oFono
Open-source telephony

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Outline

1. A brief history of Linux telephony
2. Nokia N900
3. oFono
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2. Nokia N900
3. oFono
What’s (cellular) telephony?

- network status
- network selection
- SIM security (PIN, PUK...)
- SIM phone book
What’s (cellular) telephony?

- network status
- network selection
- SIM security (PIN, PUK…)
- SIM phone book
- voice calls
- Short Message Service (SMS)
- location
- supplementary services
- General packet radio service (GPRS)
- …
The standard (?)

- Hayes commands set
- ITU V.250
- 3GPP 27.007
- better known as *AT commands*
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- originally for 300 bauds fixed serial line
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The standard (?)

- Hayes commands set
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- better known as *AT commands*
- designed in the seventies...
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- ASCII
- awkward multiplexing
- PPP (binary) for backward-compatibility
Besides the standard

- AT commands extensions:
  - vendor-specific commands
  - many implementations not fully adherent
Besides the standard

- **AT commands extensions:**
  - vendor-specific commands
  - many implementations not fully adherent

- Full replacement for AT commands, e.g.:
  - Nokia: Phonet / ISI
  - ST-Ericsson: CAIF

- PPP can be replaced too:
  - proprietary framing
  - Ethernet emulation
Existing solutions

- Qtopia: technology showcase for Qt
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- OpenMoko: low-level D-Bus API
- Android Radio Interface Layer (RIL)
Existing solutions

- Qtopia: technology showcase for Qt
- OpenMoko: low-level D-Bus API
- Android Radio Interface Layer (RIL)
- NetworkManager: laptop-centric, AT-specific, IP-centric
- N900 CSD: Nokia modem-specific, closed
Outline

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## N900 telephony architecture

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Phonet

- simple datagram-based binary protocol
- multiplexing out of the box
- asynchronous notifications
- abstraction layer for modem interconnect
- one IP packet = one Phonet datagram
Phonet

- simple datagram-based binary protocol
- multiplexing out of the box
- asynchronous notifications
- abstraction layer for modem interconnect
- one IP packet = one Phonet datagram
- 2.6.28: Phonet stack, GPRS, USB gadget
- 2.6.31: USB host driver
- same stack on N900 and PC!
## oFono architecture

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oFono core stack

Core:
- D-Bus (de)serialization
- network registration logic
- call handling logic
- SMS retransmit, format and parsing
- SIM phonebook to vCard conversion
- data caching
- ...

Plugins:
- call history
- SMS storage
oFono drivers

- hardware auto-detection
- modem message formatting/parsing
- plugin sub-layer for AT modem variants
- hardware-specific extra functions
## oFono vs CSD comparison

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References

- oFono project
  http://www.ofono.org/
- Linux kernel
  http://www.kernel.org/
Any questions?