

# Software-Defined Open Network Management & Security

## Open NMS

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# Introduction

Context, Problematic ...

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

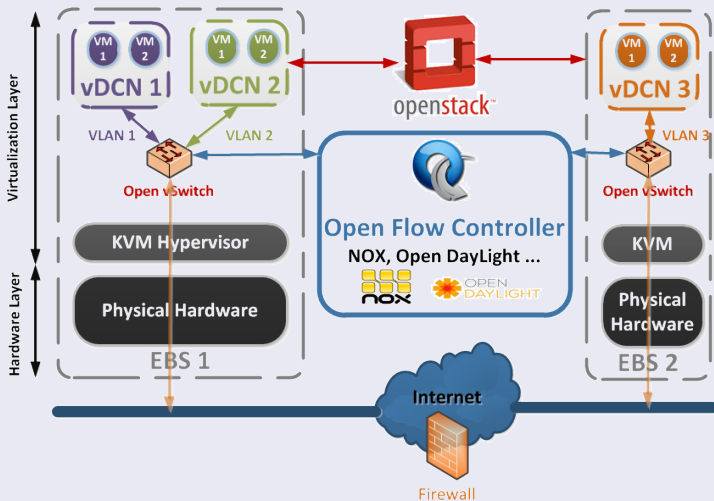
- **Software-Defined Networking** introduces a split between the Data Plane and the Control Plane.
- **Open Daylight** aims to innovate and create an open and transparent approach to SDN by providing network applications, orchestration, services and an Open Flow Controller.
- **OpenStack** delivers a massively scalable cloud operating system and controls large pools of compute, storage (Swift), and networking (Quantum) resources.
- **Slicing** : Isolation using VLAN, VXLANs, QinQ, PBB (Mac-in-Mac), SPB, GRE ...



# Introduction

Context, Problematic ...

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



# Introduction

Context, Problematic ...

## Why? ... The need for CCloud Elasticity, Isolation and Transparency in Multi-Tenants Data Center Network(DCN)

- Enforcement of vDCNs **Isolation** as specified by high level security policies across all resources.
- Provide **Transparency** to Multi-tenants DCNs.
- **CCloud 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) ?**

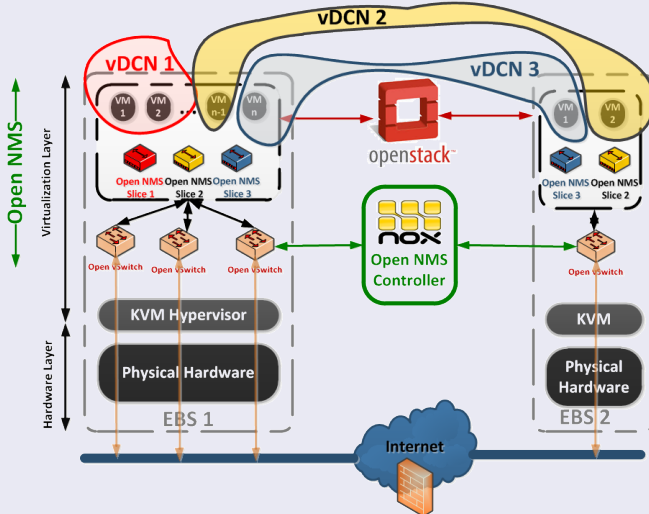
**Keywords:** vDCN, Isolation, SDN, OpenFlow, Open NMS ...



# Introduction

Solution : Open Network Management & Security (Open NMS) Architecture...

## Open NMS Architecture



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### 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 traffic 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, ...)



### Ecolotic Demonstration Context

- OpenFlow Multi-Path Topology : Provide Multipathing Discovery between Core, Edge and Aggregation Switches.
- 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 :

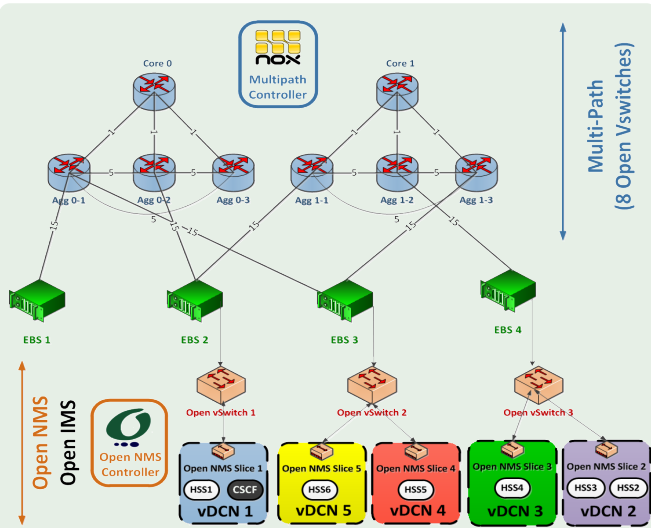
- 4 Ericsson Blade System (EBS).
- Running KVM, Libvirt.
- 8 Open vSwitches (Multipath).
- 4 Open vSwitches (Open NMS).
- 4 VMs.
- 2 Nox Controller (Open NMS & Multipath)

#### 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.



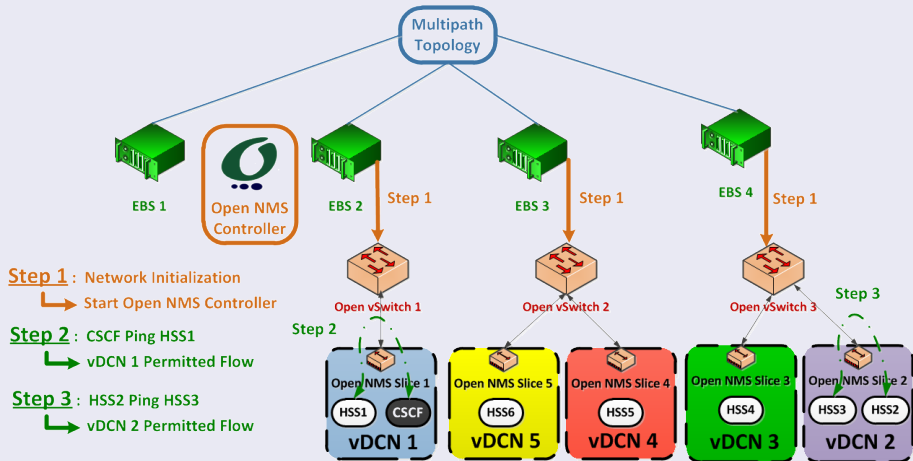
### Open NMS Framework & Architecture

- 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.

# Ericsson Demonstration

## Demonstration Scenario

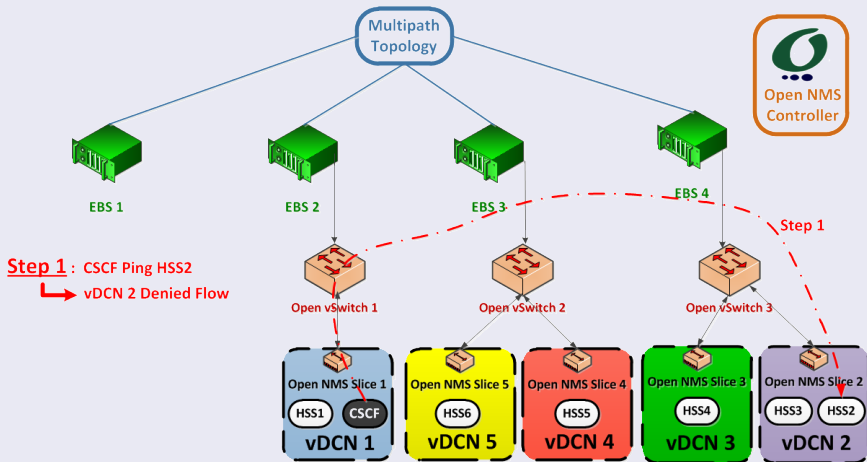
### Demonstration Scenario 1 : Isolation enforcement in OpenNMS. Tenant vDCNs Isolation : Intra-vDCN Permitted Flows



# Ericsson Demonstration

## Demonstration Scenario

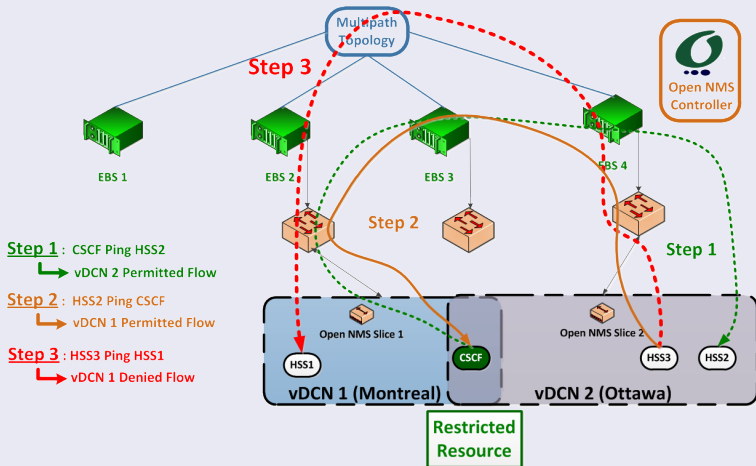
### Demonstration Scenario 2 : Isolation enforcement in OpenNMS. Tenant vDCNs Isolation : Inter-vDCNs Denied Flows



# Ericsson Demonstration

## Demonstration Scenario

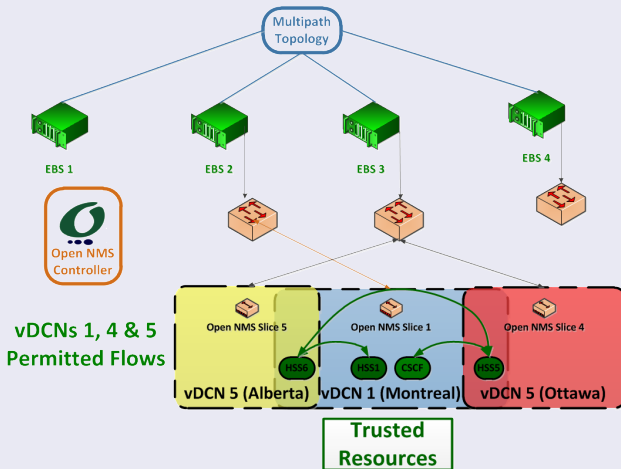
### Demonstration Scenario 3 : Scaling up vDCNs using Open NMS: Restricted



# Ericsson Demonstration

## Demonstration Scenario

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





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## 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).

