TOMORROW starts here.
Hybrid Clouds: Integrating the Enterprise Data Center and the Public Cloud

PSODCT-1009

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Session Abstract

In this session, participants will learn how to create hybrid clouds, tightly coupling enterprise data centers and applications with the public cloud. A hybrid cloud approach consists of seamless integration between an on-premises enterprise data center with a public cloud service provider. The seamless integration includes:

- Layer-2 networking connectivity between the enterprise data center and the public cloud for workload mobility
- A secure communication channel
- The deployment of security and application services in the public cloud
- Management features for hybrid cloud environment.

The Cisco hybrid cloud architecture is an extension of the Nexus 1000V virtual networking portfolio, now extended for cloud architectures.
Agenda

- NEXUS 1000V OVERVIEW
- HYBRID CLOUD TRENDS
- NEXUS 1000V INTERCLOUD ARCHITECTURE
- INSTALLATION WORKFLOW AND USE CASES
- DEMO
- NEXUS 1000V INTERCLOUD VISION
Virtual/Cloud Networking Vision

Nexus 1000V

- Multi-Hypervisor
- Multi-Services
- Multi-Cloud

VMware vSphere
Microsoft Hyper-V/Windows Server 2012
KVM
Xen Server

Firewall, WAN/App optimization, ADC,
Cloud Router, WAF, VM Segmentation

Private, Public, Hybrid, Community
Nexus 1000V Architecture

VSM: Virtual Supervisor Module
VEM: Virtual Ethernet Module
Hybrid Cloud Trends
Hybrid Cloud Use Cases

**Peak Workload**
- Bursting from private cloud to public cloud for peak workloads

**DevTest**
- DevTest Application across private and virtual private cloud

**Upgrade / Migration**
- Capacity during workload upgrade or migration

**Disaster Recovery**
- DR as a service for Enterprises to reduce DR complexity and cost
Hybrid Cloud Challenges

SECURITY: WORKLOAD SECURITY, CONNECTION SECURITY

TRANSPARENT MIGRATION BETWEEN ON-PREM AND CLOUD

REINVENTING IT – NEW TECHNIQUES FOR EVERY CLOUD

COMPLEX USE, LACK OF VISIBILITY AND FLEXIBILITY
Nexus 1000V InterCloud
Enterprise Apps and Network Services – on the Public Cloud

Centralized VM Migration and Management

Enterprise Cloud

Nexus 1000V InterCloud

Provider Cloud

ENTERPRISE VISIBILITY

ENTERPRISE CONTROL

ENTERPRISE SECURITY

PROVIDER RESOURCES

PROVIDER EASE OF BUSINESS

PROVIDER VALUE

Firewalls IDS
Optimization
Routing
L2 Services
Nexus 1000V InterCloud
Enterprise Apps and Network Services – on the Public Cloud

- All data in motion is cryptographically *isolated* and *encrypted*
  - Enterprise to Cloud & VM to VM within Cloud
- Enterprise owns the keys
Central Management with Prime Network Services Controller
InterCloud + Cisco Intelligent Automation for Cloud

User requests cloud services via end-user portal

Cisco Cloud Portal

Orchestrator manages workflow across multiple cloud environments

Cisco Process Orchestrator

(Integration via Northbound API)

(Workloads moved via InterCloud)

Cisco Prime Network Services Controller (MANAGEMENT LAYER)

Policy manager
Resource manager
Service registry
VM Manager
Cloud Provider Manager

Nexus 1000V (Platform layer)

Private Cloud

Public Cloud

VM
N1KV Switching
Firewall, Routing
Crypto Secure

Tenant B
Architecture
InterCloud Virtual Switch
Switch extended from enterprise to cloud

- Secure L2 extension
- Secure virtual switch in cloud
Cisco Prime Network Services Controller
Single point of Management for InterCloud

- Register with Cloud Providers
- Interface with VM Management Tools
- Clone/Move VMs in VPC with secure wrapper
- Web Interface and support for 3rd party integration
Cloud VM Trust Mechanism

1. Generate and store SSH key pair for each VPC.

2. SSH public key passed as part of creating VM along with SSH username.

3. SSH public key downloaded as part of VM startup and made as authorized key for SSH user.

HTTPS/XML API
HTTP/HTTPS
SSH/SCP

Enterprise Datacenter

Cloud Datacenter

Intercloud Extender

Intercloud Switch

VPC

VM

IC Agent

S2S Data Tunnel
Access Data Tunnel

Cloud Provider

VSM

Cisco Prime Network Services Controller

SSH public key passed as part of creating VM along with SSH username
Tunnel Key Management

1. S2S Tunnel Profile: Control Channel Key
2. S2S and Access Tunnel Profile:
   - Control Channel Key
   - Data Tunnel Encryption Key
   - Data Tunnel Hash Key
3. Rekey: Data Tunnel Encryption and Hash Key

Encryption algorithm – AES-128-GCM, AES-128-CBC, AES-256-GCM (Suite B), AES-256-CBC

Hashing algorithm – SHA-1, SHA-256, SHA-384

HTTPS/XML API
SCP
Deployment Requirements

- Ensuring Cisco Prime Network Controller and InterCloud Extender can access internet through a NAT device (e.g. firewall, router) so they can connect to a cloud resources.
- Need to punch a hole in enterprise and/or provider’s firewall to allow inbound and outbound UDP port TPORT traffic for DTLS
- Need to acquire an admin/user account for accessing enterprise vCenter and resources
- Need provider account credentials for accessing provider resources
- If Nexus 1000V is used in the enterprise port profiles need to be manually copied from VSM to InterCloud VSM
Installation Workflow and Use Cases
Nexus 1000V InterCloud Components

Enterprise Datacenter

- VSM
- InterCloud Extender
- Enterprise Virtual Switch
- VM Manager

Cloud Datacenter

- Cloud API Interface
- InterCloud Switch
- Cloud VMs
- Secure Tunnels
Nexus 1000V InterCloud Components

- **Cisco Prime Network Services Controller** – Deployed as a Virtual Machine and provides a single pane of glass to manage enterprise and cloud data centers

- **InterCloud VSM** – Nexus 1000V Virtual Supervisor Module provides the control-plane to manage port-profiles for VMs in the InterCloud infrastructure

- **InterCloud Extender** – Virtual Machine in enterprise data center to provide secure connectivity to the InterCloud Switch in provider cloud. InterCloud Extender is registered as a module on the InterCloud VSM

- **InterCloud Switch** – Virtual Machine in provider data center, has secure connectivity to the InterCloud Extender in enterprise cloud and secure connectivity to the Virtual Machines in the provider cloud. InterCloud Switch is registered as a module on the InterCloud VSM.

- **Cloud Virtual Machines** – Virtual Machines in provider data center to run customer workloads with an automatically installed InterCloud Agent
Nexus 1000V InterCloud Installation Steps

1) Install Cisco Prime Network Services Controller
2) Add VM Manager
3) Install InterCloud VSM
4) Register InterCloud VSM

Note:
• InterCloud VSM can only be installed as a VM (not supported on 1110)
Nexus 1000V InterCloud Infrastructure Setup

1) Create Provider Account
2) Upload Infrastructure Images
3) Configure port-profiles in InterCloud VSM
4) Extend Network to Cloud
Infrastructure Setup Step 1: Add Provider

- Provide a name for the provider. Currently only Amazon is supported as a provider.
Infrastructure Setup Step 2: Upload InterCloud Infrastructure Images

- InterCloud Extender is a VM in the enterprise data center
- InterCloud Switch is a VM in the provider cloud
- InterCloud Switch image has to be in AMI format
Infrastructure Setup Step 4: Create port-profiles

- Uplink port-profile – Trunk port allowing all VLANs that are being extended.

```plaintext
port-profile type vethernet N1K_Cloud_Default_Trunk
switchport mode trunk
switchport trunk allowed vlan 51-60,252
no shutdown
publish port-profile
max-ports 64
system vlan 252
state enabled
```

* Management VLAN for InterCloud Switch needs to be a system VLAN
Infrastructure Setup Step 4: Create port-profiles

- vEthernet port-profile for Virtual Machines that will be migrated to the public cloud

```
port-profile type vethernet Cloud-VM-55
  switchport mode access
  switchport access vlan 55
  no shutdown
  state enabled
```

- vEthernet port-profile for InterCloud Switch management interface

```
port-profile type vethernet ICS-Mgmt
  switchport mode access
  switchport access vlan 252
  no shutdown
  system vlan 252
  state enabled
```

* Management VLAN for InterCloud Switch needs to be a system VLAN
Infrastructure Setup Step 5: Extend Network to Cloud

- To create a VPC click on “Extend Network to Cloud”
Use Case 1 – VM Migration

1) Upload ICA image for VM

2) Select VM and click “Migrate VM to Cloud”

3) Edit Virtual Machine properties – set the port-profile to use for the cloud VM.

4) Review the summary and click Finish to migrate the VM to the cloud
Use Case 2 – Create VM from Template

1) Upload VM template – Support for AMI, ISO and OVA

2) Select the uploaded template and click on Create Template in Cloud

3) Instantiate VM from the uploaded template

4) Customize VM port-profile and other attributes
Demo
Nexus 1000V InterCloud Vision
Virtual Services with Nexus 1000V InterCloud

ENTERPRISE CLOUD

Cisco Prime Network Services Controller

Nexus1000V vPath

VM VM

N1KV InterCloud

PROVIDER CLOUDS

L2 Virtual Private Cloud

InterCloud Switch vPath

VM VM

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Cisco Public
N1KV InterCloud + CSR 1000V
Direct Access to VPC Workloads from Branch/Remote Offices

InterCloud extends and secures L2 subnets into public clouds

CSR provides access into the secure InterCloud network
VPN for branch and remote users
Inbound and outbound direct Internet access for cloud applications
Routing and services within InterCloud network
N1KV InterCloud Vision

ENTERPRISE CLOUD

PROVIDER CLOUD #1

PROVIDER CLOUD #2
Additional Information

N1KV InterCloud:
www.cisco.com/go/intercloud

World of Solutions:
Live Demo in Booth # 6

Related Cisco Live Sessions:
BRKVIR-2023 - Cisco Nexus 1000V InterCloud based Hybrid Cloud Architectures and Approaches
BRKVIR-2011 - Deploying Services in a Virtualized Environment
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