HCL

Reimagine your networks with **SD WAN 2.0**

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DYNAMICS OF WAN: THE KNOWN, UNKNOWN & UNDREAMT

> “Yesterday is gone. Tomorrow has not yet come. We have only today. Let us begin.”
> – *Mother Teresa*

This quote though used in a different context by Mother Teresa is kind of apt for the present technology crossroads. Circa 1986, the year first router was launched changed the way world connected ever since. Fast forward to the present and we can find ourselves in a technology generation that has evolved from hardware to software to ‘anywhere’. Substantiating the WAN journey could get really nostalgic for “Network Engineers”, especially If you look at how far we have come from a Sat-Comm’s to ATM to Frame-relay to MPLS to Internet based WAN to the more recent darling of technology enthusiasts “Softwarization” of WAN. While the underlying transport technologies changed, computational powers of routers evolved, what remained constant was the human effort to configure/deploy these technologies and to run them with “Human Intelligence”. In the realm of the above mentioned quote, “Yesterday” covers the ring side view of changes, from monolithic DC to branch office connectivity architectures to modern day “Anywhere” connectivity and tomorrow that has still not come envisages the unknown and undreamt part of changing WAN paradigm

The ‘anywhere’ dimension is brought forth by the public cloud providers with core focus on the DevOps narrative. As DevOps cross knee voltage and workloads get distributed, SDWAN methodologies for application access and security will have to be tightly coupled to capitalize on this new anywhere enabled operating model. SD-WAN as we know has come a long way. Question is no longer whether to Deploy SD-WAN or not. That part we believe is already answered. Just to drive home this point, consider “IDC” report on State of SD-WAN which estimates enterprise spend on managed SD-WAN services to grow at a compound annual growth rate (CAGR) of 76.1% and close to $5.7 billion in enterprise spend is expected by 2023. However, as enterprises evolve their cloud strategies and technology landscape changes (Evolution of IoT, 5G, and Edge Computing etc.), Network architects will increasingly wade into unknown territories.

With technological requirements for WAN evolving, we believe there are certain aspects which should become the key design principals while designing new Age WAN i.e.

- “GLOCAL”: Local WAN riding on Global Backbone
- Leverage “NFV” and keep the hardware footprint nimble i.e. uCPE for agility, flexibility.
- Branch is the “new perimeter, embedding security from edge” i.e. Convergence of SDWAN & Network Security
- “Multi-Cloud: The New Normal” i.e. Cloud Agnosticism while choosing SD-WAN platform
- “Seeing is Believing” i.e. Visibility & “Self-Healing” i.e. Automation capabilities
- Speed of Innovation: Time to Market is key in ever changing world we live in

IS YOUR WAN BUILT FOR AGILITY?

As enterprises embrace “Being Digital”, resulting in application sprawl across private and multitude of public clouds & now with the emergence of Edge computing, network architectures, especially WAN needs a complete overhaul (& we are not even talking about legacy Hub & Spoke i.e. DC to branch office architectures). We are talking about technologically savvy enterprises. Enterprises who deployed first generation SD-WAN initially reaped the benefits that SD-WAN deployments brought i.e. OPEX reduction with increased use of Internet as transport medium, high-availability, and application visibility. However, looking at all these parameters one can easily identify them with typical IT endeavors. Challenge today is (it’s a good position to be in) that some of these “New Age” technologies are not typical IT initiatives, they are “Business initiatives” and in some cases these technologies are “business itself”. For ex: an automobile manufacturing company today cannot even fathom itself without IoT: “Connected Manufacturing”, “Self-Driven Cars” are not something for future, they are reality of today. Similar vertical use cases exist in healthcare, BFSI, retail, travel, transport, and logistics verticals.

In our opinion new age WAN has 2 pillars i.e.

- Branch-Access
- Backbone Connectivity (especially for enterprises present globally)

While SDWAN at the Branch-Access has relatively matured, thanks to the abundance of SDWAN providers, it occupies a bigger market share. However, this document will focus more on recent developments i.e. growth in uCPE space along with global backbone enabling multi-geo cloud access. Especially, Branch-to-cloud WAN connectivity, primarily built on ‘Internet-first’ principals, supporting dynamic scalability together with zero-trust security principles.

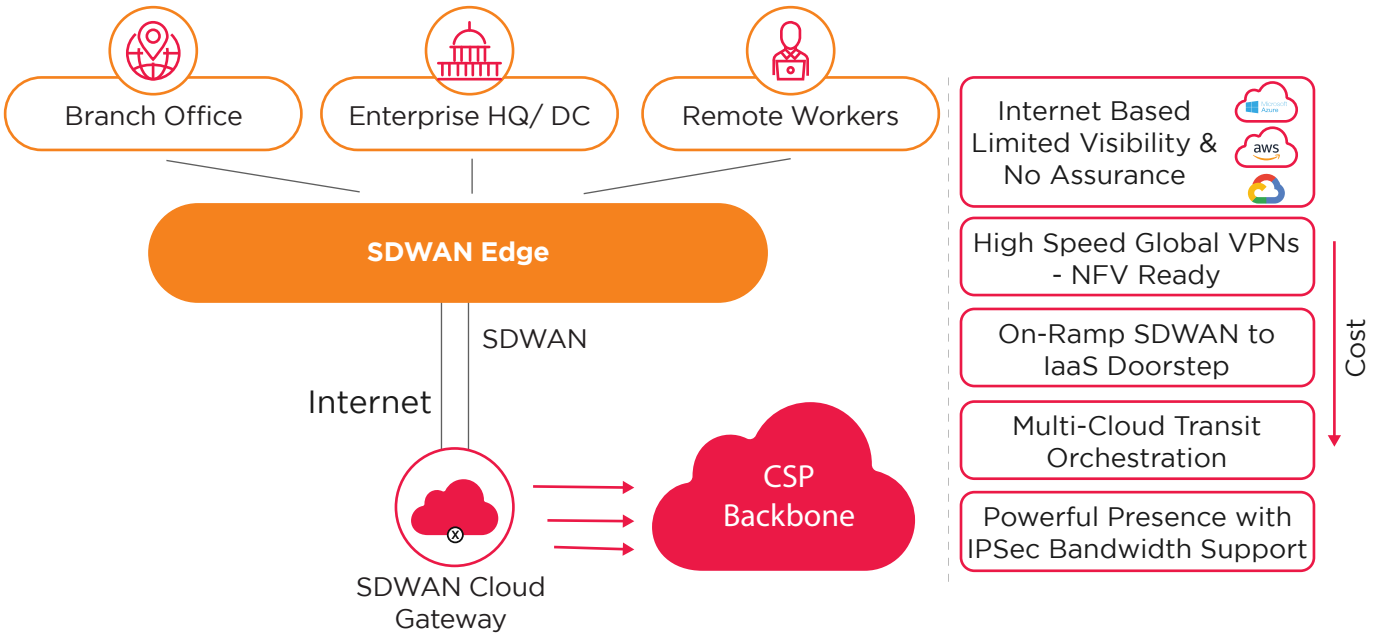
Instead of going across the bare internet to reach to the application hosted in another geography, and being subjected to numerous internet peering points and intercontinental links, what if a customer can enter the nearest available CSP (Cloud Service Provider) network or interconnect location and use their WAN backbone to reach the application? Traditionally enterprises have relied upon using MPLS based backbones by aggregating regional traffic at regional DC’s/Hub’s and interconnecting the same via MPLS backbones provided by traditional telecom players. However, with the ever-changing world now customers have more choices which can provide both global backbone connectivity and also enable faster access to public clouds.

CLOUD SERVICE PROVIDER BACKBONE

CSPs beckon a high-speed backbone network which combined with powerful global presence, makes it a compelling proposition for global businesses to fulfil 'Cloud delivered Branch' promise, quickly and efficiently. For globally spread out enterprises getting multiple regional hubs has been both "OPEX intensive" and "Operationally Challenging". Leveraging Cloud Service provider backbone to interconnect multiple regions & in process enabling super-fast access to cloud workloads seems to be a win-win situation.

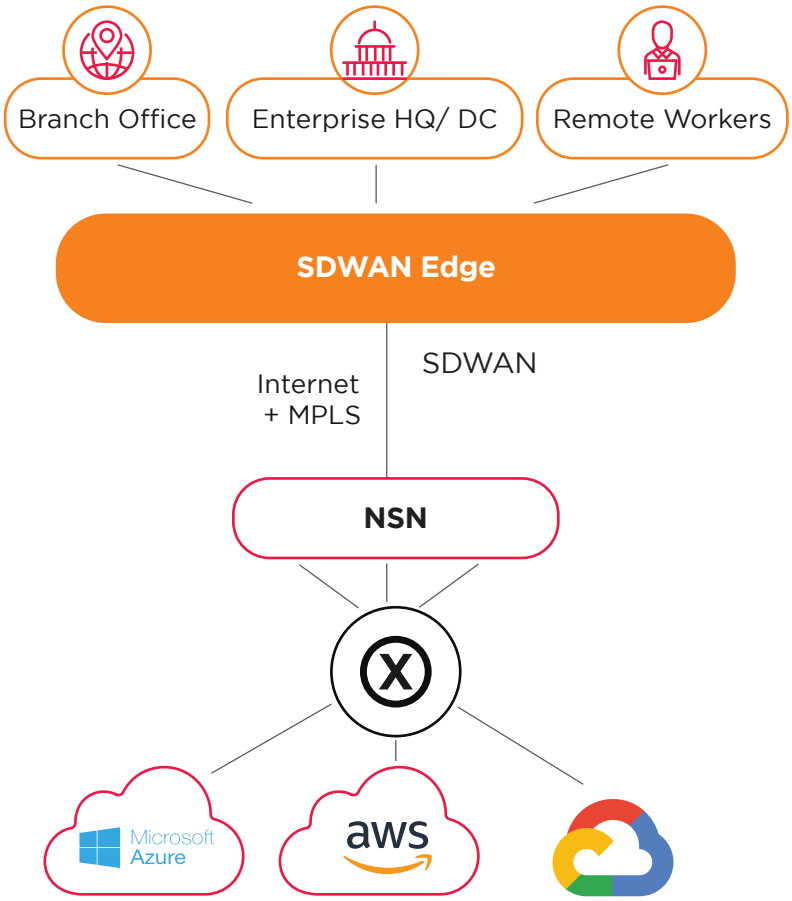
This option gives rise to a new network service construct which simplifies deployment of large-scale secure and optimized branch connectivity across the global cloud network. This includes optimized fast path routing between on-premises, virtual appliances and cloud hosted workloads with secure connectivity using automated IPsec tunnels (Multiple SD-WAN OEM's are integrating their orchestrators to facilitate this with Cloud Providers). The 'pay- as- you- use' service supports pricing and customization based on regional DC/PoP selection and bandwidth need of enterprises. CSP backbone also forms the de facto WAN solution for new vendors catering to multi-cloud transit traffic orchestration, based on transit gateways overlaid on global CSPs network.

However, as the saying goes "Devil lies in details", this option while being extremely tempting does come with its own pitfalls which need to be carefully evaluated.



NETWORK SERVICE NODE

The next option includes a dedicated backbone, providing private interconnections to clouds at a ‘Carrier Neutral’ location. NSN acts as a gateway to the cloud providing local access to world’s leading public CSPs backbone formed within NSNs, alleviates inter-provider interconnects, with most of the NSN pops serving as an ‘internet switch’ at carrier hotels. This not only gives an enterprise a seamless migration to Internet, but also a true enterprise edge.



- Dedicated Backbone & Global Interconnect
- NFV Compliant Portal Friendly
- Bring Your Own Connection
- Carrier Grade Assurance
- Real-time Visibility
- Multi-Cloud Routing

Cost

Ensuring right performance at the right place, NSN decongests connectivity and dramatically simplifies access neutrality. The proposition constitutes quick Interconnects combined with low latency cross connects. Combined with SDWAN based overlay technologies in both access through branch overlay and in backbone, it enables true workload hosting flexibility while providing an improved user experience. It eases hybrid cloud adoption, with secure and direct connectivity to public clouds and helps an enterprise embrace a truly segmented global-regional WAN architecture with a global backbone.

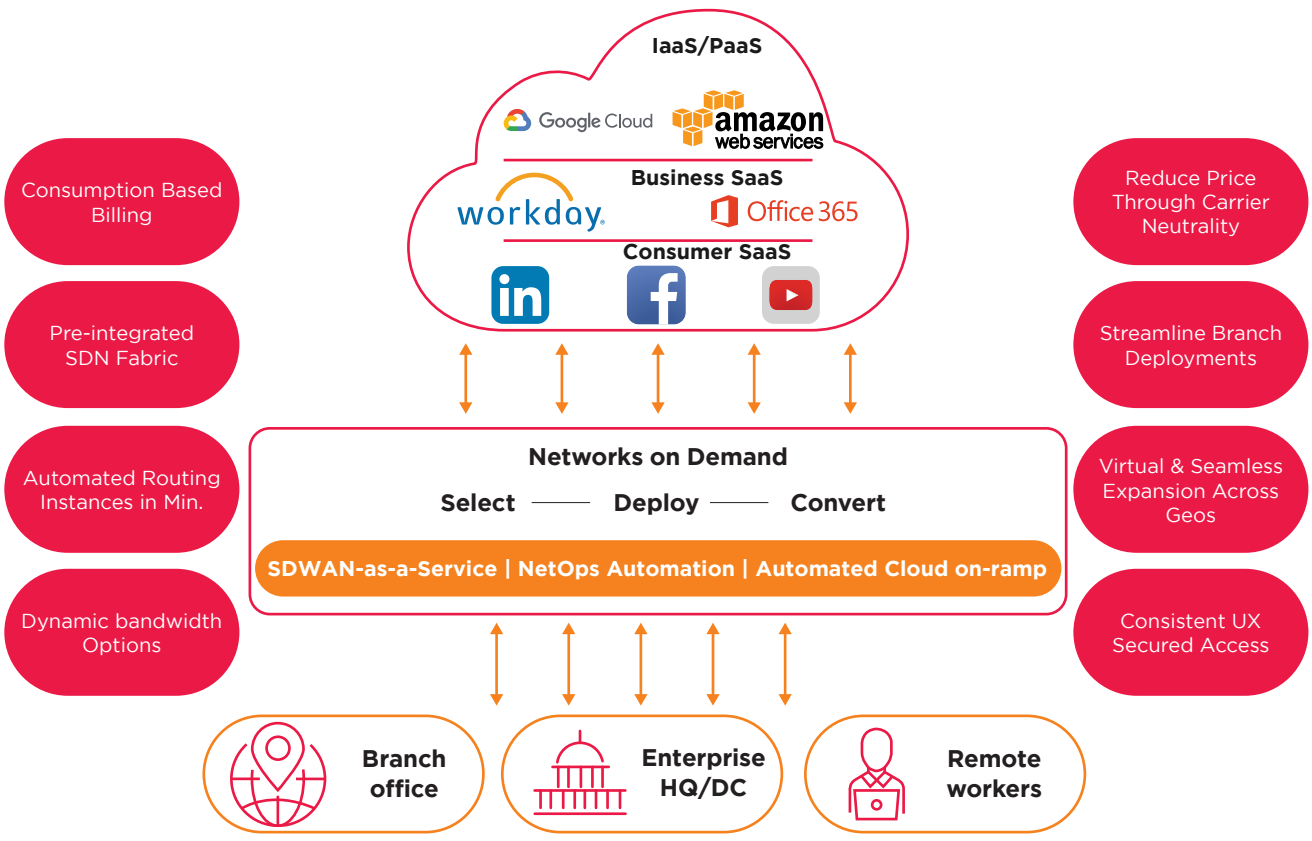
BACKBONE ON THE GO

Whether it is a CSP backbone or NSN or a combination of two, automating VNF Snap-On at the WAN edge or at the CSP global network's nearest pop, becomes pivotal feature to enable true "Anytime, Anywhere, Pay-As-You-Go" Backbone model. It can either be a standard IPSec connection to CSP hub or uCPE connecting to virtual SDWAN at the edge of chosen backbone architecture, it is the SDWAN controller which ensures the bonding between multiple WAN links into a single virtual overlay. This automated cloud on-ramp, accelerates content and application delivery, enabling high performance, simplifying scalability, network reliability and resilience.

Through a single global view of the entire network from a centralized and operational dashboard, enterprises can reduce operational complexity of managing their network across multiple cloud regions and remote locations,

This network automation service which is based on a global orchestration capacity and networks-on-demand, envisages real time, proactive, and self-healing networks. This integrated network orchestration and management on SD-WAN acts as single source of truth by orchestrating all the varied native controllers. Administrators can now configure a vendor agnostic set of network equipment through intelligent workflows and allow them to manage and roll out the operating system software, patches and packages with a single command using single user interface.

NETWORK-ON-DEMAND

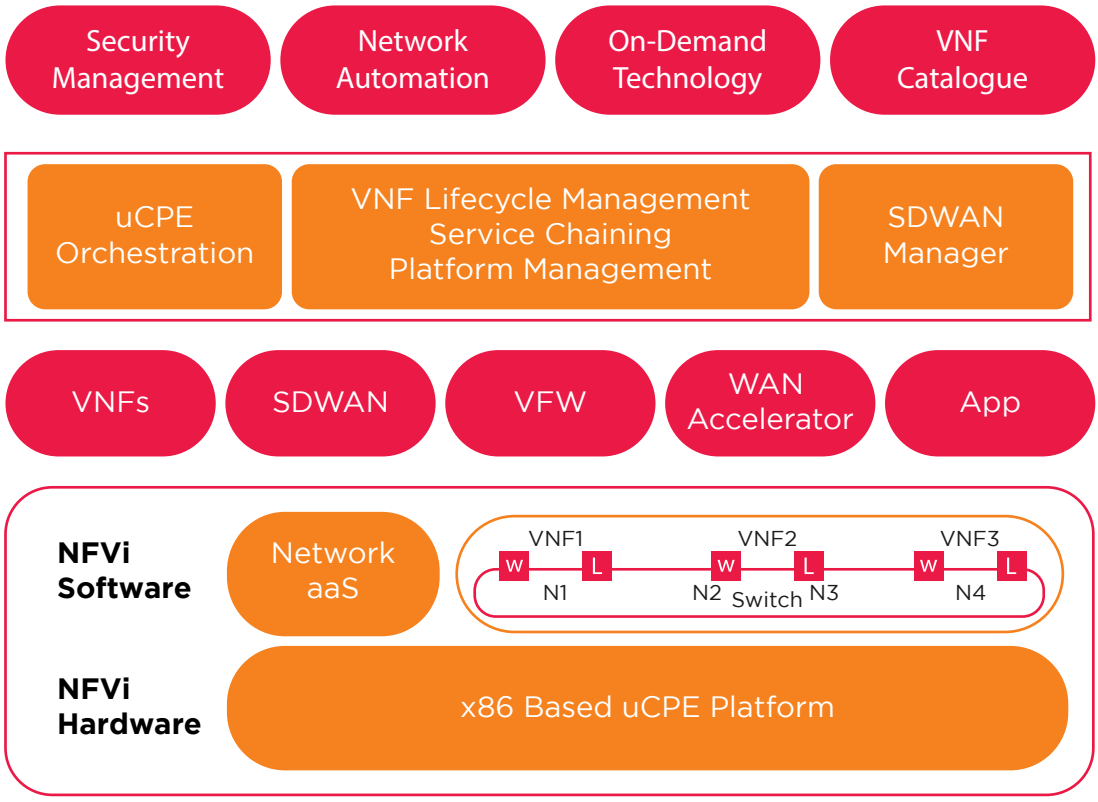


Extending the modern SD-WAN and NFV capabilities, 'network-on-demand' service enables the next-level of network agility and provide robust control to the enterprises from the WAN edge to the underlying transport network. This is a shift from legacy service delivery processes to enabling real-time changes not only for access/port bandwidth or QoS, but also the addition/deletion of different WAN services on each network port and updating cloud services or extranet connections, all from a single global portal.

This creates a true end-to-end globally managed, controlled, and orchestrated SD-WAN architecture by not only catering to today's changing business dynamics in WAN environment but also by futureproofing it through introduction of additional management and control layers. All this, while maintaining business continuity and holding down operational costs.

NFV KINSHIP – REDEFINING INTELLIGENCE AT THE NETWORK EDGE

The first generation of SDWAN was dominated by proprietary black-box devices. With advent & maturing of VNF's, Network Architects realized that this could give them the flexibility long enjoyed by their DC counterparts. Using a X86 based CPE coupled with VNF's not only provides them with enterprise grade flexibility but also goes a long way in helping them on long stated endeavors of reducing hardware footprint from branch i.e. rather than having multiple appliances, one uCPE can host multiple services on top of a Whitebox x-86 based hardware, with virtualization middleware acting as a software glue between different network functions running on top.



To provide enterprises the flexibility to 'Bring-their-own-network', the oxymoron of interoperability between uCPE provider device and network functions that run on top is solved by different OEMs and vendors together enabling a prominent and integrated delivery model, providing unparalleled variety and vendor agnosticism.

This shift in focus from hardware to service chained software embellishes the promise of combining 'any network function' and building 'any service topology'. This not only reduces points of failure and hardware to be managed but also enables programmability and push button 'on-demand' service execution.

Enterprises can now choose from a platter of cloud snapped SDWAN services and 'try-before-you-buy' based dynamic product offerings. This solidifies congeniality for a true 'Branch-in-a-box' uCPE which apart from simplifying network edge closet also allows customer loads and cloud native network functions to be delivered as containers, extending support for new age services such as IOT, quantum high speed trading, smart-city infra etc., making the stakes for Linux based DANOS (candidate for future release) high.

UCPE VALUE FOR SDWAN

Innovation sustainability

- Open programmable platform, myriad application choices
- Dynamic onboarding of new services transforms IT infrastructure to drive new revenue models
- End-to-end service chaining and service enablement with reliable uptime

Reduced Cost

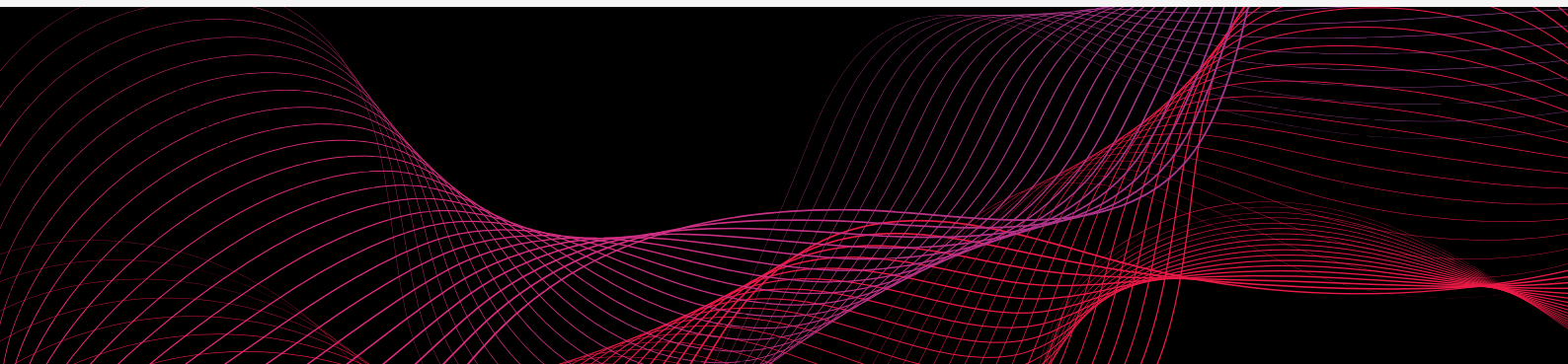
- Replacing dedicated HW reduces CAPEX, OPEX and
- Cost savings in terms of hardware procurement and deployment
- Lower IT cost by eliminating truck rolls

Automation & operational efficiency

- Service- on-demand support with one platform for multiple applications
- Standardized NFV management plane, simplifying network integration
- Smooth service upgrades for active NFVs

Swift Launch

- End-to-end service provisioning alleviating operational burden
- VNF management, interoperability, and integration (even for brownfield environment)
- Lock-in prevention



UCPE - NFVI ORCHESTRATION

uCPE hypervisor led NFVi orchestration provides automated deployment and management of NFV-based services, all while integrating on-demand network and security services, along with SDWAN. It is a versatile platform enabling VNF creation, deployment, and management. It supports rapid integration with existing systems and provides a single -pane-of-glass view for managing NFV operations. It also supports customer tenancy, allowing enterprises to install and manage any proprietary application in the sandbox, unlocking possibilities to grow new revenue opportunities through enterprise managed micro-services.

FEATURES AND BENEFITS

Open Platform

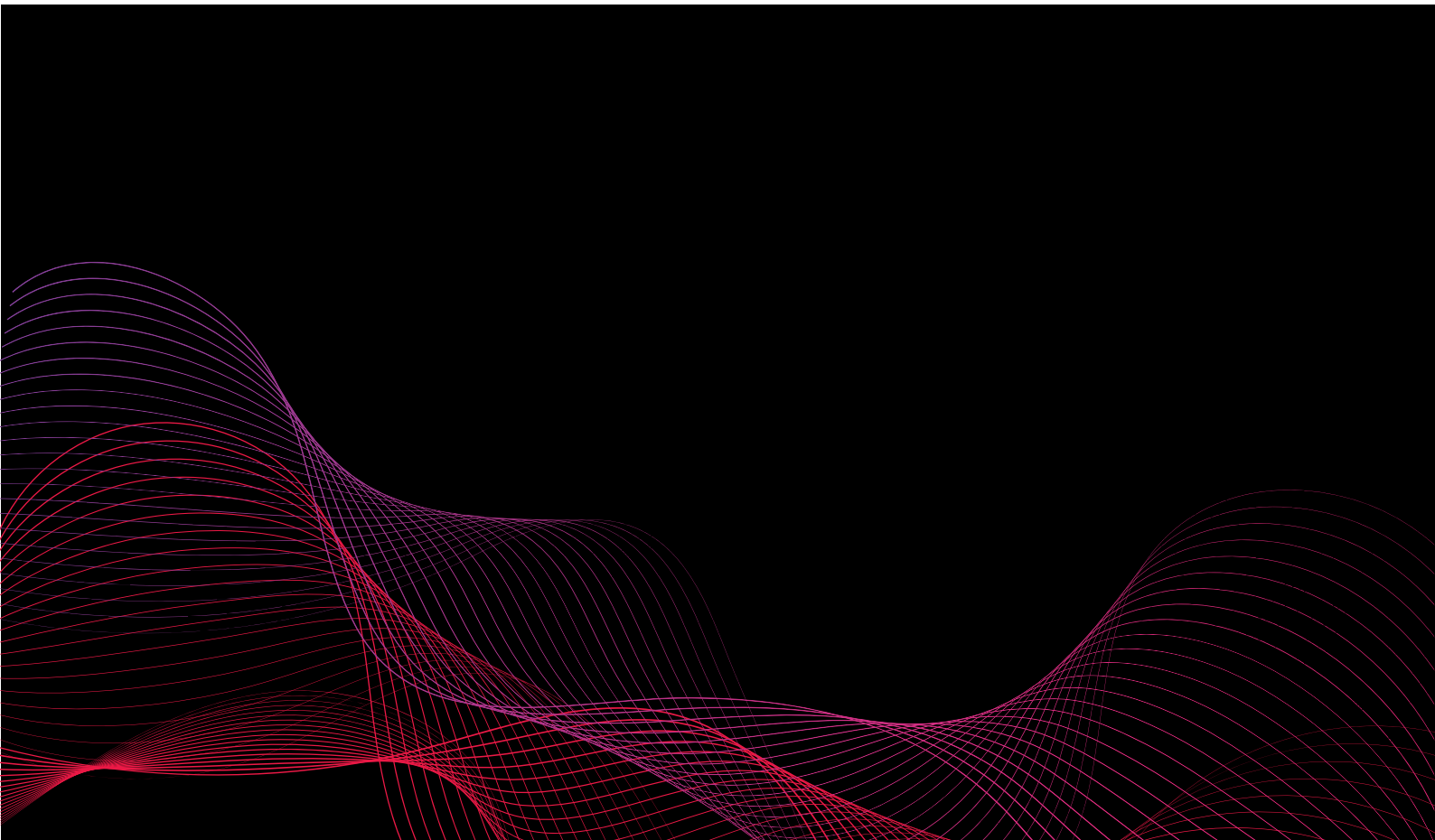
- Open, standard cloud components enable deployment of multivendor environment
- Scalable software supporting small Intel Atom servers to large multi-socket Intel Xeon
- Platform security and data-path encryption

Enhanced Networking

- VRFs to isolate traffic in VPNs
- L2 and L3 VPN over anything
- Modular data-path supports protocol extensibility

Operational simplicity

- ZTP and multi-WAN
- Fault, performance, and troubleshooting
- Automation integration



SDWAN AS A SERVICE - CONSUMPTION MODELS

Considering the current enterprise WAN scenario, there are broadly 3 unique service consumption models which compiles the SDWAN capabilities in designing, implementing, operating, and supporting at different levels of enterprises and partner's involvement. Enterprises consume WAN edge infrastructure functionality in following ways –

Technology	Managed Network Services	Co-Managed	DIY
Business Intent Overlays (Application & Security Policy)	●	●	●
WAN Edge Solution Implementation	●	●	●
WAN Transport	●	●	●

● Included ● Not Included

A DIY approach to an enterprise SDWAN rely on in-house expertise to design, build and operate. This is inherently risky as enterprises are not only required to build a specialized talent pool but also procure from different vendors and network suppliers.

A fully managed network service-based consumption model includes NSI (Network Service Integrators), MSP (Managed Services Providers) owning Day0, Day1 and Day2 services, including WAN edge equipment and end-to-end network connectivity through partnerships with different SDWAN vendors, ISPs and NSPs. In some cases, they may re-sell third party access, allowing organizations to 'Bring Your Own Access'.

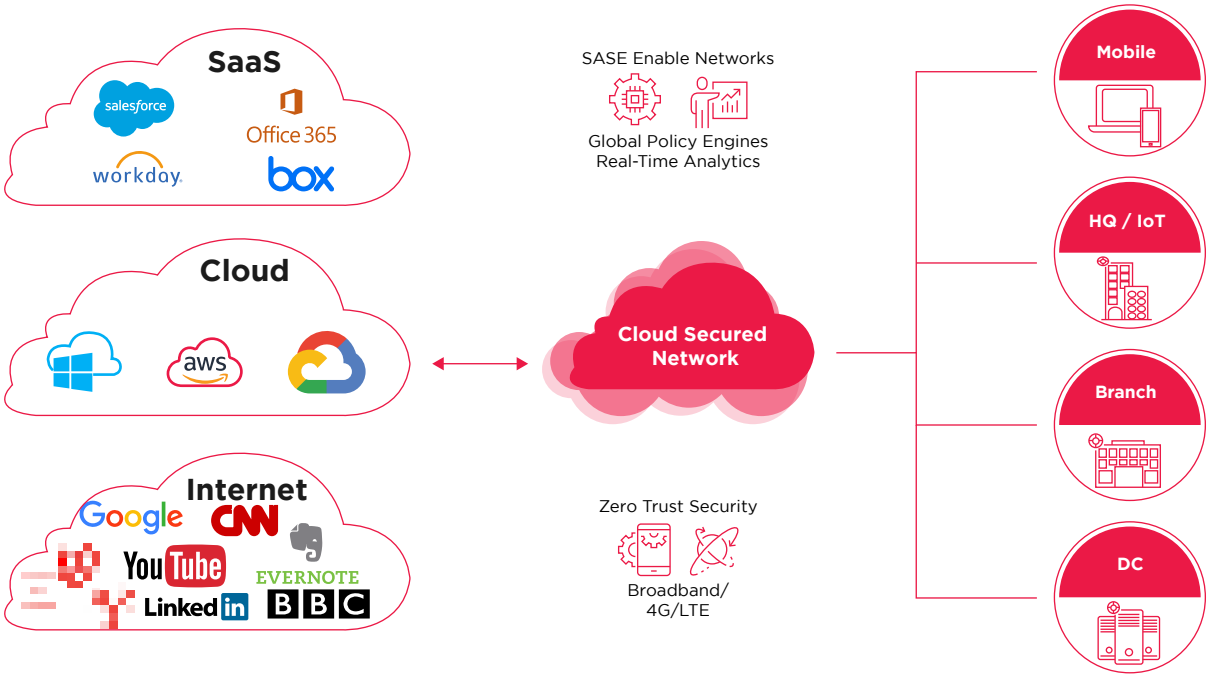
A co-managed option empowers enterprises to create and self-select business intent overlay policies. This gives enterprises the control to customize application QoS and scale security as necessary, anywhere, alleviating the limitations of location-based appliances.

Pay-as-you-Go Licensing

By utilizing the capabilities of the managed services model, enterprises have the opportunity to reduce their upfront costs and potentially lower requirements for in-house expert-level technical staffing. This in a way helps the enterprises to move from costly and unpredictable capital expenditures (CAPEX) model to better scalable and more stable operational expenditures (OPEX) model, enabling monthly pay-as-you-go SDWAN and cloud network connectivity whenever and wherever needed..

CLOUD-SECURED NETWORKS

Solving emerging business challenges with point network and security solutions leads to technical silos which are complex and costly to own and manage. The security and risk management stalwarts understand that to future-proof SDWAN deployments and minimize branch sprawl, requires a converged cloud-delivered secure access and service edge solution, quint-essential to address the current infrastructural shift. The new network and security converged architecture design identifies the mobile users and modern devices, delivering secure access to the appropriate cloud-based applications, anywhere, anytime.



The cloud-native and zero trust security model targets multiple enterprise-level benefits

Secured and efficient Operations

Flexibility - Cloud-based flexible security services like web filtering, DNS security, credential theft prevention and next-generation firewall policies

Reduced complexity – Simplify by minimizing the number of security products to manage, update and maintain by consolidating the security stack

Increased performance – Easy cloud-enabled secured connectivity to resources and apps anytime, anywhere

Networks Protection

Zero Trust protection – A complete session protection, regardless of whether a user is on or off the corporate network

Threat prevention – Complete content inspection with more security and better visibility into the network

Reduced Cost

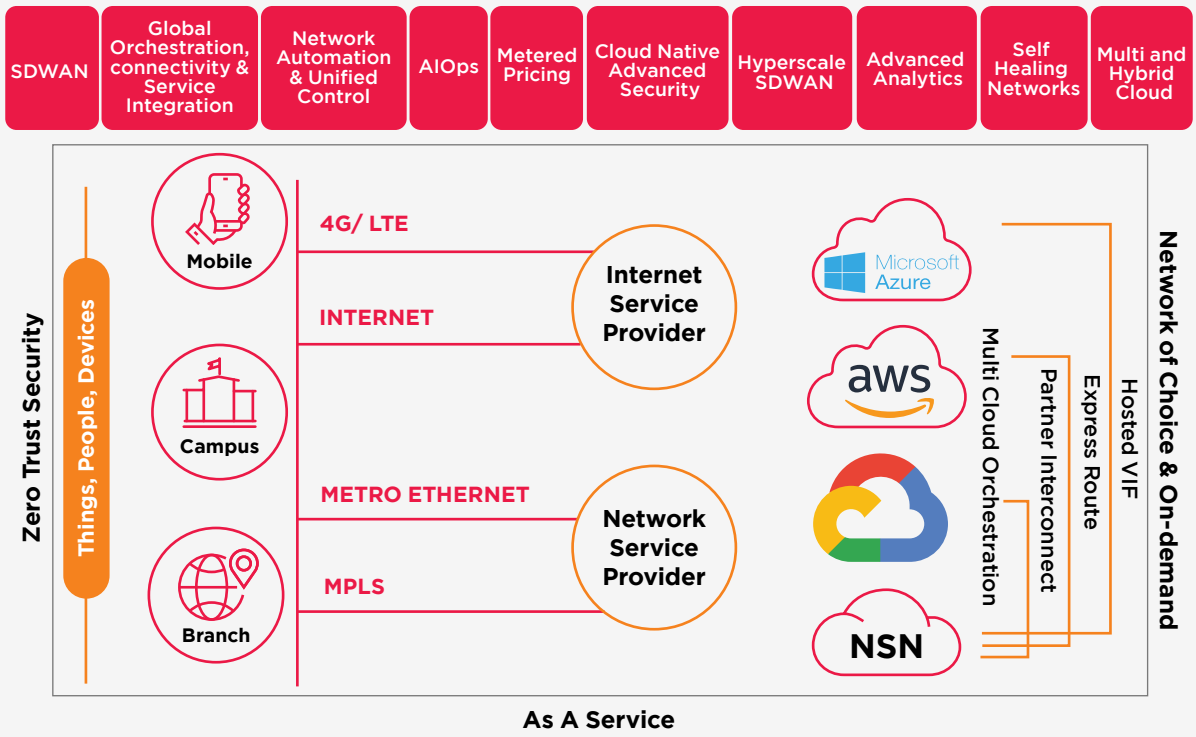
Single platform to manage multiple point products reduce enterprise costs and IT resources

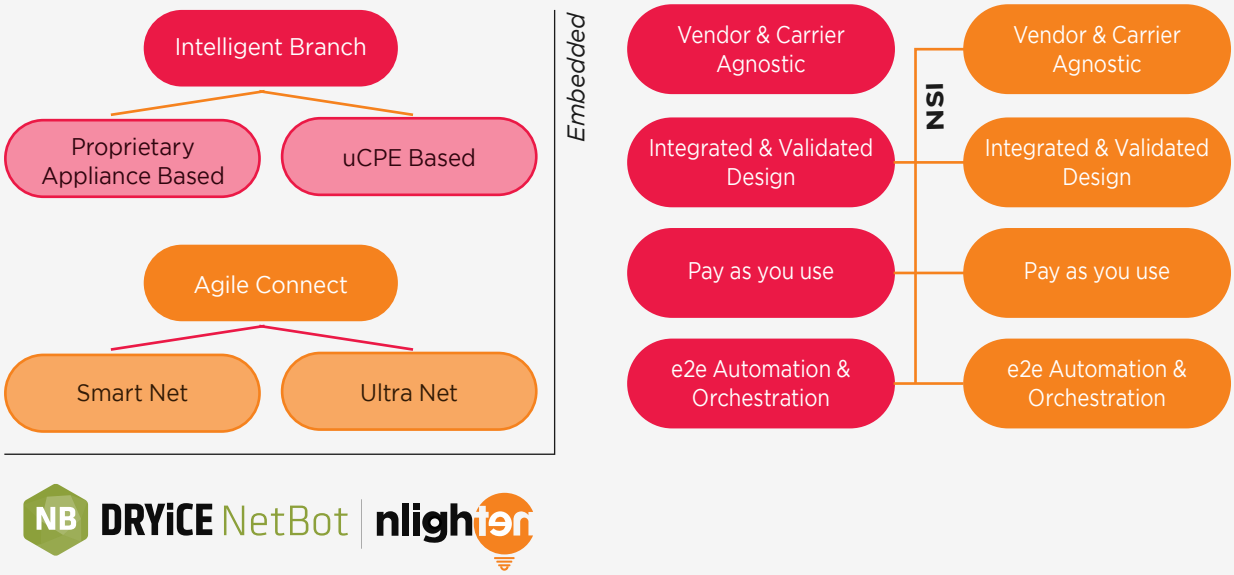
With this new converged regime, businesses tend to have one policy — one firewall for protecting against network-based threat, reduced time-to-market, and high agility to the digitally transforming businesses.

HCL TIS SNAPSHOT

HCL TIS 2.0

HCL's TIS is a future-ready and cloud-agnostic SD-WAN framework that dynamically routes and intelligently connects the global WAN infrastructure of the enterprise to make it truly transport agnostic. The business-first and experience-centric structure enables centralized control, cloud-management, AIOps, global network automation orchestration, advanced analytics and carrier-neutral establishments, all in as a service model.





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