



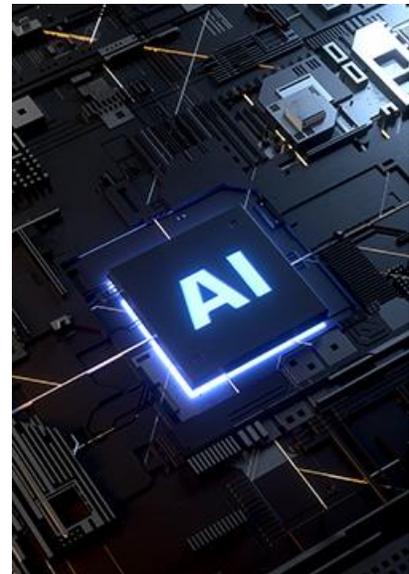
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Dynamic 5G Networks Demand AI-Powered OSS

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5G represents a gigantic leap forward in networking technology with accelerated transmission, higher bandwidth, massive connectivity and reduced latency. Combining these capabilities with network slicing and MEC processing offers the potential to revolutionize businesses and transform societies. However, fully employing these new capabilities is impossible unless they are matched by equally sophisticated mechanisms of orchestration and management. Dynamic 5G services require unprecedented levels of automation with AI-driven OSS functions to utilize the full value of 5G networks. The OSS of the future must incorporate new technology and methodologies and work in tandem with BSS to automate 5G operations for both CSPs and their customers.



Cloud-native microservices

One of the major benefits of a 5G network is the ability to flexibly meet the needs of diverse applications and services for latency, bandwidth, security and more across multiple technology and service provider domains. For example, a vending machine will differ vastly from a self-driving car in what it needs from the network. 5G networks not only meet these different criteria but also continuously adapt to the shifting needs of individual applications and services in real time for optimized resource management. A self-driving car might need high bandwidth and near-zero latency when driving and then need nothing when it is parked. 5G networks with the

right kind of architecture can monitor and adjust for these different needs to avoid a massive waste of resources.

What is the right architecture for CSPs in the 5G era? The answer lies in adoption of a microservices-based architecture for mission-critical BSS and OSS applications. Many operators still use legacy architecture with rigid and complex systems that suffer from high TCO, limited scalability and minimal flexibility. Microservices break down these complex systems by creating a loosely coupled architecture. Modular cloud-native components communicate with simple APIs and carry out specific functions to support far greater OSS orchestration.

Microservices should have the ability to be hosted on any public or telco cloud platform utilizing containers. Containers can deploy microservices in seconds for rapid scalability, deployment and redeployment to any public or telco cloud platform. This endows CSPs with a wide range of advantages, including cloud scaling, cloud economics and a faster time to market. CSPs can use microservices coupled with DevOps to dynamically upgrade and scale OSS functions on demand for extensive optimized flexibility and seamless upgrades.

Dynamic E2E orchestration

5G transformation cannot happen overnight. The transition of CSPs from physical to virtual and cloud-native resources is still ongoing and has created complex multi-vendor systems with both physical and virtual resources. Open ecosystems that utilize the resources and services of multiple vendors and partners are becoming the industry norm. These hybrid systems, with both 4G and 5G components, span multiple on-premise, cloud and edge locations, making onboarding, provisioning, service assurance and problem resolution incredibly complex and difficult to manage. Slow adoption of cloud-native functions across the industry and inadequate legacy equipment further complicate networks and OSS operations when dealing with multiple organizations. Despite the intricacies of these new systems and ecosystems, CSPs must still guarantee high QoS and meet demanding SLAs. Manual management of these complex OSS processes creates a human bottleneck and severely limits the utility of networks regardless of enhancements to speed or flexibility.

Dynamic E2E orchestration of services and network resources resolves these problems by automating service and network design, provisioning, full-lifecycle management and optimizations. OSS functions must employ open APIs to offer flexible programmability and simplify integration with a broad ecosystem of partners. Complex environments make it difficult to manually pinpoint the causes of problems, monitor processes or scale systems, but E2E orchestration provides the crucial advantage of visibility to resolve these problems.

Orchestration across telco clouds, public clouds and the edge for diverse multi-cloud services is another crucial step in managing complex networks for the 5G era. Combining OSS functions with closed-loop capabilities, AI and advanced analytics guarantees efficient resource management and service deployment while giving CSPs the flexibility to navigate the challenges of multi-vendor ecosystems.

Domain orchestration

The dynamic nature of 5G services requires CSPs to expand beyond traditional practices for monolithic systems with a new operations approach. Networks must divide into self-sufficient operational domains with autonomous operations. Each domain, such as Open RAN, transport networks and core networks, must combine dynamic OSS and orchestration microservices to address their specific needs.

Cross-domain service orchestration provides smooth integration for diverse network domains (technology, geo and vendor), including pre-5G and 5G networks. It provides service lifecycle management across all hybrid network domains, including legacy networks, SDN networks, cloud environments and NFVI environments.

This domain orchestration approach is ideally suited to accommodate the emerging 3GPP standards for network slice management.

5G network slicing

A recurring theme concerning the transition of networks to 5G is the concept of dynamic flexibility. 5G network slicing is a crucial technology in providing this capability. CSPs can seize 5G business opportunities by allocating network slices to serve the specific needs of a service or vertical market. However, vertical markets can have some of the most stringent and fluctuating demands for high network performance of any type of organization. Network slices must therefore support provisioning and scaling on demand to meet the dynamic needs of enterprise verticals. The only technology with the ability to provide the necessary speed and precision for network slicing is E2E automation.

Orchestration and OSS systems must support the emerging service, network and sub-network management functions from 3GPP as a baseline to automate network slicing on demand. Functions for customer service management and network service management are required for dynamic orchestration of network slicing across multiple domains. Dynamic instantiation and lifecycle management of slices within each domain requires network slice subnet management.

Open OSS and BSS integration

The demands for speed and flexibility from heterogeneous networks require open integration between OSS and BSS systems. Industries are incorporating new technologies to create smart factories, smart cities, smart grids and autonomous vehicles. Consumer services like smart homes, AR, VR and advanced media for gaming and entertainment are growing in popularity and demand. This new generation of digital services is made possible through cloud, IoT and 5G technology and creates a completely new set of monetization opportunities. However, discussing

revenue management without service management misses one of the most fundamental principles of the modern IT landscape: integration.

Legacy systems are significant obstacles to innovation. For example, a CSP will face a multitude of technical and business problems in attempting to rate, charge and bill a new service model with an existing legacy system. The tightly coupled architecture of most legacy systems creates severe bottlenecks and lacks the flexibility to adopt new models. Modernized revenue management must utilize a single platform with open OSS integration to provide a central source of information for traditional, digital and partner-based services.

How can this integration be achieved? Digital services models can use cloud-based online revenue management. Cloud environments help foster open architecture with standardized APIs in a partner ecosystem for greater OSS and BSS integration.

Advanced OSS

The world is growing smaller because its networks are growing larger. OSS in the 5G era must be AI-driven and integrated with BSS for CSPs to take full advantage of the power, speed, scale and connectivity of 5G networks. A separate approach to service management and revenue management is an outdated method and burdens CSPs with deficient operational efficiency, poor customer experience and lost revenue. Service management and revenue management should utilize a common software framework with cloud-native microservice-based architecture, DevOps methodology, E2E orchestration, domain orchestration, 5G network slicing, and open integration. CSPs will consequently be able to optimize customer experience and dynamically streamline the management of new revenues.