Cisco UCS Director Tech Module

Nexus Data Center Switching (Ethernet)
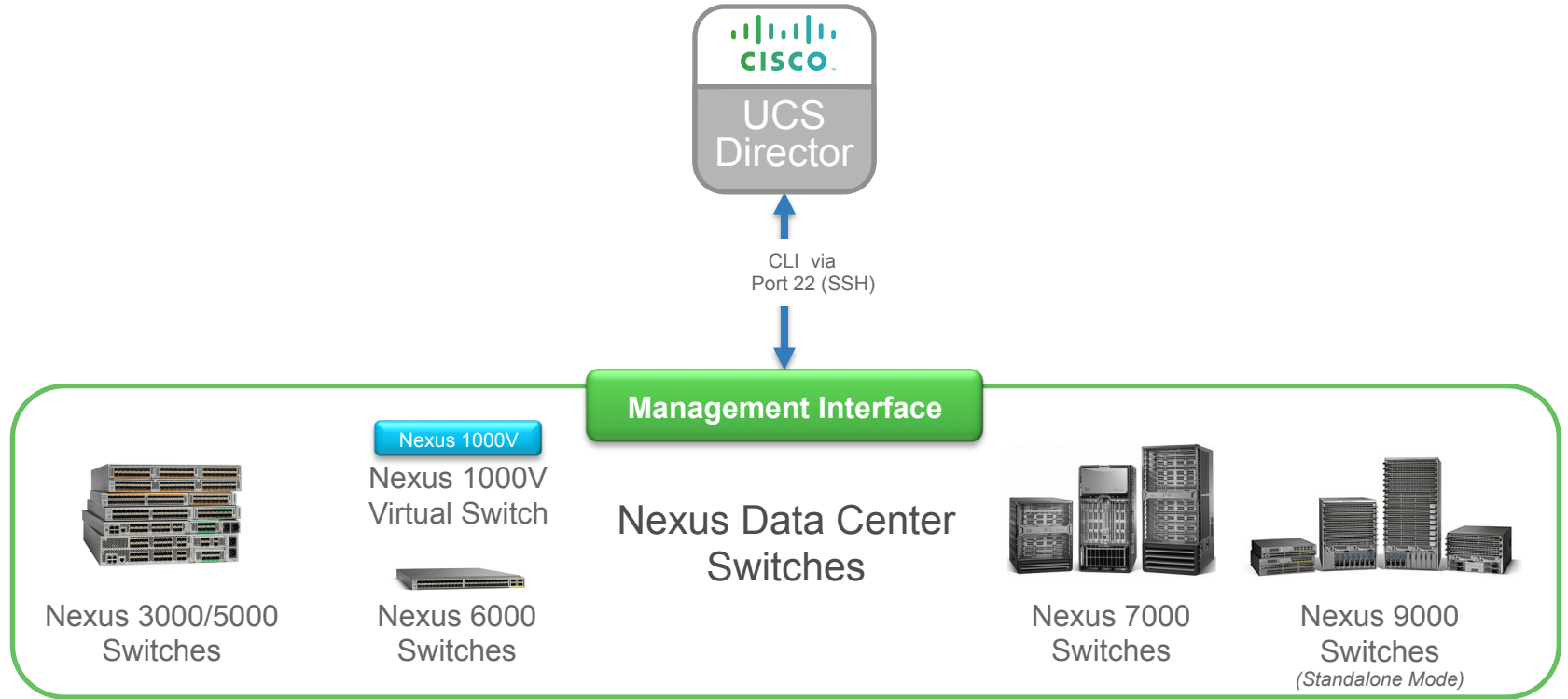
Version: 1.0

September 2016

Agenda

- Overview & Architecture

- Hardware & Software Compatibility

- Licensing

- Orchestration Capabilities
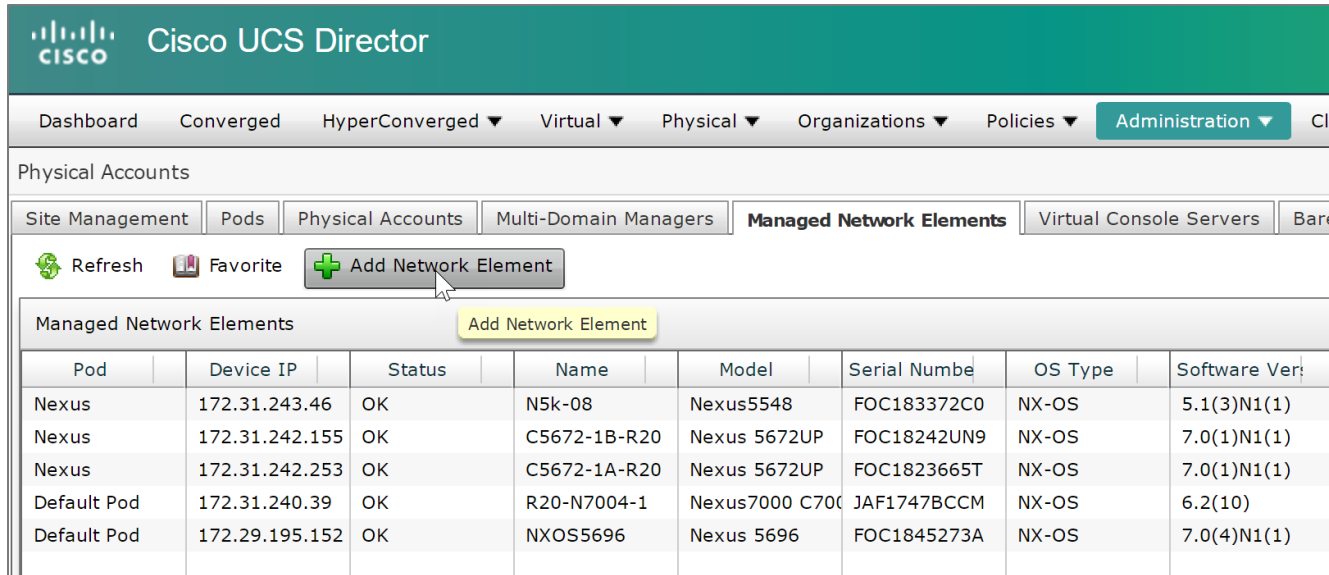
- Reports

- Example Use-Cases

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Architecture & Overview

UCS Director and Nexus Switch Integration

CISCO

UCS Director

CLI via
Port 22 (SSH)

Management Interface

Nexus 1000V

Nexus 1000V
Virtual Switch

Nexus Data Center
Switches

Nexus 3000/5000
Switches

Nexus 6000
Switches

Nexus 7000
Switches

Nexus 9000
Switches
(Standalone Mode)

Adding a Nexus Data Center Switch

- Navigate to **Administration → Physical Accounts**, choose the **Managed Network Elements** tab and click **Add Network Element**

Adding a Nexus Data Center Switch

- Select the appropriate **Pod, Device Category and Protocol**

Hardware & Software Compatibility

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IMPORTANT!!

- The following slide featuring support information may be out of date

- **ALWAYS** check the most up to date version of the UCS Director Compatibility Matrix

- The latest Compatibility Matrix and other supporting UCS Director documentation can be found at the following location:

  http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/ucs-director/doc-roadmap/b_UCSDirectorDocRoadmap.html

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UCS Director Nexus 1000 Distributed Virtual Switch Support *(as of UCS Director 6.0)*

with VMware vSphere

Supported Models	Supported Software (NX-OS)
Nexus 1000V for VMware vSphere	4.2(1)SV2(1.1a) 4.2(1)SV2(2.1) 4.2(1)SV2(2.1a) 4.2(1)SV2(2.3) 5.2(1)SV3(1.2) 5.2(1)SV3 (1.3) for VMware vCenter 5.5 5.2(1)SV3(1.4) for VMware vCenter 6.0 5.2(1)SV3(1.6) for VMware vCenter 6.0 5.2(1)SV3(1.10) 5.2(1)SV3(1.15)

UCS Director Nexus 1000 Distributed Virtual Switch Support *(as of UCS Director 6.0)*

with Microsoft Hyper-V

Supported Models	Supported Software (NX-OS)
Nexus 1000V for Microsoft Hyper-V	5.2(1)SM1(5.2b) 5.2(1)SM3(1.1) 5.2(1)SM3(1.1a)

CISCO

UCS Director Nexus 1100 Cloud Services Platform Support *(as of UCS Director 6.0)*

Supported Models	Supported Software (NX-OS)
Nexus 1110	4.2(1)SP1(5.1a) 5.2(1)SP1(7.2)

UCS Director Nexus 3000 Series Data Center Switch Support *(as of UCS Director 6.0)*

Supported Models	Supported Software (NX-OS)
Nexus 3016Q Nexus 3064T Nexus 3064X	5.0(3)U5(1e)
Nexus 3048	5.0(3)U5(1e) 6.0(2)U2(1) 6.0(2)U2(2)
Nexus 3172	7.0(3)I2(2a)
Nexus 3548	5.0(3)U5(1c)

UCS Director Nexus 5000 Series Data Center Switch Support *(as of UCS Director 6.0)*

Supported Models	Supported Software (NX-OS)
Nexus 5596Q	7.0(7)N1(1)
Nexus 5596UP Nexus 5596T	6.0(2)N2(5)
Nexus 5548UP	5.2(1)N1(4) 6.0(2)N2(5)
Nexus 5548P	5.2(1)N1(4) 5.2(1)N1(7) 5.2(1)N1(8b) 5.2(1)N1(9) 6.0(2)N2(5)
Nexus 5696Q	7.1(1)N1(1) 7.2(1)N1(1)

Supported Models	Supported Software (NX-OS)
Nexus 5672UP	7.0(1) 7.2(1)N1(1)
Nexus C5624Q	7.1(1)N1(1) 7.2(1)N1(1)
Nexus 5648Q	7.1(1)N1(1) 7.1(2)N1(1)
Nexus 56128P	7.1(1)N1(1)

UCS Director Nexus 6000 Series Data Center Switch Support *(as of UCS Director 6.0)*

Supported Models	Supported Software (NX-OS)
Nexus 6001-64P	6.0(2)N1(2) 7.0(1)N1(1)

UCS Director Nexus 7000 Series Data Center Switch Support *(as of UCS Director 6.0)*

Supported Models	Supported Software (NX-OS)
Nexus 7702 Nexus 7706 Nexus 7710 Nexus 7718	6.2(8a)
Nexus 7004 Nexus 7009 Nexus 7018	6.2(8a)
Nexus 7010	6.2(8a) 6.2(12) 6.2(14)
Supervisors	6.1(3)

Supported Models	Supported Software (NX-OS)
Supervisor 2E Supervisor 2	6.1(2)
Supervisor 1	6.2(2) 6.2(2a) 6.2(12) 6.2(14)

F-Series I/O Modules	
N7K-F132XP-15 N7K-F248XP-25	N7K-F248XP-25E N7K-F248XT-25E

UCS Director Nexus 9000 Series Data Center Switch Support *(as of UCS Director 6.0)*

Supported Models	Supported Software (NX-OS)
Nexus 9136PX	6.1(2)I2(1) 7.0(3)I2(2a)
Nexus 9508	6.1(2)I2(2)
Nexus 9504	7.0(3)I1(2) 7.0(3)I2(2a)
Nexus C9516	7.0(3)I1(1) 7.0(3)I2(2a)
Nexus 9372TX	6.1(2)I3(1)
Nexus 9396TX	6.1(2)I3(1) 7.0(3)I1(2)

Supported Models	Supported Software (NX-OS)
Nexus 9332PQ	7.0(3)I1(1)
Nexus 9372PX	6.1(2)I3(1) 7.0(3)I2(2a)
Nexus 93120	7.0(3)I2(2)
Nexus 93128	7.0(3)I2(1a) 7.0(3)I2(2d)

All versions pertain to Nexus 9000 switches running in standalone mode only, for ACI mode, see the ACI specific tech module

Licensing

Licensing Information

- UCS Director licensing is purchased solely in the form of physical server licenses

- Each physical server license includes a storage device license and a network device license as well

- UCS Director tracks the number of physical servers, storage and network devices being managed against the number of installed licenses

- If additional storage and/or network device licenses are required, you can purchase additional physical server licenses

- Each physical network device (switch) will consume a network device license

- Standalone VSM or VSM HA will require only 1 network device license for UCS Director to manage

- Enabling the VXLAN feature in UCS Director doesn't need any license as base license includes all the features

Licensing Examples
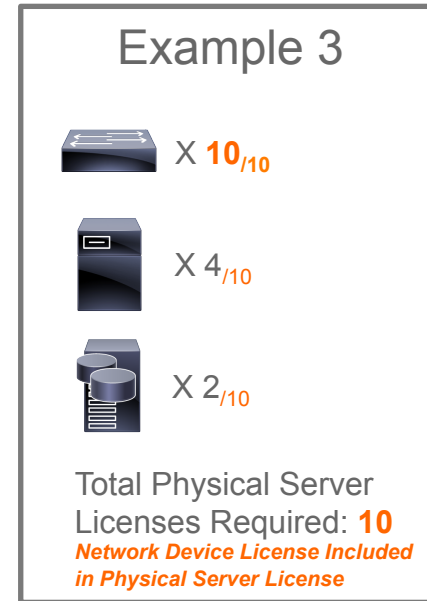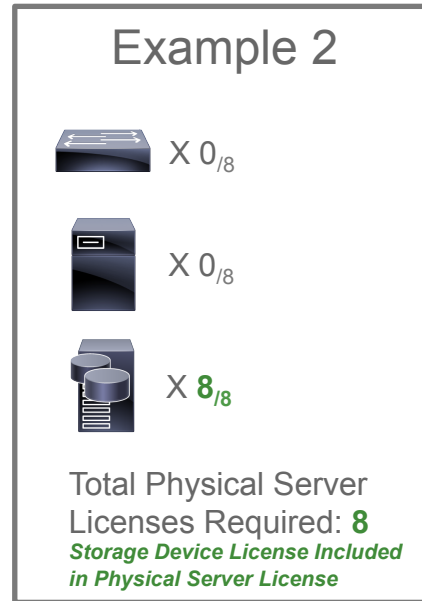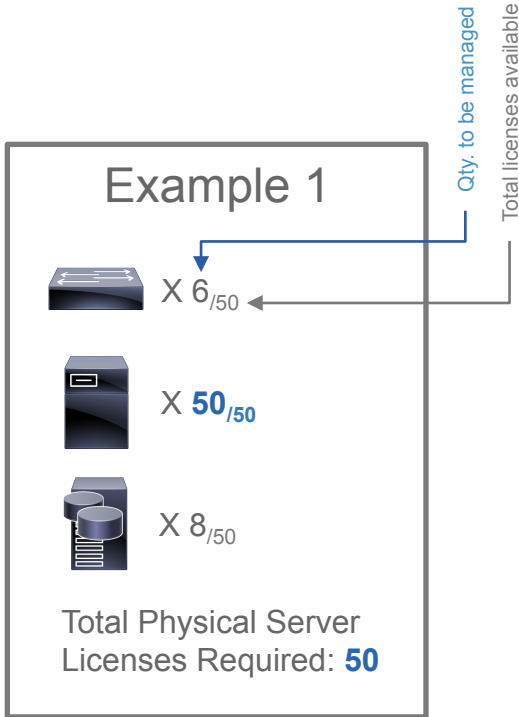
Orchestration Capabilities

Orchestration Capabilities

Spanning-Tree Tasks:
Configure PVST
Configure STP PORT
Configure MST INSTANCE
Configure MST

VLAN Tasks:
Create VLAN
Delete VLAN
Assign VLAN to Group
Unassign VLAN from Group

Private VLAN Tasks:
Create Private VLAN
Delete Private VLAN
Associate Private VLAN
Delete Associate Private VLAN
Configure Private VLAN Port
Remove Private VLAN Ports
Configure Private VLAN Port Profile

VDC Tasks:
Create N7K VDC
Remove N7K VDC
Update N7K VDC
Allocate Port To VDC
Remove Port From VDC

VXLAN Tasks:
Create VXLAN
Update VXLAN
Remove VXLAN
Configure VXLAN Range
Assign VXLAN to PortProfile
UnAssign VXLAN PortProfile
Encapsulate VXLAN PortProfile
Encapsulate VXLAN Port Profile with Segment
Create VXLAN Encapsulate segment
Delete VXLAN Encapsulate segment

SVI Tasks:
Create SVI
Remove SVI

Trunk Tasks:
Configure Trunk
Configure VTP
Configure Access
Update Trunk

QoS Tasks:
Configure QOS on Nexus 5K
Configure QOS on Nexus 9K
Delete N9K QOS Profile
Configure QOS on Nexus 1K

HSRP Tasks:
Create HSRP
Update HSRP
Remove HSRP

Port Profile Tasks:
Create Port-Profile
Delete Port-Profile
Update Port-Profile
Inherit Port Profile
Delete Inherit Port Profile

Port Profile Tasks:
Create Port-Profile
Delete Port-Profile
Update Port-Profile
Inherit Port Profile
Delete Inherit Port Profile

HSRP Tasks:
Create HSRP
Update HSRP
Remove HSRP

Access-Lists Tasks:
Create ACL Entry
Delete ACL Entry
Add IP ACL Rule
Delete IP ACL Rule
Delete MAC ACL Rule
Add MAC ACL Rule

Port Channel Tasks:
Create Port-Channel
Delete Port-Channel
Update Port-Channel
Assign Port to Port Channel

MAC Address Tasks:
Create Static MACAddress
Remove Static MACAddress
Assign Static MACAddress
UnAssign MACAddress Port
Configure MACAddress Table

Miscellaneous Tasks:
Configure Port
Configure VPC Domain
Configure Feature
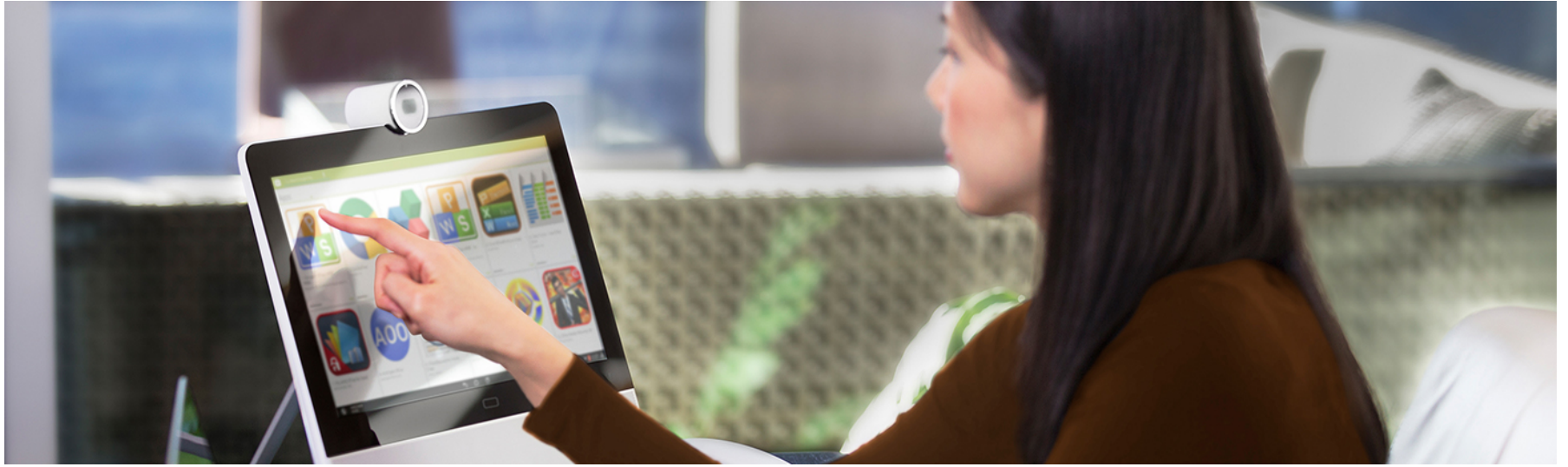
Reports

Tabular Reports and Information

- UCS Director discovers Nexus switches configuration through an inventory process and provides the below reports

- Depending upon the capability of Nexus platform, UCSD will show specific parameters. For example: Nexus 7000 – UCSD will show VDC information; Nexus 5000 – UCSD will show storage information

  - Licensing
  - Modules
  - Features
  - VLANs
  - L2 neighbors
  - Interfaces
  - Private VLANs
  - MAC Address Table
  - Quality of Service (QoS)

Tabular Reports and Information
Nexus 5000

- Summary
- Licenses
- Configurations
- Modules
- L2 Neighbors
- Interfaces
- Port Capabilities
- VLANs
- Private VLANs
- Port Profiles
- SXP Connection Peers
- HSRP
- VPC Info
- VTP Status

- Features
- MAC Address Table
- MAC Address Table Configuration
- SAN Zones
- SAN Zonesets
- FCNS Database
- Fabric Login
- Device Alias
- FCAlias
- VSANs
- QOS Class Maps
- QOS Policy Maps
- Service Request Details

Tabular Reports and Information
Nexus 7000

- Summary
- Licenses
- Configurations
- Modules
- L2 Neighbors
- Interfaces
- Port Capabilities
- VLANs
- Private VLANs
- Port Profiles
- VDC
- VDC Detail

- VDC Interfaces
- VPC Info
- VTP Status
- Features
- MAC Address Table
- MAC Address Table Configuration
- QOS Class Maps
- QOS Policy Maps
- Service Request Details
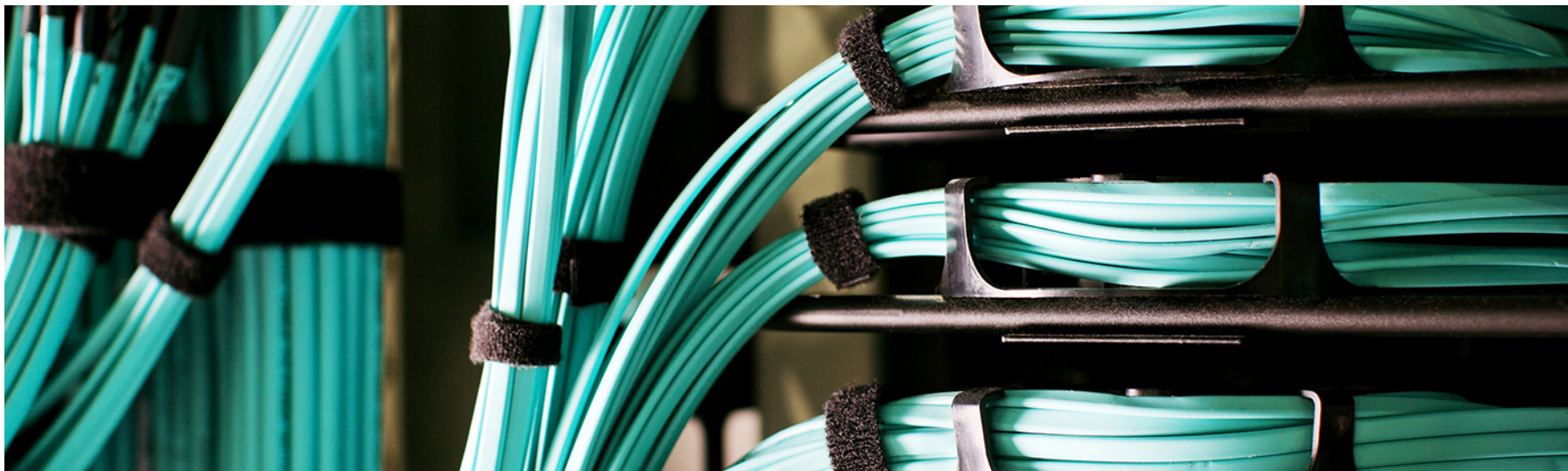
Example Use-Cases

Example Use-Cases

- Use-Case #1: Create VLAN and allow on Trunk Port

- Use-Case #2: Create Port-Channel, VPC Domain and VPC Peer-Link

- Use-Case #3: Configure any NXOS commands unsupported by UCSD

- Use-Case #4: Configure VxLAN on Nexus 1000v

Use Case # 1

- Most common task on L2 Switches is to create new VLANs and allow them on trunk ports/port-channels
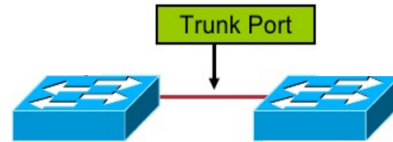
- Flowchart to provision VLANs on Nexus switches and add those VLANs to existing allowed VLAN list on the specific trunk ports is as shown below

- Workflow can be downloaded from the UCS Director community site https://communities.cisco.com/docs/DOC-69361
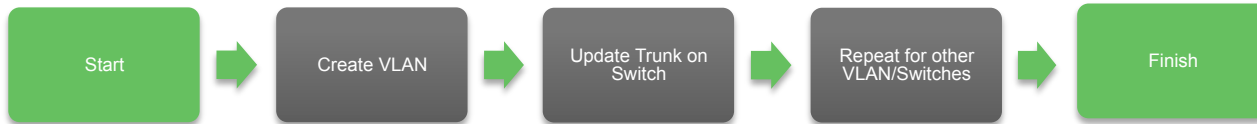
Use Case # 1

The actual workflow for this use case is as shown below:
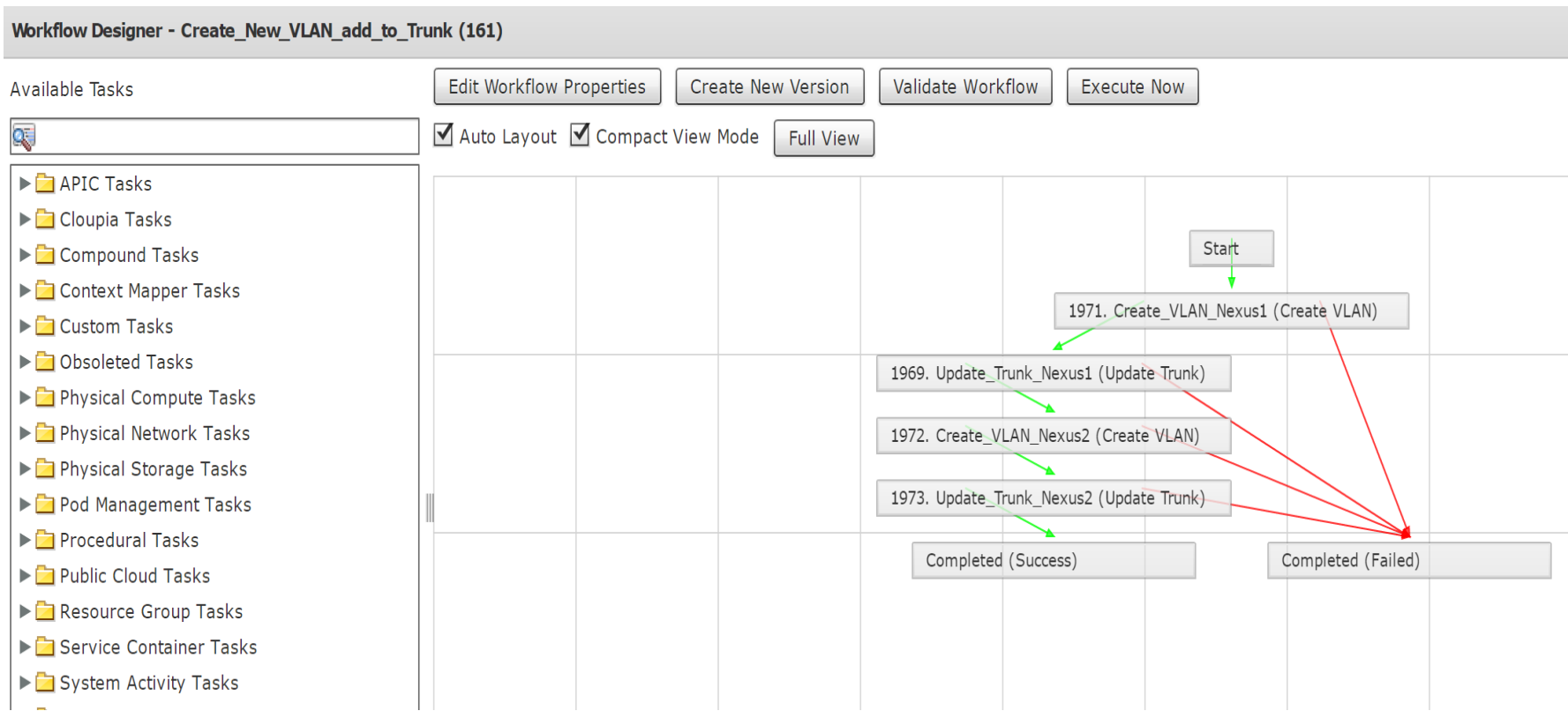
Use Case # 1

Execute the workflow and provide the requested user inputs…

Executing Workflow: Create_New_VLAN_add_to_Trunk

Workflow Version:

0 (default version)

Create new VLAN on Nexus switches and add the VLAN to allowed list on trunk port

VLAN NAME

VLAN ID

NEXUS Switch1 — Select...

NEXUS1 TrunkPort — Select...

NEXUS Switch2 — Select...

NEXUS2 TrunkPort — Select...

Submit   Close

Provide VLAN Name

Provide VLAN ID

Select Nexus 1 Switch

Select Nexus 1 Port

Select Nexus 2 Switch

Select Nexus 2 Port

Use Case # 1

Service Request completion and Nexus Verification

Use Case # 2

- One of prime features of Nexus switches is VPC peering.
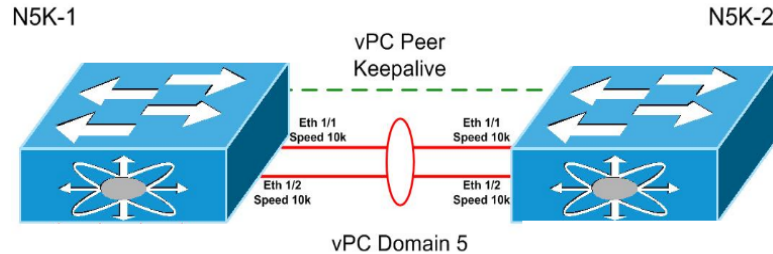
- UCSD can configure vPC Domain across pair of Nexus Switches

- UCSD has all the tasks needed to configure Port-Channel and VPC Domain as shown below:

- Workflow can be downloaded from the UCS Director community site https://communities.cisco.com/docs/DOC-69362
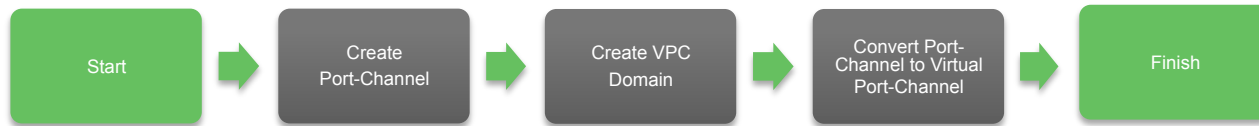
Use Case # 2

The actual workflows for this use case is as shown below:
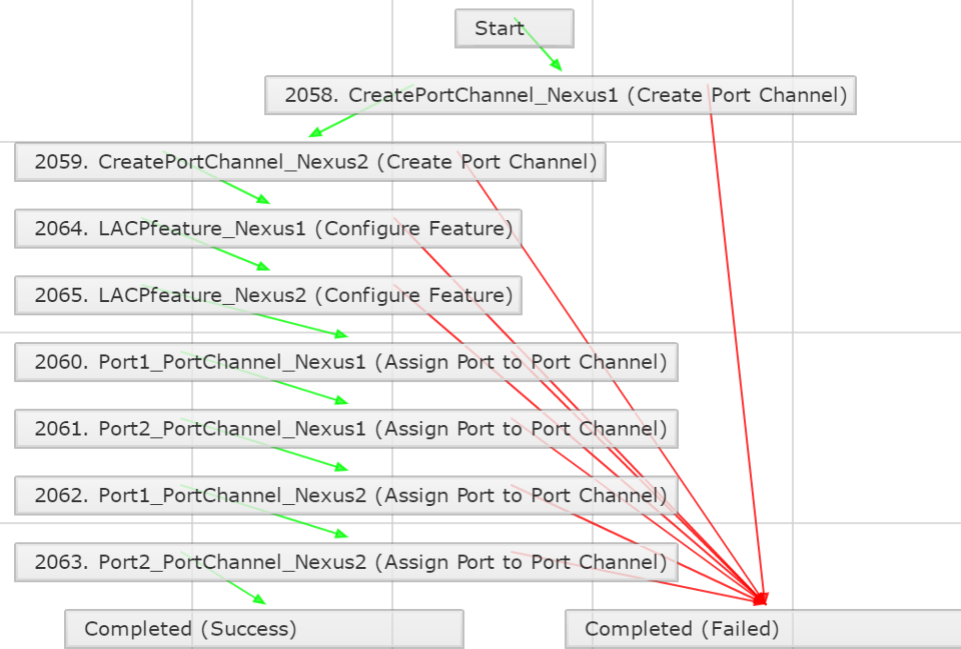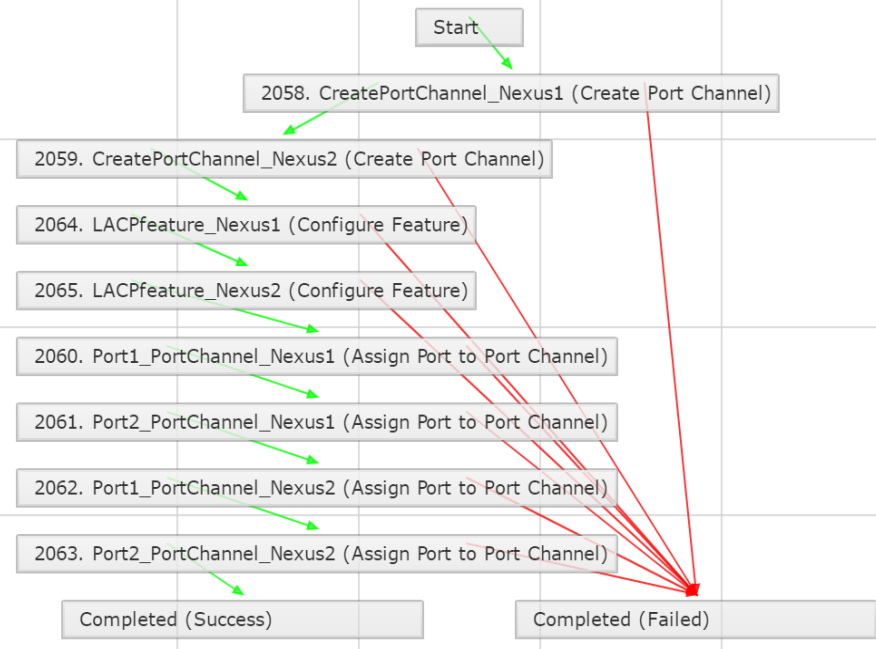
Use Case # 2

Execute first Port-Channel workflow and then VPC workflow; provide the requested user inputs…

Executing Workflow: Create_PortChannel

Workflow Version:
0 (default version)

Select Nexus 1 Switch	→	Nexus1	Select...	172.31.242.253
Enter Port-Channel No.	→	PortChannel Number	31	
Select Nexus 2 Switch	→	Nexus2	Select...	172.31.242.155
Add Port 1 to Port-Channel	→	Port1_Nexus1	Select...	Ethernet1/1
Add Port 2 to Port-Channel	→	Port2_Nexus1	Select...	Ethernet1/2
Add Port 1 to Port-Channel	→	Port1_Nexus2	Select...	Ethernet1/1
Add Port 2 to Port-Channel	→	Port2_Nexus2	Select...	Ethernet1/2
Enable LACP Feature	→	LACP_Nexus1	Select...	lacp
Enable LACP Feature	→	LACP_Nexus2	Select...	lacp

Submit   Close

Executing Workflow: Create_VPC

Workflow Version:
0 (default version)

Select Nexus 1 Switch	→	Nexus1	Select...	172.31.242.253
Enter VPC ID	→	VPC ID	29	
Nexus 1 Peer IP	→	Nexus1 mgmt0 IP	172.31.242.254	
Nexus 2 Peer IP	→	Nexus2 mgmt0 IP	172.31.242.155	
Select Nexus 2 Switch	→	Nexus2	Select...	172.31.242.155
Enable VPC Feature	→	VPC Feature Nexus1	Select...	vpc
Enable VPC Feature	→	VPC Feature Nexus2	Select...	vpc
Peer-Link Port-Channel	→	Port-Channel_Nexus1	Select...	port-channel31
Peer-Link Port-Channel	→	Port-Channel_Nexus2	Select...	port-channel31

Submit   Close

Use Case # 2

Service Request completion &
Nexus Verification


```
172.31.242.253 - PuTTY

C5672-1A-R20#
C5672-1A-R20# show vpc brief
Legend:
                (*) - local vPC is down, forwarding via vPC peer-link

vPC domain id                    : 78
Peer status                      : peer adjacency formed ok
vPC keep-alive status            : peer is alive
Configuration consistency status : success
Per-vlan consistency status      : success
Type-2 consistency status        : success
vPC role                         : primary
Number of vPCs configured        : 0
Peer Gateway                     : Disabled
Dual-active excluded VLANs        : -
Graceful Consistency Check       : Enabled
Auto-recovery status             : Enabled (timeout = 240 seconds)

vPC Peer-link status
---------------------------------------------------------------------
id    Port   Status Active vlans
--    ----   ------ ---------------------------------------------------
1     Po31   up     1
C5672-1A-R20#
```

Workflow Status | Log | Objects Created and Modified | Input/Output

Service Request

Status

Refresh

▼ Overview

Current status for the service request.

Request ID	195
Request Type	Admin Workflow
Workflow Name	Create_VPC
Workflow Version Label	0
Request Time	08/03/2016 12:58:38 GMT-0700
Request Status	Complete
Comments	

▼ Ownership

| Initiating User | admin |

1. Initiated by admin — 08/03/2016 12:58:39
2. Configure Feature — 08/03/2016 12:58:58
3. Configure Feature — 08/03/2016 12:59:16
4. Configure VPC Domain — 08/03/2016 12:59:36
5. Configure VPC Domain — 08/03/2016 12:59:57
6. Configure VPC PortChannel — 08/03/2016 13:00:19
7. Configure VPC PortChannel Completed action — 08/03/2016 13:00:37
8. Complete Completed successfully. — 08/03/2016 13:00:39

Workflow Status | Log | Objects Created and Modified | Input/Output

Service Request

Status

Refresh

▼ Overview

Current status for the service request.

Request ID	194
Request Type	Admin Workflow
Workflow Name	Create_PortChannel
Workflow Version Label	0
Request Time	08/03/2016 12:52:12 GMT-0700
Request Status	Complete
Comments	

▼ Ownership

| Initiating User | admin |

1. Initiated by admin — 08/03/2016 12:52:14
2. Create Port Channel — 08/03/2016 12:52:25
3. Create Port Channel — 08/03/2016 12:52:34
4. Configure Feature — 08/03/2016 12:52:52
5. Configure Feature — 08/03/2016 12:53:10
6. Assign Port to Port Channel — 08/03/2016 12:53:18
7. Assign Port to Port Channel — 08/03/2016 12:53:39
8. Assign Port to Port Channel — 08/03/2016 12:53:51
9. Assign Port to Port Channel Completed action — 08/03/2016 12:54:14
10. Complete Completed successfully. — 08/03/2016 12:54:14

Close

cisco

Use Case # 3

- Leverage 'Execute Network Device CLI' task to configure specific command/feature which is currently not supported by UCSD (this task is executed on existing accounts and so you don't have to provide IP and credentials).

- Below workflow will configure OSPF commands on Nexus. As mentioned earlier, currently UCSD doesn't support Layer 3 / Routing configuration but using task 'Execute Network Device CLI', UCSD can SSH into Nexus device and configure any NXOS-supported commands

Start → Execute Network Device CLI → Finish

- Workflow can be downloaded from the UCS Director community site
  https://communities.cisco.com/docs/DOC-69363

Use Case # 3

The actual workflow for this use case is as shown below:

Use Case # 3

The workflow has pre-defined user inputs. These variables are called using ${variable} format in CLI Commands task

Note: 'Execute Network Device CLI' task has input for rollback commands which should be listed as shown for UCSD to rollback this task

Use Case # 3

Service Request completion and Nexus Verification

Use Case # 4

Nexus 1000v was first virtual switch in the industry to have VxLAN overlay in Virtual Domain. UCS-D supports VxLAN deployment on Nexus 1000v with following tasks:

Create VXLAN
Update VXLAN
Remove VXLAN
Assign VXLAN to PortProfile
UnAssign VXLAN PortProfile
Encapsulate VXLAN PortProfile
Encapsulate VXLAN Port Profile with Segment
Create VXLAN Encapsulate segment
Delete VXLAN Encapsulate segment

- Workflow can be downloaded from the UCS Director community site
https://communities.cisco.com/docs/DOC-69364
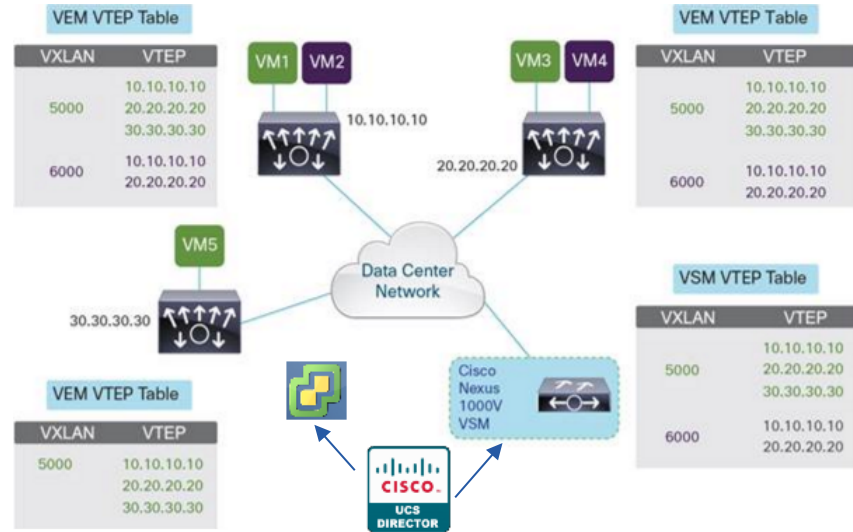
Use Case # 4

- Most common tasks to configure VxLAN on Nexus 1000v are demonstrated in this workflow.

- On Nexus 1000v, segmentation feature needs to be enabled, followed by configuring VTEP Port-Profile, VTEP VMKernel Interfaces, Bridge Domain and VXLAN Port-Profile for VMs

- For complete Nexus 1000v VxLAN configuration refer link: http://www.cisco.com/c/en/us/products/collateral/switches/nexus-1000v-switch-vmware-vsphere/guide_c07-702975.html#_Toc320841522

Start → Enable VxLAN Feature → Configure VTEP Port-Profile → Create VxLAN → Configure VM Port-Profile → Assign VxLAN to VM Port-Profile → Finish
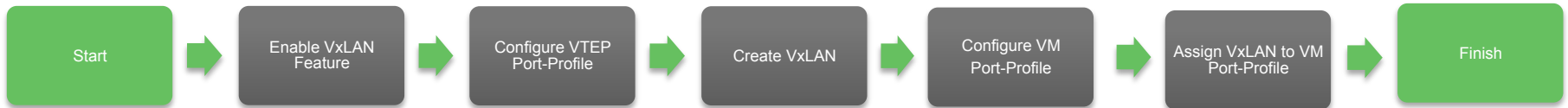
Use Case # 4

Execute the workflow and provide the requested user inputs…

Select Nexus 1000v

VTEP Port-Profile Name

VTEP VLAN

Bridge Domain

VxLAN ID

VM Port-Profile Name

VM VLAN

Executing Workflow: VSM_VXLAN

Workflow Version:

0 (default version) ⁂

Select Nexus 1000v   Select...   10.29.174.169 ⁂

Feature   Select...   segmentation ⁂

VTEP Port-Profile Name   UCSD_VTEP ⁂

VTEP VLAN   999 ⁂

Bridge Domain   UCSD ⁂

VxLAN ID   9999 ⁂

Multicast Address   239.99.99.99 ⁂

VM Port-Profile Name   UCSD_VM ⁂

VM VLAN   909 ⁂

Submit   Close

Enable VxLAN feature

Multicast IP

Use Case # 4

The actual workflow for this use case is as shown below:

Use Case # 4

Service Request completion and Nexus Verification

CISCO

TOMORROW *starts here.*