



The Internet: Technology Background

- Internet
 - An interconnected network of thousands of networks and millions of computers, linking businesses, educational institutions, government agencies, and individuals
- World Wide Web (Web)
 - One of the Internet's most popular services, providing access to over 50 billion Web pages

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Packet Switching

- Packet switching: Method of slicing digital messages into packets, sending the packets along different communication paths as they become available, and then reassembling the packets once they arrive at their destination
 - Uses routers (special purpose computers that interconnect the computer networks that make up the Internet and route packets) and routing algorithms to ensure packets take the best available path toward their destination

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Domain Names, DNS, and URLs

- Domain name
 - IP address expressed in natural language
- Domain name system (DNS)
 - Allows numeric IP addresses to be expressed in natural language
- Uniform resource locator (URL)
 - Addresses used by Web browsers to identify location of content on the Web

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Client/Server Computing

- Model of computing in which very powerful personal computers (clients) are connected in a network with one or more server computers that perform common functions for the clients, such as storing files, software applications, etc.

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Internet Network Architecture

- **Backbone:** High-bandwidth fiber-optic cable owned by a variety of NSPs
- **IXPs:** Hubs where backbones intersect with regional and local networks, and backbone owners connect with one another
- **CANs:** LANs operating within a single organization that leases Internet access directly from regional or national carrier
- **ISPs:** Lease Internet access to home owners and businesses

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ISPs (Internet Service Providers)

- Retail providers that deal with “last mile of service”
- Offer both narrowband (traditional telephone modem connection at 56.6 Kbps) and broadband (service based on DSL, cable modem, T1 or T3 telephone lines, and satellite)

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Broadband Service Choices

- **Digital Subscriber Line (DSL):** High-speed access through ordinary telephone lines
- **Cable modem:** Piggybacks digital access to Internet on top of analog video cable line
- **T1 and T3:** International telephone standards for digital communication; offer guaranteed delivery rates
- **Satellite:** high-speed downloads, slower uploads

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Who Governs the Internet?

- Organizations that influence Internet and monitor its operations include:
 - Internet Architecture Board (IAB)
 - Internet Corporation for Assigned Names and Numbers (ICANN)
 - Internet Engineering Steering Group (IESG)
 - Internet Engineering Task Force (IETF)
 - Internet Society (ISOC)
 - World Wide Web Consortium (W3C)

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Insight on Society: Government Regulation of the Internet Class Discussion

- How is it possible for any government to “control” or censor the Web?
- Does the Chinese government, or the U.S. government, have the right to censor content on the Web?
- How should U.S. companies deal with governments that want to censor content?
- What would happen to e-commerce if the existing Web split into a different Web for each country?

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Internet II: The Future Infrastructure

- **Internet II:** Second era of Internet being built by private corporations, universities, government agencies
- To appreciate benefits, must understand limitations of the Internet's current infrastructure
 - Bandwidth limitations
 - Quality of service limitations
 - Network architecture limitations
 - Language development limitations
 - Wired Internet limitations

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The Internet2® Project

- Internet2: Consortium of 200+ universities, government agencies, and private businesses collaborating to find ways to make the Internet more efficient
- Primary goals:
 - Create leading edge very-high speed network for national research community
 - Enable revolutionary Internet applications
 - Ensure rapid transfer of new network services and applications to broader Internet community

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Wireless Local Area Networks (WLANs)

- Wi-Fi: High-speed, fixed broadband wireless LAN. Different versions for home and business market. Limited range
- WiMax: High-speed, medium range broadband wireless metropolitan area network
- Bluetooth: Low-speed, short range connection
- Ultra-Wideband (UWB): Low power, short-range high bandwidth network
- Zigbee: Short-range, low-power wireless network technology for remotely controlling digital devices

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Development of the Web

- 1989–1991: Web invented by Tim Berners-Lee at CERN
- 1993: Marc Andreessen and others at NCSA create Mosaic, Web browser with GUI that runs on Windows, Macintosh, or Unix
- 1994: Andreessen, Jim Clark found Netscape; create first commercial Web browser, Netscape Navigator
- August 1995: Microsoft introduces Internet Explorer, its version of Web browser

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Hypertext

- A way of formatting pages with embedded links that connect documents to one another, and that also link pages to other objects such as sound, video, or animation files
- Uses Hypertext Transfer Protocol (HTTP) and URLs to locate resources on the Web

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Web Browsers

- Primary purpose to display Web pages
- Internet Explorer (75%) and Firefox (20%) dominate the market
- Other browsers include:
 - Netscape
 - Opera
 - Safari (for Apple)

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E-mail

- One of the most used applications of the Internet
- Uses a series of protocols to enable messages containing text, images, sound, video clips, etc., to be transferred from one Internet user to another
- Also allows attachments
- Can be an effective marketing tool
- Spam a worsening problem

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Instant Messaging

- One of fastest growing forms of online human communication
- Displays words typed on a computer almost instantly, and recipients can then respond immediately in the same way
- Different proprietary systems offered by AOL, MSN, Yahoo, and Google

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Search Engines

- Identifies Web pages that appear to match keywords (queries) entered by a user, and provides list of best matches based on one or more of a variety of techniques
- No longer simply search engines, but also shopping tools and advertising vehicles (search engine marketing)

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Intelligent Agents (Bots)

- Software programs that gather and/or filter information on a specific topic and then provide a list of results
- Types include search bot, shopping bot, Web monitoring bot, news bot, chatterbot

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Internet II and E-commerce: New and Disruptive Web Features and Services

- Blogs: Personal Web page that typically contains a series of chronological entries by its author, and links to related Web pages
- Really Simple Syndication (RSS): Allows users to have digital content automatically sent to them; typically used for news
- Podcasting: Audio presentation stored as an audio file and available for download from Web

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Internet II and E-commerce: New and Disruptive Web Features and Services

- Wiki: Allows user to easily add and edit content on a Web page
- New music and video services: Videocasts; digital video on demand
- Internet Telephony: Use Voice Over Internet Protocol (VOIP) and Internet's packet-switched network to transmit voice and other forms of audio communication over the Internet

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Internet II and E-commerce: New and Disruptive Web Features and Services

- Internet television (IPTV)
- Video conferencing
- Online software and Web services: Web apps, widgets and gadgets, digital software libraries, distributed storage
- M-commerce applications

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Some Vocab. You Need to Know

- ERP – enterprise resource planning
- EDI Electronic data interchange