

CDP Homework 1 - Vatui Adrian

Client/server options

- Protocol: TCP or UDP
- Message size: number of bytes that the client sends and the server receives in one package; this can range from 1 to 65507¹
- Mode: STREAM or ACK (stop-and-wait; the client waits for the server to send an acknowledgment message before sending the next package)

Tracked metrics

- Messages sent/received (should indicate if any data was lost during the transfer)
- Bytes sent/received (should indicate if any data was lost during the transfer)
- Transfer time

¹ Through trial and error (and [this](#) stackoverflow post) I determined the maximum amount of data that can be sent through a UDP package to be 65507 bytes. The reasoning for this, as explained in the aforementioned post:

“As a result of the IP header containing a 16 bit field for length, the largest size an IPv4 message can be is 65535 bytes And that includes the IP header itself.

The IP packet itself has at least a 20 byte header. Hence $65535 - 20 == 65515$ is the largest size of the payload of an IP message. The payload can be a UDP datagram.

The UDP datagram itself is typically an 8 byte header. Hence $65515 - 8 == 65507$. So even if the UDP header could theoretically contain an amount higher than 65507 in its own length field, the IPv4 message can't contain it.”

Test results

Tests were done with a ~500MB file and a smaller, ~10MB file.

Pro toc ol	Message size (bytes)	Mo de	Message s sent	Message s received	Bytes sent	Bytes receive d	Transfer time (seconds)	Data lost (bytes)	Data lost (%)
UD P	65,507	ST RE AM	9,318	127	610,380,5 91	8,319,3 89	1.829	602,061 ,202	98.64 %
UD P	65,507	AC K	9,318	9,318	610,380,5 91	610,38 0,591	406.849	0	0.00%
UD P	1,024	ST RE AM	596,075	3,682	610,380,5 91	3,770,3 68	3.109	606,610 ,223	99.38 %
TC P	1,024	ST RE AM	18	18	1,118,818	1,118,8 18	0.01	0	0.00%
TC P	65,507	ST RE AM	9,318	9,318	610,380,5 91	610,38 0,591	392.212	0	0.00%
TC P	65,507	AC K	9,319	9,319	610,380,5 91	610,38 0,591	412.84	0	0.00%

[link](#) to original spreadsheet

Conclusions

UDP is noticeably faster than TCP, however at the cost of massive amounts of lost data. Waiting for acknowledgement messages from the server reduces the speed to about the same as using TCP, but guarantees 100% of the data was sent successfully. Although it was slower, TCP always managed to send all of the data, with or without the manual acknowledgement check implemented by me, because the protocol itself guarantees data is not lost and received in order.