

Knight Foundation School of Computing and Information Sciences

Spring 2023 Senior Design Project

HOMA

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PROBLEM

HOMA is a new transport layer protocol that boasts very low latency. This allows it to excel at transmitting high volumes of short messages. The final aim of HOMA is to replace TCP entirely in datacenter networks.

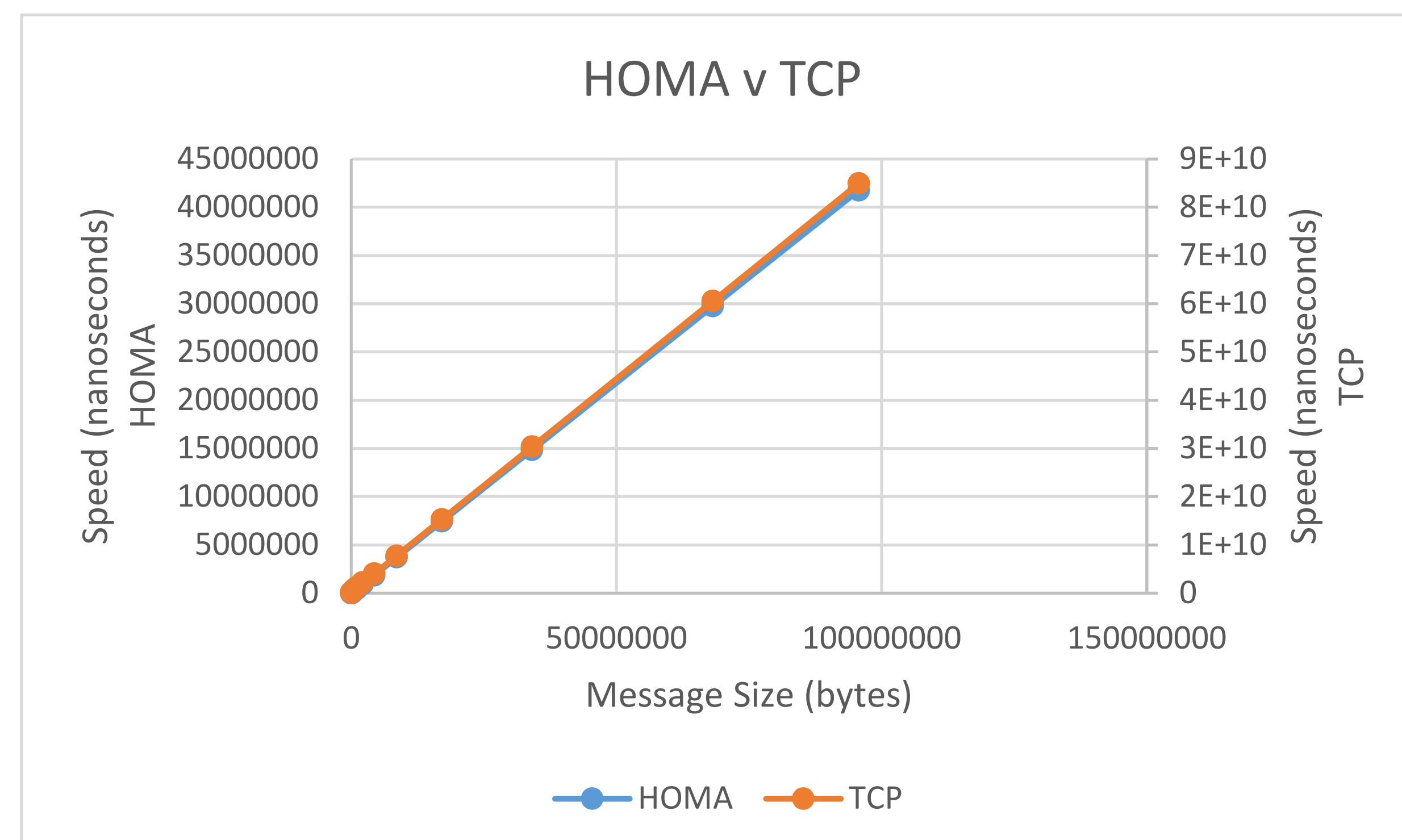
SYSTEM DESIGN

```
guest@Ubuntu:~/Documents/HomaCIS4911-master$ ./waf --run scratch/HomaL4Protocol-simple-test
Waf: Entering directory `/home/guest/Documents/HomaCIS4911-master/build'
Waf: Leaving directory `/home/guest/Documents/HomaCIS4911-master/build'
Build commands will be stored in build/compile_commands.json
'build' finished successfully (0.509s)
Time it took: 233090 ns   Message size: 532480 b
guest@Ubuntu:~/Documents/HomaCIS4911-master$
```

Comparison

From our tests HOMA is about 2000 times faster than TCP. Both have a linear growth, but HOMA can transmit 1040 bytes of data in 3258 ns while TCP does it in 81705600 ns.

The chart below illustrates this.



ACKNOWLEDGEMENT

The material presented in this poster is based upon the work supported by Wenjia Wang. We/I thank Wenjia Wang for his/her/their assistance and mentorship that I/we received throughout the senior design project.

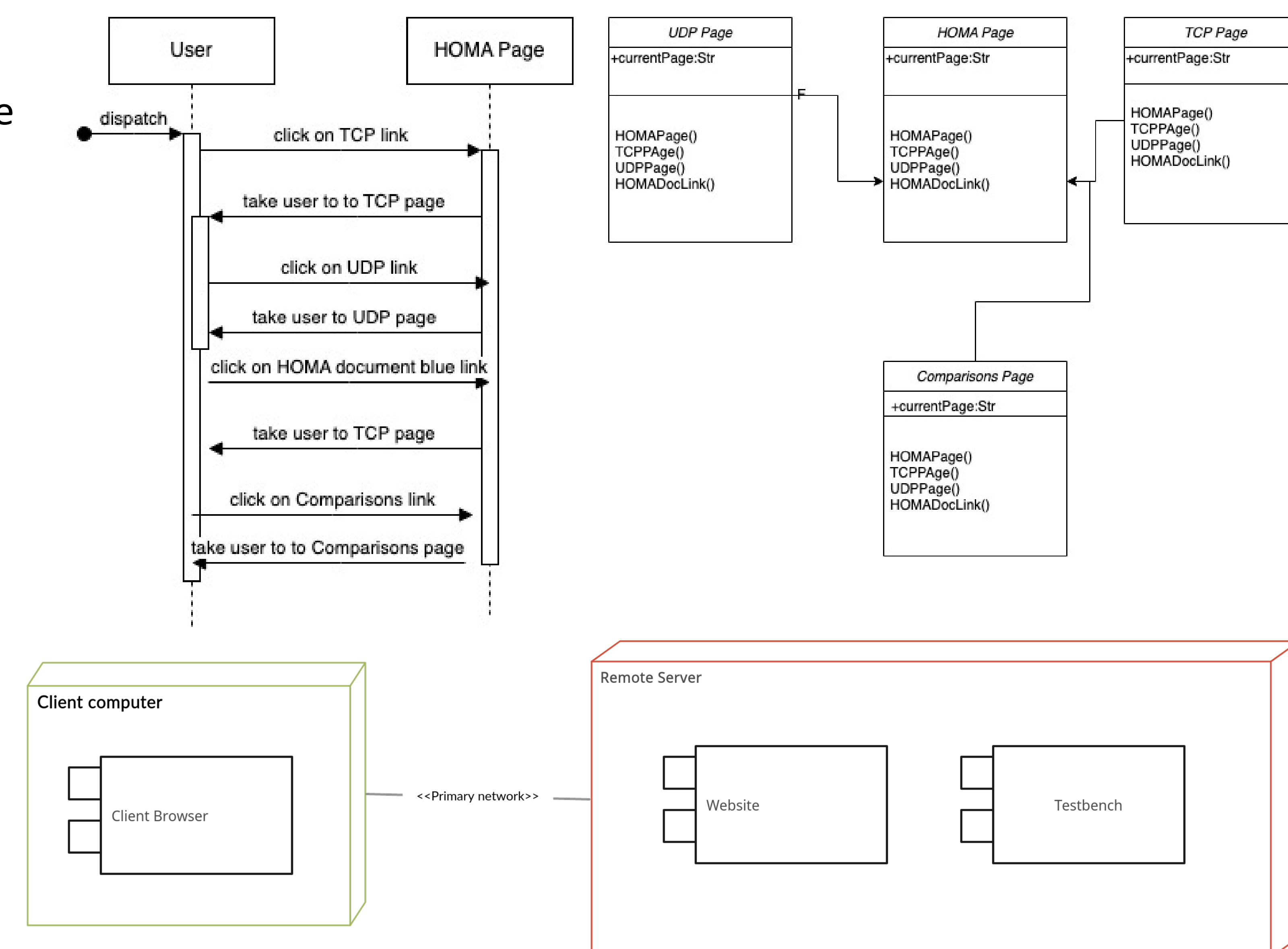
CURRENT SYSTEM

Currently HOMA is still in development resulting in there not being a usable implementation outside of simulating it.

Issues

- Very little documentation exists about HOMA and the documentation that does is very limited.
- The ns3 implementation of HOMA can only send a maximum of 95667960 Bytes or 95.67 mb. Limiting what you can do with it in its current state.

OBJECT DESIGN



SUMMARY

HOMA has a lot of potential. Unfortunately, because it is still in development there are many restrictions on it. But with improvements to the maximum data size and more features currently being worked on HOMA can easily surpass TCP.

IMPLEMENTATION

- HOMA connection simulated using ns3 with output displayed in the terminal.
- TCP program coded in C++ with output displayed in the terminal.

REFERENCES

<https://github.com/serhatarslan-hub/HomaL4Protocol-ns-3>
<https://www.nsnam.org/docs/models/html/tcp.html>