**SOLUTION BRIEF**
**End-to-End NFV-vEPC Service Orchestration**

# Multi-Vendor, End-to-End, NFV-vEPC Service Orchestration

Network Function Virtualization (NFV) enables the deployment of network functions on general-purpose hardware instead of traditional purpose-built hardware. Furthermore NFV allows operators to leverage standard IT virtualization and cloud technologies to reduce total cost of operation and increase the service innovation, automation and scale.

Existing mobile Evolved Packet Cores (EPC), deployed with purpose-build hardware are very expensive to deploy and are static – forcing operators to design and deploy for worst-case load scenarios and leaving network capacity idle as usage patterns shift during throughout the day. The deployment of a vEPC and associated service delivery requires sophisticated orchestration of the virtual resources inside the datacenter, as well as the physical mobile backhaul network. The solution below demonstrates end-to-end vEPC service orchestration. The solution uses packet optical transport platforms and orchestration software from Cyan, Red Hat Linux and OpenStack and Intel-Xeon processor-powered platforms from Dell. This solution has been officially accepted to comply with the ETSI NFV ISG requirements and published on their portal as an operator sponsored proof-of-concept

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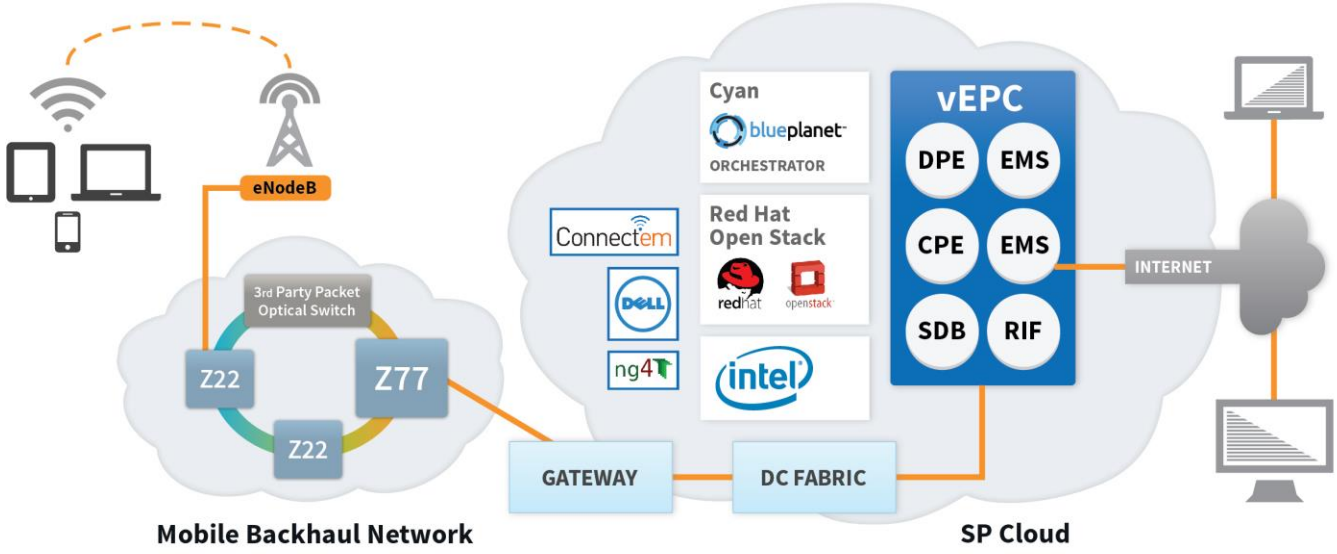


Using cloud computing technologies within the network infrastructure as a flexible, cost-effective approach to support traditional network services allows carriers to reap both the benefits of NFV as well as instantly on, scalable and ubiquitous cloud computing resources. Intel, Cyan, Red Hat, Dell and Connectem have collaborated to build an NFV solution for a vEPC running on cloud resources that are easily provisioned and integrated into a carrier's infrastructure using standards based APIs. This multi-vendor solution provides integration both on the northbound side facing the OSS/BSS layer as well as the southbound side that touches all the network elements that provide end to end communication such as Network Interface Devices (NIDs), mobile towers (eNodeB), switches, routers, packet optical mobile-backhaul, gateways, cloud computing and NFV resources.

### Key Ingredients:

### Intel

The extreme processing power and virtualization capabilities of Intel Xeon processors and 10GbE technology provide operators a standard, reusable, shared platform for SDN and NFV applications that is easy to upgrade and maintain. Recent Intel® microarchitecture and DPDK optimized vSwitch improvements have significantly reduced the need for specialized silicon, enabling network operators to take advantage of the proven scalability of modern, virtualized data center technology.

### Cyan, Inc.

Cyan's Blue Planet is the first purpose-built SDN/NFV solution designed for service providers to simplify the development, deployment and orchestration of

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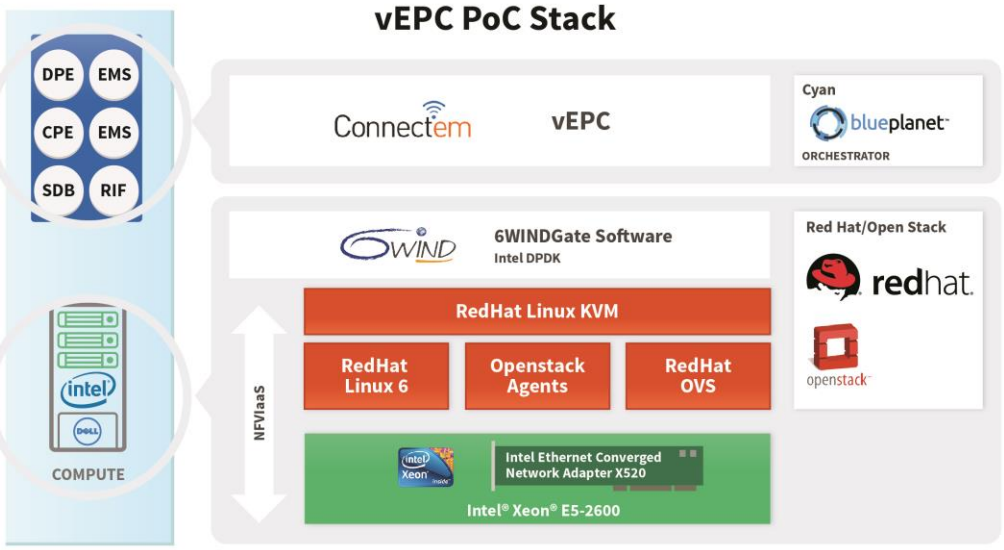


scalable services. Blue Planet is a scalable platform with open north/southbound APIs to interface with multi-vendor network hardware, OSS systems and applications. It is also responsible for the lifecycle of virtual functions running within the NFV Infrastructure (NFVI). Furthermore, Blue Planet supports FCAPS for the NFVI and the virtual network functions (VNFs), including tracking the relationships and dependencies between the NFVI resources and the VNFs. Cyan solutions include Blue Planet SDN software and Z-Series packet-optical transport platforms.

### Red Hat & 6WIND

Red Hat Enterprise Linux® and Red Hat Enterprise Virtualization provide the secure, reliable operating environment and flexible, high-performance, cost-effective virtualization needed to decouple network functions from the hardware they run on. 6WIND's 6WINDGate networking software uses the Intel DPDK library within the 6WINDGate networking stack to process network packets outside the Linux kernel, for a tenfold improvement in data plane performance. Finally, Red Hat Enterprise Linux OpenStack® Platform controls the overall foundation solution and provides an interface for a wide variety of network orchestration software tools.

### DELL

DELL PowerEdge C6220 servers harness the capabilities of Intel® Xeon® Processor E5-2600 performance with excellent combination of compute, memory and I/O (input/output) performance inside Dell's established shared infrastructure servers to help build the scale-out cloud environment.

### Connectem

Connectem Virtual Core for Mobile (VCM) is a self-contained virtual packet core that provides all the functionalities of an Evolved Packet Core. Connectem has collapsed the functions and re-define the functions for maximum optimization of Data Center tools, technologies and economics. VCM takes the entire EPC as a module to provide services to the users. It dismantles the node boundary and removes the need for encoding and decoding at multiple interfaces. VCM provides a robust, high performance, scalable and fault tolerant solution that is optimized for the task of processing sessions.

### ng4t Test Software

ng4T provides active test solutions for verification and deployment of mobile networks. NG40® test platform is fully scalable and runs on virtual machines as well as standalone high performance servers. The NG40 test software can be used as Core or RAN network element emulator. In this NFV solution the NG40 eUTRAN test software is used to test a started EPC instance prior going into productive operation.