

Course Name: A Level (2<sup>nd</sup> Sem)

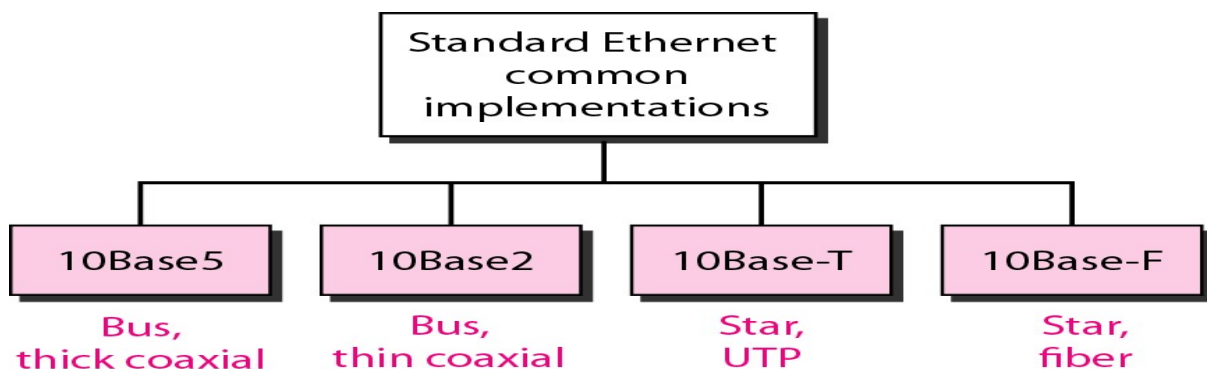
Subject: DCN

Topic: Ethernet contd.

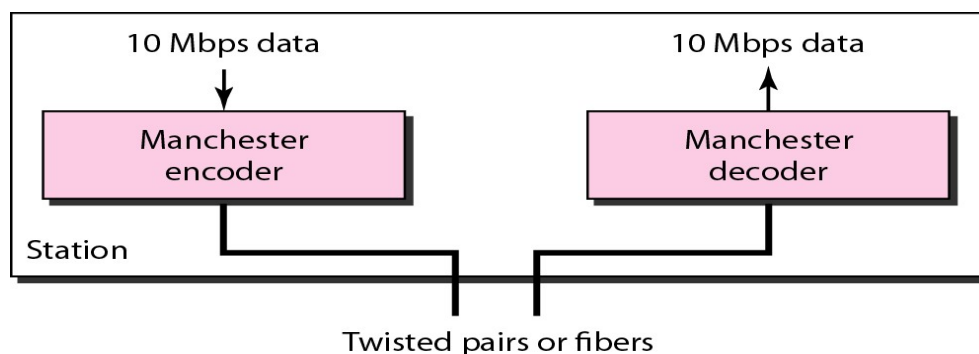
Date: 20-05-20

## **Standard Ethernet:**

The Standard Ethernet defines several physical layer implementations; four of the most common, are shown in the figure.



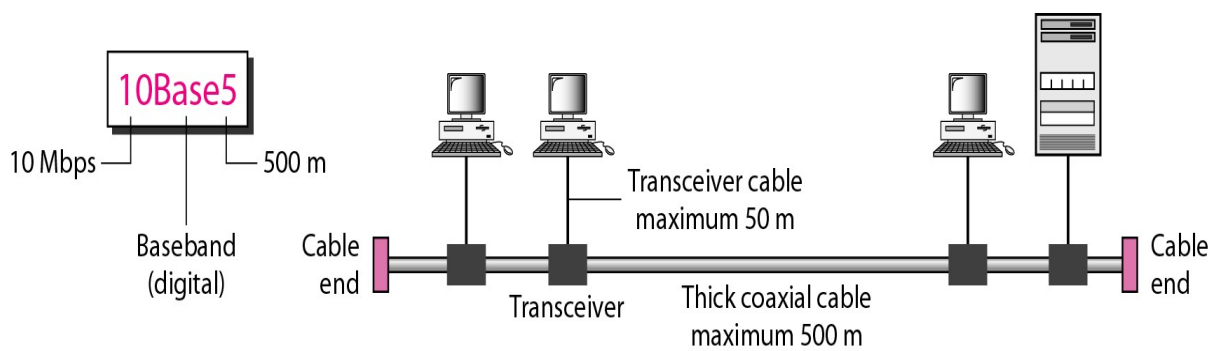
All standard implementations use digital signaling (baseband) at 10 Mbps. At the sender, data are converted to a digital signal using the Manchester scheme; at the receiver, the received signal is interpreted as Manchester and decoded into data. As we know that Manchester encoding is self-synchronous, providing a transition at each bit interval. Figure shows the encoding scheme for Standard Ethernet.



## **10Base5: Thick Ethernet**

The first implementation is called **10Base5, thick Ethernet, or Thicknet**. 10Base5 was the first Ethernet specification to use a **bus topology** with an external **transceiver** (transmitter/receiver) connected via a tap to a thick coaxial cable. Figure shows 10Base5 implementation.

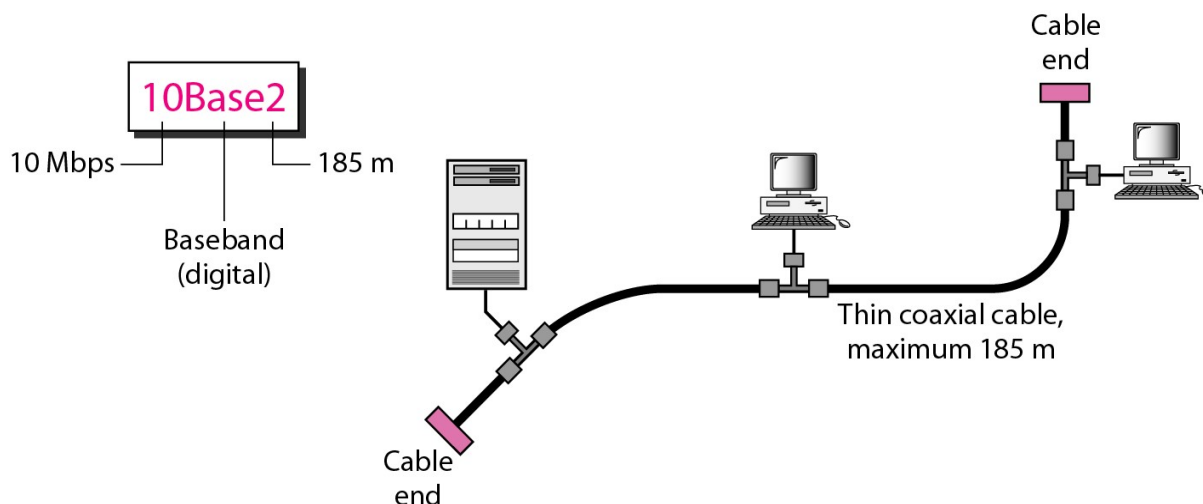
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The transceiver is responsible for transmitting, receiving, and detecting collisions. The transceiver is connected to the station via a transceiver cable that provides separate paths for sending and receiving. This means that collision can only happen in the coaxial cable. The maximum length of the coaxial cable must not exceed **500 m**; otherwise, there is excessive degradation of the signal. If a length of more than 500 m is needed, up to five segments, each a maximum of 500 meter, can be connected using repeaters.

## 10Base2: Thin Ethernet

The second implementation is called 10Base2, thin Ethernet, or Cheapernet. 10Base2 also uses a bus topology, but the cable is much thinner and more flexible. The cable can be bent to pass very close to the stations. In this case, the transceiver is normally part of the network interface card (NIC), which is installed inside the station. Figure shows the 10Base2 implementation.

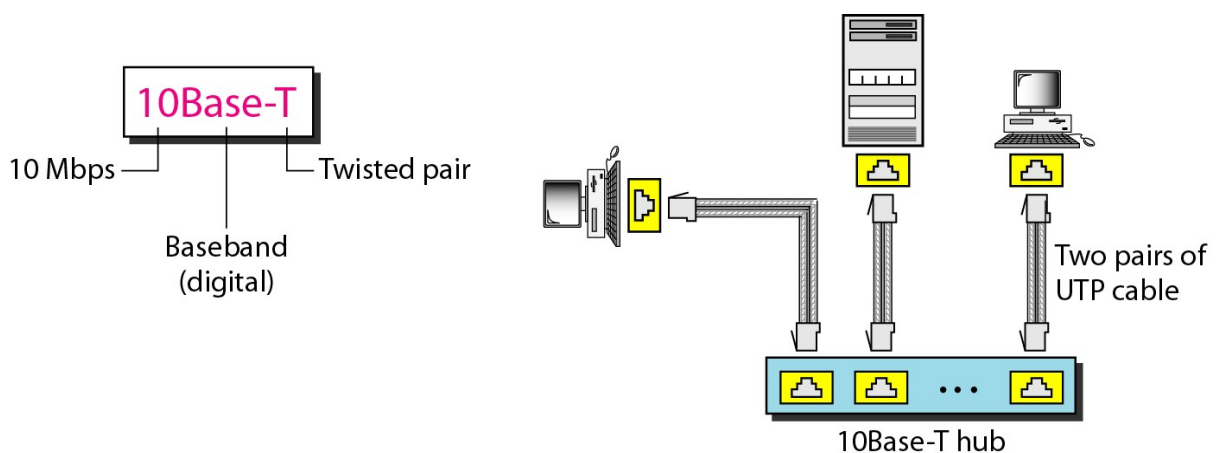


The collision here occurs in the thin coaxial cable. This implementation is more cost effective than 10Base5 because thin coaxial cable is less expensive than thick coaxial and the tee connections are much cheaper than taps. Installation is simpler because the thin coaxial cable is very flexible. However, the length of each segment cannot exceed 185 m (close to 200 m) due to the high level of attenuation in thin coaxial cable.

## 10Base-T: Twisted-Pair Ethernet

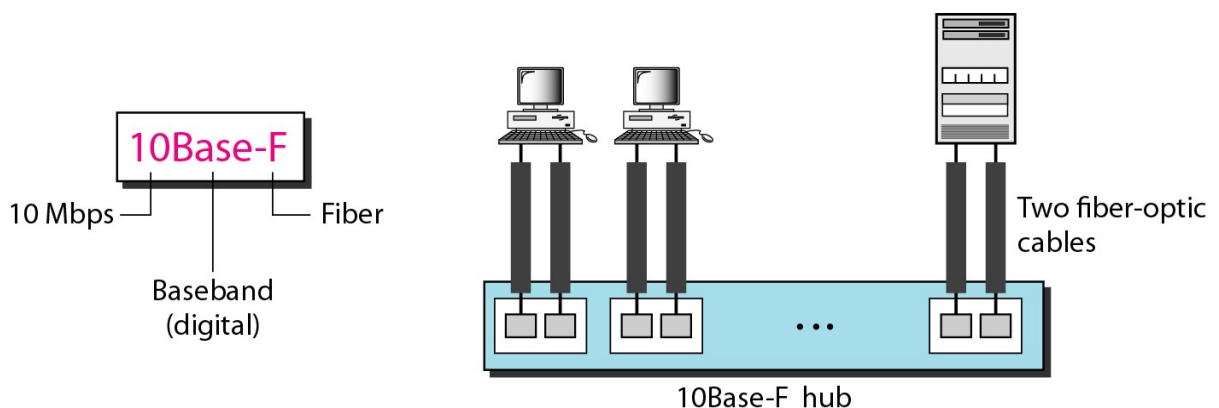
The third implementation is called 10Base-T or twisted-pair Ethernet. 10Base-T uses a physical star topology. The stations are connected to a hub via two pairs of twisted cable, as shown in Figure.

Two pairs of twisted cable create two paths (one for sending and one for receiving) between the station and the hub. Any collision here happens in the hub. Compared to 10Base5 or 10Base2, we can see that the hub actually replaces the coaxial cable as far as a collision is concerned. The maximum length of the twisted cable here is defined as 100 m, to minimize the effect of attenuation in the twisted cable.



## 10Base-F: Fiber Ethernet

10Base-F uses a star topology to connect stations to a hub. The stations are connected to the hub using two fiber-optic cables, as shown in the figure.



## **Summary of Standard Ethernet implementations**

<i>Characteristics</i>	<i>10Base5</i>	<i>10Base2</i>	<i>10Base-T</i>	<i>10Base-F</i>
Media	Thick coaxial cable	Thin coaxial cable	2 UTP	2 Fiber
Maximum length	500 m	185 m	100 m	2000 m
Line encoding	Manchester	Manchester	Manchester	Manchester

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### **Exercises:**

- A. What are the common Standard Ethernet implementations?**
- B. Compare and contrast 10Base5 and 10Base2 Ethernet?**