Fearless, 1000 days and still running: the ‘most resilient’ exit nodes of the Tor network and their ISP’s – a quantitative approach.

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Abstract

We make use of metrics to identify what we call ‘the most resilient exit nodes of the Tor network’, and so gain an insight into their characteristics. This first quantitative answer, we hope, will be of help, both to the users and makers of this network.
1 Introduction

Some questions are like some flowers, so perennials: ‘present at all seasons of the year’.

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“Can I install extensions for the Tor Browser?”, “What ISP should I use if I want to run a relay or exit node?”, etc.

But to answer these, words should never be left long without numbers, and common language, with its inherent incertitudes, avoided as much as possible – hence we chose to opt for a different approach than has been generally so far, to answer one of them.

The quantitative approach adopted here will be a complement to the more qualitative methodologies preferred so far.

2 Methodology

Resilience here is understood as a combination of age and present status (i.e. the node must be running).

Our criteria in this study were:

- The relay is an exit node;
- The exit node has existed for at least 1000 days;
- The exit node is running.

We make use of the Tor Metrics database, where this translates into the following search query:

flag:exit running:true first_seen_days:1000-10000

With about 180 servers as a result, at the time of writing.

To describe them going forward we use consistently the nomenclature ‘most resilient’.

This approach, of course, merits comment, but it is the best ‘proxy’ (in the sense that this term has within statistics) that this problematic has for answer; an approximation in other words.

It does not account for instance for the fact that some of the most resilient Tor exits may have happened to be down, or offline, at the time of this writing, or that some of those recorded here may have been inactive for considerable periods of time. We do not account for this (though the aforementioned database provides this information for the latter).

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1https://trac.torproject.org/projects/tor/wiki/doc/GoodBadISPs
2An arbitrary value, as one must be chosen, resulting in a number of servers small enough to be handled by one researcher.
3https://metrics.torproject.org/
4The number fluctuated between 177 at the beginning, 180 in the middle, and 178 again by the end of our research (single day). We can only conclude this was attributable to the smaller nodes, hence we added a criteria of our own: bandwidth should be 1 MiB/s or more. The servers that were left did not change, we went through the list multiple times.
Because computer science is a social science – as computer scientists eventually always find out – it must deal with the same problems that these same sciences have been dealing with for centuries. Except, they may find themselves not well equipped enough, lacking the right tools to solve these problems, having either rejected or ignored them.

This research gives an overview of the most resilient exits of the Tor network, and their ISP’s (Internet Service Providers).

3 Results

We truncate the values for total bandwidth.

<table>
<thead>
<tr>
<th>ISP</th>
<th>Number of exit nodes amongst ‘most resilient’</th>
<th>Total bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVH</td>
<td>10</td>
<td>155 MiB/s</td>
</tr>
<tr>
<td>Leaseweb</td>
<td>3</td>
<td>118 MiB/s</td>
</tr>
<tr>
<td>NForce</td>
<td>3</td>
<td>89 MiB/s</td>
</tr>
<tr>
<td>Online</td>
<td>6</td>
<td>53 MiB/s</td>
</tr>
<tr>
<td>Balnhof</td>
<td>1</td>
<td>38 MiB/s</td>
</tr>
<tr>
<td>Flokinet</td>
<td>6</td>
<td>22 MiB/s</td>
</tr>
</tbody>
</table>

Table 1: Most resilient exit nodes of the Tor network and commercial ISP’s.

<table>
<thead>
<tr>
<th>ISP / org.</th>
<th>Number of exit nodes amongst ‘most resilient’</th>
<th>Total bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zwiebelfreunde E.V.</td>
<td>12</td>
<td>490 MiB/s</td>
</tr>
<tr>
<td>Calyx Institute</td>
<td>13</td>
<td>163 MiB/s</td>
</tr>
<tr>
<td>Tetaneutral.net</td>
<td>2</td>
<td>107 MiB/s</td>
</tr>
<tr>
<td>DFRI</td>
<td>5</td>
<td>105 MiB/s</td>
</tr>
</tbody>
</table>

Table 2: Most resilient Tor exit nodes and non-commercial ISP’s, organizations.

_Tetaneutral.net_, an ISP built as an association, provides services for the non-profit organization _Nos oignons_.

Finally, it is our understanding that _Zwiebelfreunde_, an association, is behind the exit nodes with nomenclature _nifty_.

4 Recommendations

From a prescriptive point of view, this does not mean users wishing to start a Tor relay or node – exit or otherwise – should necessarily choose
one of the companies which, in this research, come up often (e.g. OVH, Leaseweb or Online).

As the association *Nos oignons* – two of the largest ‘most resilient’ exit nodes – point out the Tor network suffers from what they call a problem of “diversity”, understood in the following specific sense:

(...) a big majority of Tor relays are hosted at OVH, Online and Hetzner, three leaders in cheap, mainstream hosting.

With the algorithm currently used by Tor to determine routes or circuits between relays, it would unfortunately be enough to compromise these three companies to gain a considerable overview of the network, and make it easy to launch attacks on users with the goal of de-anonymization.

By choosing other ISP’s, we contribute to improve the Tor network’s quality: the more relays are hosted with other providers, the harder it gets to conduct a global surveillance of the network, the better its security.¹⁵

Less obvious commercial ISP’s unveiled in this study include *NForce*, which provides more bandwidth to ‘most resilient’ exit nodes than *Online*, *Fokinetc*, which services no less than 6 such relays, and *Bahnhof*, whose advertised bandwidth amongst these is considerable – to name a few.

¹⁵Our translation.
Acknowledgements

To the owners of the most resilient Tor exit nodes – who, with their pages they have given us much to laugh, and with their courage much to think, dream.

To the universities and their staff: the University of Waterloo, Boston University, the University of North Carolina at Chapel Hill, and Carnegie Mellon University.

To the organizations encountered:

https://www.zwiebelfreunde.de/
https://www.calyxinstitute.org/
https://nos-oignons.net/
https://www.dfri.se/
https://www.hartvoorinternetvrijheid.nl/
https://www.gitoyen.net
https://digitalcourage.de/
https://effi.org/

... – we apologize to those we could not identify and hence forgot.

We will not mention those who in fact are not among them, as they have identified themselves, but the reader is left to draw their own conclusions as to the merit of the ones that aren’t here: be they their own universities, non-profit’s or ISP’s ... Contact them, and bring about change!
chaucer    Hextet Systems
snowfall    Hextet Systems
cowcat    Hextet Systems
PrivacyRepublic0002    OVH SAS
TorThdNinja    OVH SAS
multisec2    Broadnet AS
tor03k    OVH SAS
lewwerDuarUesSlaav    ServerAstra Kft.
kramse2    Zencurity ApS
Apollo    Denetron LLC
kramse    Zencurity ApS
multisec5    Broadnet AS
multisec4    Broadnet AS
Wix    OVH SAS

--- ca. 10 MiB/s

PrivacyRepublic0003    OVH SAS
batrelay    Andreas Fink trading as Fink Telecom Services
multisec3    Broadnet AS
PrivacyRepublic0004    OVH SAS
Cloud    OVH SAS
FelixIO    Keyweb AG
CalyxInstitute06    The Calyx Institute
CalyxInstitute12
CalyxInstitute11
CalyxInstitute08
CalyxInstitute13
CalyxInstitute05
marcuse2    Ielo-liazo Services SAS
marcuse1    Ielo-liazo Services SAS
CalyxInstitute09
AquaRayTerminus    Aqua Ray SAS
CalyxInstitute14
Minotaur    GoDaddy.com, LLC
CalyxInstitute03
hedden    Quasi Networks LTD.
CalyxInstitute01
TorExitVIF    Concorde inc.
CalyxInstitute04
ua321    UA VPS LLC
micole    PT Cloud Hosting Indonesia
torNodeCom2    Login, Inc.
BostonUCompSci    Boston University
windeck    23media GmbH
saveyourprivacyexl    Flokinet Ltd
glittershy    MCI Communications Services, Inc. d/b/a Verizon Business
corewars    MULTACOM CORPORATION
torNodeCom    Login, Inc.
Mercury    Denetron LLC
nacor    CityNet Telekom Ltd.
ibibUNCC0    University of North Carolina at Chapel Hill
Unnamed    Hurricane Electric LLC
Unnamed    I.C.S. Trabia-Network S.R.L.
yuicat2    CYBERDYNE

--- ca. 5 MiB/s

timcinel    OVH SAS
Unnamed    I.C.S. Trabia-Network S.R.L.
ByteIndian    Online S.a.s.
ByteIndian1    Online S.a.s.
alkalal    SC Fastweb SRL
balthaasar    Online S.a.s.
--- ca. 1 MiB/s