

The background features a vibrant, abstract design with a color gradient from dark blue on the left to bright yellow and white on the right. The design consists of overlapping, wavy horizontal bands and a radial pattern of lines emanating from a bright white point on the right side, creating a sense of motion and energy.

CISCO *Live!*

Let's go



The bridge to possible

Revolutionize Your Network Management with Cisco Catalyst Center

Physical or Virtual on AWS or VMware ESXi

Shai Silberman, Product Manager

Prabhjit Singh Bagga, Technical Marketing Engineer, Tech Lead



<http://cs.co/catalyst-center-youtube>

BRKOPS-2521

Agenda

- How do I manage my complex, hybrid networks with Catalyst Center?
- Is there any new Catalyst Center Physical Appliance?
- How do I easily deploy Catalyst Center on AWS and ESXi?
- How do I secure and manage my deployments on AWS and ESXi?
- How does HA work with Catalyst Center on AWS and ESXi?
- How do I migrate from Physical Appliance to Catalyst Center on AWS?
- How do I backup my Catalyst Center and restore if needed?

About Shai..

20+ years of industry experience

- Catalyst Center Product Manager
- Previously, I was a customer
- EX-Cisco Champion
- MBA+MSSE
- Lecturer @SJSU

Two truths and a lie

- Was a DJ
- I am a twin
- Coached football (not the American one)



About Prabhjit..

12+ Years with Cisco

- 3+ Years in TAC
- 3+ Years in Solution Testing (4G/LTE, VoLTE)
- 3+ Years as Cloud Engineer
- 5+ Years as a TME in SDA and Catalyst Center

Two truths and a lie

- I started school when I was 2 years old
- I can ride a scooter with 5 people on it
-



Catalyst Center adoption continues to grow

11K Devices added per day in last 12 months

12M Network Devices Managed
 **50% Y/Y**
8M APs | 3M Switches | 200k Routers | 89k WLCs

31k Monthly Active Users
 **25% Y/Y**
includes 72% of Fortune 100!



200 Million
Unique Monthly Clients



Population of Brazil
203 Million 2.5% of global population



6 Billion
Network Events analyzed weekly
with AI Network Analytics

Nearly 10 million events per
second



2 Billion
API Calls performed annually
by customers

Nearly 64 calls per second

Virtual Appliance (VA) Accomplishments



Catalyst Center on AWS

Active Deployments

75

Total Devices

10,406

Total Clients

65,753

Total Wireless

WLC: 213
AP: 7667



Catalyst Center on ESXi

Active Deployments

130

Total Devices

19,440

Total Clients

139,279

Total Wireless

WLC: 265
AP: 13,361

Catalyst Center Options

Catalyst Center Virtual Appliances

The new cool kids on the block!

No cost for software (\$0 PID)

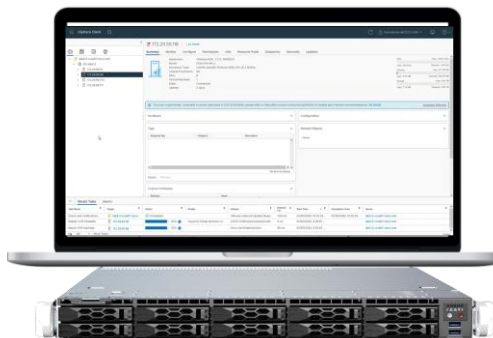
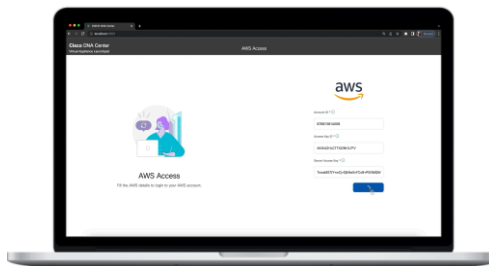
Optional support can be purchased

Quicker time to value

Deploy in 90 min

Scale parity with DN2-HW-APL(44 core appliance):

- 25,000 End points
- 1,000 switches
- 4,000 access points
- 1,500 sites
- Clustering instances not supported



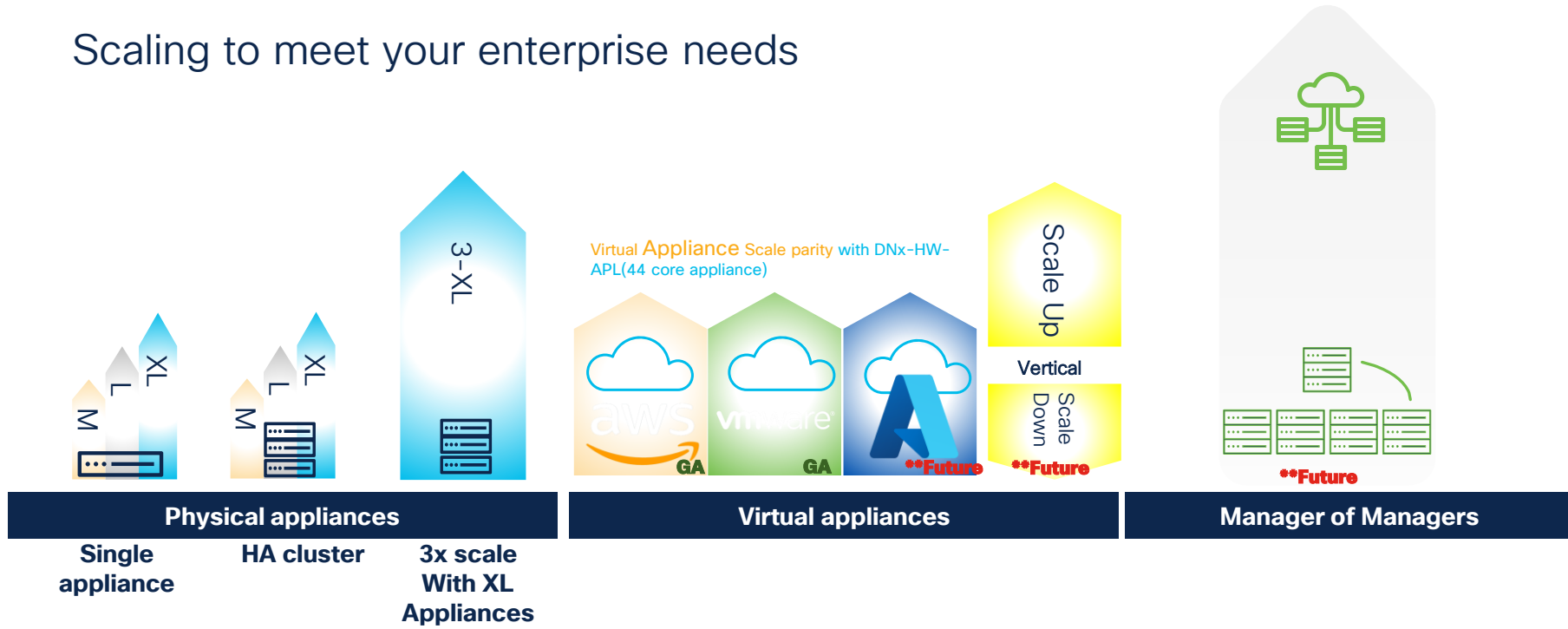
- Supported Worldwide
15 AWS regions supported;
with more coming!
- Take advantage of your EDP



- Customer-supplied on-premises server
- Customer-supplied VMware license
- VM Requirement:
32vCPU, 256GB Ram, 3TB Storage
*Check datasheet for additional requirements

Catalyst Center operational evolution

Scaling to meet your enterprise needs



Catalyst Center platform system scale

As of 2.3.7.x

| Description | Medium appliance DN2-HW-APL | Large appliance DN2-HW-APL-L | Extra large appliance DN2-HW-APL-XL | 3 XL cluster | Virtual appliance |
|------------------------------|--------------------------------|---------------------------------|--|--------------|-------------------|
| Endpoints (concurrent) | 25,000 | 40,000 | 100,000 | 300,000 | 25,000 |
| Network devices | 5,000 | 8,000 | 25,000 | 35,000 | 5,000 |
| APs | 4,000 | 6,000 | 13,000 | 25,000 | 4,000 |
| Sites | 1,500 | 5,000 | 10,000 | 10,000 | 1,500 |
| Access control policies | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| Access contracts | 500 | 500 | 500 | 500 | 500 |
| Per fabric site scale | | | | | |
| Fabric nodes | 500 | 600 | 1,200 | 1,200 | 500 |
| VNs | 64 | 128 | 256 | 256 | 64 |
| IP pools | 100 | 300 | 1,000 | 1,000 | 100 |

← Latency between DNAC to device: 200ms (RTT) →

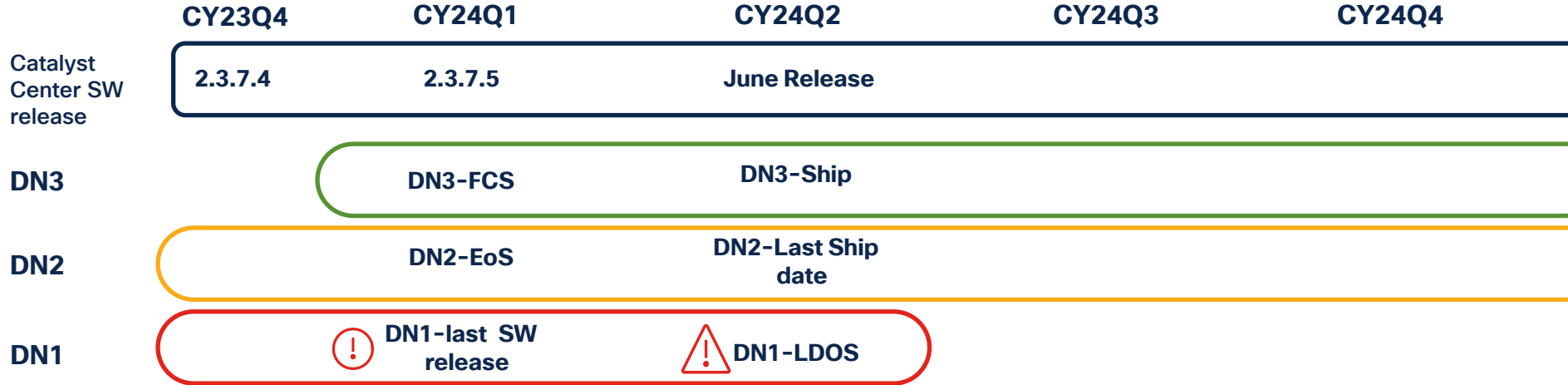
Appliance Licensing and Support Requirements

| | Physical | ESXi | AWS |
|--------------------------|-----------|-------------|-------------|
| Appliance License | Perpetual | Perpetual | perpetual |
| Support | Term | Term | Term |
| SNTC Support Requirement | Mandatory | Recommended | Recommended |

- Subscription Licenses are only attached to network devices (Switch, Router, AP, WLC) and cover feature support on Catalyst Center. (PnP, Swim, Assurance...)
- Support for Physical appliances (SNTC) is mandatory at the time of purchase
- Support for VA appliances (SNTC) is recommended at the time of purchase (Infra Support)

Physical Appliance

Appliance Roadmap and Migration



DN2/DN3 appliance comparison



DN2-HW-APL (44C) ~1KW 1,236.10BTU/hr

- i6238 2x22C @2.1/3.7Ghz, 2x140W, 256G RAM



DN3-HW-APL (32C) ~1.1KW 1,428.31 BTU/hr

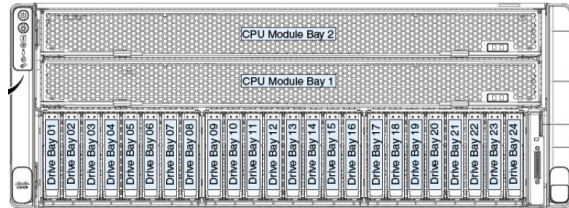
- i6326 2x16C @2.8/4Ghz, 2x185W, 256G RAM

DN2-HW-APL-L (56C) ~1.2KW 1,485.35BTU/hr

- i8280 2x28C@2.7/4Ghz, 2x205W, 384 RAM

DN3-HW_APL-L (56C) ~1.3KW 2,159.40 BTU/hr

- i6348 2x28C@2.7/4Ghz, 2x235W, 384G RAM



DN2-HW-APL-XL(112C) ~2KW 2,573.32 BTU/hr

- i8276 4x 28C@2.2/4Ghz, 4x165W, 768G RAM



2U



DN3-HW-APL-XL (80C) ~1.9KW 2,107.36BTU/hr

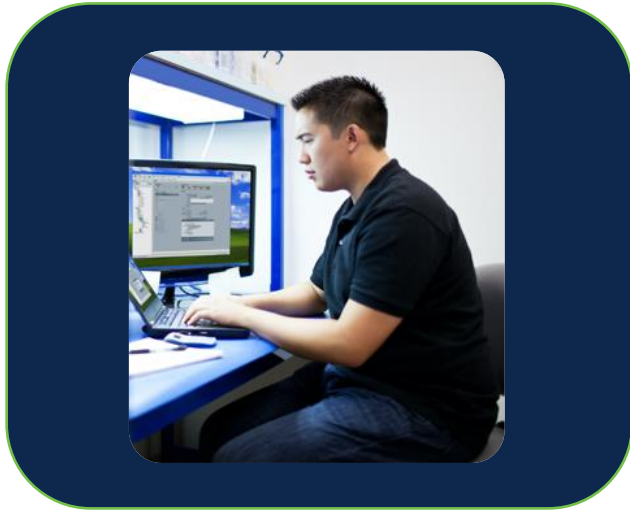
- i8380 2x40C @2.3/4Ghz, 2x270W, 768G RAM

Note: There is no scale difference between DN2 & DN3 appliances

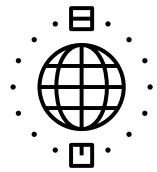
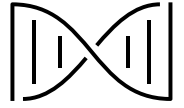
Power, BTU and space savings

Deployment Steps

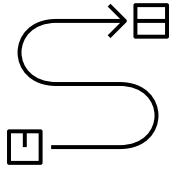
Bring-up Cisco Catalyst Center On-premises



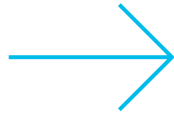
Order and Wait for the Lead Time



Order



Supply
Chain



Shipping



Datacenter



DCOps

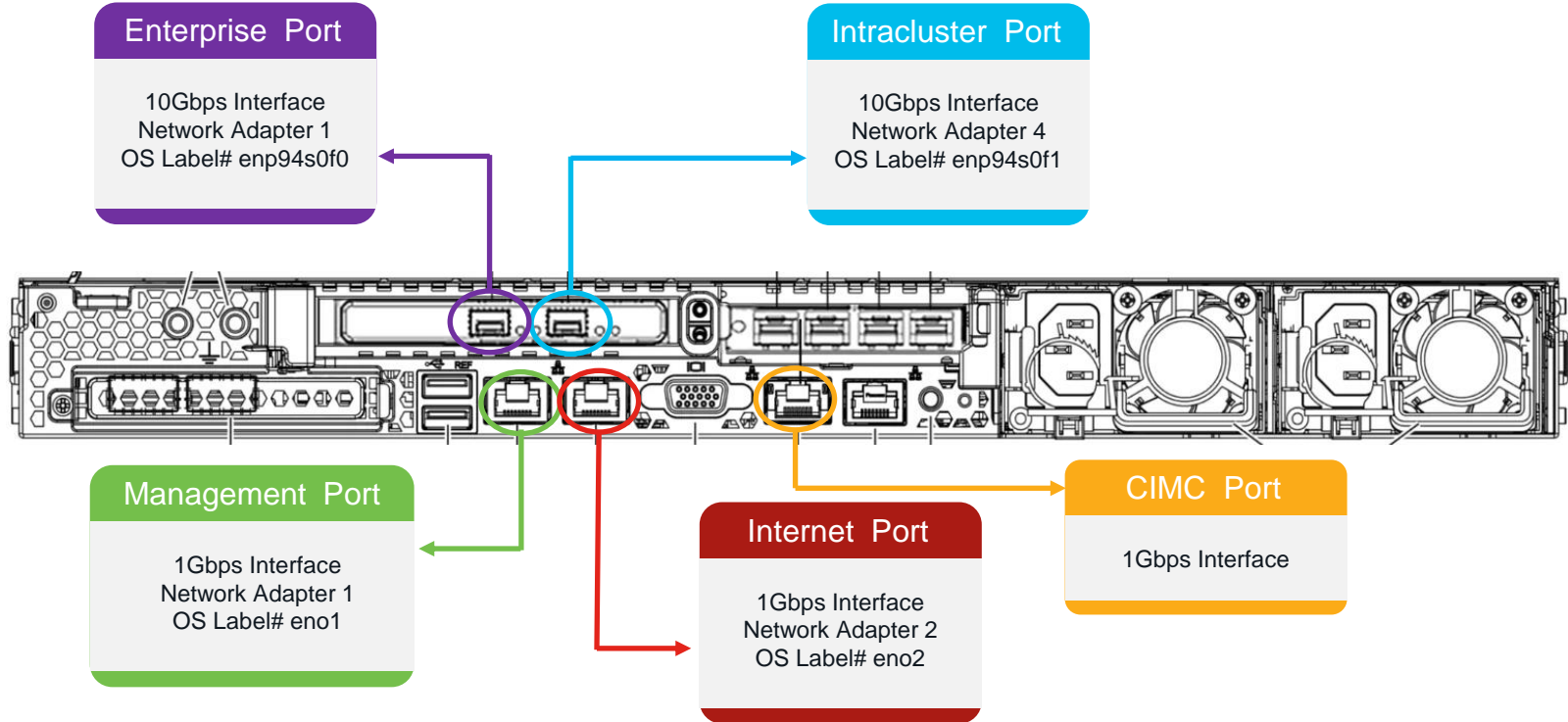


IT/NetOps

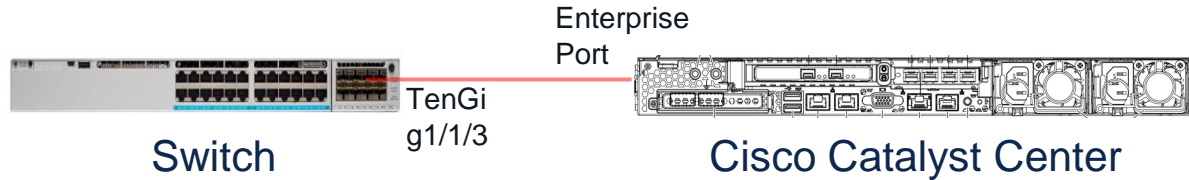


Lab Admin

Rack/Stack/Cable



Switch Configuration for Cisco Catalyst Center



```
dist-dc-01#config terminal
dist-dc-01(config)#interface tenGigabitEthernet 1/1/3
dist-dc-01(config-if)#switchport mode access
dist-dc-01(config-if)#switchport access vlan 99
dist-dc-01(config-if)#speed auto
dist-dc-01(config-if)#duplex full
dist-dc-01(config-if)#mtu 1500
dist-dc-01(config-if)#no shut
dist-dc-01(config-if)#end
dist-dc-01#copy running-config startup-config
```

Access VLAN

Speed Auto

Duplex Full

MTU 1500

Maglev Config Wizard Steps

STEP #3

The wizard has discovered 4 physical network adapter(s) installed on the appliance.
Enter the network settings for the 1st network adapter - (40:a6:b7:37:ff:fc - 10G - enterprise network).
Recommended use: enterprise network
Phy Interfaces: enp94a0f0
Remove all NFS mount before network changes

NETWORK ADAPTER #1 (enterprise)

Host IPv4 Address:
10.4.48.66
IPv4 Netmask:
255.255.255.0
Default Gateway IPv4 Address:
IPv4 DNS Servers:
172.29.59.1
IPv4 Static Routes:
10.4.0.0/255.254.0.0/10.4.48.1
LACP Mode

STEP #4

(Optional) Enter the network settings for the 2nd network adapter - (40:a6:b7:37:ff:fd - 10G - intra-cluster link).
Recommended use: intra-cluster link
Change of 'Cluster Link' IP Address and Netmask is not supported.
Phy Interfaces: enp94a0f1
Remove all NFS mount before network changes

OPTIONAL - NETWORK ADAPTER #2 (cluster)

Host IPv4 Address:
169.254.0.66
IPv4 Netmask:
255.255.255.128
Default Gateway IPv4 Address:
IPv4 DNS Servers:
IPv4 Static Routes:
LACP Mode

STEP #5

Specify a new password for the 'maglev' user.
Please use SHIFT for capitalization, using CAPS LOCK may result in inconsistent password.
* Indicates a mandatory field.
Password generation is optional, but recommended.
User is advised to append personal password with generated password for recommended security.
Caution: Remember generated password for future log ins.

USER ACCOUNT SETTINGS

Linux Password: *

Re-enter Linux Password: *

Password Generation Seed:
< Generate Password >
Auto Generated Password:
< Use Generated Password >

STEP #6

Cluster's hostname is the FQDN identifier of the Cluster.
Virtual IP address(es) is a list of IP(s) through which the Cluster's Management, Enterprise Interfaces can be accessible.
Note that these are different from node's individual IP.

MAGLEV CLUSTER DETAILS

Cluster Virtual IP Address(s):
0 Space separated list of virtual IPs, one for each configured network interface

STEP #7

(Optional) Enter the network settings for the 3rd network adapter - (40:8b:06:44:04:a2 - 10G - management network).
Recommended use: management network
Phy Interfaces: enp1
Remove all NFS mount before network changes

OPTIONAL - NETWORK ADAPTER #3 (management)

Host IPv4 Address:
172.29.59.66
IPv4 Netmask:
255.255.254.0
Default Gateway IPv4 Address:
172.29.59.1
IPv4 DNS Servers:
172.29.151.10
IPv4 Static Routes:

Catalyst Center Virtual Appliance (VA) on ESXi

- Why Deploy on ESXi
- Modes of Deployment
- Demo

Why Deploy Catalyst Center on ESXi



Operational flexibility and choice for customers



No additional CAPEX associated w/ physical appliance



Quicker time to value from weeks to 2 hours




Using AWS and VMware's native HA functionality



Drive Sustainability

Specifications, Features, and Scale

| | Specifications of DNAC VM | Specifications of Server | Device Scale |
|--|---|--|---|
|  Catalyst Center (CC) VA on ESXi | <ul style="list-style-type: none">• Type: OVA• CPU: 32vCPU• Mem: 256GB• Storage: 3TB• Storage Bandwidth: 180Mbps (Bi-directional)• IOPS: 2000-2500 | <ul style="list-style-type: none">• vCenter and ESXi: 7.0.x• Intel CPU 2.1Ghz and above• Hyperthreading enabled• RAM: 256 GB for VA• RAID: Any as long as bandwidth and IOPS | <ul style="list-style-type: none">• 25K End-points• 1K Devices• 4K APs• 2500 site elements |

Note: Make sure to reserve additional 8GB RAM for ESXi

Things to Consider When Planning your Deployment

Ease of Deploying

Resources on ESXi

HA with DRS

Headless Install of
Catalyst Center

Multiple Catalyst
Centers

Am I going to be fired for this?

How many of you
Bring up/Manage
VMware and ESXi
environment by
yourself?

Show of Hands



Two Methods

Manual Mode
Deploy OVA on ESXi or
vCenter

1

Download OVA

2

Deploy using OVF Template

3

Configure using Maglev
Wizard

Auto Mode
Cisco Launcher App

1

Download OVA and
Launcher Script

2

Verification of Resources

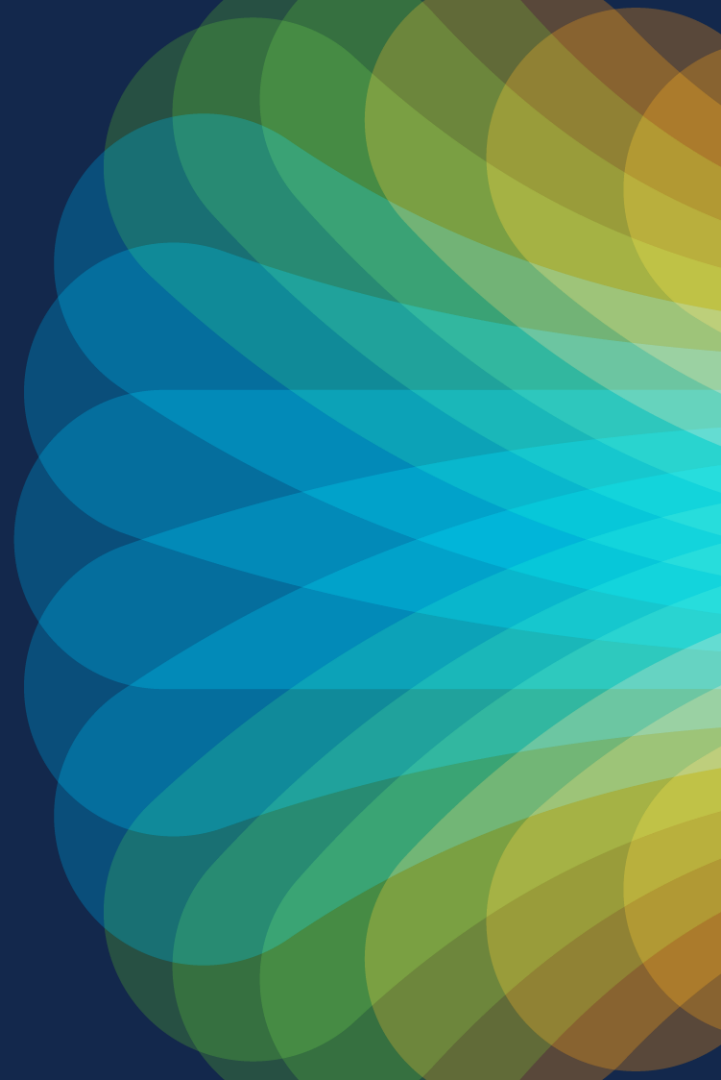
3

Headless Install

4

Deploy on multiple ESXi
Hosts

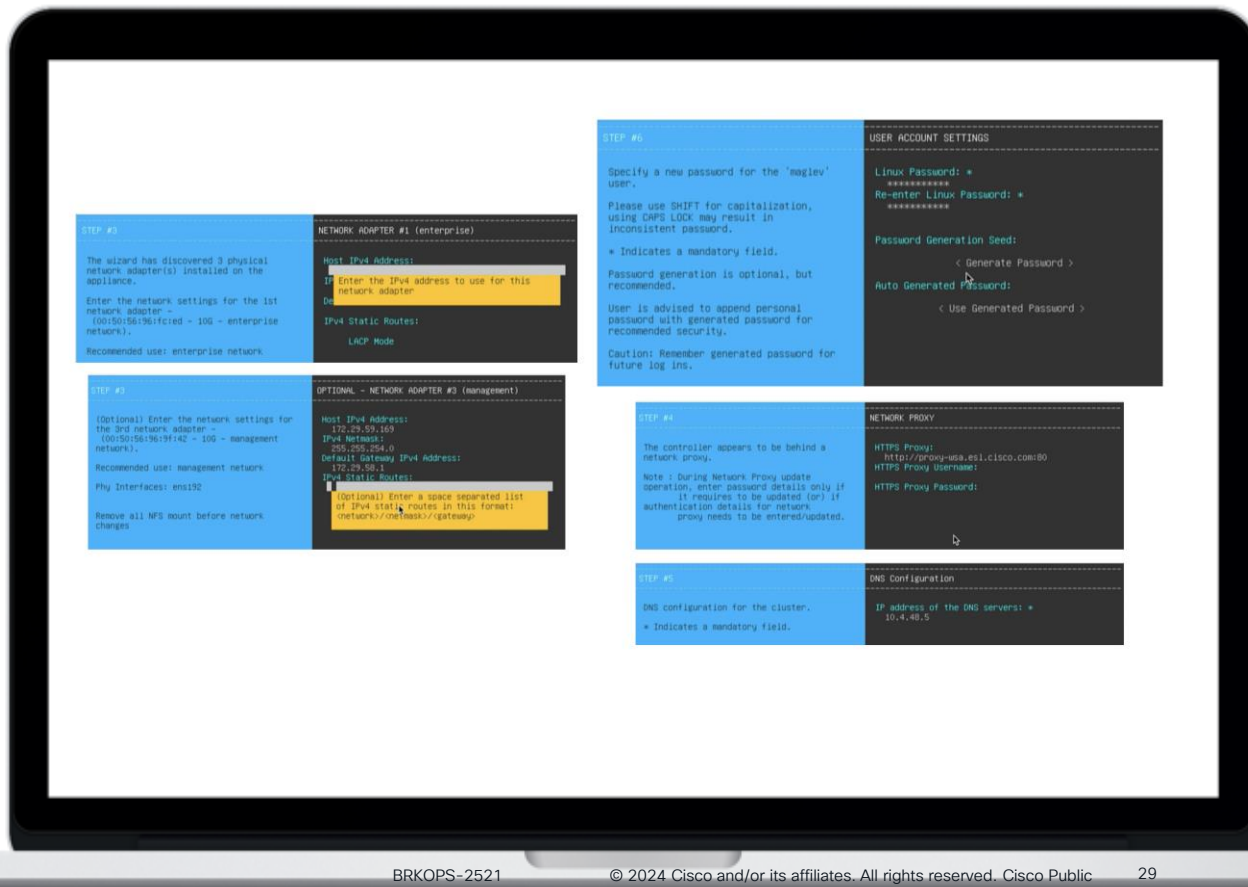
Auto Mode Cisco Launcher App



Why do I need Launcher App?

Verification of ESXi Resources

Headless Install

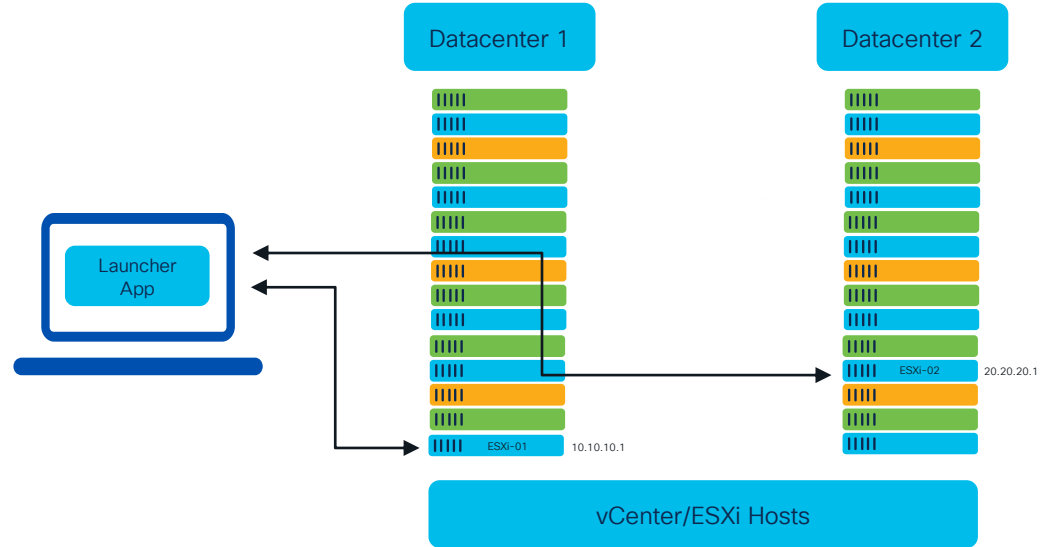


Why do I need Launcher App?

Verification of ESXi Resources

Headless Install

Central Location to Deploy multiple Catalyst Centers



Pre-requisites to Auto Mode using Cisco Launcher

| | VMware | Launcher App |
|--|--------|--------------|
| Download OVA and Launcher App from Cisco.com | ✓ | |
| vCenter or ESXi | ✓ | |
| Create one or two networks (optional) for Catalyst Center | ✓ | |
| Create Resources – 32 vCPU, 256GB RAM, 3TB Storage | ✓ | |
| Decide to use Thick or Thin Provisioning | ✓ | |
| Note IP Address of vCenter or ESXi to configure config.json file | | ✓ |
| Note IP Address for Catalyst Center, NTP IP, DNS IP | | ✓ |
| Note Proxy IP/URL to configure config.json file | | ✓ |

How does Launcher work?

Download Launcher Script on Linux, Windows, or Mac

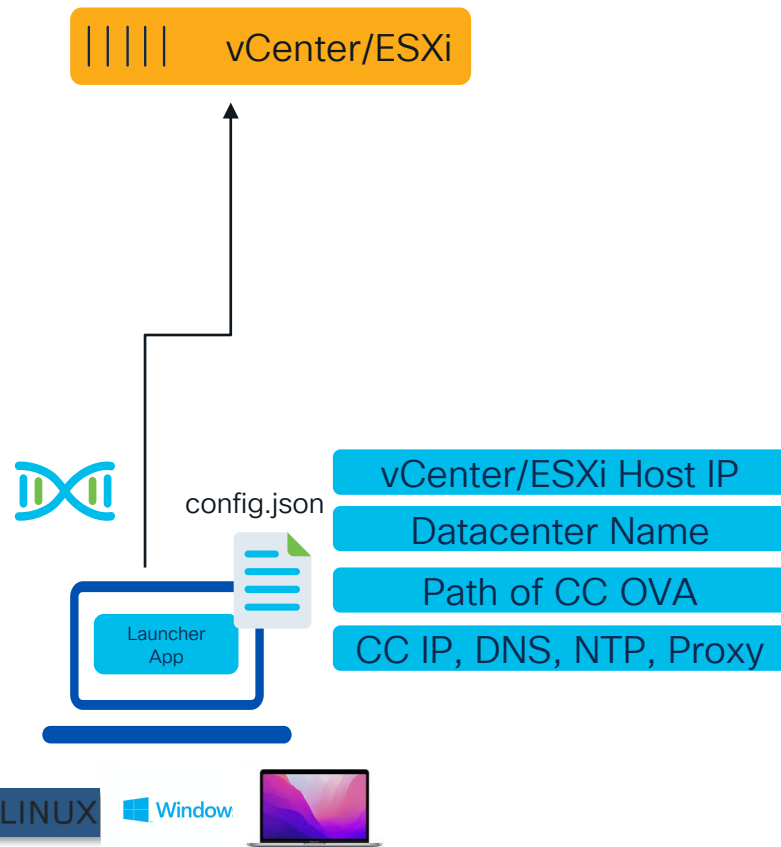
Configure json file

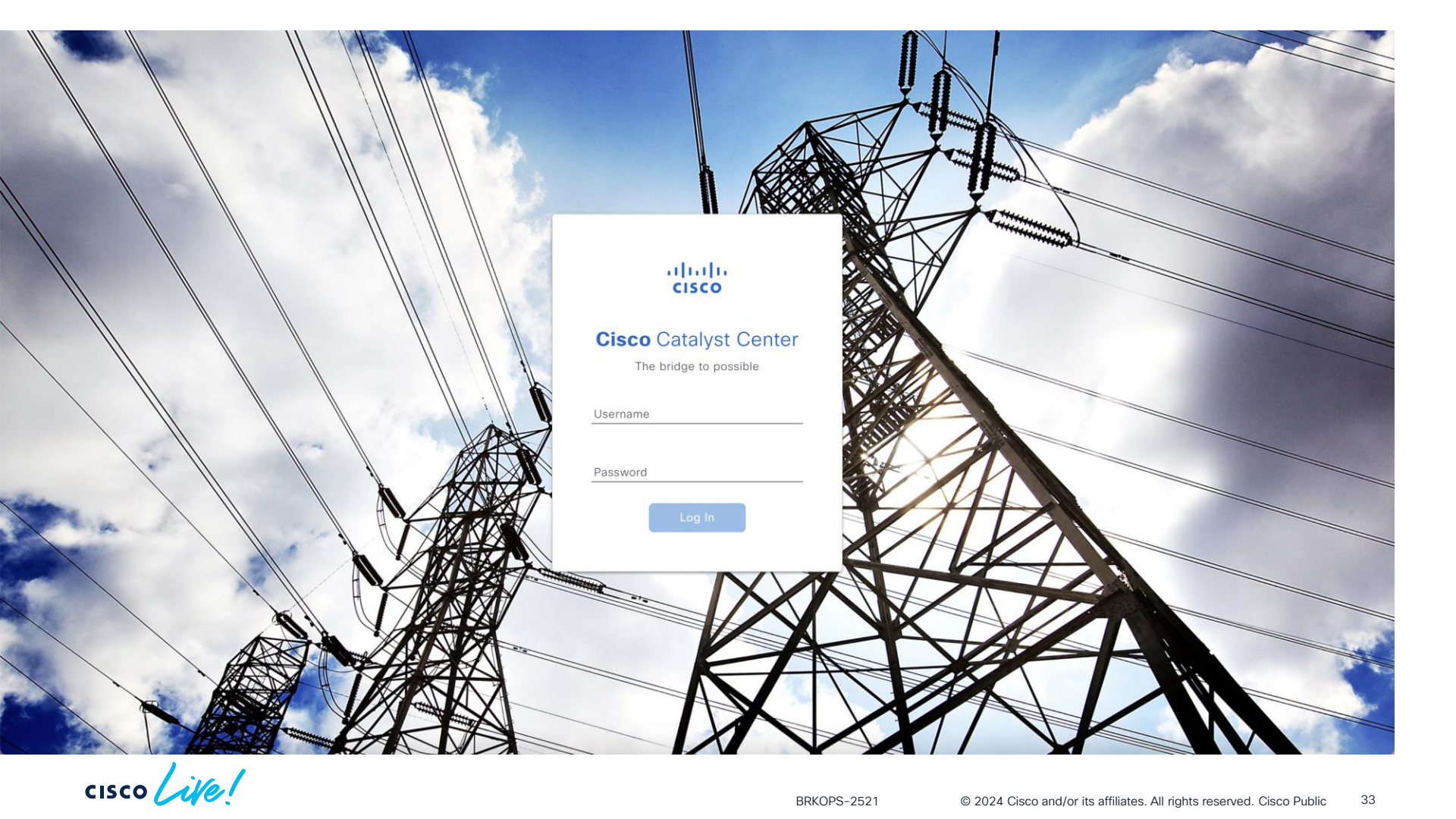
vCenter/ESXi Host IP, Datacenter Name, Datastore Name, Cluster Name

Path of Catalyst Center OVA

Catalyst Center IP, DNS IP, NTP IP, Proxy IP/URL

Deploy OVA and Headless Install of Catalyst Center





Cisco Catalyst Center

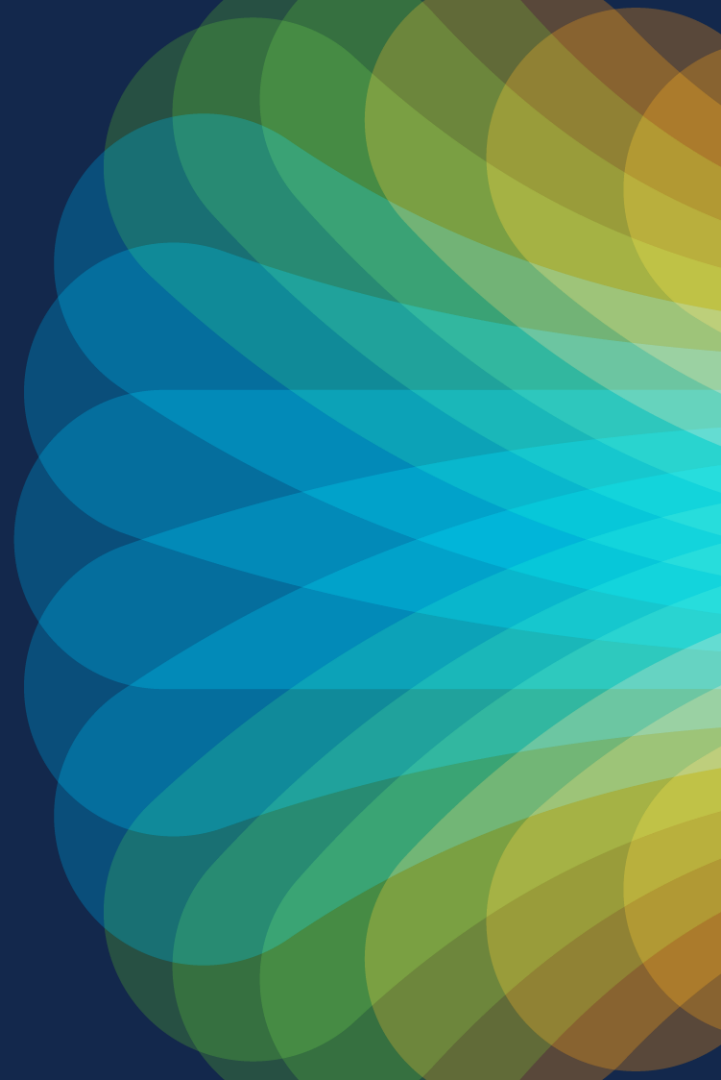
The bridge to possible

Username

Password

Log In

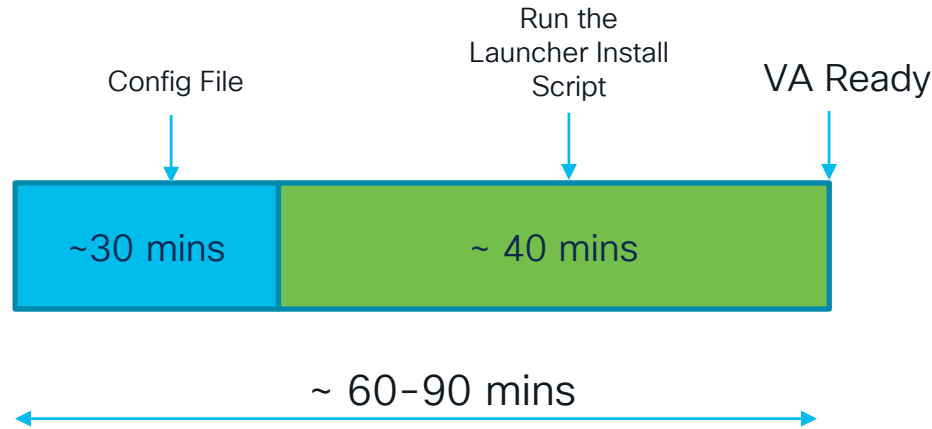
Demo Launcher App





```
dnac@demo-vm:~/test_build$  
dnac@demo-vm:~/test_build$  
dnac@demo-vm:~/test_build$  
dnac@demo-vm:~/test_build$  
dnac@demo-vm:~/test_build$ ls  
LICENSE  config.json  config_template.json  dnac-esxi-launcher  dnac-esxi-launcher-linux-v0.9.1003.tar  log_config.json  
dnac@demo-vm:~/test_build$
```

Time Estimate for Auto Mode Deployment

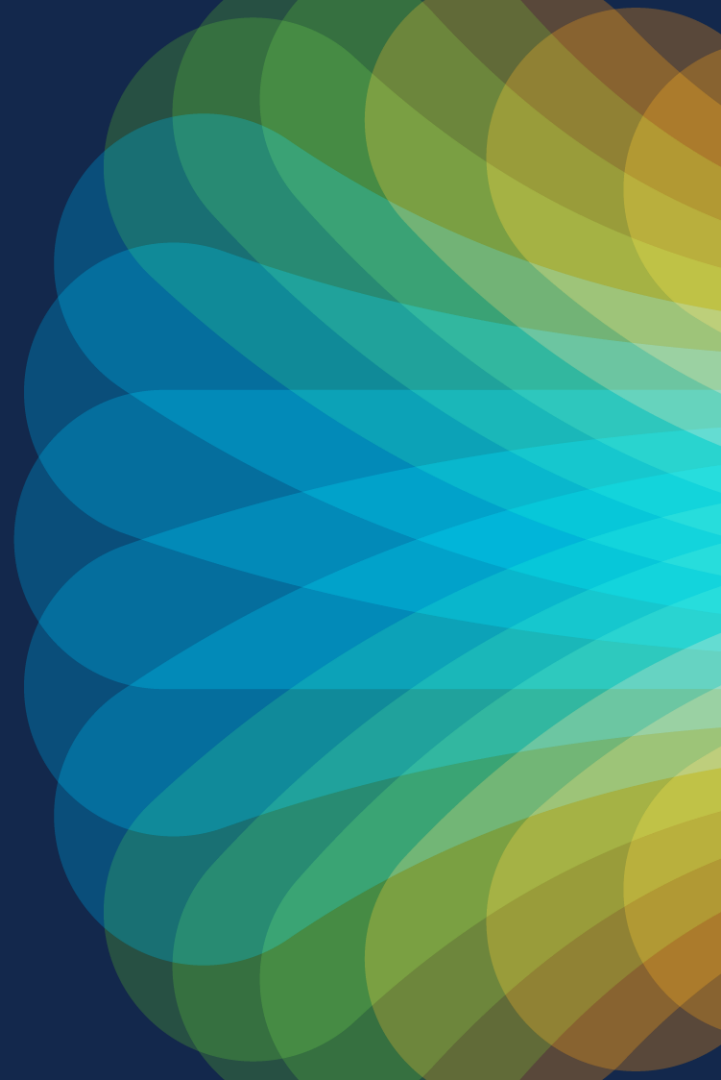


Note: Values are approximate and may vary due to factors like network speed, EXSi resources, and connectivity

Pre-requisites to Deploy using Manual Mode

| | VMware | Catalyst Center |
|---|--------|-----------------|
| Download OVA from Cisco.com | ✓ | |
| vCenter or ESXi | ✓ | |
| Create one or two networks (optional) for Catalyst Center | ✓ | |
| Resources – 32 vCPU, 256GB RAM, 3TB Storage | ✓ | |
| Decide to use Thick or Thick Provisioning | ✓ | |
| Reserve IP Address for Catalyst Center | | ✓ |
| Note DNS IP Address, NTP IP Address, Proxy IP Address/URL | | ✓ |
| Catalyst Center CLI Maglev Password | | ✓ |

Demo Manual Mode



Getting Started

LAUNCH VSPHERE CLIENT (HTML5)

Documentation

VMware vSphere Documentation Center

For Administrators

Web-Based Datastore Browser

Use your web browser to find and download files (for example, virtual machine and virtual disk files).

[Browse datastores in the vSphere inventory](#)

For Developers

vSphere Web Services SDK

Learn about our latest SDKs, Toolkits, and APIs for managing VMware ESXi and VMware vCenter. Get sample code, reference documentation, participate in our Forum Discussions, and view our latest Sessions and Webinars.

[Learn more about the Web Services SDK](#)

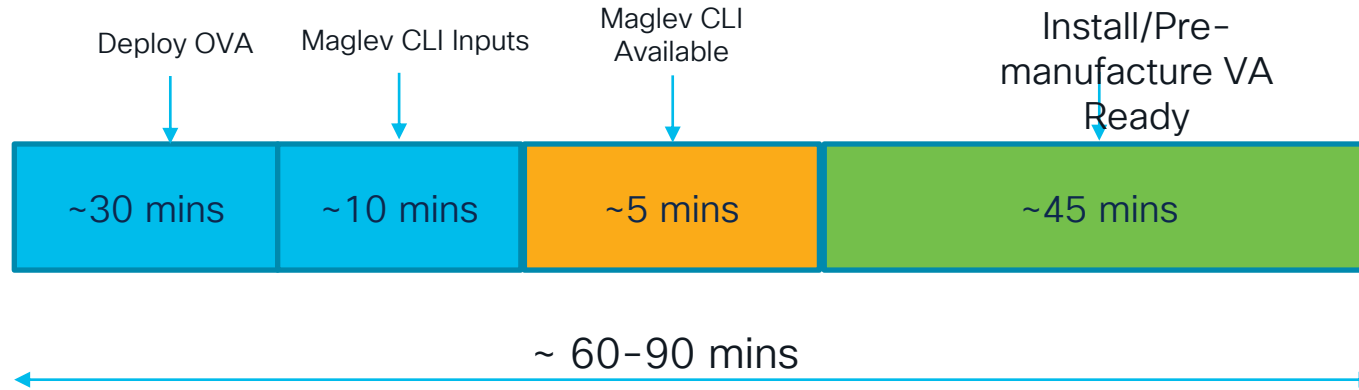
[Browse objects managed by vSphere](#)

[Browse vSphere REST APIs](#)

[Download trusted root CA certificates](#)



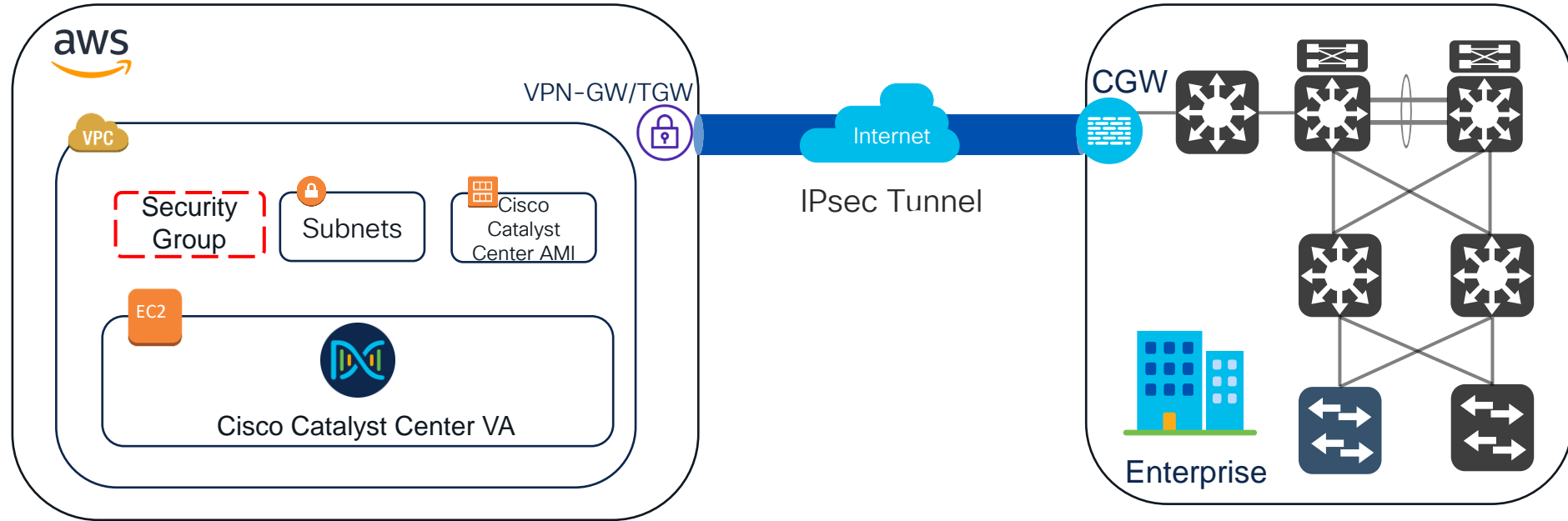
Time Estimate for Manual Mode Deployment



Note: Values are approximate and may vary due to factors like network speed, EXSi resources, and connectivity

Catalyst Center on AWS

Deployment Overview



Deploy Anywhere in the World* - GeoDiversity



- Available
- Coming Soon

Driving sustainability



GO GREEN WITH AWS: CLOUD SUSTAINABILITY

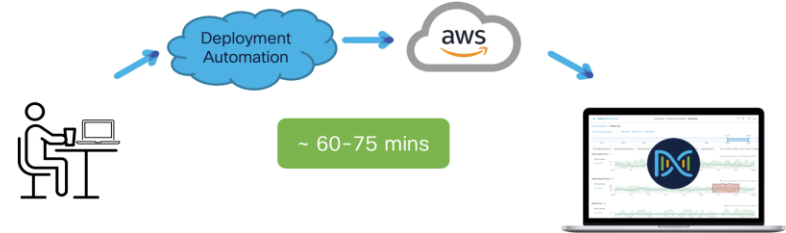


Virtualization has long been recognized as a more sustainable method to run applications

High Availability Using AWS's Native Features

Infrastructure availability from 99% to 99.99%.

Quicker Time to Value (Agility)



How many of you
Bring up/Manage AWS
environment by
yourself?

Show of Hands



Things to Consider When Planning your Deployment

Ease of Deploying

Security

Single Pane of Glass

Observability

Serviceability

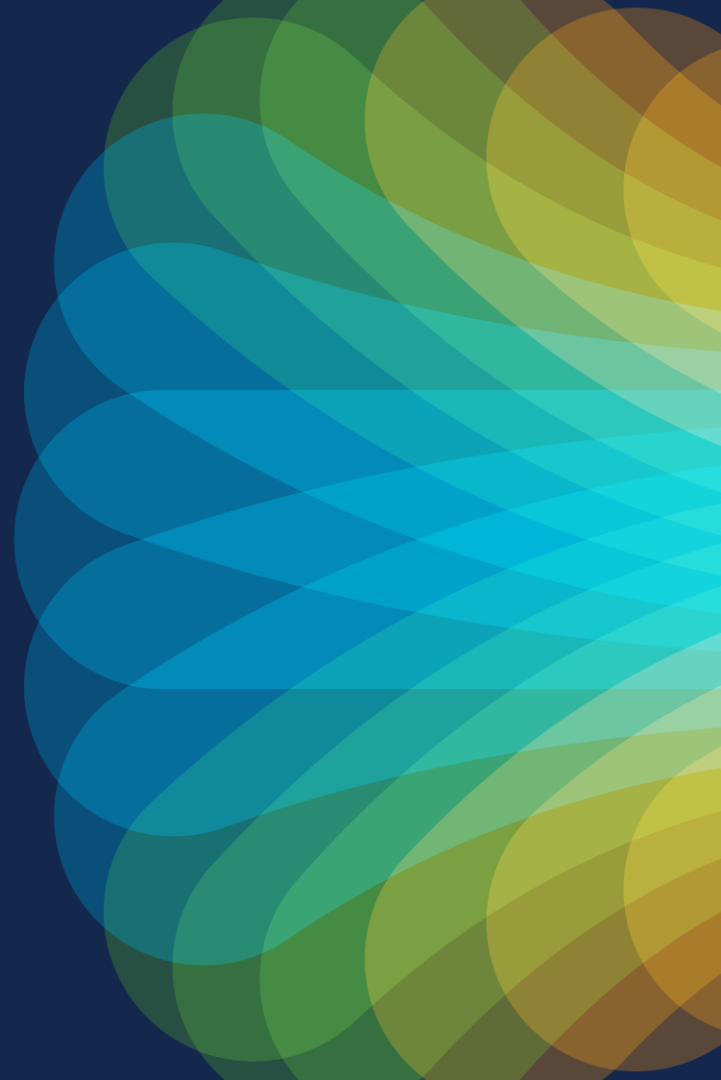
Three Modes to Deploy CC VA on AWS

Auto Mode
(Cisco Launchpad
App)

Manual Mode
(CloudFormation
Template)

Manual Mode
(AWS
Marketplace)

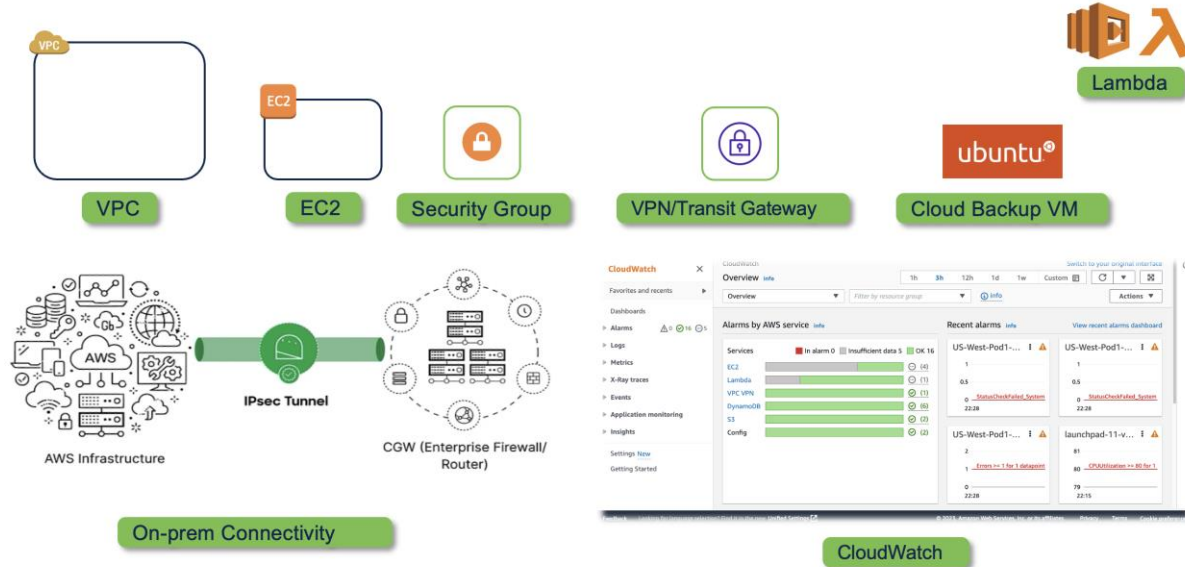
Auto Mode Cisco Launchpad App



Why Deploy CC Using Launchpad?

Ease of Deploying
AWS + CC

Deploy AWS across the globe, VPC, Security Groups, VPN-GW, IPSec Tunnel, GP3, SSD, S3, EBS, Deploy of CC Globally

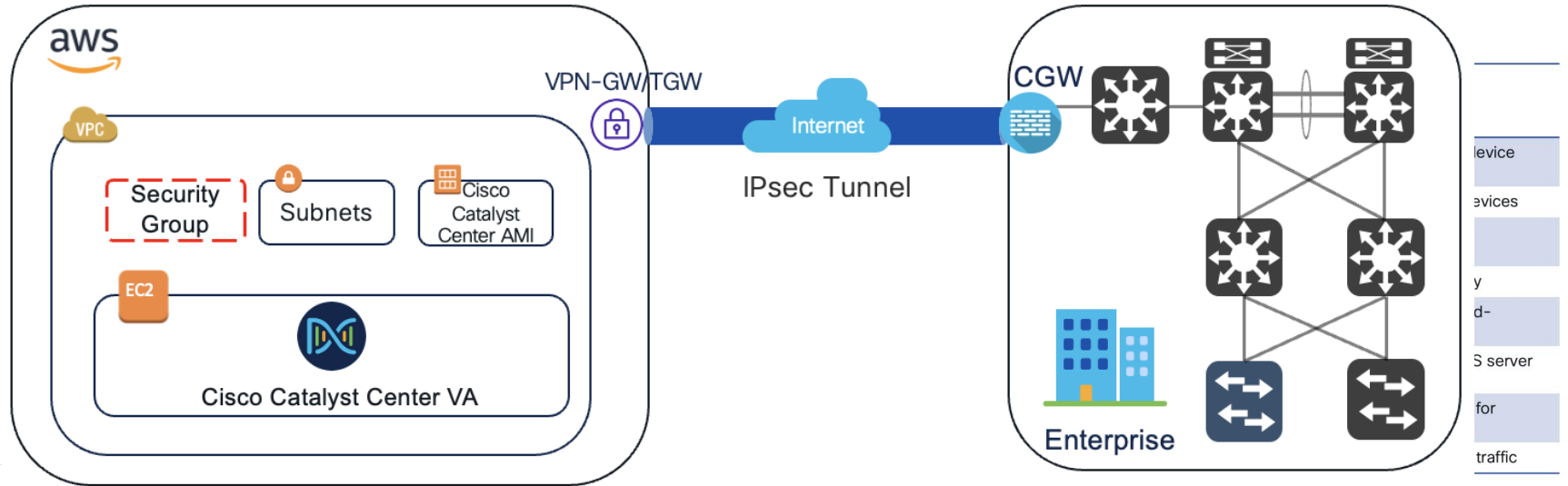


Why Deploy CC Using Launchpad?

Security

No Internet Gateway, Changes only by admin, IPSec or TGW attachments

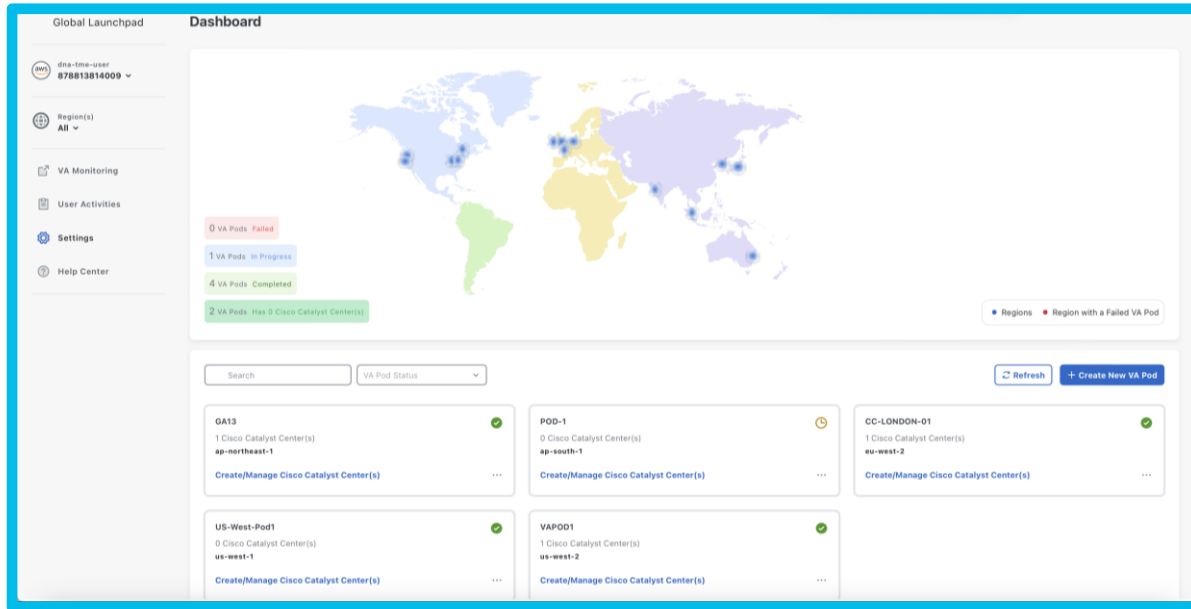
Security Group



Why Deploy CC Using Launchpad?

Single Pane of Glass

Manage AWS and Catalyst Center globally view dashboard

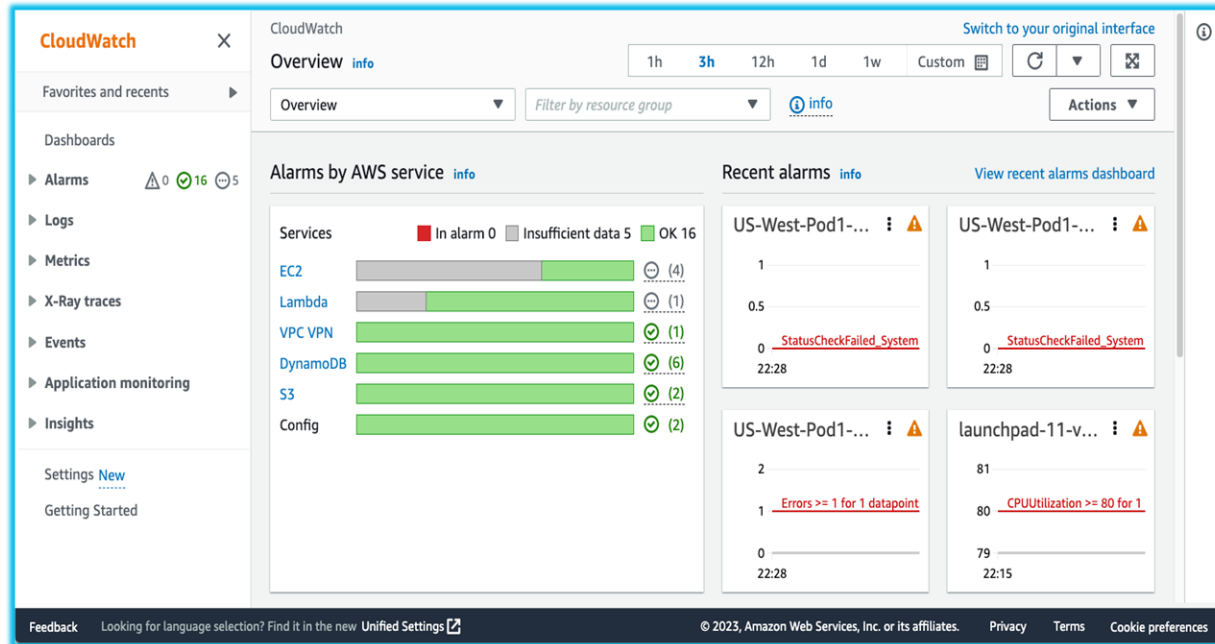


Concurrently
deploy around
the world in ~
75 mins

Why Deploy CC Using Launchpad?

Observability

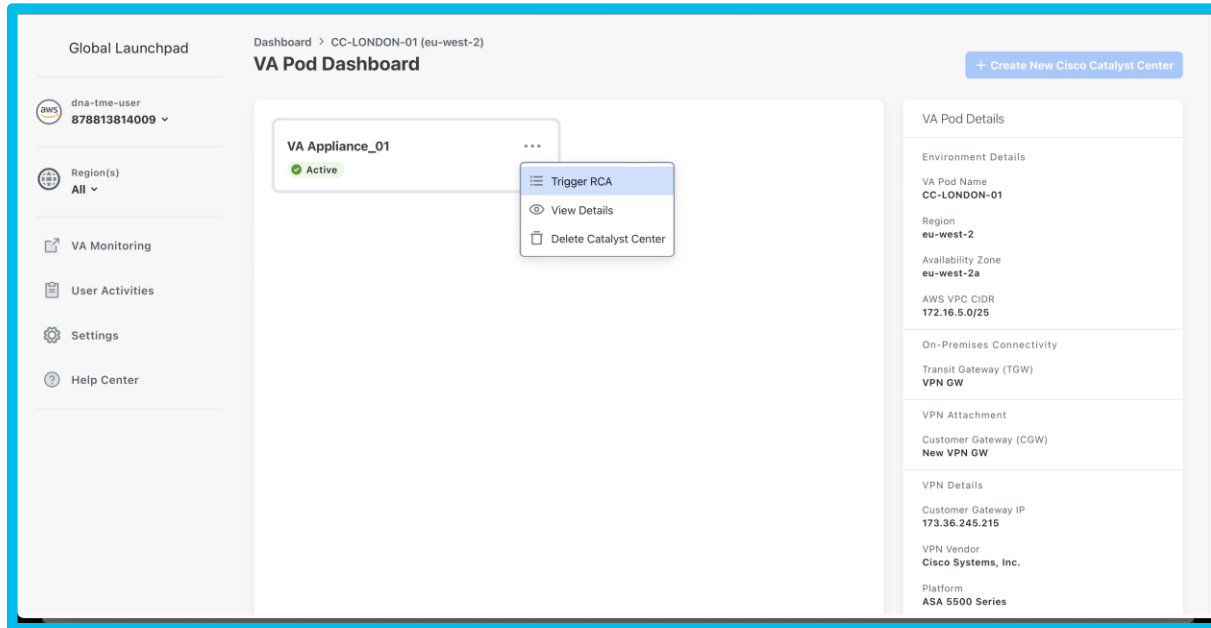
CloudWatch to observe any changes/misconfigurations/alerts



Why Deploy CC Using Launchpad?

Serviceability

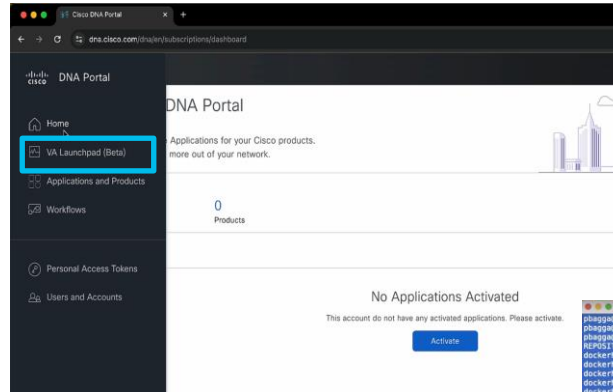
Monitoring Global Alerts, Get SNS notification, Create RCA Bundles



Where is it available?

Log into Launchpad via Cisco hosted or Customer hosted container app

Cisco Hosted



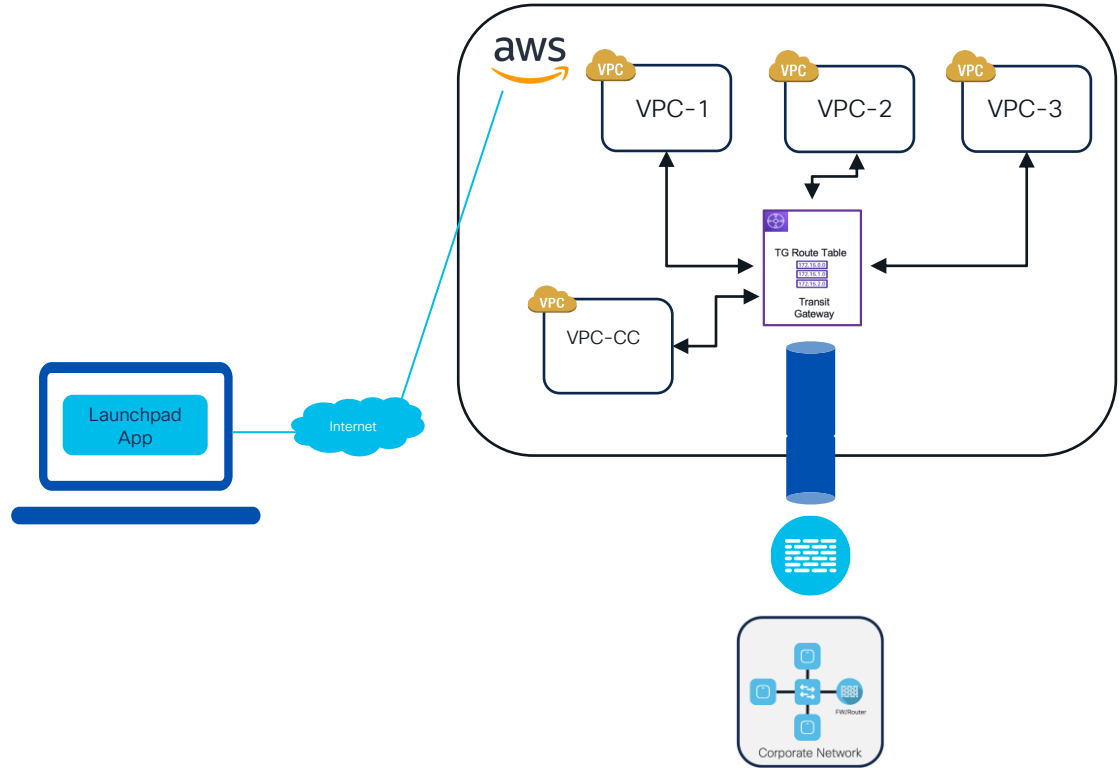
Container App

```
phagg@MAGGA-M-K38V Downloads %  
phagg@MAGGA-M-K38V Downloads % docker images  
REPOSITORY TAG IMAGE ID CREATED SIZE  
dockerhub.cisco.com/maglev-docker/server 1.0.1 1998adb9eccc 5 days ago 309MB  
phagg@MAGGA-M-K38V Downloads %  
phagg@MAGGA-M-K38V Downloads % docker run -d -p 8080:8080 --name server2 1998adb9eccc  
434696708923099c5a70a5319d862807a5b7012a0b975e8d852a9dcf7d346  
phagg@MAGGA-M-K38V Downloads %  
phagg@MAGGA-M-K38V Downloads % docker run -d -p 3801:3801 --name client2 de3feed551e4  
08f40b0e2e555f204d505c0f8846f0b72408c386d198b3f52bcf72242eb1d  
phagg@MAGGA-M-K38V Downloads %  
phagg@MAGGA-M-K38V Downloads % docker ps  
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS  
6884a8b51e95 de3feed551e4 "docker-entrypoint.s..." 4 seconds ago Up 3 seconds 0.0.0.0:3801->3800/t  
cp client2  
434696708923 1998adb9eccc "docker-entrypoint.s..." About a minute ago Up About a minute 0.0.0.0:8080->8080/t  
cp server2  
phagg@MAGGA-M-K38V Downloads %  
phagg@MAGGA-M-K38V Downloads %  
phagg@MAGGA-M-K38V Downloads %
```

How Does it work?

Log into Launchpad via Cisco hosted or Customer hosted container app

Launchpad creates a VPC in your AWS with security hardening



Security Hardening

Security Groups

Admin User

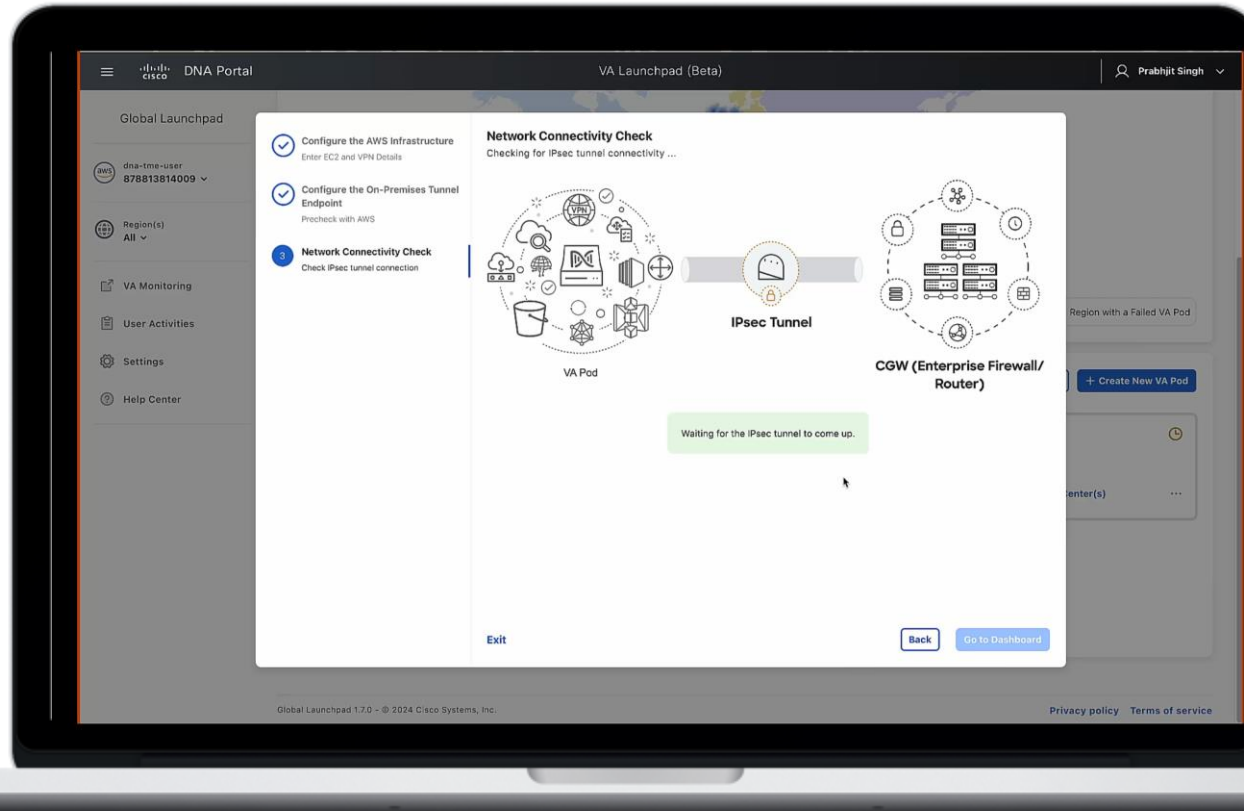
No Internet Gateway

How Does it work?

Log into Launchpad via Cisco hosted or Customer hosted container app

Launchpad creates a VPC in your AWS

Launchpad helps you Configure IPsec Tunnel / connect to TGW



IPsec VPN Configuration

```
crypto ikev1 enable <outside_interface>  
crypto ikev1 policy 200
```

Enable Internet Key Exchange (IKE) Configuration
A policy is established for the supported ISAKMP encryption,

```
crypto ipsec ikev1 transform-set ipsec-prop-vpn-06c14b5f0791af2f8-0 esp-aes esp-sha-hmac
```

```
crypto ipsec profile ipsec-vpn-06c14b5f0791af2f8-0  
  set pfs group2  
  set security-association lifetime seconds 3600  
  set ikev1 transform-set ipsec-prop-vpn-06c14b5f0791af2f8-0  
exit
```

```
crypto ipsec df-bit clear-df <outside_interface>
```

```
sysctl connection tcpmss 1379
```

```
crypto ipsec security-association replay window-size 128
```

```
crypto ipsec fragmentation before-encryption outside
```

```
tunnel-group 3.109.140.185 type ipsec-l2l  
tunnel-group 3.109.140.185 ipsec-attributes  
  ikev1 pre-shared-key jK8CORoyB3QPnr5GsPKvSdYbj.YP_olu
```

**Change the <outside_interface> to
the name of your public-facing
interface**

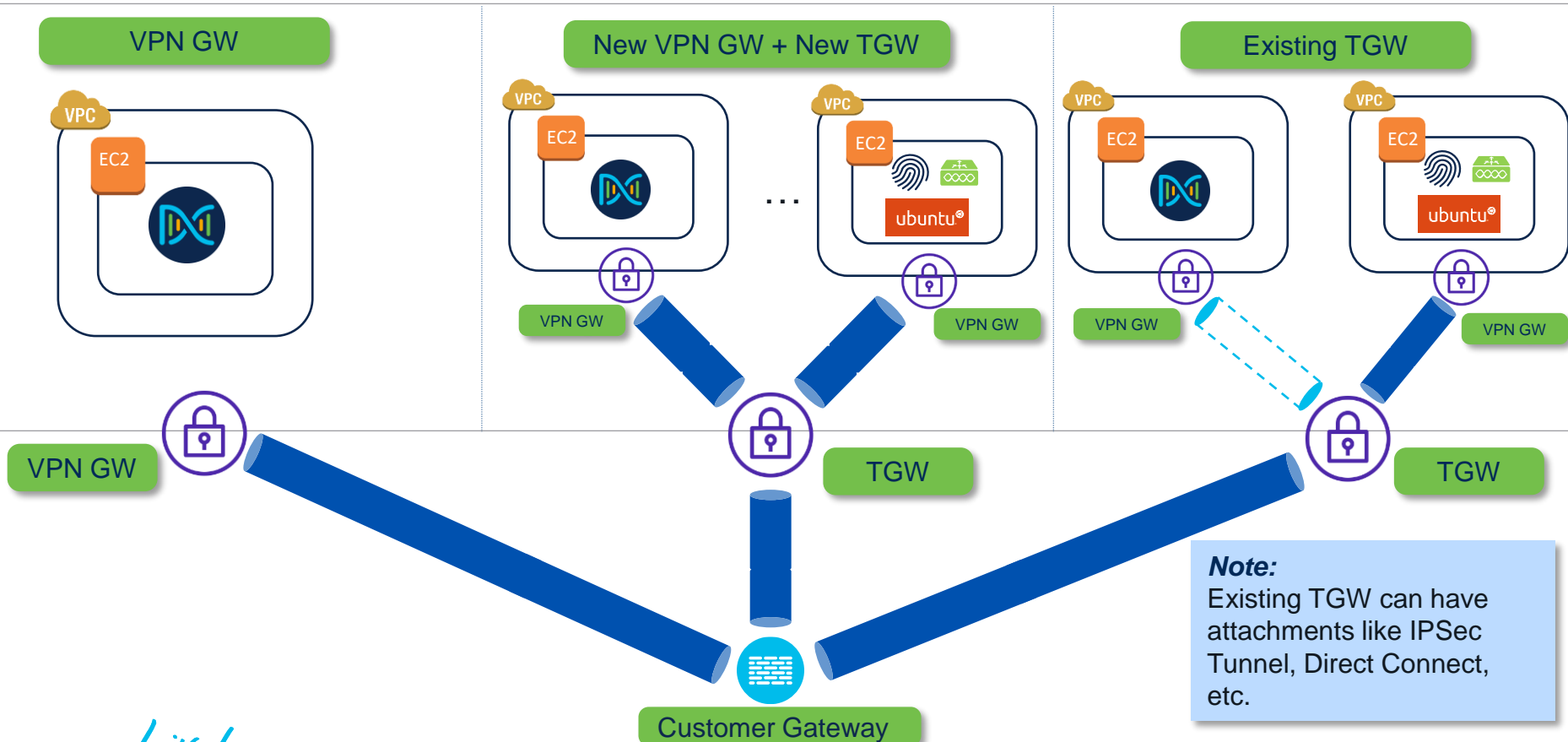
**Tunnel Interface
Configuration**

```
nameif Tunnel-int-vpn-06c14b5f0791af2f8-0  
ip address 169.254.39.246 255.255.255.252  
tunnel source interface <outside_interface>  
tunnel destination 3.109.140.185  
tunnel mode ipsec ipv4  
tunnel protection ipsec profile ipsec-vpn-06c14b5f0791af2f8-0  
no shutdown  
exit
```

```
route Tunnel-int-vpn-06c14b5f0791af2f8-0 172.16.2.0 255.255.255.0 169.254.39.245 100
```

Static Route Configuration

Choose Your Connection from AWS to On-premises!



Supported Customer Gateway (CGW) Devices

| Vendor | Platform | Software |
|------------------------|------------------|----------------|
| Checkpoint | Gaia | R80.10+ |
| Cisco Meraki | MX Series | 15.12+ (WebUI) |
| Cisco Systems, Inc. | ASA 5500 Series | ASA 9.7+ VTI |
| Cisco Systems, Inc. | CSRv AMI | IOS 12.4+ |
| Juniper Networks, Inc. | J-Series Routers | JunOS 9.5+ |
| Juniper Networks, Inc. | SRX Routers | JunOS 11.0+ |

| Vendor | Platform | Software |
|--------------------|----------------------|----------------------|
| Mikrotik | RouterOS | 6.44.3 |
| Fortinet | Fortigate 40+ Series | FortiOS 6.4.4+ (GUI) |
| Palo Alto Networks | PA Series | PANOS 7.0+ |
| SonicWall | NSA, TZ | OS 6.5 |
| Sophos | Sophos Firewall | v19+ |
| Strongswan | Ubuntu 16.04 | Strongswan 5.5.1+ |
| Yamaha | RTX Routers | Rev.10.01.16+ |

Note:

Link: <https://docs.aws.amazon.com/vpn/latest/s2svpn/your-cgw.html>

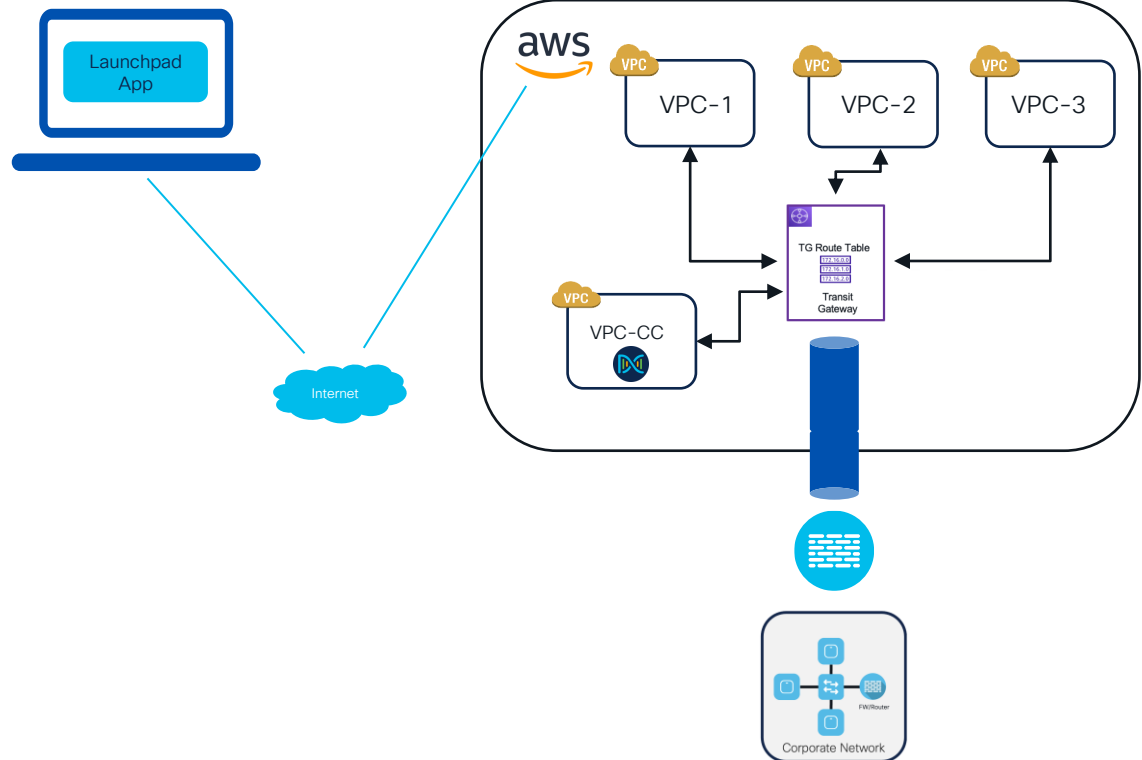
How Does it work?

Log into Launchpad via Cisco hosted or Customer hosted container app

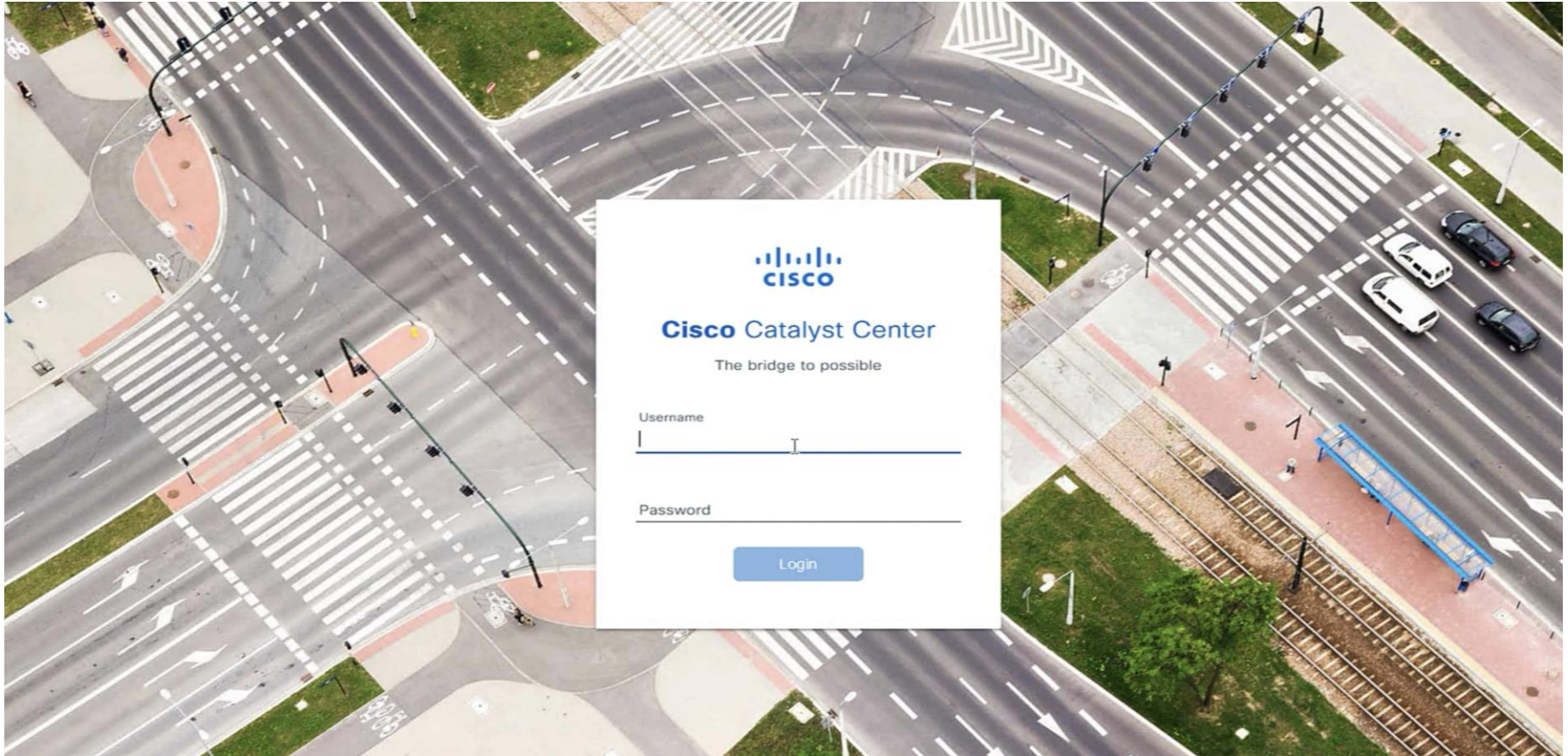
Launchpad creates a VPC in your AWS

Launchpad helps you Configure IPsec Tunnel / connect to TGW

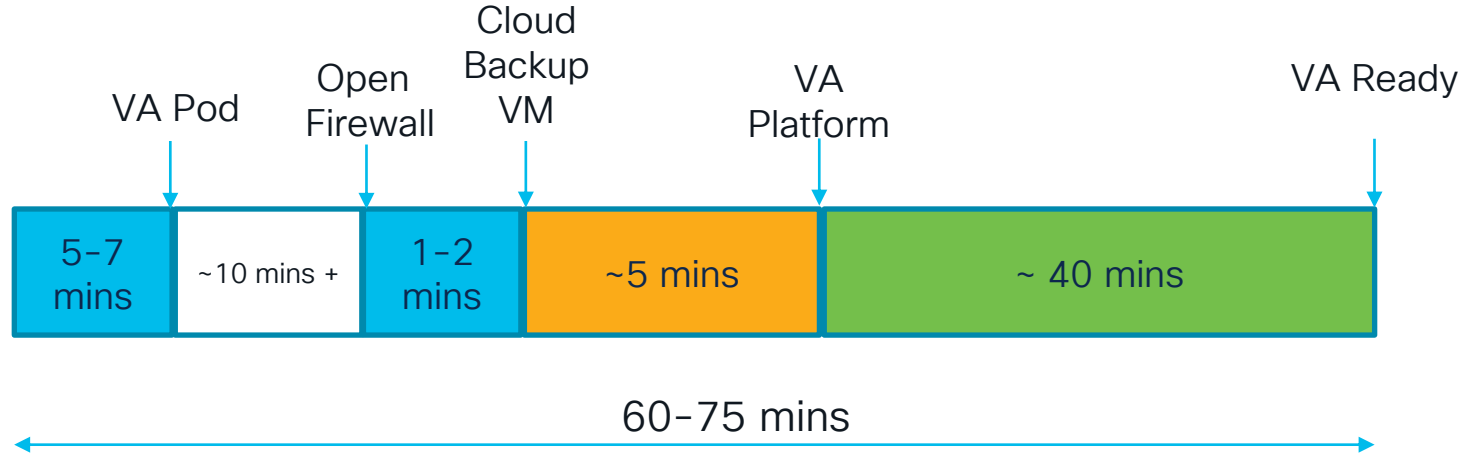
Launchpad deploys CC VA in the VPC



Cisco Catalyst Center is UP !!

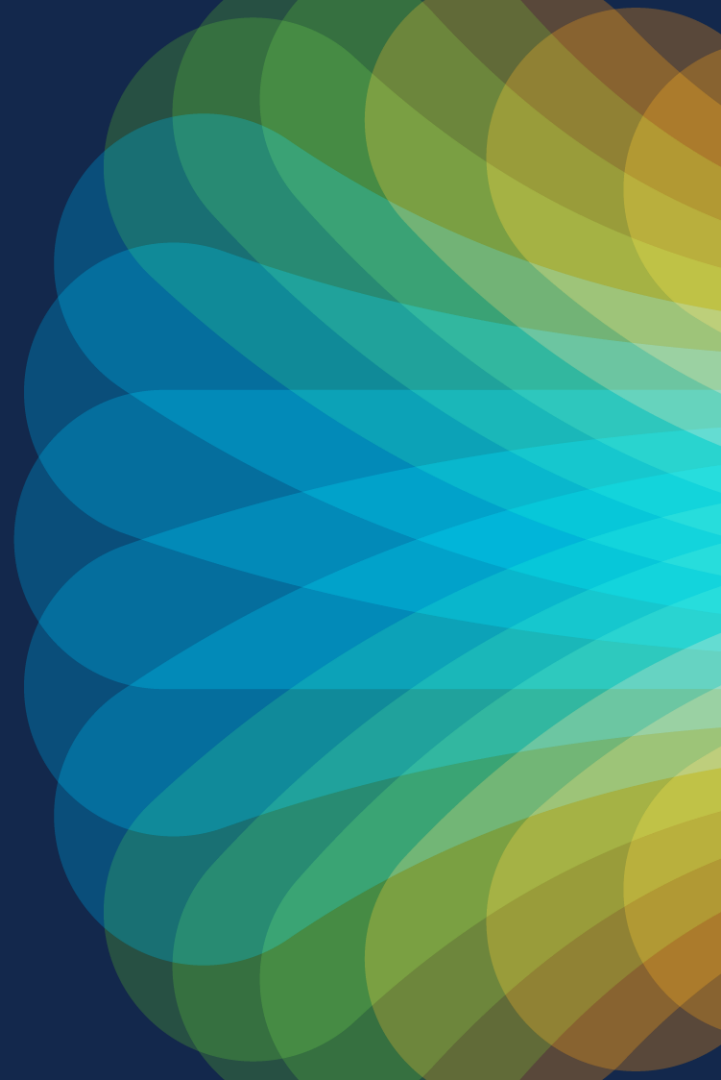


Time Taken From 0 to 100...



Note: Values are approximate and may vary due to factors like network speed, EXSi resources, and connectivity

Demo Auto Mode Launchpad App





AWS Access

Enter the AWS details to connect to your AWS account.

For more information, see <https://docs.aws.amazon.com/general/latest/gr/aws-sec-cred-types.html>



☒ IAM Login ☐ Federated Login

Access Key ID ⓘ

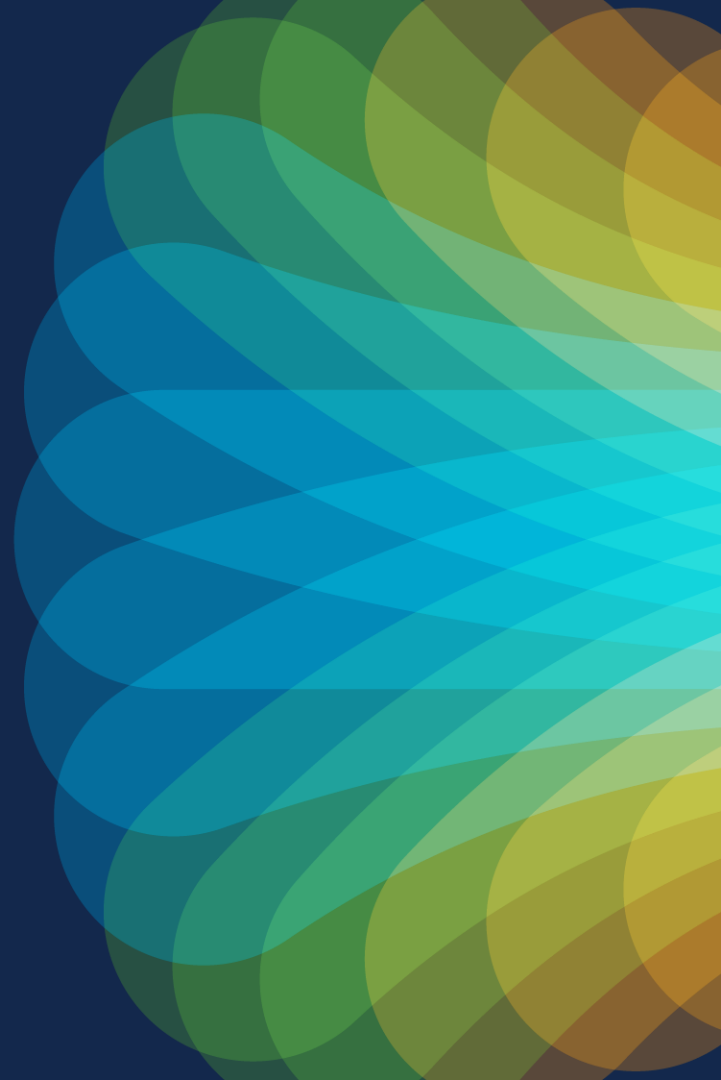
Access Key ID

Secret Access Key ⓘ

Secret Access Key

☐ Use MFA authentication ⓘ

Manual Mode CloudFormation Template

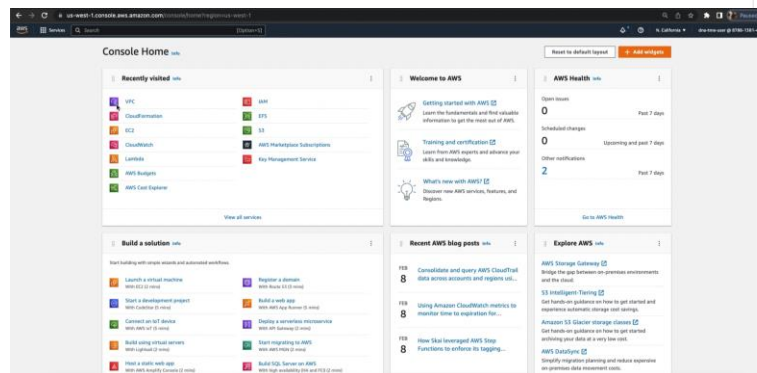
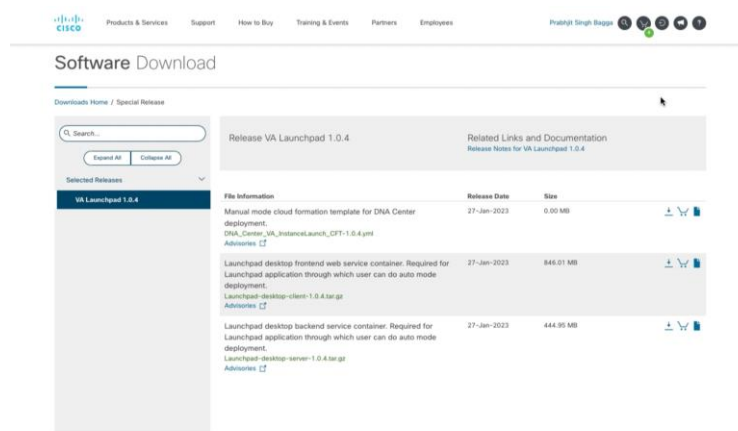


Steps to Deploy using Manual Mode

CloudFormation Template

1

Download
CloudFormation
Template
+
AWS Account



Steps to Deploy using Manual Mode

CloudFormation Template

2

- VPC
- Subnet for VA
- Security Group
- Keypair
- Connectivity to On-prem



VPC

The screenshot displays the AWS Management Console for a VPC named `vpc-026581c8cc0257c62` in the `pb-vpc-west` region. The **Details** tab is active, showing the following information:

| Details | State | DNS hostnames |
|--|--|---|
| VPC ID: <code>vpc-026581c8cc0257c62</code> | Available | Disabled |
| Tenancy: Default | DHCP option set: <code>dopt-085daf16a6a4cf200</code> | Main route table: <code>rtb-096af5efabd0bb1e6 / pb-route-table</code> |
| Default VPC: No | IPv4 CIDR: <code>192.168.0.0/16</code> | IPv6 pool: Amazon Associated |
| Network Address Usage metrics: Disabled | Route 53 Resolver DNS Firewall rule groups: - | Owner ID: <code>878813814009</code> |

Below the details, the **Resource map** tab is selected, showing a visual representation of the VPC resources. The map includes:

- VPC**: `pb-vpc-west`
- Subnets (2)**: `us-west-1c` (containing `pb-subnet-1c`) and `us-west-1a` (containing `pb-subnet-1a`)
- Route tables (1)**: `pb-route-table`
- Network connections**: `pb-internet-gw-west`

Arrows in the resource map indicate that the subnets are associated with the route table, which is in turn associated with the internet gateway.

An information box at the bottom left states: "Introducing the VPC resource map. The new resource map helps you visualize the resources in your VPC. It shows your VPC."

Steps to Deploy using Manual Mode

CloudFormation Template

Subnet for VA

2

- VPC
- Subnet for VA
- Security Group
- Keypair
- Connectivity to On-prem



VPC > Subnets > subnet-0b63cae571cb710e0

subnet-0b63cae571cb710e0 / pb-subnet-1a

Actions ▾

| Details | | | |
|--|--|---|----------------------------------|
| Subnet ID subnet-0b63cae571cb710e0 | Subnet ARN arn:aws:ec2:us-west-1:878813814009:subnet/subnet-0b63cae571cb710e0 | State Available | IPv4 CIDR 192.168.1.0/24 |
| Available IPv4 addresses 249 | IPv6 CIDR 2600:1f1c:cc2:11fa::/64 | Availability Zone us-west-1a | Availability Zone ID usw1-az1 |
| VPC vpc-026581c8cc0257c62 pb-vpc-west | Route table rtb-096af5efabd0bb1e6 pb-route-table | Network ACL acl-0736e4d1eb66a8b7a | Default subnet No |
| Auto-assign public IPv4 address No | Auto-assign IPv6 address No | Auto-assign customer-owned IPv4 address No | Customer-owned IPv4 pool - |
| Outpost ID - | IPv4 CIDR reservations - | IPv6 CIDR reservations - | IPv6-only No |
| Hostname type IP name | Resource name DNS A record Disabled | Resource name DNS AAAA record Disabled | DNS64 Disabled |
| Owner 878813814009 | | | |

Steps to Deploy using Manual Mode

CloudFormation Template

2

- VPC
- Subnet for VA
- Security Group
- Keypair
- Connectivity to On-prem



Security Group

Outbound Rules

| Type | Protocol | Port | Description |
|------|-----------|-----------|---|
| TCP | Netconf | 830 | Cisco Catalyst Center uses NETCONF for device inventory, discovery, and configuration |
| TCP | SSH | 22 | Cisco Catalyst Center to SSH to network devices |
| UDP | DNS | 53 | Cisco Catalyst Center uses DNS to resolve hostnames |
| UDP | SNMP | 161 | Network device management and discovery |
| TCP | HTTPS | 443 | Cisco Catalyst Center uses HTTPS for cloud-tethered upgrades |
| UDP | RADIUS | 1812 | Using external authentication with a RADIUS server |
| TCP | Cisco ISE | 5222,8910 | Cisco Catalyst Center uses Cisco ISE XMP for <u>PxGrid</u> |
| TCP | Cisco ISE | 9060 | Cisco DNA Center uses Cisco ISE ERS API traffic |

Steps to Deploy using Manual Mode

CloudFormation Template

2

- VPC
- Subnet for VA
- Security Group
- Keypair
- Connectivity to On-prem



Keypair

| Key pairs (1/7) Info | | | | |
|--------------------------------------|-------------------------------|------|------------------------|--|
| <input type="text" value="Search"/> | | | | |
| <input type="checkbox"/> | Name | Type | Created | |
| <input type="checkbox"/> | CSR-SCI | rsa | 2022/04/19 16:10 GMT-7 | |
| <input type="checkbox"/> | dnac-key | rsa | 2022/06/08 15:34 GMT-7 | |
| <input type="checkbox"/> | Launchpad-dnac-04-virtualdnac | rsa | 2022/07/28 21:22 GMT-7 | |
| <input checked="" type="checkbox"/> | pb-vpc-key | rsa | 2022/08/12 23:57 GMT-7 | |
| <input type="checkbox"/> | Launchpad-05-virtualdnac | rsa | 2022/08/17 21:10 GMT-7 | |
| <input type="checkbox"/> | launchpad-07-virtualdnac | rsa | 2022/08/25 23:58 GMT-7 | |
| <input type="checkbox"/> | launchpad-11-virtualdnac | rsa | 2022/10/03 17:17 GMT-7 | |

Steps to Deploy using Manual Mode

CloudFormation Template

2

- VPC
- Subnet for VA
- Security Group
- Keypair
- Connectivity to On-prem



Connectivity to On-prem

Details

| | | | |
|--------------------------------------|--|--|---|
| VPN ID vpn-0ba9820429ebe0464 | State Available | Virtual private gateway vgw-092d9c1a894956ffb | Customer gateway cgw-09f112073d7e107e4 |
| Transit gateway - | Customer gateway address 173.36.245.215 | Type ipsec.1 | Category VPN |
| VPC - | Routing Static | Acceleration enabled False | Authentication Pre-shared key |
| Local IPv4 network CIDR 0.0.0.0/0 | Remote IPv4 network CIDR 0.0.0.0/0 | Local IPv6 network CIDR - | Remote IPv6 network CIDR - |
| Core network ARN - | Core network attachment ARN - | Gateway association state associated | Outside IP address type PublicIPv4 |

Tunnel details | Static routes | Tags

Tunnel state

| Tunnel number | Outside IP address | Inside IPv4 CIDR | Inside IPv6 CIDR | Status | Last status change | Details | Certificate ARN |
|---------------|--------------------|------------------|------------------|--------|--|---------|-----------------|
| Tunnel 1 | 52.8.213.39 | 169.254.75.8/30 | - | Up | February 8, 2023, 21:18:55 (UTC+01:00) | - | - |

Note: Connectivity types includes IPsec Tunnel, SD-WAN, Direct Connect, Co-lo, etc.

Steps to Deploy using Manual Mode

CloudFormation Template

3

Open the
required ports
on Enterprise
Firewall/Router



| Type | Protocol | Port | Description |
|------|-----------|-----------|--|
| TCP | Netconf | 830 | Cisco Catalyst Center uses NETCONF for device inventory, discovery, and configuration. |
| TCP | SSH | 22 | Cisco Catalyst Center to ssh to network devices |
| UDP | DNS | 53 | Cisco Catalyst Center uses DNS to resolve hostnames. |
| UDP | SNMP | 161 | Network device management and discovery. |
| TCP | HTTPS | 443 | Cisco Catalyst Center uses HTTPS for cloud-tethered upgrades |
| UDP | RADIUS | 1645,1812 | Using external authentication with a RADIUS server. |
| TCP | Cisco ISE | 5222,8910 | Cisco Catalyst Center uses Cisco ISE XMP for PxGrid. |
| TCP | Cisco ISE | 9060 | Cisco Catalyst Center uses Cisco ISE ERS API traffic. |

Note: These are a subset of all ports needed. Check the entire list from this [link](#).

Steps to Deploy using Manual Mode

CloudFormation Template

4

Deploy
CloudFormation
Template



| | |
|--|--|
| EnvironmentName String that will be prefixed to AWS resource names | <input type="text" value="ciscolive"/> |
| PrivateSubnet1ID VPC Subnet to use for Cisco DNA Center | <input type="text" value="subnet-0b63cae571cb710e0"/> |
| SecurityGroup Security Group to Attach to Cisco DNA Center | <input type="text" value="sg-0d51ad1359a29d79b"/> |
| Keypair SSH Keypair for Cisco DNA Center | <input type="text" value="Select AWS::EC2::KeyPair::KeyName"/> |
| Cisco DNA Center Configuration | |
| DnacInstanceIP Cisco DNA Center IP Address | <input type="text" value="Enter String"/> |
| DnacNetmask Cisco DNA Center Netmask | <input type="text" value="Enter String"/> |
| DnacGateway Cisco DNA Center Gateway Address | <input type="text" value="Enter String"/> |
| DnacDnsServer Enterprise DNS Server | <input type="text"/> |

Steps to Deploy using Manual Mode

CloudFormation Template

4

Deploy
CloudFormation
Template



Cisco DNA Center Configuration

DnacInstanceIP
Cisco DNA Center IP Address

DnacNetmask
Cisco DNA Center Netmask

DnacGateway
Cisco DNA Center Gateway Address

DnacDnsServer
Enterprise DNS Server

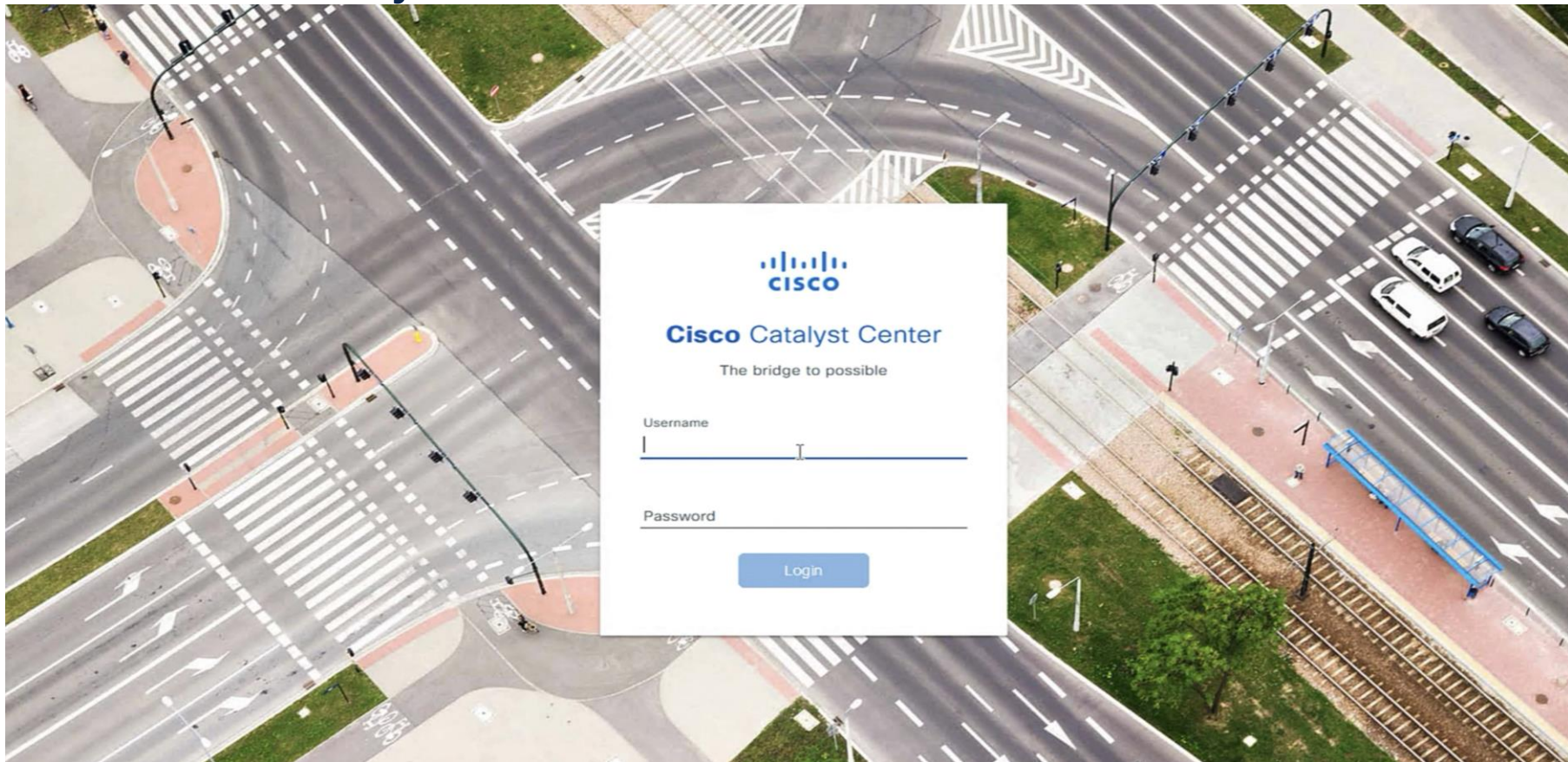
DnacPassword
Cisco DNA Center Password

DnacFQDN
Cisco DNA Center FQDN

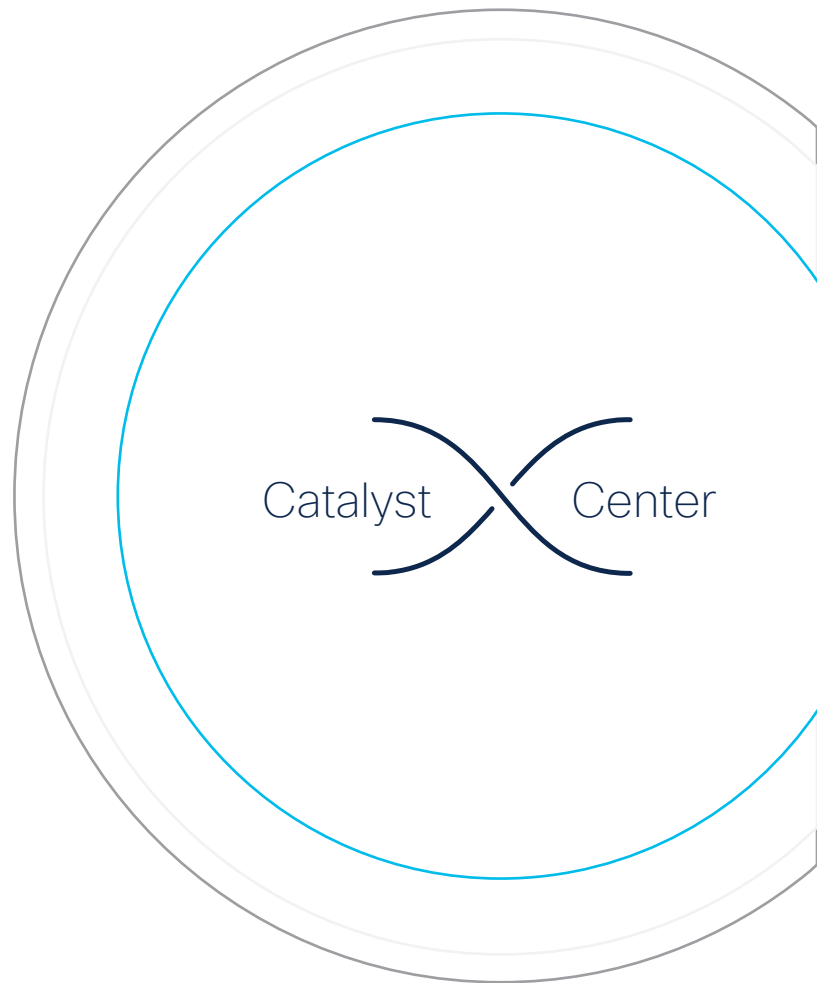
DnacHttpsProxy
Enterprise HTTPS Proxy (optional)

DnacHttpsProxyUsername
HTTPS Proxy Username (optional)

Cisco Catalyst Center is UP !!



Demo Manual mode



Demo Manual Mode CloudFormation Template





Software Download

Downloads Home / Special Release

Search...

Expand All

Collapse All

Selected Releases

VA Launchpad 1.0.4

Release VA Launchpad 1.0.4

Related Links and Documentation

[Release Notes for VA Launchpad 1.0.4](#)

File Information

Release Date

Size

Manual mode cloud formation template for DNA Center deployment.
DNA_Center_VA_InstanceLaunch_CFT-1.0.4.yml
[Advisories](#)

27-Jan-2023

0.00 MB



Launchpad desktop frontend web service container. Required for Launchpad application through which user can do auto mode deployment.
Launchpad-desktop-client-1.0.4.tar.gz
[Advisories](#)

27-Jan-2023

846.01 MB



Launchpad desktop backend service container. Required for Launchpad application through which user can do auto mode deployment.
Launchpad-desktop-server-1.0.4.tar.gz
[Advisories](#)

27-Jan-2023

444.95 MB

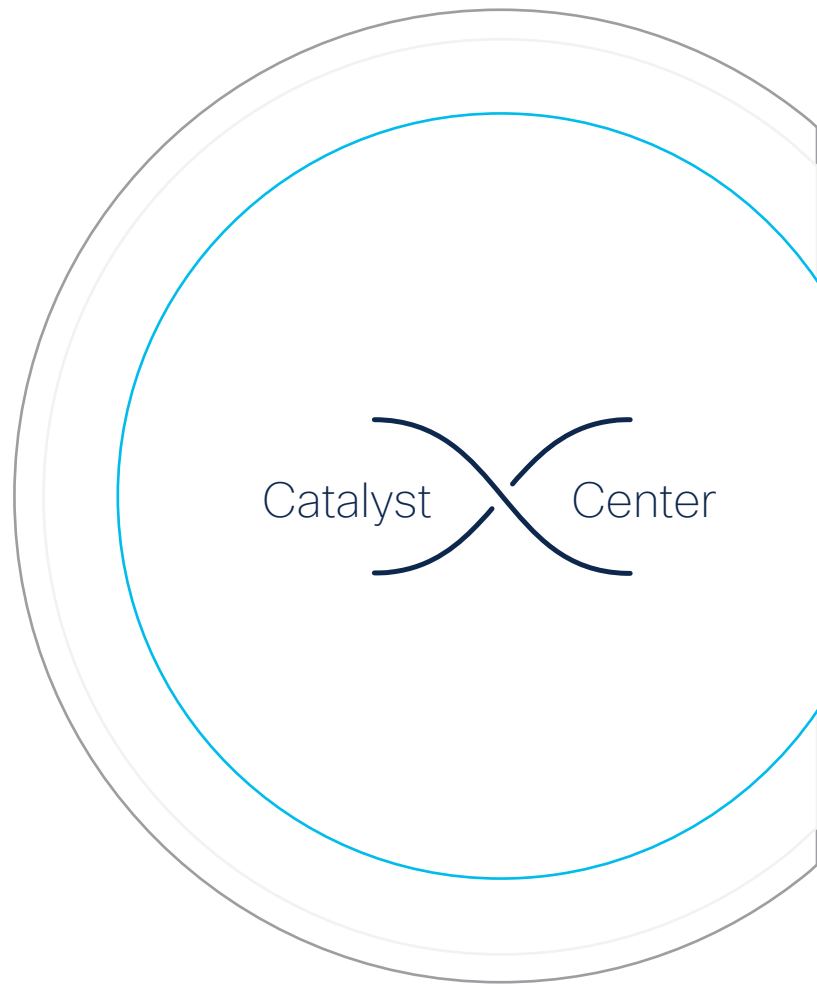


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Manual Mode with AWS Marketplace



Steps to Deploy using Manual Mode

AWS Marketplace

AWS Infrastructure

VPC, Security Groups, VPN-GW, IPSec Tunnel/Connectivity

Subscribe

AWS Marketplace – Cisco DNA Center

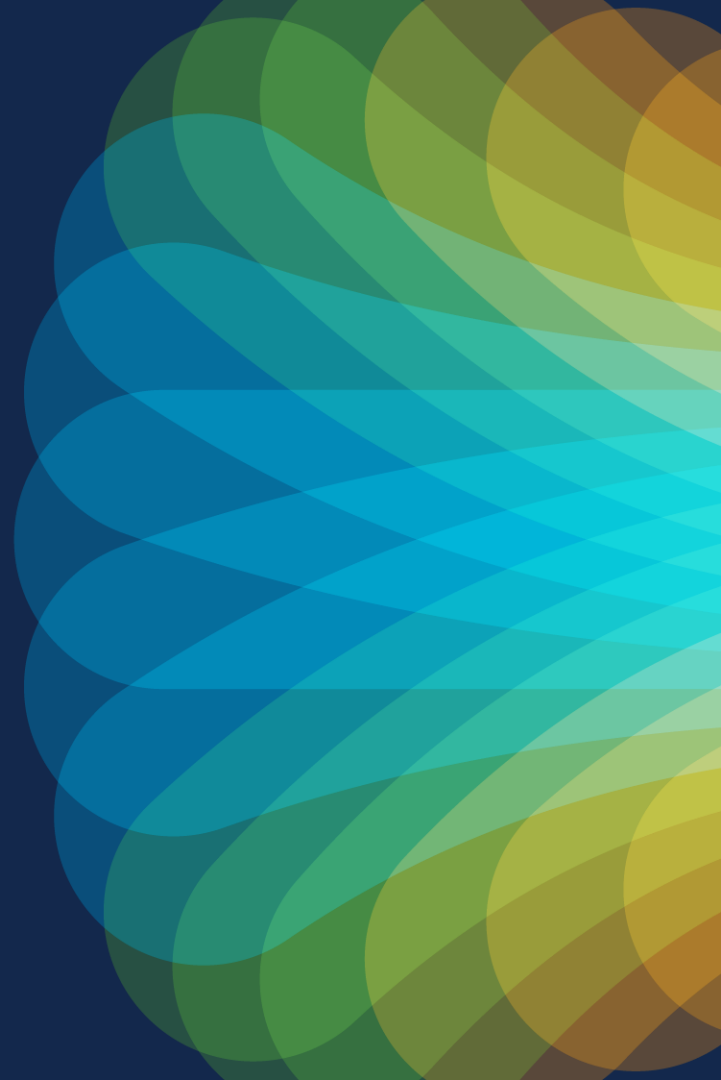
Launch with EC2

Select VPC, Security Groups, Keypair, IP Address

Inject Cloud Config
in EC2

Catalyst Center IP, DNS, NTP, Proxy

Demo AWS Marketplace



aws

Services

Search

[Option+S]

London

dna-tme-user @ 8788-1381-4009

Console Home

Info

Reset to default layout

Add widgets

Recently visited

Info

AWS Marketplace Subscriptions

S3

CloudWatch

IAM

EC2

CloudFormation

VPC

AWS Private 5G

CloudFront

Support

View all services

Welcome to AWS

Getting started with AWS

Learn the fundamentals and find valuable information to get the most out of AWS.

Training and certification

Learn from AWS experts and advance your skills and knowledge.

What's new with AWS?

Discover new AWS services, features, and Regions.

AWS Health

Info

Open issues

0

Past 7 days

Scheduled changes

4

Upcoming and past 7 days

Other notifications

4

Past 7 days

Go to AWS Health

Build a solution

Info

Start building with simple wizards and automated workflows.

Launch a virtual machine

With EC2 (2 mins)

Start migrating to AWS

With AWS MGN (2 mins)

Register a domain

With Route 53 (3 mins)

Host a static web app

With AWS Amplify Console (2 mins)

Recent AWS blog posts

Info

FEB 8

End-to-End Observability for SAP on AWS : Part 1 Overview

FEB

How to Accelerate Interface

Explore AWS

Info

AWS Support

Save time and move faster with expert guidance and assistance.

AWS Support

aws.amazon.com/.../how-to-accelerate-interface-development-with-skuid-no-code-studio-on-a...

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81

How to Deploy Catalyst Center on AWS

Cisco Launchpad App (Auto Mode)

CloudFormation Template (Manual Mode)

AWS Marketplace (Manual Mode)

Ease of Deploying
AWS + CC

Launchpad creates AWS Infra
Launchpad Installs Catalyst Center

Manual Creation of AWS Infra
Manual Creation - Catalyst Center

Manual Creation of AWS Infra
Manual Creation - Catalyst Center
Insert Cloud Init Config

Single Pane of
Glass

Launchpad helps Deploy Globally
Launchpad helps Manage Globally

Does not exist
Through AWS Console

Does not exist
Through AWS Console

Security

Launchpad creates Security Groups
Launchpad creates Audit Role

Manual creation of Tunnel
Manual creation of Security Group

Manual creation of Tunnel
Manual creation of Security Group

Observability/
Serviceability

Launchpad Creates CloudWatch
Launchpad - RCA - AWS and CC

Manual creation of Alerts
Manual Troubleshooting of AWS

Manual creation of Alerts
Manual Troubleshooting of AWS

NFS Server

Launchpad brings up Cloud NFS
VM

Manual creation of NFS Server

Manual creation of NFS Server

Time Taken

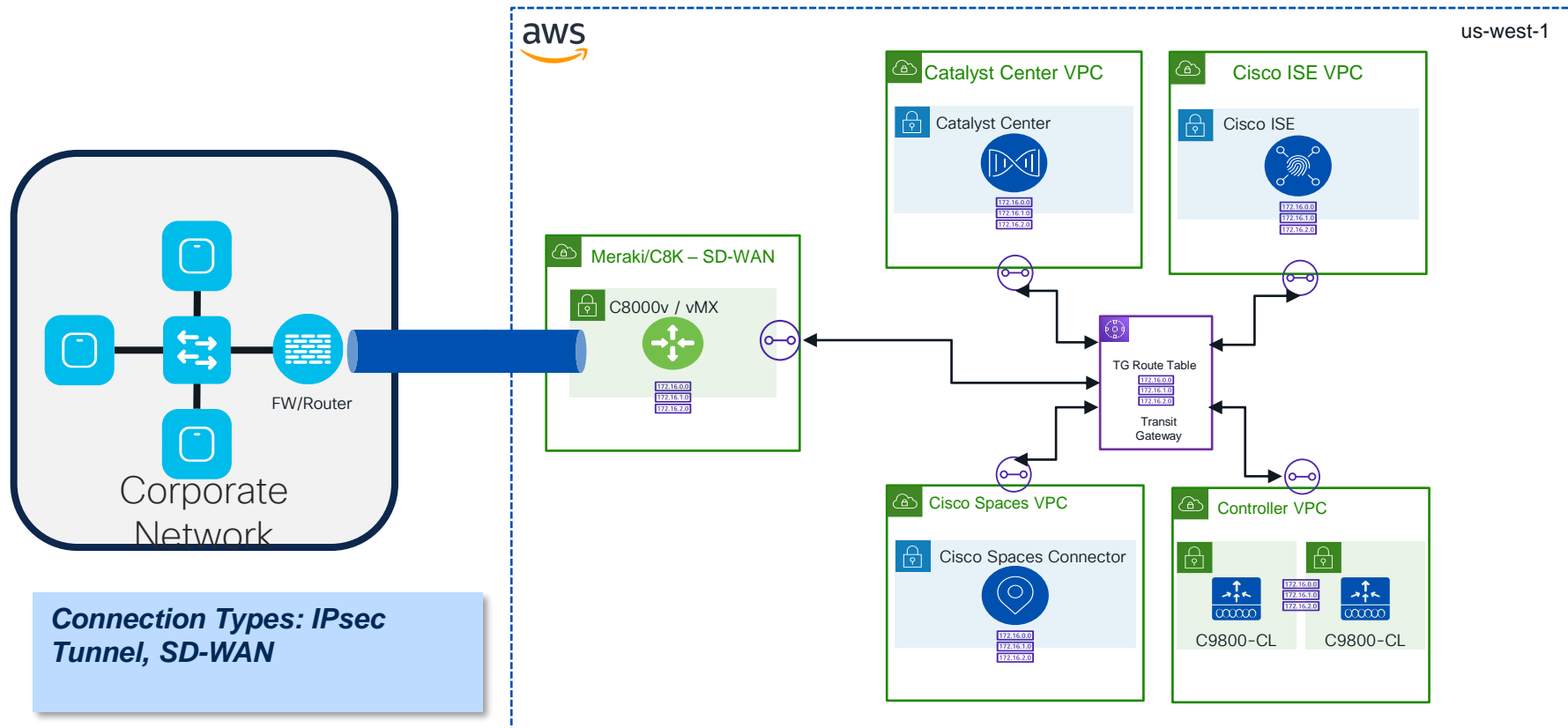
Quick Time to Value
75 mins + Firewall Ports

Days to weeks

Days to weeks



Cisco on AWS – End to End Possible!



Connection Types: IPsec Tunnel, SD-WAN

How many of you
would like to deploy
multiple Cisco
Products as a solution
stack on AWS?

Show of Hands



Enterprise Readiness



Backup & Restore



High Availability (HA)

Backup/Restore

Backup & Restore across all Form Factors



Physical Appliance

- Same method
- Backup on NFS Server
- Restore on Physical Appliance



VA on AWS

- Same as Physical Appliance
- NFS can be on AWS Cloud or
- On-premises



VA on ESXi

New

- Using Physical Disk of ESXi server
- Data Retention
- NFS Server also supported

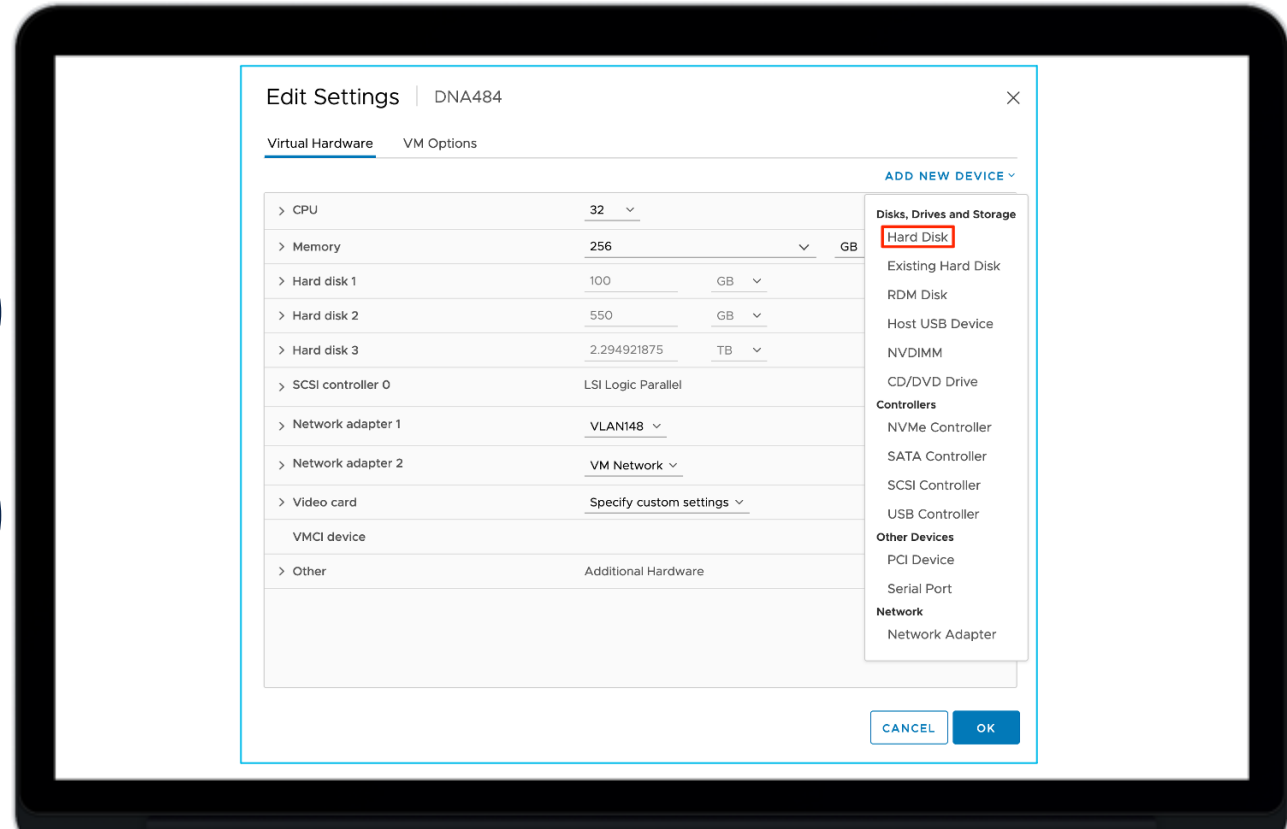
Need to be same Catalyst Center version for Backup & Restore

Steps to Create Backup/Restore on ESXi

1

Select Hard Disk as
New Device

This is the Disk where
Backup will be stored



Steps to Create Backup/Restore

2

Allocate Space for
this new Disk

Edit Settings | DNA484

Virtual Hardware | VM Options

ADD NEW DEVICE ▾

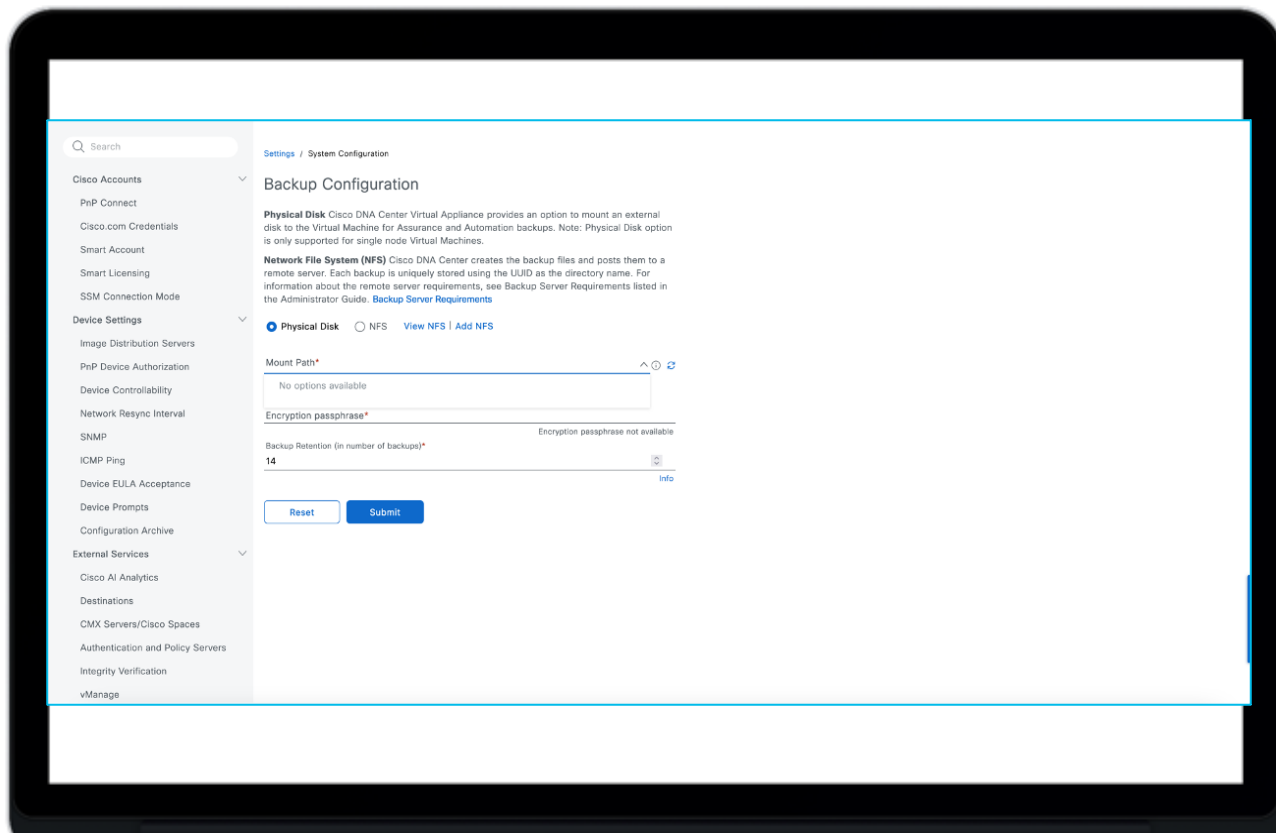
| | | |
|---------------------|---------------------------|---|
| > CPU | 32 ▾ | |
| > Memory | 256 ▾ | GB ▾ |
| > Hard disk 1 | 100 | GB ▾ |
| > Hard disk 2 | 550 | GB ▾ |
| > Hard disk 3 | 2.294921875 | TB ▾ |
| > Hard disk 4 | 300 | GB ▾ |
| > SCSI controller 0 | LSI Logic Parallel | |
| > Network adapter 1 | VLAN148 ▾ | <input checked="" type="checkbox"/> Connected |
| > Network adapter 2 | VM Network ▾ | <input checked="" type="checkbox"/> Connected |
| > Video card | Specify custom settings ▾ | |
| VMCI device | | |
| > Other | Additional Hardware | |

CANCEL OK

Steps to Create Backup/Restore

3

Mount Path is Empty
before Creating New
Disk



Steps to Create Backup/Restore

4

Mount Path Shows
the New Disk

The screenshot displays the 'Backup Configuration' page in the Cisco DNA Center. The left sidebar contains a navigation menu with categories like 'Cisco Accounts', 'Device Settings', and 'External Services'. The main content area is titled 'Backup Configuration' and includes explanatory text for 'Physical Disk' and 'Network File System (NFS)'. The 'Physical Disk' option is selected, and the 'Mount Path*' field is highlighted with a red box, showing the value 'mks-managed-28278cce-5780-4b15-9179-329848b92892'. A tooltip on the right provides details about the disk: 'Total size : 294.2 GB, Used size : 28 KB, Mount point : /data/external/disk-28278cce-5780-4b15-9179-329848b92892'. Below the mount path, there are fields for 'Encryption passphrase*' and 'Backup Retention (in number of backups)*' set to 14. At the bottom, there are 'Reset' and 'Submit' buttons.

Settings / System Configuration

Backup Configuration

Physical Disk Cisco DNA Center Virtual Appliance provides an option to mount an external disk to the Virtual Machine for Assurance and Automation backups. Note: Physical Disk option is only supported for single node Virtual Machines.

Network File System (NFS) Cisco DNA Center creates the backup files and posts them to a remote server. Each backup is uniquely stored using the UUID as the directory name. For information about the remote server requirements, see Backup Server Requirements listed in the Administrator Guide. [Backup Server Requirements](#)

☒ Physical Disk ☐ NFS [View NFS](#) [Add NFS](#)

Mount Path*
mks-managed-28278cce-5780-4b15-9179-329848b92892

Total size : 294.2 GB,
Used size : 28 KB
Mount point : /data/external/disk-28278cce-5780-4b15-9179-329848b92892

Encryption passphrase*

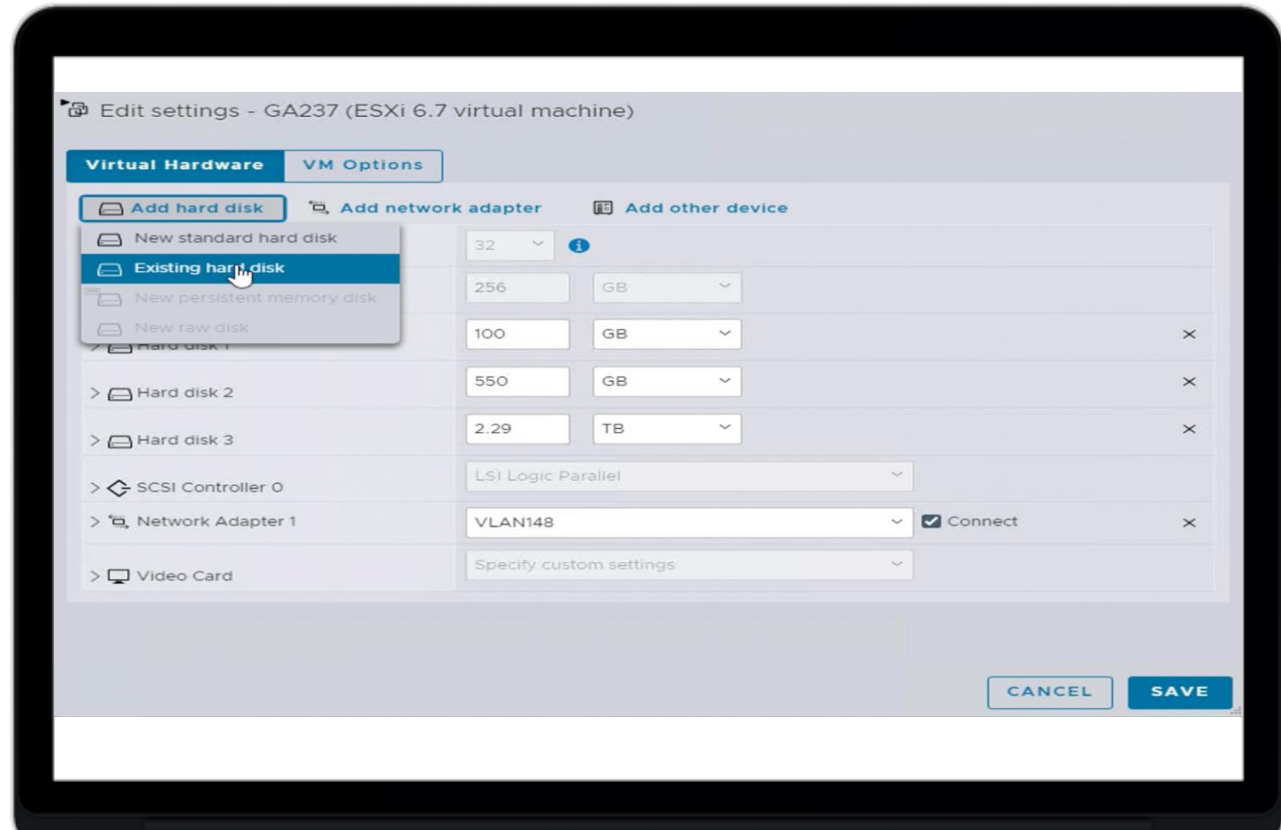
Backup Retention (in number of backups)*
14

[Reset](#) [Submit](#)

Steps to Create Backup/Restore

5

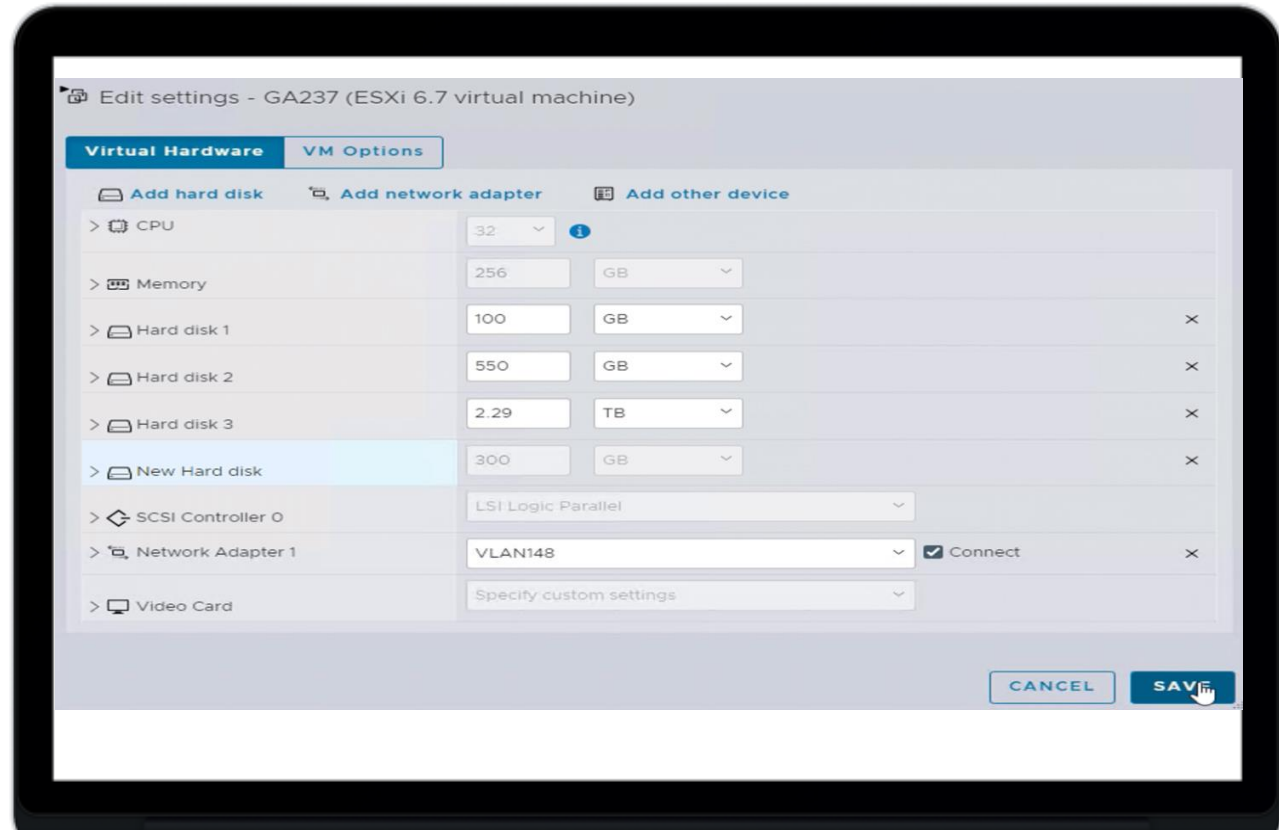
Create Existing disk



Steps to Create Backup/Restore

6

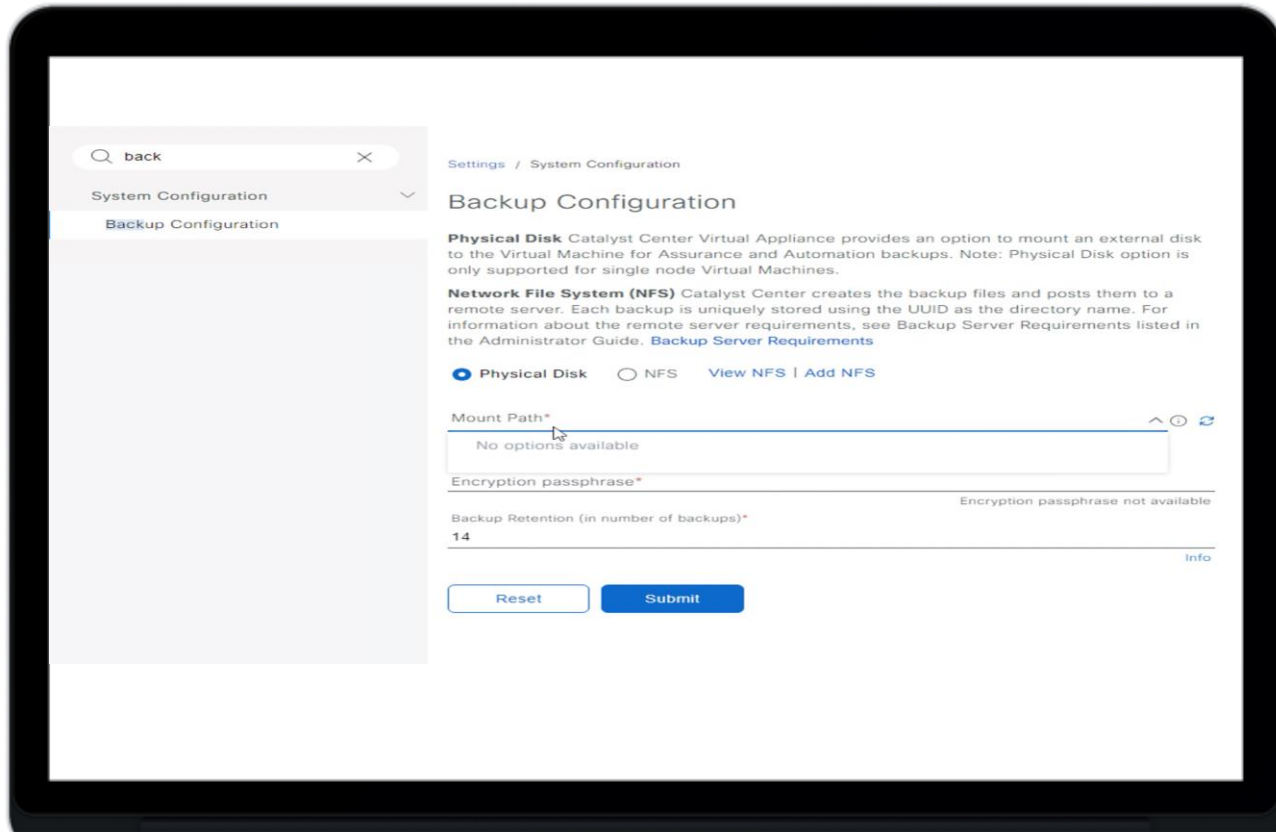
New disk added



Steps to Create Backup/Restore

7

Before rebooting VA



The screenshot shows the 'Backup Configuration' page in the Catalyst Center interface. The left sidebar contains a search bar with 'back' and a dropdown menu with 'System Configuration' and 'Backup Configuration'. The main content area is titled 'Backup Configuration' and includes the following sections:

- Physical Disk:** Catalyst Center Virtual Appliance provides an option to mount an external disk to the Virtual Machine for Assurance and Automation backups. Note: Physical Disk option is only supported for single node Virtual Machines.
- Network File System (NFS):** Catalyst Center creates the backup files and posts them to a remote server. Each backup is uniquely stored using the UUID as the directory name. For information about the remote server requirements, see Backup Server Requirements listed in the Administrator Guide. [Backup Server Requirements](#)

Below these sections are two radio buttons: **Physical Disk** (selected) and **NFS**. To the right of the NFS button are links: [View NFS](#) | [Add NFS](#).

The **Mount Path*** field is empty, displaying 'No options available'. To its right are icons for expand, help, and refresh. Below this is the **Encryption passphrase*** field, which is also empty, with a note 'Encryption passphrase not available' to its right.

The **Backup Retention (in number of backups)*** field is set to **14**.

At the bottom right is an **Info** link. At the bottom are two buttons: **Reset** and **Submit**.

Steps to Create Backup/Restore

8

After rebooting

The screenshot shows the Catalyst Center web interface for Backup Configuration. The left sidebar has a search bar with 'bac' and a dropdown menu showing 'System Configuration' and 'Backup Configuration'. The main content area is titled 'Backup Configuration' and includes the following sections:

- Physical Disk**: Catalyst Center Virtual Appliance provides an option to mount an external disk to the Virtual Machine for Assurance and Automation backups. Note: Physical Disk option is only supported for single node Virtual Machines.
- Network File System (NFS)**: Catalyst Center creates the backup files and posts them to a remote server. Each backup is uniquely stored using the UUID as the directory name. For information about the remote server requirements, see Backup Server Requirements listed in the Administrator Guide. [Backup Server Requirements](#)

Below these sections are two radio buttons: **Physical Disk** (selected) and **NFS**. To the right of the NFS button are links for [View NFS](#) and [Add NFS](#).

The **Mount Path*** field contains the text: `mks-managed-75eadbea-bacc-48bc-868b-e9475da1b78f`. To the right of this field is a link for [Encryption passphrase not available](#).

The **Backup Retention (in number of backups)*** field is set to **14**. An [Info](#) link is located to the right of this field.

At the bottom of the form are two buttons: **Reset** and **Submit**.

Steps to Create Backup/Restore

9

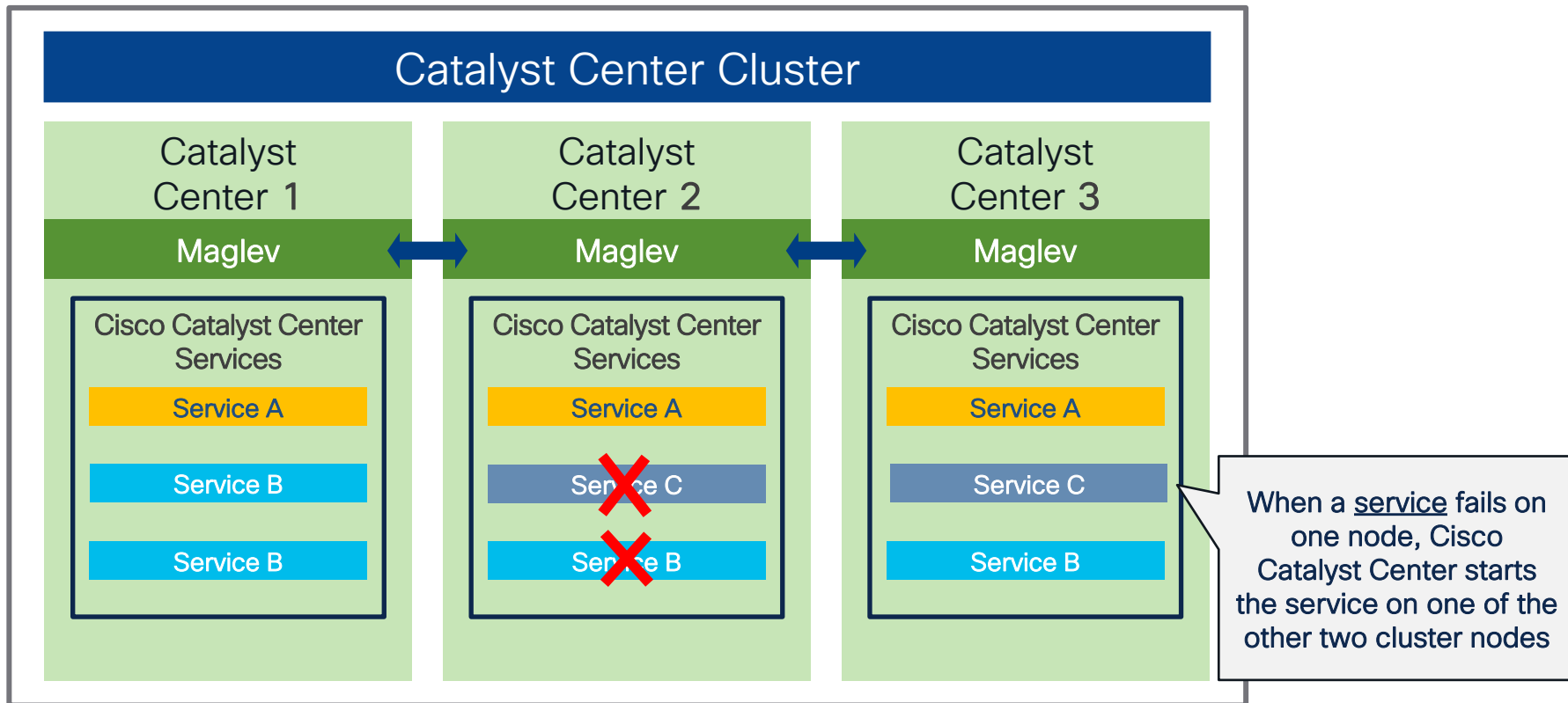
Back files from other
VA

The screenshot displays the 'Backup & Restore' management interface. At the top, it shows the title 'Backup & Restore' and a timestamp 'As of: Jan 25, 2024 12:27 AM' with a 'Create Backup Now' button. Below this, two summary boxes provide backup statistics: 'NUMBER OF BACKUPS' (2 Success, 0 Failed, 0 In progress) and 'DISK USAGE' (274 GB Available, 20.2 GB Used). A section titled 'Why do you manually trigger backup?' includes a 'Create a schedule' link. Below this is a filter bar with tabs for 'ALL', 'INPROGRESS', 'SUCCESS', and 'FAILURE'. A search bar is present above a table of backup records. The table lists two backups: 'backup-all-2370' (9 GB, Success, Thu Jan 18, 2024 09:03 PM) and 'backup1All' (11.2 GB, Success, Wed Jan 17, 2024 10:25 PM). The interface also shows '2 Record(s)' and a 'Show Records: 25' dropdown.

| Backup Name | File Size | Version | Status | Scope | Is Compatible | Created Date | Duration | Created By | Actions |
|-----------------|-----------|---------|---------|----------------------------|---------------|---------------------------|----------|------------|---------|
| backup-all-2370 | 9 GB | 1 | Success | Catalyst Center (All data) | Yes | Thu Jan 18, 2024 09:03 PM | 2m 45s | netadmin | ... |
| backup1All | 11.2 GB | 1 | Success | Catalyst Center (All data) | Yes | Wed Jan 17, 2024 10:25 PM | 4m 14s | netadmin | ... |

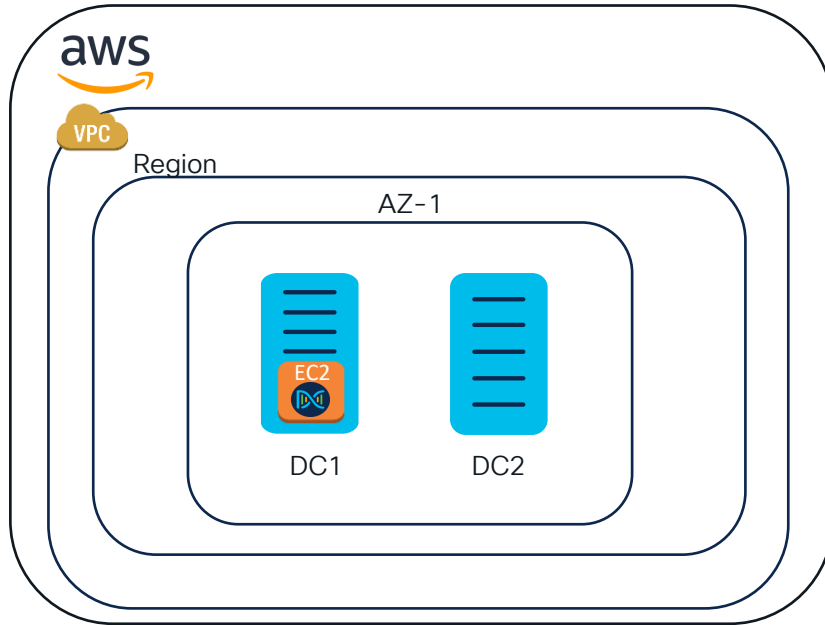
High Availability (HA)

How does HA work in Physical Appliance?



How does HA work in AWS?

Using AWS's Native HA Capabilities
Infrastructure availability from 99% to 99.99%.



Multiple DCs

Redundant Infrastructure

Low Latency

How does High Availability work in ESXi?

Cluster ESXi Hosts

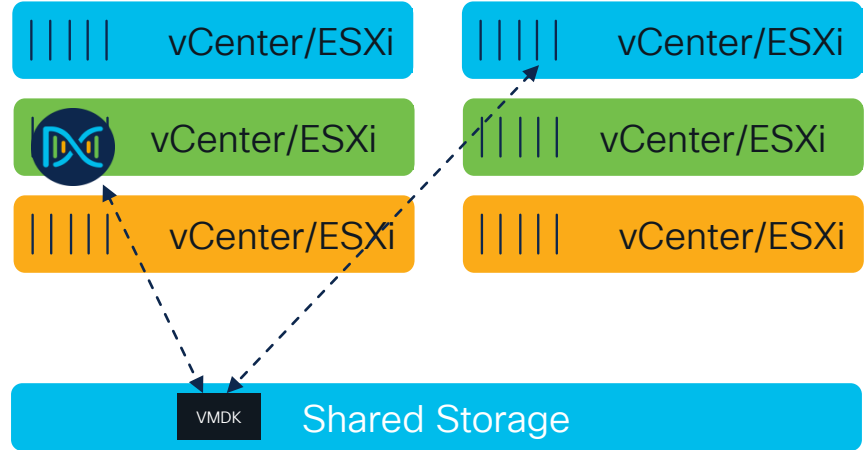
Resources Check

vMotion

Migration Options

vSphere's Distributed Resource Scheduler
(DRS)

Enabled enabled on vCenter



Steps to Create HA for VA on ESXi

1

Creating New Cluster

New Cluster

1 Basics

2 Review

Basics

Name HA-ESX

Location DC-lab3-2

vSphere DRS ☐

vSphere HA ☐

vSAN ☐

These services will have default settings - these can be changed later in the Cluster Quickstart workflow.

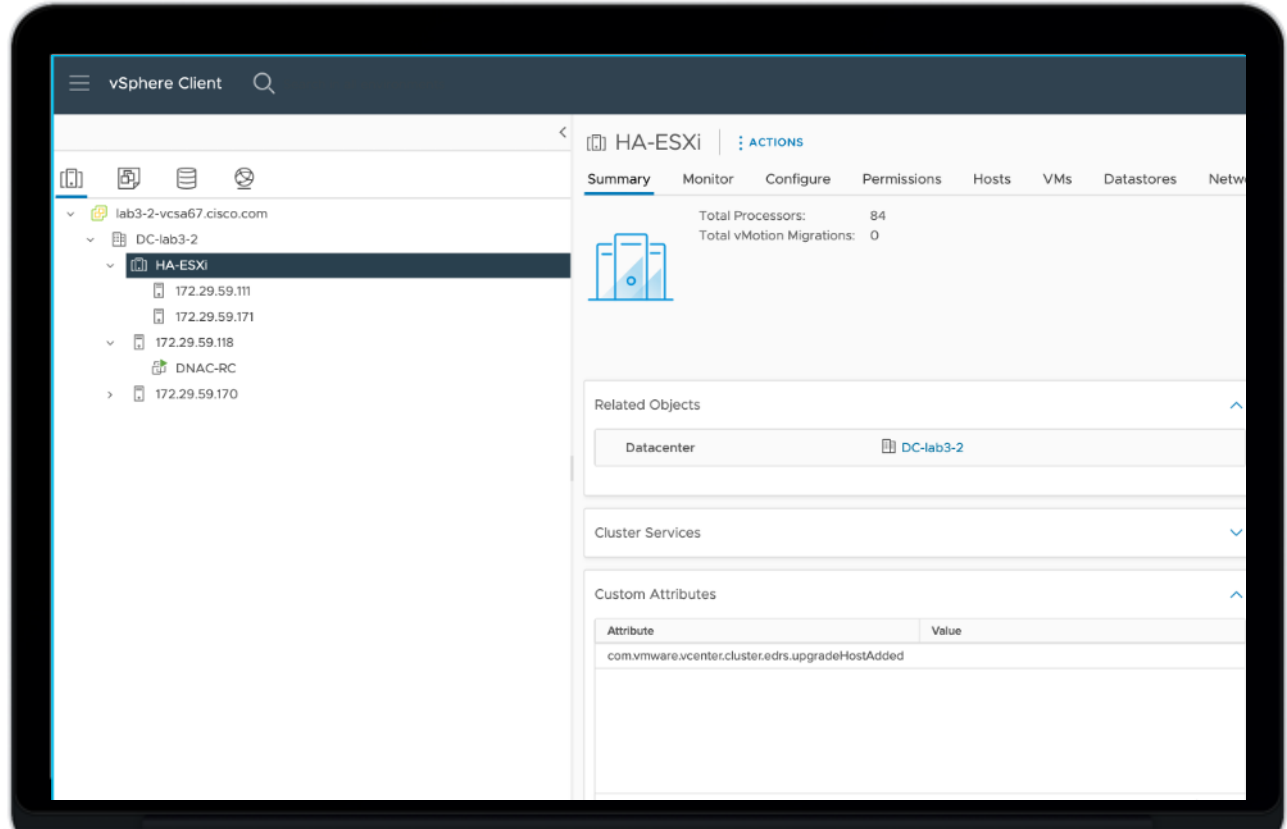
☐ Manage all hosts in the cluster with a single image

CANCEL NEXT

Steps to Create HA for VA on ESXi

2

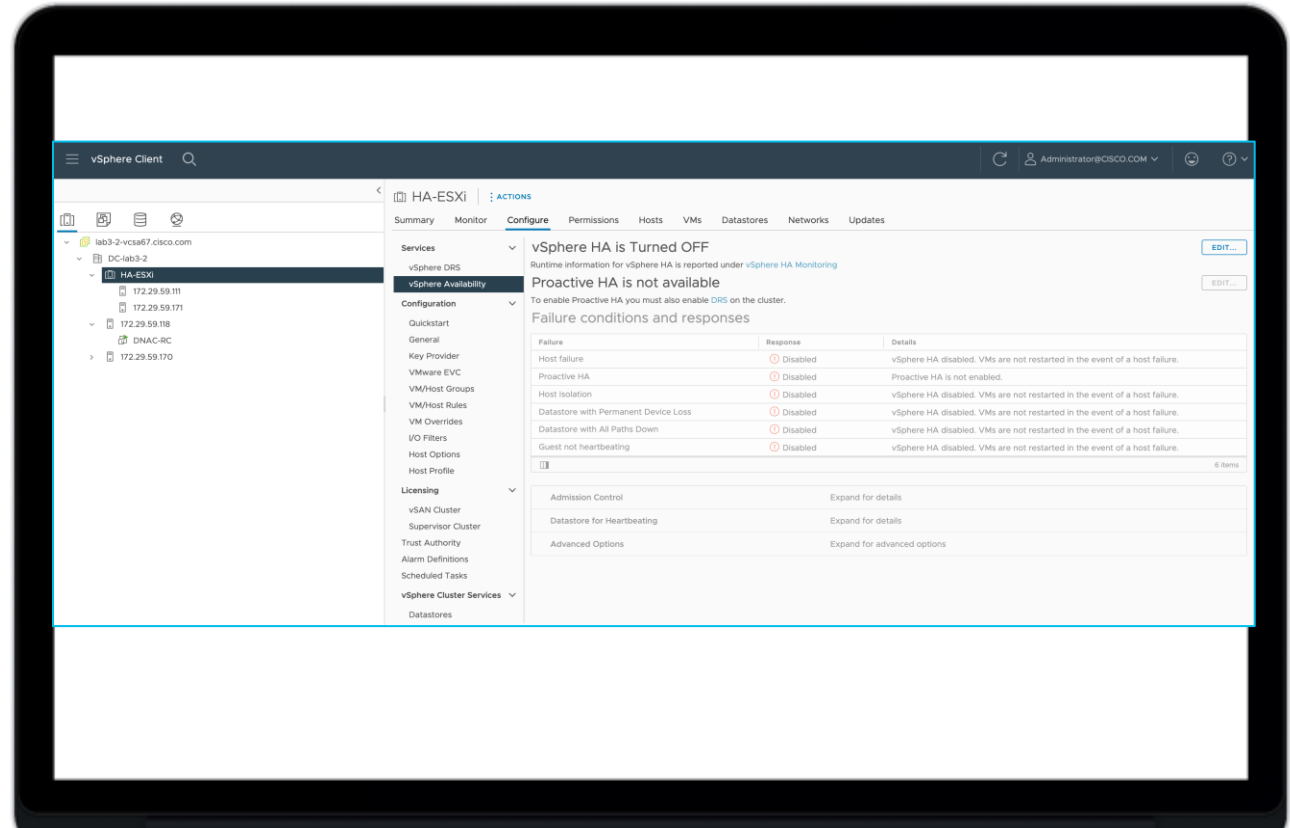
Add ESXi hosts to the cluster



Steps to Create HA for VA on ESXi

3

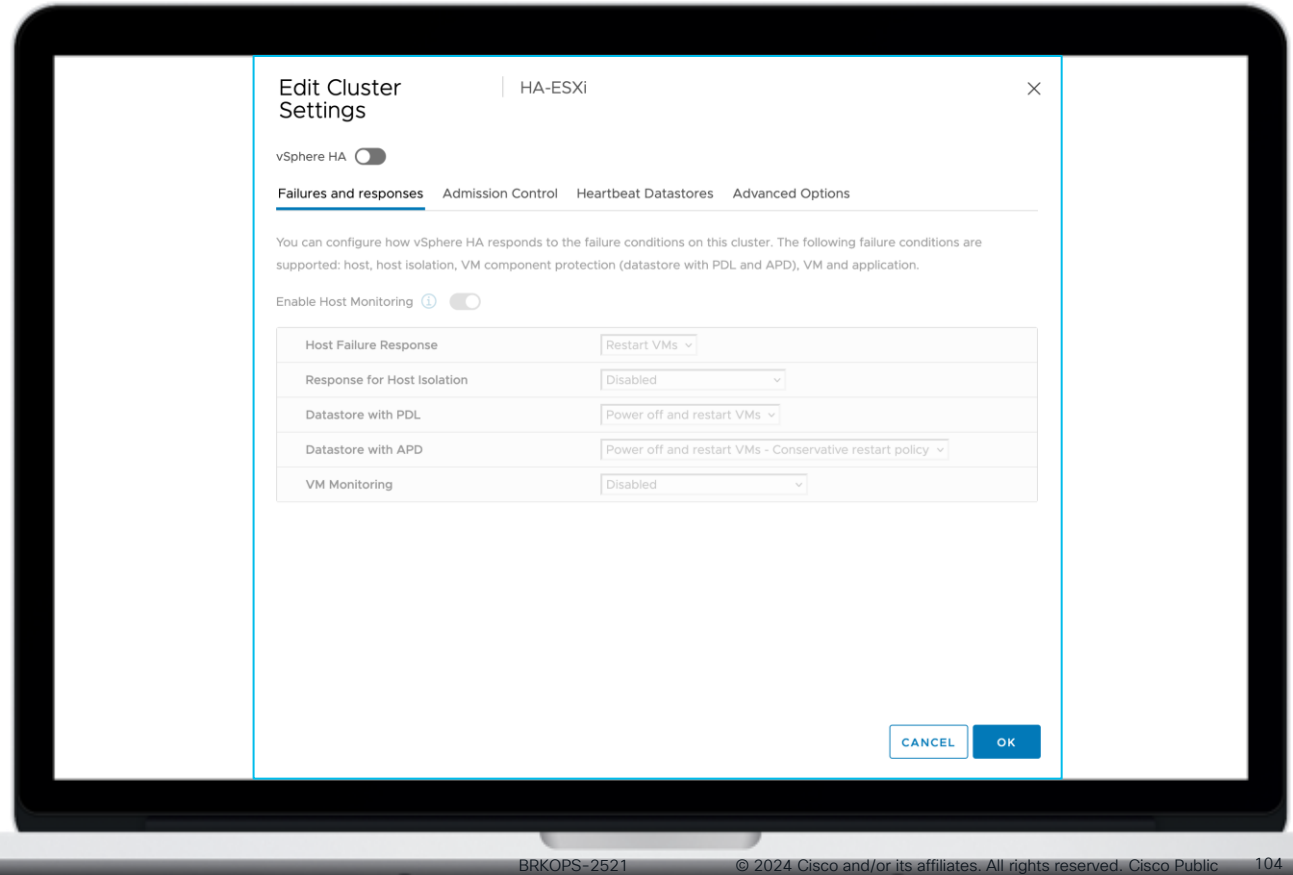
Setup HA vSphere



Steps to Create HA for VA on ESXi

4

Enabling the vSphere HA



Steps to Create HA for VA on ESXi

5

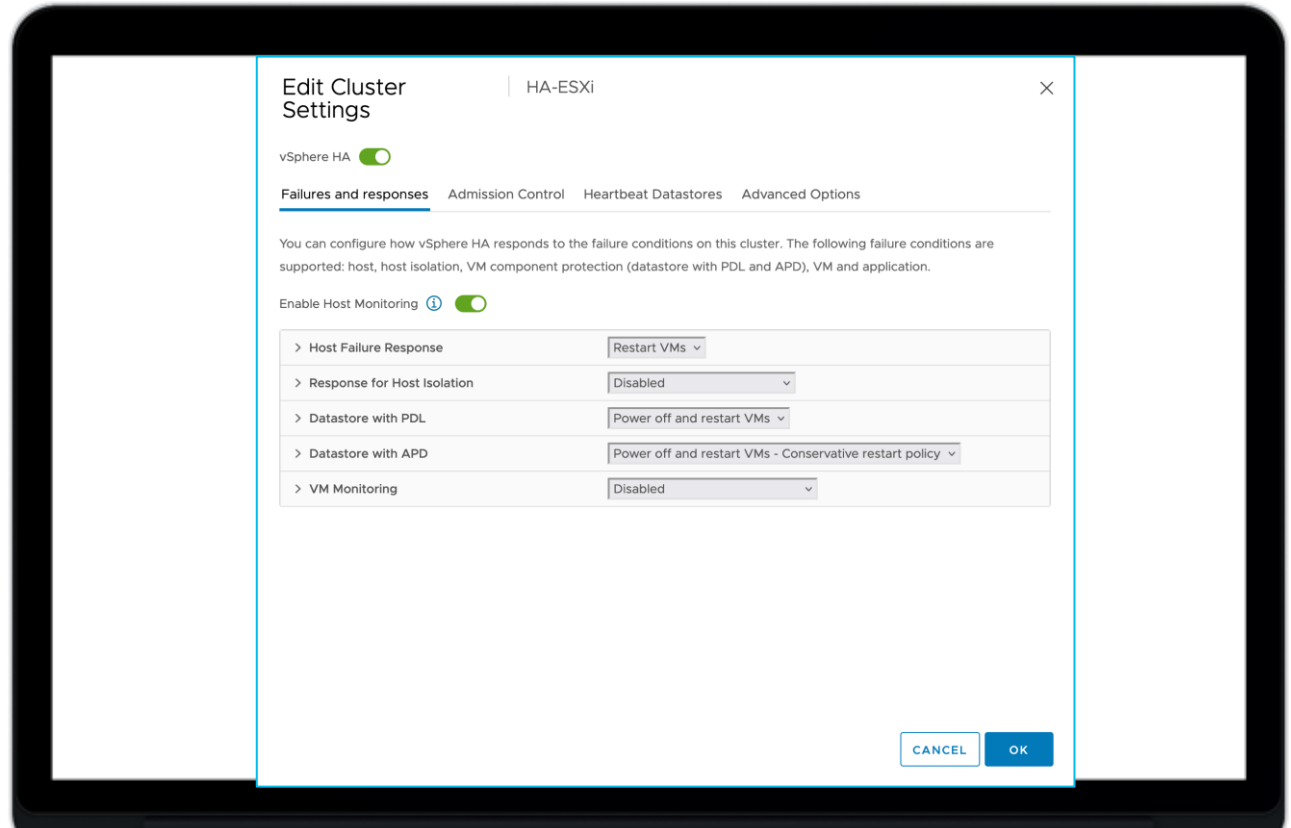
Host Failure Response

Response for Host Isolation

Datastore with PDL

Datastore with APD

VM Monitoring



Steps to Create HA for VA on ESXi

6

vSphere HA is On



The screenshot displays the vSphere Client interface for the 'HA-ESXi' host. The left sidebar shows the navigation tree with 'HA-ESXi' selected. The main pane is divided into 'Configuration' and 'Monitoring' tabs. Under 'Configuration', the 'vSphere Availability' section is expanded, showing 'vSphere HA is Turned ON'. Below this, it states 'Proactive HA is not available' and provides instructions to enable it. A table titled 'Failure conditions and responses' lists various failure scenarios and their configured responses. At the bottom, the 'Recent Tasks' pane shows two tasks: 'Configuring vSphere HA' for both hosts, each at 6% completion.

| Failure | Response | Details |
|--------------------------------------|-----------------------------|---|
| Host failure | ✓ Restart VMs | Restart VMs using VM restart priority ordering. |
| Proactive HA | ⊘ Disabled | Proactive HA is not enabled. |
| Host Isolation | ⊘ Disabled | VMs on isolated hosts will remain powered on. |
| Datastore with Permanent Device Loss | ✓ Power off and restart VMs | Datastore protection enabled. Always attempt to restart VMs. |
| Datastore with All Paths Down | ✓ Power off and restart VMs | Datastore protection enabled. Ensure resources are available before restarting VMs. |
| Guest not heartbeating | ⊘ Disabled | VM and application monitoring disabled. |

| Task Name | Target | Status | Details | Initiator | Queued For | Start Time | Completion Time | Server |
|------------------------|---------------|--------|---------------------------------|-----------|------------|-------------------------|-----------------|--------------------------|
| Configuring vSphere HA | 172.29.59.111 | 6% | Installing vSphere HA agent ... | System | 9 ms | 07/26/2023, 5:45:43 ... | | lab3-2-vcasa67.cisco.com |
| Configuring vSphere HA | 172.29.59.171 | 6% | Installing vSphere HA agent ... | System | 5 ms | 07/26/2023, 5:45:43 ... | | lab3-2-vcasa67.cisco.com |

Resources

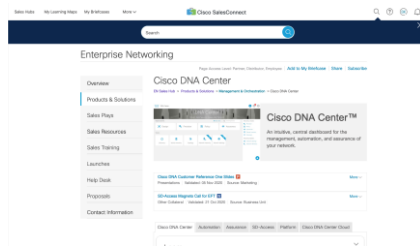
Catalyst Center Resources

| | Guides | Release Notes | FAQ | YouTube Community Page |
|---|---|--|---------------------|--|
|  Physical | Installation Guide – 2.3.5 , 2.3.7 Admin Guide – 2.3.5 , 2.3.7 User Guide – 2.3.5 , 2.3.7 | RN – 2.3.5 RN – 2.3.7.4 | FAQ | http://cs.co/catalyst-center-youtube |
|  aws | Deployment Guide – 2.3.5 Admin Guide – 2.3.5 Ordering Guide | RN – 2.3.5 | FAQ | http://cs.co/va-launchpad http://cs.co/va-manual http://cs.co/va-landingpage http://cs.co/va-blog1 |
|  vmware | Deployment Guide – 2.3.7.3 Admin Guide – 2.3.7.4 | RN – 2.3.7.4 | FAQ | http://cs.co/catalyst-center-youtube |

Collaterals, Videos, and other Resources

Want to Present?

Salesconnect



Want to Learn?

Catalyst Center on YouTube
<http://cs.co/catalyst-center-youtube>



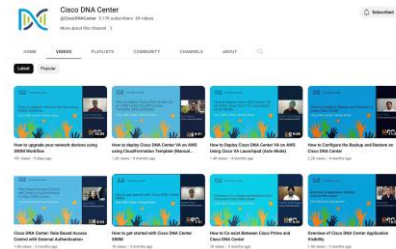
6.88K
Subscribers

~ 82 videos

Playlists



SUBSCRIBE



Want to ask Questions?

Communities
Cisco DNA Community

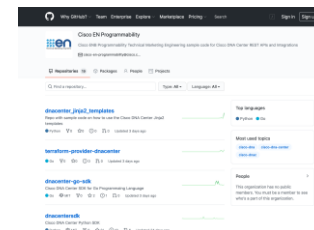


Want to Automate?

DevNet



GitHub





The bridge to possible

Thank you

CISCO *Live!*

The background features a vibrant, multi-colored abstract design. On the left, there are horizontal, wavy bands of color in shades of red, orange, yellow, and green. On the right, a bright white light source emits a series of sharp, radiating lines in various colors, including blue, green, and yellow, creating a sunburst effect.

cisco *Live!*

Let's go