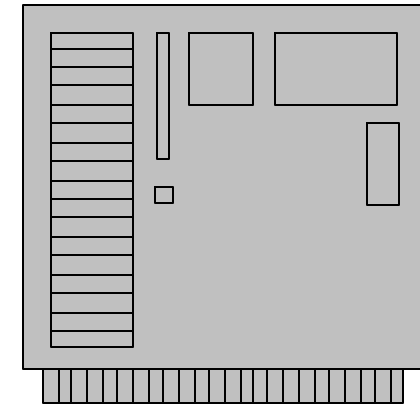
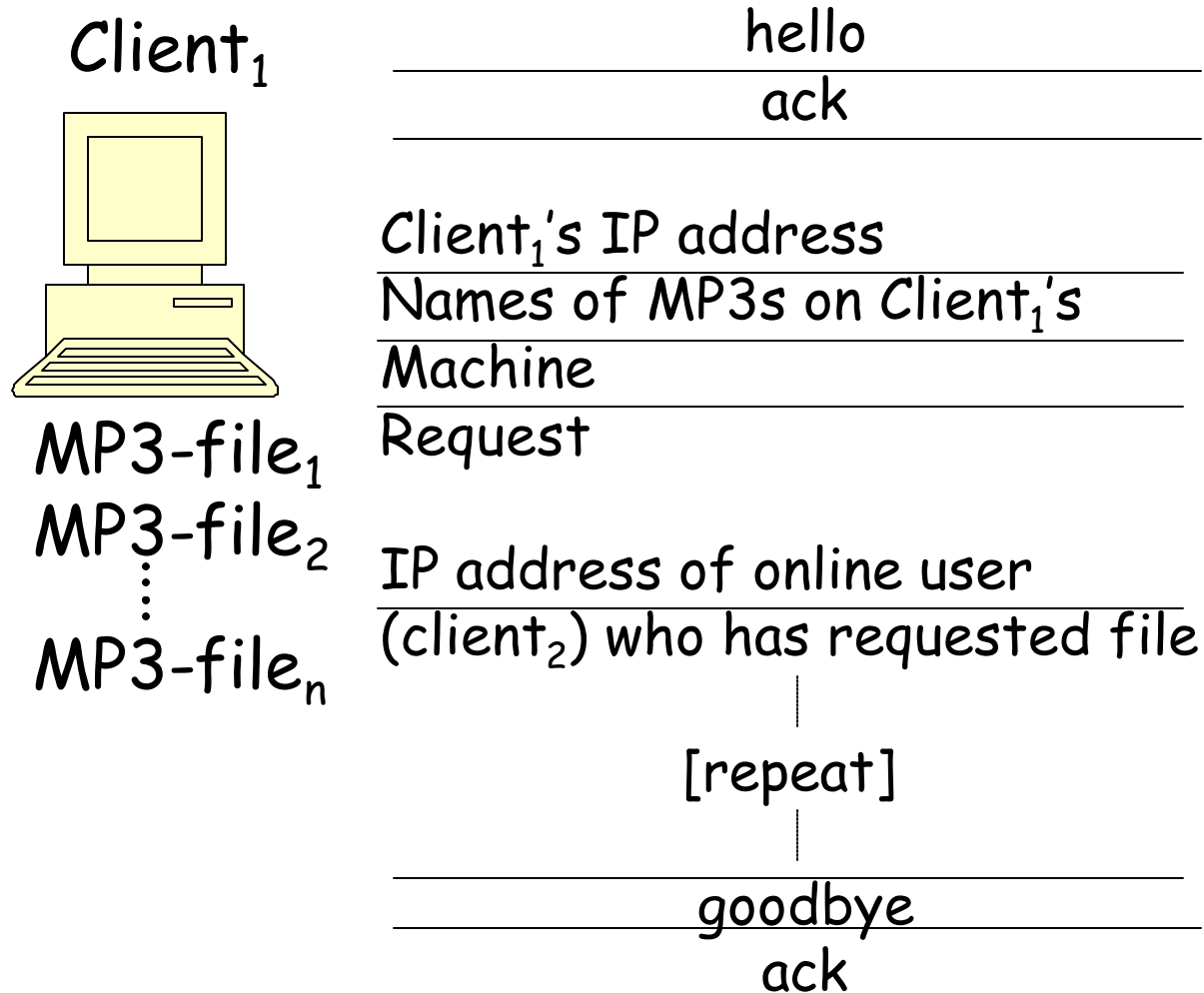


CS155a: E-Commerce

Lecture 8: October 2, 2001

**Business Models for Online
Content Distribution**

Napster Client-Server Interaction



Searches a db of currently online users for one that has previously stored the requested MP3. Adds client₁ and its list to db.

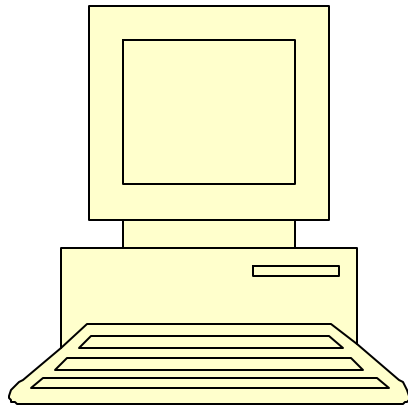
Removes client₁ and its list from db

Notes on Client-Server Interaction

- Proprietary protocol and db search.
- No MP3 files stored on server.
- Don't need usernames. Could have made the service anonymous.
- No need to save IP addresses between sessions. Many are assigned dynamically.
- Discussion point: Are anonymity and memorylessness threats or opportunities for business?

Napster Client-Client (P2P) Interaction

Client₁

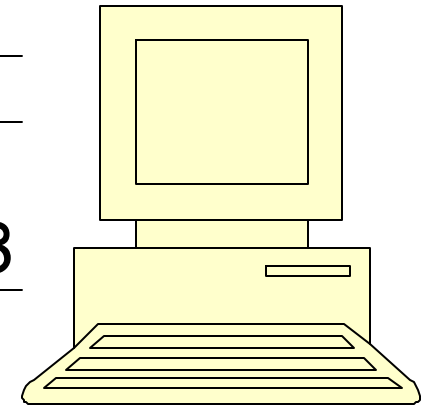


Client₁'s IP address

Request

Requested MP3

Client₂



Note: This part uses "standard Internet protocols," e.g., FTP

Napster History

- 1987: MP3 format developed by Karlheinz Brandenburg of Fraunhofer Gesellschaft. "CD ripping" now feasible.
- 1999: Shawn Fanning develops Napster, believing he has "bypassed" copyright law. Napster has >25M users in its first year.
- Dec., 1999: RIAA sues Napster for "contributory and vicarious" copyright infringement.
- April, 2000: Metallica sues Napster, Yale, Indiana Univ., and USC. (Yale bans the use of Napster within a week.)

Napster History, continued

- July, 2000: US District Judge Patel grants RIAA's request for an injunction. The injunction is temporarily stayed soon thereafter.
- October, 2000: Napster announces a partnership with Bertlesmann AG (one of the "major labels" in the industry whose trade association is suing it!).
- January, 2001: Napster and Bertlesmann say that they will roll out a "subscription service" by "early summer" and will use "DRM technology."

Napster History, continued

- February, 2001: Ninth Circuit upholds lower court's findings that Napster is guilty of contributory and vicarious infringement.
- Summer, 2001: Napster and Bertlesmann fail to roll out subscription service.
- September, 2001: Napster reaches a settlement with music publishers (but not with RIAA record labels). However, CNET.com reports the number of users has "dropped from tens of millions...to almost zero."

? Napster, R.I.P. ?

Gnutella P2P File Sharing

- "Pure Peer-to-Peer."
- Peers are called "servents."
- Servents communicate over standard HTTP.
- Goal is "total decentralization." In particular, no Napster-like server that "directs traffic," collects data, and otherwise centralizes control.

"A" Generates a Gnutella Request

- Creates
 - Search String **S**
 - (Unique) Request ID **N**
 - Time-to-Live **T**
- Sends (**A**, **S**, **N**, **T**) to all of its Gnutella neighbors.

"B" Receives Gnutella Request (A, S, N, T)

- If B has already received request N or $T=0$, B drops this request and does nothing.
- B looks up S in its local file system and sends (N, Result) to A.
- B sends (B, S, N, T-1) to all of its Gnutella neighbors, and it records the fact that A has made the request N.
- When B receives a response of the form (N, Result) from one of its neighbors, it forwards this response to A.

Gnutella Advantages and Disadvantages

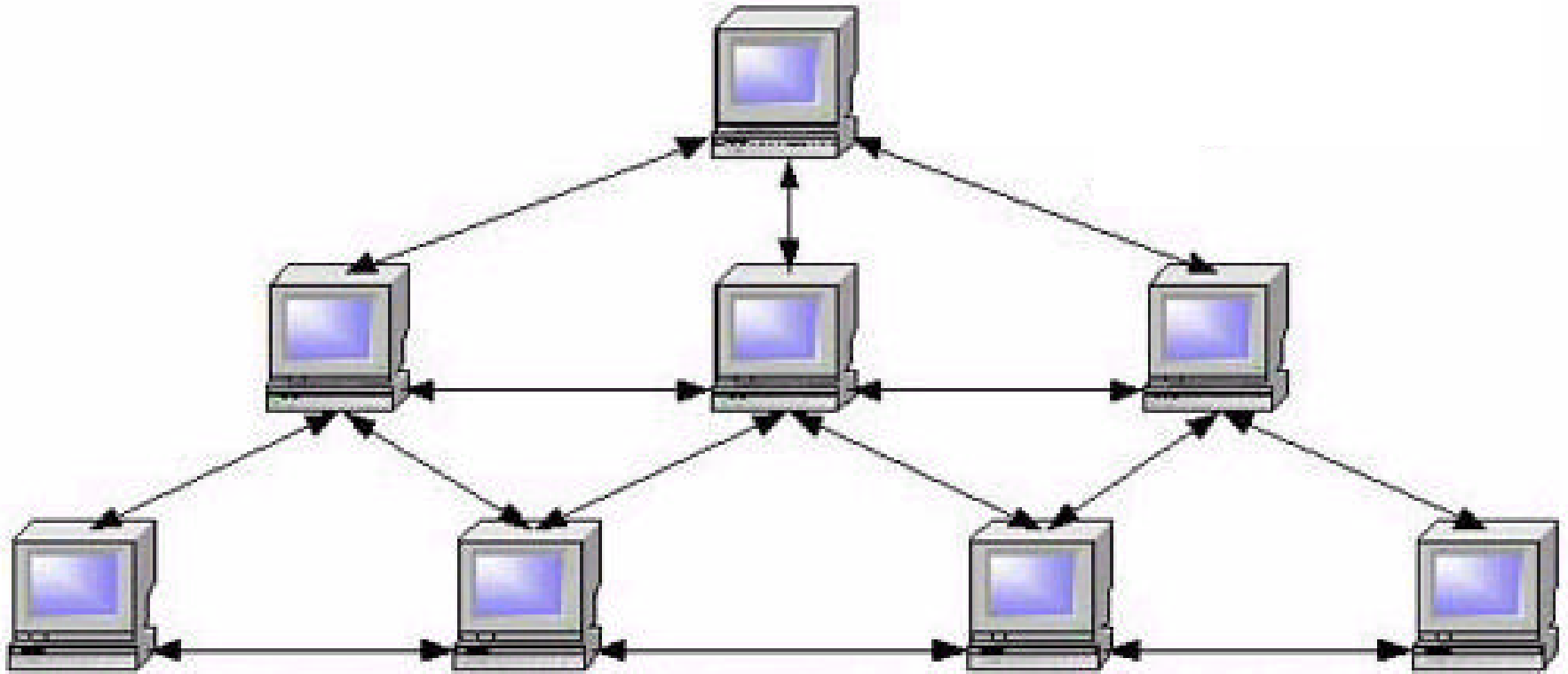
Main Advantage : "Search for S" can be done in many ways, e.g., structured database search, simple text matching, "fuzzy" text matching, etc. "Result" can take many forms.

Main Disadvantage : Inefficiency!

- "Flood" of Requests. If average number of neighbors is C and average TTL is D , each search can cause C^D request messages.
- Natural evolution into many barely-connected subnets, not one "user community."

Other Disadvantage : Request monitoring.

(Comes with standard HTTP.)



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Gnutella History

- Gnutella was written by Justin Frankel, the 21-year-old founder of Nullsoft.
- Nullsoft posted Gnutella on the Web, March 1999.
- Nullsoft acquired by AOL, June 1999.
- A day later AOL yanked Gnutella, at the bequest of Time Warner.
- People had already downloaded and shared the program.
- Gnutella continues today, run by independent programmers.

Freenet P2P File Sharing

- Works similarly to Gnutella. Exceptions include:
 - Intermediaries store all results. (Diffuses responsibility.)
 - Uses proprietary protocol. (Eliminates HTTP monitorability.)
- Launched by Ian Clarke (Univ.of Edinburgh) in 1997.
- Explicitly anti-censorship, anti-copyright, and pro-anonymity in its goals.

RealNetworks: An Internet Media Delivery Solution

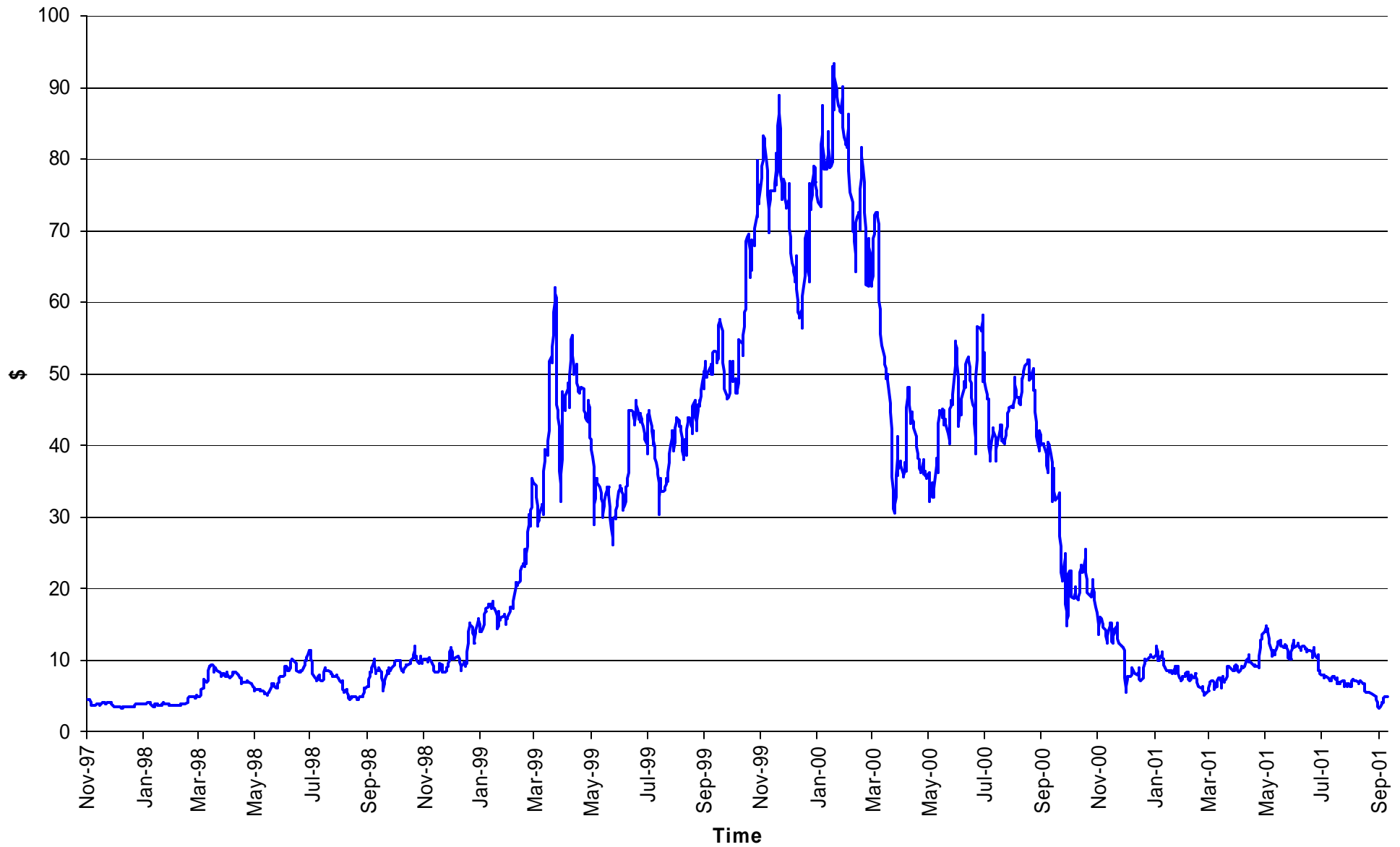
- Full Name: RealNetworks, Inc.
- Employees: 1,000
- Stock Price (**RNWK**):
 - \$5.04 (at close 10/2/01)
 - 52-week range: \$3.26 to \$42
- Earnings Per Share: **-\$0.68**
- Provides client and server software for streaming multimedia content over the Internet.



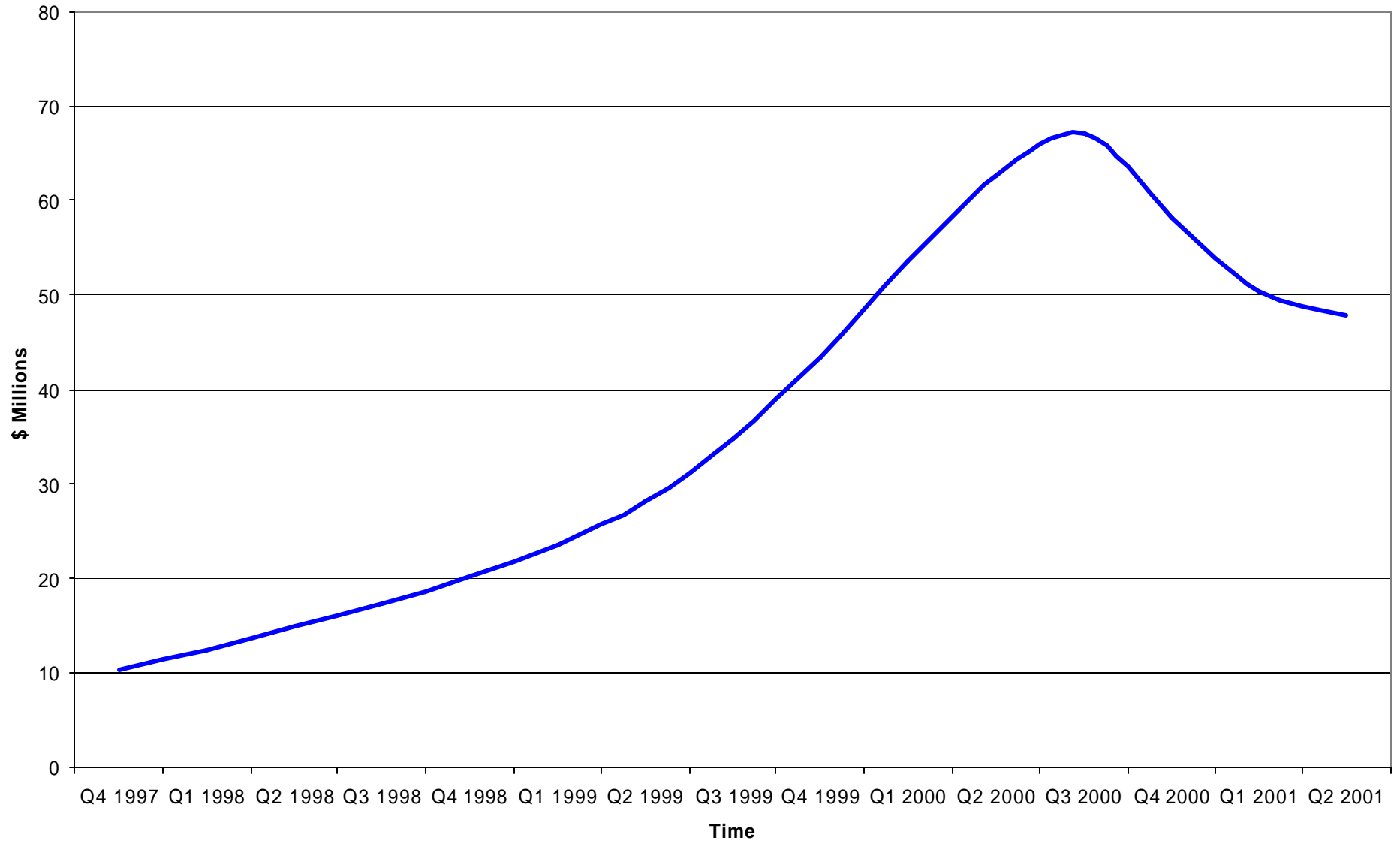
RealNetworks Overview

- Founded by Rob Glaser (as Progressive Networks) in 2/1994.
- Acquired Vivo Software in 3/1998, Xing Technology in 8/1999, and Netzip, Inc. in 1/2000.
- Went public in 11/1997; reached an all-time high (adjusted) price of \$93/share in 2/2000.
- Over 200 million registered users as of 6/2001; RealPlayer is installed on 95% of home PCs.

RealNetworks Stock Chart



RealNetworks Quarterly Revenues



RealNetworks Business Model

- The basic RealPlayer software is free. Users may pay a small fee (~\$20) for an advanced version with more features. Roughly 13% of the RealNetworks revenue stream comes from this.
- Roughly 35% of its revenue stream is from services and advertising.
- Roughly 50% of its revenue stream is from charging broadcasters of streaming data for the RealServer software.
- In summary, the (slightly oversimplified) business model is: Give away the player, sell the server!

Competition in the Market

- Microsoft's Windows Media Player (WMP) has become a competitor; it now offers functionality similar to RealPlayer.
- Microsoft has been very aggressive in its attempts to gain market share:
 - By **bundling** WMP with Windows, Microsoft incents users to use it instead of RealPlayer; it's one fewer program to download.
 - By signing **Windows-only deals with various radio stations** (including Boston's WGBH and New York's WNYC), Microsoft is forcing users to use WMP if they want to access these resources.

RealNetworks Maintains Dominant Market Share

RealNetworks has successfully maintained a dominant market share: **over 85% of the streams on the Web are RealNetworks-encoded.**

- Unlike what Netscape did with its browser, **RealNetworks gave away the player for free from the beginning.** This was crucial in establishing such a large user base in the first place.
- While Microsoft's content-distribution is just limited to one OS (Windows), **RealServer runs on 11 different OSs.** Because Windows servers make up only about 20% of the publicly accessible Internet, this poses a significant bottleneck for Microsoft.

"Daft Club" Model

Purchase Daft Punk CD and you also get a "personalized code" that gives you access to the Daft Club server. From it you get:

- Ability to download a new Daft Punk "bonus track" each month. The bonus tracks are not released on CDs.
- Access to the rest of the Daft-Club user community.

Bonus tracks will be wrapped with DRM metadata that says they can't be copied. Almost surely circumventable, but would many people bother circumventing?

“Napster++ as Superdistribution” Model (Napster--??)

- Napster users pay monthly subscription fee.
- They can download DRM-wrapped songs from Bertlesmann server. (And other labels if others also settle.)
- When they redistribute via P2P file sharing, they get rebates on their next month's subscription fees. DRM system keeps track.
- They retain the chat-room, “Napster community” network effects.

Again, probably circumventable. But is there a price point at which circumvention would not be worth it?

"Street Performer" Model

Novelist gives chapter 1 to publisher and promises rest of book after she is paid $\$X$.

Publisher posts chapter 1, collects payments, issues signed receipts to customers ("donors"?).

If publisher collects $\$X+Y$, he gets rest of book from novelist, posts it, gives $\$X$ to novelist, and keeps $\$Y$.

If he collects less than $\$X+Y$, he sends refunds to customers. Also, if novelist doesn't deliver rest of book, she gets bad publicity and customers get refunds.

"Street Performer" Model (Cont.)

Many variations:

- New author gives first book away.
- Non-anonymous big donors
- Some publishers "edit" and choose, and some don't.
- Famous authors don't have to deliver chapter 1 in advance.

"Hum A Few Bars" Model (K. McCurley, Financial Crypto '00)

"I listen to music in the living room, in the office, in the car, in the shower, and while jogging. I want the music companies, consumer-electronic companies, and data-networking companies to wire these environments so that I can hum a few bars and get the song I've hummed looked up, retrieved from their databases, and piped into my speakers. I'd expect to pay one monthly fee, as I do for cable TV."

JF Note: Can be "all streaming"; no need to clutter your living room floor or your computer disk with a "CD collection." Music will be purely a service, not a product.

Notable Business-Model Components

- + Buy one song at a time (cheap!).
- ? "Lock" content to user.
- "Lock" content to device(s).
- "Play k times."

(+ / ? / -: Just my guesses.)

Reading Assignment for October 4, 2001

Chapters 3 and 4 of "Blown to Bits,"
by Philip Evans and Thomas S.
Wurster.