Full–and Half-Duplex Operation As defined by the IEEE 802.3x specification, two nodes connected via a full-duplex, switched path can simultaneously send and receive packets. Gigabit Ethernet follows this standard to communicate in full-duplex mode. All Gigabit Ethernet products on the market in 1999 are full duplex.

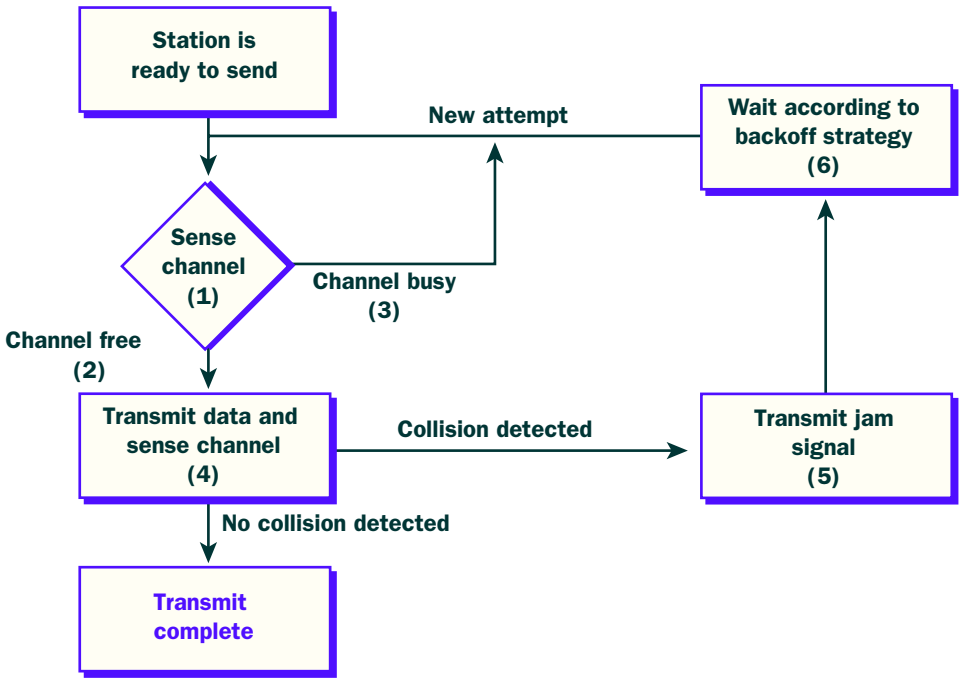

Figure 2. CSMA/CD Flow Chart

Gigabit Ethernet also employs standard Ethernet flow control methods to avoid congestion and overloading.

When operating in half-duplex mode, Gigabit Ethernet adopts the same fundamental CSMA/CD access method to resolve contention for the shared media. The CSMA/CD method is illustrated in Figure 2. The Gigabit Ethernet CSMA/CD method was enhanced in order to maintain a 200-meter collision diameter at gigabit speeds. Without this enhancement, minimum-sized Ethernet packets could complete transmission before the transmitting station senses a collision, thereby violating the CSMA/CD method.

To resolve this issue, both the minimum CSMA/CD carrier time and the Ethernet slot time have been extended from their present value of 64 bytes to a new value of 512 bytes. (Note that the minimum packet length of 64 bytes has not been affected.) Packets smaller than 512 bytes have been augmented with a new carrier extension field following the CRC field. Packets longer than 512 bytes have not been extended. These changes, which can impact small-packet performance, have been offset by incorporating a new feature, called packet bursting, into the CSMA/CD algorithm. Packet bursting will allow servers, switches and other devices to send bursts of small packets in order to fully utilize available bandwidth.

Devices that operate in full-duplex mode (switches and buffered distributors) are not subject to the carrier extension, slot time extension or packet bursting changes. Full-duplex devices will continue to use the regular Ethernet 96-bit interframe gap (IFG) and 64-byte minimum packet size.