GlobalLogic®

WHITE PAPER

Digital Transformation in the Telecommunications Industry

Volodymyr Krolivets, Telecommunications Consultant

Table of Contents

Introduction

People are becoming more and more dependent on communications networks for both business and personal use. In only 10 years since the launch of the first iPhone, and starting from October 2016[1], Internet usage by mobile and tablet devices has exceeded desktop usage worldwide. This year, the global smartphone installed base reached 2.8 billion (it was less than half a billion in 2009). Nowadays, the smartphone is a more capable and sophisticated platform than any previous-generation PC and is equivalent to a pocket supercomputer.

Other gigantic communications platforms are social (Facebook now has 2 billion monthly active users[2], WhatsApp more than 1.2 billion[3]) and cloud (rapid growth across all segments of the cloud market, including IaaS, PaaS, SaaS, containers, and cloud orchestration). Also worth mentioning is the explosive growth of mobile traffic. According to the latest Ericsson Mobility Report[4], data traffic grew 70% between Q1 2016 and Q1 2017.

All the above-mentioned facts have had a huge impact on the communications industry. Yet they are just some of the factors influencing the industry. We will cover the following in subsequent sections: the role of the communications industry and how it will look in the future, the challenges of driving innovation, and the ingredients for a successful future.

1. http://bit.ly/2u8W6lU
2. http://tcrn.ch/2us8jYu
3. http://bit.ly/2ubFKmU
4. http://bit.ly/2wsA5FJ

The Evolution of the Telco Industry

The telco industry has passed through several huge transformative stages. The transition from analog to digital and the emergence of a global standard (GSM) occurred in the 1990s. Then came 3G that brought data and web services to our lives. Finally, as the latest step, 4G came to our devices, which led us to mobile broadband that is capable of transmitting even more information, as well as digital services in the 2010s. Now, we're talking about the future—one that will bring about a new paradigm of telecommunications. 5G and IoT are game changers, creating new business models and roles for both operators and vendors. The models that have been in operation for the last 10 years simply will not work for the next decade.

5G networks will look very different than what operators built in the past. In general, if we look at 2G, 3G, or 4G networks, they are focused on throughput and capacity. Of course, in the future, we are going to see a hundred times faster throughput, but we will also see the latency of networks decrease. We are going to see 10 times better battery life than we saw in the past. That will open up whole new types of applications for consumers and business customers. However, operators will not able to offer such new opportunities without implementing new infrastructure that transforms future-generation networks. This transformation needs to be implemented through the whole network, affecting radio access network, transport/core network, and IT/VAS platforms.

NFV (Network Function Virtualization) and SDN (Software Defined Networking) are the main cloud-centric technological advances appearing in the market today. After a slower start than initially anticipated, the NFV/SDN market will expose moderate growth through ongoing NFV/SDN investments by major telcos (e.g. ATT, Verizon, Telefonica, China Mobile). ABI Research[5] forecasts that the NFV market will reach $38 billion by 2022.

According to WEF[6], investment by the telecommunications industry in interoperability and technology has underpinned a huge shift in information and capital flows through the global economy. It has done this while providing the building blocks for the emergence of entirely new business processes and models across industries. In parallel, access to a globally connected network has enabled millions of people around the world by giving them access to marketplaces, social programs, and real-time information in a way that will have long-term effects on their quality of life. As we move to a hyper-connected world, many devices — for example, smartphones, wearable devices, connected cars, and virtual / augmented reality devices — will connect and communicate to further improve human lives.

5. http://bit.ly/2vpT8Ux
6. http://bit.ly/2wsXLtH

The Challenges of Driving Innovation

Implementing Collaborative Development

To bring to the table all the potential benefits of 5G and the Internet of Things (IoT), a significant transformation of networks, operations, business processes, and business models must take place. To compete, Telcos must reorganize and retrain their IT, engineering, and operations organizations and cultures to develop NFV, SDN, and service orchestration software collaboratively. Historically, these have been separate units within provider organizations, operating in silos and often contradicting each other. However, now:

- Employees from different departments must work in a collaborative mode (i.e., IT engineers should develop applications for new architectures).
- The operations camp should define and adapt new operating models.
- Marketing needs to understand what services will have the highest demand and prepare the market for them.

These tasks will not be easy, as to achieve all the above-mentioned results, a global strategy for the development of the operator is needed. Simply replacing one specialized hardware platform with a standard server and virtualized service function will not suffice.

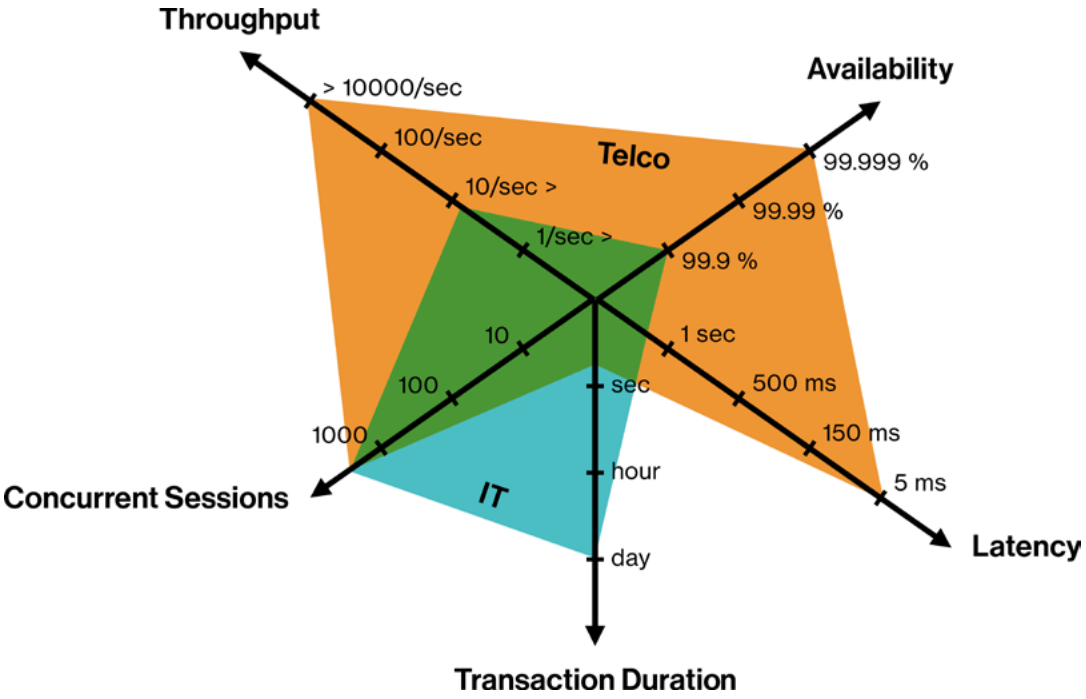
Managing Divergent Technologies

SDN, NFV, and service orchestration are the approaches that are going to make telco networks and operations more Agile, programmable, and cloud-connected. They also want to be more innovative, achieve faster time-to-market for services and products, and start to regain the business lost to OTT players. It's obvious that legacy networks will coexist with SDN and NFV, and that existing infrastructure will not go away. The question is how to design and build future networks so that operators can continue to evolve their infrastructures to work with this parallel, very heterogeneous universe for a while that incorporates 5G, IoT, digital services, and the explosion of OTT services.

NFV and SDN present a challenge: how to manage an increasingly divergent set of capabilities, policies, features, functions. Ultimately, these will allow operators to monetize the investment that they are making in their networks So, why have telcos just started to use the best practices for virtualization from industry leaders such as Google and Amazon?

One of the reasons is that it has to be a very special type of virtualization. It has to be ready for the telco environment and support telecom service performance. Figure 1 on the next page illustrates a simple difference between IT cloud and telco cloud requirements.

Figure 1.
The difference between IT cloud and telco cloud requirements



Competing Against New Players

In addition, it's worth mentioning that the telco equipment market has faced aggressive competition as network equipment is increasingly commoditized and intelligence moves to the software layer with a range of innovative new players entering the market (e.g., Big Switch Networks, Affirmed, and others).

There are other examples of new players undermining old business models. Facebook has launched two projects: the Open Compute Project[7] and the Telecom Infra Project[8] (TIP) The basic idea behind this latter project is to re-invent telecommunications infrastructure based on open source hardware. As one of TIP's first outcomes, in 2016 Facebook introduced Voyager[9], a networking solution for Open Packet DWDM networks — in other words, industry's first "white box" transponder and routing solution. (A white box is essentially a hardware device with no well-known brand name.) Voyager has already been tested by Facebook and Telia. In addition, leading European operator Orange is also testing the device, working with Equinix and the African telecom company MTN.

In an effort to optimize OPEX and CAPEX, as well as increase service agility and operational flexibility, telcos began exploring a white box concept that allows the separation of the hardware and software components of networking devices. White boxes like this will be a big part of the future, as this is very disruptive to many existing business models. And there is clearly a need for more efficient equipment. For instance, data traffic on AT&T wireless networks has grown more than 250,000% since 2007. Autonomous vehicles, virtual reality and augmented reality, and IoT will only push those numbers higher as new access technologies like 5G come online. Telecom OEMs are not paying attention to this, and it will be very disruptive to many of their current business models.

7. http://bit.ly/2vAe63y
8. http://bit.ly/2ubW1bx
9. http://bit.ly/2urX5Dx

Ingredients for a Successful Transition

Adapting DevOps Culture and Micro-services Architecture to Telco Cloud

As the telco industry moves towards an increased use of virtualization, leveraging modern software development approaches such as Agile, DevOps, CI/CD, and containers is becoming an important way to smooth the transition to NFV and SDN. DevOps is seen as the combination of modern software development best practices intertwined with network operations. DevOps brings continuous development and quicker release cycles, with reduced risk of build and interoperability issues. The separation of network functions and infrastructure will require new approaches to provide consistency and coordination in the validation of solution, services, network planning, and deployment. Procurement models will be changed according to the software essence of network functions.

As network and network components like routers, gateways, and firewalls become more programmable and more API-enabled, it is becoming easier to bring them into the DevOps tool chain and the OpenStack environment — or in the future, some kind of container environment. So, as telcos move from the mostly physical world to the NFV-virtualized SDN-enabled world of tomorrow, they find that onboarding applications to the DevOps platform is really challenging. Companies need to change their cultures — specifically, rebuild the engineering culture — and focus on getting initiatives out the door iteratively, and fast. As an example of the possible future collaboration between operator and vendors, view the proof of concept demonstrated by Ericsson and Verizon at OpenStack Summit 2016 (Figure 2).

Although the principles and tools are immediately applicable for all IT development and engineering tasks, some DevOps methods are only applicable for software development. As operators and vendors incorporate more NFV and SDN technologies and software development into their networks and solutions, the applicability of these tools will increase with the time.

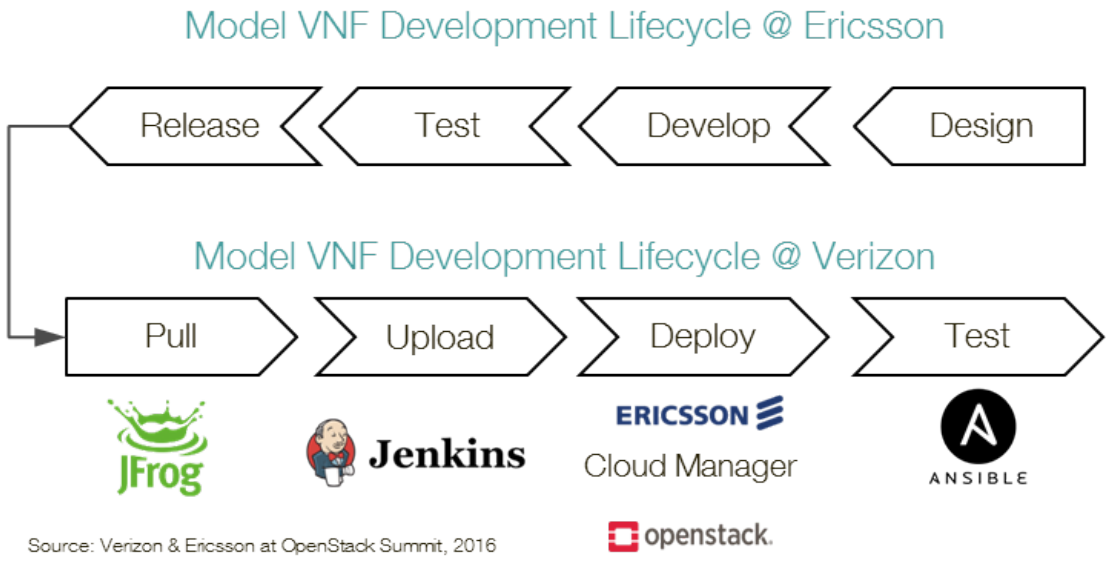


Figure 2.
A proof-of-concept demonstrated by Ericsson and Verizon at OpenStack Summit 2016

Introducing Container-Based Microservices

Another important change is the introduction of a container-based microservices architecture. Several leading operators such as AT&T, Verizon, and Telefonica have publicly grasped the move to microservices and containers in their telco clouds. The benefits of using a microservices architecture and containers is that applications can be tested using a distributed and iterative model, without taking applications offline, so there is no service interruption.

Operators are looking to use disruptive web-scale technologies to build a more Agile model of software that can be used to improve customer service, reduce resource utilization, enable easier integration with third-party solutions, and give them the ability to add new features faster. Also worth mentioning is the significant activities taking place in the open-source community around microservices and containers. Several groups are helping to promote the use of microservices and container technology in the telecommunications world (e.g., Cloud Native Computing Foundation (CNCF)[10], Open Container Initiative (OCI)[11]). Members of these groups include Huawei, AT&T, Cisco, Verizon, Amazon, and Google.

Utilizing Open Source Software

Open source software is becoming one of the key enablers for the communications industry. The emergence of NFV and SDN technologies has led to a significant boost in the number of open source software and hardware projects that specialize in different components of the NFV and SDN stacks. As one of the research directors at Analysys Mason said [12]:

"Both vendors and operators can leverage and contribute to open source communities through integrating platforms and platform capabilities into their products and services. Operators are looking for a faster time-to-market and cost edge when it comes to implementing the major business and operations transformation required to take full advantage of SDN, NFV and cloud. Vendors, similarly, are looking to take advantage of these communities so that they can focus their R&D investments on where they can truly differentiate. Taking advantage of open source software and hardware can help both operators and vendors taking advantage of economies of scale and de facto standards to create more open, Agile, extendable, cost-effective, and 'automatable' platforms on which to build the digital economy services of the future 5G, IoT, and Cloud. The days of single-vendor stacks of software running on purpose-built hardware are over in all but the most high-performance applications."

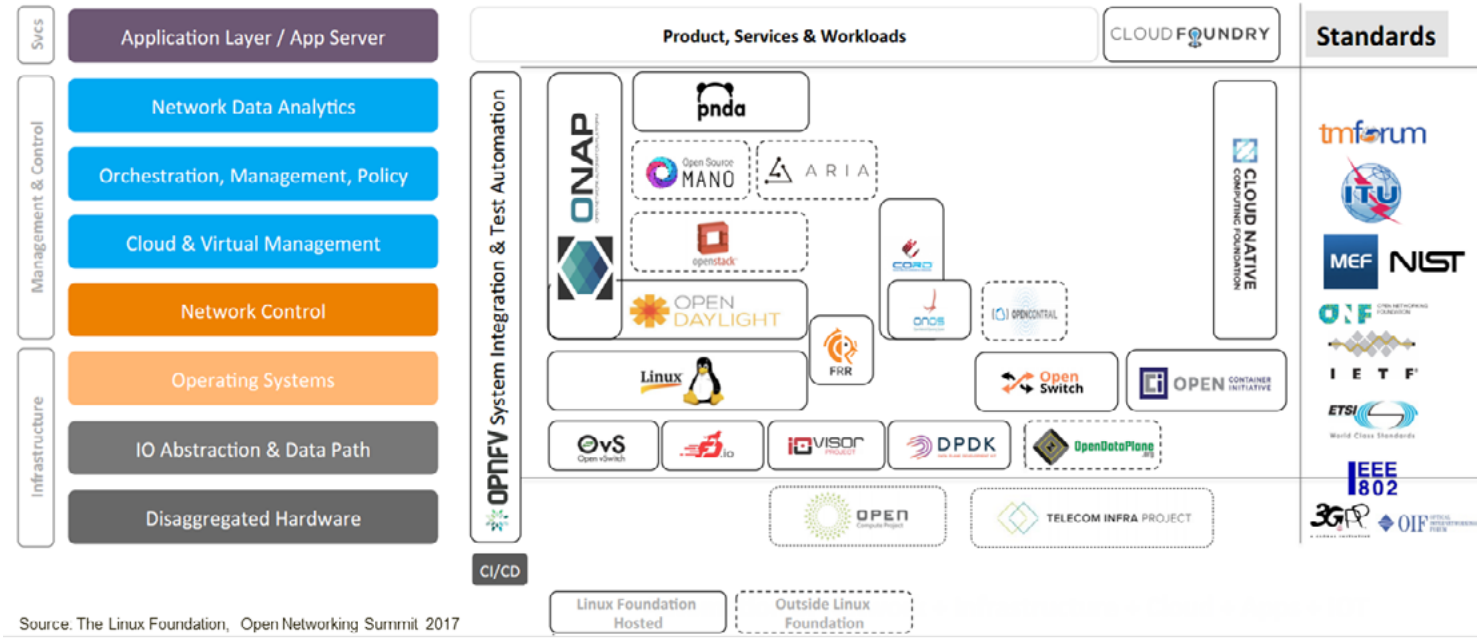
In confirmation of the popularity of open source in the telco world, it's worth mentioning that more than 50% of global wireless subscribers represented by operators have signed onto ONAP (Open Network Automation Platform), which was a result of a merger between AT&T's ECOMP and the Open Orchestrator Project (which in turn was driven by China Mobile, China Telecom, and Huawei) at the beginning of 2017. The goal of ONAP is to enable end users to design, orchestrate, manage, and automate network services and virtual functions.

10. http://bit.ly/2v6c9bX
11. http://bit.ly/2v6cGuA
12. http://bit.ly/2ffjVMU

Open source networking is a fundamental component of enabling enterprises, carriers, and cloud providers to build the entire end-to-end stack. On Figure 3, you can see a range of open source projects currently available — most of which are hosted by the Linux Foundation.

Traditional standardization bodies such as 3GPP, ITU, and ETSI are as important as ever in standardizing access technology and network protocols. Closer collaboration between telecom standardization bodies and open source projects is one of the key realizations of production-ready, end-to-end, and conceptual products in open networks.

Figure 3.
Open source projects that are currently available for building end-to-end telco stacks



Source: The Linux Foundation, Open Networking Summit 2017

Predictions for the Future

The new rules of the digital age create conditions for transitioning from oligopolies to a competitive market, in which small players with pure software products and solutions gain a certain authority. A fundamentally new paradigm of the telecommunications market is taking shape.

Developed countries will begin implementing 5G networks between 2019 and 2020. Among the first will be Japan, South Korea, China, and the United States. Operators from these countries will be the first to transform their infrastructure, business models, and internal culture to meet the new demands of 5G networks. A few predictions:

(1) Operators and vendors will try to compete on an equal footing with OTT / Web companies (e.g., Amazon, Google, Netflix, and others). From AT&T and Verizon competing with Google and Amazon solutions, to Facebook and Google entering the telecom market with their infrastructure offerings, operators will strive to offer similar services such as IoT platforms[13]. For example, some operators are already testing solutions for the transport infrastructure developed by Facebook with their own networks[14].

(2) The business model of operators will be changed. While earlier it was a B2C model (where the main services were voice communication, SMS, and data transmission), in the future each operator will choose and provide services in those industries where it deems it necessary, using business models that will be dominated by B2B2C and B2B2B. One example is smart parking, where the operator provides the infrastructure (i.e., connection and data processing platform) for the municipality or shopping center, which will directly communicate with the user (i.e., the driver who is parking). There will be two basic types of operators: those that act as platform providers (e.g., an IoT for different industries and business models: B2B & B2B2C), and those that act as digital services providers (including B2C and B2B).

(3) The telecom industry will play a key role in the massive future ecosystem of connected devices (see Figure 4). According to various estimates[15], by 2025 there will be between 30 and 70 billion connected devices in the world (e.g., smart phones, VR / AR devices, wearable electronics, IoT devices and sensors, connected cars, etc.). Operators will try to provide not only the connectivity, but also the (1) platform for data analysis and processing and (2) applications / services. One of the most promising and interesting cases will be connected vehicles and autonomous cars. By 2025, this will become a reality, made possible through the use of fog / edge computing, wherein the main data processing takes place on the "edge" of the network, as close as possible to the subscriber (machine), and AI (supported both by the car and the network). As a result, the car will be transformed into a specific movable data center. Already today, work has begun in these areas, both in the direction of AI[16] and in the field of autonomous vehicles[17] and intellectual transport.

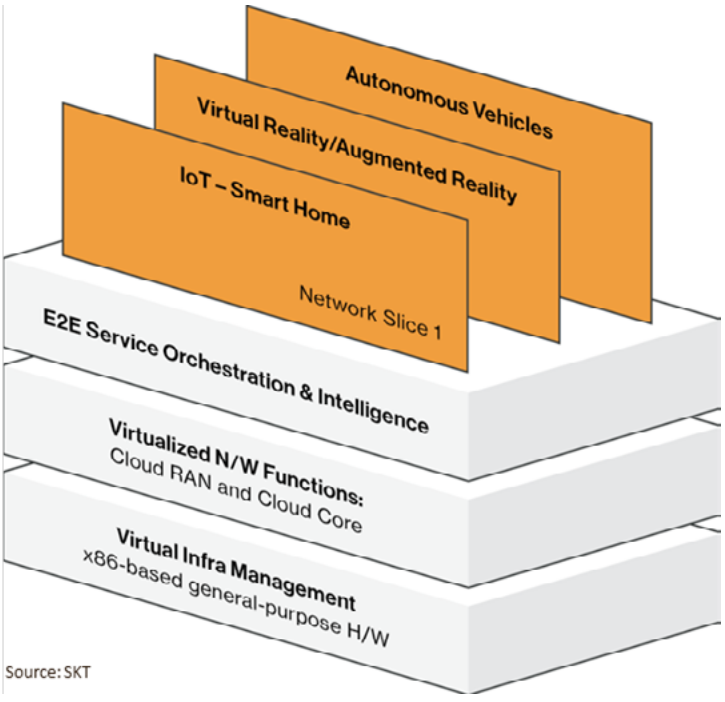


Figure 4.
A simple view of future networks

13. http://bit.ly/2v6N9kA
14. http://bit.ly/2v4znRg
15. http://read.bi/2vAgGX5
16. http://bit.ly/2wsOxxG
17. http://bit.ly/2urO9Ok

Conclusion

Such intensive development within the communications industry poses new challenges for consumers, enterprises, operators, and vendors. Partnering with a digital product development company like GlobalLogic significantly increases the competitiveness of a telco company's products and services, from accelerating digital transformation for Communications Service Providers to helping Network Equipment Makers develop next-generation products and services and build digital platforms.

As companies enter the digital era, they need to form global transformational processes in order to stay competitive in the global economy. A quality partnership can help players across the telco landscape master new ways of coordinating these global business processes.

GlobalLogic®
1741 Technology Dr.
San Jose, CA 95110

+1.408.273.8900
info@globallogic.com
www.globallogic.com