ADDRESSING THE NEED FOR AGILE OPERATIONS

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Executive summary

- Amdocs views the evolution from today's existing OSS to an operational layer that can fully support the needs of next-generation networks, as critical for the successful adoption of NFV/SDN. This is an evolutionary approach which enhances existing operational system capabilities with new capabilities, rather than a transformational approach where existing components are replaced.
- At a minimum, to meet the needs of NFV/SDN networks the operational layer requires the addition of three key components or functionalities to create the requisite agility.
- The capabilities provided by Amdocs form part of the NFV Service Lifecycle, which outlines three capabilities that are required to operate commercial and robust NFV/SDN networks. Amdocs has offers to address these three requirements.
- The evolution of the operational systems will not stop once these three components are added; there will be additional future enhancements and consolidations within the operational layer to meet the ever-changing needs of service providers and their customers.
- Amdocs recommend that service providers invest in upgrading and enhancing their existing OSS systems to support NFV/SDN, adding the three key components of the NFV Service Lifecycle to minimize the operational impact.

Technology developments are changing networks

The communications industry is undergoing an unprecedented level of change. The interval between introducing new network technologies is decreasing as data capacity is increasing.

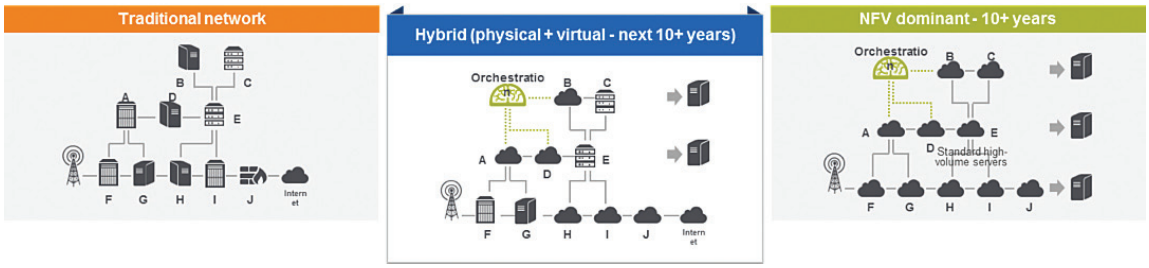

Figure 1. The Hybrid Reality

These changes have a profound effect on the operational aspects of today's networks to the extent that the existing operational systems are being forced to adapt. In particular one of the key challenges is how to address the complex operational issues of the hybrid (physical and virtual) networks of the future.

Evolution to support Agile Operations

Amdocs' approach to supporting network functions virtualization (NFV) and software-defined networks (SDN) and addressing the service-related factors is evolutionary rather than revolutionary. Amdocs has developed a modular approach, adding a number of new components to create a new operational layer that addresses both the physical and virtual/software-defined network needs. Amdocs approach to this Next Generation OSS for the hybrid network is the blueprint that incorporates the capabilities required to support both existing and next-generation network technologies and services, providing an evolutionary path from today's operational systems.

Blueprint for Agile Operations

Amdocs is leading the evolution of operational systems in response to fast-moving technology changes, in particular the introduction and adoption of NFV/SDN.

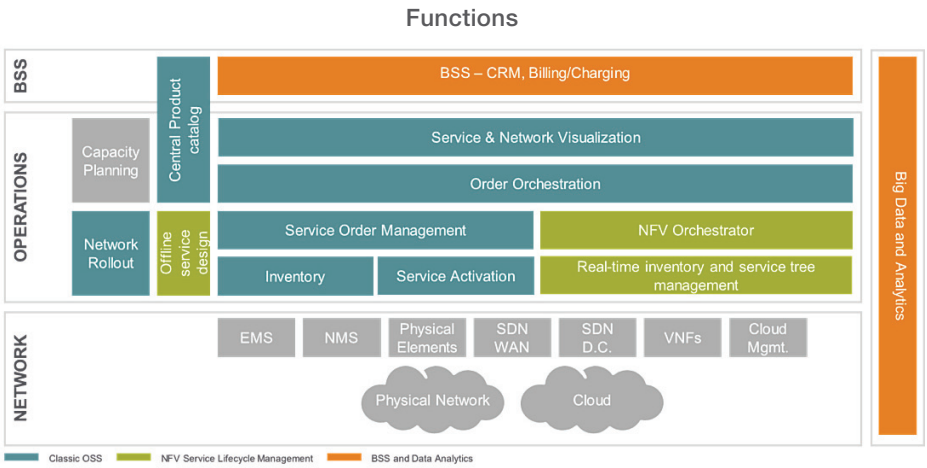

Figure 2. Next Generation Operations – Hybrid Network Blueprint – Functions

OSS vendors that fail to adapt, upgrade or enhance their current systems will increasingly be unable to meet the needs of service provider networks, and their systems will rapidly become obsolete.

Conversely, new vendors seeking to enter the market with SDN/NFV-only solutions will find it increasingly hard to deploy operational systems that meet the requirements of hybrid networks. With the exception of a few Greenfield operators, most service providers have significant investment in their existing networks and so require operational system solutions that support both physical and virtual networks.

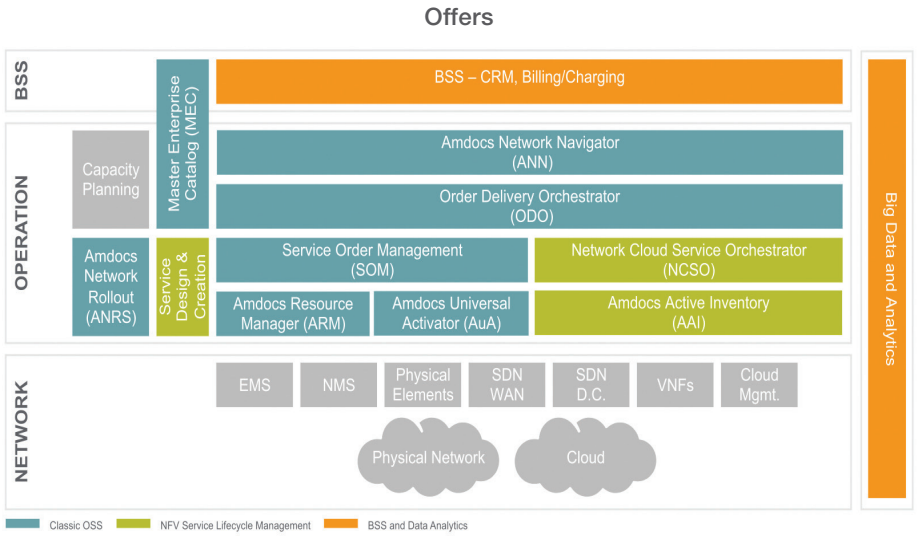

Figure 3. Next Generation Operations – Hybrid Network Blueprint – Offers

Amdocs Next Generation OSS evolution blueprint combines the current physical operational systems (in blue) with the NFV Service lifecycle systems (in green) to create an integrated model for Agile Hybrid Operations. Increasingly real-time and non-real-time analytics (in orange) will form part of this ecosystem.

NFV Service Lifecycle

The addition of 3 core functional capabilities evolves Amdocs' existing OSS portfolio into a Hybrid Next Generation OSS portfolio capable of supporting agile operations. This portfolio is designed to meet the needs of the hybrid world. Amdocs believes this is the minimal functionality required for a future-proof operational layer to support the needs of service providers in 2016 and beyond.

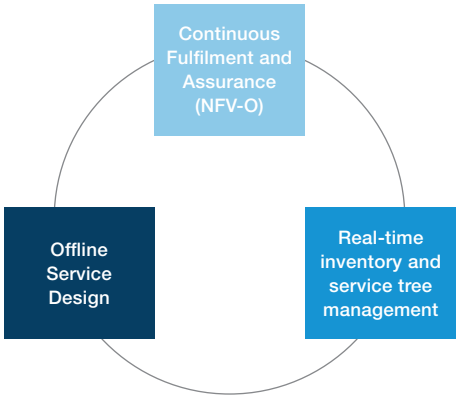

Figure 4. NFV Service Lifecycle – Functions

Service Design and Create

- Automated, agile (NFV/SDN) service definition, test and launch
- Design, test and create (NFV) services in weeks, not months

Network Cloud Service Orchestrator

- Plan, design and manage virtualized services on a service ready network
- VNF fulfillment, service chaining and service configuration

Active Inventory

- Near real-time e2e view of services, topologies, resources and utilisation
- Supporting feasibility and assurance across hybrid resources

Offline Service Design

A key capability for a service provider is the ability to rapidly and efficiently design, test and launch innovative new services.

Today the service innovation cycle is too long and too resource-intensive to see SPs emulating the rapid service development of the OTT industry. Typically new service development takes 9-12 months, but in some instances complex services can take in excess of 18 months to develop and launch. The process is too long and too costly to allow service providers to respond competitively, and drives cautious development of low-risk services as opposed to radical service innovation which many SPs aspire to.

Amdocs believe that agile operations require an automated service design, test, de-bug and publication capability to enable rapid and efficient service development – the catalyst for true service innovation.

To this end Amdocs has developed Service Design & Create (SDC), a solution that enables the rapid design, test and launch of multiple services. SDC supports the full service development life-cycle in a highly automated manner including automated test and debug which is a major cost component of service innovation today. SDC uses pre-defined templates for VNF packages as well as modular policy and workflow definitions to support drag-and-drop service creation with high levels of re-use of design components. SDC is integrated with Amdocs Network Cloud Service Orchestrator and with the catalog to ensure that service definitions can be easily distributed and that the new services can be automatically instantiated by the orchestrator in minutes or even seconds.

Amdocs Service Design and Create shortens the service development lifecycle from months to weeks, and significantly reduces the end-to-end service development cost. The ability to develop 'fire and forget' services swiftly fundamentally changes the way network engineers respond to dynamic customer needs, providing service agility and unlocking the real value of virtualization.

Continuous Fulfilment and assurance (NFV Orchestration)

The orchestration of virtual networks functions (VNFs) is a critical capability for any hybrid network and an NFV-Orchestrator as a key requirement for any OSS supporting next generation networks.

Amdocs Network Cloud Service Orchestrator (NCSO), is a purpose-built NFV-Orchestrator that manages both virtual network functions (VNFs) and physical network functions (PNFs) using its advanced “Sensei” engine to continuously monitor and fulfil virtual and hybrid services.

Amdocs believes that to achieve the service agility, CAPEX and OPEX savings predicted by the adoption of NFV a key operational capability is an NFV-Orchestrator with strong functionality and scalability. Many of the NFV-Orchestrators developed on existing EMS and CMS platforms lack the flexibility and scalability to orchestrate commercial dynamic NFV networks.

In addition to support for ETSI MANO Amdocs believe an NFV-Orchestrator should support the following key functionalities:

- Open to any VNF (Vendor neutral)
- Catalog driven to support rapid service introduction
- Event driven continuous fulfilment

In addition NFV-Orchestrators must be scalable to support the largest networks, not just PoCs or lab systems.

Real-time inventory and service tree management

Market-leading inventory systems, like Amdocs Resource Manager, use data integrity or data synchronization techniques to maintain high levels of data accuracy. The inventory was typically the master and planned changes were made first in the inventory before being pushed out to the network.

NFV and SDN create dynamic networks, and with their adoption the network becomes the master. Future operational systems must have the capability to provide a near-real-time, end-to-end view of network services, topologies, resources and utilization, including the ability to isolate this data for a specific moment in time as well as to show historic data. This capability is key for real-time service assurance, fault and performance management.

For example if a VNF fails it is important for resolution to understand the network configuration at the time of failure, the traffic profile, the hardware the VNF was instantiated on, etc.

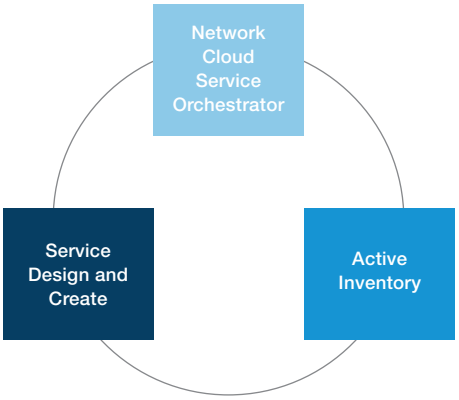

Figure 5. NFV Service Lifecycle – Offers

Amdocs believes that this will be a key capability for mature, commercial NFV/SDN services.

Conclusion

Amdocs Next Generation OSS evolution blueprint envisions the deployment of a number of new “components” to the existing operational systems to create an operational layer capable of meeting the future needs of an industry requiring much greater service agility.

Amdocs has invested heavily in developing the first three components required to support robust commercial NFV/SDN deployments. These new components complement the existing OSS and BSS products and solutions which will continue to be needed for the foreseeable future. The Amdocs Next Generation OSS evolution blueprint is about augmenting existing operational systems with the capabilities they require to address the needs for NFV/SDN and beyond.

Amdocs recommend that service providers invest in upgrading and enhancing their existing OSS systems to support NFV/SDN adding the 3 components of NFV Service Lifecycle to minimize operational impact and to rapidly monetize NFV.

To find out more go to **www.nfvreadyoss.com**

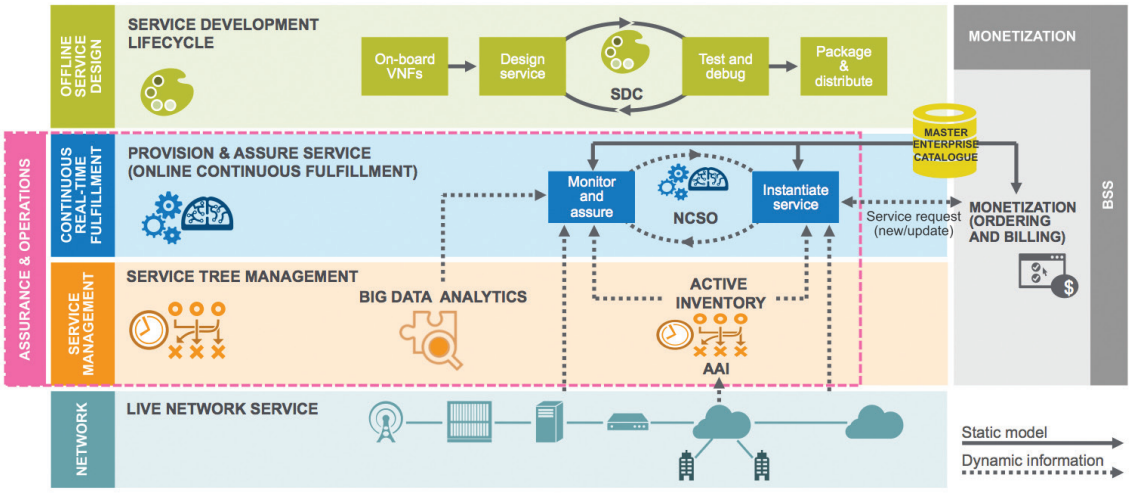

Figure 6. Amdocs NFV Service Lifecycle – Overview

ABOUT AMDOCS

Amdocs is the market leader in customer experience software solutions and services for the world's largest communications, entertainment and media service providers. For more than 30 years, Amdocs solutions, which include BSS, OSS, network control, optimization and network functions virtualization, coupled with professional and managed services, have accelerated business value for its customers by simplifying business complexity, reducing costs and delivering a world-class customer experience.

The Amdocs portfolio enables service providers to capture the world of digital immediacy by operating across digital dimensions to engage customers with personalized, omni-channel experiences; creating a diversified business to capture new revenue streams; becoming data empowered to make business and operational decisions based on insight-based and predictive analytics; and achieving service agility to accelerate the fast rollout of new technologies and hybrid network services.

Amdocs and its more than 24,000 employees serve customers in over 90 countries. Listed on the NASDAQ Global Select Market, Amdocs had revenue of $3.6 billion in fiscal 2015.

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