



Solution Brief

Amdocs End-to-End Service Orchestration

Innovation is the engine that will empower communication service providers (CSPs) to support their customers' evolving needs in the digital age, enabling them to generate new revenue streams. While the rollout of 5G and the cloudification of networks are key enablers of this innovation, they are also accelerating it. Increasingly, services are being supported by chaining capabilities across a hybrid network that spans multiple domains and technologies, as well as a mix of physical, virtual, and cloud network functions that spread from the network access and edge to the core, telco cloud – and now, also public clouds. Driven by business intent, end-to-end service orchestration integrated with closed-loop automation aligns network actions with desired outcomes, across multiple domains and technologies, enhancing operational efficiency, and ensuring agile response to changing business needs.

However, as CSPs seek new revenue opportunities, outdated operations support systems (OSS) and complex multi-vendor infrastructures pose significant barriers to service innovation, business growth, and customer satisfaction. Creating and deploying services from end to end in such an environment often requires manual processes entailing updating multiple vendor and domain-specific element managers, SDN controllers, or orchestrators, and then integrating these changes with the back-end OSS. Yet the current hybrid network services topology environment of 'islands' makes it extremely hard to obtain end-to-end visibility, and control and run operational processes efficiently to launch, deliver, manage, and assure services. Increasingly, CSPs are understanding that to overcome these challenges, they must accelerate service automation, while assigning top priority to obtaining end-to-end service orchestration and visibility capabilities that support service lifecycle orchestration and management across/over multiple domains. Doing so will enable them to efficiently manage their hybrid networks spanning multiple dimensions: covering physical + virtual + cloud functions; deployed on-premises; deployed within the network or on the cloud.

Amdocs End-to-End Service Orchestration is a comprehensive and unified system that enables efficient and effective service lifecycle management of network and cloud services across multiple siloed domains, vendor technologies, and hybrid networks.

The solution covers all aspects of service lifecycle management – starting with business intent then to onboarding, design, and creation to orchestration, integrating with service assurance, and operations – providing a single harmonized system for the management of policies/SLAs/KPIs, automated fulfillment, and closed-loop operations.

Highlights

- A single multi-vendor, cross-domain, and hybrid network orchestrator
- NaaS solution that simplifies northbound integration
- End-to-end service lifecycle management of network and cloud services including 5G network slicing
- Standards-based, service-driven modeling for composing reusable service building blocks, as well as all cloud and network resources required to roll out and operate the service
- AI-driven network function homing and placement
- Automated continuous service fulfillment and closed-loop assurance through real-time enforcement of xNFs, networks, and cloud resources, as well as service-related policies
- Open and vendor-agnostic solution, aligned with and based on industry-leading standards, including ETSI, TMF, ONAP, and MEF
- Cloud-native, microservices-based, and intelligent automation-infused for greater business agility, faster time to market, and optimized OPEX

Laying the foundation for next-generation network services

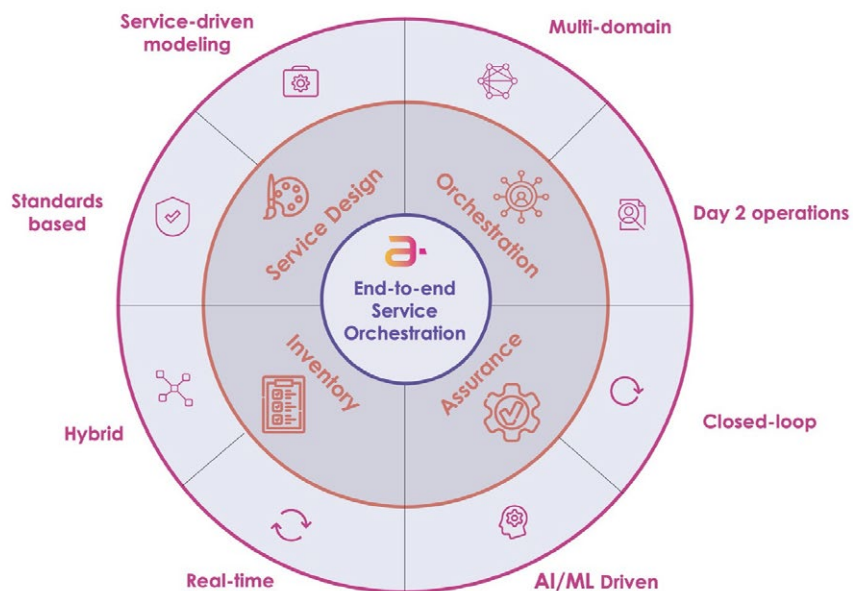
Services are increasingly being supported by chaining capabilities across complex hybrid networks that span multiple technologies and capabilities. As CSPs gradually introduce NFV and SDN technologies to specific network domains or services, it will enable them to apply cloud-based innovation approaches, automation tools, and software-driven capabilities to these network domains. Nevertheless, many parts of the network will continue to rely on traditional physical appliance-based network elements in the coming years. This mix of siloed virtual, physical network domains and clouds is increasingly managed by horizontal service operations centers, exposing multi-vendor and multi-domain complexities and impacting service providers' ability to innovate and offer next-generation digital, agile services that meet their customers' emerging needs.

Traditional network management and operations technologies were conceived for physical appliance-based networks with disparate operations support systems (OSS). Yet these led to highly disjointed manual processes. Trying to manage highly complex services and continuously changing environments using manual processes that span multiple system silos is increasingly difficult and undermines the

ability of CSPs to not only innovate but also deliver and operate services in a timely manner and comply with service-level agreements. As service providers launch new services like managed SD-WAN, Network-as-a-Service, SASE, and edge, and new 5G and network slicing-based services become a reality, multi-domain service orchestration and automation will be crucial to the successful deployment and monetization of these new services.

Amdocs End-to-End Service Orchestration

accelerates service innovation and drives business growth by addressing the operational complexities of multivendor, multi-technology networks and clouds. By covering all aspects of service lifecycle management from service design, planning, and deployment to configuring, orchestrating, and assuring networks and services, it empowers CSPs to fully exploit their investments in new networks and technologies and unleash the huge potential of 5G, as well as programmable and cloud-native networks, to create new revenue streams. The solution's integrated closed-loop automation capabilities, which are enabled by machine learning, enable CSPs to detect, analyze, and resolve service performance degradations before they impact the customer experience, thereby guaranteeing superior, end-to-end QoE while increasing operations efficiency across complex hybrid infrastructure and multi-vendor technologies.



Modular, service and network automation solution products and capabilities designed to manage and orchestrate services over hybrid networks

Amdocs Network Design

Amdocs Network Design is a service and resource designer. It then maintains those services, as well as the resource and function models in a catalog. Functioning as a configuration environment, it enables network, IT and business personnel to design, persist and distribute service and resource metadata, product specifications, service workflows and orchestration processes, to support both traditional and virtual services.

The solution is used for the onboarding of PNFs/ VNFs/CNFs using standard structures and information models. It enables virtual, physical and logical resource design, as well as the ability to create models for defining and instantiating services, resources and products for hybrid service decomposition. Base models serve as building blocks for high-level models with Amdocs Network Design providing the ability to create a catalog of re-usable and consistent designs.

The models are then used by the orchestrator to deploy/provision actual service instances on networks and clouds.

In Addition to a UI-based design, Amdocs Network Design also supports industry standards – TOSCA-based Modeling, SOL001/ETSI Onboarding, and out of box integration to sync the Product Specifications that are mastered in BSS Catalogs.

Key capabilities:

- Based on ONAP SDC and compliant with ONAP APIs, distribution process and exported model
- Compliant with both ETSI network service and SID CFS-RFS services to support a hybrid service design
- Ability to onboard VNFs in accordance with ETSI SOL001 and ONAP HEAT-based onboarding
- Support for complete service design lifecycle
- Intuitive graphical user interface for creation and composition of service designs
- Pre-integrated with Amdocs Catalog (aligning service and product models) and Amdocs Network Inventory



Amdocs Ranked #1 Vendor in Service Design and Orchestration Product for the 6th consecutive year

Amdocs Network Orchestration

Amdocs Network Orchestration is a model-driven orchestration system that enables continuous adaptive fulfillment and assurance of network services using pre-defined models and policies.

The solution is responsible for automating the provisioning, activation and end-to-end lifecycle management of services across multiple domain-level network orchestrators and controllers.

Amdocs Network Orchestration performs closed-loop automation using corrective actions triggered by inputs from AI/ML, external systems and/or integrated monitoring.

Key capabilities:

- A model-driven architecture that uses TOSCA as a Domain Specific Language (DSL)
- Acts as an End-to-End solution to orchestrate orders across multiple domains
- A carrier-grade platform, supporting high availability, advanced logging, self-monitoring, and self-healing
- A widely deployed system successfully automating multiple enterprise services and mobile core services
- Combines with Amdocs' in-depth industry expertise to deploy solutions with multiple xNFs, xNFM, and 3rd party controllers
- Aligned with and its development has contributed to many industry standards including ETSI, TMF, ONAP, and 3GPP
- Provides a comprehensive set of design tools and development SDKs to support multiple service types
- A highly extensible platform with plugin and customization support
- Deployable in both public and private clouds
- Provides unified management of resources and services components for multi-technology and multi-vendor networks
- Supports complex data types and TOSCA native data types

Amdocs Network Orchestration delivers the following End-to-End Service Orchestration (E2ESO) use case examples:

- Modeling and Orchestration of 5G network slices - eMBB, uRLLC, and mMTC service types
- Domain management of network slice subnets on the 5G core and RAN, including shared and dedicated subnets
- Homing and placement of mobile network workloads, as per the slice template policy
- Orchestrate Core, RAN, and Transport slice subnet via a call to southbound domain managers
- Life Cycle Management of 5G network slices - View service tree/hierarchy view, scale up/in
- Generate Charging Triggers in 3GPP defined format towards the Charging Function (CHF)

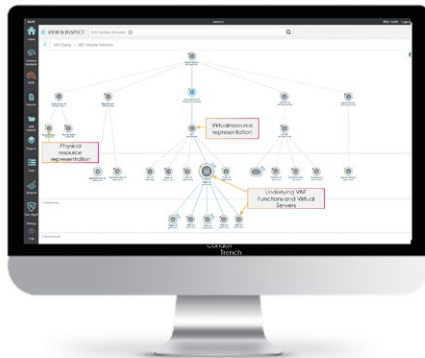
Amdocs Network Inventory

Amdocs Network Inventory is a catalog-driven, hybrid inventory solution that supports inventory management and visualization of physical, logical, cloud and virtual network functions, including support of federated network views across both Amdocs and third-party inventory systems.

To manage the network service topology, the solution includes a service inventory, which utilizes graph database technology for highly scalable, ultrafast writing and retrieval of service tree structures that characterize rapidly changing NFV and hybrid networks. Amdocs Network Inventory also provides service fulfillment and assurance systems with the data needed for accelerated and automated operations.

Key capabilities:

- Maintains unified map of the network service topology, logical cloud/virtual/physical network resources and all interdependencies
- Full coverage of CNFs, VNFs and non-virtualized network elements
- Highly scalable for handling the largest tier-1 networks, as well as tier-2 and tier-3 networks
- Network capacity monitoring and management
- Advanced metadata management and creation
- Open APIs enable rapid integration and lights-out operation with northbound and southbound systems
- Advanced, cross-silo graphical user interface for end-to-end views and data access across the network
- Advanced federation of third-party inventories and other external data sources to enable maximum reuse of existing resources and accelerated deployment
- Tracks both 'as-is' and 'as-planned' network, and locks assigned network resources to prevent unauthorized reassignments and prevent design fallout

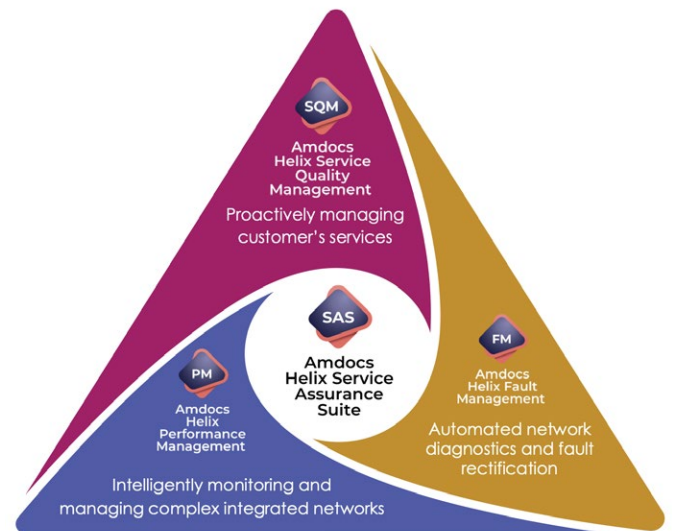


Amdocs Helix Service Assurance Suite

Amdocs Helix Service Assurance Suite (SAS)

part of Amdocs INS, takes an automated, analytical, proactive and unified approach to supporting network and service quality management, including performance and fault management functionalities. This includes enabling fast adoption of new services driven by the introduction of technology advancements such as virtualization, cloudification and disaggregation, leveraged by SDN, 5G, and IoT.

The solution's modular architecture enables CSPs to pick and choose from a variety of features and functionalities, which can be deployed gradually to meet evolving business and technical needs.



With advanced automation and unique analytical capabilities, our patented machine-learning and forecasting technologies enable proactive problem resolution, powered by manual, semi-manual or fully automated yet controllable closed-loop processes.

Benefits:

- Improved customer satisfaction through enhanced visibility of network health and service quality
- Integrated assurance capabilities across fault, performance and service quality management with built-in automation powered by AI/ML
- Operational efficiencies with support for multi-technology, multi-vendor fixed and mobile networks, including 5G
- Reduced TCO through an open and standards-aligned approach, eliminating risk of vendor lock-in
- Scalability & performance through experience working with large CSPs, network equipment providers, IT software vendors and cloud suppliers

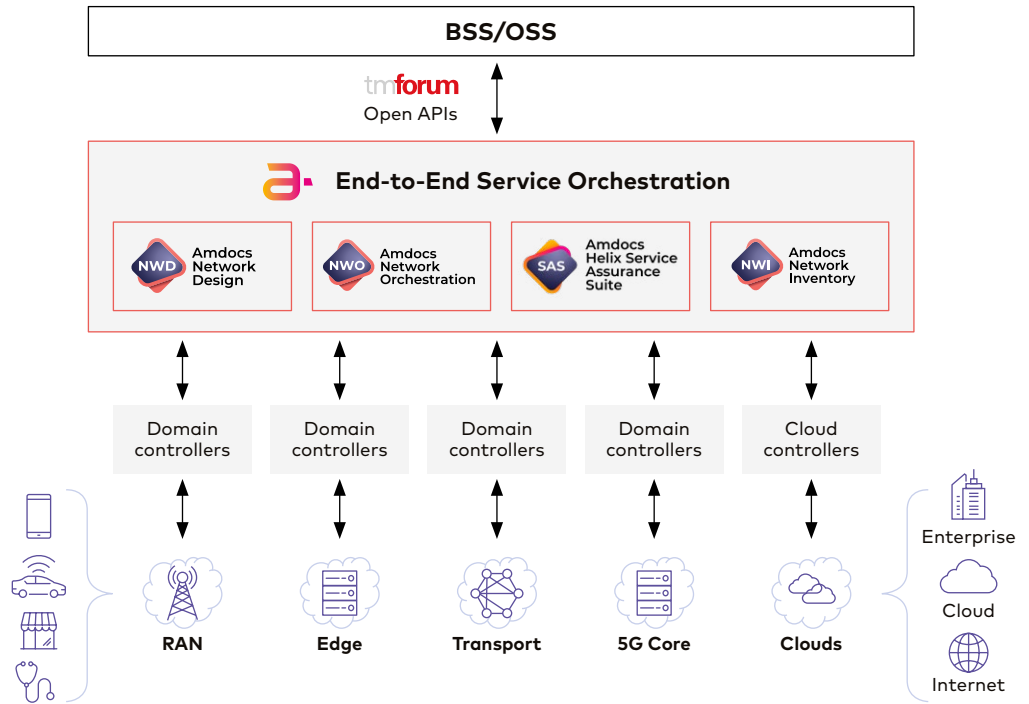
Key use cases:

- 5G, standalone and non-standalone
 - Assurance of 5G RAN, transport, core and infrastructure
 - Service quality management for 5G slices, eMBB, uRLLC, mMTC
- Mobile private networks (MPN), IoT and vertical markets
 - Monitoring of MPN, edge, IoT and vertical market solutions over 5G
- Enterprise services
 - Improved customer experience via proactive service impact
- Consumer services
 - Broadband service performance management
- Operational evolution
 - AI/ML adoption for root cause analysis (RCA), and FM/PM Anomaly detection
 - Automation to drive efficiencies across NOC and SOC
 - Monitoring of virtualized & containerized infrastructure



**Amdocs Named Leader in
ABI Research's Cloud-Native
Network Automation and
Orchestration Software Market
Competitive Ranking**

Amdocs End-to-End Service Orchestration solution, powered by Amdocs Intelligent Networking Suite, empowers CSPs to focus on innovation by increasing their agility, efficiency and network openness, driving the creation of new services that meet their consumer and enterprise customers' needs and expectations through automation of their hybrid networks.



Additional key benefits:

Reduced complexities and cost
Automated E2E lifecycle management of services across multiple domain-level controllers

Increased business agility
Vendor-agnostic, non-proprietary, open-source and standards-aligned solution

Enhanced visibility and control
Federated and complete inventory view over service and network resources, including PNF, VNF, CNF

Ensure scalability and availability
Modular, cloud native, microservices-based architecture supports high availability and redundancy configuration

Improve operational efficiency
Integrated AI/ML-based intelligent closed-loop assurance and optimization

Open and extendable
Comprehensive set of design tools and development SDKs supports multiple service types



Amdocs Intelligent Networking Suite

Amdocs Intelligent Networking Suite is a unified, yet modular service & network automation platform for the end-to-end service lifecycle management of hybrid network and cloud services, from design & creation to, orchestration, continuous monitoring and operation. The platform assures the end-to-end services and network traffic by orchestrating network service-related operational activities and policy management. The Amdocs Intelligent Networking Suite supports all lines-of-business (LOBs), including enterprise/B2B, mobile, consumer broadband and multi-play, as well as NFV and 5G-based services.

Learn more

Visit www.amdocs.com/solutions/5g to see how to unlock the full potential of 5G

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 approximately 30,000 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 \$4.58 billion in fiscal 2022.

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

