

# The Neo900 Open Smartphone

A platform with new security features

`neo900.org`

Werner Almesberger  
`werner@almesberger.net`,  
Jörg Reisenweber  
`joerg@openmoko.org`

# The Neo900 project

- Tired of closed mobile platforms ?
- Openmoko veterans, still hungry
- Open hardware
- Designed for Free Software
- New security features

# Inspired by Nokia N900

- Linux-friendly platform
- Active community
- Has a real keyboard

# Making a smartphone in three easy steps

- Electronics  
(lots of them)
- Mechanical design (case)
- User-visible software

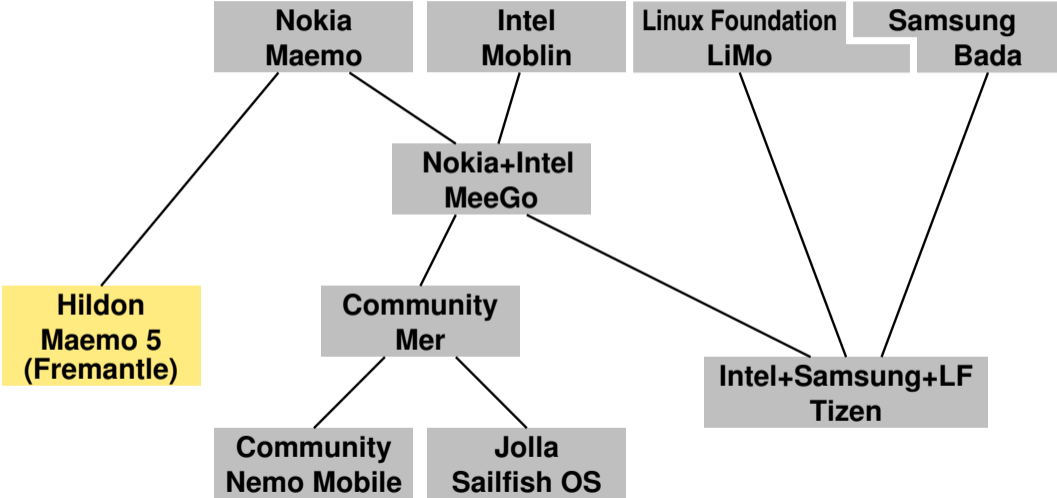
# Smartphone user interface

The Openmoko experience:

- **2007.1**: Gaudy, obese, unmaintainable, confusing
- **2007.2**: Lighter, cryptic
- Let's try something new: **Qtopia**  
Let's try something else, too: **Android**
- **2008**: Enlightenment
- Post-Openmoko: **QtMoko**, **SHR**

Lesson learned. Let's not do this again.

# Software evolution (simplified)

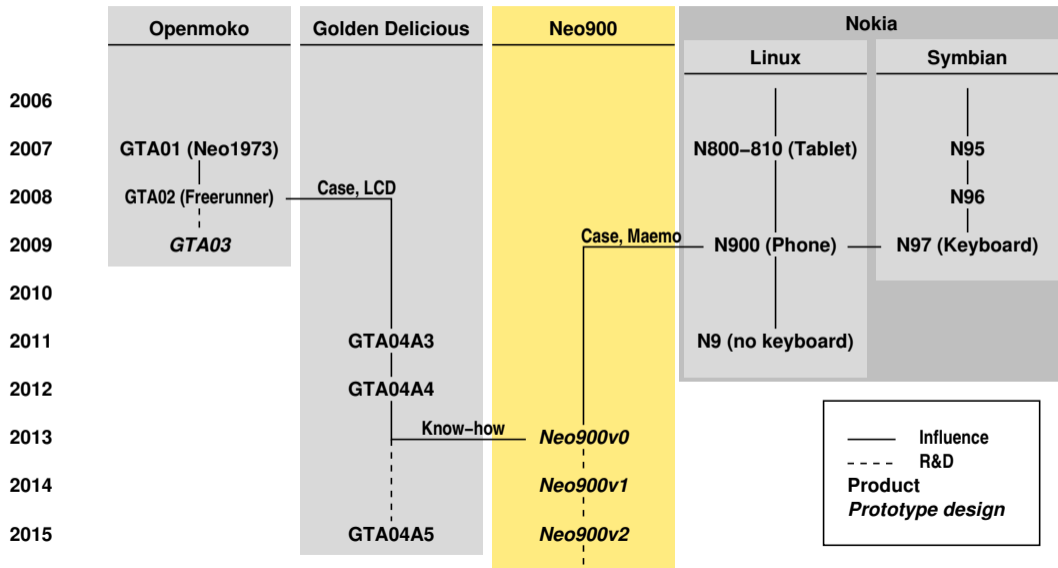


# Software choices

Neo900 is a Linux platform.

- Maemo (Fremantle)  
Hardware compatibility goal
- Debian / Devuan  
Board Support Package
- Replicant (Android)
- MeeGo
- ... whatever you choose to install or port

# Hardware evolution

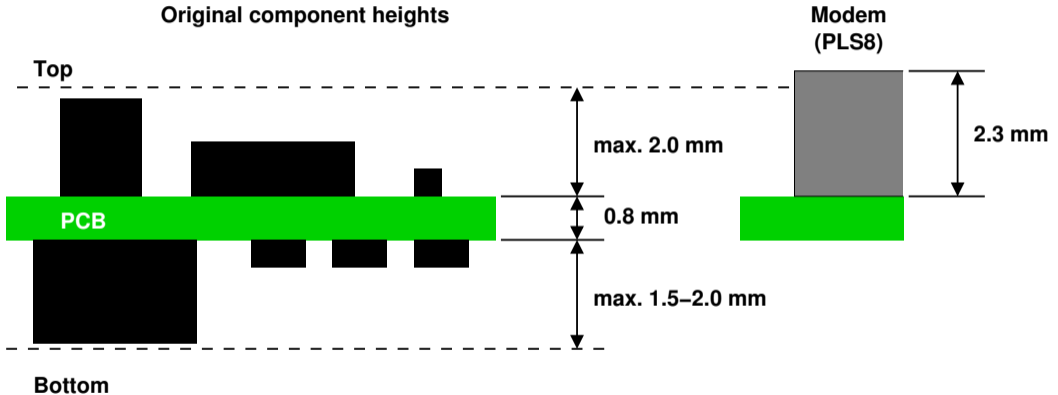




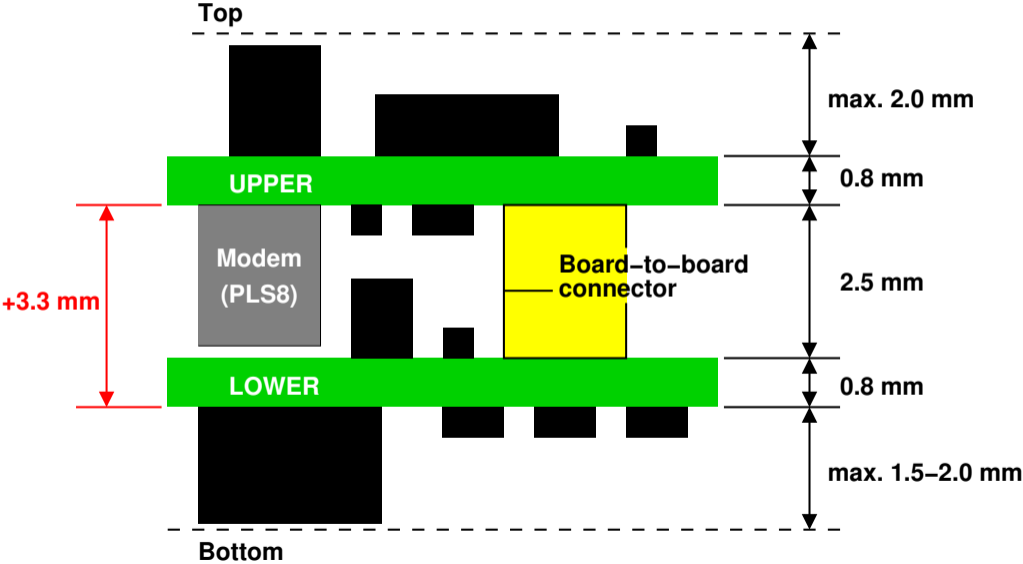
# Reusing the case

- N900 case is nice
- Making own would be too expensive
- N900 case is still available

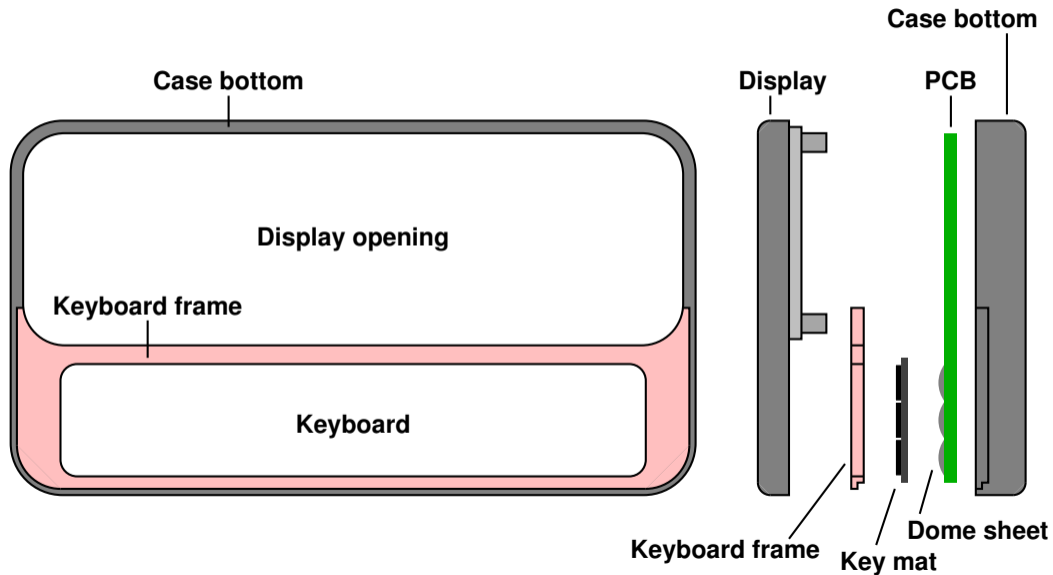
# Problem: We need more space



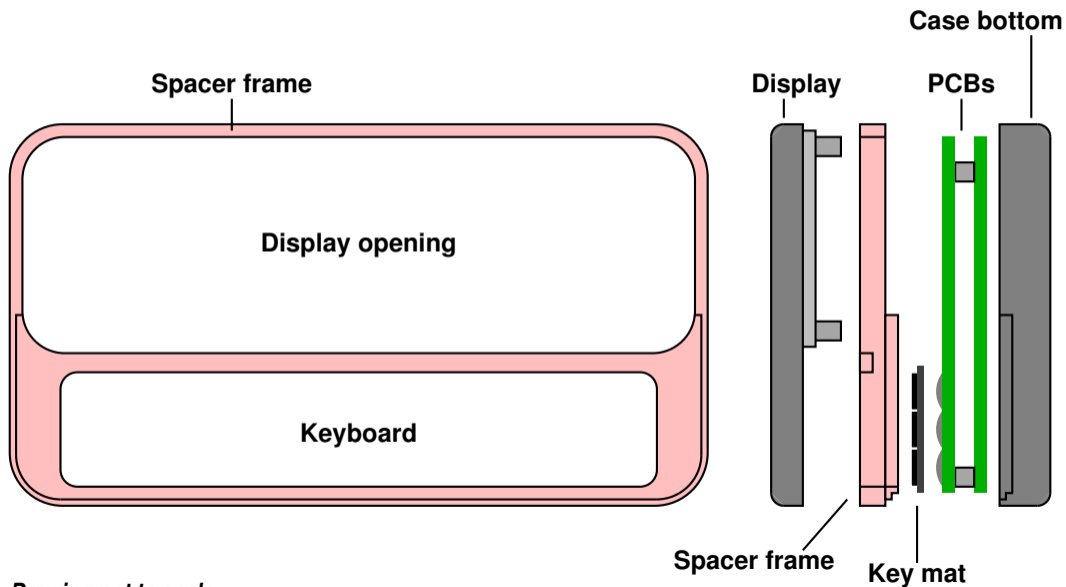
# Solution: Add another board



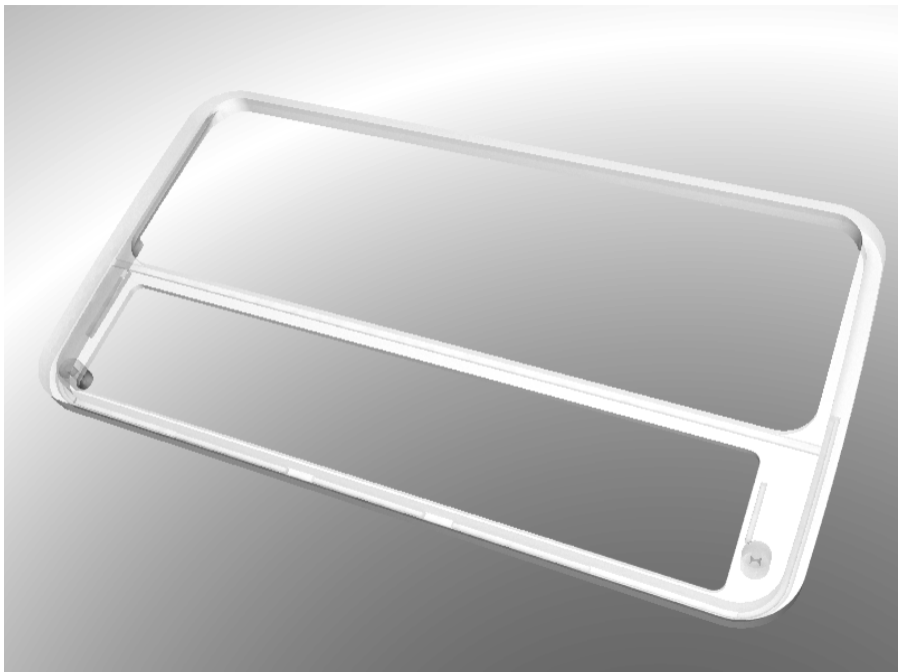
# Original mechanical stacking



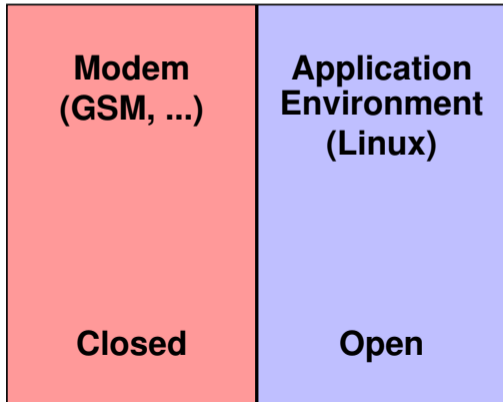
# The Spacer Frame



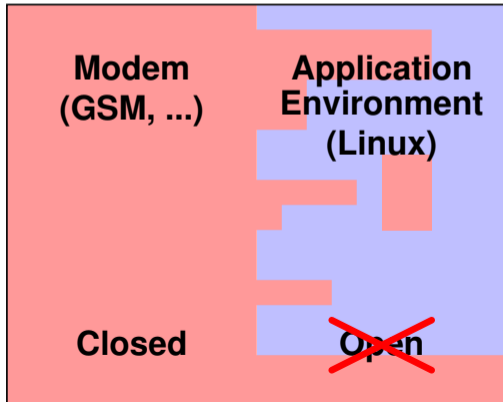
*Drawing not to scale*



## Your smartphone, in theory

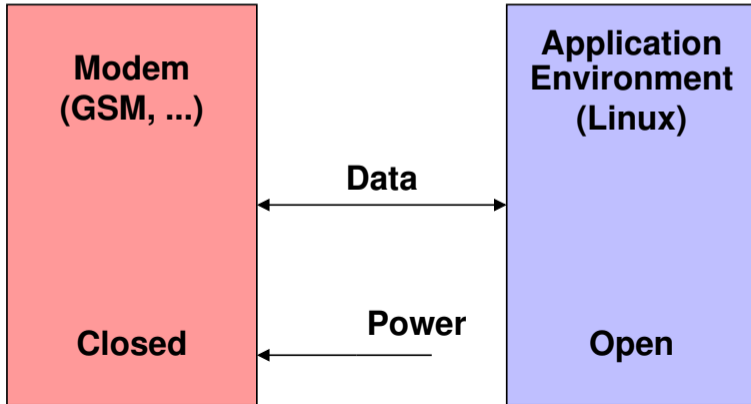


## In practice

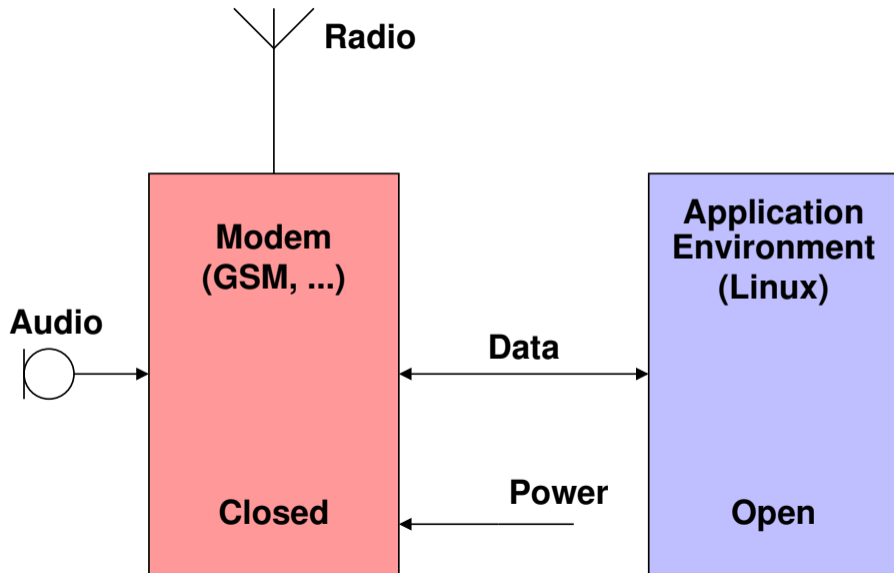




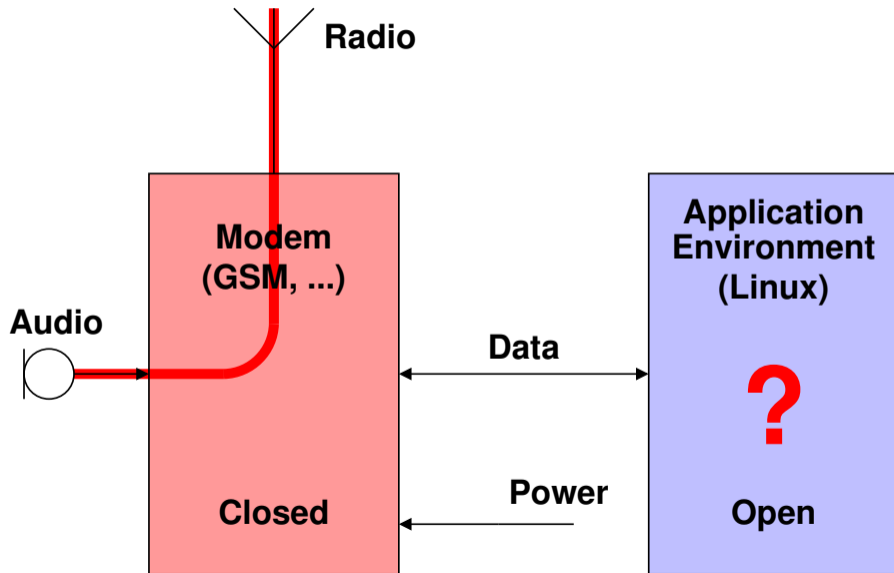
# Keep them separated



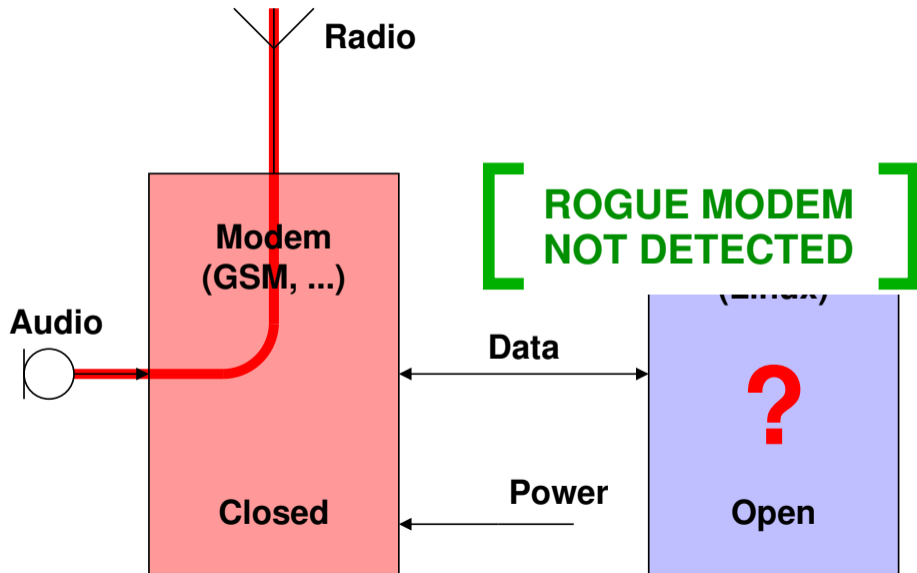
However, ...



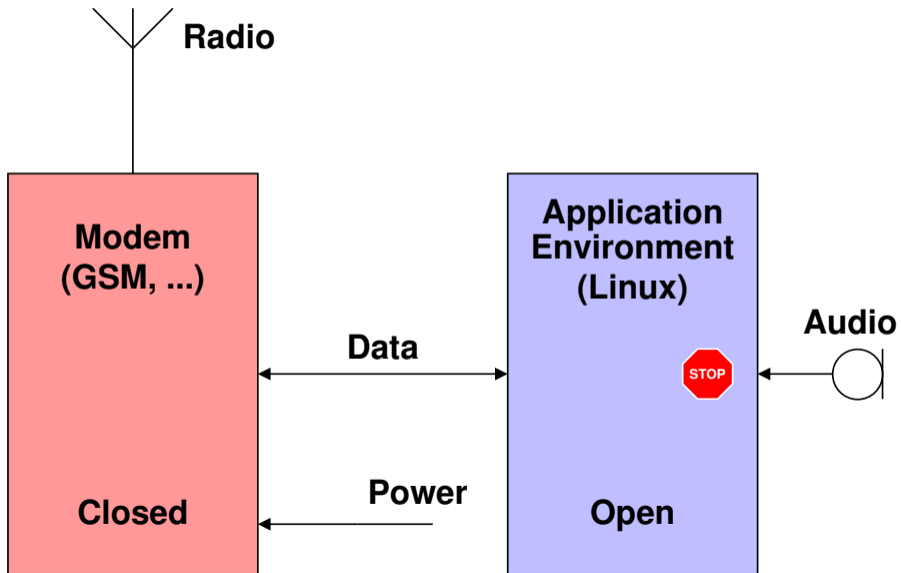
Oops !



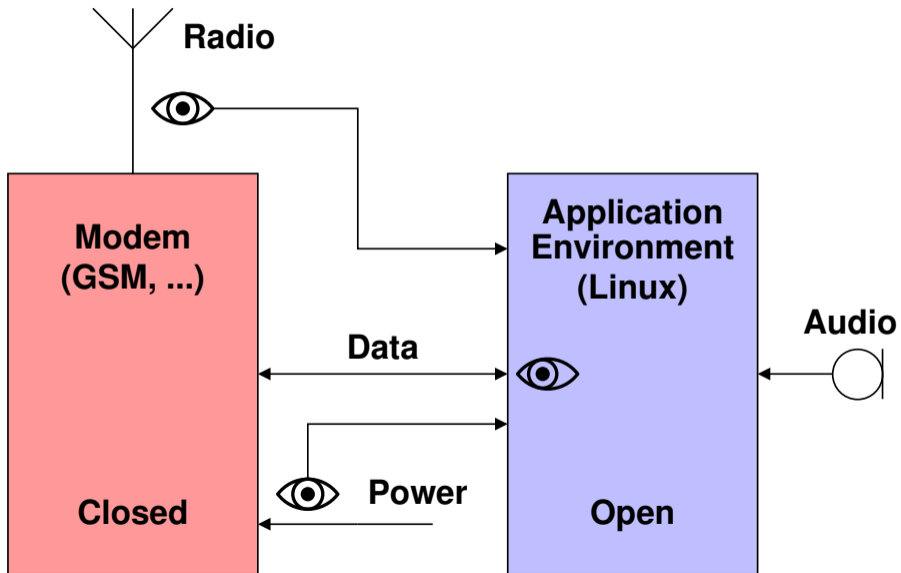
Oops !



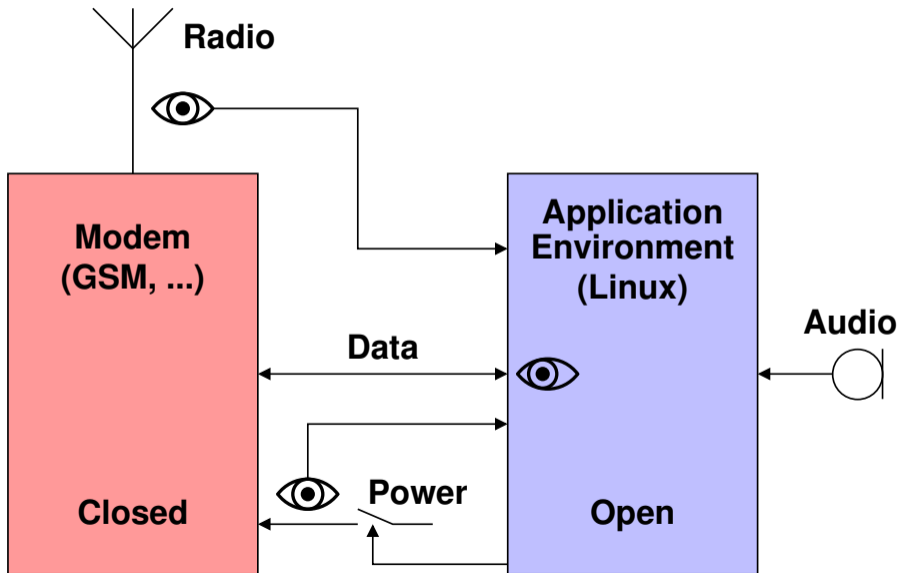
# Sensory deprivation



... and monitor



Just in case ...



# Prototype V0/V1

- Modem, some switches
- No CPU
- Goal: Test mechanical compatibility and modem
- Produced early in the project



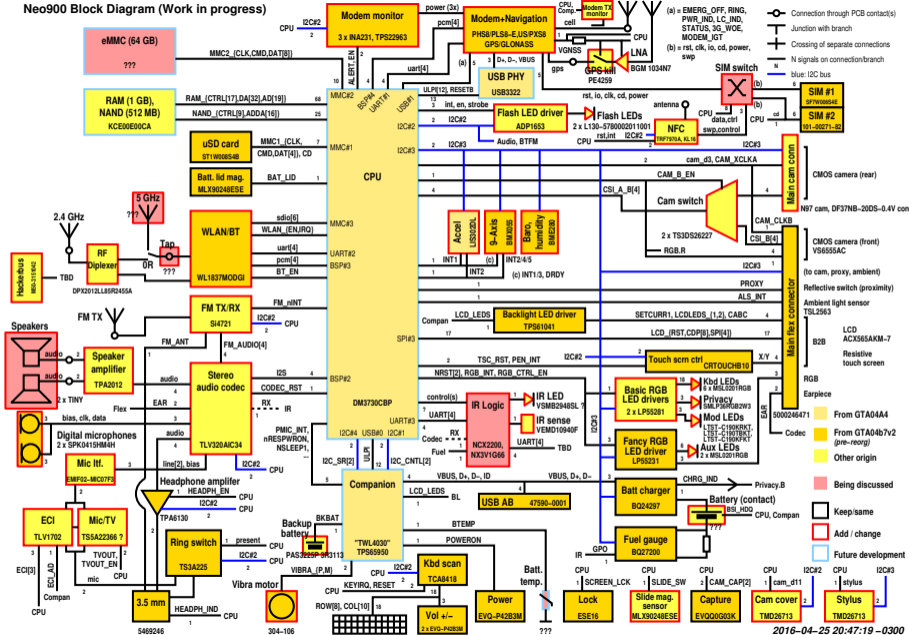
# Prototype V2

- Most components present
- External CPU (BeagleBoard)
- Refined mechanical design
- Goal: Test subsystems
- Working on this now

# Prototype V3

- Complete system, with CPU
- Goal: Certification
- Goal: Finalize design before production
- Expected around end of 2015

# Neo900 Block Diagram (Work in progress)



## Feature comparison (1/2)

|             | N900                  | → | Neo900                  |
|-------------|-----------------------|---|-------------------------|
| CPU         | TI OMAP3xxx, 600 MHz  | → | 1 GHz                   |
| RAM         | 256 MB                | → | 1 GB                    |
| eMMC        | 32 GB                 | → | 64 GB                   |
| Modem       | GSM, UMTS             | → | Various options         |
| Touch       | Resistive             | + | Dual-touch              |
| Sensors     | Accel, light          | + | Add compass, gyro, baro |
| Infrared    | Consumer IR (TX only) | → | CIR (TX/RX), IrDA       |
| Positioning | GPS                   | + | GLONASS                 |

| Modem   | Bands                     |
|---------|---------------------------|
| PHS8    | 4×GSM, 5×UMTS             |
| PLS8-E  | 2×GSM, 3×UMTS, 5×LTE      |
| PLS8-US | 4×GSM, 3×UMTS, 4×LTE      |
| PXS8    | 4×GSM, 5×UMTS, 3×CDMA2000 |

## Feature comparison (2/2)

New features:

|           | Neo900    |
|-----------|-----------|
| NFC       | TRF7970A  |
| Expansion | Hackerbus |

What we keep:

|              | Neo900                         |
|--------------|--------------------------------|
| Screen       | 3.5", 800 x 480, Transflective |
| Front camera | VGA                            |
| Main camera  | 5.0 MP                         |

# Products

NeoN:

- Upgrade kit (boards, parts)
- Bring your own N900
- No soldering required

Neo900:

- Complete device
- Built from N900 still in the market

## More information

- Web: [neo900.org](http://neo900.org)
- Village: see us at the **Neo** village

