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# Tor Project

Progress Report Q4 2018 - S-LMAQM-17-GR-1121

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# Project Information

<b>Grantee:</b>	The Tor Project, Inc.
<b>Project Title:</b>	Tor Browser for Android
<b>Award Number</b>	S-LMAQM-17-GR-1121
<b>Period of performance:</b>	Q4 of the year -October 1st 2018 - December 31st 2018
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## Summary

### Work related to Tor Browser for Android

We have continued working on Tor Browser for Android and have made 4 additional Alpha releases<sup>1234</sup> improving upon our first Alpha release and incorporating important security updates from Firefox.

During the past 3 months (October - December 2018) we have achieved almost 1M new downloads. We are currently at ~395k total installs on active devices as of 31st December 2018 with a retention rate of ~40%.

<sup>1</sup> "New Release: Tor Browser for Android 1.0a2 | Tor Blog." 10 Oct. 2018, <https://blog.torproject.org/new-release-tor-browser-android-10a2>

<sup>2</sup> "New Release: Tor Browser for Android 1.0a3 | Tor Blog." 31 Oct. 2018, <https://blog.torproject.org/new-release-tor-browser-android-10a3>

<sup>3</sup> "New Release: Tor Browser 8.5a5 | Tor Blog." 3 Dec. 2018, <https://blog.torproject.org/new-release-tor-browser-85a5>

<sup>4</sup> "New Release: Tor Browser 8.5a6 | Tor Blog." 11 Dec. 2018, <https://blog.torproject.org/new-release-tor-browser-85a6>

### **Work related to Tor network optimization for mobile users**

We have significantly reduced memory usage, mostly in mobile and clients and improved how Tor reports about bootstrapping status.

Objective 1: Build a Tor Browser for Android to empower mobile users to safely, anonymously, and securely interact with Internet resources and services.

### **ACTIVITY O1.1: BUILD A TOR BROWSER FOR ANDROID WITH FUNCTIONALITY AND BUILD PROCESSES IN PARITY WITH DESKTOP TOR BROWSER.**

#### **Progress Report:**

For our subsequent Alpha releases we continued backporting important security fixes<sup>56</sup> from Mozilla into Tor Browser for Android by rebasing our mobile patches to the latest ESRs, with ESR60.4 being the latest version in use as of Tor Browser 8.5a6.

We also fixed a number of issues relating to functionality available on the desktop Tor Browser that was missing from the Android version<sup>7</sup> as well as applying a number of security related improvements and bug fixes<sup>8</sup>.

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<sup>5</sup> <https://www.mozilla.org/en-US/security/advisories/mfsa2018-24/>  
<https://gitweb.torproject.org/tor-browser.git/commit/?h=tor-browser-60.2.1esr-8.0-1&id=3943f44464ab5aa6bf92b3326cd99479779a83c7>

<https://gitweb.torproject.org/tor-browser.git/commit/?h=tor-browser-60.2.1esr-8.0-1&id=19a1fbba648f1dd12e7bfc31f7c3f82cfc89cf33>

<sup>6</sup> <https://trac.torproject.org/projects/tor/ticket/28104>

<sup>7</sup> <https://trac.torproject.org/projects/tor/ticket/28507>

<https://trac.torproject.org/projects/tor/ticket/27111>

<https://trac.torproject.org/projects/tor/ticket/27701>

<https://trac.torproject.org/projects/tor/ticket/28705>

<https://trac.torproject.org/projects/tor/ticket/27256>

<https://trac.torproject.org/projects/tor/ticket/27762>

<sup>8</sup> <https://trac.torproject.org/projects/tor/ticket/28640>

<https://trac.torproject.org/projects/tor/ticket/25013>

<https://trac.torproject.org/projects/tor/ticket/27611>

<https://trac.torproject.org/projects/tor/ticket/28125>

<https://trac.torproject.org/projects/tor/ticket/1623>

Additionally we made a lot of progress on achieving build process parity with desktop Tor Browser<sup>9</sup> and we're happy to be able to say that since Tor Browser 8.5a5 Tor Browser for Android releases are shipped at the same time as the desktop alpha releases.

**Next Report [Final Report]:**

We will continue to work on adding new functionality to Tor Browser for Android for our stable release, currently planned for the end of March 2019.

**ACTIVITY 01.2: RESEARCH AND DEVELOP ANDROID SPECIFIC FINGERPRINTING DEFENSES FOR TOR BROWSER.**

**Progress Report:**

There was no additional progress on Android specific fingerprinting defenses during Q4.

**Next Report [Final Report]:**

Fingerprinting investigation will continue as we move towards a stable release. We are very satisfied with our work in this front and feel we are on target to accomplish a level of fingerprinting defense in parity to the one we have for desktop.

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<sup>9</sup> <https://trac.torproject.org/projects/tor/ticket/26693>  
<https://trac.torproject.org/projects/tor/ticket/28472>  
<https://trac.torproject.org/projects/tor/ticket/28144>  
<https://trac.torproject.org/projects/tor/ticket/28476>  
<https://trac.torproject.org/projects/tor/ticket/28483>  
<https://trac.torproject.org/projects/tor/ticket/27443>  
<https://trac.torproject.org/projects/tor/ticket/28470>  
<https://trac.torproject.org/projects/tor/ticket/27439>  
<https://trac.torproject.org/projects/tor/ticket/27440>  
<https://trac.torproject.org/projects/tor/ticket/27441>  
<https://trac.torproject.org/projects/tor/ticket/26697>  
<https://trac.torproject.org/projects/tor/ticket/26696>  
<https://trac.torproject.org/projects/tor/ticket/28752>  
<https://trac.torproject.org/projects/tor/ticket/25164>  
<https://trac.torproject.org/projects/tor/ticket/28696>  
<https://trac.torproject.org/projects/tor/ticket/28697>  
<https://trac.torproject.org/projects/tor/ticket/28803>  
<https://trac.torproject.org/projects/tor/ticket/28685>  
<https://trac.torproject.org/projects/tor/ticket/28764>

## **ACTIVITY O1.3: WORK WITH MOZILLA TO MERGE AND BUILT DEFENSES BACK INTO FIREFOX MOBILE**

### **Progress Report:**

There were no patches upstreamed to Mozilla during this period. However, we maintain an excellent relationship with the Firefox mobile team and continue to meet regularly, both online and in person, to discuss potential upstream patches. In December, we attended the Mozilla All Hands (conference) in Orlando.

### **Next Report [Final Report]:**

We will continue to submit our patches upstream to Mozilla as we work on fixing Android specific fingerprinting and other privacy protection features.

Objective 2: Specifically Build a Tor Browser for Android to empower mobile users to safely, anonymously, and securely interact with Internet resources and services.

## **ACTIVITY O2.1: ENABLE STANDALONE USE OF TOR BROWSER FOR ANDROID WITHOUT SEPARATE ORBOT INSTALLATION**

### **Progress Report:**

During Q4, we continued evaluating the best approach for integrating Tor into Tor Browser for Android without the need for an additional Tor Proxy app such as Orbot<sup>10</sup>. We are pleased to announce that we have implemented this since our 8.5a5 release<sup>11</sup> of Tor Browser for Android. Since this release, we have continued working on the user interface to allow easier configuration of the built-in Orbot.

### **Next Report [Final Report]:**

We will continue our work on the user experience improvements necessary to make this work seamlessly for our users as we work towards our stable release.

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<sup>10</sup> <https://trac.torproject.org/projects/tor/ticket/27609>

<sup>11</sup> <https://blog.torproject.org/new-release-tor-browser-85a5>

<https://trac.torproject.org/projects/tor/ticket/27977>

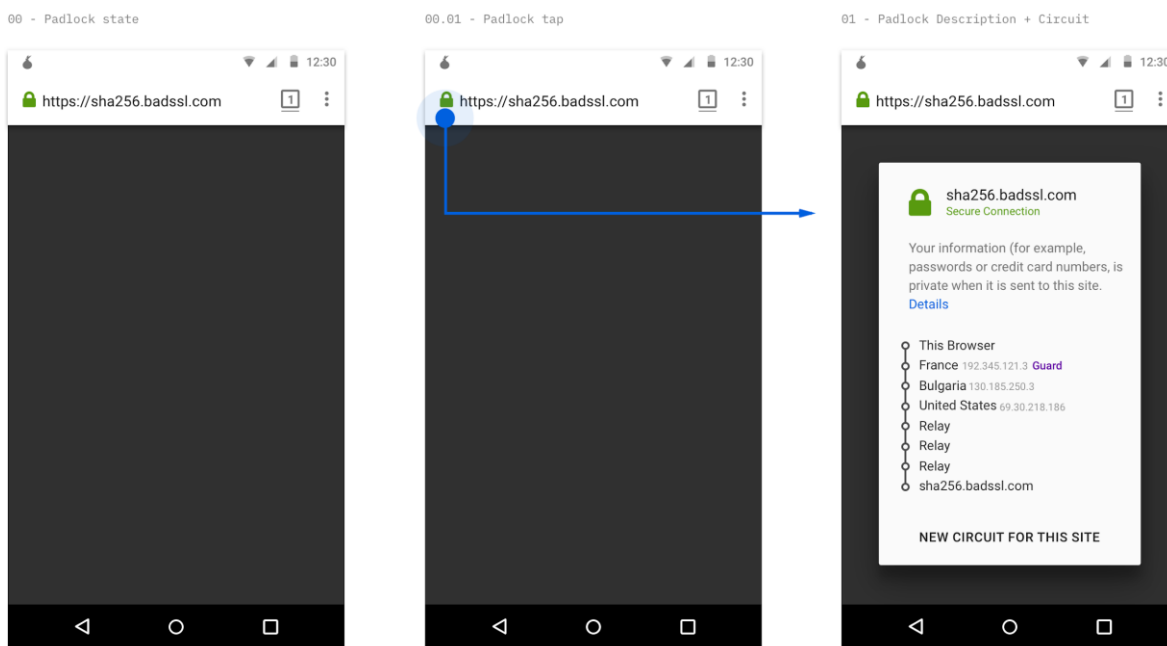
<https://trac.torproject.org/projects/tor/ticket/28051>

<https://trac.torproject.org/projects/tor/ticket/28468>

## ACTIVITY O2.2: IMPROVE USABILITY OF TOR BROWSER FOR ANDROID, RELATIVE TO ORFOX, INCLUDING ANTI-CENSORSHIP BRIDGES.

### Progress Report:

During Q4 we continued to work on bringing all Tor Browser for Desktop usability improvements<sup>12</sup> to Android, including localization to all of the languages supported by our desktop version. Additionally, this work included the new padlock states and circuit display improvements already present in our desktop version.



Padlock states and circuit display on Tor Browser for Android

### Next Report [Final Report]:

We will continue testing and improving upon the usability of Tor Browser for Android for our first stable release which is planned for end of March 2019.

We will finalize the integration of all UI changes we applied for desktop 8.0, including the new bridge request/selection experience.

<sup>12</sup> <https://trac.torproject.org/projects/tor/ticket/26690>  
<https://trac.torproject.org/projects/tor/ticket/26843>

## **ACTIVITY O2.3: IMPROVE SOFTWARE AND TOR NETWORK ARCHITECTURE TO IMPROVE USABILITY FOR LOW-SPEED NETWORKS AND LOW-POWER, LOW-RAM DEVICES.**

### **Progress Report:**

Reduced memory usage, focusing on clients and mobile.<sup>13 14</sup>

The principle results<sup>15</sup> from the work done here, versus the same measurements in version 0.3.5<sup>16</sup>, are:

- The 10 min loop 10MB and 100MB file download through an **Exit** profile shows that we've reduced our memory usage by ~73%.
- The 10 min loop 10MB and 100MB file download through an **Onion** profile shows that we've reduced our memory usage by ~50%.
- The one time 100MB file over an **Exit** and **Onion** profile shows that we've reduced our memory usage by ~73%.

We fixed several bugs that made Tor's startup time slower (principally noticeable on mobile platforms)<sup>17</sup> and now use openssl SHA3's implementations when they are faster.<sup>18</sup>

Tor now supports a new "dormant" mode in which it does not initiate network activity, and tries to avoid CPU wakeups. It enters this mode on request from a controlling application, or after a period of inactivity. This mode is intended to help mobile devices sleep, and to minimize the impact of unused Tor clients on the network, and on the devices that run them.<sup>19</sup>

All the improvements from this activity are included in 0.3.5 of the Core Tor on December 2018.

## **ACTIVITY O2.4: IMPROVE THE TOR NETWORK'S CONTROLLER INTERFACE TO ALLOW MOBILE APPS TO REDUCE BANDWIDTH AND BATTERY USE.**

### **Progress Report:**

There was no additional progress on Tor Network's controller interface during Q4.

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<sup>13</sup> <https://trac.torproject.org/projects/tor/ticket/26630>

<sup>14</sup> <https://trac.torproject.org/projects/tor/ticket/28558>

<sup>15</sup> <https://people.torproject.org/~dgoulet/volatile/perf/0.4.0-ed0bc85ed0ac/>

<sup>16</sup> <https://people.torproject.org/~dgoulet/volatile/perf/0.3.5/>

<sup>17</sup> <https://trac.torproject.org/projects/tor/ticket/28481>

<sup>18</sup> <https://trac.torproject.org/projects/tor/ticket/28837>

<sup>19</sup> <https://trac.torproject.org/projects/tor/ticket/2149>



### **Next Report [Final Report]:**

All improvements here will be included in 0.4.0 to be released in April 2019.<sup>20</sup>

## **ACTIVITY O2.5: ENABLE BETTER REPORTING OF NETWORK AND CONNECTION ERRORS TO APPS THAT USE TOR NETWORK**

### **Progress Report:**

There was no additional progress on better reporting of network and connection errors during Q4.

### **Next Report [Final Report]:**

Finish refactoring on OR\_CONN<sup>21</sup> to display the earliest connection to a relay or bridge at the first bootstrap steps, not just connections to directory servers.

Improved what Tor reports to controllers about our bootstrapping status, so they can better inform the user -- especially for the purpose of troubleshooting what has gone wrong.<sup>22</sup>

Improved accuracy and usefulness of information reported to controllers about bootstrap status.<sup>23</sup>

We ensured that pluggable transport processes output can be read all the time, using the same methods as we use for other data<sup>24</sup>.

Fixed bug on expired consensus that caused guard selection to stall at bootstrap progress of 80%.<sup>25</sup>

Fixed bug that prevented tor from bootstrapping when the client's clock is ahead or behind of the network by a few hours.<sup>26</sup>

Improved the design and reliability of the embedding API by collecting feedback on mobile embedding API and resolve issues.<sup>27</sup>

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<sup>20</sup> <https://blog.torproject.org/new-release-tor-0401-alpha>

<sup>21</sup> <https://trac.torproject.org/projects/tor/ticket/27167>

<sup>22</sup> <https://trac.torproject.org/projects/tor/ticket/28179>

<sup>23</sup> <https://trac.torproject.org/projects/tor/ticket/28018>

<sup>24</sup> <https://trac.torproject.org/projects/tor/ticket/28179>

<sup>25</sup> <https://trac.torproject.org/projects/tor/ticket/23605>

<sup>26</sup> <https://trac.torproject.org/projects/tor/ticket/28591>

<sup>27</sup> <https://trac.torproject.org/projects/tor/ticket/25510>

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<sup>28</sup> <https://blog.torproject.org/new-release-tor-0401-alpha>