Get strong, fast and agile with Cloud Native

In a world where the only certainty is change, telcos are threatened by dwindling revenues but empowered by the promise of 5G and the rapid migration of enterprise services to cloud. For those who can find the right solutions to navigate into the blue ocean, a trillion-dollar market awaits.

By Deng Ao

The silo problem

Traditional siloed network architecture impedes telcos' development given that business success today hinges on maximizing network efficiency, offering a diverse service range, and quickly responding to the highly varied demands of long-tail markets. That's why more telcos are using integrated NFV and SDN solutions to cloudify their networks and benefit from the following features: greater agility and efficiency, global resource sharing, easy capacity expansion, adjustable architecture, capability openness, agile service creation, and automated closed-loop O&M.

Network cloudification needs to marry the CT industry's reliability with the agility and flexibility of the IT industry. While NFV standardizes and virtualizes network infrastructure hardware, the traditional box development approach to software architecture, service innovation, operations, and O&M is inflexible and inefficient.

Cloud Native is a large-scale, IT-based software design for distributed network architecture that's a step closer to NFC. Harnessing Cloud Native concepts to reconstruct virtual network functions software enables the full distribution and full automation of this software and the construction of truly efficient and agile telecoms cloud networks.

Service and experience

The Cloud Native concept focuses on services and experience rather than infrastructure. Decoupling from hardware infrastructure enhances network resource efficiency and yields a series of advantages:

Flexibility places network-level distributed architecture at the core. The key technologies are stateless design, control and user plane separation, and cross-data center deployment. These enable flexible networks with service awareness. Resources can be provided on-demand, service capacity isn't constrained by single pieces of physical hardware, and network functions can be dynamically generated and deployed on-demand. This ensures that the different experience requirements of applications are met.

Robustness positions redundant and smart O&M capabilities at the core. The key technologies are stateless design, N-way redundancy and cross-DC deployment, active fault detection, and automatic closed-loop control. These enable decentralized multi-point fault tolerance and self-healing systems for high reliability independent of infrastructure.

Agility deploys network slicing, service orchestration, and grey release at the core. The key technologies are service-based decomposition, data modeling, and application orchestration. They flexibly assemble new network functions, launch new network services, and enable network functions and features to be customized online for rapid response to different industry demands.

Cloud Native networks can give operators unparalleled flexibility, efficiency, speed, and elasticity. Second-level network capacity expansion, minute-level service release, experience assurance, and optimal efficiency are all easily achievable.

Going native

Cloud Native combines different ideas like key IT and best practices such as DevOps, continuous delivery, and agile infrastructure. However, it isn't possible to fully replicate IT practices in architectural setup and key tech selection in a Cloud Native network. Telcos need to consider business features and the differentiated service requirements of application scenarios, quality requirements, and DevOps models. They should focus on flexibility, robustness, and agility, and introduce key Cloud Native technologies in a layered, on-demand and step-by-step manner.

Micro-service decomposition of virtualized software: Data and control plane separation should first be completed before micro-service decomposition. Service status and session data are separated from service processing units and stored in a separate distributed database, creating a stateless design for service processing units, allowing on-demand elastic scalability, and enabling single or multiple service processing units to fail without affecting services. This greatly enhances the flexibility and robustness of virtual software. Micro-service decomposition of virtualized software can then be implemented according to the service application scenario and network model.

When it comes to decomposition granularity, smaller is not necessarily better. Instead, the focus should be on independent upgradability, independent scalability, and reusability. The size of post-decomposition micro-services will differ markedly between applications that change rapidly and have a high number of customized requirements, such as IoT and enterprise communications, and those where functions are comparatively stable, like IMS and EPC.

Building a telco DevOps platform: After service-based decomposition is carried out, the smallest service unit can be independently developed, scaled, operated, isolated, and repaired. Introducing a DevOps platform and a collaborative development and O&M culture enables fully automated, continuous service iteration, and release from the development to operations stage. Telcos can then quickly respond to differentiated requirements, achieve agile development, and release new services.

Telcos need to build a telco DevOps platform and processes that fit the particular

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characteristics of their services. But, most lack software development capabilities and tend to use a B2B delivery model where the vendor is responsible for development and the telco operates the service, unlike in IT where companies develop and operate services themselves.

Unlike in IT, a telco DevOps platform requires more complete automated O&M, reliability, and security capabilities, as well as the ability for rapid integration with current network O&M systems. However, telcos shouldn't be aiming to build an end-to-end DevOps team for processes, and should instead consider how to best leverage their service expertise – a better method is where the vendor provides a basic platform and basic micro-service units, and the telco carries out on-demand orchestration and the secondary development of micro-service units based on service scenarios.

Big data-based smart O&M system: While flexible and agile, software and hardware decoupling and decomposition based on virtualized software services increases system complexity and O&M; for example, hierarchical decoupling leads to complex fault demarcation and location. With hundreds of thousands of virtual machines (VM) and service nodes, the number of failed nodes increases. As the size of the cloudified network increases, the cost of O&M also grows exponentially under a traditional manual model.

When building a Cloud Native telco cloud network, it's necessary to implement a fully automated, closed-loop, smart O&M system based on big data and artificial intelligence. Such a system can automatically collect a variety of service instances and hardware and software statuses, and analyze them based on policies. The system can then suggest and action network error corrections, configuration adjustments, and the self-healing of network functions. Alongside system-wide automated service orchestration, these features enhance O&M efficiency and ensure efficient and stable service operations 24/7.

Introducing container technology: Containers are a lightweight virtualization technology that greatly benefits resource efficiency, performance, deployment, start-up speed, and mobility; however, they also have security issues. VMs are a heavyweight virtualization technology that have clear advantages in terms of security and resource isolation, but are worse at resource efficiency and performance. The two types of virtualization technology will coexist in the future, and operators can select which type to use based on the characteristics of the particular application.

Decomposition based on services enables "Lego-type" agile service assembly and creation. Telco DevOps platforms enable rapid service development under an Internet model by streamlining development and operations. And application-based multi-node fault tolerance and self-healing under stateless design and smart O&M allow carrier-grade reliability independent of infrastructure. By harnessing Cloud Native concepts, telcos can build agile and efficient telecom cloud networks, enhance E2E efficiency, and achieve business success.