

01:22

## CSMA PROTOCOL

- ★ Principle of CSMA: "sense before transmit" or "listen before talk."
- ★ Carrier busy = Transmission is taking place.
- ★ Carrier idle = No transmission currently taking place.

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## CSMA/CD

- ★ If two stations sense the channel to be idle and begin transmitting simultaneously, they will both detect the collision almost immediately.
- ★ Rather than finish transmitting their frames, which are irretrievably garbled anyway, they should abruptly stop transmitting as soon as the collision is detected.
- ★ Quickly terminating damaged frames saves time and bandwidth.
- ★ This protocol, known as CSMA/CD (CSMA with Collision Detection) is widely used on LANs in the MAC sublayer.
- ★ Access method used by Ethernet: CSMA/CD.

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## CSMA/CD

- ★ At the point marked  $t_0$ , a station has finished transmitting its frame.
- ★ Any other station having a frame to send may now attempt to do so. If two or more stations decide to transmit simultaneously, there will be a collision.
- ★ Collisions can be detected by looking at the power or pulse width of the received signal and comparing it to the transmitted signal.
- ★ After a station detects a collision, it aborts its transmission, waits a random period of time, and then tries again, assuming that no other station has started transmitting in the meantime.
- ★ Therefore, model for CSMA/CD will consist of alternating contention and transmission periods, with idle periods occurring when all stations are quiet.

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## CSMA/CD – FOR GATE ASPIRANTS

$$\text{Efficiency} = \frac{1}{1 + 6.44 \times a}$$

$$a = \frac{T_p}{T_t}$$

- ★ If distance increases, efficiency of CSMA decreases.
- ★ CSMA is not suitable for long distance networks like WAN; but works optimally for LAN.
- ★ If length of packet is bigger, the efficiency of CSMA also increases; but maximum limit for length is 1500 Bytes.
- ★ Transmission Time  $\geq$  Round Trip Time of 1 bit
- ★ Transmission Time  $\geq 2 \times$  Propagation Time

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## CSMA/CA

- ★ Carrier-sense multiple access with collision avoidance (CSMA/CA) is a network multiple access method in which carrier sensing is used, but nodes attempt to avoid collisions by beginning transmission only after the channel is sensed to be "idle".
- ★ It is particularly important for wireless networks, where the collision detection of the alternative CSMA/CD is not possible due to wireless transmitters disabling their receivers during packet transmission.

transmitters desensing their receivers during packet transmission.

- ★ CSMA/CA is unreliable due to the hidden node problem and exposed terminal problem.
- ★ Solution: RTS/CTS exchange.
- ★ CSMA/CA is a protocol that operates in the Data Link Layer (Layer 2) of the OSI model.