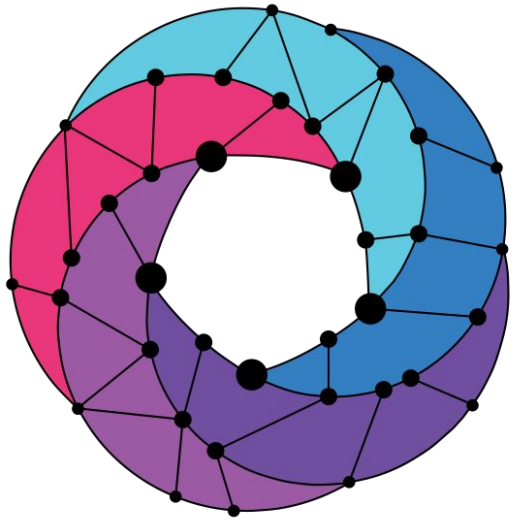

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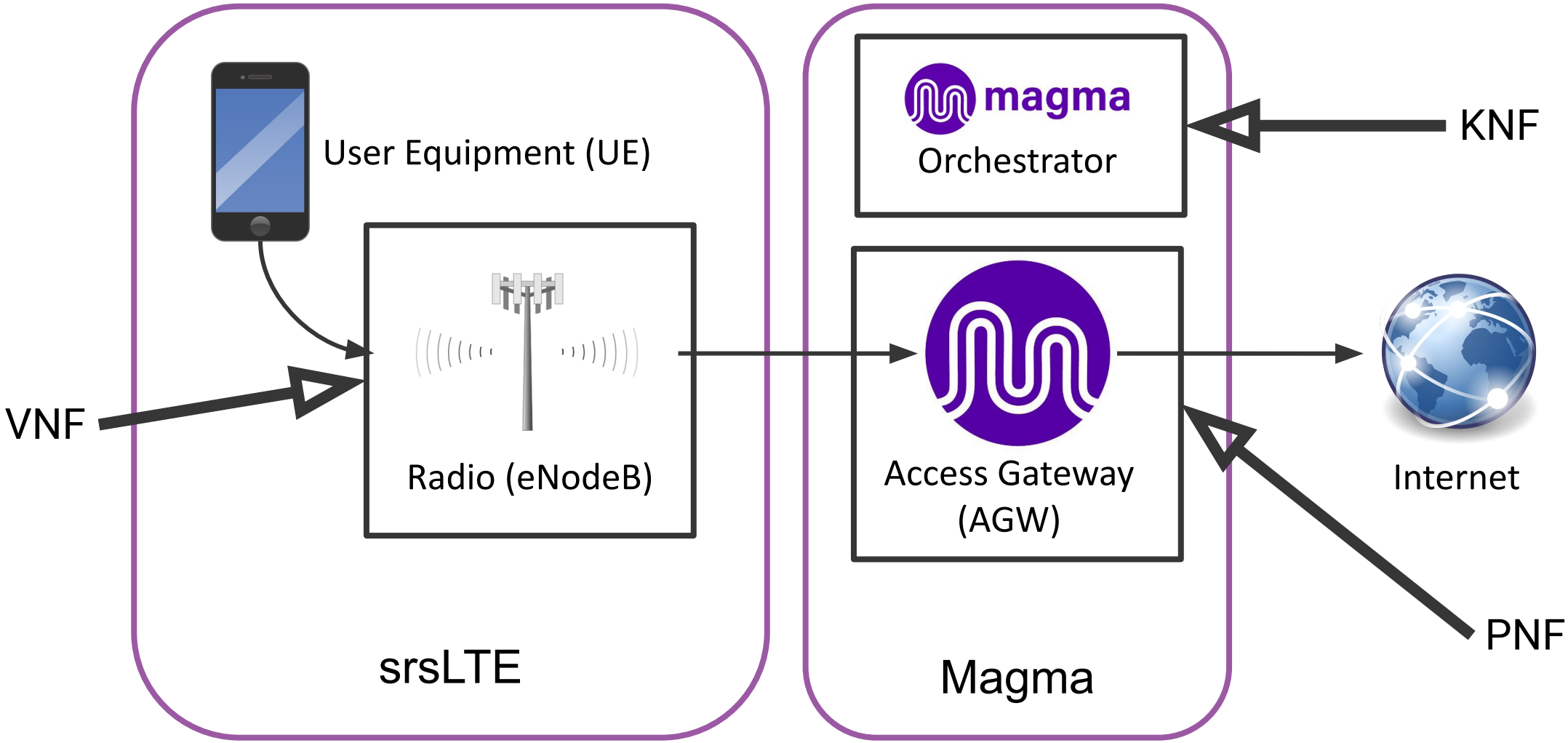
Onboarding a Complex Network Function

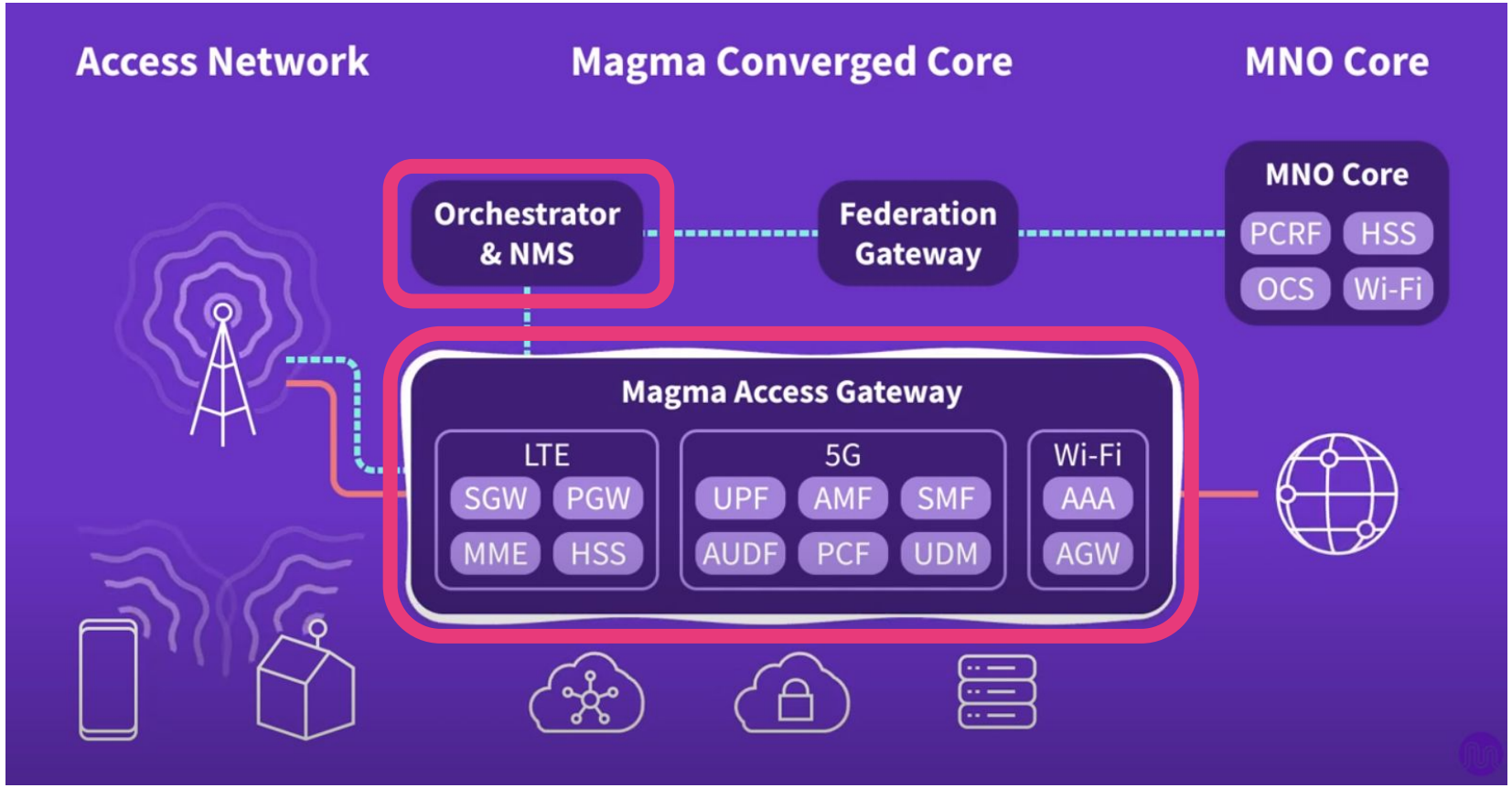
Mark Beierl (Canonical)

ETSI

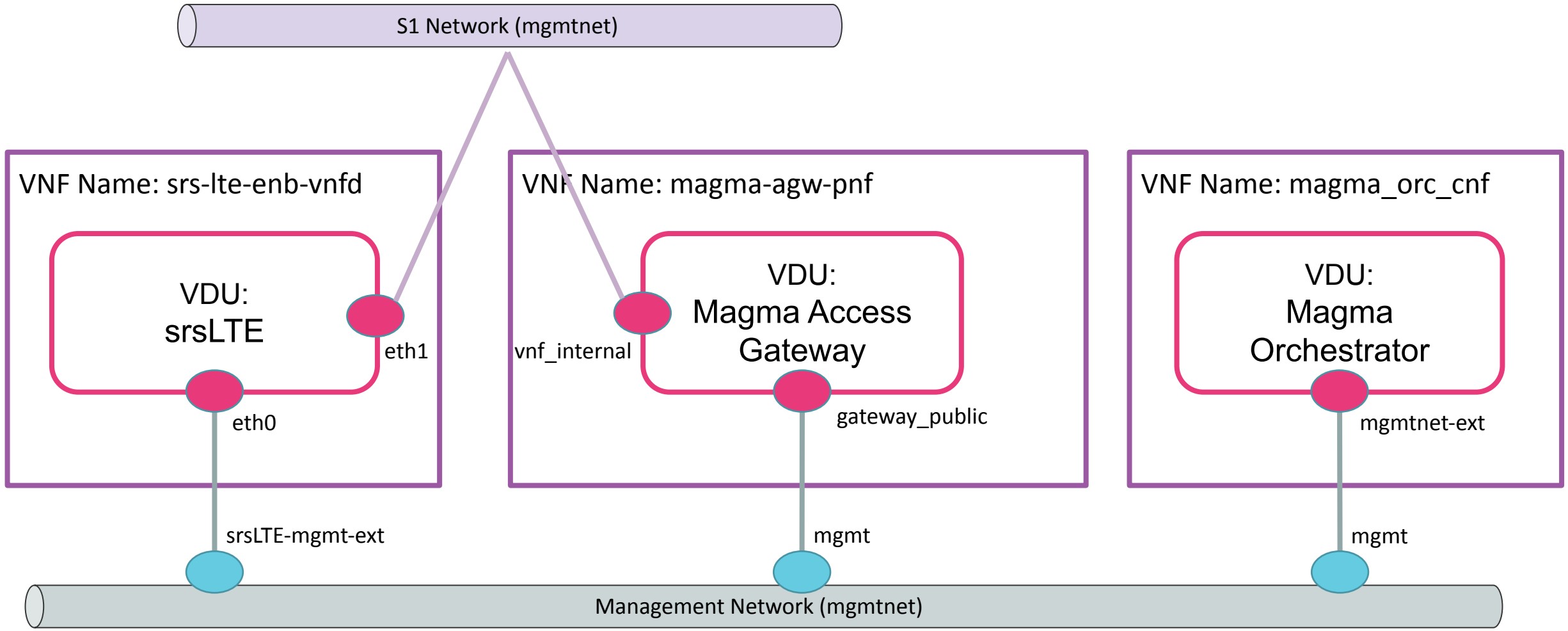
Magma Deployment Overview



Magma Components



Modelling a Network Service



Day 0 - Basic Instantiation

- Description of each VNF component
- Definition of NFVI requirements
  - Compute performance attributes:
    - CPU Pinning
    - NUMA Topology Awareness
    - Memory Page Size
  - Data plane performance attributes:
    - PCI-Passthrough
    - SR-IOV

More information: OSM Day 0 Guidelines

Day 0 - Basic Instantiation - configurations

- Minimal configuration of the VNFs can be injected via cloud-init
- Example:

```
#cloud-config
    password: osm4u
    chpasswd: { expire: False }
    ssh_pwauth: True
```

- Identifying the instantiation parameters
  - Memory, CPU, number of instances, networking, etc

Cloud-init documentation here

Day 1 - Service Initialization

The goal of Day 1 is the automatic initialization of VNF services right after the instantiation

Day 1 - Service Initialization

- Identifying dependencies between components
  - IP address for connectivity
- Defining the required configuration for service initialization
  - Start some interfaces
  - Replace values in configuration files
  - Start services inside the VNF
- Identifying the need for instantiation parameters
  - External endpoints to configure

More Information: VNF Onboarding guidelines / VNF Onboarding Walkthrough

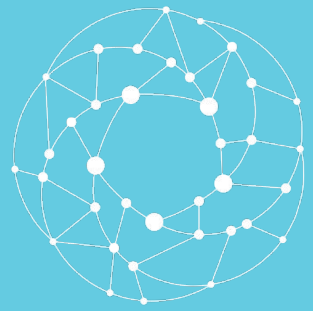
Day 2 – Runtime Operations

The goal of Day 2 is the reconfiguration of the services and service monitoring

Day 2 - Runtime Operations

- Identifying dependencies between components
  - IP address for connectivity
- Defining the required configuration for service initialization
  - Start some interfaces
  - Replace values in configuration files
  - Start services inside the VNF
- Identifying the need for instantiation parameters
  - External endpoints to configure

More Information: VNF Onboarding guidelines / VNF Onboarding Walkthrough



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Model the srsLTE eNodeB

Day 0 - Basic Instantiation

VNF name	VNF Description	VDU name	Image name	Flavor			Nº ifaces
				vCPU	vMem	vDisk	
srs-lte-enb_vnfd	An eNB simulator	srsLTE-vdu	ubuntu-focal-20.04-amd64-server-20220606	2	4 GB	15 GB	2

This table is a reference table. Other parameters could be added, such as the existence of a cloud-init file for each VDU, if the VDU has a charm, etc.

More information: OSM Day 0 Guidelines

VNF Descriptor: Sizing

```
vnfd:
  vdu:
    virtual-compute-desc: srsLTE-vdu-compute
    virtual-storage-desc:
    - srsLTE-vdu-storage
  description: srsLTE VDU
  version: 1.0
  virtual-compute-desc:
  - id: srsLTE-vdu-compute
    virtual-cpu:
      num-virtual-cpu: 2
    virtual-memory:
      size: 4.0
  virtual-storage-desc:
  - id: srsLTE-vdu-storage
    size-of-storage: 15
```

Software Image

```
vnfd:
  vdu:
    description: srsLTE-vdu
    id: srsLTE-vdu
    name: srsLTE-vdu
    sw-image-desc: ubuntu20.04
  sw-image-desc:
  - id: ubuntu20.04
    image: ubuntu/images/hvm-ssd/ubuntu-focal-20.04-amd64-server-20220606
    name: ubuntu20.04
```

Network Internal Connection Points

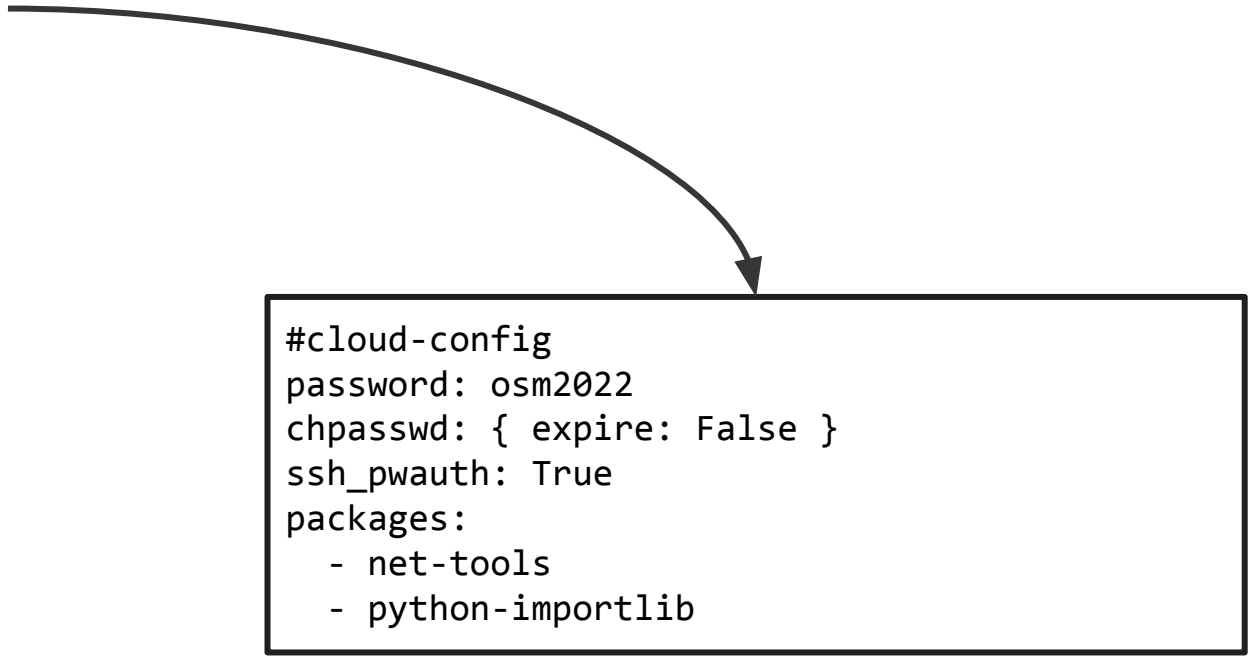

```
vnfd:
  vdu:
  - description: srsLTE-vdu
    id: srsLTE-vdu
    int-cpd:
    - id: eth0-int
      virtual-network-interface-requirement:
      - name: eth0
        virtual-interface:
          type: PARAVIRT
    - id: eth1-int
      int-virtual-link-desc: internalS1
      virtual-network-interface-requirement:
      - name: eth1
        virtual-interface:
          type: PARAVIRT
```

Network External Connection Points

```
vnfd:
  ext-cpd:
  - id: srsLTE-mgmt-ext
    int-cpd:
      cpd: eth0-int
      vdu-id: srsLTE-vdu
```

VNF Descriptor: Day 0 Configuration

```
vnfd:
  vdu:
  - cloud-init-file: cloud-config
    description: srsLTE-vdu
```



VNF Descriptor: Day 1 Configuration


```
vnfd:
 df:
  - id: default-df
    lcm-operations-configuration:
      operate-vnf-op-config:
        day1-2:
          execution-environment-list:
          - id: srs-enb-ue-ee
            juju:
              charm: srs-enb-ue
              proxy: false
          initial-config-primitive:
          - name: config
            execution-environment-ref: srs-enb-ue-ee
            parameter:
            - name: bind_address_subnet
              value: <bind_address_subnet>
            - name: mme_addr
              value: <mme_addr>
            seq: 1
```

VNF Descriptor: Day 2 Configuration

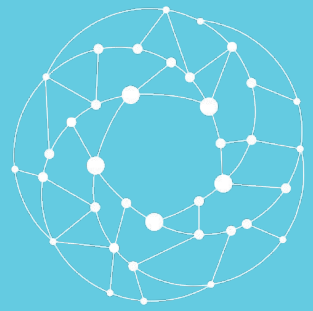

```
vnfd:
 df:
  - id: default-df
    lcm-operations-configuration:
      operate-vnf-op-config:
        day1-2:
          config-primitive:
          - name: attach-ue
            execution-environment-ref: srs-enb-ue-ee
            parameter:
            - data-type: STRING
              name: usim-imsi
            - data-type: STRING
              name: usim-k
            - data-type: STRING
              name: usim-opc
          - name: detach-ue
            execution-environment-ref: srs-enb-ue-ee
```

VNF Descriptor: Actions (Juju Charm)


```
attach-ue:
  description: Attach User Emulator to enodeB
  params:
    usim-imsi:
      description: "USIM IMSI"
      type: string
    usim-k:
      description: "USIM K"
      type: string
    usim-opc:
      description: "USIM OPC"
      type: string
  required:
    - usim-imsi
    - usim-k
    - usim-opc
detach-ue:
  description: "Detach from AGW."
remove-default-gw:
  description: "Remove default gateway"
```

VNF Descriptor: Charm Code


```
def _on_attach_ue_action(self, event):
    self._stored.ue_usim_imsi = event.params["usim-imsi"]
    self._stored.ue_usim_k = event.params["usim-k"]
    self._stored.ue_usim_opc = event.params["usim-opc"]
    self._configure_srsue_service()
    service_restart(SRS_UE_SERVICE)
    self._stored.ue_attached = True
    self.unit.status = self._get_current_status()
    event.set_results({"status": "ok", "message": "Attached successfully"})
```



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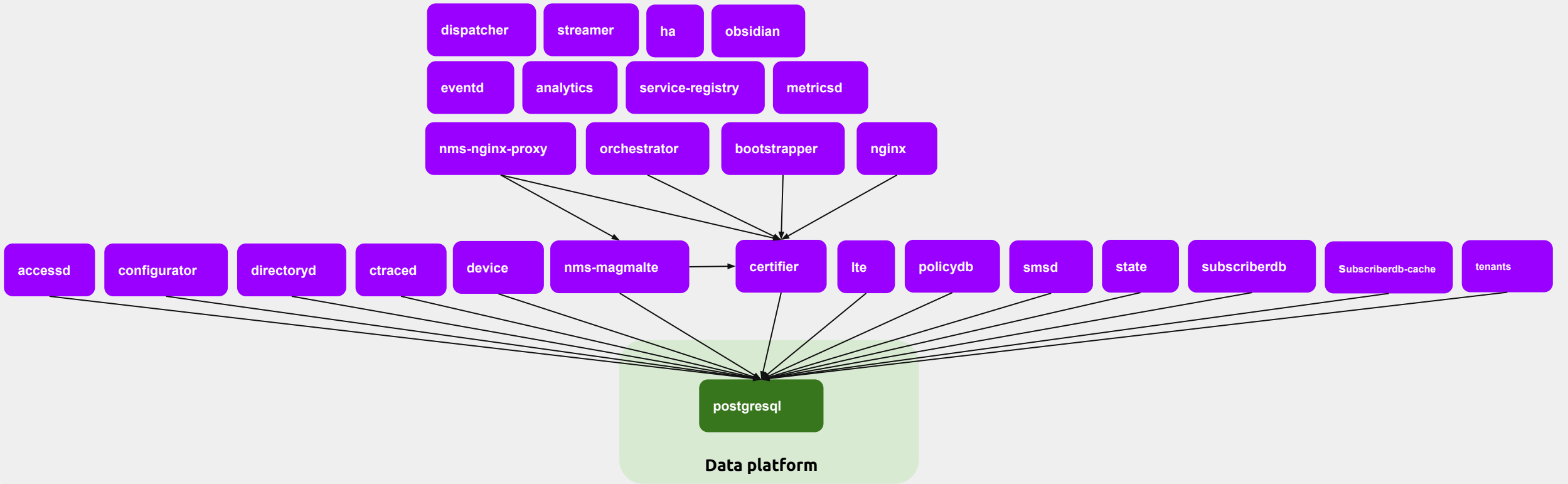
Model the Magma Orchestrator

Magma Orchestrator



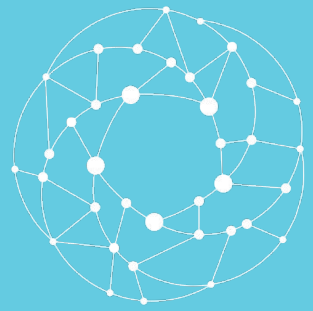
Model

Kubernetes, SOL006, Helm and Juju

- SOL006 defines standard model
- Competing model descriptors for Cloud Native
  - Helm
  - Juju
- ETSI recognizes additional models
  - Descriptor can make reference to a Juju bundle, or Helm chart
- OSM manages bundle or chart as single entity

KNF Descriptor: Bundle

```
vnfd:
  product-name: magma_orc_cnf
  version: "1.0"
  provider: Canonical
  description: "K8s container deployment of Magma Orchestrator"
  id: magma_orc_cnf
  kdu:
    - name: magma-orc-kdu
      juju-bundle: bundle.yaml
```



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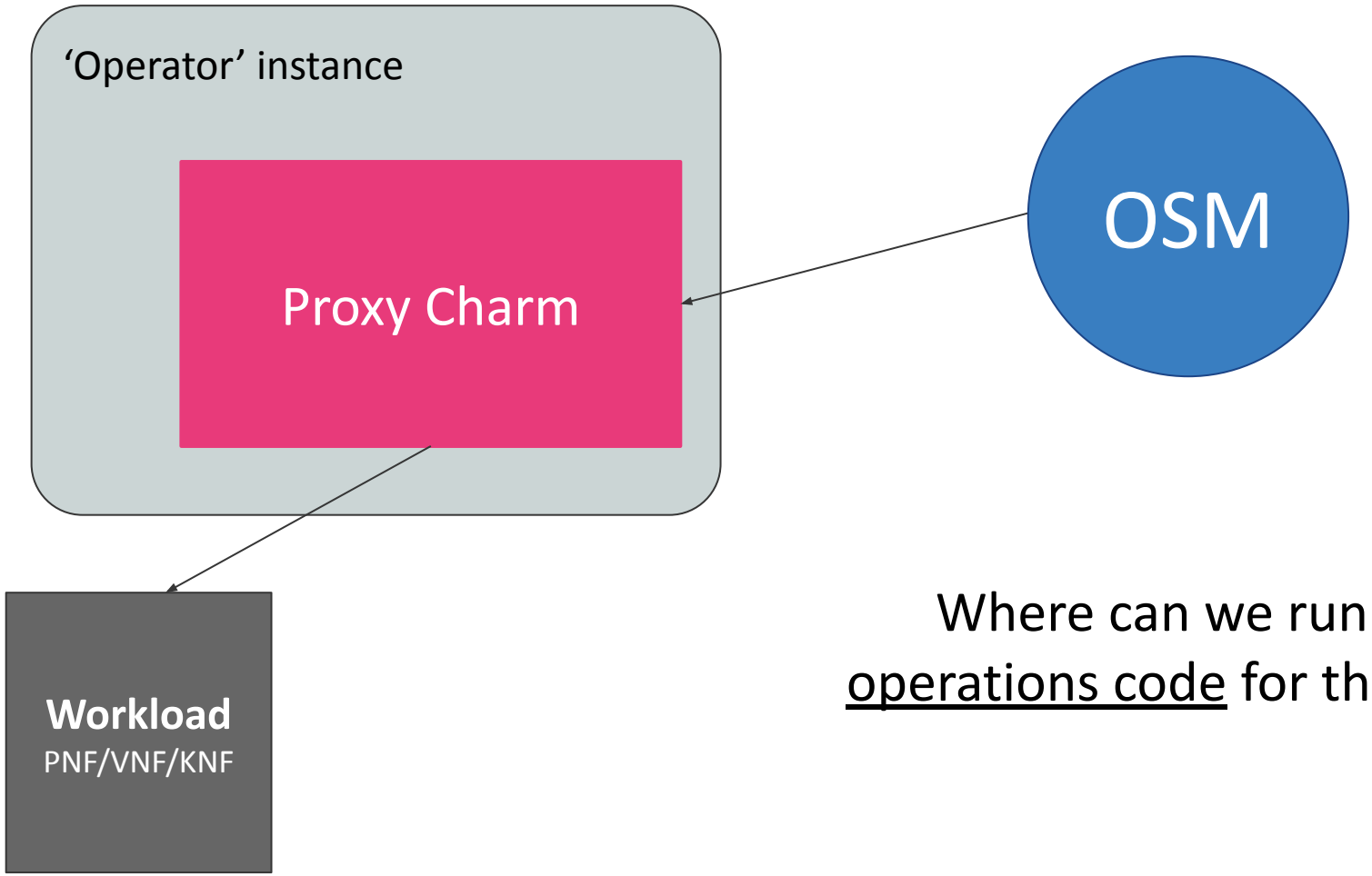
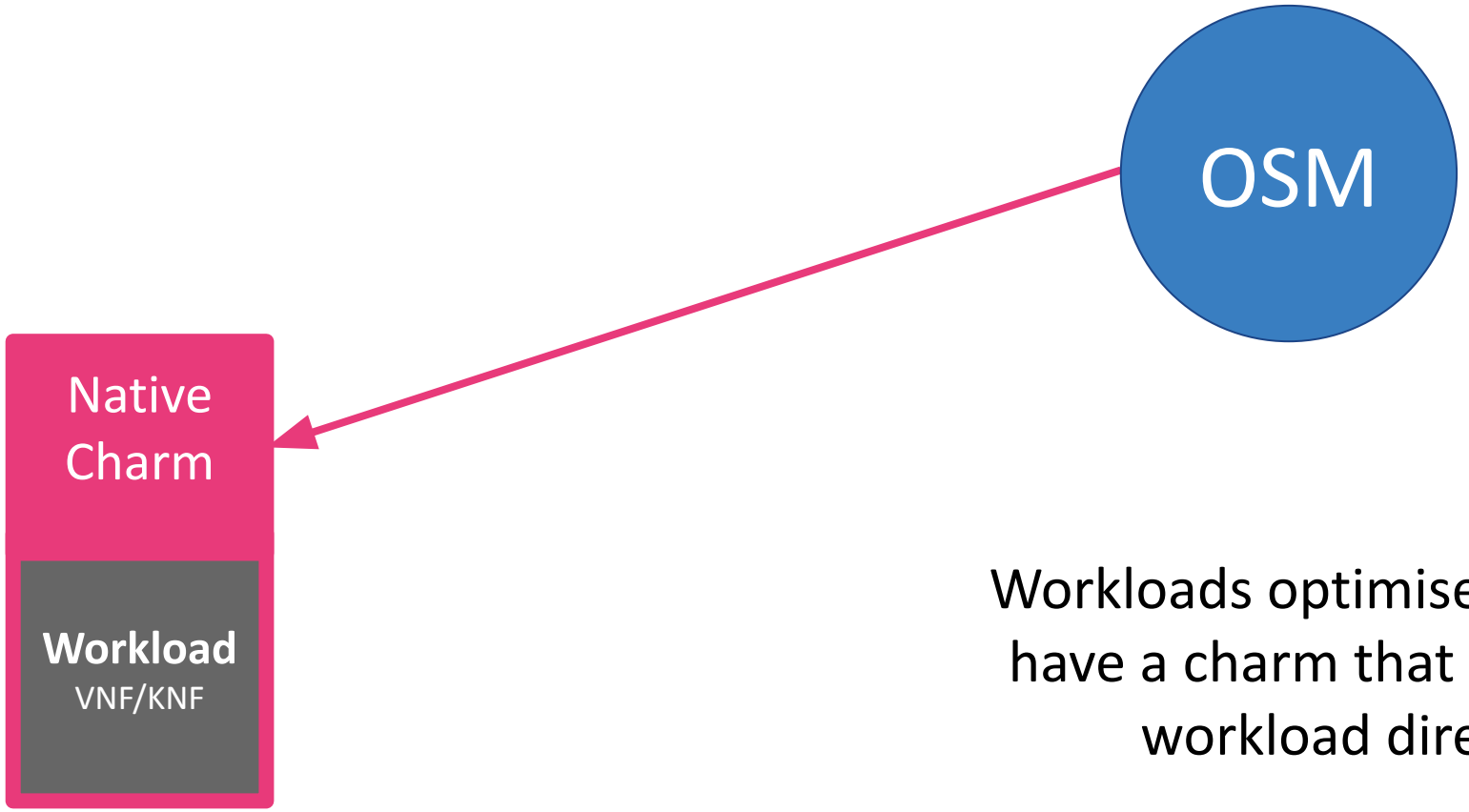
Q&A

Operating “proxy” workloads

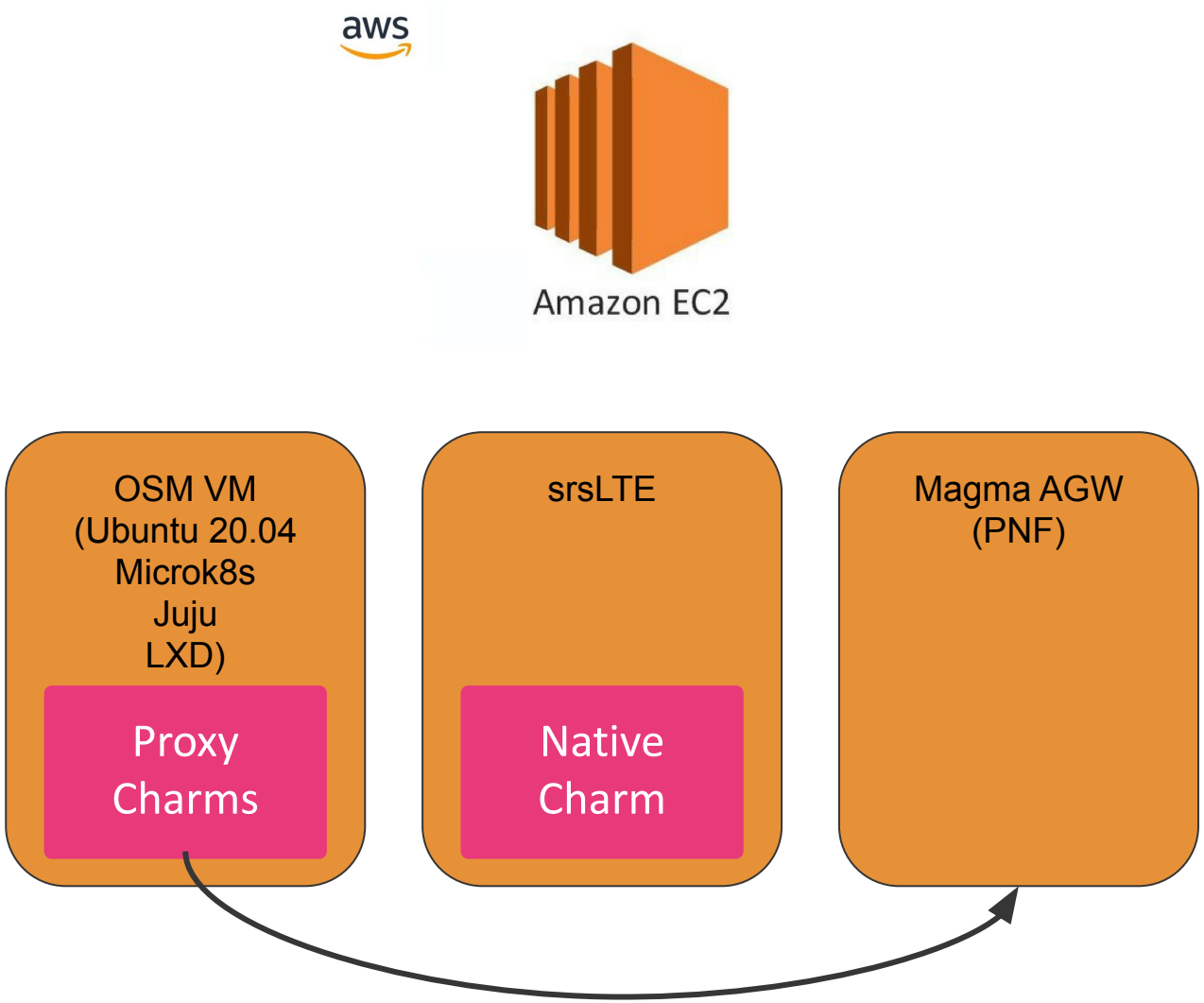


Where can we run our own operations code for this workload?

Operating “native” workloads



Workloads optimised for OSM have a charm that drives the workload directly.


aws
Amazon EC2
Amazon EKS
OSM VM
(Ubuntu 20.04
Microk8s
Juju
LXD)
Proxy
Charms
srsLTE
Native
Charm
Magma AGW
(PNF)
magma
Orchestrator