LCG Lightning Talks

SAN19-110

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San Diego 2019

Agenda

- Generic Kernel Image (GKI) - John Stultz
- AOSP on Dragonboard db845c and Pixel3* - Amit Pundir
- Mainline on form-factor devices: Enabling Panels - Sumit Semwal
- Helping Upstream LTP-DDT into LTP - Orson Zhai
- Status on LCR/LKFT builds - Yongqin Liu

Generic Kernel Image (GKI)

John Stultz <john.stultz@linaro.org>

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Disclosure

- This is my experience, not official Google instructions!
- Email kernel-team@android.com or talk to your Google TAM for more info

Generic Kernel Image Overview

- Generic kernel that successfully boots AOSP and passes tests*
- Slightly different take than modular distro kernels
  - Not one super-collection of modules that works on everything, just the kernel
  - Vendors: BYOMs

Background presentations:

- Linux Plumbers Conf 2018:
  - Readiness_of_ARM64_kernels_for_GKI.pdf
- Linux Plumbers Conf 2019:
  - GKI_Progress.pdf
  - ABI_Monitoring.pdf

GKI Getting started

- Common android-4.19-r or android-mainline
  - See arch/arm64/config/gki_defconfig
- Userland:
  - ueventd.rc : Add: “modalias_handling enabled”
  - device.mk: Add “BOARD_VENDOR_KERNEL_MODULES += <list of all modules>”
  - device.mk: Add “BOARD_VENDOR_RAMDISK_KERNEL_MODULES += <initrd modules>”
- Examples:
  - https://android-review.googlesource.com/c/device/linaro/hikey/+/989223
  - https://android-review.googlesource.com/c/device/linaro/hikey/+/1015018

GKI HOWTO #1

- Start with working vendor tree based on android-4.19-r or android-mainline
- Diff device_defconfig and gki_defconfig
- Work to minimize the delta while still having device_defconfig boot and work
  - Many iterative passes!
  - Painful and slow - Sorry!
- Once down to the minimum delta, switch device configs to modules
  - Some module-subconfigs are only bools, don't fret
  - Another painful and slow process!
  - Be aware of storage, clk, etc drivers that need to be initrd loaded
  - Hack: Set all modules as BOARD_VENDOR_RAMDISK_KERNEL_MODULES!
- Validate device_defconfig boots w/ modules all loaded

GKI HOWTO #2

- Build vendor tree w/ gki_defconfig and make sure you can swap it in for vendor kernel
  - Common issues: missing symbols caused by options selected by modules not normally built in!
  - Solution: add DUMMY kconfig options to select in the gki_defconfig
- Figure out what changes gki_defconfig needs and submit upstream to common.git
  - Expect to be told to fix it upstream!
- Finally check out common android-4.19-r or android-mainline and build with gki_defconfig then swap it for vendor kernel
- Generate a config-fragment from the gki_defconfig/device_defconfig delta
  - This makes it easier to follow future gki_defconfig changes

John’s GKI Recommendations

- Reach out to kernel-team@android.com to get on the right lists

- Start with android-mainline, not android-4.19-r!
  - There will be some upstream drivers that are not built to be modular
  - You will be asked to fix this, rather then changing the gki_defconfig
  - Do it **upstream first** and backport the change!
  - Otherwise you’ll be doing it again and again!

- Utilize config fragments once you’ve gotten a working vendor_gki_defconfig
  - But maybe commit the generated vendor_gki_defconfig?
  - So you can more easily find regressions that might come from future changes to gki_defconfig.

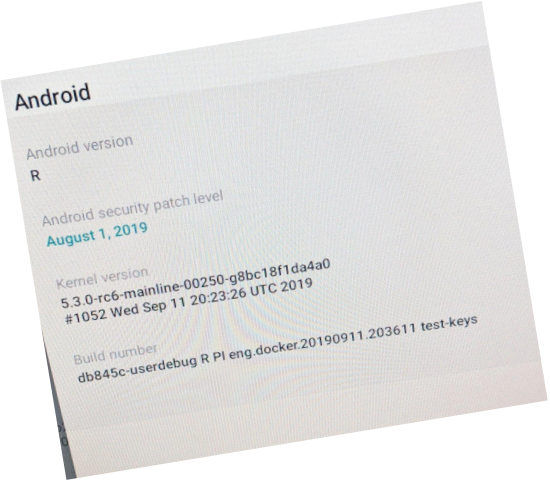
- Participate!

GKI TODO

- Check out build_abi.sh!
- Collecting kernel modules after they are built is a little messy
- May seem cleaner to move to external modules projects, but you’re going to need some in-kernel-tree modules, so don’t bother
- Figuring out vendor ramdisk / vendor boot partition stuff

GKI TODO

- Check out build_abi.sh!
- Collecting kernel modules after they are built is a little messy
- May seem cleaner to move to external modules projects, but you're going to need some in-kernel-tree modules, so don't bother
- Figuring out vendor ramdisk / vendor boot partition stuff



Come see the demo @ Demo Friday!

AOSP on Dragonboard db845c and Pixel3*

Amit Pundir <amit.pundir@linaro.org>

*Running mainline kernel and not to be confused with AOSP's blueline-userdebug build target.

AOSP on Dragonboard db845c

- Patchset is under review on Android Gerrit
  - Boots to UI with mesa-19.1.3
  - Super/Logical partition support is enabled
  - Android Gadgets and USB host works
  - On-board Ethernet and USB-Ethernet dongle works
  - Running v5.2 kernel
    - Based on Qcomlt' release/db845c/qcomlt-5.2 branch and AOSP's experimental-android-5.2 release tag
    - Hosted at https://git.linaro.org/people/amit.pundir/linux.git/log/?h=dragonboard-android-mainline-tracking

AOSP on Dragonboard db845c

- In Progress
  - Merge db845c support in AOSP
    - Fix one last selinux hurdle
  - GKI enablement
    - Checkout John's GKI demo on Friday
  - Switch to v5.3 kernel and start with v5.4-rc

- To Do
  - Audio, WiFi, Bluetooth, EAS, Multimedia integration

- Getting Started
  - Daily builds http://snapshots.linaro.org/96boards/dragonboard845c/linaro/aosp-master/
  - Wiki https://wiki.linaro.org/AOSP/db845c
  - Bugtracker https://bugs.96boards.org/describecomponents.cgi?product=DragonBoard%20845c

AOSP running mainline kernel on Pixel 3

- Not to be confused with AOSP's blueline-userdebug build target.
  Goal of this project is to run AOSP on Pixel3 with mainline linux kernel and Freedreno graphics stack to start with.

- Update since last Connect
  - Patchset is under review on Android Gerrit
    - Super/Logical partition support is enabled
    - Running v5.2 kernel same as db845c
      - Micron UFS reset support is added (posted on lkml)
      - PON/reboot-bootloader support added (posted on lkml)
  - In Progress
    - Display driver updates and panel support

- Getting Started
  - Wiki https://wiki.linaro.org/AOSP/blueline

Mainline on form-factor devices: Enabling panels

Sumit Semwal <sumit.semwal@linaro.org>

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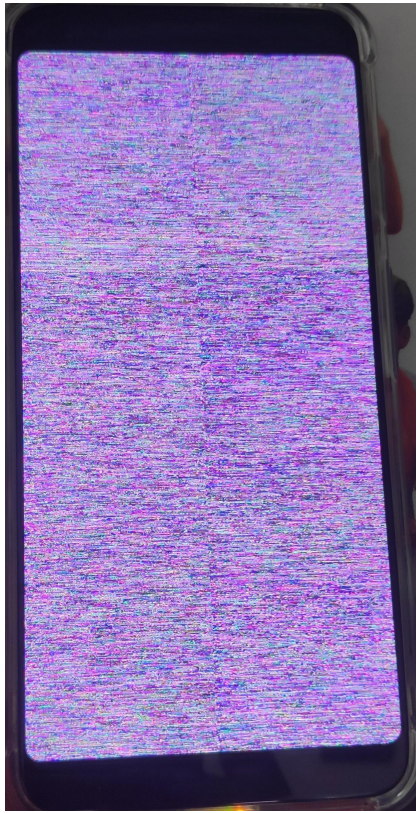
Pixel 3 Display Status

- SDM845 based phone
- **Command** mode panel, 1080x2160
- Upstream-able panel driver
  - Converted from downstream dtsi based one to drm_panel based one
    - Good starting point at the freedreno wiki [1]
    - Converted the timings, and other properties
  - Added backlight support
  - Pinmux suspend/resume support
- Prerequisites
  - Labibb regulator support [2]
  - patches to inherit clocks and regulators from bootloader [3]

[1]: https://github.com/freedreno/freedreno/wiki/DSI-Panel-Driver-Porting
[2]: https://patchwork.kernel.org/cover/10989425/
[3]: https://patchwork.freedesktop.org/series/63001/

Pixel 3 - ‘Boots to UI’ ..



Sort of..

Pixel 3 Issues with Upstream Display

- Driving single DSI lane for 1080x2160 in Command mode
  - Requires DSC (Display Stream Compression) support

- DSC support missing in msm driver upstream
  - Lots of other devices need that, so we need to get that added upstream

[1]: https://github.com/freedreno/freedreno/wiki/DSI-Panel-Driver-Porting
[2]: https://patchwork.freedesktop.org/series/63001/

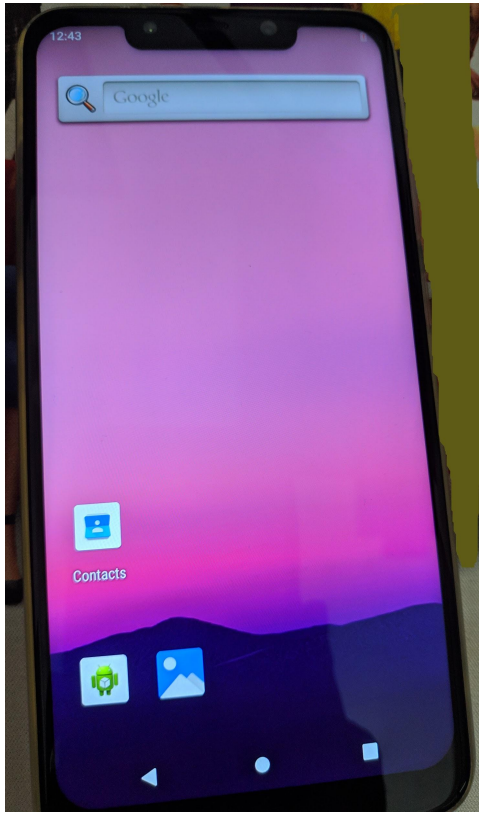
Poco F1 Display Status

- Poco F1 is another SDM845 based phone from Xiaomi
- Panel is **video** mode, 1080x2246
- Has same dependencies as Pixel3
  - Labibb regulator support [1]
  - patches to inherit clocks and regulators from bootloader [2]
- **Doesn't** need DSC enabled
- Similar to Upstream-able panel driver
  - Converted from downstream dtsi based one to drm_panel based one
    - Good starting point at the freedreno wiki [3]
    - Converted the timings, and other properties, taking care of Video mode settings
  - Pinmux suspend/resume support

[1]: https://patchwork.kernel.org/cover/10989425/
[2]: https://patchwork.freedesktop.org/series/63001/
[3]: https://github.com/freedreno/freedreno/wiki/DSI-Panel-Driver-Porting

Poco F1 - Boots to UI

Visibly :)



Work in progress

- DSC needs to be enabled in Upstream Kernel
- Bootanim shows as ‘white’ screen
  - Under investigation

Acknowledgements

- Rob Clark
- Bjorn Andersson
- Qualcomm Landing Team
- CodeAurora team
- Android kernel team

Helping Upstream LTP-DDT into LTP

Orson Zhai

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What we have done?

- Run 2000+ DDT test cases on Hikey.
  - Pass rate is very low.
- Debug 13 sub-system test bundle.
- Analyse cases 100+.
- Write patches 20+.

What problem we've found?

- DDT is heavily designed for hardware (SoC & Boards) from Texas Instrument.
  - Many specific test cases are not designed for all chip vendors.
- Some of cases depend on 3rd party command & tools.
  - Case will go to fail if no command/tools are found.
  - TI uses Yocto recipe to resolve it, but not easy for others.
- Lack of enough auto-skipping code.
  - TCONF (one of LTP standard status) is not being implemented in DDT.

Failed Case Analysis

Subsystem	Failed Log Entry	Root Cause	Suggestion
ALSA	arecord: device_list:268: no soundcards found... aplay: device_list:268: no soundcards found...	No Sound card in Hikey	Add Auto-detection, report as TCONF
MMC	ERROR|Line: File:FATAL: CONFIG_MMC is not =m - |	CONFIG_MMC is not configured as “m” (kernel module).	Should report as TCONF
SPI	Various like |ERROR|Line: File:FATAL: error when modprobe spi-pl022 - | |ERROR|Line: File:insmod.sh spi-pl022 failed. Return code is 1 - |	/dev/spidev has been removed from kernel v3.18 (we run hikey with v4.14)	Upgrade test case with new kernel Report TCONF instead of ‘ERROR’.

Failed Case Analysis

Subsystem	Failed Log Entry	Root Cause	Suggestion
UART	ERROR|Line: File:FATAL: serialcheck binary is not available. Please install it	Tools from 3rd party are not being installed.	Mark 3rd party dependency in files. Separate script to check the environment and report.
Armv*	Issues with Busybox grep utility	Machine name is hard coded	We added entry for hikey, need a cleaner fallback
GPIO	|TRACE LOG|Inside do_cmd:CMD=cat /proc/interrupts |grep -i gpio| |ERROR|Line: File:cat /proc/interrupts |grep -i gpio failed. Return code is 1 - | |ERROR|Line: File:FATAL: The gpio numbers are not specified for this platform hikey - | |ERROR|Line: File:gpio.sh -l 1 -t pm_context_restore failed. Return code is 1 - |	Scripts in test can not find interrupt number for Hikey. Hikey needs to be configured with gpio banks and bits information. There is no “gpio_test.ko” which maybe exist only in TI’s kernel source.	Find a better way to get interrupt infor and gpio settings (read from dtb?) Release kernel module code with test cases all together.
IPC, USB	insmod: ERROR: could not load module ddt/mbox_test.ko: No such file or directory |ERROR|Line: File:FATAL: Module name not found - ||| - |	Can’t find kernel modules which is necessary for test	Release kernel modules code with test cases. Build the modules when compiling test binary (need to specify kernel source tree)

What to do next?

- Pick up mass requirement test cases for all SoC vendors.
- Upstream them back to LTP main trunk and rewrite them if necessary.

News: UART is ready for Upstream!

- We have prepared patches to upstream UART DDT tests.
- Discussed and reviewed by DDT maintainer Carlos.
- Currently undergoing review, will be sent very soon to LTP ML by Carlos.

Status on LCR/LKFT Builds

Yongqin Liu <yongqin.liu@linaro.org>
Linaro Consumer Group

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LCR - Linaro Confectionary Release

- Android 10 LCR builds in Progress
- Released builds:
  - Hikey 9.0-19.01
  - TI AM572X(X15) 9.0-19.05/9.0-19.08
  - TI AM65X 9.0-19.05/9.0-19.08
- Other derived builds
  - AOSP Master builds for HiKey, HiKey960, X15
  - Automotive builds
    - Android Pie 9.0 based builds: HiKey, HiKey960, X15, AM65X
    - AOSP master based builds: hikey-auto, hikey960-auto, x15-auto
  - OP-TEE builds
  - TV builds
- Tests
  - Basic function tests
  - Boottime
  - Benchmarks
  - CTS/VTS
  - Auto related CTS/VTS

LKFT - Builds

- AOSP master builds
  - Hikey with 4.9, 4.14, 4.19 kernels
  - X15 with 4.14, 4.19 kernels
- android-mainline + android 9.0:
  - hikey, hikey-auto, hikey960, hikey960-auto, x15, x15-auto
- 4.19 + android 9.0
  - hikey, hikey-auto, hikey960, hikey960-auto
  - x15, x15-auto, am65x, am65x-auto
- 4.14
  - android 9.0: hikey, hikey960
  - android 8.1: hikey, x15
- 4.9
  - Android 9.0: hikey, hikey960
  - Android 8.1: hikey
- 4.4
  - Android 9.0: hikey
  - Android 8.1: hikey

- Future builds in Plan
  - Android 10 + Q-GSI INPROGRESS
    - cts/vts test plan under review
    - No prebuilt gsi image for arm32
  - AOSP Master + Q-GSI
    - Sepolicy version in vendor.img from aosp master not compatible with Q GSI Image
    - the first stage init command from master has problem to boot the second stage init from Q GSI image
  - Builds with GKI image + AOSP Master
    - KOs loading not supported with android10 ramdisk-debug.img yet
  - Pure Clang builds
    - Build errors with assembly files
    - Not work yet Arm32

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LKFT - Tests

- Implicit basic tests including building, boot up, adb connection, etc.
- cts-lkft
- vts-kernel
- `CtsCarTestCases`
- vts-hal-auto
- EAS jobs

LKFT - Problems found with android-mainline

- Stopped to wait for manual input during making kernel with clang
  - Introduced with change: “security: Implement Clang's stack initialization”
  - Workaround: specify clang options when make configs
- Adb stuck with platforms that using usb dwc3 drivers
  - Introduced with change: “usb: gadget: f_fs: Allow scatter-gather buffers”
  - Fixed by change: “usb: dwc3: Check for IOC/LST bit in both event->status and TRB->ctrl fields”
- X15 failed to boot with pvrsrvkm errors:
  - Introduced with change: “arm: use swiotlb for bounce buffering on LPAE configs”
  - Workaround: revert temporarily
- X15 failed to build with error related to vdso
  - BFD: arch/arm/vdso/vdso.so: Not enough room for program headers, try linking with -N
  - Introduced with change: “ARM: 8858/1: vdso: use $(LD) instead of $(CC) to link VDSO"
  - Workaround: specify to use xxx-ld.bfd explicitly when building kernel
- Sdcardfs not supported problem
  - Fix changes already merged into the kernel/common android-mainline branch
- HiKey failed to boot problems with 5.3.0-rc1
  - Fixs already merged into 5.3.0-rc2
- See lkft-mainline, lkft-mainline-xxx for latest workarounds for common and platform specific problems

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LKFT - Problems on debugging

- Git bisect seems not that helpful to find the bad commit for broken problem
- What I do now is to bisect manually on files instead of commits
- John monitors changes on Linus's branch
- Vendor.img and ramdisk-debug.img generation out of AOSP Tree
  - Copy the KOs into vendor.img and ramdisk-debug.img with tools like img2simg, cpio
- GKI builds:
  - How often to update the aosp master snapshot
  - Build 2 kernels takes 2 times the time compared to building one kernel
    - Make modules would build kernel as well

Linaro Android Report Management System

- Updates from Last Connect
  - Added feature to generate PDF version test report for LCR builds
  - Communicate with Jenkins to show CI build status for lkft builds
  - Added feature for re-submitting test jobs
  - Fixed the wrong test number problem for lkft builds
  - Separated build configs from reporting business logic
- Next plan
  - Re-factor bug report function for lkft builds
  - Try to add some bug bisect function for regression investigation
  - Improvements on deployment.

PDF version

19.09 Reference LCR for AM65XEVM

Test Report

Date	2019.09.19
Author	Yongqin Liu <yongqin.liu@linaro.org>, Linaro Consumer Group
Approvers	Tom Gall <tom.gall@linaro.org>, Linaro Consumer Group
Build	https://ci.linaro.org/job/android-lcr-reference-am65x-p/58
Release	https://releases.linaro.org/android/reference-lcr/am65x/9.0-19.08

Page #1

15	4.19-9.0-x15	Sep. 19, 2019, 03:06, 5 hours, 36 minutes	ti2019.04-rc1-android-23-g635ce9637569 INQUEUE	#114-635ce963
16	4.19-9.0-x15-auto	Sep. 19, 2019, 03:06, 5 hours, 36 minutes	ti2019.04-rc1-android-23-g635ce9637569 INQUEUE	#114-635ce963
17	4.19-master-hikey	Sep. 09, 2019, 12:53, 1 week, 2 days	#4-v4.19.71-822-ga853124492dc SUCCESS	#2-a8531244
18	4.19-master-hikey960	Sep. 09, 2019, 12:53, 1 week, 2 days	#4-v4.19.71-822-ga853124492dc SUCCESS	#2-a8531244
19	4.4-8.1-hikey	May. 16, 2019, 01:07, 4 months	#71-552a990d SUCCESS	#166-552a990d
20	4.4-lts-9.0-hikey	Sep. 19, 2019, 01:44, 6 hours, 58 minutes	#103-def8cf91 SUCCESS	#103-def8cf91
21	4.9-10.0-gsi-hikey	Sep. 13, 2019, 01:12, 6 days, 7 hours	#4-v4.9.193-639950-g174d3f8a8e1e FAILURE	#4-174d3f8a
22	4.9-10.0-gsi-hikey960	No Build Yet	#4-v4.9.193-639950-g174d3f8a8e1e FAILURE	#4-174d3f8a
23	4.9-8.1-hikey	May. 15, 2019, 23:17, 4 months	#106-7c09ed7b SUCCESS	#220-7c09ed7b
24	4.9-9.0-hikey	Sep. 16, 2019, 23:16, 2 days, 9 hours	#175-v4.9.193-638927-g51a3f9a91c8f SUCCESS	#168-51a3f9a9
25	4.9-9.0-hikey960	Sep. 16, 2019, 23:16, 2 days, 9 hours	#175-v4.9.193-638927-g51a3f9a91c8f SUCCESS	#168-51a3f9a9
26	aosp-master-tracking	Sep. 19, 2019, 00:14, 8 hours, 27 minutes	#108 SUCCESS	No Trigger Build Setup Yet

Builds for mainline-9.0-hikey

Index	Build No.	Created Time	Pass	Fail	Total	ModulesDone	ModulesTotal
1	v5.3-253-g08a41be0ac28	Sep. 19, 2019, 03:30, 5 hours, 30 minutes	0	0	0	0	0
2	v5.3-252-gd7478c81f011	Sep. 19, 2019, 02:16, 6 hours, 44 minutes	0	0	0	0	0
3	v5.3-251-ge22a61b471b9	Sep. 18, 2019, 01:24, 1 day, 7 hours	51323	73	51396	70	70
4	v5.3-250-g352686974fae	Sep. 17, 2019, 13:07, 1 day, 19 hours	51323	73	51396	70	70
5	v5.3-247-g9cd2d925fbd9	Sep. 16, 2019, 12:56, 2 days, 20 hours	51323	73	51396	70	70
6	v5.3-246-gbc378eba659a	Sep. 16, 2019, 11:55, 2 days, 21 hours	51325	71	51396	70	70
7	ASB-2019-09-05_mainline-94-g900cf2ea2a13	Sep. 14, 2019, 13:52, 4 days, 19 hours	51323	73	51396	70	70
8	ASB-2019-09-05_mainline-93-g7f4338a01505	Sep. 13, 2019, 12:12, 5 days, 20 hours	51323	73	51396	70	70
9	ASB-2019-09-05_mainline-91-g19a4939e67c1	Sep. 13, 2019, 11:04, 5 days, 21 hours	51323	73	51396	70	70
10	ASB-2019-09-05_mainline-90-g577bbfcfca85	Sep. 13, 2019, 06:38, 6 days, 2 hours	51323	73	51396	70	70
11	ASB-2019-09-05_mainline-89-gb7ee32b12fed	Sep. 10, 2019, 13:56, 1 week, 1 day	49175	8	49183	34	34
12	ASB-2019-09-05_mainline-6-g91e15d7d3903	Sep. 09, 2019, 02:16, 1 week, 3 days	49175	8	49183	34	34
13	v5.3-rc7-232-ga8b8978ef1fc	Sep. 05, 2019, 12:36, 1 week, 6 days	51323	73	51396	70	70
14	v5.3-rc7-231-g7388b79c4a34	Sep. 05, 2019, 11:31, 1 week, 6 days	49400	58	49458	65	70
15	v5.3-rc7-229-g2fd007db5704	Sep. 05, 2019, 11:02, 1 week, 6 days	51323	73	51396	70	70
16	v5.3-rc7-228-g723c3e1800bf	Sep. 05, 2019, 10:26, 1 week, 6 days	51323	73	51396	70	70
17	v5.3-rc7-226-g96e5ff3731ca	Sep. 05, 2019, 08:47, 2 weeks	51323	73	51396	70	70
18	v5.3-rc7-223-g5da9f3fe49d4	Sep. 05, 2019, 07:30, 2 weeks	49175	8	49183	34	34
19	v5.3-rc7-222-g912a0d157e14	Sep. 04, 2019, 11:23, 2 weeks	51320	76	51396	70	70
20	v5.3-rc6-220-gb9cbb991c933	Aug. 31, 2019, 04:40, 2 weeks, 5 days	51322	74	51396	70	70

Thank you

Join Linaro to accelerate deployment of your Arm-based solutions through collaboration

contactus@linaro.org

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