An Overview of Network Security (cont’d)

Upper Layers

- Messaging
  - SMTP, MIME, POP, IMAP, IM
- Internet Telephony
  - H.323, SIP
- RPC-Based Protocols
  - RPC (& rpcbind), NIS, NFS, Andrew
- File Transfer Protocols
  - FTP, TFTP, SMB
- Remote Login
  - Telnet, “*r*” commands, ssh
- SNMP
- Network Time Protocol
- Information Services
  - Finger, whois, LDAP, WWW, NNTP
- Proprietary Protocols
  - RealAudio, SQL*Net, etc.
- P2P
- X11
- Small Services
  - Echo, daytime, etc.

Messaging

- SMTP
- MIME
- POP
- IMAP
- IM

SMTP

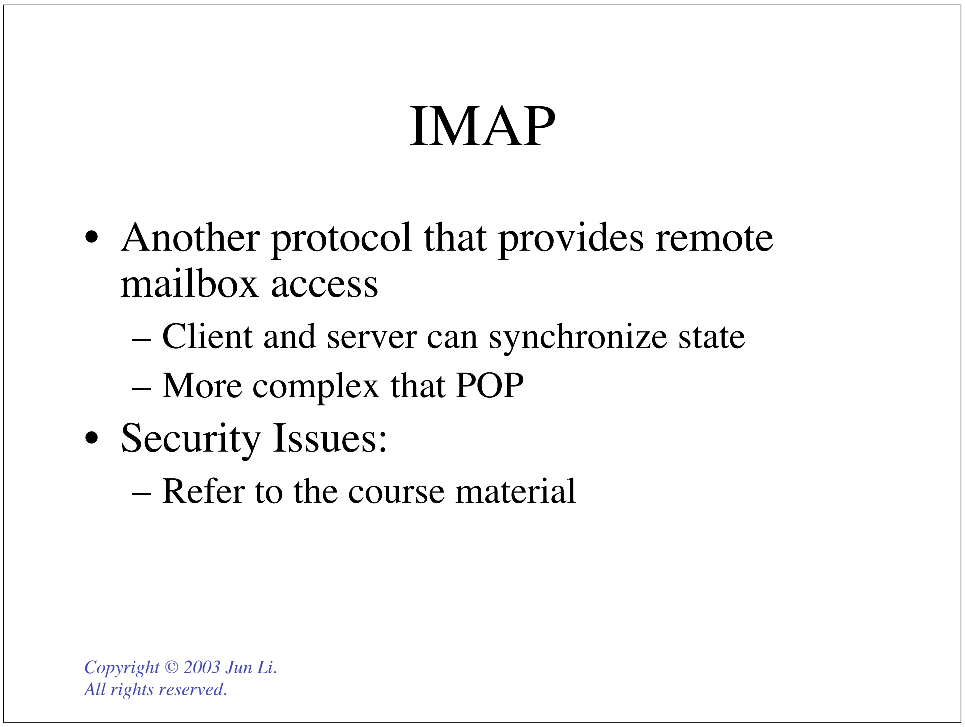
- SMTP (simple mail transfer protocol) moves email on the net
- Security Issues:
  – Don’t know who’s the real sender
  – Can be abused for a DOS attack
    - Imagine a machine’s mail spool directory is fully of junk emails
  – Privacy issues
    - EXPN, VRFY
  – Spam!
  – *Sendmail*, as the most common implementation of SMTP, is often configured badly
    - run as root on many Unix systems. :(
  – Open relay problem

MIME

- MIME (Multipurpose Internet Mail Extensions) is a protocol on encoding messages
- Security Issues
  - Structured encoded info can specify automated execution
    - Fetch a file .ssh/identity and .ssh/identity.pub
  - Can carry worms! Can carry viruses! Can carry anything!

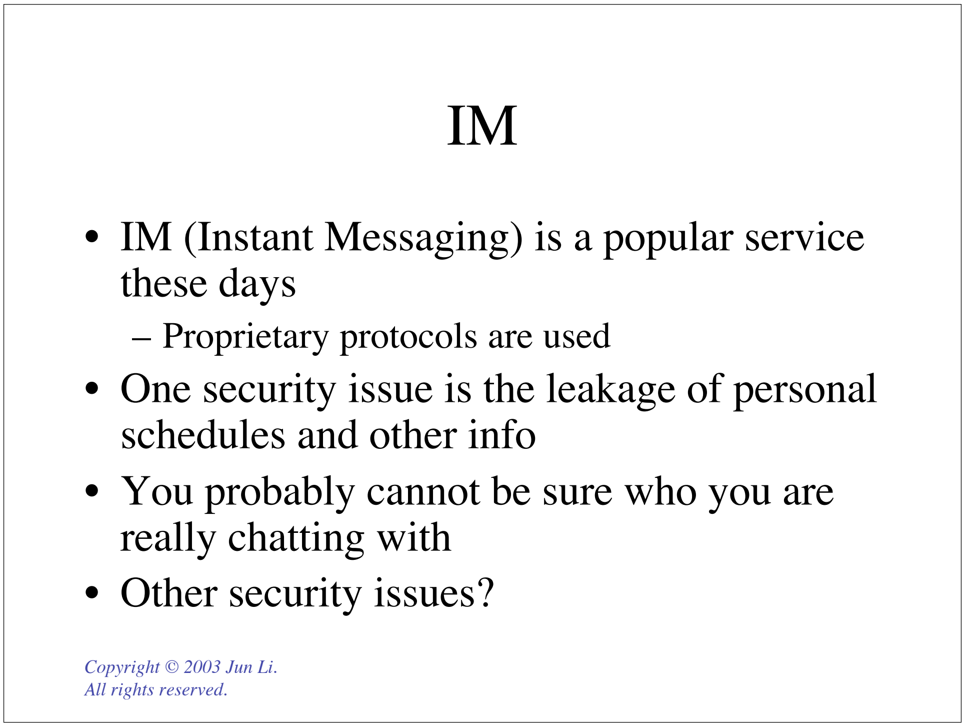
POP

- POP (Post Office Protocol) allows a client to download messages from a mail server
  - Regularly probe the server for new emails
  - The mail will be removed from the server
- Security Issues:
  - Requires the client to have an account on the server
  - Password in plaintext in early days



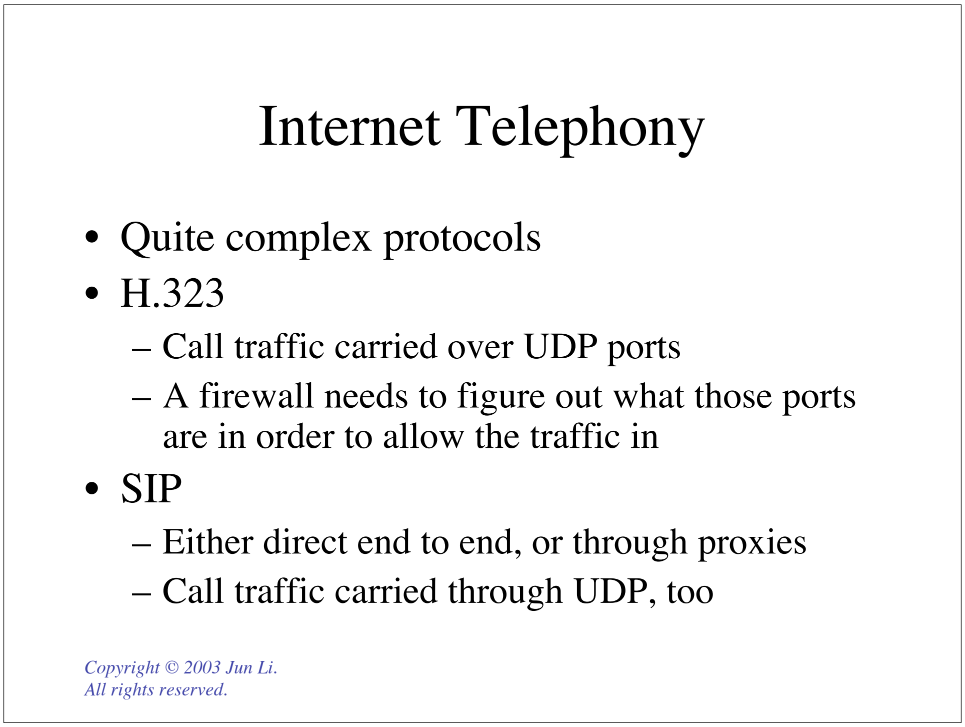
IMAP

- Another protocol that provides remote mailbox access
  - Client and server can synchronize state
  - More complex that POP
- Security Issues:
  - Refer to the course material



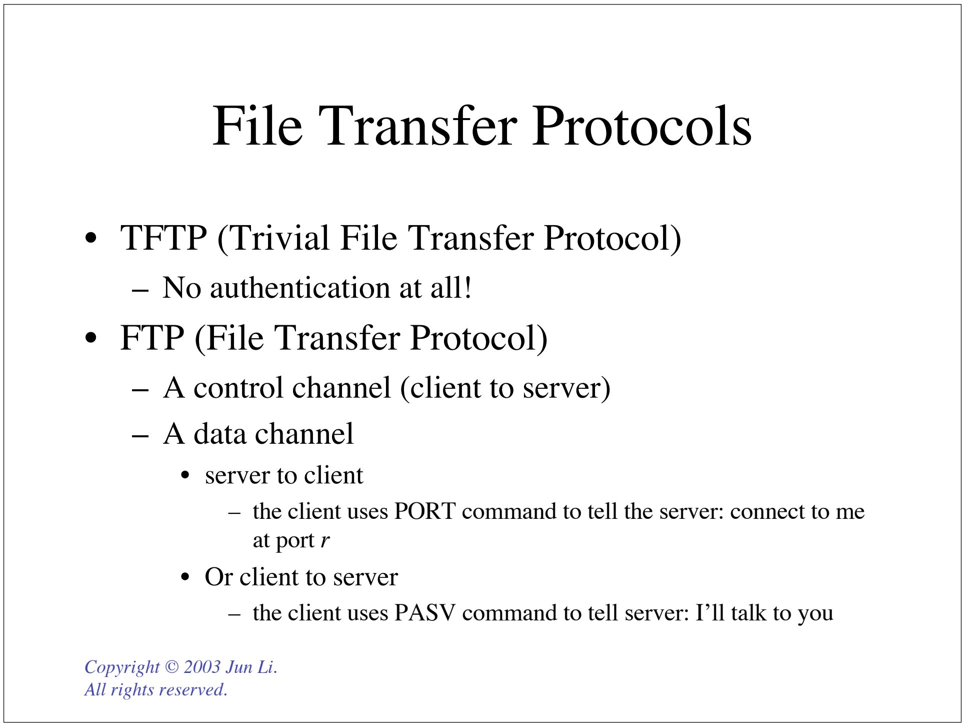
IM

- IM (Instant Messaging) is a popular service these days
  - Proprietary protocols are used
- One security issue is the leakage of personal schedules and other info
- You probably cannot be sure who you are really chatting with
- Other security issues?



Internet Telephony

- Quite complex protocols
- H.323
  - Call traffic carried over UDP ports
  - A firewall needs to figure out what those ports are in order to allow the traffic in
- SIP
  - Either direct end to end, or through proxies
  - Call traffic carried through UDP, too



File Transfer Protocols

- TFTP (Trivial File Transfer Protocol)
  - No authentication at all!
- FTP (File Transfer Protocol)
  - A control channel (client to server)
  - A data channel
    - server to client
      - the client uses PORT command to tell the server: connect to me at port *r*
    - Or client to server
      - the client uses PASV command to tell server: I'll talk to you

FTP Security Issues

- Anonymous FTP area should NOT be writable
- Should not have files like /etc/passwd there
- What else?

Peer-to-Peer Networking

- All nodes are equal
  - Quite some legal issues, as you know
- Security Issues:
  - Seems every participant must be protected!
  - Seems every participant could be malicious
  - Wrong files being offered
  - Often need to allow a supplier to install and run arbitrary programs
  - What else?

The Web: Threat or menace?

- Web is hottest thing on the Internet
  - But may be one of the greatest security hazard as well