Osmocom

Open Source Mobile Communications

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at the iHub, Nairobi, Kenya

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- ➔ Many successful Free / Open Source (FOSS) projects

  - – Operating Systems (Linux, FreeBSD, OpenBSD)

  - – Anything Internet/Web related: Apache, ngingx, lighttpd, Firefox

  - – Smartphones: Android (at least the Open Source portions of it)

- ➔ Collaborative, Open development project: Anyone can join, no fees/contracts/membership

  - – shared investment in R&D, while everyone can use full results

  - – not about a one-way producer/consumer relationship

  - – sustainable FOSS projects require responsible committment from all stake holders

    - • the software needs to be written, tested and maintained, after all

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What is Osmocom?

- Osmocom: **O**pen **S**ource **MO**bile **COM**munications

- Bringing benefits of Free / Open Source (FOSS) development model to Mobile Communications

  - remove reliance on expensive, proprietary black-box equipment

  - you don't have to be Ericsson anymore to study, experiment, innovate and improve

- Started 2008 with "whatever needed to bring a [then Siemens] GSM BTS into operation"

  - first called bs11_abis, later bsc_hack, then OpenBSC, OsmoBSC/OsmoNITB

  - developing one network element at a time: BTS, BSC, PCU, MSC, SGSN, GGSN, ...

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Osmocom Projects

- → Osmocom is home to many Open Source projects related to mobile communications

- → Cellular Network Infrastructure for 3GPP technologies is only one part of this

- → Other Projects include

  - TETRA, Thuraya, DECT, P25, SDR, SIMtrace

  - 59 member projects in https://osmocom.org/ project list

  - 112 git repositories with source code on https://git.osmocom.org/

- → In context of this workshop, we focus on Cellular Network Projects for GSM, GPRS, EDGE, UMTS, …

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- ➔ **OsmoBTS**: GSM Base Transceiver Station, supports wide range of hardware

- ➔ **OsmoBSC**: GSM Base Station Controller, supports many BTSs

  - not just OsmoBTS, but also Ericsson, Siemens, Nokia, etc.

- ➔ **OsmoNITB**: GSM Network In The Box to run autonomous/small GSM networks

- ➔ **OsmoMSC**: GSM Mobile Switching Center with A and IuCS interface

- ➔ **OsmoSGSN**: Serving GPRS Support Node for 2G and 3G with Gb, IuPS and Gp interface

- ➔ **OpenGGSN**: Gateway GPRS Support Node for 2G and 3G with Gp and Gi interface

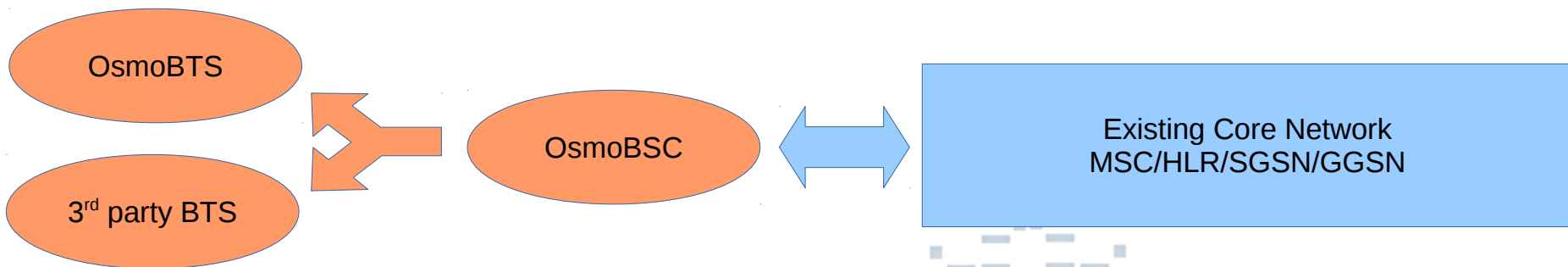(many other special-purpose projects not listed here)

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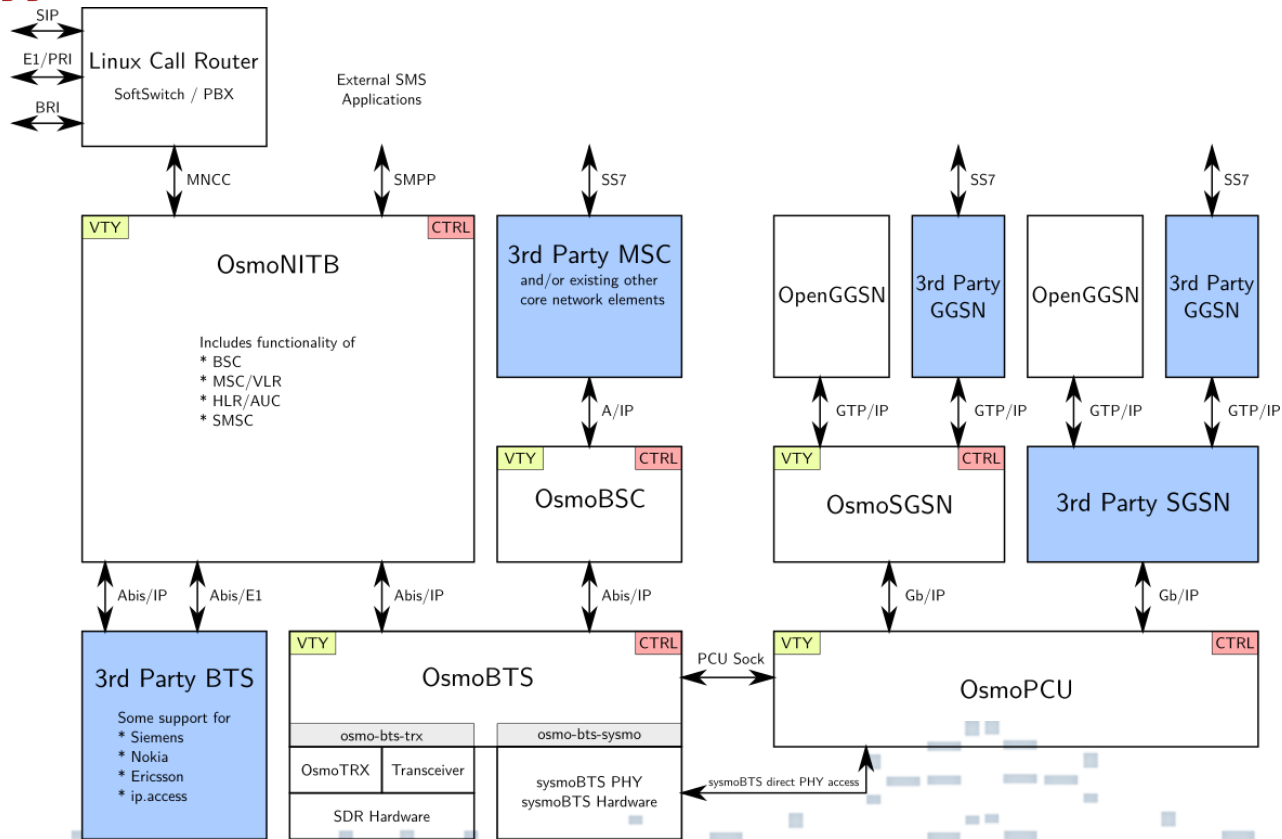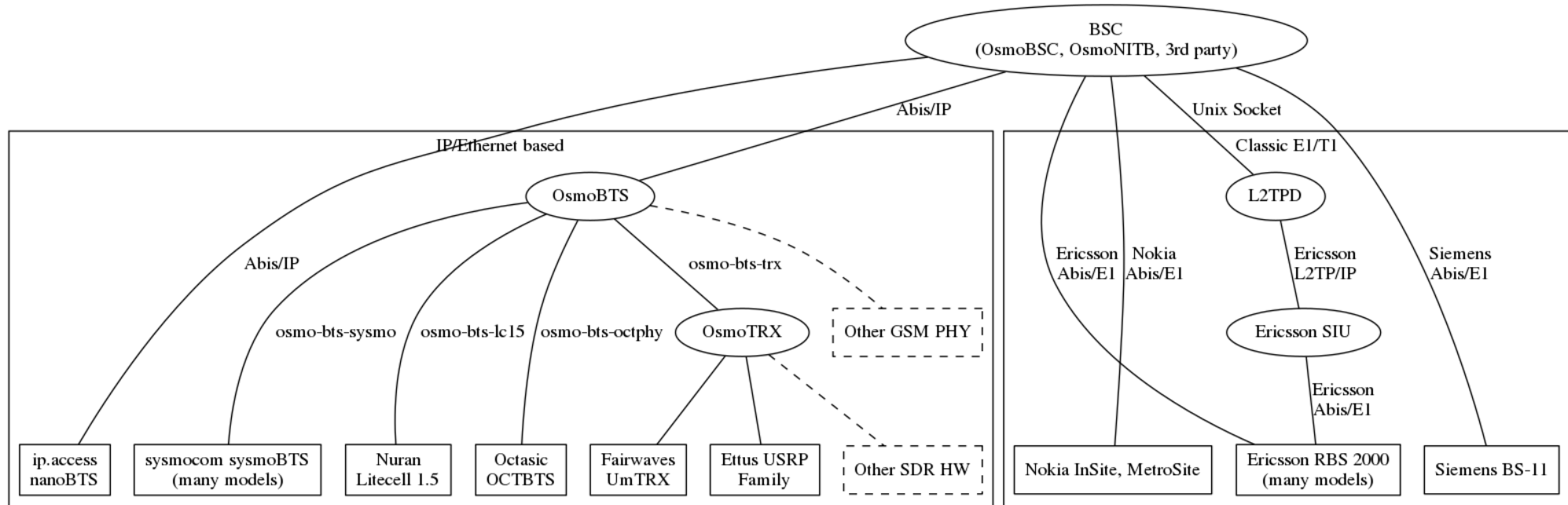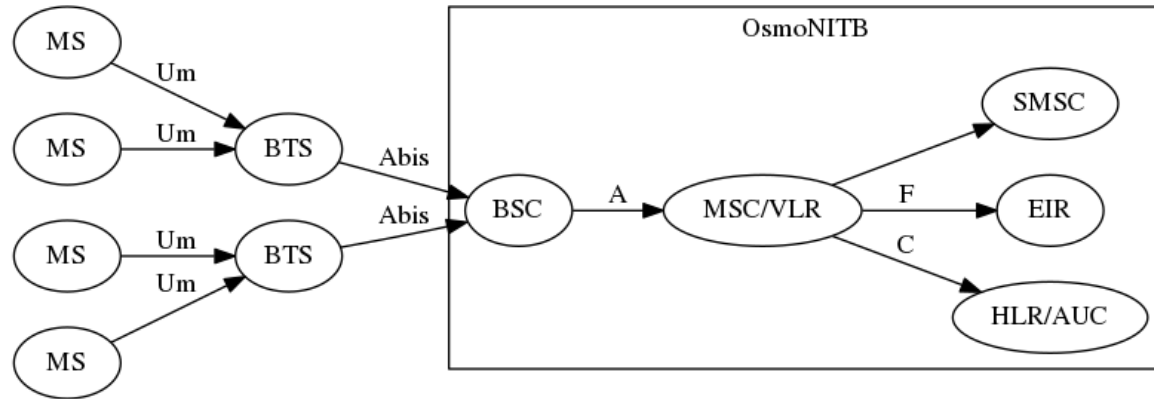
OsmoNITB

Reduces to
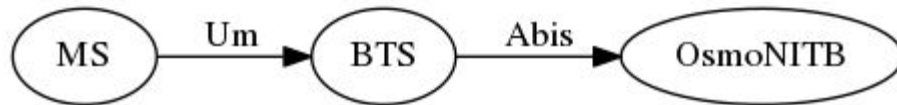
- ➔ NITB includes entire GSM network in a box
  - – BSC, MSC, VLR, SMSC, HLR
  - – Use any Osmocom supported BTS + OsmoNITB => done.
- ➔ Target user **is <u>not</u> the classic cellular operator**
- ➔ Applications include
  - – private GSM networks (farms, mining, research)
  - – autonomous rural networks with or without PSTN interconnect
  - – handset testing, M2M/IoT device testing

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- ➔ OsmoBTS, OsmoPCU and OsmoBSC to implement GSM/GPRS/EGPRS RAN
- ➔ Interface with existing core network (MSC + SGSN) via A and Gb interface
- ➔ Open Source BSC allows to co-locate one (software) BSC per BTS
- ➔ osMUX protocol can be used for satellite back-haul optimizaiton
- ➔ Perfect match for low-cost rural RAN in low-ARPU regions

OsmoBTS

3rd party BTS

OsmoBSC

Existing Core Network
MSC/HLR/SGSN/GGSN

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How can you use Osmocom?

➔ Recycle decommissioned classic BTS equipment

- with OsmoBSC attached to classic operator core

- with OsmoNITB to run autonomous cellular network

➔ With variety of OsmoBTS based hardware options (e.g. sysmoBTS)

- with OsmoBSC attached to classic operator core

- with OsmoNITB to run autonomous cellular network

➔ With OpenCellular hardware + Cellular Community Manager

Cellular Community Manager

Osmocom GSM+GPRS Stack

OpenCellular Hardware
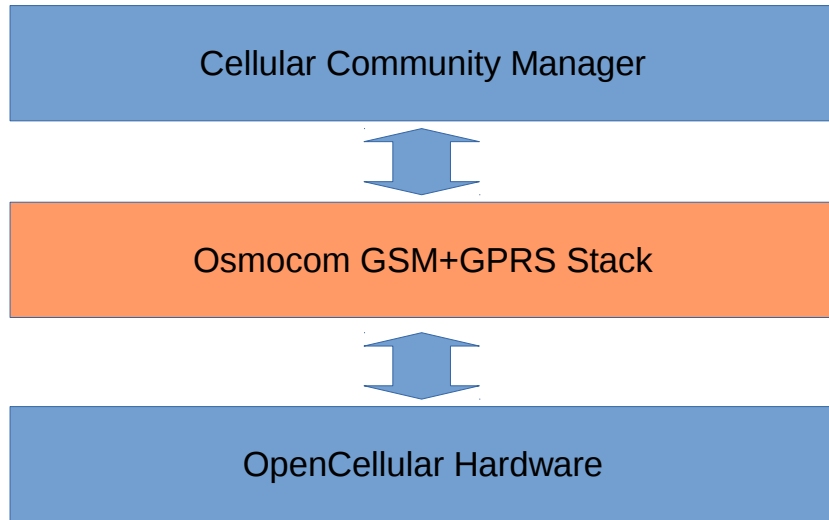
➔ Osmocom Stack implements actual GSM/GPRS protocol stack and functional elements like TRX, BTS, BSC, MSC, SGSN, GGSN

➔ Osmocom Stack is managed by Cellular Community Manarger for subscriber management, billing, monitoring

➔ If you deploy OpenCellular for 2G, you are deploying an Osmocom GSM network!

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Introducing sysmocom

- Founded 2011 by two inventors of OpenBSC + OsmoNITB: Holger Freyther + Harald Welte

- Located in Berlin (Germany)

- Current team size of 11 (8 of which are R&D engineers)

- Development of solutions and technology for mobile networks

  - from PHY/SDR to RAN to Core Network to SIM cards

  - embedded electronics design and software development

- 100% owner driven and financed; only organic growth

- All our Osmocom related work is FOSS. We don't believe in proprietary black-boxes.

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- ➔ symocom contributes > 80% of Osmocom Cellular Infrastructure development

- ➔ has put several million € worth of development effort into the Osmocom project

- ➔ Osmocom is FOSS and has no license costs

  - – anyone can use it (respecting GNU AGPL license terms) for free

  - – but all relatedR&D still has to be funded. We rely on your contribution!

- ➔ sysmocom provide support, training, tested releases, consulting, integration services to

  - – BTS / equipment vendors

  - – operators (commercial and non-commercial)

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➜ Osmocom develops cellular network elements + protocol stacks

➜ All resulting software is Free/Open Source Software, available to anyone

➜ You can use Osmocom GSM/GPRS/UMTS

  – as RAN to classic 3GPP Core Network (if yo have your MSC/HLR/SGSN/…)

  – as autonomous Network-In-the-Box

➜ Osmocom is deployed in production networks for 6+ years

➜ Osmocom interoperates with BTS equipment from many vendors

➜ OpenCellular uses Osmocom at it heart, to implement GSM/GPRS/EDGE RAN+CN

➜ sysmocom provides professional R&D, training and support service around Osmocom

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- Osmocom User Manuals: http://ftp.osmocom.org/docs/latest/

- Osmocom Cellular Homepage: http://osmocom.org/projects/cellular-infrastructure/wiki

- Video Tutorials from Osmocom Conference: https://media.ccc.de/c/osmocon17

- Mailing List: openbsc@lists.osmocom.org

- IRC: #osmocom on freenode

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