Roadmap to the Cloud Native Telco

Architecture for Hyper-scale CSPs

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Why Telecoms Needs a Cloud Native Manifesto

The imperative for Cloud Native engineering in the Telecomms sector is headlined by the clarion call from Orange for an industry manifesto.

Following the publication of the Cloud Native Manifesto by the Next Generation Mobile Networks Alliance (NGMN), Laurent Leboucher, group CTO and SVP of Orange, joins TelecomTV to explain what the manifesto is, why it is needed and the impact it could have on the telecom sector.

The Cloud Native Manifesto, developed by the Next Generation Mobile Networks Alliance (NGMN), outlines the principles and guidelines for building cloud-native architectures in the context of telco networks.

This manifesto aims to provide a framework for leveraging cloud computing technologies to enable scalable, flexible, and efficient mobile network infrastructure. It recognizes the need for agility, scalability, and automation in the face of increasing demands on telco networks.

Orange Leadership

As the TMF writes in this interview with Laurent, they are seeking to apply a Cloud Native approach to their core network infrastructure. In 2020 CIO Thierry Souche set the scene, saying that the Only Way is Cloud Native.

Laurent is extending the work he began for the IT systems of Orange, where he applied a Cloud DevOps model to transform their business systems and is now leveraging that learning to similarly modernize their core network.

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Orange is testing how its vision will work in practice on Pikeo, an experimental, fully cloudified 5G standalone network, where they are developing network functions as microservices deployed in cloud infrastructure in containers orchestrated by Kubernetes, with the access network based on Open RAN principles and technologies.

In his TelecomTV interview Laurent describes the type of product innovations that a software-driven network is enabling for Orange, such as 'Standalone 5G', where "network slicing" prioritizes certain slices to cover critical uses or specific needs and offer different levels of quality and security.

He says they will also leverage their Cloud Native capability and AI to better automate their network operations, using CI/CD DevOps practices.

At 3m:15s he is asked about network disaggregation and he says this is a key path to utilizing Cloud Native applications, allowing them to introduce more innovation as different network building blocks are split so that new industry players can provide these services. They have already begun to disaggregate some functions like L2 switches and IP routers, and are deploying Cloud Native 5G networking and are starting with OpenRAN.

From 7m:18s Laurent describes what he believes the keynote strategic goal for the Telco cloud industry should be.

While the industry is on the journey to adopt Cloud Native they are still doing so in silos – Vendors bring them virtualized network functions but each requires a slightly different flavour of Cloud infrastructure, meaning they would end up with multiple islands of small Cloud platforms to implement them.

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Instead what is needed is an end-to-end homogeneous Telco cloud offering, one that is commoditized across the entire industry not just designed for single operators like Orange.

Principles

The Cloud Native Manifesto is based on the following principles:

- **Cloud-Native Architecture:** Embrace cloud computing principles and practices to enable scalability, elasticity, and resilience.
- **Microservices:** Design systems as a collection of small, loosely coupled services that can be independently developed, deployed, and scaled.
- **Containerization:** Utilize container technologies to package and deploy applications, enabling portability and efficient resource utilization.
- **Automation:** Automate infrastructure provisioning, deployment, scaling, and management to improve efficiency and reduce human error.
- **DevOps Culture:** Foster a collaborative culture that encourages close collaboration between development and operations teams to enable continuous integration, delivery, and deployment.

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Guidelines

The Cloud Native Manifesto provides the following guidelines for implementing cloud-native architectures in mobile networks:

- **Design for Scalability:** Build systems that can scale horizontally to handle increasing traffic and user demands.
- **Resilience and Fault Tolerance:** Design systems that can recover from failures and continue to provide services without interruption.
- **Efficient Resource Utilization:** Optimize resource allocation and utilization to ensure cost-effectiveness and maximize performance.
- **Security:** Implement robust security measures to protect sensitive data and ensure the integrity of the network.

  Continuous Integration and Deployment: Adopt CI/CD practices to enable rapid and frequent software releases.
- **Monitoring and Observability:** Implement comprehensive monitoring and observability solutions to gain insights into system performance and troubleshoot issues.

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Benefits

By embracing the Cloud Native Manifesto, mobile network operators and service providers can unlock several benefits:

- **Scalability:** Cloud-native architectures enable systems to scale seamlessly to handle increasing traffic and user demands.
- **Flexibility:** Microservices and containerization allow for agility and flexibility in deploying and scaling services.
- **Efficiency:** Automation and efficient resource utilization lead to cost savings and improved performance.
- **Resilience:** Fault tolerance and recovery mechanisms ensure uninterrupted service availability.
  Innovation: Cloud-native architectures provide a foundation for rapid innovation and experimentation.

Orange has been an early adopter and innovator in this area, and in this Telecom TV interview Philippe Ensarguet, VP of software engineering, explains how they went about the process, what tools and partners they selected, and what lessons they learned along the way.

He also explains the importance of Kubernetes and GitOps for the cloud-native telco.

Conclusion

The Cloud Native Manifesto by the NGMN sets the stage for the adoption of cloud-native architectures in the mobile network domain. By following the principles and guidelines outlined in the manifesto, mobile network operators can leverage cloud computing technologies to build scalable, flexible, and efficient infrastructure that meets the demands of the digital era.

Anatonomy of the Cloud Native Telco: The Evolution of Network Functions from VNF to CNF

The headline journey for the Cloud Native Telco is the evolution from VNF (Virtual Network Function) to CNF (Cloud Native Network Function).

In a TelecomTV interview a panel of industry experts from BT, Verizon and Orange explore the challenges and progress of this journey.

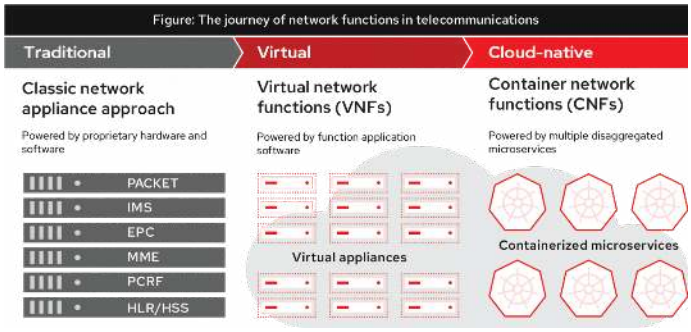
They identify key industry trends such as vendors offering 'Cloud Ready' solutions, the bundling of various pre-integrated network functions, to which they respond by saying their preference is for common services that are deployable to their Telco cloud, rather than vertically integrated vendor solutions.

CNFs

At 12m:55s Guy takes a step back to clarify what exactly are CNFs, as the terms Cloud Native Functions, Cloud Network Functions and Containerized Network Functions are often used.

CNFs are applications that implement or facilitate network functionality in a cloud native way.

As Redhat describes CNFs represent the evolution of virtualized network functions from Virtual Machines to containerized applications, making it possible to manage how and where the functions run across clusters in the environment. The CNCF operates a certification program.



CSPs and other telecom organizations are migrating away from traditional Virtual Network Functions (VNFs) and Physical Network Functions (PNFs) toward CNFs and Kubernetes-based infrastructures that provide service reliability while lowering capital and operating expenses and encouraging cross-cloud compatibility.

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Kubernetes

Kubernetes is key to the implementation of CNFs. In this blueprint Redhat offers a guide for a scalable 5G architecture where a 5G CNF is deployed.

Telcos are prioritizing Kubernetes for containerizing and managing these network functions, tailoring it for their industry and adopting it for key use cases such as an Edge platform.

As The New Stack reports Kubernetes is the breakthrough technology that is helping in the roadmap of transition to the containerized application workloads from the legacy virtualized layer that has infrastructure overheads and still requires more investments to host the applications.

In the distributed cloud environment, Kubernetes provides a single policy-driven standard platform to manage CNFs and VNFs deployed in different cloud environments. That further helps in having a centralized management layer to manage the telco cloud.

Microservices Architecture

However, CNFs are more than just the containerization of network functions. To get the full benefit of cloud-native principles beyond container packaging requires further rearchitecting of network function software, like decomposing it into microservices.

The next step in this evolution is to decompose monolithic applications into modular microservice components. Telecom Review describes how Nexign has enabled Megafon to build a 'microservices factory' that underpins their strategy to act as a digital ecosystem platform.

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For example Amdocs are applying the microservices architecture to the OSS/BSS layer, creating Microservices360 (MS360), an end-to-end carrier-grade accelerated microservices development platform for its own new generation of products, with a full SDK for cloud-native code development and deployment, that leverages the Red Hat OpenShift container platform deployable solution architecture to optimally run on carrier-grade Intel computing and storage technology.

Modernizing OSS/BSS

As STL describes Microservices for Telco BSS/OSS are the next big thing as they allow separating any application or functioning into a bundle of independent functions running in separate docker containers. Redhat defines a roadmap for modernizing legacy OSS for the Cloud Native OSS era.

The key benefit of running various components of BSS in the telecom domain and networks as microservices is that it can be launched, stopped, or restarted independently, meaning managing updates and scaling them each in virtual network function seamlessly without stopping the entire system.

OSS and BSS functions will be instantiated as containerized microservices interconnected via a service mesh, guided by business policies and governance rules, and ultimately overseen by people. This architecture will eliminate silos and provide the underpinnings for continuous integration and continuous development (CI/CD).

Other vendors like Accolite and Intraway are also fully embracing the trend. Accolite describes the benefits of their Cloud Native OSS architecture and Intraway are offering a SaaS-based OSS/BSS built on Cloud Native principles including 'ChatOps' features.

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PaaS – Platform as a Service

A key feature of the enterprise DevOps world is the use of the 'PaaS' model (Platform as a Service), so that developers are empowered with a pre-defined set of low level component parts they can build on rather than reinventing the wheel.

The XGVela project is an open source PaaS for Cloud Native telecomms, and Sagar Nangare explores how this might be replicated to the Telco world, including how it can accelerate 5G rollout.

With XGVela, a PaaS platform with telco features can be used to accelerate the design, development and innovation of telco related services. XGVela can provide a reference design of telco-PaaS and accelerate cloud native transformation for telecommunication industry. Keynote adopters include China Mobile.

Conclusion

Analysys Mason writes the cloud-native 5G network therefore becomes a 'super-application' in which all of its software components – including cloud-native network functions (CNFs), cloud-native operational capabilities and associated cloud-native IT services – can be orchestrated together as a single entity to deliver 5G networking functionality.

This 5G network super-application will run on elastic, cloud-native infrastructure that will be ubiquitously deployed across central, regional, metro and far edge locations.