The HiKey AOSP collaborative experience
Outline

- HiKey in AOSP intro
- Issues with AOSP & how HiKey addresses them
- How Linaro’s previous efforts helped us along here
- Unique requirements for AOSP devboards
- Lessons learned
- Accomplishments & future plans
- Questions!
HiKey + AOSP!
HiKey + AOSP!

All well documented on the AOSP website:

https://source.android.com/source/initializing.html

$ repo init -u https://android.googlesource.com/platform/manifest
$ repo sync -j24

Grab & extract vendor binaries from here:

https://developers.google.com/android/nexus/drivers#hikey

$ source build/envsetup.sh
$ lunch hikey-userdebug
$ make -j24 droidcore
Past Issues with AOSP

- AOSP as Nexus only development project
- Slow uptake of LTS kernels
- Devboards lacking integration seen on form-factor devices
HiKey in AOSP

- Addresses a number of complaints we and others have had with AOSP
- Provides a reference devboard in AOSP!
- Unlike nexus devices, HiKey will move forward to newer kernel versions
- Takes Linaro’s previous efforts generating Android builds w/ the latest kernels and userspace but does it inside of AOSP
- Provides good testbed for validation
## Slow uptake of LTS kernels

<table>
<thead>
<tr>
<th>Device</th>
<th>Released</th>
<th>Kernel</th>
<th>Kernel release date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nexus 5</td>
<td>October 31, 2013</td>
<td>3.4</td>
<td>May 20th, 2012</td>
</tr>
<tr>
<td>Nexus 5X / Nexus 6P</td>
<td>October 22, 2015</td>
<td>3.10</td>
<td>June 30, 2013</td>
</tr>
</tbody>
</table>
Vendors base their BSP trees on whatever the latest AOSP common kernel.

Google generates AOSP common trees based upon what kernel versions their partner vendors require.
Put this to the test with HiKey

- When HiKey AOSP effort started, HiKey official kernel was 3.18, which was the latest AOSP common git branch
- Pushed to migrate to 4.1
- AOSP released experimental android-4.1 branch.
- Linaro helped push a number of fixes in for it and reorganized the tree
- AOSP released an official android-4.1 branch!
Forward porting AOSP common.git

- Linaro has taken the effort for a number of years to forward port the AOSP common.git tree to the latest mainline release
- Provided members with a “preview” of what the AOSP tree would possibly look like, allowing for early Android development against newer kernels
- Provided practical experience with the AOSP common.git tree
- Helped the Android upstreaming effort
Also put us a step ahead

- Allowed us to see where upstream changes collided.
- We had to resolve a number build fixes and issues with the forward ported tree.
- So when AOSP common.git experimental trees appeared, we had a number of fixes ready and waiting to go.
- So when the experimental/android-4.1 branch appeared, Amit Pundir was ready
Keeping it going for 4.4 and beyond

- After kernel v4.4 was released, Amit Pundir had a forward ported tree ready.
- Sent it to Google developers, so it might be a helpful reference when they do their experimental/android-4.4 release.
- Google developers decided to just take Amit’s tree, rather than do their own forward port!
The Devboard as the Product
Boards aren’t phones
Do have some features
And workarounds
Less obvious needed items
Less obvious needed items

- Configfs gadget support
- “adb reboot bootloader”
- pstore
- easy firmware flashing
- handling different sized mmc & userdata partitions
“reboot reason” functionality

- Communicates to bootloader to enter fastboot or recovery mode on next boot
- Working with community to get a solution that works for a number of different systems
  - Works with upstream nexus7 kernel and HiKey
  - Integrating w/ patches from Rockchip devs
  - Working to get it all upstream
pstore via DTS

- Allows for console and dmesg data to be preserved after a crash
- With upstream code, pstore functionality is enabled with custom platform driver
- Couple of attempts by folks to push patches to do this via dts entries
- Nudged developer at Google to resubmit, hopefully can get it queued soon
Other bootloader enhancements

- HiKey uses UEFI, which normally uses fat boot partition
  - Preference is the standard AOSP boot image format
- Extending the UEFI and recovery loader fastboot protocol support
- Supporting proper getvars for partition resizing
Pain points and lessons learned

- For devboards, it’s really useful to have USB host and gadget support working at the same time.
- Being able to update the entire bootloader via fastboot would be useful.
- Devboard testing limitations vs form-factor expectations (ie: hotplug testing!)
Since last connect....

- Forward ported HiKey patches from 3.18 -> 4.1
- Migrated from Lollipop to Marshmallow and master
- Collaborated w/ Google to release and fixup experimental/android-4.1 tree
- Reorganized experimental/android-4.1 tree, which was basis for android-4.1
- Added features expected on android devices (reboot reason, pstore, improved fastboot) to HiKey
- Upgraded to mali r6p0
- Chased lots of bugs
- Provided reference forward ported 4.4 tree, which became experimental/andorid-4.4 & provided fixes and cleanups, to help create android-4.4
Future plans

- Migrate AOSP HiKey builds to android-4.4
- Move to Vendor/ODM partitions
- Continue pushing HiKey and AOSP common patches upstream
- Continue rolling HiKey AOSP builds along to the next LTS release (4.8-4.10)
- Power management & EAS test bed
Linaro cross team effort!

- HiSilicon LT
- Build and Baselines
- 96boards
- Member Services
- LMG Kernel
- QA Services
Questions!