



## Cloud Director™

### The Leading Cloud Services Platform for Cloud Providers

#### AT A GLANCE

VMware Cloud Director (VCD) is a leading cloud service-delivery platform used by some of the world's most popular cloud providers to operate and manage successful cloud-service businesses. VMware Cloud Director helps cloud providers derive maximum efficiency from their cloud infrastructure and enables the creation and provisioning of differentiated and value-added cloud services. VMware Cloud Director is available globally through VMware Partner Connect, Cloud Provider.

#### KEY BENEFITS

- VMware Cloud Director delivers a hyperscale-class cloud platform in and across Cloud Provider's datacenters helping save operational cost and capital expenditure.
- VMware Cloud Director is highly automated, extremely operationally efficient, and scale-tested for global cloud environments
- VMware Cloud Director delivers a suite of native cloud services and Kubernetes Native & Tanzu clusters, along with custom self service capabilities. Hundreds of cloud providers across the world have used VMware Cloud Director to up-level from pure IaaS / hosting to a full-fledged portfolio of profitable cloud services
- VMware Cloud Director delivers a unified platform to manage applications, VMs as well as containers. VCD offers several ways to code and extend its functions in a developer environment such as python and REST API as well as Terraform Provider support to drive infrastructure as code.
- VMware Cloud Director has proven cost saves and revenue generation for Cloud Providers, enabling business growth with minimal operational headcount increase.

#### What is VMware VMware Cloud Director?

VMware VMware Cloud Director is VMware's flagship cloud services platform for Cloud Providers. It is a pervasive cloud infrastructure control plane for cloud providers' service-delivery needs, and the management entity for a global VMware cloud estate. VMware Cloud Director allows seamless provisioning and consumption of cloud computing resources and services to geographically distributed lines of business and IT teams in an API-driven approach.

#### What are the key features of VMware VMware Cloud Director?

**Multi-tenant Resource Pooling:** VMware Cloud Director helps create virtual datacenters from common or distributed infrastructure to cater to heterogeneous enterprise customer needs. With VMware Cloud Director, a Cloud Provider can host and serve multiple customers from a single vCenter that may be stretched across distributed physical servers.

**Cloud-native Offerings:** VMware Cloud Director provides an easy on-ramp to cloud-native application development for enterprise DevOps by delivering enterprise-grade native and Tanzu based Kubernetes runtime, lifecycle management of K8 clusters managed by any K8 provider (CSE/WCP/Tanzu/Ent-PKS). With Kubernetes delivered by self-service, tenants can deploy k8s clusters with or without the VMware Cloud Director Container Services Extension, they can upgrade custom or VMware templates, spin up, scale in/out, one or more standards compliant vSphere Kubernetes k8s clusters via native GUI or API and CLI.

**Deep Automation:** VMware Cloud Director delivers unparalleled infrastructure efficiencies with context-aware automation across workflows. Terraform Provider for VMware Cloud Director enables complete provisioning of compute and network resources as code, and integration with Cloud Provider Pod enables simple architecture design of a service-ready cloud stack.

**Service Suite and Service Stitching:** VMware Cloud Director has an open extensible form-factor that is leveraged by leading data protection, storage, network, security, and other cloud software vendors to natively integrate their offerings VMware Cloud Director UI. Moreover, cloud providers can offer each of their customers bespoke user experiences by publishing their own custom services and user-views in App Launchpad with automatic delivery on both containers (Helm charts) and VM.

**Policy-driven Cloud Management:** VMware Cloud Director ensures enterprises have secure, isolated virtual resources and intelligent dynamic distributed firewalling for integral malware spread prevention. Cloud Director provides independent role-based authentication at the levels of cloud providers and their customers, and fine-grained access control across datacenters, sites, virtual machines, and applications. Moreover, intelligent workload-placement allows cloud providers to drive higher efficiency from their cloud infrastructure licensing and utilization while delivering outstanding performance and exceeding SLAs.

**Global Hybrid Cloud Management:** VMware Cloud Director helps cloud providers manage and gain deep visibility into datacenters across sites and geographies, and monitor cloud resources across sites from a single pane of glass. VMware Cloud Director is proven to connect and scale seamlessly across thousands of sites. Multi-site is a core requirement for hybrid customers and is supported by Cloud Director and Cloud Director service bi-directionally.



**Cloud Migration and Availability:** VMware Cloud Director helps enable simple, secure VM migration and data center extension with VMware Cloud Availability. This allows for secure hybridity, simple Layer 2 connectivity and cold or warm migrations to Cloud Director and Cloud Director service on VMware Cloud on AWS. The integration with VMware Cloud Availability makes it easy for cloud providers to run data protection offerings compatible with on-premises vSphere enterprise environments.

**Networking and Security as an inclusive offering:** VMware Cloud Director supports NSX-T with dynamic distributed firewalling, cross VDC networking, vApp Edge Networking services, overlapping IP support, IPv4 and IPv6 coverage and native layer 2 and layer 3 IPSec VPN services. VMware Cloud Director provides Load Balancer as a service capabilities in association with NSX Advanced Load Balancer, bringing application intelligence to load balancing.

**High Performance compute workload coverage:** VMware Cloud Director supports Nvidia high performance vGPU AI Enterprise services for customers who wish to utilize a next generation compute solution that requires GPU compute power. Using native multi-tenancy VMware Cloud Director is able to reduce the cost of physical GPU services and share capabilities securely across tenants.

**Operational Visibility and Insights:** Leveraging integration with VMware vRealize Operations' Tenant App for VMware Cloud Director, cloud providers can use multi-layer analytics and predictive remediation to better serve their enterprise customers. The integration also provides visibility into virtual machine costs and accountability to understand granular costs of virtual infrastructure required to support business services.

## What are the key benefits of VMware Cloud Director for the Cloud Provider?

**Operational Efficiency:** VMware Cloud Director enables cloud providers to obtain extreme operational efficiencies out of their cloud infrastructure, and also reduces operational overheads that come with maintaining silo'd private and multi-cloud environments. VMware Cloud Director significantly reduces time-to-market for cloud providers' services and scales these services globally without external dependencies and ballooning costs.

**Service-expansion and Monetization:** VMware Cloud Director enables cloud providers to spin up new cloud services on Day 1. Cloud providers can drive more revenue by publishing their own service suite, or 3rd party ISV-provided backup, DR, security, migration, and other leading cloud services that are tenant and site-aware. Services can also be launched by App Launchpad, negating customer knowledge of infrastructure and security to any end point; containers and VMs. VMware Cloud Director forms a unified management plane for the entire service portfolio of a cloud provider. VMware Cloud Director is also a key element to getting the 'Cloud Verified' certification, a mark of the most capable and differentiated VMware Cloud Providers in the world.

**Developer-Readiness:** VMware Cloud Director provides an open platform for cloud providers and customer developers to build on. Using the programmatic interfaces, automation tools, and extensibility frameworks of VMware Cloud Director, cloud providers can not only differentiate themselves by providing unique experiences to their customers but also help them get to application-building faster. Using VMware Cloud Director, providers are able to offer tenants various tiers of cloud native services, secure K8s cluster infrastructures (now including Tanzu Kubernetes Grid for vSphere and Multi-Cloud) and marketplace application portfolios / interfaces to meet developer needs.

## What are the key benefits of VMware Cloud Director to the end-customer?

**VMware Cloud-as-a-Service:** Consume turnkey cloud services, including the full VMware Software-Defined Datacenter, as a service from a trusted VMware Cloud Provider, with full self-service controls or delivered as part of a managed service.

**Easy-to-Provision and Easy-to-Consume VMware Cloud:** Experience a single access point for all your virtual datacenters via an intuitive UI or APIs. Enjoy easy, self-service consumption and provisioning of cloud services, including 3rd-party services and cloud provider-built services through a single pane of glass to any target platform. Leverage simplified workflows and container services to build better and faster.

**Easy Workload Migration Across Virtual Datacenters:** Backup, evacuate, or replicate VMs or entire datacenters in a few clicks to a resilient VCD-powered cloud

**Fast Path to Hybrid Services:** VMware Cloud Director provides a feature-rich, self- service and modern cloud environment with on-demand elasticity, streamlined on-boarding and hybrid cloud operations across multiple clouds.

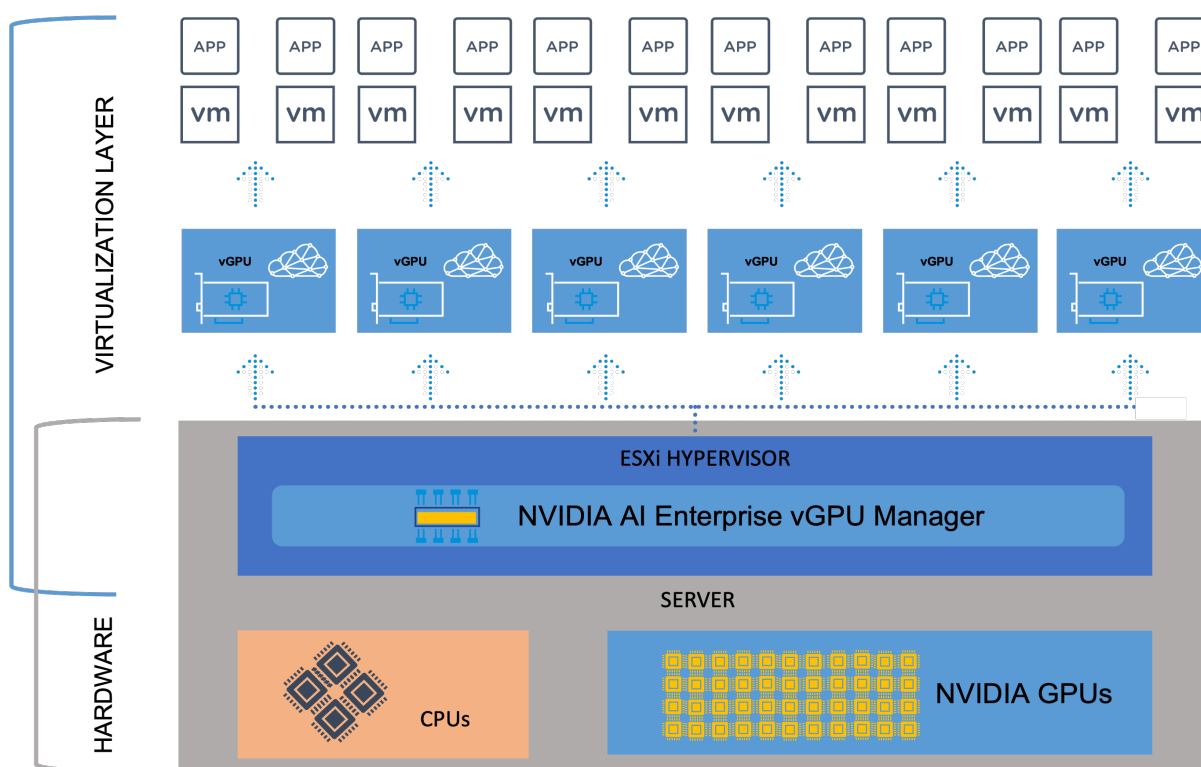
**Developer Ready Clouds:** VMware Cloud Director provides Terraform Provider infrastructure-as-Code a range of API capabilities and Kubernetes K8s native & Tanzu cluster services from the Container Service Extension supporting VMWare PKS, Tanzu Kubernetes Grid (TKGs & TGKm) or native Kubernetes that can be consumed by enterprise developers as code. Tenants can deploy and manage any type of K8s cluster (native/Tanzu/Ent-PKS) using VMware Cloud Director cluster API/CLI/UI (with or without Container Service Extension). Equally now Cloud Providers can offer Platform as a Service VMware Marketplace or custom applications to consumers via the App Launchpad, essentially negating the need for customers to understand underlying infrastructure.

## What is new in VMware Cloud Director 10.3.2?

### Support for AI/ML workloads with NVIDIA vGPU services

As modern applications become more prolific in cloud, service providers need to address the increasing customer demand for accelerated computing (e.g. machine learning, artificial intelligence development, high end analytics, 3D modeling, virtual desktops, video editing, high-end computer gaming, weather prediction, oil and gas geology, scientific computing and much more) that require large volumes of multiple, simultaneous computation that can be met with GPU capability.

Cloud Providers can now leverage vSphere support for vGPU based on NVIDIA *AI Enterprise* with *compatible hardware* from within Cloud Director delivering multi-tenancy vGPU services, key in reducing cost requirements for vGPU services. Cloud Provider tenants of Cloud Director can self serve, manage and monitor their vGPU accelerated hosts and virtual machines within Cloud Director and Cloud Providers can meter vGPU usage averaged over a unit of time per tenant with through vCloud API for tenant billing.



Cloud Director delivers NVIDIA virtualization through preconfigured NVIDIA ESXi hosts and virtual machines with NVIDIA AI Enterprise, using vSphere 7 Update 2 GPU features whereby NVIDIA MIG (Multi-instance GPU) achieves multitenancy boundaries between workloads at the physical level inside a single device, increasing optimization and margin. Cloud Director is reliant on host pre-configuration for vGPU services including NVIDIA deployment/configuration and *vGPU profiles*.

For the initial phase of this release, Cloud Director supports vMotion and High Availability of vGPU workloads, and only Flex based tenant Orgs can support GPU Profiles & Policies. vGPU is focused and optimized to support general purpose GPU targeting Machine Learning, Artificial Intelligence and high performance compute optimized for GPU. Cloud Providers can offer vApp Templates pre-configured with all the necessary Nvidia drivers, placement policies and vGPU Profiles assigned.

NVIDIA IAI Enterprise licenses are the sole responsibility of the Cloud Provider to obtain and manage, there is no additional cost for Cloud Director to support of NVIDIA vGPU services. Support for vGPU is the same as provided with vSphere, covering latest generation NVIDIA GPU based on Ampere.

Cloud Providers are able to 1) monitor (through vCloud API and UI dashboard) vGPU allocation, usage per VDC and per VM to optimize utilization and meter/bill (through vCloud API) vGPU usage averaged over a unit of time per tenant for tenant billing. Tenants can monitor (through vCloud API and UI dashboard) their own vGPU allocation, usage per VDC and per VM to optimize their costs and utilization.

## Networking services: NSX-T Segment Profiles

To simplify operational onboarding and configuration of essential services Cloud Director now allows system administrators to assign customer NSX-T segment entity profiles to organizational virtual data center networks. Segment profile capabilities include:

- Spoof Guard: Enable/disable Port Bindings based on an IP or MAC address
- IP Discovery: Configure ARP and/or DHCP snooping.
- MAC Discovery: Setup MAC Change and MAC Learning rules
- Segment Security: BPDU and DHCP Filter, Rate Limits, etc.
- QoS: DSCP (trusted or untrusted), CoS, Bandwidth limitations

As such this allows providers or tenant admins to apply a profile encapsulating multiple networking components to a network segment. This can save considerable configuration time and using profiles help ensure a consistent approach to networks and security minimizing space for manual configuration error.

Segment profiles must be created prior in NSX-T directly by the provider admin and can be imported into Cloud Director where they can be organized into custom network profiles. The segment profiles are flexible to be able to be applied at a global Org VDC level or vApp level - applied and sync'ed with all NSX-T managers.

Custom segments profiles are needed in several specific situations, including as example: MAC or IP learning needs to be enabled for nested environments, custom security profiles to allow for DHCP traffic originating from a network, custom security profiles for HCX, enabling spoof guards or defining QoS on specific networks.

## Networking services: Rate limiting NSX-T Data Center Edge Gateway

Customers need quality of service to ensure the performance of critical applications where there is limited network capacity. The primary goal of Quality of Service (QoS) is to manage packet loss and reduce latency and jitters on a network connection. QoS enables organizations to adjust their overall network traffic by prioritizing specific high-performance applications.

Cloud Director is now able to use a preconfigured QoS Profile at the customer Gateway for both ingress and egress via API and UI. The QoS profiles can be designed simply and infrequently as an operational configuration or managed service in NSX-T. The more frequent workflow – i.e. assigning these profiles to an NSX-T Data Center Edge Gateway with the bulk of the QoS profile specification occurring, is accomplished in Cloud Director.

Cloud Director provides a simple mechanism for the provider and or tenant to specify the desired QoS profiles when configuring NSX-T Data Center Edge Gateways. The QoS profiles must already exist on the target NSX-T manager configured as a day two operation or a managed service that can be done by the provider and offers additional upsell opportunity.

Providers & tenants in the context of the NSX-T Data Center Edge Gateway, can specify both the QoS profiles for egress traffic and ingress traffic. Cloud Director makes a call to the NSX-T to find all QoS profiles for that specific manager, allowing the Provider or Tenant to specify the desired profile to apply. All components of this solution are protected by the same rights governing the ability to “Update Properties of Gateway”, typically restricted to Providers but can be assigned to tenants also if required.

## Automation capability: vRealize Orchestrator update and NSX-T support

Cloud Director now supports vRealize Orchestrator versions 8.6/8.5/8.4 and orchestration support for the Cloud Director REST API schema in 10.3.2.1, this has been compiled with support for latest JRE/JDK for Java v11. For organisations that use vRealize suite this has been a long awaited update enabling them to upgrade to the latest Cloud Director version, but also support has been supplied for basic NSX-T workflows; NSX-T manager, Geneve Network pools, NSX-T backed provider vDC, TO Gateways, NSX-T backed external networks and NSX-T backed edge gateway. This has been a previous blocker for some customers to advance to NSX-T where automation is necessary to provision networking components via vRealize Orchestrator.

## vApp move with networking

The move vApp API has been extended to now also move the entire network configuration with the vApp to negate re-configuration post move (apart from the new parent network connection or any new parent environment compatibility issues).

## New Distributed Routing toggle for Org VDC

Cloud Director now allows tenants to configure their NSX-T routed organization virtual data center networks as being “distributed” or not in much the same way that NSX-V routed organization virtual data center networks could be configured with a “distributed routing” flag. For NSX-T Org VDC Networks that are not distributed, VCD will attach this network to a Tier-1 Service Interface port (i.e. directly to the Service Router component of the Tier-1 gateway).

This delivers the possibility for East-West security on the same edge, as an example; Tenants who want to use the Edge Gateway firewall capability to control East-West traffic between organization virtual data center networks. Prior 10.3.2, that is impossible to do since East-West traffic is always distributed, by-passing the NSX-T Service Router altogether. By forcing all East-West traffic (between networks) through the Edge Gateway, using the more expensive Distributed Firewall (DFW) solution is not necessary.

This also helps unlock migration challenges from NSX-V to NSX-T, for example when configuring DNS server addressing on the org vdc network in NSX-V tenant administrators often defined the Org VDC Network gateway IP address as the DNS server address and DNS forward from the edge to an external resolver. Moving to NSX-T this resolution would be lost as NSX-T drops DNS requests where the network’s gateway IP address is the same as the DNS resolver. To address this migration issue, Cloud Director allows tenants to configure their NSX-T routed org vdc network interface type as either “internal” (i.e., distributed) or “non distributed” which will be attached to a Tier-1 Service Interface port. Specifically for this migration use case, the migrator determines that the network’s DNS resolver is configured with the gateway’s IP address, it can configure a special DNS NAT rule pointing to the Edge Gateway’s DNS forwarding service, negating the need to making any guest customizations after migration.

To Learn more about how VMware Cloud Director works, please visit [cloudsolutions.vmware.com](https://cloudsolutions.vmware.com) or please watch and subscribe to our YouTube Channel or any of the resources below:

- [HTTP://BIT.LY/VCPP\\_TWITTER](http://bit.ly/vcpp_twitter)
- [HTTP://BIT.LY/VCPP\\_FB](http://bit.ly/vcpp_fb)
- [HTTP://BIT.LY/VCPP\\_LINKEDIN](http://bit.ly/vcpp_linkedin)
- [HTTP://BIT.LY/VCPP\\_YOUTUBE](http://bit.ly/vcpp_youtube)

### FIND OUT MORE

**For information or to purchase VMware products call 877-4-VMWARE,**

visit <http://www.vmware.com/>,

or search online for an authorized reseller.

For detailed specifications and requirements, refer to the [product documentation](#).

