

Telecommunication Technology

❖ *DigitalSherlock.com | SafeHack.com*

❖ *Date: 2005/05/27*

❖ *Document Name: telecommunication_technology.pdf*

❖ *GNU Free Documentation License*

❖ *Version 1.00, 2005-05-27*

❖ *Copyright © 2005 Adonis, MSc, Eng, CISSP, Security+, CEH, GSec, MCSE, etc.*

❖ *Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation.*

❖ LANs

- **Designed to work in limited geographic area**
- **Use wire, fiber optic to connect devices on the LAN**
- **Router bridges switch used to connect LAN's**
- **2 Types of LAN**
 - **CAN Campus Area Network**
 - **MAN Metropolitan Area Network**

❖ LAN Topologies

- **Bus**
 - **Packets travel the full length of cable and are received by all other stations**
 - **Used primarily by Ethernet**
 - **If any station experiences cabling termination errors the entire BUS can stop**
- **Ring**
 - **The network nodes are connected by unidirectional transmission links**
 - **Form a closed group**
 - **Token ring & FDDI use this topology**
- **Star**
 - **The nodes of a network are connected to a central device directly, like a hub**
 - **10BaseT use this topology**
 - **If one station experiences cabling errors the Network WONT be affected**
 - **It has more resiliency than a BUS topology**
- **Tree**
 - **A BUS type topology where branches with multiple nodes are possible**
- **MESH**
 - **All nodes are connected to every other node to make the network redundant**
 - **May be used to create back-bon redundant networks**

❖ LAN Transmission Protocols

- **CSMA**
 - **CSMA/CA Carrier Sence Multiple Access with Collision Avoidance**
 - **CSMA/CD Carrier Sence Multiple Access with Collision Detection**
 - **A station continuously monitors a line then transmits the packet when it thinks the line is free**
 - **If the station doesn't receive an acknowledgment from the destination it assumes a collision and it resends the packet "Persistent Carrier Sence"**
 - **Another type is when a station waits a random amount of time before resending a packet "nonpersistent Carrier Sence"**

➤ **Polling**

- A primary station checks a secondary station regularly at pre-determined times to see if it has data to transmit
- Secondary stations are not permitted to transmit until they are given permission by the primary host.
- Polling is commonly used in large mainframe environments
- It is not expensive

➤ **Token-Passing**

- Stations cannot transmit until they receive a special frame called "Token"
- This prevents collision present in CSMA
- Token Ring and IEEE 802.5 are two examples of token passing networks
- Token passing are deterministic, which means that it is possible to calculate the maximum time that will pass before any station will be able to transmit

❖ **Types of Transmission**

➤ **BaseBand / Broadband**

- BaseBand - Carries only a SINGLE channel
- Broadband - Carries SEVERAL channels
- BaseBand - is accomplished by applying direct current to a cable
- Broadband - divides the cable into channels
- Ethernet is a baseband Network
- Broadband technologies: T1, T3, ISDN, ATM, DSL, CATV

➤ **Analog / Digital**

- **Analog**
 - Are continuously varying electromagnetic waves
 - Can be carried over air, water, twisted pair, coaxial, Fiber optic
 - Infinite wave form
 - Continuous signal
 - Use the modulation process
 - ◆ Amplitude (height of the signal)
 - ◆ Frequency (number of waves in defined period of time)
- **Digital**
 - Saw-tooth wave form
 - Pulses
 - 1-0 On-OFF
 - Digital signals represent binary digits as electrical pulses
 - Computers use digital signals when moving data

➤ **Asynchronous / Synchronous**

- **Asynchronous**
 - Meaning "not with," and chronos, meaning "time"
 - Used when two devices are not synchronized in any way
 - The sender can send data at anytime, the receiving end must always be ready
 - Sending bits of data sequentially.
 - Start and Stop Bit mark the beginning and the end of each transfer
 - Communication device must operate at the same speed
 - Modems use asynchronous data transmission
 - Terminal server use asynchronous data transmission

- **Synchronous**

- Meaning "with," and chronos, meaning "time"
- Takes place between two devices that are synchronized usually via clocking
- Transfers data as stream of bits instead of data framed in start stop bits
- Occur at the same clock rate when all clocks are based on a single reference
- Very High speed transmission rate

- **LAN Transmission Methods**

- **Unicast - Packet are sent from single source to a single destination**
- **Multicast - Source packet is copied and sent to multiple destinations**
- **Broadcast - Packet is copied and sent to all the nodes on a network or segment**

❖ **Common Data Services**

- **File Services**

- **Mail Services**

- **Print Services**

- **DNS Services**

- **DNS- resolves hostnames into IP addresses**
- **DNS - has distributed databases all over Internet to provide name resolution**

- **Client/Server Service**