

A person with short brown hair and glasses, wearing a dark grey hoodie, is seen from the back and side, looking at a computer monitor. The monitor displays a network management interface with various charts and data. The background is a server room with rows of server racks and blue ambient lighting.

Amdocs Intelligent Networking Suite

Driving automation in
the era of hybrid and
open cloud networks

Executive summary

- The transformation of network automation technology and operations support systems (OSS) is being driven by the following key developments: the advent of 5G and the telco cloud; the need for effective management of hybrid networks composed of physical, virtual and cloud network functions; and the increased importance of digital-enabled cloud-native deployments of network automation and operations systems to reduce operator TCO and improve agility
- While the journey to network modernization will vary from operator to operator, network automation and OSS transformation is a necessary pre-requisite for a process that will change the relationship between network and IT as operators embark on the road to open cloud networks
- Amdocs' transformation vision recognizes the importance of managing hybrid networks on this journey and automating end-to-end service and network orchestration spanning separate network domains, distributed infrastructure and heterogeneous environments. A key Amdocs objective is to help service providers modernize, consolidate and transform their operations systems to realize a modular, cloud-native management solution approach

What is driving network automation and OSS transformation?

Several factors are driving service providers to invest in transforming their network and operations management systems.

- As service providers look ahead to the disaggregated, distributed, modularized and ecosystem-powered networks of the future (such as 5G, IoT, SDN/NFV, cloud-based, AI/ML-driven), a new operations paradigm is taking hold, requiring

different service and network management capabilities. The advent of 5G and the telco cloud is ushering in new network architectures and new operational and business models, and many of the network automation and OSS transformation decisions will be driven by changes in these areas. Additionally, service providers are under significant pressure to reduce opex, so automation will be key in the era of 5G and telco cloud networks, starting with network and service operations

- A top priority for service providers is to have flexible systems that enable efficient and effective management of hybrid networks - spanning multiple dimensions: covering physical + virtual + cloud functions; deployed on-premises + cloud; and supporting legacy connectivity + new value-added services. The move to the future-state network architecture will not happen instantly and a wide range of hybrid and cross-domain deployment scenarios will need to be supported through a |step-wise journey
- Cloud-native deployments of network automation and management systems – across all flavors of public, private and hybrid clouds – are becoming increasingly important to reduce TCO and improve agility. Additionally, digital network self-care/self-service capabilities are becoming more relevant to help streamline and simplify operations. A key underpinning of modernized network automation and OSS architectures is the flexibility and agility to enable different operational and business models. Microservices architecture (distributed sub-functions of an application), container orchestration (e.g. w/ Kubernetes), dynamic/elastic resource management, DevOps methodologies and more play a vital role here

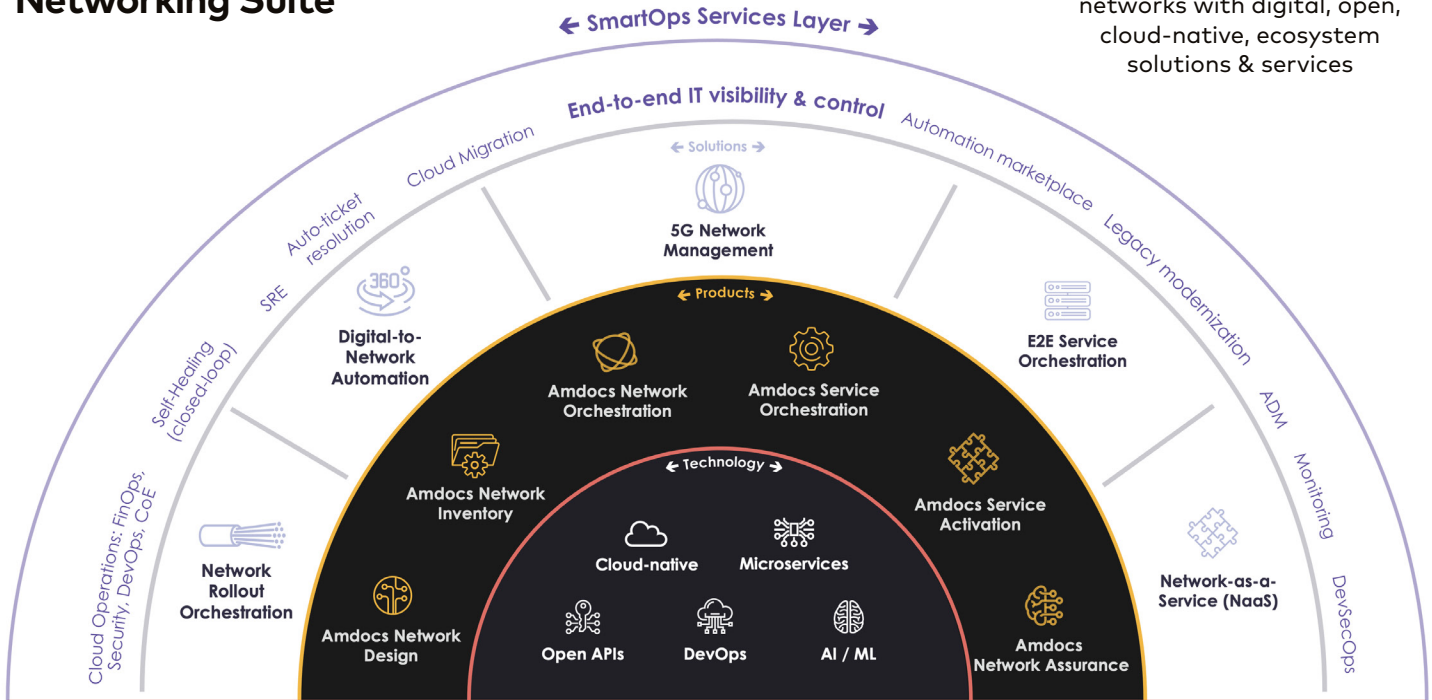
The journey of network modernization and the associated transformation of network automation technology and OSS will vary from operator to operator. It's a process of evolution that needs to be well thought through and must include both existing systems and the introduction of new processes and agile operational structures that will change the relationship between network and IT. Whatever the challenges on the road to the open cloud networks of the future, and whichever approach a service provider chooses, network automation and OSS transformation is recognized as a necessary pre-requisite for success.

Amdocs' vision and approach

A key objective for Amdocs is to help service providers modernize, consolidate and transform their service and network management systems to realize a modular, cloud-native management solution approach. Amdocs has evolved its proven capabilities into Amdocs Intelligent Networking Suite designed to manage and orchestrate hybrid networks, combining traditional service fulfillment functionality with cloud and NFV orchestration and automation capabilities.

Amdocs Intelligent Networking Suite

Driving automation for the era of hybrid & open cloud networks with digital, open, cloud-native, ecosystem solutions & services



Supporting key business imperatives and multiple automation journeys

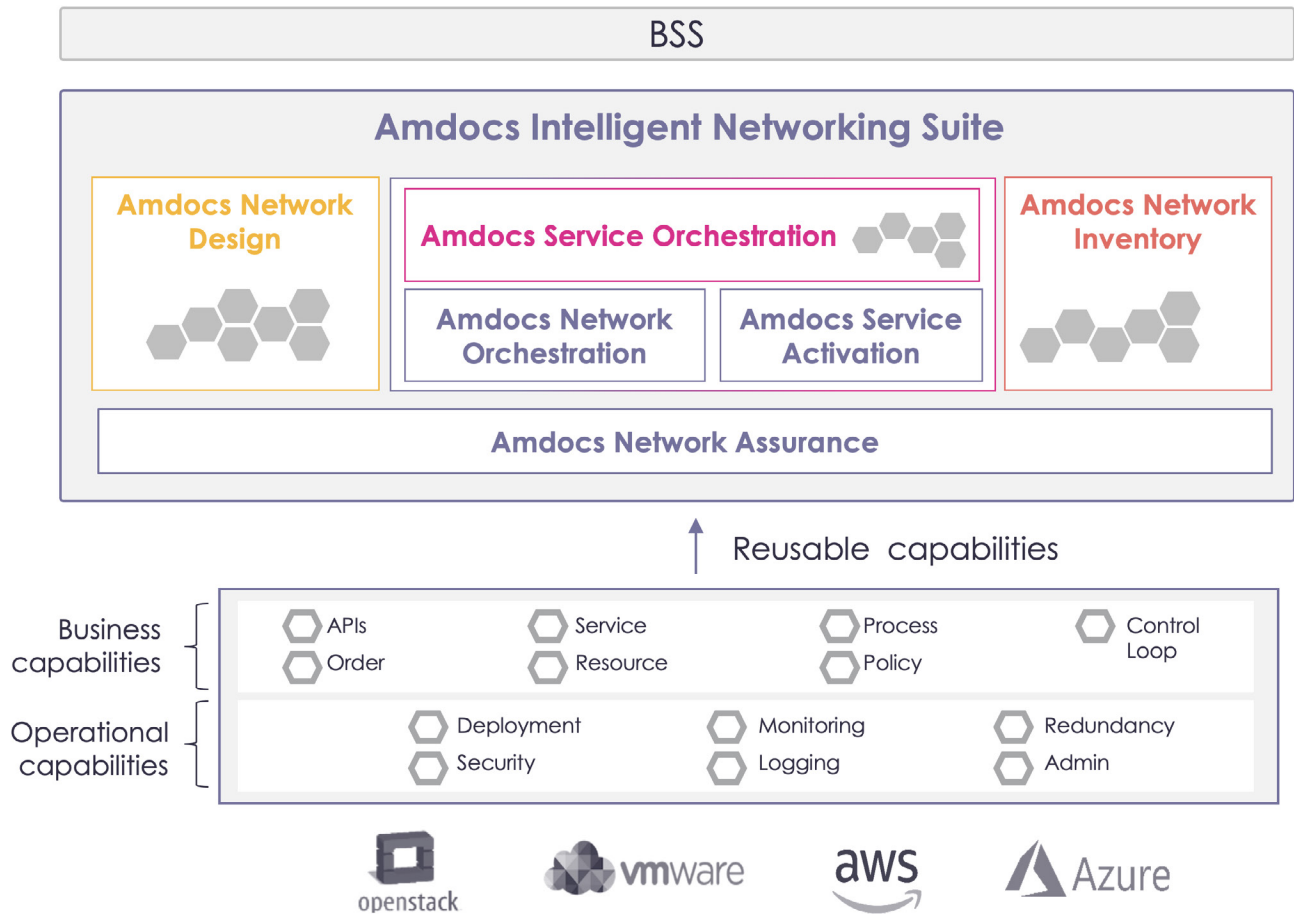
Amdocs is enabling service providers to realize and operate open programmable networks that help accelerate service innovation and drive business growth. Amdocs empowers service providers to modernize and innovate with service and network automation solutions that support key business needs and multiple automation journeys.

- **Digital-to-network automation** with zero-touch, self-service for ordering, fulfillment and on-going service management and operations, evolving existing systems in a manageable and stepwise manner, achieving value without full transformation and reducing time-to-market and cost to 'first value'
- **5G network management and slice & edge automation** covering cross-domain network slice management and smart edge and VNF/CNF placement, with comprehensive capabilities to manage the service lifecycle from slice design, through to creation and dynamic modification in real time, and all the way to closed-loop assurance and operations
- **End-to-end service and network orchestration** covering all aspects of design and orchestration for services spanning multiple domains and vendor technologies, providing a single view of data and processes, unified management of policies/SLAs/KPIs, automated closed-loop configuration and fulfillment processes, and simplification of service lifecycle management
- **Network-as-a-service (NaaS) / virtual network services (VNS)** automation empowering service providers to rapidly define, launch, fulfil, operate and assure new offerings that combine organic capabilities (e.g. connectivity) with ecosystem elements, including SD-WAN, WAN acceleration/optimization, vCPE/VNFs, UCaaS, enterprise perimeter services, unified threat management (UTM), vertical IoT packages, and other NaaS/VNS offerings

Comprehensive business functionality to manage and orchestrate hybrid networks

Amdocs Intelligent Networking Suite capabilities cover the full network service lifecycle: service design environment (seeded with base definitions and service modeling templates for fast-start), end-to-end orchestration, including integration/interoperability with relevant domain-specific orchestrators/controllers, inventory functionality that serves as a logical centralized reference point for instantiated services and network resources, and assurance and autonomous operations capabilities.

- **Modular approach** that encompasses traditional OSS functions along with advanced network automation capabilities, including federation layer for hybrid management, NFV orchestration, CNF orchestration, and edge and network-slicing management
- **New network-ready capabilities** covering, amongst others, 5G non-standalone (NSA) and standalone (SA), edge and IoT, and including multi-domain orchestration, master catalog, policy management and analytics
- **Pre-integrated with Amdocs BSS** components, leveraging our unique position in the market with end-to-end business-to-network service management coverage (e.g. [Vodafone](#), [AT&T](#))
- **Incrementally expanded business software packages** (e.g. SD-WAN, vCPE, etc.) via accelerated development aligned with customer projects (e.g. [Comcast](#), [Globe](#), [SES](#) and [Vodafone Ziggo](#))
- **Digital business enablers** such as marketplace foundations, self-service portal and an open ecosystem of pre-integrated third party VNFs/CNFs
- **Continually enriched partner ecosystem**
An increasing array of ecosystem services such as VNFs/CNFs certification and testing



Built with open, digital, cloud technologies

Amdocs provides a pragmatic and seamless path for service providers moving from physical through hybrid to open cloud networks. Existing OSS and fulfilment systems can be incorporated in both 'side-by-side' and 'over-the-top' implementations through federation and loosely-coupled integration based on advanced and flexible technology underpinnings.

- **Cloud-native**, public-cloud/private-cloud deployable, micro-services based, with shared foundations, including discovery and service mesh, and observability
- **Open and declarative APIs**, and alignment with standards to simplify integration with the ecosystem (e.g. MEF APIs, TMF APIs, ONAP APIs, TOSCA models)
- **AI/ML infused** into key functions for intelligent, data-driven automation
- **DevOps** methodologies and tool-sets to drive continuous enhancements into deployed solutions

Why partner with Amdocs

Uniquely enabling and accelerating network monetization end-to-end

Amdocs provides a hybrid, cloud-native, service-aware management solution that connects customer-facing services domains, for example commerce and care functions, to the network domain (or multiple network domains and/or network clouds). The solution seamlessly supports end-to-end service lifecycle management (design, orchestrate/fulfill, operate) for a wide array of innovative services, including intelligent connectivity, value-added services (VAS), cloud applications, edge capabilities, IoT, QoS private/isolated networks (e.g. slice-based) and more.

Amdocs is uniquely positioned to provide network operations and management solutions that ensure a service provider's network is a true 'agile monetization platform' rather than a static infrastructure. 5G will accelerate this imperative even further. As service providers introduce a large variety of offerings, all of which will require end-to-end management across business and operational systems and the network, Amdocs will continue to drive differentiation by delivering capabilities that allow service providers to:

- Manage and operate a fully programmable network based on high-performing, resilient, modular and heterogenous network capabilities, using software control to orchestrate the entire service lifecycle and operate it with policy-driven automation
- Evolve to a dynamic and agile service and network management approach on a distributed, virtualized and cloud architecture
- Adopt network and service management systems based on microservices architectures, DevOps, toolchains, and public/private/hybrid clouds
- Ensure seamless co-existing and synchronized operations support for the network evolution journey, leveraging existing investments for pragmatic step-wise transformation
- Implement design and fulfillment capabilities for all aspects of the service across hybrid network and system environments, modeling, fulfillment and repair processes, policies and SLAs, including business definitions








Driving the adoption of open cloud networks

In a bid to meet the needs of the connected digital society, service providers are looking to create an open, distributed, automated network leveraging the hybrid cloud to enable flexibility and agility as well as reduce opex. Amdocs is providing operators the management systems and tools to adopt open, modular network capabilities which remove the burden of vendor lock-in, and avoid the high costs and inflexibility associated with monolithic, proprietary network infrastructures.

To support this transition, Amdocs is committed to an open, standards-based approach in providing service and network automation capabilities. Service providers are looking to change the current model of single-vendor networks, and 5G and telco cloud provide a compelling event for the move to a more open, flexible approach to building and managing future networks. Amdocs is continuing to drive our differentiation as the champion for open cloud networks by:

- Leveraging ONAP as a vendor-neutral, open community to support management and orchestration of any type of service over any type of network using any type of network or cloud function
- Supporting customers who want to take ownership of their network orchestration and leverage the benefits of open systems by joining the customer's internal development and integration teams as a joint scrum team (for example, as performed at Bell Canada)
- Accelerating engagement in related open/standards forums such as MEF, TMF APIs, ETSI / MANO, LF Acumos, LF Edge, RH VCO, GSMA 3GPP, GSMA NEST, ORAN / OCS and TIP

Amdocs active in various communities/standards

Organization	Areas of Interest	Amdocs Involvement
	<ul style="list-style-type: none"> Life-cycle Service Orchestration (LSO) Service Assurance 	<ul style="list-style-type: none"> Research on assurance Drafting LSO Open API's
	<ul style="list-style-type: none"> Multi-domain e2e Orchestration: OSS, NFV Open API's 	<ul style="list-style-type: none"> Drafting Open API's Participating in TM Forum NaaS Catalysts
	<ul style="list-style-type: none"> VNF onboarding, packaging, certification Multi-domain e2e Orchestration: NFV, WAN Experiential Network Intelligence (ENI) 	<ul style="list-style-type: none"> Leading standardization of VNF on-boarding Contributing to e2e orchestration topic Promoting ONAP and PBO architecture
	<ul style="list-style-type: none"> VNF/NS modeling VNF packaging 	<ul style="list-style-type: none"> NFV descriptors mapping to TOSCA/YAML
	<ul style="list-style-type: none"> OSS/BSS 5G and Network Slicing 	<ul style="list-style-type: none"> 5G architecture, incl. network slicing 3GPP BSS standards
	<ul style="list-style-type: none"> VNF modeling, onboarding, certification LCM and closed loop Edge automation Co-creation modules 5G use-cases 	<ul style="list-style-type: none"> SDC, AA&I Involvement in development of additional modules per defined use cases Collaboration with service provider partners (e.g. Bell)
	<ul style="list-style-type: none"> Open tech. / interfaces for access, transport, core RAN optimization e2e 5G network automation 	<ul style="list-style-type: none"> Disaggregated Cell Site Gateway (DCSG) integration Participate in developing OAM and A1 Participating in building an open source stack for 5G RAN ONAP, MEC and ZSM interworking

New domain experts for service management and automation in the hybrid era

The new era of hybrid networks and systems spanning multiple dimensions – covering physical + virtual + cloud functions; deployed on-premises + cloud; and supporting legacy connectivity + new services – is creating unprecedented complexity in the management of service lifecycles and automation of operational processes. Amdocs' solution encompasses the technology, people and knowledge to scale operations and address the complexities of this new world. We are continuing differentiate ourselves by enabling step-wise and pragmatic evolution from current to future management and automation systems by:

- Incorporating service, customer and business insights (the data to which we have access in Amdocs systems) to drive service-aware assurance and network operations automation – a natural extension to Amdocs' proven BSS, OSS and NFV capabilities, utilizing our extensive experience and expertise in each domain
- Enabling scalable operations with real-time data collection and analysis, low manual touch and guided resolution
- Driving autonomous, closed-loop operations with proactive remediation actions, self-healing and intent-driven assurance
- Infusing skills, capabilities and experience from the new network domain into our service provider customers, moving them to the new paradigm of 'network + automation-coding' rather than just monitoring/administration

Conclusion

Network technologies such as 5G, IoT, SDN/NFV and others, will drive new service and network architectures, new operational models and new business models. It follows that managing the open cloud networks of the future will require investment, not just in the core network infrastructure, but in the transformation of associated network automation technology and operations support systems. This transformation cannot be "once and done," but will be a step-wise automation journey that must enable efficient and effective management of hybrid networks.

Amdocs' vision and approach for transformation of network automation and OSS and management of hybrid networks is powered by Amdocs Intelligent Networking Suite, a unified, modular and cloud-based service and network automation platform that combines traditional service fulfillment functionality with cloud and NFV orchestration and management capabilities.

With the combination of Amdocs' unique experience and expertise, and our hybrid-ready solutions, we can help ensure successful transformation for service providers, whatever stage they are at on the journey and at whatever pace they choose to take to realize the new era of open cloud networks.

For more information visit
[www.amdocs.com/products-services/
network-service-automation](http://www.amdocs.com/products-services/network-service-automation)



Amdocs helps those who build the future to make it amazing. With our market-leading portfolio of software products and services, we unlock our customers' innovative potential, empowering them to provide next-generation communication and media experiences for both the individual end user and large enterprise customers. Our 28,000 employees around the globe are here to accelerate service providers' migration to the cloud, enable them to differentiate in the 5G era, and digitalize and automate their operations.

Listed on the NASDAQ Global Select Market, Amdocs had revenue of \$4.3 billion in fiscal 2021.

For more information, visit Amdocs at www.amdocs.com