Enhancing Service Provider Network Efficiency

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What is Network Efficiency

Approach to increase revenue and reduce capital and operational expenditure from scalable and flexible networks.

Some of the parameters influencing Network Efficiency being discussed

Network

Simplification

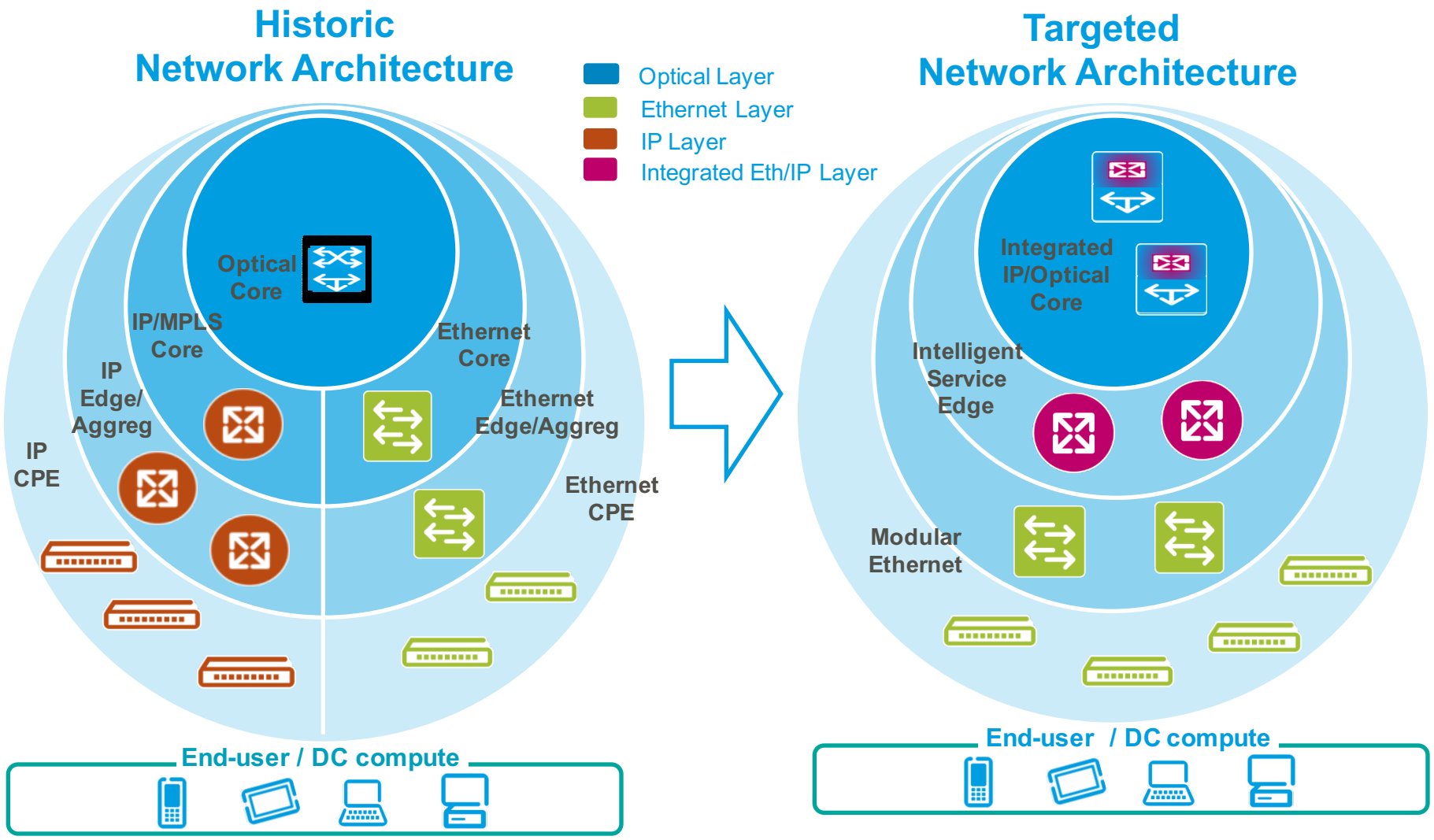
Automation

Virtualisation

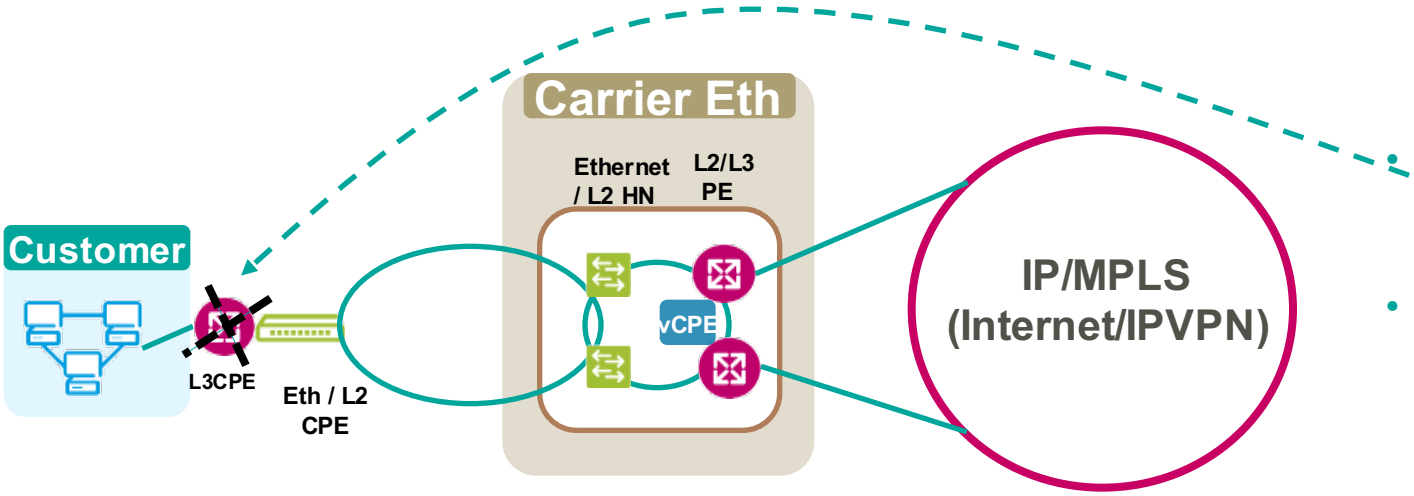
Programmability

Innovation

Network simplification

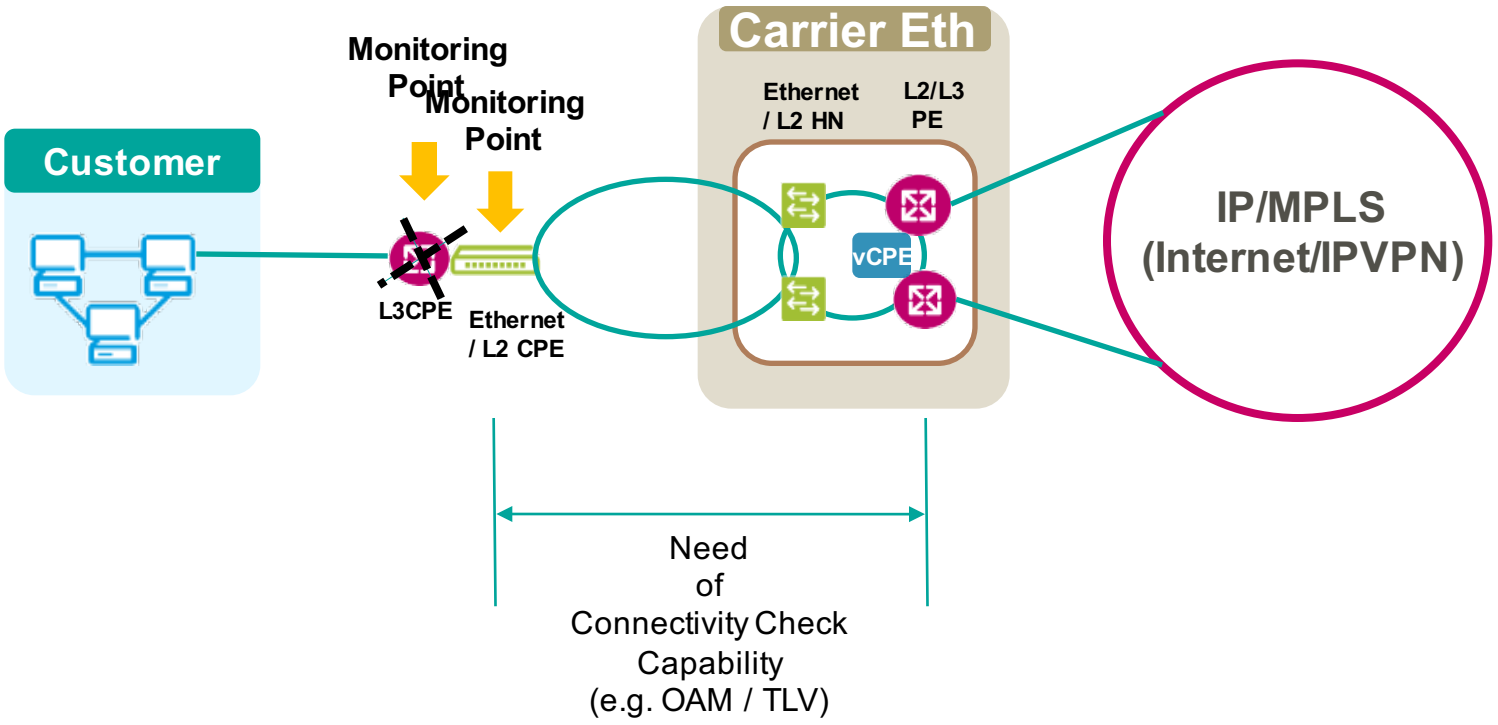


Use Case: vL3CPE router (PE based)

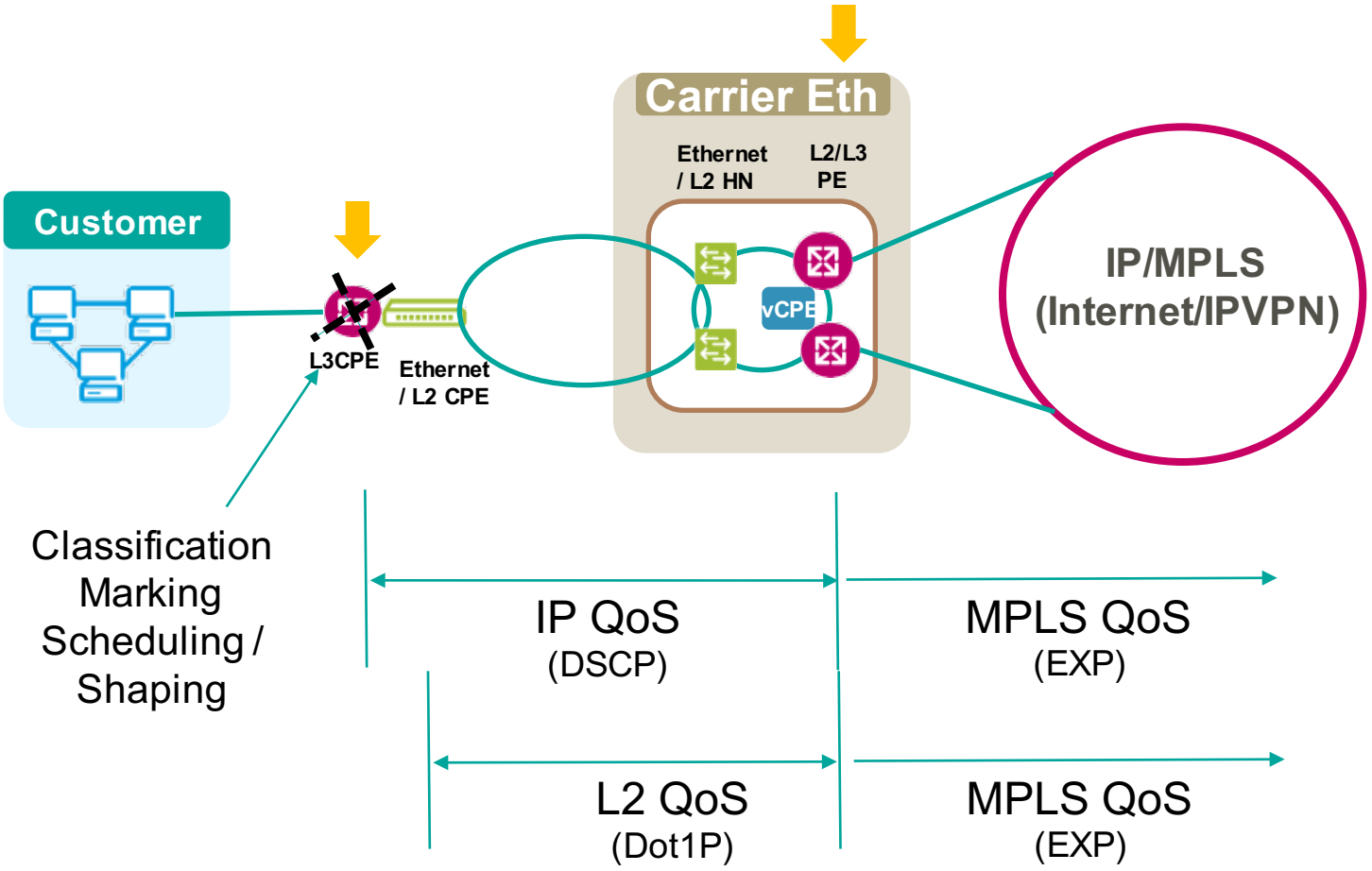


- Traditional Managed L3 services (Internet Access and IPVPN) delivered with dedicated L3 CPE router
- vL3CPE means removing the L3 CPE router and delivering the functionality in PE Routing Platform

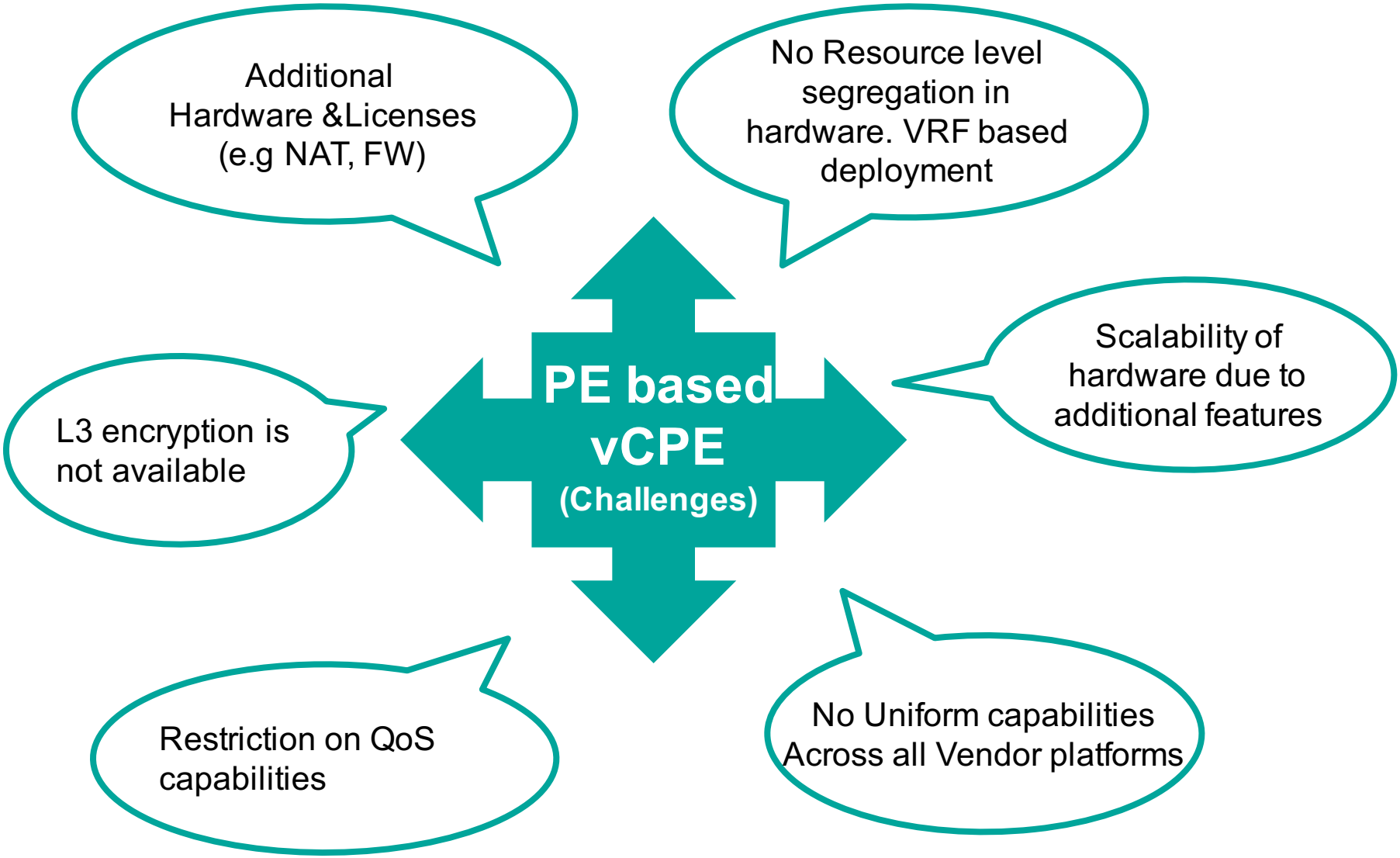
Monitoring & Fault Detection



End-to-End QoS with vCPE



Technical Challenges with Hardware PE based vCPE

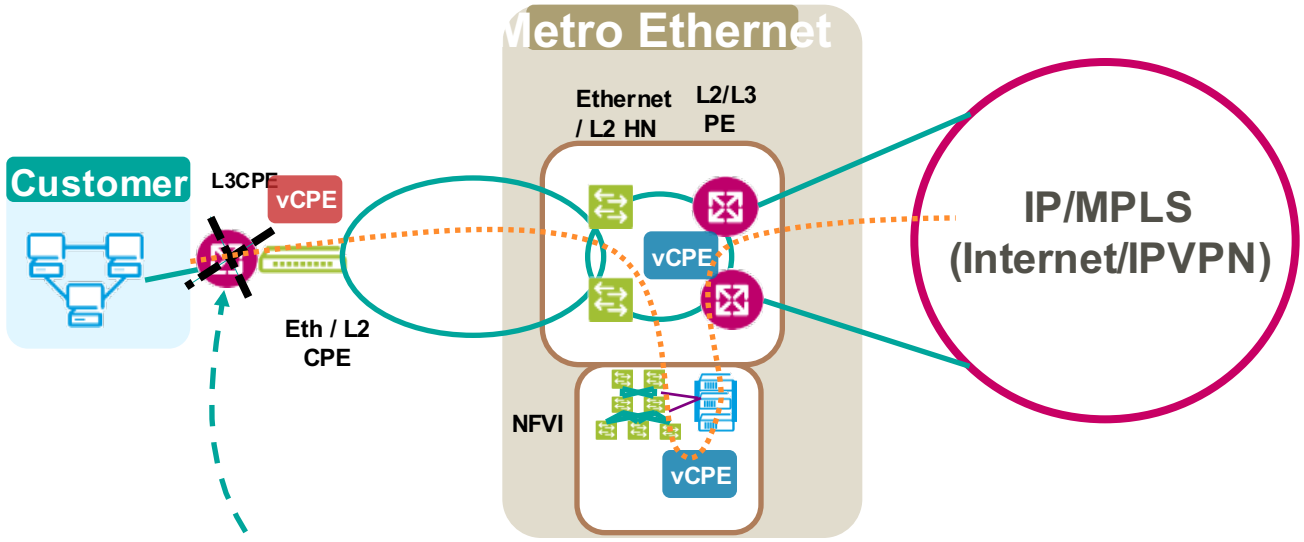


Driving factors for NFV based vCPE implementation

NFV is the key to further improve network efficiency by moving network intelligence and functions to software based deployment on generalised compute platforms to support

- Network scalability & elasticity
- Service agility & flexibility - On-demand capabilities
- Automation
- Unit cost reduction
- Rapid innovation improvement → Faster time to market

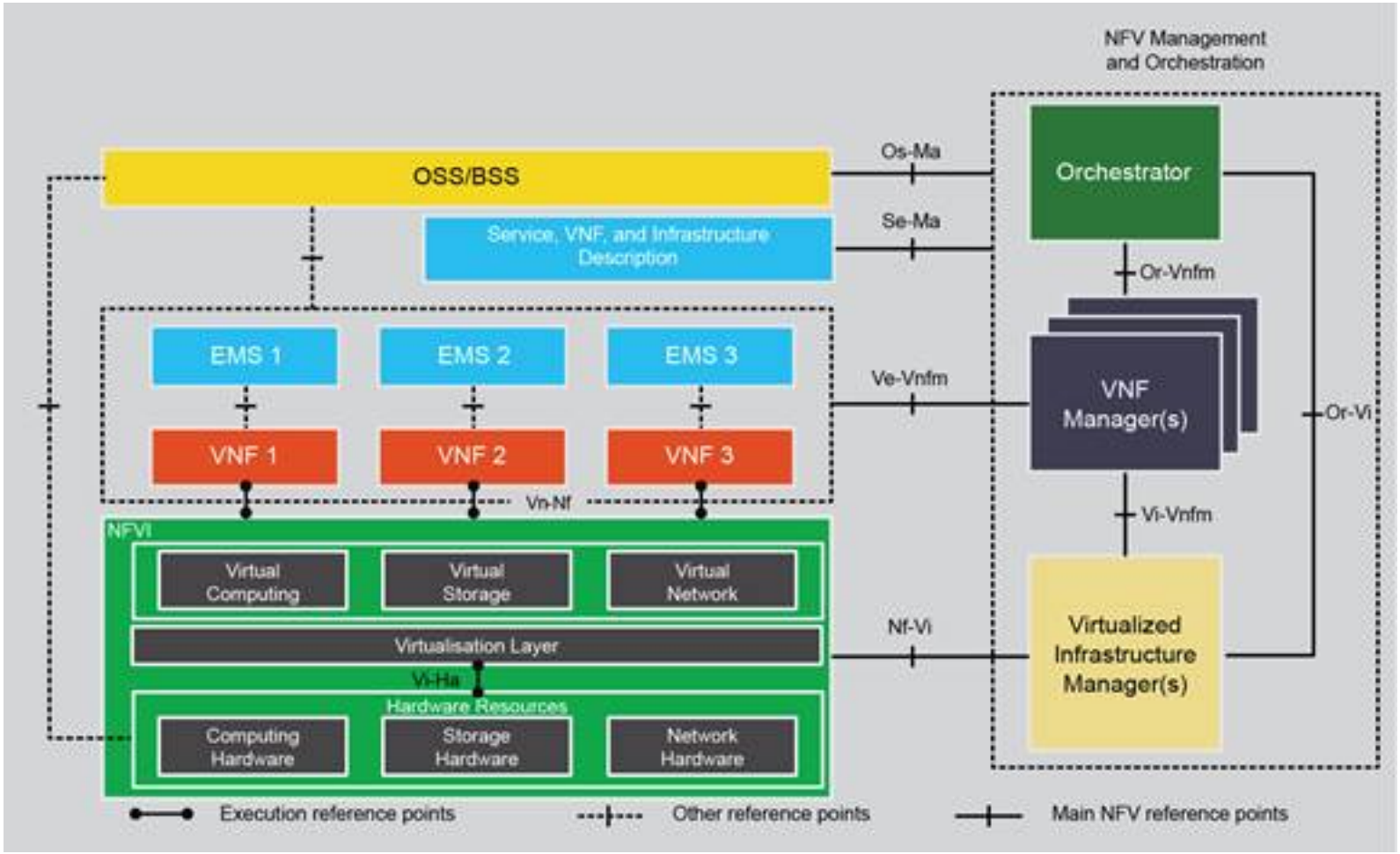
vCPE – Network Virtualization (NFV) Experience



vCPE

- Traditional Managed L3 services (Internet Access and IPVPN) delivered with dedicated L3 CPE router
- vL3CPE means removing the L3 CPE router and virtualizing the function in the network
- Initial vCPE location: PE router
- Evolution:
  - NFV based using NFVI deployed in Colt nodes
  - NFVI extended to customer premises (Distributed NFV)

ETSI NFV Reference Architecture



Design Considerations for Virtual Network Function (VNF)

- Elasticity
  - On demand scale in/out
- Multitenancy
  - Multiple tenants to be delivered on single VNF instance
    - Cost efficient solution
    - Resource efficient - reduced number of VM and VNF
    - Segregation of traffic between tenants
- Service chaining
- License model
- Feature capability
- Interoperability with other components
- Release management lifecycle
- Support model
- Adaptability to latest technology development

Design considerations for NFVI

Centralized or Distributed Deployment

- Based on use case of Network Function – Node or CPE Edge

Baremetal (Better performance) or HyperVisor (Aggregated resources)

- Baremetal →CPE Edge
- Hypervisor → Node

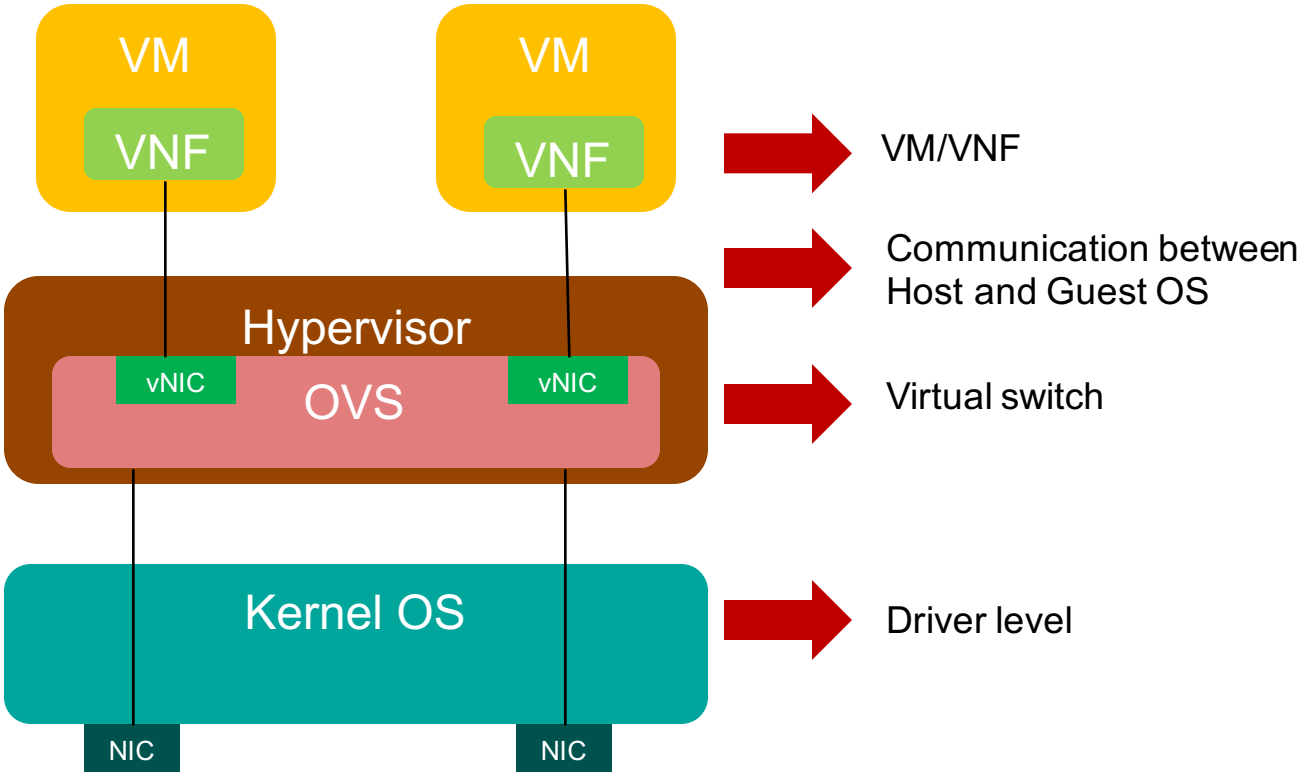
ESXi or KVM for Virtualization

- KVM is open source → more development in OPNFV

Manual management or OpenStack / 3rd party integrator

- Manual management for initial small deployment
  - → low implementation effort → short term
- OpenStack management for integrated solution
  - → High implementation effort → long term
- Third party integrator – common interface (need for customization)

NFV Performance bottleneck



Need for Optimal and Scalable NFVI

- Carrier grade performance

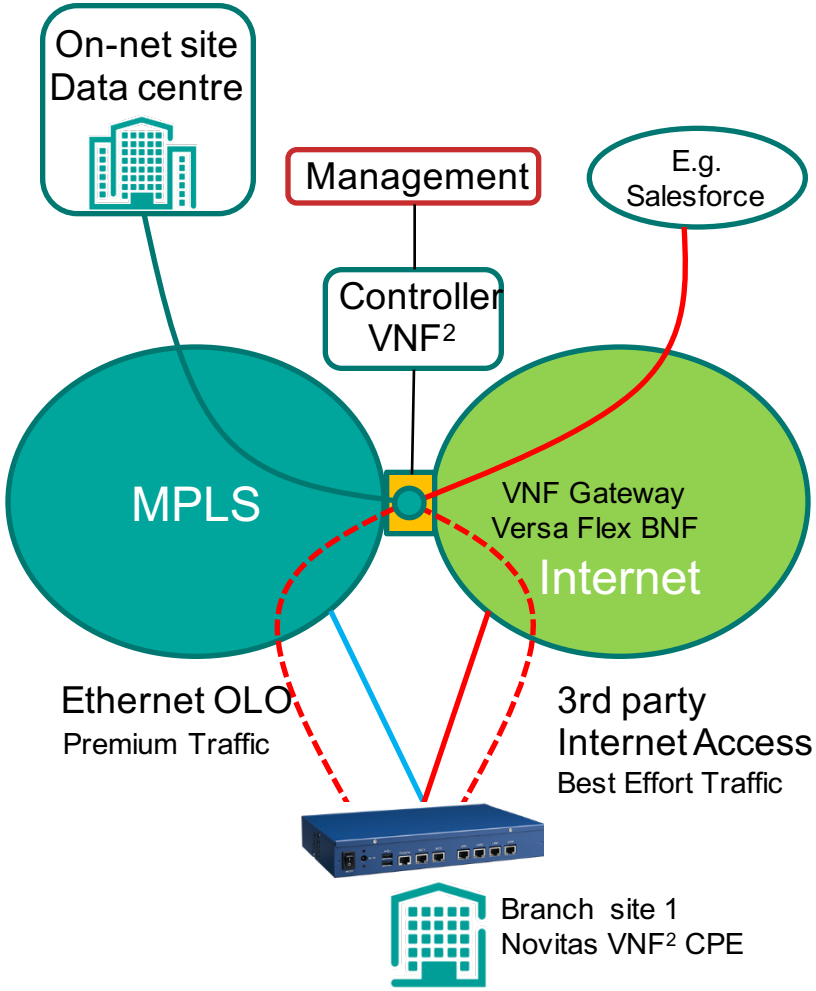
- SR-IOV
  - Optimal performance - traffic bypassing the Hypervisor vSwitch
  - Challenges with portability, flexibility, QoS, complex traffic steering.

- Data Plane Development Kit (DPDK)
  - Vendor based deployment of DPDK can achieve 5-8x times performance improvement.
  - Need standardization of vendor implementation of DPDK capability
  - Line rate performance cannot be achieved for different combination.

	Flows	Huge Pages Ram (2M)	2 Cores with 2 threads	Frame Length bytes	TX-packets	RX-packets	Throughput(Mbps) Bidirectonal	DUT Load %	Average Latency (mS)	Loss (%)
VM1	2k	4096	10,11,34,35	IMIX	51496874	51442520	2500	64	0.05	0.008
VM2	2k	4096	22,23,46,47	IMIX	51382170	51248143	2500	64	0.06	0.012
VM1	20k	4096	10,11,34,35	IMIX	21939472	21912378	1400	64	0.06	0.006
VM2	20k	4096	22,23,46,47	IMIX	21949776	21951686	1400	64	0.07	0.007

(Source: Colt internal lab test results)

Software Defined WAN



OLO[1] – Other Licensed operator
VNF[2] – Virtual Network Function

Driving factors

- Customers need to guarantee the business applications performance and continuity
- They also require increased agility to connect quickly and at low cost
- Zero touch provisioning - a plug-and-play deployment model
- SD-VPN enables the off load of traffic (for example public cloud) from the MPLS network to the internet over a secure IPSec tunnel, freeing up MPLS bandwidth

STATUS:

- Testing of Virtual Network Function underway with COTS CPE
- Design of supporting compute infrastructure close to completion

Benefits & Achievement

approx.
€1,000 /unit

Reduce Cost

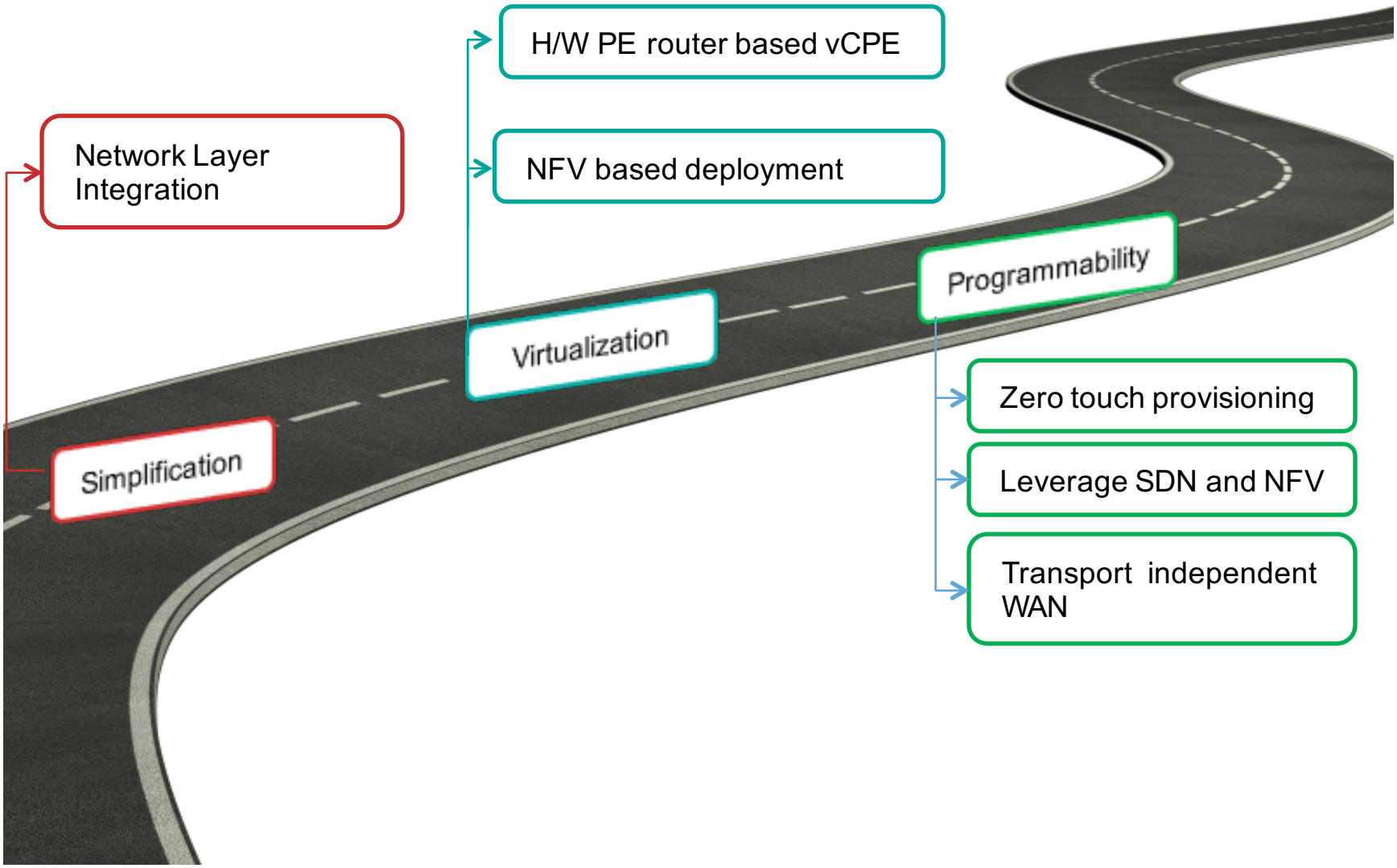
Better Orchestration

Faster Service Delivery

More than 50% services delivered in vCPE currently

Simplified Product Management & Inventory

Journey so far…



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For your time

Thank you