Living in a Network Centric World

Network Fundamentals – Chapter 1
Objectives

- Describe how networks impact our daily lives.
- Describe the role of data networking in the human network.
- Identify the key components of any data network.
- Identify the opportunities and challenges posed by converged networks.
- Describe the characteristics of network architectures: fault tolerance, scalability, quality of service and security.
- Install and use IRC clients and a Wiki server.
How Networks Impact Daily Life

- Explain the benefits of instantaneous communication and how it supports and improves our lives.
How Networks Impact Daily Life

- Describe the characteristics and purpose of popular communication media such as, IM, Wikis, Blogs, Podcasting, and Collaboration Tools

  - Instant messaging
    - Real time communication between 2 or more people based on typed text

  - Weblogs (Blogs)
    - Web pages created by an individual

  - Podcasting
    - Website that contains audio files available for downloading

Weblog

January 03, 2007

Shame on you, New York Times!!

SAN JOSE, CA - Okay, so maybe not a scandal at New York Times, but nearly scandalous... $490. Did you see their editorial on net neutrality today? Made me say (but loud) "I used to really like The New York Times." Okay, so I do read it every day. They rarely haven't been reading this blog, however... which is disappointing. If they had, they would have not fallen into the hype machine that is net neutrality. In a big business versus big business debate (Google, eBay, Yahoo, Microsoft, etc. versus Telcos, cable companies, satellite providers, etc.), the ministry should be the marketplace, not the government. You can call that one Ormrod's law. The New York Times editorial today broke Orwell's law by calling for government regulation in the internet. That's a pity.

Let's review briefly:

1) The FCC Chairman says he's already got the outlines. In others words, they fixed the FCC's 'connectivity principles.' Translation: There's not a problem and if there was he could get away with punishment.

2) The FCC Chairman says he doesn't see a problem, and has asked not existentially anything, to show why the problem is, in fact, they haven't been able to. Translation: There's not a problem.

Instant Messaging

Podcasting
How Networks Impact Daily Life

- Explain ways that using information networks to share and collaborate improves teaching and learning.

Students at remote locations can access the same resources as those available on campus. This course is distributed over the network and the content is enhanced by links to other resources, which are also on the network.
How Networks Impact Daily Life

- Describe ways communication over a network changes the way we work
How Networks Impact Daily Life

- Describe ways communication over a network supports the way we play

The onboard data network provides a range of services to airline personal seatback video systems.
Data Networking Role, Components, and Challenges

- Basic characteristics of communication
  - Rules or agreements are 1st established
  - Important information may need to be repeated
  - Various modes of communication may impact the effectiveness of getting the message across.
Data Networking Role, Components, and Challenges

- Describe the role of data networking in communications
Data Networking Role, Components, and Challenges

- Describe the various elements that make up a network
  - Devices
    - These are used to communicate with one another
  - Medium
    - This is how the devices are connected together
  - Messages
    - Information that travels over the medium
  - Rules
    - Governs how messages flow across network
Describe the role of converged networks in communications

- Converged network
  - A type of network that can carry voice, video & data over the same network
Network Architecture Characteristics

- Explain four characteristics that are addressed by network architecture design
  - Fault tolerance
  - Scalability
  - Quality of service
  - Security
Network Architecture Characteristics

- Describe how packet switching helps improve the resiliency and fault tolerance of the Internet architecture.

Packet Switching in a Data Network

- Many paths may be used for a single communication as individual packets are routed to a destination.
- Prior to transmission, each communication is broken into packets which are addressed and numbered.
- At the destination, packets may be reassembled into order according to their sequence number.
- No fixed path is established. Packets are routed according to the best path available at the time.
Network Architecture Characteristics

- Describe characteristics of the Internet that help it scale to meet user demand
  - Hierarchical
  - Common standards
  - Common protocols
Network Architecture Characteristics

- Explain the factors that necessitate Quality of Service and the mechanisms necessary to ensure it.

Using Queues to Prioritize Communication

Queuing according to data type enables voice data to have priority over transaction data, which has priority over web data.
Network Architecture Characteristics

- Describe how QoS mechanisms work to ensure quality of service for applications that require it.
Network Architecture Characteristics

- Describe how to select the appropriate QoS strategy for a given type of traffic

<table>
<thead>
<tr>
<th>Communication Type</th>
<th>Without QoS</th>
<th>With QoS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streaming video or audio</td>
<td>Choppy picture starts and stops.</td>
<td>Clear, continuous service.</td>
</tr>
<tr>
<td>Vital Transactions</td>
<td>Time : Price</td>
<td>Time : Price</td>
</tr>
<tr>
<td></td>
<td>02:14:05 $1.54</td>
<td>02:14:04 $1.52</td>
</tr>
<tr>
<td></td>
<td>Just one second earlier...</td>
<td>The price may be better.</td>
</tr>
<tr>
<td>Downloading web pages (often lower priority)</td>
<td>Web pages arrive a bit later...</td>
<td>But the end result is identical.</td>
</tr>
</tbody>
</table>
Network Architecture Characteristics

- Describe why networks must be secure
Network Architecture Characteristics

- Describe basic measures to secure data networks
  - Ensure confidentiality through use of
    - User authentication
    - Data encryption
  - Maintain communication integrity through use of
    - Digital signatures
  - Ensure availability through use of
    - Firewalls
    - Redundant network architecture
    - Hardware without a single point of failure
IRC Clients and Wiki Server

- Install and use IRC clients and a Wiki server
Summary

In this chapter, you learned to:

- Describe how networks impact our daily lives.
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- Identify the key components of any data network.
- Identify the opportunities and challenges posed by converged networks.
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