Software-Defined Open Network Management & Security
Open NMS

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Outline

Introduction

Context, Problematic ...

Why? ... Complexity of Virtual Networks, Elasticity, Isolation , Scalability and Transparency ...

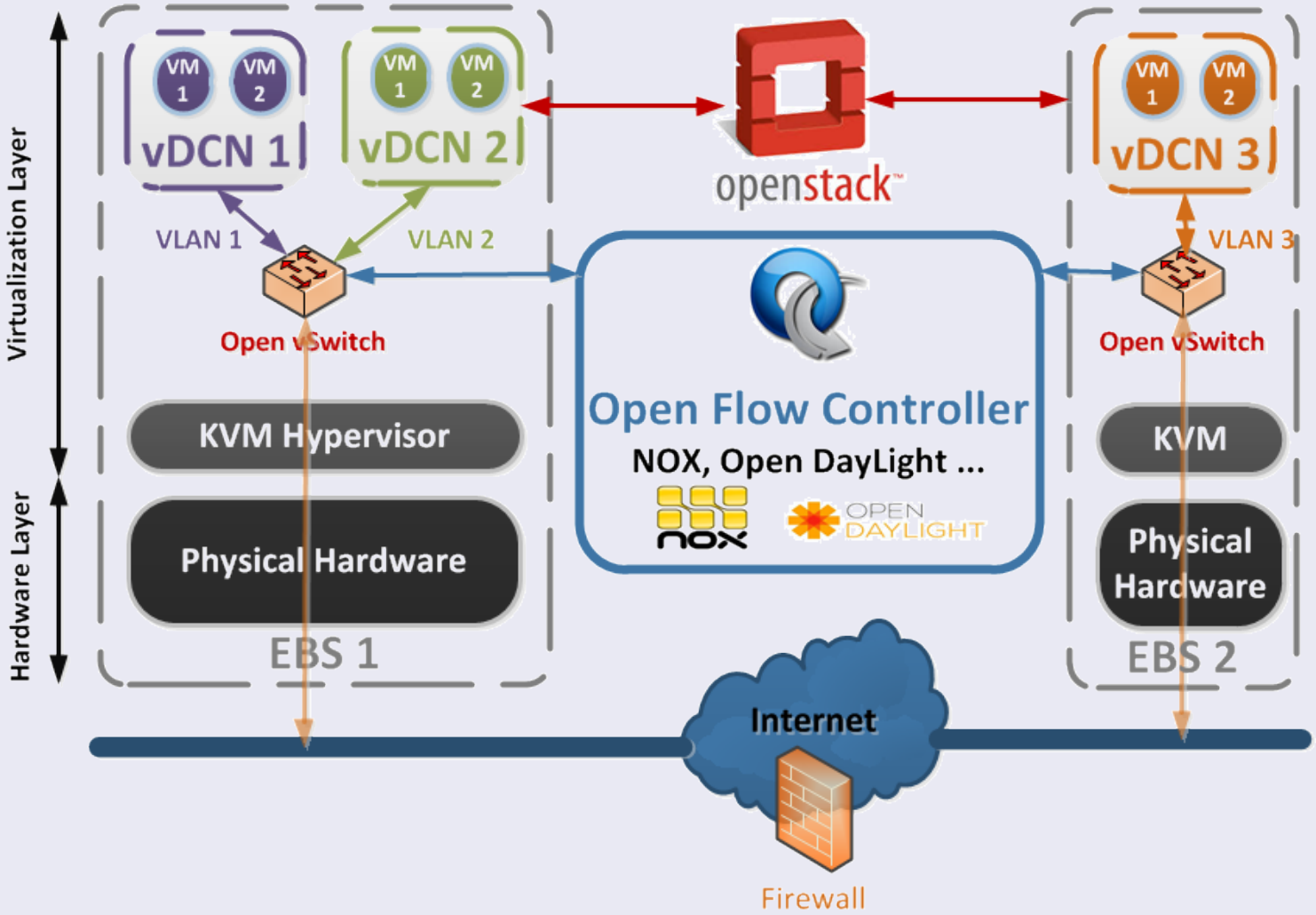
- Enforcement of vDCNs **Isolation** as specified by high level security policies across all resources.
- Provide **Transparency** to Multi-tenants DCNs.
- **CLoud Elasticity** : vDCN Migration, Open vSwitch Migration, Open Flow policies Migration, VM Migration.
- ... How to maintain the **System Consistency while vDCN Migration for both VM and Network (Virtual Switch) ?**
- The need for new mechanisms to enforce Isolation between different virtual DCNs in a transparent and automatic way ...

Keyworks: vDCN, Isolation, SDN, OpenFlow, Open NMS ...

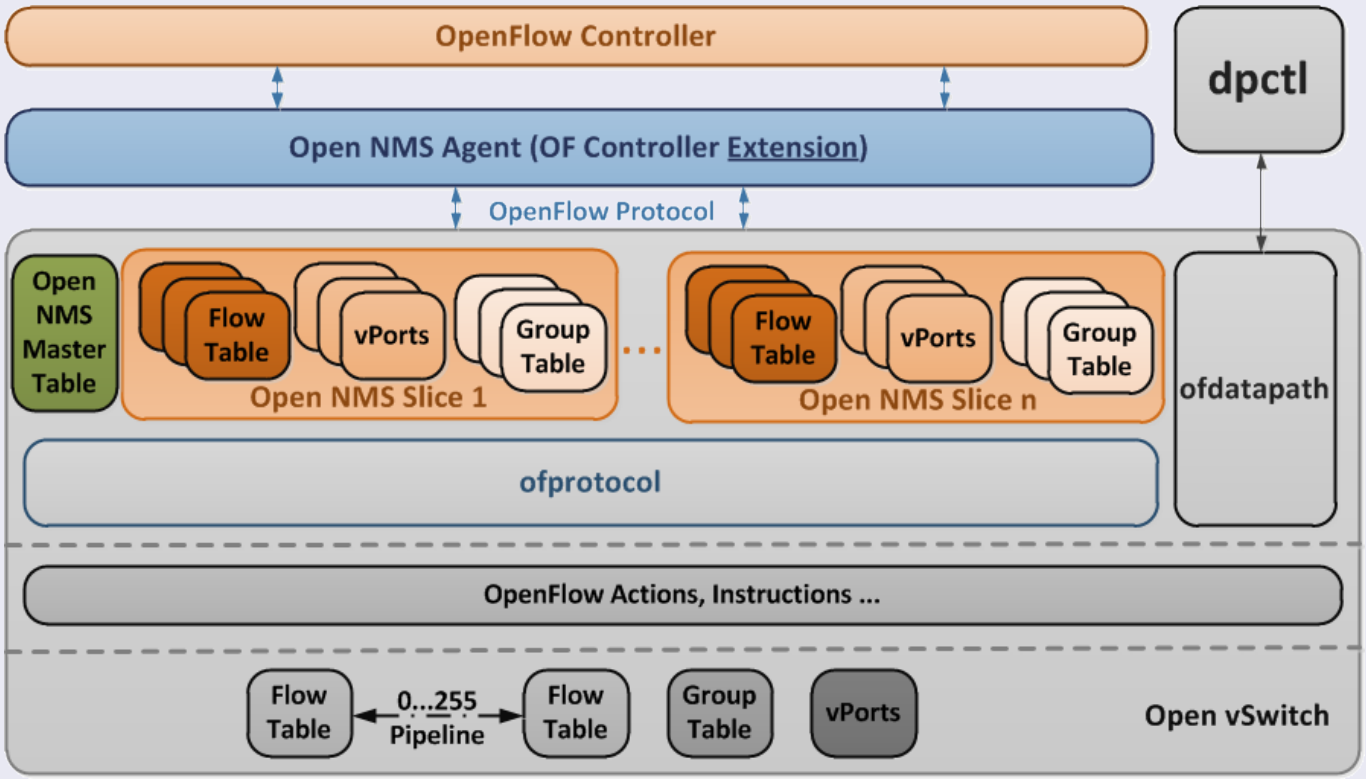
What? . . . SDN, Open daylight, OpenStack Context

- **Software-Defined Networking :** By providing a split between the Data Plane and the Control Plane, it offers a flexible management of the virtual network resources.
- **OpenStack :** We use it as our Cloud Framework, it delivers a massively scalable cloud operating system and controls large pools of compute, storage (Swift), and networking (Quantum) resources.
- **Open Daylight** aims to innovate and create an open and transparent approach to SDN by providing network applications, orchestration, services and an Open Flow Controller.
- **Open NMS** adds the new functionality to implement an elastic policy enforcement layer using SDN. First step, multi tenancy support is what we present in this demo.

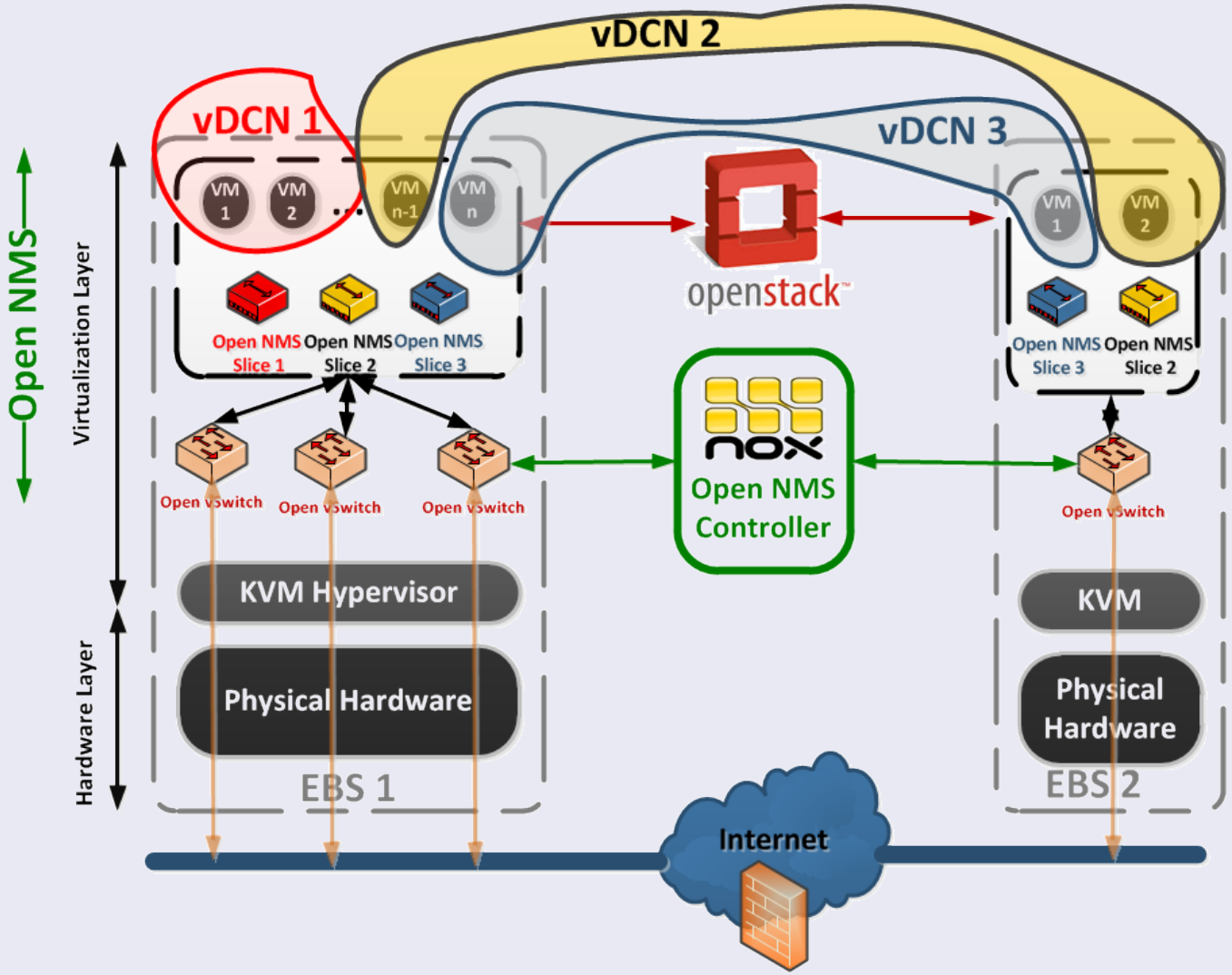
What? . . . SDN, Open daylight, OpenStack Context



Open NMS Concept



Open NMS Architecture



Outline

Demonstration Objectives

- Provide an **isolated** vDCNs using SDN.
- Enforcement of vDCNs **Isolation** : Inter-vDCNs and Intra-vDCNs Isolation.
- **Cloud Federation :** Inter-vDCNs resource sharing.
  Provide two ways of policy-enforcements :
  - **Restricted** : 2 vDCNs connected by an intermediate vDCN :
    - Used if trust level is low between two vDCNs.
    - Each Tenant enforce his policies regarding trafic from other Tenants.
    - Have neutral vDCN.
  - **Trusted** : Trusted resources between vDCNs.

Ericsson Demonstration

Software-Defined Open NMS Objectives

Ultimate Objectives

- **CLoud Elasticity** : vDCN Migration, Open vSwitch Migration, Open NMS Slice Migration, VM Migration.
- **Transparency** : Ability to the tenant to control his vDCN using OpenStack and OpenFlow controller (Nox, ODL, ...)

Demonstration Context

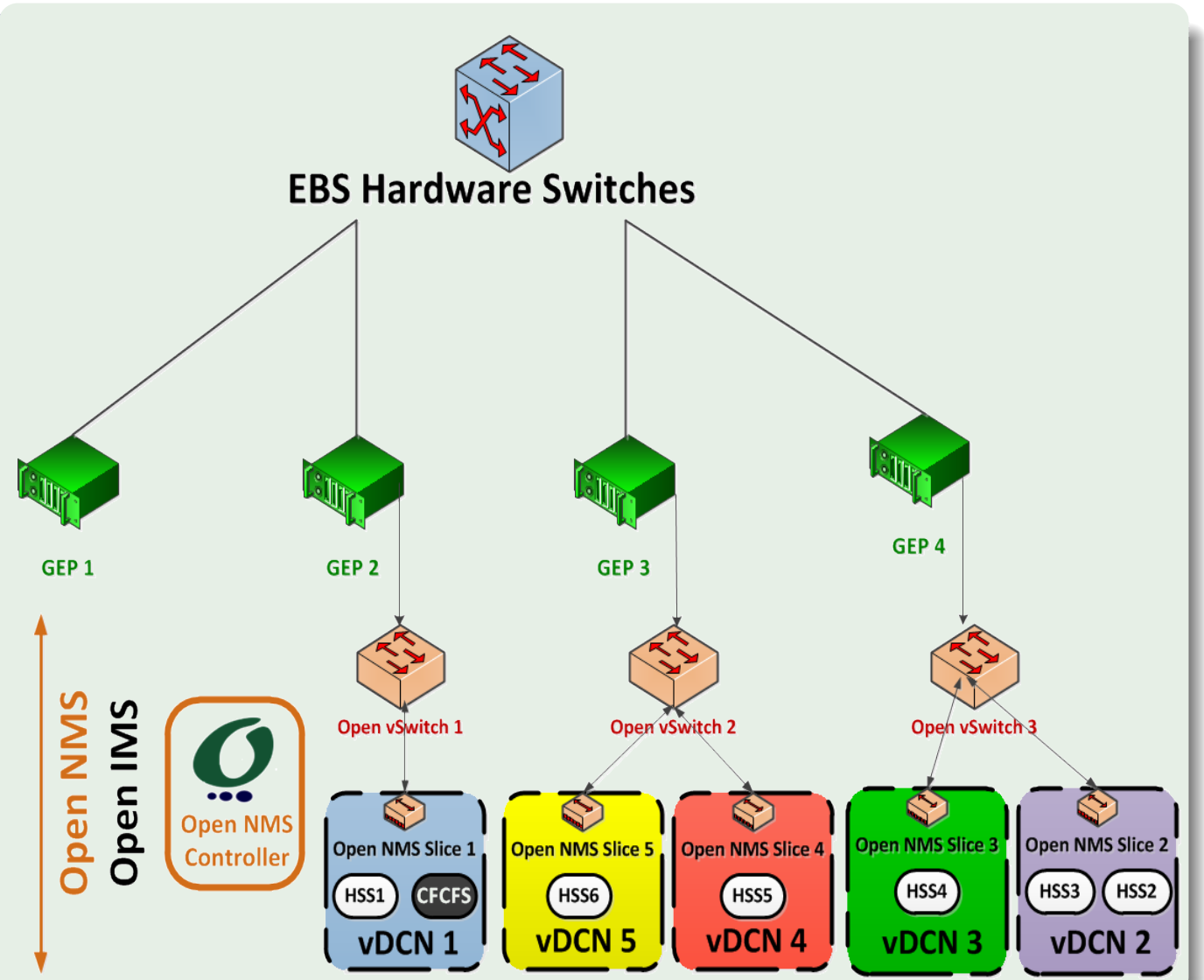
- Software-Defined **Open NMS** : Provide Tenant vDCNs Isolation (Inter & Intra-vDCN policies enforcement).
- Open IMS : Scaling up Tenant vDCN using Open NMS. Ability to share Open IMS CSCF between Tenant vDCNs (Need Access to Distant HSS).

Ericsson Demonstration

Ecolotic Demonstration Overview

Demo Overview

- Lab Setup :
  - 4 GEP : Ericsson Blade System.
  - Running KVM, Libvirt.
  - 3 Open vSwitches : OF 1.3.
  - 7 VMs.
  - 5 Open NMS Slices – 5 vDCNs.
  - Nox + Open NMS Controller.
  - Open NMS Visualization Tool.
- Virtual DCNs Initialization.
  - Creation of 7 instances Open IMS (6 HSS & 1 CSCF).
  - Starting Open NMS Controller (Link up vDCNs Nodes).
- Slicing Open vSwitches using Open NMS.
- Inter & Intra vDCNs Isolation.

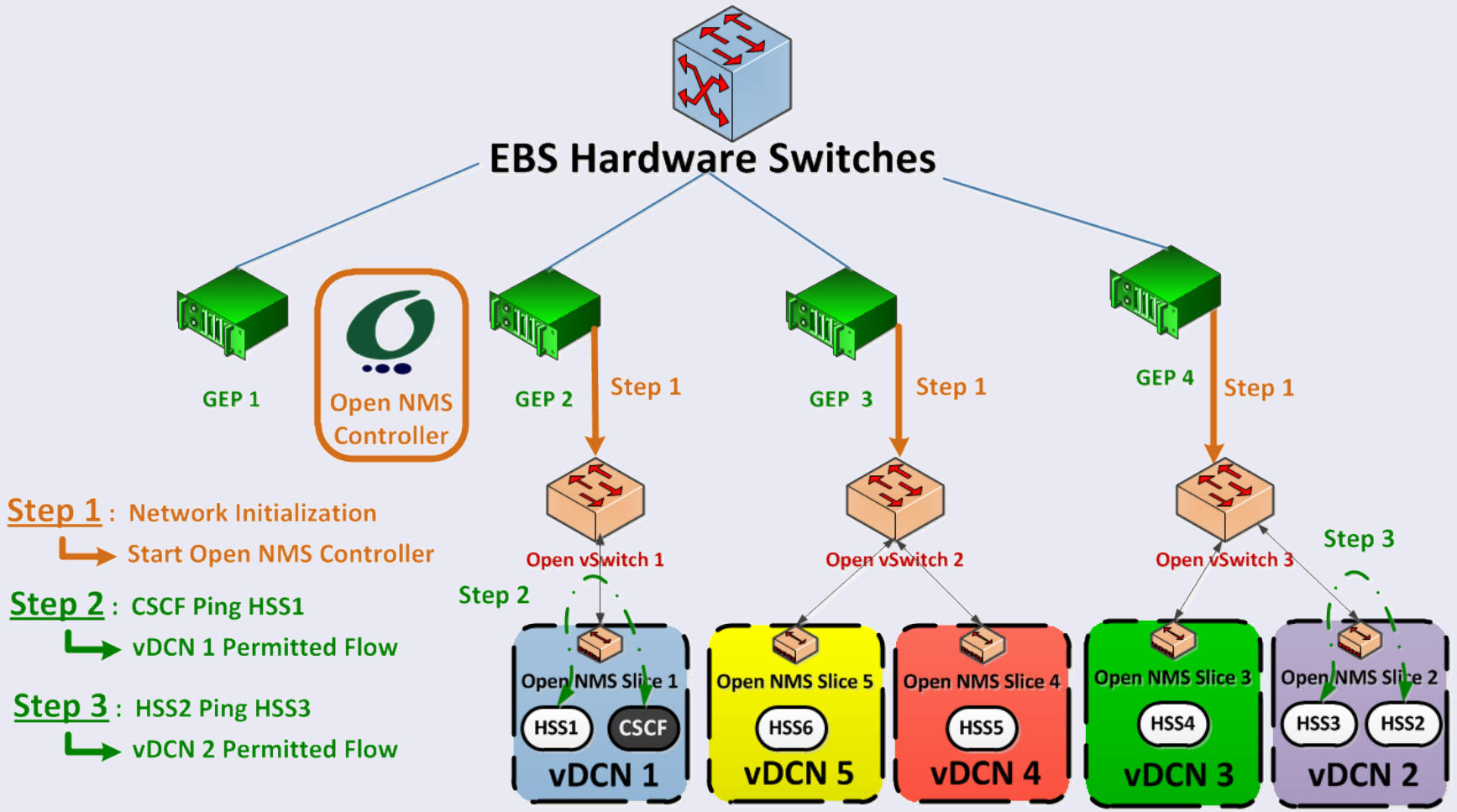


Open NMS Framework & Architecture

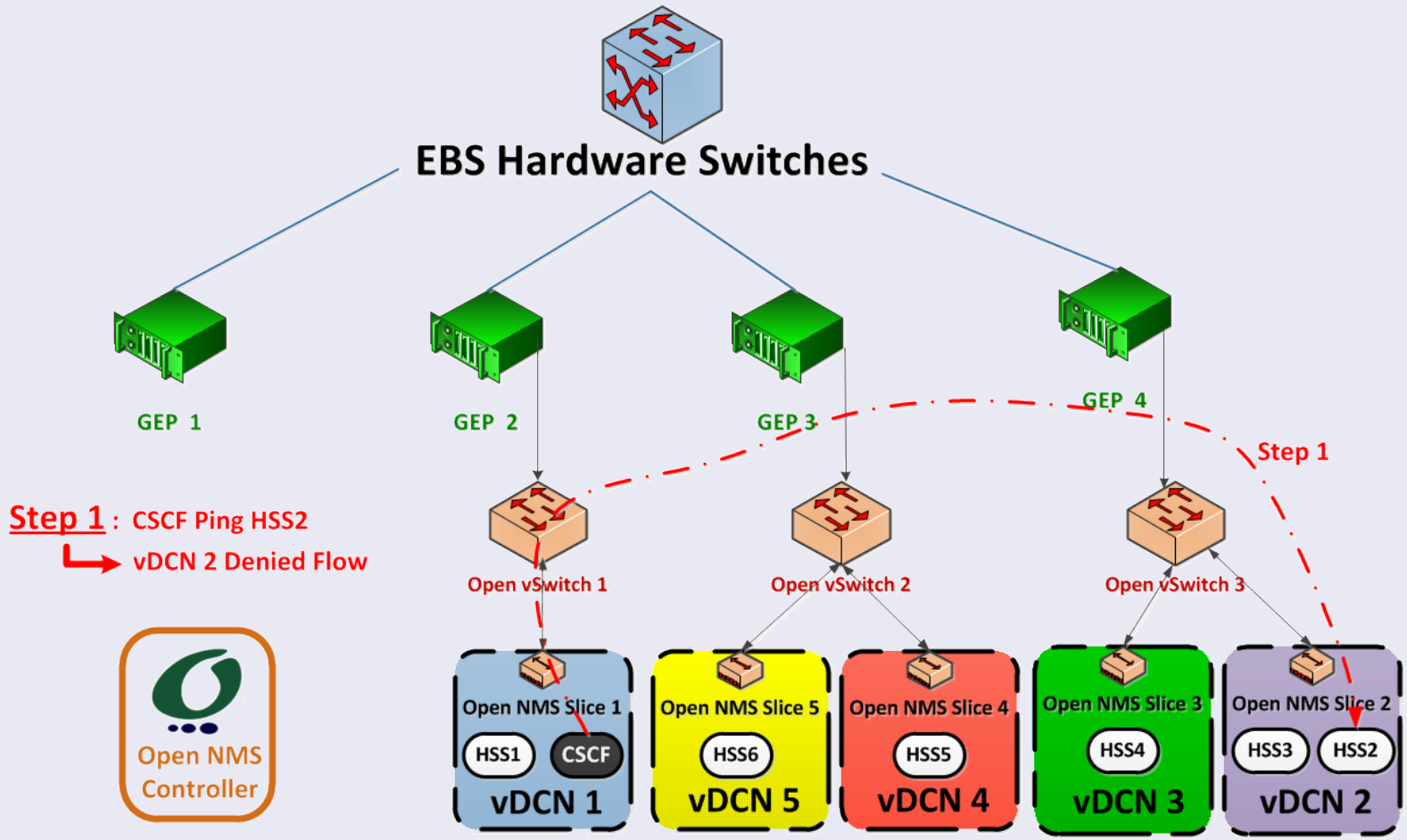
- Open NMS GUI Presentation : Open NMS Visualization Tool.
- Isolation enforcement in OpenNMS: Tenant vDCNs Isolation.
  - Intra-vDCN : Open NMS Controller Notification in case of Permitted Flows.
  - Inter-vDCNs : Open NMS Controller Notification in case of Denied Flows.
- Cloud Federation : Scaling up vDCN.
  - Inter-vDCNs : Restricted Resources.
  - Inter-vDCNs : Trusted Resources.

Demonstration Scenario 1 : Isolation enforcement in OpenNMS.

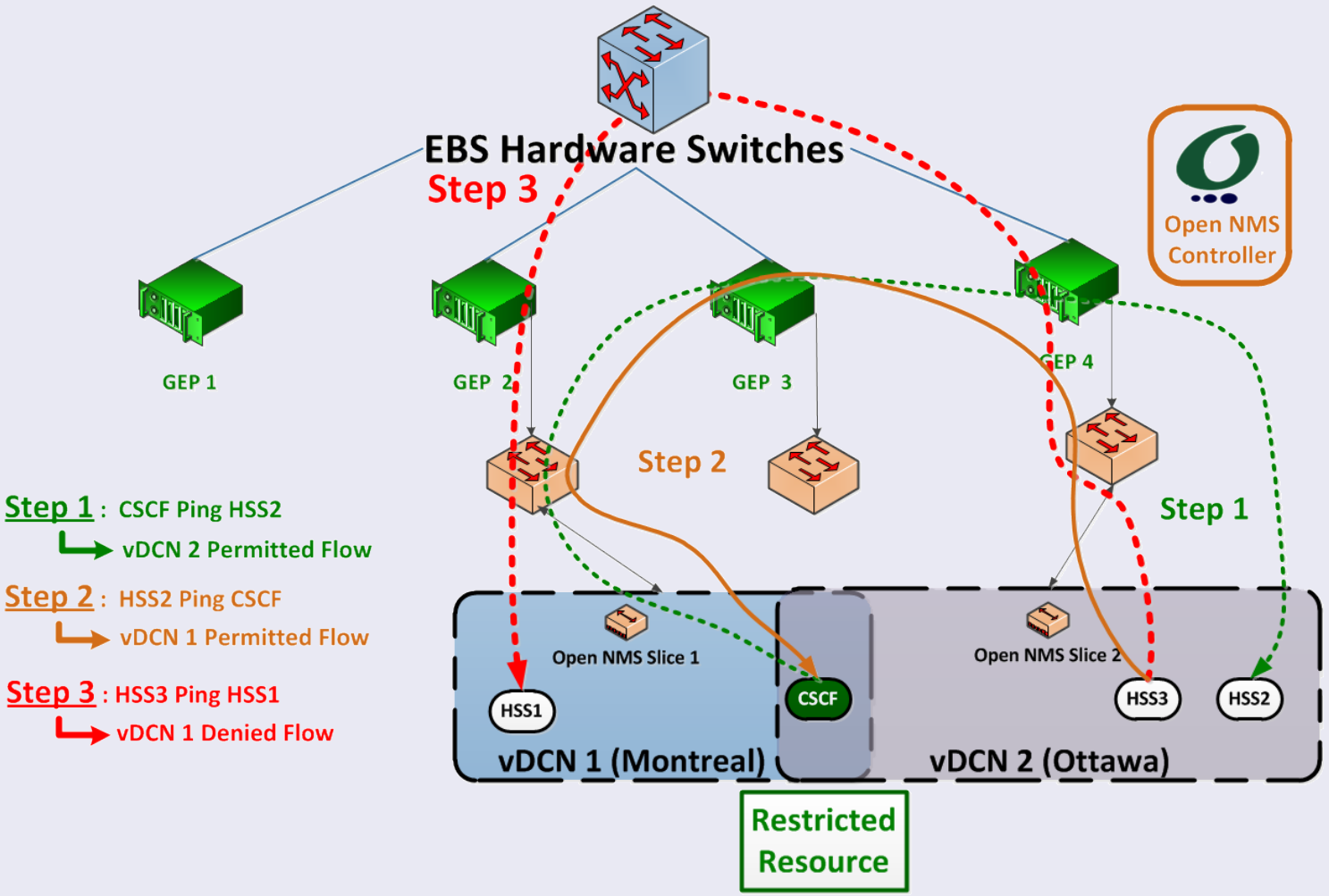
Tenant vDCNs Isolation : Intra-vDCN Permitted Flows



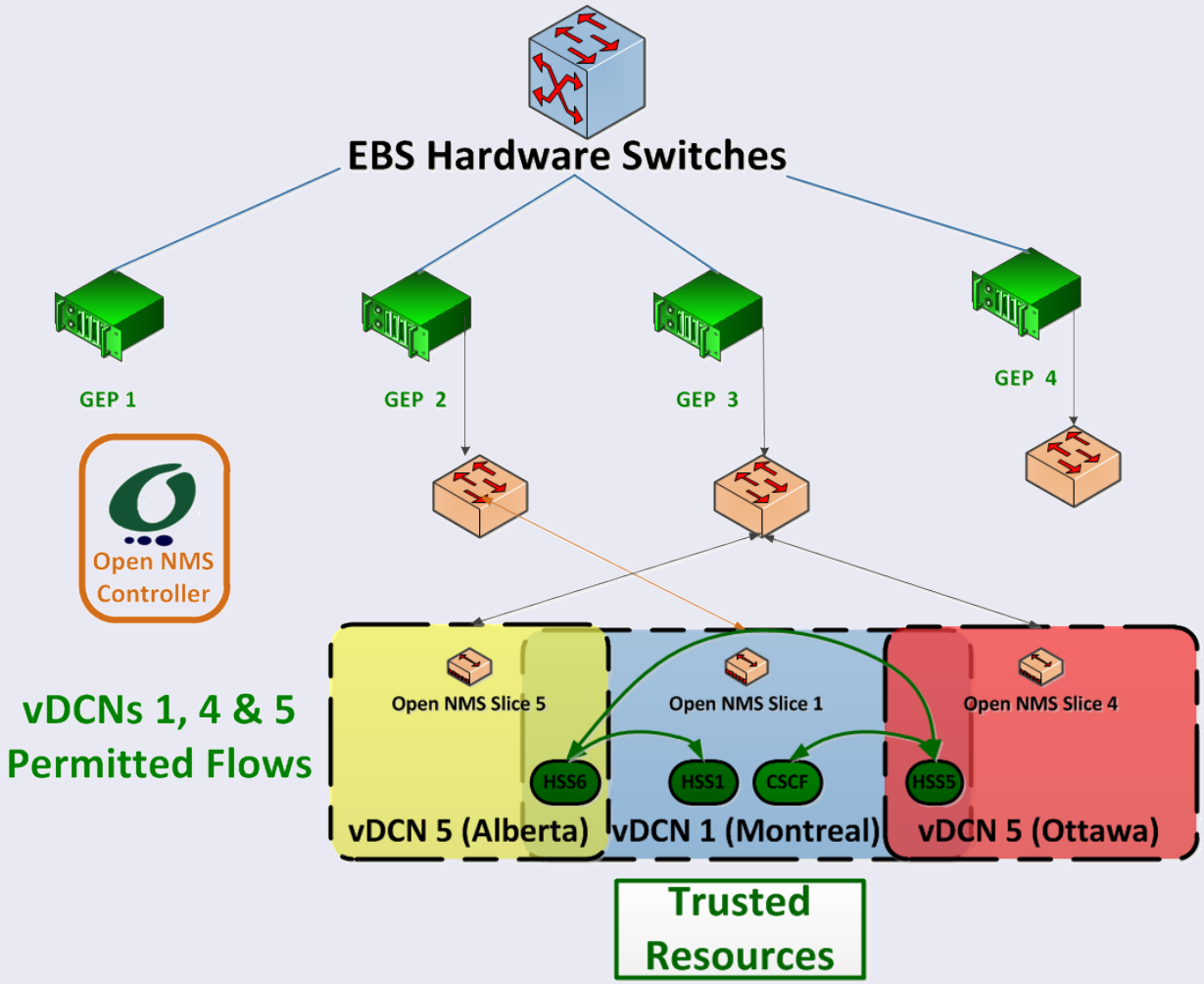
Demonstration Scenario 2 : Isolation enforcement in OpenNMS.
Tenant vDCNs Isolation : Inter-vDCNs Denied Flows



Demonstration Scenario 3 : Scaling up vDCNs using Open NMS: Restricted



Demonstration Scenario 4 : Scaling up vDCNs using Open NMS: Trusted



Outline

Conclusion & Perspectives

Conclusion

- Our Software-Defined Open NMS Architecture gives us the ability to isolate and scale up Tenant vDCNs.

Perspectives

- vDCN Migration, Open vSwitch Migration, Open NMS Slice Migration and VM Migration (Improve Cloud Elasticity).
- Provide Tenant Transparency (Open Daylight and Openstack Integration).