Android Upstreaming Status and Future

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Overview

- Accomplishments so far this year

- Discussions from Linux Plumbers

- What is still to be done

- Next steps / Discussion

Linaro Accomplishments so far in 2013

- Mempressure events merged in 3.10 (AntonV)
    - Android developers planning to move from low-memory-killer in a future release.
- Android Sync driver in staging in 3.10 (John)
- FAT_GET_VOLUME_ID ioctl merged in 3.11 (Bintian)
- Suspend time logging merged in 3.11 (Zoran)
- Keyreset functionality merged into sysrq in 3.12 (Mathieu)
- compat_ioctl enablement for ashmem, alarmdev, sync, FAT_GET_VOLUME_ID and others merged during 3.10-3.12 (DmitryP, John, Serban, Bintian)
    - Binder support hopefully soon
- pstore suspend debugging queued for 3.13 (Zoran)
- wakeup_source enablement for RTC and power_supply drivers queued for 3.13 (Zoran)
    - Hopefully MMC as well (Ulf)

Community Accomplishments so far in 2013

- ConfigFS gadget merged in 3.10 (Sebastian/Andrzej)

  – Will likely replace Android Gadget eventually

- Alarmtimer support added to timerfd merged in 3.11 (Todd)

  – Allowed android-battery meta-driver to move to user land

  – Likely to replace /dev/alarm

- Freezer optimizations merged in 3.11 (Colin)

  – Merged upstream in parallel with AOSP!

Discussion from Linux Plumbers

- Android Sync

- Atomic Display Framework

- ION

- Binder

- Netfilter

- Android Gadget

Android Sync

- Dmabuf-fences is the upstream preferred solution

- Implicit vs explicit sync contracts

- Seemingly agreement on allowing for optional explicit sync arguments in the APIs

  - Likely trying to implement Android's Sync api on top of kernel-internal dmabuf-fences

- Next steps:

  - Maarten started looking at this, but may need assistance

Atomic Display Framework

- Simplified KMS-like framework.

- Sort of an experiment to see what an ideal framework for Android would look like

- Similar to upstream atomic mode-setting / nuclear pageflip work

- Integrates Android sync points in the API

- Presented as fodder for how KMS could be extended

- Next steps:

  – Continue pushing community and Android developers to collaborate on this.

  – Hopefully avoid forking display frameworks!

ION

- Discussed ION interface issues

- Upstream preferred solution is post-attach delayed allocation

    - Android developers have issues with this approach

- Likely to continue having separate interfaces, but hopefully will share underlying logic.

- Next steps:

    - Push ION into staging

    - Try to integrate ION's "heap" allocators in the dmabuf post-attach delayed allocation approach.

Binder

- Greg KH earlier claimed he would get libbinder running over KDBUS, allowing in-kernel binder driver to be dropped

- This is apparently quite hard, as KDBUS has very different semantics then binder.

- Not looking very likely a way forward, but Greg wants us to check back in a year.

- Next steps:

    - None, at the moment

Netfilter

- Got background on Android netfilter extensions:

  - xt_quota2, xt_idletimer and xt_qtaguid

- Upstream developers suggest using NFQUEUE instead of xt_qtaguid

- Next steps:

  - xt_quota2 likely to be done w/ nfacct

  - xt_idletimer changes look possible to merge

  - NFQUEUE viability research on-going

Android Gadget

- ConfigFS driver merged in 3.10 likely to eventually replace Android Gadget

- ConfigFS still missing some functionality:

  - Needs FunctionFS support

  - Also upstream needs MTP, Android Accessory and Android Audio function support

- Next steps:

  - Find hands to work on this
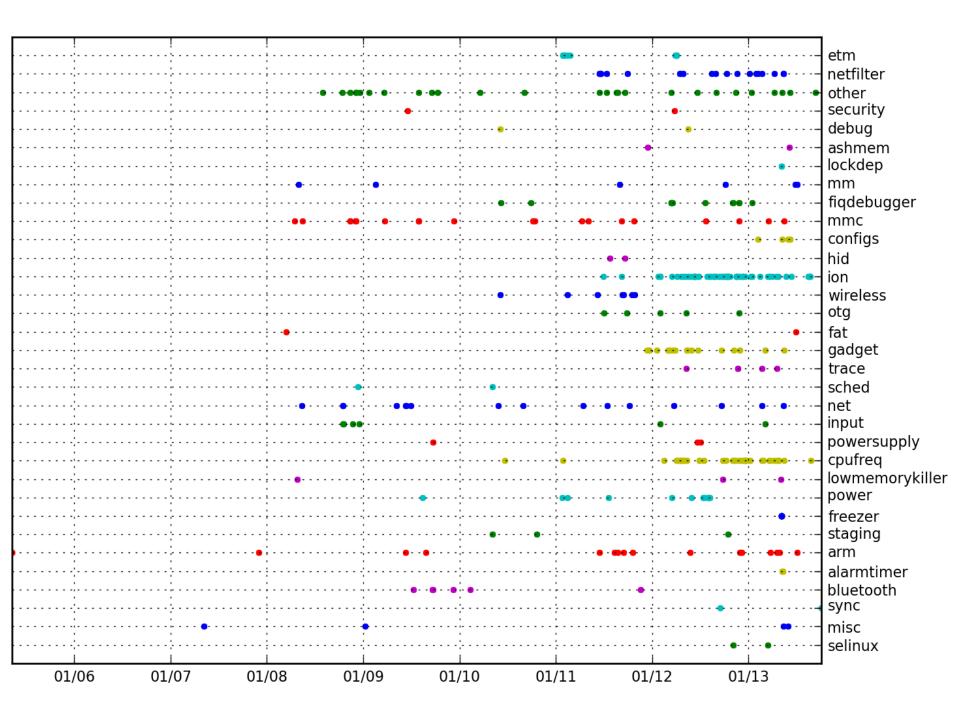
Current work in progress

- MMC improvements (Ulf)

- ION moving to staging & making it arch neutral (Jesse, Sumit, John)

- Netfilter changes (Mathieu)

- Volatile Ranges work to upstream part of ashmem (John)

- Binder compat_ioctl (Serban)

What is left?

- Lots of graphics work

    - ION, Sync, ADF

    - Want to avoid a forked graphics infrastructure

- ETM/ETB

- FIQ Debugger functionality in KDB (stalled)

- ARM improvements (ro kernel text, console flush, etc)

- Android Gadget driver

    - Enable FunctionFS in ConfigFS gadget

    - Support MTP, Android Accessory, Android Audio gadget functions

- Interactive cpufreq gov

    - Hopefully replaced by power-aware scheduling

- Bluetooth, wireless, other networking changes

- Moving items out of staging (binder, ashmem, logger, sync, etc)

```
net/netfilter/xt_qtaguid.c                | 3012 +++++++++++++++++++++++++++
drivers/usb/gadget/android.c              | 1517 +++++++++++++
drivers/gpu/ion/ion.c                     | 1495 ++++++++++++
arch/arm/common/fiq_debugger.c            | 1376 ++++++++++++
drivers/usb/gadget/f_mtp.c                | 1274 +++++++++++
drivers/cpufreq/cpufreq_interactive.c     | 1247 +++++++++++
drivers/usb/gadget/f_accessory.c          | 1180 +++++++++++
drivers/usb/gadget/f_audio_source.c       |  828 ++++++++
arch/arm/kernel/etm.c                     |  680 ++++-
net/netfilter/xt_qtaguid_print.c          |  566 ++++
drivers/gpu/ion/ion_system_heap.c         |  450 +++
drivers/net/ppp/pppolac.c                 |  449 +++
drivers/input/misc/gpio_matrix.c          |  441 +++
drivers/net/ppp/pppopns.c                 |  428 +++
drivers/input/misc/keychord.c             |  391 +++
drivers/input/misc/gpio_input.c           |  390 +++
net/netfilter/xt_quota2.c                 |  385 +++
include/linux/ion.h                       |  376 +++
drivers/gpu/ion/ion_priv.h                |  359 +++
net/netfilter/xt_qtaguid_internal.h       |  352 +++
drivers/char/dcc_tty.c                    |  326 ++
drivers/gpu/ion/ion_heap.c                |  320 ++
drivers/input/keyreset.c                  |  239 ++
drivers/input/misc/gpio_event.c           |  228 +
drivers/gpu/ion/ion_chunk_heap.c          |  213 +
drivers/gpu/ion/ion_cma_heap.c            |  205 +
drivers/gpu/ion/ion_page_pool.c           |  200 +
drivers/input/misc/gpio_axis.c            |  192 +
drivers/gpu/ion/ion_carveout_heap.c       |  187 +
kernel/trace/trace_output.c               |  182 +
drivers/switch/switch_class.c             |  174 +
drivers/usb/phy/otg-wakelock.c            |  173 +
drivers/switch/switch_gpio.c              |  172 +
include/linux/freezer.h                   |  171 +
include/linux/gpio_event.h                |  170 +
arch/arm/mm/rodata.c                      |  159 +
...
```

**diffstat of android-3.10
sorted by delta**

Key:

Upstreaming in progress
Upstream since 3.10

Discussion

- Resource issues
    - Plenty of work, not too many full time hands
    - Need to leverage the graphics team
- Next areas of focus?
    - ARM changes
        - Tend to collide and cause frequent pain
        - Would be good to resolve
    - Android Gadget (low hanging fruit)
    - FIQ Debugger (currently stalled)
    - ????

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