Workshop in Communication Networks
Exercise 1

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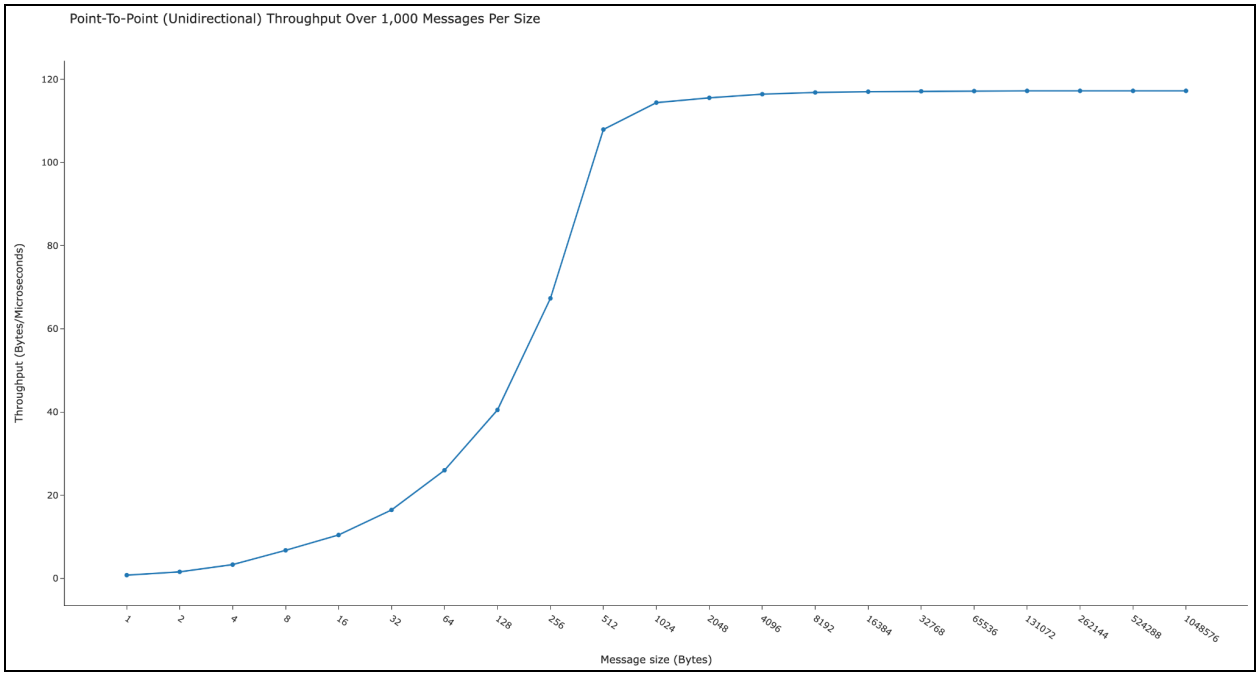
The goal of this exercise is to implement a client-server network application in C++ to measure the network throughput. The client will send data to the server and measure the time it takes to send the data. The data size will be increased progressively from 1 byte to 1 MB, and the throughput will be calculated and printed for each size. The objective is to determine the maximum network throughput by analyzing the results.

1	0.770891	bytes/microseconds
2	1.57791	bytes/microseconds
4	3.30551	bytes/microseconds
8	6.74593	bytes/microseconds
16	10.4309	bytes/microseconds
32	16.4558	bytes/microseconds
64	25.9972	bytes/microseconds
128	40.5038	bytes/microseconds
256	67.3348	bytes/microseconds
512	107.933	bytes/microseconds
1024	114.398	bytes/microseconds
2048	115.553	bytes/microseconds
4096	116.429	bytes/microseconds
8192	116.84	bytes/microseconds
16384	117.028	bytes/microseconds
32768	117.123	bytes/microseconds
65536	117.178	bytes/microseconds
131072	117.221	bytes/microseconds
262144	117.226	bytes/microseconds
524288	117.225	bytes/microseconds
1048576	117.229	bytes/microseconds



The measurements provided show the throughput in bytes/microsecond for different message sizes, ranging from 1 byte to 1MB. The results show that the throughput increases as the message size grows, which is expected since larger messages can be transmitted with fewer overheads. However, the rate of increase slows down as the message size becomes larger, indicating that the network has a limit on the amount of data that can be transferred per unit time.

The first few measurements show relatively low throughput rates, ranging from 0.77 to 6.75 bytes/microsecond, which may be due to the overhead associated with establishing a connection and sending small amounts of data. As the message size grows, the overhead becomes less significant, and the throughput rate increases. The measurements for message sizes from 8 bytes to 512 bytes show a significant increase in throughput rate, ranging from 6.75 to 107.93 bytes/microsecond. Beyond this range, the increase in throughput rate becomes less significant, and the measurements for message sizes from 1024 bytes to 1048576 bytes show a relatively stable throughput rate of around 115 to 117 bytes/microsecond.

The stability of the throughput rate for larger message sizes suggests that the network has reached its capacity limit, and further increasing the message size does not result in a significant improvement in the throughput rate. The measurements show that the **network's capacity limit is around 117 bytes/microsecond**, which can be used as a reference for designing and optimizing network applications.