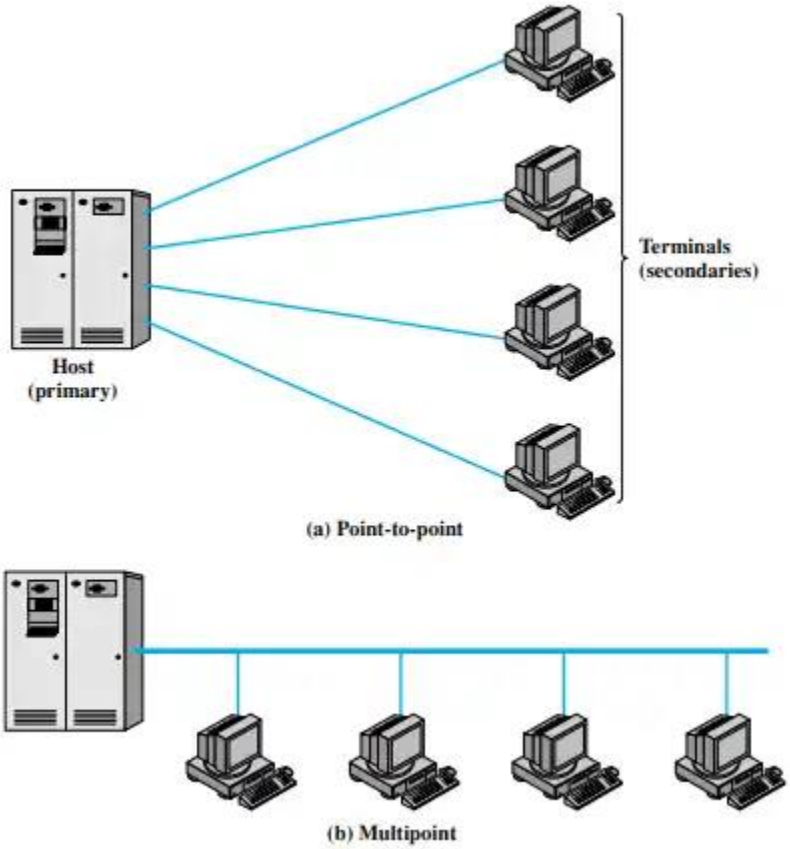
## Line Configurations

Two characteristics that distinguish various data link configurations are topology and whether the link is half duplex or full duplex.

### Topology

The topology of a data link refers to the physical arrangement of stations on a transmission medium. If there are only two stations (e.g., a terminal and a computer or




two computers), the link is point to point. If there are more than two stations, then it is a multipoint topology. Traditionally, a multipoint link has been used in the case of a computer (primary station) and a set of terminals (secondary stations). In today's environments, the multipoint topology is found in local area networks. Traditional multipoint topologies are made possible when the terminals are only transmitting a fraction of the time. Figure 6.9 illustrates the advantages of the multipoint configuration. If each terminal has a point-to-point link to its computer, then the computer must have one I/O port for each terminal. Also there is a separate transmission line from the computer to each terminal. In a multipoint configuration, the computer needs only a single I/O port and a single transmission line, which saves costs.

Full Duplex and Half Duplex

Data exchanges over a transmission line can be classified as full duplex or half duplex. With half-duplex transmission, only one of two stations on a point-to-point link may transmit at a time. This mode is also referred to as two-way alternate, suggestive of the fact that two stations must alternate in transmitting. This can be compared to a one-lane, two-way bridge. This form of transmission is often used for terminal-to-computer interaction. While a user is entering and transmitting data, the computer is prevented from sending data to the terminal, which would appear on the terminal screen and cause confusion. For full-duplex transmission, two stations can simultaneously send and receive data from each other. Thus, this mode is known as two-way simultaneous and may be compared to a two-lane, two-way bridge. For computer-to-computer data exchange, this form of transmission is more efficient than half-duplex transmission. With digital signaling, which requires guided transmission, full-duplex operation usually requires two separate transmission paths (e.g., two twisted pairs), while half duplex requires only one. For analog signaling, it depends on frequency: If a station transmits and receives on the same frequency, it must operate in half-duplex mode for wireless transmission, although it may operate in full-duplex mode for guided transmission using two separate transmission lines. If a station transmits on one frequency and receives on another, it may operate in full-duplex mode for wireless transmission and in full-duplex mode with a single line for guided transmission. It is possible to transmit digital signals simultaneously in both directions on a single transmission line using a technique called echo cancellation.