

KUBERNETES FOR NEXT-GENERATION TELCO NETWORKS

Modernize or fall behind: why telcos must implement containerization for agility, resilience, and innovation.

Beyond voice and text, effective telecoms provide quick access to entertainment, and industry-specific applications in health and manufacturing, and emergency response. They deliver high-quality, on-demand, and reliable applications to stay relevant.

But aging monolithic systems, fear of disruption, and lack of talent hold many telcos back.

[Modernization](#) is imperative in this cloud-native, customer-centric era. Microservices, containers, and a savvy orchestrator technology are part of the solution.

Before 4G, telcos used bare metal, or single-tenant physical servers, to meet extensive customer service level agreements (SLAs). The shift to 4G virtualization improved efficiency by moving functions to remote access software on private or public cloud.

In the 5G era, containerized network function virtualization (NFV) provides new services dynamically and without installing hardware. It accelerates both microservices transformation and cloud-native deployment. Software packages that contain full capabilities to run an application (also known as containers) create bespoke 5G services. They deliver consistent performance and throughput across environments.

Last year, major players such as AT&T, Telefonica, and Vodafone partnered with cloud providers to handle data processing and deploy container technology in [edge computing services](#).

The advent of Kubernetes

Kubernetes (Helmsman in Greek) is an open-source container orchestration platform that automates deployment, scaling, and management of containerized applications. Google developed it in 2015, and the Cloud Native Computing Foundation (CNCF) now maintains it.

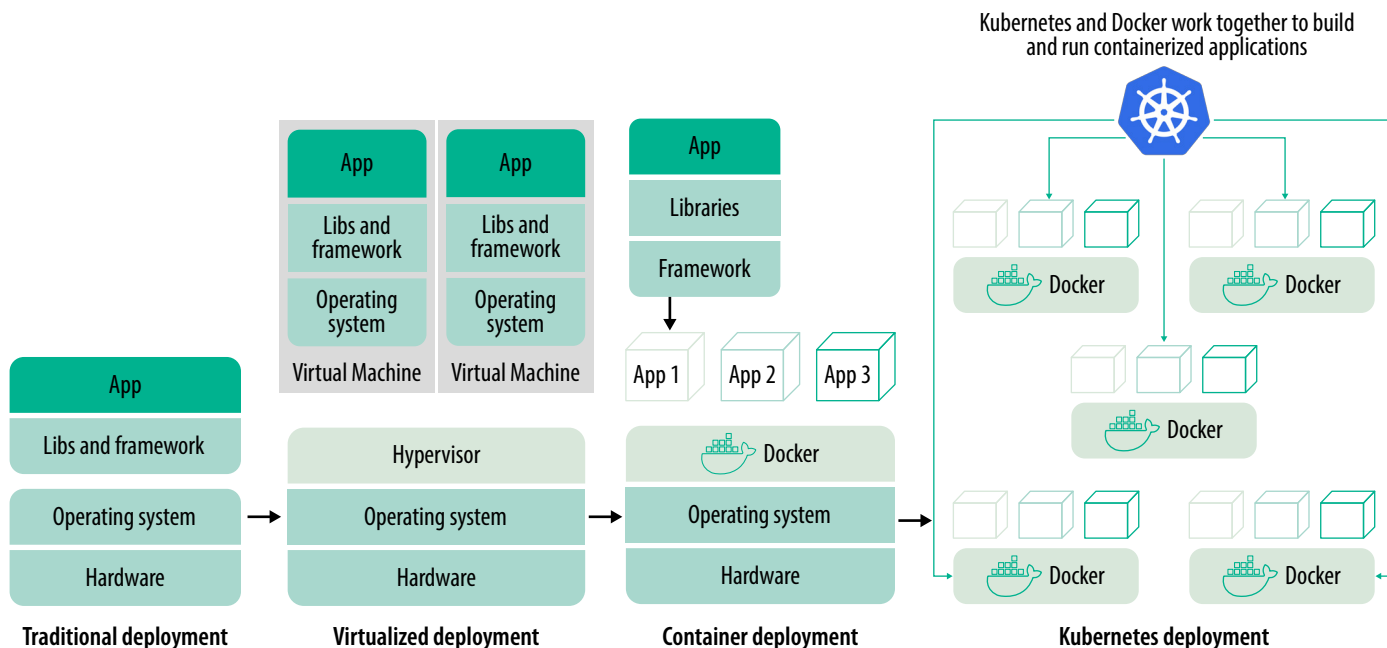
In virtualization, a hypervisor abstracts virtual machines (VMs) from the underlying hardware. Each VM has its own operating system and dependencies.

Containers are the next generation of virtualization, built on the foundation of Kubernetes. Containers are similar to VMs, but they share an operating system and have their own file system, CPU, memory, and process space. Like VMs, they are independent and decoupled from the hardware and operating system.

However, managing several containers together is difficult. Kubernetes' flexible architecture and robust cloud-native management capabilities allow telecoms to rapidly develop new features and applications while maintaining performance and reliability.

Infosys studies establish that Kubernetes reduces deployment times by 50% to 80%, which facilitates companies to launch new services faster and anticipate customer needs.

Figure 1. The journey from traditional to Kubernetes deployment



Source: Infosys

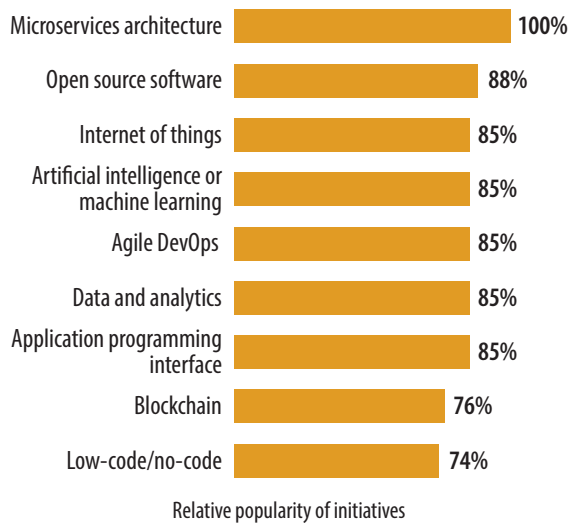
Multicloud needs

Kubernetes works well in the multicloud era, where microservices (an architectural paradigm) and single-function container modules loom large. “As telcos go on the offensive and race to the edge of 5G computer networks, they create new services that change the way we work, live, and play,” says Vikram Meghal, VP and head of engineering for CMT, Infosys. He adds: “Taking advantage of multicloud is a once-in-a-generation shift that gives telcos the muscle to innovate, become more customer-centric, and drive the business forward.”

Kubernetes in a firm’s software stack provides a scalable and fault-tolerant infrastructure to run distributed applications. This simplifies application deployment, management, and scaling across multiple hosts, internally and in the cloud.

The move to cutting-edge technologies, open-source software, and internet of things (IoT) drives Kubernetes adoption (Figure 2).

Figure 2. Telcos mainly modernize for microservices



Source: Infosys Modernization Radar 2022: Race to modernize telecommunications and utilities

Kubernetes and other orchestration platforms such as Docker revitalize how telcos deploy cloud-native applications. By grounding products in portable clusters, these technologies improve 5G performance for mission-critical applications such as healthcare and video streaming. They also support auto healing and native integration.

For instance, telcos use Kubernetes to automatically spin up more servers to boost video streaming during peak demand. They use the technology to update and maintain software applications running on those servers to roll out new features and fixes.

It isn't all plain sailing

But there are challenges too.

Jobin John, head of IT architecture and transformation at Virgin Media Ireland, says that Kubernetes requires a skilled workforce, and talent isn't easy to find. Also, organizations need commercial support to ensure optimal performance and stability for their production environment.

While Kubernetes integrates well with cloud providers such as AWS, Azure, and Google Cloud Platform, Virgin Media Ireland found the integration challenging with the existing monitoring and log analysis tools, and legacy applications.

“The legacy systems, in particular, are not built with microservices architecture in mind, making application deployment on a Kubernetes platform more complex,” says John. “We had to make an investment on the layer above the legacy pattern to enable the full benefit of the Kubernetes platform.”

“Furthermore, with Kubernetes handling multiple application clusters on shared resources, the risk of security breaches increases significantly. Therefore, embedding security-by-design principles right from the inception of this technology adaptation is crucial.”

Benefits for telcos

Historically, telco clouds were in private data centres. As software and hardware increasingly disaggregate, telcos move to hybrid and multicloud.

A microservice approach to application design enables telcos to deploy hundreds, or even thousands of containers across multiple cloud services, private data centres, and server farms. Thus, their operations teams need efficient tools to manage many containers together. Firms like Virgin Media, Vodafone, and Orange want to deploy 5G-enabled mission-critical services quickly and with low latency.

Kubernetes is telcos' preferred orchestration platform, as it provides:

- **Container orchestration:** Automates deployment, scaling, and management of containerized applications.
- **Service discovery and load balancing:** Exposes services to the network and distributes traffic across multiple containers.
- **Storage orchestration:** Manages and provisions storage for containers.
- **Self-healing:** Enables automatic monitoring and management of containers to reduce downtime and increase service availability.

- **Automated rollouts and rollbacks:** Reduces the load on admins managing containers.
- **DevOps-first approach:** Enables developers to own the Kubernetes application end-to-end, optimize its performance, and troubleshoot more effectively than with monoliths.
- **Speed to market:** Facilitates multiple releases to boost velocity.

Centralized Kubernetes management assists firms to buy and provision from a single vendor, which automates the process and increases service delivery. Reliable and fast cloud connectivity improves customer experience and supports telcos to compete in the 5G and IoT space. The technology eliminates authentication and compatibility issues between network and platform functions and seamlessly connects employees across on-premises and public clouds.

Securing data, processes, and applications across multiple cloud properties is a challenge. Virgin Media Ireland applies secure by design approaches, inherent in Kubernetes, for shift-left security and better infrastructure management with full automation. Secure by design with Kubernetes identifies the best deployment configuration for security and cost within the available infrastructure. As Kubernetes adoption grows, the number of tools to supplement it rise too.

Talent a bigger impediment than cost or disruption

Telcos must upskill quickly to take advantage of Kubernetes. Though Kubernetes is outsourced to providers such as Red Hat OpenShift and VMware in platform as a service mode, employees still need tech expertise to integrate it with business, said John from Virgin Media Ireland. Our [Modernization Radar 2022 research finds](#) that firms are modernizing very quickly; in five years, all legacy will be gone. Further, lack of skills and talent poses the biggest challenge to using new technologies like microservices and containers. Chief information officers from the survey said that although cost (23.8%) and risk of disruption (26.6%) were deterrents to cloud-native programs, by far the biggest challenge (50.6%) was not having skilled employees in-house to take on this advanced software engineering.

To get ahead, telcos need to invest in their workforce, build a community of practices for microservices modernization, and tap into the gig economy.

Other options

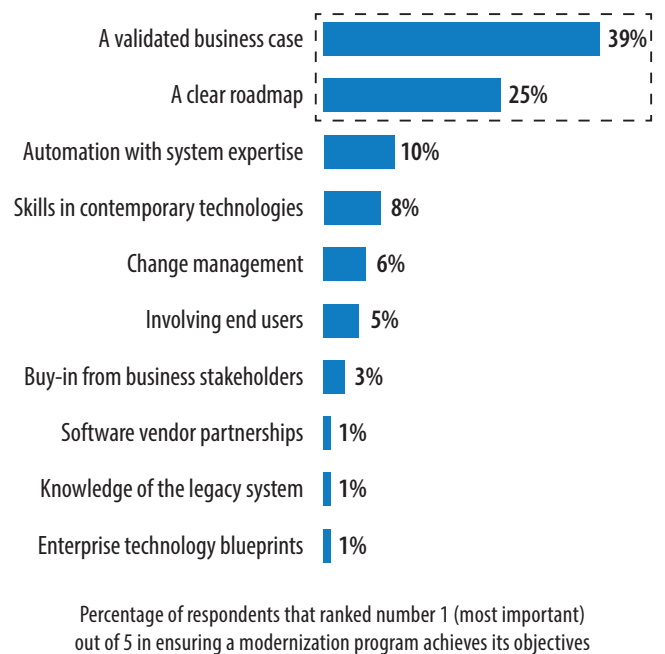
Kubernetes is not for everyone. Small teams, simple applications, or monoliths don't need it.

Kubernetes and similar platforms such as Docker or AWS EKS are suitable for applications that need scalability, availability, performance, or where [modernization programs](#) are moving the firm to microservices. They offer automation, fault tolerance, and ability to scale quickly.

Focus on business outcomes

Telcos that focus on business outcomes like improved top-line performance and customer retention seamlessly adopt Kubernetes and its partner ecosystem (Figure 3).

Figure 3. Modernization success relies on business outcomes



Source: Infosys Modernization Radar 2022: Race to modernize

“Investing in technologies like Kubernetes is essential for any company’s growth and survival in today’s rapidly evolving tech landscape,” says John.

He adds: “As we navigate the shift toward digitally enabled services and experiences, it becomes increasingly clear that traditional monolithic approaches cannot keep pace with consumer demand. With containers and orchestration of containers, we gain the flexibility to innovate, streamline processes, enhance security measures, and increase overall network efficiency — all critical elements needed to deliver exceptional value to our customers.”

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