Updates from the Network Team

What is happening in the C Tor world?

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State of the Onion 2022

Network Team Summary of 2022

- Continue the ramping down on new client features in the C implementation of Tor.
- Ramping up on Rust development as part of the Arti project.
- VPN work with LEAP and Guardian Project!
- Work with friends that are integrating Tor into their applications.
- Denial of Service **:-(**

Congestion Control

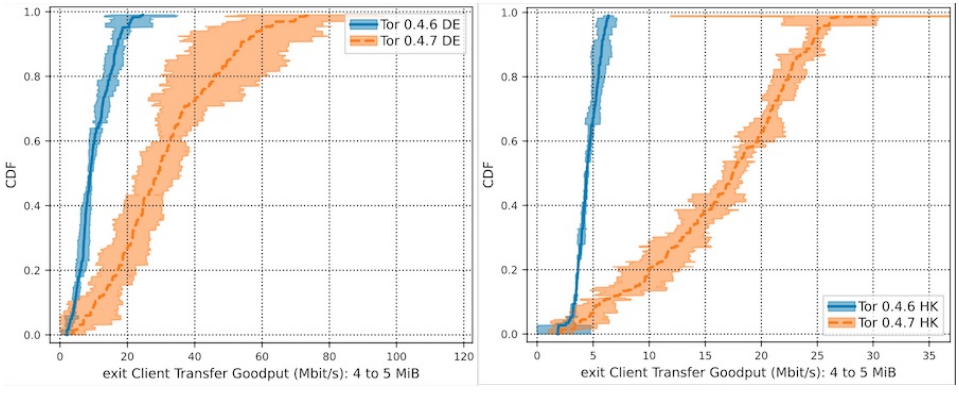
We implemented three congestion control algorithms: Tor-Westwood, Tor-Vegas, and Tor-NOLA. All of them are available in **Tor 0.4.7.**

Both Tor-Westwood and Tor-NOLA exhibited ack compression, which caused them to wildly overestimate the Bandwidth-Delay Product, which lead to runaway congestion conditions.

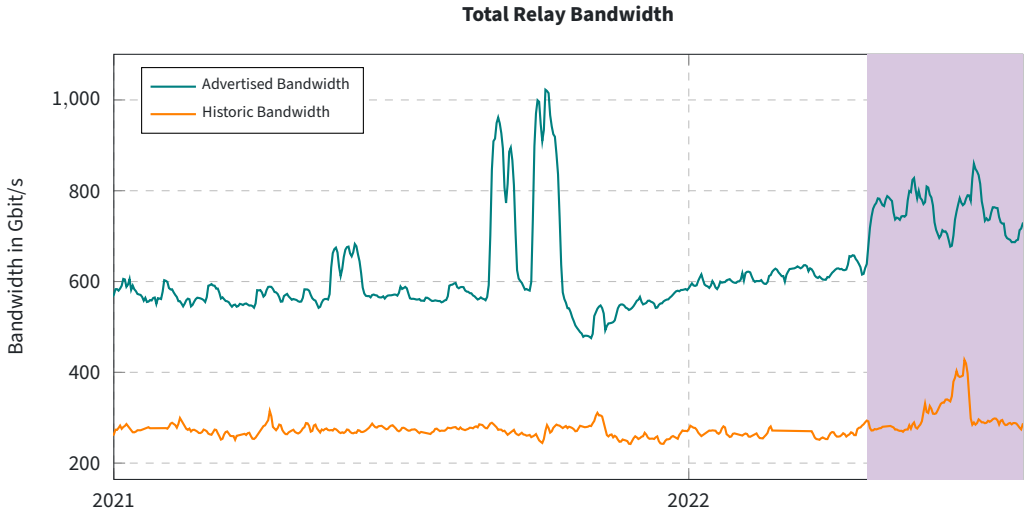
Google's BBR algorithm also suffers from these problems, and was not implemented in Tor.

Congestion Control

Tor-Vegas performed beautifully, almost exactly as the theory predicted, as seen in the results from **Shadow.**



Congestion Control



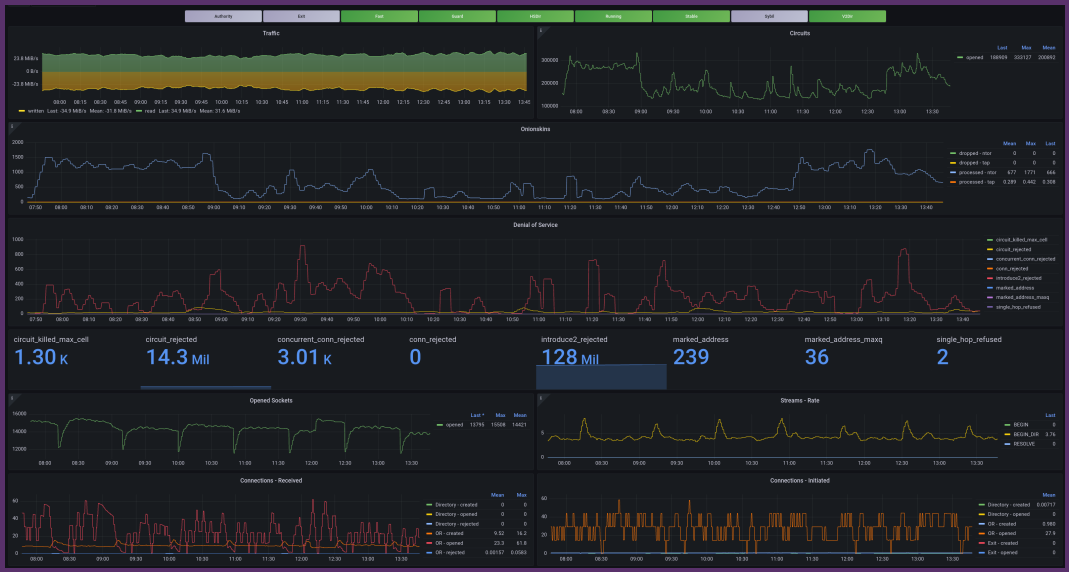
Source: metrics.torproject.org

Ongoing Denial of Service

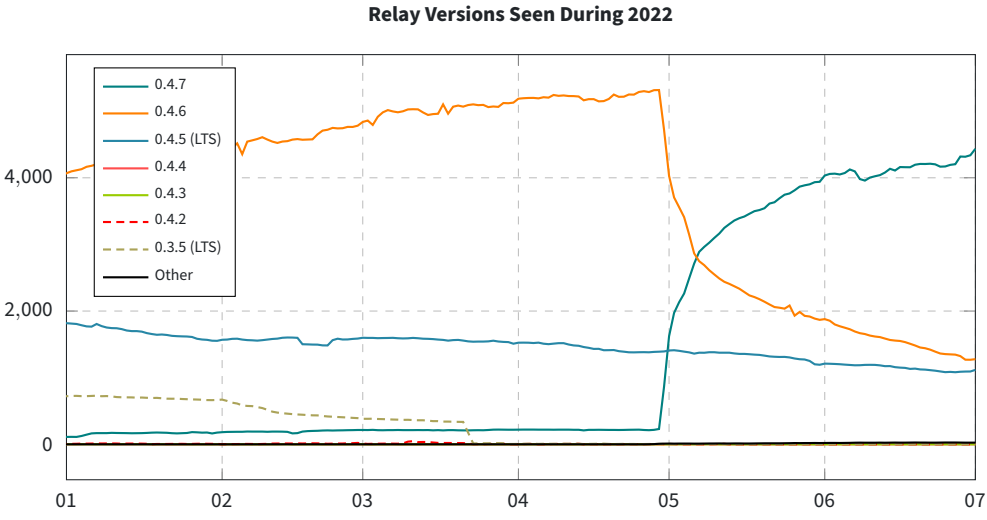
The ongoing Denial of Service against the Tor network in the last couple of months have made it drastically harder to analyse the impact and tuning opportunities related to the deployment of congestion control in the network.

Ongoing efforts to reduce the impact of Denial of Service attacks is helping, but it continues to be a bit of an arms race.

Better introspection tooling for Tor is also being integrated into C Tor via the **MetricsPort** feature.


Authority
Exit
Fast
Guard
Hsdir
Running
Stable
Valid
V3dir
Traffic
23.8 MiB/s
0 B/s
-23.8 MiB/s
written Last: -34.9 MiB/s Mean: -31.8 MiB/s
read Last: 34.9 MiB/s Mean: 31.8 MiB/s
Circuits
Last Max Mean
opened 188909 353127 206693
Onionskins
Mean Max Last
dropped - ntor 0 0 0
dropped - tap 0 0 0
processed - ntor 677 1771 666
processed - tap 0.291 0.442 0.308
Denial of Service
circuit_killed_max_cell
circuit_rejected
concurrent_conn_rejected
conn_rejected
introduce2_rejected
marked_address
marked_address_maxq
single_hop_refused
circuit_killed_max_cell
1.30 K
circuit_rejected
14.3 Mil
concurrent_conn_rejected
3.01 K
conn_rejected
0
introduce2_rejected
128 Mil
marked_address
239
marked_address_maxq
36
single_hop_refused
2
Opened Sockets
Last * Max Mean
opened 13795 15508 14421
Streams - Rate
Last
BEGIN 0
BEGIN_DIR 3.76
RESOLVE 0
Connections - Received
Mean Max
Directory - created 0 0
Directory - opened 0 0
Directory - rejected 0 0
OR - created 9.92 16.2
OR - opened 23.3 61.8
OR - rejected 0.00157 0.0583
Connections - Initiated
Mean
Directory - created 0.00717
Directory - opened 0
OR - created 0.988
OR - opened 27.9
Exit - created 0
Exit - opened 0

The Tor Network



Source: metrics.torproject.org

A massive thank you for upgrading to Tor 0.4.7 so quickly!

Congestion Control

Onion Service operators will also benefit from upgrading to **Tor 0.4.7.**

For more details, please read Mike Perry's blog post on Congestion Control at blog.torproject.org/congestion-contrl-047

Proof of Work for Onion Services

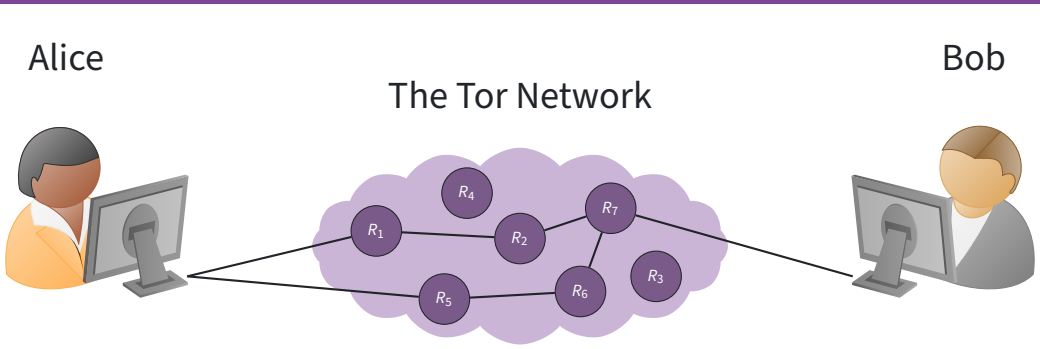
Implement PoW for Onion Services that can dynamically enable, disable, and adjust the difficulty of the system if pathological situations appears.

Make the cost of attacking an Onion Service higher.

A big thanks to **tevador** for all the help here!

See Proposal #327.

Conflux



Next up is **Nick** who will give you all an update on the **Rust work and Arti!**

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OpenPGP:
1C1B C007 A9F6 07AA 8152
C040 BEA7 B180 B149 1921