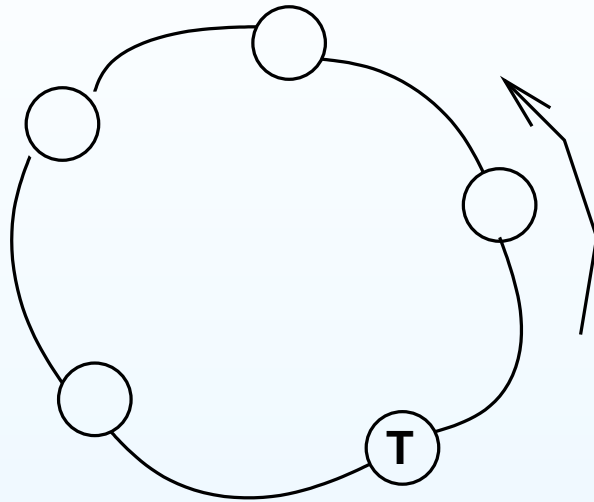


## Token Ring Physical Layers

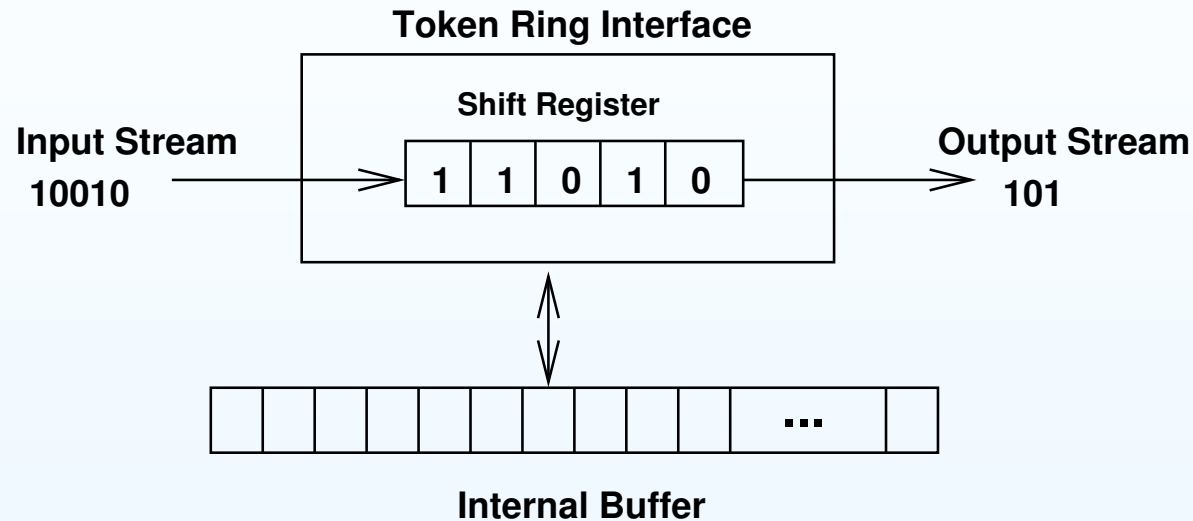
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### **Token Ring**

- Point-to-point between nodes.
- Nodes can send only when in possession of the token and only one token exists on the network (typically).
- Node sends message and removes bits when they return.
- Recipient copies bits and sets the error bits.

## Node behavior



### Token Ring Node Interface

- Shift register moves bits through.
- Data can be copied to an internal buffer, but data bits must not be delayed.

## Tokens

- A token is simply a bit in a short frame.
- A token is released immediately after the bits of a message.
- A sender with data changes the bit when shifting through and appends its own message.
- Bit length.
- The token must fit on the network.

## IEEE 802.5

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- Signaling method - Differential Manchester encoding using +3.3 volts and -3.3 at 4Mbps, 16 Mbps or 100 Mbps.
- UTP/STP/fiber with maximum cable lengths between stations of 150 m/375m/2 km and a maximum number of stations on a ring segment of 250 .
- Each frame contains a 32-bit CRC and response bits set by the recipient.
- Data can be copied to an internal buffer, but data bits must not be delayed.

# Frame Format

Start Delim	Access Control	Frame Control	Dest Addr	Src Addr	Data	CRC	End Delim	Frame Status
1 Byte	1	1	2 or 6	2 or 6	M	4	1	1 Control

- Frame sentinels are special characters not allowed in Manchester.
- The access control byte has fields that allow the stations to set and honor priorities on messages.
- The frame control byte contains among other things the token bit.
- A single bit in the FC indicates if the frame contains data or is the token.
- Addresses can be 16 bits or 48 bits.

- Maximum frame length is 4550 bytes for 4 Mbps rings and 18,200 bytes for faster networks.
- The frame status has two bits: Address recognized and frame-copied.
- A token is simply the first three bytes.

## Access Method

- Wait for a frame with the token bit set.
- Change the token bit to a zero and append message.
- Remove any bits that arrive.
- When done sending, follow last message with a frame with only the Access Control and Frame Control fields and with the Token Bit set.