

VNS Application Edge

Orchestrate and manage
applications and Kubernetes
clusters at the edge.

Verizon's integrated SDN and Edge vision

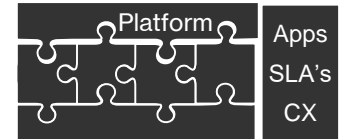
Products & Solutions

- Customer created solutions
- Vendor vertical products
- High customer added value

IoT	VDI	Smart Cities	UX
Logistics	Gaming	CDN	

SDN/Edge Integrated Ecosystem

- Orchestration across products & ecosystem
- API driven integration capability
- Standards based ecosystem



Intelligent Networking

- Integrated network transport and services
- Global portfolio of supported transport types
- Efficient service delivery

Wave	IP Network	5G
MPLS	Ethernet	4G/LTE

Dynamic containerized applications have new requirements



Network Vectors

- Paradigm shift in latency needs (from 1-10s to **<5ms**)
- High incidence of **graphical content**, needing high throughput (>10Gbps)
- Exponential **growth in data (~44ZB of data*)**



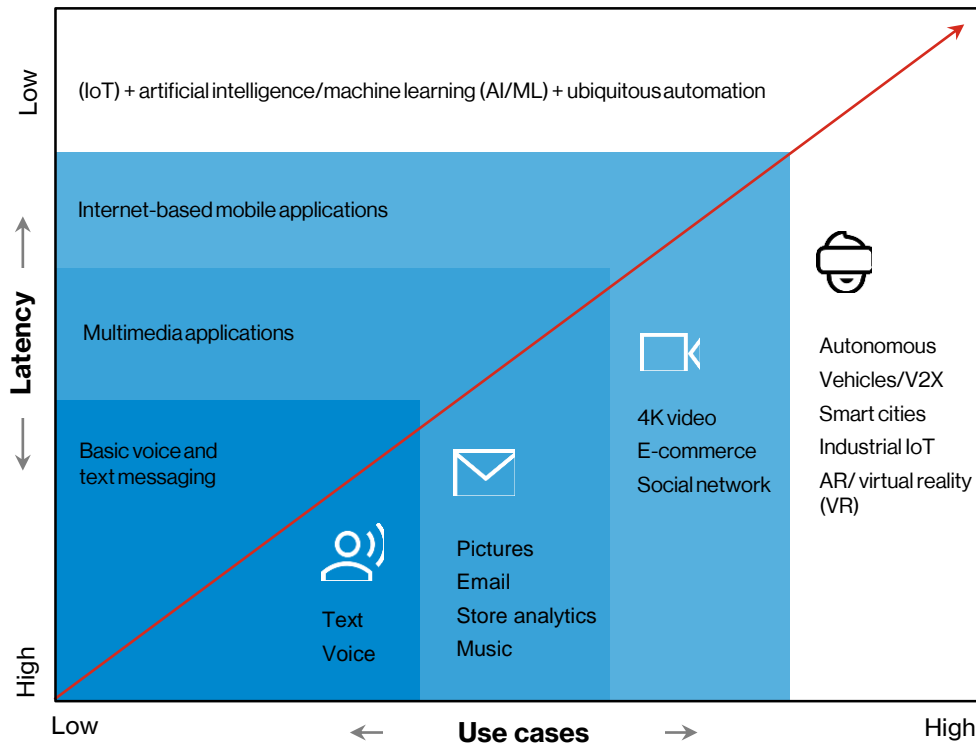
Distributed Ecosystem

- Distributed surge in terminals (**~50B in 2020**) resulting in **localized storage/processing**
- Application demands leading to **multiple data mgmt. models (e.g. public/private/hybrid clouds)**



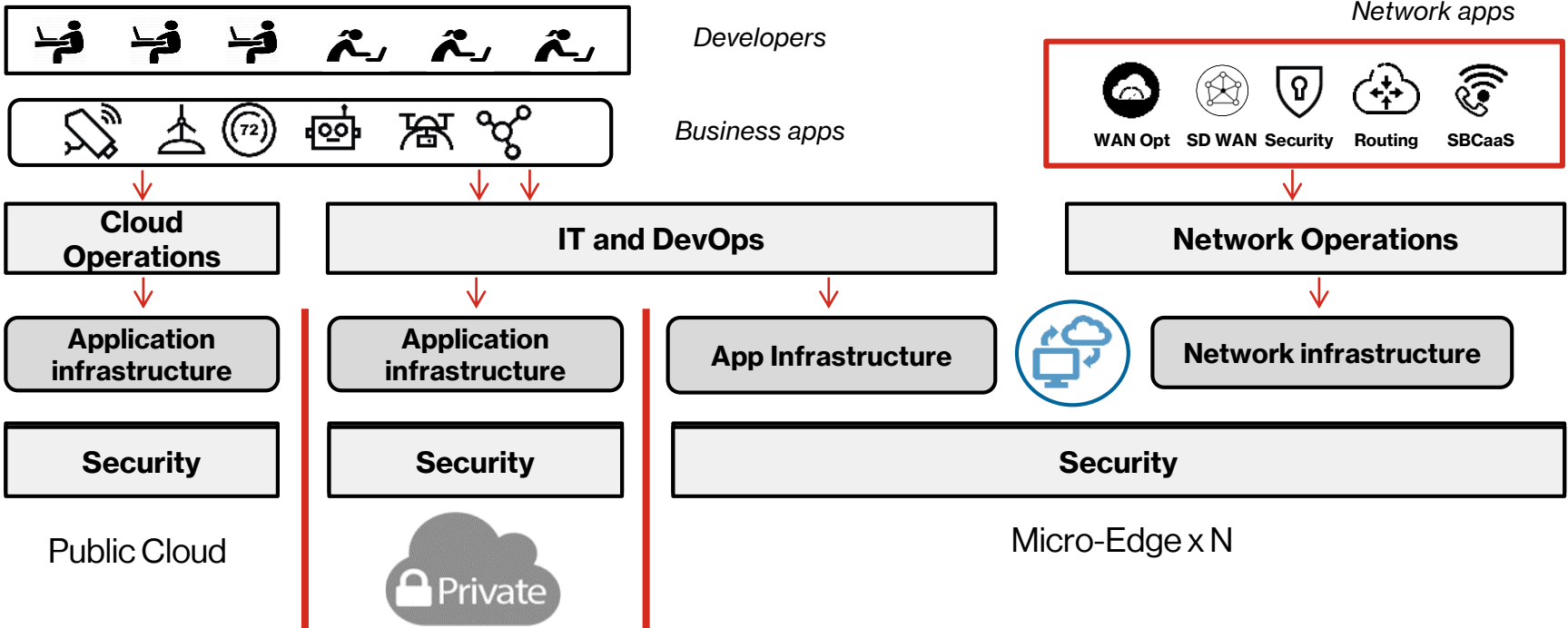
App Lifecycle

- Complex **multi-site/multi-vendor deployments**
- Increased challenges of **autoscaling and load balancing** during high demand
- *Admin. challenges with operating a **multi-cluster applications***



Hosting applications at the edge comes with challenges

Managing both application, network infrastructure at the edge.



The rising popularity of containerized applications

The growth of Kubernetes

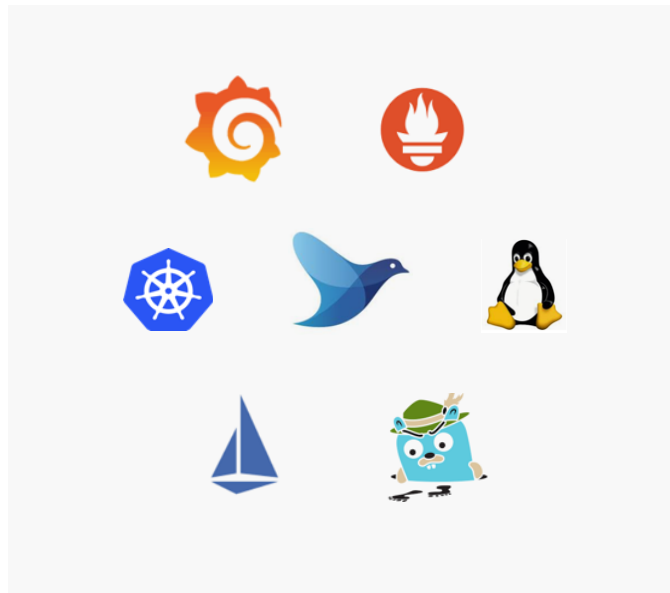
By 2025, more than 85% of global organizations will be running containerized applications in production, which is a significant increase from fewer than 35% in 2019.¹

Containerized applications helps with software portability

- Software remains reliable when moved to different operating systems, test/staging/production environments, or even from data center to cloud

These apps can serve as “just-in-time software”

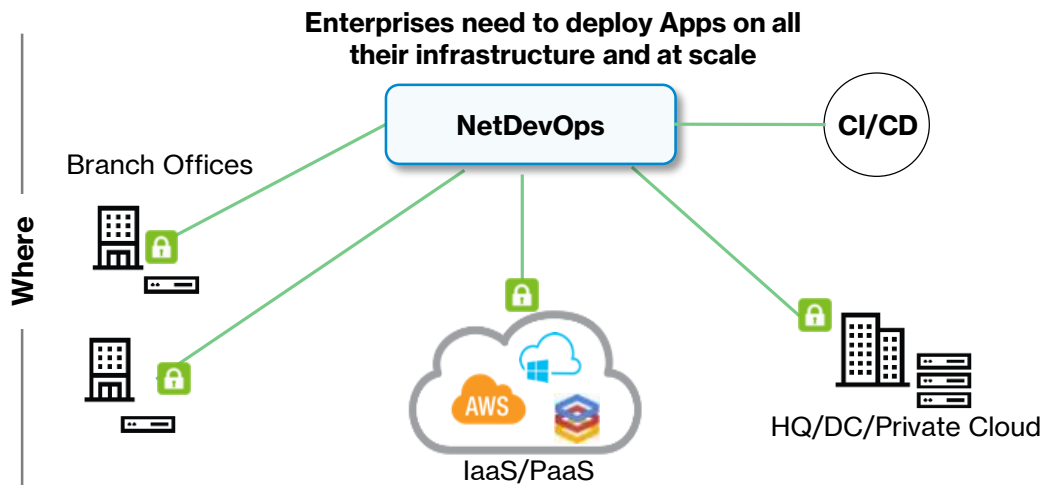
- Because containerized applications are lightweight and can be instantiated very quickly, they can be spun up in near real time as needed



1 - Gartner CTO's Guide to Containers and Kubernetes – Answering the Top 10 FAQs. 27 July 2020. Analysts: Arun Chandrasekaran, Wataru Katsurashima.

Challenges with Enterprises Kubernetes deployment

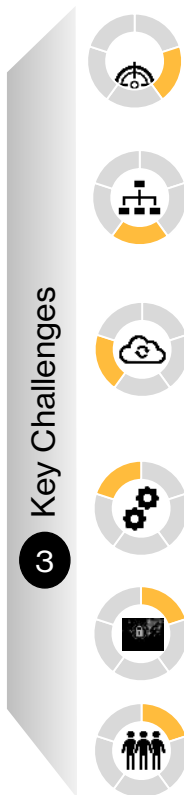
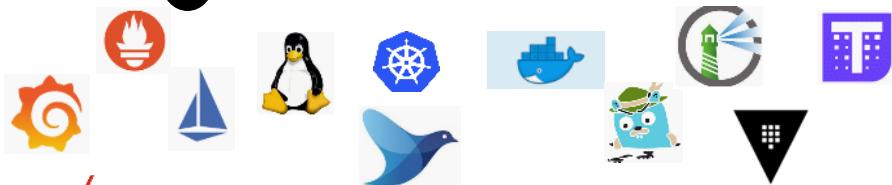
How do you manage your app end to end lifecycle?



Where

What

2 Tool integration becomes complex



1 Select, Test and bring up your Infrastructure

Hybrid cloud, DC, edge with iterative testing on updates

2 Select, test and bring up your Kubernetes distro

Select your distro and manage/test updates

3 Select, test and bring up your cloud native tools

Cluster customization and app operations

4 Develop, test and deploy scripts to bring it all together

Manage the pull platform lifecycle

5 Security and Role Governance

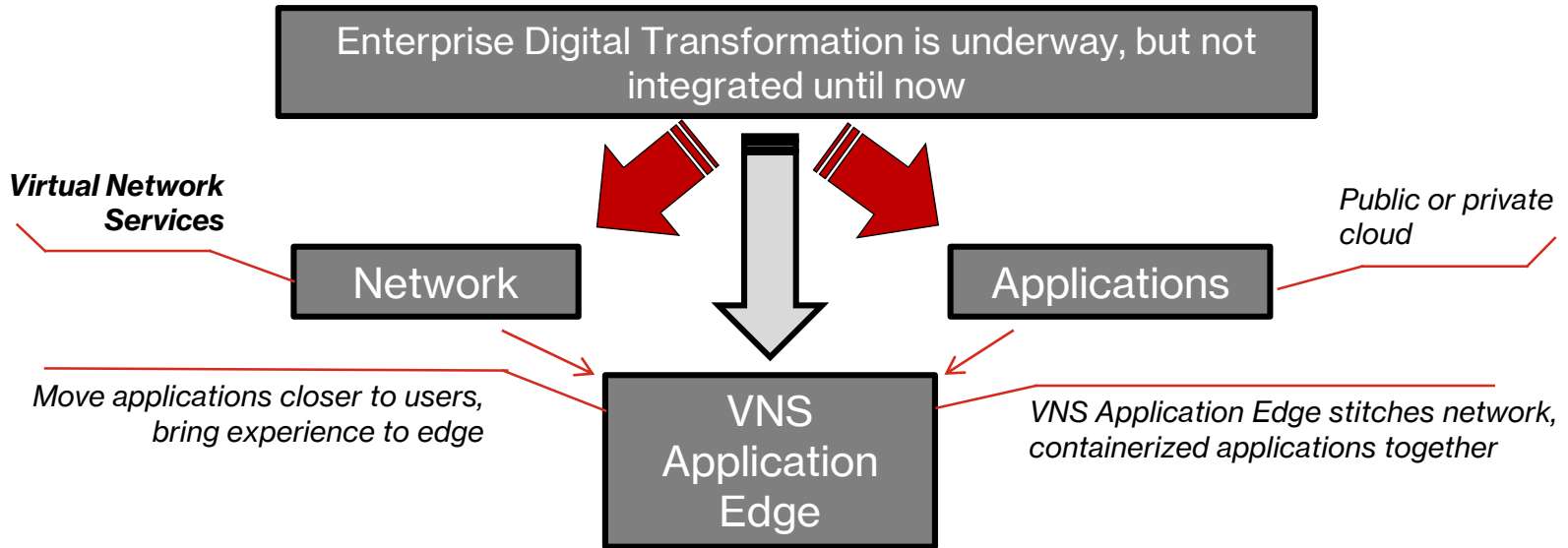
People with right access to right clusters and applications

6 Hire the right Skillsets

The right skills are rare and expensive

Bringing management of network, applications together

- Delivers IaaS and PaaS using a **highly secure and automated deployment model**
- Provides consistent **Customer and User experience** globally across diverse Infrastructures
- Combining VNS networking strategy with **ability to host applications, enhancing app performance**
- Enables dynamic, streamlined and **consistent Kubernetes deployments across the WAN**



VNS Application Edge – the next phase of innovation

What is it?

- Fully managed service enables network, customer app deployment at premise edge in single form factor footprint
- Deploy on existing or new uCPE footprint
- Integrates with public cloud instances

How does it work?

- True light footprint Managed Kubernetes Cluster at edge allows customers to unleash benefits of container technology
- Packaged with integrated portal enabling modernization of business apps across infrastructure (uCPE, Public, MEC)

How does it help?

- Supports rapid deployment of customer owned, latency-sensitive workloads at edge, where local processing speed could enable richer app experience
- Tackles, solves challenges of managing container infrastructure at scale across WAN

Benefits

- Reduced on premise compute infrastructure
- Zero trust security, assurance in-built
- Fast paced publish and roll back
- Control back to Enterprise
- Integrates with existing CI/CD framework

VNS Application Edge Services

Integrated delivery of applications and networking services

Compute

Start and finish with Intel Xeon-d 2100 family, Designed for intense workloads and high performance compute. Available with 4 to 12 physical cores

Memory

Optimized deployment models to suit a balance of workloads requirements and support for large data sets, ranging from 8G to 32G RAM

Storage

Large storage array options with RAID 5 to handle persistent storage volumes

Containers and Orchestration

Run highly scalable Docker workloads and scale on the VNS Application Edge platform. Automated cluster bring up with simple portal experience and unique dynamic placement with Kubernetes Blueprint designs

Portal Experience

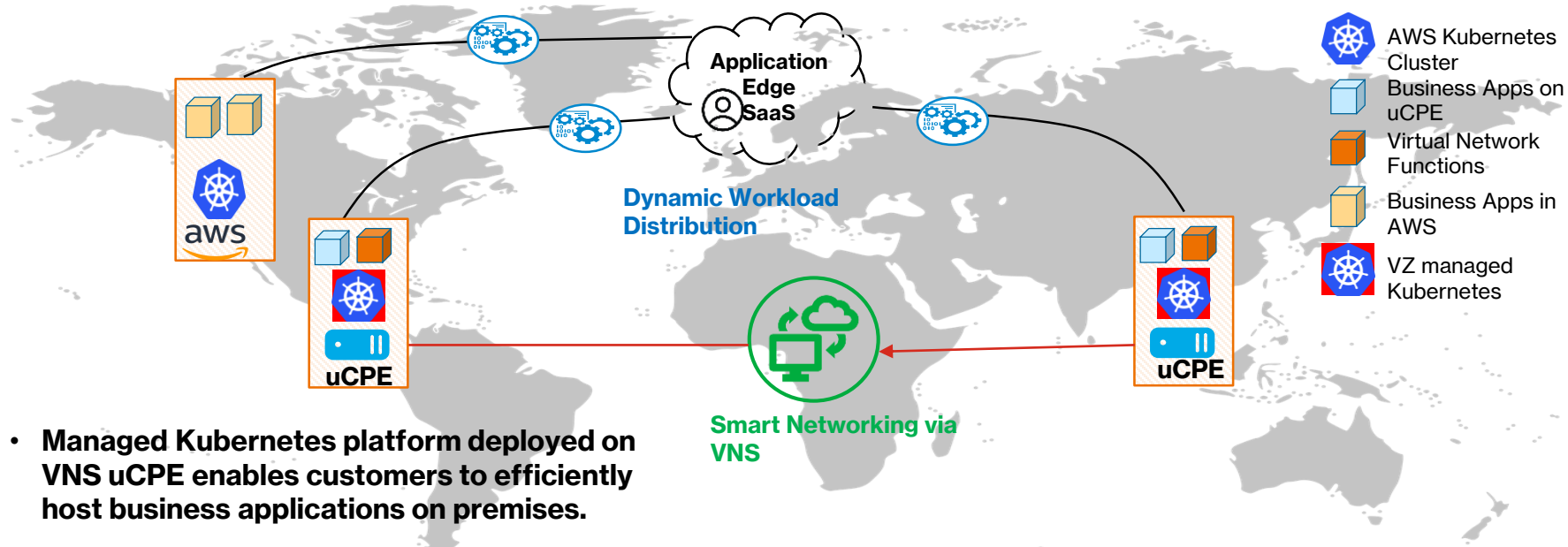
Single pane of glass to manage all cluster and app deployments from one centralized portal

Networking and Security

Extend workloads into the SD WAN footprint overlay or take advantage of virtual Security options to protect sensitive data. Deliver encrypted workloads

Bringing customer apps closer to customer networks

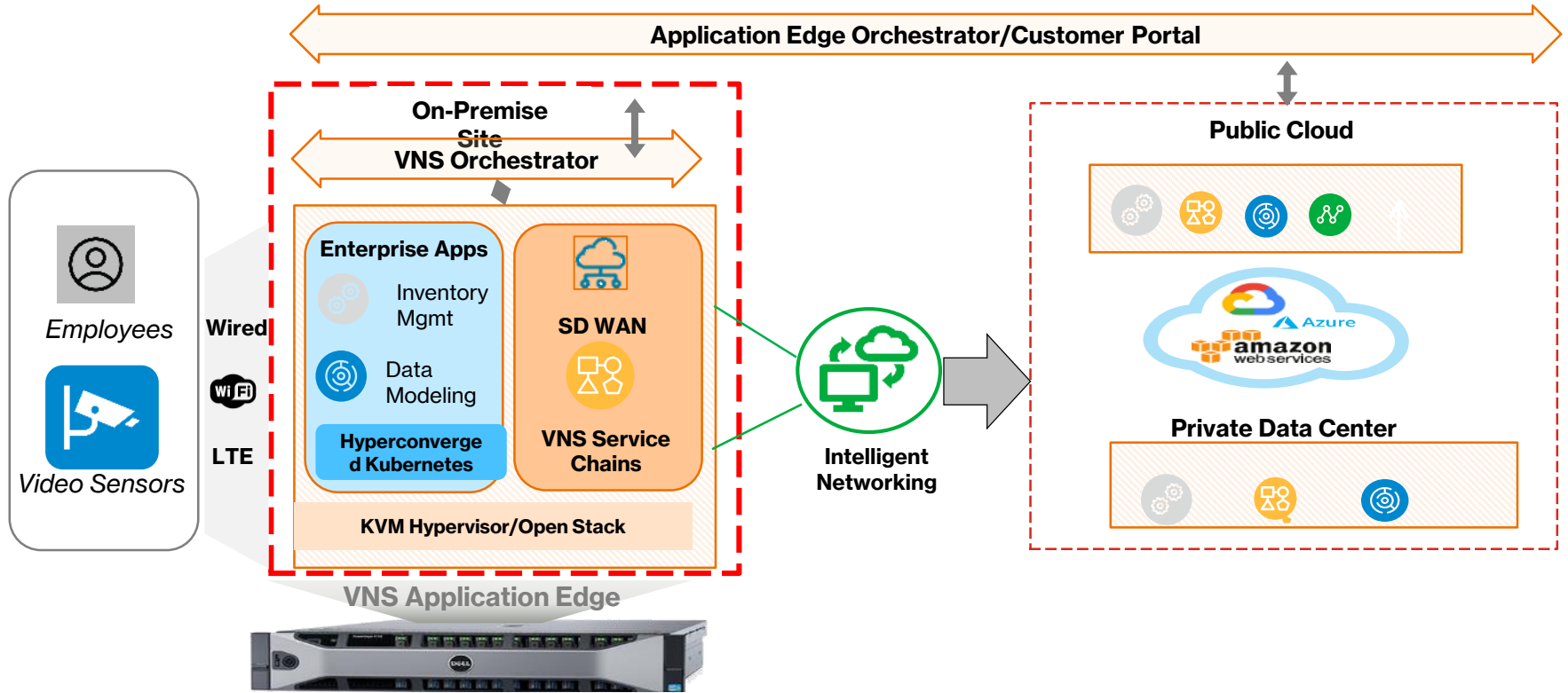
VNS Application Edge in a nutshell



- **Managed Kubernetes platform deployed on VNS uCPE enables customers to efficiently host business applications on premises.**
- **Provides life cycle management of applications and clusters at scale across heterogeneous environments.**

Deploy apps across any infrastructure.

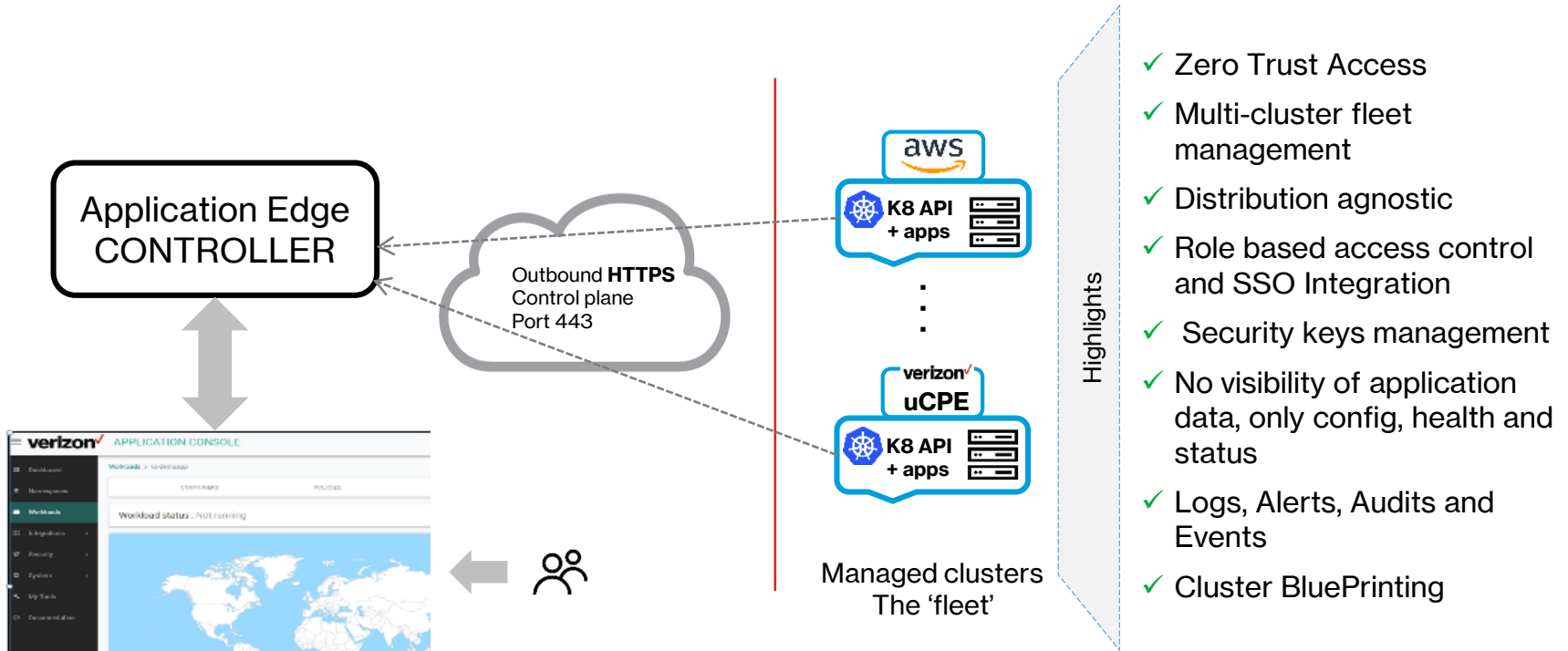
VNS Application Edge with Intelligent Networking



X86 based Universal CPE

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Key Application Edge Portal Highlights

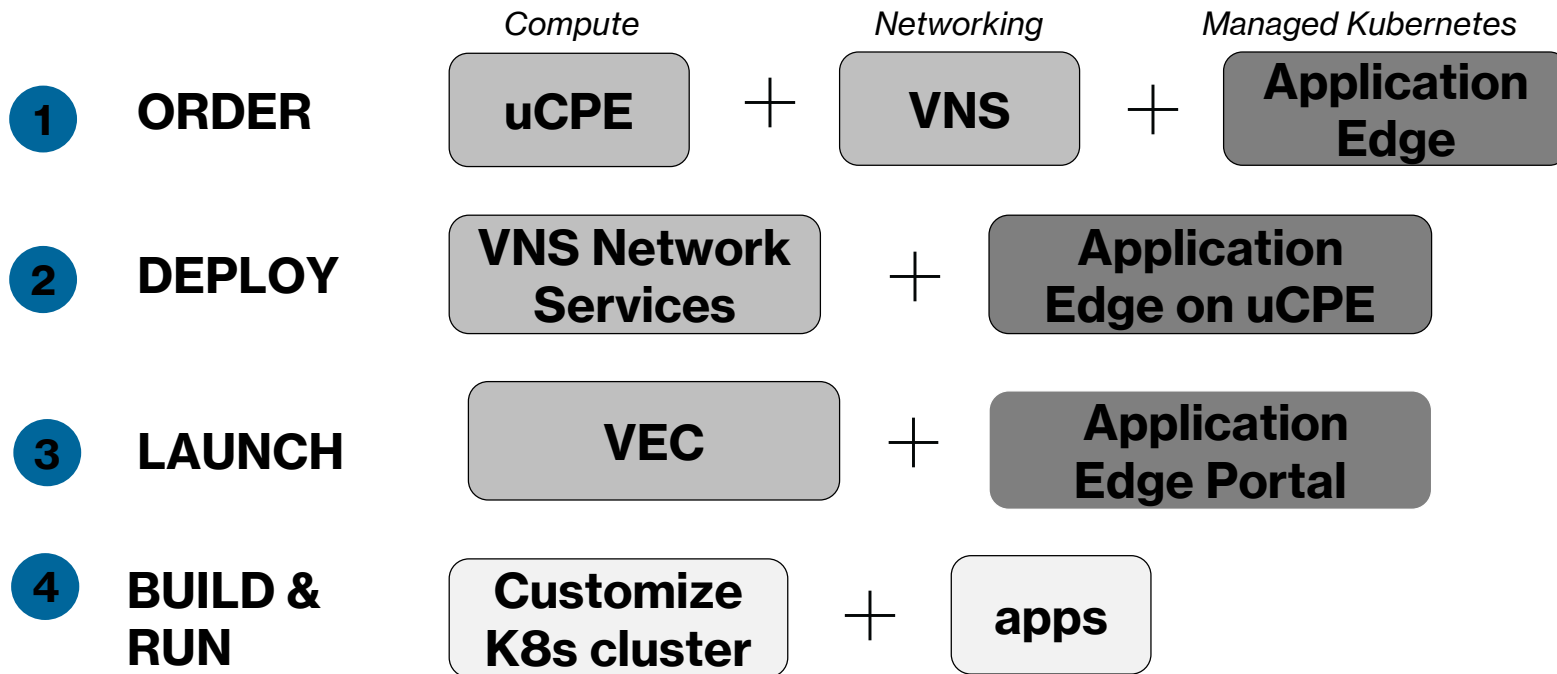


VNS Application Edge packaging details

Consume VNS Application Edge in conjunction with the VNS subscription

Small	Medium	Large	Cloud
Small footprint—for general app consumption	Memory optimized and medium footprint—for general app consumption and dev testing	Storage optimized and large footprint—for performance app consumption and dev testing	Core, RAM and Storage and is provided by a third party cloud provider
8 cores	16 cores	24 cores	Determined by customer
16 GB RAM	64 GB RAM	128 GB RAM	Determined by customer
400 GB storage	2 TB storage	3.5 TB storage	Determined by customer

Delivering the VNS Application Edge service

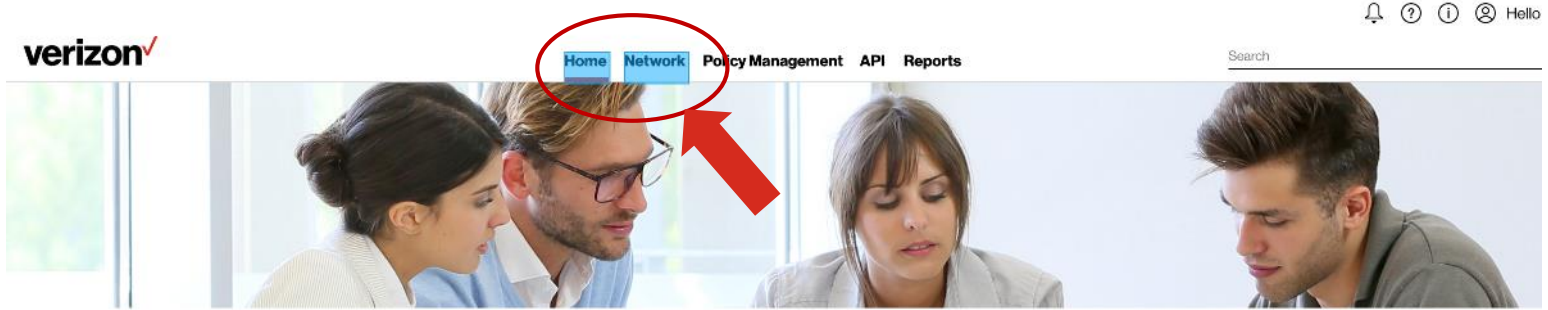


Enables a consistent user experience globally

- Uniform changes can be made across all sites regardless of location – at the edge or in the cloud
- Applications can have the same features regardless of location
- Less human intervention helps reduce chance for errors



Application Edge Portal integrated with VEC portal



Dynamic Network Manager represents a new advanced platform and unified Graphical User Interface.

[Learn More](#)

My Alerts

Customize

Filter by Location, Region, VPN...

Tenant Spaces

Made in InVision



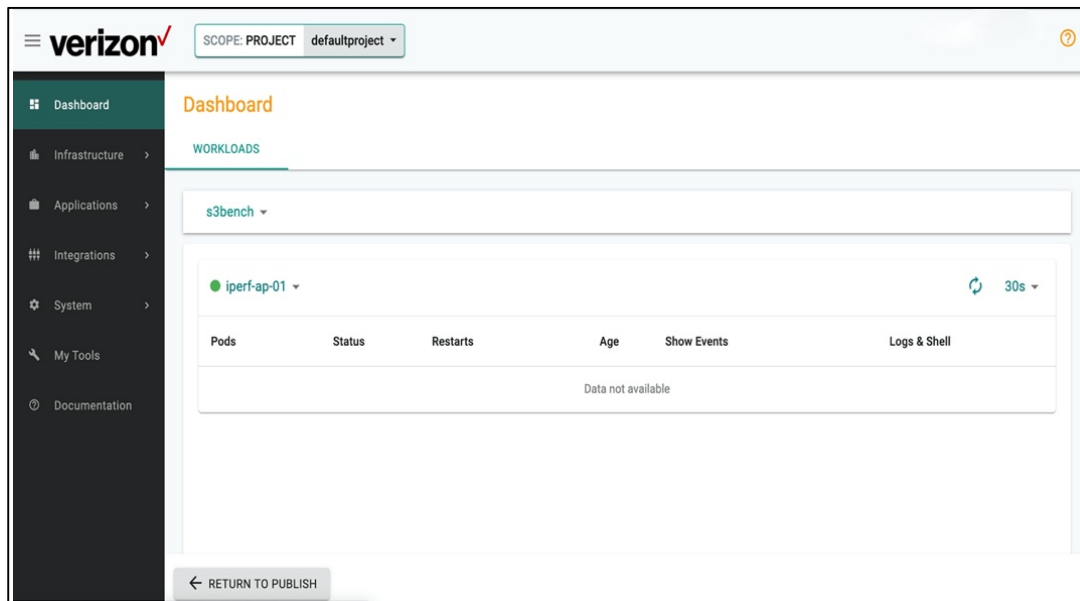
Application Edge Portal: Application Lifecycle Management

The screenshot displays the Verizon Application Edge Portal interface. At the top left is the Verizon logo. The top navigation bar includes links for Home, Network, Policy Management, API, and Reports. Below this, the interface is organized into four main sections: Transport Services, Edge Services, Physical Locations, and Applications & Interfaces. Under Transport Services, there are links for SCI, Private IP, Public IP, ELAN, ELINE, and Access. Under Edge Services, there are links for Edge Devices and Application Lifecycle Management, which is highlighted with a blue bar and a red circle. A red arrow points to the Application Lifecycle Management link. Under Physical Locations, there is a View All link. Under Applications & Interfaces, there are links for App Labels, WAN Labels, and User Groups & Site Labels.

Dynamic Network Manager represents a new advanced platform and unified Graphical User Interface.

Easily manage Kubernetes containerized applications

- One user-friendly portal with a single pane of glass for managing Kubernetes containers on premises
- Multi-cluster/multi-cloud management on premises and in public and private clouds
- One-click control of thousands of clusters
- Facilitates management of the full application development lifecycle
- Security and governance



VNS Application Edge and popular public cloud services

To be successful with edge/cloud-based Kubernetes deployment, you need both:

Key:

No default support
 supported

Managed Kubernetes distribution

Multi-cluster management and application operations platform

Verizon

At the micro edge and cloud where VNS Application Edge is deployed, both

Amazon EKS

AWS public, along with EKS, only supports managed Kubernetes distribution

Does not support by default

- Verizon's VNS Application Edge-powered platform to deploy apps on top of EKS in AWS public cloud and micro edge locations
- In the future, VNS Application Edge can also be used to deploy apps to Outpost and AWS Wavelength (doesn't support EKS but can host VNS Application Edge)

	DC	Micro Edge	AWS	Azure (tbc)	Google (tbc)
Kubernetes distro	Application Edge/ third party	Application Edge	EKS	AKE	GKE
Multi cluster mgmt.	Application Edge	Application Edge	Application Edge	Application Edge	Application Edge

Enterprise applications are continually evolving.

Applications requiring near real-time data and the processing of large amounts of data on-premises that need to be aggregated to the cloud



Energy

Being able to respond in real time.

- Data curation for IoT and surveillance applications
- Artificial intelligence/machine learning analytics from telemetry data



Retail

Reduce local footprint without decreasing performance

- Digital engagement of customers
- Store surveillance
- Inventory management
- Store analytics



Manufacturing

Enable augmented reality (AR) to enable the use of robotics

- Instrumentation tracking/calibration
- Security management
- AR-assisted assembly and repair

Aerospace

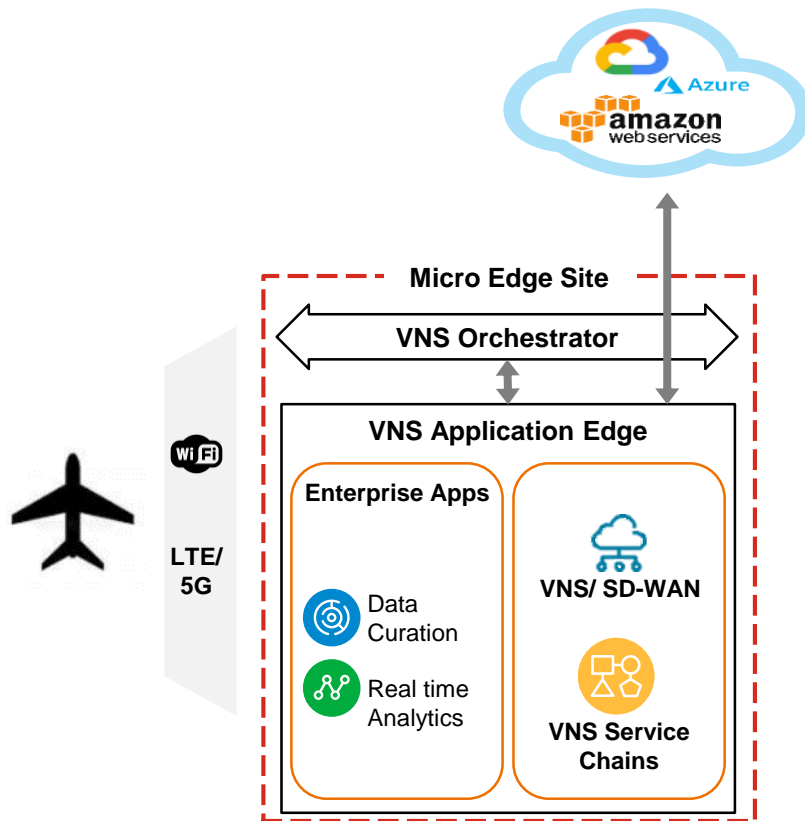
Data Hauling and Curation

Challenges

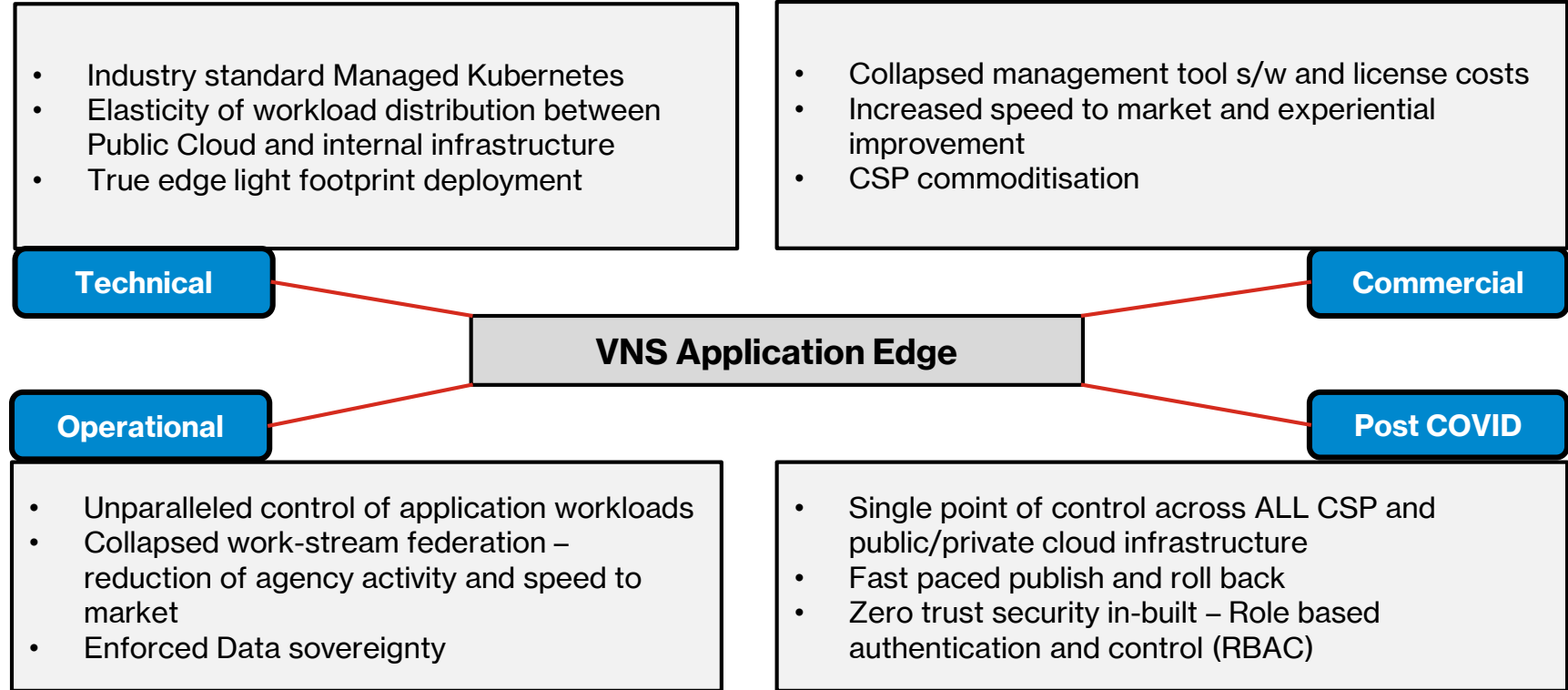
- Large data dumps following every flight from aircraft telemetry sent to public cloud for curation and analyses
- Current methods result in heavy data dumps over inundated network and results in large public cloud costs

Solutions

- Local data curation and real time analytics at the micro edge, will reduce needs for large data processing (cores/GPUs) and with local data persistent storage, result in better real time experience and results.
- Reduced data access and caching benefits with local edge curation.



The business benefits



What makes VNS Application Edge different?



Enables enterprise-grade functionality to simplify, scale and secure Kubernetes cluster and containerized application management while improving application performance – even in complex and multi cloud environments



Integrates the Kubernetes containerized application management tool through a monitoring platform (single pane of glass) for containerized applications on:

- VNS uCPE
- The Amazon AWS public cloud (other public clouds to be made available in the future)



It's supported on Verizon's VNS platform, which is a Managed Network Service. Verizon has more than 30 years of experience managing some of the most complex networks in the world



Verizon's VNS is available in 130 countries around the world and has a rich partner ecosystem built on OpenStack, with multiple vendor partner/virtual network function (VNF) combinations that can be mixed and matched without vendor lock-in

Q&A

Polling

Upcoming Webinar.

Telematics Update with Verizon Connect

**Presented by John Molamphy, Senior
Vice President of Verizon Connect**

Nov. 13, 2020 at 10:00 am ET

Invite Me!



