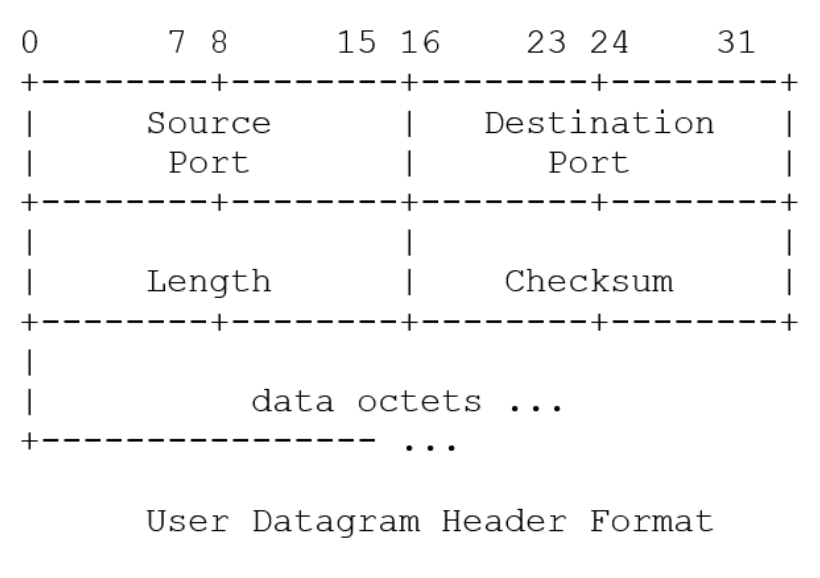
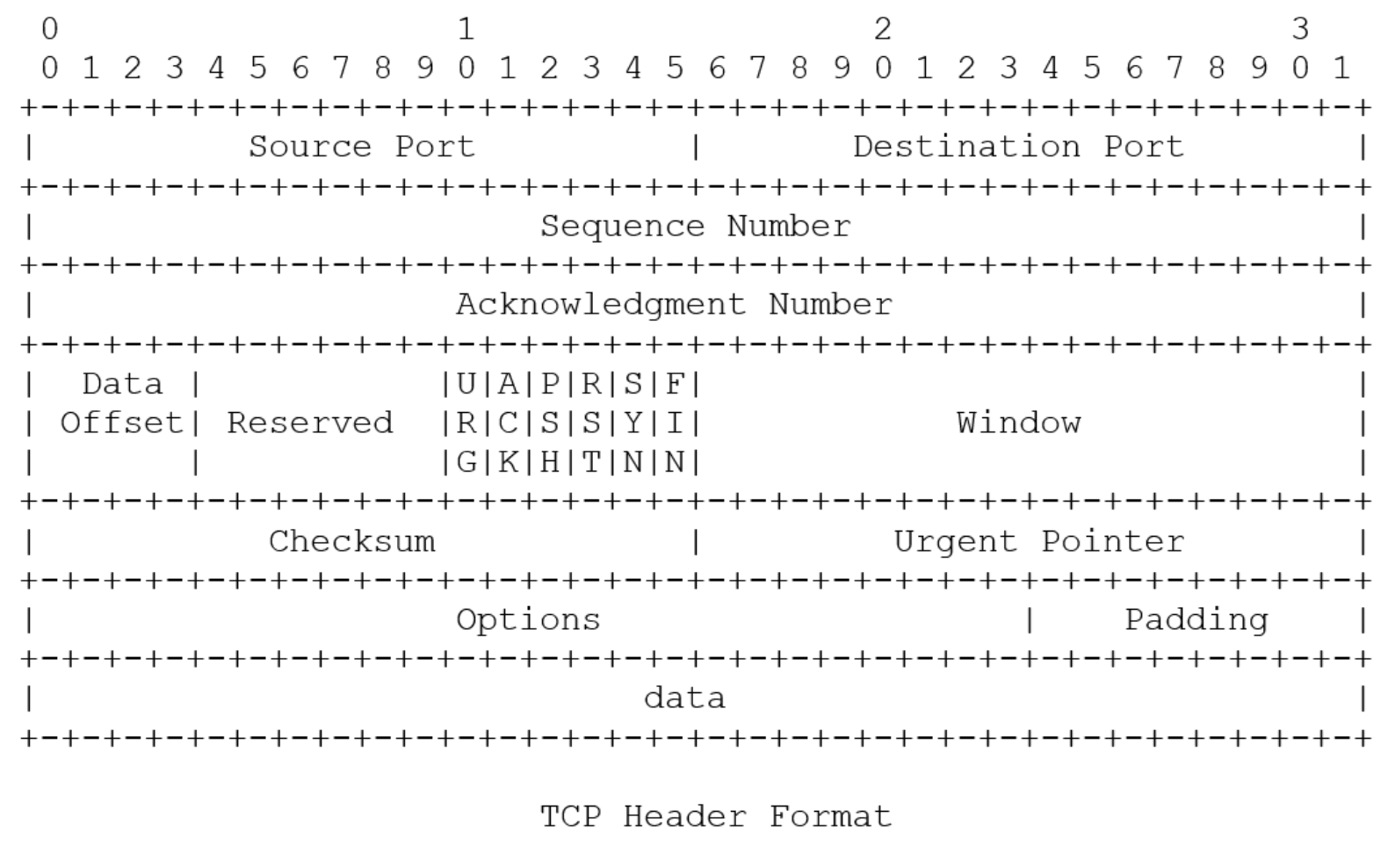
TCP

CyberQuince

INTRODUCTION

TCP is a reliable data transfer protocol that is implemented on top of an ***unreliable*** (IP) end-to-end network layer.





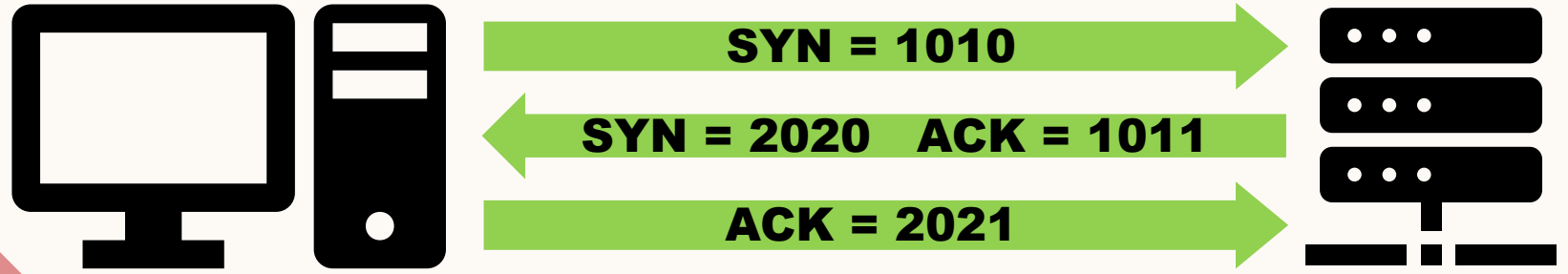
https://www.ietf.org/rfc/rfc768.txt
https://www.ietf.org/rfc/rfc793.txt

THREE-WAY HANDSHAKE

Three-way handshake is a process which is used in TCP/IP networks to establish connections between servers and clients.

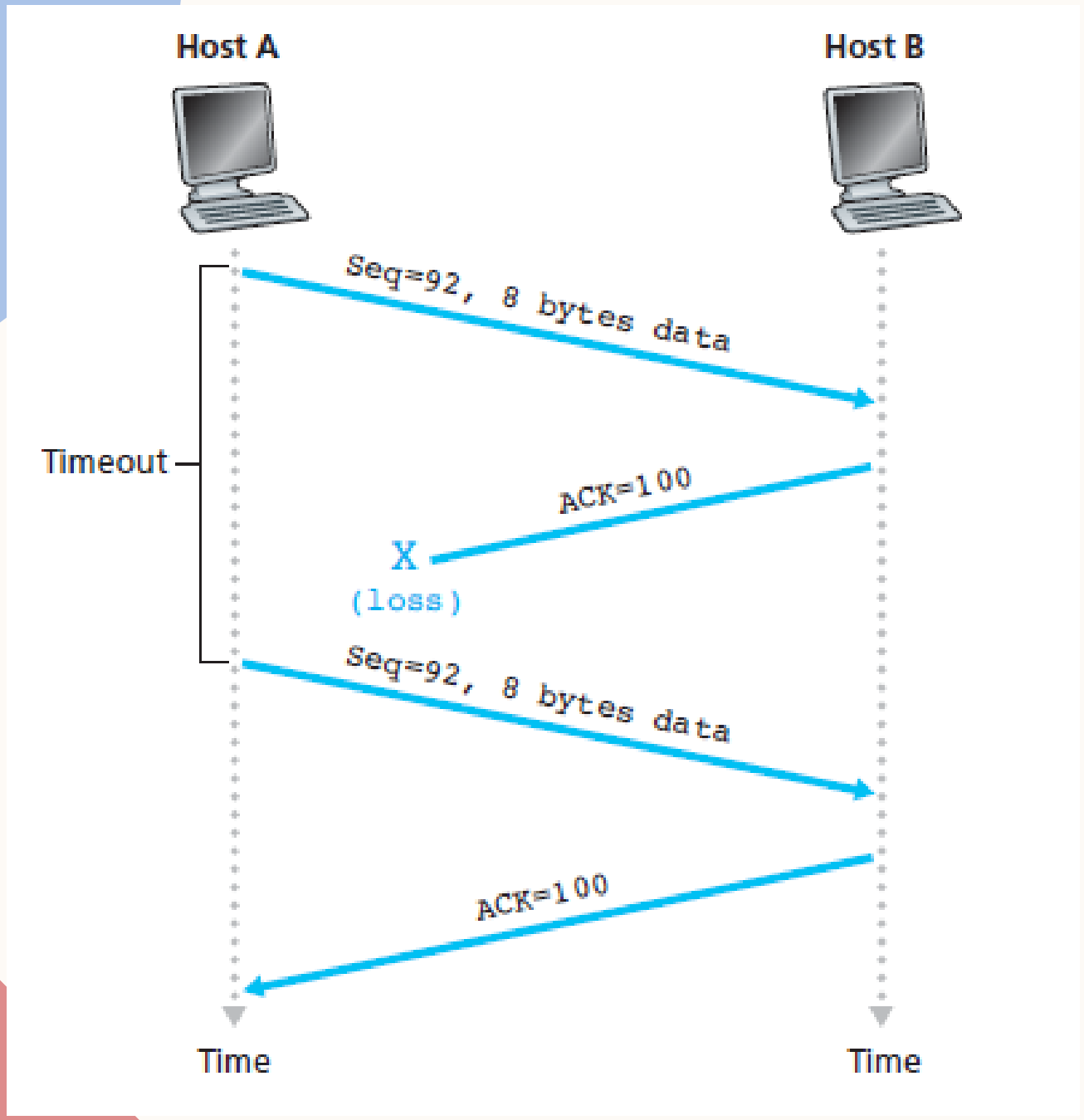
It uses a SYN → SYN ACK → ACK sequence to make that happen.

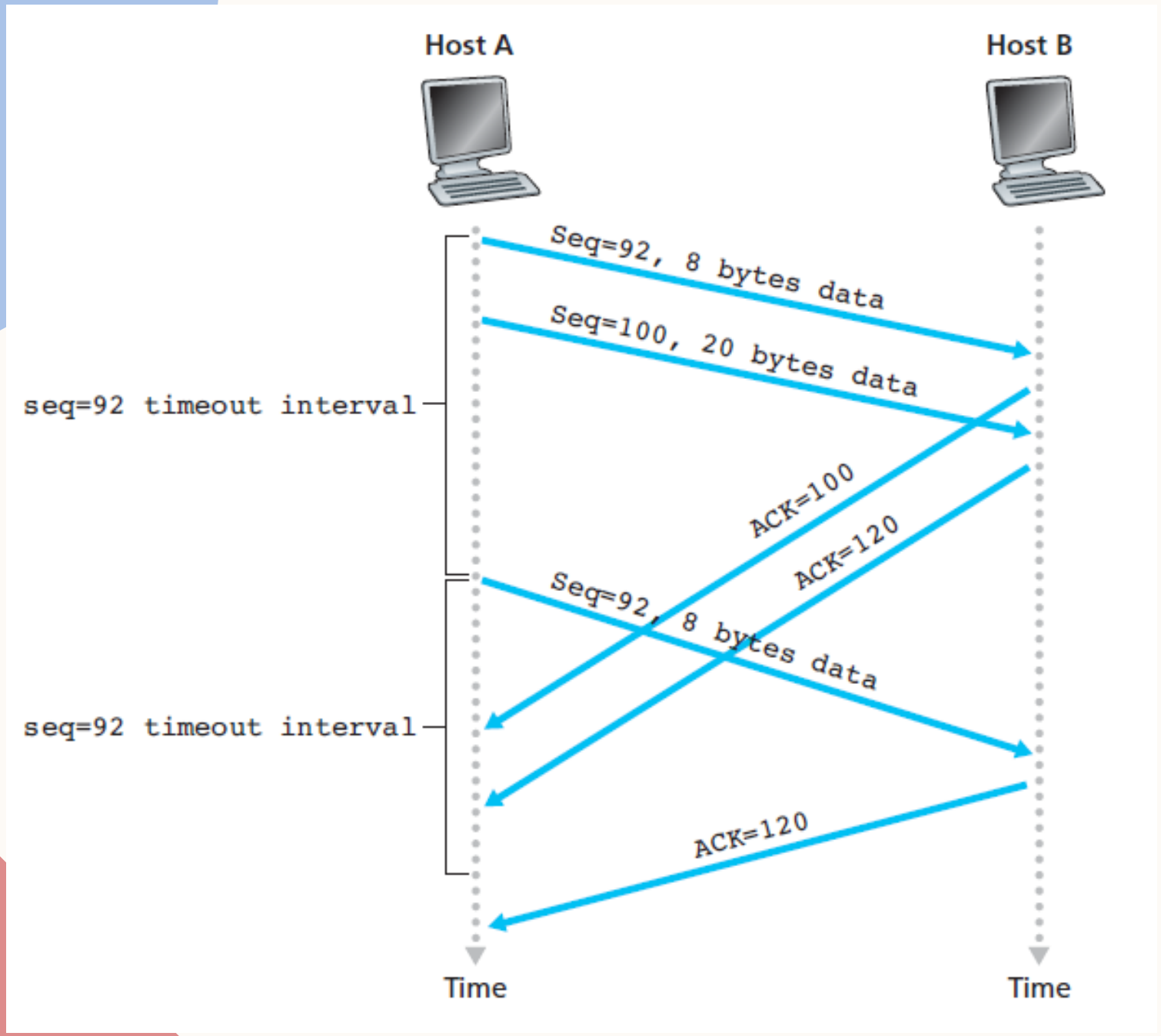
THREE-WAY HANDSHAKE

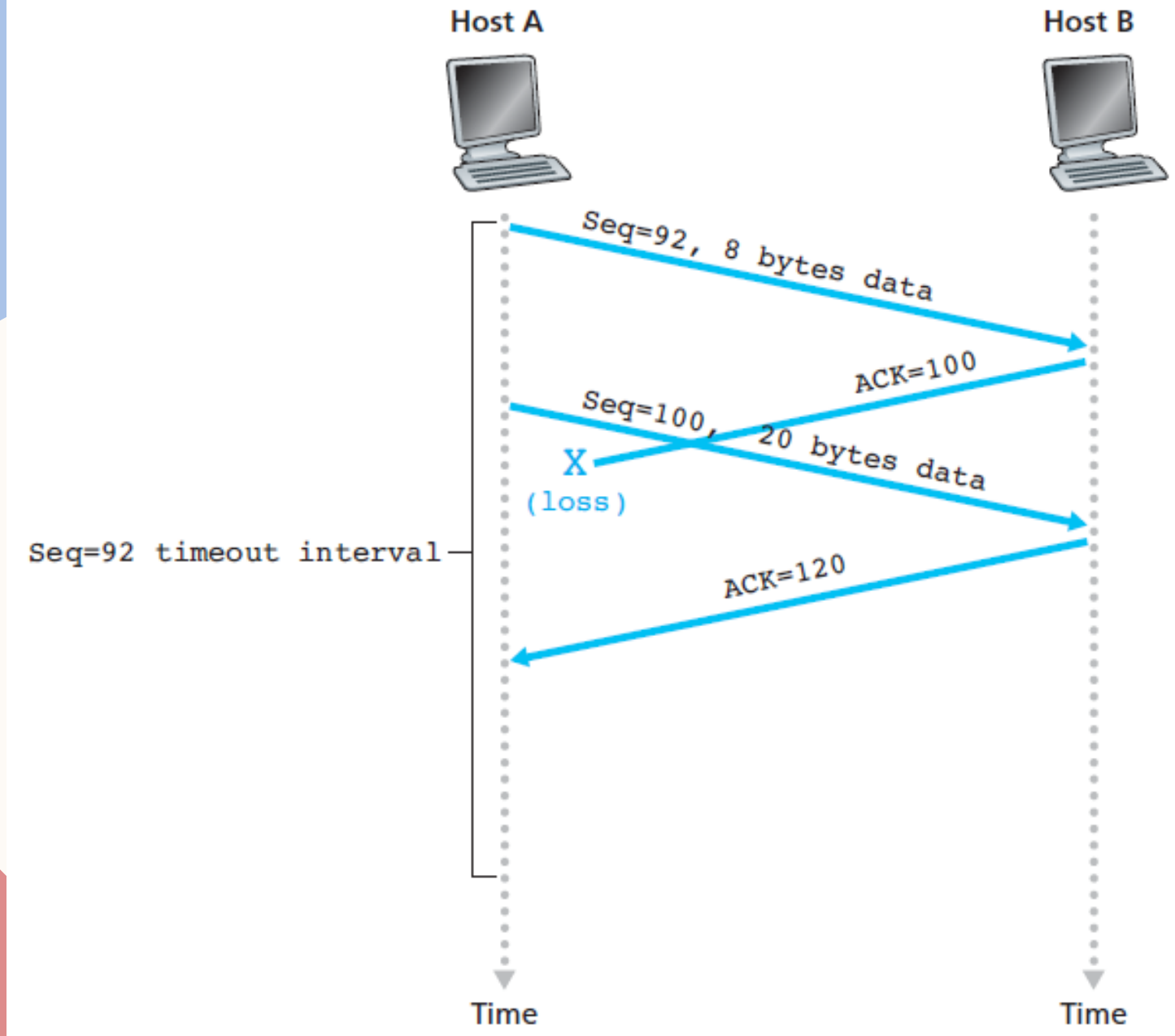


RELIABLE TRANSFER

TCP must recover data that is damaged, lost, duplicated, or delivered out of order by the Internet. TCP achieves this reliability by assigning a sequence number to each octet it transmits and requiring a positive acknowledgment (ACK) from the receiving TCP.


Host A
Host B
Seq=92, 8 bytes data
Timeout
ACK=100
X
(loss)
Seq=92, 8 bytes data
ACK=100
Time
Time


Host A
Host B
Seq=92, 8 bytes data
Seq=100, 20 bytes data
seq=92 timeout interval
ACK=100
ACK=120
Seq=92, 8 bytes data
seq=92 timeout interval
ACK=120
Time
Time

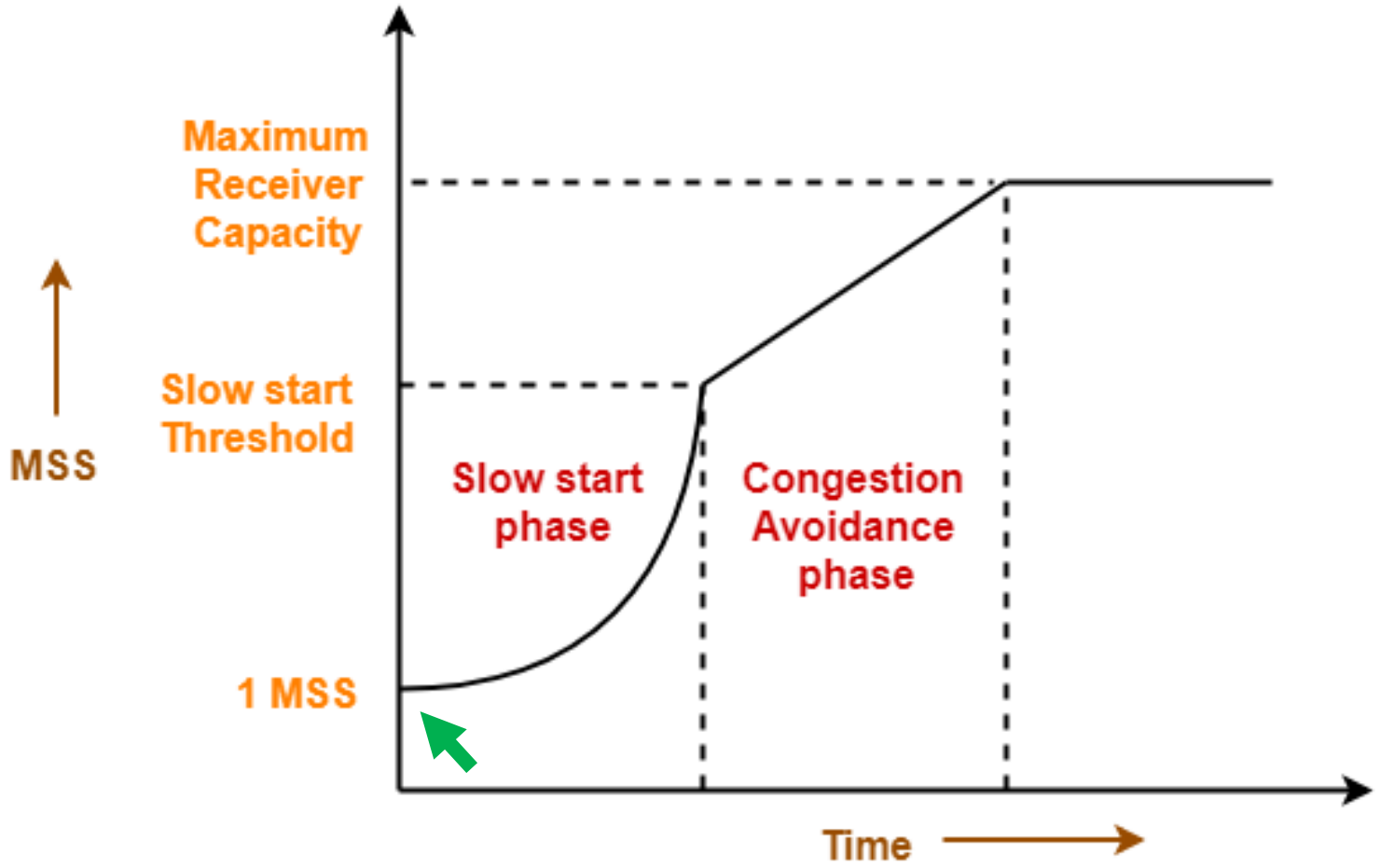

Host A
Host B
Seq=92, 8 bytes data
ACK=100
Seq=100, 20 bytes data
X
(loss)
Seq=92 timeout interval
ACK=120
Time
Time

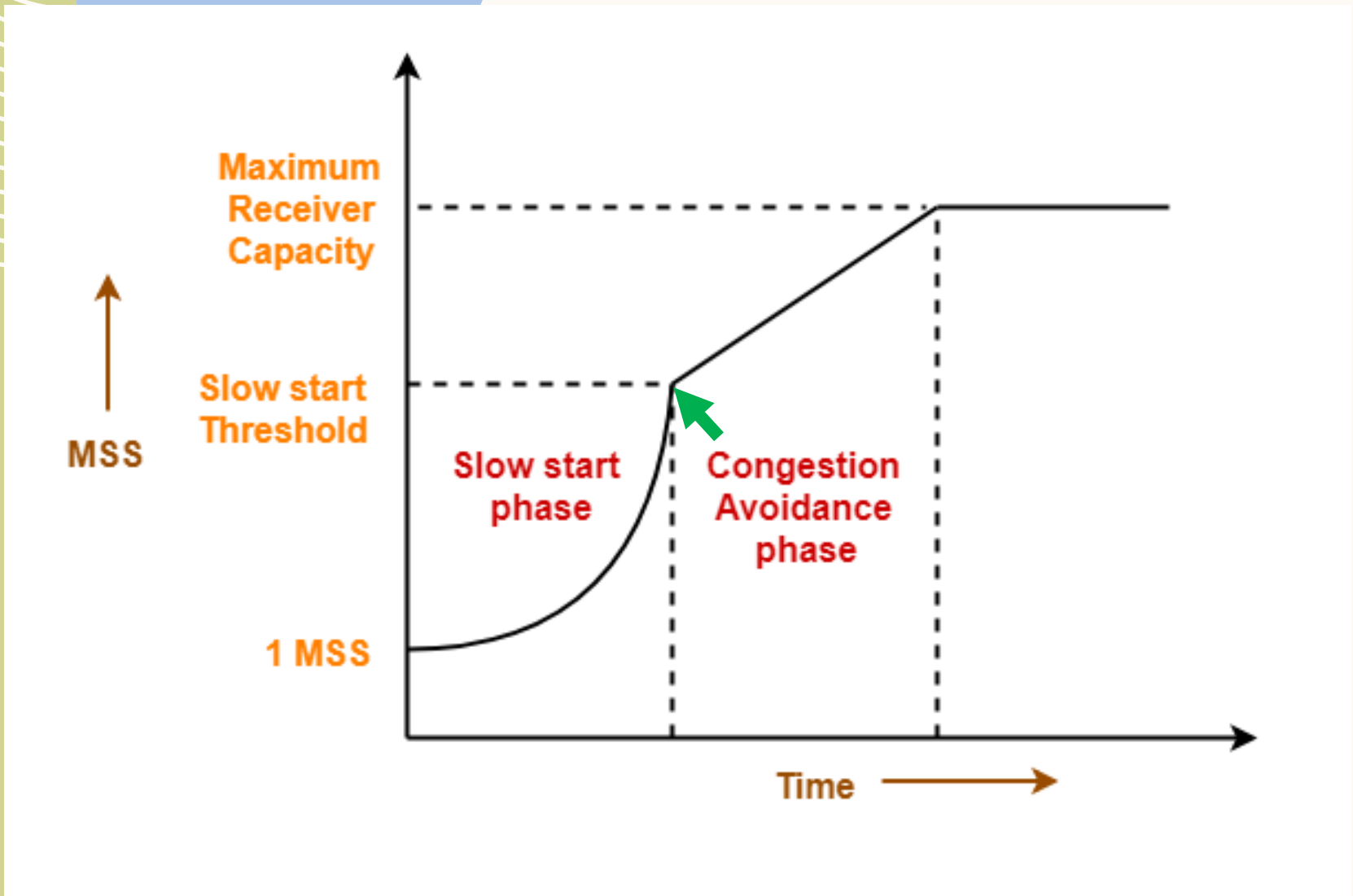
CONGESTION CONTROL

TCP uses a reactive congestion-avoidance algorithm that dynamically adjusts the rate at which data is sent to reduce the amount of network congestion and packet loss.

CONGESTION CONTROL

- Slow Start Algorithm
- Congestion Avoidance Phase
- Congestion Detection Phase


Maximum
Receiver
Capacity
Slow start
Threshold
MSS
Slow start
phase
Congestion
Avoidance
phase
1 MSS
Time


Maximum
Receiver
Capacity
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Slow start
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Congestion
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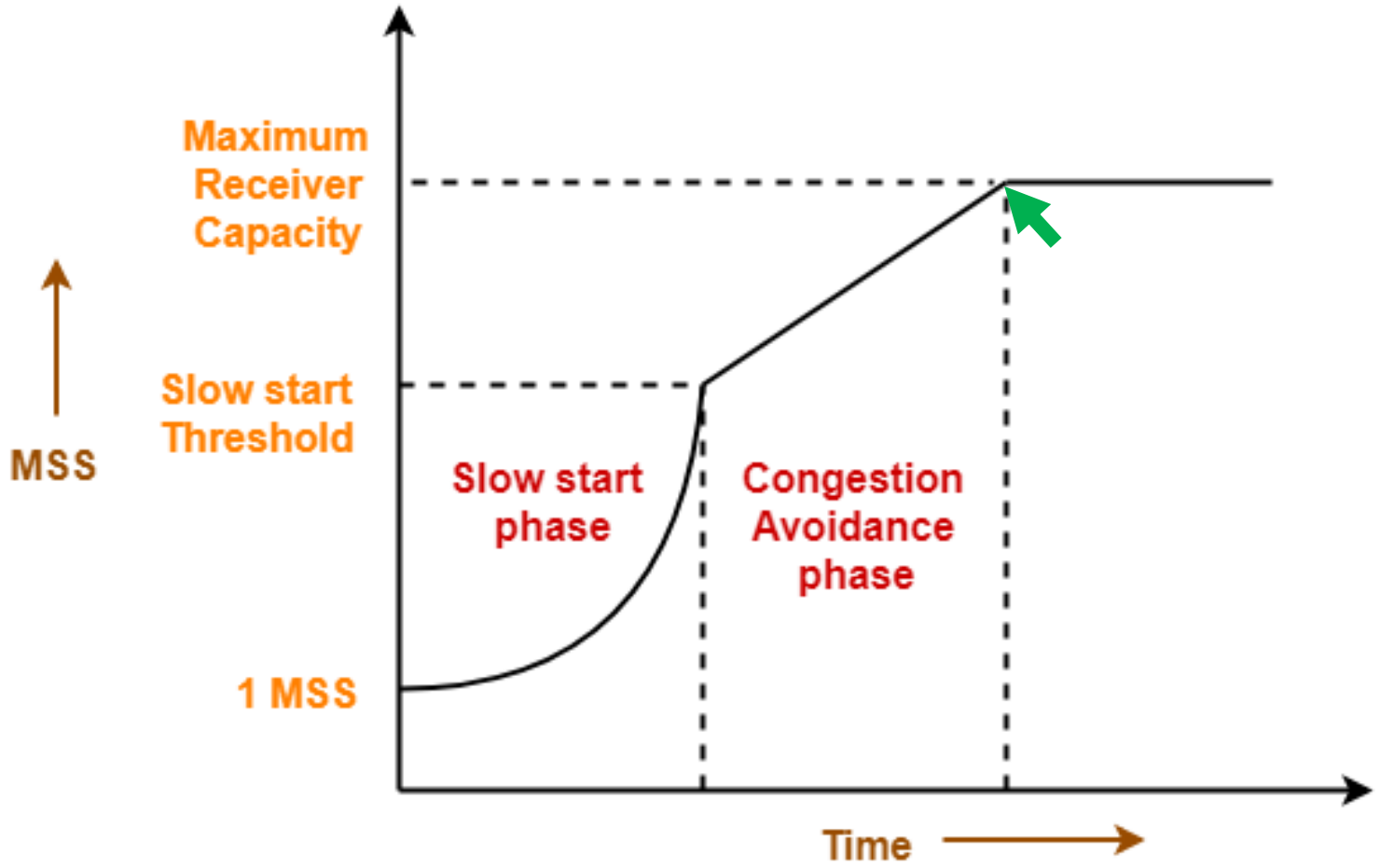
Time


Maximum
Receiver
Capacity
Slow start
Threshold
MSS
1 MSS
Slow start
phase
Congestion
Avoidance
phase
Time

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