MIRPUR UNIVERSITY OF SCIENCE AND TECHNOLOGY (MUST), MIRPUR
DEPARTMENT OF SOFTWARE ENGINEERING

Computer Networks

Lecture [4]: Network Topologies (Contd…)

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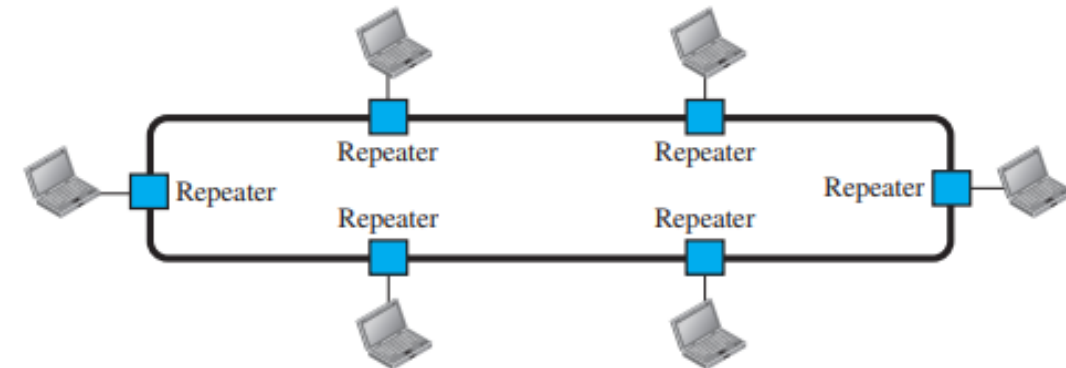*(Lecturer)*

Topics discussed in Today's Lectures

- Ring Topology

- Tree Topology

- How to Choose the Network Topologies

Ring Topology

- In a ring topology, each device has a **dedicated point-to-point connection** with only the two devices on either side of it

- A signal is passed along the ring in one direction, from device to device, until it reaches its destination

- Each device in the ring incorporates a **repeater**

- *A repeater expands the coverage area of the network, repropagate a weak or broken signal and/or service remote nodes*

- When a device receives a signal intended for another device, its repeater regenerates the bits and passes them along the link

Ring Topology (Contd…)

- Ring is relatively easy to install and reconfigure

- Each device is linked to only its immediate neighbors

- To add or delete a device requires changing only two connections

- The only constraints are:

  - Maximum ring length

  - Number of devices

- In addition, fault isolation is simplified

- Generally, in a ring a signal is circulating at all times

- If one device does not receive a signal within a specified period, it can issue an alarm

- Alarm alerts the network operator to the problem and its location

Ring Topology (Adv)

- All data flows in one direction, reducing the chance of packet collisions

- A network server is not needed to control network connectivity b/n each workstation

- Additional workstations can be added without impacting performance of the network

Ring Topology (Dis-Adv)

- All data being transferred over the network must pass through each workstation on the network, which can make it slower than a star topology

- The entire network will be affected if one workstation shuts down

Tree Topology

- Devices in this topology are organized in a hierarchical structure like a tree

- Central node, known as root, connects to multiple nodes forming branches

- Each branch can further extend with additional nodes, creating sub-branches.
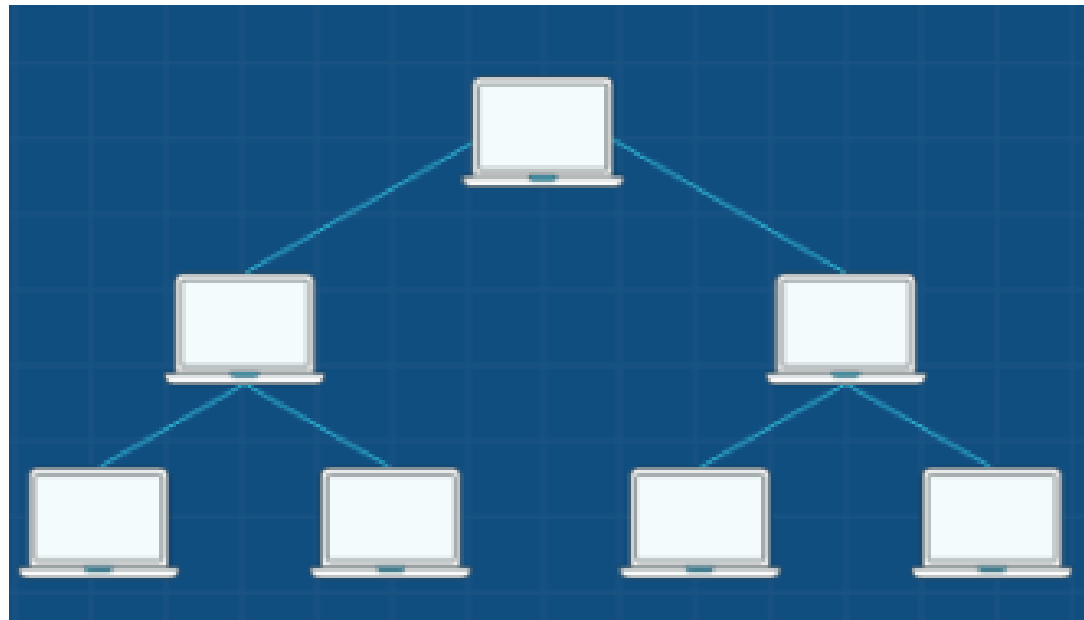
Physical Topology (Contd…)

Tree Topology (Contd…)

Pros	Cons
It is easily scalable by adding branches and levels.	If the central root node gets disrupted, the whole network gets affected.
Failure in one branch doesn't affect the network.	The cost of the central hub and cables is much higher.
Every segment can operate independently in a tree topology. It improves the performance and security of the network.	Due to the hierarchical structure, troubleshooting & maintenance becomes challenging.

How to Choose the Network Topologies
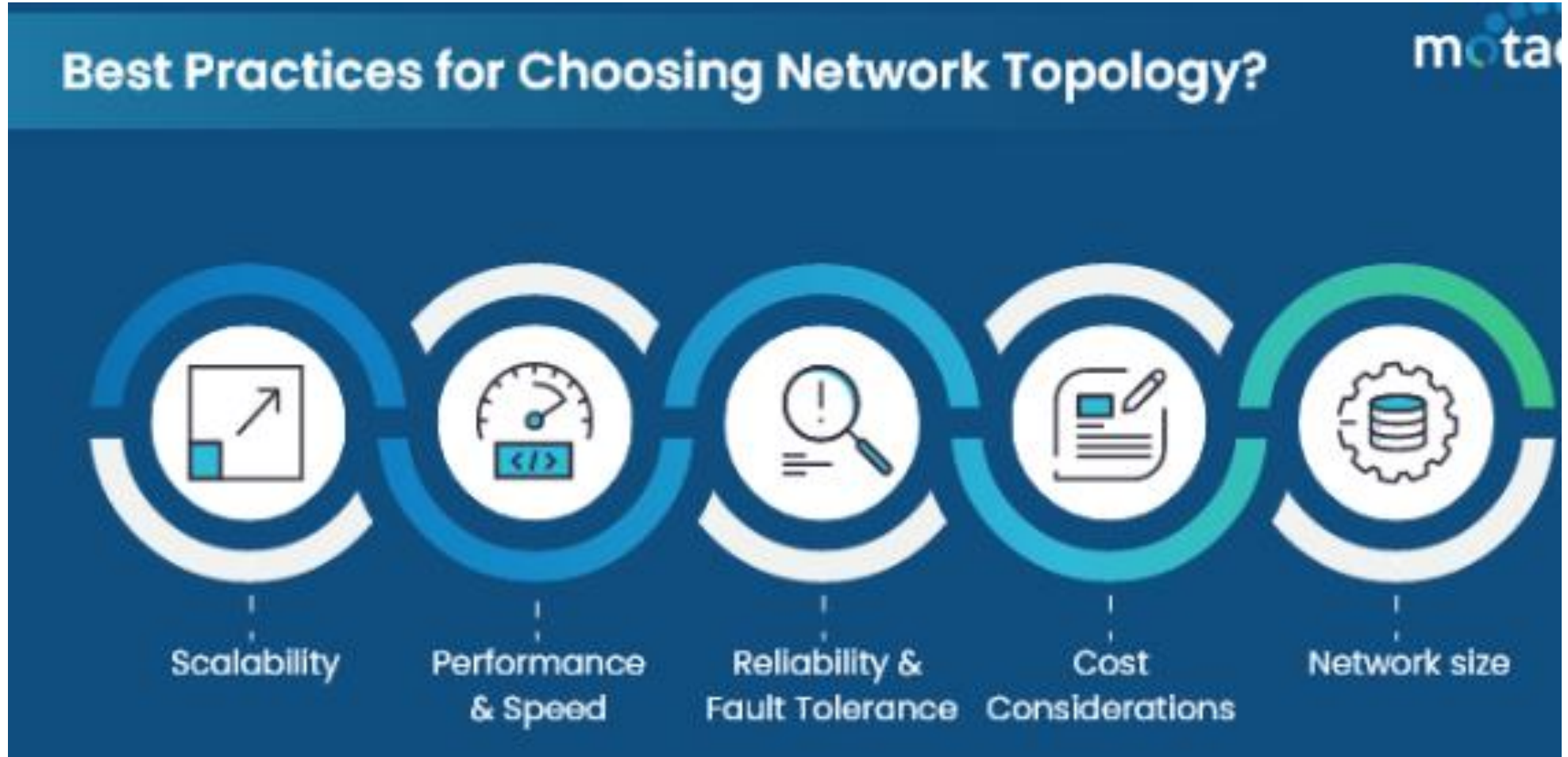
How to Choose the Network Topologies

1. Scalability

- A scalable network can easily accommodate more devices, users, or data without compromising performance

- When selecting a network topology, consider how well it supports future growth, allowing you to scale up your network as needed

2. Performance and Speed

- Performance indicates the speed and efficiency of data transfer

- It's about determining how quickly information can move between devices.

- When choosing a network setup, consider speed requirements for your data.

3. Reliability and Fault Tolerance

- It is the network's ability to continue functioning even if there are issues in some parts

- A reliable network doesn't collapse entirely when a problem occurs; it keeps operating

- So, when selecting a network topology, consider how crucial continuous operation is for your needs

- Choose a topology that offers the reliability, fault tolerance and error detection

4. Cost Considerations

- It's intelligent to budget your digital infrastructure

- Every topology has varying costs, like cabling, equipment, and ongoing maintenance expenses

- Choosing a topology aligned with your budget ensures a cost-effective and sustainable network solution.

5. **Network Size**

- Size of a network refers to number of devices and the physical area it covers

- It's like determining how many rooms your network needs to connect

- Take your home for example, topologies like the bus or star will be suitable because they are good, cost-effective choices for smaller networks

- Layout is simple, allowing all devices to be connected via a single coaxial or RJ45 cable

References

Chapter 1
Data Communication and Networking (5th Edition)
By Behrouz A. Forouzan

THANKS