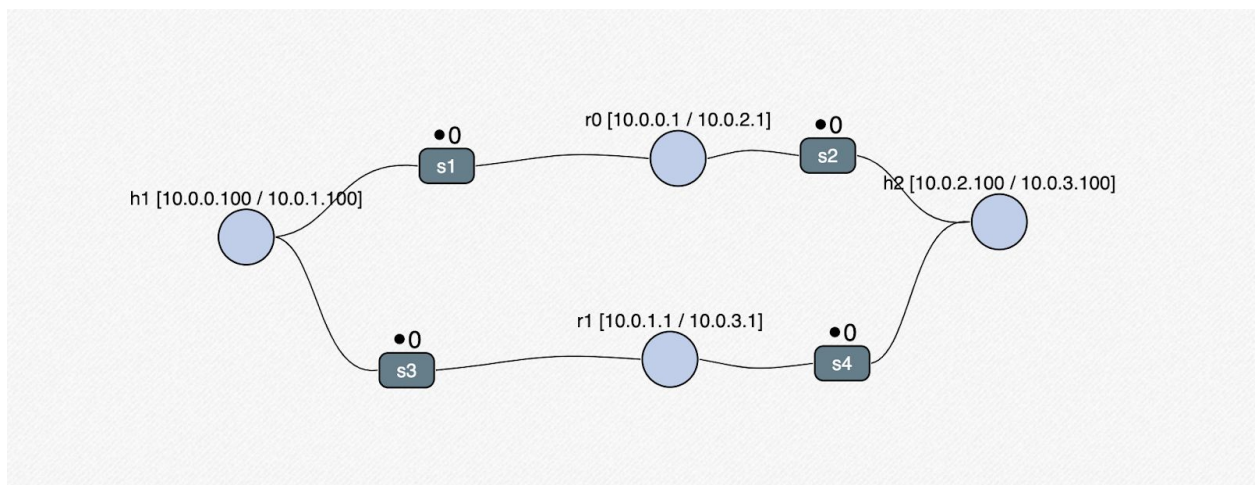


Advanced Computer Networks - Programming Assignment: MPTCP

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Topology Visualisation:



1. Does MPTCP improve file transfer performance?

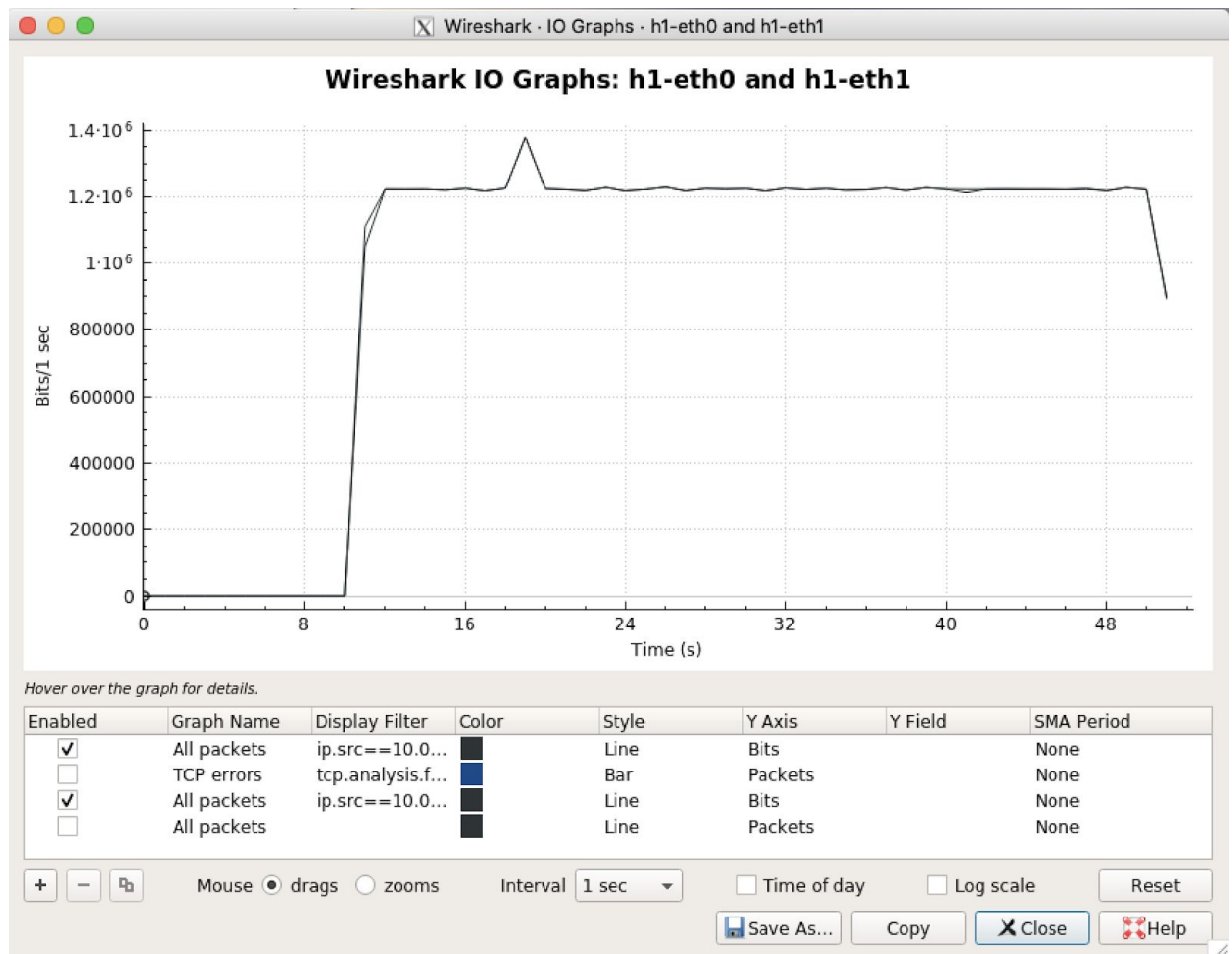
Does MPTCP increase the total throughput or decrease the total download time?

Yes, MPTCP increases the total throughput and decreases the total download time as evident from the plots below. The traffic is routed to multiple paths resulting in an increase in total throughput. With MPTCP, the throughput observed is 11.2 MB/s while it was 5.70MB/s without it. The download time reduced from 2 minutes and 33 seconds to 1 minute and 17 seconds.

Does this make sense, why or why not?

It does make sense because as soon as the network encounters congestion, it directs the packets to the other available routes which increases the overall network throughput.

a. MPTCP Enabled



```

FINISHED --2020-05-03 23:09:15--
Total wall clock time: 1m 17s
Downloaded: 1 files, 870M in 1m 17s (11.2 MB/s)

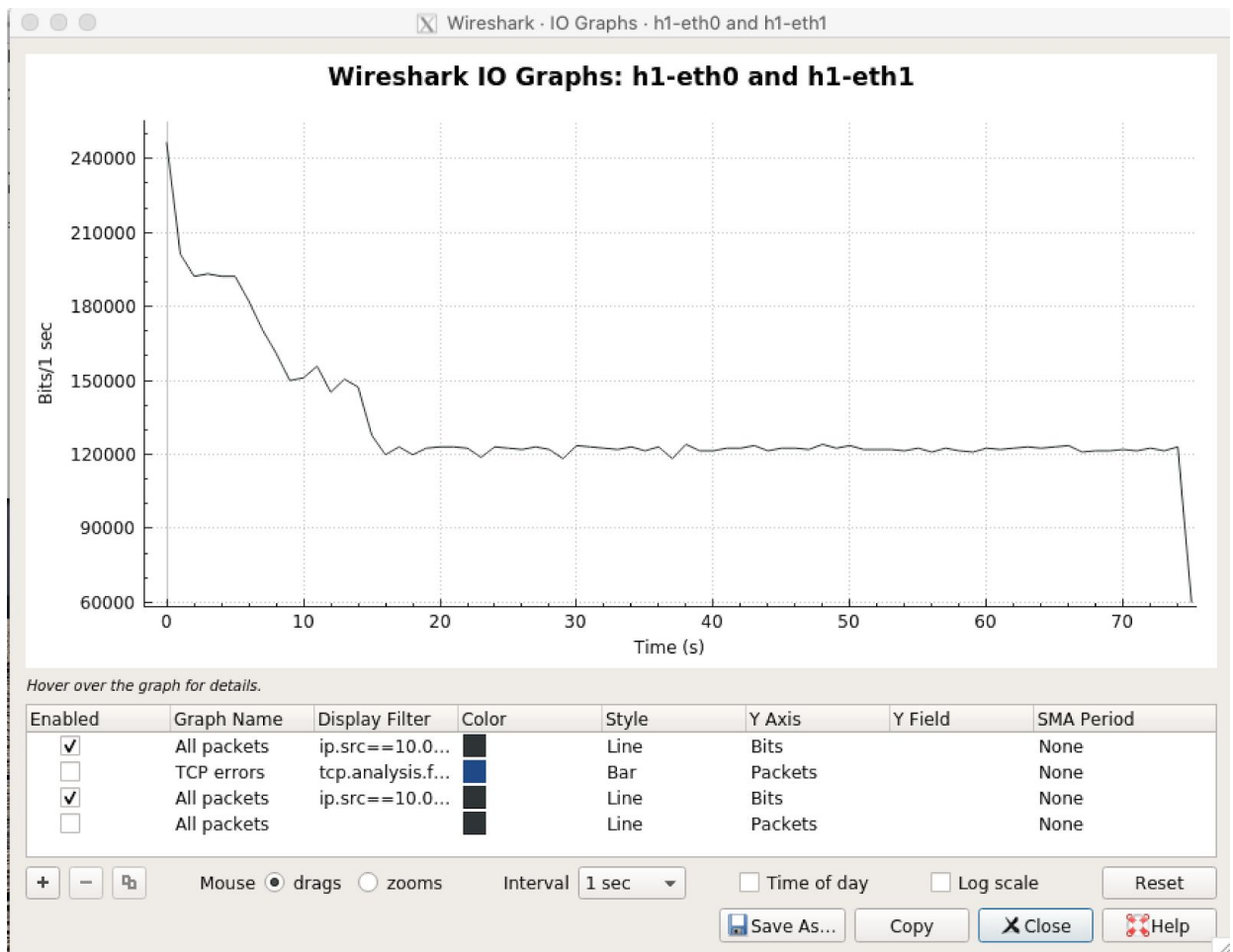
```

```

real    1m17.504s
user    0m0.484s
sys     0m2.686s

```

b. MPTCP Disabled



```
FINISHED --2020-05-03 23:18:42--
Total wall clock time: 2m 33s
Downloaded: 1 files, 870M in 2m 33s (5.70 MB/s)
```

```
real    2m32.804s
user    0m0.807s
sys     0m4.550s_
```

2. Does MPTCP improve (approximated) web browsing performance?

	Wget time	Fraction of objects on path 1
MPTCP enabled	33 seconds	100%
MPTCP disabled	43 seconds	100%

Does MPTCP help reduce the page load time?

Yes. The total time reduced from 43 seconds to 33 seconds.

What fraction of objects are requested over each path?

100%

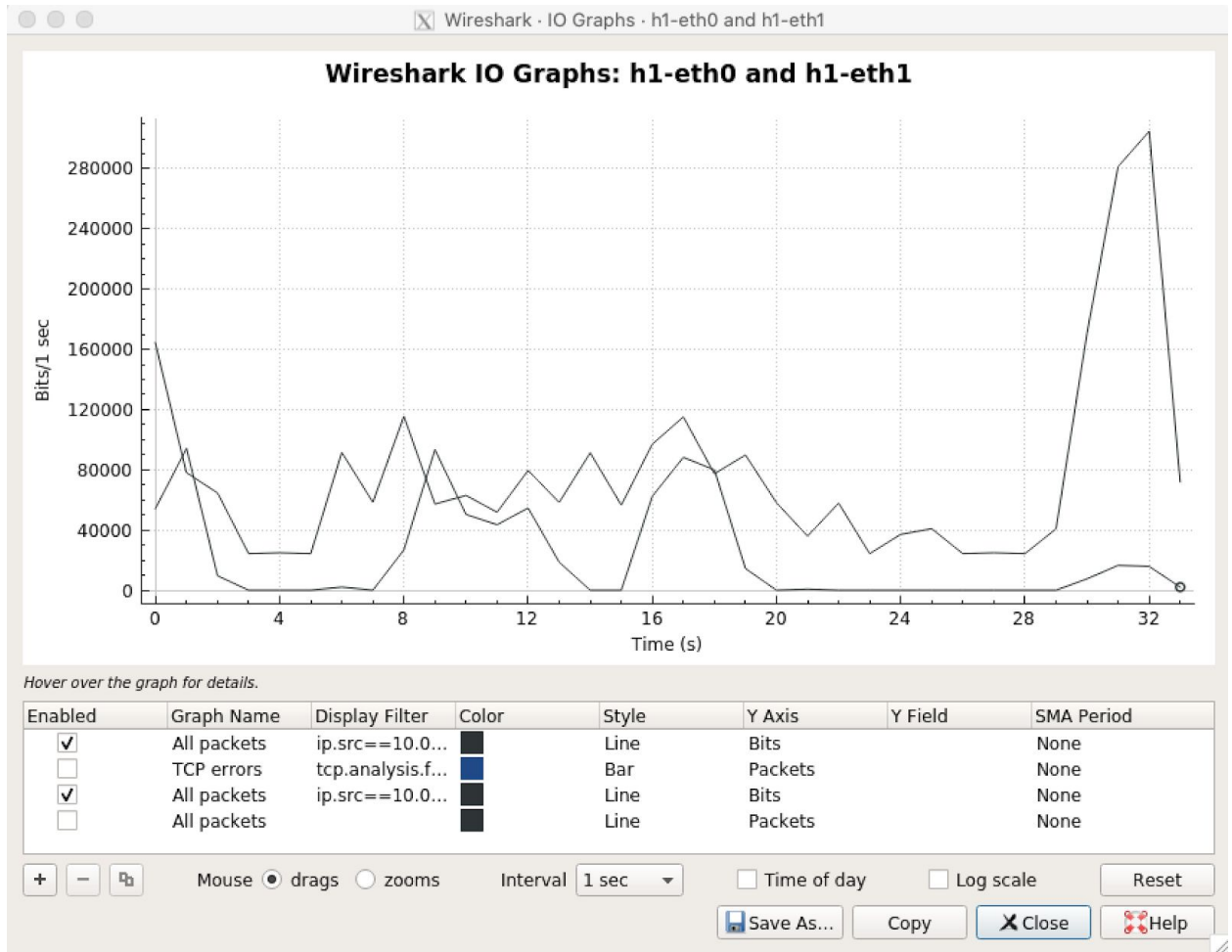
Does this make sense, why or why not?

Yes, it does make sense as all get requests must request 100% of the packets which may take a different path due to congestion when MPTCP is enabled.

Is wget a reasonable approximation of a web browser, or would you expect a real web browser to have different performance?

Although wget is non-interactive, it can be considered as a reasonable approximation of a web browser. We can expect similar behavior and performance while using a real web browser.

a. MPTCP Enabled:



```

FINISHED --2020-05-03 22:36:10--
Total wall clock time: 33s
Downloaded: 65 files, 4.8M in 28s (174 KB/s)

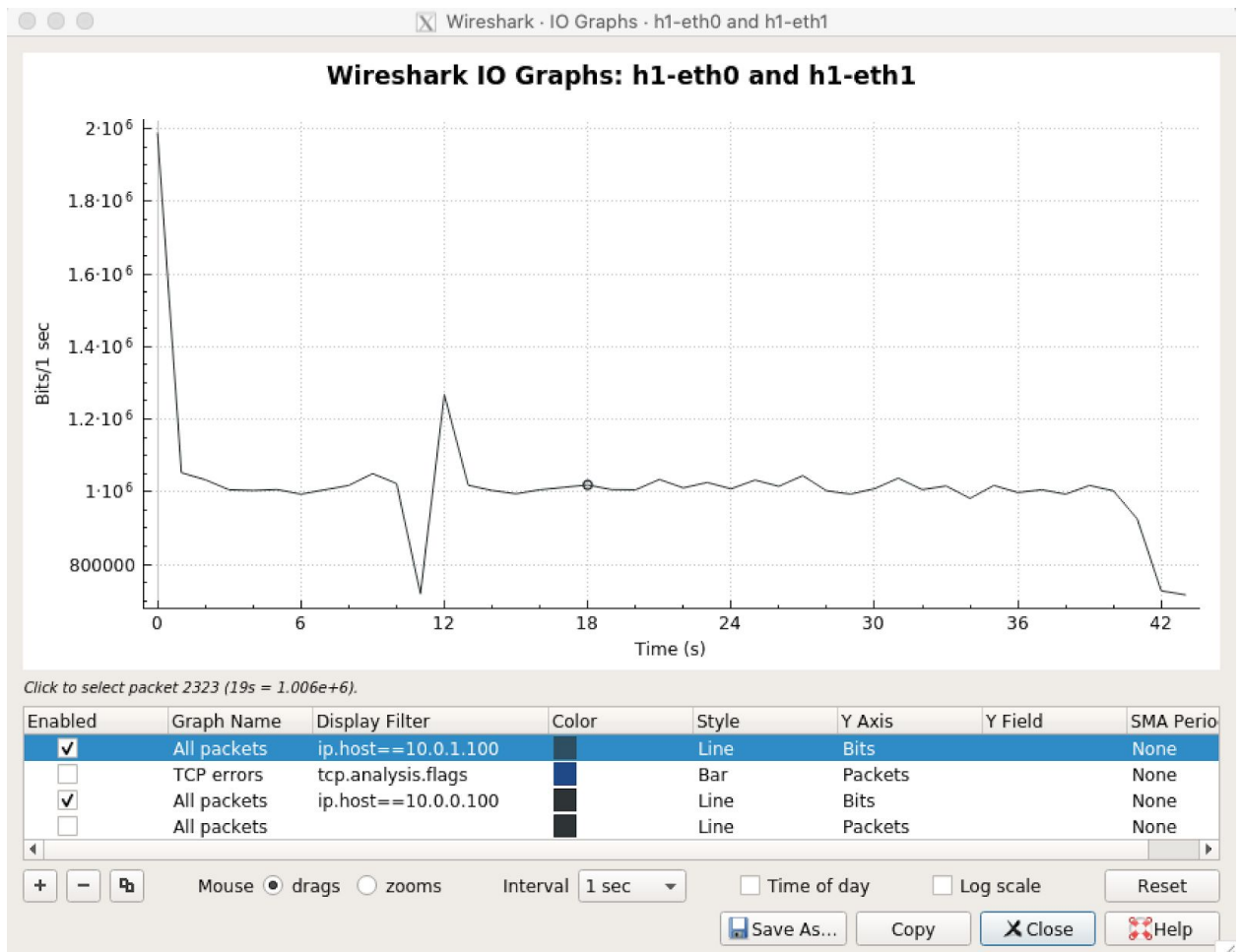
```

```

real    0m33.158s
user    0m0.088s
sys     0m0.214s
root@mininet:~#

```

b. MPTCP Disabled



```
FINISHED --2020-05-03 22:41:50--
Total wall clock time: 43s
Downloaded: 65 files, 4.8M in 39s (128 KB/s)
```

```
real    0m43.252s
user    0m0.112s
sys     0m0.124s
root@mininet:~#
```