



Delivering Closed-loop Service Assurance at the Virtual Edge with CENX Exanova Service Intelligence

Virtualizing customer premise equipment (vCPE) or the customer edge (vCE) promises faster, more automated delivery of new connectivity and services to enterprises. Virtual Edge spending will reach \$18B by 2020 according to SDxCentral. However, managing multi-vendor, physical and virtual infrastructure side-by-side increases operations complexity.

CENX Exanova Service Intelligence enables service providers to accelerate and assure new connectivity services at the Virtual Edge rapidly and cost-effectively by bridging operations between physical and network function virtual infrastructure (NFVI) with a single pane view. **Take full advantage of NFV with Exanova.**

Virtualization of the customer edge promises an end to outdated, difficult to upgrade, physical CPE, as well as a reduction in the truck rolls required to turn-up new, and troubleshoot existing, services. Virtualization also increases the opportunity for wireline service providers to deliver a range of differentiated, value-added services, such as VoWiFi, hosted VoIP, virus protection, load-balancing and other services.

However, the curve to new technologies is often steep. As providers build out NFV infrastructure, they also need to continue to provide the high QoE that enterprises expect. NFV can become another silo if not implemented with a solution that bridges operations between physical and virtual infrastructure. Exanova enables planning, orchestration, and assurance for hybrid infrastructure side-by-side in a single pane view.

Exanova Service Intelligence for Orchestrated Service Assurance

Exanova provides orchestrated service assurance within the Lifecycle Service Orchestration (LSO) framework. Exanova's NFV service assurance capabilities enable operations personnel to assure data services delivered through vCPE across multi-vendor physical and virtual network functions (VNFs).

With Exanova, service providers can reap the benefits of vCPE solutions, while avoiding increased operations complexity and costs:

- Exanova's capacity planning and workflow automation capabilities enable the intelligent and rapid build-out of new services
- TOSCA templates provide the key input parameters required to instantiate and configure a VNF, as well as KPIs for monitoring at the VIM/VM/VNF layers automatically
- In a single pane, Exanova's provides at-a-glance and detailed views of network inventory, service topology, fault, performance, and utilization across the physical and virtual infrastructure, VNF, and VIM
- Exanova's end-to-end view enables NOC personnel to understand the impact of a specific alarm, the most probable root cause, and immediately identify impacted customers

Accelerating Multi-vendor vCPE Services with Orchestration and Assurance

To demonstrate this use case, CENX used

- VMWare VIO
- Accedian virtual network interface devices (vNID)
- Fortinet Fortigate virtual firewalls (vFW)
- Brocade virtual routers (vRouter)

In this use case, an enterprise customer places a service request through a web-based, self-serve portal, triggering a closed-loop orchestration and assurance process.

- Exanova compares established capacity planning policies against current utilization metrics available at all layers (VNF, VM, NFVi)
- Exanova determines whether to trigger scaling the VNFI or VNF
- This triggers Exanova's TOSCA-Template driven instantiation and orchestrated assurance of a new vRouter) and vFW for customer's L3VPN using TOSCA templates
- Exanova's Service Information Model (SIM) is dynamically updated with information about the customer, the service topology/inventory, the PNFs, existing VNFs, and the VIM, enabling a closed-loop

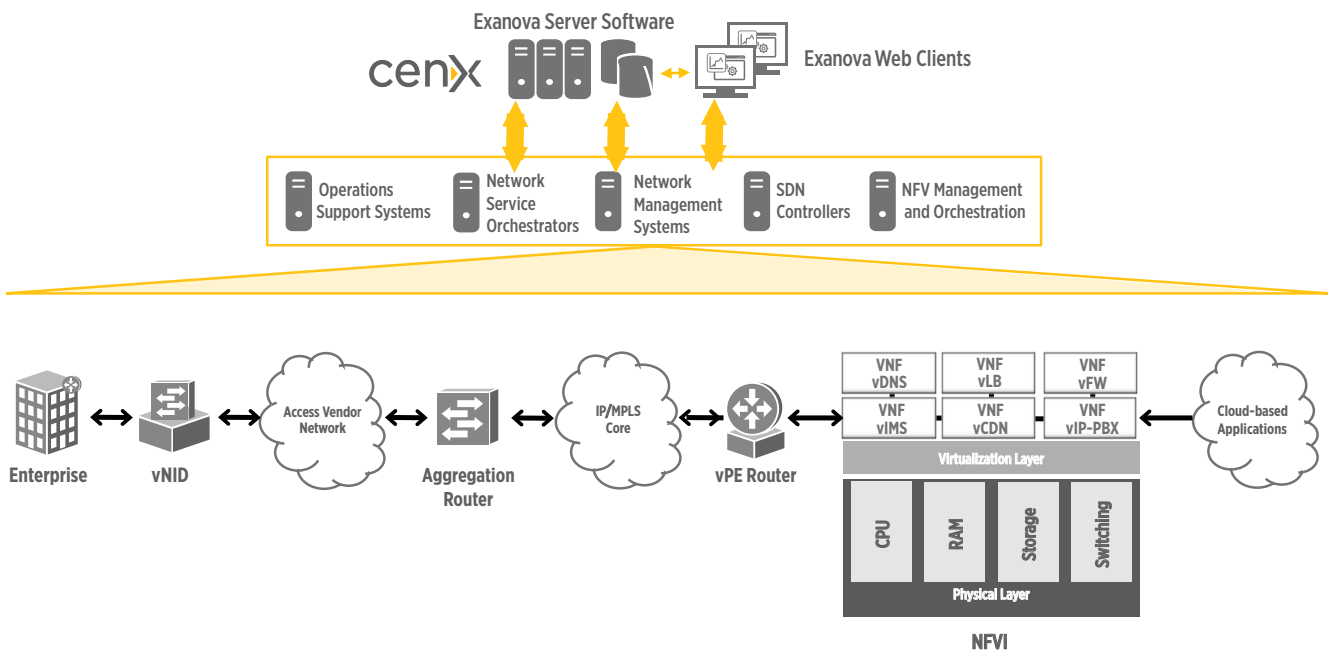


CENX's Orchestrated Service Assurance Solution for vCPE

Exanova Service Intelligence powers orchestrated service assurance across physical and virtual infrastructure wireline service provider networks. Exanova enables service providers to deliver premium QoS and QoE for data service delivery that spans physical and virtual components, including multiple NFV orchestrators (NFVOs), multiple VNFs, multiple virtual infrastructure managers (VIMs), multiple virtual network function managers (VNFMs), and containers, all without having to swivel chair to other management system.

Exanova visualizes physical and virtual network inventory and service topology end-to-end, in multi-provider, multi-vendor, and multi-domain networks. Its real-time analysis engine aggregates network data across systems, correlates KPIs, and provides NFVI and VNF performance metrics for Virtual Edge vCPE applications side-by-side with physical network element performance.

Figure 1: Exanova Service Intelligence provides end-to-end orchestrated service assurance across wireline networks



Delivering NFV Business Value

Exanova Service Intelligence enables the transition to NFV in core networks with the critical orchestrated service assurance capabilities that service providers require to manage service performance across both physical and virtual network elements, enabling service providers to deliver a premium QoS and QoE:

- Drive revenue growth in an increasingly competitive marketplace with differentiated services
- Increase efficiency, agility, and flexibility with workflow automation
- Decrease capex and opex with streamlined operations and capacity planning
- Increase QoS and end-user QoE with real-time troubleshooting and SLA management

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