Constructing an All-Cloud Network

Industry transformation is shaping an intelligent world that, for telcos, also means disruptive changes in services, business models, and technical standards. ICT convergence and the rise of IoT, 4K, VR, 5G, and AI are redefining the concept of what a basic service is. Declining revenues from traditional services are driving telcos towards business models that work under a collaborative ecosystem. But, the value SDN and NFV will create for telecom networks is unclear, slowing the development of technical standards and commercialization.

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A new layer of cloud

Cloud services demand a level of flexibility from the application layer that wasn’t required when telcos knew what future services they would be providing and could easily develop technology to meet predictable needs. Moreover, OTT players are compounding this uncertainty, threatening telco dominance of the application layer.

The gap between existing network infrastructure and applications is already huge, with two major problems: One, the passive adaptation
of networks to each new service is either poor or extremely costly; and two, existing networks can’t be adapted to business models capable of competing with OTT players.

But, network cloudification can build an intelligent adaptation layer between the network connection layer, with its defined functions, and uncertain service applications. Cloudification delivers a fast-response network infrastructure that can quickly enable applications that have commercial value.

**Standardized connection layer**

Regardless of network evolution, networks must ensure high bandwidth, low latency, and ubiquitous connectivity for telcos to expand their business.

**Intelligent adaptation layer**

This crucial layer is responsible for:

**Opening network capabilities**: Facing the flexible application layer in the northbound direction, the adaptation layer centralizes resource scheduling and abstraction. Application developers can then schedule and assemble open network capabilities to quickly innovate services and applications.

**Stabilizing architecture**: Facing the standardized connection layer in the southbound direction, the adaptation layer masks the instability of various technical standards by using deterministic architecture to manage uncertain technologies.

**Enabling agile innovation**: This layer provides rapid and low-cost iteration capabilities, minimizing the costs associated with errors to combat business uncertainty.

**Flexible application layer**

This layer is designed to support a digital service and application ecosystem whose services and applications can belong to either telcos or third parties. It supports telco business scenarios and provides a ROADS (Real-time, On-demand, All-Online, DIY, Social) experience for end users through Internetized operations.

After cloud migration, networks are agile, efficient, intelligent, and open. They help operators build commercially driven networks for the future and maximize the value of their network assets.

**Network Cloud Engine (NCE): The brain of the cloud network system**
Huawei developed All-Cloud to resolve a range of business issues with a series of scenario-specific solutions.

The new NCE serves as the adaptation layer in the shape of a cloud-based platform and system. By enabling and opening network capabilities, it provides customers with network connectivity that delivers a ROADS experience and other VAS.

The NCE has the following characteristics:

**Cloud Native**

The NCE is based on a cloud infrastructure and platform service. Network functions for different service scenarios, such as home, enterprise, and operator WANs, are deconstructed into independent, autonomous, and neutral micro-services. Each micro-service supports gray upgrades, which enables elastic scaling based on service requirements. Service deployment requirements determine cross-domain distributed deployment and scheduling, improving network resource utilization by as much as 100 percent. The architecture is user-oriented, providing multi-tenant resource isolation and management. The reliable design complies with design-for-failure principles, enabling automated monitoring, fault location, isolation, and self-healing on the NCE.

**Lifecycle automation**

The NCE provides the following functions: planning and simulation, network service deployment and provisioning, network monitoring, assurance, and optimization of the entire process.

Based on a unified software orchestration and workflow engine, different service packages can be quickly and flexibly built for different service and commercial scenarios. This implements full-lifecycle automation of physical and virtual network functions, with the aim of reducing network connectivity service time from months to days via a friendly, real-time online consumer service portal or application, which provides minute-level provisioning and services. Intelligent operations, such as planning, deployment, control, maintenance, and assurance, are implemented through a unified, simple, and clear administrator’s workbench, improving O&M efficiency tenfold while greatly reducing OPEX.

**SaaS, NaaS, and DevOps**

In addition to providing traditional CT network devices and a software transaction model, the NCE supports new SaaS and NaaS transaction and delivery models on the public cloud. Examples include one-stop e-commerce service transaction models such as online product and service subscriptions, provisioning, and adjustment. These help operators reduce consumer-oriented transaction costs and slash transaction costs between solution providers and operators.

NCE provides DevOps tools so operators or third-party partners can flexibly integrate, reuse, and combine existing micro-service and third-party capabilities. This enables rapid development and low-cost testing when customers’ business scenarios and network tech change. For example, Huawei’s CloudEPN enables operators and third party integrators to use the NCE-based DevOps tool platform to quickly create new third-
party firewalls, accelerate WANs, and introduce a wide range of VAS. It also integrates secondary software and capabilities, providing the end consumer with more flexible and richer integrated services.

The NCE is the brain of the entire cloud network solution architecture. It integrates the SDN agile controller and can combine and assemble different software function modules for micro-services to adapt to various CloudX network scenarios.

The NCE simplifies business monetization and ramps up efficiency by accelerating service and application development and innovation.

Another important part of Huawei’s comprehensive cloud network architecture is the infrastructure connection layer. People, things, data, and applications are all interconnected, with data centers (DC) at the core in a range of scenarios, including home, base station, enterprise, campus, branch, and IoT.

**Making All-Cloud reality**

Taking cloud networks from concept to implementation is long, slow, and difficult. The entire industry chain must form a consensus on the following three ideas, and then fully promote them:

**Business-driven:** Develop a network evolution roadmap to start the shift from tech-driven to business-driven networks.

Network evolution technologies are continually emerging in the CT, IT, and OTT space. But, telcos must first consider commercial value, starting with ROI, before selecting technologies and applications. They need to look at increasing B2B revenues and optimizing the B2C service experience.

**Systematic evolution:** Decide on network-wide cloudification strategies, focus on service continuity and connecting old and new services, and ensure steady and systematic network evolution.

Operators have more than 30 years of accumulated network infrastructure, so it’s unwise to rush cloud migration. Evolution must progress together with business planning, and so a policy of gradual evolution is advisable.

**Unified architecture:** Define a unified cloud network architecture that’s agreed industry-wide.

Cloud networks are still in their initial development stage, and still need to be defined by the industry to implement a stable and unified architecture. A priority when selecting technologies is the ability of the service layer to carry over the flexibility and agility of OTT/IT, while masking the uncertainty of technologies and protocols and supporting flexible service innovation.

It’s also important that the network layer doesn’t lose the strengths of CT, and that its architecture is standardized so interconnections can happen without increasing complexity. Therefore, standards organizations, such as IETF, BBF, and ITU-T, are vital to defining cloud network architecture.

For decades, global operators have deployed networks based on technology. However, as the direction of future service development leads us into uncertainties, traditional network deployment logic is already showing cracks. Future opportunities will only open up by making business value the core of future network planning.