

Amdocs* NFV Powered by ONAP* Enables Intelligent VNF Deployment

Amdocs NFV powered by ONAP utilizes Intel® Xeon® Scalable processors and Enhanced Platform Awareness to enable VNFs to gain high performance and efficiency.



The Emerging Role of NFV Orchestration

The key role of the NFV orchestrator is to manage the lifecycle of VNFs and virtualized network services, and this includes placing and managing VNFs on servers in the network and tracking the available server inventory and capacity. As network virtualization grows, the function of orchestration is evolving as well, providing a standardized way to manage and optimize virtualized services across multiple network and cloud domains.

Open Network Automation Platform (ONAP)* is an open source initiative that provides a comprehensive platform for real-time, policy-driven orchestration and automation of physical and virtual network functions that will enable software, network, IT, and cloud providers and developers to rapidly automate new services and support complete lifecycle management.

Amdocs,* together with Intel, is promoting ONAP to leverage Enhanced Platform Awareness (EPA) technologies running on Intel® Xeon® Scalable processors. Modeling the EPA features in the VNF descriptor provides ONAP with information about the hardware capabilities used by the virtual environment platform. ONAP enables these VNFs to utilize Intel Xeon Scalable processors' acceleration and networking capabilities for outstanding performance.

ONAP provides global and massive scale (multisite and multivirtualized infrastructure manager (VIM)) orchestration capabilities for both physical and virtual network elements. It facilitates service agility by providing a common set of northbound REST APIs that are open and interoperable, and by supporting YANG and TOSCA data models. ONAP's modular and layered nature improves interoperability and simplifies integration, allowing it to support multiple VNF environments by integrating with multiple VIMs, VNFMs, SDN Controllers, and even legacy equipment.

Amdocs NFV Powered by ONAP

Amdocs has been one of the early developers of and is a key contributor to ONAP and is working with early ONAP adopters. This unique position enabled Amdocs to introduce Amdocs NFV powered by ONAP, one of the first software and services portfolios in the industry to leverage ONAP to enable communication service providers (CommSPs) to accelerate NFV/SDN service innovation.¹

Amdocs NFV powered by ONAP is a productized version of key ONAP modules coupled with additional tools and capabilities. The modular, fully integrated, and certified solution enables CommSPs to design, orchestrate, and operate network services across their entire service footprint.

Amdocs NFV powered by ONAP is complemented by a portfolio of professional services to fast-track NFV strategic planning, implementation, and operations/assurance, as well as integration to existing operational and business support systems, which is essential to commercializing virtual network services.

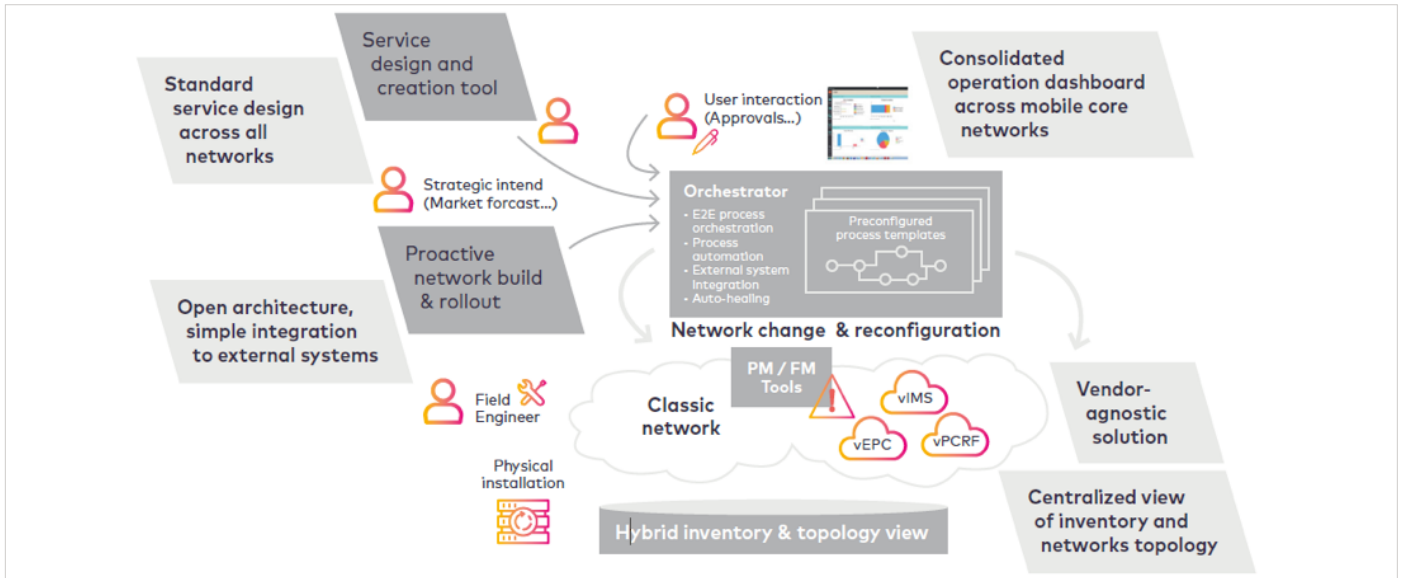


Figure 1. Amdocs NFV powered by ONAP orchestrator coordinates network traffic by managing network service-related lifecycle management activities such as scaling, policy management, administrative operations, and assurance.²

Amdocs NFV powered by ONAP features three main modules:

- Service design and creation module: provides a design-time system that allows for service development and creation and the design of policies for operating the network.
- Orchestrator module: once the service is designed, the orchestrator module is used to place VNFs in the right servers in the network. The orchestration module features an SDN controller for managing the flow of traffic on the network. The module also features an application control element that manages the lifecycle of the VNF, in terms of installation and uninstallation of the software, as well as start and stop and install bundles.
- Operate module: provides inventory updates to the orchestrator module so it knows where the VNF inventory is located and which servers have capacity.

The policy engine in the operate module ensures policy compliance by the services and manages any changes to the policies. Finally, the data collection, analysis, and events functionalities provide the data needed to ensure that the network services are running smoothly.

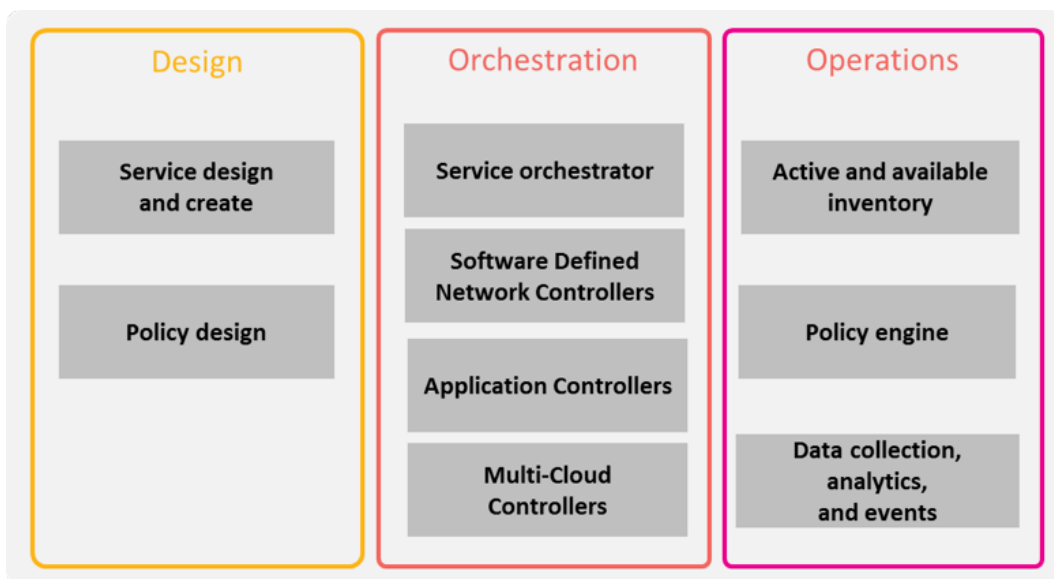


Figure 2. Amdocs NFV powered by ONAP main modules.

Amdocs NFV powered by ONAP can be deployed either on premises or in the cloud using DevOps adoption techniques.

Key Capabilities of Amdocs NFV Powered by ONAP

- Scale network resources up and down
- Provide transparency on function virtualization
- Policy-driven prioritization of network resources utilization
- Allocate resources based on service level
- Optimize coexistence of virtualized functions
- Coordinate resource allocation with legacy network
- Manage service availability
- Control costs
- Fault management

Amdocs NFV powered by ONAP also provides the Amdocs Open Network Partner Program, an ecosystem that brings together infrastructure and VNF vendors to collaborate and fulfill a wide range of multivendor NFV use cases helping service providers accelerate their NFV adoption. Amdocs also offers a portfolio of expert services for VNFs onboarding, testing, and use cases validation, helping VNF vendors to accelerate time to market.

EPA for Intelligent VNF Placement

One of the key functions of the Amdocs NFV powered by ONAP orchestrator is to place VNFs on servers that have the resources enabling a high degree of functionality by leveraging EPA input. For example, security applications may need encryption acceleration capabilities and a video application will have significant transcoding requirements that would be ideally run on a server with a transcoding accelerator.

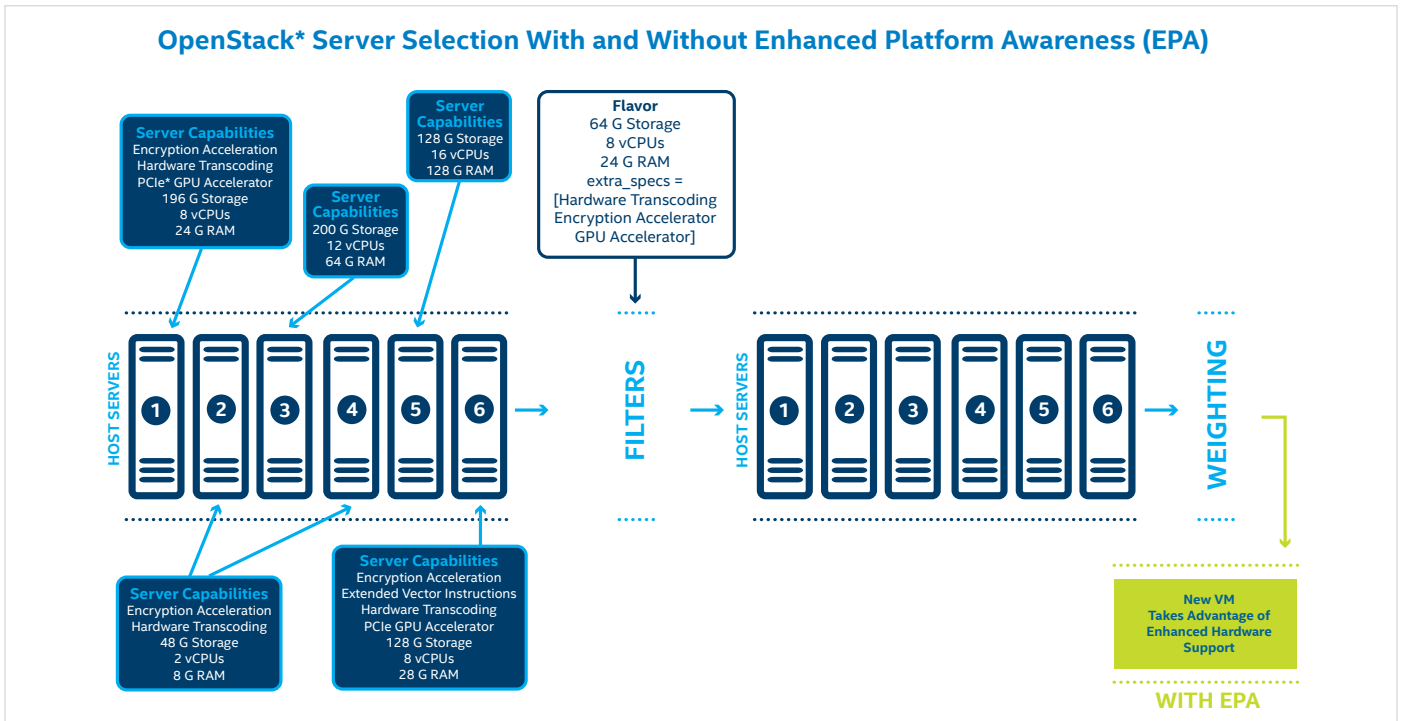


Figure 3. How EPA features are implemented in an OpenStack* virtual environment.

Amdocs NFV powered by ONAP leverages servers based on Intel Xeon Scalable processors and Intel® Ethernet controllers with Enhanced Platform Awareness (EPA), which represents a methodology and a related suite of changes across multiple layers of the orchestration stack targeting intelligent platform capability discovery, configuration, and capacity consumption.

Amdocs has incorporated EPA modeling support into its NFV powered by ONAP and offers a node discovery feature that identifies server hardware features and advertises them to the orchestrator for use in VNF assignments. Amdocs NFV orchestrator can then intelligently deploy VNFs to the most appropriate server with the decision based on resources that will help the VNF to operate at peak performance.

EPA features include the following:

- Single Root I/O Virtualization (SR-IOV): provides dedicated VNF access to networking.
- CPU pinning: guarantees a VNF will be pinned to a particular CPU, thus maximizing cache utilization, eliminating operating system thread scheduling overhead and coordinating network I/O.
- Huge pages: enables the discovery, scheduling and allocation of huge pages (up to 1 GB as compared to normal 4 KB pages) as a resource.
- Non-uniform memory access (NUMA) awareness: enables discovery of much faster NUMA systems for VNFs that need fast access to memory.

Taken together, these EPA features deliver improved application performance, input/output throughput, and application determinism.

Conclusion

NFV offers CommSPs great agility to scale services up or down according to demand or customer desires. ONAP is designed to facilitate this agility for multi-provider network services that potentially could span multiple countries. With its Amdocs NFV powered by ONAP orchestrator, Amdocs is bringing a solution to market that is tested and hardened for network deployments. With performance from Intel Xeon Scalable processor-based servers and VNF automation enabled by Enhanced Platform Awareness, Amdocs' NFV orchestrator intelligently deploy VNFs to offer great performance and meet the needs of service providers that are embracing NFV to re-architect their networks for a new generation of services and customers.

About Amdocs

Amdocs is a software and services provider to the world's most successful communications and media companies. As its customers reinvent themselves, it enables their digital and network transformation through innovative solutions, delivery expertise, and intelligent operations. Amdocs and its 25,000 employees serve customers in over 85 countries. Listed on the NASDAQ Global Select Market, Amdocs had revenue of \$3.9 billion in fiscal 2017. For more information, visit Amdocs at www.amdocs.com.

About Intel® Network Builders

Intel® Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The program offers technical support, matchmaking, and co-marketing opportunities to help facilitate joint collaboration through to the trial and deployment of NFV and SDN solutions. Learn more at <http://networkbuilders.intel.com>.



¹ "Amdocs Monitors 'Pretty Much Everything' in ONAP," SDx Central, published August 14, 2017, at <https://www.sdxcentral.com/articles/news/amdocs-monitors-pretty-much-everything-in-onap/2017/08/>

² Figures 1 and 2 provided courtesy of Amdocs.

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