OsmoCon 2017

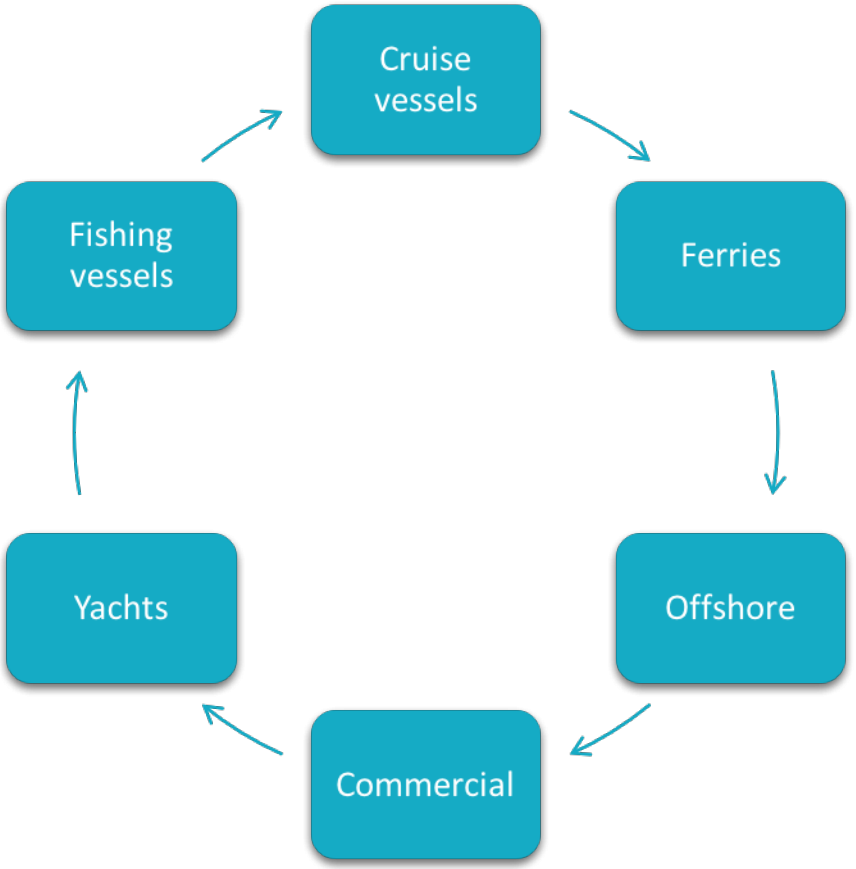
Running a OsmoCom based commercial network

April 21st, 2017 | Roch-Alexandre Nominé

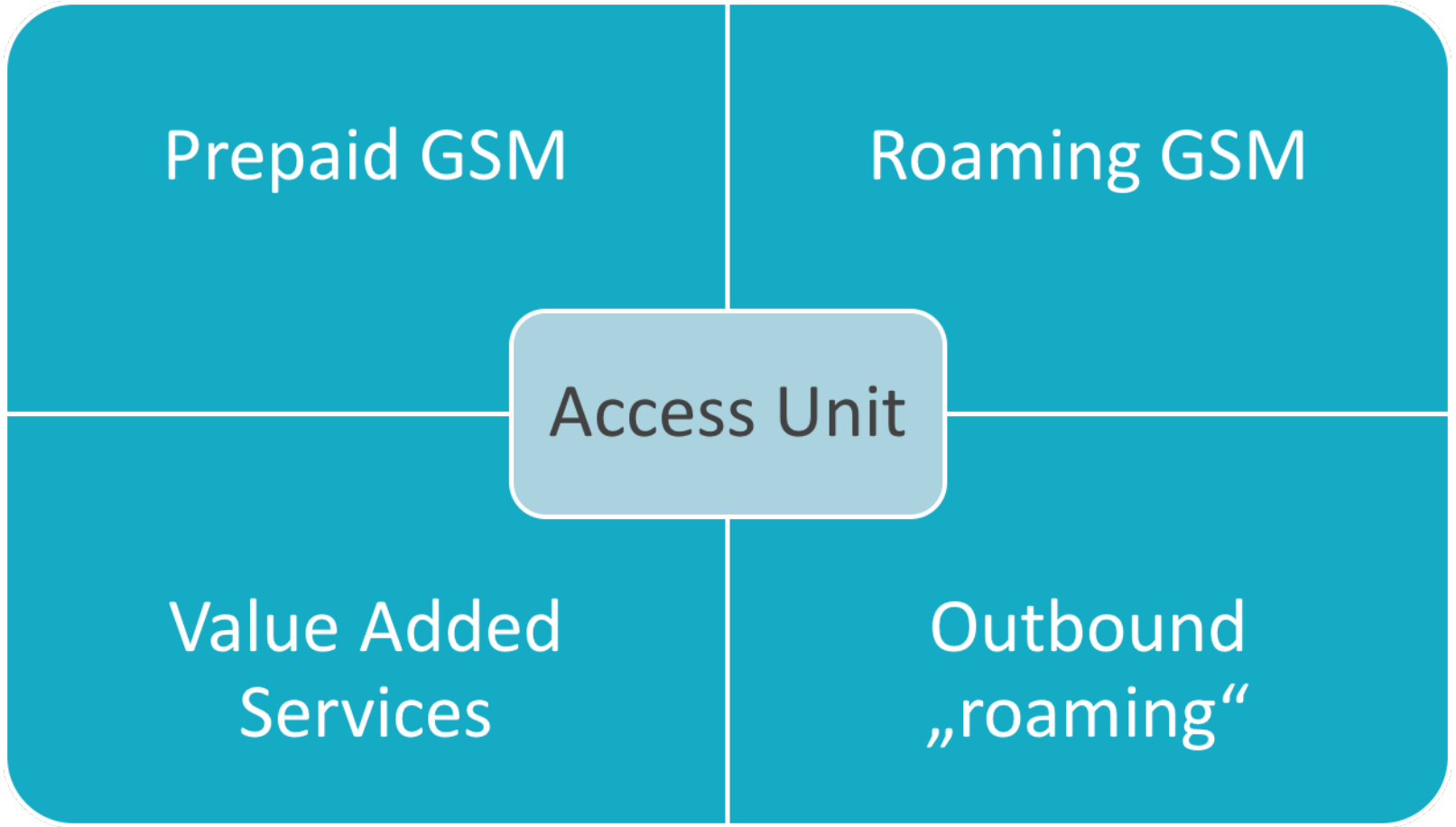
On-Waves ehf.

- Maritime GSM Service Provider
- Established in 2007, Headquartered in Reykjavik, Iceland
- Offices in Reykjavík and Paris
- Síminn hf., (“Iceland Telecom”) is the majority owner (Nasdaq OMX Nordic: SIMINN)
- Vessels located in all continents of the world
- Serving multiple market segments
- On-Waves owns and operates end-to-end IP maritime GSM core network
- Bridge the gap between ocean and land and simultaneously enhance the life qualities of seafarers and their families and operational efficiency.

Market segments

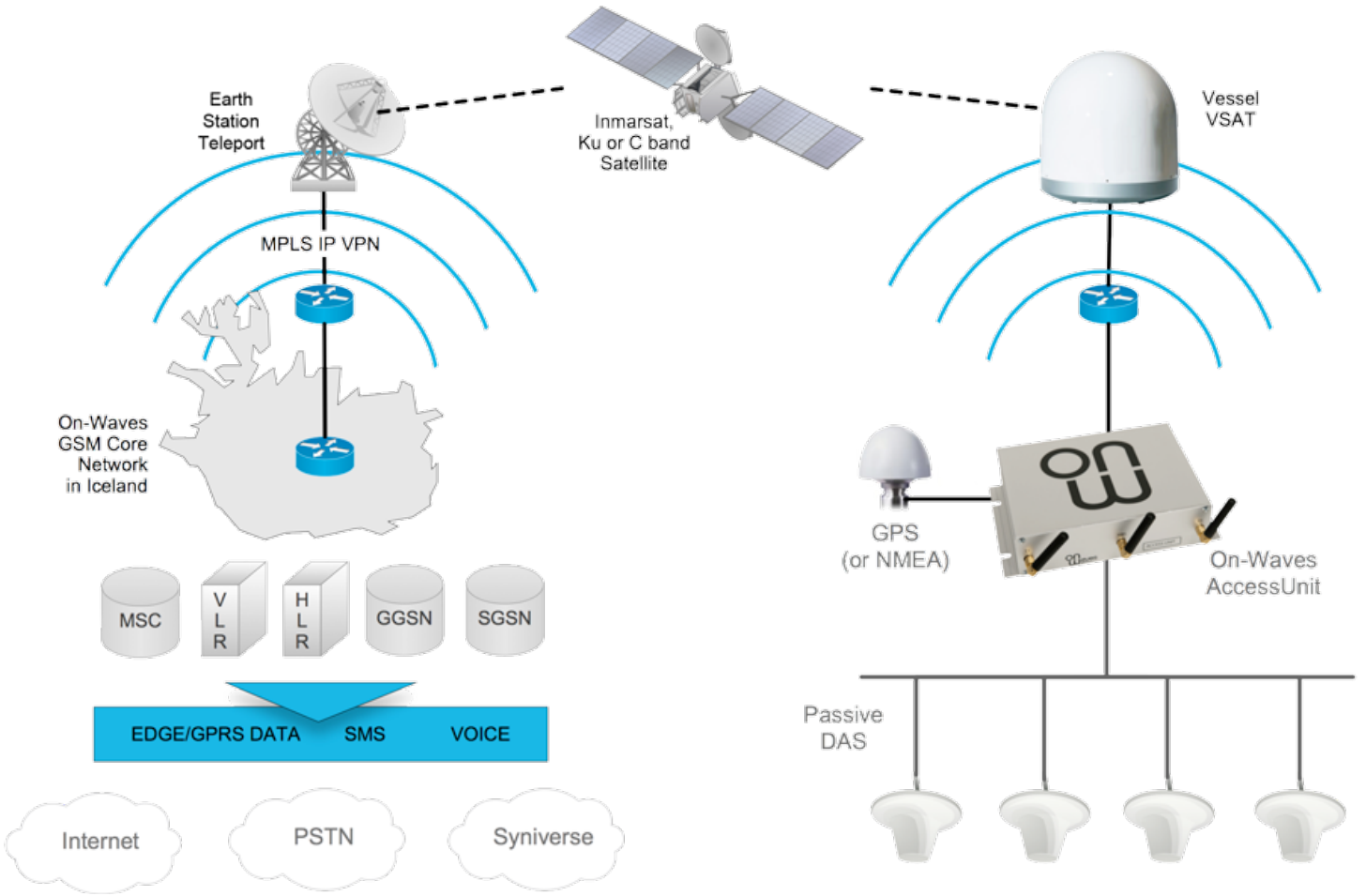


OW product and services



Some of On-Waves vessels

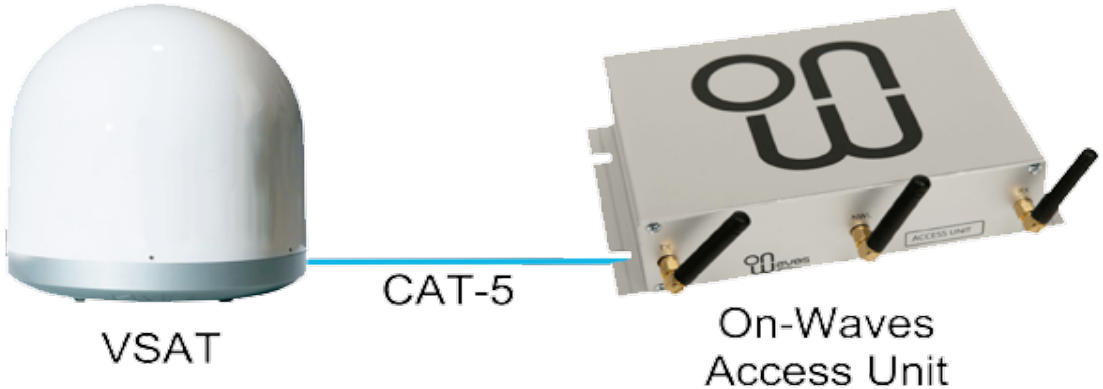
GSM Network Overview

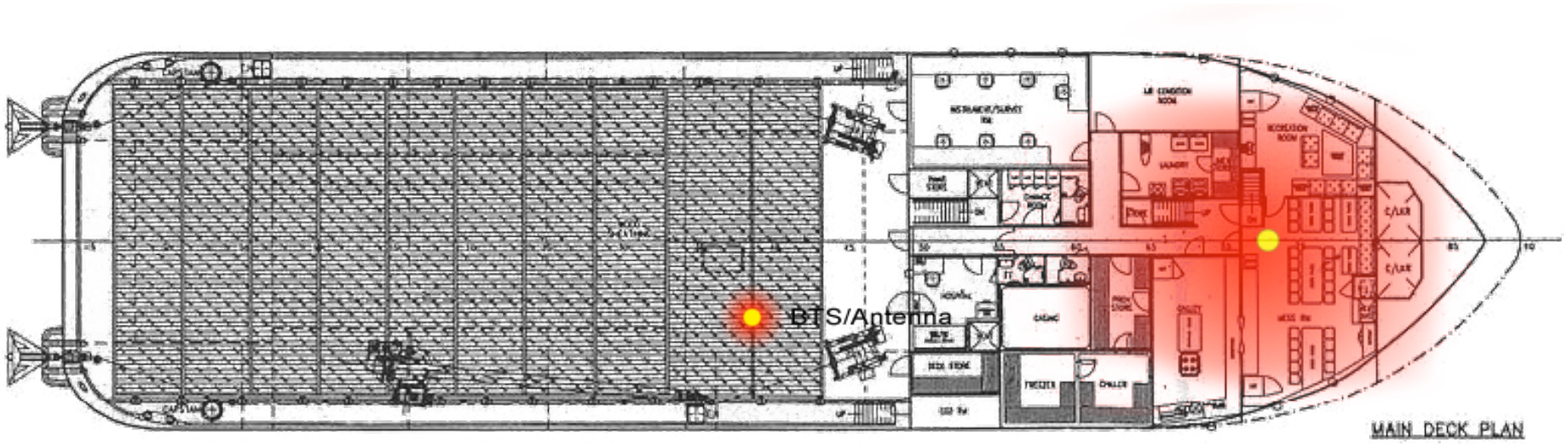


Small Form Factor

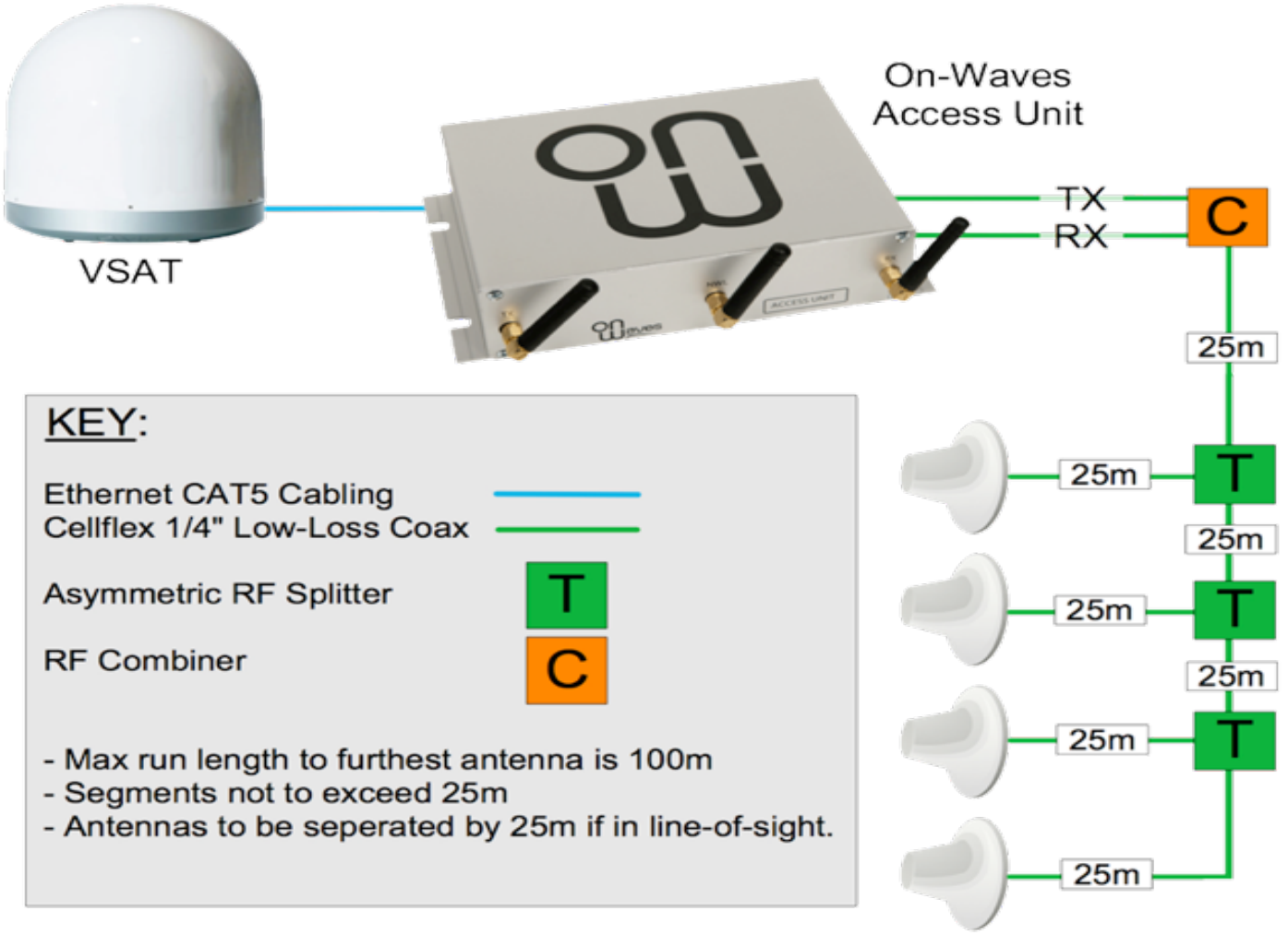
- Integrated BSC and BTS improves stability over VSAT
- Low power requirement -- POE
- Simple to configure and deploy
- Integrated GPS receiver
- Up to 12 active calls, plus SMS and 2.75G “EDGE” data
- Can limit max simultaneous calls as needed
- 8kb/s per call and 5Mb/month “idle state” usage.

Hotspot coverage

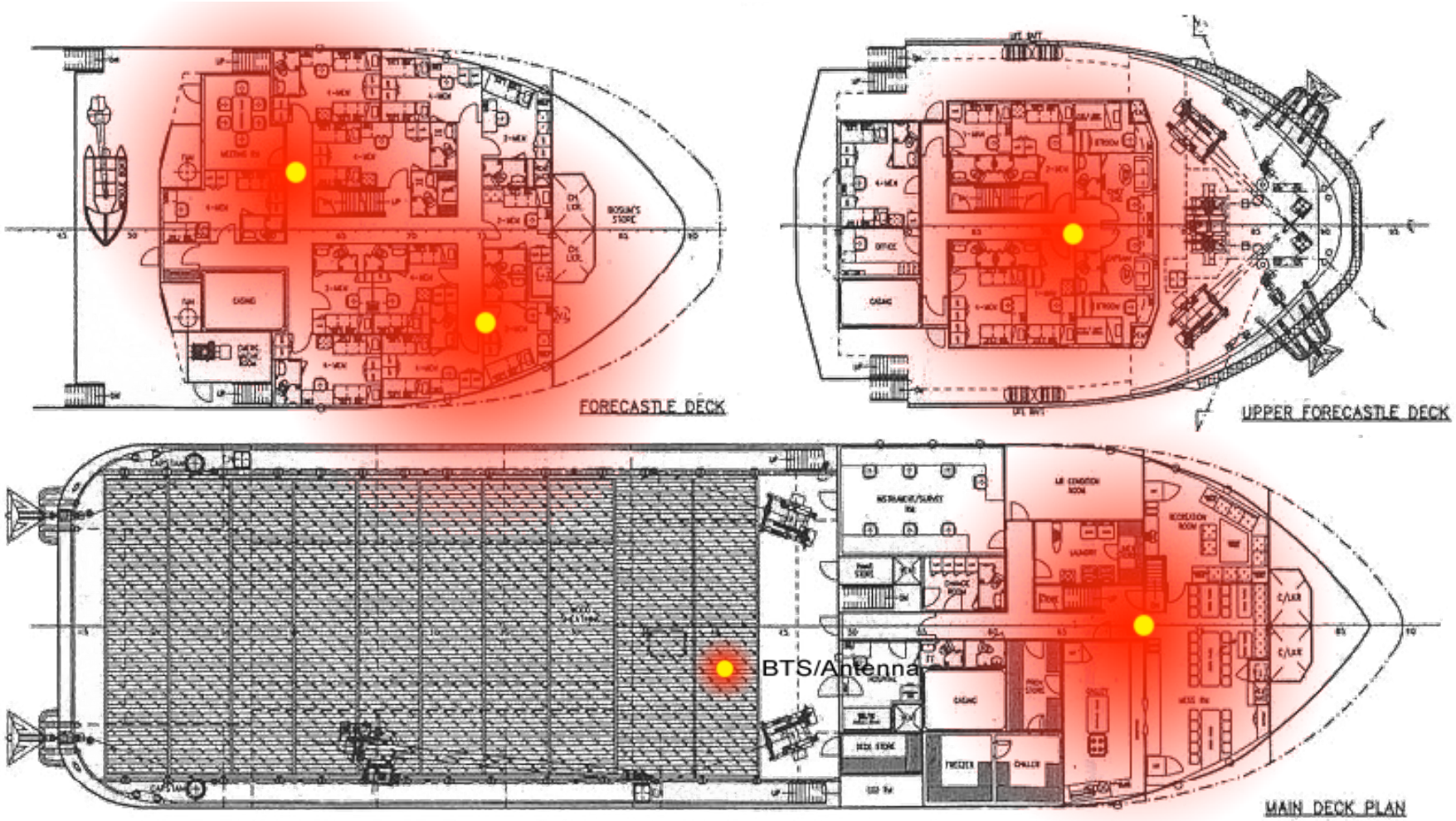




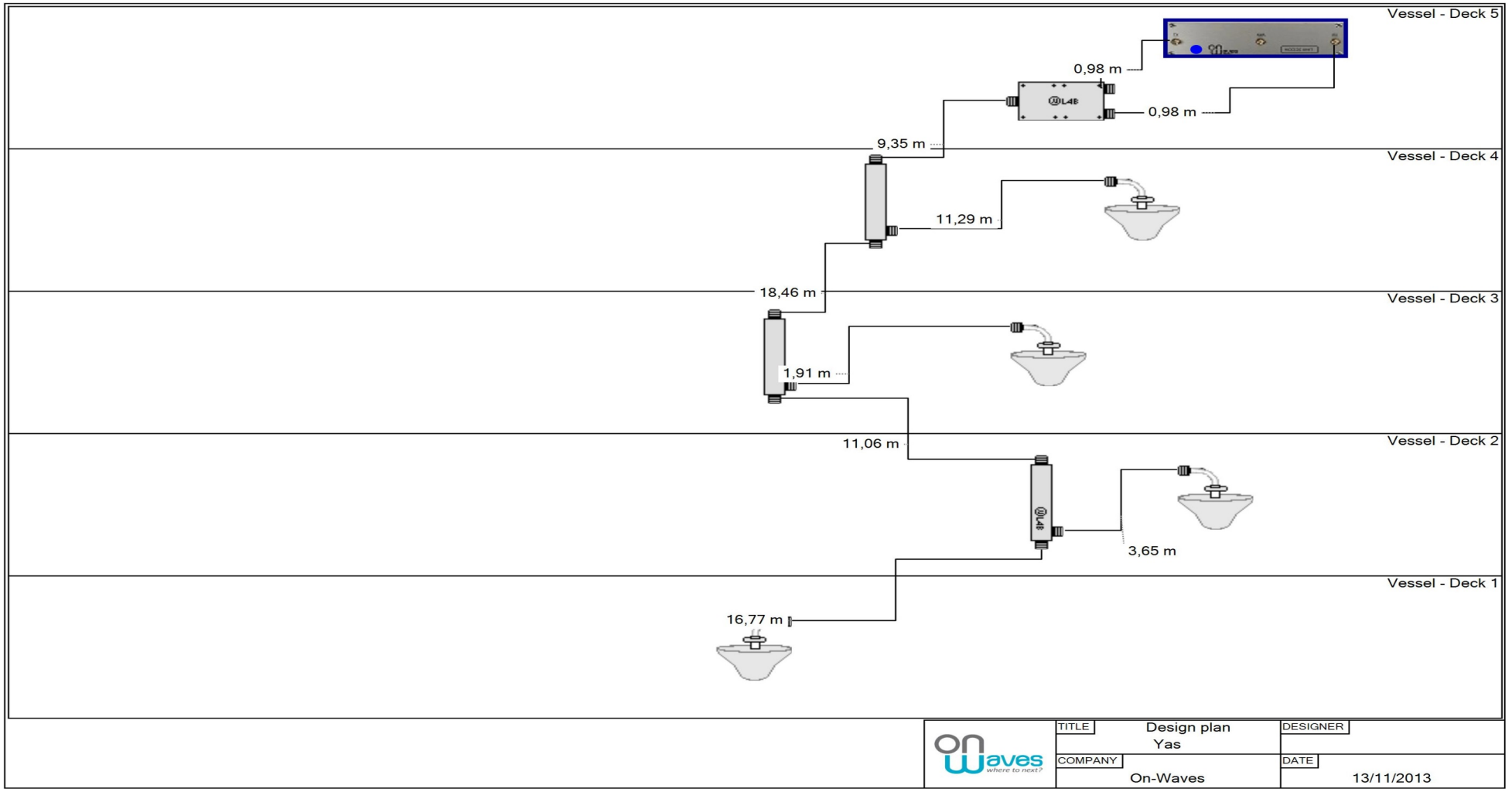
“Medium” Size Solution



Passive DAS coverage



Cable Drawing



GPS Manager – Manages Service Availability

- Automated Platform disables GSM service when vessel approaches port and reactivates when departing port to comply with regulations
- If the vessel is within 12nm of shore (2nm for the EU), a required state of LOCKED is transmitted back to the BSC.
- When the vessel is beyond 12nm of shore, a required state of UNLOCKED is transmitted back to the BSC.
- If the GPS input is lost for more than 400 seconds, the BSC automatically LOCKS as a fail-safe to prevent the phones from attempting to obtain service in port.
- KVH and On-Waves has certified direct GPS input from KVH BDE – no additional equipment required.

VSAT challenges

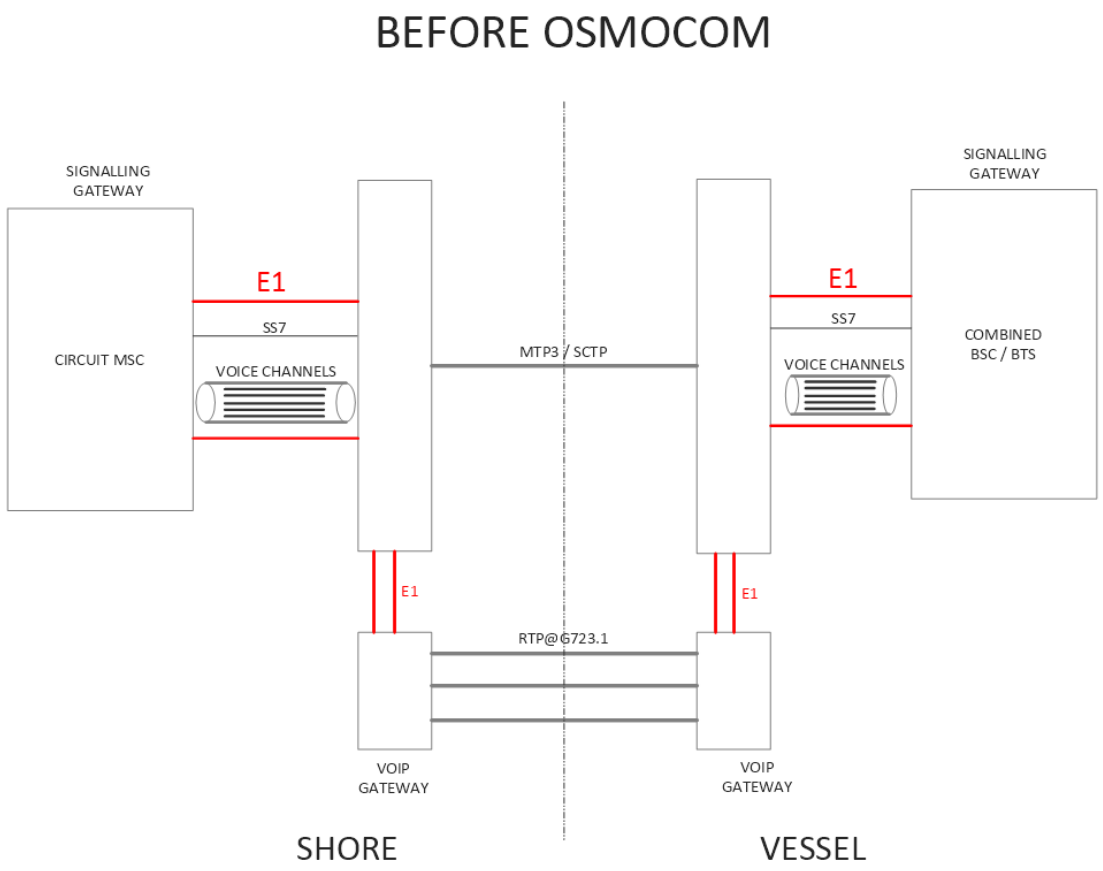
- QoS – Virtually no support for QoS by the VSAT vendor
- Heavy use of Address/Port Translation
- Crazy firewalling
- Bandwidth – typical available bandwidth is 128kbit/s (for the entire vessel)
- RTT is way over 900ms
- Jitter is way over 200ms
- Packet Loss can easily go over 1%
- Non VSAT based systems: Inmarsat Fleet Broadband and Thuraya

On-Waves/OsmoCom project

- On-Waves involvement started in 2009 with implementation of the ip.access A interface over IP
- Contribution spreads over numerous projects: osmo-bsc, bsc-nat, osmo-gbproxy, osmo-stp, osmux, ASN.1/TCAP/MAP stack
- Average of 1 to 2 full time contributors per year
- 95% of the BSS software environment is Open Source
- No proprietary implementation
- Addition of new nodes to support non-standard features

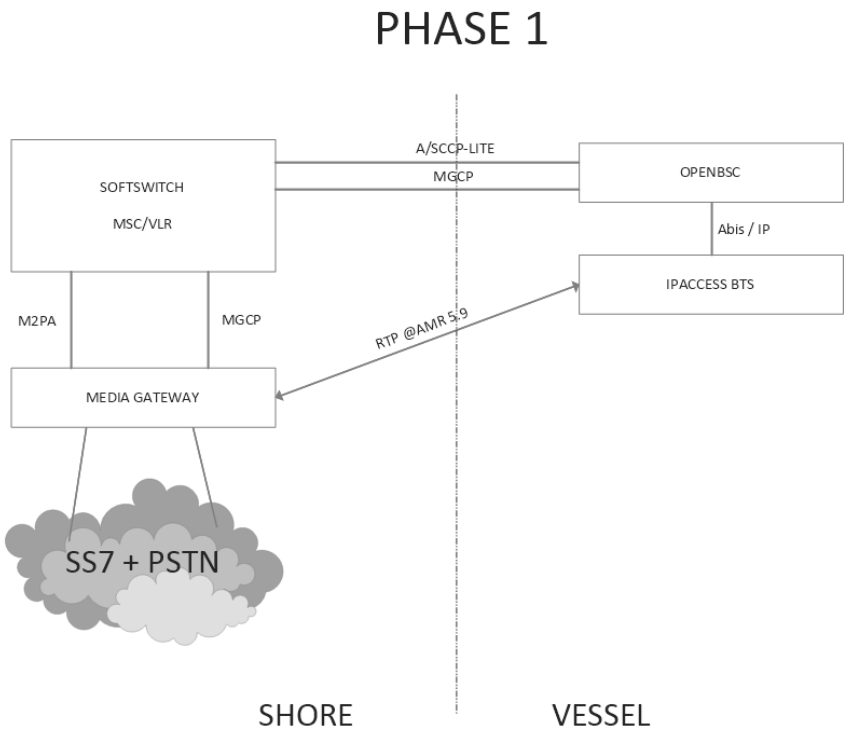
On-Waves before OsmoCom

On-Waves before OsmoCom



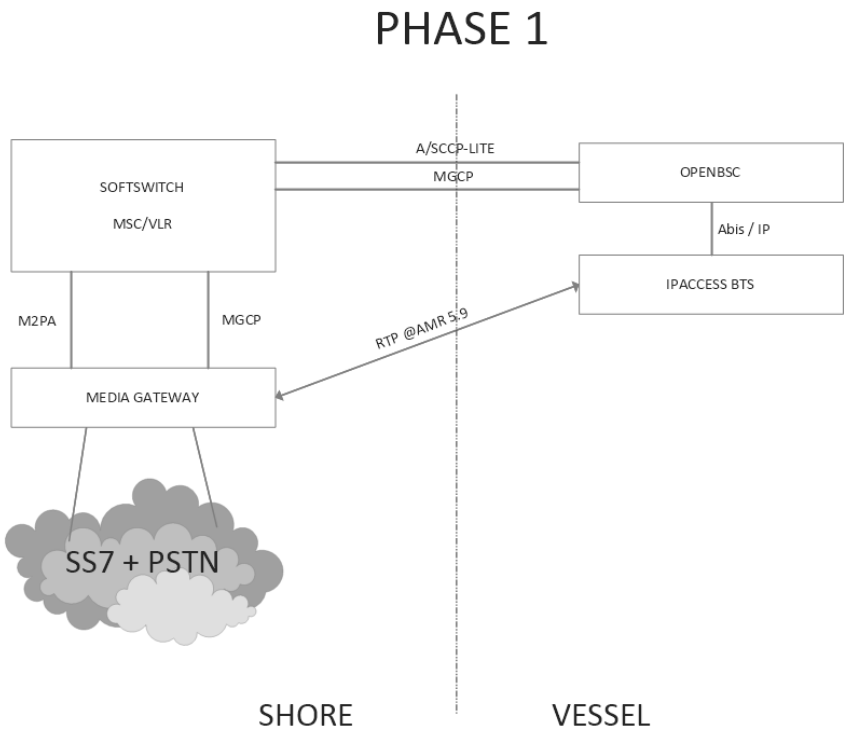
- Circuit-based Ericsson GSM MSC
- Proprietary circuit combined BSC/BTS (aka Interwave BS+)
- Proprietary Signaling gateways
- Cisco routers for G.711/G723.1 transcoding
- Very static configuration: one vessel, one BSC, one E1 trunk, x voice circuits
- 90 kgs
- 80k EUR investment/vessel

Implementation of the ip.access A/IP Interface



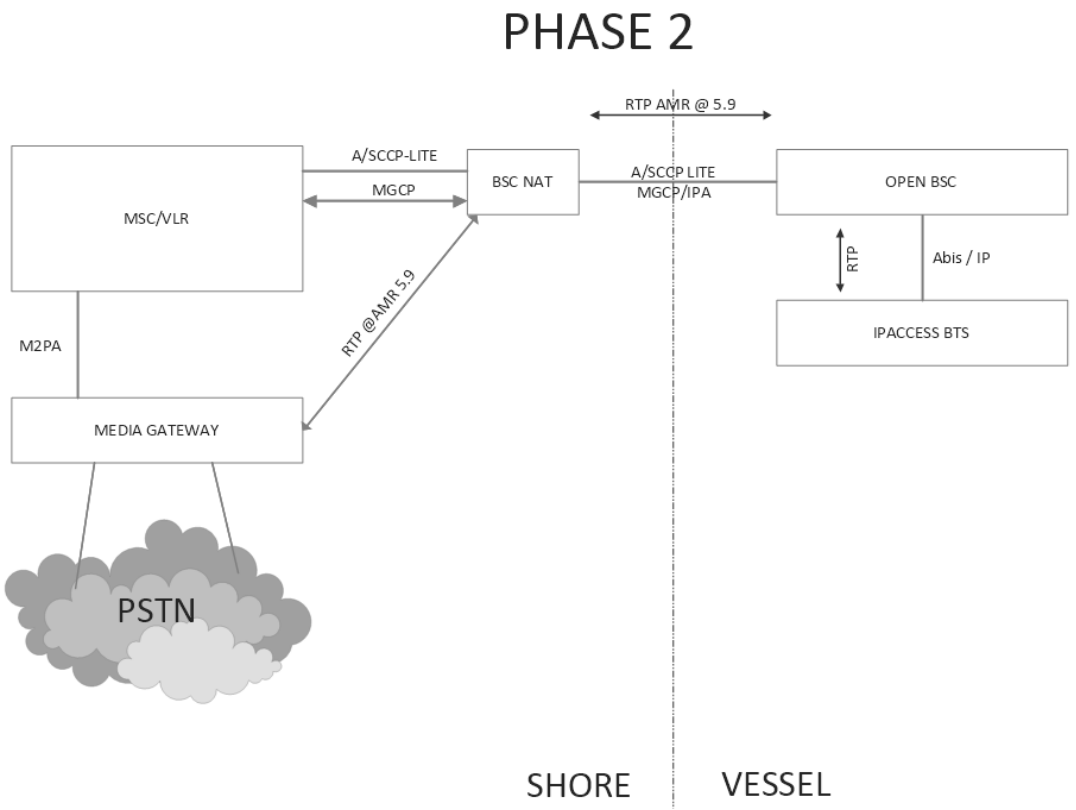
- On-Waves migration to a softswitch MSC/VLR
- Use of the ip.access nanobts (On-Waves had also sourced the IPA circuit BSC)
- Implementation based on traces, no support from the BTS vendor
- A interface implemented using the SCCP-Lite protocol (proprietary but widely implemented)
- Implementation done in a few (2-3) months

Implementation of the ip.access A/IP Interface



- Limited scalability
- No support of IP Network/Port Address Translation
- SoftMSC limitation (number of connected BSCs)
- Non-standard SDP implementations by ip.access/Audiocodes

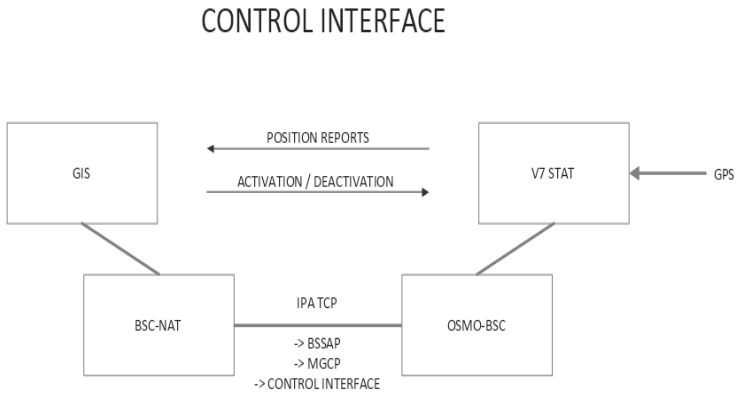
Development of BSC-NAT



BSC-NAT features

- One BSC from soft-MSC/VLR point of view
- Virtually supports hundreds/thousands of remote BSCs
- Implementation of MGCP over IPA protocol to support IP NAT
- BSC acts as RTP/MGCP proxy towards the BSC-NAT
- Support for multiple MSCs (still in development)
- Support for Location Update access-lists
- BSC Authentication (not extremely secure)

Support for control Interface



- Use of IPA A link to carry admin commands
- Implementation of SET/GET/TRAP paradigm
- Implementation of an external interface on osmo-bsc used to submit vessel GPS positions
- Used to lock/unlock TRX

OSMUX

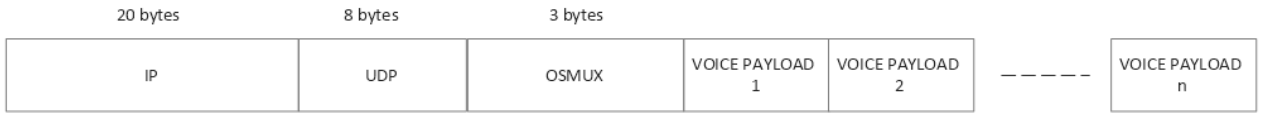
- RTP is extremely inefficient (24 kbit/s IP bandwidth to carry a AMR@5.9 call)
- RTP is using multiple UDP ports
- No bandwidth efficiency improvement if multiple calls
- Support for cRTP is limited to serial/Frame-Relay links or depends on VSAT modem vendor

OSMUX

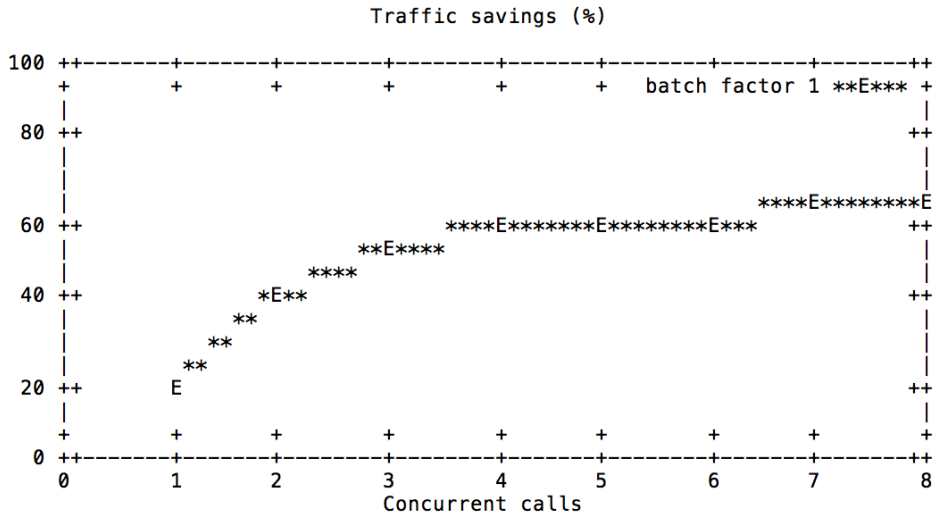
OSMUX

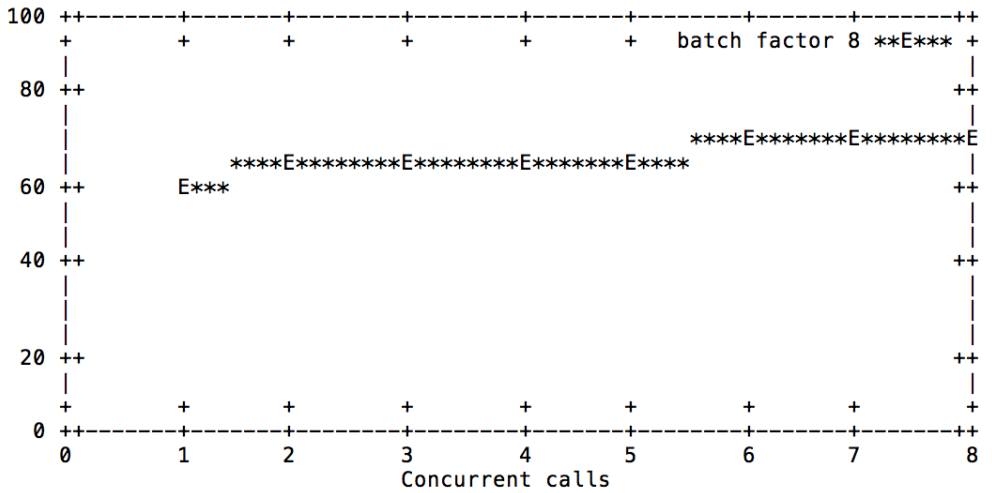
RTP FRAME (20ms payload)

OSMUX FRAME (x ms payload)

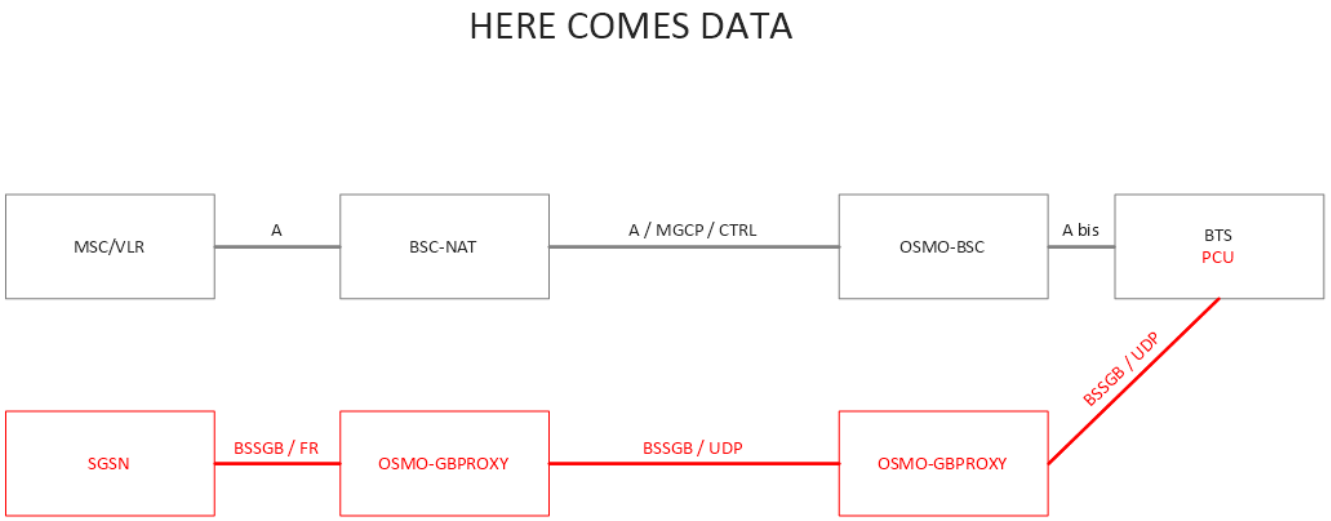


OSMUX performances





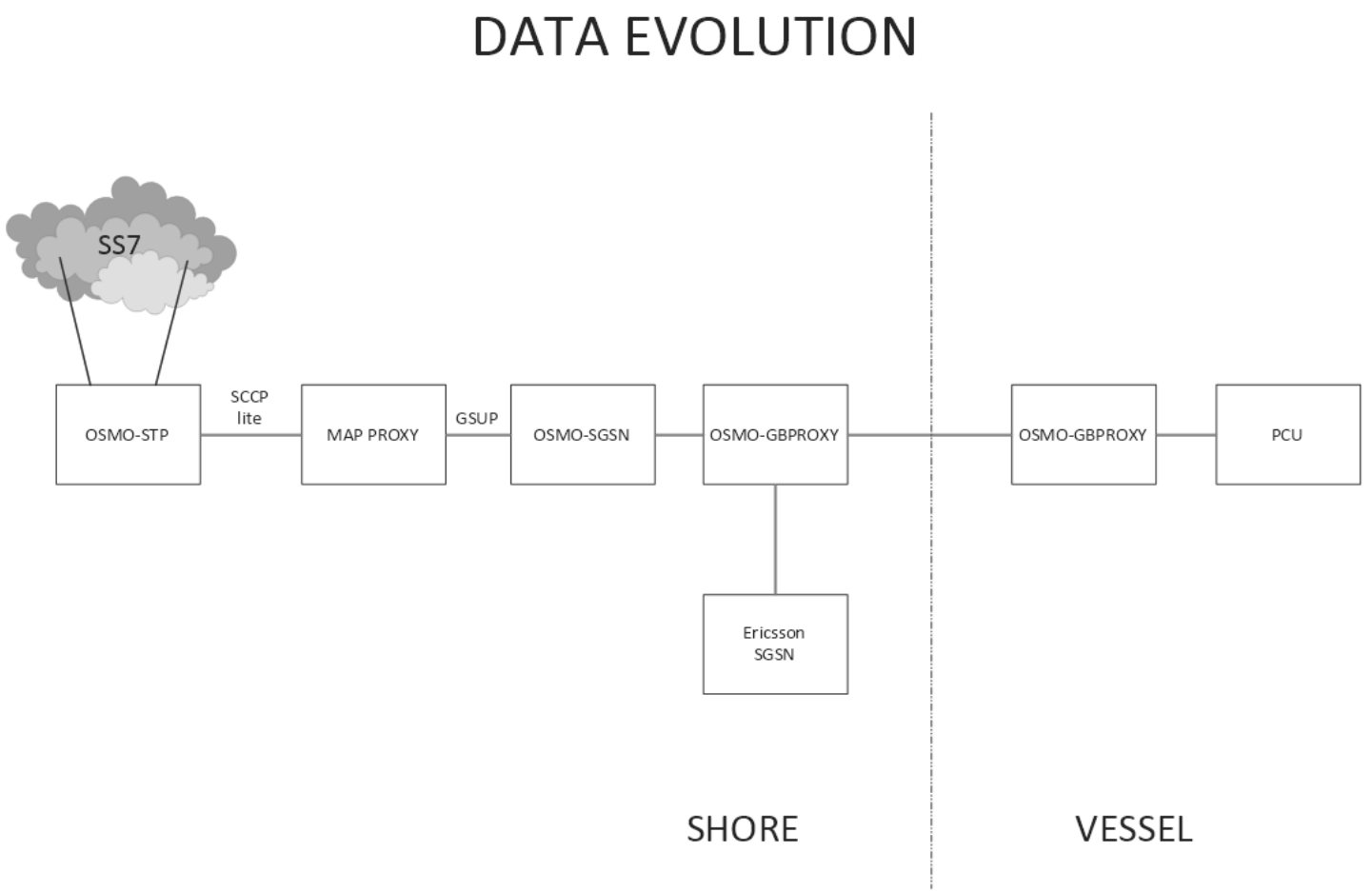
Here comes data



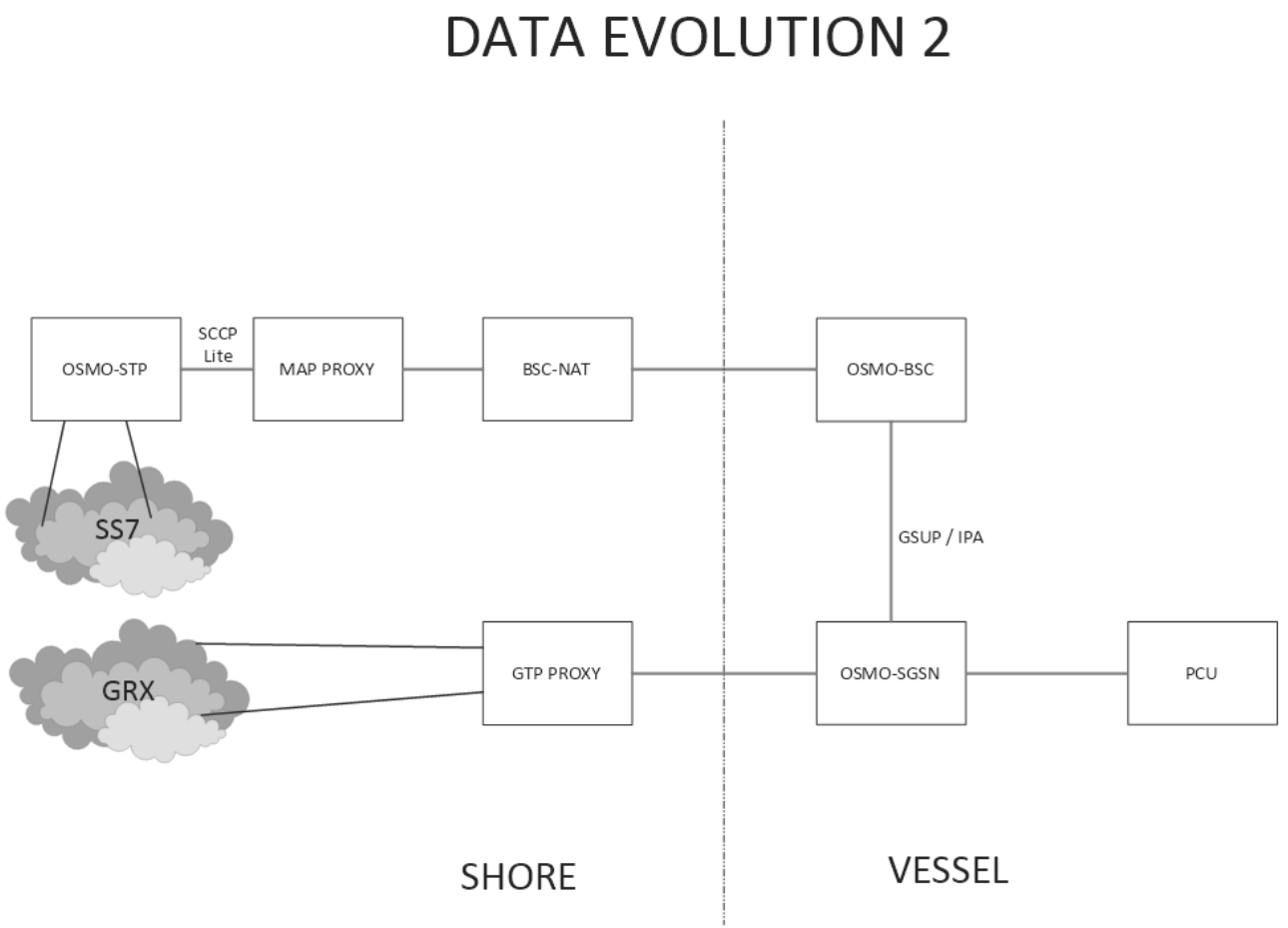
Data issues

- Difficulties in replacing the Siminn-hosted SGSN (IREG, GRX IP issues, CDRs, …)
- Need support for MAP to support inbound roaming
- Extremely verbose BSSGB protocol

Data Evolution 1



Data Evolution 2



How an MSC project turns into …

- Started a project to replace the On-Waves softswitch
- Implemented a complete TCAP/MAP/CAP stack in Smalltalk/Pharo
- Led to implementation of the SGSN-MAPPROXY, a production-grade HLR/AUC, a SMS Home Routing platform, …
- Further info: https://github.com/moiji-mobile

Thank you

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