Commercial Private Networks

Some of the private commercial networks that were developed in parallel with advances made to the Internet

James Tam

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Comparison Of The Day's Transfer Times

CPSC 231 code examples <1 MB

CPSC 233 code examples 1.5 MB

Transfer times (seconds)

Bits/second	Bytes/second	1 KB file	1 MB image	10 MB video
100	12.5	80	80000	800000
300	37.5	26.67	26666.67	266666.67
1200	150	6.67	6666.67	66666.67
2400	300	3.33	3333.33	33333.33
64000	8000	0.13	125.00	1250.00

Transfer times (minutes)

Bits/second	Bytes/second	1 KB file	1 MB image	10 MB video
100	12.5	1.33	1333.33	13333.33
300	37.5	0.44	444.44	4444.44
1200	150	0.11	111.11	1111.11
2400	300	0.06	55.56	555.56
64000	8000	0.00	2.08	20.83

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Early Commercial Networks (~Late 1970s-1980s)

- CompuServe
- The Source
- Gameline
- Quantum Computer Services/AOL

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CompuServe

Image: www.chw.net

- Classmates Jeff Wilkins, John Goltz set up a time sharing service: CompuServe Networks Inc. as a part of the Golden United Life Insurance company.
- Goltz served as the first president.
- The network was built using lines that were leased from AT&T.
- Using proprietary network hardware and software their network outperformed AT&T's.[1]
- Unlike traditional timeshare, CompuServe developed programs that were installed on CompuServe's computers and managed by their staff.
  - Clients paid extra to use them.

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1 "On the Way to the Web" (Michael A. Banks, Wiley 2008)

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CompuServe

www.radford.edu James Tam

CompuServe

- Also experimented with providing information products:
  - Database: an extensive list of consumer merchandise.
- The company was successful, and the only flaw was that 50% of the time the network was idle.
- Microcomputer users (available since the early 1970s) became a market.
  - People bought modems with the microcomputers even though there was very little to connect to (e.g., transfer files from a friend's computer): 110 – 300 bits per second.
- At the same time prices of mainframes began to drop sufficiently so companies began to buy rather than timeshare.

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CompuServe

- CompuServe had idle computers and a local phone number in almost every city.
- Wilkins saw three things to draw in microcomputer users to CompuServe:
  1. Speed and power of the mainframes.
  2. Storage: at the time no one made hard drives for micros (and floppy drives cost almost as much as the computer ~$500) so most data was stored on tape.
     - CompuServe's mainframes used several 20 MB hard drives (wow!)
  3. Communication: email and a public bulletin board system where users could read and leave public messages under different threads.
  4. The ability to purchase and download software (no computer store could stock them all so CompuServe would provide greater selection).
     - In those days games were text only like Star Trek and Adventure (so you had to use your imagination) making the game sizes significantly smaller.

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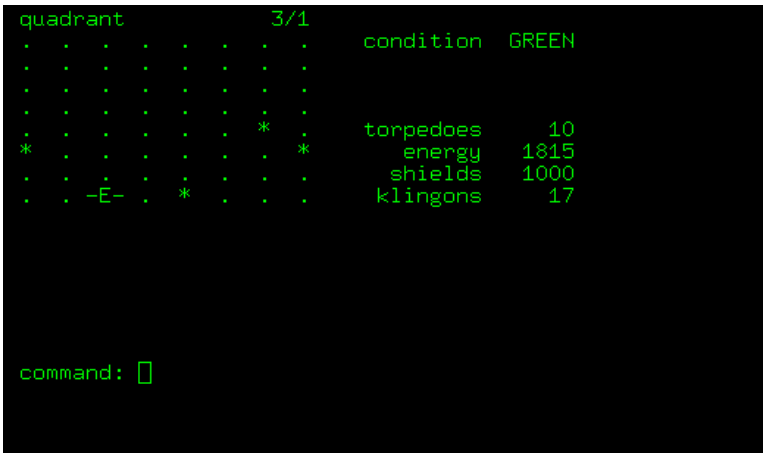
CompuServe

- Example online offering (simulation).



www.en.wikipedia.org

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CompuServe

- The initial user group consisted of technically-minded people ('geeks') who could/would program for the network.
  - At first they tried free access for these early adopters.
- In 1979 they implemented pay only: $9 startup fee, $5/hour during off hours, $12/hour primetime.
  - 100 bps (regular), 300 bps (premium) – eventually this was upgraded to 1,200 bps (wow!)
  - (In those days $3 – 4 would pay for a movie).
- It was a command line interface like the micro computers of the time (menu interface developed quickly when more users connected).

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The Source

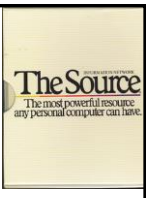

Image: en.wikipedia.org

- Founded by Bill Von Meister.
- Technical whiz kid:

Tam

- An entrepreneur (at least at the beginning)
  - He started **9 companies in 10 years**, the **longest that he stayed was 2 years** and was **forced out of most of them**.
  - He like the excitement of starting a new company but not the drudgery of running one.
    - "Serial CEO" (term by Tam)

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The Source

- Envisioned a system: InfoCast (sometime after 1978 when FCC legalized the public piggybacking of digital data on FM radio broadcasts):
  - Send news, weather, business, sports reports from a central location to FM stations around the country via PSN's (packet switched networks) and phone lines.
  - The company DBC (digital broadcast corporation) was formed to produce and market InfoCast.
- Homes would receive broadcasts through rented receivers.
- Users would be able send data and even exchange messages.
- Jack Taub and Consolidated Industries of America provided financial backing (1978).

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The Source

- Von Meister, soon realized that it wasn't feasible to outfit millions of American households with receiver/transmitters (and infrastructure – broadcast/decode)
  - It would require 100s of millions (dollars).
  - Wireless connections via cellular signals wasn't an option.
- He got GTE Telenet (later SpringNET) to provide their network on off peak hours.
- For Telenet their upfront cost was NIL (no risk).
- Customers would pay $100 signup fee and $4.60/off hour.
  - This was regarded as a bargain!
  - $100/hour for access to the New York Times Information Bank.
- CompuCon (Von Meister's network) was to provide but didn't create content (third parties like New York Times, Prentice Hall, Dow Jones would do so).

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The Source

- It provided information, messaging, games (all produced by others).
- Interface: choice of text menu or command line.
- It went live in late spring 1979 not as 'CompuCon' but as "*The Source*" (less technical…the source of…anything).
- It acted like the early web.

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The Source

- By Oct 1979 DBC (company behind the Source) was bogged down in $5 million in debt.
- Taub fired Von Meister.
- Also, there were technical problems: only 80 – 100 users could log on at a time, there were time lags of up to 10 seconds during peak hours.
  - Solutions were a year away.
- Some customers left for CompuServe, some returned back to the Source because it was familiar to them and there was a sense of community.
- Eventually Taub himself was fired from the Source but retained control of DBC.

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The Source

- Taub re-organized the company as NIU (National Information Utilities).
  - The system was to broadcast computer games and other programs. (There also might be the ability for subscribers to record their favorite TV programs for a fee).
  - But the idea went nowhere.
- Eventually CompuServe bought out the Source (memberships were terminated and members could become CompuServe members and get some free time).

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Gameline

- Von Meister thought of a gaming service (called Gameline) for a new company he founded - CVC (Control Video Corporation) - after leaving the Source/DBC.
- The Atari 2600 was a game console that was released in the late 1970s.

- Von Meister envisioned an oversized **cartridge** for $60 that would plug into the console and the cartridge contained:
  - A modem (dials a toll free number) and download data
  - Memory so it could store a game for (cost $1) as well as transmit joystick and trigger movements back to Gameline's mainframe computer.
  - The Atari market was huge ~13 million in the US alone!

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Gameline

- The game would remain on the machine until it was shut off or another game was downloaded.
- (Theoretical benefits):
  - Gamer: got to try out many games (games cost ~$40 or more each).
  - Game companies would get royalties.

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Gameline

- Problems:
  - None of the game companies would provide the executable for their games (so it could be downloaded) so games had to be reverse engineered.

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1 "On the Way to the Web" (Michael A. Banks, Wiley 2008)

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Gameline

- 1983: Steve Case was hired by Gameline.
  - He was the younger brother of a major Gameline investor (hired to watch over Von Meister - and his spending).
  - Case knew nothing about computers aside from a college course that he took years ago (and he hated it).
  - Intelligent but quiet and thoughtful.
    - Washington Post Reporter Michael Schrage who covered the company once called Case "…the least quotable human at the company…"
- Later problems
  - May 1983 Atari announced it had lost a billion dollars in the first quarter of 1983 (it was the first business to lose so much money in so short a period of time).[1]
    - Gameline's success depended entirely on Atari's sales.

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1 "On the Way to the Web" (Michael A. Banks, Wiley 2008)

Gameline

- (Problems with Gameline and CVC continued)
  - The 2600 console was old and Atari was focusing on the Atari 400 computer to keep up with newer gaming consoles.
  - Developers were producing discounted cartridges.
    - Problem for Atari: it discounted console prices so it was counting on the cartridge sales).
- Eventually CVC closed down.

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Quantum Computer Services

- CVC was reincarnated on May 1985 as Quantum Computer Services with a deal with Commodore for an online service.
- Quantum was down to 10 employees, but to ramp up the Commodore service 15 new employees were hired.
- Nov 1, 1985, the new online service Q-Link went live. And people began logging on immediately.
- Q-Link had the usual online features: email, games, bulletin boards, file downloads, shipping, chat, news, SIGS.
  - There were many ambitious plans e.g., A Dungeons and Dragons Role playing MMORPG (Massive Multiplayer Online Role-Playing Game).
  - It charged $9.95/month and $0.08 a minute for most of the services.

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Quantum Computer Services

- (Q-link continued)
  - Network connections at300 – 1200 bps with access only after 6 PM weekdays (all day weekends).
  - Games were programmed in BASIC and assembly.
- Eventually Quantum finally got Apple to agree to a deal to develop and online service for them.
  - It helped that Q-Link was a graphical system that was regarded as the easiest online service to use.
- AppleLink-Personal Edition went live May 1988.
- Quantum marketed the service with ads and disks in computer magazines (foreshadowing AOL's free disk distribution campaigns).

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Quantum Computer Services

- PC-Link: was developed for Tandy's (Tandy Radio Shack) IBM-compatible computers and went online August 1989.
- The additional Quantum client resulted in problems.
  - Apple didn't like Quantum spending time on the PC version, they wanted major changes in the service: i.e., devote all their free time to Apple, they wanted Quantum to spend more on marketing…money that Quantum didn't have).
  - Before the end of 1989, just as the Macintosh version was to go online the plug was pulled on AppleLink-Personal Edition.
  - However the contract did not prohibit Quantum from running an Apple online service and this was done by retooling the software to exclude the Apple logo.
  - The Apple name couldn't be used so the new name: America Online was used for Quantum's online service.

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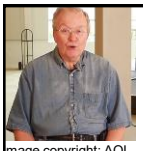

image copyright: AOL

AOL (America Online)

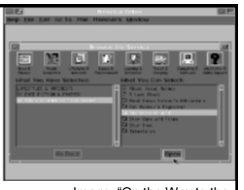

Image: "On the Way to the Web" (Michael A. Banks, Wiley 2008)

- America Online (named by Steve Case).
  - The Apple name couldn't be used so a new name was needed (reminder: previous name AppleLink)
  - (AOL: Case noted that many successful American companies had 3 letter names: IBM, MTV, GMC)
- Case decided that the service should be friendlier than others:
  - Elwood Edwards whose (wife Karen worked at AOL): "Welcome", "You've got mail", "File's done", "Goodbye" (voices could be turned off or substituted with other sounds).
- October 1989 America Online went online.
- Oct 1991: Quantum legally changed its name to America Online but more commonly known as AOL.

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AOL: Featured Game

Images: courtesy of Tam

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AOL Marketing

Credit: Jan Brandt / Internet History Podcast

- 1993 AOL marketer Jan Brandt (who developed a successful direct marketing campaign for children's books in a previous job) developed a direct marketing campaign for AOL.
- Initial test: Disks were sent to general mailing lists
  - Many weren't even computer users or they didn't own computers with modems.
  - The initial conversion rate was 10% (200,000 people at a cost of $250,000) much higher than the typical one of 1 – 2%.
- The marketing program that followed: The disks were not only mailed out but given out en masse: concerts, in stores, bundled with other products etc.. ("carpet bombing America with disks").

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AOL Marketing

- The campaign was successful.
  - As it turned out it was too successful!
  - AOL soon grew to 500,000 members.
  - This was so many that people couldn't log on when they wanted to or they experienced slow downs when they did .
    - AOL was referred to as AOH "American On Hold".
  - New members continued signing on.

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BBSs (Bulletin Board Systems)

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BBS Connections

- Microcomputer Bulletin Board Systems (BBS).
- The **connection wasn't to a network**, instead it was a **connection to another computer** via modem.
  - BBS software: accept calls, handle logins, transfer files, send emails (not always real time) and message boards.
  - 1978 first bulletin board set up by Ward Christensen and Randy Seuss (former eventually developed the Xmodem file transfer protocol): **CBBS** (Computerized Bulletin Board System).
  - By the late 1980s magazines like Popular Mechanics and Thrasher skateboarding magazine setup their own BBSs to complement or substitute for their presence on CompuServe or AOL.
- BBSs helped sell modems: BBS users outnumbered CompuServe and The Source users for many years.
  - Each BBS was small but there were so many of them.

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Image: www.sexysocialmedia.com

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BBS Connections (2)

- Modems and software became easier to use, costs drops which helped speed migration to online services and eventually to the Internet.
  - Early Internet users established their connections with modems (~2400, 14,400 bps)

	Bytes/second	1 KB file	1 MB file	10 MB file
2400	300	3.33	3333.33/55	33333.33/555
14400	8000	0.56	555.6/9.3	5555.6/92.6

- Some BBSs ran software (like FIDO and GTE PowerComm) formed the basis of national networks relaying information between nodes.
  - BBS users paid a small fee for the relay service but to some it was worth it to communicate with someone around the world.
- Direct dial to a network was faster than indirect connections via a PSN but a long distance charge must be paid.

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BBS Connections (3)

- Some of the largest boards were miniature versions of CompuServe or the Source (256 users at once).
- The release of the Web caused BBS membership to steeply decline and BBS companies who didn't became ISPs shut down.
  - Some BBSs have resurrected themselves and can be accessed via remote logins (e.g., telnet) instead of dialing with a modem.

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BBSs: The Canadian Connection

- DataPac: It was a (Canadian) regional network operated by Bell Canada and Northern Telcom.
- Nucleus: Started as Calgary based BBS with the goal of becoming one largest BBSs in Western Canada.[1]

1 https://baxtel.com/data-centers/nucleus-information-service

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Evolution Of The Networks

- Games:
  - Commercial games could be downloaded (sans packaging and manuals but with greater selection and lower cost).
    - ~Early form of Steam
  - Online gaming:
    - At first they were text only adventure, role playing games were available on CompuServe and the Source.
    - Later games with graphics were added.
- Online chat:
  - Jeff Wilkins (CompuServe CEO) didn't see its value at first.
  - Although it wasn't listed in the menu users could 'secretly' access the chat functionality (command line "go cb").
    - The number of 'secret' accesses was greater than expected.

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Evolution Of The Networks

- (Online chat continued)
  - When chat became the largest billing product it was finally added (officially) to the menu.
- Some members were hooked to the online world to the point that they couldn't pay their bill.
  - Some bills would reach $700 (movies were only a few dollars then).
  - A few members would disappear one month while paid down their bill (and return when the debt was paid).
- Although the term 'phishing' was not used then, there were occurrences of members impersonating system administrators to get access to another member's account.
  - The fake administrator would rack up charges on the compromised member's account.

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Evolution Of The Networks

- Interface:
  - Initially the interface was text and command line (32 or 40 columns x 16 lines)
  - Later menus (text) were added (but command line shortcuts still possible).
  - **Most online services**: GEnie, DELPHI etc.. focused on improving reliability and response time:
    - CompuServe stayed up (because of redundancies and good coding practices) when other services went down during the crash of 1987 (due to an earthquake)
    - GEnie included satellite links so 87 San Francisco users could still login even when links to all phone lines were down.
  - But the success of Q-Link and AOL proved that appearance and ease of use was just as important.
  - By the time that **ease of use issues were also addressed** (e.g., re:Source) it was sometimes too little, too late added to the Source (eventually bought out).

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Second Wave Of Online Networks

- MCI & AT&T
- Delphi
- GEnie
- Playnet

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MCI & AT&T

- MCI:
  - 1983 MCI Telecommunications launched its $100 million email service (the first large brand name company to establish an commercial online service).
  - It also pioneered email connection to the Internet (hired Vint Cerf for this project).
  - It built what would become the backbone of the Internet: The National Science Foundation Network (NSFNET) in the late 1980s.
- AT&T
  - AT&T responded with AT&T mail (similar to MCI) but added "Mail Talk"
    - 'Robot' read emails.
- These big companies had little effect on the online services like CompuServe (which provided more than just email).

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Delphi

Image: en.wikipedia.org

- (Named for the Delphic Oracle of classic Greek myth), its parent was General Videotext Corp (GVC).
- Delphi went live March 1983.
  - Provided online access to the Cadillac Modern Encyclopedia, news, weather, classified as well as gateways to other services
    - Shopping
    - 'Delphi Oracle' which would answer any question (often tongue in cheek).
- In 1984 other features were added which included: a chat, SIGS (*S*pecial *I*nterest *G*roup*s*).
- Set up local dial up numbers in major cities to reduce the (even minimal) cost of PSNs for a flat fee.
  - The customer could transition to a national service and pay regular Delphi rates.
- Throughout the 1980s it vied with the Source to be the second largest online service.

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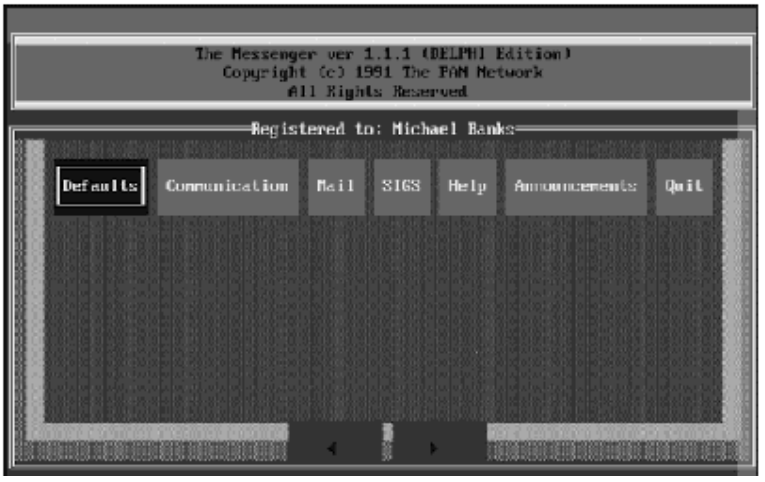
Delphi Front End Interface (Early Years)



"On the Way to the Web" (Michael A. Banks, Wiley 2008)

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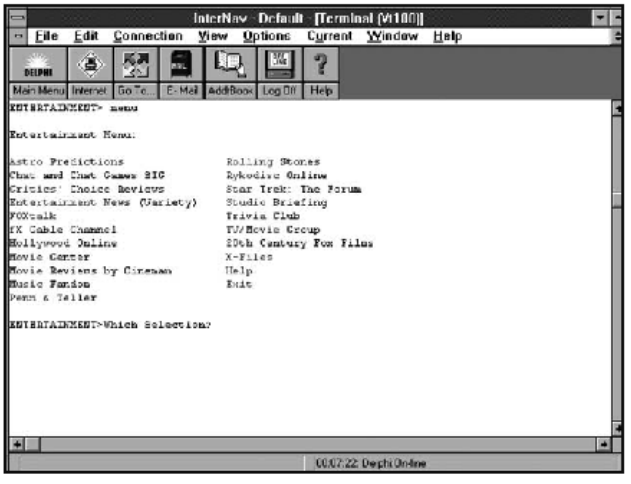
Delphi Front End Interface (Windows)



"On the Way to the Web" (Michael A. Banks, Wiley 2008)

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GEnie

Image: en.wikipedia.org

- GEnie (*G*eneral *E*lectric *N*etwork for *I*nformation *E*xchange).
- General Electric offered time sharing services in the 1960s under the name General Electric Information Services (GEIS).
  - At the time it was the biggest player in time sharing (40% of the market).
- GEnie went live October 1985 with some basic services: email, personal computing SIGs, news, weather and sports.
- The game offerings started out sparse but that would later change as online multiplayer games would become a major focus.
  - Multiplayer BattleTech! (MechWarrior I)
- It was half the cost of CompuServe at the higher speeds ($5 an hour at 1200 and 2400 bps).

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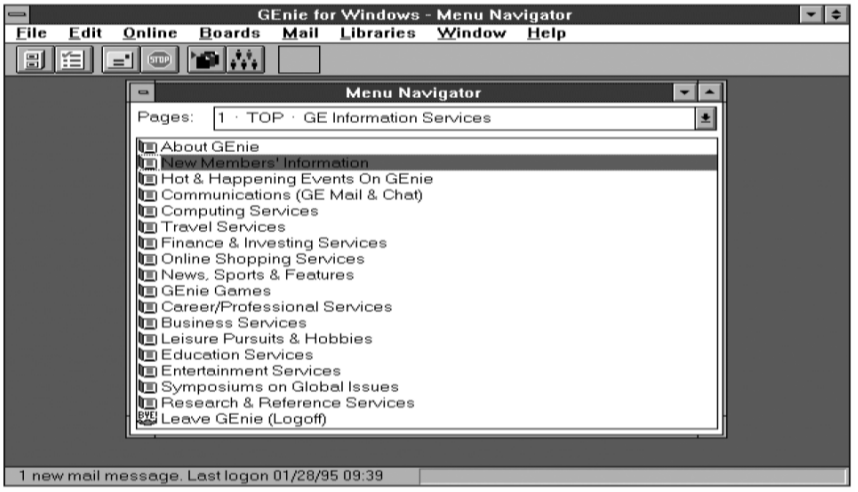
GEnie Front End Interface



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"On the Way to the Web" (Michael A. Banks, Wiley 2008)

Genie: Multiplayer Game (Probably)

http://massivelyop.com/2015/05/16/the-game-archaeologist-multiplayer-battletech/

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Image: www.c64world.com/playnet/

Playnet

- Howard S. Goldberg and David Panzl left General Electric in 1982 to found Playnet Inc. associated with Rensselaer Polytechnic Institute (RPI).
- Unique features: **graphics and color** (often used templates and graphical elements) were **loaded from disk** and combined in different ways so they *didn't need to be downloaded*.
- **Games and other programs were also on the user's disk**.
  - Playnet changes: the disks would be updated during a connection.
  - Playnet distribute the software on 3 disks (the only way to access).

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Playnet

- Development time (Playnet) took so long the software focused on Commodore computers (IBM and Apple versions planned).
- 1980s Commodore users = 3 million
  - In 1985 CompuServe had 130,000 subscribers, the Source had 40,000.
- 1984 Playnet opened and it offered: email, bulletin boards, chat and instant messages. There was also single and multi player games: checkers, poker, bridge etc..
- Compared to other services Playnet was regarded as a bargain: $29.99 signup (3 disks), $6 per month plus $2/hour.

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Playnet

- Commodore already had a very profitable deal with CompuServe, so Commodore didn't support Playnet much, but the latter still flourished.
- Playnet was a trailblazer: stunning Commodore graphics, multiplayer online games

www.feydakin.com

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Prodigy

- April 11, 1988: CBS, Sears and IBM released the service Prodigy with limited rollout in a few US cities.
- The national introduction was Sept but by then CBS had financial problems and dropped out.
- It was meant for non-computer modem users (just start the software and go).
- Prodigy advertised in magazines, newspapers and on TV but it was expensive ($1500 for Prodigy *to acquire a new customer* vs. $35 for GEnie and less than half that for CompuServe).
- Although it was on a computer (to eliminate the need for a TV top box) it looked just like TV graphics (even better than AOL).

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Prodigy

www.radford.edu

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Prodigy: MadMaze Game

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Prodigy

- Although it lacked in some things, Prodigy offered some innovations: flat rate pricing $9.95 per month, online shopping.
- Its membership grew quickly and by 1991 it had 600,000 subscribers second only to CompuServe's 750,000.
  - (Some said that Prodigy counted the 6 screen names issued to each subscriber or household while others said that Prodigy counted users who had left).

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Prodigy

- It made money through online ads at the bottom of each screen and from a portion of the sales made.

"On the Way to the Web" (Michael A. Banks, Wiley 2008)

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Prodigy

- It had great graphics and was fast because the most common accessed material was cached on a local machine in each city (assumed that most traffic would just be passive reading). Leased lines would transfer data for requested information between cities.
- But it didn't have any downloading, not even email or bulletin board text could be saved to disk.
- Prodigy was presented as a **family friendly place** that was open to everyone): sponsored summer picnics and rental amusement parks and invited all members.

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Prodigy

- Prodigy's software was a **closed system**: could not upload/download or save anything to disk (you had to memorize or manually copy down text, printing didn't work everywhere). Some screen capture software might miss some details.
  - (Prodigy wanted to avoid copyright violations).
- With a family friendly image Prodigy staff felt the need to control content:
  - In 1991 Prodigy began to censor boards (inspired by anti-Semitic comments copied from a private email message and the reply to those boards).
  - The post was deleted by staff but the poster attempted to repost several times but each time it was deleted.

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Prodigy

- (Prodigy and content control continued)
  - It became a big issue and eventually Prodigy censored all boards with certain words, posts with members names (in case you defamed someone), brand names were excluded (copyright).

$#*!
My Dad Says[1]

Female dog

Canada's national animal

  - But trying to control some posts incited other members to post even more offense material.
  - Prodigy had to pay a lot to hire censors.
  - Members retaliated by organizing mass mailings, adding a few words and then resending them.
  - Prodigy's telecommunications costs grew.

1 https://www.imdb.com/title/tt1612578/?ref_=nv_sr_srsg_0

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Prodigy

- Because of rising cost Prodigy had to go from flat rate to a usage-based model and people were unhappy (Prodigy's popularity fell).
  - Jan 1, 1991, 30 messages per month free after that $0.25 per message.
  - The flat rate was raised from $12.95 to $14.95.
  - "Prodigy sucks!" t-shirts rose in popularity.
- 1994: Prodigy implemented a chat that offered unlimited service with no surcharge.
  - Costs skyrocketed and Prodigy had to shut down the chat.
  - Out came the "Prodigy sucks!" shirts again.
- Eventually Y2K problems forced it to either spend more money or shut down and the latter occurred.

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1989 Memberships

- CompuServe 500,000
- AOL 100,000
- GEnie 100,000
- The Source 50,000 (eventually bought out by CompuServe)
- DELPHI 60,000

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1991 Memberships

- CompuServe 750,000
- Prodigy 600,000
- AOL 300,000

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Private Networks: 1990s And Beyond

- **In 1988** non-research, non-government, non-military 'civilians' were given **a public link to the Internet** through the FidoNET BBS network (BBS newsgroups).
- In **1990** several **more public links to the Internet** were created:
  - UUNET began operating as a non-profit source of Usenet newsgroups.
  - CIX in the UK began providing Internet email and newsgroups.
  - MCI, CompuServe, Sprint all had email links to the Internet.
  - 3 commercial ISPs were created: UUNET, PSINET, CERFNET.
- Usually access included email and newsgroups.
- The web wasn't widely popular until the Mosaic browser was released in 1993.

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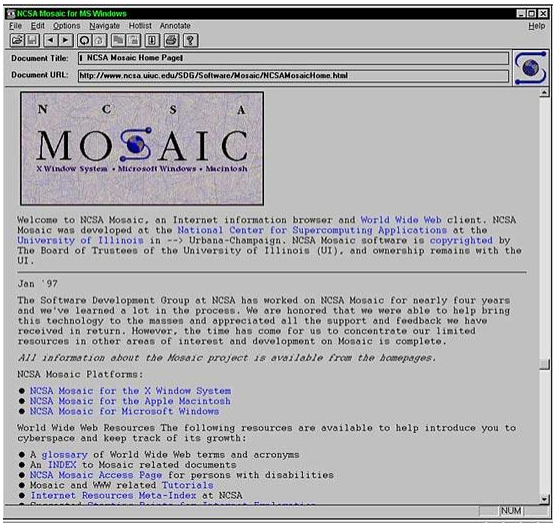
Mosaic Browser (1993)



www.wire.com

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Private Networks: 1990s And Beyond

- Although overt commercial use of the Internet was originally forbidden, in 1992 DELPHI found a legitimate reason to include it in its online offerings.
  - Nov 1992: Internet email added
  - Shortly after that Usenet, Telnet, FTP, MUDs and text-based web access was added.
  - There was a $3 surcharge per month for Internet access.
- 1993: The National Infrastructure Act was passed, which made access to the Internet as wide as possible (the restriction on commercial usage is relaxed).

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Private Networks: 1990s And Beyond

- 1993: all or most of the private networks began to offer an Internet connection in a piecemeal fashion.
  - First with email.
  - Later other services like Newsgroups and ftp were added gradually.
- The Internet was a fair learning curve for most users of private networks (a lot of configuration of your computer and memorization of steps).
- The web itself was a bit overwhelming in detail:
  - Which browser to use (unless preconfigured by the ISP).
  - What could and could not be done.
  - Determine how to collect email.
  - Where to find the interesting material online.
  - Etc.

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Private Networks: 1990s And Beyond

- AOL merged with Time Warner 2000 (eventually split 2009), was the largest ISP (2024: mostly a web portal).
- CompuServ acquired in 1998 by AOL (the latter) remained for a while as an ISP (2024: mostly a web portal).
- GEIS sold GENIE which was eventually shut down (GEIS was later sold by GE).
- DELPHI was sold to Rupert Murdoch's New Corporation (1993).
  - Some of Delphi's original management bought it back in 1996.

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Contrast: Internet Vs. Private Networks

- Pre 1990s, early 1990s:
  - Proprietary networks had millions of users, but the Internet was largely obscure.
- Private networks:
  - Controlled by one company (access, content).
  - More secure (illegal behavior and threats) but less innovation.
  - Users connected to a network like CompuServe through 'dumb terminals'
    - Could exchange data but not programs.
    - (Through specific carefully controlled cases they could download code, but that code was run separately from the dumb terminal software).

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Contrast: Internet Vs. Private Networks

- Internet:
  - Network built by researchers and government people with no central direction (no CEO, no business plan, no paying subscribers nor was there an interest in getting them).
  - …not designed to have mainstream dominance
  - Internet became so popular by "assuming that every user was contributing a goodwill subsidy: people would not behave destructively even when there were no easy ways to monitor or stop them".[1]
  - For the early years this assertion largely held.

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1 "The Future of the Internet--And How to Stop It" (Jonathan Zittrain, Yale University Press 2008)

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Private Networks Vs. Internet: Security And Software

PRIVATE NETWORKS

- The networks could not be programmed by users but software was centrally distributed by the administrators working for the company.
- The software only include what the company thought was economically viable (safer but restricts innovation for creating unexpectedly beneficial technology that could make money in a fashion not initially anticipated).

THE INTERNET

- Internet of the 1988 had no central control points to scan traffic for malware and stop the traffic.
- The end points of the Internet (user computers) could become infected because they were general purpose computers whose connection to the network was not strictly controlled via dummy terminal software.
- Sometimes the administrators of the endpoints didn't bother fixing software vulnerabilities or otherwise set up their network in a secure fashion (passwords easy to guess).

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Private Networks Vs. Internet: Security And Software

PRIVATE NETWORKS

- The networks evolved slowly with few changes being made: good or bad.
- Lacking in innovation and creativity: they were secure but some argue it was sterile vs. the Internet.

THE INTERNET

- Many of the early (and current users of the Internet) are even more ignorant and neglectful of good security practices).
- Reduced consequences in mid 1990s most users only connected via slow dialups that weren't always on (minimizing the impact of their computer being infected).

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Open Question

- Will the negative consequences stemming from the generic/open design of the Internet lead to more control?
  - State security and crime prevention.
  - Protection of intellectual property.
  - (To a lesser extent): Protection of individual rights vs. the right to freedom of speech.

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References

- "On the Way to the Web" (Michael A. Banks, Wiley)
- "**Trials and Errors"**
  - http://link.springer.com/chapter/10.1007/978-1-4302-0870-9_8

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After This Section You Should Know

- What were the early private commercial networks
- Who were the people behind these networks
- How did the private networks operate/what services did they provide
- When and how were these networks founded
- What happened to the networks now
- What were some of the distinguishing traits of the networks e.g., robustness, ease of use
- How many subscribers did each network have
- What issues did the network operators face during their operation (technical and otherwise)
- How did the private networks differ from the Internet

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After This Section You Should Know (2)

- How were the networks affected by the advent of public access to the Internet
- How did the operation of the private networks and the Internet differ in terms of safety and security
- What is a BBS
- How does a BBS operate and work

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