



# MOSAIC-5G.io

## A community led consortium

Leveraging an Ecosystem of 5G services

# What is JoX?

*An Event-Driven Juju-based Orchestrator Core for 5G Network Slicing*

# JoX objectives

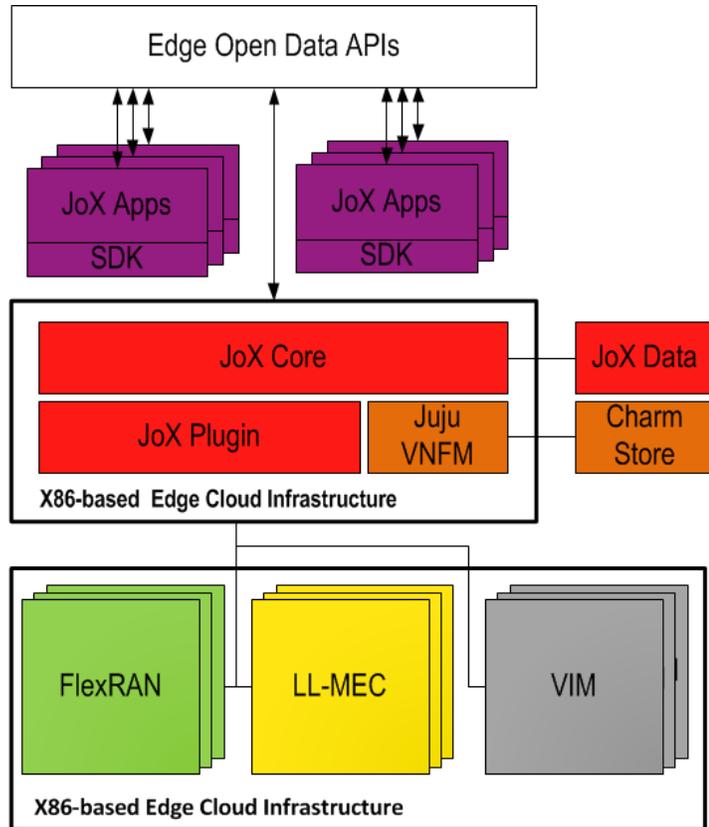


- Support network slicing orchestration on the top of Juju VNFM and MAAS
- Create a set of services to operate and control each network slice
- Provide the interplay among orchestration, VNFM and VIMs as defined by ETSI MANO
- Offer network slices isolation

# JoX features

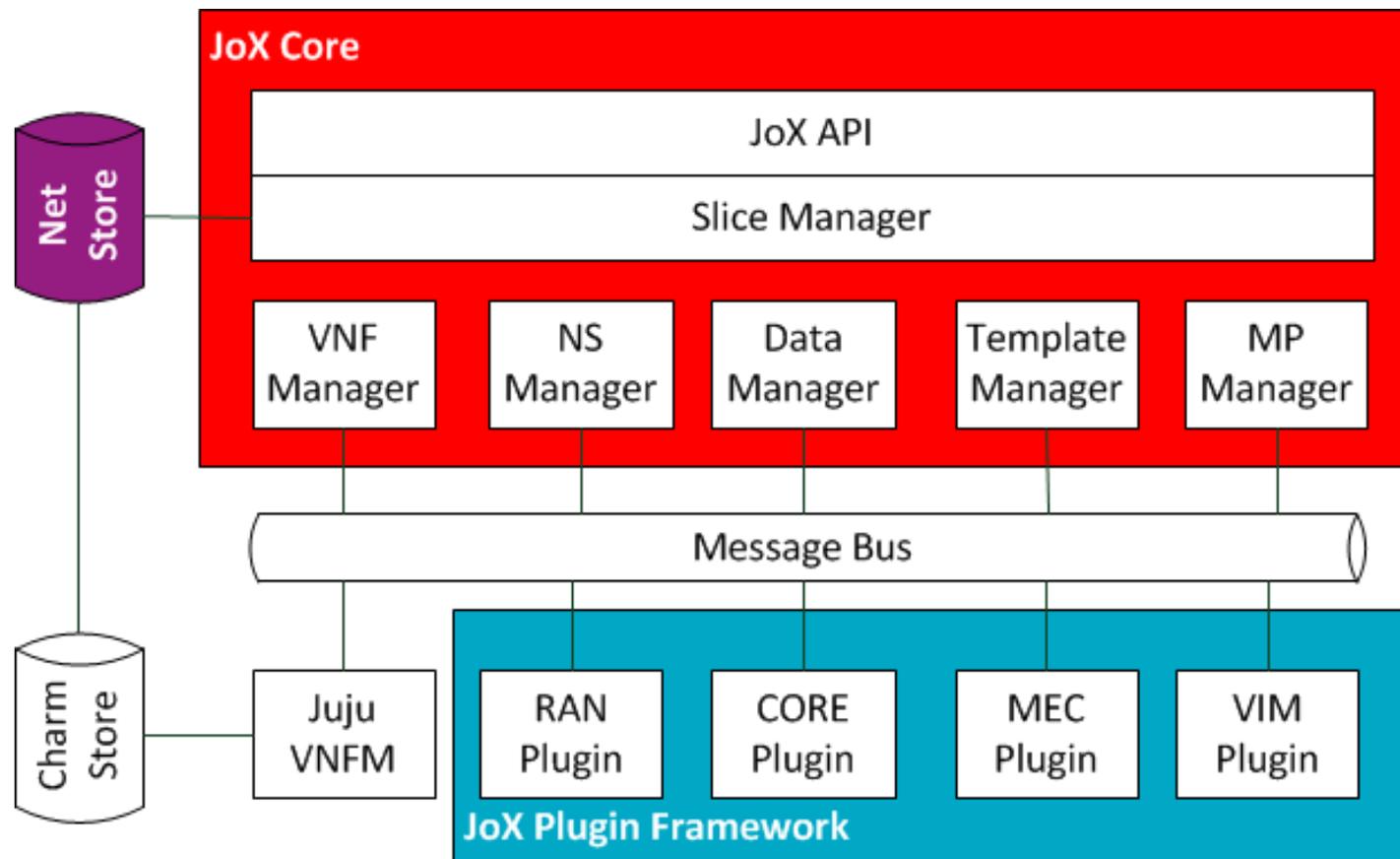
- **Network Slicing Support**
  - Deploy network slices with different end-to-end logical networks
  - Different network slices are isolated from each other in the management plane
  - Slices operate over common VNFM and VIM systems
- **Orchestration for the Mobile Network**
  - RAN, MEC and CN specific plugins to orchestrate edge network resources and services
- **Optimize the operational environment**
  - Slice-specific logic: Optimization in VNFs scheduling and network slicing
- **Northbound APIs**
  - Expose a REST northbound API to enable monitoring, control, and programming of each slice
  - Aligned with the basic operations defined by 3GPP (TR 28.801)
  - Slice-specific life-cycle: Preparation, Instantiation, Configuration, Activation, Run-time control, Decommissioning

# JoX schema



- **JoX:** *orchestrates the E2E service lifecycle according to the slice manifest*
  - NS Templates
  - Application APIs
  - Slice manager
  - Plugins
- **Juju / JaaS:** *manages the services over the infrastructure*
  - Model-driven VNFM
  - Multi-cloud multi-models
- **Network plugins**
  - RAN, CN, MEC, VIM
- **Cloud Infrastructure**
  - MaaS, LXD, AWS/GCE

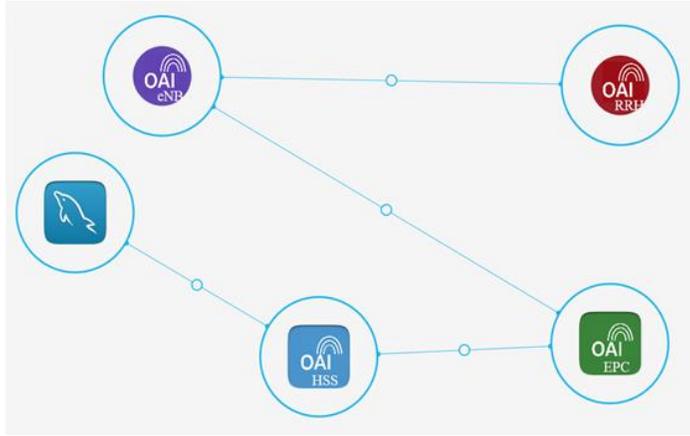
# JoX Architecture



# Jox Architecture terminology

- **Jox API:** provides NB APIs
- **Slice Manager :** handles vertically network slices and interacts with all other modules and retrieves network function/applicator from the store
- **VNF manager:** in charge of the entire VNF lifecycle including scaling
- **NS manager:** in charge of an E2E network service including failur recovery and network service availability
- **Data manager:** handles the network service data
- **Template manager:** translates and maps the template across different network elements, in particular juju templates
- **MP manager:** provides monitoring and policy manager
- **Plugins:** provides juju passthru for the underlying network element and cloud infrastructure

# Juju Template



- Template are built based on the slice manifest
- Orchestrator logic applied through EM/charms
  - Change service template *on the fly*
  - Reliability and scalability
  - Single and multi-domain
- Charms drive the app lifecycle
- JUJU store manager
  - <https://jujucharms.com/q/oai>

```

series: trusty
services:
  "oai-enb":
    charm: "cs:trusty/oai-enb"
    num_units: 2
    options:
      N_RB_DL: 50
      downlink_frequency: 2680000000L
      eutra_band: 7
      rrh_active: "yes"
      uplink_frequency_offset: "-120000000"
  to:
    - "0:0"
  "oai-epc":
    charm: "cs:trusty/oai-epc"
    num_units: 1
  to:
    - "kvm:0:0"
relations:
  - - "oai-enb:epc"
  - - "oai-epc:epc"
  - - "oai-hss:db"
  - - "mysql:db"
  - - "oai-epc:hss"
  - - "oai-hss:hss"
domain:
  "0":
    provider:aws
    machines:
      "0":
        series: trusty
        constraints: "arch=amd64 cpu-cores=4
          mem=15951 root-disk=8192"
  
```

# JoX implementation

## ■ JoX Platform

- Event-driven orchestration software based on Juju VNFM
- Support a 4G/5G plugin framework
- Python 3.5: Flask, Redis, RabbitMQ, and Pika libraries
- [Apache V2.0 license](#)

## ■ Charms and Bundles

- Charms
  - Encapsulate a VNF as a service
  - Contain the hooks to manage the entire lifecycle of the VNF
- Bundles:
  - Composition of charms: include their relationships to describe a service chain
- Mosaic5G charms and bundles are available in the Juju store under [Apache V2.0 license](#)

# JoX apps

- Mobile Network Virtualization
- Network Service Automation
- SLA-based Network Slicing
- Content-based Service Orchestration
- Service Auto Placement & Scaling
- Shared & Dedicated Provisioning
- Business Modelling
- Dynamic Service Placement & Scaling
- Slice/Service Access Control

# Useful links

- [JoX platform](#)
- [Slicing Cloud RAN](#)
- [Slicing and orchestration in service oriented 5G architecture](#)

# Mosaic5G-Contact

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