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Building the Hybrid Cloud with Intercloud Fabric - Design and Implementation

BRKVIR-3601

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#clmel

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Session Information – BRKVIR-3601

- Session: Building the Hybrid Cloud with Intercloud Fabric - Design and Implementation
- Abstract: Intercloud Fabric Design and Implementation session details Cisco Intercloud Fabric architecture and feature capabilities, helping customers to design and understand how to implement a secure hybrid cloud solution in a world of many clouds. It demonstrates how Cisco is helping customers to solve problems such as workload mobility and portability, security and network services and operation consistency. It will also cover some practical use cases on how customers are deploying Intercloud Fabric, in both Enterprise and Service Providers.

Agenda

- Introduction
- ICF Architecture Overview
- Plan and Design for ICF
- ICF video demo
- Customer Use Cases
- Available Resources
- Conclusion

Cisco's Hybrid Cloud Approach

No Vendor Lock-In

Any Hypervisor to Any Provider

Heterogeneous Infrastructure

Open

Choice

Expanding Cloud Provider Ecosystem

DT, NTT Data, SunGard

Early Cloud Provider Ecosystem

Windows Azure

amazon web services

BT

virtustream

dimension data

CISCO

...

Peak 10, OneNeck, CGI Group, Long View Systems, LightEdge Solutions, Quest, OnX Managed Service, Cirrity, NWN, Proxios, Netelligent

Adapt, ANS, Logicalis, Steria, CTI

LG CNS, Ethan Group, Infront Systems, Wipro

End-to-End Security

Unified Workload Management and Governance

Workload Mobility Across Clouds

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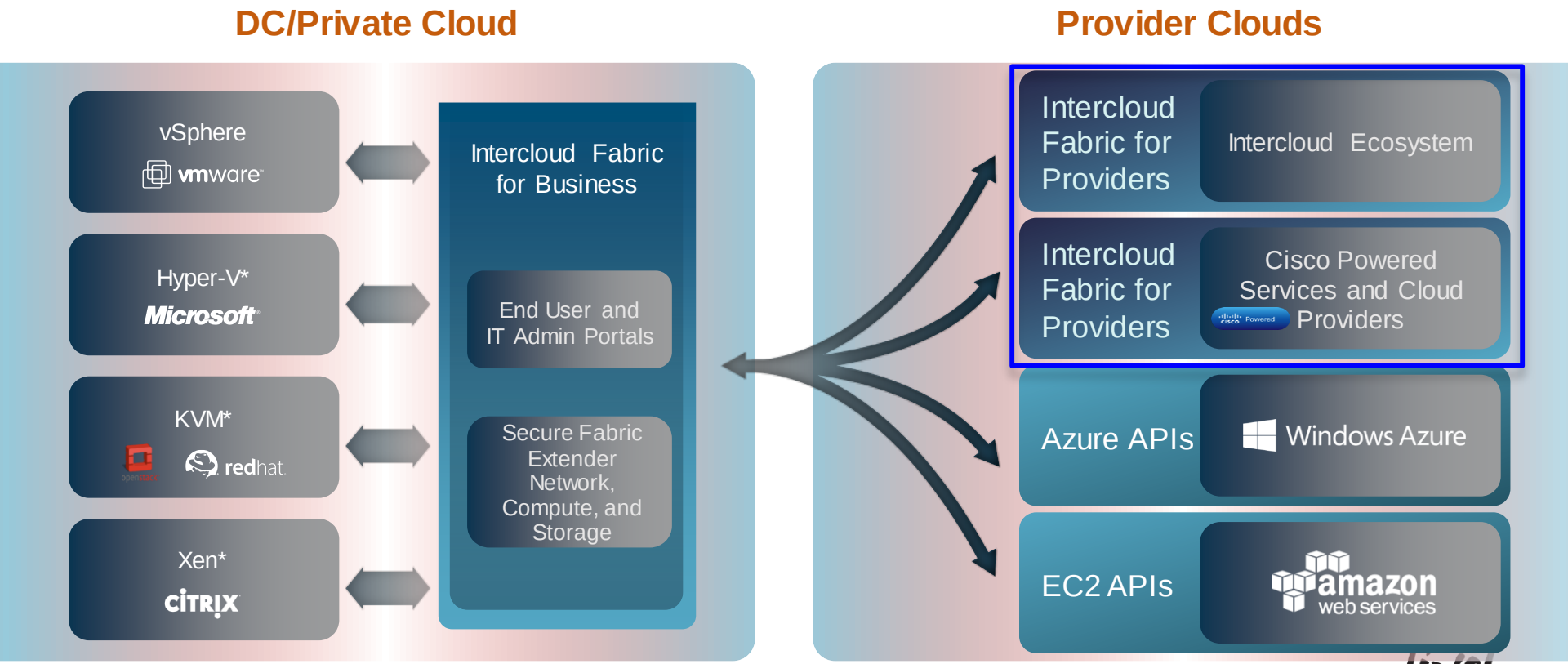
Cisco Intercloud Fabric: Solution Overview



* Available in subsequent releases

Cisco Intercloud Fabric Product Combinations

Cisco Intercloud Fabric

For DC/Private

Intercloud Fabric for Business

For Providers

TO OFFER MANAGED SERVICES

Intercloud Fabric for Business

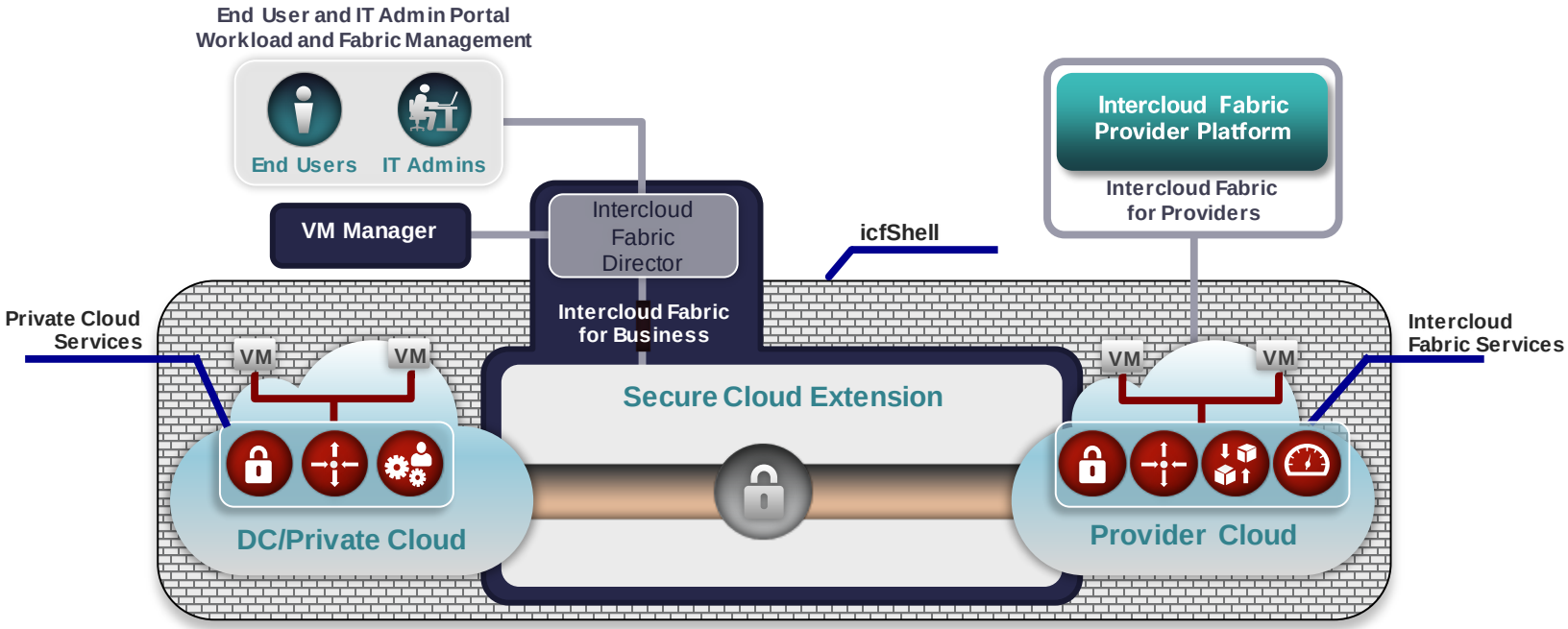
Intercloud Fabric for Provider

AS A TARGET FOR HYBRID WORKLOADS

Intercloud Fabric for Provider

Architecture Overview

Intercloud Fabric High Level Architecture



Intercloud Fabric Structure

Cisco Intercloud Fabric Architecture is Modularised to Achieve the Elasticity Needed to Support Evolving Cloud Environments

ICF Extended Services → CISCO + External Partners (storage, load balancing, etc.)

ICF Core Services → Networking | Security | VM Portability | Management and Visibility | Automation

ICF Core Infrastructure → ICFD PNSC | Secure Communications | ICFPP

Private Cloud: Enterprise

Public Cloud: Provider

Intercloud Fabric Core Infrastructure

ICFD

- Intercloud Fabric Director
- Self-service Catalog
- IT Admin and End-User portal
- Manages all the subcomponents of the solution (PNSC, cVSM, ICX, ICS)

PNSC

- Prime Network Services Controller
- Manages secure extension to the cloud
- Interfaces with public cloud APIs (ICFPP, EC2, Azure Public Cloud)
- Provides workload mobility and portability

cVSM

- Cloud Virtual Supervisor Module
- Uses Nexus 1000v technology
- Network Control Plane
- Manages ICX and ICS

Virtualised DC / Private Cloud

Virtual Appliance

Intercloud Fabric Core Infrastructure

ICX

- Intercloud eXtender
- Virtual Ethernet Module in a VM format that connects to **Enterprise** virtual switch (*Nexus1000v not required*)
- Initiates/terminates secure tunnel for site-to-site communication
- Carries VLANs that are extended to the Cloud

Virtualised DC / Private Cloud

Virtual Appliance

ICS

- Intercloud Switch
- Virtual Ethernet Module in a VM format that connects to **Public Cloud** virtual switch (*Nexus 1000v not required*)
- Initiates/terminates secure tunnel for site-to-site and for VM to VM communication

Public Cloud

Virtual Appliance

Intercloud Fabric Core Infrastructure – Contd.

ICF FW

- Zone-based firewall
- Leverages VSG (Virtual Secure Gateway) technology
- Leverages vPath
- Managed by Intercloud Fabric for Business

ICF Router

- Provides: interVLAN routing, VPN, NAT etc.
- Leverages CSR (Cloud Services Router) technology
- Runs IOS-XE
- Managed by Intercloud Fabric for Business

Public Cloud
Virtual Appliance

Intercloud Fabric Core Services

Networking		• Switching • Routing • Advanced network-based capabilities
Cloud Security		• VM to VM • App to App security controls
VM Portability		• VM format conversion • Mobility
Mgmt & Visibility		• Private and Hybrid Cloud monitoring capabilities
Automation & APIs		• VM lifecycle capabilities • Automated Operations • Programmatic APIs

Intercloud Fabric Extended Services

- Service categories are open to other Cisco and 3rd party services
- It allows to expand the service portfolio while widening an open ecosystem
- Examples:

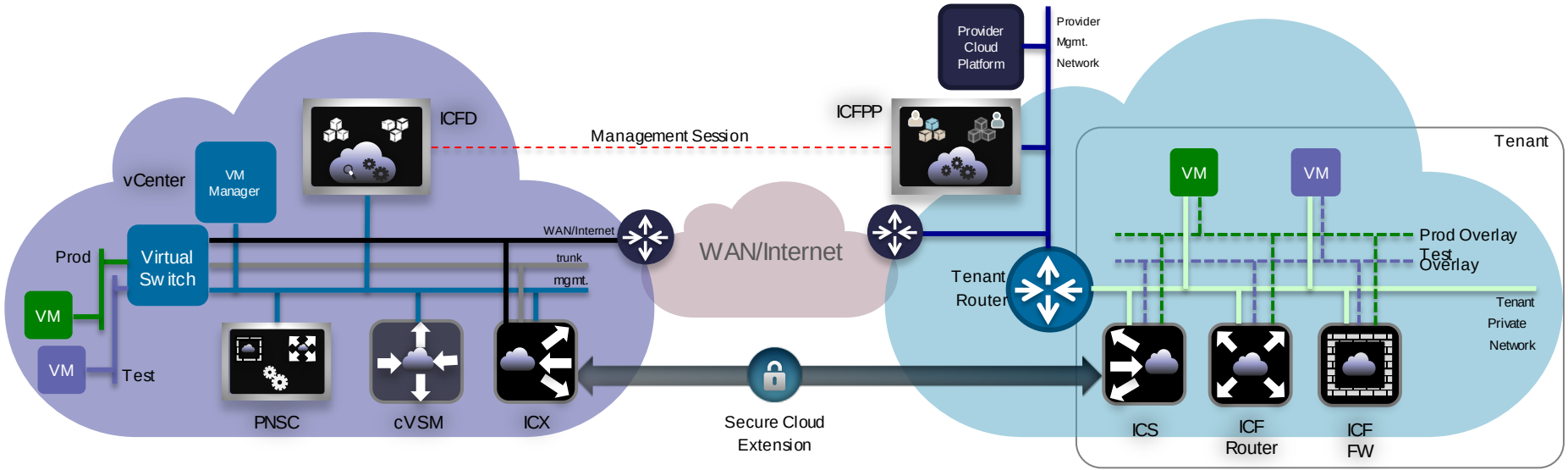
Storage

- Best of breed storage technologies
- 3rd party ecosystem
- Replication technologies
- Will enable DRaaS use cases in the future

Application Services

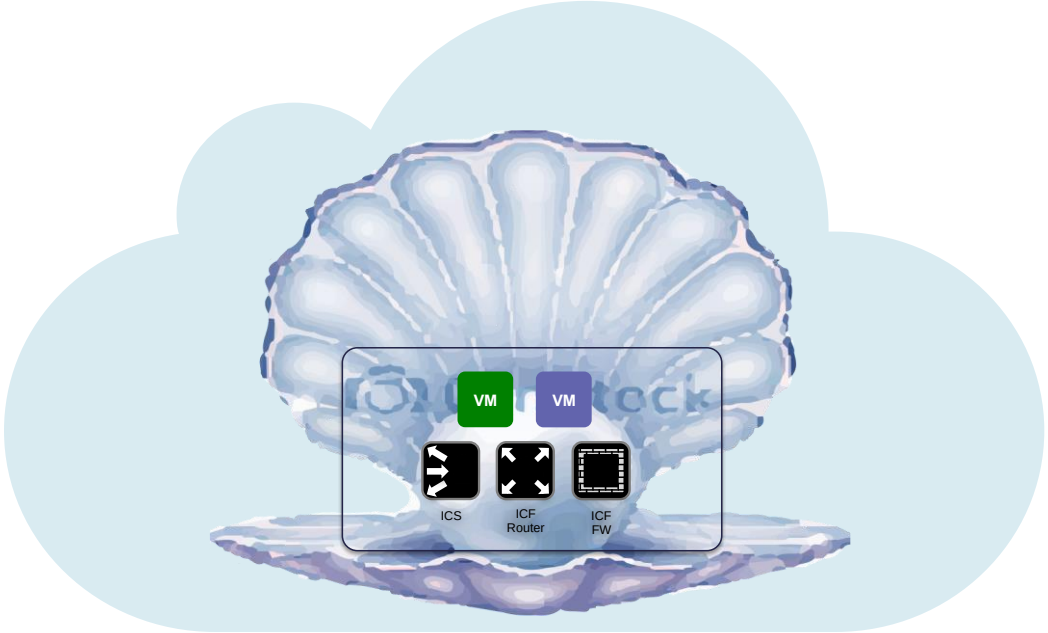
- Best of breed Application Services
- Cisco and 3rd party
- L4-L7 services

End to End Architecture with ICF Components



icfShell Concept

- High level construct that identifies a group of VMs
- Designed to be portable and secure across clouds
- Concept of Cloud Profile, that includes:
  - Workload Policies
  - Definition of Site-to-Site and VM to VM Secure Communication
  - VM Identity
  - Cloud VM Access Control



Network Overlay Driver Architecture

Cloud VM management interface, given by Provider DHCP server, from Tenant Private Network address space

Overlay interface, from Enterprise address space

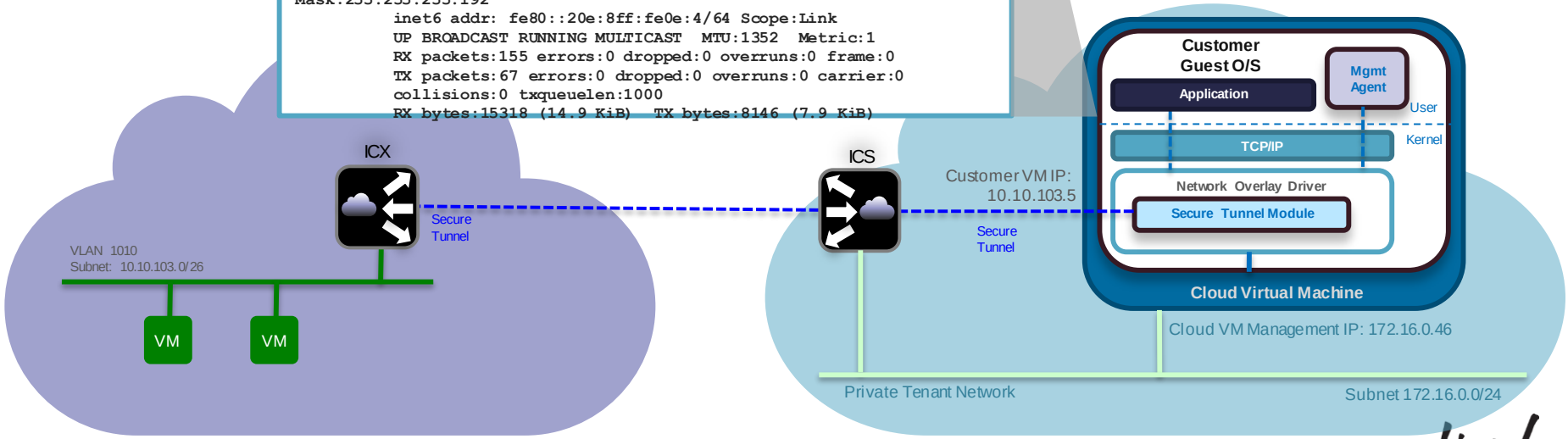
```
[root@host-172-16-0-46 ~]# ifconfig
csc0      Link encap:Ethernet  HWaddr FA:16:3E:6B:19:CC
          inet addr:172.16.0.46  Bcast:172.16.0.255  Mask:255.255.255.0
          inet6 addr: fe80::f816:3eff:fe6b:19cc/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:12013 errors:0 dropped:0 overruns:0 frame:0
          TX packets:220 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2072061 (1.9 MiB)  TX bytes:37355 (36.4 KiB)

eth0      Link encap:Ethernet  HWaddr 00:0E:08:0E:00:04
          inet addr:10.10.103.5  Bcast:10.10.103.63
Mask:255.255.255.192
          inet6 addr: fe80::20e:8ff:fe0e:4/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1352  Metric:1
          RX packets:155 errors:0 dropped:0 overruns:0 frame:0
          TX packets:67 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:15318 (14.9 KiB)  TX bytes:8146 (7.9 KiB)
```

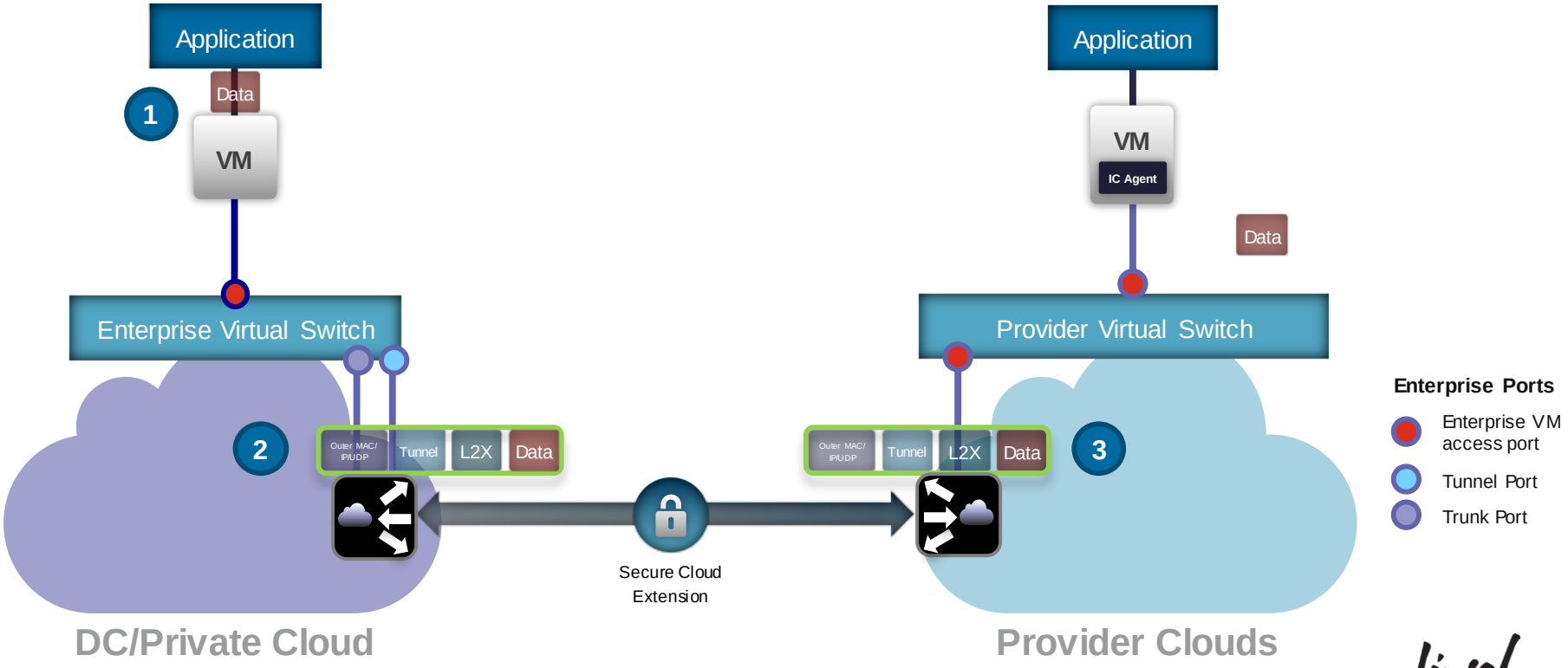
Interface *csc0* is removed

By ICF when VM is migrated

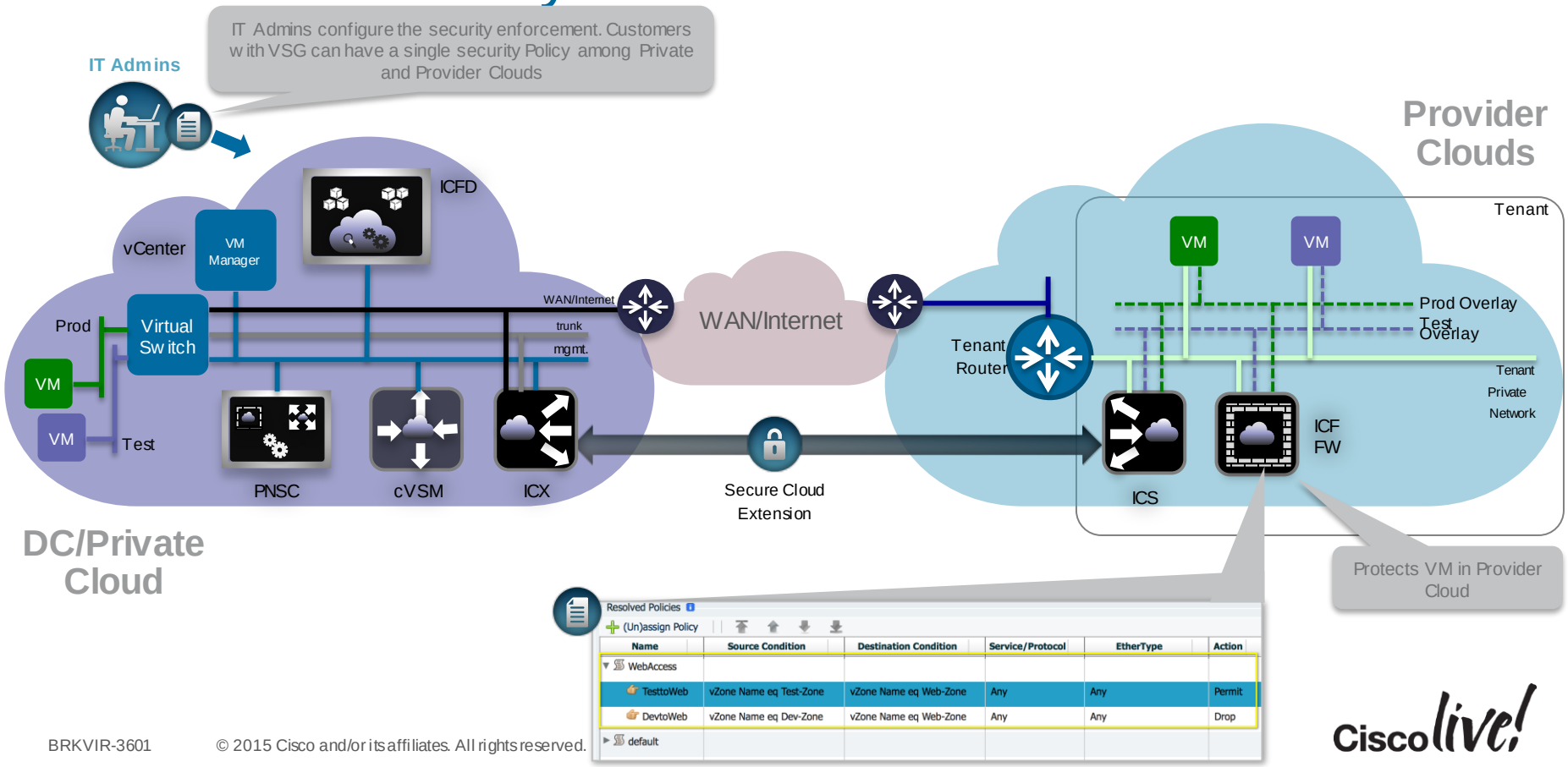
Back to Enterprise



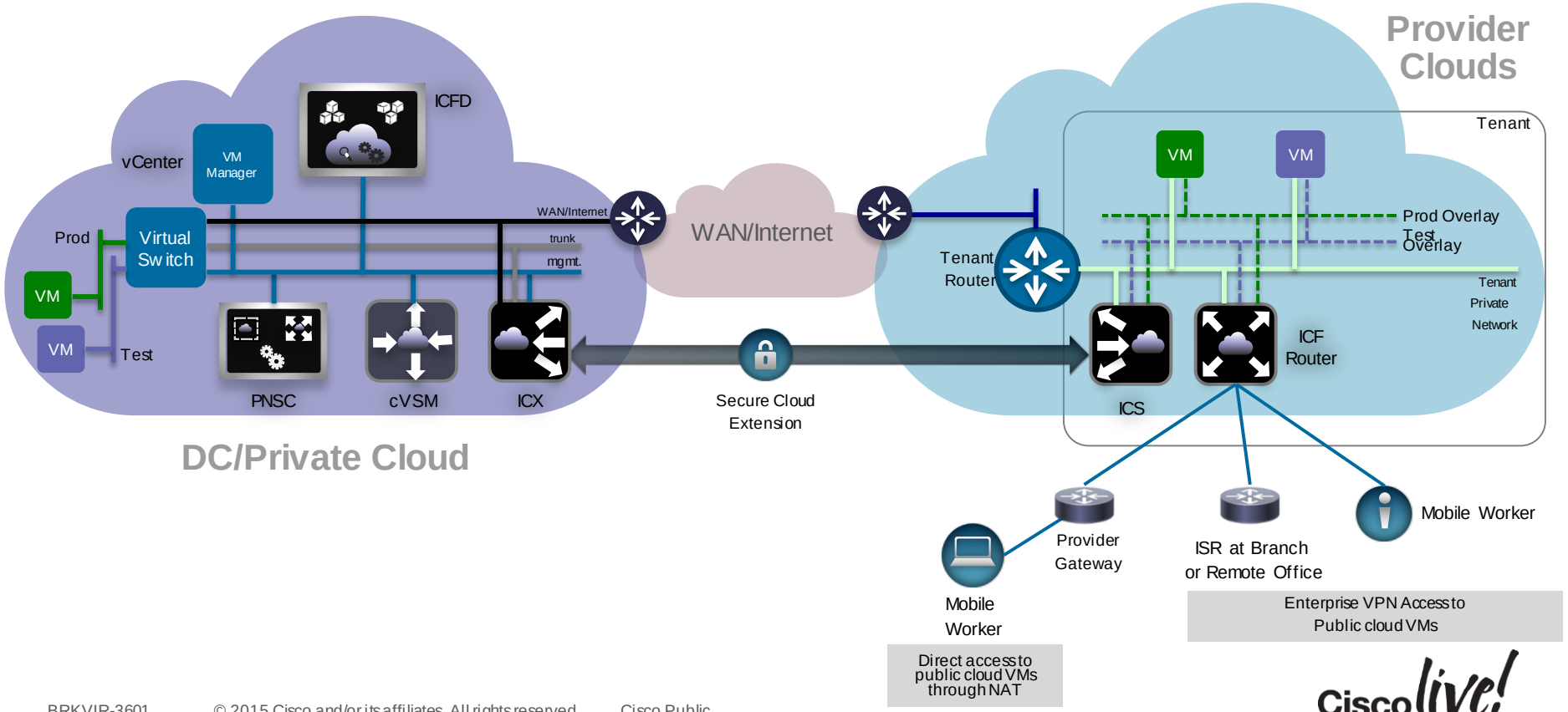
Secure Network Extension



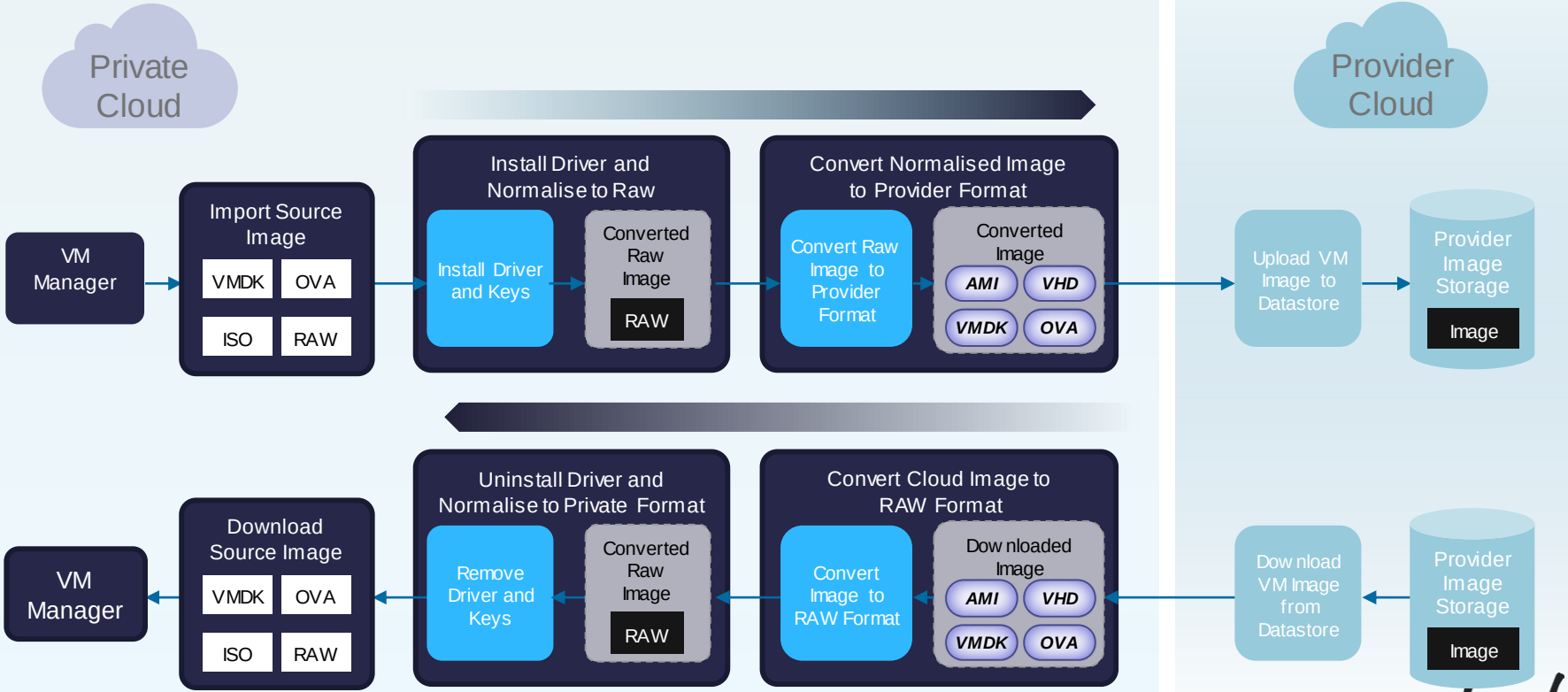
Firewall Across Hybrid Cloud

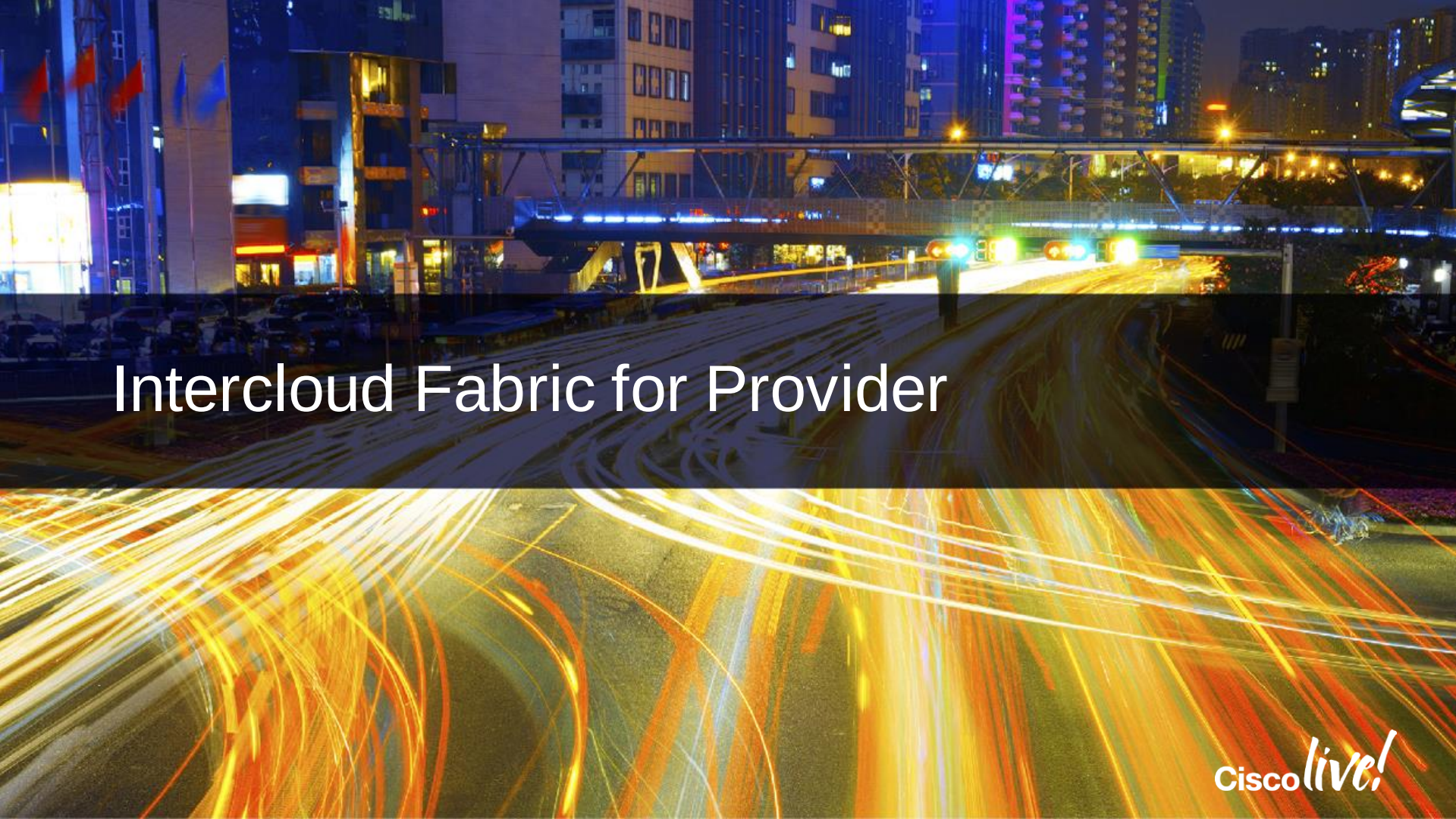


Routing Across Hybrid Cloud



ICF VM Image Conversion





Intercloud Fabric for Provider

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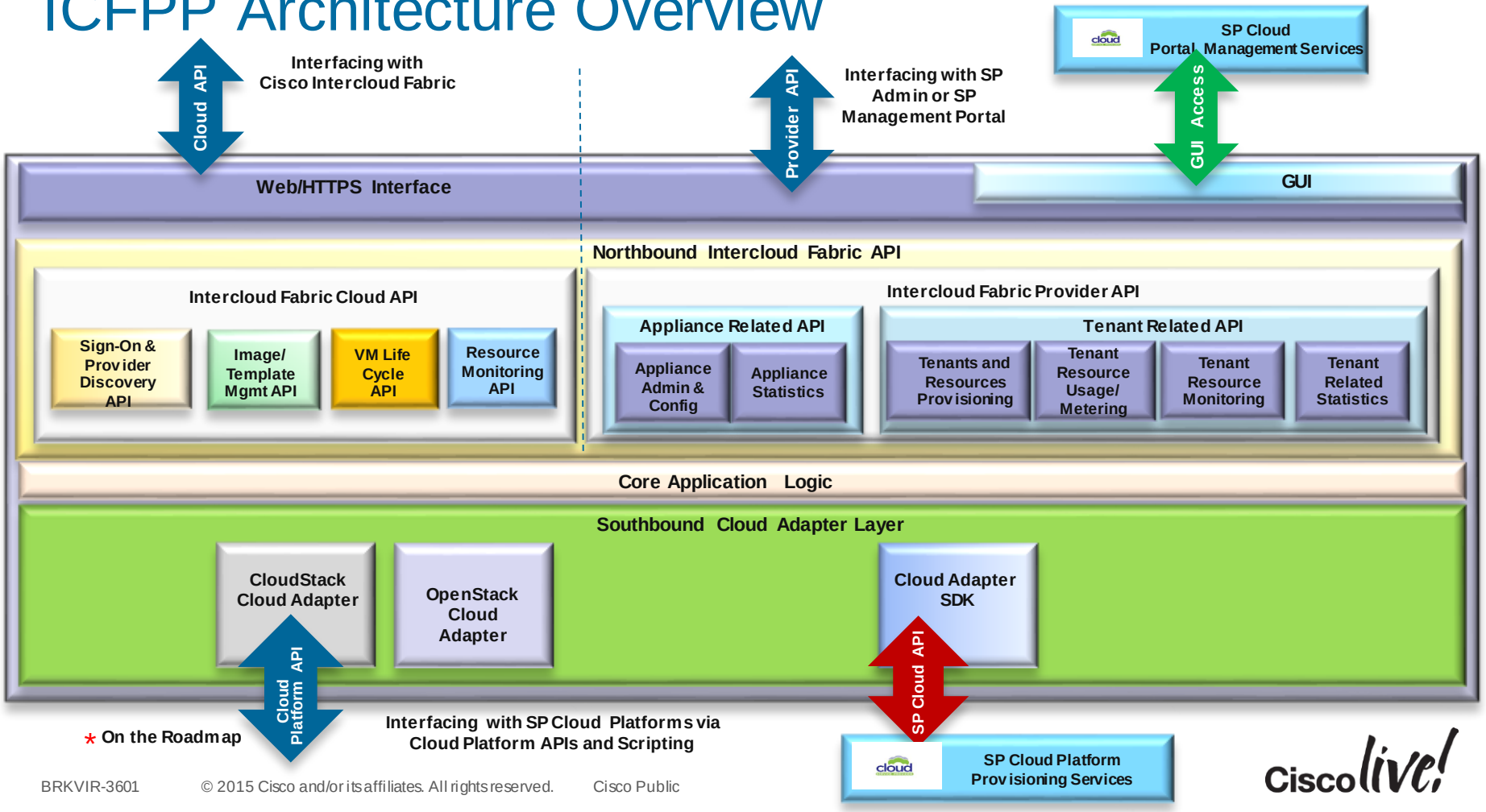
Intercloud Fabric Core Infrastructure – for Cloud Provider

ICFPP

- Intercloud Fabric Provider Platform
- Multi-tenant device, installed and managed by Service Provider
- Creates Cloud API uniformity for different Providers
- In the future, will help to build Cisco infrastructure-specific differentiation
- Supports heterogeneous Cloud Platforms
- Provides NB APIs for integration with SP Cloud Platform
- Allows tenant level resource monitoring and metering

Public Cloud
Virtual Appliance

ICFPP Architecture Overview



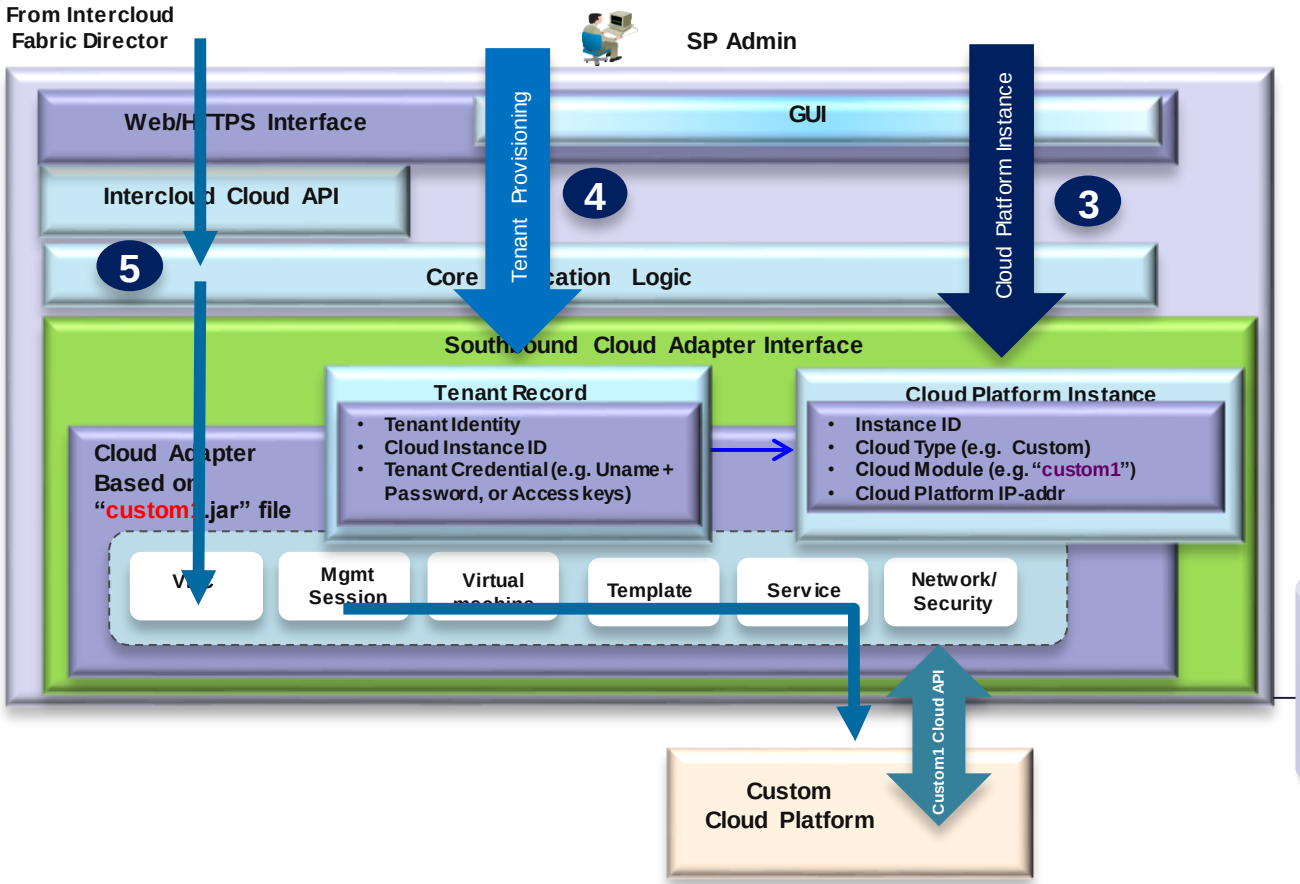
ICFPP Northbound APIs – Cloud API

Enables Cloud Provider Integration	Virtual appliance—deployed and managed by cloud provider Acts as a proxy between Intercloud Fabric and provider Infrastructure Requires access to provider infrastructure
General	Account Login, Location/Partitioning
Image Management	Import/Export, Upload of VM image, Create/Delete Template from image
VM Life Cycle	Create (from template), Retrieve, Update, Delete, Start, Stop, Reboot
VM Storage Management	Create/Delete volume and Attach/Detach volume to VM
Security	Security Group

ICFPP Northbound APIs – Provider API

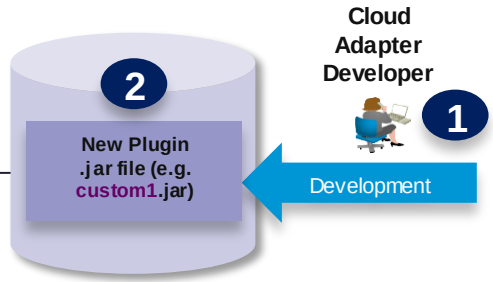
Enables Provider to Integrate with existing Portal, OSS/BSS	Used by Providers for tenant/user provisioning within ICFPP Can be used for Cloud Portal, OSS/BSS Integration Used for xxx
Cloud Instance Provisioning	Provisions provider cloud platform within ICFPP
Tenant/User Provisioning	Creates, Retrieve, Update, Delete
Accounting and Statistics	Tennant/Account Summary and Details, VM (disk, memory, compute, networks, resource usage)
Logs and Debugging	Gets current or all existing logs in the box
Infrastructure Update	Upgrade ICFPP

ICFPP Cloud Adapter Programming Model

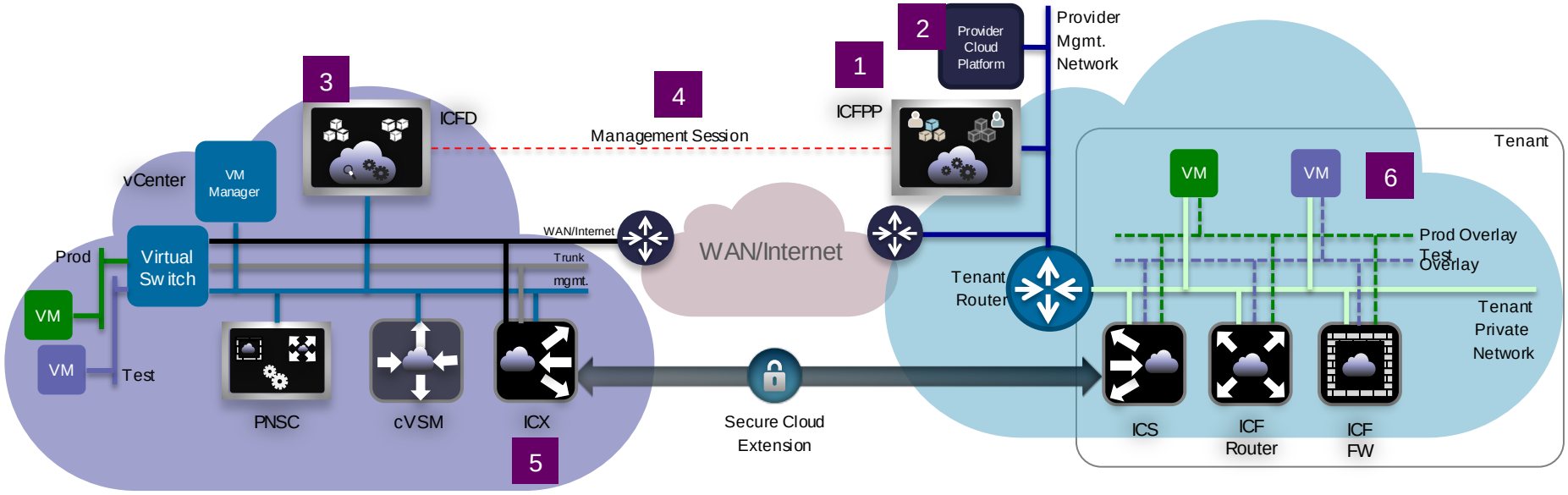


A new cloud platform adapter can be developed in the following steps:

- Develop a cloud adapter plug-in code and load it into the ICFPP system.
- Configure a Cloud Platform Instance and associate it with the plug-in module (e.g. custom1.jar)
- Provision tenants with Tenant On-board API and associate them with a targeted cloud instance.



End to End Architecture with ICF Components



1) Install ICFPP

2) Interfaces with ICFPP via API

3) Deploy Intercloud Fabric Director

4) ICFD sign-on with ICFPP

5) Configures icfCloud

6) Deploy VMs in the Cloud


Plan and Design for ICF
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ICF for Business Technical Requirements – 1 of 6

- Take note of vCenter Information where ICF components will be deployed:
  - IP Address
  - Authentication credentials *(admin access required)*
  - Data Centre Name
  - ESXi host or Cluster
  - Datastore
- Take note of DNS and NTP servers
- Create Naming convention for:
  - ICF components (ICFD and PNSC)
  - Private Cloud
  - Public Cloud
  - vDC
  - IP Pools
  - Policies *(Network and System)*

ICF for Business Technical Requirements – 2 of 6

- Reserve IP addresses for:
  - Intercloud Fabric Director
  - IP pools *(explained later)*
- Management IP Pool sizing:
  - 1 x PNSC
  - 1 for standalone cVSM, 2 for redundant standalone
  - 1 for standalone ICX, 2 for redundant ICX
  - 1 for standalone ICS, 2 for redundant ICS
  - CSR and VSG requires additional IP address
  - Each additional pair of ICX and ICS will use additional IP addresses *(one instance of ICF supports up to 16 pairs of ICX-ICS)*
- URI from cloud provider
  - Amazon and Azure does not require it

ICF for Business Technical Requirements – 3 of 6

- IP Pool planning for Management network and other networks that will be extended to the Cloud:
  - Naming convention
  - IP range
  - Subnet mask
  - Gateway IP Address
  - VLAN ID
- Network Policy
  - Name convention
  - Port group name
  - IP address type: DHCP or Static *(**note:** DHCP can be used, but IP may change after VM migration)*
  - NIC name
  - Mandatory NIC or not (each policy has to have at least 1 mandatory NIC)

ICF for Business Technical Requirements – 4 of 6

- System Policy
  - Name convention
  - VM Name Template (can use variables to define VM name in the cloud)
  - DNS Domain
  - DNS Server List
- ICF can support up to a maximum of 1000 VMs
  - 100 VMs per icfCloud
  - 16 x icfCloud
- Open firewall to enable access to cloud provider IP ranges:
  - TCP and UDP 6644 and 6646 *(required for the ICX to communicate with ICS)*
  - TCP 22 and 443 (required for PNSC to communicate with cloud provider

ICF for Business Technical Requirements – 5 of 6

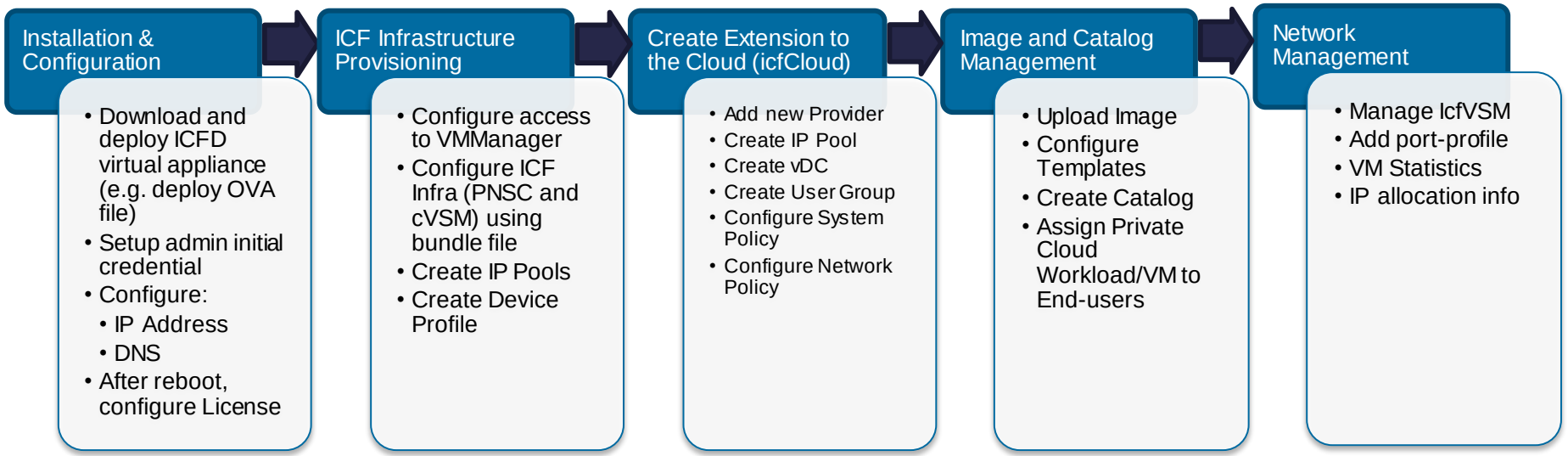
- Enterprise virtualised infrastructure requirements
  - vCenter 5.1 or 5.5
  - ESXi 5.1 or 5.5
  - Recommended network redundancy in the ESXi hosts
  - ICFD and PNSC must have IP connectivity on port 443 to all ESXi hosts
- If ICX trunk port is connected to VMware standard virtual switch or distributed switch, change the following to accept: Promiscuous Mode, MAC Address Changes, Forged Transmits
- Disable Unknown-Unicast-Flooding-Block (UUFB) if you are using Cisco Nexus 1000v switch in the private cloud. Enter command “no uufb enable”

ICF for Business Technical Requirements – 6 of 6

- Plan for capacity on prem and on the cloud
- Review Intercloud Fabric Release Notes with the most updated information

Product	vCPU	Memory (GB)	Disk (GB)
ICFB	4	8	100
PNSC	4	8	220
cVSM	1	2	3
ICX	2	2	4
ICS for AWS	8	15	20
ICS for Azure	4	7	20
ICS for others	4	4	20

Overall Business Customers Experience with ICFB Implementation – Basic Environment

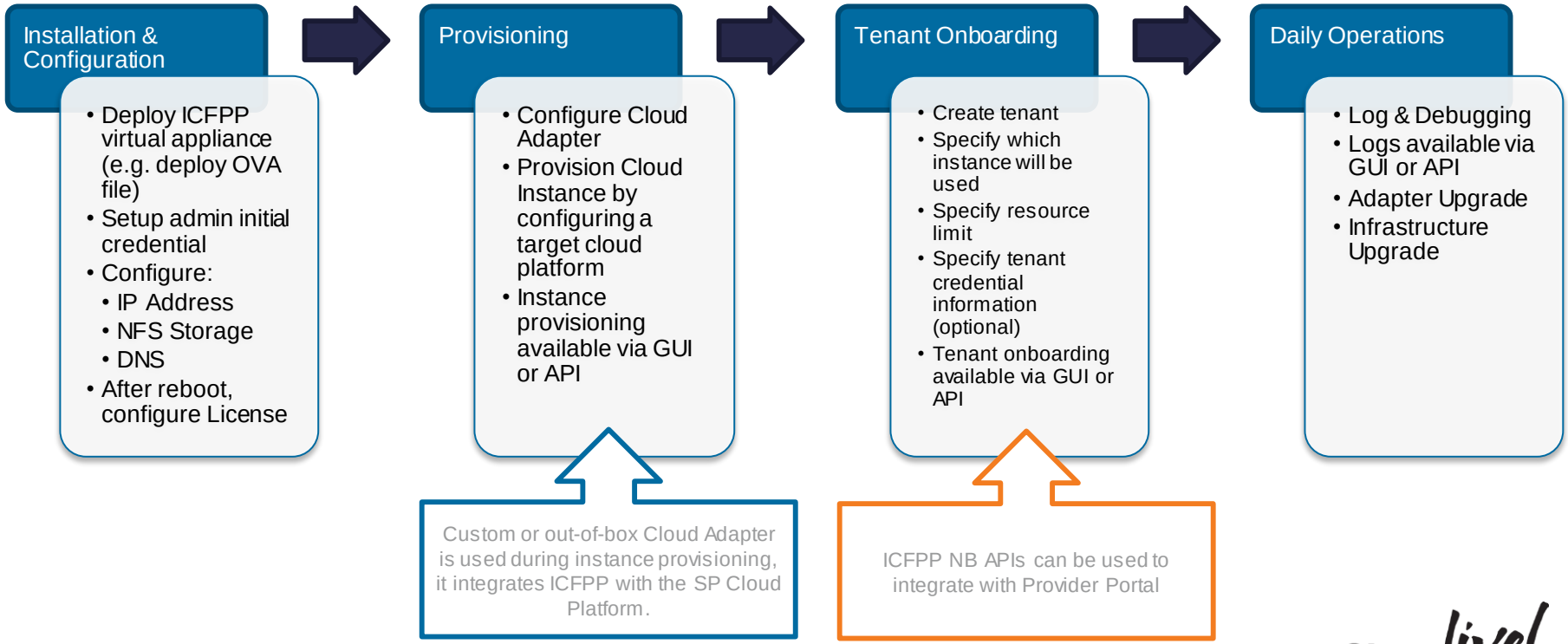


Configure Hybrid Cloud in few hours!

ICF for Provider Technical Requirements

- Any cloud management platform or provisioning tool with northbound API can be integrated with ICF for Provider, via Cisco developed adapter or custom
- Business customers will access ICFPP through its public address
- Connection is initiated by ICFB
- Port 443 needs to be opened for remote access and between ICFPP and the cloud management platform/provisioning tool
- Need public IP assignment for ICS
- Each tenant will have its own ICS

Overall Service Provider Customer Experience with ICFPP Implementation



Video

Video Demonstration

- Use Case 1: End-User Experience
- Use Case 2: Create Workload in the Cloud
- Use Case 3: Workload Migration

Customer Examples

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Customer Use Cases

- Will be presented during session

Cisco Resources for Intercloud Fabric

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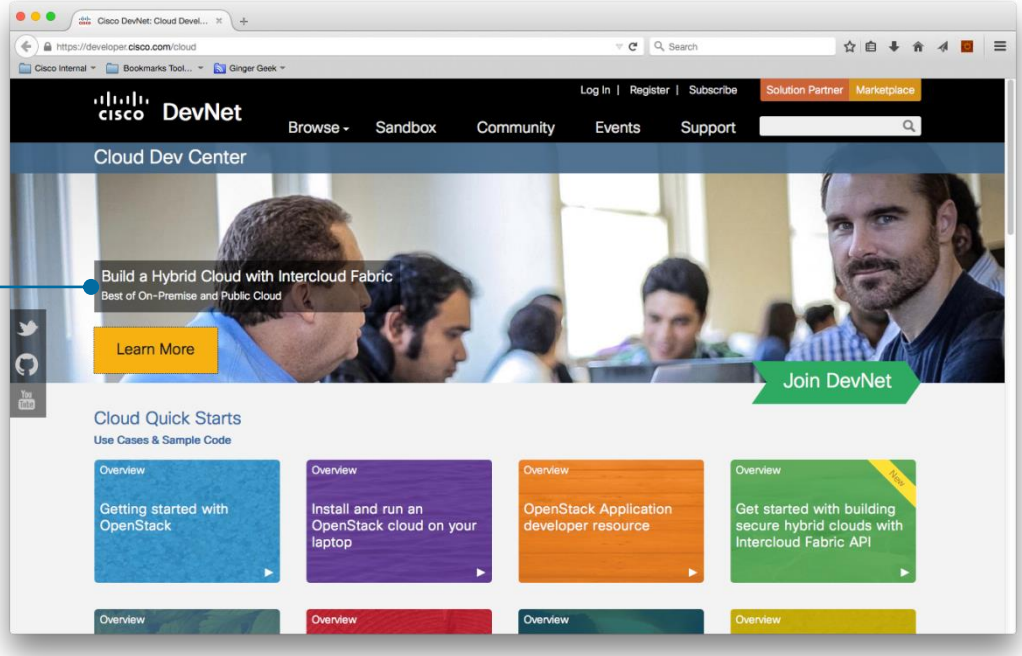
Intercloud Fabric Resources

- Official Site:
  - cisco.com/go/intercloudfabric
- White Paper:
  - http://www.cisco.com/c/en/us/td/docs/solutions/Hybrid_Cloud/Intercloud/Intercloud_Fabric.html
- Deployment Videos:
  - http://www.cisco.com/c/en/us/support/cloud-systems-management/intercloud-fabric/products-installation-guides-list.html
- Developer Community:
  - https://communities.cisco.com/community/developer/networking/cloud-and-systems-management/intercloud-fabric
- DevNet
- YouTube Videos

Intercloud Fabric @ Cisco DevNet

Intercloud Fabric @ DevNet

Resources for Developers:
- API documentation
- Code snippets
- Sandbox
- Forum



developer.cisco.com/cloud

Conclusion

Conclusion

- Intercloud Fabric provides a simple way for customers to expand their Data Centre/Private Clouds network and security to Provider Cloud, allowing seamless experience
- Workload migration and portability is seamless to the end-user, irrespective of the underlying infrastructure configuration
- Support for heterogeneous infrastructure
- Intercloud Fabric for Business provides single point of management for multiple cloud providers, with End-User and IT Admin Portal and Self-Service Catalog
- Intercloud Fabric for Provider:
  - Enabler for hybrid cloud
  - Enhances additional managed services
  - ICFPP Creates Cloud API uniformity for different Providers
  - ICFPP will differentiate Cisco Powered Providers from other clouds
    - Roadmap to include bare-metal workloads, tither storage integration etc.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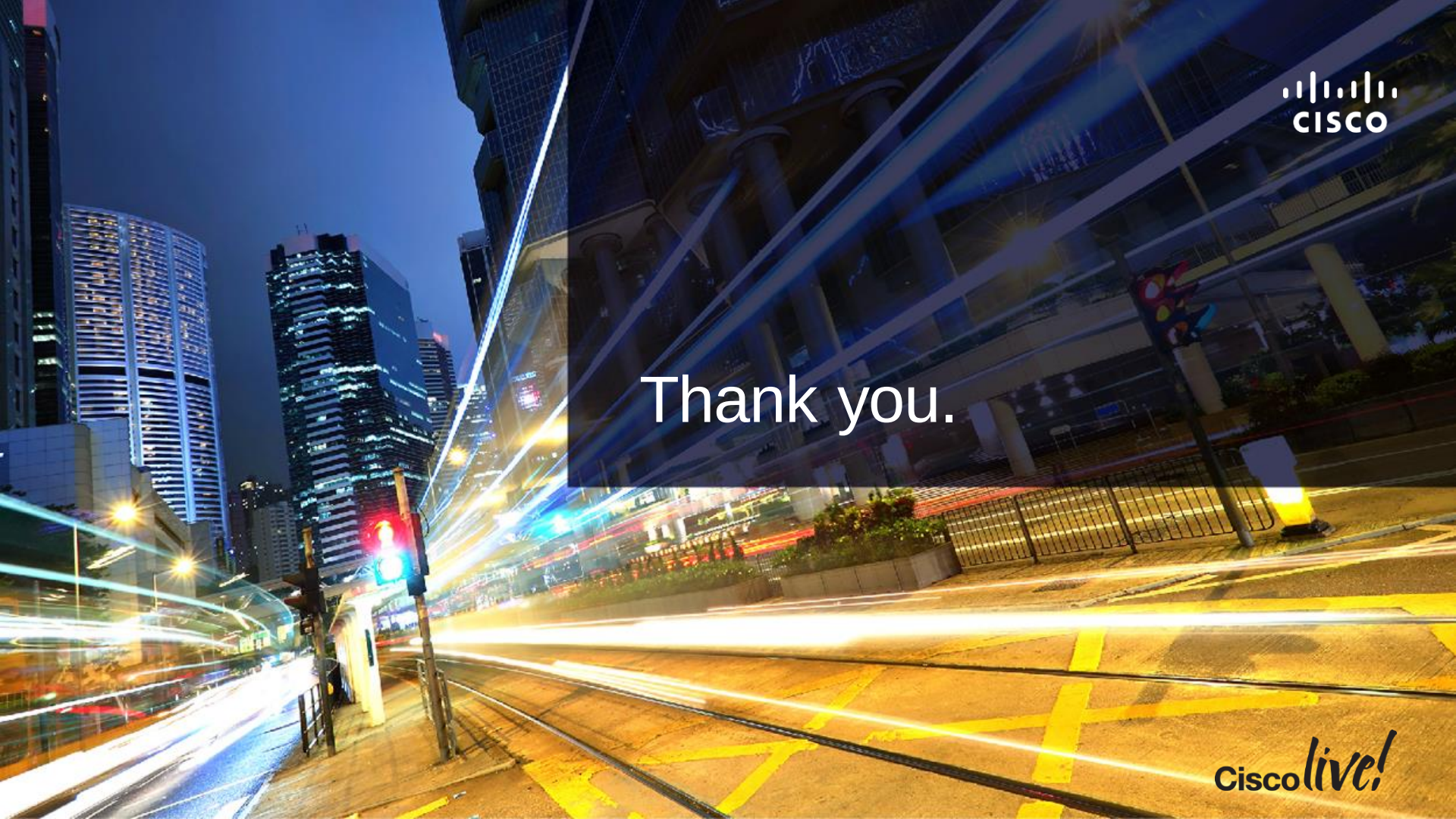
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