

ModemManager revamped: now supporting LTE/4G modems



Aleksander Morgado
aleksander@lanedo.com
aleksander@gnu.org

Index

- The road to LTE
 - Requirements
 - 3GPP
 - 3GPP2
 - Devices
- ModemManager
 - What is it?
 - Current status
 - Towards 0.7
 - Coming next...

The road to LTE: Requirements

- **2G**

CS **voice** calls the key feature, while PS data communications just an add-on

- **3G**

Designed for both CS **voice** and **video** calls, plus PS **data** communications

- **4G**

Designed only for PS **data** communications

- Data-transmission specific design targets:

- Peak rate and rate at cell edge
- Low latency
- High capacity (spectral efficiency)
- Spectrum flexibility

All IP!

Satisfaction 100% guaranteed

The road to LTE: 3GPP

- 2G:
 - **GSM** (r96): 14.4 kbit/s
 - **GPRS** (r97): (FL) 57.6 kbit/s, (RL) 28.8 kbit/s
 - **EDGE** (r98): (FL, RL) **236.8 kbit/s**
- 3G:
 - **UMTS** (r99): (FL) 384 kbit/s [ITU: IMT-2000, true 3G]
 - **HSDPA** (r5): (FL) 14 Mbit/s
 - **HSUPA** (r6): (RL) 5.76 Mbit/s
 - **HSPA+** (r7,r8): (FL) 42 Mbit/s, (RL) 11.5 Mbit/s
 - **DC-HSDPA** (r8), **DC-HSUPA** (r9), **MC-HSDPA** (r10) (up to **168 Mbit/s**)
- 4G:
 - **LTE** (r8): (FL) 300 Mbit/s, (RL) 75.4 Mbit/s
 - **LTE advanced** (r10): (FL) **1Gbit/s** [ITU: IMT-Advanced, true 4G]

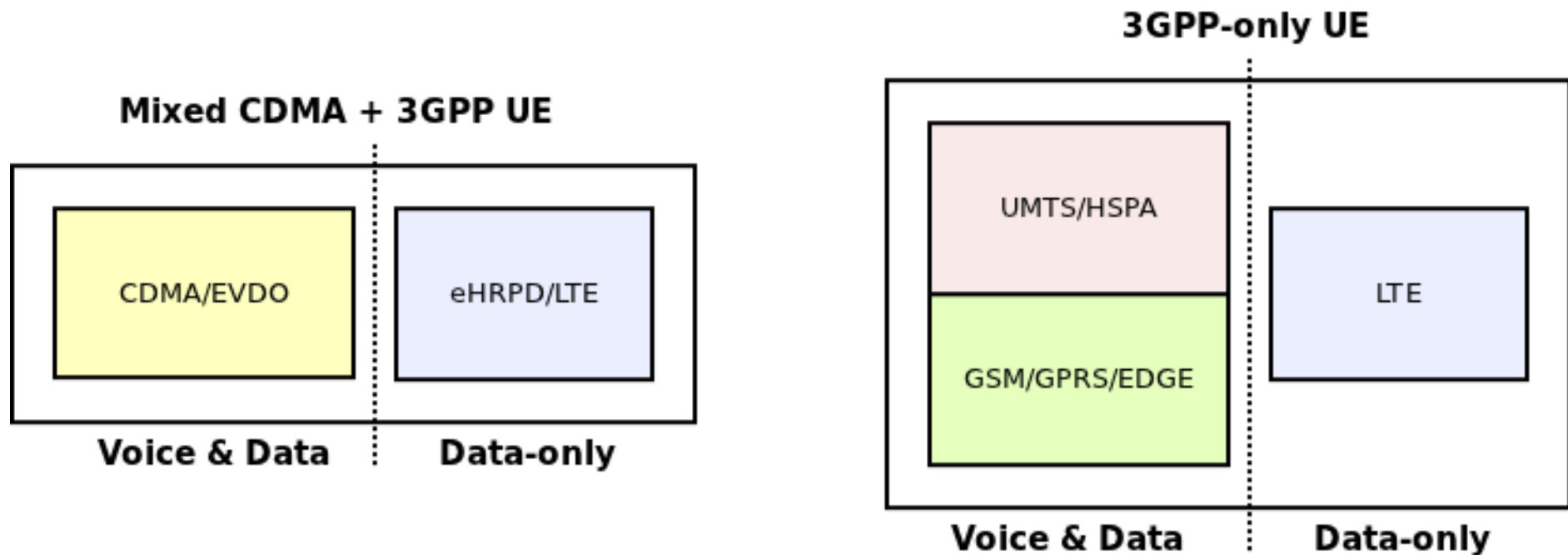
The road to LTE: 3GPP2

- 2G:
 - **IS-95**: up to **14.4 kbit/s**
- 3G:
 - **CDMA2000 1x**: (FL) **153 kbit/s**
 - **CDMA2000 1xEV-DO**
 - **Rev 0**: (FL) 2.4 Mbit/s, (RL) 153 kbit/s [ITU: IMT-2000, true 3G]
 - **Rev A**: (FL) 3.1 Mbit/s, (RL) 1.8 Mbit/s
 - **Rev B**: (FL) 4.9 Mbit/s per carrier, up to **14.7 Mbit/s**
- 4G:
 - ~~CDMA2000 1xEV-DO rev C, a.k.a. **UMB** (*)~~ → **LTE**

(*) ... My bet is that the superhero name was the main reason of failure

The road to LTE: Devices

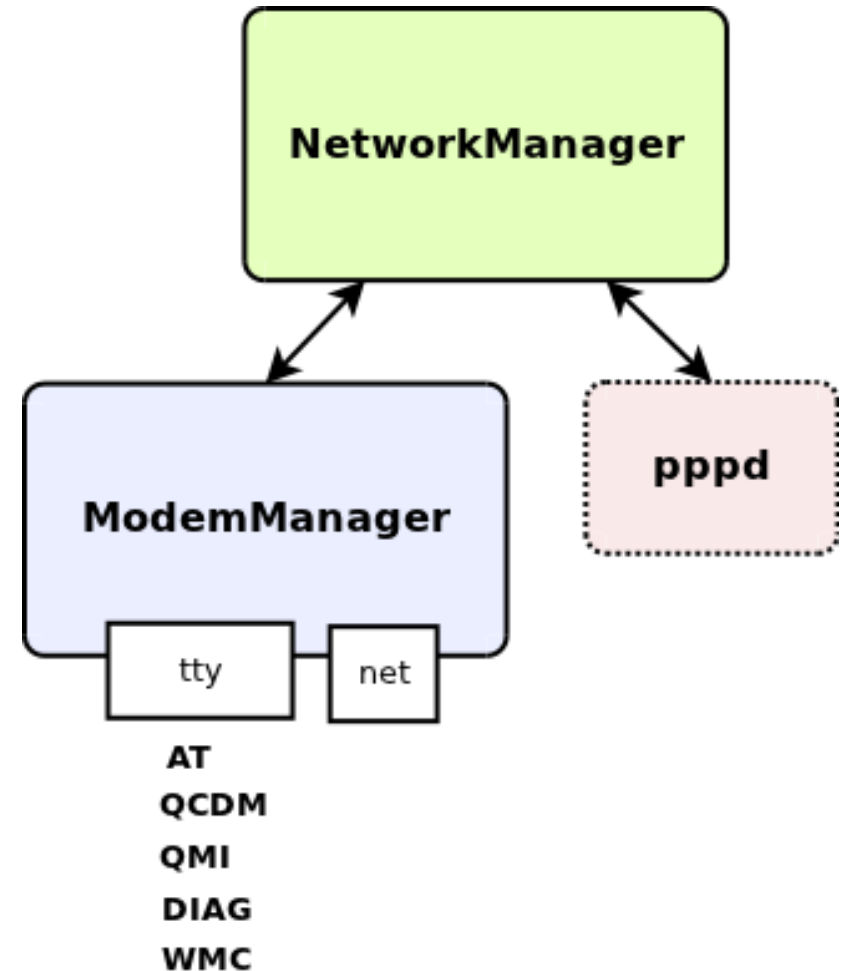
- All IP-based services is the future...



(*) ... but the future is not here (yet)

ModemManager: What is it?

- Dbus-activated daemon which controls and monitors Broadband(*) Modems
- Works (not only) with **NetworkManager**
- Extended with plugins for vendor-specific features



(*) POTS/Dial-up modems soon as well

ModemManager: What is it?

- In other (*) operating systems the device **manufacturers** or even network **operators** themselves provide specific **drivers** and/or **connection managers**.
 - E.g.: Verizon's VZAccess Manager
- Worst of all:
users expect that.

(*) less interesting, ugly and evil

Flickr, jasohill
CC BY-NC-SA 2.0



ModemManager: What is it?

- In GNU/Linux, **ModemManager** is **the** connection manager and (*) knows already how to connect your modem.
- Best of all:
users expect that.

Flickr,imaphotog
CC BY-NC-SA 2.0



(*) ideally, no guarantee given ;-)

Intermission

Dear Operators and Manufacturers,

If you want the best experience for your GNU/Linux users, please cooperate with upstream instead of writing your own software.



Ways to help:

- Develop plugins yourselves (*)
- Give out test hardware
- Talk to the developers, we don't bite!

(*) or hire someone to do that for you

ModemManager: Current status

- [0.5] Stable releases (MM_05)
- [0.6] Unstable branch (MM_06)
 - Compatible API-wise with 0.5
 - Extended RS232 support
 - New plugins: Cinterion, Iridium
 - Port organization
- [0.7] Development branch (master)
 - Full rework
 - Proper LTE device management
 - Not yet integrated in NetworkManager

Flickr, iAMiAN_
CC BY-NC-SA 2.0



ModemManager: towards 0.7

- [MM 0.5/0.6] Split object hierarchy
 - One generic **GObject for CDMA**-based modems
 - Plus vendor/product-specific subclasses
 - One generic **GObject for 3GPP**-based modems
 - Plus vendor/product-specific subclasses
- [MM 0.7]
 - One generic **GObject for “Broadband”** modems (either 3GPP, CDMA or both)
 - Plus vendor/product-specific subclasses
 - One generic GObject for “POTS” modems
 - (not yet)

ModemManager: towards 0.7

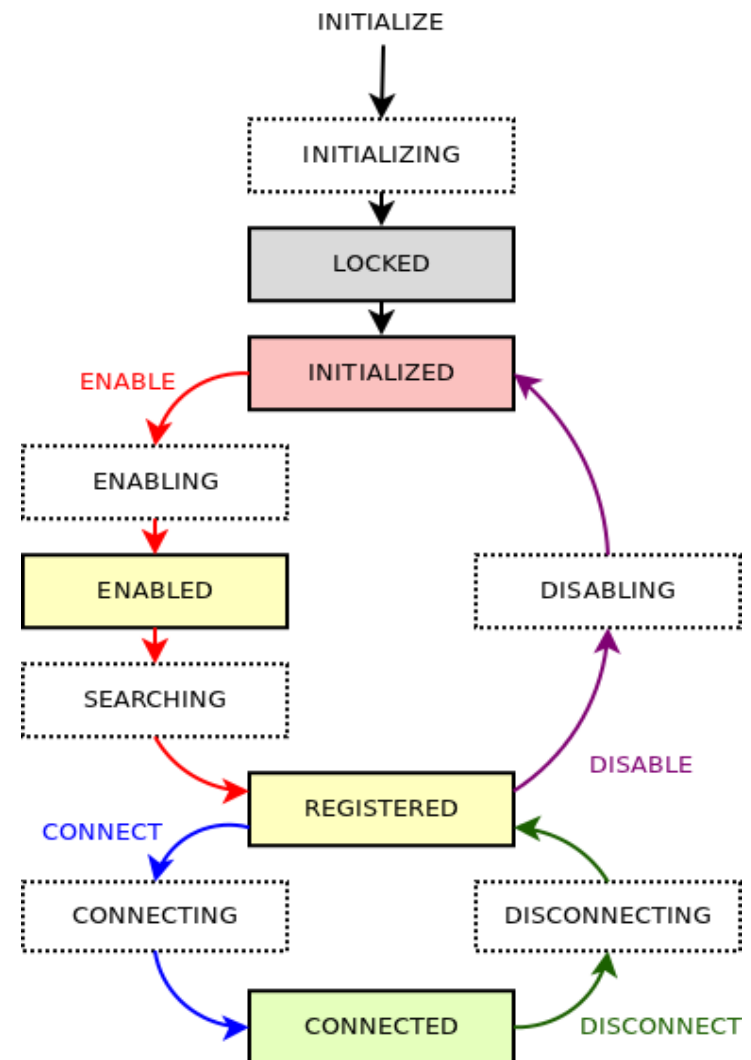
- [MM 0.5/0.6] Probing queries for:
 - Modem **capabilities**
 - Vendor and Product strings, if needed (only 0.6), for extended RS232-only modem support.
 - Port types
- [MM 0.7] Capabilities probing **no longer needed**

ModemManager: towards 0.7

- [MM 0.5/0.6] **Static** interfaces
 - all modems export them, even if they don't support the specific features.
 - e.g SMS messaging or USSD support in 3GPP
- [MM 0.7] **Dynamic** interfaces
 - modems export them only if they support the specific features.

ModemManager: towards 0.7

- [MM 0.5/0.6] State machine **messy**
 - Commands with completely different purposes are given in the same logical sequence.
 - Plugins can override **commands**.
- [MM 0.7] Global state machine split in sequences of **feature-specific state machines**.
 - Plugins can override **steps of the state machines**.



ModemManager: towards 0.7

- [MM 0.5/0.6] **Bearer**s are **hidden** to the user
 - only one data bearer can be used at a time
- [MM 0.7] **Bearer**s are **exposed** to the user
 - and the user can configure and activate/deactivate them independently

ModemManager: towards 0.7

- [MM 0.5/0.6] **dbus-glib**
- [MM 0.7] **GDBus**
 - gdbus-codegen
 - Using the new standard ObjectManager interface

ModemManager: towards 0.7

- [MM 0.5/0.6] **AT, QCDM**
 - Plugins usually override AT commands
- [MM 0.7] **Port agnostic**
 - Plugins can override 'actions' (GIO async methods with an input and an output).
 - There is no assumption on the type of port being used to run the action.

ModemManager: coming next...

- **QMI port** integration with [libqmi](#)
 - Linux kernel > 3.4 (cdc-wdm + qmi-wwan)
 - Qualcomm Gobi 2k/3k
 - Full potential of the modem
 - No PPP
 - Transparent handoffs
 - Firmware upgrades

Thanks! (*)

- **Mailing list:**

network-manager-list (at) gnome.org

- **Repository:**

git clone git://anongit.freedesktop.org/ModemManager/ModemManager

- **IRC:**

#nm in FreeNode

(*) Applaud now if you didn't get asleep; that will wake up the others