

# Enabling Digital Transformation with Converged Cloud Fabric

## How a Self-service Networking Architecture for Converged Systems can Accelerate the Digital Transformation Journey

Enterprises that have embarked upon the complex journey of digital transformation are quickly coming to one central realization: it is imperative to provide cloud-style agility, experience and operational simplicity for on-premises data center networking. Additionally, flat IT budgets are demanding lower TCO to attain cloud-style economics, flexible deployment models and open architecture in a multi-vendor data center environment.

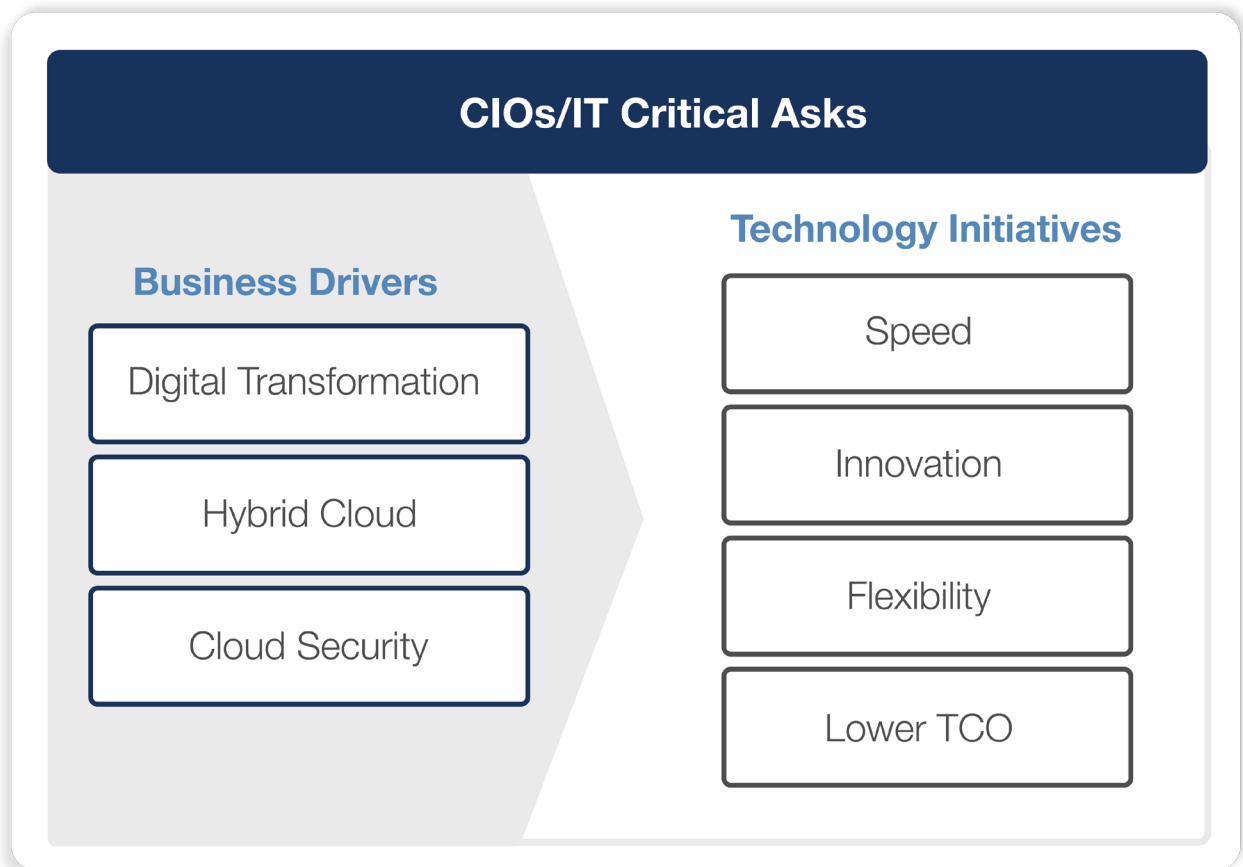
### Digital transformation trends:

- Embrace cloud-style self-service operations, agility and experience for on-prem applications.
- New cloud-style architecture for on-premise data centers to meet the scale-out, resiliency and TCO requirements.
- Enable cloud-style seamless Day0/Day1/Day2 operations in a heterogeneous application environment with the flexibility of deploying any virtualization, container and Hyper-Converged Infrastructures (HCI).
- Enable invisible infrastructure so that the network operates at the speed of applications.
- Intent-driven AI workflows with predictive analytics for autonomous network environments.
- Cloud-style integrated and unified management (one dashboard) for networks within and across data centers.

Enterprise on-prem data centers need to modernize rigid, legacy, inflexible network infrastructure to be more cloud-like to meet the evolving needs of cloud-native applications such as application connectivity, application visibility/analytics and application security. Also, there is a need for uniform networking workflows across on-premises data centers to speed up policy provisioning and consistent operations.

It is imperative for CIOs to adopt products that drive application speed, innovation, flexibility at reduced TCO within the organizations and tie them closely to business missions and goals. CIOs are not only looking into IT transformations but digital transformation as a whole, to achieve the velocity necessary for innovation, execution and change using agile DevOps practices. Cloud-native applications have fundamentally changed the operational and management requirements for the underlying network infrastructure. Furthermore, adoption of on-prem virtualized and hyper-converged systems (HCI) from VMware, Dell EMC VxRail and Nutanix, mandates consistent cloud-like experience and speed.

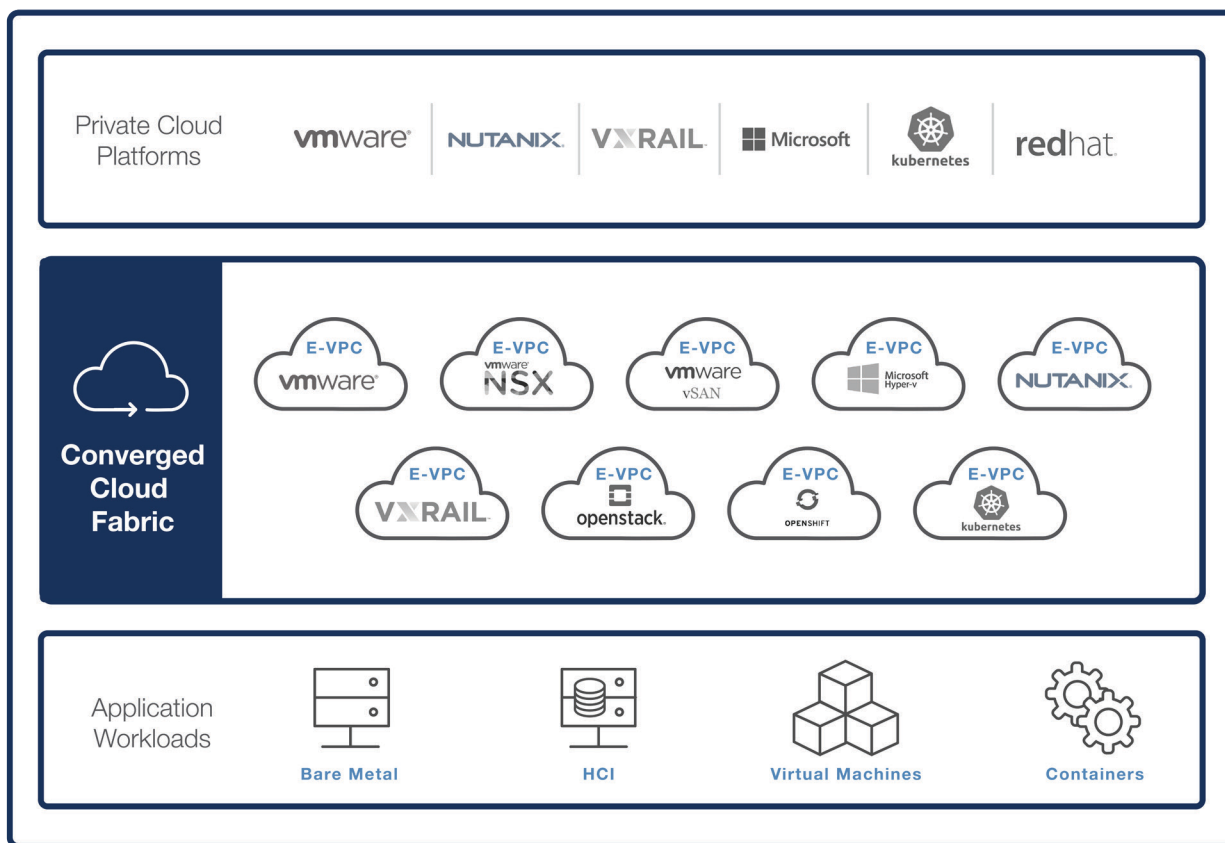
Technology initiatives like hybrid cloud and cybersecurity require modernization of on-prem data center network infrastructure to deliver granular insights into application connectivity, visibility, analytics and security.



## Converged Cloud Fabric - Design Philosophy

Arista CCF's approach simplifies data center networking by providing operational consistency, visibility and governance. The platform embraces the same design principles adopted by public cloud providers to offer a fully cloud-like experience for on-premise data centers. Arista CCF empowers organizations to transform and future-proof their networks for a hybrid, multi-cloud world and meet the scale and performance requirements of the new digital economy.

CCF is the industry's first data center fabric leveraging SDN controller software and open networking hardware. The CCF controller operates as "one logical switch", which removes complexity and automates Day0/Day1/Day2 operations, delivers Network-as-a-Service through cloud-style Enterprise Virtual Private Cloud (E-VPC), and provides contextual analytics for deep visibility.



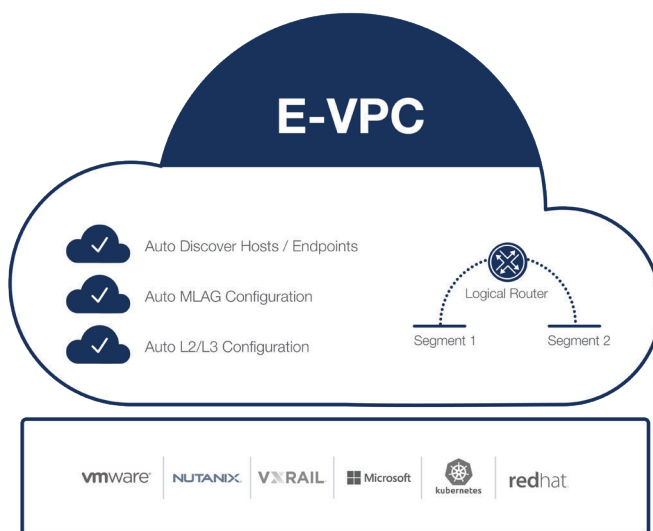
To accomplish this, CCF has incorporated the following cloud design principles:

### Cloud-style Experience

CCF empowers application teams with self-service experience for on-prem data centers as offered in public cloud.

CCF's Enterprise VPCs (E-VPC) was inspired by public cloud providers' implementation of virtual private clouds (VPCs/ VNets) for underlay network abstraction allowing rapid VM and container deployments using a logical network abstraction. E-VPC simplifies on-prem networking by expressing networking rules within the E-VPC and alleviates provisioning dependency of network hardware constructs (ports, VLANs, VRFs).

By transitioning to a logical network architecture built around externalized software control, the enterprises can accomplish cloud-style self-service networking -- a critical piece of the digital transformation journey .

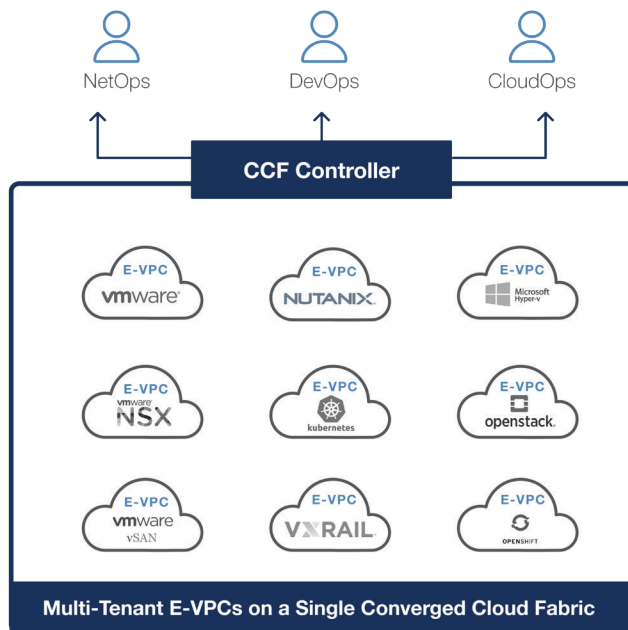


### Cloud-style Consistency

Network management is manual, costly and prone to errors, which is anathema to the high-speed, high-reliability world of digital services.

Using programmable interfaces and software controls, it is now possible for an IT team to manage a network at scale, deliver consistent networking resources as services rather than fixed assets . DevOps/CloudOps teams can leverage built-in multi-tenancy and delegated administration for consistent management and programmatic automation for on-prem deployments.

With E-VPCs, mainstream IT organizations can deliver cloud-style Network-as-a-Service and zero-touch operational experience for all private cloud orchestrators through built-in network automation including VMware vSphere/NSX/ vSAN, DellEMC VxRail HCI, Nutanix HCI, Microsoft Hyper-V, Kubernetes con-tainers and OpenStack.



## Cloud-style Infrastructure

As east-west traffic becomes more prevalent, enterprises are shifting away from n-tier static topologies in favor of pod-based, leaf-spine (Clos) fabrics interconnected through a spine-core layer. This allows for rapid scale-out by adding switches or more pods.

CCF's fully HA design with scale-out architecture guarantees service availability by circumventing any single point of failure. Also, the hierarchical control plane, optimally partitioned across controller and switches delivers resiliency comparable to distributed controls.

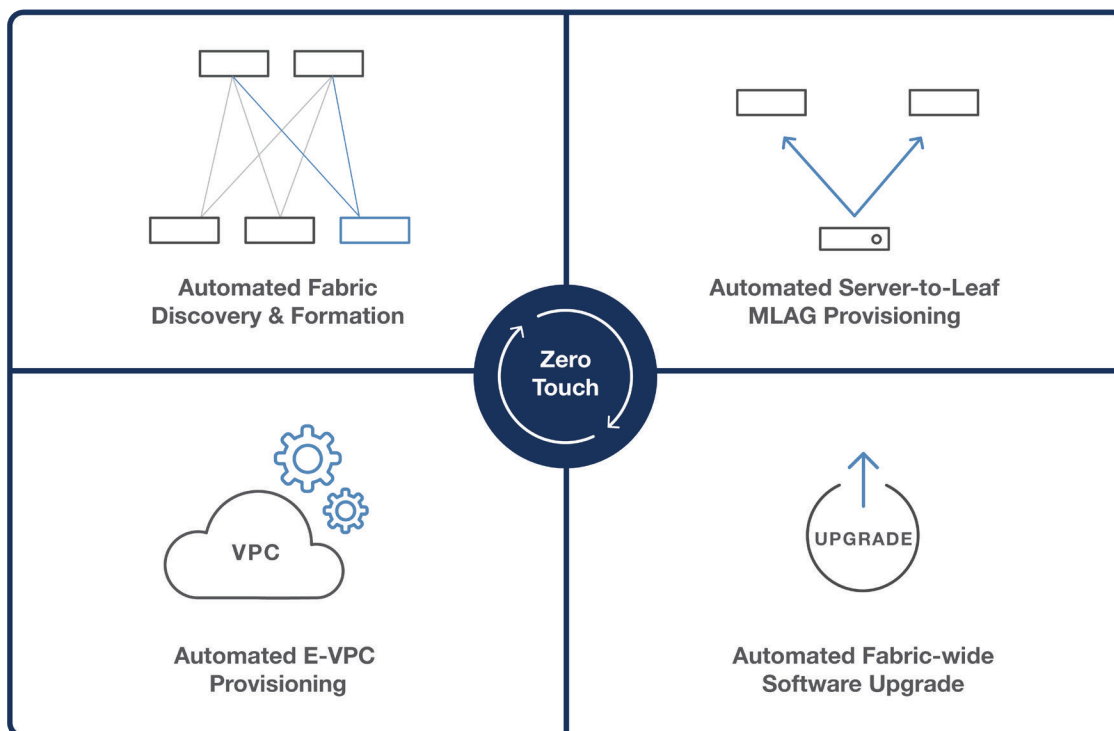
CCF allows network teams to deliver resilient, scale-out, and flexible designs across enterprise cloud deployments, regardless of location.



## Cloud-style Operation

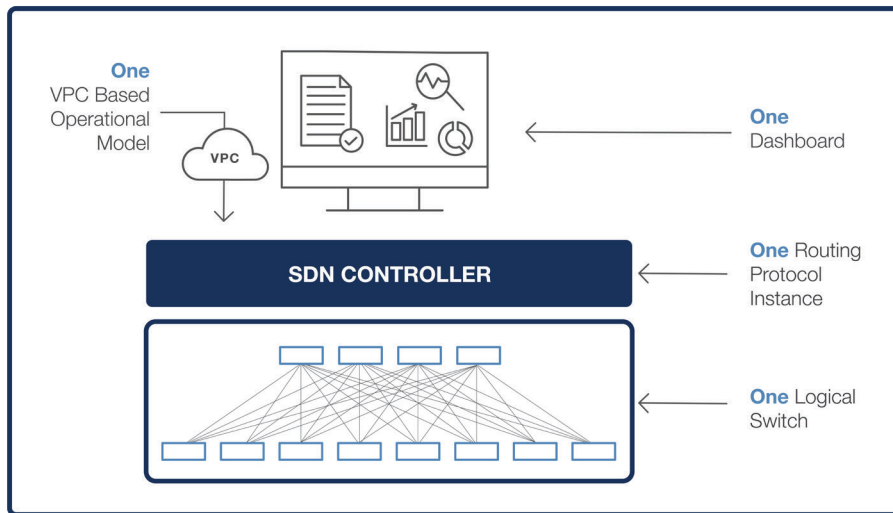
Network teams managing on-premise data centers are burdened by operations that are slow, complex and are unable to keep up with 24x7 uptime requirements. After all, the networking scope of each box is fairly narrow with cumbersome troubleshooting.

CCF's Zero Touch SDN-based capabilities simplifies Day0/Day1/Day2 operations and provides actionable intelligence to NetOps/DevOps/CloudOps teams for rapid root cause analysis & troubleshooting. With a controller-based architecture, analytics can utilize server-level resources to support advanced functions like rapid root-cause analysis, proactive capacity management and provide contextual insights for the network.



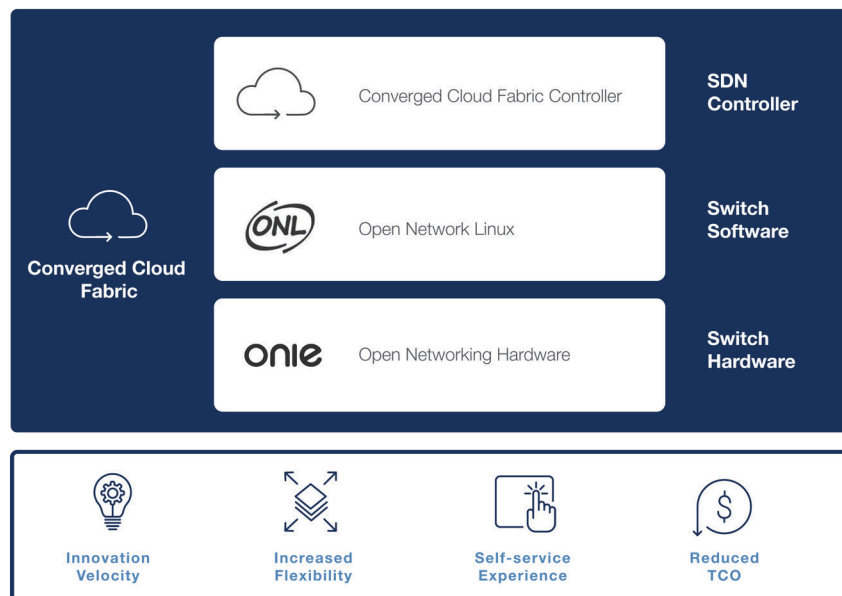
## Cloud-style Architecture

CCF's SDN-based architecture implies that the network's policy plane, management plane, and much of the control plane are externalized from the hardware device itself using an SDN controller, with few functions offloaded on each device for scale and resiliency. Architecture ensures rapid network recovery by eliminating box-by-box protocol convergence delays and does away with cumbersome management processes in favor of policy and network control regimes that operate at the speed of virtual machines and containers. CCF removes operational complexity by managing the entire fabric as one logical switch coupled with an intuitive self-service dashboard, for centralized policy, provisioning, operations and visibility.



## Cloud-style Economics

CCF delivers an agile, composable construct that is not only fast, flexible and economical but can achieve tremendous scale without subjecting the enterprise to manual design and deployment. It focuses on streamlining total cost of ownership (TCO), thus enabling the same team to manage much larger network infrastructure through zero-touch operations and network automation with private cloud and HCI platforms. CCF is offered with single-source procurement and support for the entire solution and turn-key (zero-touch) integrations without any additional programming.



## Converged Cloud Fabric

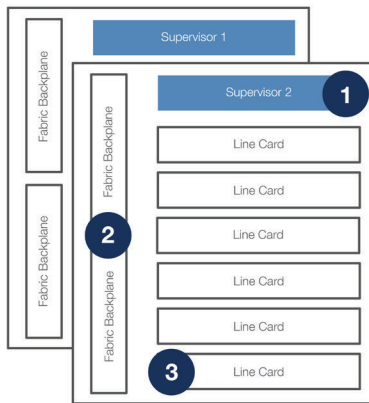
CCF is an automated fabric built around these key cloud networking design principles. CCF leverages AWS-style VPC constructs or E-VPCs in on-premises infrastructure to deliver a cloud-style self-service experience to the enterprises. It does this by automating the entire network stack to provide a consistent networking environment across multiple private cloud platforms, including VMware (vSphere, NSX, vSAN) and Nutanix. This allows the network to operate at speeds required of VMs and containers.

CCF does away with the complexity of traditional network stacks by implementing one logical switch that oversees a modular, pod-based architecture built around a scale-out, leaf-spine fabric. At the same time, static, proprietary infrastructure is converted to merchant silicon hardware overseen by a software-defined controller. CCF provides built-in analytics, telemetry, real-time contextual visibility and one-click troubleshooting workflows across end-to-end fabrics.

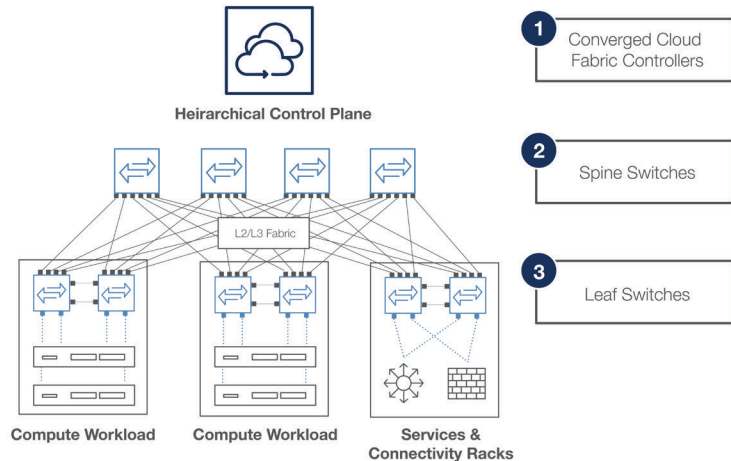
The Converged Cloud Fabric architecture can be viewed as disaggregation of the traditional chassis:



### Traditional Chassis Switches



### Converged Cloud Fabric - Logical Chassis



### Traditional Hardware Chassis

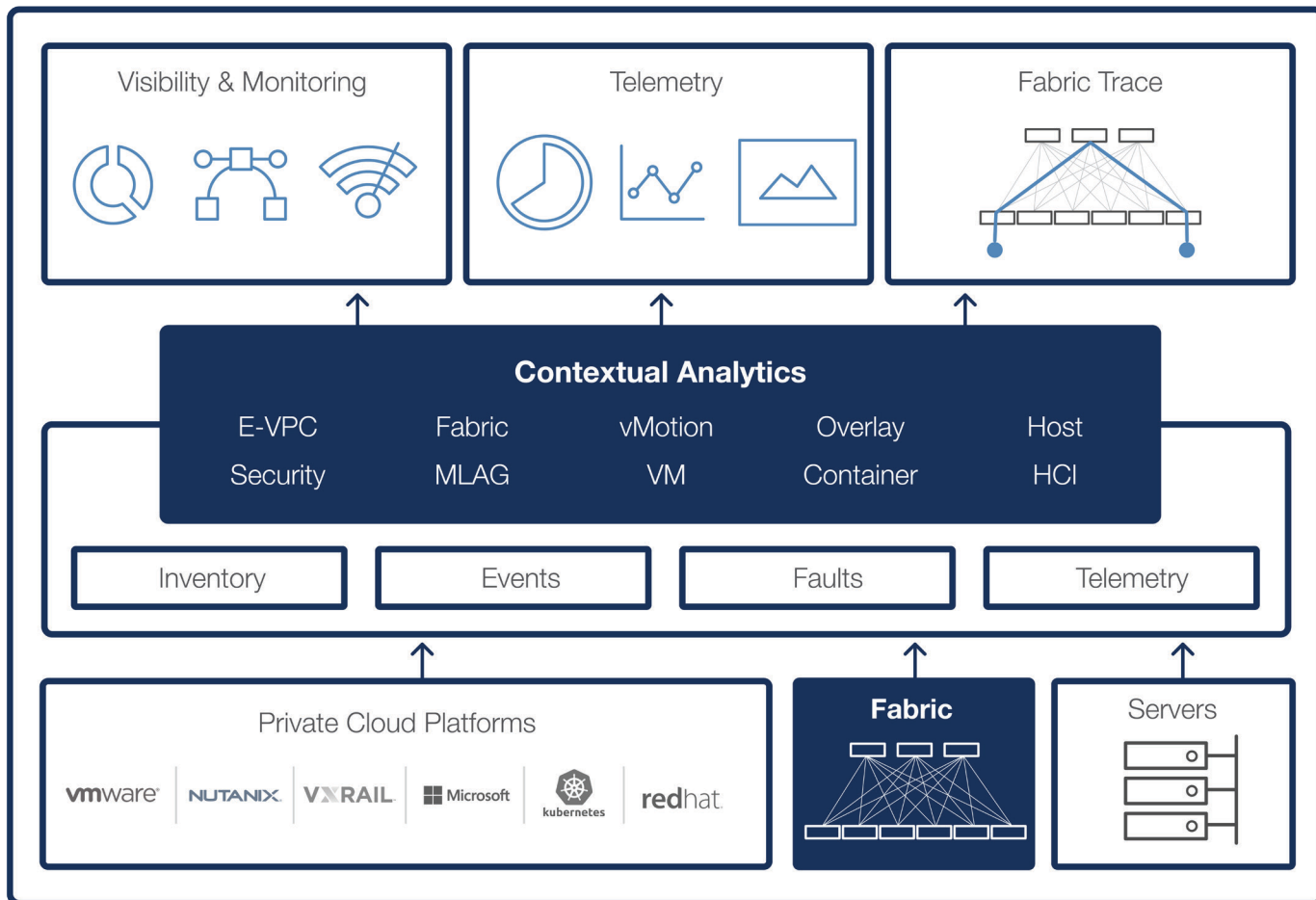
- ✓ Single pane of glass (supervisor)
- ✓ Plug-n-Play line cards & fabric cards
- ✓ Centralized upgrade via supervisor
- ✓ Centralized routing protocol on supervisor

### CCF - Logical Chassis

- ✓ Single pane of glass (controller)
- ✓ Zero-touch Fabric change management
- ✓ Zero-touch Fabric upgrade via controller
- ✓ Centralized routing protocol on controller

Using CCF, NetOps, DevOps and CloudOps teams are able to effectively collaborate using a wide range of management and operational functions, including the rapid onboarding of both applications and tenants. In this way, enterprises are able to deliver on the cloud-experience-on-prem paradigm mentioned above by linking key aspects of the CCF solution to desired network services.

By leveraging E-VPC automation and contextual analytics capabilities, organizations are able to provide self-service experience to DevOps & CloudOps users. For network operators, management is simplified using capabilities like intent-based networking, zero-touch workflows and multi-layer security, using a common GUI, CLI or API model and unified dashboard.



Ultimately, this brings the economics of the cloud to the enterprise data center, where both capex and opex are reduced dramatically and organizations are no longer limited by the whims of their vendors regarding what new capabilities are introduced into the environment and on what schedule this is done.



## Customer Case Studies

No single platform can deliver full digital transformation on its own, however. To be truly effective, digital solutions must enable broad integration with the leading technologies that are modernizing other areas of the IT stack.

Arista has demonstrated this ability in numerous instances, forging strong bonds with virtual server and storage systems, open and converged hardware platforms and cloud services.

### Dubai Municipality Case Study: VMware SDDC

CCF provides best-in-class automated underlay fabric for VMware SDDC deployments, including vSphere, NSX, vSAN, VxRail and VMware Cloud Foundation (VCF). CCF provides underlay network automation and contextual visibility to hosts/VMs, enabling the network to operate at speed of VMs and containers. CCF analytics and telemetry optimized for VMware deployments enables real-time insights and one-click troubleshooting workflows for VM-to-VM troubleshooting across the fabric.

Let's learn what CCF solved for Dubai Municipality. Dubai Municipality, employs more than 10,000 people across 34 departments providing critical services like public health and city planning. However, a rapidly expanding population had begun to exceed the capability of its legacy network to scale in a cost-effective manner, so the decision was made to replace its core switching architecture with a flexible core-and-pod fabric.

Best of **vmworld 2019** WINNER | Networking



Converged  
Cloud Fabric

+











Day1/Day2 Operations	BCF
Auto-Host Detection & MLAG Automation	0-Click
Auto-VLAN Configuration	0-Click
Visibility for End-host	0-Click
VM/Container Troubleshooting	1-Click
Fabric Analytics	0-Click

Operate the network at the speed of VMs  
VPC ON-PREM | AUTOMATION | ANALYTICS

Dubai Municipality deployed the CCF Controller within a vCenter management stack to enable automated SDN management on top of leaf-spine fabric. The goal was to implement an end-to-end SDN architecture with full visibility and automation of vSphere server deployments.

Not only did this reduce the size of existing infrastructure, it enhanced network performance along a number of parameters. Overall switching speed, for example, saw a 42-fold increase, while backbone capacity expanded 16X. In addition, Dubai Municipality was able to consolidate its three traditional data centers into one logical cloud, reducing migration costs by 90 percent.

### Nutanix IT Case Study: Hyper Converged Infrastructure

CCF is also emerging as a preferred networking solution for leading HCI platforms. As many HCI pioneers have found out, the plug-and-play benefits of HCI are of marginal benefit if networking must still be manually configured on each and every switch.



## Solutions Innovation of the Year

### 2019 Nutanix Elevate Technology Alliances Award Winner

Converged Cloud Fabric,  
ideal networking  
solution for Nutanix HCI



- ✓ Network Automation at VM speed
- ✓ End-to-end network visibility
- ✓ Operational Velocity

This is why Arista has worked closely with providers like Nutanix and Dell EMC. In this way, CCF can learn and inherit the configuration states of the Prism and VxRail management systems so they can be pushed out as network configurations across all switch nodes via redundant, high-availability controller nodes.

Nutanix IT used CCF networking solution for managing their large IT environment. CCF provided zero-touch networking to Nutanix HCI based on Acropolis Hypervisor (AHV) with leaf-spine design based on open networking switches with SDN controls, and brought public cloud VPC-style logical networking that is API integrated with Nutanix Prism. With CCF, Nutanix's engineering teams were able to leverage the same capabilities and efficiencies as cloud providers in terms of economics, operational workflows and could optimize app placement across public and private clouds based on the applications needs of elasticity, cost, and performance.

In the end, CCF managed the entire leaf-spine fabric as one logical switch, even if configurations scaled into the hundreds. It protected against misconfigurations and potential security gaps while allowing administrators to focus on higher-level strategic concerns rather than the day-to-day burdens of manual network management. CCF also simplified provisioning and other tasks so they can be performed by generalists rather than specialists.

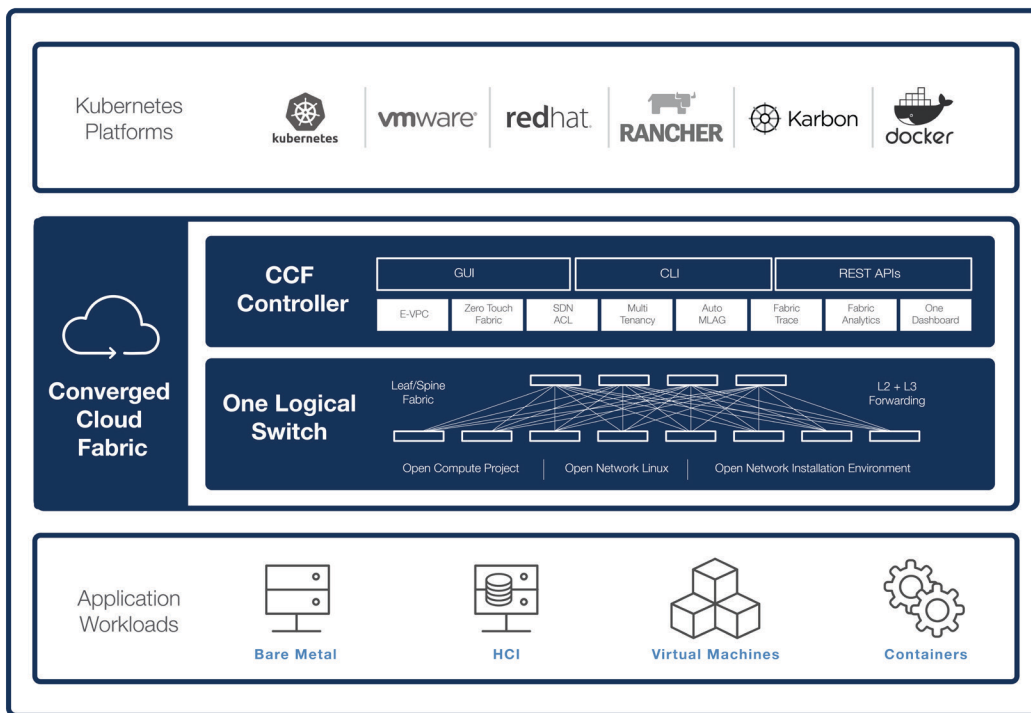
## NIO Case Study: Containers

Application portability will be one of the hallmarks of digital transformation, and the only practical way to achieve this is with containers. The challenge this presents to networking, however, is in the need for rapid provisioning, configuration and orchestration on both physical and logical infrastructure.

CCF solves these difficulties by deploying a software agent on the container orchestration layer that communicates with a plug-in at the host. This allows multiple container environments to be securely instantiated on a fabric, providing a consistent operational experience and greatly reducing cost and complexity of the data environment. It also provides full visibility across multiple containers, as well as automatic configuration of the network segments that each container is accessing. As well, this enables rapid troubleshooting of any container networking issues, even when, as is typical, containers are being created, utilized and decommissioned at a rapid pace.

## Universal Container Integration

### Run Kubernetes Anywhere: Freedom of Choice



### Popular K8S Management Platforms to choose from:

- VMware PKS
- RedHat OpenShift
- Rancher OS
- Nutanix Karbon

### Popular K8S Networking Options to choose from:

- Calico
- Flannel
- Cilium
- NSX-T

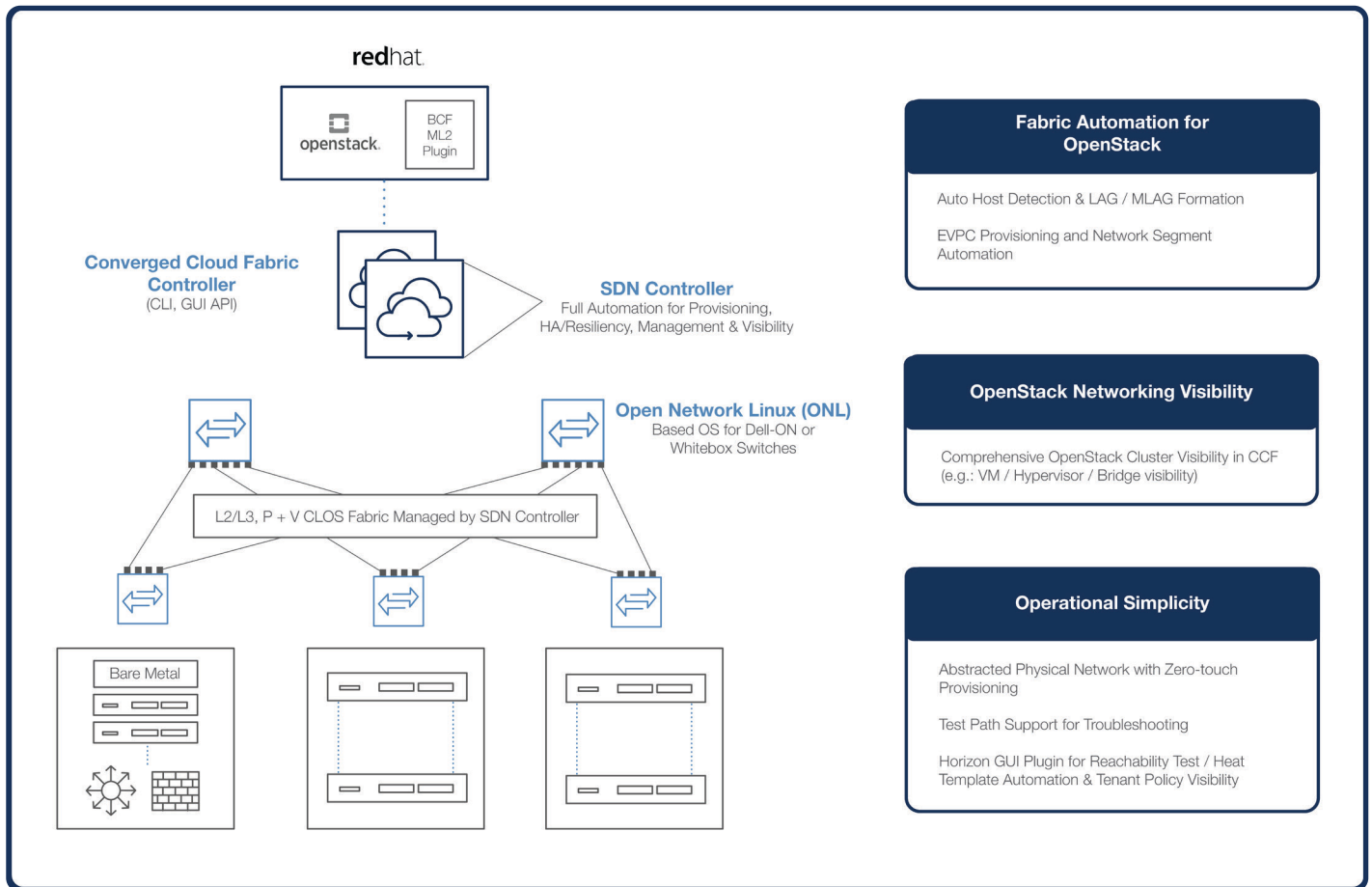
A prime example of this approach at work is NIO, an autonomous vehicle manufacturer headquartered in Shanghai with a U.S. base in San Jose. The company was looking to create a new analytics platform for R&D projects and needed a network that could quickly scale to tens of petabytes per week. With CCF, the company gained the ability to gather data on the order of 16 TB per vehicle per hour using a network that was designed, implemented, vetted and put into operation in a matter of days, not months.

## Verizon Case Study: NFV Cloud

Conformity with NFV is also emerging as a crucial element in digital transformation, which in most cases means OpenStack. For Verizon, the combination of Red Hat, Dell EMC and Arista resulted in the largest NFV deployment to date, delivering on the company's key requirements for resiliency, performance, design simplification and integrated security.

One of the key advantages of this approach was the tight integration between the CCF networking installer and the RHEL OSP 7 director. This vastly simplified the installation of an OpenStack-ready networking fabric by integrating workflows into a seamless, predictable process without jeopardizing stability and the integration of new or upgraded system components.

## OpenStack Integration



Verizon was able to deploy a wide range of complex NFV workloads on top of an OpenStack automation layer which itself rested on top of the CCF. Under normal circumstances, this would have produced a nightmare for network health, history and troubleshooting functions, but the integration with leaf/spine elements coupled with CCF's existing visibility tools provided a 12-fold increase in speed and performance over traditional network designs.

**CCF Customer Benefits Summary:**

For users, the benefits of self-service “cloud on-prem” or “VPC on-prem” architecture using the Converged Cloud Fabric are plentiful and varied.

- The adoption of network automation and a Network-as-a-Service operational model improves network speed, agility and ease of management by multiple orders of magnitude.
- No longer will network professionals spend hours manually configuring switches and routers only to see the rationale for such changes vanish before they are even implemented.
- Through simplified management and zero-touch workflows, the network, in fact, becomes an enabler of next-generation data and application service models and enables users to capitalize on the speed at which virtual and containerized environments are intended to operate.
- Different IT teams—NetOps, DevOps and CloudOps teams—can now collaborate seamlessly, speeding up issue resolution and deliver enhanced IT productivity. The enterprise also benefits from end-to-end visibility and contextual data collection that supports advanced analytics and automated troubleshooting which leads to steadily improving optimization of network performance.

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