OSM#10 Hackfest
Hackfest Content Overview
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What is OSM?

A community-driven production quality E2E Network Service Orchestrator for telco services. It focuses on delivering operational-ready virtualized Network Services.
Benefits of OSM

- A well-known Information Model (IM), aligned with ETSI NFV, allows operators to model Network Services without worrying of the virtualization of resources and the underlying infrastructure.
- Capable of modelling and automating the full lifecycle of:
  - Network Functions (virtual, physical or hybrid),
  - Network Services (NS)
  - Network Slices (NSI)
- Includes all the way from their initial deployment (Instantiation / Day-0, and Day-1), to their daily operation and monitoring (Day-2).
VNF Onboarding Workflow

- Network Functions Virtualisation will only scale if all of the functions can be automated.

...specially true for 5G!

VNF Packages
(unique)

1. Instantiate Network Services/Slices, making VNFs manageable (“Day 0”)
2. Initialize VNFs so they provide the expected service (“Day 1”)
3. Operate the service: monitoring, reconfigurations and (closed-loop) actions (“Day 2”)

Network Service Instance

VNF-O & VNFM for abstraction and orchestration

1. (instantiation with optional parameters)
Orchestration

• Last mile workload-specific workflows and codepaths
  • Scripts, file changes, integration, config, backup etc
• OSM leverages Juju Charms to perform operations
  • Proxy
    • PNF or existing fixed functions with limited integration options
    • Charm acts on NF using a network protocol
    • Code must have its own execution environment
  • Native
    • Charm has direct access to function
    • App that can be installed on Win/Ubuntu/RHEL/CentOS, or
    • Docker image that can be driven by a charm directly
    • No need for external management port - actions run locally
The Scenario for the Hackfest

Your mission? Deploy and manage an entire end to end cellular data network complete with:

- Magma Orc8r and AGW software (the EPC)
- Software radio and cell phone
- Firewall/router to manage internet egress
- Web cache to reduce backhaul expenses
Cellular Data Path

Central Datacentre

Regional Datacentre

UE

eNB

SDN

Router

Web Cache

EPC (PGW)

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Reality is messy and mixed
Charms are packages of scripts to drive apps

Lifecycle scripts
- install
- config
- update
- remove
- scale

Integration scripts
- relate-mysql
- relate-ldap
- relate-proxy
- relate-...

“Action” scripts are OSM Primitives
- “action: backup”
- “action: restore”
- “action: scan-viruses”
- “action: health-check”
- “action: add-repo”
- “action: …”
- “action: …”
- “action: …”

These are your operations primitives.
What are the eNodeB and UE?

- **UE**
  - User Equipment
  - Our “pretend” cell phone for the week
- **Evolved Node B:**
  - Connected to carrier network
  - Radio that communicates with phones (UE)
- **Software driven by srsLTE**
  - Free, open source LTE software
  - [https://github.com/srsLTE](https://github.com/srsLTE)
    - srsUE
    - srsENB
So what is an Evolved Packet Core? (EPC)
What is the Router?

- Network device to forward data packets between networks
- Uses tables to determine where packets go
- Already exists in our network
- Purpose built VyOS based appliance
  - Has no lifecycle
  - Cannot manage the firmware
- Only able to manage routing tables

*This is a PNF*
What is the Web Cache?

- Technology that stores (caches) content
  - Stores copies of content passing through
  - First request gets content from source
  - Subsequent requests replay content from local storage

- Powered by Squid
  - [http://www.squid-cache.org/](http://www.squid-cache.org/)

- Has allow/deny rules for what origins will be served
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Central Datacentre

OSM

Regional Datacentre

VIM + K8s

Magma Orchestrator (KNF)

Proxy Charm

Native Charm

Physical Router (PNF) - VyOS

Squid KNF

Magma vEPC vdu

SDN

Generic eNodeB + UE emulator vdu
Magma EPC Network Slice 1

EPC Manager NS

vEPC Element Manager (KNF)

magmaOrc8r
control plane KDU's

metrics
has
gui

EPC NS

Magma AGW + Tester (VNF)

vEPC (VDU)
magmaAGW

Generic eNodeB + UE emulator (VDU)

Physical Router (PNF)

Web Cache KNF / Internet

Physical Switches (Data Plane)

SGi interface
S1 interface
Operational EPC in minutes!

- Docker and VM-based virtualization lifecycle management
- Complex KNF deployment in minutes
- Physical Network Function automation
- VNF Monitoring
- Automatic Horizontal Scaling
- High performance techniques activation
- Underlay network automation
- Network Function Day-0, Day-1 and Day-2 operations
- Network Slicing with shared services