Internetworking Concepts

- Chapter 20

The Internet

- Internetworking: a collection of individual networks connected by intermediate networking devices that function as a single large network.
Internet vs. internet

The essence of the internet model:
- An internet approach hides lower layer details from the user.
- Provides universal service (i.e., interconnection) independent of the particular networks to which they are attached.

Circuit Switching Versus Packet Switching

Circuit switching
- Implies a dedicated path (Point to Point)
- Form the dominant technology for voice and for data (although this is changing)
- Virtual circuits
Packet Switching:
- Research began back in the 1960s.
- Application data (streams or messages) are chopped into pieces (i.e., packets)
- The network layer interconnection service knows how to get the packets to the correct destination.

- What are the advantages of PS over CS?
- What is the disadvantage?

Two approaches to packet switching

Datagram:
- Packets treated independently
- Network devices route data on a per packet basis

Virtual circuits (for packets!):
- Preplanned route is established before packets are sent.
- Network devices route on a VC basis (only done once).
The Internet

So what exactly does the Internet provide?

Defining the Internet:

- A network based on the concepts of an internet.
- A global, unified network used by more than 383 million users.
- A network based on a suite of protocols collectively referred to as TCP/IP.
- A network that interconnects physically disjoint networks using computers called routers.
The Internet

For a particular internet architecture:

• A network architecture is a blueprint of the network
• This is different from a network protocol which describes the rules and conventions that govern how computers exchange information.
• To completely understand a particular internet, one must understand the relevant set of protocols as well as how the building blocks are ‘architected’ together.
A Brief History of The Internet

1962: J. Licklider (MIT) published first paper talking about the benefits of a "Galactic Network".
1966-1967: Lawrence Roberts (MIT) proposed the ARPANET to DARPA.
1968: Roberts and DARPA funded BBN to develop the first packet switch process (the Interface Message Processor or IMP).
1969: Kleinrock’s Network Measurement Center at UCLA was chosen to be the first node on the ARPANET. 4 nodes by the end of 1969.
1972: First big Internet application made available: email.
1973: Bob Kahn and Vint Cerf invented TCP/IP.
1983: ARPANET migrated from NCP to TCP/IP.
1985: NSF requires TCP/IP for NSFNET.
1990: ARPANET decommissioned.
1995: NSF funded MCI Worldcom to build the next generation Internet: very High Performance Backbone Network Service (vBNS).
1995: NSFNET removed as Internet backbone. Replaced with the Network Access Point (NAP) model.
1999: Internet2 launched the Abilene network.
2003/2004: National LambdaRail (NLR) project: next Internet?

Based on notes by Jim Martin