GNU/Linux: coming to a phone near you: Maemo Leste

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Mix of technical and non-technical parts

- What and Why
- History of Maemo and CSSU
- Overview of components
- Current status, news
- Future plans, milestones
- How you can participate/help

What is Maemo Leste?

- GNU/Linux
- Mobile OS for phones and tablets
- Based on Devuan (ascii release - Debian stretch based)
- Soon to be based on Devuan beowulf - Debian buster
- No vendor kernels: only mainline linux (with minimal patches)
- Linux experience: freedom, hackability (want wireguard? no problem. btrfs? got you covered.)
- Alpha stage

Why Maemo Leste?

- Need an OS for FOSSers
- Tired of Android, other mobile OSes, broken promises about openness
- Open, hackable, not locked down
- Show that we can have a viable FOSS mobile OS
- Community developed (!)

History: Maemo Fremantle

Mobile "hacker" OS made by Nokia for the N900. (And previous versions before that for the Nokia 770, Nokia 800, Nokia 810)

Still usable today (still use it today)

- Uses the debian package manager
- GNU/Linux
- Only some parts are open source
- Still maintained by the community: CSSU (Community Seamless Software Update)
- https://wiki.maemo.org/Fremantle_closed_packages
- https://wiki.maemo.org/Free_Maemo

Idea: build on Maemo Fremantle's proven OS

- Maemo Fremantle got a lot of things right, but hard to port because a lot of components are (or were) closed source.
- Open source everything, stay mostly compatible on API level with Fremantle (no need to figure out APIs)
- Big ecosystem of open source applications written for Fremantle, recompile/port it

Userspace components

- **mce**: Mode control entity
- **dsme**: Device state management entity
- **icd2**: internet connectivity daemon (manages wifi, cellular data)
- **ke**-recv: receive and process kernel events
- **clockd and alarmd**: clock and alarm
- **hildon framework**: user interface (gtk, qt)
- **hildon-desktop and hildon-home**: window manager and main ui
- **him**: hildon input method framework
- **PyMaemo**: Python interfaces to most hildon components

Builds on existing standardised daemons/tools (next slide)

Userspace components: standardised daemons

- dbus (bus for communication), gconf (settings)
- udev (kernel events), evdev (input events)
- pulseaudio (audio)
- upower, udisks (power and storage)
- hostapd/wpa_supplicant, ofono, lircd, bluez/bluetoothd (connectivity)

Porting older Maemo code

- Replace HAL with udev, upower, udisks, input devices, gadgetfs
- Port Maemo widgets and patches to Qt5, gtk
- Replace or rewrite closed parts/dependencies
- Maemo CSSU has done a lot of porting and reverse engineering
- Device specific X drivers

Maemo Leste infrastructure: CI

- Repository hosted on maemo.org servers
- Website and build servers hosted at home
- Jenkins + jenkins-debian-glue builds our packages
  - https://phoenix.maemo.org/
- Build slaves are KGPE-D16 desktop and a Softiron Overdrive machine (arm64).

Status

Maemo Leste is in an alpha stage now (no longer pre-alpha).

The following mostly just works, with a good UI:

- Virtual keyboard
- Wireless
- 2g/3g/4g connectivity (still work in progress)
- Audio
- Charging
- Basic browsing
- USB peripheral/otg

Also see https://leste.maemo.org/Status

Status: work in progress

The following items are being worked on

- ofono (data, sms, calls) and connui-cellular - getting there
- Good UI for calls, contacts and SMS
- 3d acceleration - looking bright
- Camera support

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- Good UI for calls, contacts and SMS
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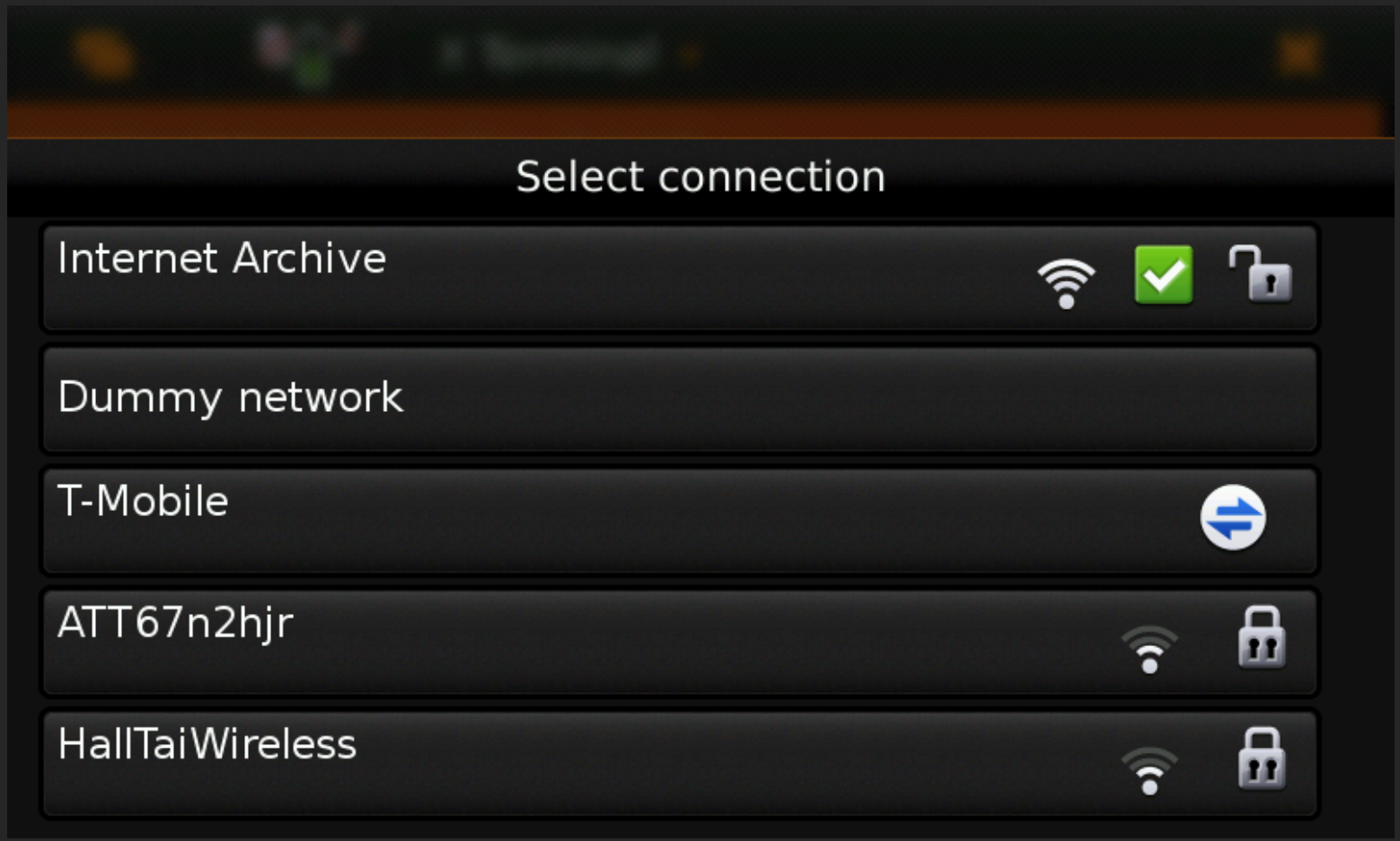
Screenshot time

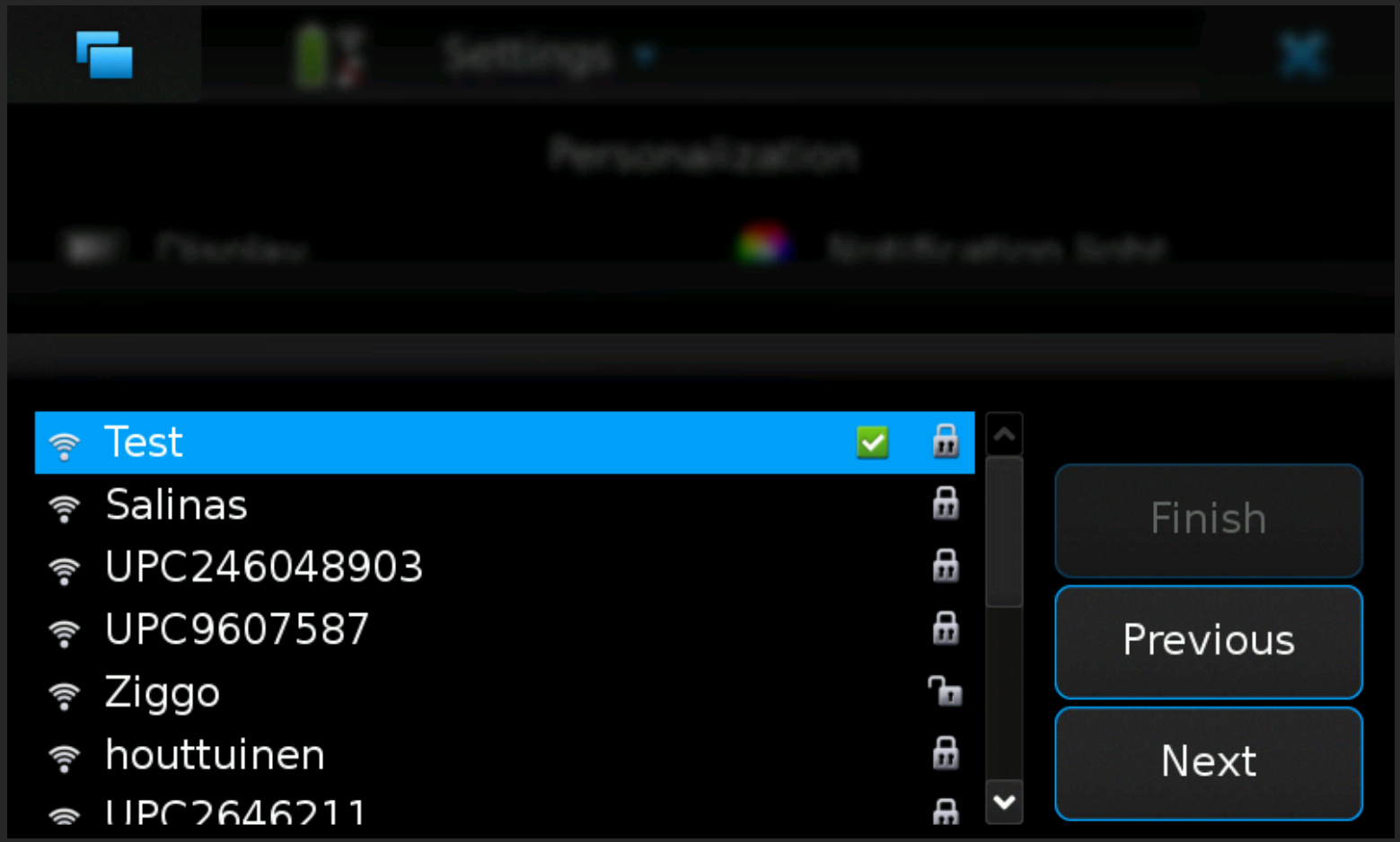
Status: Wireless UI



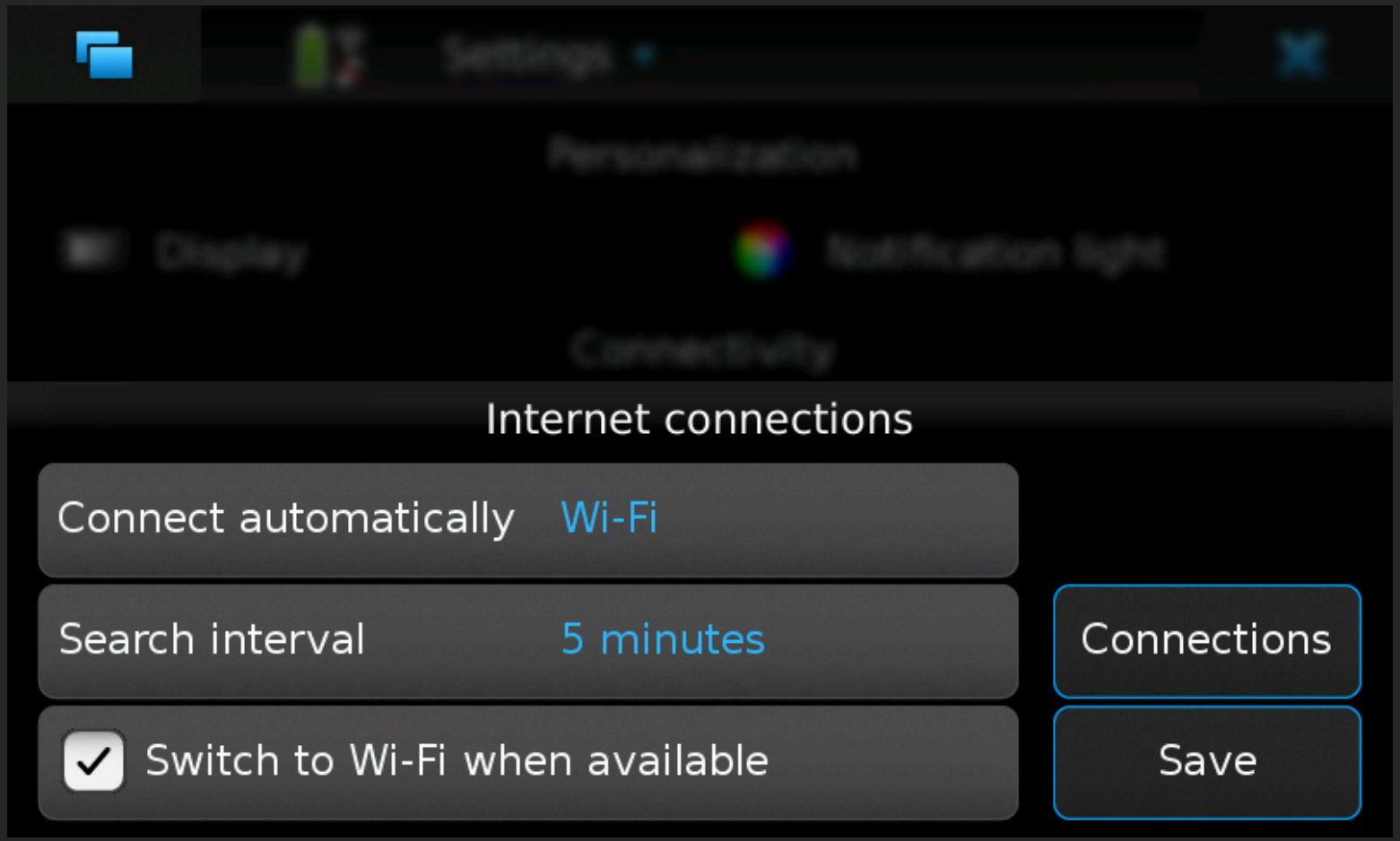
Status: Wireless UI part II

WPA2 EAP works

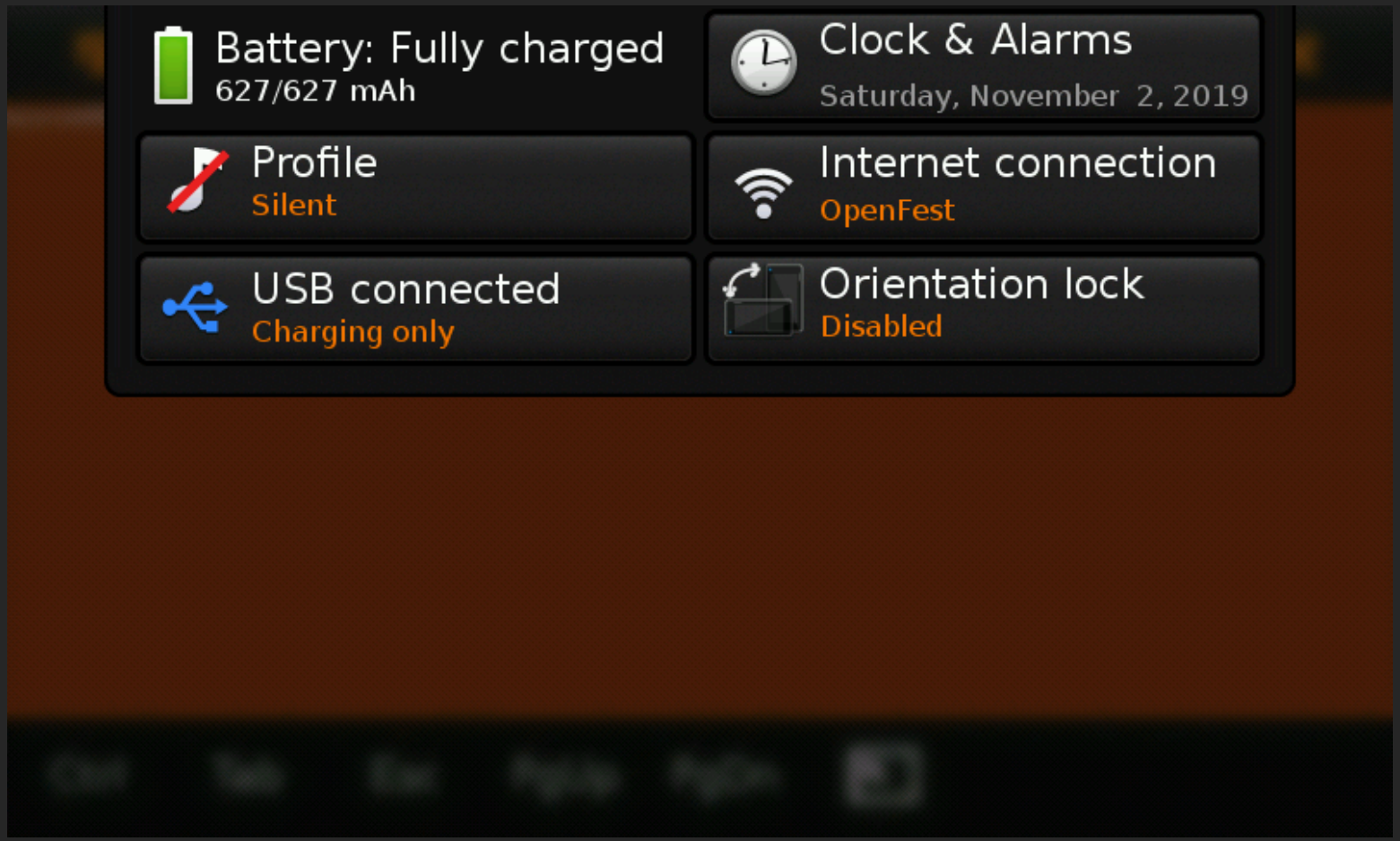
Status: Wireless UI part III



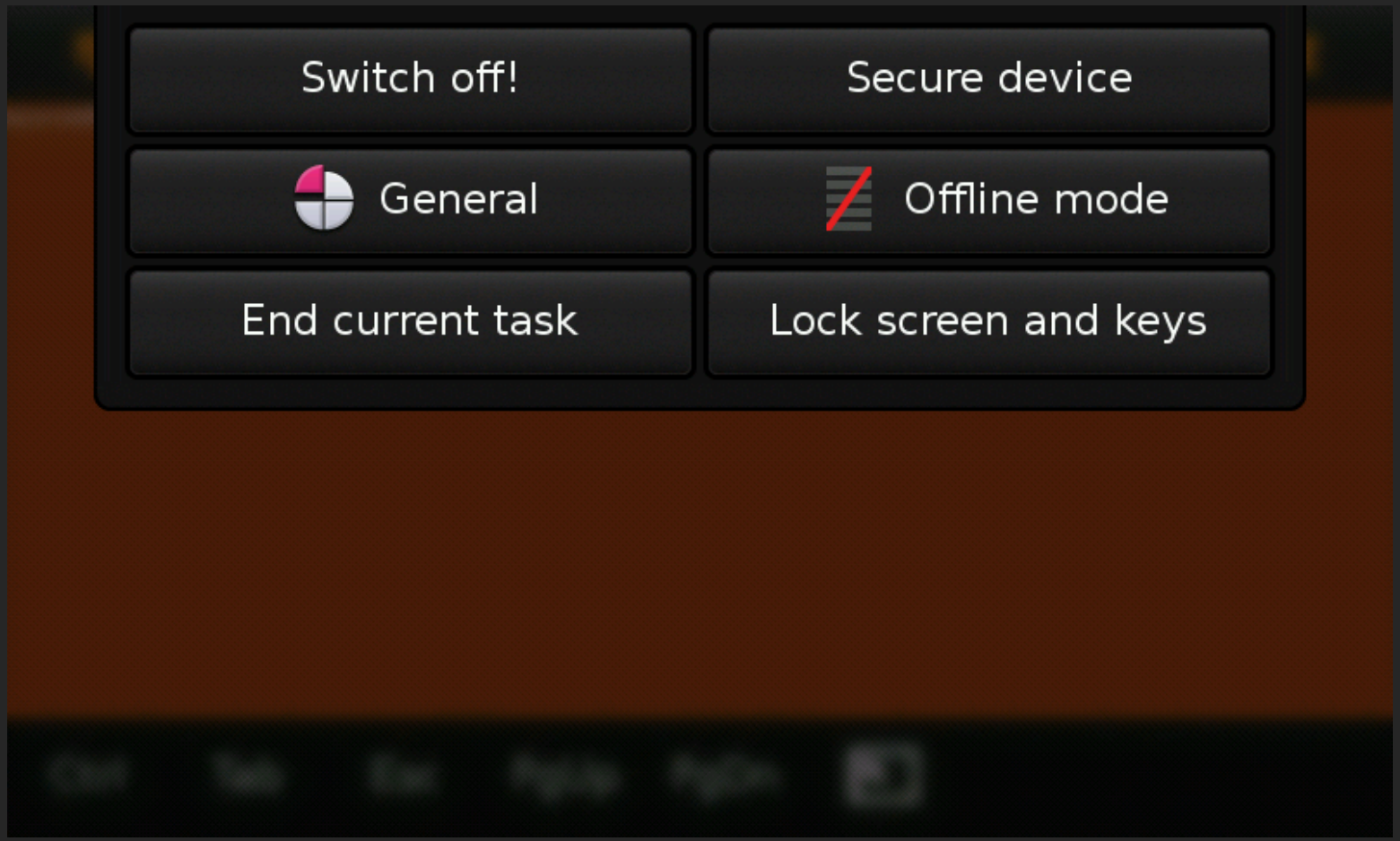
Status: Wireless UI part IV



Status: Hildon UI

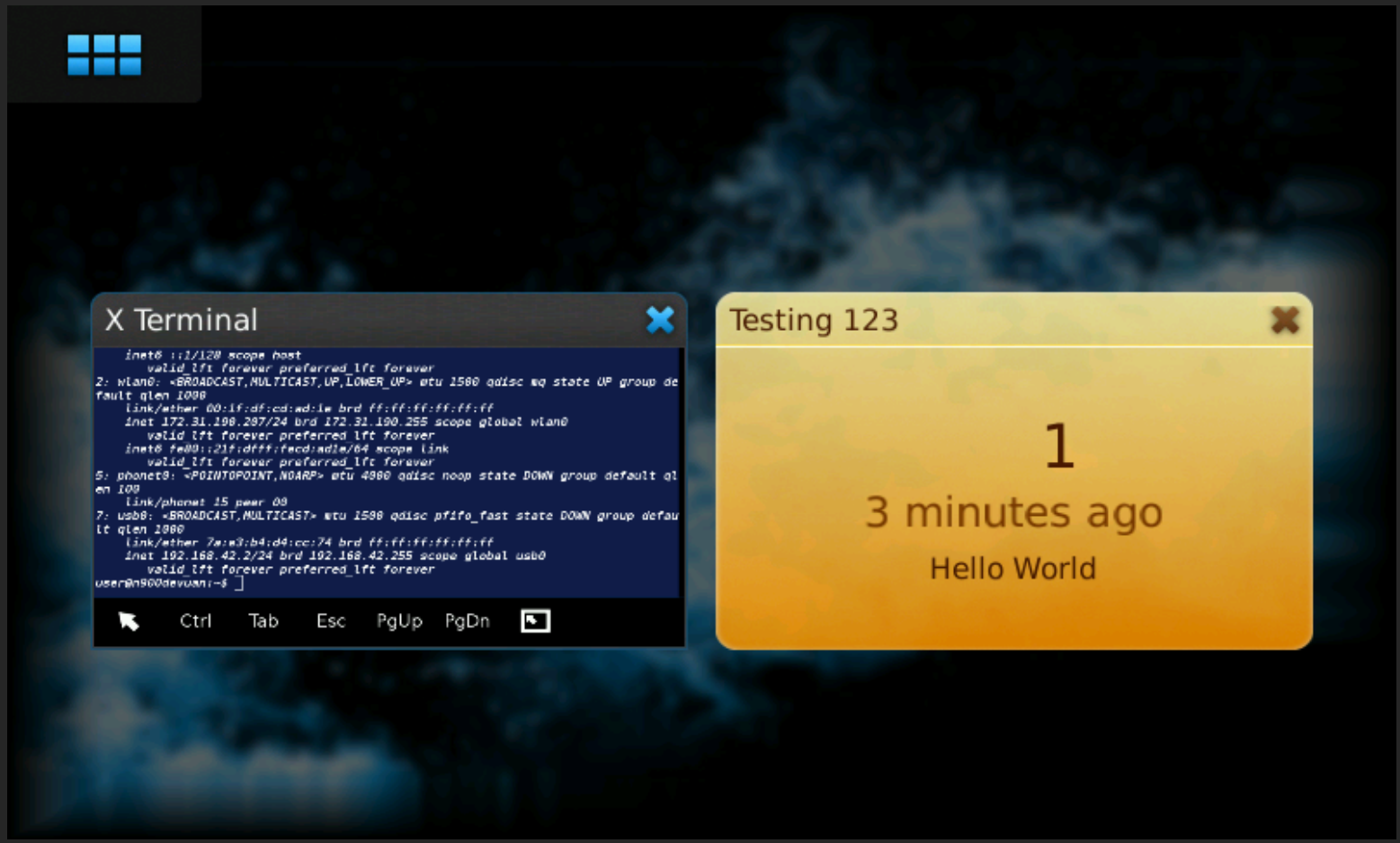


Status: Hildon UI part II

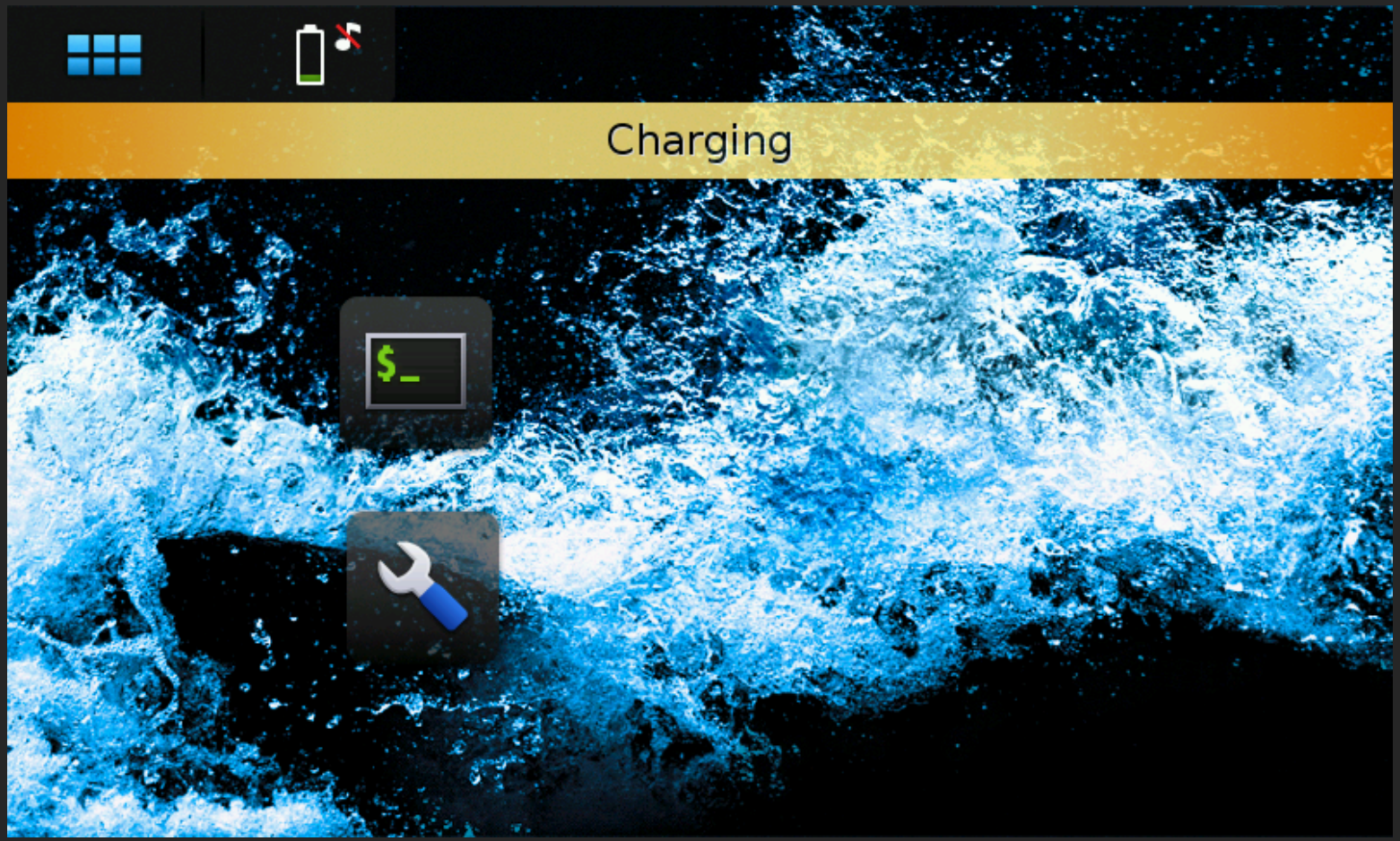


Status: Hildon UI part III

Status: Hildon UI part IV



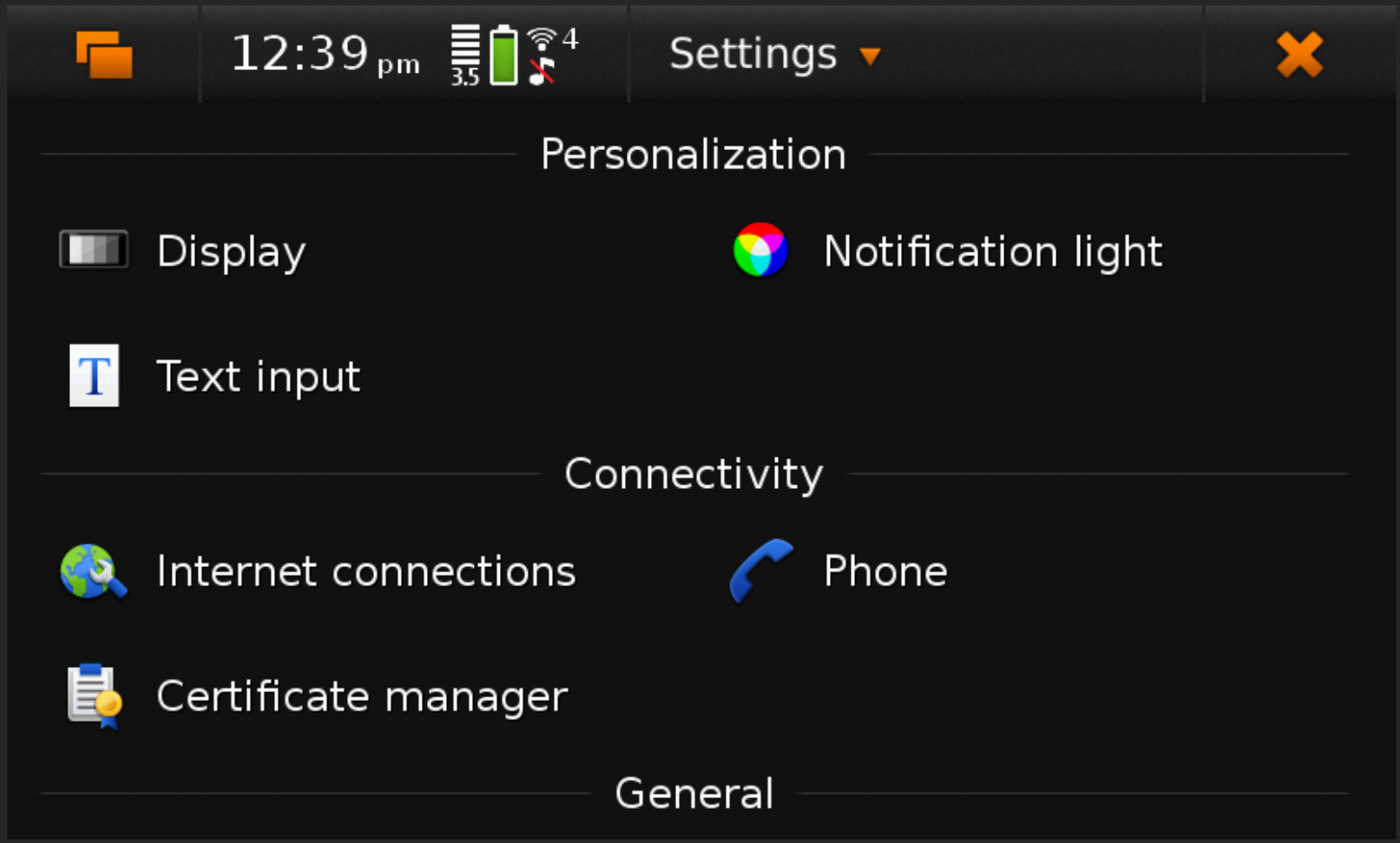
Status: Hildon UI part V



Status: Hildon UI part VI

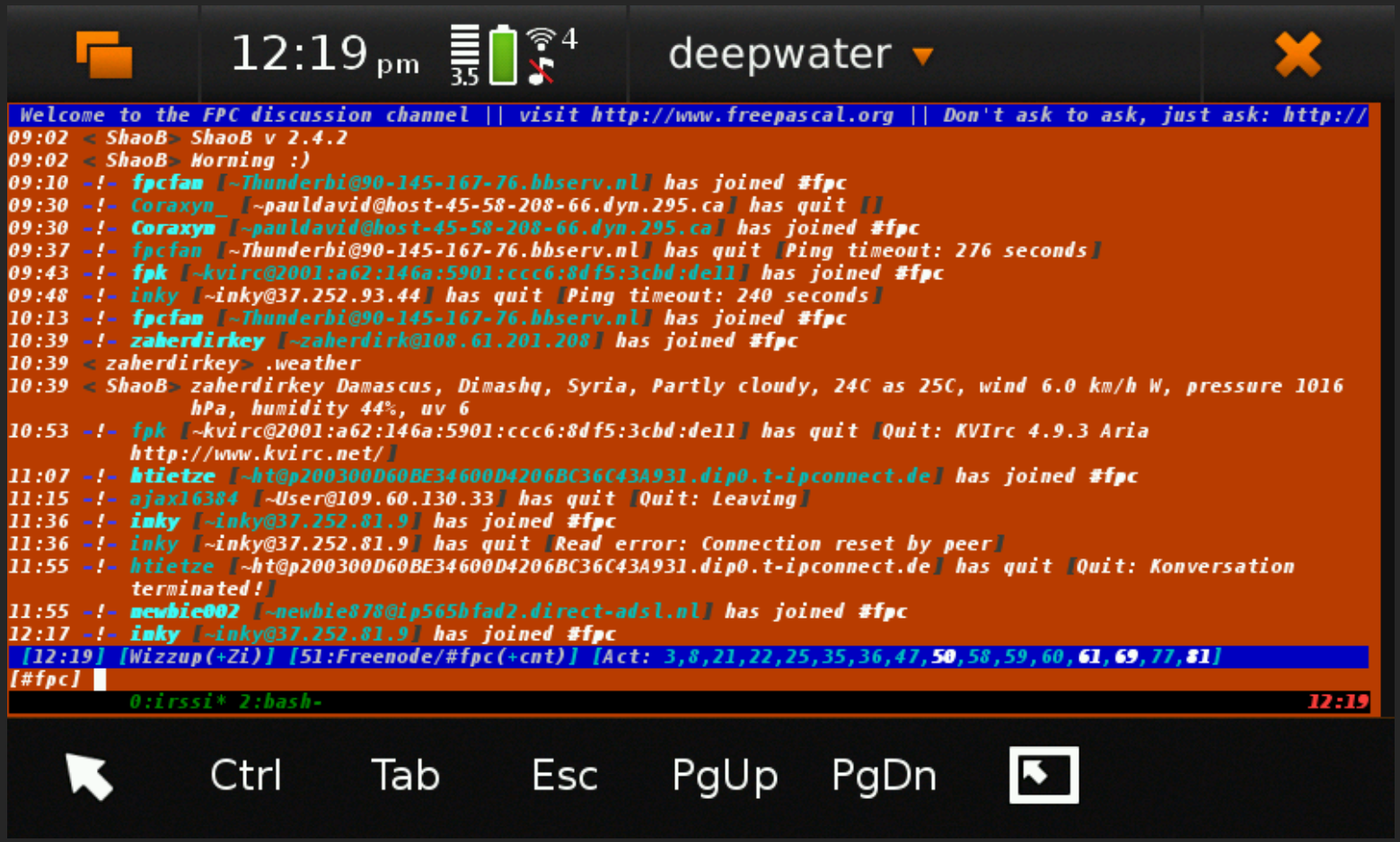
Status: Hildon UI part VII

Status: Settings

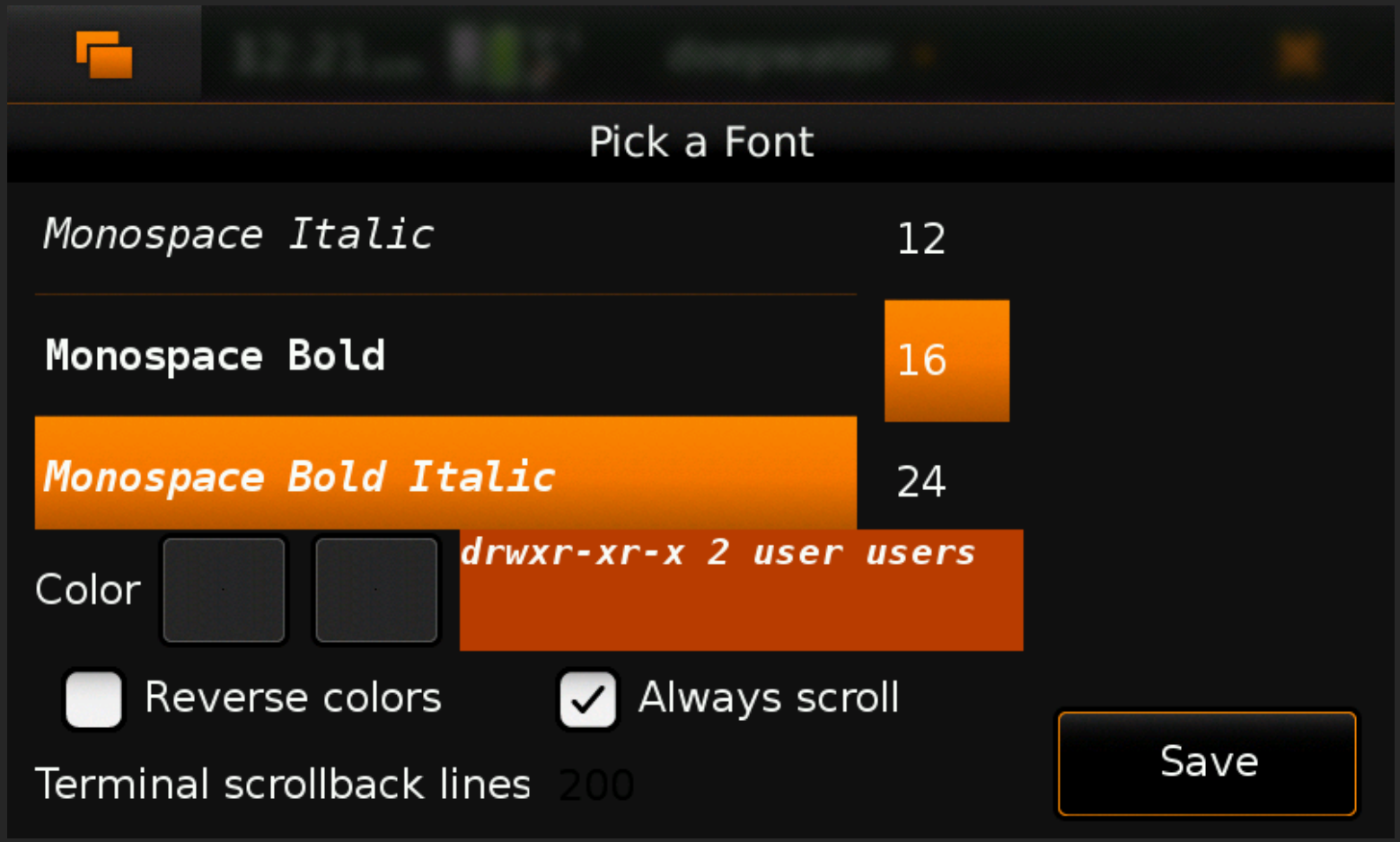


Status: Terminal

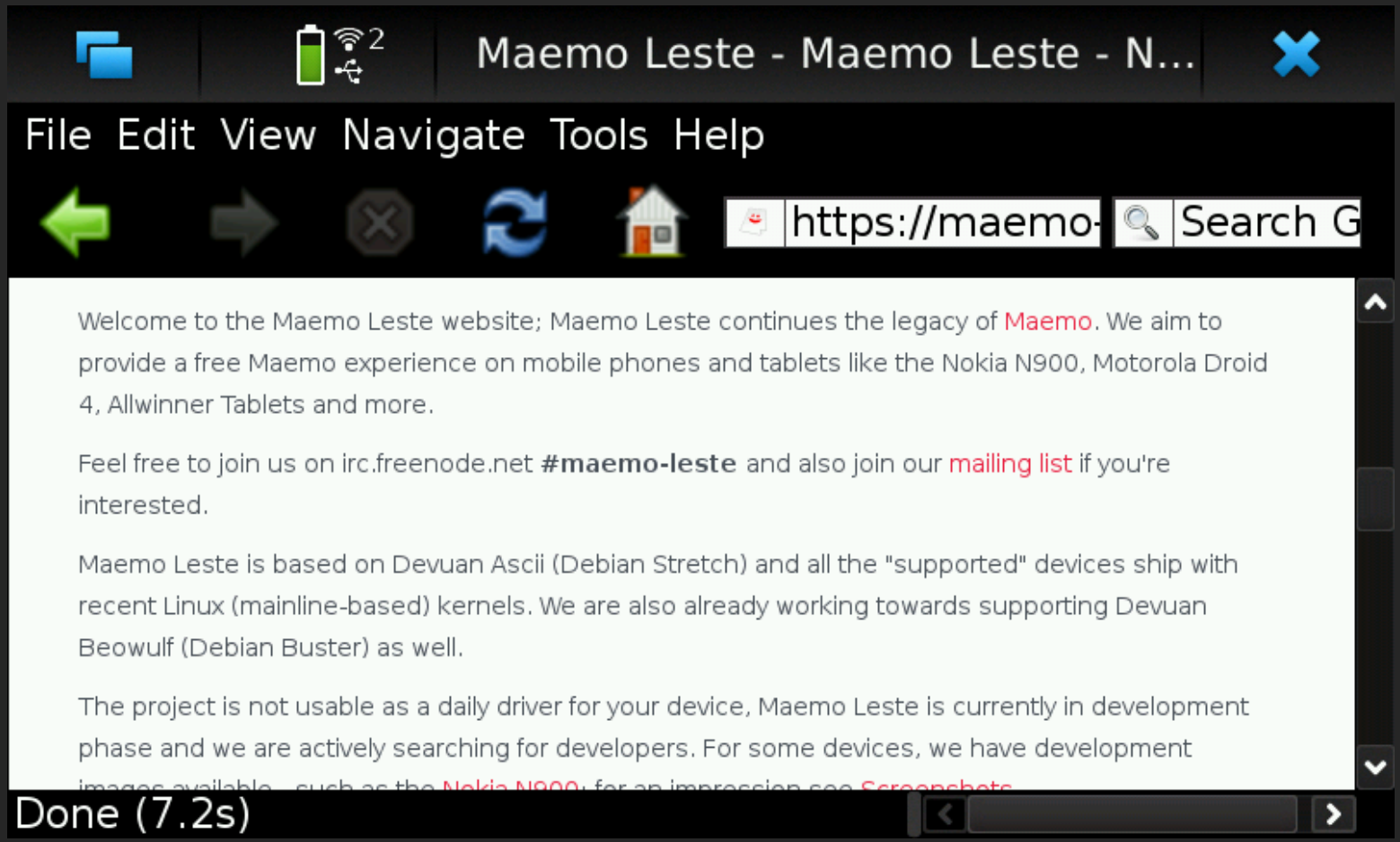
Status: Terminal part II



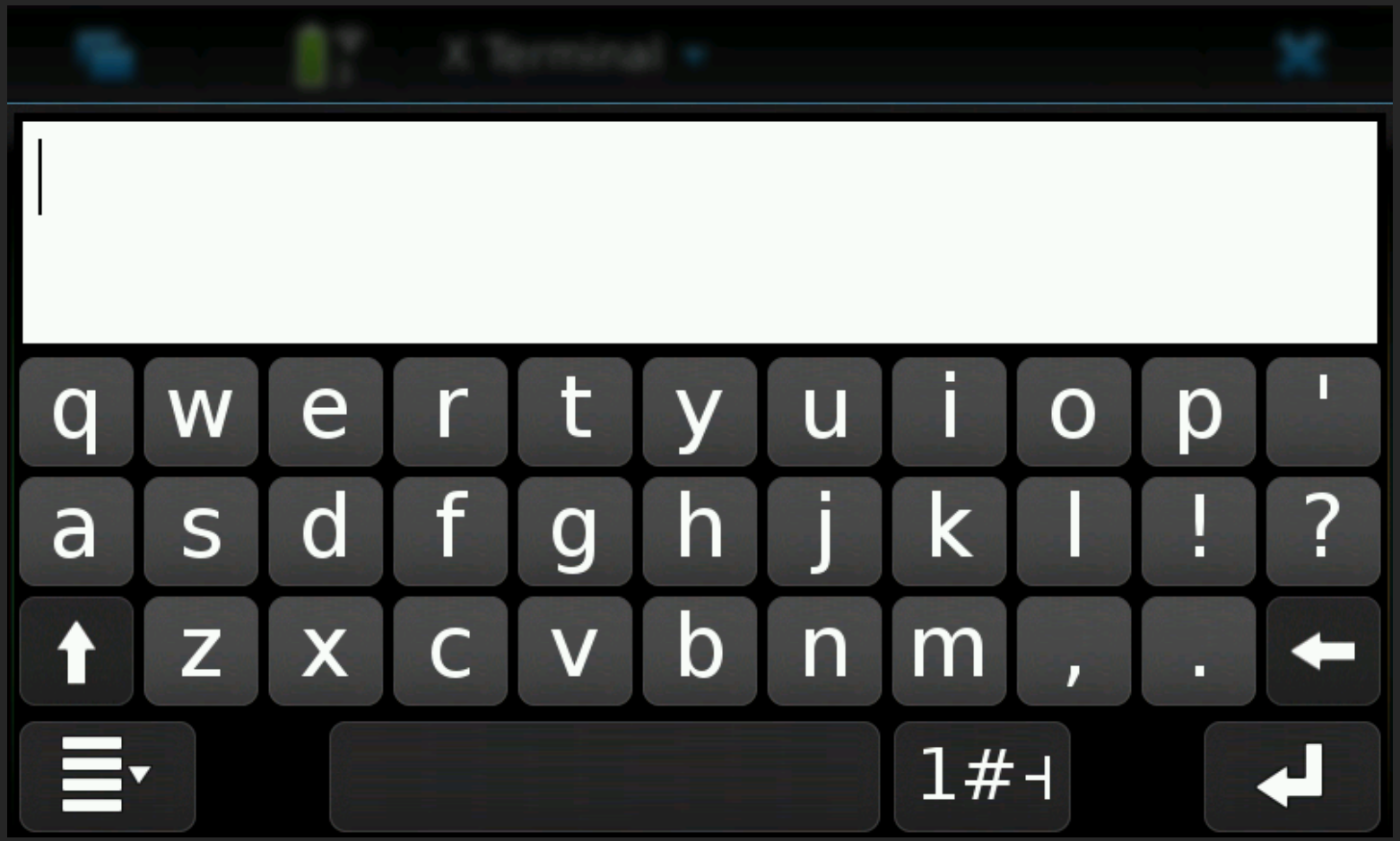
Status: Terminal part III



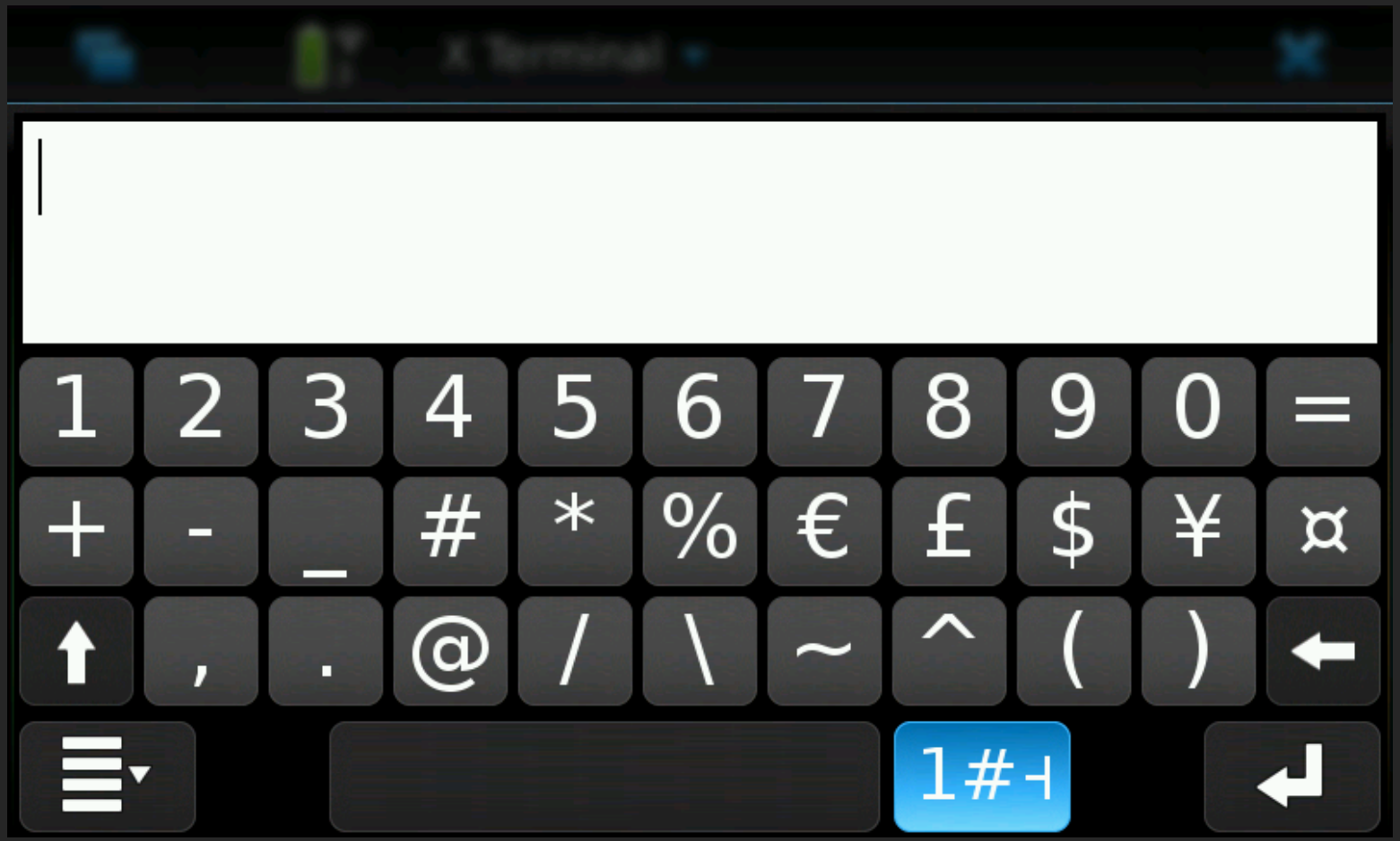
Status: Browser



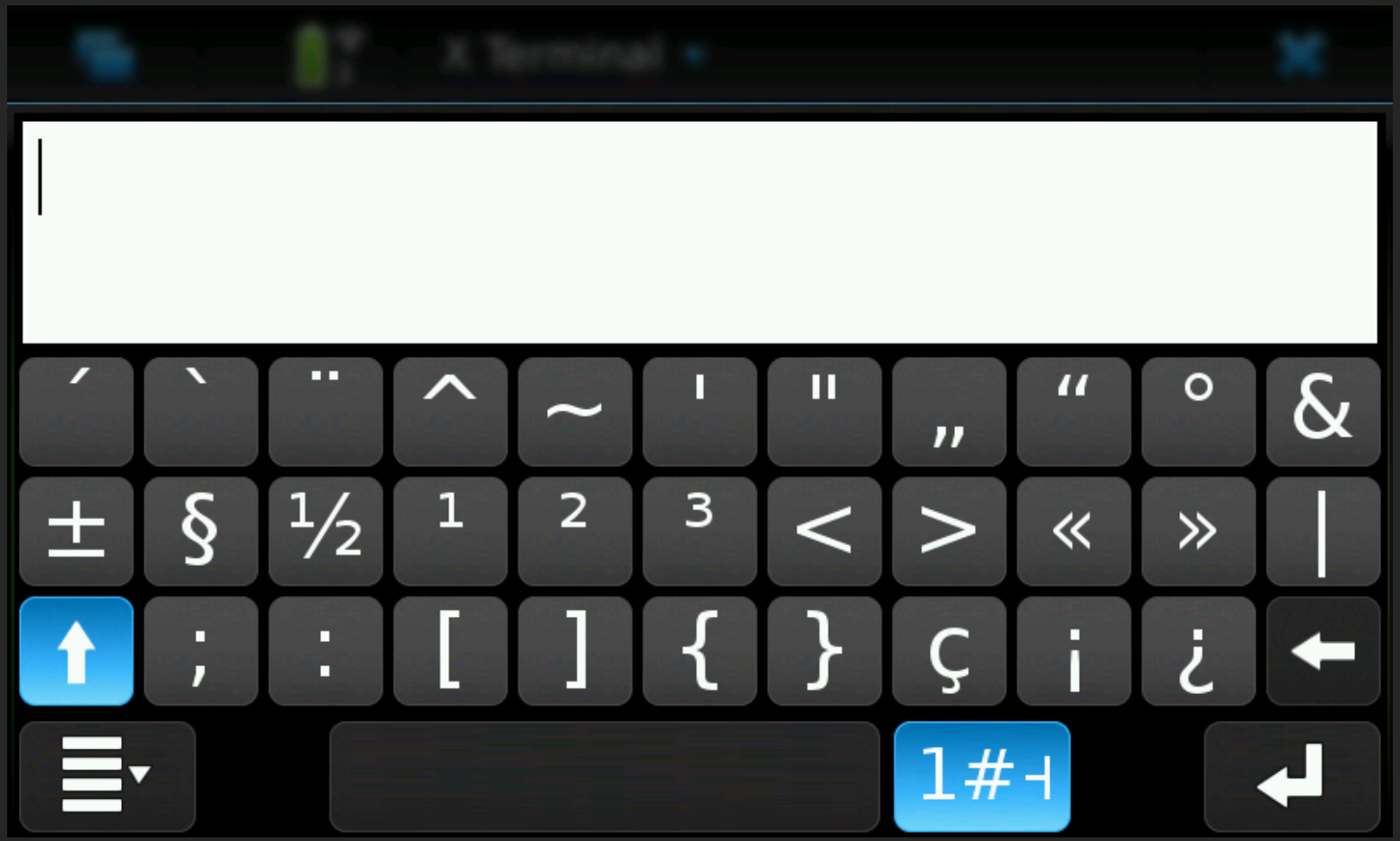
Status: Virtual Keyboard



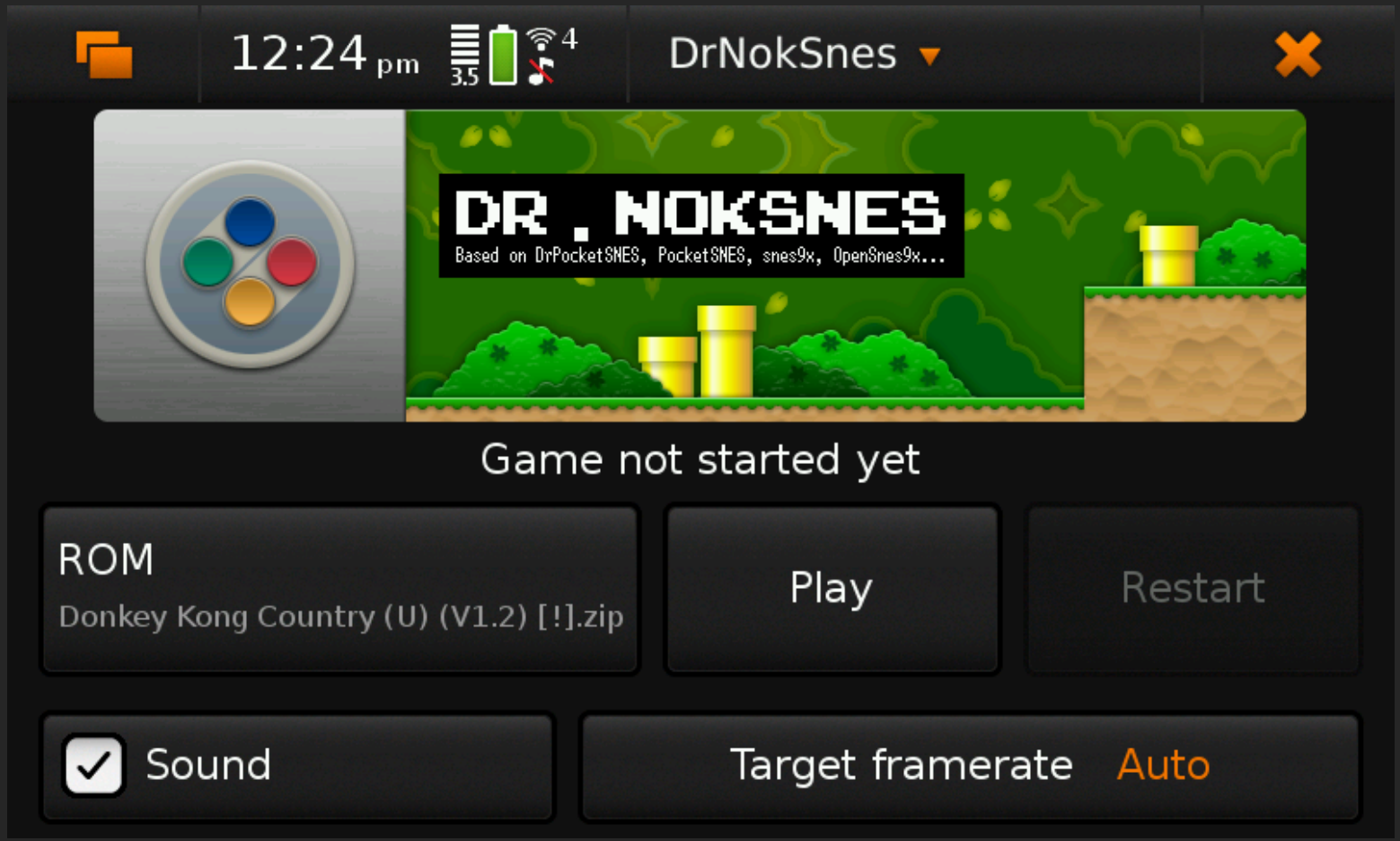
Status: Virtual Keyboard: part II



Status: Virtual Keyboard: part III

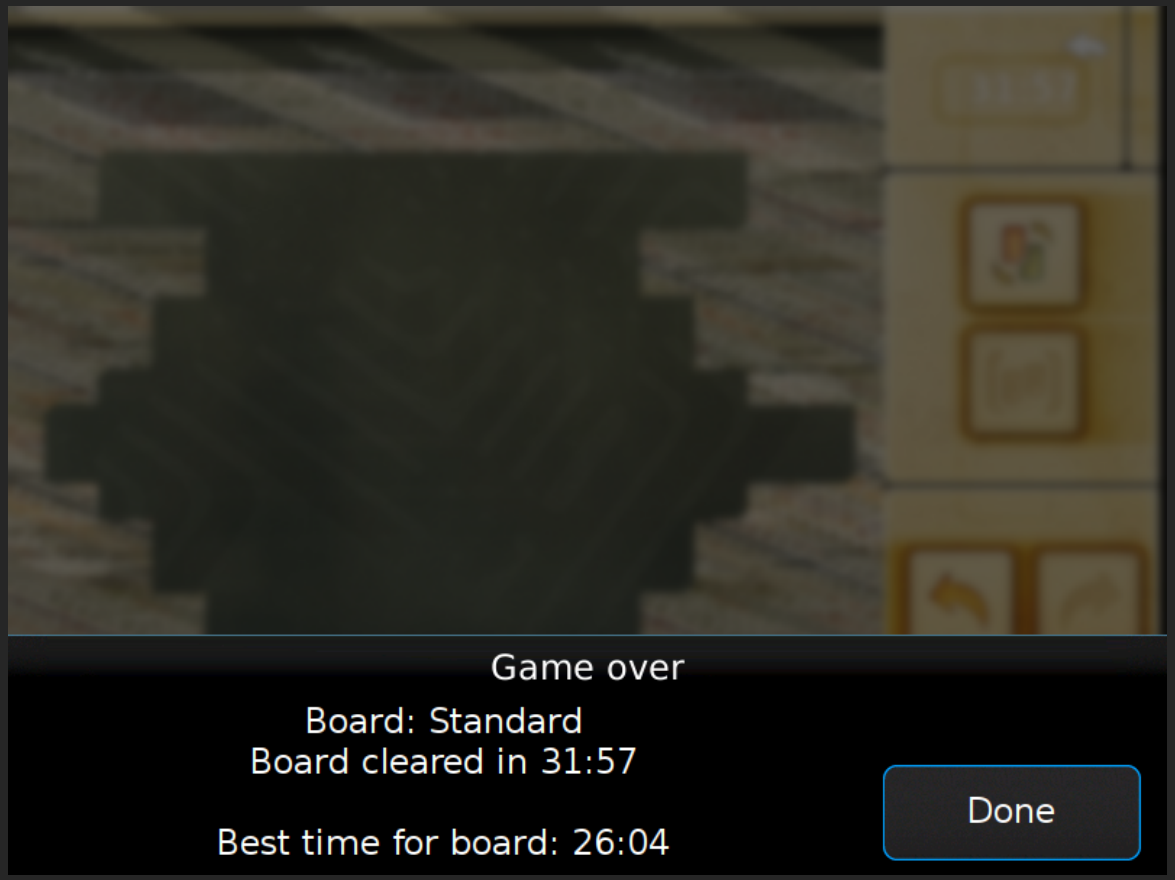


Status: Games: SNES emulator

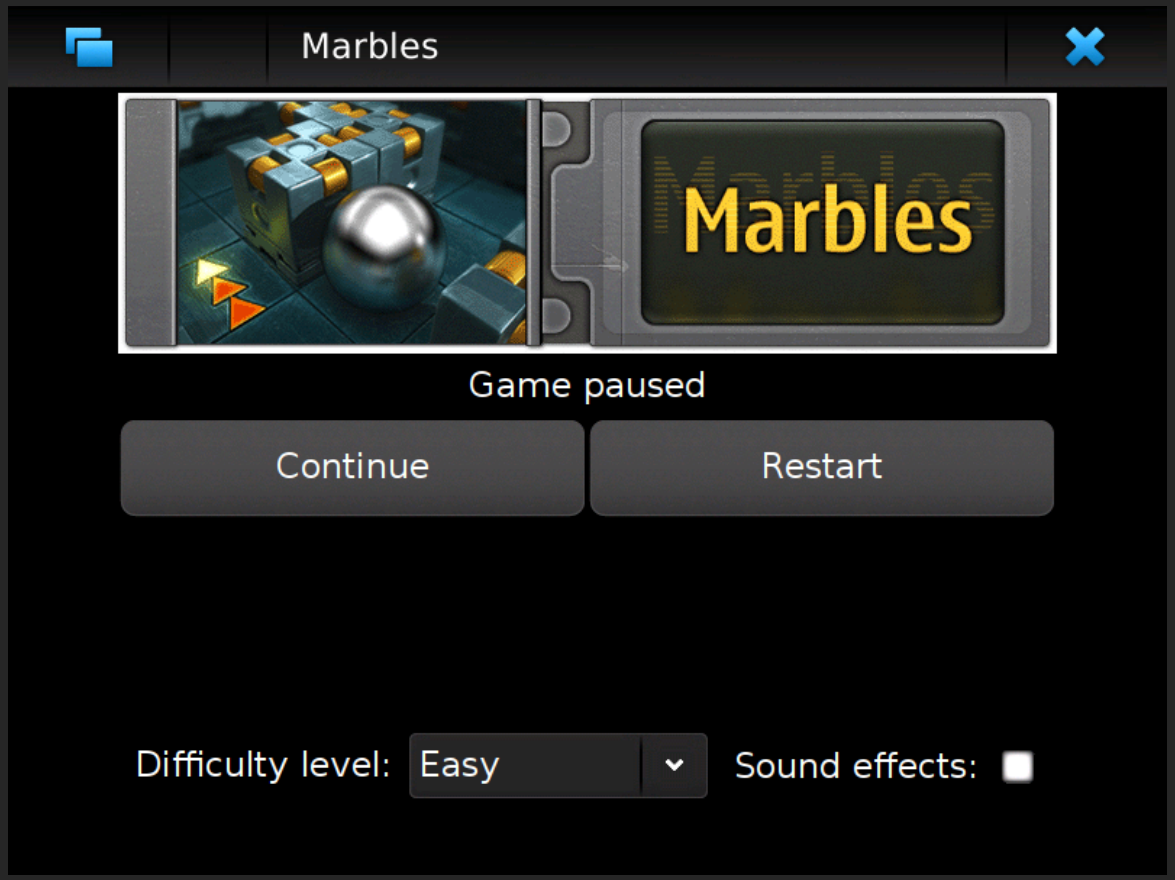


Status: Games: Mahjong

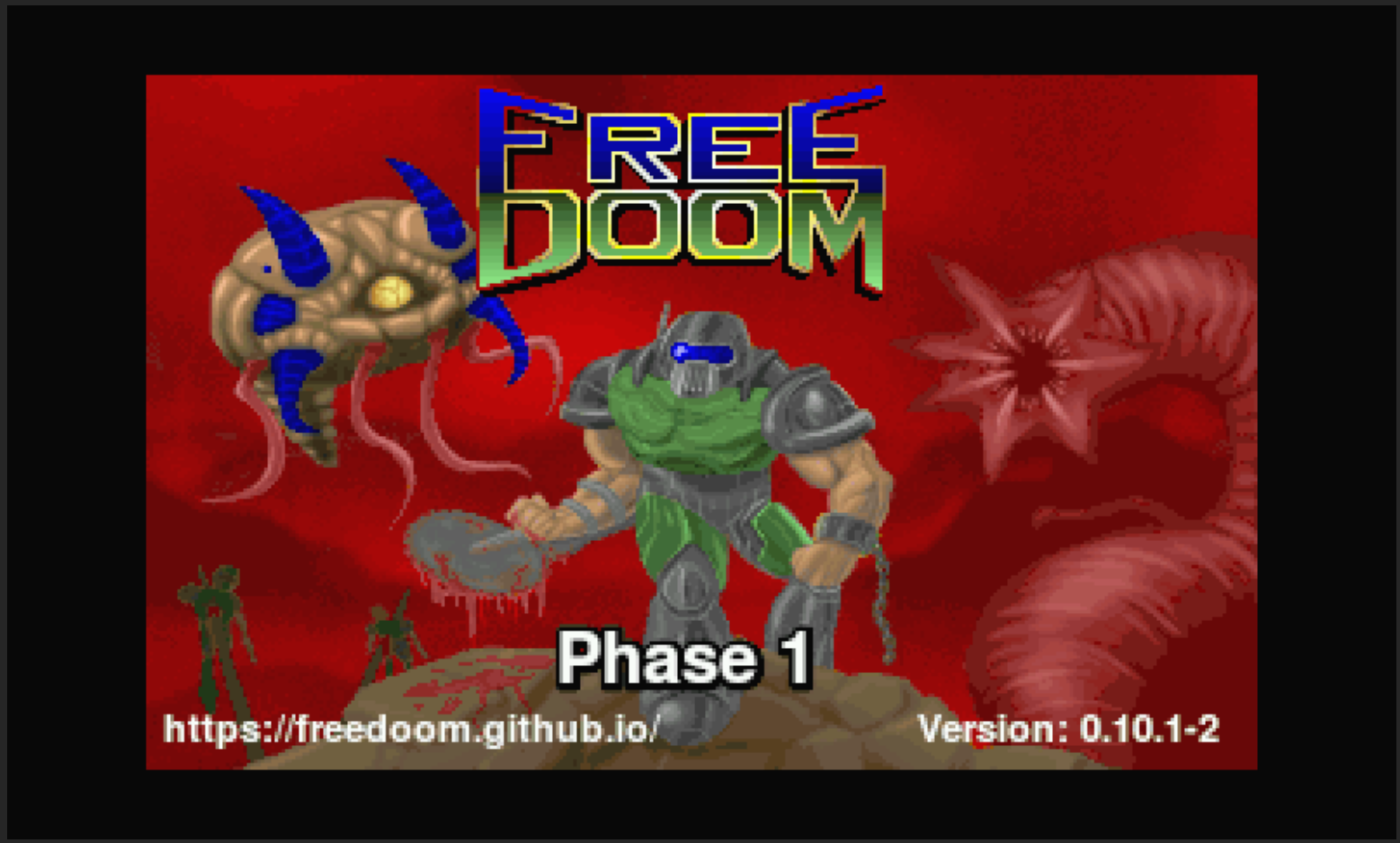
Status: Games: Mahjong part II



Status: Games: Marbles

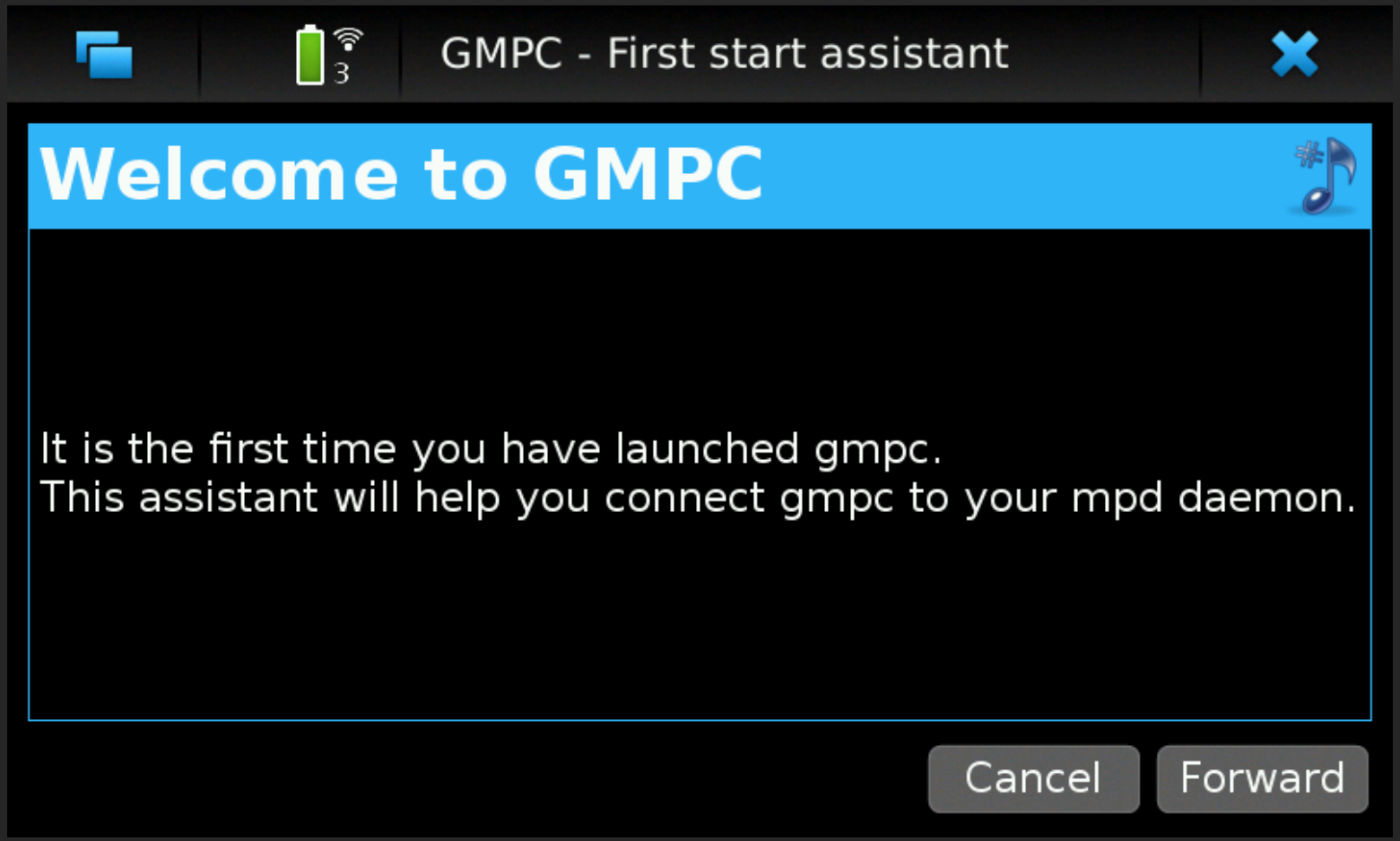


Status: Games: Doom

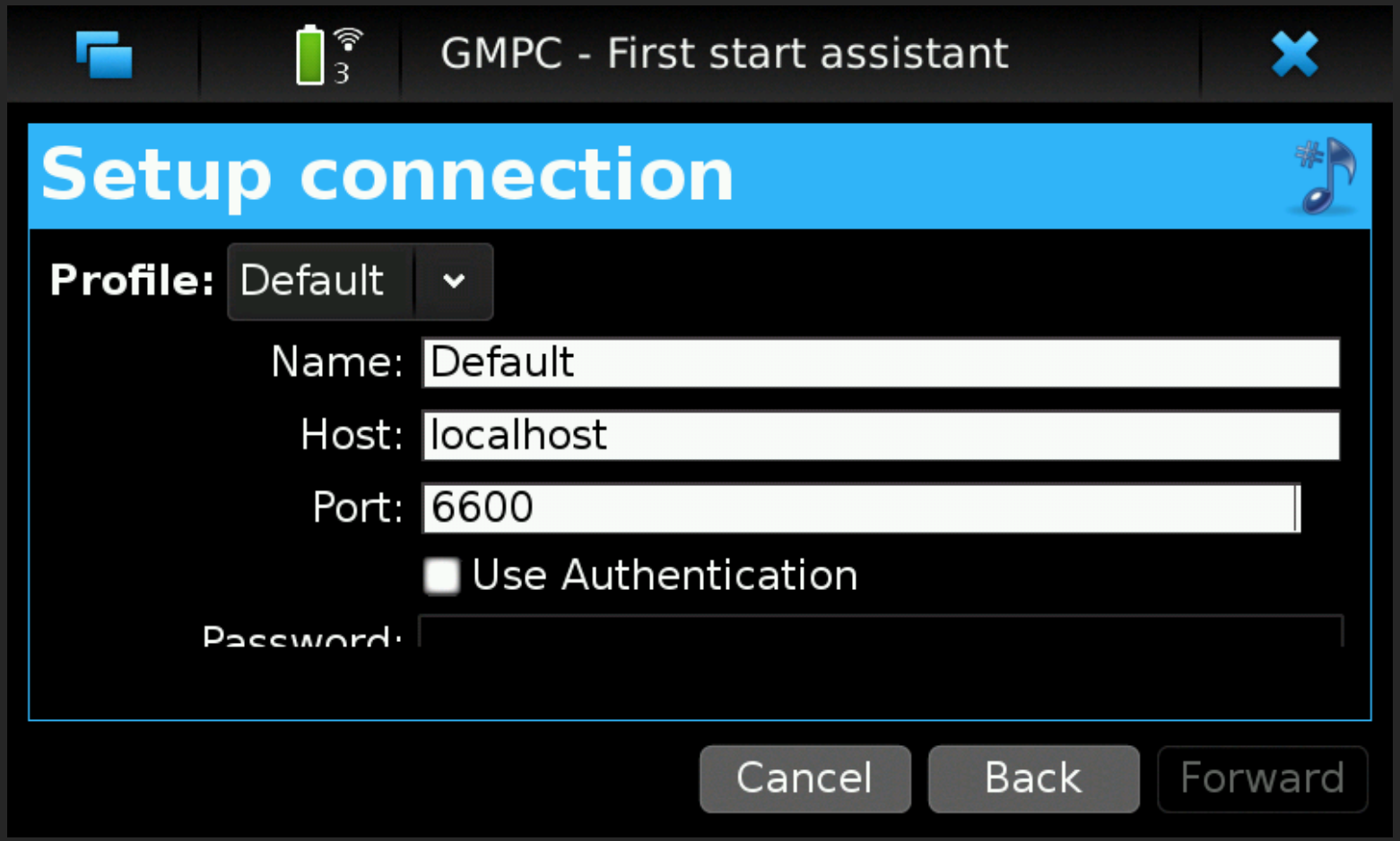


Status: Games: Doom part II

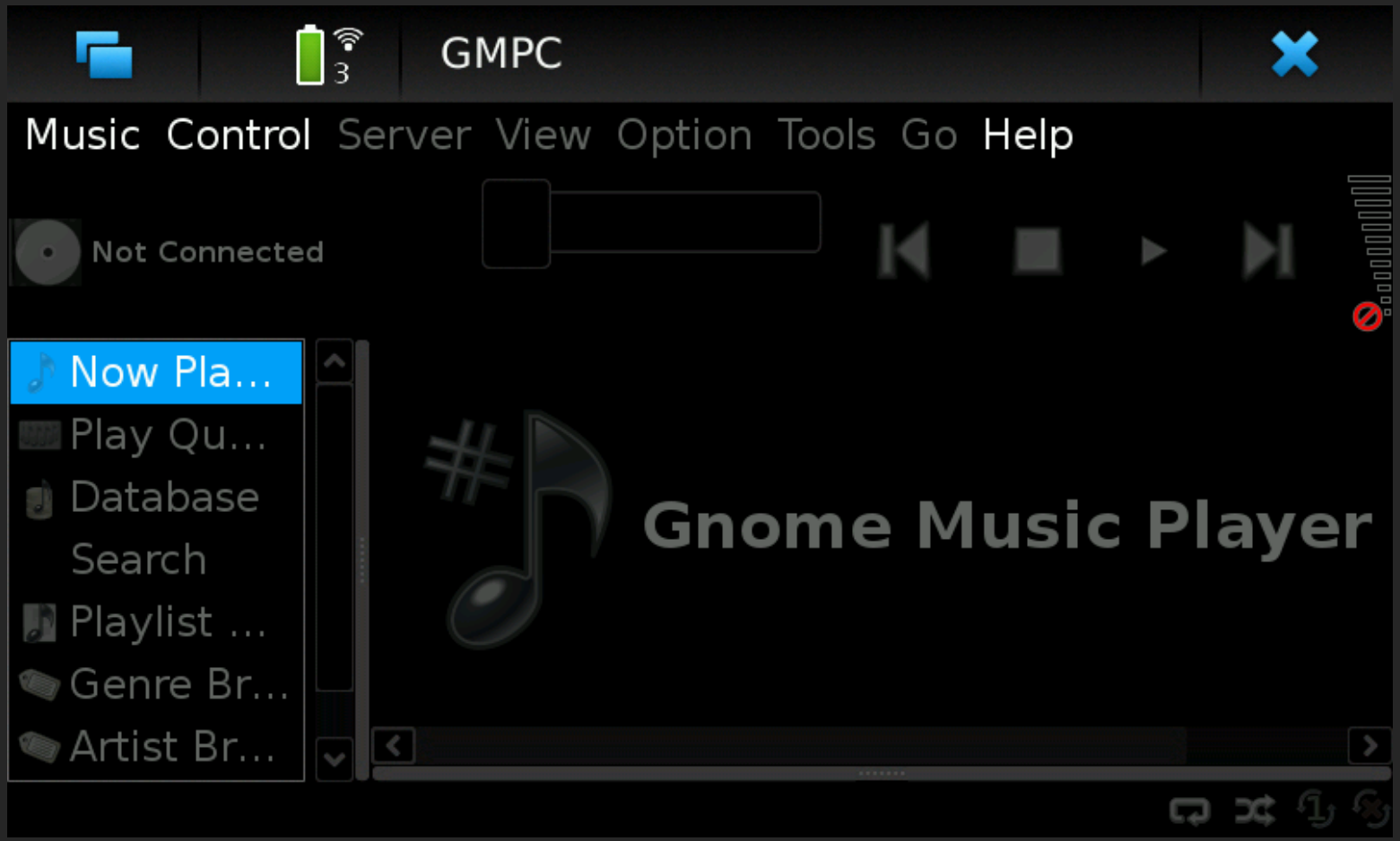
Status: Debian packages: GMPC



Status: Debian packages: GMPC part II

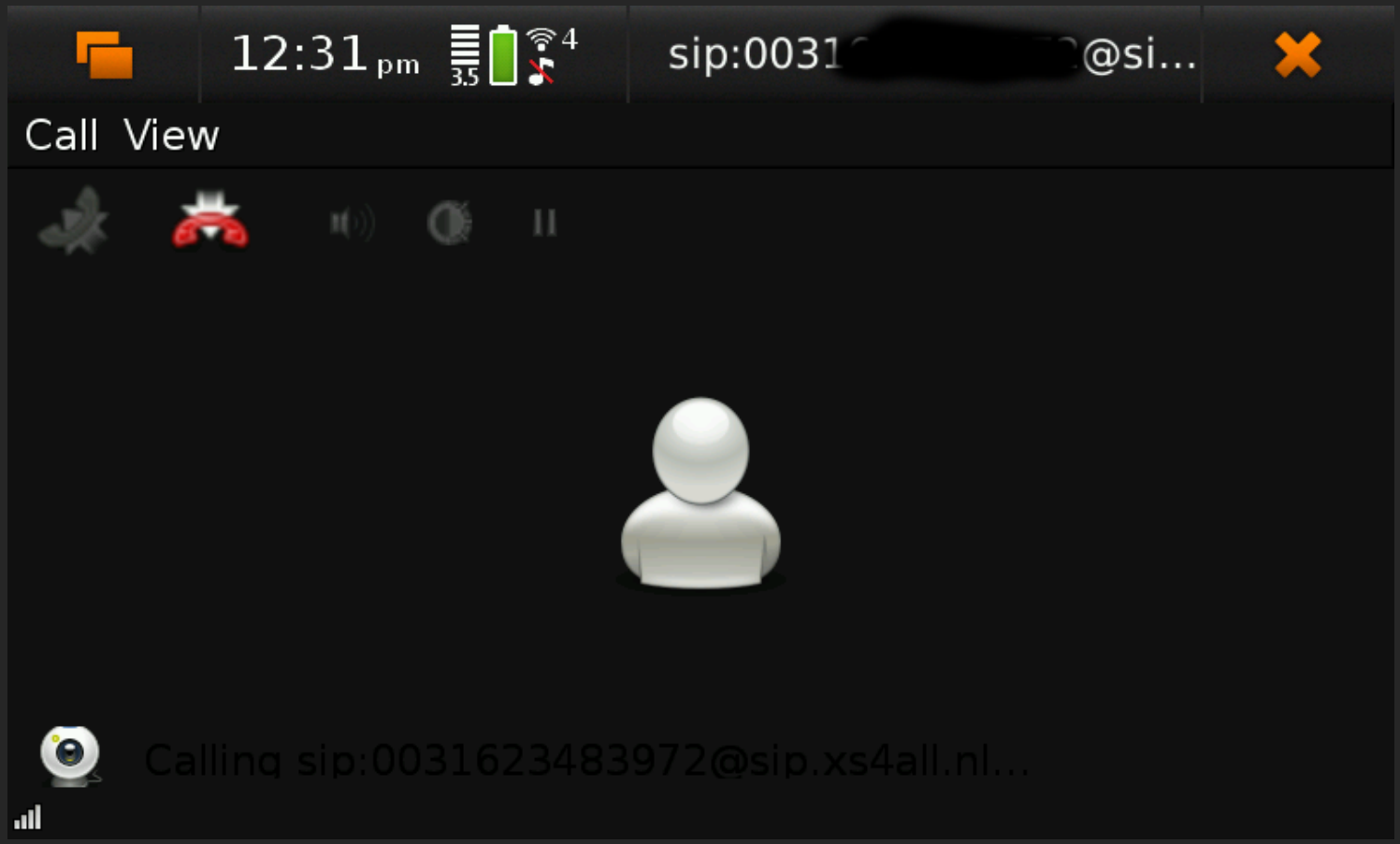


Status: Debian packages: GMPC part III



Status: Debian packages: Ekiga softphone

Status: Debian packages: Ekiga softphone: part II



Status: continued

Applied for funding at NLNet in August...

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Grant request has been approved!

Device: Pinephone

- Linux 5.3 plus patches, Alwinner A64 based
- Hardware kill switches for wifi, mic, modem
- Worldwide LTE modem, on usb (no DMA)
- 3D via open source "lima" driver
- One of the cameras already works, other needs a driver
- Lots of developers working on support, and it's **cheap**!

Full specifications: `https://www.pine64.org/pinephone/`

Prototypes for developers ready - being shipped now. Can show development kit after talk.

Device: Pinephone part II

Prototype on the left, development kit on the right

Plans to support many mobile OSes: Leste, postmarketOS, UBPorts...

Device: Pinephone part II

Prototype on the left, development kit on the right

Plans to support many mobile OSes: Leste, postmarketOS, UBPorts...

PineTab is also in the works (ask after presentation)

Device: N900

- Original Maemo Fremantle device, 256MB ram, 600Mhz CPU - weak!
- Needs more power management work (8-16 hours of battery life) on 1000mAh
- Linux 5.1, with PowerVR patches, butter smooth :)
- Wireless, battery, touchscreen, keyboard, usb peripheral, audio works
- 2g/3g data works
- text messages work (phone calls start, need some more work) - needs a good UI

Device: Motorola Droid 4

- Linux 5.4
- Battery life might easily be several days
- No 3d acceleration yet, but making significant headway (kernel module loads now)
- Wireless, battery, touchscreen, keyboard, usb host and peripheral work, audio, 3g data, sms, calls with audio routing
- 3g data, sms and calls integration in ofono is ongoing

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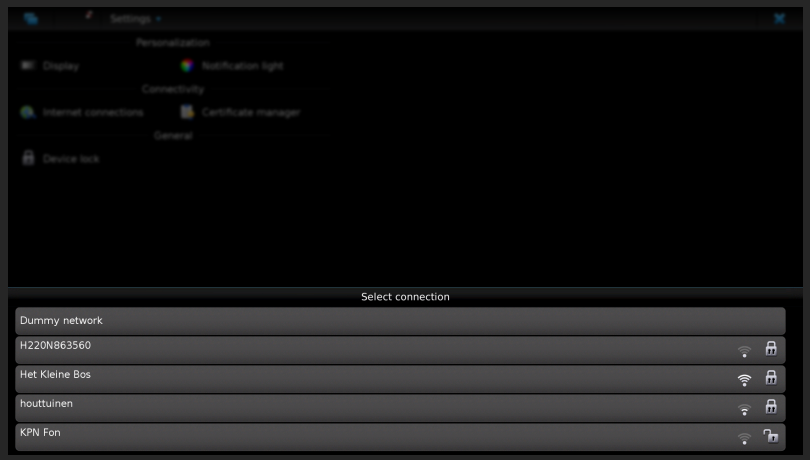
Can hand out devices to experienced and enthusiastic developers!

Device: Allwinner devices

- OLinuXino LIME2, Allwinner A33 tablets
- 3d acceleration works with Lima
- wireless, battery, touchscreen, usb host and peripheral work
- Mainline hardware video decoding!

Device: Raspberry Pi 2+



- Working 3d acceleration, wifi
- Makes for a nice demo platform when connected to a FullHD touchscreen

Device: virtual machine

- Works with Qemu, Virtualbox, VMware
- Useful for development
- QEMU passthrough of hardware (wifi, modem) is very handy

Future

Various milestones yet to reach:

- Dogfooding (eat your own dog food) - want to switch from Fremantle
- Community contributed packages/apps
- Alpha release for the Pinephone
- Beta releases for N900 (calls), Droid 4 (3d accel)
- Finish cellular UI and data plugin
- Working phone/sms/contacts UI
- Qt5 and Gtk3 port of Hildon (work ongoing)
- More here: https://github.com/maemo-leste/bugtracker/milestones

Generally:

- **More community involvement** - we need help!
- Anything you want...

Future?

- Mainline without any patches
- full disk encryption
- better browser (firefox or webkit based)
- Android emulation with Anbox

Summary

- Now in alpha stage; beta follows when calls work and have a UI
- Mainline linux and devuan/debian makes a lot of powerful things simple
- Fun to play with
- Already usable in some form on several devices, more to come
- No easy phone calls ... yet
- Need more people to document, test and write code, get more organised in general

Resources

- Homepage: https://maemo-leste.github.io/
- Wiki: https://leste.maemo.org
- Source: https://github.com/maemo-leste/
- Bugtracker: https://github.com/maemo-leste/bugtracker
- Maemo community: https://maemo.org
- IRC: irc.freenode.net #maemo-leste
- Mailing list: https://mailinglists.dyne.org/cgi-bin/mailman/listinfo/maemo-leste

Demos

- Virtual machine demo
- (VOIP/SIP) calls
- SMS using telepathy framework (empathy UI)
- Video of Leste on A33 tablets, Nokia N900 phones
- Live Nokia N900 demo
- Live droid4 demo (no 3d acceleration yet - mostly painful to watch :))
- Can show (non-booting, smoked PMU last week) pinephone prototype
- Find me in the speakers corner after this talk