The Tor software ecosystem

Roger Dingedine
Jacob Appelbaum
The Tor Project
https://torproject.org/
Tor: client, relay/bridge, dir (heavy)

Step 2: Alice’s Tor client picks a random path to destination server. Green links are encrypted, red links are in the clear.
Tor: hidden services (moderate)

**Step 5:** Bob connects to the Alice's rendezvous point and provides her one-time secret.
All of these projects are listed at https://www.torproject.org/volunteer
TBB: Tor Browser (heavy)
The old Torbutton
Congratulations. Your browser is configured to use Tor. Please refer to the Tor website for further information about using Tor safely. You are now free to use the Tor network.

Your IP address appears to be: 95.170.88.81
TBB: Vidalia (light)
Arm (light)

arm - odin (Linux 2.6.28-18-generic) Tor 0.2.1.19 (unknown)
caerSidi - 76.104.132.98:9001, Control Port (password): 9051
flags: Fast, HSDir, Named, Running, Stable, Valid

Bandwidth (cap: 40 KB, burst: 100 KB):
Downloaded (586 bytes/sec - avg: 13.2 KB/sec, total: 11.8 GB):

Accounting (awake)
16 GB / 30 GB

Time to reset: 150:10:02
16 GB / 30 GB

Events (INFO, BW):
18:49:57 [INFO] router_pick_published_address(): Could not determine our add
18:49:57 [INFO] resolve_my_address(): Address 'odin' resolves to private IP
public IP addresses.
18:49:57 [INFO] resolve_my_address(): Interface IP address '192.168.1.20'
TorK (dead)
Tor Controller libs (heavy)

- stem
- pytorctl
- jtorctl
- txtorcon

```
meejah@pretend:~/src/txtorcon-github$ make trial --reporter=text txtorcon.test

Ran 229 tests in 1.140s

PASSED (successes=229)
meejah@pretend:~/src/txtorcon-github$ python examples/launch_tor_endpoint.py
10%: Finishing handshake with directory server
15%: Establishing an encrypted directory connection
20%: Asking for networkstatus consensus
25%: Loading networkstatus consensus
40%: Loading authority key certs
45%: Asking for relay descriptors
80%: Connecting to the Tor network
85%: Finishing handshake with first hop
90%: Establishing a Tor circuit
100%: Done
I have set up a hidden service, advertised at:
http://567zt26xqpvmdwcs.onion:80
locally listening on IPv4Address(TCP, '0.0.0.0', 31955)
```
TBB: HTTPS Everywhere (heavy)

Encrypt the Web

with HTTPS Everywhere
TBB: Noscript (external)
TBB: Thandy (light)

updateframework.com
Torsocks (light)
Pidgin (community)
HTTP Proxies (deprecated?)

- Privoxy
- Polipo
- Shim
Torbirdy (moderate)
ttdnsd (light)
Orbot (heavy)
Gibberbot (moderate)
Pond (light)
Tails (heavy)

The Amnesic Incognito Live System
TLSDate (moderate)
Tor cloud bridge images (moderate)
**Tor-ramdisk (community)**

**NOTE:** Only ftp supported at present

Enter IMPORT or GENERATE (all upper case): GENERATE
A new secret key will be generated when tor is started ...

<Tor is configured (but not started yet)>

Hit enter to continue:

* Enter "netstart" to (re)configure the network
* Enter "netstatus" to see the network status
* Enter "nettest" to test network connectivity
* Enter "listening" to see sockets listening on the network
* Enter "established" to see sockets established on the network
* Enter "torconf" to (re)import/generate the secret_id_key/torrc
* Enter "torstart" to (re)start tor.
* Enter "torreload" to reload torrc.
* Enter "torstop" stop the tor server.
* Enter "toreexport" to export the secret_id_key/torrc and NOT halt the system.
* Enter "processes" to see all the running processes
* Enter "resources" to see ram usage
* Enter "shutdown" to export the secret_id_key/torrc AND halt the system.

* torstart_
TorTV (community)
Torouter (light)
Libs we depend on / help maintain

- Libevent
- OpenSSL
- tor-fw-helper (libnatpmp, miniupnp)
<table>
<thead>
<tr>
<th>#</th>
<th>Consensus Weights</th>
<th>Advertised Bandwidth</th>
<th>Guard Probability</th>
<th>Middle Probability</th>
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### compass.torproject.org (light)

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<td>ro</td>
<td>AS39743 Voxility SRL</td>
</tr>
<tr>
<td>14</td>
<td>1.0478%</td>
<td>0.4420%</td>
<td>0.5224%</td>
<td>0.5224%</td>
<td>2.0984%</td>
<td>*</td>
<td>(1 relays)</td>
<td>(1)</td>
<td>(1)</td>
<td>dk</td>
<td>AS197564 Solido Networks ApS</td>
</tr>
</tbody>
</table>
metrics.torproject.org (heavy)

The Tor Project - https://metrics.torproject.org/
Relay search (light)

Tor Metrics Portal: Relay Search
Search for a relay in the relay descriptor archive by typing (part of) a nickname, $-prefixed fingerprint, or IP address and optionally (yyyy-mm) or up to three days (yyyy-mm-dd) in the following search field and clicking Search. The search will stop after 30 hits or provide a month or a day, after parsing the last 30 days of relay lists.

Searching for relays with nickname chaoscomputerclub ...

valid-after 2012-12-26 12:00:00
r chaoscomputerclub10 EaAjn8ZmhwX2iEKBExi2acY2+G4 Eyaik1MdQ4PdrHshhhYihnrY2sQ 2012-12-26 11:54:07 62.113.219.3 443 80
s Exit Fast Guard HSDir Named Running Stable V2Dir Valid
v Tor 0.2.4.6-alpha
w Bandwidth=1537
r chaoscomputerclub29 PlaTxlD82LQhU4aUEIRZQgq+A Nip1X+Eh4BbdL+K6ojxqnJhiBw 2012-12-26 11:01:55 77.244.254.229 443 80
s Exit Fast Guard HSDir Named Running Stable V2Dir Valid
v Tor 0.2.4.6-alpha
w Bandwidth=5390
r chaoscomputerclub27 YxgewWRfnfzWNyXJRf2JoI6npH5Q daoixQVMRKT7whwyWdHhAtrBAbU 2012-12-26 10:50:38 77.244.254.227 443 80
s Exit Fast Guard HSDir Named Running Stable V2Dir Valid
v Tor 0.2.4.6-alpha
w Bandwidth=4525
r chaoscomputerclub4 ZZ32U31gX+qzt3S5Y1NC1wTwsp5k wW0vwrQ59BuXjY/80cEcJ4D6JVA 2012-12-25 18:42:24 80.237.226.74 443 80
s Exit Fast Guard HSDir Named Running Stable V2Dir Valid
v Tor 0.2.4.6-alpha
w Bandwidth=10000
r chaoscomputerclub11 cee0m5YdXixoxW/M0V6Bqjs2y5M KwFGo+wloy7wVb0upWtoQEt10 2012-12-26 11:55:03 62.113.219.4 443 80
s Exit Fast Guard HSDir Named Running Stable V2Dir Valid
Was there a Tor relay running on this IP address?

IP address in question: 128.31.0.34
Date or timestamp, in UTC: 2011-01-01 12:00

Looking up IP address 128.31.0.34 in the relay lists published between 2011-01-01 09:00 and 2011-01-01 12:00 UTC as well as in the relevant exit lists. Clients could have selected any of these relays to build circuits. You may follow the links to relay lists and relay descriptors to grep for the line printed below and confirm that results are correct.

valid-after 2011-01-01 09:00:00
r morial lpXfw1/uGEym58asExG0XAgzjE 9jGJK0qqr0Hl11US8iolNse3PA 2010-12-31 15:39:29 128.31.0.34 9101 9131

valid-after 2011-01-01 10:00:00
r morial lpXfw1/uGEym58asExG0XAgzjE fo/t0mGfia3/L7pEqbNOpkj7HY 2011-01-01 09:39:40 128.31.0.34 9101 9131

valid-after 2011-01-01 11:00:00
r morial lpXfw1/uGEym58asExG0XAgzjE fo/t0mGfia3/L7pEqbNOpkj7HY 2011-01-01 09:39:40 128.31.0.34 9101 9131

valid-after 2011-01-01 12:00:00
r morial lpXfw1/uGEym58asExG0XAgzjE fo/t0mGfia3/L7pEqbNOpkj7HY 2011-01-01 09:39:40 128.31.0.34 9101 9131

Result is POSITIVE with high certainty!

We found one or more relays on IP address 128.31.0.34 in the most recent relay list preceding 2011-01-01 12:00 that clients were likely to know.

Was this relay configured to permit exiting to a given target?

Target address: 
Target port: 80

Submit Query  Reset
<table>
<thead>
<tr>
<th>Fingerprint</th>
<th>Nickname</th>
<th>Farav.</th>
<th>danne.</th>
<th>dizum.</th>
<th>gabel.</th>
<th>maatu.</th>
<th>moria1</th>
<th>tor26</th>
<th>turtl.</th>
<th>urras</th>
<th>consensus</th>
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<tbody>
<tr>
<td>0013D223</td>
<td>sumkledi</td>
<td>Exit</td>
<td>Exit</td>
<td>Exit</td>
<td>Exit</td>
<td>Exit</td>
<td>Exit</td>
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<td>Fast</td>
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<td></td>
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<td>Running Valid</td>
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<td>Running Valid</td>
<td>Running Valid</td>
<td>Running Valid</td>
<td>Running Valid</td>
<td>Running Valid</td>
<td>Running Valid</td>
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<tr>
<td></td>
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<td>V2Dir</td>
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<tr>
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<td>Fast</td>
<td>Fast Valid</td>
</tr>
<tr>
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<td></td>
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<td>Running V2Dir</td>
<td>Running V2Dir</td>
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<td>Running Stable</td>
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<td></td>
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<td>pornostefi</td>
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<td>Named Running Valid</td>
<td>Running Valid</td>
<td>Named Running Valid</td>
<td>Running Valid</td>
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<td>Running Valid</td>
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<td>Fast</td>
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<td>Fast Valid</td>
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<td></td>
<td>Guard</td>
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<td>HSDir</td>
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<td>HSDir Valid</td>
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<td>Running Stable</td>
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<td>Running Stable</td>
<td>Running Stable</td>
<td>Running Stable Valid</td>
<td></td>
</tr>
</tbody>
</table>
Time in seconds to complete 1 MiB request

*Measured times on all sources per day*

- Median
- 1st to 3rd quartile

The Tor Project - https://metrics.torproject.org/
Tor Weather - Sign Up!

Enter Email: ___________________________ Re-enter Email: ___________________________

Node Fingerprint: (search for a router)
Hint: Often your node fingerprint can be found on unix-like machines in the file: /var/lib/tor/fingerprint
Note that this service is not for Bridge relays.

☑ Email me when the node is down
☑ How long before we send a notification?
    Default value is 0 hours. Enter a value between one hour and six months

☐ Email me when the router’s Tor version is out of date
☐ Email me when the router has low bandwidth capacity
☐ Email me when the router has earned me a Tor t-shirt

Subscribe to Tor Weather! (More Info)

Please note that while we won’t ever intentionally publish them, the address/node pairs sent to this server are not protected against SMTP eavesdropping, hacking, or lawyers.

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Backend database support for metrics (moderate)

- Onionoo
- PyOnionoo
(py)obfsproxy (moderate)
Dark blue means the proxy is running but no client is being served.
Light blue means a client is currently being served.
Gray means that the badge has disabled itself. This can be because it has detected it is running on a mobile device, or the browser doesn't support WebSocket (this happens on Internet Explorer 9).
Black means that there was an internal error and the proxy is no longer running.
Flashproxy (moderate)
Other pluggable transports

- Stegotorus
- Skypemorph
GetTor (low)
BridgeDB (light)

Bridge relays (or "bridges" for short) are Tor relays that aren't listed in the main directory. Since there is no complete public list of them, even if your ISP is filtering connections to all the known Tor relays, they probably won't be able to block all the bridges.

To receive your bridge relays, please prove you are human

Type the two words

I am human

Another way to find public bridge addresses is to send mail to bridges@torproject.org with the line "get bridges" by itself in the body of the mail. However, so we can make it harder for an attacker to learn lots of bridge addresses, you must send this request from an email address at one of the following domains:

- gmail.com
- yahoo.com

Looking for IPv6 bridges?

Looking for obfsproxy bridges?

Specify transport by name:

Submit Query
Brdgrd (community)
Successfully bootstrapped Tor
We will include some geo data in the report
Your AS number is: AS36692
Reporting to file report_http_requests_2012-12-27T134858Z.yamloo
Performing GET request to http://google.com/
Performing GET request to http://google.com/ via Tor
Performing GET request to http://facebook.com/
Performing GET request to http://facebook.com/ via Tor
Performing GET request to http://youtube.com/
Performing GET request to http://youtube.com/ via Tor
Performing GET request to http://yahoo.com/
Performing GET request to http://yahoo.com/ via Tor
Performing GET request to http://baidu.com/
Performing GET request to http://baidu.com/ via Tor
Performing GET request to http://wikipedia.org/
Performing GET request to http://wikipedia.org/ via Tor
Performing GET request to http://live.com/
Performing GET request to http://live.com/ via Tor
Performing GET request to http://twitter.com/
Performing GET request to http://twitter.com/ via Tor
Performing GET request to http://qq.com/
Performing GET request to http://qq.com/ via Tor
Performing GET request to http://amazon.com/
Performing GET request to http://amazon.com/ via Tor
$ mono scallion/bin/Debug/scallion.exe -d 0 prefix
Cooking up some delicious scallions...
LoopIteration:15 HashCount:251.66MH Speed:89.2MH/s Runtime:00:00:02 Predicted:00:00:12
Ding!! Delicious scallions for you!!

Exponent: 37074435
Address/Hash: prefix2bp7lfuuvp

-----BEGIN RSA PRIVATE KEY-----
MIICXQIBAAKBgQDVNX1MDVXQ6EjRLubgMUnhVeYyigEPZ4BLUhzNRp4MEMgQHLP
GRLMc2yK29Q8fuVC1o2zJS8IF6RbXyB9Sdyuzh43st2CZeTMEWbkz6NNAJz+8Uh
1I35CWx5p4w1sw2eZx+wM7s6L14762pV21qolxqHoIefOsIso0AHixYPrQIEA1j2
AwKBgAEqghqEMZ2cedXc+AIKmZebbJyWvfp9W9HRHXn6cU0mYFNHXnAjr8KR6r
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2Vw0HzDIQ7q1UwYBzn1RCl1Wgyd5+0wDZ80CQDDaeWQ8U1o3/8St1KLvpify+fkQ
81j0GdoUJgYcz3nDEp6sCPvg3aSI7b195odY4L3d0pQ4SnPj0zGJMfdqecwFLAkbj
-----END RSA PRIVATE KEY-----
Tor2Web (medium)
Network testing scripts

- TorFlow
  - Exit testing
  - Bandwidth testing
- TorDNSExitlist
- TorBEL
- TorCheck
  - Bulkexitlist
Tor network simulators

- Shadow
- ExperimenTor
- Chutney
- Puppetor
Tor specs (moderate)

- The specifications aim to give developers enough information to build a compatible version of Tor:
  - Main Tor specification
  - Tor version 3 directory server specification (and older version 2 directory specification)
  - Tor control protocol specification
  - Tor rendezvous specification
  - Tor path selection specification
  - Special hostnames in Tor
  - Tor's SOCKS support and extensions
  - How Tor version numbers work
  - In-progress drafts of new specifications and proposed changes
Apps that (confusingly!) aren't from Tor

- Tormail
- TorChat
- Advanced Tor
- Misc snakeoil
Nymble, Wikipedia support
2012

- **Congestion-aware Path Selection for Tor** [PDF] (Cached: PDF) by Tao Wang, Kevin Bauer, Clara Forero, and Ian Goldberg. In the Proceedings of Financial Cryptography and Data Security (FC'12), February 2012. [BibTeX entry].


- **Shadow: Running Tor in a Box for Accurate and Efficient Experimentation** [PDF] (Cached: PDF) by Rob Jansen and Nicholas Hopper. In the Proceedings of the Network and Distributed System Security Symposium - NDSS'12, February 2012. [BibTeX entry].


All of these projects are listed at https://www.torproject.org/volunteer