

- > GTA04
- > * aus Sicht von OM's strategischen Ueberlegungen incl 'Prolog'
- > * aus Benutzersicht (usecases)
- > * aus technischer Sicht (Datenblatt)
- > * Regeln zur Bewertung der Machbarkeit einzelner Details
- > * Spezifikation fuer EE (=FG-W. Erweitertes Datenblatt mit BOM-
- > Vorschlag)
- > * aus Sicht des Projektleiters (OM-SOP and HR, timelines etc)

1 Positioning of GTA04 in Openmoko's line of products, characterization of GTA04, customers targeted.

[[to be done by management]]

based on GTA01, GTA02 case and product id.

Targeted customers: Geeks used to GTA02

2 GTA04 usecases

Run OM2007

Run OM2008

Run any standard Distribution of Linux, after cross-compile (e.g. Debian)

Use like a „usual“ cellphone, i.e. have the feature set like a standard Nokia phone, for selecting ringtones, profiles, constant or instant up display with info like „time of day“, „associated to GSM / signalstrength“...

3 technical properties

[[this is an intermixed collection of user-targeted product specification (like in „product specifications:“ in a user-manual) and engineering notes which had to be reworded and move to §5.

Included are specs from GTA02 from wiki, which have to be reviewed and adapted to exclude details too specific technical (like e.g. manufacturers of components) and to be more specific at large where GTA02-specs were fuzzy or don't apply to GTA04]]

NEW FEATURES:

1. 3g, preferably with HSPA, quadband
2. additional inputs outputs (usb, usb2, vga etc)

➤ IRDA and IR-Remote:

SIR OK, we don't need FIR (fast IRDA).

IR-LED wavelength for widespread custom IR-Remote, not for IRDA (Rationale: IRDA is fine with Remote-wavelength, for short distances, but remote has poor sensitivity/range with IRDA-wavelength).

Remote can „learn“ codes **and** carrier-frequency (~30KHz) from IR-IN photodiode.

Remote (and IRDA) is sw-driven by CPU (UART in/out + one GPIO for carrier-freq detection/injection. Probably ANDed with UART)

Boot-console outputs directly to IR-LED at 19200baud, 8N1, to „connect“ debug terminal-RX by simply placing a photodiode next to IR-LED of GTA04. (contact-less debug-connector)

IR-LEDs high output type, should cover at least the two octants [long-axis:up, stylus-axis:up, hsjack-axis:left] and [long-axis:up, stylus-axis:up, hsjack-axis:right], means we probably need 4 IR-LEDs: left, up, right, front.

Photo-diode should be aligned long-axis:up

Photo-diode should also be sensitive to visible spectrum [IR..blue], and can be read out by A/D converter to sense ambient light.

➤ Wired AV-connectivity

We are using 3.5mm 4-pin AV-connector according to

http://members.omtp.org/Lists/ReqPublications/Attachments/36/OMTP_Local_Connectivity_Wired_Analogue_Audio_v1_0.pdf.,

augmented by definition of additional functions for particular pins.

Basic pin definition of this de-facto standard is as follows (augments in *italic*)

pin	function1	function2	function3	function4
1/base	GND			
2/lower ring	hs-mic mono + button (<i>detection of several buttons by probe of resistance to GND. TBD: specify valid R-values</i>)	video composite out	<i>video composite in</i>	<i>power source for stereo mic</i>
3/upper ring	right out (<i>HiFi-power 1)</i>)	<i>right line-in (HiFi 2)</i>	<i>SP/DIF digital link, in/out</i>	
4/tip	left out (<i>HiFi-power 1)</i>)	<i>left line-in (HiFi 2)</i>	<i>A/Din DC, for sensors etc. May be programmed pullup to VDD/2 by 50K, for ratiometric measurements</i>	

1): *HiFi-power*:

20~20,000Hz +/- 3dB @ 8Ohm~10kOhm load

Power: >20mW @ 16Ohm

THD and Noise S/N: >80dB @ [1Vrms@100Ohm](#) and [20mW@16Ohm](#) [[TBD]]

2): *HiFi*: 2Vrms@1kOhm for +3dB at maximum attenuation. Boost amplifiers may be configured for higher sensitivity. THD+S/N according to 1)

Additional function of this 3.5mm receptacle is to provide optical TOS-Link digital output and input.

➤ *ff*

➤ *ff*

[[from here on TBD. Just some topics to give an idea until next version of this document]]

3. NFC / RFID

[[TBD. What kind of RFID functionality are we talking about? Reader or emulate an RFID-tag?]]

4. Accelleration

One 3-axis G-meter and one 3-axis gyro

5. graphics

We use graphics accelleration of CPU Video driver

6. second SD-card. external insertion of Sdcard.

7. camera. Module, 180° rotation for front view (camera) and view to user (video-phone)

8. photolight / torch

9. laserpointer

10. FM-radio/DRB

11. DVBT

12. universal radio instead of prev. 2 points (and point 3)

13. ... to be continued

Features

Display- Topply o2.8, 480 x 640 pixels, VGA, 200 NIT minimum, resistance type touch, 8-wire connected for limited multitouch capabilities.

User Interface Navigation- Touch screen on LCD, 2 control “buttons”, 1 Power button, 1 Aux

Built-in 802.11b/g Radio with full support by FOSS driver, AP-mode, Monitor-mode Promiscuous mode for security audits and mesh applications. External Antenna-connector

Built-in Bluetooth 2.0 + EDR (CSR and support PCM audio, full A2DP support)

1 built-in Tri-Axis sensor, one Gyro-Sensor

Built in GPS Radio – -130 dBm with internal antenna, -157 dBm tracking on chipset specification, TTFF under 40 seconds with -130 dBm signal strength, and tracking (u-Blox)

Antenna – Specialized antenna for best in hand hold GPS, GPRS and Wi-Fi/Bluetooth performance are required, -105dBm on receiving, Tx 30dbm+2 on GSM

External Antenna – MMCX GPS connector

UMTS/3G Radio –GSM/GPRS radio. A Pre-PTCRB certified module will be preferred

Linux – Linux kernel 2.6.24 or later Openmoko kernel

USB2.0-OTG compliant - Client and Host mode switch-able (to be used for software downloading), provide host 500mA/5V power

Power- Normal mode power will be via 1200 mAh battery with built-in coulomb counter, [GTA02-smart-battery]. Battery will keep device in standby mode. Battery life (Approximation/Ideal Target) Standby time 150-200 Hrs (GSM) Talk time (Backlight off) Up to 3-4 hrs(GSM)

Charging of battery in device by autonomous dedicated charger circuitry, feedback of charging/full state via LED on power-button

LED- 3-color-LED indicator under Aux/Power button key

Hardware Specification

[edit]Hardware Electrical

400/500 MHz Samsung 2442B Processor/SOC (400 minimum, ARM920T core, ARMv4T)

Boot code in NAND FLASH or 2MB NOR FLASH (optional design)

128 MB SDRAM total, 64 MB CPU internal, 64 MB external

256MB NAND Flash MCP package.

[edit] Display

Topploy VGA ; 72.2mm (2.84”) diagonal, 480 x 640 pixels, 16 bit color depth

Transmissive display: good readability in high ambient light is essential

White LED backlight. Required brightness is 200 NIT minimum.

Resistance type touch panel.

[edit] WiFi 802.11 b/g transceiver

Must have GPL support source or GPL compatible policy

TX power at 11 Mbps: 13 dBm minimum

RX sensitivity at 11 Mbps: -89 dBm desired, -83 dBm minimum

AP mode desirable, not required

WEP and WPA supported

Atheros preferred because of its GPL policy

[edit] Serial interfaces (UART)

Three serial interfaces are required

Console

A-GPS and GPS

GSM/GPRS

[edit] Accelerometer

2x accelerometer required

Could support interrupt while suspend or power save mode

3 axis sensing

[edit] A-GPS

GPS chipset receiver and antenna

Sensitivity at Antenna port: -157 dBm tracking on chipset specification

LNA and SAW filter for maximum interference protection

Cold start time to first fix: 40 sec typical at -130 dBm, 60 sec max

Must support GPL for Assist-GPS function with open API

Industry quality GPS

Could fit in GTA01 GPS area on the PCB

[edit] GPS Antenna Performance

Antenna is passive and internal; 15 mm x 15 mm ceramic patch is nominal design

Antenna LNA and SAW filter are required to meet GPS performance

15 mm square ground plane (minimum 1 mm ground border around patch) (TBA)

There will be one external GPS antenna connector (MMCX)

C/N ratio should higher than 35 on production testing

[edit] Buttons

Touch screen over LCD is primary data entry mechanism

Two “hard” buttons: Power button (on side of Neo1973) is a mechanical switch actuated by a plastic pushbutton in a hole in the housing. Aux (911) button on the top of the device, All two of these buttons, when pushed by the operator, are binary inputs (on/off or pressed/not pressed) to the software. The effect of each button is determined by the application software in the device

Buttons may need to be backlit

50000 cycles on hardware specification

[edit] Sound outputs

Speaker in box (need good volume and acoustic behavior in noisy environments)

Audio is monophonic

Max volume: 100 dB at 5 cm to assure good performance in environment.

Support earphone with mic by jack

[edit] Power Design Requirements

Software based power management unit preferred

NXP PCF series preferred

Need support charge from USB function

Need support powered by USB function

Power switch: Neo1973 will have a power switch, for power on/off and suspend

Power/Aux switch must be backlit

Switch controls whether device is running or suspended by presses of the switch

Switch does not shut off the power; it only suspends/resumes the device

Internal Li-Ion or Li-Polymer battery is included. This battery supplies standby power to the device eliminates the rebooting of the device when local power is again reapplied. Battery is 1200 ma-hr.

Battery life (Approximation) Ideal/Target Standby time 150-200 Hrs (GSM) Talk time (Backlight

off) Up to 4 hrs(GSM)

Estimated current draw for the entire device when in suspend mode (and ALL peripherals are turned off or set for deep sleep) is <5 mA at 3.6 volts (Li-Ion terminal voltage).

GSM module deep sleep(alive and keep contact with base station) stage should take less than 8mA

Battery will reach half capacity (~600 mAh) with 500 charge-discharge cycles. This will occur in less than 2 years of daily service.

When powered continuously, Neo1973 must suspend (to low power mode) based either on observed low battery voltage condition or a configurable time delay.

Neo1973 must monitor battery status while suspended and resume automatically if the charger is inserted.

Primary power connection: 1200mAh battery

USB charger have ID pin 47.5k pull down for Openmoko identification

Indicators: an LED indicator visible from the side of the unit will illuminate when charging or have missing incoming call

[edit] GSM/GPRS

850/1800/1900 and 900/1800/1900 MHz bands must be supported

Design should allow for multi-band version (850/900 MHz)

Module based GPRS transceiver could meeting PTCRB and appropriate FCC certifications. It preferred that the module be pre-certified with PTCRB or OTA test

FCC/CE certification required for GSM/GPRS part

[edit] GSM-GPRS Antenna Performance

-105 dBm receiving on each channel (GSM/PCS)

30+2 dBm transmission on GSM channel

[edit] Wi-Fi Modules

Must support GPL driver

Atheros AR6k preferred

Flash version required

[edit] Wi-Fi Antenna Performance

The Wi-Fi antenna with TX 13 to 15 dBm

RX -89 to -83 dBm @802.11b 11Mbps or an equivalent performance antenna

[edit] Bluetooth

CSR BC4 or later solutions

[edit] USB

Neo FreeRunner GTA02 will have USB, client/host. Using USB 1.1

Provides USB host 5v power

Could be powered by USB

[edit] Microphone

1 microphone is in the device

[edit] Firmware Image

Using Linux 2.6.24 or later

Could support boot from NAND or Boot from NOR

Shipping image should come with basic phone function

Could do full firmware upgrade by USB cable

[edit] PSN

Device will have a PSN (product serial number) printed on the product label and machine readable in system NAND memory

[edit] IMEI

Production phase should have IMEI code written

[edit] Package Specification

Weight: ~133 grams with battery.

4 in 1 laser pen passed RoHs and safty regulation for laser equipment safty

1x 512MB microSD Card (SanDisk/Transcend)

1x USB cable Standard A to mini-B connector

1x 1200mAh smart/gauge battery

Quick start guide

5v USB power cord w/100-240 switchable power plug

Safety card, warranty card

Package could pass 1m to 1.5m drop test

AC USB charger,100v-240v, Passed UL and all required safety regulation

Must pass FCC/CE certification

Must pass NCC certification for Taiwan import regulation

RoHS Compatible

WEEE Report required

[edit] Life Cycle Specification

[edit] Product Life

The product is designed to last a minimum of 2 years.

[edit] Operating Temperature

Target operating range is -10°C to $+60^{\circ}\text{C}$

[edit] Storage Temperature

-15 deg C to +70 deg C

[edit] ESD

The device can withstand a 4.0kV contact discharge and 8.0kV air

[edit] Drop test

Should pass 1m direct drop to concrete ground or 1.5m on slide with carpet

4 basic guidelines for evaluating feasibility of product features

5 Details addressed to EE for design

6 OM SOP and HR

We give FG-W abstract spec (like "WLAN802.11") and a suggested BOM (e.g. "6410 CPU"). Then we ask them to create a schematics that is maximum SW-compatible to GTA03. I'll stay in close contact with their EE dept, and will try to guide them in a direction so we get a HW-design comarable to our own GTA03 design in the end.

The purpose of this operating procedure is twofold: We can not pass them out schematics for a base to evolve from there, as they could deny any responsibility for bugs in the final device. And we want to see a second design done by an independent group of developers, so we (i.e. me) can compare the OM-solution with the FG-W-solution, so we end up with some sort of completely "double-checked" design.