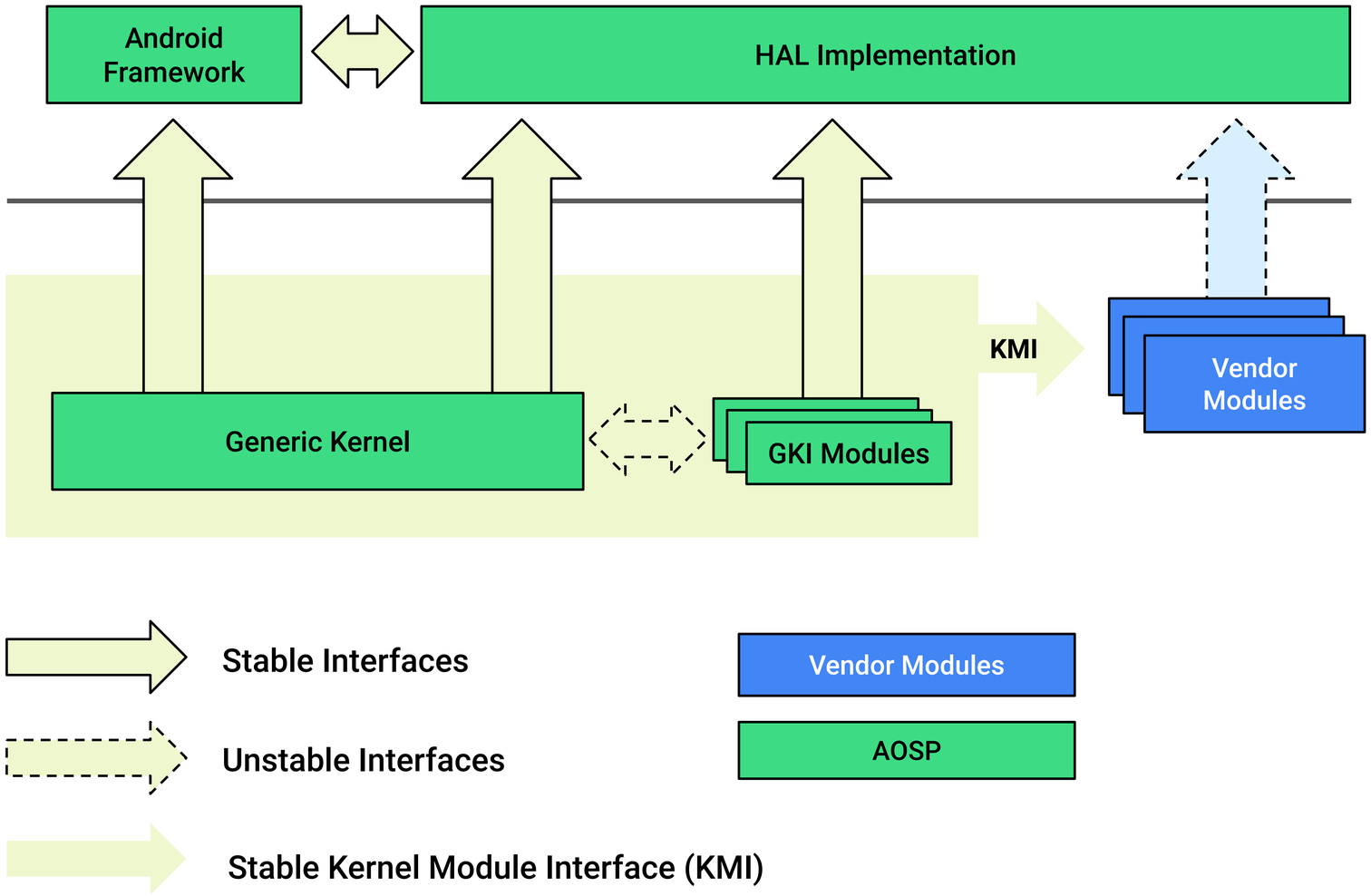
Generic Kernel Image

Linux Plumbers Conference 2021

Android Microconference

android

GKI Architecture



GKI Deployment

Android 11 (2020) -- 5.4

- Devices continue to ship with device kernel
- Android compliance testing must be run with GKI kernel in addition to the product kernel

Android 12 (2021) -- 5.10

- Devices ship with GKI boot image
- Regular binary releases available publicly on ci.android.com
- All testing done with GKI
  - Tests check for *certified* image

Main Difference vs Upstream: Out-of-Tree Modules

- Vendor Hooks to modify default behavior of Generic Kernel
  - *Regular* hooks are the same as TRACEPOINTS
  - *Restricted* hooks can execute handlers in non-atomic context but cannot be detached
- Additional exports via `EXPORT_SYMBOL_GPL()` to enable vendor hooks
- Kconfig options to enable hidden configs on behalf of out-of-tree modules

In `android12-5.10` kernel:

- 194 *Regular* hooks and 107 *Restricted* hooks

Partner Value-Added Features in Generic Kernel

Many partner value-adds can be implemented using *Vendor Hooks*

- **In Core Kernel:**

```
int ret = 1;
trace_android_vh_my_feature(&ret, &task);
if (!ret) return;
```

- **In Vendor Module:**
  - init:

```
rc = register_trace_android_vh_my_feature(my_feature, NULL);
```

  - handler :

```
void my_feature(int *ret, struct task_struct *task) { *ret=0; }
```

Complex cases may require the actual code in ACK

- Code potentially impacts all vendors

The Future: Increased Alignment with Upstream

- 2020-2022: Accumulating ecosystem technical debt in Android Common Kernels (`android12-5.10` and `android-mainline`)
  - Features that were in Vendor or OEM kernels are now
    - Upstreamed, OR
    - Isolated into vendor modules (possibly via hooks), OR
    - Merged into Android Common Kernel
  - Debt is visible for `android-mainline` as quilt series: https://android.googlesource.com/kernel/common-patches/
- 2023-2024: Reducing Technical Debt
  - *Upstream First* Development model for new features
  - Work toward upstreaming all out-of-tree patches in Android Common Kernels