

## Network Topologies

In this technological era, everything appears as connected through a network either physically or rationally. This networking is actually possible through the logical designing and arrangement of computer systems. Health care organizations are complex in their structure and functions because of the very nature of healthcare industry. As for any other organization, a suitable network topology is important for ensuring efficiency of the organization. This paper is discussing the different network topologies and their relative differences. The paper also tries to identify the best suitable network topology for a healthcare organization.

The network topology describes how a network is physically arranged and how data is transferred from one device to the other. Network topologies are classified as physical and logical. Physical topology describes the physical arrangements of the devices and wires whereas the logical topology represents the travel pathways of data from one computer to another in a network. Based on their physical networking design, the physical topologies are found in four major categories which are bus, star, ring, and point-to-point topologies. The different types of logical topologies are switching, bus and ring.

The physical bus topology is a less complex topology and was a preferred method in the past. A long continuous cable connects computers each other in bus topology. One of the main advantages of bus topology is that a new computer can be added to the network by extending the cable from the last computer to the new one. Bus topology has become outdated due to a number of drawbacks it has. Computers in a LAN are connected using a central device such as a hub or a switch in star topology. A single cable connects each computer to the central device. In a ring topology, devices are connected to one another just like in a bus topology but the ends are not

terminated instead the cabling is brought back to the first device to form a ring. The ring topology has reliability issues as data can travel only in one direction. Data cannot travel if any station in the ring breaks. Though technologies such as FDDI could help in overcoming the shortcomings of a physical ring topology, the technology is costly. A point-to-point topology is a direct link between two devices connected in the network. In this topology, a device in the network is linked to the telecommunication provider and the connection then hooks into their network to provide an internet access to the branch office. In the point-to-point topology, data travels through a dedicated link but the topology is highly expensive. They are used mostly for specialized purposes such as for large internet works. A mesh topology is a multiple point-to-point topology which is faster and reliable but very expensive.

The bus topology is the simplest and most inexpensive than the other topologies as the amount of wire and hardware is lesser compared to others. They allow a trouble free installation. (Bonin, A, 2012). Health care organizations can not consider this topology for designing their network because of the drawbacks of the topology. Firstly the maximum length of cabling in bus topology is 185 meters. The number of computers is limited to 30 per cable segment. Both ends of the bus topology need to be terminated and any break in the network damages the whole network. The entire network is disturbed while adding or removing a new machine. The star topology has a significant advantage that a break down in the communication between any of the devices in the network and the hub doesn't affect the other computers in the network. The network administrator can monitor the status of all the connections. (Bonin, A, 2012). Star topologies have the benefits of faster technology, centralized management of network traffic and easier network upgrades. The central device in the star topology enables convenient communication options. The most important disadvantage of the star topology is that if the central device or the hub fails for any unexpected

reason, the entire network goes down. However, the advantages outweigh this disadvantage and the central devices are usually reliable except in rarest conditions. Because of the benefits of star topology, star topology is a good choice for any healthcare organization. The ring topology is a highly expensive topology and permits more number of computers to be connected to the network than bus and star topologies. It is used for covering larger geographic areas to avoid the complication of using a star topology. One of the major drawbacks of ring topology is that any user can access the data as it travel through the network. This arises confidentiality concerns especially for a healthcare organization. Considering all the topologies bus topology is not a choice for a healthcare organization because of its limitations in geographical coverage. The star topology is reasonably expensive but reliable and covers some geography. The easiest trouble shooting is possible for star topology. The ring topology is highly expensive and fairly easy to troubleshoot any issues and can cover geography more than all others. (Bonin, A, 2012). Still ring topology is not suitable for healthcare organization as it is highly expensive and not as easy as star topology for troubleshooting. The point- to- point topology or a mesh topology is not a practically possible choice for any small or medium sized healthcare organizations.

The size of the organization affects the choice of topology for an organization. Mostly larger organizations prefer mesh topology or ring topologies for their networks. Small and medium sized organizations choose star topology. For a healthcare organization with limited number of nodes in their network, star topology would be the best choice. However they have to ensure that the central node is always functioning and security features should be perfectly implemented so as to avoid any break down. Maintaining an additional central device also is an option to avoid any complications. Star Topology (2008). The physical topologies require a logical topology to pass

data through the network. Hence, for a healthcare organization, the best choice would be a physical star topology implemented with a logical bus topology.



## References

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