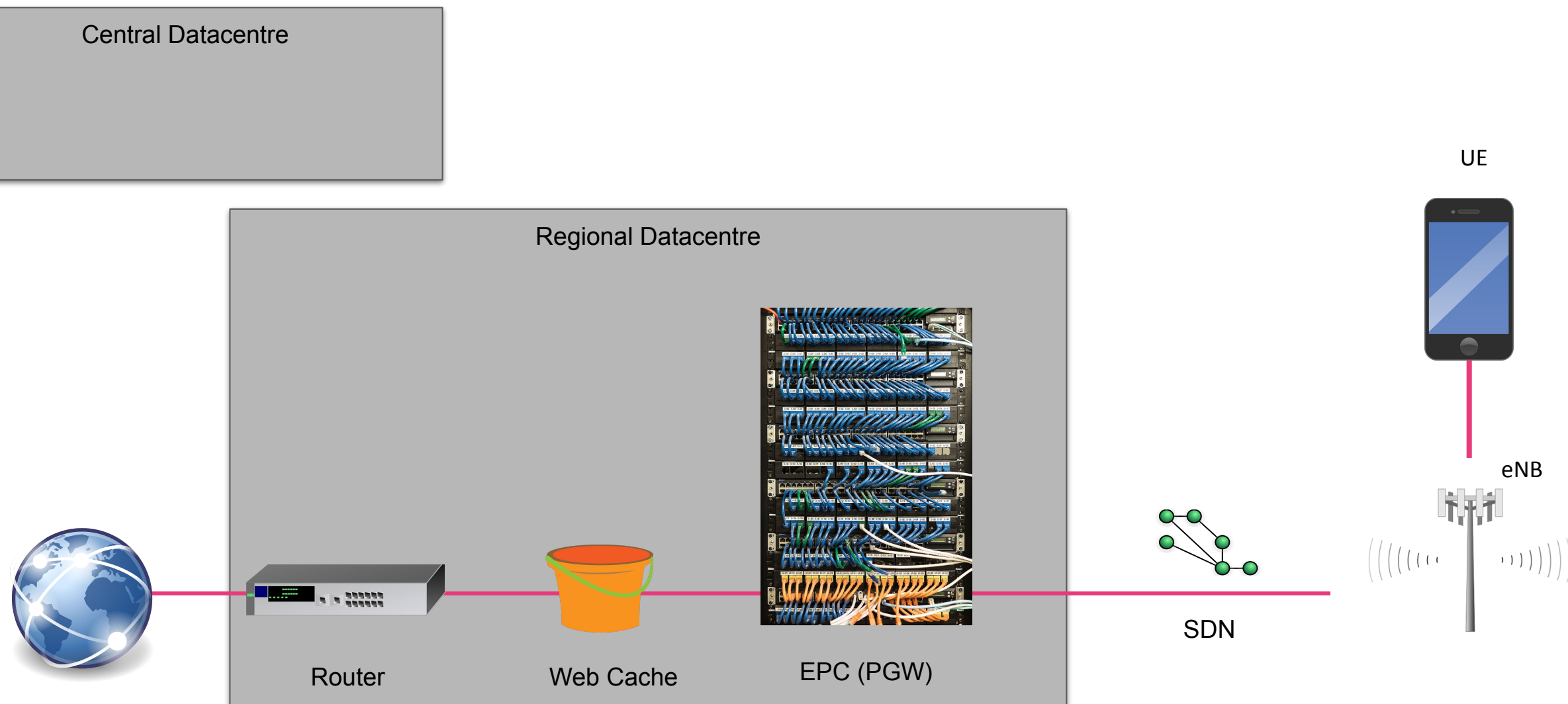# OSM#9 Hackfest
Hackfest Scenario Overview
Mark Beierl (Canonical)

Cellular Data Path

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
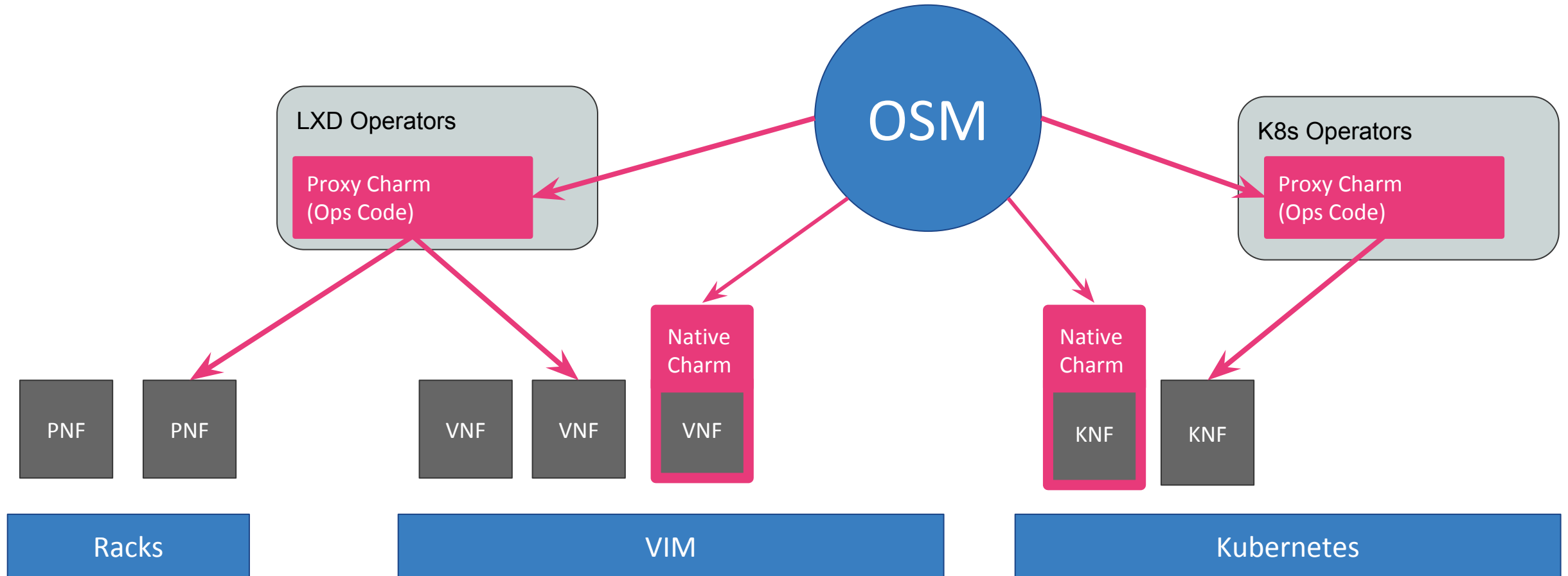 - Connected to the mobile phone network that communicates directly wirelessly with mobile handsets
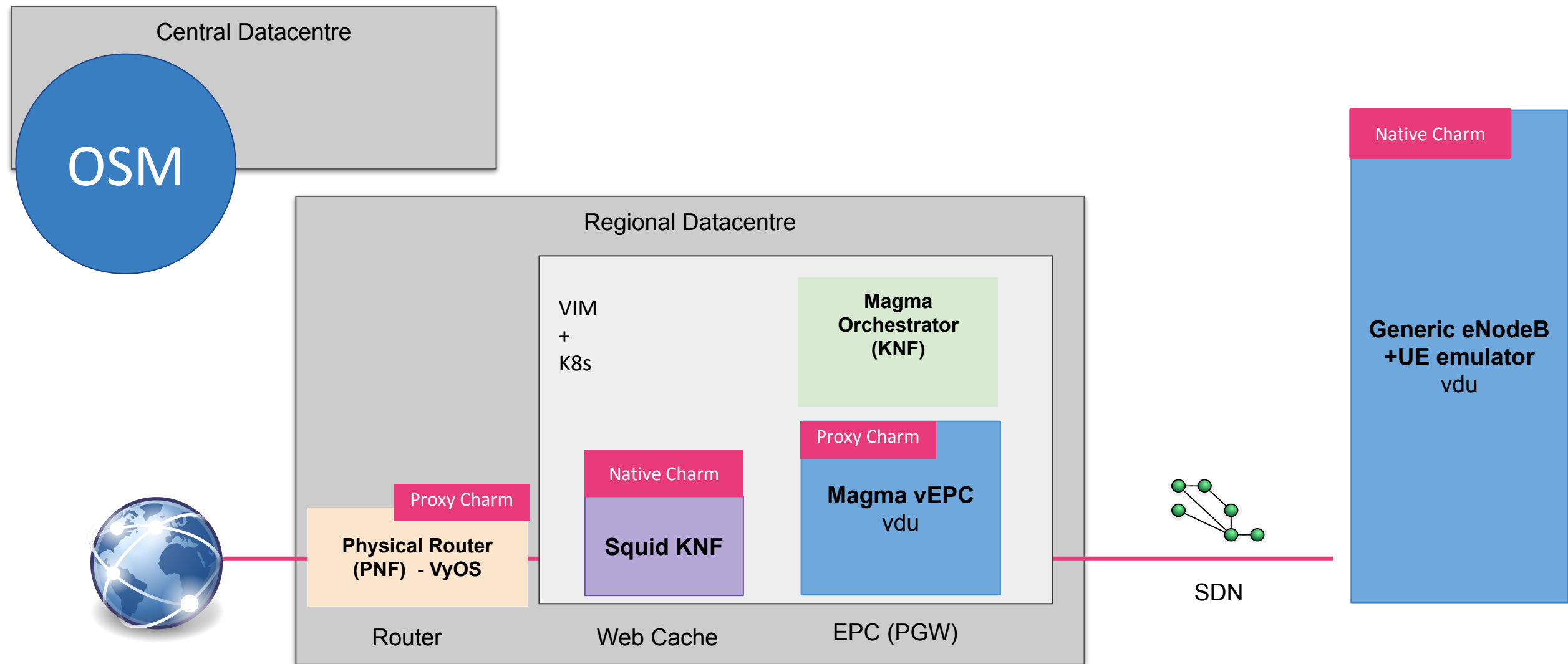
Cellular Data Path

Central Datacentre

Regional Datacentre

UE

eNB

SDN

Router

Web Cache

EPC (PGW)
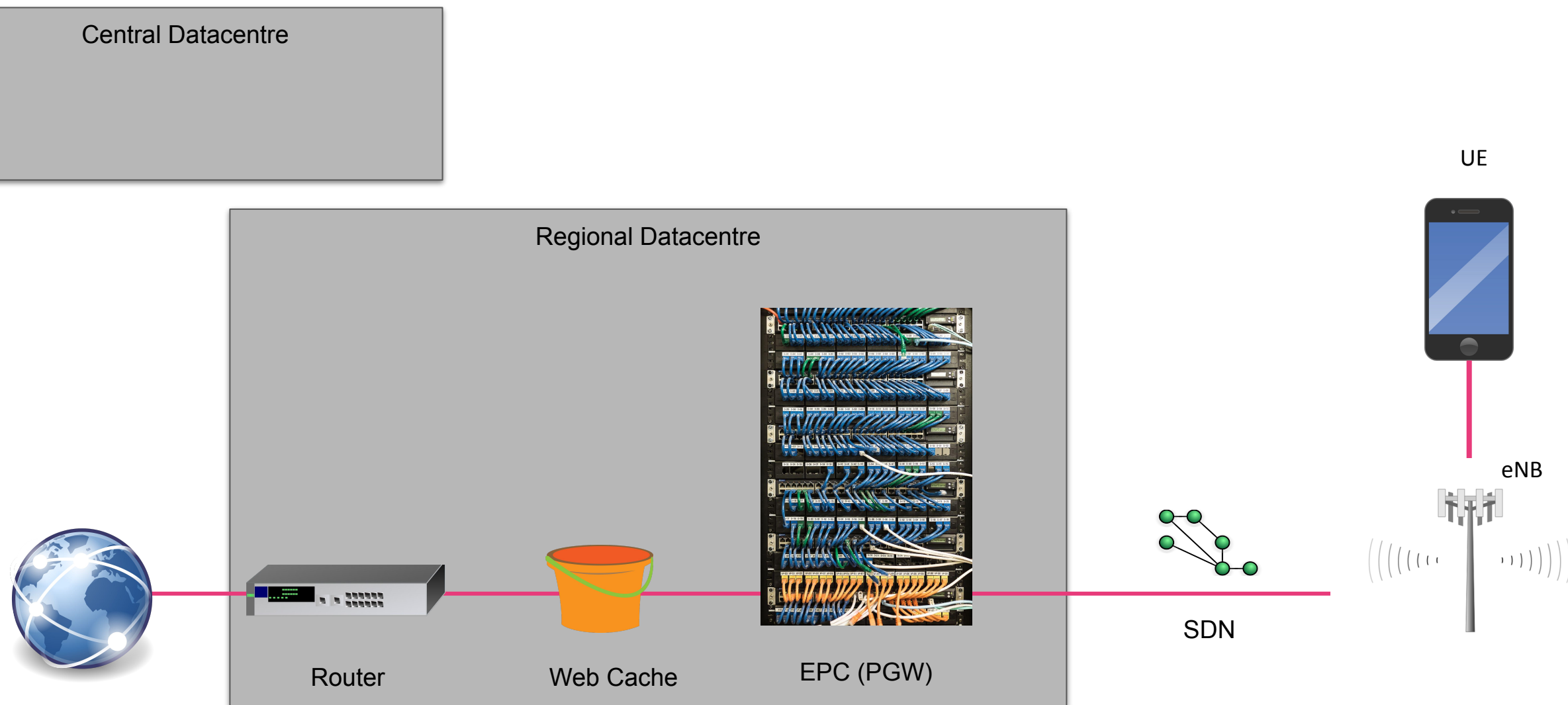
Cellular Data Path
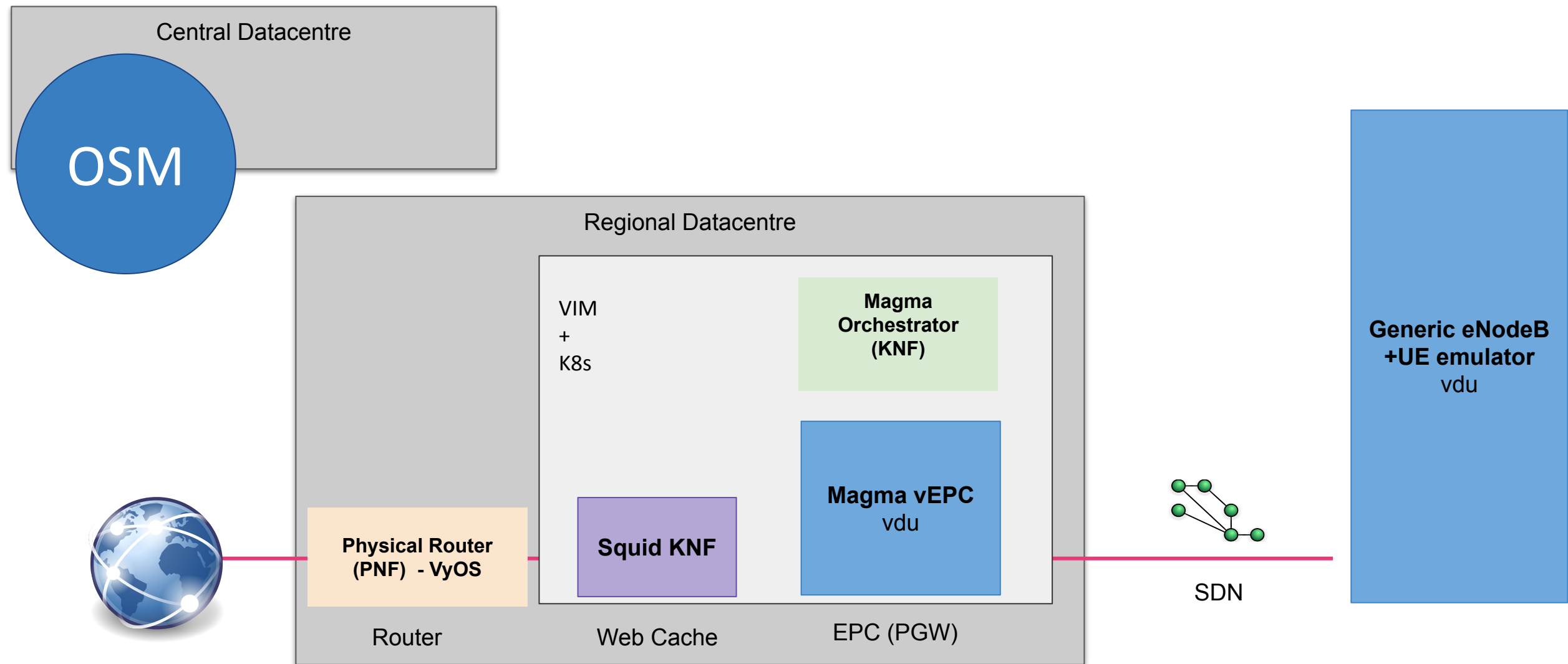
Reality is messy and mixed

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

Cellular Data Path

Open Source MANO

OSM

Central Datacentre

Regional Datacentre

VIM
+
K8s

Magma Orchestrator (KNF)

Native Charm

Proxy Charm

Physical Router (PNF) - VyOS

Native Charm

Squid KNF

Proxy Charm

Magma vEPC vdu

Generic eNodeB +UE emulator vdu

Router

Web Cache

EPC (PGW)

SDN

Charms are packages of scripts to drive apps

Open Source MANO

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.

Charm

APACHE kafka.

Software Components: Magma vEPC

OSM Creates and Configures:

- Magma vEPC Combination K8s and VMs
  - 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

EPC (PGW)

| Orchestrator Slice (shared)	Evolved Packet Core Slice
Magma Orchestrator (KNF)	**Magma AGW + Tester (VNF)**
other kdus / nginx_proxy kdu / orc8r_proxy kdu	**Magma vEPC** vdu / **Generic eNodeB +UE emulator** vdu
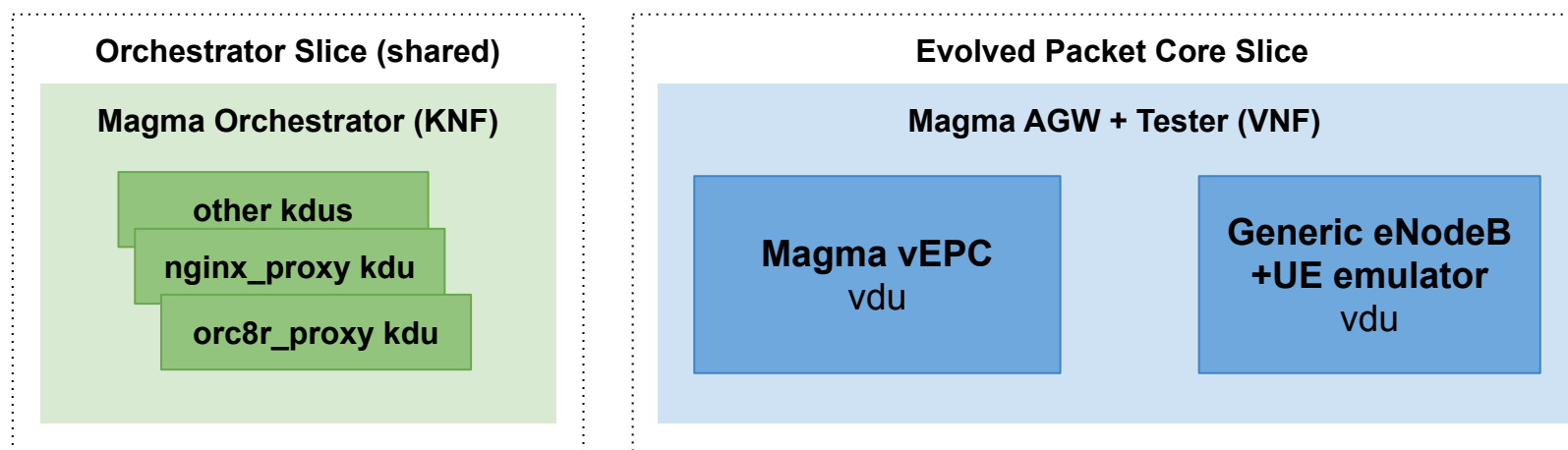
Software Components: Magma AGW

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
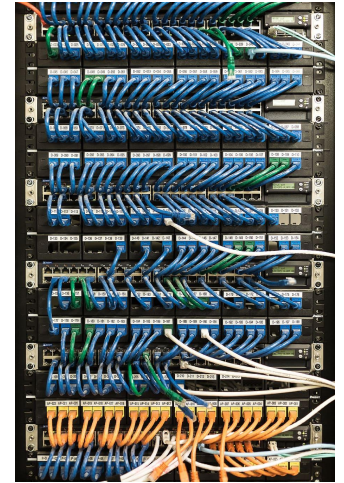
EPC (PGW)

Software Components: PNF Router

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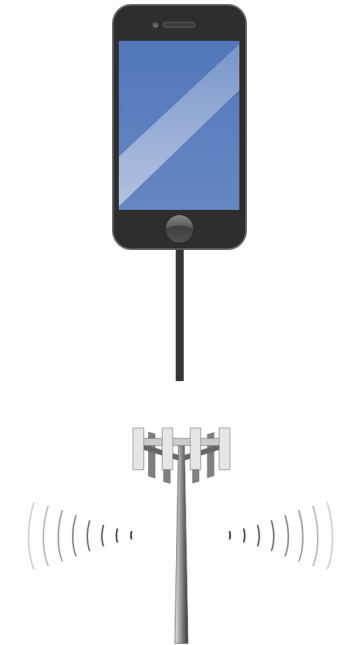
Configuration:

- 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)
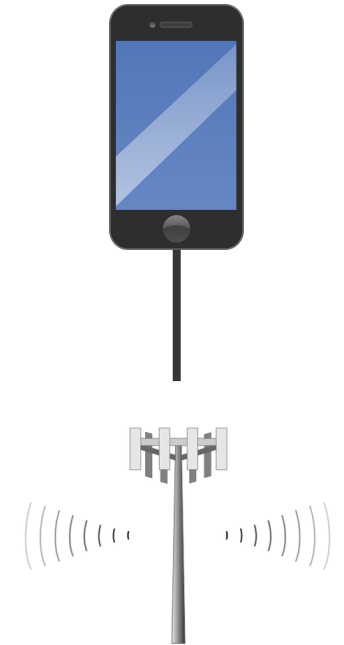 - Software UE (Cellphone)
- Graphical Desktop with Firefox

https://github.com/srsLTE/srsLTE

Generic eNodeB +UE emulator vdu

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

Generic eNodeB +UE emulator vdu
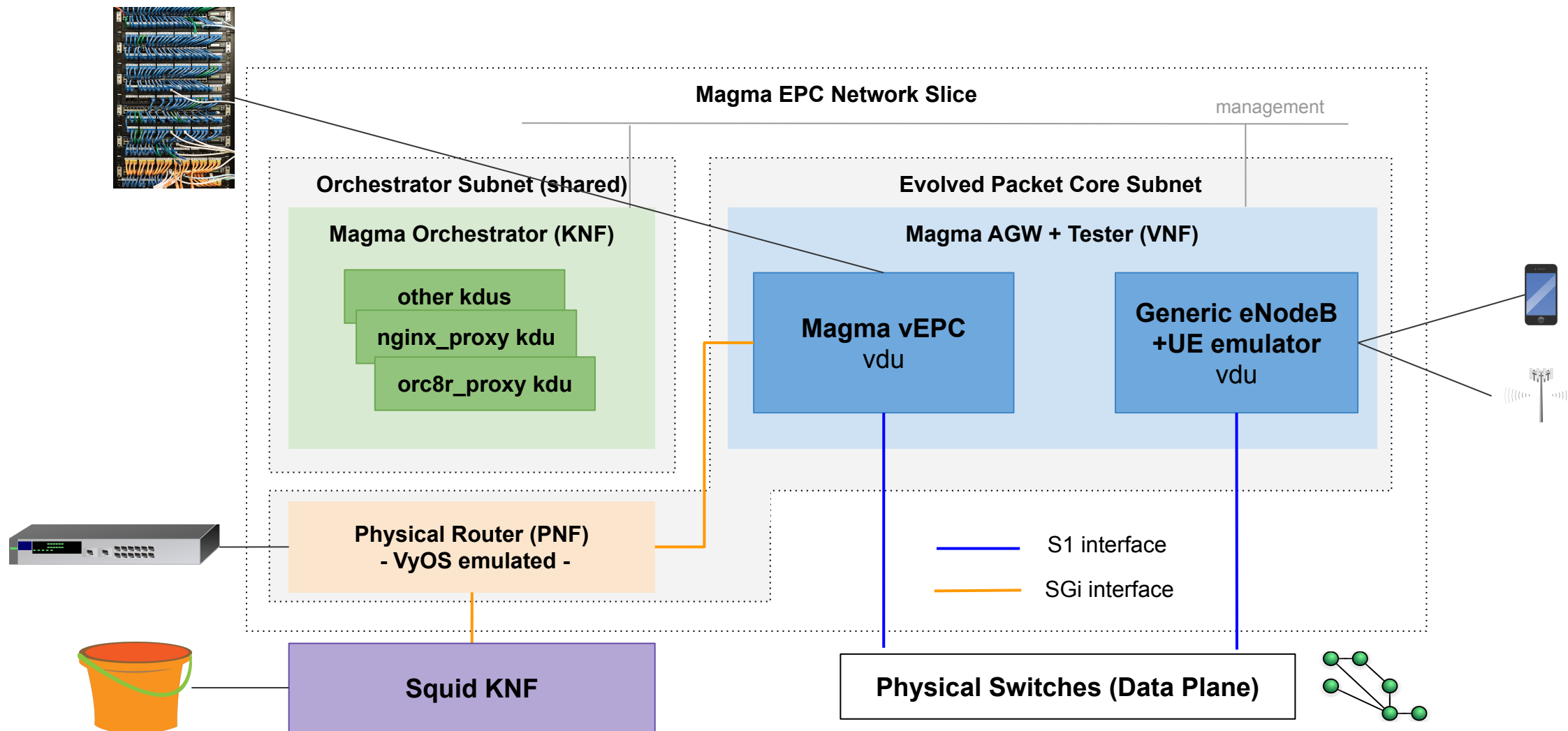
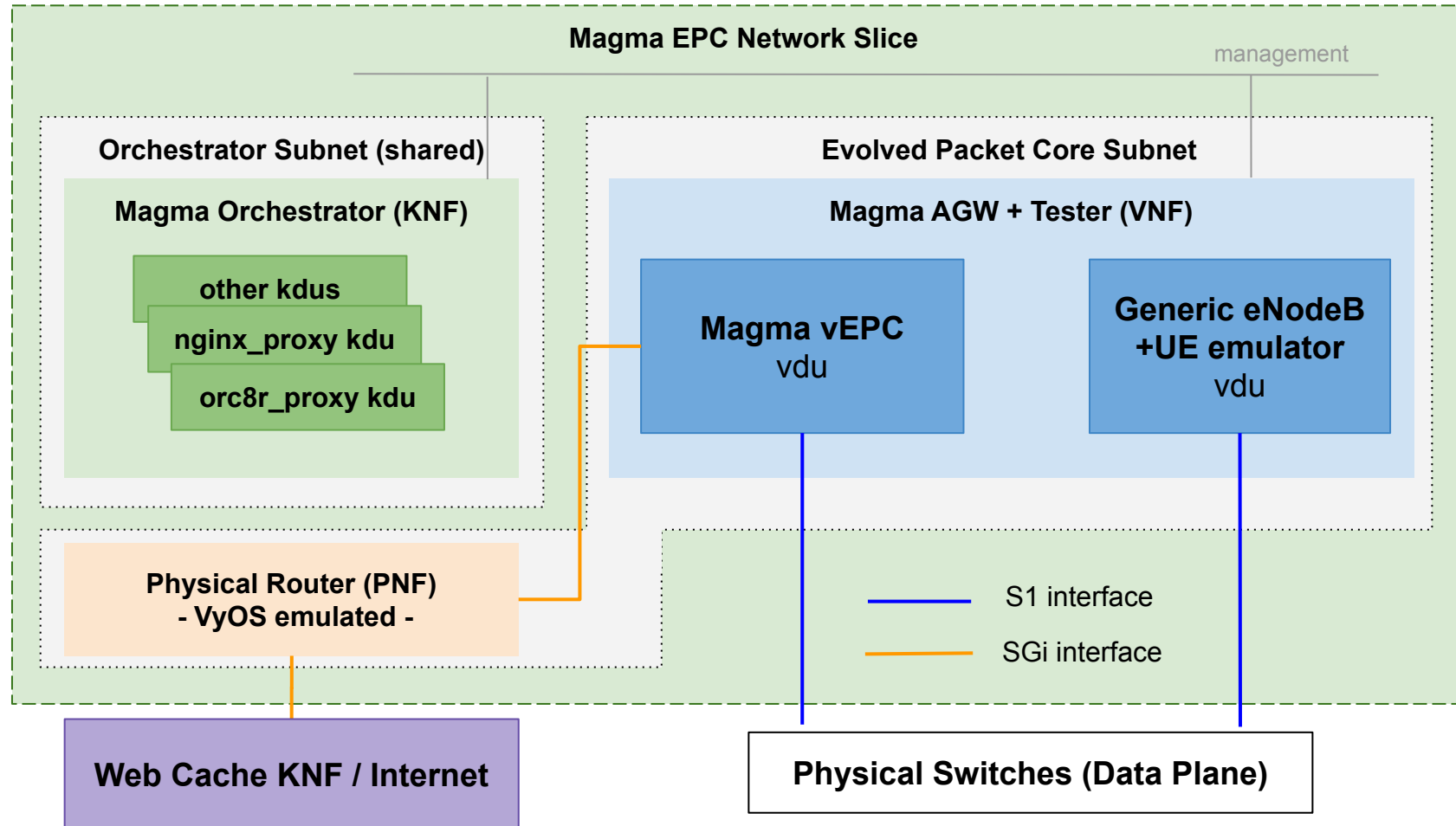# Software Components: Web Cache

Web Cache

OSM Creates and Configures:

- Web Cache Container
  - Based on Squid
  - http://www.squid-cache.org/
- Demonstrated using Native K8s orchestration charm

The Big Picture

Magma EPC Network Slice

management

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 Router (PNF)
- VyOS emulated -

—— S1 interface

—— SGi interface

Squid KNF
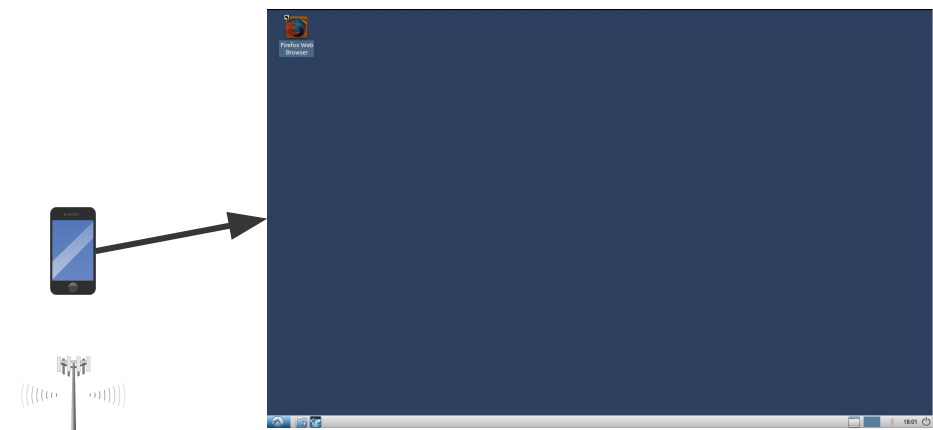
Physical Switches (Data Plane)

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The EPC Network Slice

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
  - http://172.21.247.1/project/instances/
  - Desktop credentials: ubuntu / osm2020
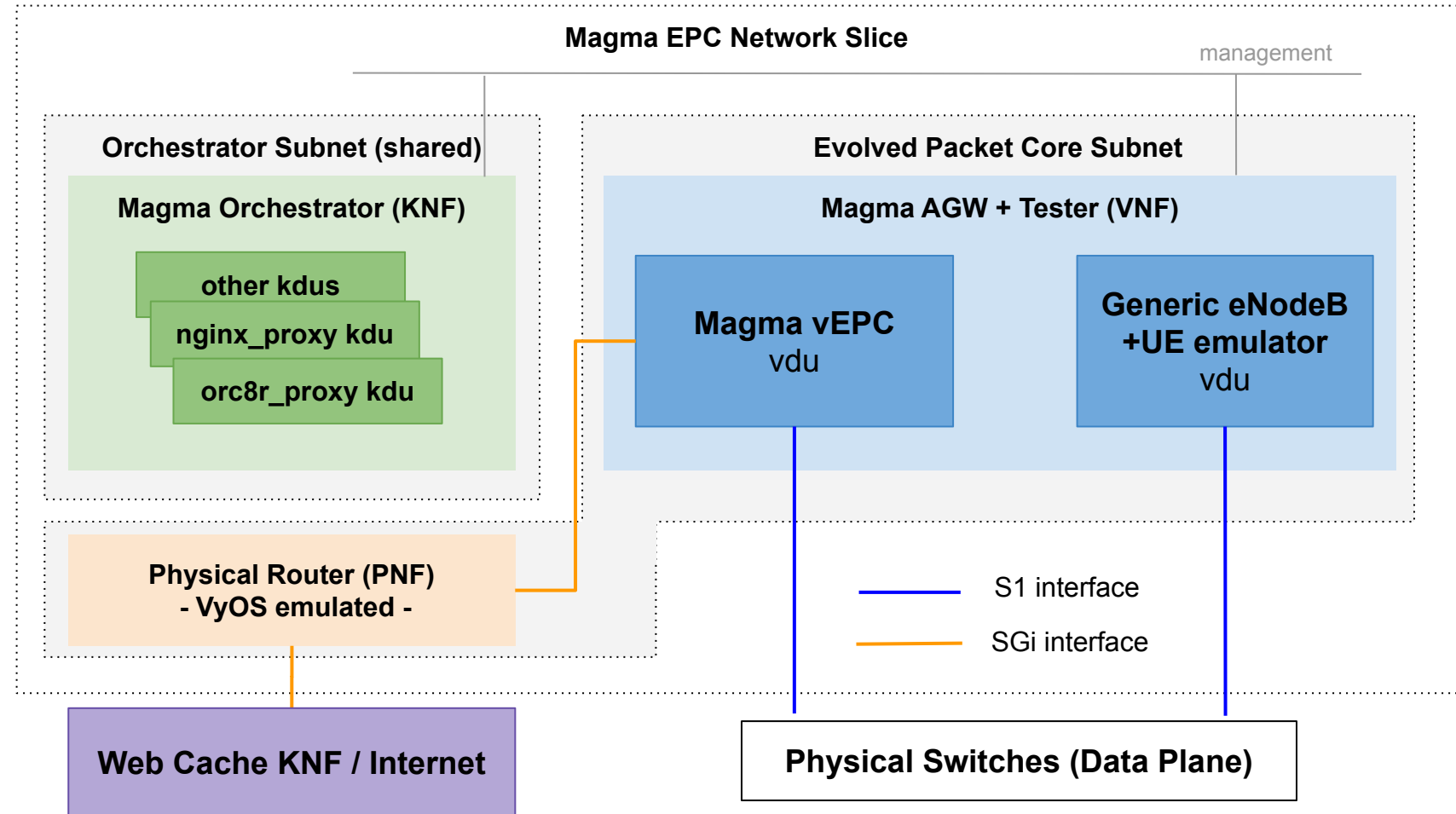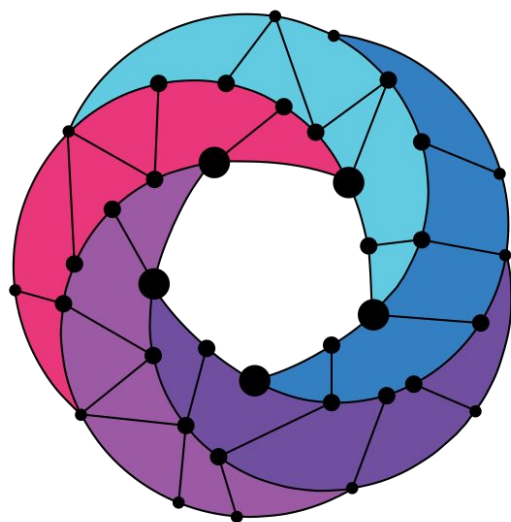
User Provisioning

- 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!

Magma EPC Network Slice

management

Orchestrator Subnet (shared)

Magma Orchestrator (KNF)

other kdus

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Generic eNodeB +UE emulator
vdu

Physical Router (PNF)
- VyOS emulated -

S1 interface

SGi interface

Web Cache KNF / Internet

Physical Switches (Data Plane)

Find us at:

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