Introduction to the Internet and Data Networking

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Introductions.

Go around the room – each person 1-2 minutes on:

1. Who they are?
2. Why they are here?
3. What do they wish to accomplish?

Goals of the Course

- **Week 1:** Gain a basic understanding of how the Internet was formed.
- **Week 2:** Understand the following networking concepts: LAN/WAN, Seven Layer OSI Model, TCP/IP.
- **Week 3:** Gather an overview of the various core technologies of Data Networking
- **Week 4:** Understand what companies, agencies, and organizations are helping to build the Internet today.
- **Week 5:** Have an ability to discuss the pros/cons of the Internet and why it will change the way we work, live, play, and learn.

Week 6 is open …

Possibilities:

HANDS-ON EXPERIENCE

CCNA Prep

Quiz Show Game with Teams

Final Exam

Suggested Readings

- **“Networking Explained”**
  by Michael A. Gallo, William M. Hancock (Paperback)
  Amazon.com: $35.96
  BarnesandNoble.com: $44.95

- **“CCNA: Cisco Certified Network Associate Study Guide”**
  by Todd Lammle (or anything from Sybex Press)
- **“CISCO Certification: Bridges, Routers & Switches for CCIEs”**
  by Andrew Bruce Caslow
- “**CCIE Professional Development: Routing TCP/IP”**
  by Jeff Doyle

Not required

Definition of "Internet"

- **On October 24, 1995, FNC Resolution:**
  - "Internet" refers to the global information system that --

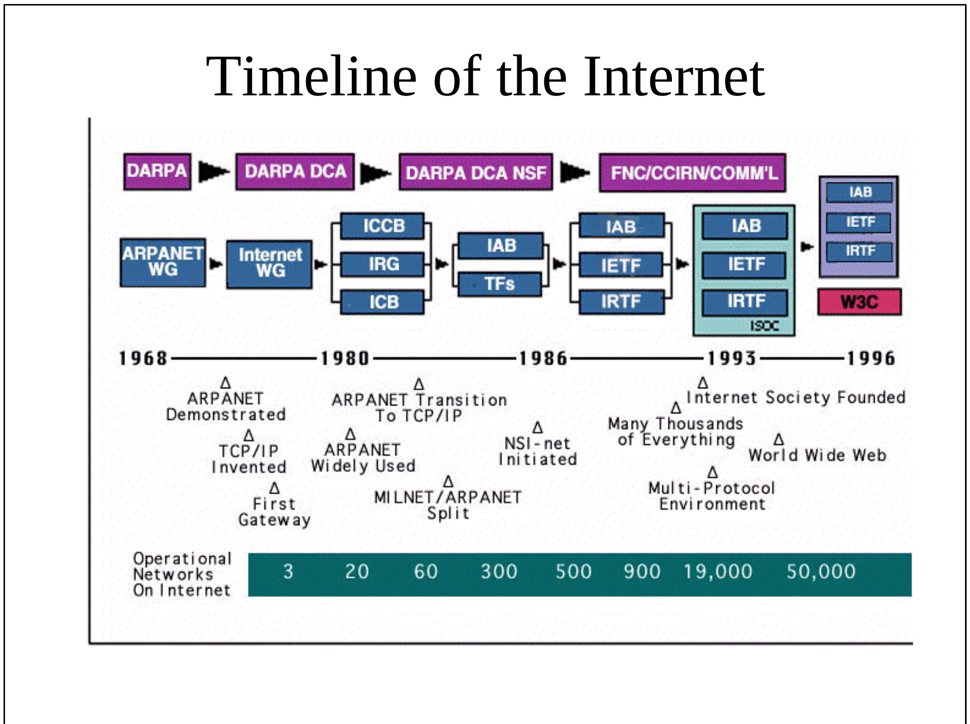
    (i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons;

    (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and

    (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein."

On October 24, 1995, the FNC unanimously passed a resolution defining the term *Internet*.

"The Federal Networking Council (FNC) agrees that the following language reflects our definition of the term "Internet".



1. How did the Internet get started?

The Internet's roots can be tracked back to 1957 when the US formed ARPA (Advanced Research Projects Agency) within the DoD (Dept of Defense). The formation of ARPA was the US' response to the USSR's launch of Sputnik – first artificial Earth satellite. ARPA's mission was to establish the US as the world's leading country in defense and military applicable science and technology. ARPA, later known as DARPA, established in 1969 an early internetwork called ARPANET. It was originally restricted to the military, defense contractors, and university personnel involved in defense research. ARPANET – first four node connections were Stanford Research Institute (SRI), UC at Santa Barbara (UCSB), UCLA, and University of Utah – ARPANET heralded the era of packet switching networking OR data networking as we know it today.

Other networks developed like BITNET, CSNET, CREN, UUCP (via FidoNet).

2. How did ARPANET become the Internet?

Around 1983, the academic and research science community convinced Congress that the US had to meet the Japanese supercomputing challenge. Around this time, Japanese government committed itself to a national goal of developing a computer capable of displaying common sense, possessing a general knowledge about how the world works, having insight into human nature, having a vocabulary of 10,000 words, and speaking & understanding English and Japanese, all by the end of the 1980s. In the US, Japan's goal was perceived analogous to the US's national goal of putting a man on the moon – SPACE RACE – US wins and claims a seemingly dominate position over USSR. Suffice it to say the Japanese supercomputing challenge was taken very seriously in the US.

So, in response, Congress authorized the National Science Foundation (NSF) to fund the construction and operation of U.S. supercomputer centers. By the end of 1985, six such centers were established throughout the country: San Diego Supercomputer Center, National Center for Atmospheric Research (Boulder, CO), National Center for Supercomputer Applications (Champaign, IL), Cornell Supercomputer Center (Ithaca, NY), John von Neuman Supercomputer Center (Princeton, NJ), Pittsburgh Supercomputer Center (CMU).

Next challenge for NSF was to get researchers across the country access to this Supercomputer Center Network. NSFNET was born – (now traditional) 3-tiered network design having a backbone, regional distribution network, and numerous campus networks. The backbone originally was based on 56 kbps leased circuits. From 1989 to 1992, the backbone was reconfigured twice to handle the increasing traffic loads – first T1 (1.5Mbps) then to T3 (45 Mbps). During the 80s, many other gov't funded organization built their own private networks that interconnected with NSFNET. These networks: NSFNET, ARPANET, MILNET, and SPAN (Space Physics Analysis Network from NASA), became known as the Internet.

WOW – so the Internet was born out of research and academic institutions funded by our gov't.

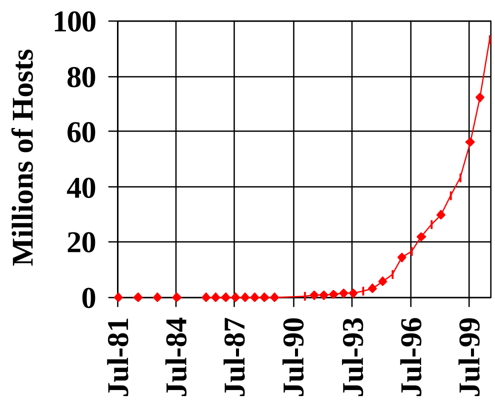
3. How did the Internet evolve from a research and academic network to one that is available to the general population?

By the early to mid 90s, a commercial Internet began to take shape, consisting of "20 percent bottom line" people instead of research and educational visionaries. During this period private Internet Service Providers (ISP) business were started by entrepreneurs who recognized the growing demand for Internet access by both the general public and the business community.

CIX, MAE, Sprint & MCI, AT&T, "mom and pops", etc.

Explosive Growth of the Internet
Almost Doubles (~1.5x) every Year.

Time vs. Internet Hosts



Number of Hosts

- Jul 00 93,047,785
- Jan 00 72,398,092
- Jul 99 56,218,000
- Jan 99 43,230,000
- …
- Jan 93 1,313,000
- …
- Aug 81 213

Sources:

www.mids.org - ***Matrix.Net, Inc. "Matrix Information and Directory Services, Inc. (MIDS) Established 1990: A pioneer of Internet commerce site***

www.isc.org - The Internet Software Consortium (ISC) is a nonprofit corporation dedicated to developing and maintaining production quality Open Source reference implementations of core Internet protocols.

Host growth

For close to a decade the size of the Internet has doubled every year. In *MMQ* 601 we noted that: It now appears that this growth rate is slowing somewhat. Careful statistical analysis reveals the beginnings of an ``elbow'' over the 1997-1999 period. At that time, growth had reached a factor of 2.1 prior to ebbing to 1.46. Incorporating the July 1999 data puts this factor at 1.5. The growth rate of the Internet is, indeed, slowing.

US Censur as of October 6, 2000

US Population Estimate: 275k People

World Population Estimate: 6.1b People

Percent of Host/People on Internet in the World: 1M/6.1B = 1.6%

RAW DATA FROM ISC.ORG
Date Hosts

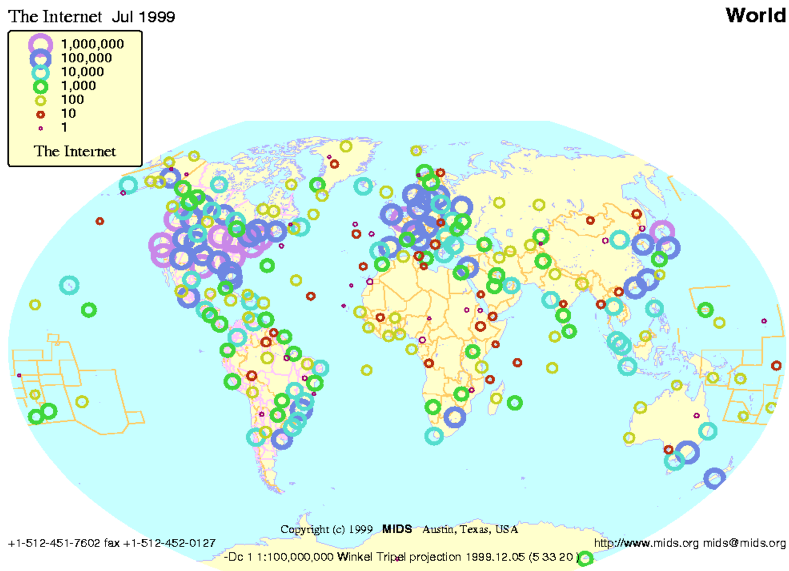
08/81 213 Host table #152

05/82 235 Host table #166

08/83 562 Host table #300

10/84 1,024 Host table #392

Internet Users in the World



This graphic shows that by continent:

North America (primarily US – 60%)

Europe

Asia & South America

Australia & Africa

Quick review:

1) FNC's definition of the "Internet" – information systems network that is grounded that addresses by IP and utilizes the TCP/IP suite.
2) TCP – Transmission Control Protocol
   IP – Internet Protocol
3) Internet – DARPA – ARPANET -> NSFNET -> Internet
   Defense Research, Gov't & Academic, Commericial, many predict the future will be consumer
4) Internet has 93 Million Hosts
5) Internet almost doubles in size every year
6) Continents: NA, Europe, Asia, SA, Australia, Africa