



The latest real-world uCPE deployments

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Today's speakers

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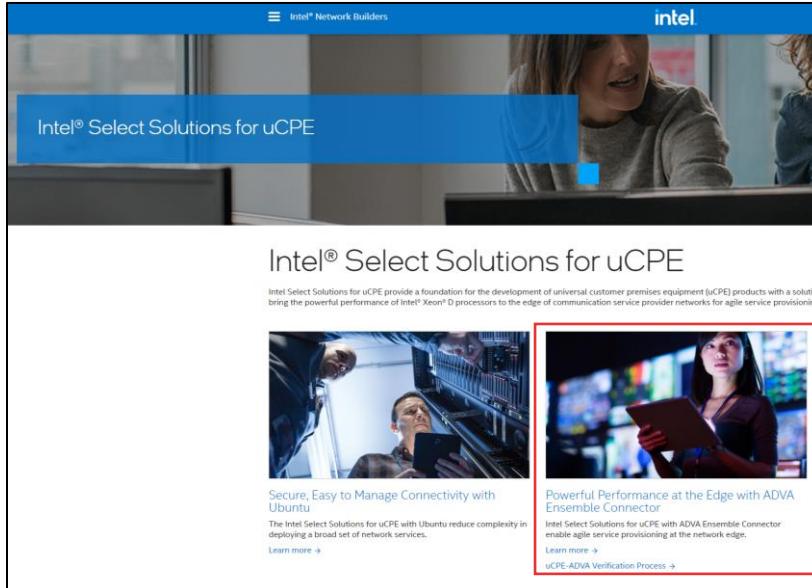
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Thanks to our partner and sponsor Intel!

ADVA presence on Intel Network Builders and Intel Select Solutions



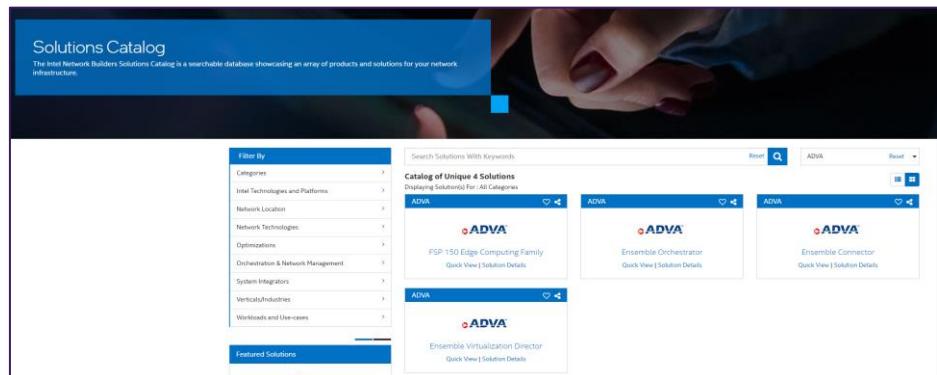
Intel Select Solutions for UCPE



The screenshot shows the Intel Select Solutions for UCPE page. At the top, there's a banner with the Intel logo and the text "Intel® Select Solutions for uCPE". Below the banner, the main title is "Intel® Select Solutions for uCPE". A sub-section title "Secure, Easy to Manage Connectivity with Ubuntu" is followed by a description: "The Intel Select Solutions for uCPE with Ubuntu reduce complexity in deploying a broad set of network services." A "Learn more" link is provided. Another sub-section title "Powerful Performance at the Edge with ADVA Ensemble Connector" is highlighted with a red border, followed by a description: "Intel Select Solutions for uCPE with ADVA Ensemble Connector enable agile service provisioning at the network edge." A "Learn more" link is provided, and a "uCPE-ADVA Verification Process" link is at the bottom.

Four ADVA entries in solutions catalog:

- Ensemble Connector
- Ensemble Orchestrator
- Ensemble Virtualization Director
- FSP 150 Edge Computing Family



The screenshot shows the Intel Network Builders Solutions Catalog. The top header includes the Intel logo and the text "Solutions Catalog". A sub-header states: "The Intel Network Builders Solutions Catalog is a searchable database showcasing an array of products and solutions for your network infrastructure." The interface features a sidebar with a "Filter By" section containing categories like "Categories", "Intel Technologies and Platforms", "Network Location", "Network Technologies", "Optimizations", "Orchestration & Network Management", "System Integrators", "Verticals/Industries", and "Workloads and Use-cases". The main content area displays a "Catalog of Unique 4 Solutions" with four entries, each featuring the ADVA logo and a "Quick View | Solution Details" link: "FSP 150 Edge Computing Family", "Ensemble Orchestrator", "Ensemble Virtualization Director", and "Ensemble Connector".

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Why look beyond router
and SD-WAN appliances?

Network appliances work ...

... but they don't address strategic drivers



Lower cost for platform and reduced inventory



Simpler operations through automation



Cloudification and software-centric approach



Vendor diversity and supply chain resilience

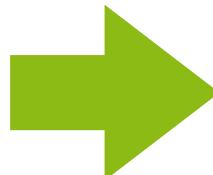


Innovation and revenue acceleration with faster delivery of new services

NFV and uCPE can help!



Network functions virtualization (NFV) and universal customer premise equipment (uCPE) enable users to realize the benefits of the cloud by **replacing closed appliances** with their choice of **software** that can be **hosted anywhere** in the network on their **choice of open hardware**.



Bringing the power of the cloud to the telecom network - today!

ADVA implementation of uCPE



VNFs

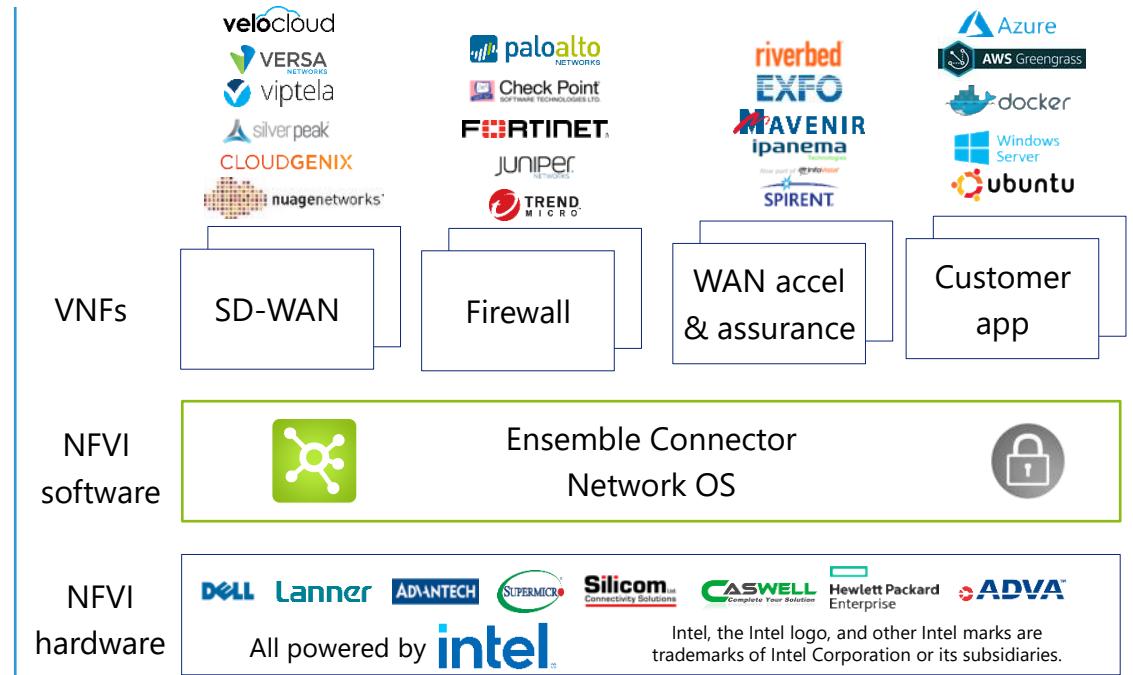
- Industry's largest library of VNFs
- Easy to onboard new VNFs
- Support for customer applications

NFVI software

- Network OS convergence layer
- Platform for edge cloud
- Provides security, encryption and management of virtualized services

NFVI hardware

- Industry's largest set of options
- Includes operator-chosen vendors



Choice of platforms and choice of apps on the platform



Real world use cases

How CSPs are using uCPE – NOW!

Four real world use cases



A

- **Alpha**: North American CSP providing managed services
- **Key point**: hosting of applications at customer edge

B

- **Bravo**: APAC CSP providing Machine Learning (ML) services
- **Key point**: deployment of uCPE host with GPU for demanding ML application

C

- **Charlie**: North American CSP providing managed services
- **Key point**: Cloudless deployment with LTE-equipped uCPE for wireless access

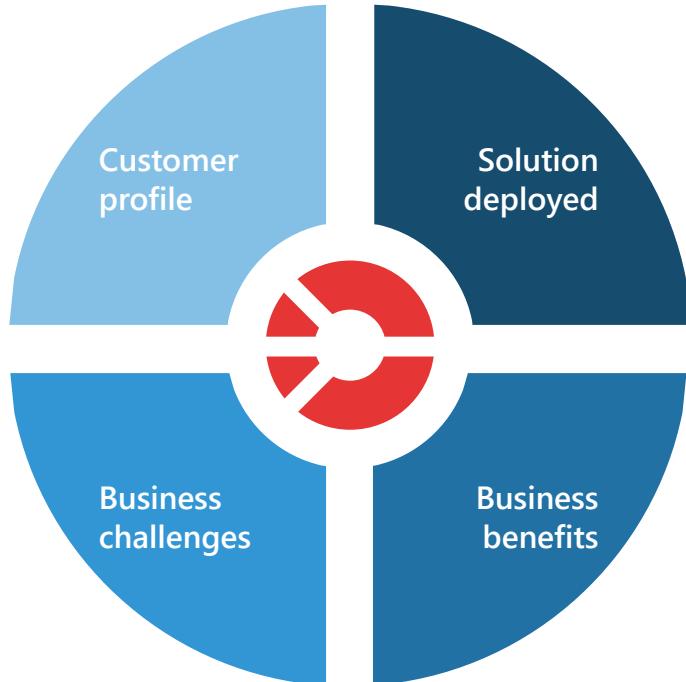
D

- **Delta**: global CSP providing managed services
- **Key point**: Reduction of inventory in depots

Alpha: North American CSP providing managed services

Overview

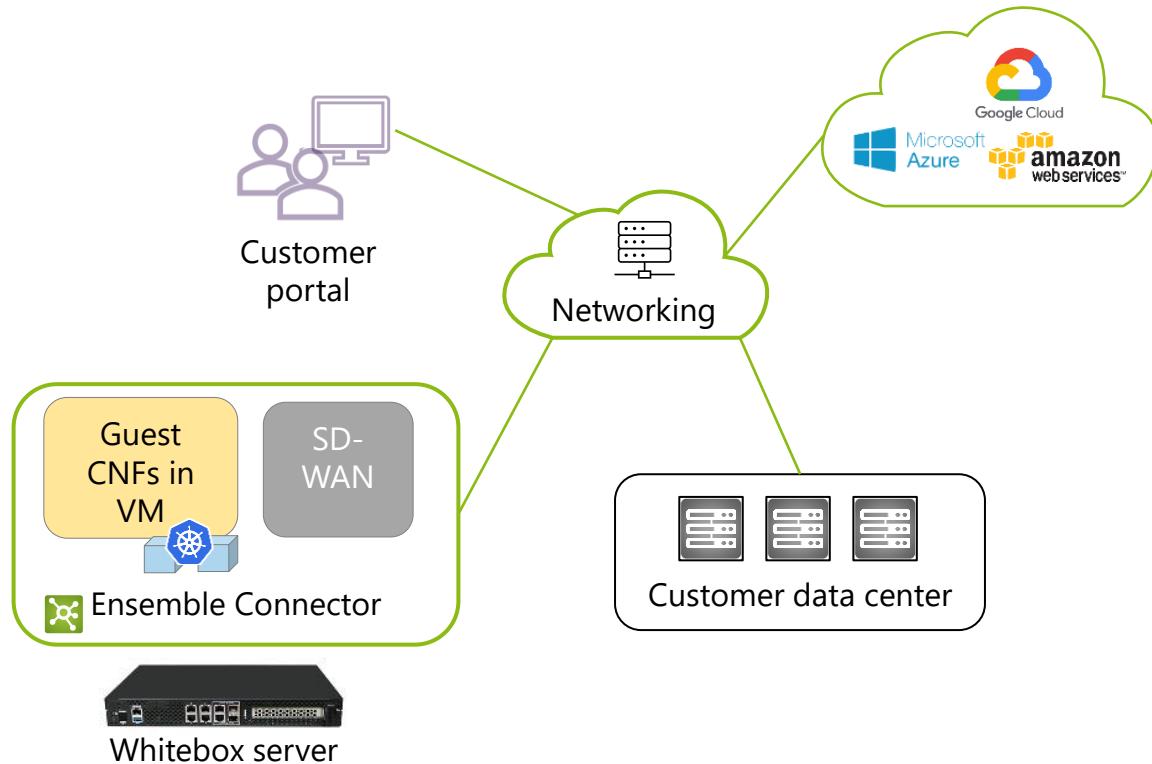
- Tier 1 CSP based in North America and providing global services
- Residential, business and government customers
- Long-time user of NFV
- Customers are asking for onsite hosting of workloads
- Need to support containerized applications using the isolation of VMs
- Need to combine with virtualized services on one platform



- Ensemble Connector
- Third-party MANO
- Third-party whitebox
- Kubernetes containers running in a virtual machine
- Ability to provide sticky value-added services
- Same platform (hardware, software, MANO) as for managed communication services

Alpha: North American CSP providing managed services

Details of application



Key aspects

- Whitebox server provides networking services and provides customer edge compute hosting
- Ability to host customer IT workloads across diverse environments
- Kubernetes deployment across clouds
- User experience from single customer portal

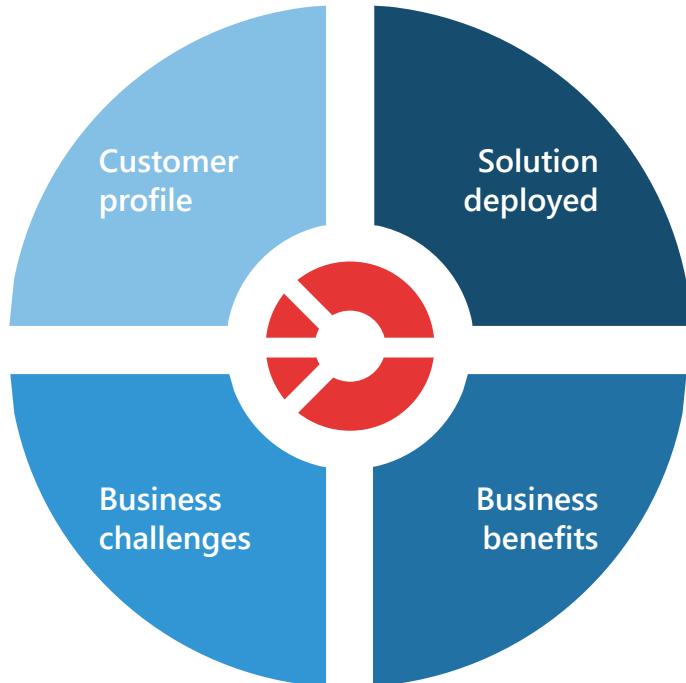


Bravo: APAC CSP providing Machine Learning (ML) services

Overview

- Tier 1 CSP based in APAC and providing global technology services
- Business, government, residential customers
- Leader in data analytics services

- Delivering new generation of cloud-native, managed smart services
- Computationally dense applications on white box
- Business case depended on ability to leverage hardware synergies with network services
- Time to market demands

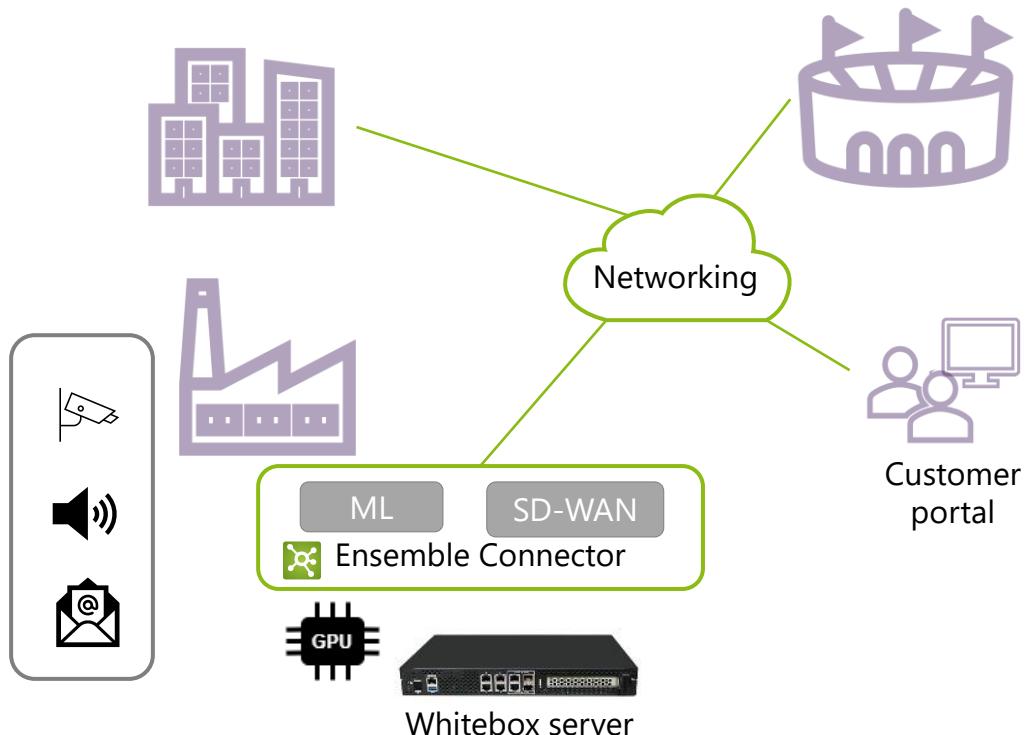


- Ensemble Connector
- ADVA SaaS MANO
- Third-party whitebox with GPU acceleration
- VNF using software developed in house to provide managed ML services

- Computational performance goals achieved
- Builds infrastructure for new smart services and new networking services
- Solution developed in very short time with minimal staff

Bravo: APAC CSP providing Machine Learning (ML) services

Details of application



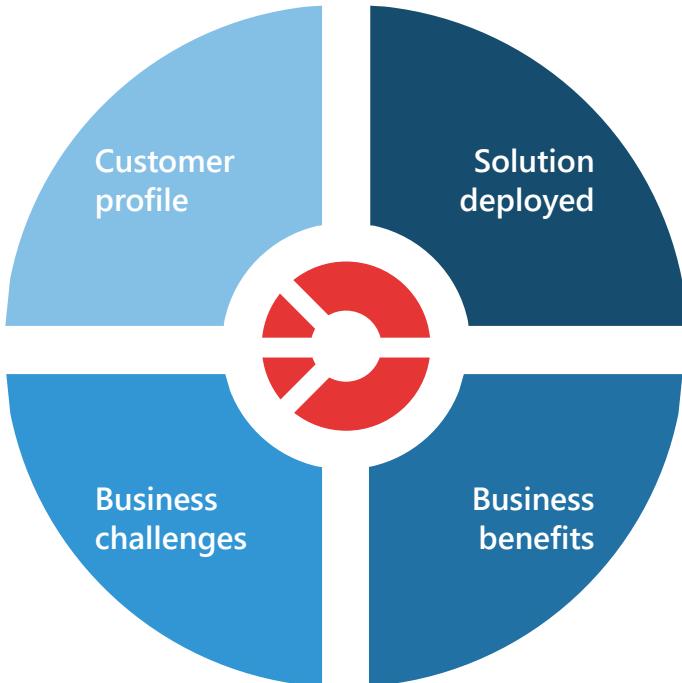
Key aspects

- Whitebox server provides networking services and hosts innovative managed ML services
- Enables service for smart factories, smart cities, smart sports, etc.
- Connector integrates ML application with hardware acceleration resources
- Computationally dense applications are handled at customer edge

Charlie: North American CSP providing managed services

Overview

- Voice, data, internet, wireless, video and secure network options throughout the US and Canada
- Large enterprises and government agencies
- Wide variety of appliance-based solutions: SD-WAN, router, firewall
- **Wanted to use a virtualized solution to enable flexibility, without requiring visits to 15,000 sites to make any potential changes in the field.**
- **Cloudless model** to optimize the footprint and cost of this approach was a key to making a successful business case

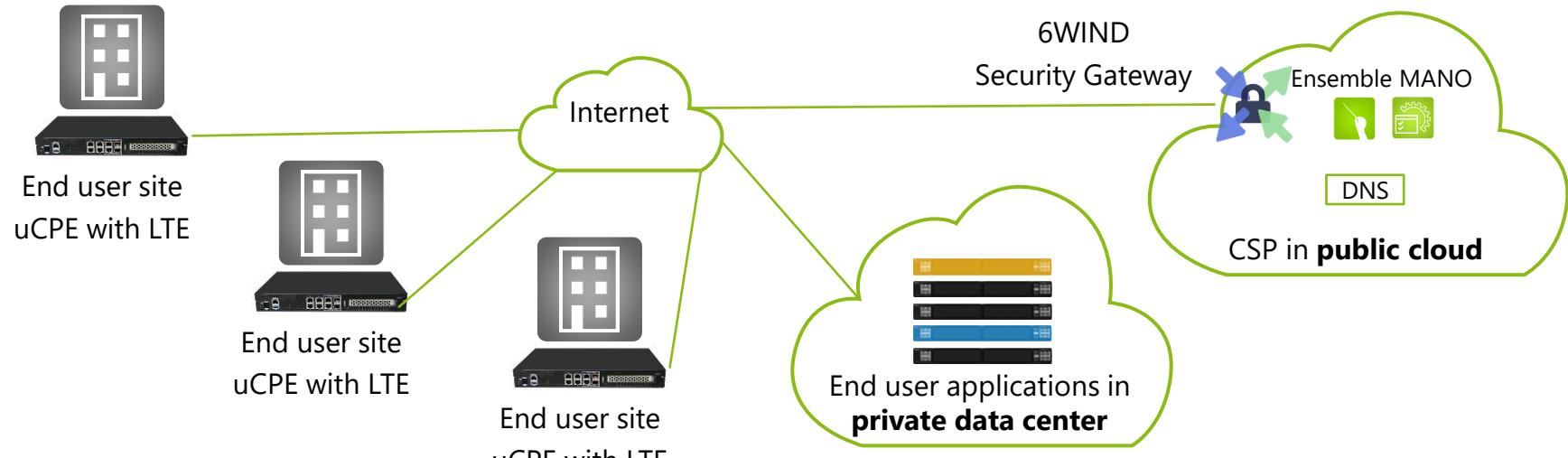


- SmartWAN with 6WIND Security Gateway
- Ensemble MANO deployed in cloud
- Third-party firewall and white box with LTE
- Solved the challenges for initial customer
- **Leverage the same model for all future customer projects.**
- Simplifies the operational process
- Open hardware and software to offer alternative services.
- Centralized changes across a large customer base



Charlie: North American CSP providing managed services

Details of application



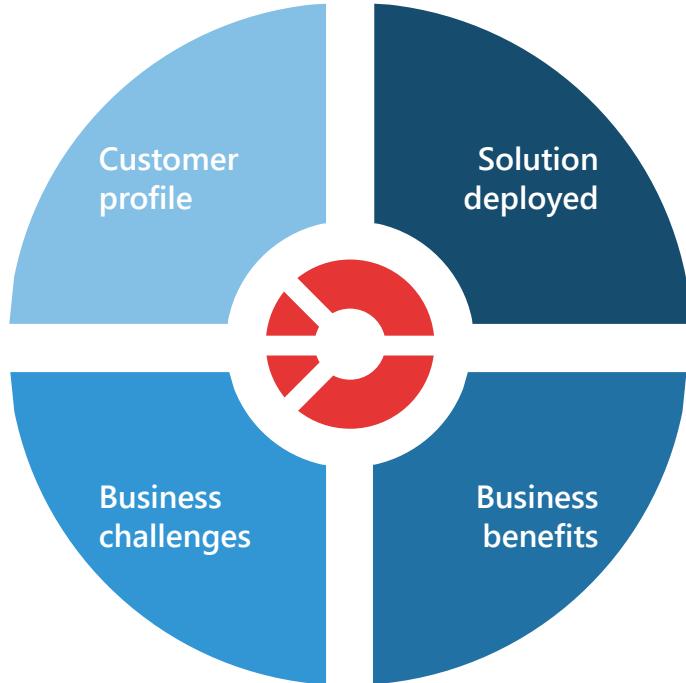
Key aspects

- MANO cluster and the 6WIND Security Gateway operating in public cloud along with DNS
- Hybrid WAN access over internet and LTE
- Connector providing profiles for multiple wireless service providers for nationwide coverage

Delta: global CSP providing managed services

Overview

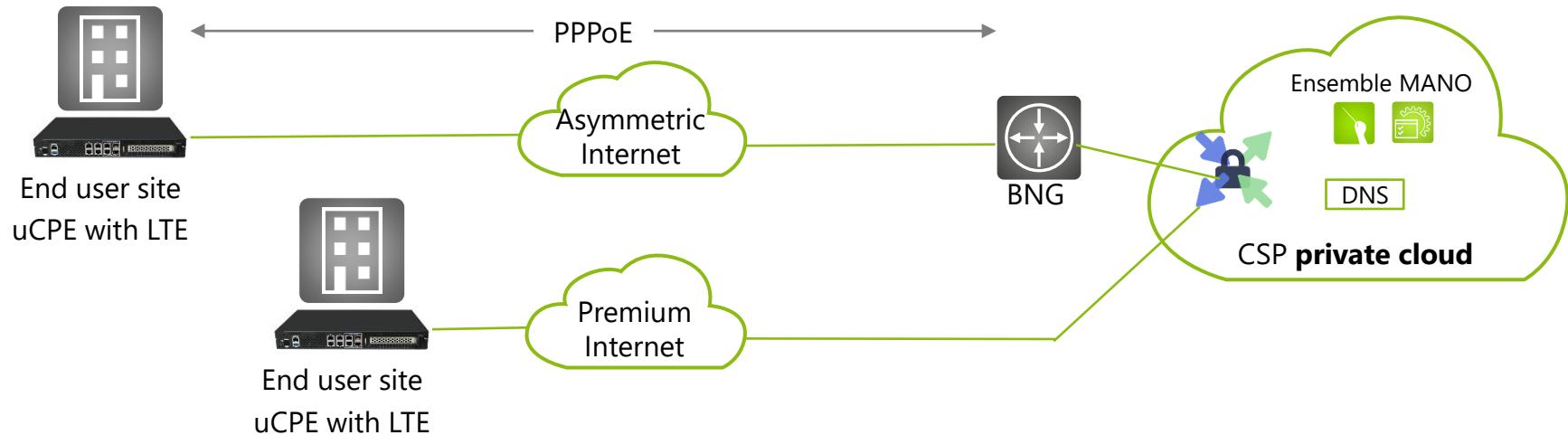
- Innovative solutions and services to 156.1 million subscribers in 16 countries across the Middle East, Asia and Africa
- 1Gbit/s services to enterprises and up to 10Gbit/s services to large enterprises and government sectors
- **Replace multiple hardware platforms and sizes with a single platform (see next slide)**
- Provide managed connectivity, SD-WAN & security applications at a **lower cost than competitors**
- Multiple underlays: LTE, symmetric Internet, asymmetric Internet with PPPOE



- SmartWAN vRouter with PPPoE using 6WIND technology
- Ensemble MANO in private cloud
- Third-party white boxes
- Select best-of-breed components at each layer, optimizing price and performance
- Wide variety of services on same physical platform, enabling lucrative upselling opportunities
- **Eliminate more costly appliances and VNFs in many use cases**
- **Future services based on open standards**

Delta: global CSP providing managed services

Overview of application



Key aspects

- ZTP with PPPoE authentication and encapsulation
- Hybrid WAN access over internet and LTE
- Connector providing profiles for multiple wireless service providers for global coverage

Delta: the problem with appliance proliferation

Lots and lots and lots of boxes!

- Customers may demand certain brands of devices for SD-WAN, firewall, router, VoIP
- And they need different sizes for different locations e.g. SOHO, hub, HQ, data center
- Stringent SLAs mean **lots of inventory in numerous depot locations**

Appliance approach:

39 types of appliances must be stocked at **every depot**

uCPE approach:
3 server types
per depot

| | SD-WAN | | | | | Firewall | | | Router | | | VoIP | | uCPE |
|--------|--------|---|---|----|----|----------|----|----|--------|----|----|------|----|------|
| Vendor | A | B | C | D | E | D | E | F | G | H | I | J | K | L |
| Small | 1 | 4 | 7 | 10 | 13 | 16 | 19 | 22 | 25 | 28 | 31 | 34 | 37 | 1 |
| Medium | 2 | 5 | 8 | 11 | 14 | 17 | 20 | 23 | 26 | 29 | 32 | 35 | 38 | 2 |
| Large | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 3 |

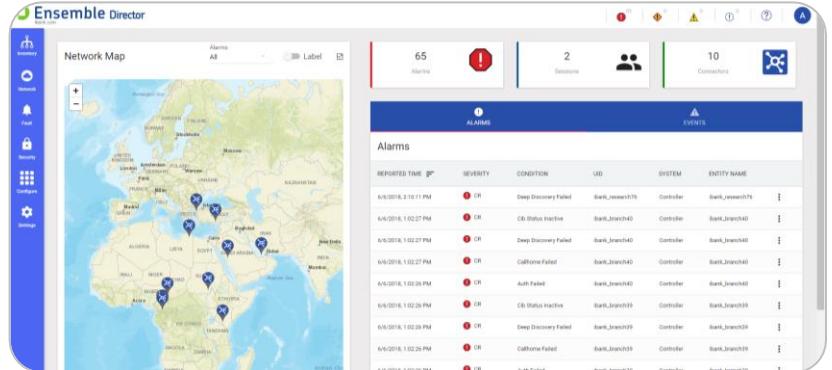


MANO as a service

Accelerating uCPE deployment

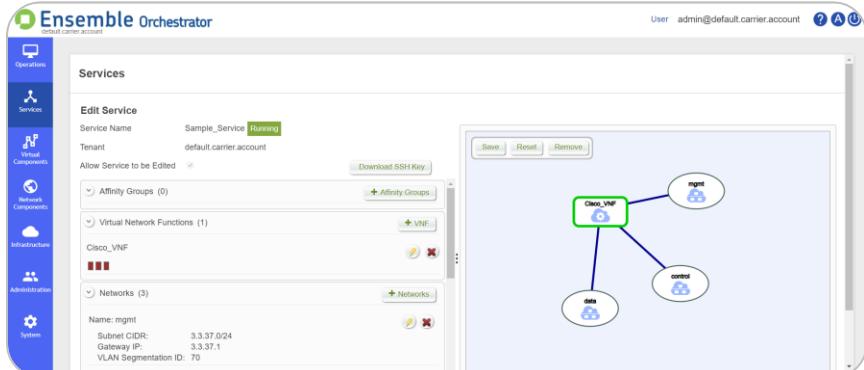
Ensemble management and orchestration (MANO)

Ensemble Virtualization Director and Ensemble Orchestrator



Ensemble Virtualization Director

Provides a single pane of glass view for managing NFV operations. Supports end-to-end ZTP, secure cloud topology designer, and third-party orchestrators

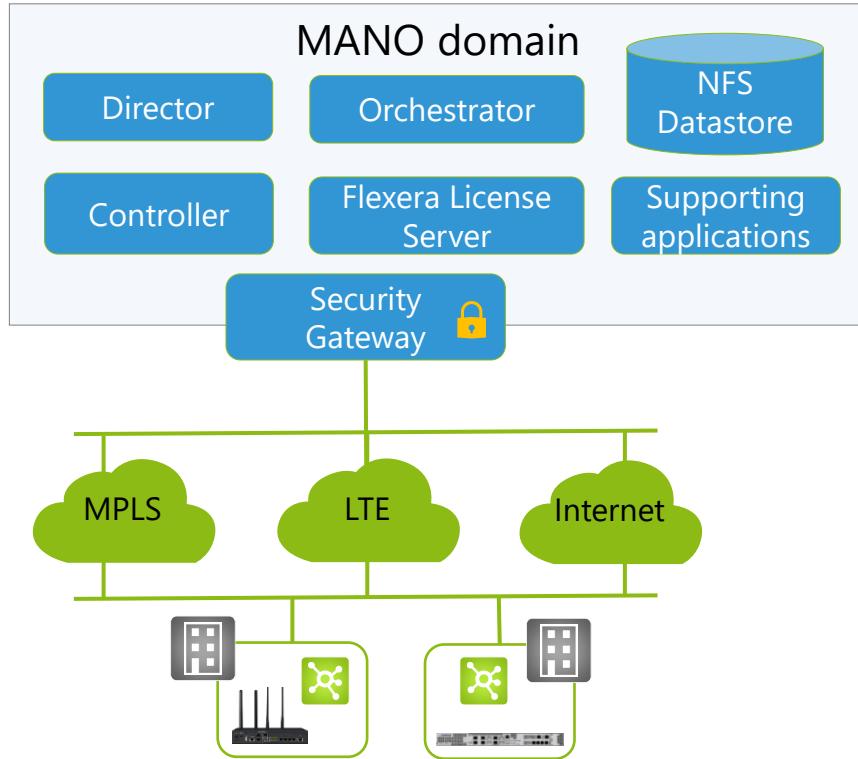


Ensemble Orchestrator

Versatile NFV Orchestration platform to instantiate VNF services and to manage VNF lifecycle

Putting the M in MANO!

Hosted SaaS MANO overview



Features and benefits

- Ensemble MANO is a multi-tiered IT management application
- Customers can leverage ADVA's hosted SaaS MANO to access critical management tools while limiting up-front investment in resources, personnel, and training
 - Allows customers to focus investment on their core business
 - Simplifies service deployment resulting in faster time to revenue
- SaaS MANO supports standalone instances with AWS uptime SLA



Summary, takeaways, Q&A

Summary and takeaways



Service providers are deploying uCPE today to deliver innovative services



An open architecture enables best of breed and future-proof deployments



A wide variety of hardware platforms enables a balance between price and performance



Cost may be the initial driver, but upsell and innovation are the long-term benefits



Look for partners with experience



Q&A



Thank you

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