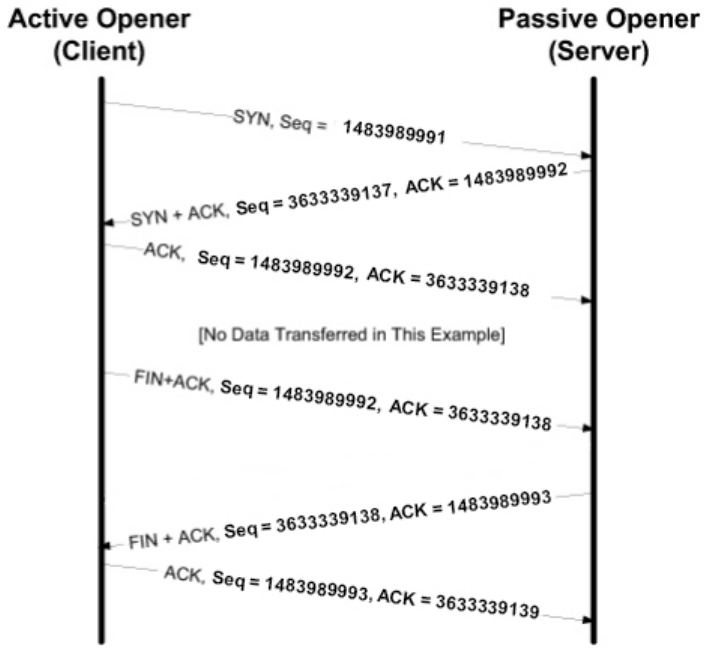
qanda

1. The Ethernet header is 14 bytes, the IP header is 20 bytes, TCP header begins on the byte immediately after. Highlight the sequence numbers and acknowledgment numbers of each packet.

```
No.     Leftover Capture Data Time           Source               Destination          Info
Protocol Length Data       Data
    324                    15.162981      192.168.1.80         138.197.192.78       52394 →
80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 TSval=1313238110 TSecr=0 SACK_PERM=1 TCP      78
Frame 324: 78 bytes on wire (624 bits), 78 bytes captured (624 bits) on interface en0, id 0
Ethernet II, Src: Apple_31:3c:75 (8c:85:90:31:3c:75), Dst: fa:5b:3b:20:40:6d (fa:5b:3b:20:40:6d)
Internet Protocol Version 4, Src: 192.168.1.80, Dst: 138.197.192.78
Transmission Control Protocol, Src Port: 52394, Dst Port: 80, Seq: 0, Len: 0
0000  fa 5b 3b 20 40 6d 8c 85 90 31 3c 75 08 00 45 00   .[; @m...1<u..E.
0010  00 40 00 00 40 00 40 06 2d ac c0 a8 01 50 8a c5   .@..@.@.-....P..
0020  c0 4e cc aa 00 50 58 73 e3 e7 00 00 00 00 b0 02   .N...PXs........
0030  ff ff 65 f5 00 00 02 04 05 b4 01 03 03 06 01 01   ..e.............
0040  08 0a 4e 46 6c 5e 00 00 00 00 04 02 00 00         ..NFl^........
No.     Leftover Capture Data Time           Source               Destination          Info
Protocol Length Data       Data
    341                    15.193768      138.197.192.78       192.168.1.80         80 →
52394 [SYN, ACK] Seq=0 Ack=1 Win=28960 Len=0 MSS=1460 SACK_PERM=1 TSval=3849333064
TSecr=1313238110 WS=128 TCP      74
Frame 341: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface en0, id 0
Ethernet II, Src: fa:5b:3b:20:40:6d (fa:5b:3b:20:40:6d), Dst: Apple_31:3c:75 (8c:85:90:31:3c:75)
Internet Protocol Version 4, Src: 138.197.192.78, Dst: 192.168.1.80
Transmission Control Protocol, Src Port: 80, Dst Port: 52394, Seq: 0, Ack: 1, Len: 0
0000  8c 85 90 31 3c 75 fa 5b 3b 20 40 6d 08 00 45 00   ...1<u.[; @m..E.
0010  00 3c 00 00 40 00 32 06 3b b0 8a c5 c0 4e c0 a8   .<..@.2.;....N..
0020  01 50 00 50 cc aa d8 90 5b 01 58 73 e3 e8 a0 12   .P.P....[.Xs....
0030  71 20 c3 7c 00 00 02 04 05 b4 04 02 08 0a e5 70   q .|...........p
0040  29 48 4e 46 6c 5e 01 03 03 07                     )HNFl^....
No.     Leftover Capture Data Time           Source               Destination          Info
Protocol Length Data       Data
    342                    15.193835      192.168.1.80         138.197.192.78       52394 →
80 [ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=1313238139 TSecr=3849333064 TCP      66
Frame 342: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface en0, id 0
Ethernet II, Src: Apple_31:3c:75 (8c:85:90:31:3c:75), Dst: fa:5b:3b:20:40:6d (fa:5b:3b:20:40:6d)
Internet Protocol Version 4, Src: 192.168.1.80, Dst: 138.197.192.78
Transmission Control Protocol, Src Port: 52394, Dst Port: 80, Seq: 1, Ack: 1, Len: 0
0000  fa 5b 3b 20 40 6d 8c 85 90 31 3c 75 08 00 45 00   .[; @m...1<u..E.
0010  00 34 00 00 40 00 40 06 2d b8 c0 a8 01 50 8a c5   .4..@.@.-....P..
0020  c0 4e cc aa 00 50 58 73 e3 e8 d8 90 5b 02 80 10   .N...PXs....[...
0030  08 0a 5b 42 00 00 01 01 08 0a 4e 46 6c 7b e5 70   ..[B......NFl{.p
0040  29 48                                             )H
No.     Leftover Capture Data Time           Source               Destination          Info
Protocol Length Data       Data
    456                    17.655277      192.168.1.80         138.197.192.78       52394 →
80 [FIN, ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=1313240581 TSecr=3849333064 TCP      66
Frame 456: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface en0, id 0
Ethernet II, Src: Apple_31:3c:75 (8c:85:90:31:3c:75), Dst: fa:5b:3b:20:40:6d (fa:5b:3b:20:40:6d)
Internet Protocol Version 4, Src: 192.168.1.80, Dst: 138.197.192.78
Transmission Control Protocol, Src Port: 52394, Dst Port: 80, Seq: 1, Ack: 1, Len: 0
0000  fa 5b 3b 20 40 6d 8c 85 90 31 3c 75 08 00 45 00   .[; @m...1<u..E.
0010  00 34 00 00 40 00 40 06 2d b8 c0 a8 01 50 8a c5   .4..@.@.-....P..
0020  c0 4e cc aa 00 50 58 73 e3 e8 d8 90 5b 02 80 11   .N...PXs....[...
0030  08 0a 51 b7 00 00 01 01 08 0a 4e 46 76 05 e5 70   ..Q.......NFv..p
0040  29 48                                             )H
No.     Leftover Capture Data Time           Source               Destination          Info
Protocol Length Data       Data
    457                    17.684606      138.197.192.78       192.168.1.80         80 →
52394 [FIN, ACK] Seq=1 Ack=2 Win=29056 Len=0 TSval=3849335556 TSecr=1313240581 TCP      66
Frame 457: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface en0, id 0
Ethernet II, Src: fa:5b:3b:20:40:6d (fa:5b:3b:20:40:6d), Dst: Apple_31:3c:75 (8c:85:90:31:3c:75)
Internet Protocol Version 4, Src: 138.197.192.78, Dst: 192.168.1.80
Transmission Control Protocol, Src Port: 80, Dst Port: 52394, Seq: 1, Ack: 2, Len: 0
0000  8c 85 90 31 3c 75 fa 5b 3b 20 40 6d 08 00 45 00   ...1<u.[; @m..E.
0010  00 34 68 06 40 00 32 06 d3 b1 8a c5 c0 4e c0 a8   .4h.@.2......N..
0020  01 50 00 50 cc aa d8 90 5b 02 58 73 e3 e9 80 11   .P.P....[.Xs....
0030  00 e3 4f 21 00 00 01 01 08 0a e5 70 33 04 4e 46   ..O!.......p3.NF
0040  76 05                                             v.
No.     Leftover Capture Data Time           Source               Destination          Info
Protocol Length Data       Data
    458                    17.684679      192.168.1.80         138.197.192.78       52394 →
80 [ACK] Seq=2 Ack=2 Win=131712 Len=0 TSval=1313240610 TSecr=3849335556 TCP      66
Frame 458: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface en0, id 0
Ethernet II, Src: Apple_31:3c:75 (8c:85:90:31:3c:75), Dst: fa:5b:3b:20:40:6d (fa:5b:3b:20:40:6d)
Internet Protocol Version 4, Src: 192.168.1.80, Dst: 138.197.192.78
Transmission Control Protocol, Src Port: 52394, Dst Port: 80, Seq: 2, Ack: 2, Len: 0
0000  fa 5b 3b 20 40 6d 8c 85 90 31 3c 75 08 00 45 00   .[; @m...1<u..E.
0010  00 34 00 00 40 00 40 06 2d b8 c0 a8 01 50 8a c5   .4..@.@.-....P..
0020  c0 4e cc aa 00 50 58 73 e3 e9 d8 90 5b 03 80 10   .N...PXs....[...
0030  08 0a 47 dd 00 00 01 01 08 0a 4e 46 76 22 e5 70   ..G.......NFv".p
0040  33 04                                             3.
```

2. Draw a diagram, similar to Figure 13-1, and include the actual sequence/acknowledgment numbers of the exchange.



3. Add to your diagram, the TCP state each connection is in. See Figure 13-9 as a reference.