

## Chapter 2.5 P2P Applications

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### 2.5.1 Pure P2P Architecture

- There is no always-on server.
- End systems directly communicate with each other.
- Peers are *intermittently* connected and changes IP addresses often.
- **Examples:**
  - File distribution (BitTorrent)
  - Streaming (KanKan)
  - VoIP (Skype)

### 2.5.2 File Distribution Time

- How does P2P compare with client-server in terms of file distribution of a size  $F$  file from one server to  $N$  peers:
- Note that peer upload and download capacity is a *limited resource*.
- Note:  $u_s$  = server upload capacity.
- In the client-server architecture:
  - Server transmission must sequentially send  $N$  file copies.
  - The time to send one copy is  $F/u_s$ , so the time to send  $N$  copies is  $NF/u_s$ .
  - Client must download the file copies.
  - If  $d_{min}$  is the minimum client download rate, then the minimum client download time is  $F/d_{min}$ .
  - Thus, the time to distribute file  $F$  to  $N$  clients using the **client-server approach** is:  $D_{c-s} \geq \max\{NF/u_s, F/d_{min}\}$
- In the P2P architecture:
  - Server transmission must upload at least one copy, which has time  $F/u_s$ .
  - Clients must each download the file copy, which has min download time  $F/d_{min}$ .
  - Clients download a combined  $NF$  bits, meaning the max upload rate... (?)
- See example graph of client-server vs. P2P on slide 2-80.
- **TODO: Finish notes**