

**Economics of Networks**

**Networks, Telecommunications, and Strategic Issues in Digital Convergence**

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**Preliminary Course Description**

This course analyzes the economics of networks, telecommunications, the Internet, and related industries, including cable television. We study in-depth the economics of monopoly and oligopoly as applied to network industries, including telecommunications markets and the Internet. We study key strategic decisions of companies in network industries. We analyze a firm’s decision whether to provide products that are compatible with those of competitors, or to engage in technical standards wars such as VHS vs. Beta in video players, Windows vs. Mac vs. Linux in operating systems for PCs, MP3 vs. WMA vs. RealAudio in digitized music, and HD DVD vs. Blu-Ray. Among others, we discuss technology transitions in information delivery with particular application to electronic music delivery and video delivery through Netflix. In telecommunications, we study the evolution of the industry, paying special attention to the crucial antitrust intervention that resulted in the 1981 breakup of AT&T and to the reform attempted by the Telecommunications Act of 1996. We discuss traditional telecommunications markets, including long distance, local, and international; “new” telecommunications markets including cellular and PCS; and “emerging” telecommunications markets based on the Internet (“VOIP”), as well as electronic commerce. We analyze the current wave of mergers and consolidation in the industry from the perspective of “digital convergence” and predict the framework and direction of industry change. We also discuss antitrust and public policy issues in network industries, focusing on the Microsoft antitrust case among others.

**Invited Speakers**

- Vint Cerf, Internet Evangelist, Google, father of the Internet (invited)
- Ira Rubinstein, NYU Law School, former Microsoft (invited)
**Requirements.** This course is intended for MBA students who have completed the core microeconomics course. Law students may take the course with consent of the instructor. Students are expected to participate in class. Students will submit a paper in lieu of a final exam. After the midterm, student groups will start presentations on the preliminary versions of their final paper.

**Readings.** There are no required textbooks. We will rely on the package of notes and readings that is available to download. The following books may also be helpful and are kept on reserve in the library.


**Outline**

A. **Unregulated Network Markets**

1. **Introduction and Discussion of Digital Convergence** (1/2 week)
   - What is the information superhighway
   - What is digital convergence, what markets it affects and how

   **Readings**

2. **A Primer on the Economics of Oligopoly and Networks** (2 weeks)
   - Perfect competition
   - Concentrated markets; monopoly; oligopoly; market power
   - Horizontal and vertical relations between markets
   - Network economics
- Network effects
  - Nature and causes
    - Complementarity
    - Technical compatibility
    - Networks and network structure
- Market structure with network effects
  - Upward-sloping demand curve
  - Critical mass
  - Fast expansion of new networks compared with non-network innovations
  - Winner takes most: extreme inequality in market shares and profits in network industries
  - Importance of installed base
  - Lock-in and path-dependence
  - Entry barriers
  - Examples / cases
    - Compatibility
    - FAX
    - Voice Telecommunications
  - Incompatibility
    - Beta v. VHS
    - CD v. LP
    - Windows vs. Apple OS vs. Linux
    - PC audio formats (MP3, WMA, AU, RM, etc.)
    - Video formats (MPEG, AVI, WMV, etc.)
    - IM formats
    - New DVD formats (Blu Ray, HD DVD)

**Readings**
- Class notes 1
- Class notes 2
- Network Economics Slides

3. **Antitrust and Regulation** (1/2 week)
- Main antitrust laws
  1. Sherman Act, Clayton Act; FTC Act;
  2. Horizontal Merger Guidelines
- Sectoral Regulation
- Application of antitrust law to telecommunications
Reading

4. **Application of Network Economics to the Computer Industry** (1 week)
- The market for operating systems for personal computers
  - The role of compatibility
  - Microsoft
    - Antitrust suits (US and EU)
    - Allegations
    - Defense
    - Rulings
    - Remedies

Readings
- Presentation on the Microsoft Antitrust case
- The Microsoft Antitrust Case For MBA Students
- NYU conference on US v. MS, including streaming video of all presentations featuring (among others) Assistant Attorney General for Antitrust Doug Melamed, NY Assistant Attorney General for Antitrust Harry First, Microsoft counsel Rick Rule and Former Solicitor General Boyden Gray
- Discussion on US v. MS on PBS TV with host Jim Goodale, Prof. Nicholas Economides, and Prof. Eleanor Fox, in streaming video, first broadcast on November 16, 2000
- Story in Wired magazine on Microsoft’s proposal for Apple allow clones

5. **The Internet** (1 week)
- Structure of the Internet; ISPs; servers;
- The Internet backbone
  - Structure
  - Pricing
  - Competition issues
  - Information portals: Google, Yahoo, etc.
- Local Internet access
  - Net neutrality, two-sided pricing
  - Network management

Reading

- Cybersecurity
  Invited speaker

6. **Electronic Commerce** (1/2 week)
   - Facilitation of transactions
   - Information goods
   - Content dissemination of information goods
     - Dissemination of video content
   - Electronic money and payment systems

   **Reading**
   - Class notes

7. **Technology Transitions in Information Delivery** (1 week)
   - Netflix vs. traditional movie rental
   - Electronic distribution of music
     - Piracy
     - Peer to peer; Napster and Torrent

   **Readings**
   - The Music Industry and the Internet, HBS case
   - Netflix, Stanford case

B. **Regulated Network Markets: Telecommunications**

8. **Structure of the Telecommunications Network and Markets** (1 week)
   - Types of telecommunications and related services
   - Markets and relationships across markets; pricing
   - End-to-end (final services) markets
   - Residential
   - Business
   - Voice
   - Data
   - Internet
   - Price discrimination
   - Intermediate markets; termination access; resale
   - Equipment markets

   **Readings**
   - Class notes

9. **History of Telecommunications** (1/2 week)
   • Invention of the telegraph; facsimile; race to standardization
   • Invention of the telephone; early years
   • The years of competing telephone networks
   • Consolidation into AT&T and GTE

**Readings**

10. **Cable Television** (1/2 week)
   • History; deregulation and re-regulation
   • Fiber to the home and fiber to the curve
   • Bundling of channels
   • Bundling of cable TV and phone services

**Reading**

11. **Government Intervention and Antitrust Actions Against AT&T** (1 week)
   • Creation of the Federal Communications Commission (1934)
   • Regulation of telecommunications and Cable
   • The Kingsbury commitment
   • US v. Western Electric (1949)
   • Breakup of AT&T
• Modified Final Judgment; restrictions on companies in the lines of business they can participate
• Vertical price squeeze; why local telephone companies were not allowed in long distance

Reading

12. The Post AT&T-Breakup Years (1984-1996) (1/2 week)
• Long distance market becomes competitive
• Wireless markets become prominent
• Local exchange carriers are unexpectedly profitable
• FCC auctions spectrum for pagers and cellular phones; PCS is introduced
• Broadband spectrum auctions; PCS

Reading

13. The Telecommunications Act of 1996, its Implementation and the Current Wave of Mergers and Consolidation (1 week)
• Logic of the 1996 Act
• Entry into local service; Sections 251, 252
• Entry into long distance service; Sections 271, 272
• Universal service; new way to raise the subsidy
• Guidelines for the implementation of the Act
• The failure of the implementation of the 1996 Act
  • Legal disputes
  • FCC; PUCs
  • Federal and State courts
• Intermodal competition

Readings
• The Telecommunications Act of 1996

14. Mergers, Consolidation and Spinoffs; the Future Telecommunications Landscape
RBOC Mergers
- SBC-Pacific Bell
- Bell Atlantic-NYNEX
- SBC-SNET
- SBC-Ameritech
- Bell Atlantic-GTE forming Verizon

Long Distance and Other Mergers
- Qwest-LCI
- MCI-WorldCom
- AT&T-TCG
- AT&T-TCI
- AT&T-MediaOne
- Qwest-US West
- MCI-WorldCom with Sprint (failed, not receiving antitrust approval)
- AT&T breakup (into AT&T, AT&T wireless, and AT&T Broadband)
- AT&T Broadband-Comcast

RBOCs with Long Distance Carriers
- SBC-AT&T
- Verizon-MCI

Wireless Mergers
- AT&T Wireless-Cingular
- Sprint-Nextel

Mergers Across Media
- AOL with Time-Warner