Solution Brief
Intel® Network Builders
Alcatel-Lucent* CloudBand* NFV Platform
Telecommunications and Networking

Alcatel-Lucent* and Intel Working Together to Accelerate NFV

The companies and their established ecosystems are addressing operational and performance issues to help drive network functions virtualization (NFV) transformation forward.

Introduction

Network functions virtualization (NFV) is gaining remarkable traction among service providers because it allows them to innovate more easily and quickly, increasing their return on investment (ROI) on all-IP network infrastructure, such as LTE. Yet, virtualizing the network from edge to core is a major undertaking, given the need to ensure that future networking equipment based on general-purpose processors delivers the necessary operational efficiency and performance. It requires operations management tools that handle all touch points with virtualized network functions, including deployment, rollbacks, service level agreements (SLAs), and capacity management in a distributed cloud. Finally, NFV-based networking solutions need to deliver deterministic, high packet throughput, achievable through performance-optimization technologies.

Deutsche Telekom* Demonstrates Auto Scaling of NFV-based Resources

Deutsche Telekom* is working on an NFV proof of concept (PoC) that integrates an IP Multimedia Subsystem (IMS) application running on the Alcatel-Lucent* CloudBand* platform over a standard cloud infrastructure implemented in Deutsche Telekom facilities. The NFV PoC demonstrates onboarding of VNFs and automated lifecycle management in a multi-vendor setup. VNF deployment and service instantiation is automatic, demonstrating the decoupling of VNF associated software instances from the underlying infrastructure. The NFV Platform is able to allocate the required resources of the VNFs running on top of the NFVI. The PoC includes auto scaling of the virtualized network functions and recovery (e.g., automated healing) from a system fault.

For more information, http://nfvwiki.etsi.org.

Network Transformation Needed

Today's networks are overly complex, partly due to an increasing variety of proprietary, fixed-function network gear that was built for maximum reliability (99.999 percent uptime). However, it is unable to deliver the agility and economics needed to address a constantly changing market environment, mainly because network elements have traditionally been optimized for high packet throughput at the expense of flexibility, thus hampering the development of new products and services. For instance, deploying anything new in a telecom network normally takes 18 to 36 months, and scaling existing network functions requires around 9 to 18 months.[1]

Another drawback of traditional networks is that service providers bear the cost of carrying a huge number of spare parts since every piece of equipment has its own unique components. In addition, software and hardware upgrades need to be carefully planned, since they are typically done onsite with physical presence and with the equipment offline. The end result is it takes a long time to react to market forces, and spending is about 80 percent OpEx and 20 percent CapEx.[1]

Issues such as these motivated the European Telecommunications Standards Institute (ETSI) to champion NFV, enabling the consolidation of many network equipment types onto virtualized, high-volume servers and allowing easy deployment of future value-add services. Illustrating this point, Figure 1 shows examples of hardware-based appliances that could be replaced by software-based network functions running in virtual machines (VMs) on servers located in data centers, network nodes, end-user premises, and the like. These software-based functions include, but are not limited to, routing, policy management, security, deep packet inspection (DPI), billing management, offloading, spectral management, and dynamic power management.

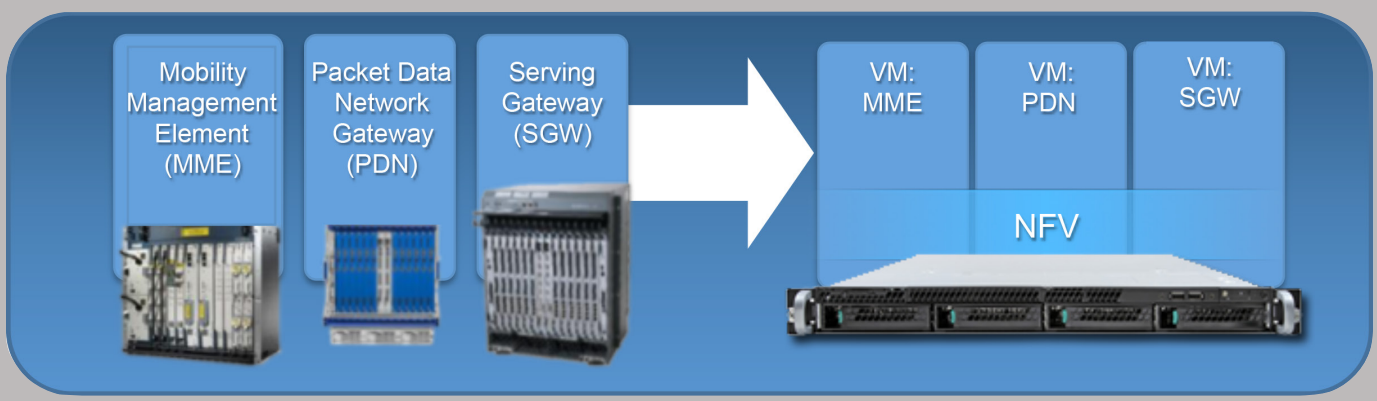


Figure 1. Transitioning from Purpose-Built Boxes to Virtualized Network Functions Running on Standard Servers

Optimizing Network Operations with CloudBand*

With NFV, service providers can shorten the time needed to roll out new services and functionality by bringing agile and flexible cloud computing and IT virtualization technologies to the networking domain. Moreover, virtualized functions run efficiently on industry-standard Intel® processor-based servers, thus spare parts inventory can be reduced significantly since network elements can all use the same type of platform.

Still, these technologies alone are not enough because service provider applications are more demanding with respect to latency and availability than most IT applications. Designed to meet these requirements, the Alcatel-Lucent* CloudBand* NFV platform (Figure 2) orchestrates NFV workloads on distributed Cloud Nodes connected by a carrier's network and provides an integrated view of the distributed cloud.

It also optimizes network operations by automating Cloud Nodes deployments, scaling, upgrades, and other application lifecycle phases, including network configuration.

Distributed cloud infrastructure: Network operators require the flexibility to deploy network functions in practically any part of the network, including core, metro, edge, and access segments. Enabling such a distributed architecture, CloudBand provides granular control over the placement of network functions and automatically dispatches these workloads in optimal locations based on resource availability and service provider policies.

Automated cloud nodes: A distributed NFV infrastructure could have thousands of cloud nodes, each providing compute, storage, and network resources. While it may take a week or more to install a traditional cloud node, CloudBand can be used to configure an NFV Cloud Node in a matter of hours automatically, with most of the work done remotely.

Automated application lifecycle management: Software-based NFV applications simplify lifecycle management, like enabling a new service to be deployed with the push of a button and without having to procure and install new equipment. CloudBand automates the entire lifecycle management of applications from onboarding to phasing out, as depicted in Figure 3.

Automated network configuration: Compared to fixed-function devices, like traditional routers and switches, software-based virtual network functions are much more dynamic because they allow for rapid configuration and flexible network abstraction. This capability, in large part, can be centralized and automated using software-defined networking (SDN) controllers in conjunction with CloudBand.

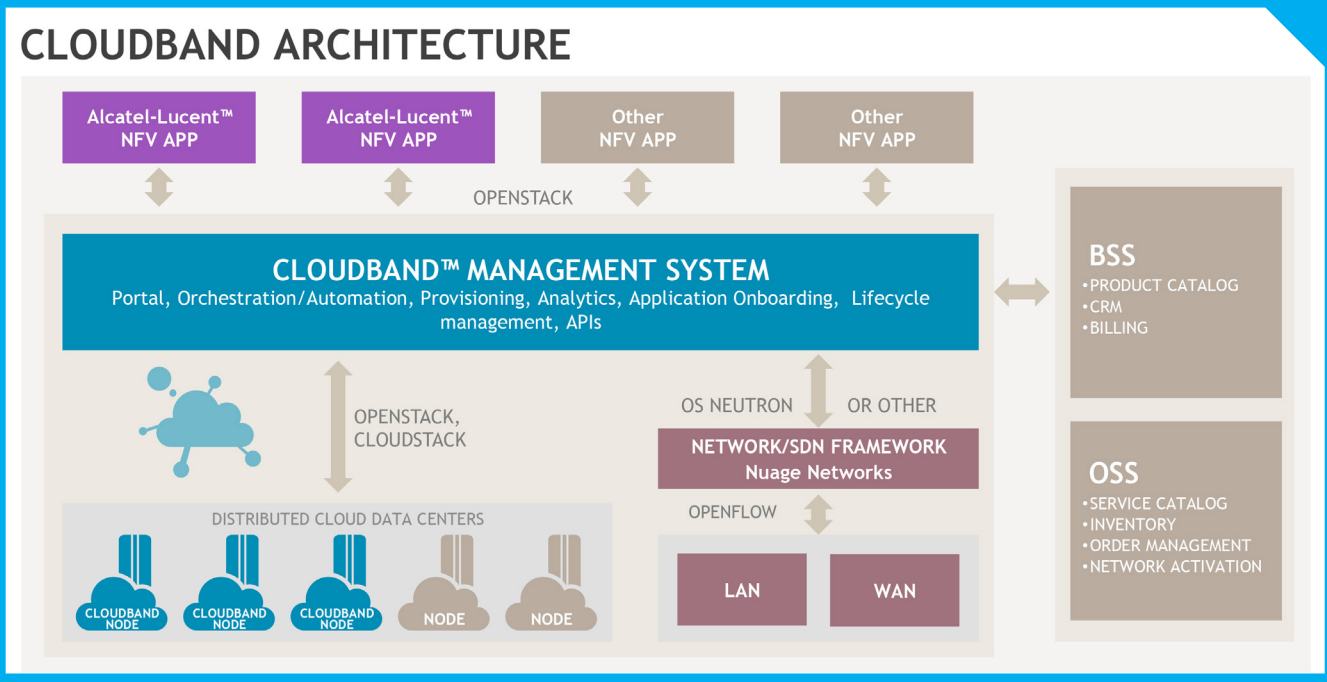


Figure 2. Alcatel-Lucent* CloudBand* Architecture

China Mobile* Scales Capacity and Reduces Energy Consumption with Virtualization

At Mobile World Congress 2014, China Mobile* demonstrated an entire LTE mobile network, including access (C-RAN), core, and IP Multimedia Subsystem (IMS), all running on a common virtualized platform. This multi-vendor, NFV solution scales capacity up and down based on changing traffic volume, and during periods of low demand, powers down servers to save energy.

An Open NFV Platform Is Fundamental

An NFV platform needs to be an open, shared environment capable of running applications from different vendors, as well as allowing network operators to make their own hardware selection decisions, change hardware vendors, and deal with heterogeneous hardware. As an open, multi-vendor platform, CloudBand shields service providers and virtual network functions from the specifics of the underlying infrastructure.

Increasing Performance with Intel® Technologies

Specifically designed for network function consolidation, the Intel® platform for Communications Infrastructure is a cost-effective solution for equipment configured for low-end elements, such as wireless access and branch routers, as well as high-end equipment, including LTE core network elements. The platform is designed expressly for communications infrastructure applications and includes Intel® QuickAssist Technology that accelerates bulk encryption, data compression, and other workloads.

The platform is based on the Intel® Xeon® processor E5-2600 v2 product family, which can deliver near-native performance for virtualized workloads, such as application, control plane, and data plane. This impressive performance is due, in part, to Intel® Virtualization Technology (Intel® VT), which reduces the overhead and footprint of virtualization software, thus boosting performance. In fact, Intel has taken a comprehensive platform approach to substantially increase virtualization performance by adding features and enhancements to its processors, chipsets, and network interface cards with the Intel® 82599 10 Gigabit Ethernet Controller.

Packet processing performance is dramatically improved by the Intel® Data Plane Development Kit (Intel® DPDK), which has proven to increase the throughput of standard Linux* networking stacks by as much as 25 times[2] as shown in Figure 4, making it a critical ingredient in SDN/NFV-based equipment. The Intel DPDK uses the core-affinity feature on Intel platforms to ensure packet processing operations run on dedicated processor cores, unencumbered by other software executing at the same time on other cores. Another Intel® microarchitecture enhancement is non-uniform memory access (NUMA) that gives processors (in multiple processor configurations) their own fast, local memory, whereas previously, processors shared a memory bus, which could lead to contention and performance degradation.

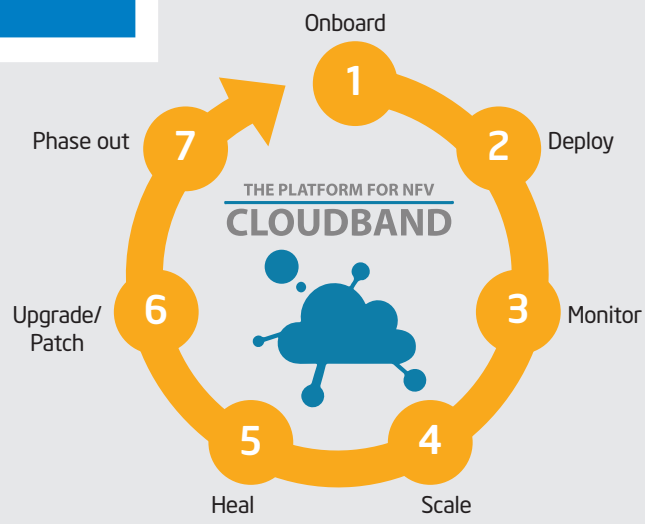


Figure 3. Alcatel-Lucent* CloudBand* Automates All Application Lifecycle Phases

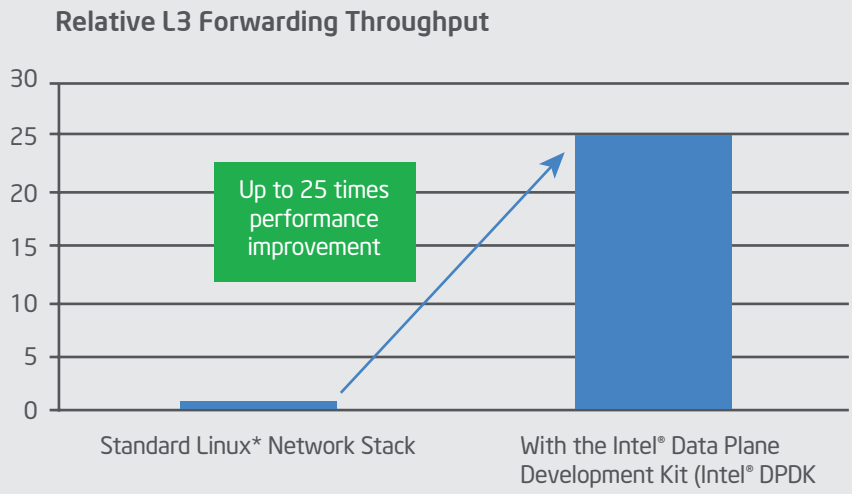


Figure 4. Packet Forwarding Speed Up

Enabling Access to Intel® Technologies Through The CloudBand* Management System

Intel and Alcatel-Lucent are working together to expose Intel VT such as the Intel DPDK, NUMA, and other performance enhancers through the CloudBand Management System. Based on specific performance requirements and agreed SLAs, CloudBand will direct the workload to be deployed on tagged VMs that can enable such features. Virtual network functions could subscribe to pre-defined profiles of high throughput, minimal jitter, or latency level. Data plane applications will get access to the resources they need, and capacity will be managed under performance constraints and application requirements. Both Intel and Alcatel-Lucent are ramping up their contribution to OpenStack* and supporting performance accelerators through special-purpose connectors and plugins. This joint work will be accessible through a shared performance lab and the ecosystem programs discussed in the following section.

Industry-Leading Ecosystems

Since CloudBand is an open, multivendor platform, service providers can expedite new services development with products from two vibrant ecosystems:

- CloudBand* Ecosystem Program – Alcatel-Lucent provides ecosystem members free access to its CloudBand commercial solution, the very same that is used in field trials. A team of experts support the virtual application vendors with onboarding, recipe creation, and building demonstrations that our customers are asking for.
- Intel® Network Builders - The program was created to make it easier to build, enhance, and operate SDN/NFV-based infrastructure. This cross-industry initiative was established to spark innovation, reduce development effort, advance open networking standards, increase interoperability, and ultimately, reduce time to market.

Accelerating Network Transformation

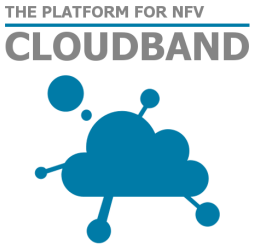
Alcatel-Lucent and Intel are working together to develop an NFV platform that delivers exceptional operational capabilities and performance, overcoming key challenges in the adoption of NFV. Alcatel-Lucent Cloudband orchestrates, automates, and optimizes virtual network functions across the service provider's distributed network and data centers. It runs on Intel® Xeon® processor-based platforms that are optimized for virtualized environments requiring high packet throughput. This combination enables service providers to meet their business needs and ease their transition to NFV-based network infrastructure.

For more information about CloudBand from Alcatel-Lucent, visit http://www.alcatel-lucent.com/solutions/cloudband.

For more information about Intel solutions for communications infrastructure, visit www.intel.com/go/commsinfrastructure.

For more information visit, **networkbuilders.intel.com** and **www.alcatel-lucent.com/solutions/cloudband**

Solution Provided By:



[1] Dor Skuler, VP and GM, CloudBand Business Unit, Alcatel-Lucent, http://www.tianow.org/videos/the-virtual-telco/13656.

[2] Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel® products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit Intel Performance Benchmark Limitations.

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