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# RAD VNF Offering





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# RAD's vCPE Toolbox



# vCPE Toolbox



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## 3<sup>rd</sup> Party Orchestrators



## 3<sup>rd</sup> Party VNFs



## ETX-2v



White Box uCPE

## ETX-2i



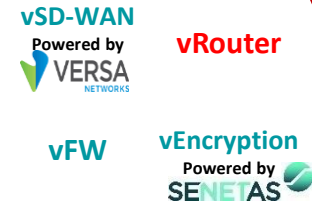
uCPE over L2 EAD

## vAccess



Pluggables

## RAD VNFs



RAD VNF based Solutions

## RADview



Domain Orchestrator

# RAD's vCPE Toolbox: Ready-To-Go Without Lock-in



## vCPE Optimized

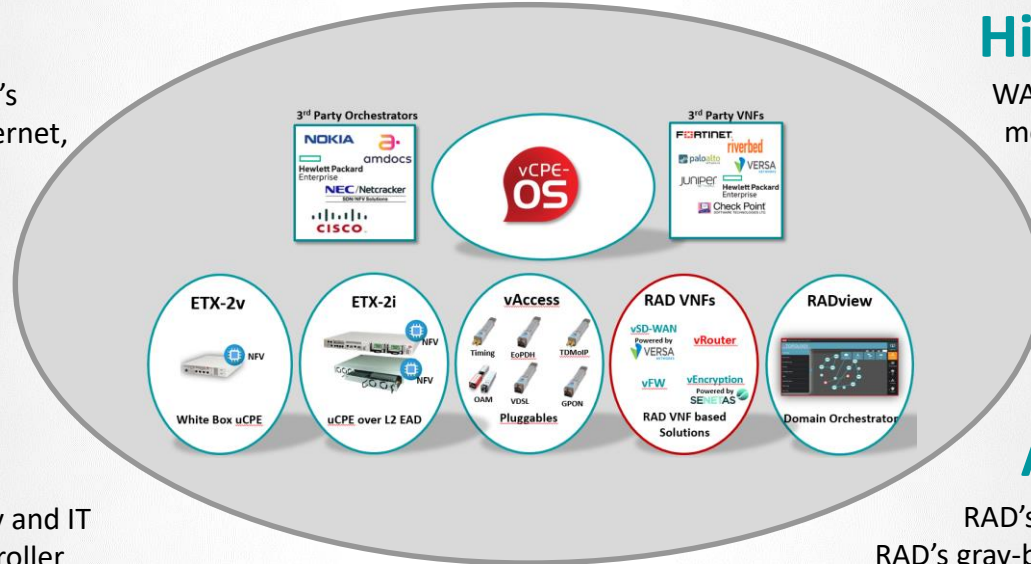
Slim and high performance  
Operating System

## Any Access

Seamless management of RAD's pluggable PNFs for Carrier Ethernet, Cellular, xDSL, PON & TDM

## High Availability

WAN, NFVI & VNF performance monitoring, troubleshooting & self healing



## Open

Any VNF - networking, security and IT  
Any Orchestration & SDN controller  
Rapid evolution based on open source industry components

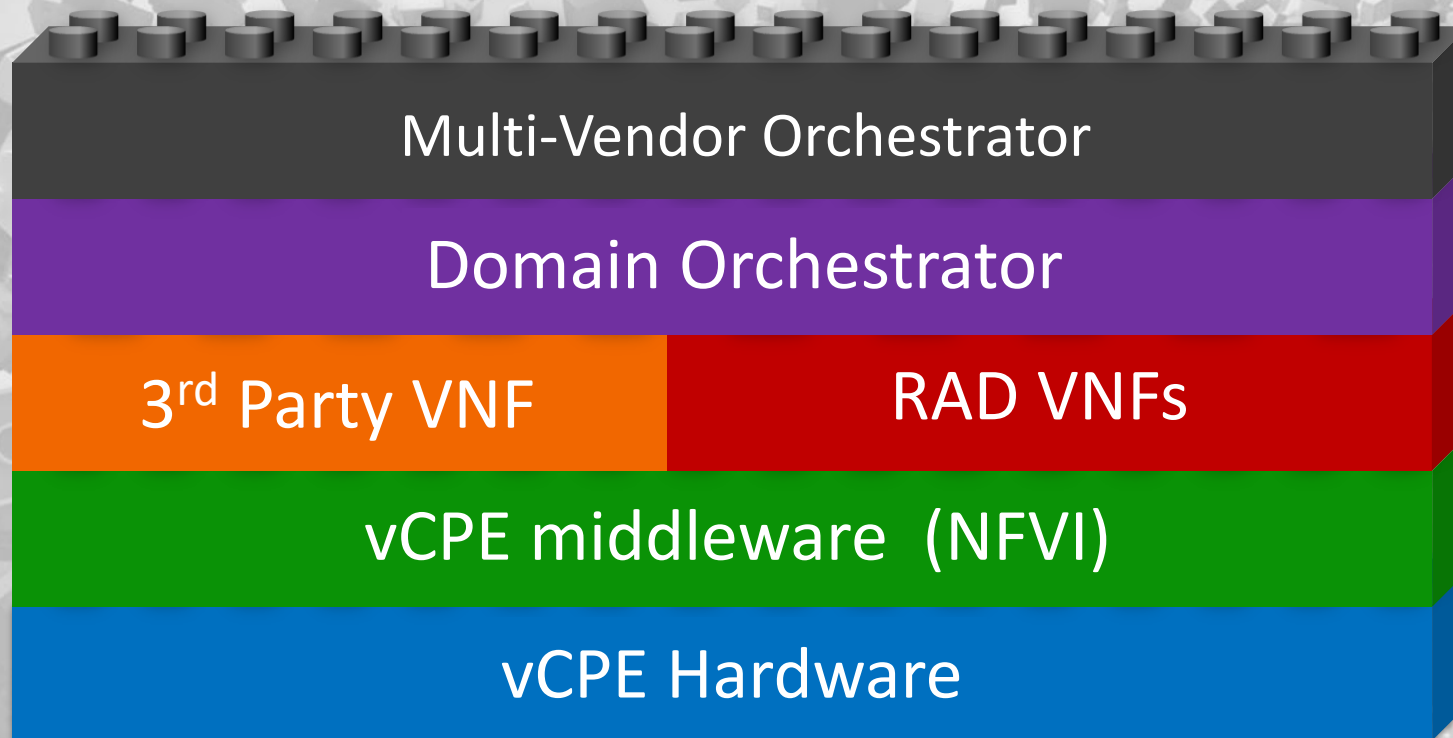
## Any Hardware

RAD's Whitebox and 3<sup>rd</sup> party server  
RAD's gray-box supporting Carrier Ethernet  
Complements RAD's pluggable PNF for access monitoring & timing

# vCPE Sale Scenarios



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# vSD-WAN Powered by Versa

The Versa logo, a stylized blue and green shape resembling a drop or a leaf.

## Deploy a Future Proof SD-WAN Service

- Service providers are consolidating their business services to a single universal CPE (uCPE) at customer premises
  - Part of a network-wide virtualization strategy
  - Open, scalable compute hardware, decoupled from software
  - Virtualized services
  - Flexible, fast service delivery with multi VNF and multi vendor approach
  - OpEx savings and agility
- SD-WAN is the most appealing use case for vCPE
  - High demand from Enterprise customers
  - Clear value for both service provider and enterprise customer

# Future-Ready vCPE with SD-WAN



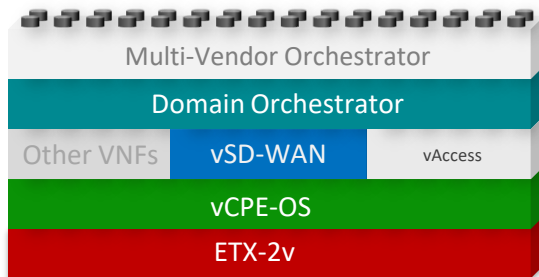
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## Use Case & Requirements

- White box for SD-WAN + NFV-based VAS
  - Interoperable with 3<sup>rd</sup> party SD-WAN
  - VNF hosting for future use

## RAD's Offering

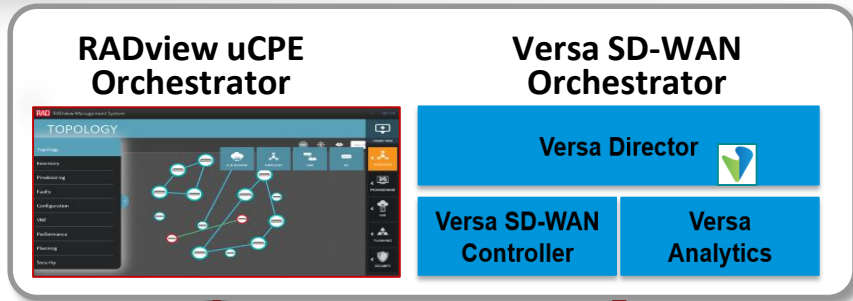
- ETX-2v portfolio
- Introduce vCPE-OS as a future-ready solution for global deployment and hosting of 3<sup>rd</sup> party VNFs
- vSD-WAN powered by Versa solution running as a VNF



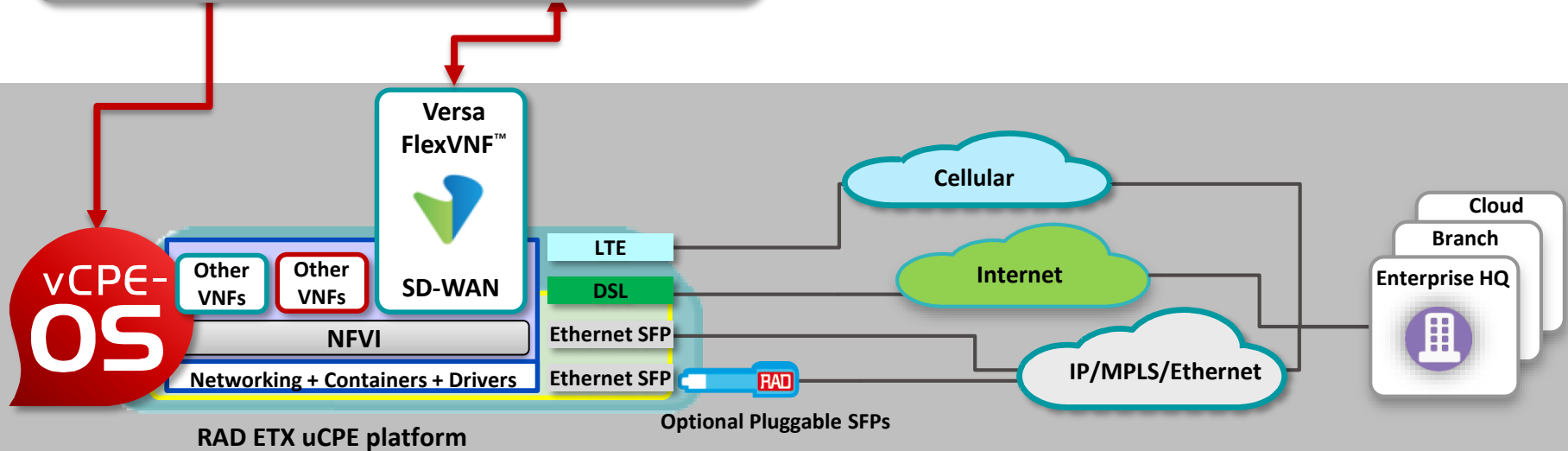
vCPE-OS as future ready for global deployment  
and to host any 3<sup>rd</sup> party VNFs



# Joint RAD-Versa Solution



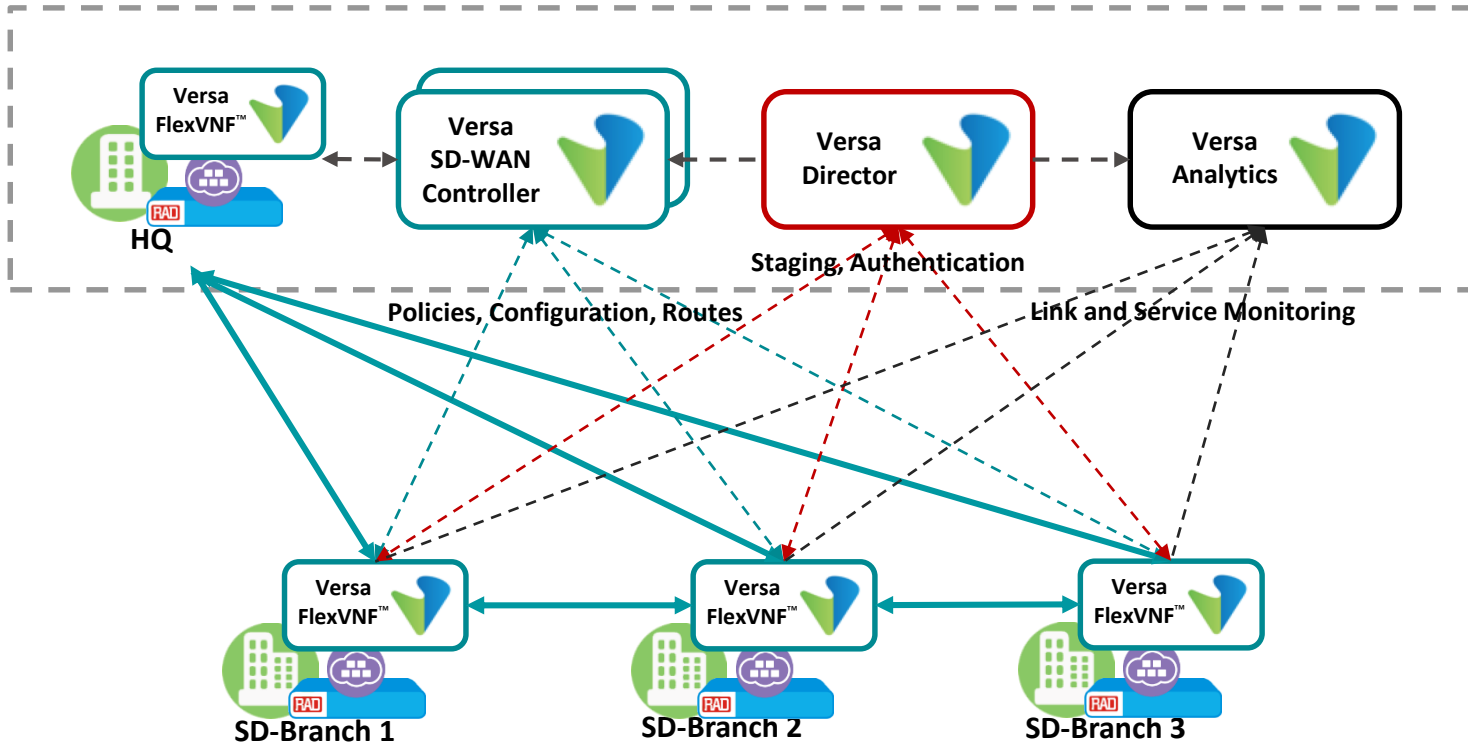
- Strategic partnership
- Pre-integrated solutions



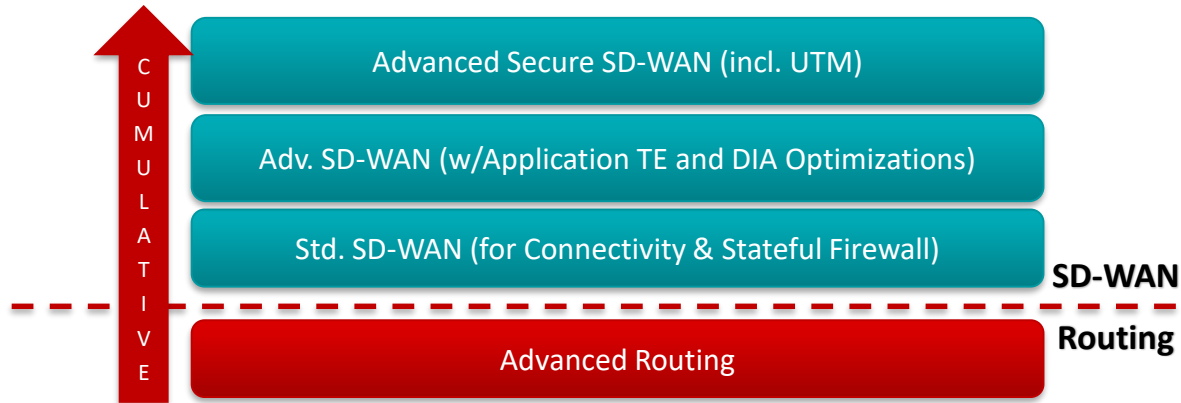
# vSD-WAN Solution Components



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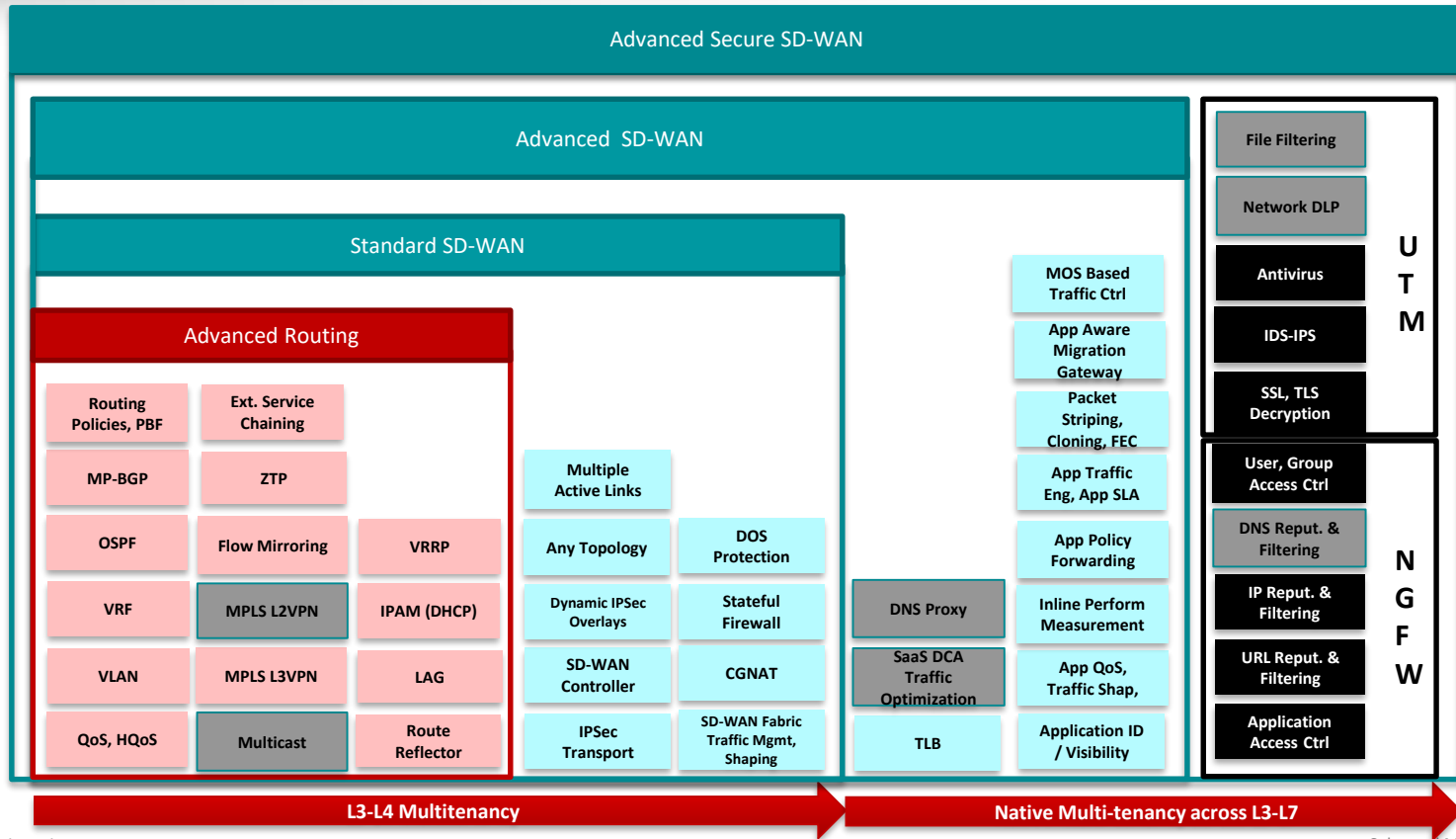
# SD-WAN Licensing Tiers



# SD-WAN Tiers



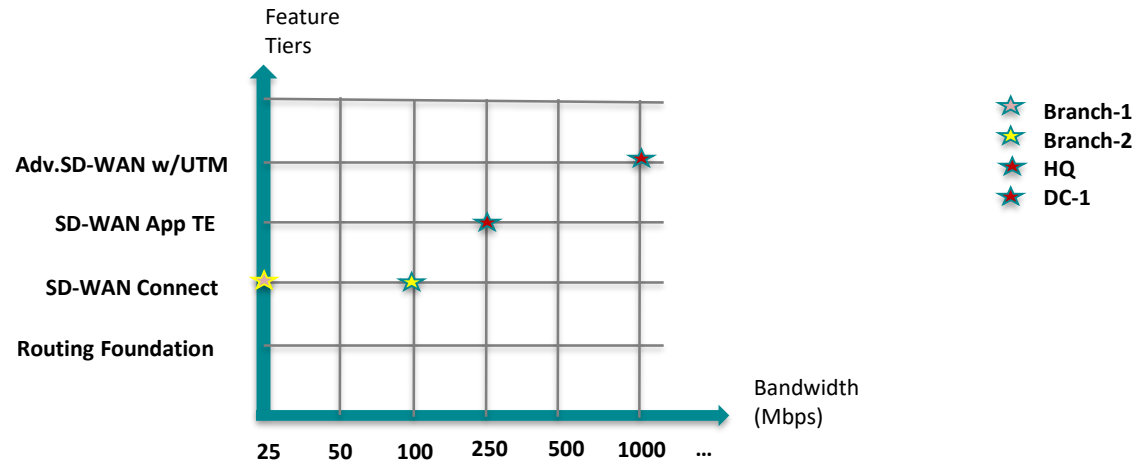
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# SD-WAN Pricing Model Overview



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- Bundle price is determined by the feature tier and bandwidth
- License is annual
- Upgrades are possible during subscription period

# Takeaways

- SD-WAN is the most appealing use case for vCPE
  - Clear value for both service provider and enterprise customer
- Unified, secure VPN across multiple public and private WANs
  - Lower the cost of existing IP VPNs
- Software bundle
  - FlexVNF, Controller, Director, Analytics
- Flexible Licensing matrix
  - feature tiers / Bandwidth



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# vFirewall



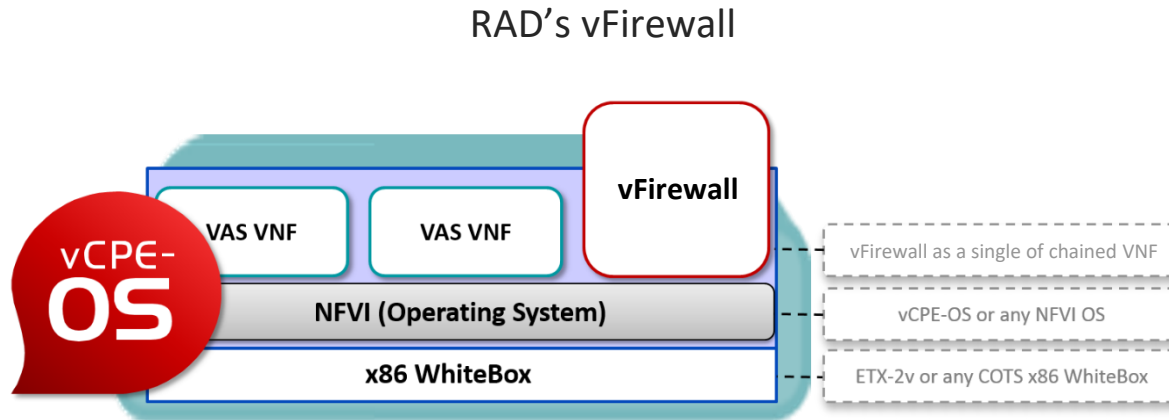
## Deploy a dynamic, scalable and cost effective firewall

- Service providers are consolidating their business services to a single universal CPE (uCPE) at customer premises
  - Part of a network-wide virtualization strategy
  - Open, scalable compute hardware, decoupled from software
  - Virtualized services
  - Flexible, fast service delivery with multi VNF and multi vendor approach
  - OpEx savings and agility
- Virtual WAN Firewall is one of the most common use cases for vCPE
  - Eliminate the cost complexity and delay of qualifying, maintaining, and sparing physical firewalls
  - Increase service agility by enabling quick implementation and scaling services per demand

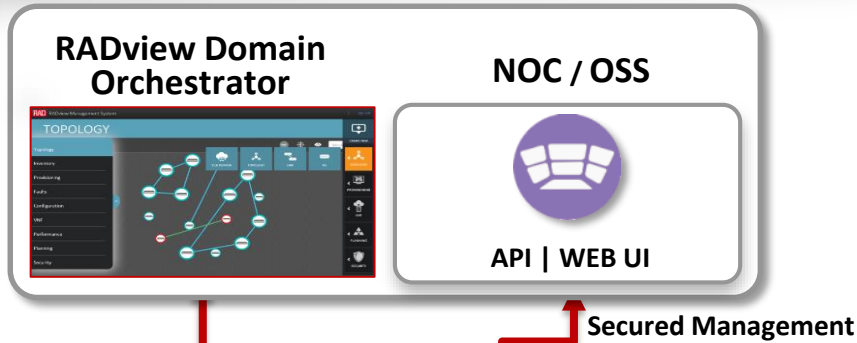


# vFirewall deployment

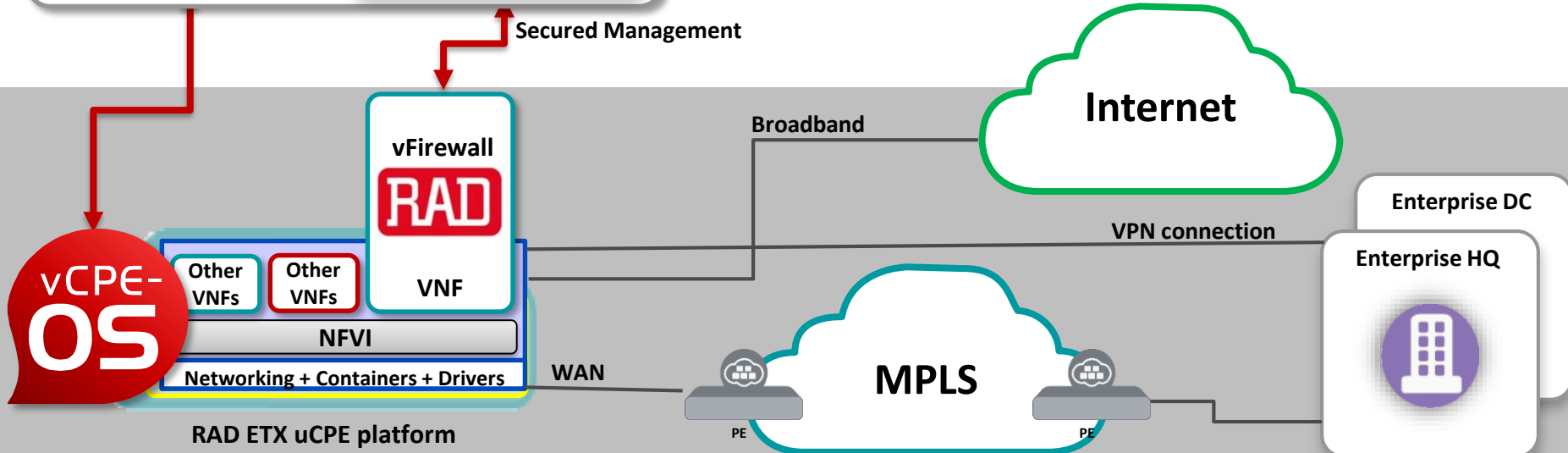
**vFirewall can be deployed on top of RAD vCPE-OS  
or on any COTS x86 box with KVM hypervisor**



# vFirewall Main Use-Case



- Perimeter firewall for secured access to internet and cloud
- WAN gateway for encrypted VPN
- IP VPN CE router



# vFirewall Main Feature-Set

- **Firewall**

- Stateful filtering
- Multiple state types
- Multiple IP filtering criterias
- Limit simultaneous connections
- Packet normalization
- DOS attack mitigation
- Gateway selection per rule
- IP aliases and grouping
- Rule scheduler

- **Secures connection**

- VPN
- OpenVPN
- L2TP
- Multiple IPsec modes
- Certification, IKE and PSK IPsec authentication

- Multiple encryption methods

- **Routing**

- IPv4 and IPv6 router
- OSPFv2/v3
- Policy based routing for firewall rules
- DNS resolver
- Integrated routing and bridging
- Port mirroring
- 802.1D compliant
- STP/RSTP
- NAT (1:1)
- NAPT
- DHCP

# Takeaways



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- Virtual WAN Firewall is the most common use cases for vCPE
- Increase service agility and scalability
  - New services on demand
- Targeting SMB, agnostic to FW brand
  - Low cost FW solution



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# vEncryption Powered by Senetas



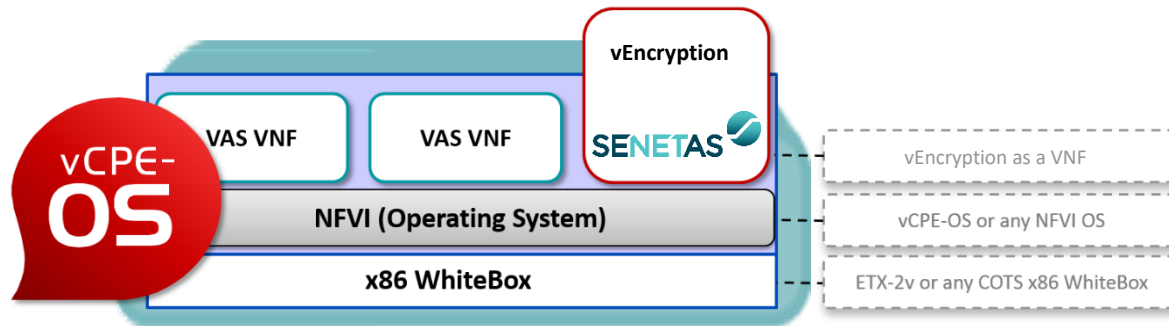
## Deploy a scalable and cost effective L2 encryption service

- Service providers are consolidating their business services to a single universal CPE (uCPE) at customer premises
  - Part of a network-wide virtualization strategy
  - Open, scalable compute hardware, decoupled from software
  - Virtualized services
  - Flexible, fast service delivery with multi VNF and multi vendor approach
  - OpEx savings and agility
- Virtual network encryption is a trending use case for vCPE
  - Provides a robust, high assurance, L2 network security for sensitive data transmission
  - Increase service agility by enabling quick implementation and scaling services per demand

# vEncryption deployment

**vEncryption delivers a powerful safeguards of data to protect financial institutions, telcos and other commercial and government organizations**

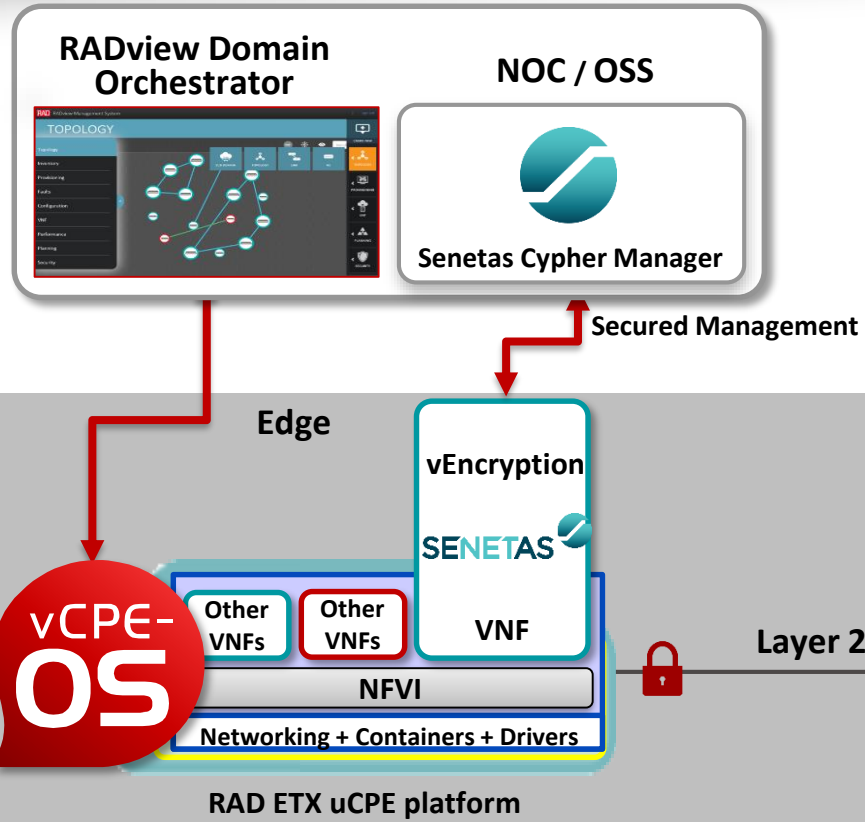
## RAD's vEncryption



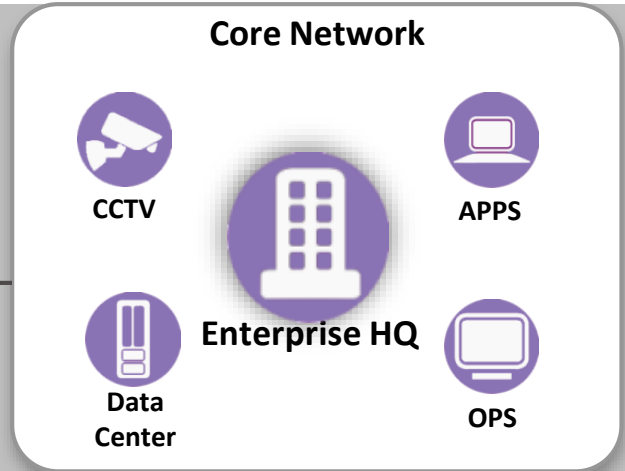
# vEncryption Main Use-Case



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- **High Speed Encryption**
  - Microseconds in latency
  - Almost no impact on BW
- **Connect office branches, remote workers or IoT devices to the core network**
- **Compatible with appliance encryption in the core network**





# vEncryption Main Feature-Set



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- **Supported L2 transport services**
  - Dark fibre
  - VPLS
  - MEF (ELAN, ELINE, ETREE)
  - Eth PW
  - LAN
- **Supported network topologies**
  - Point to Point
  - Point to Multipoint
  - Full Mesh
- **Flexible policy control**
  - Ethertype
  - MAC
  - VLAN ID
  - Q-in-Q tag
- **Security**
  - Temper resistant
  - Automatic integrated key management
  - RSA or ECDH key exchange
- **Encryption algorithms (standards)**
  - AES-128
  - AES-256
  - CFB
  - CTR
  - RSA-2048
  - ECC-512
- **Management**
  - Senetas Cypher Management 7
  - SNMPv3
  - NTP
  - SSH
  - TACACS+ AAA support

# Takeaways



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- L2 Encryption is a trending use case for vCPE
- Opportunity for new business for the SP
  - Provide end to end encrypted L2 services
- Senetas – a world pioneer in virtualized L2 encryption
  - Certified in many financial and government institutions world wide



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Thank you  
For your attention

