

# 2018 Guide to WAN Architecture and Design

## *Applying SDN and NFV at the WAN Edge*

### Part 3: The SD-WAN and the SD-Branch Office Ecosystem

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## Executive Summary

One of the goals of the [2018 Guide to WAN Architecture and Design](#) (The Guide) is to discuss the state of WAN architecture and design with an emphasis on the current SD-WAN solutions. Another goal of The Guide is to provide insight into the emergence of solutions that leverage the key concepts of SDN and NFV to support all components of the WAN edge. Within The Guide these topics will be put into the context of the current state of the enterprise environment and the solutions being brought to market by industry-leading vendors.

A discussion of wide area networking is extremely timely for two reasons. One reason is that for most of the last fifteen years there has been little investment in the development of new WAN technologies and services. Hence, until recently there hadn't been a fundamentally new WAN technology or service introduced into the marketplace since the turn of the century. That situation began to change a couple of years ago with the introduction of a new class of WAN solution that is typically referred to as a Software Defined WAN (SD-WAN). Most of these SD-WAN solutions focus on providing connectivity between the users in a company's branch offices and the resources they need to access in both internal and external data centers.

A discussion of the WAN edge is also very timely. One reason for that is the burgeoning use of the Internet of Things (IoT). For example, Gartner [has forecasted](#) that 8.4 billion connected things will be in use worldwide by the end of 2017, up 31% from 2016, and that there will be 20.4 billion connected things by 2020. Another reason why a discussion of the WAN edge is timely is that several branch office solutions that leverage SDN and NFV are being brought to market. These solutions are often referred to as software defined branch office solutions (SD-Branch). While these solutions exhibit many similarities, there are many fundamental differences amongst the solutions.

The Guide will be published both in its entirety and in a serial fashion. The [first publication](#) focused on providing insight into the current state of the WAN, the status of SD-WAN adoption and the status of the branch office. The [second publication](#) discussed considerations that network organizations need to keep in mind as they evaluate alternative SD-WAN and SD-Branch solutions. The goal of this discussion is to ensure that network organizations choose solutions that meet their current and future requirements and are to the maximum degree possible, future-proof.

This publication will discuss the ecosystem of vendors who supply SD-WAN and/or SD-Branch solutions and it will present a profile of each of the sponsors of The Guide. Each profile was based on the answers that the sponsors gave to the following questions:

- Where do you fit in the SD-WAN and/or the SD-Branch ecosystem of vendors?
- What is your value add?
- What are the proof points?

The final publication will consist of the three chapters of The Guide plus an executive summary.



# The Ecosystem

This chapter of The Guide identifies the primary sub-segments of the three major components of the SD-WAN and/or the SD-Branch ecosystem. Those three components are:

- Do-It-Yourself (DIY) solutions;
- 3<sup>rd</sup> party solutions;
- The enabling hardware.

The first two components of the ecosystem that are listed above focus on the differing organizational ways that the SD-WAN and/or the SD-Branch solutions are implemented and managed. In the first case, DIY, the network organization that consumes the solution is also the organization that is responsible for the lifecycle management of the solution. In the second case, 3<sup>rd</sup> party solutions, an organization other than the network organization that consumes the solution is responsible for the lifecycle management of the solution. The third component of the ecosystem that is listed above, the enabling hardware, focuses on the varying ways that hardware, both commercial off-the-shelf and proprietary, is utilized in both DIY and 3<sup>rd</sup> party solutions.

Throughout this chapter phrases such as *branch office functionality* refer strictly to functionality that is provided to users who reside in a branch office. The use of such phrases does not necessarily mean that the functionality itself resides in the branch office.

Due to the complexity and volatile nature of the marketplace, the ecosystem described in this section is imperfect. As a result, some of the sponsors don't fit neatly into any of the sub-segments of the ecosystem. It is also important to realize that in some instances the sub-segments are overlapping; that a given SD-WAN or SD-Branch office solution may fit into multiple sub-segments; and that a given vendor may offer multiple solutions.

## DIY Solutions

### Traditional Routers

In addition to supporting routing, routers typically support functionality such as stateful firewalls, QoS, protocol and application optimization, encryption, content filtering and split tunnels. Some router vendors have added SD-WAN functionality to their routers to create an SD-WAN solution.

### Special Purpose Appliances

Many organizations implement best of breed, single function devices in their branch offices. These single function devices include firewalls, WAN Optimization Controllers (WOCs) and WAN Path Controllers (WPCs). Some providers of this class of appliance have added SD-WAN functionality to their products to create an SD-WAN solution.

### Pure Play SD-WAN Software Routers

This class of solution is a designed-from-the-ground-up to be a SD-WAN software-based router that can be deployed either on a dedicated appliance or on a [vCPE](#), a [uCPE](#) or on [ODM hardware](#).



## Converged SD-WAN Appliances

This class of solution integrates LAN/WAN functions into a single hardware platform. In addition to being an SD-WAN software-based router, these solutions provide functionality such as wired and LTE WANs, Ethernet switching, WiFi, PoE and various security services.

## Cloud-Deployable Solutions

These WAN and branch office solutions are designed-from-the-ground-up to be deployed, at least in part, in the cloud. That does not mean, however, that they necessarily must be deployed in the cloud.

## 3Rd Party Solutions

### Network-as-a-Service (NaaS)

A NaaS offering is typically built using a core network that interconnects a distributed set of Points of Presence (POPs). In addition to basic transport, a NaaS offering typically provides functionality such as security and optimization. In virtually all instances, the provider of the NaaS offering facilitates the acquisition and management of the appropriate first and last mile services. In some instances, the functionality provided by the NaaS offering is complimented by functionality provided by a device which is located on the customer's premise. The NaaS provider may offer additional services such as consulting.

### Managed Solutions

Managed Service Providers (MSPs), such as Communications Service Providers (CSPs) and Systems Integrators (SIs), typically acquire and implement the same functionality that an enterprise network organization would in order for the MSPs to offer a managed SD-WAN or a managed SD-Branch Office. In a managed solution, the MSP is responsible for the entire lifecycle of the solution. The MSP may offer additional services such as consulting.

## Enabling Hardware

### Black Boxes

A black box is a piece of purpose-built, proprietary hardware in which all the functionality provided by the CPE is implemented in physical hardware. As a result of how it is designed, the functions provided by a black box are often referred to as being PNFs (physical network functions).

### White Boxes

The phrase *White-box* refers to situations in which the network and/or branch office functions are fully virtualized in software that is hosted on common off-the-shelf hardware, usually an X-86 appliance. In contrast to both black and gray boxes, a white box does not make use of proprietary ASICs.

### Gray Boxes

A Gray Box is a middle ground between a black box and a white box. A gray box uses ASICs to cost-effectively accelerate the performance of certain compute-intensive functions.



## Key Vendors

Below is a profile of each of the sponsoring companies that was created based in part on input from each sponsor. Each profile focuses on where the sponsor fits in the ecosystem, the value add that they provide and some proof points that highlight their value add.

### DELL EMC

#### **Where do you fit in the SD-WAN and/or the SD-WAN Branch Office ecosystem of vendors?**

Dell EMC provides turn-key hardware and software solutions designed to simplify and accelerate production-ready SD-WAN deployments and services with a choice of SD-WAN software from Versa Networks, Silver Peak, and VeloCloud.

#### **What is your value add?**

Dell EMC provides a family of Ready Node offerings, designed for Service Providers and Enterprises alike that are intended to simplify and accelerate SD-WAN adoption. At the heart of the Ready Nodes are validated, pre-tested solutions comprised of Dell EMC compute platforms and industry leading SD-WAN software offerings from Silver Peak, Versa Networks, and VeloCloud.

#### **What are the proof points?**

Included in the Ready Node offerings are reference architectures, design guides, Bill of Materials (BOM), partner software SKUs for the appropriate use-cases, pre-installed drivers and firmware settings.



# We're Ready When You Are

Dell EMC is ready to provide turn-key hardware and software solutions designed to simplify and accelerate production-ready SD-WAN deployments and services, with a choice of SD-WAN software from Versa Networks, Silver Peak, or VeloCloud.

## Introducing Dell EMC SD-WAN Ready Nodes

At Dell EMC, we view SD-WAN as a critical and necessary component for Digital Transformation. For Service Providers, SD-WAN represents an opportunity for creating new services, accelerating time-to-revenue and increasing service agility. For enterprises large and small, SD-WAN represents an opportunity to lower cloud connectivity costs, while also optimizing WAN traffic patterns and usage. Dell EMC has double down on strategy of open and verified solution choices, to build SD-WAN for production, by offering validated product options for SD-WAN services, that is built upon the industry's foremost virtualization infrastructure, and hardware platforms.

We're meeting this need with a family of Ready Node offerings, designed for Service Providers and Enterprises alike intended to simplify and accelerate SD-WAN adoption. At the heart of our Ready Nodes are validated, pre-tested solutions comprising of Dell EMC compute platforms and industry leading SD-WAN software offerings from Silver Peak, Versa Networks, and VeloCloud. Included in the Ready Node offerings are Bill of Materials (BOM), partner software SKUs for the appropriate use-cases, pre-installed drivers and firmware settings.

The choice of multiple ready node hardware platforms provides maximum deployment flexibility for large, medium or small environments. Moreover, multiple SD-WAN partners furthers that flexibility by supporting many use cases.

### SD-WAN Ready Nodes

#### PC 5000

- Client Atom Intel chipset up to 4 Cores
- Dell BIOS and Intel vPro on select SKUs
- 9.5" x 10.5" x 4.2" (WXHDXD)
- 4GB – 16 GB RAM DDR4
- 5x USB, 2 x 1 G and 2 PCIe x8.
- Mobile Broadband/WWAN (3G or LTE) WLAN
- TPM, SSD, external PSU

#### PowerEdge R330/R430

- Single/Dual Socket Intel Xeon E5-2600 v4 processors
- QAT option via PCIe
- BIOS, BMC for OOB, Internal PSU
- 15" + Depth
- TPM, SSD, NVMe SSD
- 12 x DIMM slots supporting DDR4
- 2 x PCIe Gen3 I/O slots (half-length, low profile)
- 4 x 1GbE LOMs
- LTE option available

#### PowerEdge - R640/R740

24 x 1.8" configuration

- 2S Intel Xeon E5-2600 v4 processors (22 cores max/ CPU)
- QAT option via PCIe
- BIOS, BMC for OOB, Internal PSU
- 18" + Depth
- TPM, SSD, NVMe SSD
- Up to 64GB memory ECC DDR4
- Multiple IO and expansion options; 2x PCIe lanes
- LTE available via USB/PCIe
- Up to 100G NICs available

Figure 1. Dell EMC SD-WAN Ready Nodes



## SD-WAN Ready Node use-cases

Service Providers can add new profitable managed services (e.g., cloud-managed SD-WAN or SD-Security service), and reduce their time-to-revenue for these new services. Communications Service Providers, for example, can improve their competitive advantage by offering a hybrid WAN allowing current customers to add managed internet bandwidth to their branches, particularly for less critical traffic flows. Managed Service Providers can generate new revenue streams by adding Managed SD-WAN services; and can further benefit in productivity improvements with features such as zero touch provisioning.

Enterprises can choose to deploy a do-it-yourself on-premise SD-WAN, using the Dell EMC SD-WAN Ready Nodes. Enterprises can benefit with lower capital and operating costs, by leveraging lower-cost broadband connections and improving application performance, through intelligent route selection.

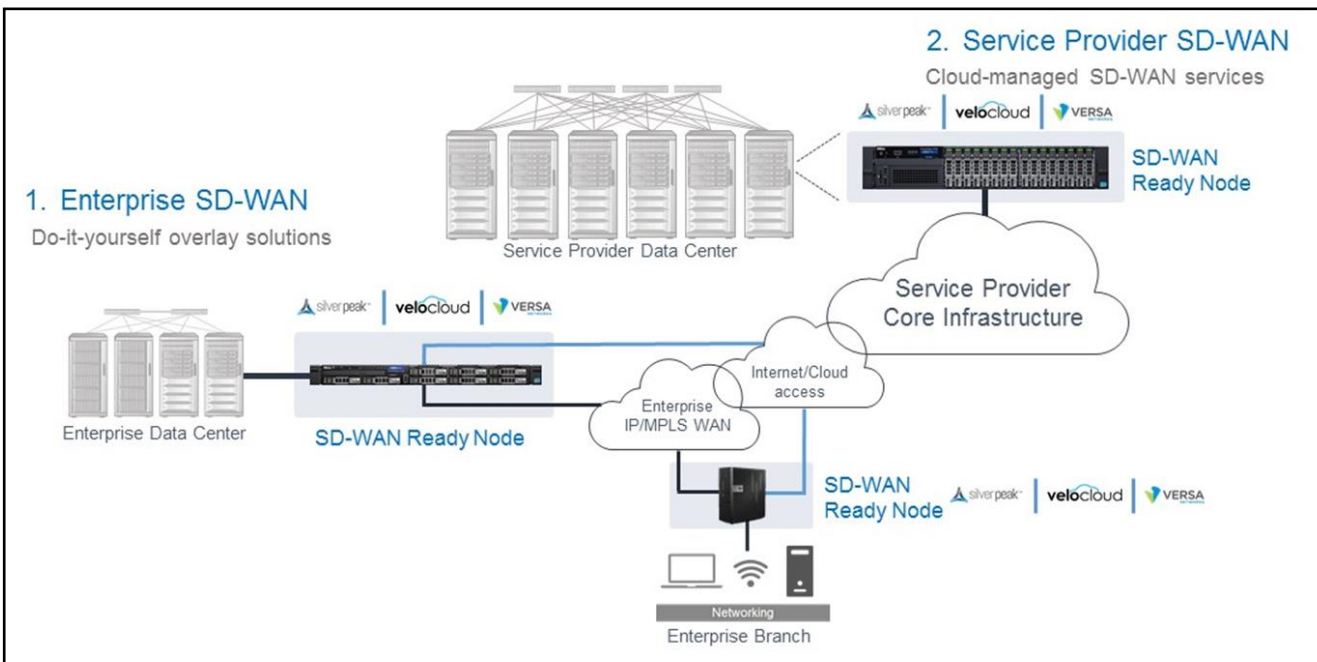


Figure 2. Dell EMC SD-WAN Ready Node use-cases

### Take the next step

Contact your Dell EMC, Silver Peak, VeloCloud or Versa Networks representative to learn more about SD-WAN Ready Nodes from Dell EMC.



Learn more about Dell  
EMC SD-WAN  
Solutions



Contact a Dell EMC Expert



## Cato Networks

### Where do you fit in the SD-WAN and/or the SD-Branch ecosystem of vendors?

The Cato Networks solution is a 3<sup>rd</sup> party solution. Since the solution could be managed by someone other than Cato, their solution could be regarded as a managed service. It is also possible to view Cato as a provider of NaaS solutions. Cato Networks has a somewhat different view of the ecosystem and sees itself as a provider of cloud-based services.

### What is your value add?

Cato simplifies the network and the associated security by converging multiple point product categories into one integrated solution. By using Cato, enterprises will be able to:

- Cut MPLS connectivity costs by augmenting or replacing MPLS services with SD-WAN solutions that deliver last mile optimization and an SLA-backed global backbone.
- Improve performance of the WAN between enterprise locations using Cato's SLA-backed backbone.
- Securely access the Internet everywhere without deploying a dedicated on-premise network security stack.
- Eliminate distributed networking and security appliances as well as the cost and complexity of buying, deploying, upgrading and patching them.
- Enforce a unified policy across remote locations, mobile users as well as physical and cloud infrastructures without using multiple point solutions.
- Strengthen the security posture with agile cloud-based security services that can scale to support any business need and rapidly adapt to emerging threats.
- Gradually migrate the legacy enterprise WAN to the new SD-WAN of the future for a growing subset of locations, users and use cases.

### What are the proof points?

- Customer case study: [Sun Rich](#) converged security and SD-WAN with Cato Cloud. Sun Rich was drowning in cost and complexity until the IT team replaced the MPLS service, WAN optimization and SD-WAN devices, routers and firewalls with Cato Cloud.
- Customer case study: [Fisher & Company](#) slashing MPLS costs and improving WAN performance. Fisher & Company replaced a global MPLS network with Cato and saved 95% on its annual costs, doubled its bandwidth, and eliminated the complexity of MPLS.
- Customer case study: [Adroll](#) transforms mobile VPN access to Amazon AWS with Cato. Before Cato, Adroll backhauled mobile VPN traffic to the physical firewall in their HQ from users around the world in order to access AWS VPCs. The traffic backhaul created a chokepoint, adding latency and saturating the HQ Internet connection. With Cato, all users connect to the Cato Cloud and access AWS directly over an SLA-backed backbone.
- Video demo: [Office 365 connectivity and security optimization](#). When a user accesses Office 365, traffic goes through the tunnel and into the Cato PoP. It is then sent through the best performing route within the Cato Cloud Network to the PoP closest to the Office 365 instance.



# The Future of SD-WAN. Today.

## The WAN is Incompatible with Modern Enterprise

The migration to cloud applications and a mobile workforce is changing the shape of the business. The Wide Area Network (WAN) was built to connect and secure static, physical locations - not today's fluid and dynamic businesses. Enterprises pay the price of this incompatibility with expensive connectivity and convoluted topologies that are hard to manage and secure. Adding new locations, enabling secure internet access at remote locations and for mobile users, and optimizing network resources for cost and performance, all represent a growing challenge for most organizations. Traditional SD-WAN is offering flexible capacity and agility but persists the dependency on expensive MPLS connectivity and security appliance sprawl, and lacks optimized support for cloud resources and mobile users.

## True WAN Transformation with Cato Networks

Cato Networks provides organizations with a global SD-WAN with SLA-backed backbone and built-in network security stack. The Cato Cloud reduces MPLS connectivity costs and branch office appliances footprint, provides direct secure internet access everywhere, and securely connects mobile users and cloud infrastructure into the enterprise network.



### Secure And Optimized SD-WAN

Cato SD-WAN enables organizations to augment MPLS with affordable last mile services (Fiber, Broadband, 4G/LTE) and

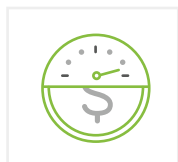
dynamically direct traffic based on applications needs and link quality. Unlike legacy SD-WAN solutions, Cato is uniquely capable to replace MPLS altogether with our global SLA-backed backbone.



### Appliance Elimination

Cato eliminates branch office equipment such as UTM, Firewalls and WAN optimization appliances.

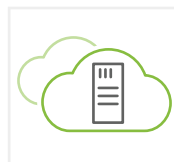
Cato protects all locations and users everywhere, without the need for unplanned hardware upgrades and resource-intensive software patches.



### Affordable MPLS Alternative

Cato leverages cloud scalability, software-defined networking and smart utilization of a multi-carrier

backbone to deliver a high performance and SLA-backed global WAN - at an affordable price.



### Hybrid Cloud Network Integration

Cato connects physical and cloud datacenters, across all providers and global regions, into a single, flat and

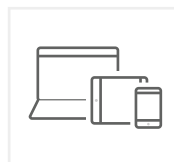
secure network. Customers can seamlessly extend corporate access control and security policies to cloud resources, enabling easy and optimized access for mobile users and branch locations to all applications and data anywhere.



### Secure Direct Internet Access

Cato connects all branch offices and remote locations to the Cato Cloud, providing enterprise-grade network

security for any location without the need for dedicated appliances or traffic backhauling.



### Mobile Workforce Secure Cloud Access

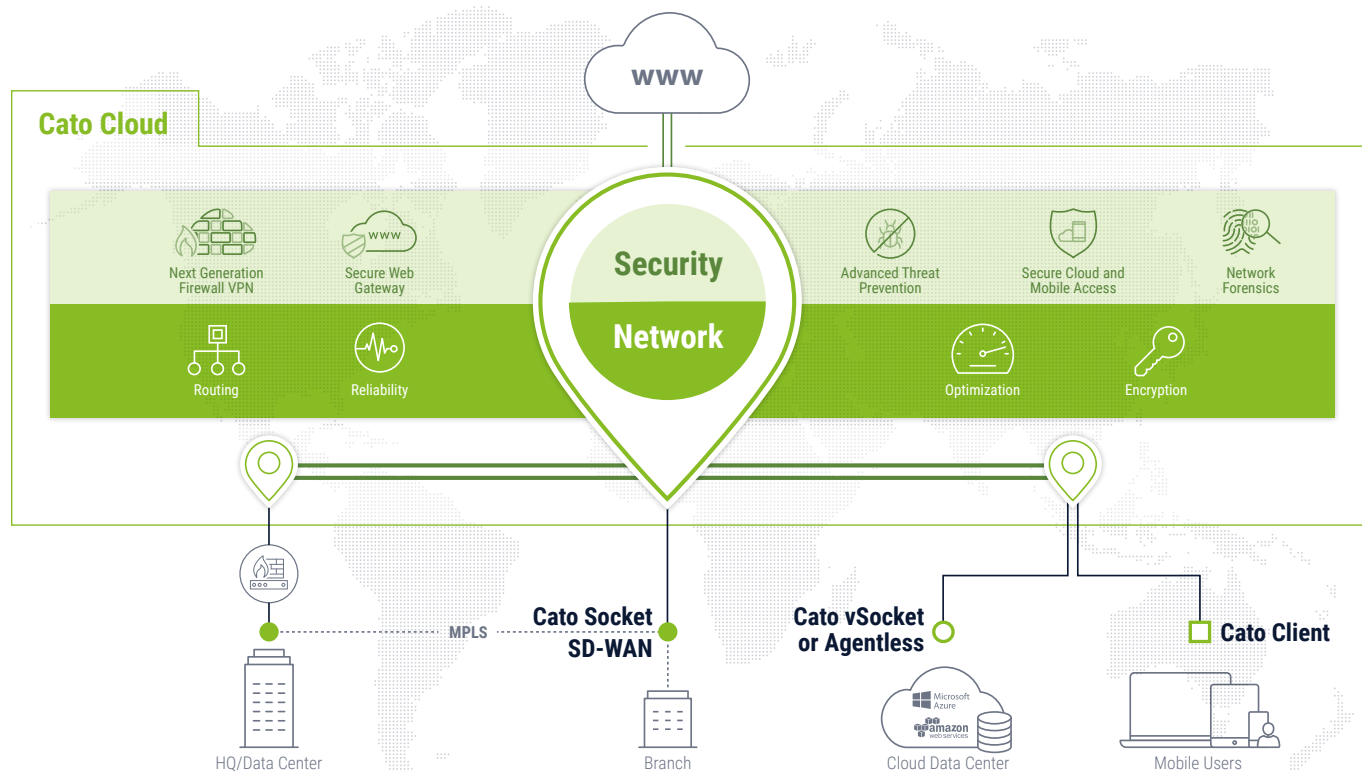
Cato connects every mobile user to the Cato Cloud and provides secure and optimized access to enterprise

resources in physical and cloud datacenters, cloud applications and internet sites. Cato uses its global backbone to optimize routing and reduce latency to key applications like Office 365, and enforce application-aware security policies on all access.



# Software-defined and Cloud-based Secure Enterprise Network

The Cato Cloud connects all locations, cloud resources and mobile users into an optimized and secure global SD-WAN. With both WAN and internet traffic, consolidated in the Cato Cloud, Cato applies a set of elastic and agile security services to protect access to enterprise applications and data, and protect users against Internet-borne threats.



## Cato Cloud Network

A global, geographically distributed, SLA-backed network of PoPs, interconnected by multiple tier-1 carriers. Enterprises connect to Cato over optimized and secured tunnels using any last mile transport (MPLS, cable, xDSL, 4G/LTE).

## Cato Security Services

A fully managed suite of enterprise-grade and agile network security services, directly built into the network. The services have no capacity constraints and are continuously updated to introduce new capabilities and adapt to emerging threats.

## From the Creators of Network Security



**Shlomo Kramer**  
Co-Founder and CEO



**Gur Shatz**  
Co-Founder and CTO

Cato Networks was founded by Shlomo Kramer and Gur Shatz. Kramer is one of the founding fathers of network security and one of the leading cybersecurity innovators of our times. He is best known for introducing the first firewall to the market as a co-founder of Check Point Software, and later the first web application firewall as a founder and CEO of Imperva. Shatz has engineered the Imperva SecureSphere platform and built DDoS protection service company, Incapsula.

For more information, visit [www.CatoNetworks.com](http://www.CatoNetworks.com)



## TELoIP

### Where do you fit in the SD-WAN and/or the SD-Branch ecosystem of vendors?

TELoIP delivers SD-WAN as a cloud overlay network. Their solution includes distributed multi-tenant cloud controllers that function as a managed SDN infrastructure. The company says their architecture lowers cost while accelerating SD-WAN adoption for partners and customers.

TELoIP positions itself as a NaaS solution provider. Their solutions are packaged as licenses which include the CPE, the SDN cloud overlay for internet access and private WAN transport, centralized portal orchestration, professional engineering services, installation and 24/7/365 support.

### What is your value add?

TELoIP provides WAN and internet optimization with a deep patent portfolio and innovative architecture that delivers value through four distinct layers of the SD-WAN experience. Those layers are:

- At the Branch – TeloIP addresses enterprise requirements for WAN, Cloud and internet transport plus multiple cloud managed Virtual Network Functions (VNFs) to increase branch network efficiency. At this layer, their value add includes:
  - TeloIP leverages all branch connectivity into a unified access solution that provides higher capacity, performance and availability for WAN, cloud and internet applications.
  - VNFs that simplify the branch ecosystem by combining Routing, VLAN, Link Aggregation, Compression, IPQoS, Failover, Encryption, and Firewall functionality as services delivered through a single CPE.
  - Dynamic virtual circuits that enable granular policy controls which enhance productivity by ensuring appropriate bandwidth allocation across active users and applications based on business intent.
- On the Last Mile – According to TeloIP, their multi-patented data plane delivers superior speed and performance over broadband by combining per-packet routing intelligence with sophisticated path conditioning to ensure:
  - Bi-directional user quality of experience for real-time apps like VoIP and Skype for Business.
  - Faster top speed performance by combining the bandwidth of all links into a single ethernet handoff, plus providing compression.
  - Seamless, preemptive fast failover with no dropped call or lost sessions.
  - That the solution works with saturated broadband connections.
  - No bandwidth wastage as is caused by alternate techniques such as FEC.
- In the Cloud – TeloIP Cloud is a carrier-class, multi-tenant SDN network that creates an elastic, SD-WAN for each customer. The value of which is that:
  - All branch offices, data centers, remote users, mobile workers and IoT devices are securely connected into a customer protected route domain.
  - Distributed points-of-entry provide routing intelligence, long-haul transport efficiency and low-latency routes to WAN, cloud and internet services.
  - TeloIP Cloud accelerates SD-WAN deployments and lowers costs by providing managed SDN infrastructure and WAN transport as part of the NaaS license.



- Cloud Orchestration – TELoIP brings all these benefits together in a single pane of glass that is purpose built to monitor and manage the end-to-end user Quality-of-Experience (QoE). The functionality provided includes:
  - QoE scoring provides consistent predictive quality metrics that indicate the current and historical performance across sites, links and key applications.
  - QoE visualization and integrated alerts with embedded diagnostic tools and widgets that accelerate troubleshooting and empower support teams to quickly find and repair service issues.
  - Multi-tiered logins with role based access and alerts that foster seamless collaboration between customers, service providers and TELoIP support.

## What are the proof points?

TELoIP provided the following proof points:

- TELoIP solutions are currently operating at 3,000 customer locations.
- For over 15 years, customers have relied on TELoIP software-defined network to increase the speed, quality and reliability of their broadband voice and data networks.
- TELoIP customers are leveraging TELoIP SD-WAN for a secure, efficient high-performance network that connects all branch offices and remote/mobile users to WAN, cloud and internet services.
- The [Tolly Group](#) has run certification testing as a proof point for TELoIP SD-WAN. Their report documents the TELoIP solution's aggregated speeds, QoS traffic shaping with zero packet loss over broadband, and seamless fast failover for high availability.
- TELoIP and their software-defined VINO solutions have earned [21 patent](#) grants and numerous [industry awards](#) including:
  - 2017 TMC Communications Solution Product of the Year.
  - CIO Review Top 20 Most Promising Software-Defined (SDN) Solution Provider.
  - 2017 CRN Software-Defined Data Center 50.
  - 2016 TMC Communications Solutions Product of the Year Award.



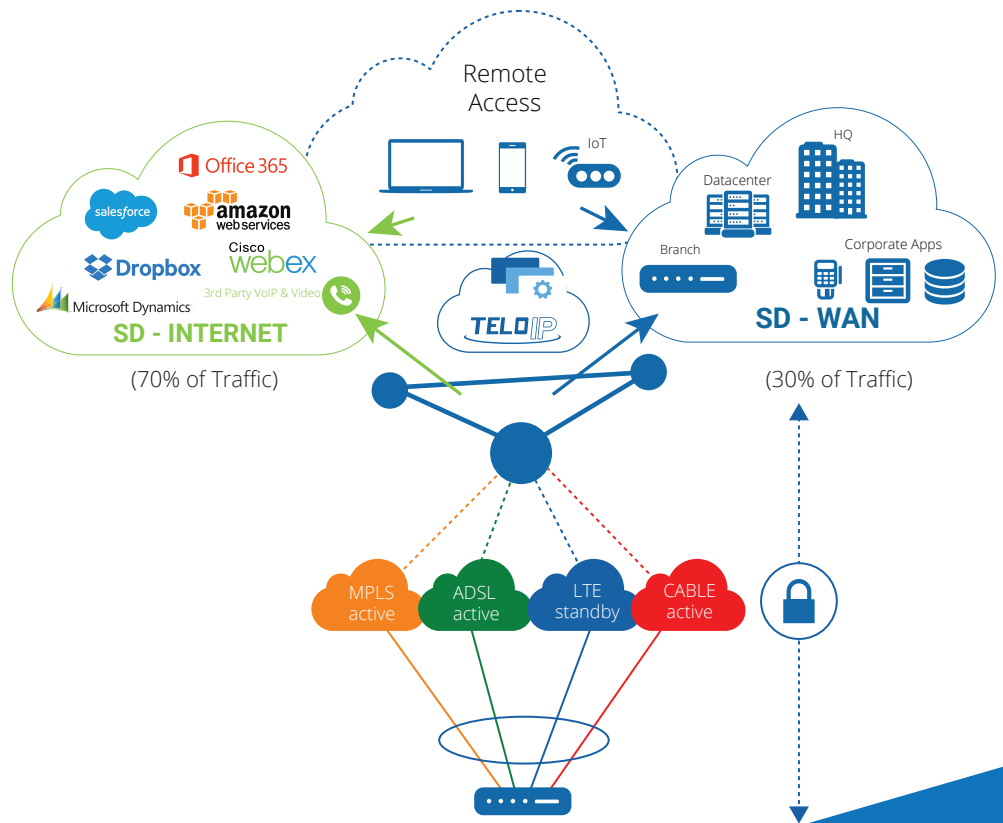


## RISK FREE SD-WAN Experience

For over 15 years, TELoIP has been managing converged voice, video and data solutions that deliver the promise of the internet for business customers.

### Hardened Infrastructure

TELoIP Cloud network is carrier-class SD-WAN-as-a-Service infrastructure providing both high-availability and high-performance plus a long haul WAN transport network for the lowest overall cost.



## SIMPLIFYING CLOUD ACCESS WITH SOFTWARE DEFINED NETWORKS

### VINO SD-WAN



#### CLOUD CONNECTIVITY

We eliminate barriers to SD-WAN adoption by leveraging a turnkey, multi-tenant cloud (the TELoIP Cloud) with nine points of entry in North America. We located each point of entry in carrier-neutral facilities, allowing us to take advantage of a plethora of blended transit services co-located in these sites.



#### COST-EFFECTIVE

VINO SD-WAN allows enterprises to take advantage of broadband pricing and carrier diversity to create a non-stop network ensuring virtual private network reliability and performance at 'best effort' price points.



#### CLOUD MANAGED

The TELoIP Cloud creates a Virtual Intelligent Network Overlay (VINO) that unifies all branch traffic into a single cloud-managed SD-WAN overlay connection.

### WHY IS TELOIP DIFFERENT

TELoIP has long held that the battleground is on the network edge, where our patented ANA/IPDE/MPDS technologies provide a measureable performance advantage over any other SD-WAN competitor — especially with poor underlays or under congested busy hour conditions..

TELoIP's VINO architecture provides a patented Virtual Network Function (VNF) Control Plane that builds a full mesh topology between points of entry. The multi-patented Data Plane provides comprehensive underlay management and Virtual Network Functions (VNF) for IPQoS, Firewall, Link Aggregation, Failover and Routing. The VINO Portal offers complete Management Plane with service orchestration, move, add, change delete support and performance visualization.

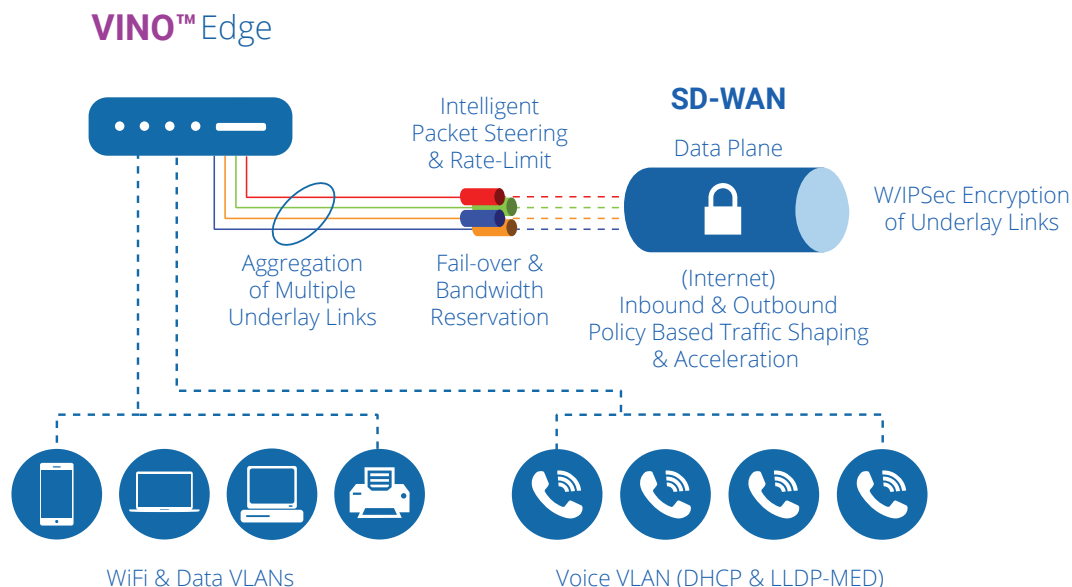
TELoIP offers substantial differentiation, with patented technology in each of the data plane, control plane and management plane that delivers higher aggregated speeds and better quality of experience than competitive solutions when tested using the same underlay links and test scenarios. We believe that TELoIP is well-positioned in the SD-WAN market because:

- Only TELoIP provides both WAN and Internet optimization
- TELoIP enables high-quality voice and video calls with no drops
- We address the need to connect remote and mobile users securely
- We can address scalable security requirements for IoT ecosystems
- VINO SD-WAN aligns network services to user, application and business requirements



## VINO SD-WAN DELIVERS

- VoIP Quality-of-Experience
- 'Hitless' VoIP/Video Fail-over
- Increased Performance
- Software Defined Perimeter
- Cloud Managed Network
- Centralized Orchestration
- Secure Remote Access Solutions
- Cloud Agility
- Lower WAN Costs



## WHY VINO SD-WAN



### INNOVATION

Deploy knowing TELoIP has the deepest intellectual property portfolio in the SD-WAN business. We turn business challenges into technology solutions, with award-winning technology that has been awarded 21 patents and counting



### EASY TO BUY & DEPLOY

We ensure customer success by combining all the VINO SD-WAN components into a simple, predictable license fee that includes professional design, installation and ongoing 24/7/365 support.



### NON-STOP BROADBAND

We build unbreakable cloud tethers backed with impeccable network engineering and support services. Working with our partners we ensure that you have a risk-free experience.

## KEY CHALLENGES WE ADDRESS

- Network Reliability & Uptime
- VoIP & UCaaS Performance Issues
- Multi-Cloud Reliability & Performance
- End-User Productivity
- Network Capacity/Bandwidth
- Branch Office Security
- Branch Office Complexity
- Network Visibility and Control
- Remote/Mobile/IoT Device Access
- Support of Digital Transformation Efforts
- IT Budget Pressure

## CONTACT

SMB or Enterprises – Call us for SD-WAN consultations from Network Design to ROI Calculation and Price Quotes at [info@teloip.com](mailto:info@teloip.com)





## Cradlepoint

### Where do you fit in the SD-WAN and/or the SD-Branch ecosystem of vendors?

While the Cradlepoint NetCloud SD-WAN solution and AER-Series routers are capable of supporting traditional MPLS environments, they are optimized for "broadband first" customers that are deploying a mix of wired and wireless (i.e., 4G LTE and WiFi-as-WAN) links. The other major points of differentiation within the current SD-WAN ecosystem include:

- All-in-One Solution that enables the SD-Branch for small footprint distributed enterprises. The Cradlepoint AER-Series routers provide a converged branch solution that is managed from a single-pane-of-glass: the NetCloud Manager. Functions provided include: SD-WAN, integrated 4G LTE modems (up to 2 modems and 4 carrier SIMs), Ethernet switching with PoE, WiFi AP with Guest WiFi support, advanced security (i.e., NG firewall, IPS/IDS, Web filtering, etc.) and IoT edge computing.
- Cradlepoint is focused on highly distributed enterprise WANs that have deployed branches within tertiary markets where wired broadband services are limited in terms of reach and speed; e.g. discount retailers, convenience stores, retail insurance, etc.. Many of these sites are deploying 4G LTE as their primary WAN and often deploying a second cellular carrier as backup.
- Cradlepoint has extended SD-WAN to in-vehicle networks by supporting multiple 4G LTE connections and steering traffic based on signal strength, jitter, latency, throughput and data plan consumption.
- Cradlepoint has partnered with both wireline and wireless carriers around the world to deliver SD-WAN-enabled solutions that are optimized for 4G LTE.

### What is your value add?

- Cradlepoint has the most advanced 4G LTE support of all SD-WAN players, including 300Mbps today and upcoming support for 600Mbps and Gigabit LTE in 2018.
- Cradlepoint is currently participating in 5G trials with major carriers and the company intends be the first to deliver SD-WAN for 5G.
- Cradlepoint has extended SD-WAN beyond the branch to include in-vehicle networks, temporary sites and mobile command centers that rely on multiple 4G LTE connections to provide reliable and performant connectivity with intelligent traffic steering.
- Cradlepoint NetCloud supports both SD-WAN and SD-Perimeter technology to enable branch, mobile and IoT networking on a single platform with single-pane-of-glass management.

### What are the proof points?

Cradlepoint's 2-page "advertorial" provides several use cases and customers stories that highlight our unique positioning within the SD-WAN ecosystem and our value add.

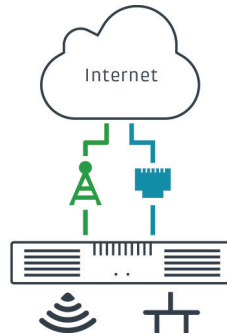




# Elastic Edge: Pervasive Connectivity for People, Places & Things

## Software-Defined Branch

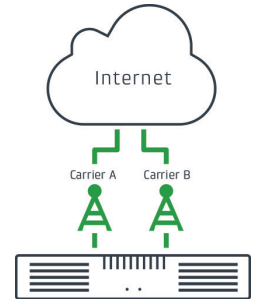
Cradlepoint's all-in-one branch network solutions are ideally suited for "Lean IT" organizations that demand business-critical 4G LTE connectivity. Powered by Cradlepoint NetCloud software and services, these solutions combine SD-WAN functionality with integrated WiFi, Ethernet switching with PoE support, advanced edge security, and multiple 4G LTE modems in a single platform. The entire branch network can be deployed, controlled and managed from a single pane of glass in the cloud.



**Feature Highlight:** NetCloud SD-WAN functionality is optimized for LTE-dependent networks and utilizes a unique Active-Dynamic traffic steering algorithm that provides complete, policy-based control over hybrid WANs that include multiple 4G LTE connections. It can select the optimal path across any wired or wireless link based on a combination of signal strength, latency, jitter, service, carrier preference, and data plan consumption.

## Cutting the Wire: LTE-Optimized SD-WAN

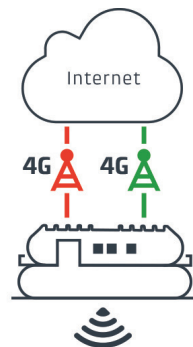
For highly distributed networks such as rural convenience stores and insurance offices, there are few options for reliable broadband. Even if wired options exist, building a nationwide network often requires stitching together more than 100 Internet Service Providers. In contrast, cellular networks provide pervasive, high-speed broadband data to cities and towns of all sizes, enabling a nationwide WAN with just a few providers. Cradlepoint leads the market in 4G LTE technology, from narrow-band IoT solutions to providing a pathway to gigabit LTE and 5G. Cradlepoint branch solutions have integrated software-defined modems supporting advanced capabilities offered by cellular providers.



**Feature Highlight:** Cradlepoint branch routers accommodate two LTE modems and up to four carrier SIMs. NetCloud Manager lets customers centrally configure Smart WAN Selection and perform zero-touch deployments.

## SD-WAN on Wheels

Many organizations – first responders, disaster response teams, mass transit, school districts, and more – rely on in-vehicle networks to serve their customers or the public. These mobile networks require a wireless WAN that delivers high availability, advanced security, and optimal application performance on the move.

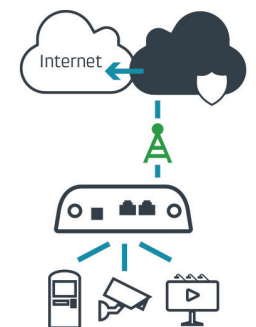


Cradlepoint delivers the SD-WAN capabilities of its NetCloud platform in a ruggedized mobile router that combines multiple 4G LTE modems, WiFi, advanced edge security, GPS tracking, and telemetry integration – keeping vehicles, and the people and things in them, connected and protected.

**Feature Highlight:** Cradlepoint is the only SD-WAN mobile router that supports FirstNet, the private 4G LTE network for first responders. Policy-based Active-Dynamic traffic steering delivers persistent application sessions during cellular disruptions, and can intelligently steer applications between FirstNet and commercial LTE.

## Connected & Protected IoT Devices

The news of Reaper and Mirai botnet attacks affecting millions of IoT devices illustrates the ever-increasing WAN vulnerabilities of IoT deployments. Cradlepoint, a global leader in 4G LTE routers for M2M/IoT networks, is the only vendor to integrate Software-defined Perimeter (SD-P) technology to provide perimeter security, a private IP overlay for Internet and enterprise WAN isolation, and micro-segmentation. Enterprises use NetCloud to orchestrate and deploy – in minutes – secure overlays for M2M/IoT devices anywhere, with no configuration or Internet-routable IP addressing required.



**Feature Highlight:** Cradlepoint's NetCloud Perimeter (NCP) feature is available on M2M and branch routers, enabling SD-P overlays that connect and protect M2/IoT devices in the branch or in the field. The NCP Client extends SD-P functionality to remote workforces that require secure access to Intranet and public cloud applications from laptops, tablets, or smartphones.



# Stories of Software-Defined Networking in the Branch & Beyond

## Stores Optimize Connectivity With SD-WAN

For its rapidly expanding restaurant chain, The Copper Cellar needed more flexibility, less hardware, better WAN uptime, and the ability to manage everything through the cloud.

The Copper Cellar streamlined its branches with Cradlepoint's SD-WAN solution, including a dual-modem router with wired broadband set up as the primary link and 4G LTE for failover.



Cradlepoint's NetCloud platform provides zero-touch deployment, single-pane-of-glass management, and SD-WAN services for optimized path selection. The IT team easily sets up business-based policies that seamlessly move traffic such as voice and video to the best-performing link.

## Remote Sites Use LTE as Primary WAN

Professional Contract Services Inc. (PCSI) needed connectivity for its offices located in areas without access to wired WAN. With Cradlepoint's NetCloud Manager (NCM) and routers, PCSI's small IT team provides connectivity quickly and cost-effectively – with limited man-hours and simplified configuration, deployment, and remote management.

The IT team configures its routers at headquarters through NCM's single-pane-of-glass platform, then later can push out firmware upgrades, security patches, and other updates instantly.



*"I was overwhelmingly impressed with how simple, quick, and easy it was to deploy Cradlepoint solutions," said Nathan Matarazzo, systems analyst at PCSI.*

## Cities Use SD-WAN in Police Vehicles



In major U.S. cities, police departments often face unreliable connectivity and insufficient bandwidth for their high-tech cruisers. With Cradlepoint's cloud-managed in-vehicle routers and

extensibility docks with SD-WAN capabilities, officers are always connected to critical information and applications in the field.

This dual-modem SD-WAN solution enables cellular-to-cellular failover when a connection drops and dynamic traffic steering when it deteriorates. IT teams also can push out updates through the cloud rather than bringing each vehicle to headquarters.

Additionally, four-nines uptime enables officers to file report from anywhere instead of at the office, which improves incident response times.

## Stores Protect IoT With Secure Perimeter

Many large retail and restaurant chains are installing video surveillance cameras to monitor employee and guest activity. However, without cloud access to their DVR systems, these enterprises lack PCI-compliant options for real-time monitoring.

IT teams address their IoT connectivity and security needs with cloud-managed Cradlepoint routers and NetCloud Perimeter (NCP), which enables a Virtual Cloud Network to be created in minutes. With NCP running on every router and on each manager's mobile device, a Software-defined Perimeter is established. With its own cloud-based network attached to a devoted VLAN, end-to-end encryption keeps data protected.



LEARN MORE ABOUT NEXT-GENERATION ELASTIC WAN CONNECTIVITY: [CRADLEPOINT.COM/ELASTIC-WAN](https://www.cradlepoint.com/elastic-wan)



## Apcela

### Where do you fit in the SD-WAN and/or the SD-WAN Branch Office ecosystem of vendors?

Similar to Cato, Apcela has integrated SD-WAN as part of a global network platform offering and it provides access to a cloud-based SD-WAN orchestrator. Apcela views itself as an overlay and cloud managed vendor. The company operates a global, low latency, underlay network, and it has integrated an SD-WAN overlay to improve application performance and security for distributed hybrid IT environments.

### What is your value add?

Apcela has built its AppHUB™ global networking and application delivery platform to improve application performance and simplify distributed security for hybrid IT. The platform re-integrates the fragmenting hybrid IT enterprise architecture, where applications, data, and infrastructure span legacy premises-based datacenters and cloud platforms (e.g. SaaS, PaaS, and IaaS) on a distributed basis across a region or around the globe.

SD-WAN is integrated into the AppHUB platform to facilitate orchestration of application delivery and security management across enterprises' distributed locations. The Apcela AppHUB platform, however, is both technology and transport agnostic, meaning that Apcela can integrate with existing networking, security, and transport solutions including other SD-WAN vendors and carrier provided MPLS.

Apcela leverages the deep packet inspection capabilities of software-defined networking to integrate applications and users with security policies and a range of other application services, often delivered on the AppHUB platform as Virtualized Network Functions.

Apcela's AppHUBs are virtual datacenters deployed at network and cloud service, provider-dense, carrier-neutral colocation facilities and key industry vertical datacenters such as financial exchanges.

The AppHUB platform serves as an orchestrator, integrating and distributing key components of the application services stack such that AppHUB = Network + SD-WAN + Security + Cloud Gateways + WAN Acceleration + Application Performance Monitoring. Apcela leverages an SD-WAN overlay integrating and orchestrating technologies from a range of application services vendors including:

- **Application Performance Monitoring and Management:** AppDynamics, ThousandEyes, Dynatrace, and SolarWinds
- **Application Delivery Controllers:** F5 Networks, A10 Networks and Citrix Systems
- **WAN Acceleration:** Riverbed, Silver Peak Systems
- **Security:** Palo Alto, Fortinet, Checkpoint, Bluecoat, ZScaler, Skyhigh
- **Switching and Routing:** Cisco, Viptela, VeloCloud, Versa Networks
- **Network:** Carrier MPLS, Ethernet, Commercial Broadband

Strategically located in over 40 countries across North America, South America, Europe, APAC and the Middle East, AppHUBs bring the enterprise edge to 185 markets and is within 15 milliseconds of 400 more – to ensure the most secure and fastest application performance. Customers can leverage computing capabilities at each of the AppHUBs to eliminate network



bottlenecks, shorten the distance between edge locations and application hosting hubs, distribute their security as well as improve overall performance of their WAN and application delivery platform. The global network securely interconnects a high-performance, low-latency backbone with hundreds of cloud provider data centers to accelerate and secure application performance across hybrid IT environments.

The AppHUB platform integrates the various application services at the API level and then orchestrates to deliver smart, real-time policies and configurations. Integrating disparate application services functions at the API level enables Apcela to centralize both orchestration and data collection. In this closed loop system, Apcela is able to correlate application delivery and performance issues for rapid remediation of network, security, and application performance issues.

Looking ahead, Apcela's ultimate goal is to build an automated self-service and self-healing platform for application delivery across legacy premises based data centers and the cloud. This approach will continue to build on machine learning, which leads to intent-based networking – whereby network and integrated security and application delivery services will be able to self-configure and re-configure as needed.

### **What are the proof points?**

Nearly 100 Forbes Global 2000 companies across financial services, biopharmaceuticals, healthcare, engineering, manufacturing, and retail have adopted the AppHUB platform to improve application performance and security for their distributed hybrid IT operations. AppHUB eliminates hardware-based servers and appliances across the application delivery stack, reducing network costs and improving the performance of business and mission-critical applications.

Apcela stated that their AppHUB platform is in production today across dozens of use cases including: cloud application integration; branch IT infrastructure abstraction; next-generation, cloud-ready WAN; SaaS acceleration; and mobile application acceleration. Below are a few scenarios of the AppHUB platform solving large enterprise IT and application performance challenges.

- SaaS and IaaS acceleration for a multi-billion-dollar, biopharmaceuticals company
  - Improved on-demand, business-critical video conferencing services
  - Accelerated speed and performance of AWS integration
  - Provide visibility into end-user application performance
- Branch infrastructure optimization for a billion-dollar global engineering company
  - Simplify and accelerate 150+ branch office technology updates with SD-WAN
  - Enable AR/VR, IoT, and real-time AI algorithms and simulations processing
  - Extract branch infrastructure to distributed AppHUBs
- Cloud application assembly for a multi-billion-dollar contact center BPO company
  - Integrate cloud applications directly for mission-critical application requiring integration of InContact, Salesforce, AWS, and Tokbox (WebRTC PaaS)
  - Significantly improve voice and video quality to globally distributed users



# Elements of a Successful Digital Transformation and the Role of **SD-WAN**



A network evolution is happening and at the heart are applications. Apps, once secured and accessed via enterprise data centers, are moving to the cloud at an accelerating pace and users have moved beyond enterprise firewalls, requiring remote access and mobility.

Enterprise IT is now distributed and apps are delivered across hybrid IT environments resulting in performance challenges and complexity. This fragmented landscape requires a new application delivery model – hybrid WAN – supporting an evolution in how applications are delivered, secured and managed to ensure optimal performance and end-user experience. However, to ensure speed, performance and security in this model, companies are turning to SD-WAN solutions to enhance and extend the key functions of their enterprise for a higher performing, next-generation, distributed IT infrastructure.

## Hybrid IT at the Foundation

Hybrid IT, an enterprise approach that manages some IT resources in-house and uses cloud-based services for others is a reality. Previously, IT utilized public cloud computing for non-critical IT services such as development and test applications or for turnkey SaaS applications like web analytics. All of which could replace internal applications and enable access for a mobile workforce. Today, enterprises aggressively pursuing digital transformation are running behind cloud first mandates and deploying new applications as SaaS wherever practical. Additionally, public IaaS platforms are no longer the domain of development and test environments as enterprises re-factor and even re-architect legacy, mission-critical applications to run in public cloud environments.

To stay ahead of this accelerating transformation, network infrastructure must evolve as rapidly as the cloud environment. Unfortunately, many legacy enterprise network architectures cannot keep pace. Traditional enterprise network architectures are built around a hub-and-spoke, carrier MPLS network anchored on the legacy premises-based data center. These typically interconnect the business operations of the enterprise, including regional offices and branches - bringing all traffic back through the datacenter. Any users and traffic destined for the cloud, typically go through a centralized, security DMZ (demilitarized zone of firewalls and web gateways) in the datacenter. This worked in the past when applications were in the datacenter, but it's becoming obsolete. So, what is the solution?

## Consider Hybrid WAN

Because the internet is critical to enterprise cloud connectivity, its performance is not consistent making it impossible to rely on for business and mission-critical applications. This is where hybrid WAN comes into play. Hybrid WAN leverages both internet and MPLS - meeting the requirements of broad and increasingly distributed application deployments. Hybrid WAN also keeps the MPLS network interconnected to the distributed enterprise operations and legacy applications in the enterprise datacenter and local internet connections. This allows direct transit to cloud-based applications and services without the latency and costs associated with bringing all traffic back through a centralized, security DMZ.

While a hybrid WAN architecture solves hybrid IT performance challenges, it poses security challenges. DMZs are centralized for easier management. This leaves enterprise IT managers with a potentially costly and complex alternative of deploying firewalls in front of every internet connection. This is why enterprises have turned to a software-defined WAN (SD-WAN), which in a hybrid WAN environment overcomes many of these challenges - with additional benefits. Most SD-WAN technologies include at least some basic firewall functionality such as packet filtering, while others include fully featured, next-generation firewalls.

## Add SD-WAN for Success

A fully functional hybrid WAN includes a range of architectural enhancements built for true cloud interoperability that includes a high-performance core network, carrier-neutral commercial data centers and extensive interconnection with both SaaS and IaaS cloud platforms. The combination of hybrid WAN and SD-WAN enables users and traffic destined for more critical cloud applications to reduce reliance on the unpredictable performance of the public internet and makes the interconnection with cloud applications directly to the user. Carrier-neutral commercial datacenters also serve as distributed security points and when combined with SD-WAN, enterprises can deploy a number of smaller distributed security DMZs. SD-WAN provides a comprehensive, distributed security approach providing access to policies across the network. Additionally, to further reduce network costs, SD-WAN:

- Addresses latency and capacity issues;
- Provides an improved application performance – user location and application needs are not an issue;
- Creates an automated and simplified network connecting multiple locations with one overlay; and
- Offers telemetry that determines data traffic priorities.

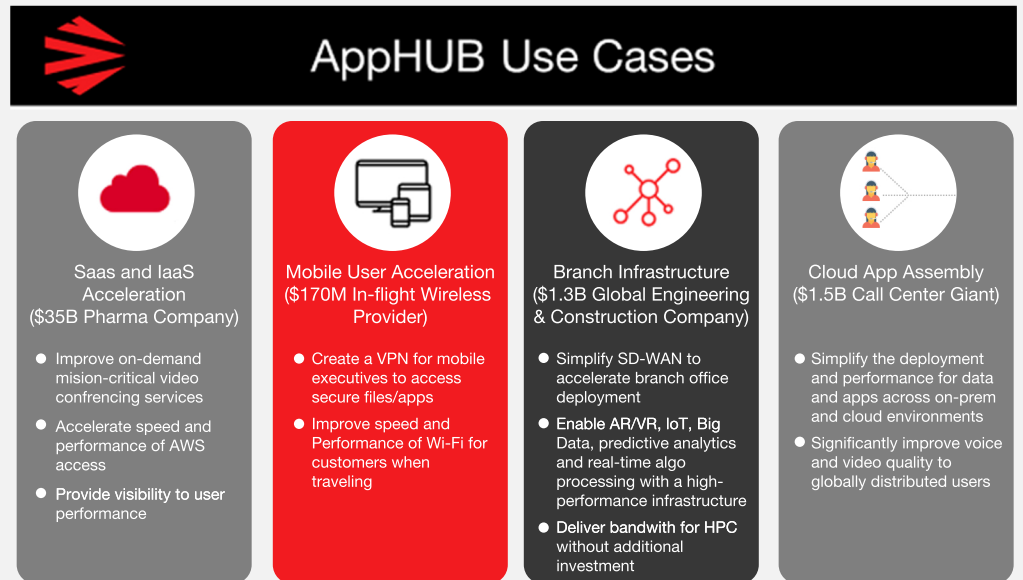


**Apcela**, the high-performance application delivery company recognizes these three elements for a successful digital transformation. Apcela serves more than 100 of the Forbes Global 2000 including banks, exchanges, financial services and biopharma companies across 185 markets in 41 countries worldwide. Apcela enables enterprises to move to a cloud environment – keeping some of an organization’s WAN and enhances and extends what companies already have with its AppHUB solution.

## AppHUBs Enhance and Extend Key Functionalities with SD-WAN

AppHUBs are virtual datacenters deployed at network and cloud service provider-dense, carrier-neutral colocation facilities and datacenters. Built from colocation, network connectivity, hardware-optimized, virtualized network functions (VNFs) and hyper-converged compute and storage, each AppHUB is equipped with a complete network telemetry solution: AppMon. This ensures the underlay network and customer overlay networks meet SLAs. Additionally, AppHUBs’ machine learning capabilities and run-over operating logs reduce the time-to-diagnosis for Apcela’s NOC and in many cases, to the point where enterprises are unable to perceive an issue.

Enterprises can leverage computing capabilities with AppHUBs to eliminate bottlenecks in their networks, shorten the distance between edge locations and application hosting hubs, distribute security and improve overall performance of their WAN and application delivery platform. Apcela deploys SD router instances at each one of its AppHUBs to ingress- and egress-encrypted traffic to and from the AppHUB and network backbone. These instances are internet-connected, allowing enterprises to utilize Ethernet, DIA, broadband, or local access to securely connect to the WAN in the local AppHUB market. Additional AppHUB benefits include:



## Distributed Security Extending across the Enterprise

AppHUB’s suite of functions ensure security across its distributed system including:

- **Distributed Endpoint and Cloud Security:** Firewall, URL and file filtering, IDS/IPS, user Distributed Endpoint and Cloud Security: Firewall, URL and file filtering, IDS/IPS, user and application-based policies, malware detection and more.
- **Improved Performance:** By distributing firewalls closer to the edge, latency can be reduced by more than 50%. VPNs can terminate closer to users and harness the low-latency backbone to move data across the WAN.
- **Latency Optimized Internet Routing:** AppHUBs include a network-based firewall with performance IP Internet. Performance IP leverages peering agreements with 6-12 ISPs and intelligently routes traffic to the ISP providing the best latency.

## Network Connectivity for Best Performance

Carrier neutrality in an AppHUB facility ensures that WAN connectivity balances the best performance and best price. Carrier diversity ensures competition which drives carrier and path diversity as well as optimizes Apcela’s opex for its underlay network infrastructure.

## Cloud Gateways for Secure and Dedicated Connectivity

AppHUBs are Apcela’s cloud gateways, offering secure and dedicated connectivity to the industry’s leading cloud service providers like AWS, Google Cloud, Microsoft Azure and others. By leveraging the low-latency, core network connecting AppHUBs, along with Apcela’s powerful telemetry tool AppMon, customer traffic can be routed to SaaS, IaaS and XaaS providers through the closest AppHUB location, lowering round-trip times and increasing application performance.

With innovation comes pitfalls. However, they can be avoided with these key elements: hybrid WAN, SD-WAN and with Apcela’s AppHUB to ensure business and mission-critical applications function with the necessary speed and performance. No matter the location, company size, market or the amount of legacy infrastructure you have – AppHUB works to solve any issues you have moving to the cloud, while enabling growth for tomorrow.



## Talari Networks

### Where do you fit in the SD-WAN and/or the SD-WAN Branch Office ecosystem of vendors?

Talari Networks positions itself as a provider of a pure-play SD-WAN solution with a software controller that can be flexibly deployed to on-premise hardware (dedicated or 3<sup>rd</sup> party), virtual-machine based (vSphere or Hyper-V) and/or a cloud-based instance (AWS or Azure). Talari SD-WAN solutions can also simplify branch office networks by consolidating traditional edge functions such as routing, firewall and WAN optimization, as well as provide extensibility to secure cloud gateways; e.g., Zscaler.

### What is your value add?

Talari's value-add to the industry is edge intelligence and the resiliency of "Failsafe" WANs, which results in high network availability and reliability, predictable application QoE and a truly carrier-agnostic approach. Enterprises of all types want failsafe WANs. This need is driven by the high cost of downtime, the limited IT resources available at most remote locations, and the limited visibility that most enterprises have into the WAN.

Talari's patented SD-WAN technology offers unique capabilities that enable it to deliver failsafe WANs. These capabilities include:

- Continuous unidirectional measurement of packet loss, latency, jitter and bandwidth utilization which enables unprecedented WAN visibility and sub-second response to network issues;
- End-to-end QoS and inbound congestion avoidance which provides 90% - 97% sustained utilization on shared links without negatively impacting QoE;
- The ability to use all bandwidth across multiple links, even for a single high-bandwidth flow when doing link aggregation;
- Optional packet replication for real-time traffic, delivering platinum quality real-time support;
- Centralized management via Talari Aware;
- High QoE cloud access, especially in combination with carrier neutral colocation facilities close to the core of the Internet;
- The ability to scale to large WANs, which is challenging to deliver when offering true sub-second response.

The benefits of the Talari solution include:

- 50x - 150x bandwidth per dollar versus MPLS alone;
- Monthly WAN costs reduced by 40% - 80%;
- Greater network uptime and application QoE predictability than any single MPLS network;
- Radically reduced WAN troubleshooting costs via a smart, self-correcting, highly fault-tolerant WAN that not only detects problems but fixes them in sub-second time;



- Agile, non-disruptive deployment with existing MPLS, security and WAN Optimization solutions;
- Superior support for real-time apps like UCaaS and videoconferencing;
- Reliable, high QoE access to SaaS and public/hybrid cloud computing.

### **What are the proof points?**

Talari is shipping its 7<sup>th</sup> generation SD-WAN software platform that is deployed in 400+ customer sites in 40 different countries, aggregating 9,000+ SD-WAN nodes globally.



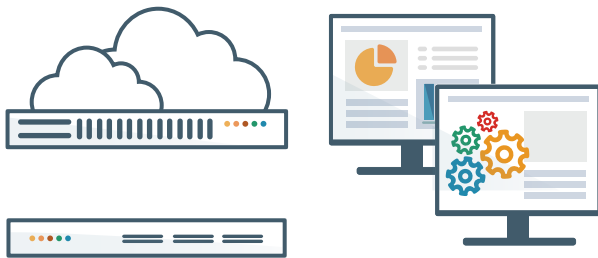
## SD-WAN SOLUTION OVERVIEW

Talari Networks, SD-WAN technology innovator, is engineering the internet and branch for maximum business impact by delivering a Failsafe Software Defined WAN (SD-WAN) solution that offers increased capacity, improved reliability, higher quality of experience while lowering costs. Talari's solution also enables a secure and consolidated branch infrastructure which delivers application and service deployment flexibility, without sacrificing availability or performance.

With the explosive growth in real time applications, distributed workforces and cloud computing, a company's productivity and customer responsiveness have never been more dependent on the WAN infrastructure. Because of this, organizations are turning their focus to their wide areas

networks (WANs) and cloud access networks, knowing that having enough bandwidth to support the increased demand and predictable reliability to ensure continuous application availability are keys to their success.

The cloud is rapidly changing demands on enterprise IT legacy resources. The traditional WAN deployment of the last decade - MPLS circuits and enabling devices, often augmented by separate WAN-Op and firewall equipment - no longer offer enterprise IT the necessary requirements for cost savings, flexibility, bandwidth, manageability and streamlined cloud connectivity. Talari's failsafe WAN offers organizations the unique combination of availability, performance and reliability, yielding a highly resilient remote site with platinum application Quality of Experience.



## Talari Solution Components

A Talari Networks Software Defined WAN, built on a comprehensive physical and virtual appliances portfolio, engineers the internet and branch for application reliability and unparalleled resiliency. Customers have great flexibility in determining how a Talari SD-WAN solution is deployed at the physical edge, the virtual edge, or in the cloud through the use of Talari's Controller, a full suite of appliances and centralized orchestration and analytics platform.

## Failsafe Software Defined WAN

A Talari SD-WAN solution delivers a resilient network that ensures application availability while lowering cost. The following are some of the leading capabilities and benefits of this solution:

### Secure Cloud Access with Visibility

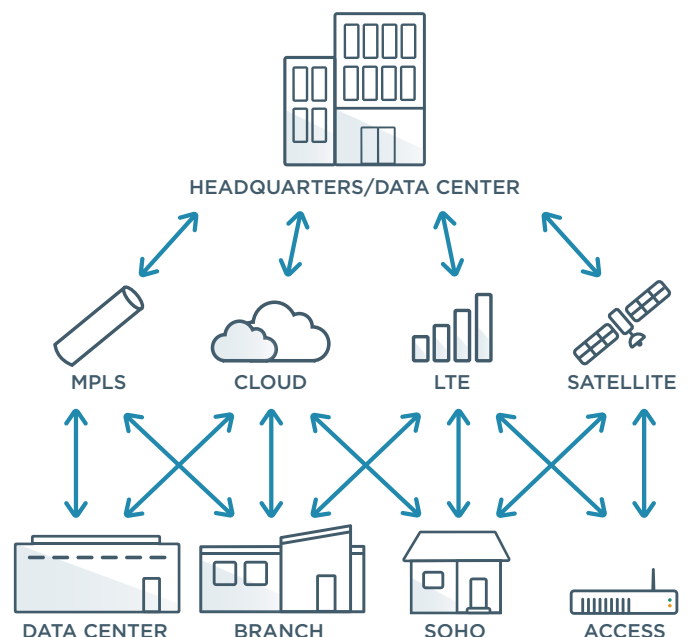
Talari extends the reach of the corporate WAN into the cloud by delivering an encrypted infrastructure with the performance, reporting and control capabilities a company requires to ensure a successful deployment.

### Increased Application Quality of Experience

Talari ensures that applications work without interruption, even in the case of link failure or network impairments such as high jitter, delay, or packet loss.

### Change WAN Economics with a Hybrid WAN

Companies can now modify their MPLS WAN infrastructure to incorporate low-cost, high-bandwidth broadband links that Talari technology converts into a business-class network.





## SD-WAN Resiliency Benefits

- Continuous per-packet, unidirectional performance analytics that factor in packet loss, latency, jitter, and bandwidth between all paths and aggregated links
- Adaptive, deterministic per-packet optimal WAN-path decisions, and in particular sub-second response to degrading network issues such as link/device failures and/or congestion-based disruption or outages
- Enabling “liquid” application flows that are not impeded even when heavy loss/jitter occurs, let alone link failure
- Enabling single priority flows across multiple links; using all m/x/n paths between location pairs
- Ability to leverage all available bandwidth across multiple links, even for a single high-bandwidth flow
- Customizable by bandwidth availability: highly efficient bandwidth utilization
- Replication of flows and packets across disparate links, especially real-time apps like VOIP that require platinum QoS support
- Enables unmatched support for real-time and highly interactive apps
- Extremely scalable (thousands of WAN links with continuous, real-time path measurement) to accommodate QoE standards set by cloud service access providers and edge-network co-location facilities (carrier agnostic)
- Superior inbound congestion avoidance; that is, “bandwidth reservation and control” that enables business-quality app predictability

## TALARI'S LEADING IT BENEFITS

■ Gain resiliency, reliability and superior QoE

■ Maintain high availability and uptime of business-critical apps

■ Leverage bandwidth aggregation with commodity Internet services to reduce WAN legacy costs



“Talari gives us the quality of service and guaranteed bandwidth we need to meet our service-level agreements for VDI and business applications.” - **Dayton Superior**



“I bought Talari to make the network more reliable, and it did exactly what it promised.”  
- **Taft, Stettinius & Hollister, LLP**



“After we implemented Talari...we went from paying \$600 per Mbps to \$100 per Mbps for bandwidth for our distribution centers. We scaled up the WAN bandwidth without scaling up the pricing.” - **Driscoll Strawberry Associates**



“We can leverage Talari’s capabilities to negotiate the highest bandwidth at the lowest cost without compromising reliability/availability in preparation for more rich content, video and streaming applications in the future.” - **Bremer Bank**



“If a WAN link goes down, the call-takers are unaware. The peace of mind and visibility we get with Talari is invaluable.” - **Maricopa 911**



“Talari provides the bandwidth we need to sustain our growth in an efficient and reliable platform.”  
- **United Federal Credit Union**

TO LEARN MORE OR REQUEST A DEMO, VISIT [TALARI.COM](http://TALARI.COM)

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## About the Webtorials® Editorial/Analyst Division

The Webtorials® Editorial/Analyst Division, a joint venture of industry veterans Steven Taylor and Jim Metzler, is devoted to performing in-depth analysis and research in focused areas such as Metro Ethernet and MPLS, as well as in areas that cross the traditional functional boundaries of IT, such as Unified Communications and Application Delivery. The Editorial/Analyst Division's focus is on providing actionable insight through custom research with a forward looking viewpoint. Through reports that examine industry dynamics from both a demand and a supply perspective, the firm educates the marketplace both on emerging trends and the role that IT products, services and processes play in responding to those trends.

Jim Metzler has a broad background in the IT industry. This includes being a software engineer, an engineering manager for high-speed data services for a major network service provider, a product manager for network hardware, a network manager at two Fortune 500 companies, and the principal of a consulting organization. In addition, he has created software tools for designing customer networks for a major network service provider and directed and performed market research at a major industry analyst firm. Jim's current interests include cloud networking and application delivery.

For more information and for additional Webtorials® Editorial/Analyst Division products, please contact [Jim Metzler](#) or [Steven Taylor](#).

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