

Network Landscape for the Telco Cloud



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1. Summary

This Telco operators are very well positioned to deliver new enterprise and 5G services, based on a full complement of enabling network technologies and capabilities. Telcos have long been experienced at delivering mission-critical services and running network workloads on private clouds; now, with the maturing of cloud-native technology, public and hybrid cloud deployments are not only in reach, but a necessity, and a game changer. This paper will discuss the global operator cloud deployment trends and the maturation cycle of supporting technologies needed to help operators deliver agile services and compete with over-the-top (OTT) providers and hyperscalers; as well as provide an overview of the opportunities and challenges ahead.

2. Global Operator Trends

In 2020, operators around the world continued to roll out 5G networks, citing enterprise demand for high-speed, low-latency connectivity for emerging digital applications. However, the clear business case for public 5G adoption has remained elusive. Beginning in late 2020 and expected to accelerate through 2021-2022, operators and vendors are beginning to apply lessons learned from networking pioneers to advance telco cloud capabilities. To meet enterprise demands, vendor solutions must be cloud-agnostic and easily integrate with and support access to multiple public and private cloud environments. In addition, there is a notable shift in the level of applications being deployed in the cloud, moving from basic network functions to critical information and core production systems.

The elevated importance of the cloud requires the network to provide high quality connectivity and an agile service delivery model. Operators that have transitioned their infrastructures are now in a position to support public 5G services targeted toward enterprises, and provide services that are equal to or better than those offered by OTT suppliers.

3. Overview of Telco Cloud – Opportunities and Challenges

3.1. Opportunities

Operators have started offering services for private networks that go beyond providing 4G/5G connectivity. As they take on more ownership of customer deployments and seek new revenue streams, this trend will accelerate throughout 2021 and into 2022.

- **Leverage growing 5G coverage:** A key requirement for private network success is the availability of coverage in urban and rural markets. Growth projections show 5G ramping rapidly in all markets, which sets the stage for significant revenue growth for operators.
- **Leverage advanced 5G technologies and capabilities:** Operators can provide high quality connectivity and leverage advanced technologies like network slicing, intelligent monitoring and visibility, and end-to-end quality of service guarantees which the OTT providers lack.
- **Leverage professional services:** Operators can carve out a more diverse and profitable revenue stream by applying their advisory, consulting, planning and design, application enablement, deployment, network automation and management skills and services to accelerate private network adoptions.
- **Lead private network deals:** Operators can become more involved with their base of enterprise customers and leverage their investment in a common cloud-friendly network infrastructure along with an ecosystem partners to drive new network opportunities.

3.2. Market Challenges

Although the opportunities are great, there are some challenges to address, including:

- **Hyperscalers eye the Telco Cloud:** Recent moves by major hyperscalers Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform, Alibaba Cloud, IBM and others are clearly aimed at capturing a slice of the emerging 5G enterprise and private network market. This challenges operators that need to leverage public cloud economies but at the same time maintain control their network infrastructure. At least for the short term, this can be viewed as a component of the network ecosystem, and creates a mutually dependent relationship.
- **Spectrum challenges:** In the global market private 5G networks will be paced by the availability of spectrum, dedicated and unlicensed (CBRS in North America, mmWave, etc.). Regulators in many countries have allocated spectrum specifically for private networks, but the majority of that dedicated spectrum will still be owned by operators, and will most likely be used for its intended purpose. This gives way to supporting operator-sourced private networks using network slicing (a key component of the 5G network architecture) to provide the necessary isolation and data protection.
- **More granular solutions:** To meet the needs of a growing list of 5G service demands and expectations, the market requires more flexibility from the ecosystem to support targeted verticals. This requires the ability to design and deploy solutions that meet a host of new applications with unique requirements. Operators will need the innovation, design and implementation processes to be streamlined and deployable in days/weeks and not months/years. Vendor-based tools for CI/CD are the answer to this challenge.
- **Legacy challenges:** Well before the advent of 5G, operators were facing a number of challenge, including: 1) rigid infrastructure, wherein the legacy infrastructures lacked programmability and ability to automate the service process; 2) operator skills gap, as network technologies have evolved and matured but many operators have not kept up with the transition; 3) budget barriers, where the cost to transition to a cloud-native programmable infrastructure was often deferred due to the lack of business justification; and 4) ineffective ecosystem revenue models between partners, cloud providers, and operators that were frequently more confrontational than mutually beneficial.

- **Countering the OTT:** The issues above prompted the rise of the OTT to fill the services gap, by leveraging the operator infrastructure and gaining a level of subscriber control, while relegating the operator to shoulder the infrastructure cost. The OTTs have captured business away from the operator, in the past, by providing more agile services, like shorter service provisioning time, self-management and a cost advantage.

3.3. The Benefits of a Common Architectural Framework

In the past, efforts by operators to transform their networks to deliver flexible and on-demand services were hampered by the lack of a common infrastructure which could act as a catalyst for innovation. However, a growing number of network operators have invested heavily in modernizing their infrastructures to be cloud-native and better able to support 5G services. This investment in cloud-native architectures, which includes all aspects of the telco network, is poised to now deliver significant benefit:

- **Increases cloud agility and network responsiveness** to ensure smooth integration between the cloud and the network and being able to place mobile workloads on any cloud at any time. The integration of public and private cloud capabilities enables the deployment of multiple use cases ranging from basic connectivity to advanced low-latency services which can be dynamically configured.
- **Leverages key operator strengths** including network experience, geographical coverage and subscriber knowledge. The operator is well positioned to provide cloud access connections with guaranteed SLAs, and to deliver consistent network experience across its serving footprint which extends from central data center to local points-of-presence. Delivering superior geographical coverage and quality of experience is not always possible with OTT services.
- **Offers one-stop subscription capabilities** to cloud-network products and e-commerce services for enterprise users. Providing enterprises the ability to purchase and access all services from a single portal enables the operator to provide additional value, by simplifying the buying process, providing cost effective access to services. Successful E-commerce support relies on the agility of the network to deliver OTT-like services with assured quality and reliability.

- **Provides multi-cloud support** to ensure workloads can be placed where they can best support consumer and enterprise services. The infrastructure solution needs to support any combination of private or public cloud and not only provide connectivity, but simplify commercial aspects such as billing. Outside of China, operators can leverage this capability to access the prevalent public cloud offerings available in specific geographical regions.
- **Supports edge-based services** anticipated with 5G by allowing compute and storage capacity to be located closer to the user. Early experiences gained with private network deployments for mining and transportation have proven the effectiveness of edge-based services made possible through the use of distributed user and control planes.
- **Supports a broad ecosystem** required to reach the full potential of 5G. A broad ecosystem comprised of system integrators, subject/domain experts, hyperscalers and operators must be nurtured in order to foster innovation, design services and achieve deployment success. In many cases the operator can leverage their network service experience and act as the primary integrator; in other cases a third party can perform the role.

3.4. Early Insights from China Market Private Network Deployments

As touched upon earlier, the market can benefit from lessons learned from early deployments by the major operators in China (China Mobile, China Telecom and China Unicom) and vendors such as Huawei. The experience garnered in China can be directly transferred to the global market; the differences noted earlier do not impact the fundamental architecture, capabilities of the network technologies, network scale and implementation processes that were followed.

- **Leverage customer relationship knowledge and needs:** The operator(s) maintained control of the subscriber and collaborated with the network vendor and vertical market experts to innovate, design, implement and deliver specific solutions – such as mining and transportation solutions.

- **Establish intelligent cloud architecture:** The operator(s) committed to network modernization which established a programmable infrastructure that could deliver all services over a common network - one network platform – support many use cases. The programmability aspects enable the operator to be responsive to new services, its broad footprint provided connectivity, and managed the commercial aspects of the services.
- **Build a comprehensive network slicing strategy:** Operators must be able to support segmentation, privacy, data integrity for the various users, while supporting the ability for customers to share network resources across multiple user domains. Network slicing provides the operator economies of scale and the users SLA and privacy assurance.
- **Build multiple Industrial Clouds (Private Clouds) for unique vertical applications:** The ability to create and manage multiple clouds was proven as multiple cloud instances were created. The ability to manage multiple clouds is key to global deployment, where the model is extended to support multiple public cloud instances based on user preferences
- **A programmable infrastructure is at the root of the intelligent network:** Technologies such as SRv6, cloud-native 5G standalone mobile core (5G SA Core), network slicing, and analytics create the infrastructure needed to support and effectively manage new vertical applications
- **Exploit AI maturity:** AI and Machine Learning (ML) have matured and were used to help facilitate service automation, provide intelligent OAM, and provide network visibility to better manage the customer experience.
- **Create scalable public cloud integration capabilities:** Operator-built solutions have provided the mechanisms to seamlessly connect to the public cloud (operator supplied) and private clouds which supported the use cases. This demonstrated effective integration of the network and cloud infrastructure needed to support a broad range of use cases.
- **Comprehensive partner ecosystems are vital:** The expertise to construct multiple vertical market applications required collaboration between the operator, vendor and vertical market experts which worked to construct the services to meet user requirements. The ecosystem model will be prevalent as additional services are designed and implemented in coming years.

- **Build agile networks at scale:** Huawei's cloud network IT architecture supported all phases of deployment for the operators in China, including a programmable infrastructure which leveraged simplified IP technologies such as SRv6, slicing and AI-based automated operations. In addition, the operators were able to leverage IT and telco expertise to move quickly from concept to deployment at scale, which supported both large and small enterprises and industrial markets.

4. Market Suggestions and Takeaways

The lessons learned during 2020 by network operators and vendors are readily being applied to support the growth and expansion of 5G network services around the world in support of private network opportunities. Key takeaways include:

- Apply lessons learned from early deployments – scale, agility, use of cloud-native technology, establish a broad ecosystem of partners and establish flexible commercial business models.
- Leverage vendors for service design and implementation, to address any skill gaps, leverage prepacked platform solutions.
- Update to a programmable network infrastructure to enable automated service and resource orchestration, leverage AI and ML for intelligent OAM to reduce time to service, and provide quality SLA-based services.
- Deploying and managing the telco cloud requires network and IT services and capabilities spanning multiple functional areas which includes:
 - Topology - cloud access based on intelligent cloud graph algorithms and a high-performance elastic control plane to deliver seamless access to services.
 - Connectivity - effective connectivity to deliver services using a combination of intent-driven orchestration and a carrier-grade (high-reliability) control plane for real-time accurate configurations.

- Visibility and analysis – SLA visualization and quality assurance for network-side services, visualizing information in multiple dimensions, detecting service quality deterioration, and accurately identifying and locating faults.
- Take a focused approach and conquer one vertical at a time to deliver a complete end-to-end solution inclusive billing, support and service assurance for a full end-to-end service.

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Glen is a Principal Analyst in Global Telecom Technology and Software, covering telecommunications infrastructure and Software Defined Networking. Glen analyzes technology, product, and partnership initiatives of vendors who supply infrastructure solutions to fixed and mobile network operators; specifically focusing on vendors that supply mobile core, IP and transport, NFV infrastructures (NFVI), and management systems as well as routing and switching solutions.

Reference: Network Landscape for the Telco Cloud. Link:

https://www.verdict.co.uk/white_papers/network-landscape-for-the-telco-cloud/

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