Introduction To Data Comm & Networking
Module 4 – Links
Chapter 8

http://intronetworks.cs.luc.edu/current2/html/index.html

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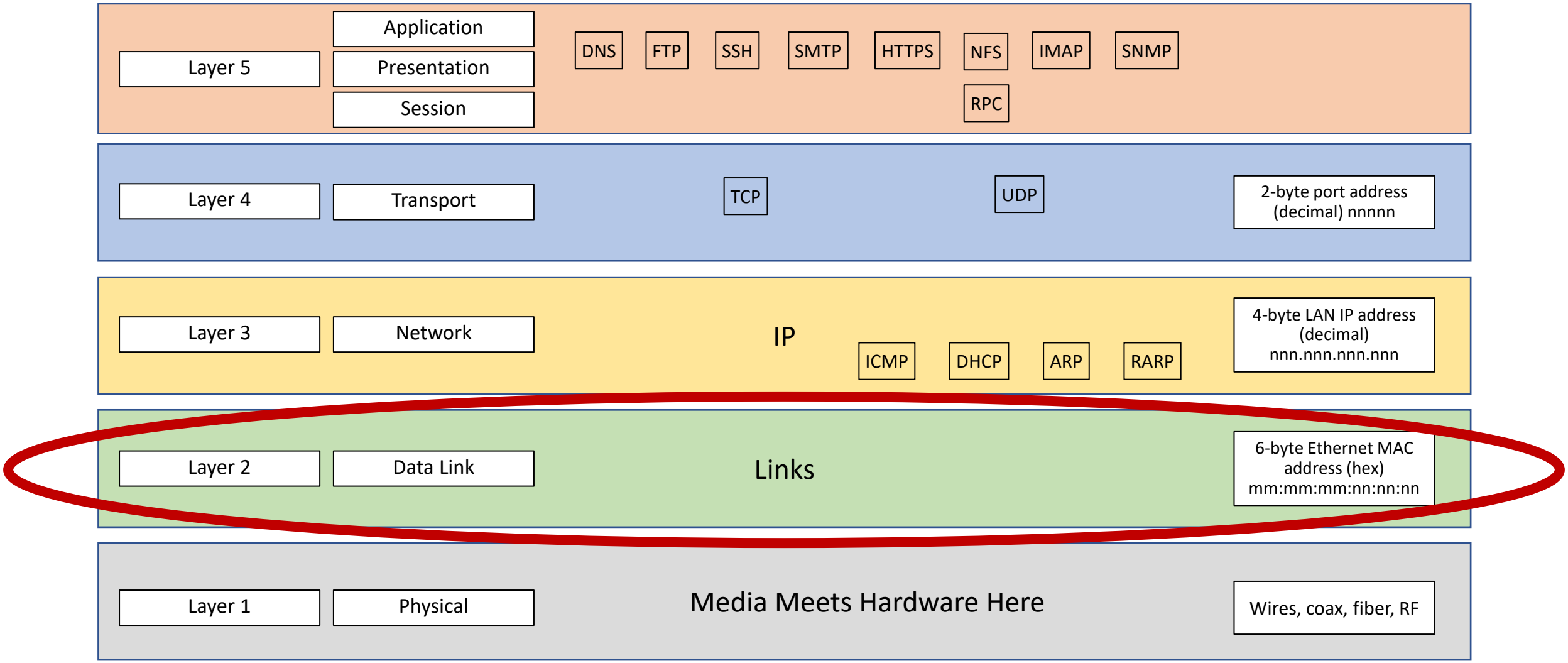
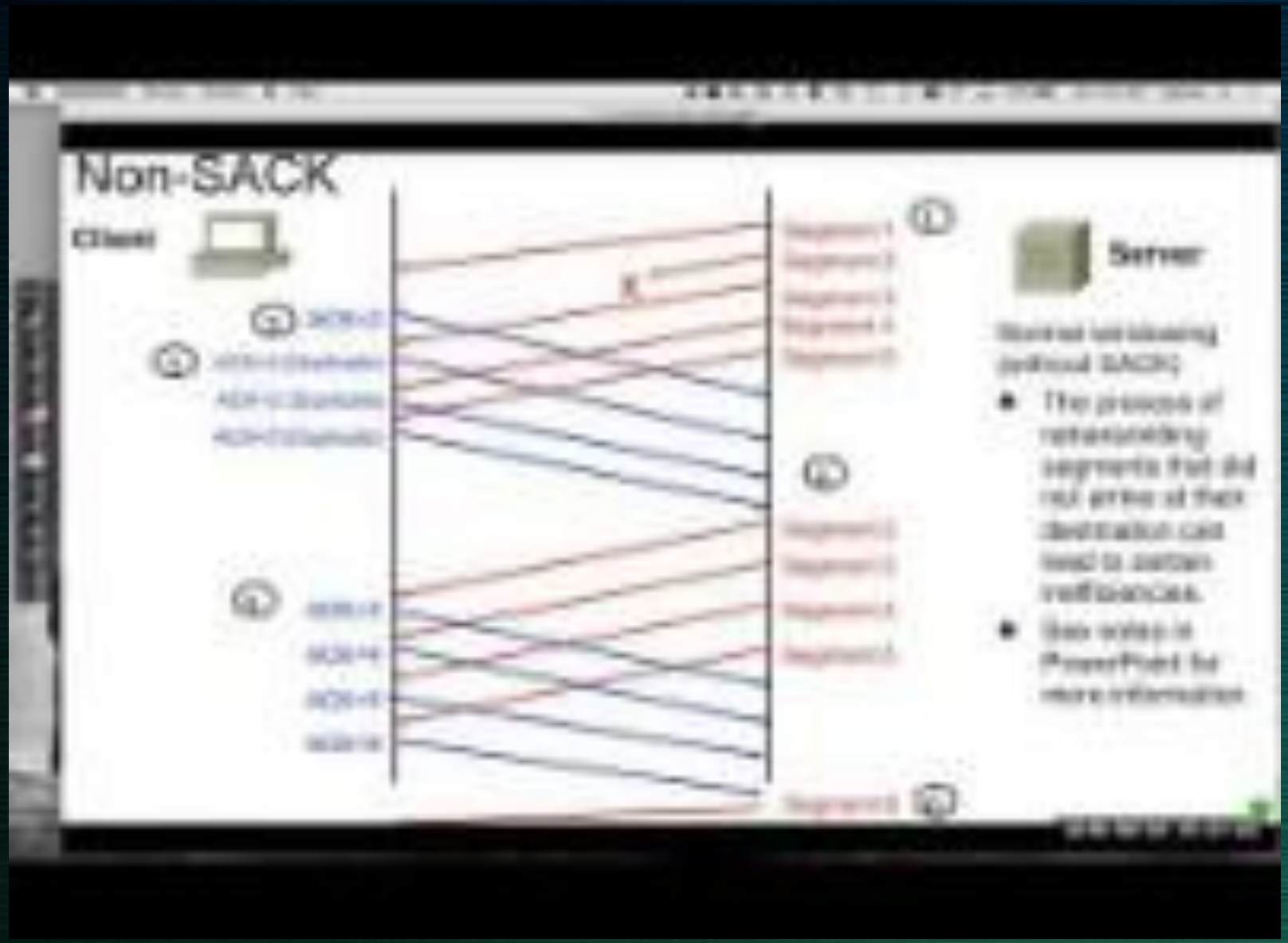
TCP/IP 5-Layer Network Stack

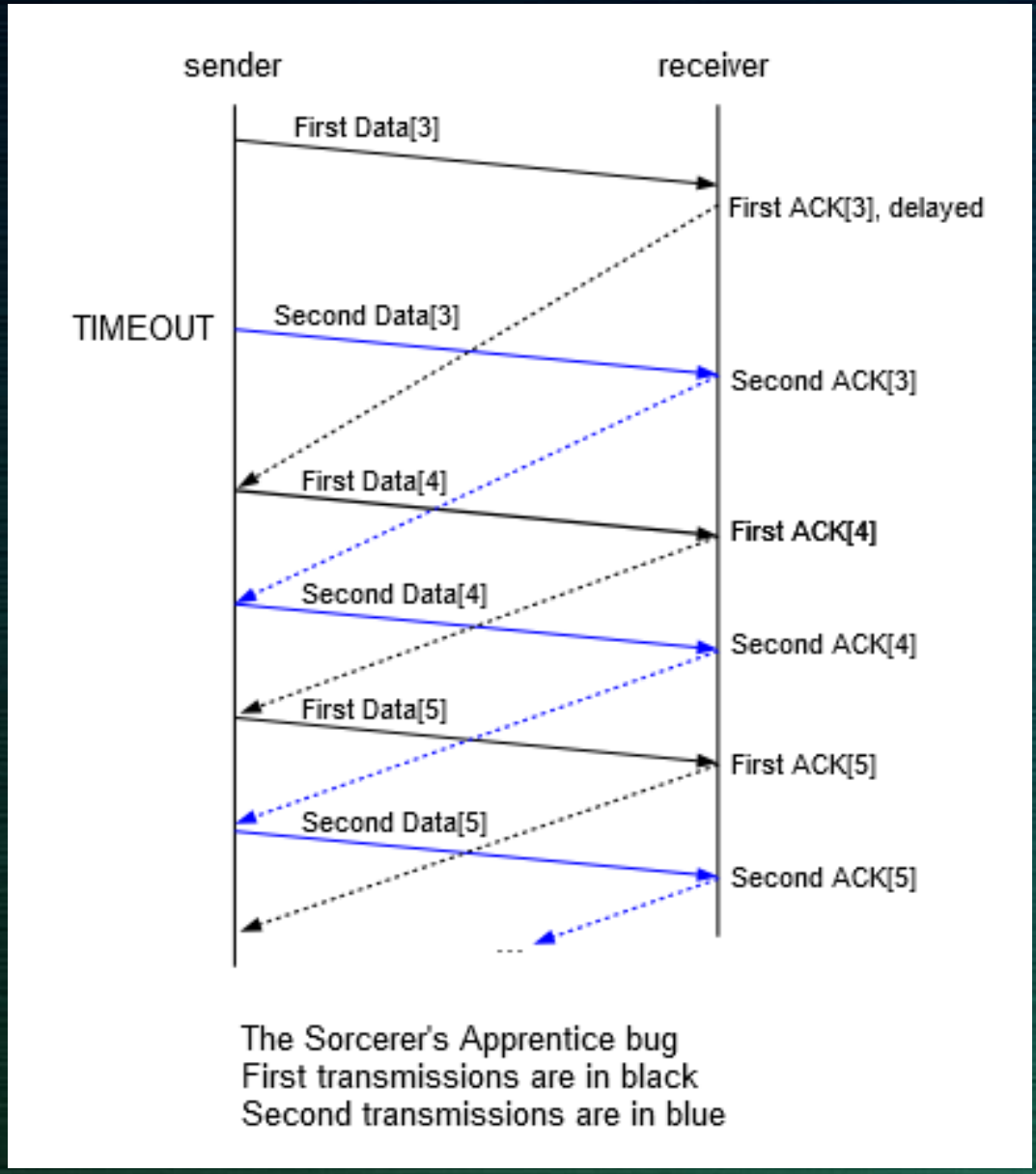


Layer 2 – Packet Transmission



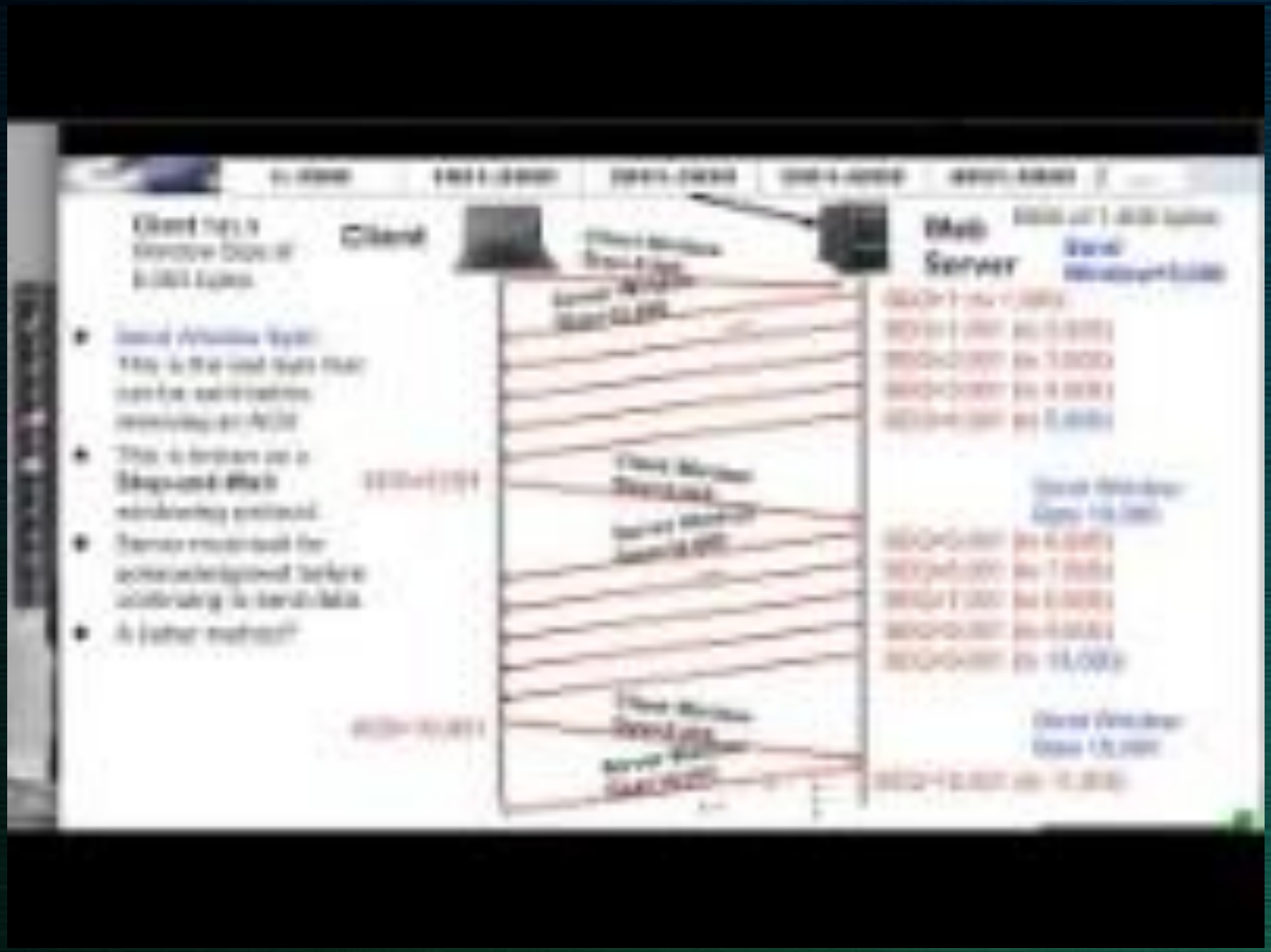
https://www.youtube.com/watch?v=sD6odUEGELE

Layer 2 – Sorcerer's Apprentice



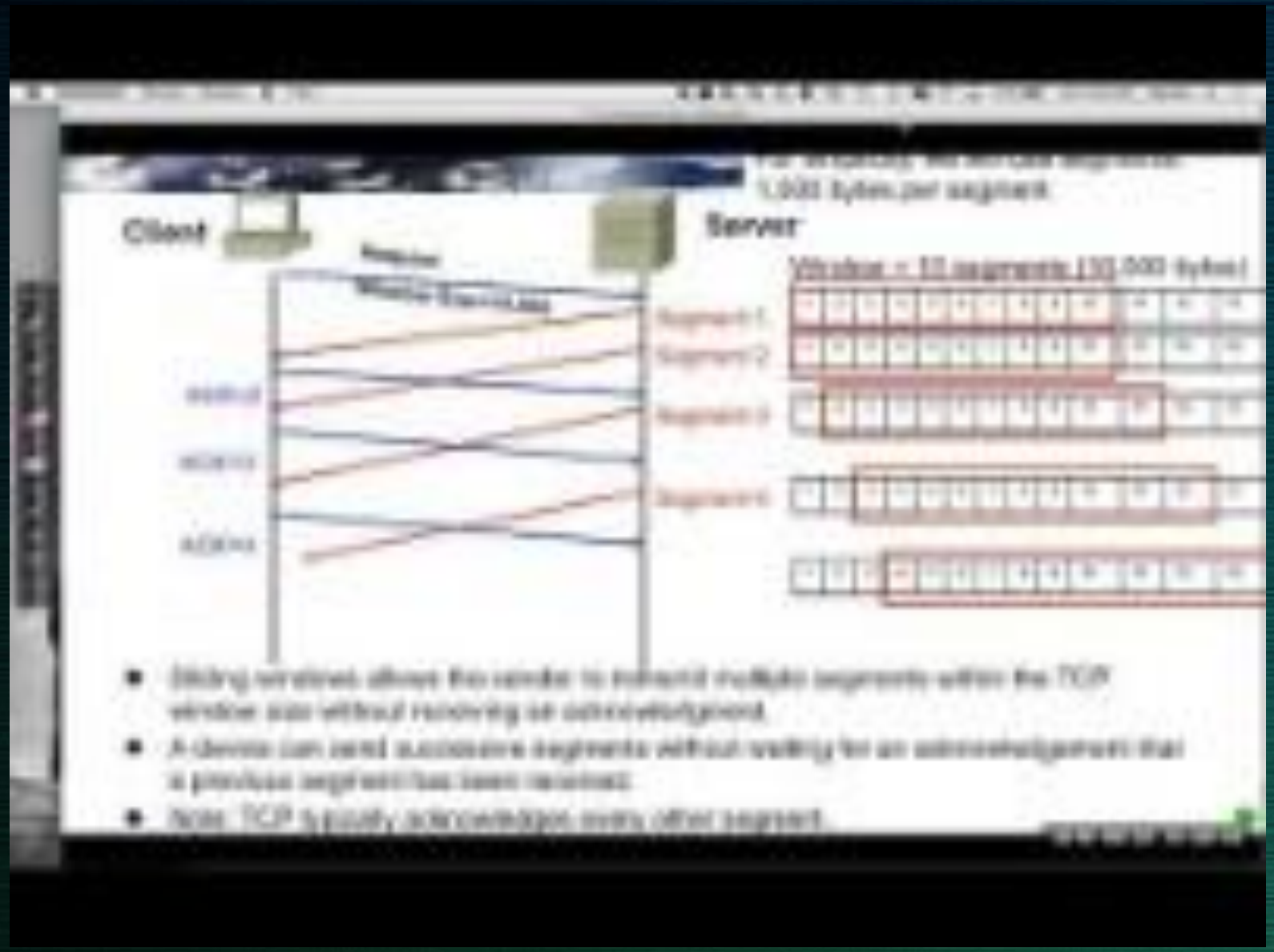
http://intronetworks.cs.luc.edu/current2/html/slidingwindows.html

Layer 2 – Flow Control & Windows



https://www.youtube.com/watch?v=4l2_BCr-bhw

Layer 2 – Sliding Windows



https://www.youtube.com/watch?v=klDhO9N01c4

Layer 2 – Terms

- RTT = round trip time
- Transit capacity = bandwidth x RTT_{noLoad}
- Pipeline drain = window resets
- Bottleneck = slowest network link = path bandwidth
- Bottleneck link = first point in link path where bottleneck exists
- Power = throughput / RTT

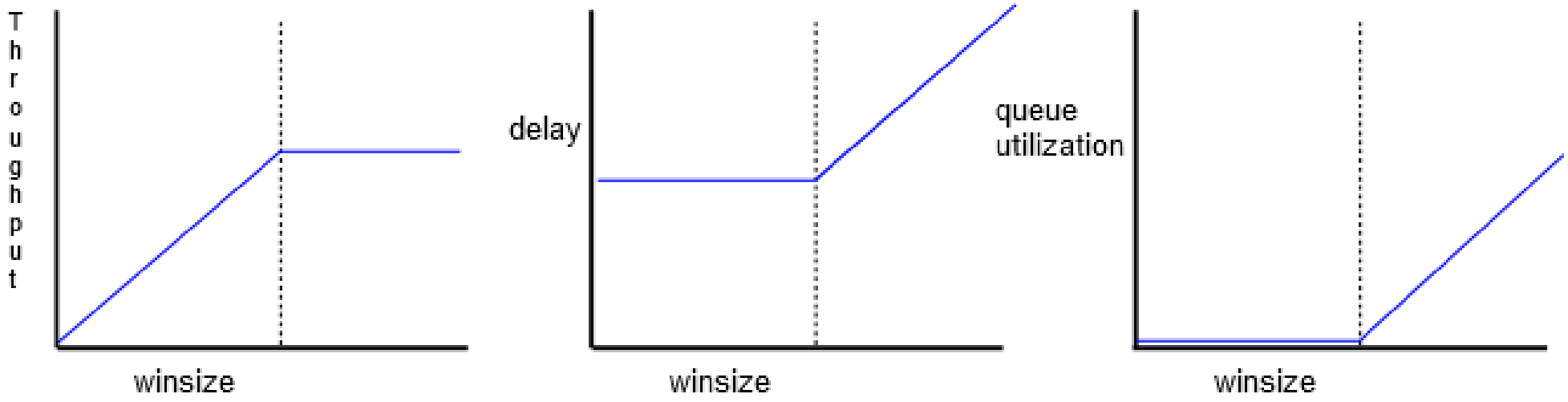
Layer 2 – Terms

- Critical winsize = bandwidth x RTT_{noLoad} = Congestion Knee
  - Winsize < Knee:
    - Throughput is proportional to winsize
    - Delay is constant
    - Queue utilization in the steady state is zero
  - Winsize > knee:
    - Throughput is constant = bottleneck bandwidth
    - Delay increases linearly with winsize
    - Que utilization increases linearly with winsize

Layer 2 – Winsize

Consider the following graphs of winsize versus

1. throughput
2. delay
3. queue utilization



Graphs of winsize versus throughput, delay and queue utilization.
Vertical dashed line represents winsize = bandwidth x no-load delay

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Layer 2 – Key Point

- GOLDILOCKS PRINCIPLE:
  - Winsize needs to be just right

References

https://www.javatpoint.com/computer-network-tcp-ip-model
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https://www.youtube.com/watch?v=4l2_BCr-bhw
https://www.youtube.com/watch?v=klDhO9N01c4