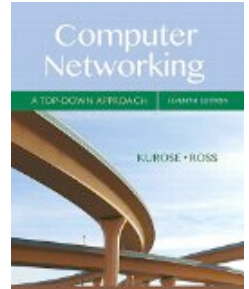


COMP 375: Lecture 07



- **News & Notes:**

- Project #1 due @ 10PM
 - Submission on cslab, not Blackboard
- Project #2 due Wed, Feb. 28
- Quiz #2 in class Friday

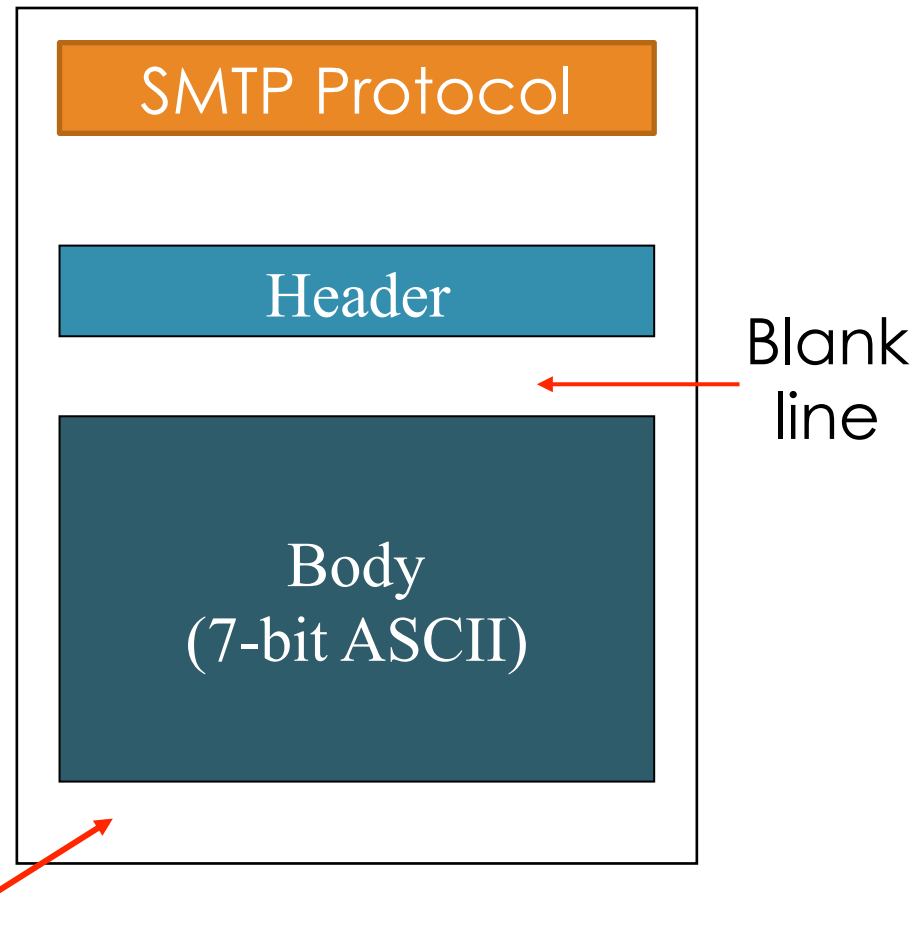
- **Reading (Wed, Feb. 14)**

- Review Section 2.4 (DNS)

Section 2.3

EMAIL

Like HTTP, SMTP messages contain an (optional) header and a body.



Signal EOM with: `"\r\n.\r\n"`

Which version of the “To” address does a mail client display?

- | | |
|-----------|--|
| A. | The header version. |
| B. | The SMTP version. |
| C. | Both of them. |
| D. | They must be the same, or the email would not be sent. |

Demo: Use telnet to connect to mail server and send email using SMTP.

- `telnet comp375.sandiego.edu 25`

- Steps:

- `HELO sandiego.edu`
- `MAIL FROM: <you@sandiego.edu>`
- `RCPT TO: <yourneighbor@sandiego.edu>`
- `DATA`
- Enter the contents of your email:
 - Header ("`To:`" "`From:`" "`Subject:`", one per line)
 - Blank Line
 - Body of email
 - End body with a line that has only a period (`.`)
- `QUIT`

The following is the complete telnet session from the demo.

Trying 10.0.27.20...

Connected to omrs-ace-vip.sandiego.edu.

Escape character is '^['.

220 sandiego.edu ESMTP mail service ready

HELO sandiego.edu

250 omr4.sandiego.edu Hello [10.41.0.203], pleased to meet you

MAIL FROM: <sat@sandiego.edu>

250 <sat@sandiego.edu>... Sender ok

RCPT TO: <sat@sandiego.edu>

250 <sat@sandiego.edu>... Recipient ok

DATA

354 Enter mail, end with "." on a line by itself

I like to eat mangos.

What do you like to eat?

.

250 BKX51286 Message accepted for delivery

QUIT

221 omr4.sandiego.edu closing connection.

What keeps us from entering fake information (e.g., FROM address)?

- | | |
|-----------|---|
| A. | Nothing. |
| B. | The mail transfer agent (i.e. mail server) checks that the FROM is valid. |
| C. | We enter a name/password logging into the mail transfer agent. |
| D. | Ethics. |

Fun Demo

SMTP servers put restrictions in place
to limit mischief.

*If you were a mail server administrator,
how would you limit people from
abusing SMTP?*

If SMTP only allows 7-bit ASCII, how do we send pictures/videos/files via email?

- | | |
|-----------|--|
| A. | We encode these objects as 7-bit ASCII. |
| B. | We use a different protocol instead of SMTP. |
| C. | We're really sending links to the objects, rather than the objects themselves. |

Base 64 allows us to represent binary data as text.

- 64 possible characters: [A-Z], [a-z], [0-9], +, /
- Encoding Algorithm:
 1. Group binary into 6-bit chunks
 2. Use value of 6-bit number as index into translation table (0 → A, 1 → B, ..., 63 → /)

Let's encode using Base64:

110011 010001 001111

Multipurpose Internet Mail Extensions (MIME)
enhance email with many features.

1. Text in character sets other than ASCII
2. Non-text attachments
3. Message bodies with multiple parts
4. Header information in non-ASCII character sets

MIME enables email features such as attachments.

```
From: sat@sandiego.edu
MIME-Version: 1.0
Content-Type: multipart/mixed; boundary="--XXXX"

Multipart message using MIME.

--XXXX
Content-Type: text/plain

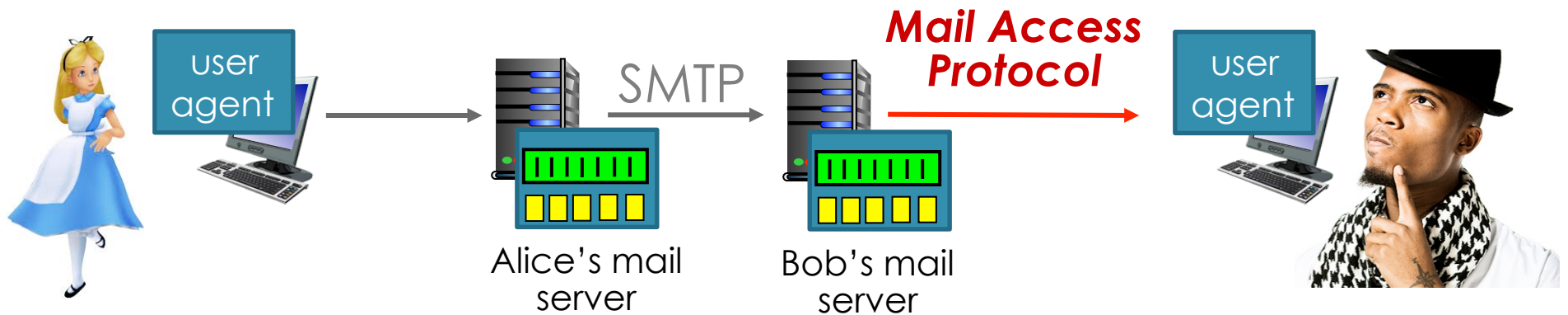
I am sending you this cool attachment!
Regards,
Dr. Sat

--XXXX
Content-Type: text/plain
Content-Disposition: attachment; filename="foo.txt"

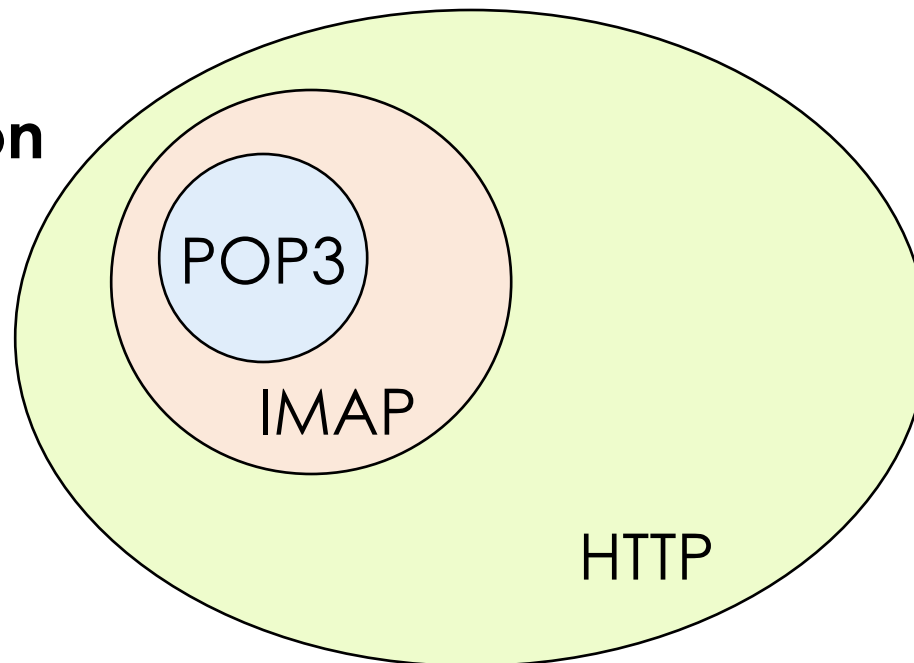
there are 10 types of people in this world..

--XXXX
```

Retrieving mail from a server uses one of several protocols.



Features Comparison

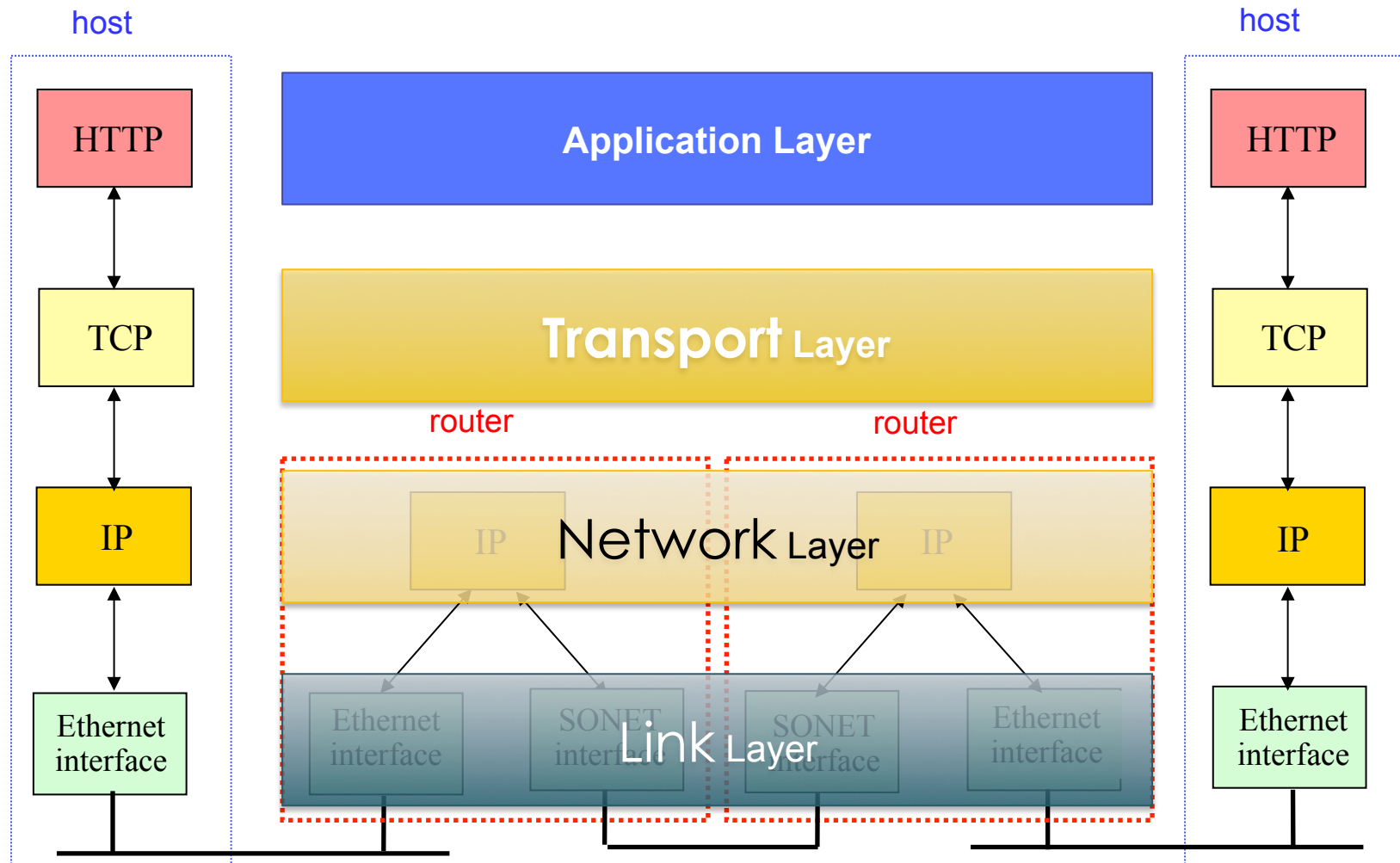


Like many older protocols, email is prone to security vulnerabilities.

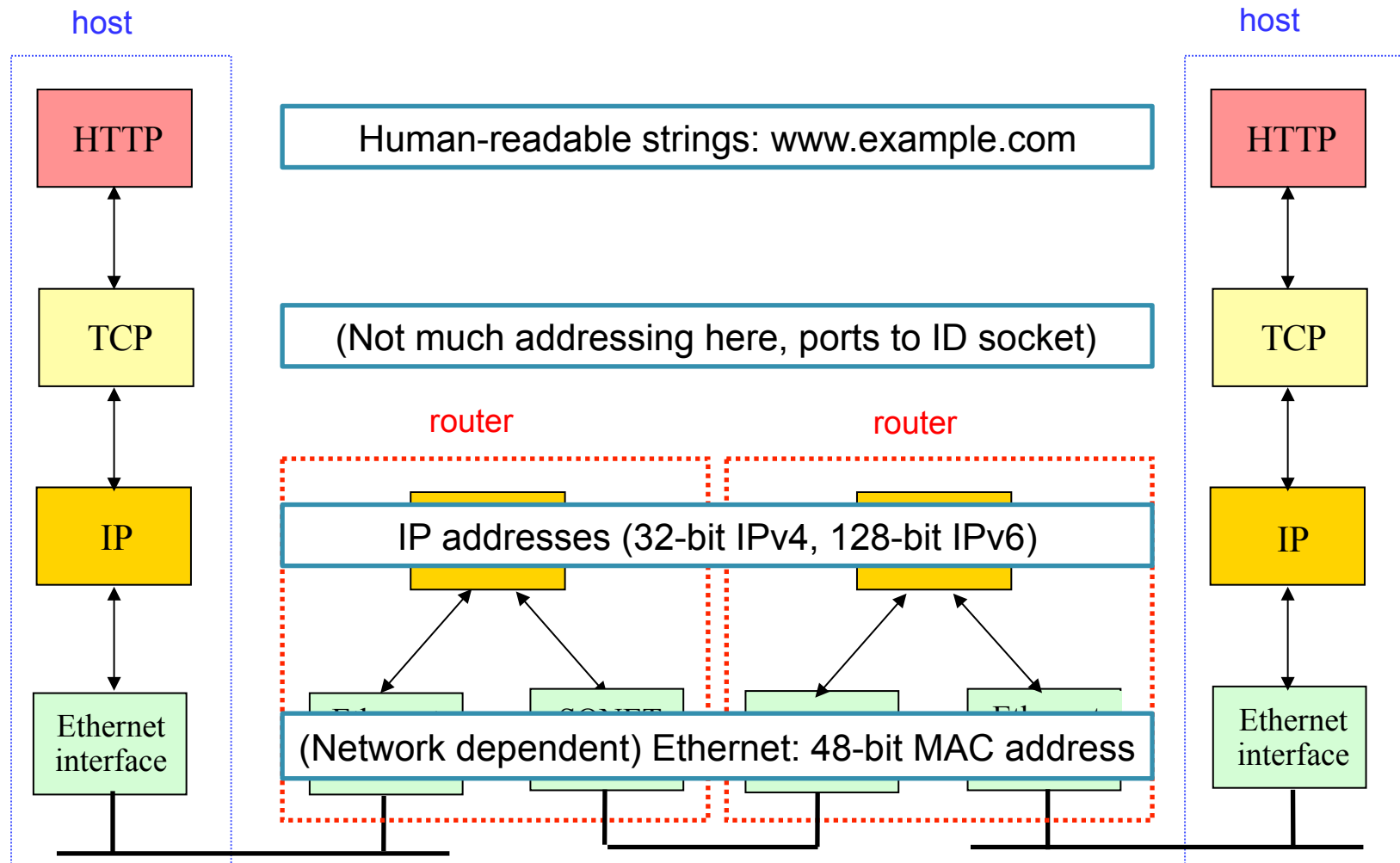
What potential security issues are there with email?

NAMING

Each layer has its own way of naming entities.



Each layer has its own way of naming entities.



Names become less human-friendly
in deeper layers of the stack.

- **Hostname** (e.g. comp375.sandiego.edu)



- **IP address** (e.g. 10.42.0.154)



- **MAC address** (e.g. E0:FF:85:49:12:11)



Naming is generally hierarchical.

- **Hostname:** **comp375**.sandiego.edu
- **IP address:** 10.42.0.**154**
- **MAC address:** E0:FF:85:**49:12:11**