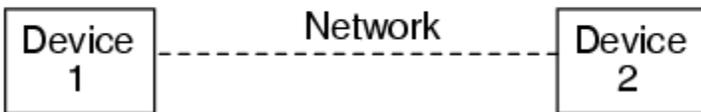


Network topology

If we want to connect two digital devices with a network, we would have a kind of network known as "point-to-point:"

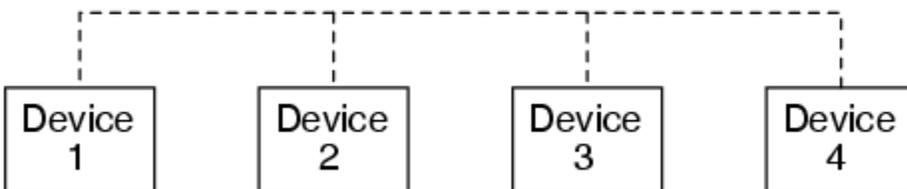
Point-to-Point topology



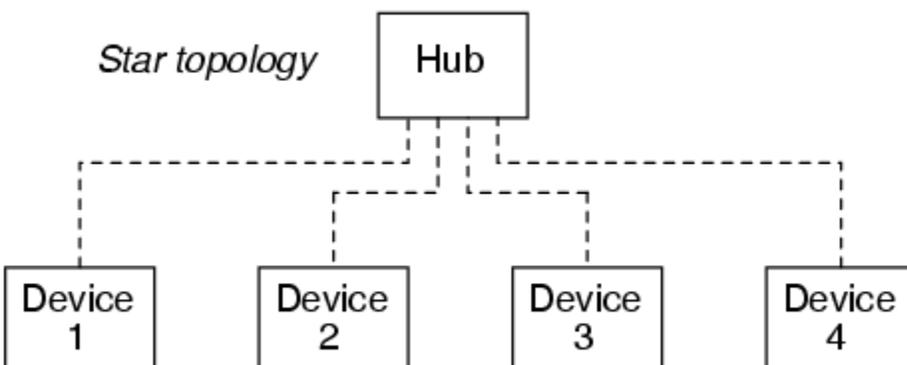
For the sake of simplicity, the network wiring is symbolized as a single line between the two devices. In actuality, it may be a twisted pair of wires, a coaxial cable, an optical fiber, or even a seven-conductor BogusBus. Right now, we're merely focusing on the "shape" of the network, technically known as its *topology*.

If we want to include more devices (sometimes called *nodes*) on this network, we have several options of network configuration to choose from:

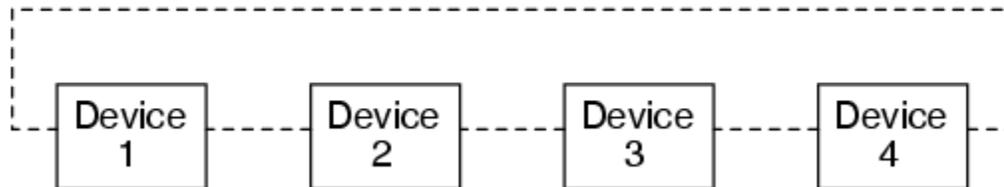
Bus topology



Star topology



Ring topology



Many network standards dictate the type of topology which is used, while others are more versatile. Ethernet, for example, is commonly implemented in a "bus" topology but can also be implemented in a "star" or "ring" topology with the appropriate interconnecting equipment. Other networks, such as RS-232C, are almost exclusively point-to-point; and token ring (as you might have guessed) is implemented solely in a ring topology.

Different topologies have different pros and cons associated with them:

Point-to-point

Quite obviously the only choice for two nodes.

Bus

Very simple to install and maintain. Nodes can be easily added or removed with minimal wiring changes. On the other hand, the one bus network must handle *all* communication signals from *all* nodes. This is known as *broadcast* networking, and is analogous to a group of people talking to each other over a single telephone connection, where only one person can talk at a time (limiting data exchange rates), and everyone can hear everyone else when they talk (which can be a data security issue). Also, a break in the bus wiring can lead to nodes being isolated in groups.

Star

With devices known as "gateways" at branching points in the network, data flow can be restricted between nodes, allowing for private communication between specific groups of nodes. This addresses some of the speed and security issues of the simple bus topology. However, those branches could easily be cut off from the rest of the "star" network if one of the gateways were to fail. Can also be implemented with "switches" to connect individual nodes to a larger network on demand. Such a *switched* network is similar to the standard telephone system.

Ring

This topology provides the best reliability with the least amount of wiring. Since each node has two connection points to the ring, a single break in any part of the ring doesn't affect the integrity of the network. The devices, however, must be designed with this topology in mind. Also, the network must be interrupted to install or remove nodes. As with bus topology, ring networks are *broadcast* by nature.

As you might suspect, two or more ring topologies may be combined to give the "best of both worlds" in a particular application. Quite often, industrial networks end up in this fashion over time, simply from engineers and technicians joining multiple networks together for the benefit of plant-wide information access.

Source: http://www.allaboutcircuits.com/vol_4/chpt_14/6.html