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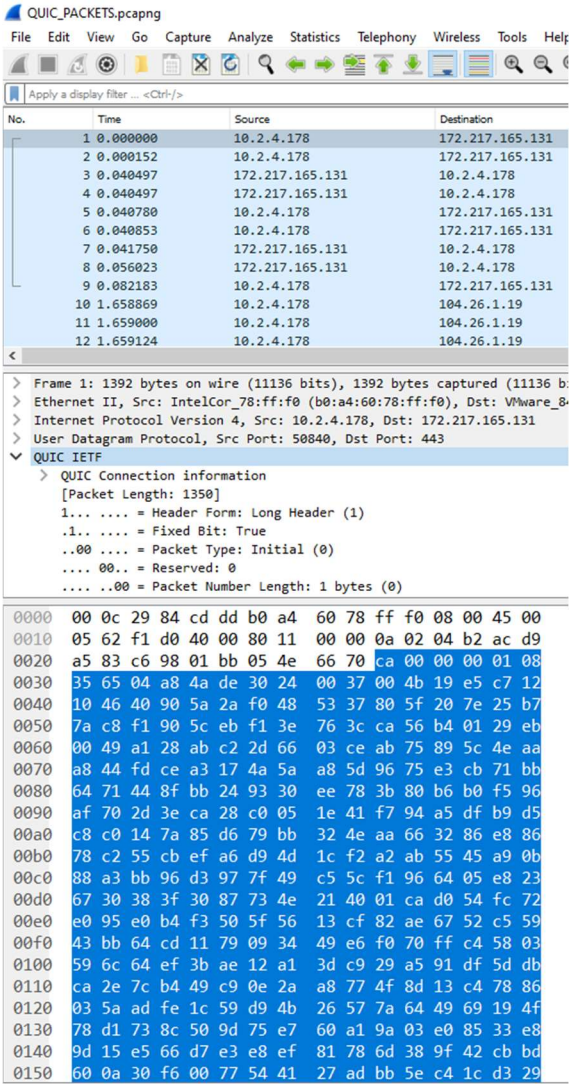
QUIC Wireshark

The QUIC packets were captured via Wireshark when browsing the internet. Wireshark was activated upon opening a YouTube video and filtering the packets specifically for QUIC packets. A quick Wireshark test before opening YouTube was done to make sure my computer wasn't using an existing connection that involved QUIC before doing the packet capture on YouTube.

- On Wireshark, the QUIC packets were found using quic in the Wireshark filter.
- A sudden burst of QUIC packets were also received upon loading the YouTube comments section and other recommended videos were loaded.
- When bringing up YouTube's sidebar, an influx of QUIC packets were detected as well.
- The packet being read in this assignment will be the initial packet used to establish the first connection with YouTube.
- The packet capture was recording while the YouTube video was being played, so more packets were captured as the video kept playing and more sections of the video were buffered and loaded.



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Packet Header captured (in Hexadecimal)	The type and meaning
0xca 00	Converts to 11001010 in binary. (8-bit Header) Marks this packet to have the QUIC Long Header, uses fixed bits, that this is the initial packet type, that there are no reserved packets, and that this will be packet number 0.
0x08	ID Length 8 (in Hexadecimal)
0x35 65 04 a8 4a de 30 24	Converts to 0011 0101 0110 0101 0000 0100 1010 1000 0100 1010 1101 1110 0011 0000 0010 0100 in binary (Connection ID header) This is the 64-bit connection ID randomly chosen by the client. This is used to help create the initial packet being captured.
0x00 00 00 01	Converts to 0000 0000 000 0001 (16-bits) (Version header) Lists version 1 as a supported version to be used during negotiation. Uncertain why the Version header is 16-bits instead of 32-bits.
0xce	Converts to 1100 1110 in binary (Packet Number header) Identifies this packet as the first packet being used in the QUIC exchange. It is also 8-bits instead of the expected 32-bits.
0x00 4b 19 e5 c7 12 10 46 40 90 5a 2a f0 48 53 37 80 5f 20 7e 25 b7 7a c8 f1 90 5c eb f1 3e 76 3c ca 56 b4 01 29 eb 00 49 a1 28 ab c2 2d 66 03 ce ab 75 89 5c 4e aa a8	Server Token being used to establish a 0-RTT connection

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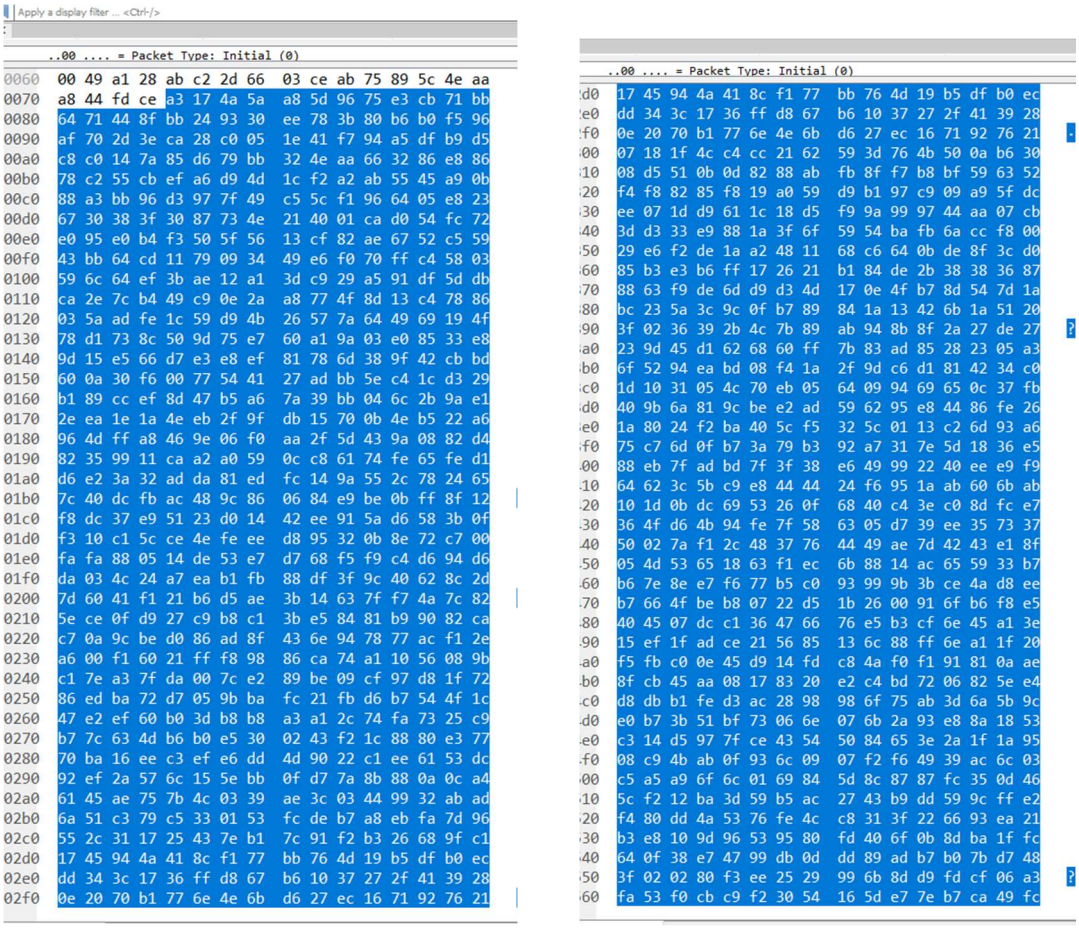

The rest is just the QUIC protected payload which was too large to include in the description table. It sends the payload through TLSv1.3 while sending a series of Frames. The Frames found in the initial exchange are PADDING and PING using 0x00 and 0x01 respectively.

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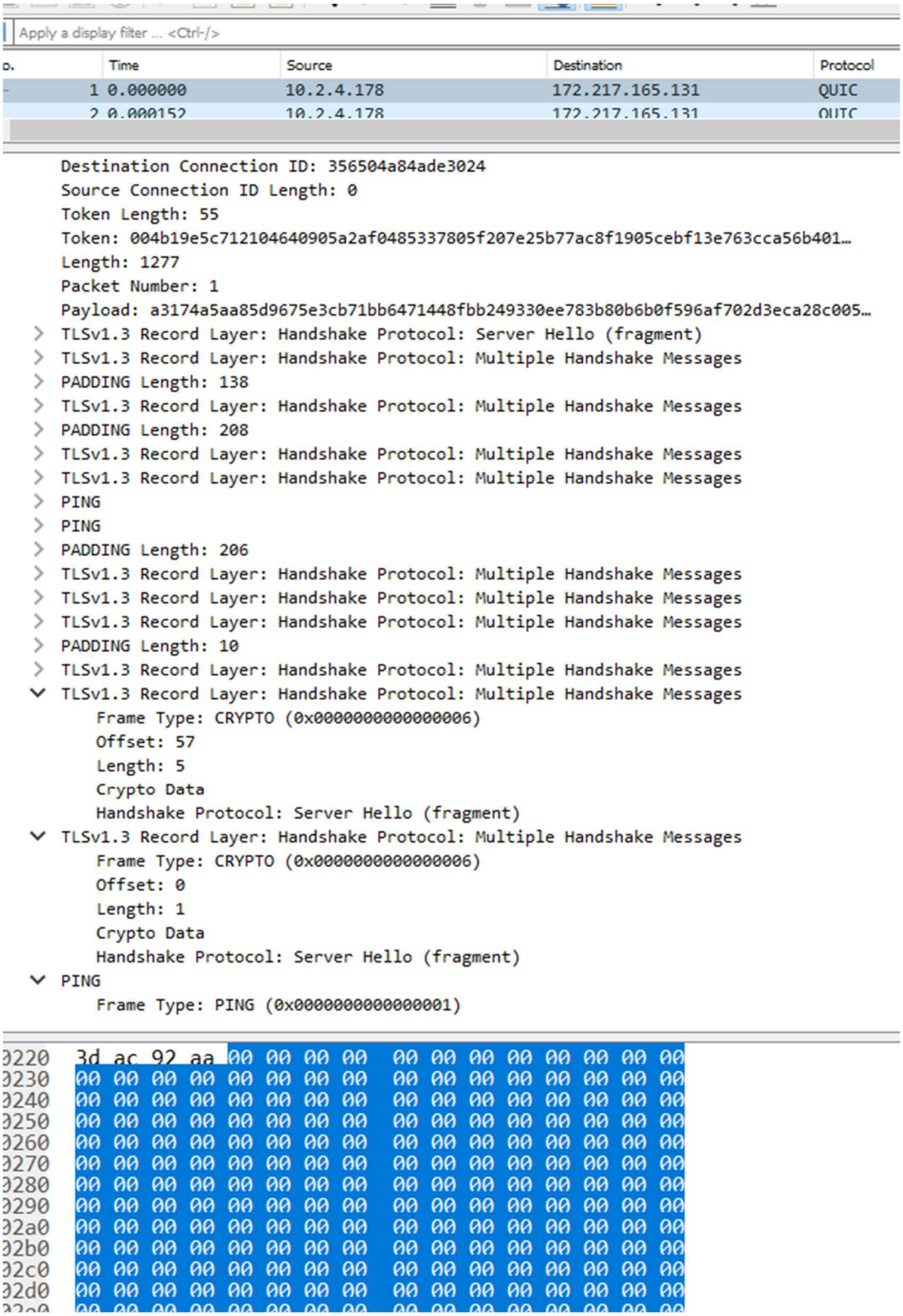
Apply a display filter ... <Ctrl-/>
No. Time Source Destination Protocol
1 0.000000 10.2.4.178 172.217.165.131 QUIC
2 0.000152 10.2.4.178 172.217.165.131 QUIC
Destination Connection ID: 356504a84ade3024
Source Connection ID Length: 0
Token Length: 55
Token: 004b19e5c712104640905a2af0485337805f207e25b77ac8f1905cebf13e763cca56b401…
Length: 1277
Packet Number: 1
Payload: a3174a5aa85d9675e3cb71bb6471448fbb249330ee783b80b6b0f596af702d3eca28c005…
TLSv1.3 Record Layer: Handshake Protocol: Server Hello (fragment)
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
PADDING Length: 138
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
PADDING Length: 208
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
PING
PING
PADDING Length: 206
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
PADDING Length: 10
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
Frame Type: CRYPTO (0x0000000000000006)
Offset: 57
Length: 5
Crypto Data
Handshake Protocol: Server Hello (fragment)
TLSv1.3 Record Layer: Handshake Protocol: Multiple Handshake Messages
Frame Type: CRYPTO (0x0000000000000006)
Offset: 0
Length: 1
Crypto Data
Handshake Protocol: Server Hello (fragment)
PING
Frame Type: PING (0x0000000000000001)
0220 3d ac 92 aa 00 00 00 00 00 00 00 00 00 00 00 00
0230 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0240 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0250 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0260 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0270 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0280 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0290 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
02d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

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The packet below was recorded while the YouTube video from before continued playing. After the initial QUIC packet was exchanged between my computer and the server, my computer transitioned to using QUIC short header packets for a more light-weight exchange. The packet shown below is a QUIC packet using the Short Header.

Data captured (Hexadecimal)	Header meaning
0x4b	0100 1011 (8-bit Header) Identifies that this packet will be using the short header since we've already established a connection. Also labels this as packet number 4
No Connection ID Present	
The rest of the data is just the protected payload contained in the short frames. Unlike the long header, there is no Connection ID or version number found in QUIC's short header.