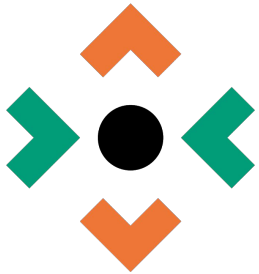

APS Networks

Open Network Linux

Project Potential

June 2020

COLLABORATION AT THE CORE

Current

Open Network Linux

ONL is a Network Operating System that aims to provide a standardised fit in terms of installation and packages as well as platform APIs for querying and modifying platform information such platform identification, chassis info, PSU, fan and thermals, etc.

These APIs are C-based and are used for platform identification, chassis info, PSU, fan and thermals and is known as ONLP(v2).

ONLP/ONLPv2

State of ONL and ONLP

- Current maintenance is limited. Maintenance is done by a single vendor = huge risk to the project.
- Apparent lack of maintenance updates, resolving issues, merging in new platforms (however a fair amount of commits recently)
- Handful of people that know enough to be able to maintain, e.g, understand build system, can review and approve platform PRs
- The build system and supporting libraries aren't well understood and represent a significant amount of technical debt -- their vendor is the original maintainers
- ONLPv2 was designed to replace ONLP, however no significant progress has been made since last year. Currently ~880 commits behind master.

There currently is no substantial ongoing maintenance.

ONLP/ONLPv2

Potential impact

There are several projects using either ONL or the supporting libraries.

- Over 200 platforms across ONLP and ONLPv2
- Barefoot uses some of the ONL supporting libraries for CLI amongst other things.
- DENT Project uses ONL;
- Stratum uses the ONLPv2 library separately (OS is NOT based on ONL)
- Multiple switch operations systems (at least 4) are based on ONL/ONLPv2

We suspect that some of these projects may have forked their own version of ONL to add fixes without contributing back.

Moving away from ONLP risks disenfranchising both platform vendors and users of the OS

Bring people back - importance of a human side.

Proposed

Introducing OpenEmbedded

and the Yocto Project

- Industry supported embedded system used all over the embedded market, from SpaceX's rockets, NASA's Mars Missions to Cable Providers STBs, to the Automobile Industry.
- Mature and active open source project
- Long term releases and stability
- Interoperability of Yocto for hardware vendors - even potential to replace ONLPv2 to control internal switch components
- Well documented and robust OS designed for the problem space with tools for all parts of the development lifecycle
- Core team of Yocto Project developers and maintainers

Introducing OpenEmbedded

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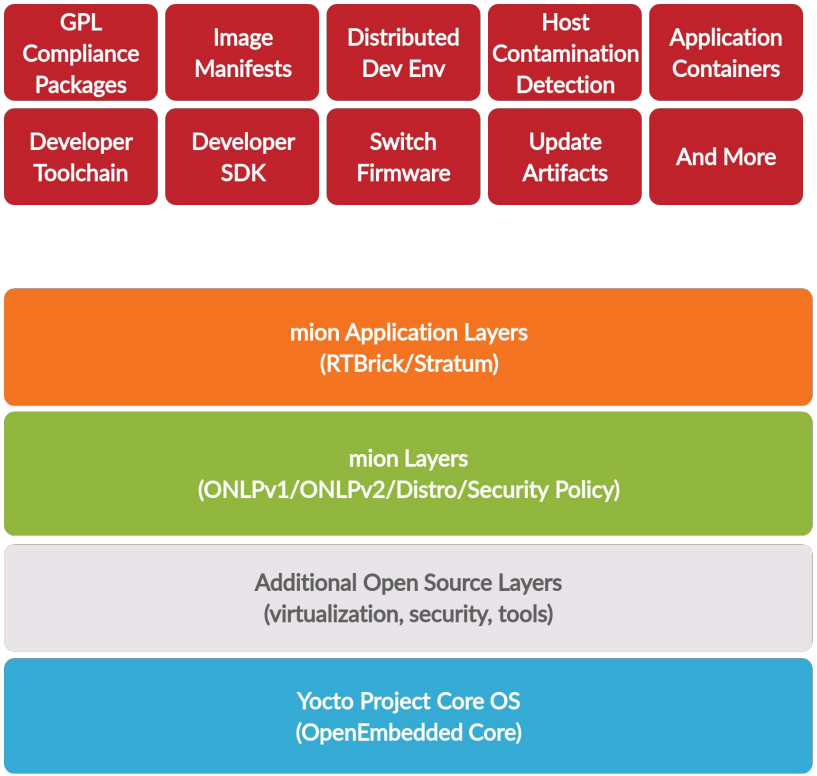


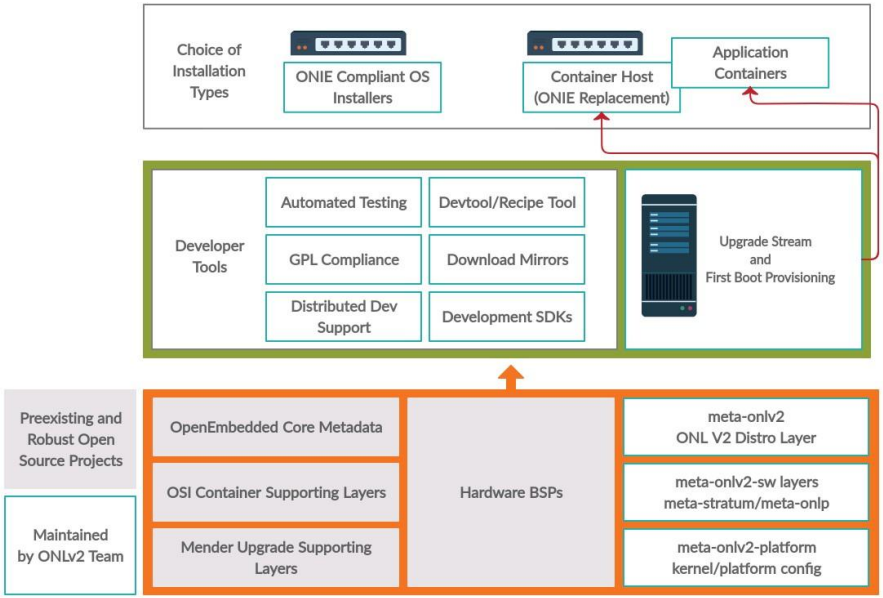
- **Not Just Firmware**
- An Entire Ecosystem for developing custom, secure and manageable Linux distributions
- Layers of a cake.
- Core Central OS with additional layers to provide a targeted OS solution, including many extras
- Development Environment and toolchain targeted towards your hardware
- Update artifacts.
- Distributed development environment (shared build interstitials, faster builds)
- Reproducible builds.

ONLv2 Metalayers

… to build the software for various platforms

On top of the core OS is the meta-onlv2-sw layer which contains additional layers used to build the software for various platforms.

- meta-onlp: Layer supporting Open Network Linux Platform.
- meta-onlp2: Layer supporting Open Network Linux Platform version 2.
- meta-stratum: Support for the Stratum APIs
- meta-onlv2-bsp: Kernel enablement and formfactor configuration.
- meta-rtbrick: Support for RtBrick BNG



Benefits of containerization

Open switch/network programming as part of a CI/CD process

A working DevSecOps model is essential for adapting and maintaining switch software in an open way - only way this can be achieved is through containerization.

- Containerization - control and security potential to make open development feasible
- Live updates (integration with **Mender**)
- Integration with CI/CD and develops methodology
- meta-selinux/meta-security layers within **Yocto Project**

Security issues

of a legacy project

- Need active community to avoid supply chain attacks
- Switch OS would be a target
- Therefore active, healthy community is the only secure solution
- Update mechanism for ONIE/ONL not robust.
- Build system difficult to understand and audit for gcc security flags
- GPL compliance difficult
- Build system dependency chain not as robust (builds out kernels that aren't used)

Benefits of OpenEmbedded

and the Yocto Project

Leveraging the Yocto Projects internal tooling, ONLv2 will produce a vast array of supports for development workflows, from end user customizable SDKs, to an update stream for both the host OS and its containers.

Want a switch OS that boots directly to the OS without ONIE and uses ONLPv2? Want to support older ONIE based installations but benefit from a fully supported OS with already existing commercial supports? Want to implement zero-interaction secure updates of both the host OS and application containers? This and more is what leveraging the Yocto Project and OpenEmbedded give us.

ONLv2

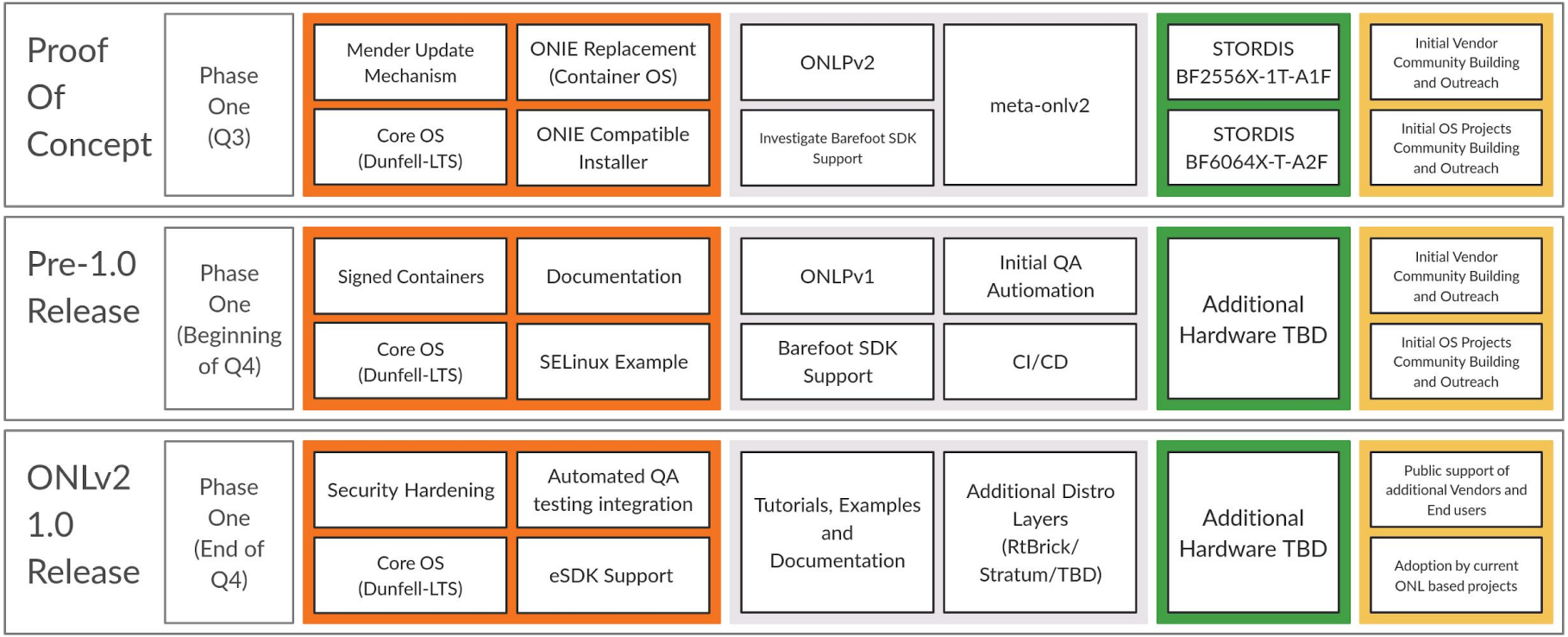
can offer

- Genuine open source solution away from vendor lock-in at the hardware, OS or controller level
- Secure solution - many eyeballs
- Rapid implementation of end-user development priorities
- Dedicated and informed industry focus for development
- Faster innovation
- More negotiating leverage for Telcos against existing vendors
- Forcing greater industry openness overall

Next Steps

ONLv2

How to build a bare metal Switch OS



Community

Leveraging people power

Collaboration is at the core. Reaching out to parallel projects and involving them is the basis of gaining wider adoption and increasing the speed of innovation internally while also expanding the markets for the external use of innovation.

- Encourage Contributions/Pull Requests by being welcoming and setting aside time to monitor
- Provide documentation from Day Zero
- Involve OCP and ONF. Updates on a regular basis.
- Perform a full forensic analysis of past issues looking at people and metrics
- Followed by reaching out to bring people back - importance of a human side that has clearly been missing.
- Combining this with new channels and communication
- Contact parallel communities. Already in contact with with former Yocto community manager at Intel to get an idea of what is specific to the networking space.
- Detailed community metrics, objectives, targets and strategy moving forward

Ease of Use

Offering first class User Experience

The project will focus on accessibility from the perspective of user experience and for the widest possible spectrum of human experiences and interactions with the hardware, the software and the community. All levels will be treated as human relatable as we possibly can.

- Publishing
- Documentation
- Tutorial building
- Media relations
- Marketing
- Internal team
- **Community**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