

Practical Analysis of Gadget Framework on Android

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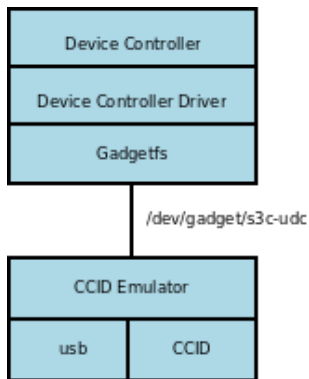
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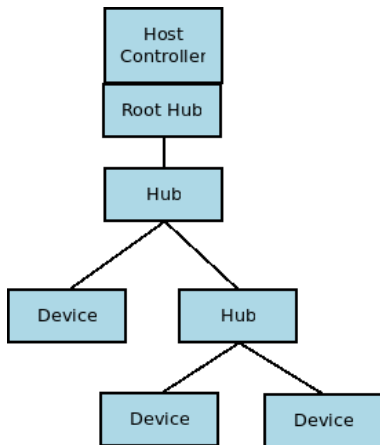
- 1 Motivation
- 2 Host and Gadget Funktionalität auf Android
 - USB
 - Gadget Treiber
 - Gadgetfs
 - System-on-Chip
- 3 Praktischer Teil
 - User Space Konfiguration
 - Null Pointer
 - Enumeration
- 4 Conclusion

Logische Struktur



- SmartCard Reader
- Smartphone
- NFC
- USB
- CCID Treiber auf Host

Logische Topologie



- 127 Endgeräte
- master-slave
- Host/Gadget
- USB Version
- CCID Treiber auf Host
- OTG

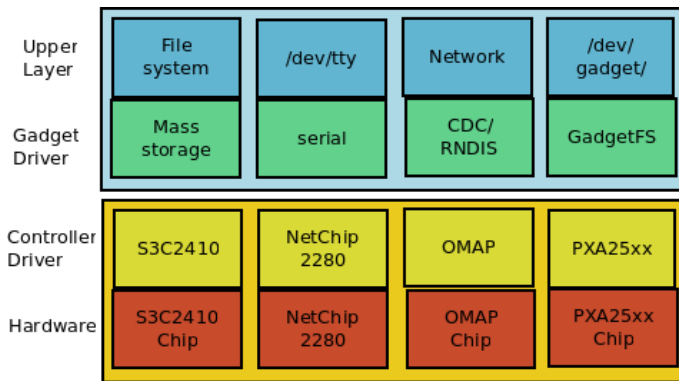
Class	Example	Host Driver
Audio	USB Sound	yes
CDC	network	yes
HID	keyboard, mouse	yes
Mass Storage	USB flash drive	yes
RNDIS	network	yes
Serial	RS-232 to USB	yes

* CCID = libccid open source generic USB CCID driver

Device Controller Typen

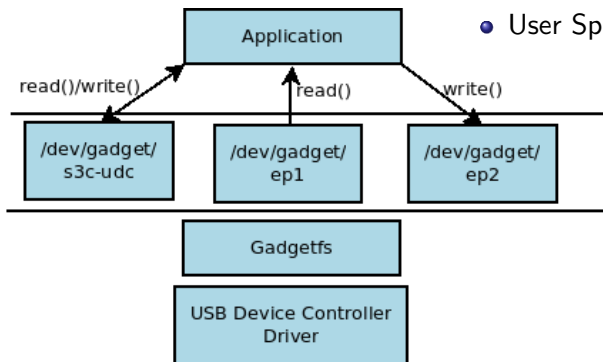
Module	Vendor
S3C2410 ARM	Samsung
OMAP USB Device Controller	Texas Instruments
net2280	NetChip
at32ap7000	Atmel
TC86C001 "Goku-S"	Toshiba

Gadget Module

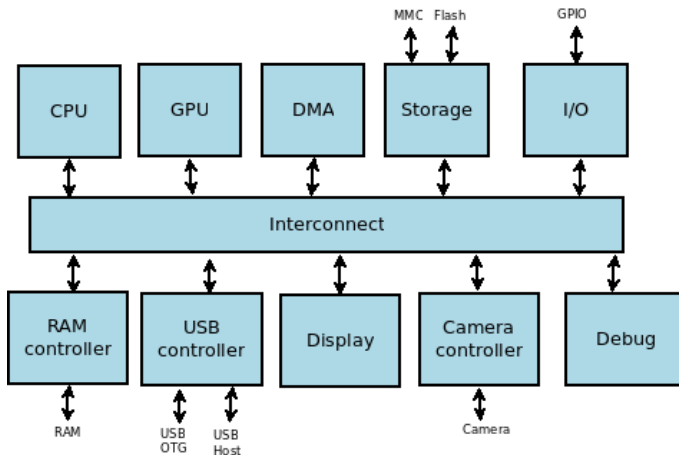


User Space Kontrolle

- Endpoint 0
- Transfertypen
- User Space vs Kernel Space



System-on-Chip



Samsung Nexus S

Model	Exynos 3 (previously S5PC110, Hummingbird)
Platform	Samsung S5PC110
Codename	crespo
USB	On-chip USB 2.0 OTG supporting high speed (480Mbps, on-chip transceiver) On-chip USB 1.1 Host supporting full speed (12Mbps, on-chip transceiver)

Null Pointer

- Kernel Exception
- Debugging
- Bugfix

User Space

- User Space Konfiguration

Enumerations Problem

- Host/Gadget
- Wireshark
- VUSB-Analyzer

Gadget

```
#>./usb
/dev/gadget/s3c-udc ep0
    configured

** Wed Feb 26 10:02:02
    2014
SUSPEND
CONNECT high speed
DISCONNECT
CONNECT high speed
DISCONNECT
CONNECT high speed
DISCONNECT
CONNECT high speed
```

Host

```
usb 2-1.5: devie descriptor read/64, error 18
usb 2-1.5: device descriptor read/64, error 18
usb 2-1.5: new high-speed USB device number 4 using ehci-pci
usb 2-1.5: device descriptor read/64, error 18
usb 2-1.5: device descriptor read/64, error 18
usb 2-1.5: new high-speed USB device number 5 using ehci-pci
usb 2-1.5: device descriptor read/8, error -61
usb 2-1.5: device descriptor read/8, error -61
usb 2-1.5: new high-speed USB device number 6 using ehci-pci
usb 2-1.5: device descriptor read/8, error -71
usb 2-1.5: device descriptor read/8, error -71
```

- anderer UDC Treiber
- UDC Treier Debuggen

Fragen?