## Lesson Plan – Network Design

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<tr>
<th>Course Title:</th>
<th>Business Information Management I</th>
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<td>Session Title:</td>
<td>Network Design</td>
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**Performance Objective:**
After completing this lesson students will have knowledge of the three basic topologies.

**Specific Objectives:**
- Understand why various networking topologies are used
- Understand variations of standard networking topologies
- Decide between the products required to determine the best network topology for the environment.

**Terms:**
- **Active Hub** - A device that regenerates received signals and sends them along the network.
- **Active topology** - A network topology which the computers are responsible for sending the data along the network.
- **Attenuation** - A loss of signal strength, a loss of a single can occur on a wire and wireless network.
- **Backbone** - a segment that is single used in a bus topology, computers are connected in a straight line.
- **Bus** - A backbone cable segment of this major topology which computers connect to form a straight line.
- **Diagram** - An illustration of a plan, in networking it describes a design.
- **Fiber Distributed Data Interface (FDDI)**
- **Hub** - used to connect segments of a LAN that uses multiple ports.
- **Hybrid hub** - a device used to interconnect different types of cables and to maximize network efficiency.
- **Layout** - A illustration of a plan, in networking it describes a design.
- **Map** - a sketch or plan; a representation.
- **Mesh** - A mesh network in which every device connects to every other is called a full mesh. It’s a hybrid network topology used for fault tolerance, and one in which all computers connect to each other.
- **Passive hub** - Central connection point, with no amplification or regeneration, requires no electrical power.
- **Passive topology** - The computers on the network simply listen and receive the signal, they don’t amplify the signal in any way.
- **Repeater** - Regenerate incoming signals to extend the range of local area networks.
- **Ring** - Data that is passed round the ring in one direction only, like a loop.
- **Signal bounce** - A no terminated signal that continues to navigate the network.
- **Star bus** - another major topology which the computers connect via a central connecting point, majority of the time used a hub.
- **Star ring** - a wired-like star networked topology device, which handles traffic like a ring.
- **Switch** - a specialized networking device that manages networked connections between any pair of star-wired devices on a network.
- **Terminator token** - Used to guarantee fair communication between all computers usually in ring topology.
Token Passing-An access of channels of data passing around a ring network.
Topology- A layout of a network.
Wireless Access Point (WAP) - a central hub device for which signals pass in a wireless network.

Preparation

TEKS Correlations:
- 130.114.c.1.A-C – explain the strategic role of information systems and information communication technology within an organization; determine risks and rewards of developing a strategic role for information systems and information communication technology; and integrate information systems planning with business planning.
- 130.114.c.2.A – identify the management information requirements and business needs of an organization
- 130.114.c.3.A – determine equipment and supplies needed
- 130.114.c.5.B&D – improve touch-system skills using the keyboard and keypad to input data and demonstrate writing techniques generating ideas and gathering information relevant to the topic and purpose, maintaining accurate records of outside sources.

English:
- 110.31.c.15.B – write procedural or work-related documents (e.g., instructions, e-mails, correspondence, memos, project plans);
- 110.31.c.19 – oral and Written Conventions/Spelling. Students spell correctly…
- 110.31 (c)(22)(B&C – evaluate the relevance of information to the topic and determine the reliability, validity, and accuracy of sources and implement changes as the need occurs and is identified.

Teacher Preparation:
- Teacher will review the terms in the outline, the three basic topologies, power point and handouts to become familiar with lesson.
- Teacher should locate and evaluate various resources and websites before the lesson.
- Teacher will have assignments and website information ready to distribute to students.

References:

Instructional Aids:
- Display for PowerPoint, websites for assignments and class discussion
- Pamphlets, articles, and/or textbooks on Network Designs.

Materials Needed:
- Internet
- Workstations running any Windows OS

Equipment Needed:
- Projector and computer to show PowerPoint
- Computers with internet access and PowerPoint software
- Computers for Students to design network layouts using Paint
Learner Preparation:
Ask students if they have ever heard of Morse Code? The instructor may need to guide students to the inserted web link or explain to the students who Samuel F.B. Morse was.
http://web.mit.edu/invent/iow/morse.html Ask students to describe the communication process with their peers current society was still using Morse Code?

Introduction

Introduction (LSI Quadrant I):
- When businesses form, the idea of networking comes to mind. Networks are based on three types of topologies: bus, star, and ring.
- In bus communication a network designer must be aware of how signals are sent, bounce, and cable termination.
- When designing a star network, a central point of control, called a hub is required.
- Variations allow fault tolerance and flexibility from the major topologies. The most tolerant variation is the mesh.
- When sending signal one consider discussing passive and active topology.
- A terminator is a connector that is simply attached at each end of the cable that prevents signals from bouncing.

Outline

Outline (LSI Quadrant II):
Instructors can use the PowerPoint presentation, slides, handouts, and note pages in conjunction with the following outline.

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<th>MI</th>
<th>Outline</th>
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|    | I. Network Layout  
|    | A. Introduce students to the term “topology” by explaining the difference between physical and logical topologies  
|    | B. Mention how data is passed from one device to another | Use PowerPoint and current events as aids.  
|    | Discuss the reasons why the topology of a network is important. Emphasize how the logical topology can dictate the type of equipment needed. |
|    | II. Standard Topologies  
|    | A. Bus  
|    | i. Due to the nature of signal travel, computers listen to each other for transmitting and sending information.  
|    | ii. Network performance slows as more computers are placed on the bus  
|    | iii. Computers only listen for data being sent; not responsible for moving data to next computer. Failure of one computer has no effect on rest of network. | Use PowerPoint as aid and watch the video.  
|    | Bus- A single cable connection, all nodes are connected to one central node that routes all data passing to and from them.  
|    | Star- Computers are
## B. Star
1. If the hub fails, network is down, but failure of single computer or cable does not affect network
   Explain that many homes networks have star topologies.

## C. Ring
1. Electronic token passes around ring with computer able to communicate only when it has token
   - Discuss the term “active topology” and FDDI.  
   Active Topology- A network topology which the computers are responsible for sending the data along the network. Explain that rings are considered active because every computer is responsible for retransmitting the token or data.

Show Video: [http://www.youtube.com/watch?v=huTEGKEV_IWY](http://www.youtube.com/watch?v=huTEGKEV_IWY)

## III. Wireless Topologies
### A. Explain why wireless topologies are considered to use a star topology. Wireless networks are made up of transmitters that broadcast packets using radio frequencies.

Use PowerPoint as aid

Have students imagine life without their cell phones and the means of communication?
### Guided Practice (LSI Quadrant III):
Have students work in groups of no more than three, break up the terms listed below and display visual aids of each.

- Active Hub
- Attenuation
- Backbone
- Fiber Distributed Data Interface (FDDI)
- Hub
- Hybrid Hub
- Mesh
- Passive Hub
- Repeater
- Switch
- Terminator
- Token Passing
- Wireless Access Point (WAP)

### Independent Practice (LSI Quadrant III):
Ask students to create a graphic organizer displaying each of the topologies and explain the advantages of each.

### Summary

#### Review (LSI Quadrants I and IV):
**Q:** What topology can be used in the manufacturing area to solve the problem of difficult cabling?
**A:** Access point using a star topology.

**Q:** Compare to bus and star topologies.
**A:** Bus requires a backbone cable segment of this major topology which computers connect to form a straight line. A star topology is another major topology which the computers connect via a central connecting point. Majority of the time star uses a hub.

**Q:** A bus topology network does not require terminators. True or False?
**A:** False

### Assessment

#### Informal Assessment (LSI Quadrant III):
Students will be evaluated on their “Quick Assessment” by using the assigned rubric.

#### Formal Assessment (LSI Quadrant III, IV):
Critical Have students list and explain three reasons to keep a network diagram current.

Possible Responses from students:

Maintain a record of a network’s true layout, configuration, and of the devices and cables that comprise it. This is a key troubleshooting tool, and is often among the first resources that a network administrator will consult when problems arise. Other reasons for currency include: keeps an accurate inventory of equipment, cables, and ancillary equipment; maintains indicators of what construction activities might impact the network, and provides a complete record of a network’s carrying capacity, as a tool for planning for growth and expansion.

### Extension

#### Extension/Enrichment (LSI Quadrant IV):
- Have students independently create a basic network design scenario.
• Mention to students that they must ask themselves a series of questions to construct a network layout. A few questions are listed below:
  1. What types of applications will be used?
  2. How much funding is available?
  3. How many servers are required?
Network Designs
Quick Assessment

Directions: Give the correct response for each question. (20 points each)

1. What is the name of the transmission method where data is sent around a ring?

2. What is the name of the device that should be attached at each end of a cable in a bus topology?

3. What is the term for the weakening of a signal as it travels the length of a cable?

4. Wireless LANs are said to use what type of topology?
Network Designs
Quick Assessment Answer Key

Directions: Give the correct response for each question.

1. What is the name of the transmission method where data is sent around a ring?
   Answer: Token Passing

2. What is the name of the device that should be attached at each end of a cable in a bus topology?
   Answer: Terminator

3. What is the term for the weakening of a signal as it travels the length of a cable?
   Answer: Attenuation

4. Wireless LANs are said to use what type of topology?
   Answer: Star