

# Aerospace Village

## Deep Space Networking Challenge #2



Authors: Laura Chappell, Chappell University  
Ginny Spicer, Chappell University

Trace File: *tcpcl\_we2ereceipt.pcap*

If you've already completed Deep Space Networking Challenge #1, it's time to move on to a more challenging challenge.

Using *tcpcl\_we2ereceipt.pcap*, answer the following questions.

1. Diagram the TCP-CL KEEPALIVE processes to show which hosts can see each other. Add direction of communications arrows and IP addresses in your diagram.
2. Add the Endpoint IDs (EIDs) of each host to your diagram.
3. In which actual packet(s) are Bundle headers located? (List all.)
4. In which actual packet(s) are TCP-CL headers located (List all.)
5. How much data is included in each Bundle segment (before and after the store-and-forward process)? Do not include any protocol headers in your calculation. (The video at <https://youtu.be/u9pyeMaRDYo> can help on this tricky question.)
6. How much time did it take to transfer the data from the source to the destination?
7. What is the true size of each Bundle header?

*Answers are located on the next pages.*

# Aerospace Village

## Deep Space Networking Challenge #2

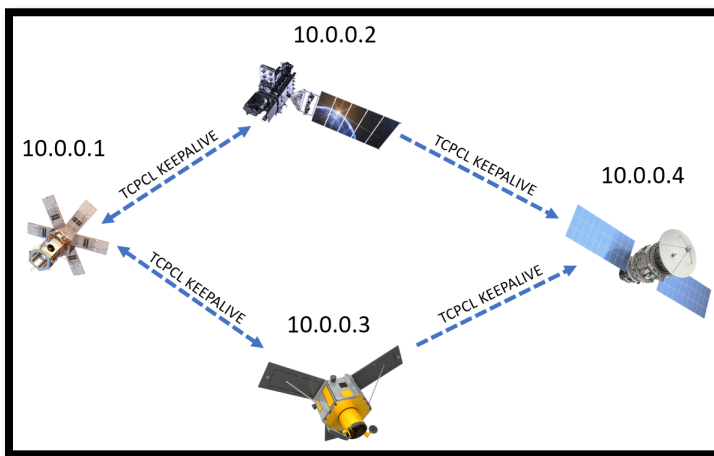
Authors: Laura Chappell, Chappell University  
Ginny Spicer, Chappell University

Trace File: *tcpcl\_we2ereceipt.pcap*

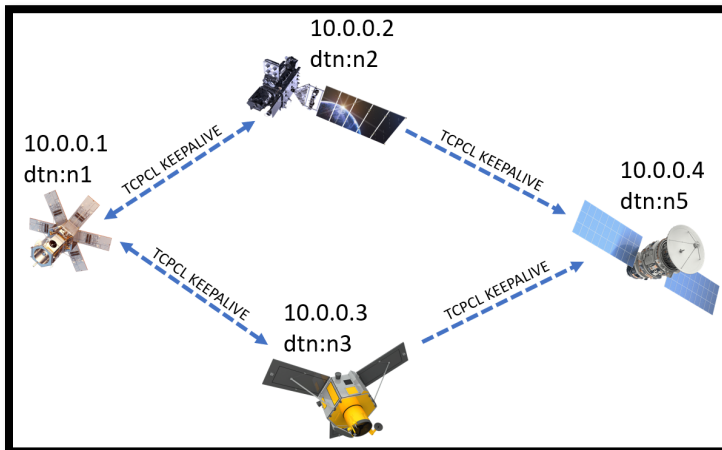


## Answers

1. Diagram the TCP-CL KEEPALIVE processes to show which hosts can see each other. Add direction-of-communications arrows and IP addresses in your diagram.



2. Add the Endpoint IDs (EIDs) of each host to your diagram.



**3. In which actual packet(s) are Bundle headers located? (List all.)**

57, 86, 114 (Remember to turn off the TCP preference setting "Allow subdissector to reassemble TCP streams")

**4. In which actual packet(s) are TCP-CL headers located (List all.)**

57, 62, 66, 75 for the Bundle before the store-and-forward process.  
86, 91, 97, 101 for the Bundle after the store-and-forward process.  
114 in the Administrative Record packet.

**5. How much data is included in each Bundle segment (before and after the store-and-forward process)? Do not include any protocol headers in your calculation.**

4043, 4096, 4096, 2984, 4043, 4096, 4096, 2984

**6. How much time did it take to transfer the data from the source to the destination?**

3.448186 seconds has transpired from the start of the first Bundle segment to the ACK after the last Bundle segment. Note there are Bundle Creation Time and Bundle Delivered Time fields in the Administrative Record packet, but the granularity is lacking – it's space! Latencies are higher than seen on our typical terrestrial internetworks.

**7. What is the true size of each Bundle header?**

49, 49, and 45 bytes (Note: Wireshark has a problem displaying the Bundle headers where they actually reside. You may need to turn on TCP reassembly and add a column for the Bundle Header Length field based on frame 114 in order to see this easily. This is ugly. You could also count over to the Bundle Header Length field in frames 57, 86, and 114.)