

How Do Networks Work?

When computers communicate across a network, the data (say, of a file being transmitted) is sent in groups called packets. Packets can be up to 600 bytes long for AppleTalk services; IP-based services can use larger packets, generally in the range of 500–1,500 bytes, although certain protocols specify packets up to 8,192 bytes.

Whenever data is sent across a link, there is a chance that one or more of the packets will be garbled in transmission. Packets can be garbled from bad connections, faulty wiring, broken wires, and missing terminations. Furthermore, electrical noise from motors, fluorescent lights, etc. can corrupt packet reception just as lightning garbles radio reception. In larger networks, intermediate devices (such as routers or bridges) act as relay stations to pass packets to the ultimate destination. These routers may momentarily be too busy to handle any new packets and will ignore (“drop”) newly arrived packets.

To ensure that its packets arrive correctly, a computer generally sends the packet and waits to receive an acknowledgment or “ack” packet from the intended receiver, which acts as a return receipt for the original data. If no ack has arrived in a reasonable time, the sender re-sends the data to be sure that it arrives eventually.

If occasional packets (fewer than 1–2%) are lost, the data transfer won’t be slowed too much. If packet loss is higher, the frequent waits for acks accumulate and the user sees slow response.