OSM#9 Hackfest
Hackfest Scenario Overview
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Cellular Data Path

Central Datacentre

Regional Datacentre

Router
Web Cache
EPC (PGW)

UE
eNB
SDN
I Just Want to Watch YouTube

- Cellular data continues to explode
- 5G gives us even more bandwidth
- Backhaul costs are expensive
- Management of all the software components is expensive
- Remote management is even more expensive

Here we show how OSM helps with the management and orchestration of Evolved Packet Core (EPC) and over-the-top services
Magma combines 3GPP functions into AGW

- **MME | Mobility Management Entity**
  - Keeps track of User Equipment registered on LTE network
  - Handles requests for network access - setting up and tearing down data sessions

- **SGW | Serving Gateway**
  - IP router with GTP support and charging functionality
  - Module for signalling between PGW and MME

- **PGW | Packet Data Network Gateway**
  - Provides access to external Packet Data Networks (ie: internet)
We will emulate in software...

- **UE | User Equipment**
  - This is the cell phone or device communicating over cellular network

- **eNB | The evolved Node B**
  - The Cell Phone Radio itself
  - Connected to the mobile phone network that communicates directly wirelessly with mobile handsets
Cellular Data Path

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Router

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Cellular Data Path

Central Datacentre

OSM

Regional Datacentre

- VIM + K8s
- Magma Orchestrator (KNF)
- Magma vEPC vdu

Physical Router (PNF) - VyOS

Router

Web Cache

EPC (PGW)

Generic eNodeB + UE emulator vdu

SDN
Reality is messy and mixed

**OSM**

- **LXD Operators**
  - Proxy Charm (Ops Code)

- **K8s Operators**
  - Proxy Charm (Ops Code)

**Racks**

- PNF
- PNF

**VIM**

- VNF
- VNF
- VNF

**Kubernetes**

- KNF
- KNF

**Native Charm**

- LXD Operators
- K8s Operators
Orchestration

- Last mile workload-specific workflows and codepaths
  - Scripts, file changes, integration, config, backup etc
- How? OSM uses scripts that are packaged in a Charm
  - Proxy
    - PNF or existing fixed functions with limited integration options
    - Charm acts on NF from a distance over some network protocol
    - SSH or REST or NetConf-Yang from the proxy charm
  - 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 open management port - actions run locally
Charms are packages of scripts to drive apps

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

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

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

These are your operations primitives.
OSM Creates and Configures:

- Magma vEPC Combination K8s and VMs
  - [https://github.com/facebookincubator/magma](https://github.com/facebookincubator/magma)
  - Management of Magma is series of K8s containers
  - Magma AGW is in a VM
    - Uses SR-IOV, CPU pinning and huge pages
Software Components: Magma AGW

Configuration:

● Information needed:
  ○ An ID for this EPC: agw_01
  ○ A name for this EPC: AGW01
  ○ An IP address of the Magma Orchestrator
  ○ The network name to create in Magma Orchestrator: osmnet

● Demonstrated using Proxy orchestration charm
Software Components: PNF Router

- VyOS package, not customized
- Router already exists, no software to deploy
- Must be registered with OSM for orchestration

Configuration:

- Routing
  - Permit / Deny traffic from the Magma AGW to internet
- Demonstrated using Proxy orchestration charm
Software Components: eNodeB + UE

OSM will deploy and configure a VM with:

- srsLTE
  - Software Radio (eNodeB)
  - Software UE (Cellphone)
- Graphical Desktop with Firefox

https://github.com/srsLTE/srsLTE
Software Components: eNodeB + UE

Configuration:

● Information needed:
  ○ Where is EPC Core
  ○ Radio parameters (MCC, MNC, etc)
  ○ UE parameters (IMSI, encryption keys)

● Demonstrated using Native orchestration charm
Software Components: Web Cache

OSM Creates and Configures:

- Web Cache Container
  - Based on Squid
  - [http://www.squid-cache.org/](http://www.squid-cache.org/)
- Demonstrated using Native K8s orchestration charm
The Big Picture

Magma EPC Network Slice

Orchestrator Subnet (shared)
- Magma Orchestrator (KNF)
  - other kdus
  - nginx_proxy kdu
  - orc8r_proxy kdu

Evolved Packet Core Subnet
- Magma AGW + Tester (VNF)
  - Magma vEPC
    - vdu
- Generic eNodeB
  - +UE emulator
    - vdu

Physical Switches (Data Plane)
- S1 interface
- SGi interface

Physical Router (PNF)
- VyOS emulated -

Squid KNF

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The EPC Network Slice

- Magma EPC Network Slice
  - Orchestrator Subnet (shared)
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  - Evolved Packet Core Subnet
    - Magma AGW + Tester (VNF)
      - Magma vEPC
        - vdu
    - Generic eNodeB +UE emulator
      - vdu
  - Physical Router (PNF)
    - VyOS emulated
  - Web Cache KNF / Internet
  - Physical Switches (Data Plane)

- management
  - S1 interface
  - SGi interface
Our Cell Phone

- The VM that has the UE software is really an Ubuntu Desktop
- But… we are using that as if it were a Cell Phone
- Can log into the desktop using VNC - password srslte
- If VNC not available, use Horizon Dashboard
  - Desktop credentials: ubuntu / osm2020
User Provisioning

- Cell phone has SIM card with credentials
- Needs to be activated in Carrier’s EPC
  - Day 1 Primitive operation to provision the phone in Magma
- Cell phone needs a radio
  - Day 2 Primitive operation to start radio emulator
  - Day 2 Primitive operation to register cell on network
End to End, But First We Learn

The next 3 days we will be breaking down the deployment step by step and teaching how each part gets created.

Enjoy the Hackfest!
Find us at:

osm.etsi.org
osm.etsi.org/wikipub