Communication Networks 2
Exercise 3 - Multipath TCP

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Problem 1 Fundamentals I

Explain the general idea and the basic concept of MPTCP. What are MPTCPs two main applications?

Problem 2 Fundamentals II

Name and explain the three operating modes of MPTCP.

Problem 3 Work Flow

Fill in the schematic MPTCP message exchange on the next page, attempting to send 'abcdefg!' from *A* to *B*. Assume no package loss. Note: You only need to add packages in the *Connection Teardown* phase.

Problem 4 Information Exchange

How is MPTCP information exchanged? What problem can occur regarding the exchange? How is that problem handled?

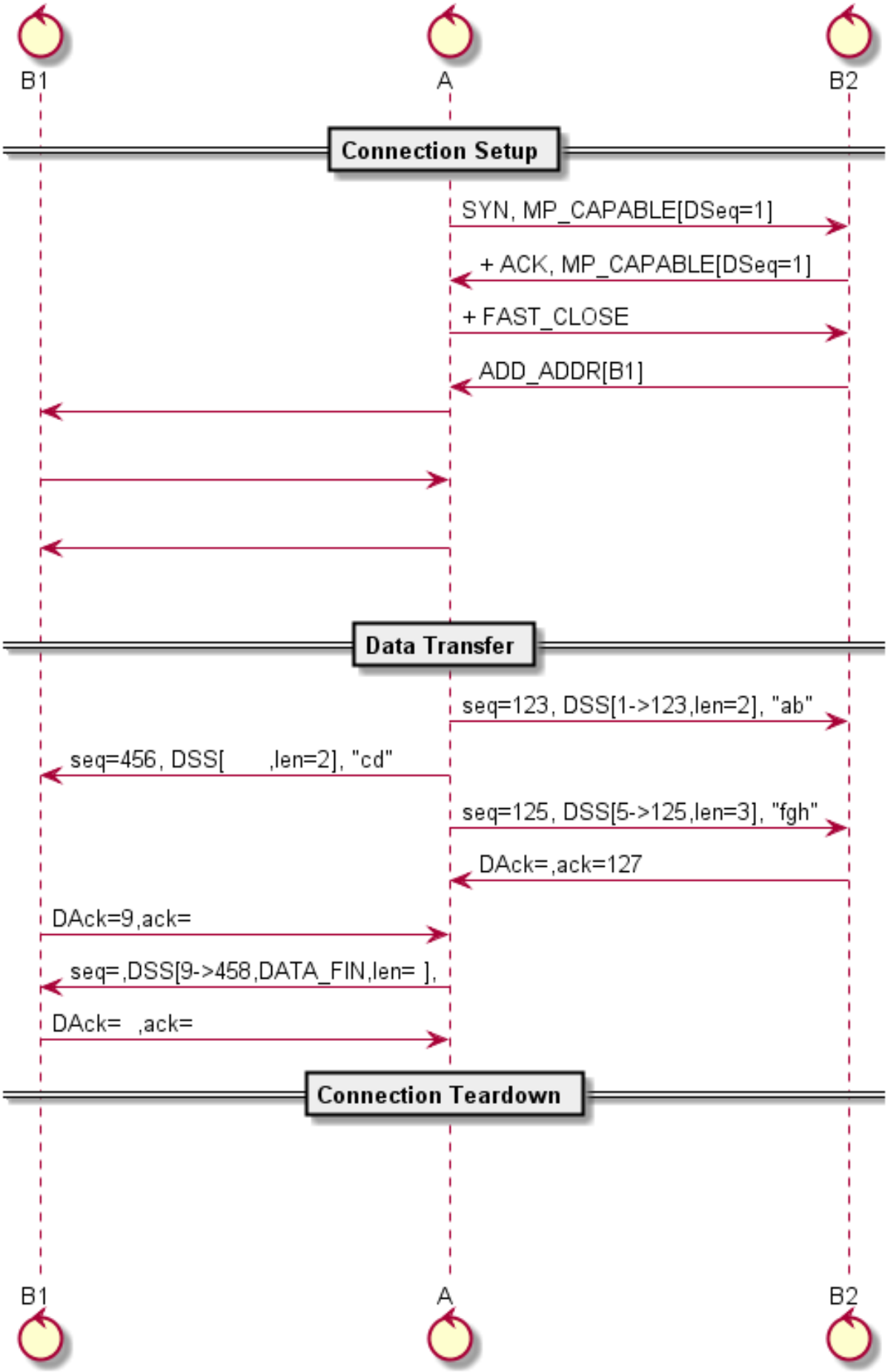
Problem 5 Sequence Numbers

How are sequence numbers handled in MPTCP and why? What problem still persists, how is it detected and handled?

Problem 6 Middleware Characteristics

Complete the partially filled middleware characteristic table below.

	Violates End2End?	Layer	Alters IP Header?	Alters TCP Header?	Alters Payload?	Interferes?
Router						
Switch						
NAT						
NAT with ALG						
Hub						


B1
A
B2
Connection Setup
SYN, MP_CAPABLE[DSeq=1]
+ ACK, MP_CAPABLE[DSeq=1]
+ FAST_CLOSE
ADD_ADDR[B1]
Data Transfer
seq=123, DSS[1->123,len=2], "ab"
seq=456, DSS[,len=2], "cd"
seq=125, DSS[5->125,len=3], "fgh"
DAck=,ack=127
DAck=9,ack=
seq=,DSS[9->458,DATA_FIN,len=],
DAck= ,ack=
Connection Teardown
B1
A
B2

Problem 7 MPTCP Failure

What would *not* cause an MPTCP connection to fail?
◯ One of the involved Endsystems does not support MPTCP.
◯ A middlebox on the path removes all unknown TCP options.
◯ A router on the path does not support MPTCP.
◯ The payload of packages is changed.

Problem 8 MPTCP Architecture

What is *not* part of the MPTCP architecture?
◯ Congestion Control
◯ Control Plane
◯ Data Plane
◯ 4-way Handshake
◯ Fast Close

Problem 9 MPTCP Advantadges

MPTCP provides the following benefits over TCP
◯ Framing of Messages
◯ Multi Streaming
◯ Adaptive Flow Control
◯ Multi Homing

Problem 10 MPTCP Objectives

What is not an objective of MPTCP?
◯ To work on unmodified applications
◯ To work over all current networks
◯ To work where TCP works
◯ To reduce the latency of connections