

# *Free your Phone and your Mind will Follow*

“Openmoko... is everything the iPhone could have been but is not.”

-- The Economist  
(or not?)

## ***The Openmoko™ Project***

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# About Me

- Ian Darwin is a long-time user of, contributor to, and advocate for, open source
- Original author of file(1) on Linux, BSD, OS X
- OpenBSD committer & user; use OpenMoko, OpenOffice, OpenStreetMap, OpenClipart, ...
- O'Reilly Author: *Lint*, *Java Cookbook*, *Checking Java Programs*
- Trainer: Learning Tree (Java, Unix, Python)
- Unix & Java Consultant
- Not paid to represent OpenMoko – just a fan



# Warning

Your current cell phone  
may suck.



# Does your cell phone suck?

- How much can you *change* it?
  - Little changes: Preferences, Ringtones, Backgrounds
    - ***What carriers used to make the most noise about!***
  - Medium: add new applications written by you/others?
    - Can you ssh in, scp files in and out?
    - Write apps without paying for a license or signing NDA?
  - Significant: replace (change, not upgrade) the OS
  - Fundamental: write apps that interact directly with the phone, freely use GPS chip, etc.
    - ***Treat your phone like a FreeNIX PC, not a black box***



# Innovation: Internet vs Cell Phones

- Both date from early 1970's
- Internet: open specs, open implementations, “RFC pattern”: ***few barriers to entry***; favor simplicity
- Cell phones: relatively secretive, closed implementations, expensive specs
- Result: way more innovation in the Internet than in cell tech
- ***OpenMoko wants to bring the Net's level of innovation to the cell phone world***



# OpenMoko Vision and Goals

- Every good FOSS project starts with a scratch of some developer's itch:
  - Sean Moss-Pultz wanted *total phone freedom*
    - FOSS bottom to top stack, Linux kernel
    - Full access to phone hardware, GPS (location-aware), etc.
  - Working for phone maker FIC in Taiwan; convinced management his vision was good



# Vision: No Barriers

- No NDA's needed to develop for the stack
- No \$\$\$ needed to develop for the stack
- No license...
- Not even hardware purchase...
- No closed-off parts of the API (usually the GPS)
- Business model: sell more handsets!



# Turn back the clock?

- The cellular phone was invented in 1973.
- It has evolved into a carrier-controlled industry
- Neo1973 will take us back to 1973 and let us make a “neo” start on the rules
  - by giving users unlimited choice(this is an article of faith, not marketing)



# Free Your Whole Industry

- "Neo (and OpenMoko) will change this industry, not because it will scroll or look sexier than the iPhone. Not because we will build a better device than Nokia. But because it will allow us all to rewrite (again and again) the rules, until we come up with the next thing -- something more than the phone.
- "This is what we mean when we say "free your phone." We will turn the phone into something that far exceeds the power of what most people (even myself) ever thought possible.
- "FOSS will be the tool that will get us there."

-- Sean Moss-Pulver, OpenMoko Founder



# Who is who?

- FIC - First Internet Computer, Taiwan
  - Established PC OEM (e.,g Koolu) and Phone maker
- Openmoko.**org** - software stack for *Open Mobile Communications*
  - Apologías a la gente hispanohablante :-)
- Openmoko.**com** – FIC subsidiary
  - Makes and sells cell phones
  - Runs Openmoko.org project!



# What is an OpenMoko device?

- OpenMoko.com would like you to buy their hardware
  - But they support the project even if you do not :-)
- OpenMoko.org target devices:
  - Small/handheld device space (PDA, sub-notebook)
  - Resolution from QVGA (320x240) to 800x600
  - Most devices will have GPS, Networking, ...



# Neo1973 is an OpenMoko.com device

- Neo1973 – hardware
  - Unlocked ~~quad~~-tri-band GSM phone
  - GTA01 Neo1973- "developer" (Summer 2007)
  - GTA02 FreeRunner - "production" HW (mid-2008)
- *There will be other hardware products from OpenMoko.com – not necessarily phones!*
  - *GTA03? Rumored – Camera, different case, same hardware minus “Glamo” video accel*
  - *GTA04? Also rumored, no details*



# Inside OM Hardware

Item	GTA01	GTA02
CPU (ARM)	266MHz SOC	400/500 Mhz SOC
Mem	64MB flash + $\mu$ SD	256MB flash + $\mu$ SD
GPS	Broadcom	Atmel ATR0635
VGA 480x640	Yes	SMedia "Glamo" 2D/3D /
Bluetooth	Yes	Yes
WiFi	No	Atheros AR6k
Speakers	Stereo	Mono (Stereo headset)
USB	Host	Host
CDCE	Yes	Yes
Accellerometer	No	2 x 2D
Battery	1200mAH	1200mAH

Reference:

[http://wiki.openmoko.org/wiki/Neo1973:\\_GTA01Bv4\\_vs\\_GTA02\\_comparison](http://wiki.openmoko.org/wiki/Neo1973:_GTA01Bv4_vs_GTA02_comparison)



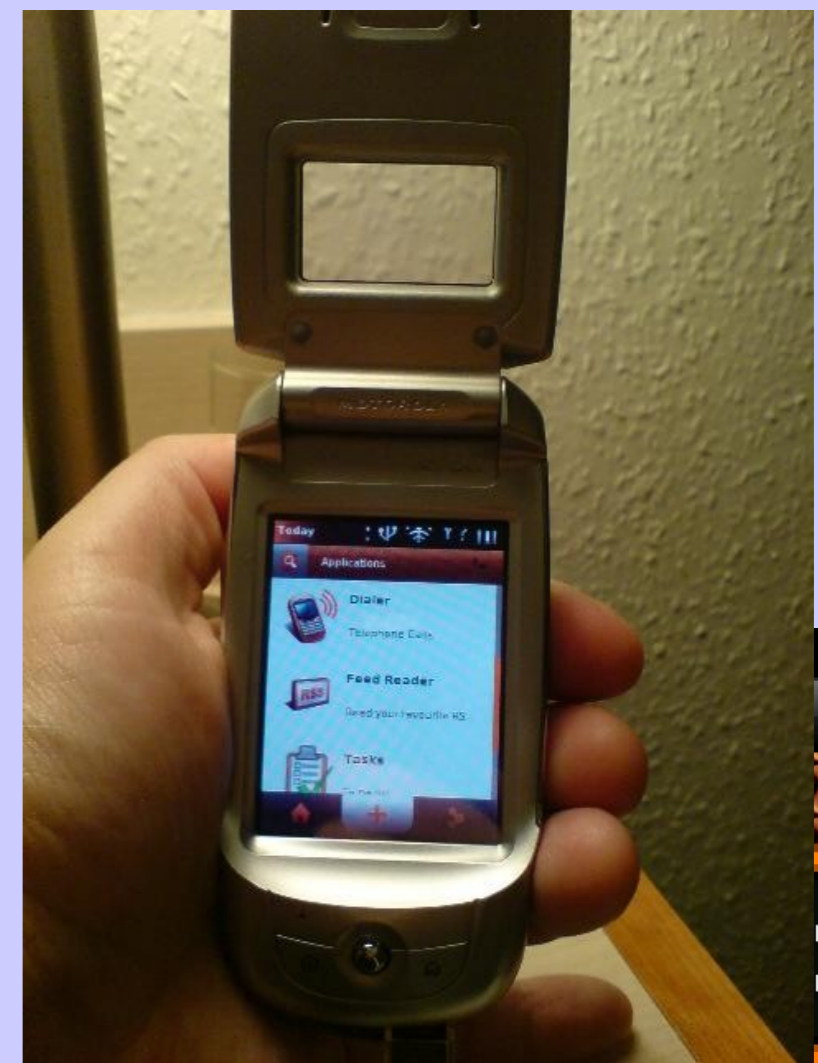
# HDX8 is an OpenMoko Device

- Dash™ - the first two-way, Internet-connected GPS navigation system
  - Swarm-powered real-time traffic updating
  - “Send location to my phone”
  - See <http://dash.net/>
  - See Tim O'Reilly's take on this:  
[http://radar.oreilly.com/archives/2007/10/dash\\_web2summit\\_openmoko.html](http://radar.oreilly.com/archives/2007/10/dash_web2summit_openmoko.html)
  - For fun, see also  
<http://yro.slashdot.org/article.pl?sid=07/10/27/164324>



# Other phones can be OpenMoko Devices

- Unofficial ports – Palm (partial), HTC, Moto, Nokia... Not the iPhone (yet?)



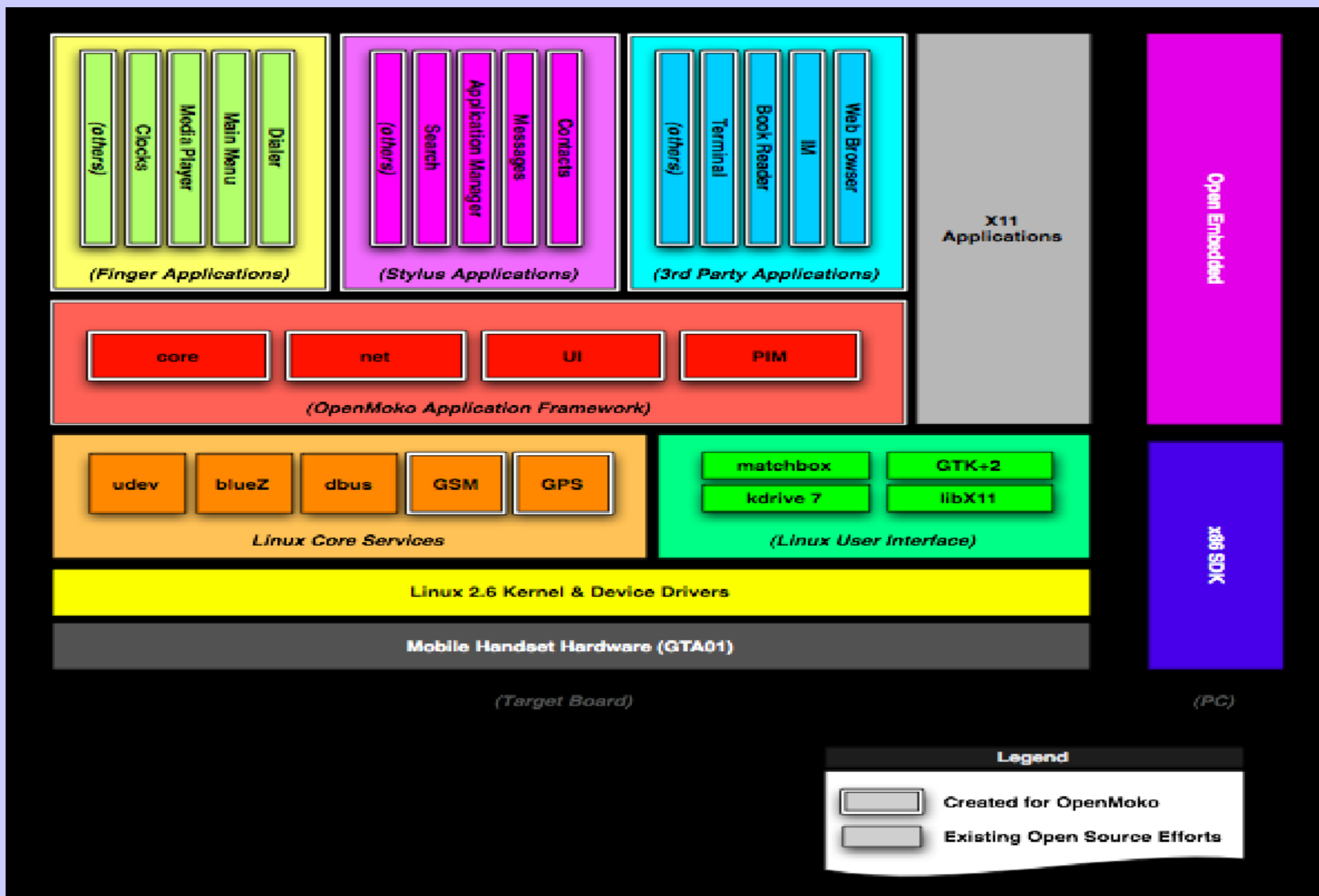
Images courtesy <http://zefanja.blogspot.com/>

<http://www.vanille-media.de/images/>

# Build free phone from scratch?

- Use existing software as much as possible
  - Consistent with other goals!
- e.g., Linux kernel, X11, Matchbox WM, GTK+2 toolkit, “dropbear” SSH, etc.
- Small number of custom libraries
- Cooperate with other projects
  - OpenEmbedded distro for kernel, toolchain
  - OpenedHand provides current GUI (see <http://blogs.gnome.org/thos/2007/08/21/openmoko-20072/>)





# Make hardware really free?

- Chip makers are not used to open source
  - “Open” not understood
  - Require NDAs? Not open!
  - OpenMoko – spread the good word – “We won't buy”
    - Results good – GTA01 all open source but for the GSM firmware (no kernel goo needed) and the GPS interface
    - GTA02 has different GPS chip, open source driver (chip talks NMEA)
  - Mostly through diplomacy rather than e.g write-in campaigns

See also <http://www.openbsd.org/papers/brhard2007/index.html>



# Make hardware really free II

- Open discussion
  - Wiki and mailing lists funded by OpenMoko.com
    - e.g., community at openmoko.org
  - Staff participate in discussions
    - But very rarely control discussion
  - Also participate in IRC channel
    - #openmoko at freenode.irc.net
  - Open discussions lead to good ideas
    - (among others)
- The company believes in “open” (mostly)



# Really Free III

- Like Sun, Openmoko has a number of FOSS luminaries on staff (some “emeritus”)
  - Harald Welte (drivers; [gplviolations.org](http://gplviolations.org))
  - Carsten “Rasterman” Haitzler (Enlightenment)
  - Mickey Lauer
  - Joachim Steiger



# The open company: hardware

- All Open Hardware
  - e.g., user posted asking for instructions on hooking up I2C hardware
  - OpenMoko staffer Joachim Steiger responded with three alternative approaches, including discussion of unreleased hardware
    - Community Mailing List, October 2-3, 2007
  - Most hardware companies are not so cooperative



# Software for your new Neo

- Can build the entire phone stack yourself from SVN repository (too big to be self-hosting)
  - Start at <http://wiki.openmoko.org/wiki/MokoMakefile>
- Or download snapshots
- Load into flash with loader dfu-util
- Can update base, add third party, with opkg (replaces ipkg from <http://handhelds.org/moin/moin.cgi/lpkg>)



# Virtual Hardware

- “No hardware purchase needed to develop software”
- Can run OpenMoko software on your desktop or in several emulators
  - QEMU best developed
  - [http://wiki.openmoko.org/wiki/OpenMoko\\_under\\_QEMU](http://wiki.openmoko.org/wiki/OpenMoko_under_QEMU)



# Betcha Can't Have Just One Stack

- Linux and BSD have run on ARM for years
  - FreeBSD, NetBSD boot (only) on Neo1973
- Several other Linux-based phone stacks shown
  - TrollTech QTopia
  - Sun JavaFX Mobile
  - PokyLinux from OpenedHand (<http://pokylinux.org>)
- Maybe: Intel MobLin, Maemo, more...
  - Gnome/Ubuntu Hildon (<http://live.gnome.org/Hildon>)
  - Probably others!

And maybe :-(



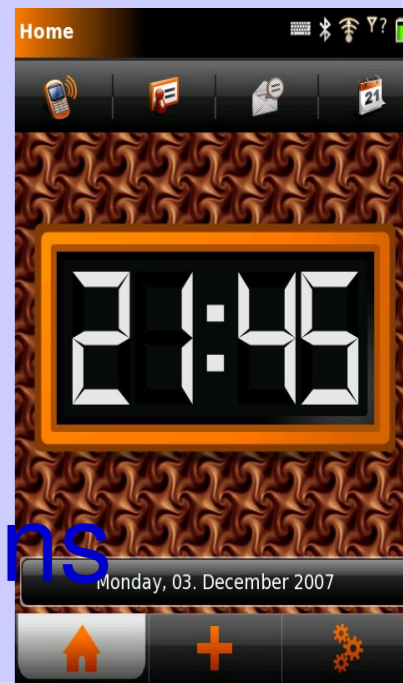
# JavaFX Mobile Runs On Neo

- JavaFX Mobile Runs on Neo1973
  - JavaFX – compositional API for Swing 2D graphics
  - JFX Mobile – Phone Stack based on this
    - And on Savaje Tech
- Shown JavaOne May, 2007
- Shown again JavaOne 2008; still not released



# Now just the OM Linux distros...

- Now several OM distros:
  - OM 2008.x – ASU – Qtopia Apps, E
  - OM 2007.x – GTK
  - FSO – freesmartphone.org (zhone – Python)
  - SHR – Stable Hybrid Release (community)
  - FDOM – Fat Dirty OM (community)
  - QT Embedded (nee Qtopia)
  - Debian
  - Gentoo
- See <http://wiki.openmoko.org/wiki/Distributions>



# TrollTech QT Extended

Origin: TrollTech

- QT Extended (Qtopia) is TrollTech's Linux phone stack
  - Re-released GPL'd August 2007
- More complete than OpenMoko stack
- QT toolkit, direct FB (not using X11)
  - Not interoperable?



# Other “Competing”? projects...

- TuxPhone, MyPhone
- GumStix (Hardware core used by above)
- Qtopia “Greenphone” hardware – recently dropped
- Others! Summary at <http://www.wired.com/gadgets/wireless/multimedia/>
- I think OpenMoko is the best balance of “complete” and “open”, but wish all success!
  - Every freed phone is part of the revolution!



# More Competing Projects: Android

- Google aka Open Handset Alliance
- Android
  - BSD licensed
  - No hardware until late 2008 (Tmobile so far)
  - Current binary-only sw is ArmV5, Neo is V4 :-)
  - An underhanded fork of Java ME
    - Compiles Java language, to leverage tools
    - Does not conform to the many existing Java standards
  - “Always in motion, the future is.”



# *Openmoko is Total Phone Freedom*

- This is true telephony freedom:
  - Run OpenMoko on a Neo1973 (default!)
  - Run OpenMoko on other devices
  - Run different OSes on Neo1973 devices
  - ***Run any application you like on any phone***



# What if you “brick” your phone?

- OpenMoko:
  - Fallback boot in rom
  - You can buy a JTAG board from us
  - Here are the schematics for the JTAG board
  - Or find a friend that has one
  - Directions on the Wiki
- iBrick™:
  - "If the damage was due to use of an unauthorized software application, voiding their warranty, they should purchase a new iPhone."
  - Apple spokeswoman Jennifer Bowcock
  - New York Times, Saturday, Sept. 29, 2007 "Altered iPhones Freeze Up"



# What if you just want to look inside?

## OpenMoko:

- Internal photos (like this) on the web
- Complete phone schematics on the web!
- Complete disassembly steps on the wiki
- GTA01 kit included guitar pick to pry the cover open
- Enjoy!

## Apple:

- If you get the cover open, you void your warranty

# Main Apps today

- “Home” summary page (formerly “Today”)
- Dialer, Dates, Contacts, Tasks, Media Player
  - Installed as /usr/bin/openmoko-\*
- It's a Linux box: Terminal, ssh in, remote X, etc
- And more:
  - Web Browser
  - Calculator
  - Feed Reader
  - Games (of course!)

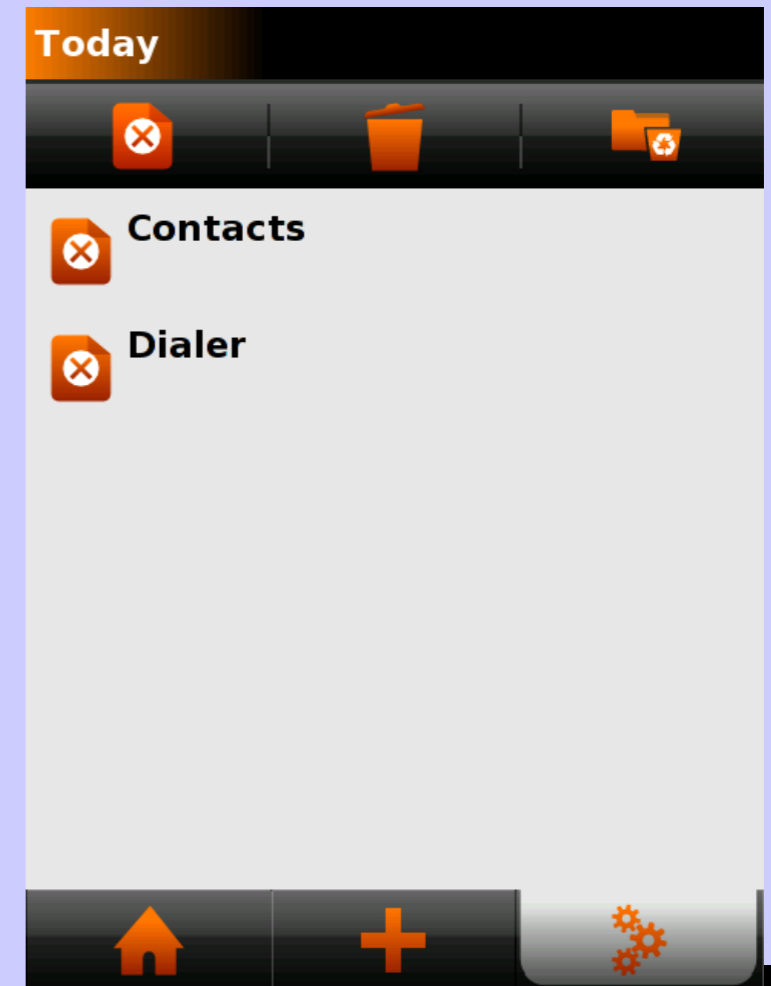
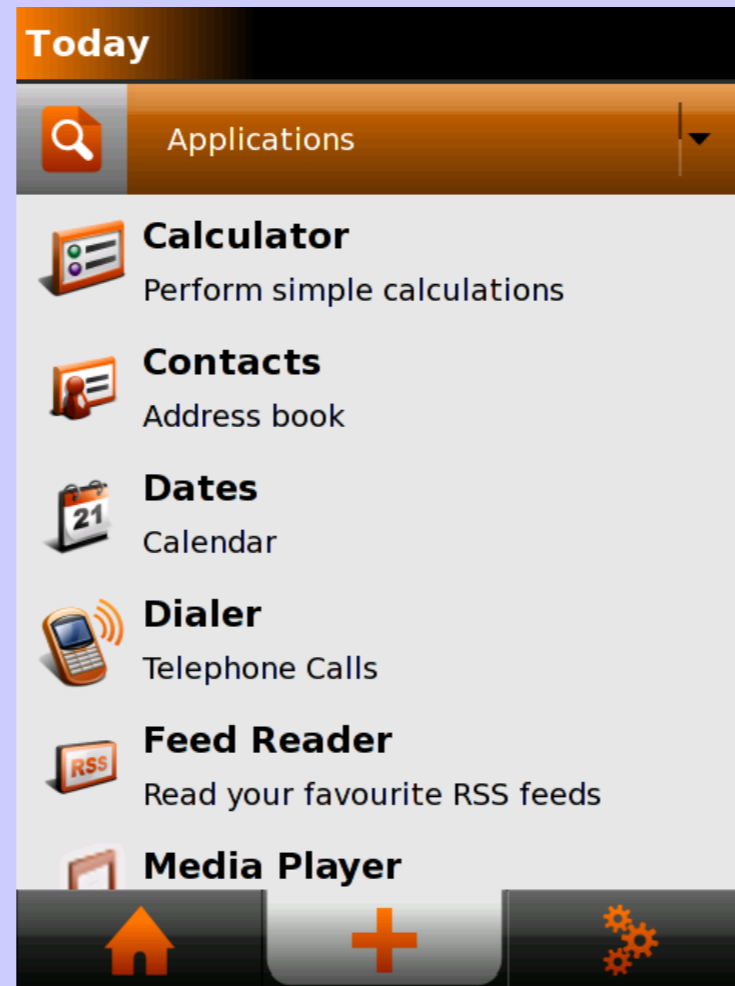
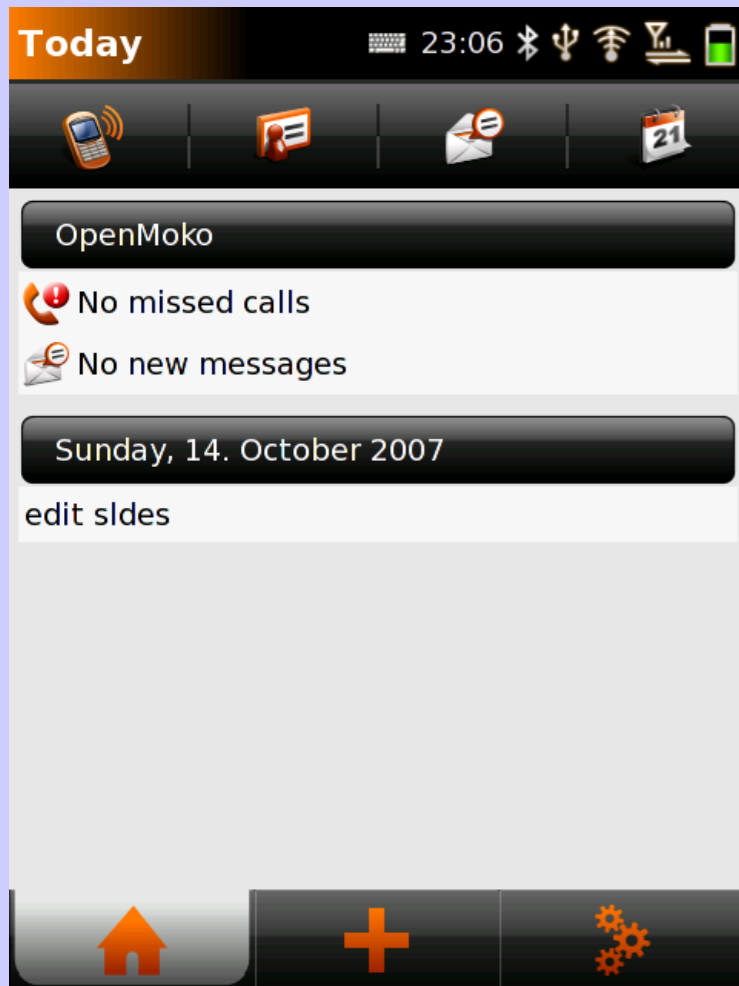


# Finger Apps vs Stylus Apps

- Fundamental property of GUI design
- Finger App has few, large buttons
  - Examples: Dialer!
- Stylus App has more, smaller buttons
  - Usually requires typing
  - Pencil icon brings up keyboard
  - Examples: Contacts, Date, Terminal



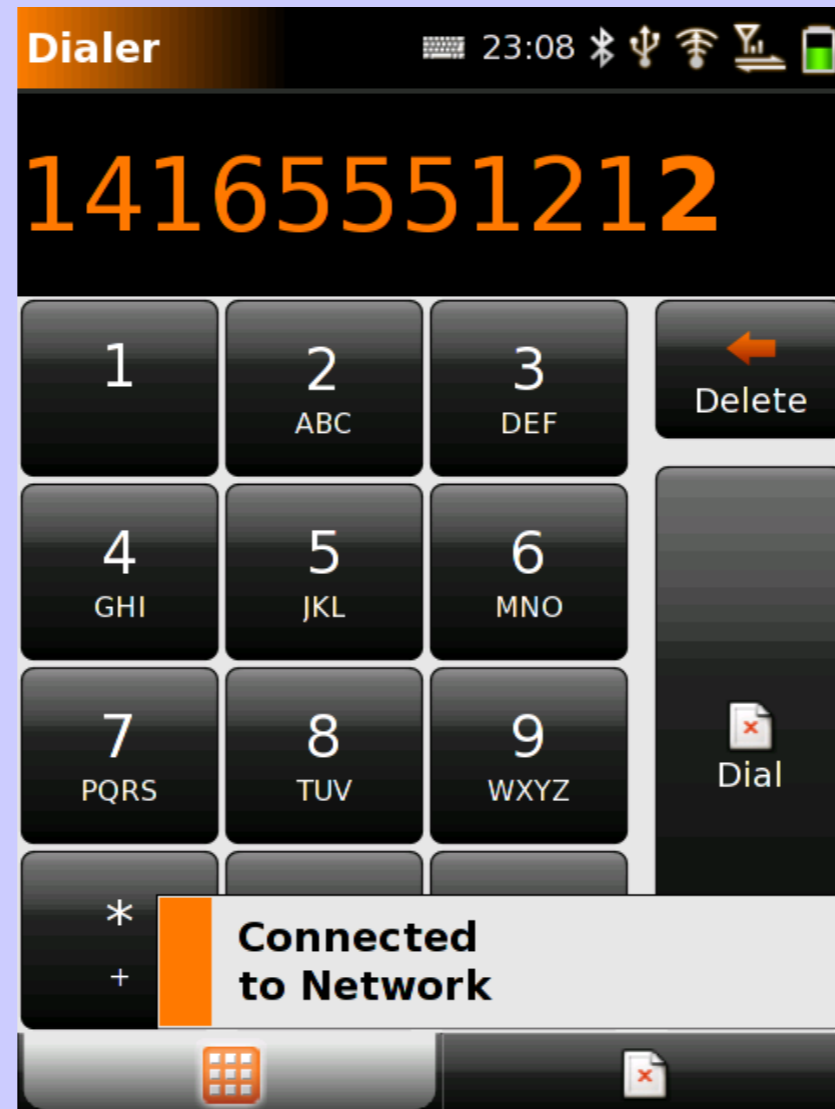
# “Home” App



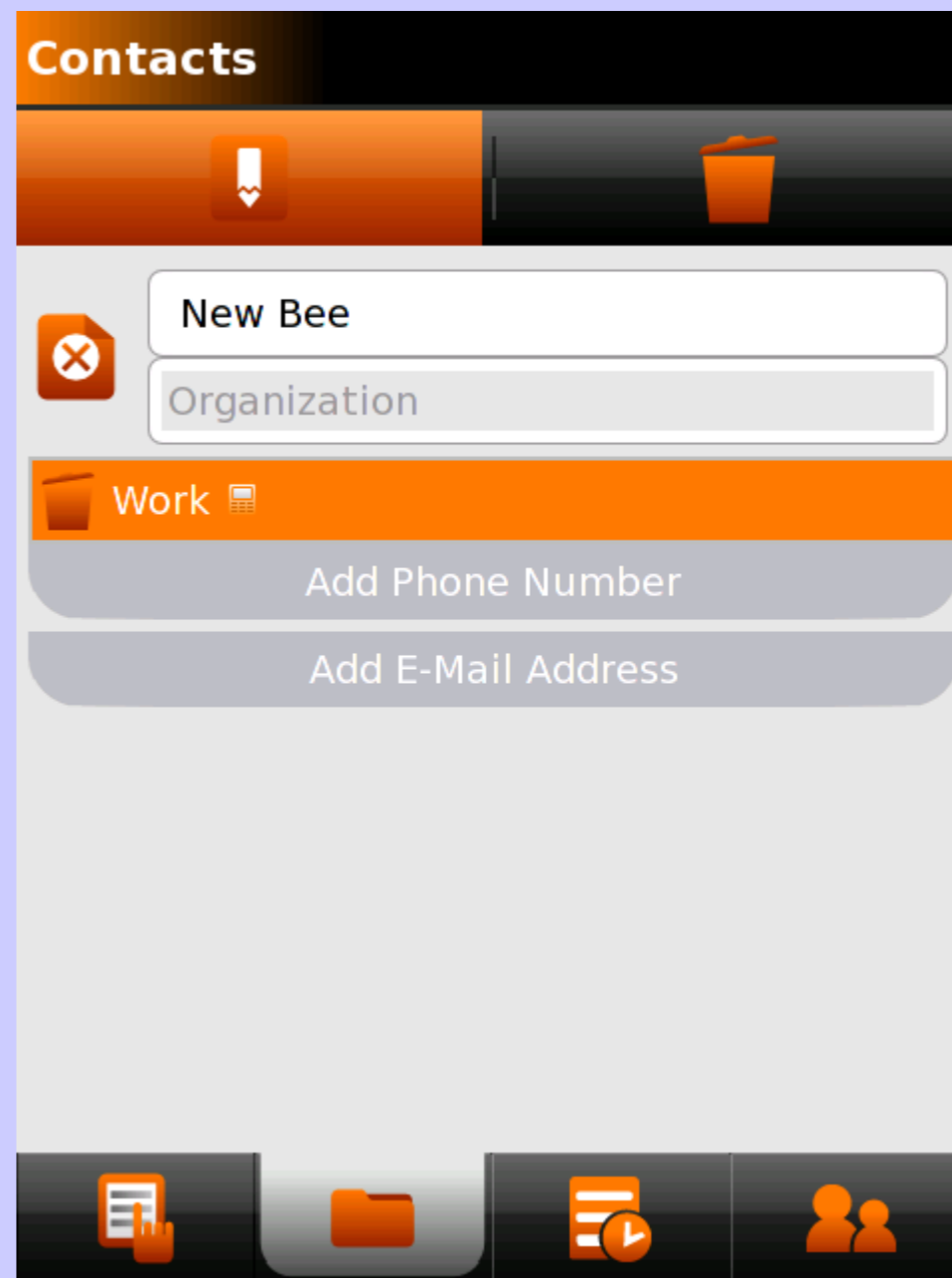
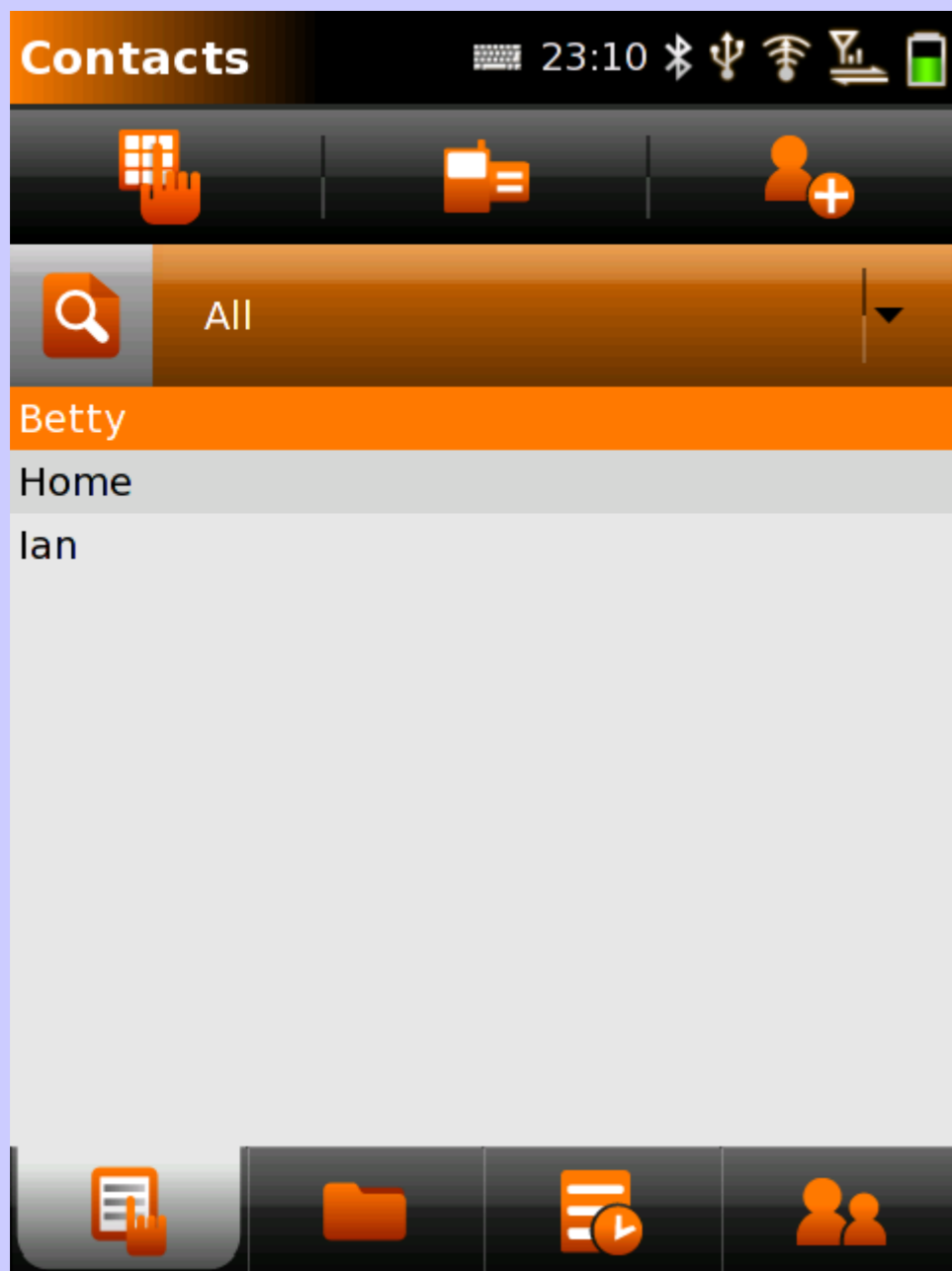
**Disclaimer** – *all screen images will change before you get around to trying to duplicate them.*



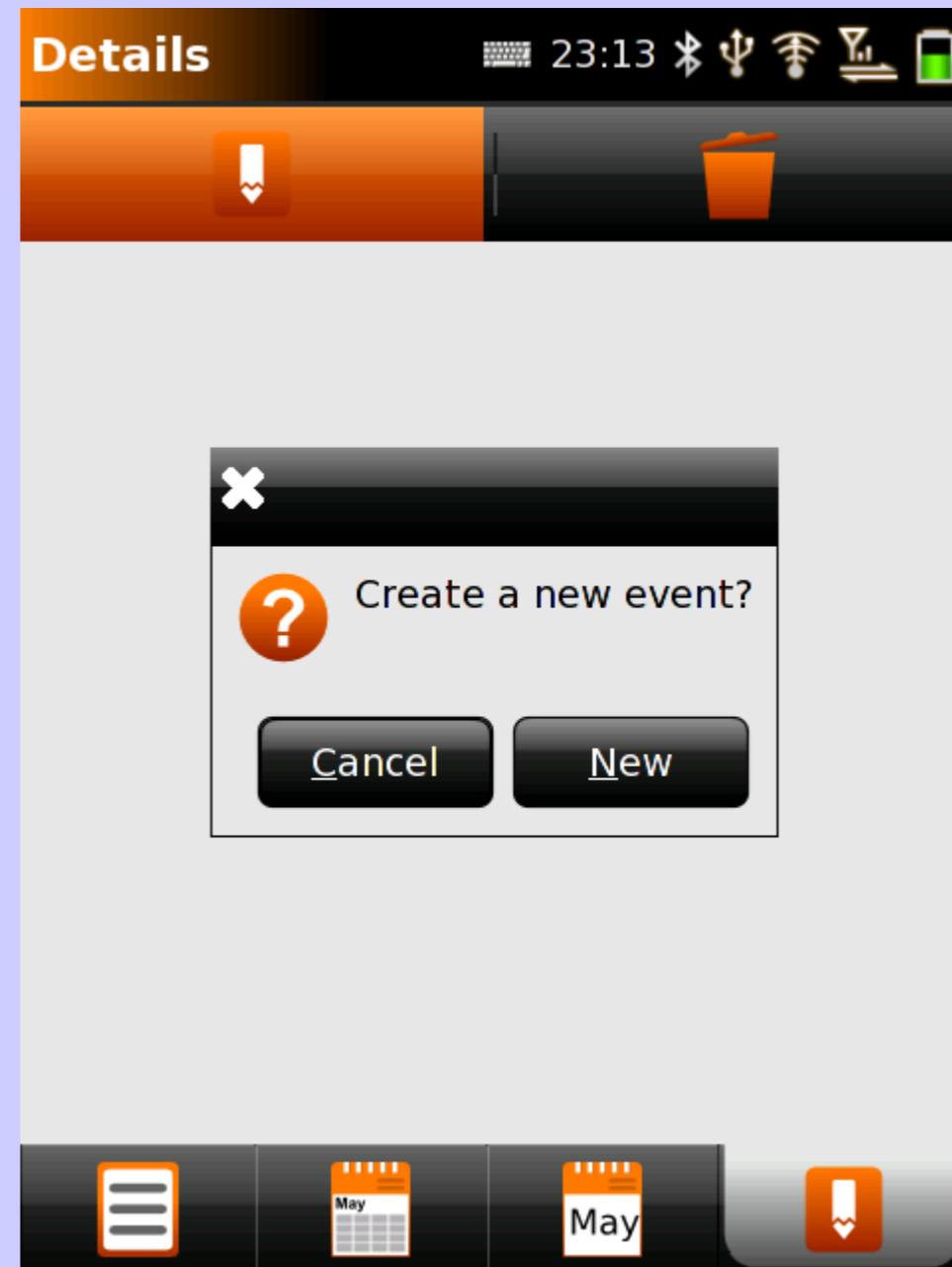
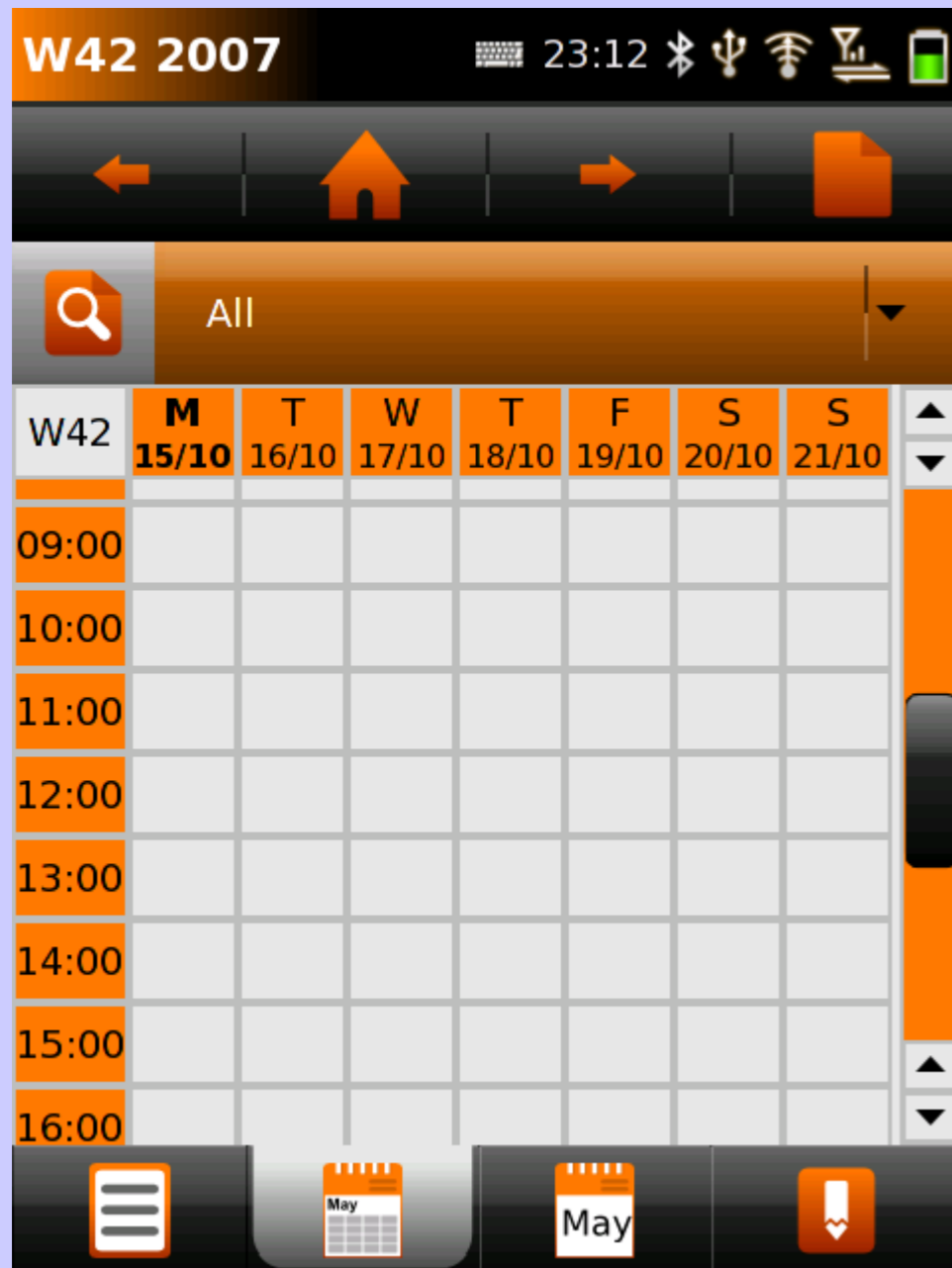
# Dialer



# Contacts



# Dates (Schedule)



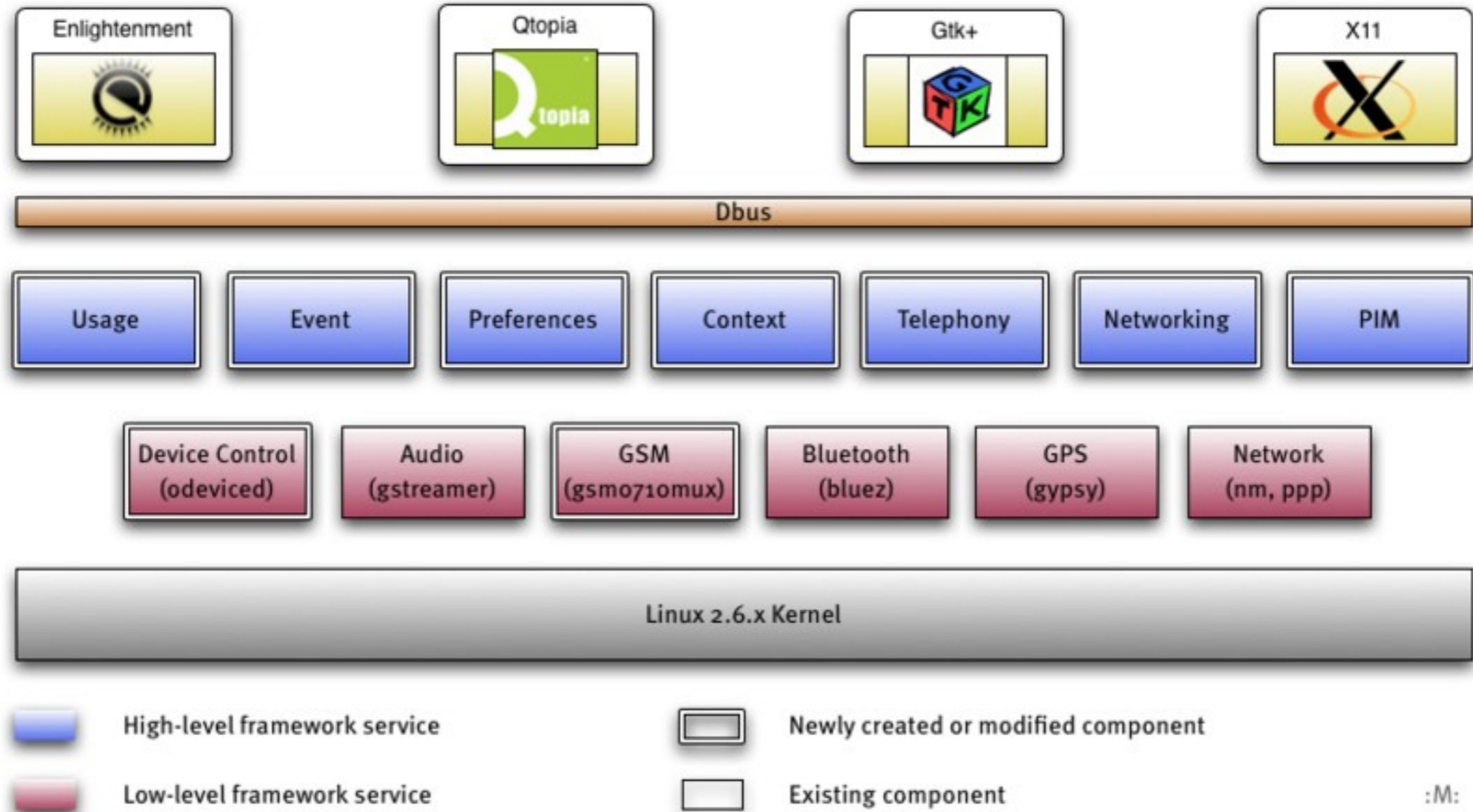
# ASU – April (2008) Software *Update*

- ***Replace previous major apps with Qtopia equivalents*** (Xified)
  - More applications, and more stable
- Use E17 WM, not Matchbox
  - Qtopia-like home page or Slider home page
  - System overall way more graphical!
- Now in use

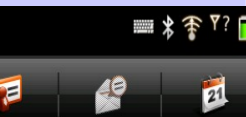


# New, Improved...

## Openmoko 2008 Software Architecture



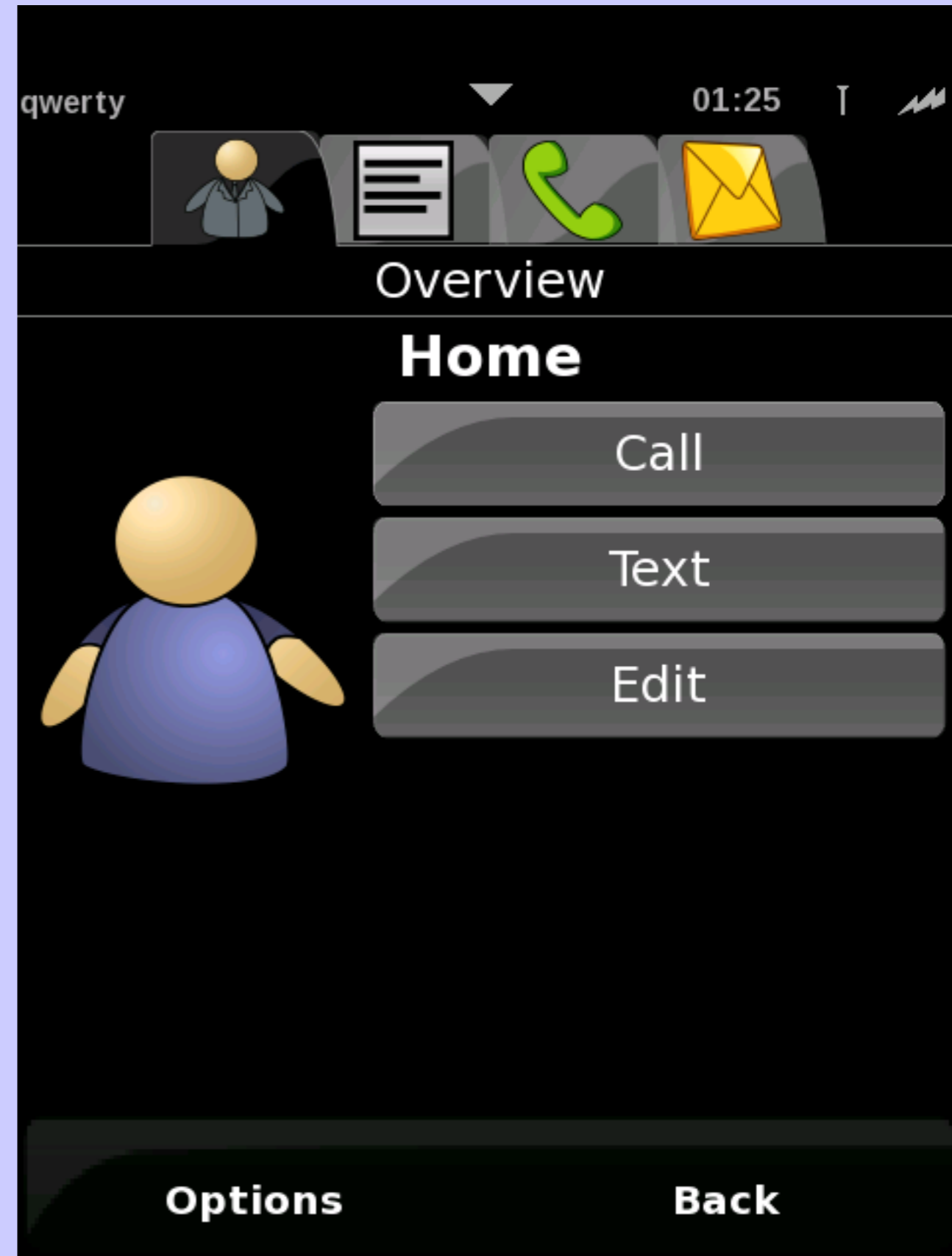
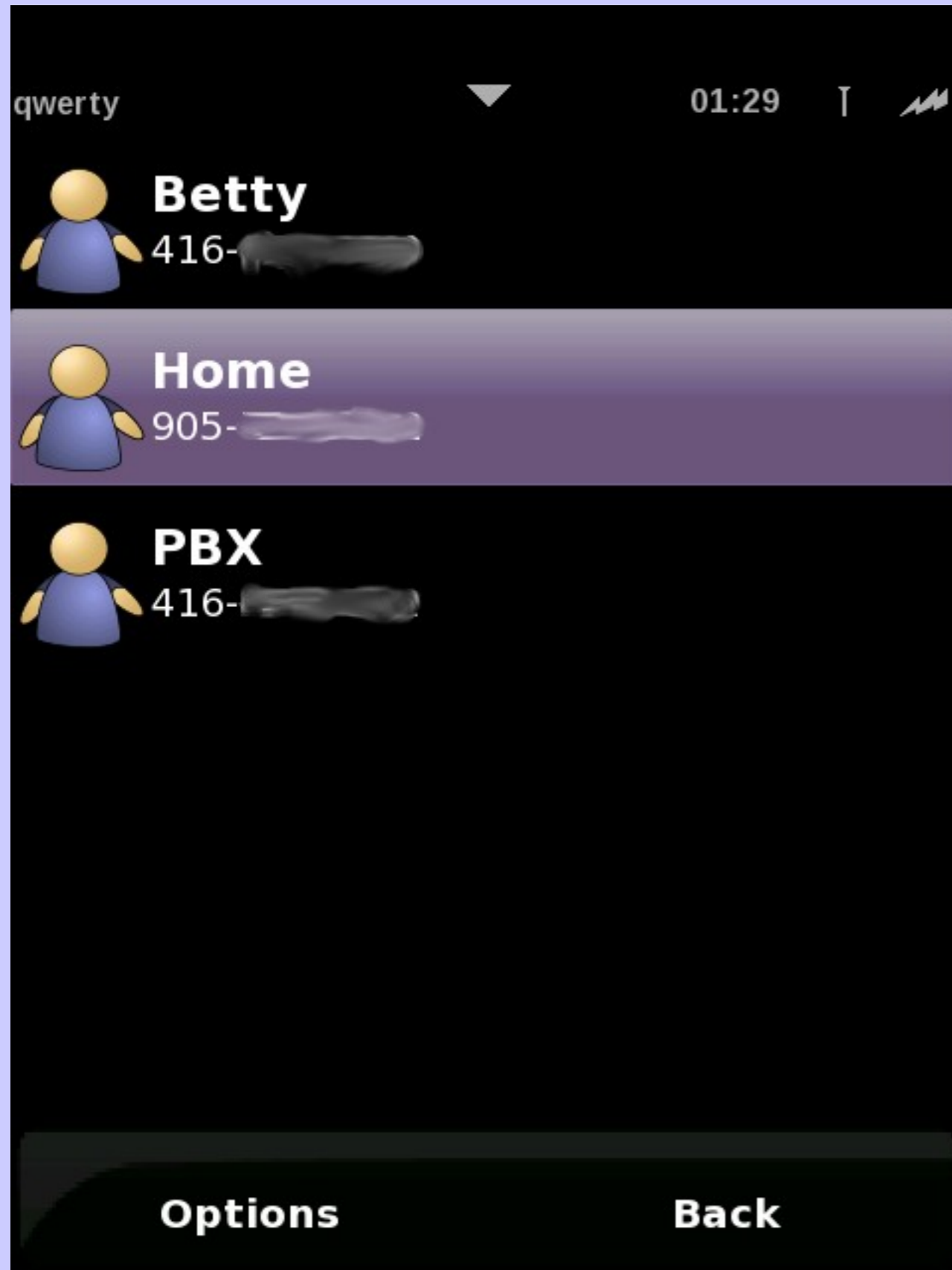
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Monday, 03. December 2007



# Contacts



Remember the disclaimer earlier – this is not necessarily final appearance or functionality!

# Third-party Apps? It Is Linux!

- Since it just “is Linux”, most existing applications can run already – recompile for Arm CPU
  - Minimal: GUI may need tweaking for screen
    - May need other libraries
  - Full: Rewrite View (GUI) using OpenMoko libraries
    - And GUI guidelines!  
[http://wiki.openmoko.org/wiki/GUI\\_Style\\_Guidelines](http://wiki.openmoko.org/wiki/GUI_Style_Guidelines)
    - e.g., don't hard-code any size, orientation
- Standard command line stuff mostly there
- X applications can run in either “direction”



# Ssh Into Phone

```
ian@daroad (ttyt1) - /tmp - Shell - Konsole
Session Edit View Bookmarks Settings Help

ian:16$ ssh phone
root@fic-gta01:~$ pwd
/home/root
root@fic-gta01:~$ ls
Screenshot-1.png  playlists          scripts
root@fic-gta01:~$ uname -a
Linux fic-gta01 2.6.22.5-mokol1 #1 PREEMPT Fri Oct 5 05:56:38 BST 2007 armv4tl u
nknown
root@fic-gta01:~$ ls /
bin      dev      home     media    proc     sbin     tmp      var
boot    etc      lib      mnt      s        sys      usr
root@fic-gta01:~$ ps ax|more -8
more: -8: No such file or directory
root@fic-gta01:~$ ps ax|head
  PID TTY          STAT       TIME COMMAND
    1 ?           Ss          0:12 init [5]
    2 ?           S<          0:00 [kthreadd]
    3 ?           SN          0:00 [ksoftirqd/0]
    4 ?           S<          0:00 [watchdog/0]
    5 ?           S<          0:00 [events/0]
    6 ?           S<          0:00 [khelper]
   48 ?           S<          0:00 [kblockd/0]
   49 ?           S<          0:00 [ksuspend_usbd]
   52 ?           S<          0:00 [khubd]
root@fic-gta01:~$ file
-sh: file: not found
root@fic-gta01:~$
```



# Build Your Own App...

- Initial Application Development documentation assumed you building filesystem images
  - Requires 7GB of disk and many hours
- See [http://wiki.openmoko.org/wiki/Application\\_Development\\_Crash\\_Course](http://wiki.openmoko.org/wiki/Application_Development_Crash_Course)
- Linux “Application Developer” package available
  - Libraries, header files, cross-compiler/linker, packager
  - Download from <http://wiki.openmoko.org/wiki/Toolchain>
  - Required steps at [http://wiki.openmoko.org/wiki/Building\\_a\\_hello\\_world\\_application](http://wiki.openmoko.org/wiki/Building_a_hello_world_application)
  - Not yet ported to \*BSD



# BYOA II

- Tools used:
  - MokoMakefile
    - Meta-wrapper for everything
  - OpenEmbedded Tool Chain
  - Bitbake
    - Make-like thing in Python
  - gcc cross-compiler



# Program in any(?) Language

- C/C++ is “normal” language
- Perl?, sh scripting available
- Python
  - Available for all; included in FSO
- Java:
  - Jalimo is best; uses Kaffe/ClassPath/...
  - Other projects underway

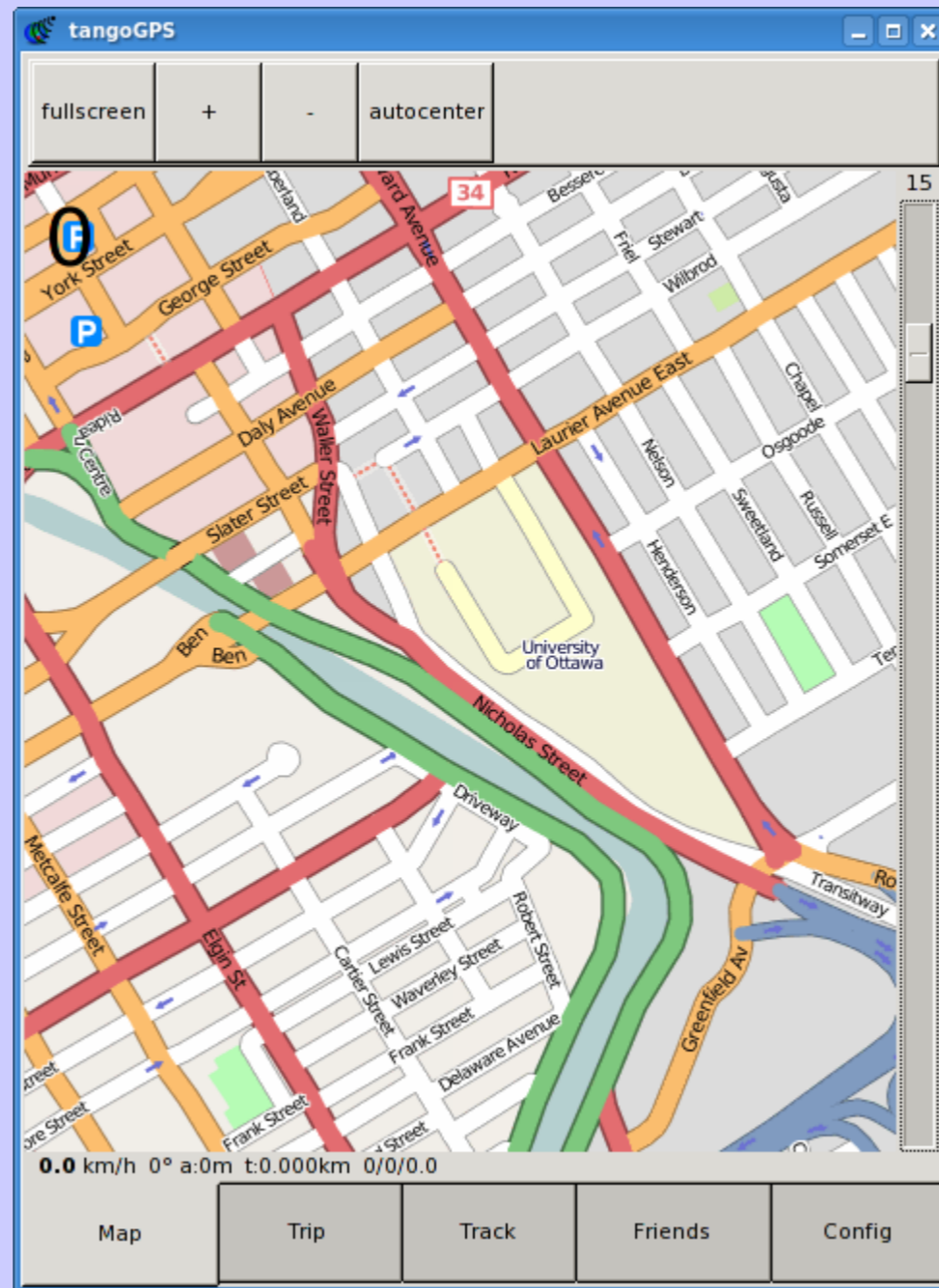


# Neat Uses Today

- It's a phone! (more or less)
- Audio
  - Media player
  - Voice recorder
- Video – player (GTA02 accelerated video)
- It's a GPS
  - Navigation (GPSDrive? TangoGPS? Diversity!)
  - OpenStreetMap (tracking; display; routing?)



# TangoGPS



# Neat Uses Tomorrow

- Accelerometer-based apps
  - Wii paddle? Screen rotation? Key gen?
- WiFi – Unified Cell/VOIP dialer application
  - Handover?
  - Asterisk? (Brandon Kruse at Digium...)
- ***The best apps are probably not even thought of yet***
  - Location-aware
  - Accelerometer-aware
  - Imagination is your friend.



# Code



# You can buy one now

- You could buy a GTA01 ~~now~~ sold out
  - This is not a consumer phone!
  - Aimed at developers and early adopters
  - Various “issues” being worked on
- You can buy a GTA02 now
  - Just go pay at <http://www.openmoko.com/>
  - Will be consumer-ready (someday)



# Resources

- OpenMoko Wiki: <http://wiki.openmoko.org/>
- FAQ: <http://wiki.openmoko.org/wiki/FAQ>
- Mailing lists:  
[http://wiki.openmoko.org/wiki/Development\\_resources#Mailing\\_Lists](http://wiki.openmoko.org/wiki/Development_resources#Mailing_Lists)
  - e.g., Community – discussion
  - e.g., Announce – the usual low-volume
- <http://projects.openmoko.org/> - “forge” site for add-on projects
- IRC channel #openmoko on irc.freenode.net



# Remember...

- OpenMoko is not a phone, it's a movement
  - OpenMoko.com sells freed phones
  - OpenMoko.org provides an open source phone stack, initially aimed at OpenMoko.com hardware
- *OpenMoko is about using Open Source to change the rules of engagement between the consumer and the carriers*

***Free Your Phone  
(and your mind will follow)!***



# Questions (and maybe answers)



