Memorandum of Understanding

Number: 2019-02-105

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1 "Finish porting Replicant to a newer Android version" Project

The parties :

Stichting NLnet, domiciled in Science Park 400, 1098 XH Amsterdam, The Netherlands, referred to as "NLnet" in this document, represented by Bob Goudriaan,

and

Denis Carikli, an individual domiciled (add address here) in France (Denis Carikli),

given that:

- NLnet has the mission "to promote the exchange of electronic information and all that is related or beneficial to that purpose"
- NLnet manages the NGI0 PET Fund, a fund dedicated to Privacy and Trust Enhancing technologies. The fund was established with financial support from the European Commission's Next Generation Internet program, under the aegis of DG Communications Networks, Content and Technology under grant agreement No 825310.
- NLnet collaborates with a number of other organizations within NGI Zero to help improve the quality, sustainability, accessibility and security of projects in a structured way.
- Many users feel locked into the dominant Android mobile ecosystem, but still have to accept potential privacy breaches because of the lack of alternatives.
- Denis Carikli is the lead developer of Replicant - a fully free (as in freedom) software Android distribution which is approved by the Free Software Foundation.
- New features are continuously pushed to the upstream Android project and at the same time new devices with different hardware components are released to market, which need to be incorporated. However, in a number of cases these depend on potentially untrustworthy binary blobs that cannot be used as such.
- In order to let Replicant become a viable alternative to users, as a platform it needs to get (and remain) in sync with the upstream Android project - so apps developed for vanilla Android can continue to run on Replicant too. This involves the development of free and open source components (including drivers) that can adequately replace the limited and potentially insecure proprietary versions.
- Denis Carikli has expressed the intention to dedicate significant private time to advancing this important effort.
- NLnet thinks that this project falls within its mission and the mission of the NGI0 PET Fund, and wants to facilitate such a contribution.

agree to the following:

- Denis Carikli has written the proposal "Finish porting Replicant to a newer Android version" which is attached to this document as Annex I. Annex I forms an integral part of this Memorandum of Understanding. If and where statements in this annex or other annexes are in contradiction with one or more statements in the main memorandum text, the statement or statements in the main memorandum text will prevail.

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- Denis Carikli is voluntarily undertaking the project, and is solely responsible for all aspects of the project including planning and coordination as well as involving contributors and partners - as long as such happens in line with the terms and spirit of this MoU. The source code of the Project shall be made publicly available under a suitable free and open source software license, as recognized by OSI or FSF.

- As the signatory of this MoU, Denis Carikli shall act as official point of contact in the context of this project; it is the responsibility of Denis Carikli to notify NLnet in case of any changes.

- NLnet commits to make a reservation for the amount of 30000 EUR to Denis Carikli in order to support the "Finish porting Replicant to a newer Android version" project. The reservation is bound to the proposal as contained within Annex I of this MoU.

- Should the project fail to complete the goals described in Annex I, partially or in full, there is no other consequence than the termination of this MoU.

- Denis Carikli commits to keep the user and developer community up to date with progress made within the project at least every two months (more often is never a bad thing) and will maintain a public status page for the project to keep the wider internet community informed. As a courtesy, Denis Carikli may send non-public updates about the status of the project to NLnet, but there is no obligation whatsoever to do so - NLnet is not operationally involved with the project; its only interest is the public benefit that is the result of the project succeeding in reaching its goals.

- Donations may be claimed up to the reserved amount within a maximum of six months after the proposed end of the project. Donations will be final when the specified milestones or previously agreed partial deliveries have been verified to have been completed. Payments will subsequently be made by wire transfer into a bank account designated by Denis Carikli.

- NLnet and Denis Carikli may issue one or more individual or joint public statements announcing the project and the financial support from NLnet and the NGI0 PET Fund. Denis Carikli is also encouraged to visibly and vocally acknowledge this contribution where possible — e.g. through the project website, promotional materials, in presentations and in source code.

- The involvement with any particular person(s) or organizations will be on the understanding that these coordinate their activities in agreement with Denis Carikli, in the spirit of cooperation, and in an effort to achieve the results of the "Finish porting Replicant to a newer Android version" Project. Denis Carikli appreciates the support from the experts and organizations involved with NGI Zero to ensure that the results of Finish porting Replicant to a newer Android version will be of the widest possible benefit to all.

- This Memorandum of Understanding cannot be seen as any kind of employment agreement or business contract. NLnet nor any of the organizations within NGI Zero receive any goods or services as a result of this MoU. Any payments are to be made as charitable donations to Denis Carikli in the light of a voluntary contribution to the public benefit such as defined within the statutory mission of NLnet foundation. Denis Carikli is responsible for paying any and all taxes or other fees with regard to this grant, should there be any, and to inform any relevant authorities within their country of these donations should this be legally required.

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(On behalf of NLnet)
Rob Gonnissen

Amsterdam - 14/01/20
(Place) (Date)

Denis Carikli

Denis Carikli
Poitiers, 19/12/2019
Carikli Denis

2 Annex I

3 Disclaimers:

- Before applying for a grant in the context of the European Union's Next Generation Internet, Joonas Kylmälä already started working on porting the Galaxy S III 4G (i9305) to Android 9. That prior work is not funded by the grant but can be used to achieve faster the goals set in the deliverable. As part of that effort he managed to boot that device under Android 9, without the nonfree software graphics libraries. He based his work on the Android Open Source Project (AOSP) source code. The graphical interface was way too slow to be usable, however it enabled him to validate that the device could boot.

- As part of the European Union's Next Generation Internet, I already started working on porting Joonas Kylmälä's work on top of LineageOS 16, however I had one or more complicated issues related to the Android build system that I didn't manage to solve. However at some point I found existing work named CustomROMs[1] that I wasn't aware of, which was meant to add support for the Galaxy SIII (i9300) to LineageOS. I started basing my work on top of this work too not to waste too much time with the build issues mentioned above (as I already spent more than one week on that issue). With what I learned with my work on top of CustomROMs, we then managed to fix the build.

4 Deliverable

4.1 Boot a device under Android 9 without known nonfree libraries

Cost estimation	Task	Comments
14h €378	• Validate that Android 9 builds under a GNU/Linux distribution compliant with the FSF's Free Software Distribution Guidelines (FSDG) and keep using it to make sure it keeps working.	

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158h: €4266	• Choose an Android distribution (like AOSP or LineageOS) to base the work on • Add very partial support for one of the following devices: – Galaxy SIII (I9300) Galaxy SIII 4G (I9305) • Make that device boot without proprietary libraries • Make sure that the kernel is also built from the Android build system • Make sure it still builds with an FSDG compliant distribution • Document the build procedure along the way	There is a small risk of having to change distribution and devices.
35h: €945	• Add partial support for a second device which will one of the following devices: – Galaxy SIII (I9300) – Galaxy SIII 4G (I9305) and factorize the code with the one that is already supported.	
Total: approximately 207h: €5589		

4.2 Easy Linux upstreaming work

Cost estimation	Task	Comments
35h: €945 1 Galaxy Note II (N7100): €30 1 Galaxy Note II (N7105): €10	• Make the the touch keys Linux driver work and upstream it in Linux.	The Galaxy Note are affected by the patch as well so they are required to test it.

7h: €189	• Make the Linux AAT1290 flash led driver work and upstream it in Linux.	

Approximate work hours: 12h: €1134
Fixed costs: €159
Total: €1293

4.3 Modem work

Cost estimation	Task	Comments
7h: €189	• Port the the Galaxy SIII (i9300) modem Linux driver from 4.16 to 5.0	The driver to port is available at https://github.com/Tourkbomb/linux/ in the modem branch.
70h: €1890	• Cleanup the the Galaxy SIII (i9300) modem Linux driver.	The code quality of the modem driver for Linux 4.16 is bad. When doing that kind of work, having bad code quality at the beginning is normal. It then needs to be cleaned up afterward. As Simon Shields didn't finish his work, the code still needs to be cleaned up and completed. Upstreaming the code will probably need to be done in a later time as it requires to re-architecture part of the code.

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158h: €4266	• Port libsamsung-ril and libsamsung-ipc to Android 9 • Make the modem driver and libsamsung-ipc work together	The port of libsamsung-ipc and libsamsung-ril will be attempted with a compatibility layer at first. Devices manufacturer shipping new devices with Android 9 are probably required not to use an approach like that[2][3]. This issue will need to be looked in more details at later. This will be done to be able to focus more on the modem driver port to be able to test it. Then the compatibility layer will be removed and patches will be merged step by step in libsamsung-ril and libsamsung-ipc. Until the modem driver is upstreamed, we will probably need to keep some of the patches in a branch, as the kernel API will most probably change as the driver probably need to be converted to use the network device API. Later (which is not part of this deliverable), we will then need to look if the approach chosen is already using a "binderized HAL" and if not, what are the consequences of converting the code to use it, because even if libsamsung-ipc has already been used used in GNU/Linux, we still want to enable GNU/Linux distributions to easily use libsamsung-ril as well.
Total: approximately 235h: €6345		

4.4 Other hardware support

Cost estimation	Task	Comments
42h: €1134	• port the sensors libraries and other device specific libraries	

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28h: €756	• Add support for Audio with the upstream kernel driver	Might be faster, depending on what Android 9 uses.
7h: €189	• Add internal WiFi support and validate the functionality	This assumes that no big issues are encountered and that Android 9 already supports upstream Linux standard WiFi interfaces like nl80211 or Wext. Note that the internal WiFi don't work without nonfree firmwares. The Replicant project doesn't ship the firmwares nor advises or instructs users on how to install them. This however don't prevent users to install them by their own.
21h: €567	• Add external WiFi support and validate the functionality	This might be very tricky. This is known to work on Replicant 6 on some of the supported devices, but it has reliability issues, which seem to depend a lot on the device used and the charge of the battery. This is most probably due to the fact that some devices aren't able to provide enough current to the external dongle. More research will be needed later (which is not part of this deliverable) to better understand and characterize the issue for some of the devices. If no big software issues are encountered, I will try to make it work as well as on Replicant 6. This is required for basic usage as the Internal WiFi doesn't work without nonfree firmwares.
Total: approximately 98h: €2646		

4.5 Release an image

Cost estimation	Task	Comments

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35h: €945	• rebrand LineageOS as Replicant	The branding was done extensively in Replicant 6 and vendor/lineageOS was forked to vendor/replicant with almost all mention of LineageOS being changed, including in the build system. This is tricky to do. I tried to rebase the Replicant 6 patches for that on top of Replicant 6, as merges were used but this doesn't look simple as the patches contains merges from Replicant 4.2, and the build system extensively depends on LineageOS strings. But even if this takes too much time, it's still possible to do basic branding such as changing the boot screen and some of the text.
70h: €1890	• Find the repositories global licenses, remove and document proprietary software	I started working on a script to do list repositories licenses for Replicant 6 that will then be adapted to Replicant 9. Android doesn't use packages like GNU/Linux, and instead has all its source code composed of many git repositories that are checked out in a single directory. Because of that we need to write a script to identify the licenses of each repositories. It will not be as fine grained than GNU/Linux but it's a very good start and it will most probably find some nonfree code that we will be able to remove.

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35h: €945	• Find, remove and document privacy issues in the source code	This task consist in looking for privacy issues. This can be done for instance by: • Looking if issues we found in the past are still present in LineageOS 16 • Searching online for known issues in LineageOS 16 • Doing some network analysis of the traffic, for suspicious activities like: – At the first start – When calling someone – When using the predictive keyboard It may not find every privacy issues, but it's already better than what we did before as it's proactive instead of being reactive.
21h: €567	• Create a recovery	
35h: €945	• Create new install and upgrade instructions in a more modular way	The instructions will need to be made modular in order to be easily changed. More specifically, to make a change that applied to all the devices, you needed to change each device-specific instructions, which highly discourage contributing to the instructions. The instructions will also need to be as simple as possible to enable users with very basic command line usage to use them.
Total: approximately 196h: €5292		

5 Conferences

5.1 Replicant conference

Cost estimation	Task	Comments

35h: €945	Preparation of the presentations and helping to organize the conference	The conference was located in Paris so there was no other costs
14h: €378	conference	
Total: approximately 49h: €1323		

5.2 CCC Camp 2019

Cost estimation	Task	Comments
€295	CCC Camp 2019 Ticket	
€383	Transportation	
€217	Camping equipment	
42h: €1134	Conference	
Approximate work hours: 42h: €1134 Fixed costs: €895 Total: €2029		

5.3 XDC 2019

Cost estimation	Task	Comments
€18	2 Replicant t-shirts	• The conference lasted 3 days and I had only 1 Replicant t-shirt • Wearing a Replicant t-shirt improves visibility and helps starting more conversations about Replicant or Android

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€155	Shared apartment rent	It's cheaper, more convenient, and easier to sleep in than a hotel
€322	Transportation	
€92	Insurance	
28h: €756	Conference	
Approximate work hours: 28h: €756 Fixed costs: €587 Total: €1343		

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Cost estimation	Task	Comments
49h: €1323	Work on slides and the conference	
€164	Transport	
€120	Conference ticket	
€219	Shared apartment rent	
€100	1 Replicant banner and Replicant flyers	
28h: €756	Conference	
Approximate work hours: 77h: €2079 Fixed costs: €603 Total: €2682		

5.5 FOSDEM 2020

Cost estimation	Task	Comments

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28h: €756	Work on slides and the conference	
€90	Train	
€160	2 days hotel	
14h: €378	Conference	

Approximate work hours: 42h: €1134
Fixed costs: €250
Total: €1384

6 Total

The total estimation for this project is €29926.

References

[1] lineage-16.0 branch in https://github.com/CustomROMs/android_local_manifests 19300 and associated repositories.

[2] https://source.android.com/devices/architecture/hal-types

[3] https://source.android.com/devices/architecture/hidl/

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