OSM#10 Hackfest
OSM Primitives for PNFs
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PNF vs VNF

PNF
Higher unit cost
Bulky
Fragile
Needs care

VNF
Low unit cost
Compact
Recyclable
Needs no care

**PNF - Bare Metal?**

**Physical Network Function**
- Implementation of a NF via a tightly coupled software and hardware system

- PNF refers to a function that is fixed
  - Purpose built to provide a specific function - hardware appliance

- PNF does not always mean bare metal
  - Can be unmanaged software in VM

- VNF does not always mean running in VM or Container
  - OpenStack Ironic allows for management of bare metal like a VM
PNF / HNF - Definitions

● PNF
  ○ Physical network function. It refers to the endpoint that provides a networking function

● PDU
  ○ Physical deployment unit. It refers to the “instance” of the appliance that will be incorporated to a Network Service instance

● HNF
  ○ Hybrid network function: Network function composed of both physical and virtual elements.

In OSM, there are no fundamental differences between a VNF, a PNF or a Hybrid Network Function (HNF)
How do we Manage a PNF

- OSM must be given information about the PNF
  - Register a PNF as a logical entity with IP and other info
- Use in standard network function package descriptors
  - Magma references the VyOS PNF
  - Must perform configuration on VyOS
- On Network Slice deployment, OSM creates an execution environment for the PNF
  - All actions execute in this environment
Physical Router: VyOS

- EPC Manager NS
  - vEPC Element Manager (KNF)
  - magmaOr8r
    - control plane KDU
  - metrics
  - has
  - gui

- Physical Router (PNF)
  - 172.21.250.200
  - 192.168.239.13

- Web Cache KNF / Internet

- EPC NS
  - Magma AGW + Tester (VNF)
  - vEPC (VDU)
  - magmaAGW

- vEPC (VDU)
  - Generic eNodeB + UE emulator (VDU)

- S1 interface
- SGi interface

Both Internet exit and management
VyOS Overview

https://www.vyos.io/products/

- Runs on physical and virtual platforms alike: small x86 boards, big servers, KVM, Xen, VMware, Hyper-V, and more
- Completely free and open source, with documented internal APIs and build procedures
- Scriptable CLI
- Ansible playbooks for configuration
VyOS Firewall

Allow or Deny traffic?
- No rules to allow incoming traffic from your Magma AGW
- VyOS needs configuration change to allow your source

Day 2 operation:
- Execute primitive to allow incoming traffic
How a Primitive Runs

1. Execute “configure-remote” action

2. Run VyOS ansible playbook task “vyos_config”

3. ssh to Vyos, execute “set firewall group” command
Always in OSM Descriptor Context

- OSM performs actions on instances of NF as outlined in a descriptor
- VyOS PNF
  - Could have been standalone function
  - Strong functional relation between Magma and Firewall
  - In this case, was included in the network slice for Magma