenya	La vostra contrasenya de Gmail