













 joining peer Alice must find another peer in Gnutella network: use list of candidate peers
Alice sequentially attempts TCP connections with candidate peers until connection setup with Bob
Flooding: Alice sends Ping message to Bob; Bob forwards Ping message to his overlay neighbors (who then forward to their neighbors...)
peers receiving Ping message respond to Alice with Pong message
Alice receives many Pong messages, and can then

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- setup additional TCP connections
- Peer leaving: see homework problem!





























## Client must contact server

- server process must first be running
- server must have created socket (door) that welcomes client's contact

## Client contacts server by:

- creating client-local TCP socket
- specifying IP address, port number of server process
- When client creates socket: client TCP establishes connection to server TCP

- When contacted by client, server TCP creates new socket for server process to communicate with client
  - allows server to talk with multiple clients
  - source port numbers used to distinguish clients (more in Chap 3)

## application viewpoint –

TCP provides reliable, in-order transfer of bytes ("pipe") between client and server

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## Chapter 2: Application layer

- 2.1 Principles of network applications
- 2.2 Web and HTTP
- 2.3 FTP
- **2.5 DNS**

- □ 2.6 P2P file sharing
- 2.7 Socket programming with TCP
- 2.8 Socket programming with UDP
- 2.9 Building a Web server

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