

CSMA/CD

Overview

Carrier-sense multiple access with collision detection (CSMA/CD) is a media access control (MAC) method used most notably in early Ethernet technology for local area networking. The concept of Ethernet is that all networked devices should be able to transmit on the network at any time. This school of thought directly opposes technologies such as the token ring, which boasts a deterministic approach to media access. Specifically, token ring networks pass tokens around the web round-robin fashion, from one networked device to the next. Only a network device with the ticket is eligible to broadcast on the network.

In the topology shown in the figure below, all devices are directly connected to the network and can transmit freely at any time if they need a reason to believe that there is no other transmission on the cable currently. Ethernet only allows one frame to enter a network segment at any time. Therefore, before a tool on this network transmits, it will listen to the line to determine if traffic is currently sharing. If no traffic is detected, it sends data. But what if two devices have data to transmit at the same time? If they listen to the line simultaneously, they may mistakenly conclude that it is safe to send data at the same time. However, when two devices send their data at the same time, conflicts occur. As shown in Figure 1, disputes can cause data corruption.

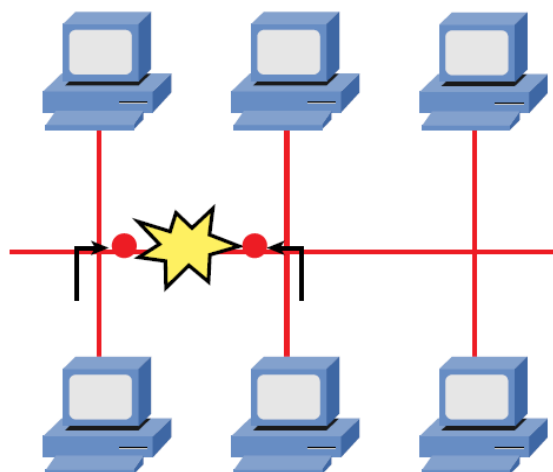


Figure 1: Collision

Collision

A network conflict occurs when something happens to the information sent from the physical network medium to prevent it from reaching its destination. It encounters another signal from one of the other hosts on the network. When these signals are combined, it will generate a useless signal on the network. A conflict occurs when the sending device does not receive a copy of the transparent response within the allotted time. This caused problems for both network devices, as they both had to wait longer and longer until they were ready to transmit information. If the network is busy enough, the network equipment may spend too much time relaying data.

Conflicts can only occur at the physical layer within the OSI model. When multiple devices share traditional media at the physical layer, this happens once you connect various devices to the hub, and you may conflict. The areas in the network where conflicts may occur are called conflict domains. So, what are the benefits of the change? The switch acts as a kind of multi-port bridge, and yes, it joins two conflict domains. What about the introduction of the bridge? The bridge divides the network into two or more parts, and each bit is a separate collision domain. Fewer network devices in the collision domain will reduce the chance of a collision, a bit like fewer cars on the road will reduce the likelihood of an accident.

Process

The CSMA / CD process is divided into several steps. The procedure is based on traditional group dialogue: permanent communication. Not all participants must speak directly, which can generate confusion. Instead, they should speak one after the other so that each participant can fully understand the contribution of the others to the discussion. Without realizing this, our conversation behavior is like this: when others speak, we step back and listen. After the other participants have completed their contributions, for the moment, we wait a short period and only start the conversation when the equivalent participant or other participants in the discussion have not begun to mention anything. If we start lecturing others simultaneously, we will stop our attempts, wait a while, and try again.

The CSMA / CD process is very similar. First, the station monitors the transmission medium. As long as you are frequently busy, the tracking will continue. The station will send the knowledge packet only when the media is free and at a particular time (at intervals between frames). At the same time, the transmitter continues to observe the transmission medium to determine if it detects any data conflicts. If no other participants try to send their data through the medium at the top of the flow and no matches occur, the flow is successful.

Collision Avoidance

Some of the most commonly used methods of collision avoidance:

- Carrier detection schemes
- Pre-programmed Time Slot
- Random Access Time
- Exponential Fallback After Collision Detection

Collision Avoidance in the Network It mainly occurs in networks with multiple access carriers Detection in the network (CSMA). The following principle usually supports this: A node willing to transmit data needs to monitor the channel for a while to determine whether other nodes are also sending on the wireless channel. The node can initiate the transmission; otherwise, the information will be postponed. Collision avoidance improves CSMA performance by preventing multiple nodes from transmitting at the same time. Reduce the probability of collisions by using randomly truncated binary exponential fallback times. Conflict avoidance splits the wireless channel equally among the transmitting nodes in the conflict domain. It is complemented by the exchange of requests to send data packets. The sender and receiver nodes will be warned not to transmit during the mainstream.

A popular circumvention scheme is characterized by a four-way handshake initiated by the sender. The transmission of the knowledge packet and the reception confirmation are sent before the invitation and authorization. Nodes listening to these packets postpone access to the channel to avoid collisions.