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COMP 343

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Assignment 7: Chapter 11-4,6,7

Chapter 12-2,3,4,6

CHAP 11

4. Spell out plausible responses for a TFTP receiver upon receipt of a Data[N] packet for each of the TFTP states UNLATCHED, ESTABLISHED, and DALLYING proposed in [11.3.5   TFTP States](http://intronetworks.cs.luc.edu/current/html/udp.html#tftp-states). Your answer may depend on N and the packet size. Indicate the events that cause a transition from one state to the next.

Unlatched (waiting to connect to port) --> DATA [1] received which moves state to ESTABLISHED --> receiver verifies the packet being sent and then sends a response, which moves state to DALLYING.

6. Assume both the TFTP sender and the TFTP receiver implement retransmit-on- timeout but *not* retransmit-on-duplicate. Outline a specific TFTP scenario in which the TFTP receiver of [11.3.5   TFTP States](http://intronetworks.cs.luc.edu/current/html/udp.html#tftp-states) sets a socket timeout interval but never encounters a “hard” timeout – that is, a SocketTimeoutException – and yet must timeout and retransmit. Hint: arrange so the sender regularly retransmits some packet, at an interval less than the receiver’s SocketTimeoutException time, but it is not the packet the receiver is waiting for.

If there are data packets being sent by the server every second and the initial ACK is lost on the first second, then what would normally happen is that the receiver would wait for the next second to resend the ACK however if it expects a Socket timeout it will never send due to the no retransmit on duplicate.

 7. In [11.3.6   TFTP scenarios](http://intronetworks.cs.luc.edu/current/html/udp.html#tftp-scenarios), under “Old duplicate”, we claimed that if either side changed ports, the old-duplicate problem would not occur.

(a). If the client changes its port number on a subsequent connection, but the server does not, what prevents an old-duplicate data packet from being accepted by the new client?

If the client changes the port number, then the server will send to the old port number hence nothing will be received by the client on the new port

(b). If the server changes its port number on a subsequent connection, but the client does not, what prevents an old-duplicate data packet from being accepted by the new client?

If the server changes the port number, then the old packet arriving will be coming from the wrong port hence it will not be accepted by the client.

CHAP 12

2. Trace the states visited if nodes A and B attempt to create a TCP connection by *simultaneously* sending each other SYN packets, that then cross in the network. Draw the ladder diagram, and label the states on each side. Hint: there should be two pairs of crossing packets.

Closed

LISTEN

SYN\_SENT

SYN\_RECD

ESTABLISHED

Closed

LISTEN

SYN\_SENT

SYN\_RECD

ESTABLISHED

A B

SYN

SYN

SYN + ACK

SYN + ACK

3. When two nodes A and B simultaneously attempt to connect to one another using the OSI TP4 protocol, two bidirectional network connections are created (rather than one, as with TCP). If TCP had instead chosen the TP4 semantics here, what would have to be added to the TCP header? Hint: if a packet from ⟨A,port1⟩ arrives at ⟨B,port2⟩, how would we tell to which of the two possible connections it belongs?

TP4 uses 10 different TPDU types whereas TCP only uses one. This makes TCP simple but every TCP header is at least 20 bytes long whereas the TP4 header maybe as little as 5 bytes. In this case a socket pair would have to be added because the connection is determined by it.

4. Simultaneous connection initiations are rare, but simultaneous connection termination is relatively common. How do two TCP nodes negotiate the simultaneous sending of FIN packets to one another? Draw the ladder diagram, and label the states on each side. Which node goes into TIMEWAIT state? Hint: there should be two pairs of crossing packets.

ESTABLISHED

FIN\_WAIT

CLOSE\_WAIT

TIME\_WAIT

Closed

ESTABLISHED

FIN\_WAIT

CLOSE\_WAIT

TIME\_WAIT

Closed

FIN

FIN

ACK

ACK

6. Suppose that, after downloading a file, the client host is unplugged from the network, so it can send no further packets. The server’s connection is still in the ESTABLISHED state. In each case below, use the TCP state diagram to list all states that are reachable by the server.

(a). The client has *not* sent the first FIN.

LISTEN

SYN\_SENT

SYN\_RECD

ESTABLISHED

(b). The client *has* sent its FIN before being unplugged.

CLOSED,

LISTEN,

SYN\_SENT

SYN\_RECD

ESTABLISHED,

FIN\_WAIT1,

FIN\_WAIT2,

CLOSE\_WAIT

LAST\_ACK

TIME\_WAIT