

Introduction

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Historical glimpses

- ✍ The past several decades have witnessed a phenomenal growth in the computer industry:
 - » Dramatic drop in the cost/performance
 - » Advanced and complex computer applications, e.g. Image processing, speech recognition,..
- ✍ As computer proliferated, so did the need for data communication
 - » People became more and more interested in connecting several computers together.

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Historical glimpses

✎ **Computer Network:**

Interconnected collection of autonomous computers and computer resources

✎ **Expected return!**

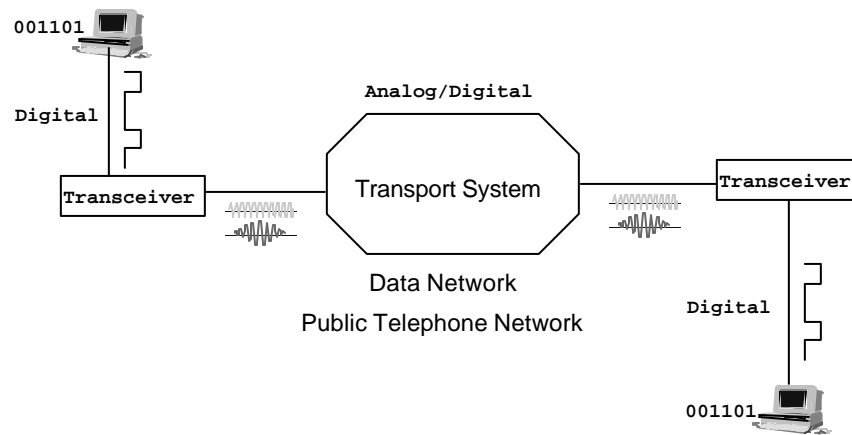
- » *Resource Sharing (information, software, printers, ...)*
- » *High reliability*
- » *Saving money*
- » *Powerful communication medium*

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Basic Networking concepts

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Simple Data Communication Model



Terminology

- ✍ Networks are classified on the basis of geographic span.
 - » **Local Area Networks (LANs)**
 - » **Metropolitan Area Networks (MANs)**
 - » **Wide Area Networks (WANs)**
- ✍ The difference in geographical extent between WANs and LANs account for significant differences in their respective design issues.

LAN Characteristics

☞ LANs are designed to:

- » Operate within a limited geographic area
- » Allow multiaccess to high-bandwidth media
- » Control the network privately under local administration
- » Provide full-time connectivity to local services
- » Connect physically adjacent devices

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LAN Characteristics

- » All nodes are connected by a single high speed shared channel.
- » Data is packetized and packets are carried past all nodes in the network.
- » Addressing is required but routing is not needed.
- » Congestion control and network architecture are among design issues.
- » Several topologies can be used but the choice of topology is not a major issue.

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LAN applications

- Personal Computer LANs
 - ✍ Collection of PCs and workstations and certain expensive resources (I.e. disks, laser printers, ..)
 - ✍ Key requirement is LOW COST
- Backend Networks
 - ✍ Interconnect large systems such as mainframes and supercomputers
 - ✍ Bulk data transfer is the key requirement
 - ✍ Reliability is another requirement
 - ✍ Cost is not a major issue

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LAN applications (Cont.)

- Typical characteristics
 - ✍ High data rate
 - ✍ High-speed interface
 - ✍ Distributed access
- Storage Area Networks (SANs)
 - ✍ Separate network to handle storage needs
 - ✍ Storage devices and servers are linked directly to the network

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LAN applications (Cont.)

- Backbone LANs

- ✍ Single LAN strategy suffers the following drawbacks:

- ✍ Reliability

- ✍ Capacity

- ✍ Cost

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LAN Architecture

- Design issues:

- ✍ Is it a Single LAN strategy?

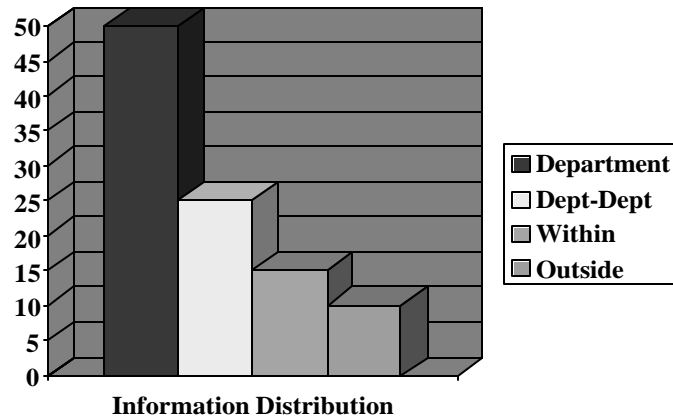
- ✍ What topology should be used?

- ✍ What is the medium?

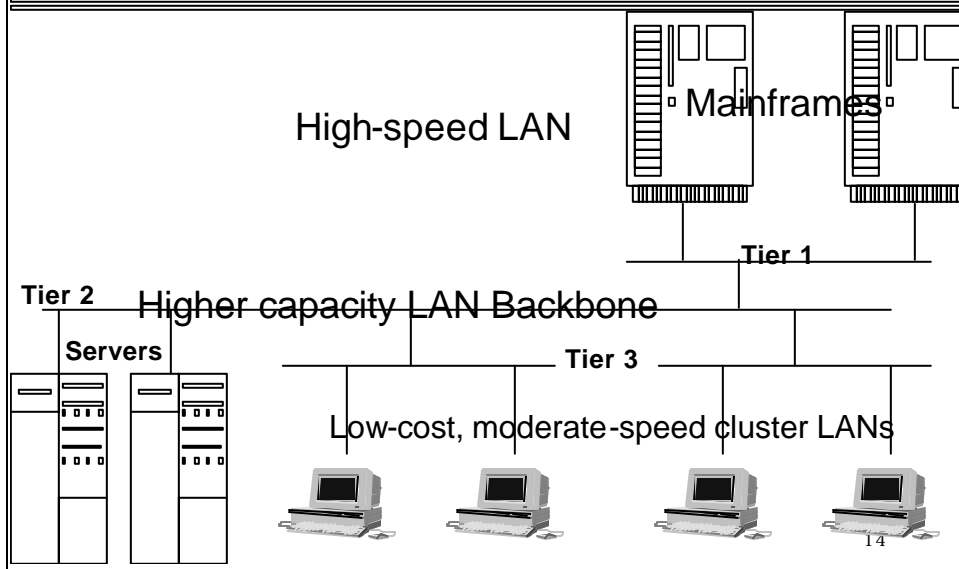
- ✍ What is the proper multiple access technique?

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Typical Information Distribution in LANs



Tiered LAN



LAN Evolution Scenarios

- Bottom up approach
 - ✍ POS
 - ✍ Timely
 - ✍ Cons
 - ✍ Not optimal
 - ✍ High cost
 - ✍ Interconnection problems
- Up bottom approach
 - ✍ POS
 - ✍ Optimized network
 - ✍ Compatible interconnection
 - ✍ Better deal terms
 - ✍ Cons
 - ✍ May not be responsive

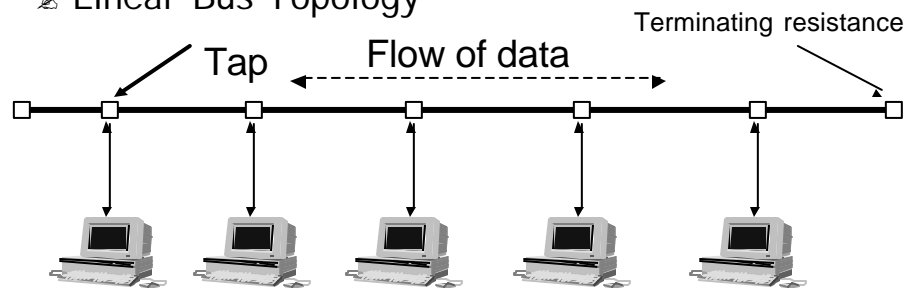
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Chapter Three

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LAN Topologies

Linear Bus Topology



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Bus Topology

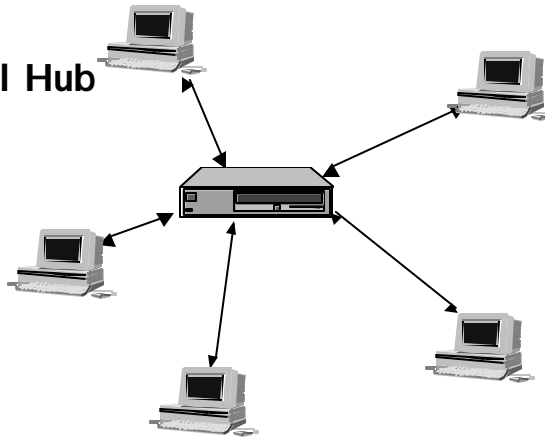
- Characteristics:
 - ✍ Broadcasting (all station are listening)
 - ✍ Full-duplex link between Tap and station
- Problems:
 - ✍ A mechanism is needed to identify the destination
 - ✍ A mechanism is needed to regulating the flow of traffic
- Solution:
 - ✍ Addressing each station
 - ✍ Multiple access technique

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Star Topology

- **Functions of central Hub**

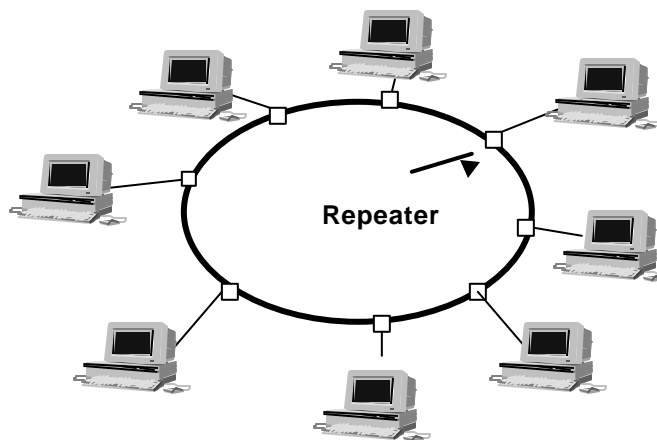
- Store-and-Forward



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LAN Topologies (Contd.)

Ring.



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