Network topology

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A network topology is the arrangement of nodes -- usually switches, routers, or software switch/router features -- and connections in a network, often represented as a graph. The topology of the network, and the relative locations of the source and destination of traffic flows on the network, determine the optimum path for each flow and the extent to which redundant options for routing exist in the event of a failure. There are two ways of defining network geometry: the physical topology and the logical (or signal) topology.

The physical topology of a network is the layout of nodes and physical connections, including wires (Ethernet, DSL), fiber optics, and microwave. There are several common physical topologies, as described below and as shown in the illustration.

Types of physical topologies

In the bus network topology, every node is connected in series along a linear path. This arrangement is found today primarily in cable broadband distribution networks.

In the star network topology, a central node has a direct connection to all other nodes. Switched local-area networks (LANs) based on Ethernet switches, including most wired home and office networks, have a physical star topology.

In the ring network topology, the nodes are connected in a closed loop configuration. Some rings will pass data only in one direction, while others are capable of transmission in both directions. These bidirectional ring networks are more resilient than bus networks because traffic can reach a node by moving in either direction. Metro networks based on Synchronous Optical Network Technology (SONET) are the primary example of ring networks today.

The mesh network topology links nodes with connections so that multiple paths between at least some points of the network are available. A network is said to be *fully meshed* if all nodes are directly connected to all other nodes, and *partially meshed* if only some nodes have multiple connections to others. Meshing to create multiple paths increases resiliency under failure, but increases cost. The Internet is a mesh network.