How the Yocto Project addressed Comcast RDK scalability issues

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OSLS 2019
Agenda

• What is the Yocto Project?
• What is the RDK?
• Scalability issues, Yocto Project to the rescue!
• Collaboration benefits
About us

- Yocto Project Community Manager
- @Linaro
- Designed/implemented Yocto Project based RDK

- RDK architect
- OpenEmbedded and Yocto Project maintainer
- Yocto Project TSC member
What is the Yocto Project?
What is the Yocto Project?

The Yocto Project is a set of templates, tools and methods that help you build custom Linux-based systems.
The Yocto Project

- An open source, collaborative project
  - hosted by the Linux Foundation in 2010
  - Project architect is Richard Purdie.
  - Based on OpenEmbedded which started in 2003.

- Support all platforms:
  - ARM, x86, PPC, MIPS

- The de facto industry standard “tool kit” for building custom embedded Linux operating systems with
  - over 50% market share by volume
  - over 80% market share by revenue
  - Released twice a year (April and October)
Why?

- **Spend less time on things that bring no value to your business:**
  - up-to-date recipes for thousands of packages
  - Quickly build an entire Linux system from source, using a validated set of packages (toolchain, busybox, libc, init system...)
  - Built in support for package management
  - Predictable and reproducible builds
- **Provides set of standard tools and build guidelines.**
  - Reuse across projects or organizations
  - Autobuilders/bots
  - Helps manage adherence to Open Source Licensing
  - Minimal dependencies on host and users
- **Flexibility and customization:**
  - Configure the system at will.
What is the RDK?
RDK Video software stack
Scalability issues, and Yocto Project to the rescue
RDK 1.x: why the need for change?

- Legacy RDK build system
  - started with a trivial script
  - grew into a very complex “program”
- Difficult to use,
  - lack of documentation
- Difficult to maintain and satisfy the scalability of RDK community
- Very slow upgrade of standard open source core components
  - security
  - bugs
  - improvements
RDK1.x : the BSP problem
Migration to Yocto Project: goals

- RDK unification
- Clear separation of ownership and responsibilities
- Yocto Project as a foundation for RDK
  - rely on well supported (and existing!) recipes
  - maintenance and security updates
- Simplified and consistent build infrastructure
- Upgradability
- Reduce cost of entry for new vendor
RDK2.x layer architecture
RDK2.x: origin of software components

75% of the system image comes “for free” from Yocto Project components.
Bonus track: the RDK Emulator
Collaboration Benefits
Yocto Project RDK benefits

- Build “on the shoulders of giants”
- Standard distribution and build tools
  - Reduce fragmentation and differentiation across SoCs in areas that don't matter
  - Reduce entry barrier for newcomers in the RDK community
  - Benefits from development, innovation and support from the entire Yocto Project ecosystem
  - Thousands of components already pre-integrated
- Standard BSP deliveries
  - Homogeneous across all RDK SoC vendors
  - BSP layer can be made independent of RDK, and can be reused for any OpenEmbedded based project
Benefits … RDK 3.0

• RDK has gained sharper Innovation focus
  • Westeros - Embedded Wayland Compositor
  • Spark UI
    • [http://www.sparkui.org/index.html](http://www.sparkui.org/index.html)
  • Firebolt SDK
    • Application Development Kit for RDK
  • Optimized Embedded Browser Framework ( WPE )
  • Secure Video playback
  • OpenCDM
Benefits...

- **RDKs Horizontal Scale** ([https://rdkcentral.com/projects/](https://rdkcentral.com/projects/))
  - Some of known Profiles
  - RDK-V - Video Clients and gateways
  - RDK-B - Broadband, edge gateways
    - DOCSIS, EPON, GPON
  - RDK-C - Smart Security Cameras
  - ...
  - Add yours
Daily Driver Benefits...

- **Reduced build times (~3x)**
  - trusted incremental builds
- **Lot of Documentation**
  - Eases Developer Onboarding
- **Open Source Community**
  - Better Chances of finding developers
- **Licensing tools**
  - Help in compliance
- **Testing Infrastructure**
  - Indirect benefits
- **Security patches**
  - Backports
Thank you for your attention