**Token Ring Research (**[**https://www.youtube.com/watch?v=p72R2uGglnU**](https://www.youtube.com/watch?v=p72R2uGglnU)**)**

**Generic Features and Method**

* Developed by IBM in 1980s
* Used for Local Area Networks (LAN)
* Direct competitor to Ethernet
* Sparked lots of debate between Token Ring and Ethernet as the Data-Link Layer of choice
* All hosts are connected in a ring topology
* The token, an empty framework, is continuously circulated on the ring
* An empty token consists of 3 fields (FRAME)
  1. Start Delimiter
  2. Access Control
  3. End Delimiter
* If Computer A wants to pass information to Computer B
  1. Catch the token as it passes Computer A
  2. Inserts data as headers between the Access Control and End Delimiter fields
  3. Token has now become a data/command frame
  4. Token is released back to the ring
  5. Examined by each \*\*\*SUCCESSIVE\*\*\* workstation
  6. Checks the destination address against their own address
  7. Passes any computers that do not match
  8. When reaches the destination, token is read, and a flag is appended to the end of the token called “Frame Status”. This is a flag that acts as an “Acknowledgement” to the sender
  9. Once Computer A receives the token with the “Acknowledgement” flag, the token and cleared and ready for the next message.
* The Media Access Method is called Token Passing
* When a host wants to transmit data, it should hold the token until it is done
* When another host wants to send data, it should wait

**Benefits over Ethernet (the current standard)**

* Token passing access method won’t cause collisions as Ethernet (CSMA/CD) will
  1. The empty frame is what stopped the cause of collisions
* Token ring allows for larger frame size
* Its speed was faster than Ethernet when Token Ring was introduced

**Why did it fail?**

* Ethernet costs were significantly lower, with IBM costing 5-6 times more
* Ethernet speeds eventually surpassed Token Ring

**Data Link Layer Protocol (Fundamentals of Data Communication Networks – Oliver CC. lbe – Nov 2017 -** [**https://learning.oreilly.com/library/view/fundamentals-of-data/9781119436256/**](https://learning.oreilly.com/library/view/fundamentals-of-data/9781119436256/)**)**

**Flow Control (technique used to ensure that a sender transmits data at a rate that the receiver can accept / manage):**

**The Stop-and-Wait Protocol**The sender sends 1 frame and then waits for an acknowledgement (ACK) from the receiver before sending another frame. As the sender is waiting for the ACK response from the receiver, protocols ensure that the sender is transmitting at a rate that the receiver can handle.  
  
A key drawback is that this leads to poor channel utilization due to round trip delay.  
  
A key advantage is that senders can be certain that packets are reaching the receiver.

Token Ring is a point-to-point