Arthur D Little

Viewpoint

Future Telco Production Model

How core revenue decline is driving new production architectures

Given the speed of technology cycles, new flexible production architectures are a prerequisite to driving the pace of product innovation and transforming operations. IP networking combined with network function virtualization (NFV)/cloud and software-defined networking (SDN) are emerging as enablers of this new design. Industry thought leaders have shown that onboarding these technologies allows the creation of agile, functionally richer, open infrastructure platforms, as well as driving significant improvement in operating costs, through automation and centralization. It is time for telecom operators to articulate a clear vision, that aligns with the new technology and innovation reality, and mitigate and overcome the risk of being left behind in the new era of communications.

Through the use of NFV, cloud and SDN, the telco services and production platform is evolving from multiple silo stacks to a programmable, cloud-like service and infrastructure platform akin to web-scale players. It is widely expected that the emerging design will enable both richer infrastructure services and the ability to scale out services on demand to respond to ever-changing customer needs. The expectation is that these technologies will allow carriers to dramatically increase their pace of innovation, and perhaps one day even narrow the gap in terms of time to market and cost of services with web-scale players.

The shift is reaching beyond customer real-time self-order, real-time provision, and self-service enabled by automation and programmability. We expect it will trigger wider and web-like collaborative relationships between carriers themselves and their suppliers:

- Applying Network-as-a-Service,
- Redeveloping retail and enterprise product portfolios,
- Enabling altogether new B2B2X offerings.

The new production architecture is challenging because the changeover is not trivial. It will require transformation of the production environment, as well as many hard-coded operating processes in the Operations Support System. To make it happen will require profound changes in organizational structures, technology skills and, above all, mindset – and perhaps even business models themselves.

A handful of carriers are both legitimizing and leading the change towards the future, through formal network transformation programs and targets. Despite their efforts, a one-size-fits-all design has not yet emerged. Operators such as AT&T and NTT are looking to meld cloud, network infrastructure and security into a single, coherent platform. By contrast, Deutsche Telekom is using these technologies to drive mass-cost reduction through centralization, whereas Telstra wants to use virtualization to expand its operating footprint. But no one has yet articulated answers to the most pressing questions of the move to software-based network architectures:

- Where to begin onboarding these technologies while telecom standards works are still under development?
- How to transform operations on a new, virtualized infrastructure requiring software capabilities?
- How to build the business case for change?
- How will operational savings and new revenues from flexible services overcome the evolution of the current roadmap?

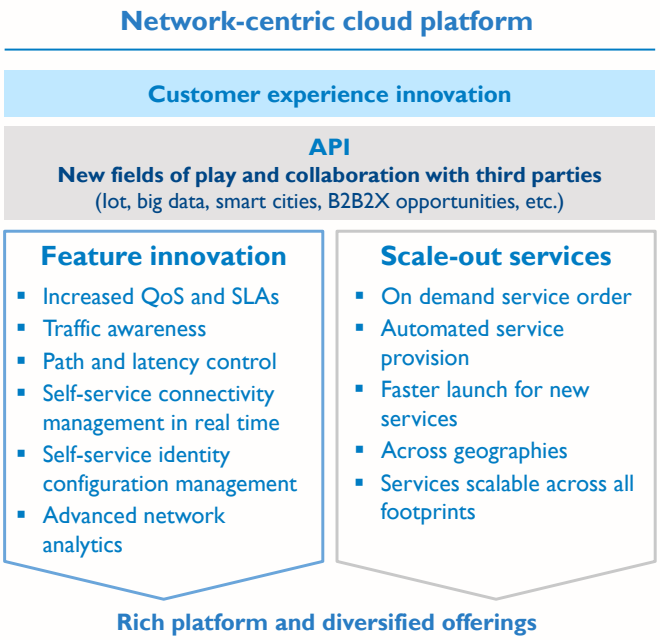
The case for change

Customer use of connectivity is evolving rapidly in terms of service flexibility, service chaining, etc. Both retail and enterprise customers expect support for exponential growth in fixed and mobile traffic and ever-more devices, as well as flexible bandwidth on demand, but for entirely different use cases.

- Retail use cases are focused on consuming always-on, advertising-driven social media, cloud applications and ever-higher-quality streamed video.
- Enterprises are looking for services that help to make the transition to the use of mobile device-/cloud-oriented architectures in order to delight staff and customers with responsive web user experience connected via public and private networks, while remaining secure.

While connectivity will remain important, these use cases require more than just plain-vanilla connectivity. Elements such as automated provisioning, traffic awareness and steering, path and latency control, service orchestration, and monitoring all form the building blocks of a next-generation infrastructure that extends the outward functionality of the network and gives customers unparalleled control.

But rich feature sets will not be enough. The variability of retail and enterprise user demand means the ability to scale out these services will be just as important. To do so, carriers require flexible and agile application deployment or production architectures that can respond to changing workloads and traffic flows, while delivering these services at dramatically lower unit costs.



Source: Arthur D. Little analysis

Bringing these two elements together creates what might be called a "network-centric cloud platform," which provides significant new opportunities for product innovation, whether alone or in collaboration with third parties. (See figure above.) It creates exciting new possibilities to reinvent existing services (voice, messaging, unified communications, cloud networking, data networking, managed services), as well as to establish and participate in new fields of play or value pools from the Internet of things (IoT), big data, customer experience, smart cities or B2B2X models of service provision. It will also enable operators to open their production models to new forms of mutualized service provision, service collaboration and integration with third-party applications just in time. Opening the door to third parties such as disruptive start-ups (e.g. Benu Networks, Aryaka), next-generation independent software vendors (ISVs) and (reformed) network-equipment vendors will provide the competitive impetus to make change a reality, enabling communications management in real-time, supported by advanced service analytics.

Operators have witnessed how OTTs, web-scale and public cloud players have created ecosystems around their offerings. These ecosystems are built upon self-service platforms and communities of users. Based on actual usage patterns, elements of platforms are evolved to make the services more relevant, adding functionality, granular control and even changing business models, if necessary. This user-driven evolutive approach forms the basis of the digital economy. The move to network-centric cloud platforms allows operators to emulate digital designs in everything from infrastructure to application services. This type of emulation at speed, perhaps one day, may even narrow the gap with web-scale players.

Without these changes, telecom operators will see their residual non-access connectivity businesses threated by outsiders, requiring urgent action.

Rejuvenation of the production model

The future carrier production model is not a custom solution stitched together from proprietary hardware; it is, as far as possible, "commodity software" running on "highly standardized infrastructure," emulating web-scale designs where practical to benefit from economies of scale in software and hardware. This should not be interpreted as wholesale adoption of web-native designs pioneered by Google, Microsoft or Facebook. Rather, in each network, domain operators will be asking themselves, How would a web-native carrier of the future produce today's services? Though consensus on the target model has yet to emerge, a number of common patterns have become visible. These require deep-rooted changes across all network domains, from network core to service-delivery platforms, to customer-premise equipment, to service exposure, to Business Support System (BSS) and Operations Support Systems (OSS) in order to deliver.

Core network architecture is being changed at two levels. The transport network is automated and dramatically simplified, whereas the control plane is being virtualized and extended in scope to allow end-to-end control of the network. Simplification of the transport network enables adoption of new network topologies and close integration of IP and optical layers. This allows operators to reduce congestion from video internet traffic and manage network resources more effectively. Control-plane applications unhooked from their proprietary hardware and OS environments are pooled into a common carrier-grade and cloudified or virtualized infrastructure.

Siloed service-delivery platforms, too, will be decoupled from proprietary platforms and operated in the same pool as network applications. (See figure below.) To reduce latency and/or optimize traffic transport (e.g., tactile web or massive high-quality video on-demand), telecom operators are exploring locating service-delivery platforms (SDPs) closer to the customer. Carriers such as AT&T and SKT are working on the (M-)CORD (Mobile-/Central Office Re-architected as Data center) concept to build out data-center resources at the network edge.

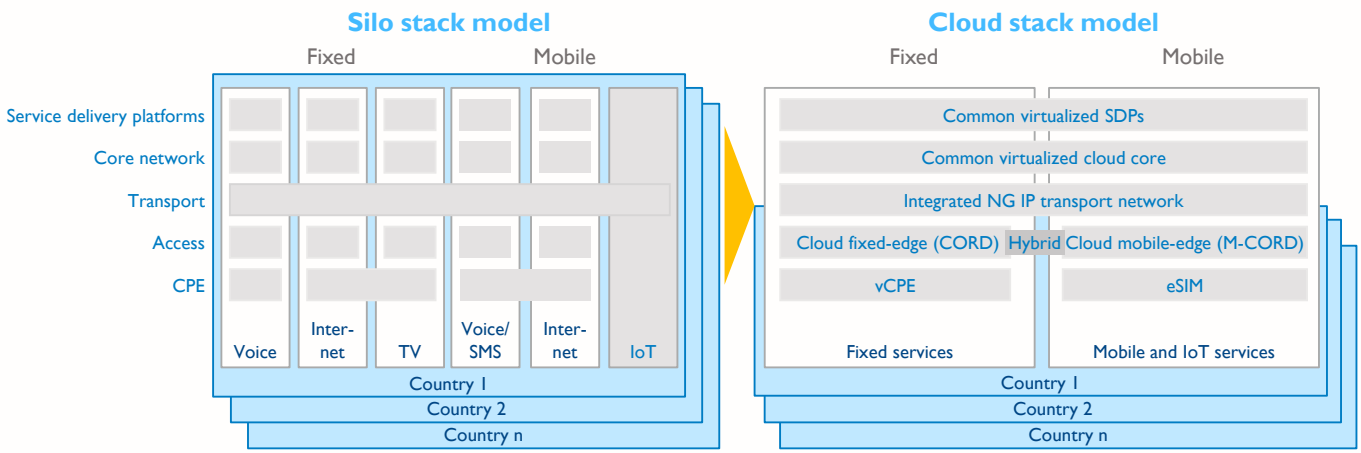
All this makes sense if the platform functionalities can be exposed to the customer, which means channeled through existing or future CPEs. Whether the approach is CPE-bypass or redeployment of virtualized boxes, carriers expect large returns from being able to monetize network functionalities, allowing users to self-administer the complexities of new service configurations. Virtualization opens the door to consolidation of network management centers, which could also represent an advantage for large telecom groups over smaller telcos.

Service exposure provided through application programming interfaces (APIs) allows own-developer and third-party access to platform functionalities. This approach to programmatic access to the network platform allows applications to consume resources in order to deliver functionality on demand. Service exposure is central to the development of innovative IoT and M2M services to discover new B2B2X opportunities. Service exposure will require changes to OSS to enable real-time resource management, service assurance and billing.

The shift to virtualized network architectures is key to customer proposition redevelopment as well as third-party ecosystem development, but also means a significant operational challenge. Generic network functions deployed on top of standard hardware controlled by a centralized resource orchestration layer will not only reduce lead time to market and network-operating costs, but also require new skills and acceptance of new risks. Telecom operators will need to adjust to this daunting new reality through extensive operational and organizational transformation. Lessons from early adopters indicate that "visible programs for employee skill-set enhancement" are central to sustaining change over a long period of time. Highly streamlined web-scale-like organizational models cannot be adopted in a single step; rather, they must be phased in as the management skill set matures and organizations are prepared to make the change.

The effect of the shift to software running on commodity hardware platforms is not limited to carriers, but will reverberate upstream to the network-equipment supplier base. It will drive the shift from equipment sales to managed services, or even the use of SaaS-based pricing and delivery models as a substitute for current SDPs or large parts of the carrier network. The software-based approach shifts service life-cycle management risks to operators – something smaller operators might find challenging. So the question arises: will they then buy network-managed services from larger operators, instead of from suppliers?

Silo stack model vs. future production model



Source: Deutsche Telekom, Arthur D. Little analysis

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Key insight for the executive

Carriers are coming under increasing pressure from declining revenues, new OTTs entering the scene and evolving connectivity needs, and must set out a vision for what role the carrier will play in the future.

We see four priorities:

1. **Align with customers' evolving needs:** Customers seek more control of their networks through comprehensive customer-facing control panels and services available on demand with pay-per-use models. Carriers driving co-development and service exposure will enable innovative B2B2X business models that can create value from leveraging network operational data.
2. **Develop a long-term architecture:** The architectural roadmap must clearly define the target picture, balancing short-term business needs with a longer-term vision for technology.
3. **Multi-local and local operators must align operating models to the new realities:** As networks are virtualized, they lend themselves to being centralized. Large operator groups finally have a real opportunity to capture benefits of scale vis-a-vis smaller players – if they manage efficiently across national boundaries. This will trigger smaller operators to seek similar benefits, which may drive the move from boxes to managed services or XaaS, and from vendors or other multi-local operators.
4. **Build a culture of innovation:** Openness as the basis of innovation takes on a whole new meaning in a software-centric business. It has been often proven that it is insufficient to have a pool of talented developers, because real talent is always found elsewhere. Hence, a culture of collaboration is key to sourcing innovation, requiring a whole new approach to managing innovation.

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Arthur D. Little

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