

The value of the telco cloud

White paper

Faster time to revenue and more value from IoT and 5G

Network Functions Virtualization (NFV) and Software Defined Networking (SDN) are being deployed in today's communications networks. With cloud computing technologies, operators can reach up to 50 percent higher utilization with their platforms and will benefit substantially from higher operational efficiency.

This paper outlines the opportunities enabled by cloud technology. It discusses how telco cloud delivers value through just-in-time capacity, automated operations, openness and short innovation cycles.

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Assessing the telco cloud's value

The telco cloud combines the benefits of cloud computing, Network Functions Virtualization (NFV) and Software Defined Networking (SDN). Cloud computing has already transformed enterprise IT and now SDN is changing the way networks are operated. NFV and SDN will also help shape the future of telecommunications networks.

The first commercial telco cloud projects are proving the new agility and efficiency that operators can expect, as well as enabling 5G.

The telco cloud brings measurable improvements in capital and operational efficiency to achieve lower total cost of ownership (TCO). Adopting a new cloud operating model can also increase flexibility as well as accelerate innovation, for example, in the development of new services.

Another way to look at the value of the telco cloud is Total Value of Opportunity (TVO), which links the new cloud capabilities to the expected business impact. TVO determines the business value of a particular IT investment. A metrics based approach, it takes account of factors such as risk, time and the ability of the organization to convert the projected value of the investment into real business benefits. For example, a solution that is open source or is part of a wide ranging ecosystem, may offer much greater business benefit than another, more proprietary solution with a similar capital cost.

Figure 1: Assessing Total Value of Opportunity for telco cloud relative to traditional deployments



Going beyond virtualization

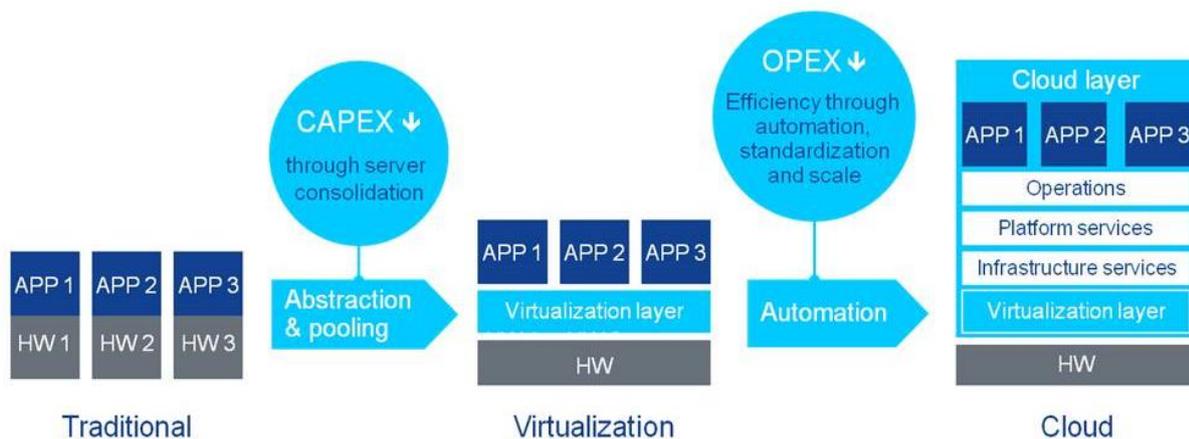
As numbers of applications, services and devices explode and multiple access networks emerge, operators face new challenges as well as exciting fresh opportunities. Uncontrolled and unpredictable traffic explosion calls for continuous investment in new network capacity. New devices and apps mean that operators are confronted by web players who can launch new services very rapidly. Efficient networks are required to improve profitability by driving down costs. Creating excellent customer experiences is critical to safeguard revenue.

Telco cloud transformation addresses all these issues. Cloud technology is needed to drive efficiency and competitiveness and even support integration with over-the-top (OTT) application providers to enable new business models.

While NFV and SDN have been deployed in operator networks, these are typically small scale and focused on virtualization rather than large scale centralized cloud deployments. These early deployments prove the technology works and provide OPEX and CAPEX efficiency. Yet to gain the real benefits of cloud technology we need to look beyond virtualization.

Telco cloud is not being built for short-term gains, but to enable widespread operational efficiency and to build a platform for innovating new services.

Figure 2: Making infrastructure assets more relevant to business



Using large scale data centers allows operators to improve TCO through centralization, automation and efficiency. Furthermore, cloud technology allows significantly faster-time-to-revenue for new services.

Cloud computing, NFV and SDN will be key to implementing 5G networks. Operators are looking to separate control and user plane as well move towards stateless VNFs with cloud databases storing subscriber and session data.

Cloud transformation captures new value

Rapid growth in personalized services and connected devices has seen users demand easily accessible content and communications. The new programmable world requires a network with very different capabilities - one which uses open interfaces and allows new applications and revenue streams.

It also offers operators a standard, future-proof network architecture that is open, interoperable, and easily evolved to offer maximum re-use of existing equipment.

As well as running network functions on generic pooled hardware, the telco cloud offers just-in-time capacity, automated operations, an open ecosystem and shorter innovation cycles.

Get more capacity 'just-in-time'

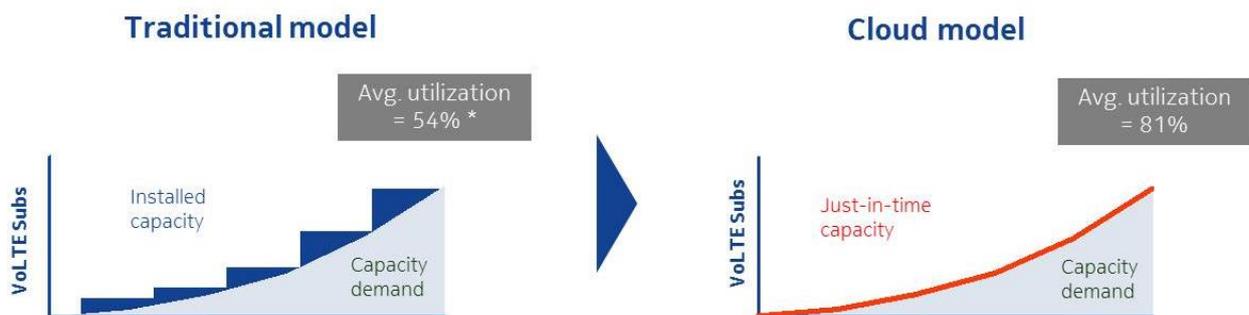
Current manual capacity planning creates many inefficiencies – slow response to rapid growth in capacity demand, unused capacity and resources locked in to labor-intensive capacity monitoring and planning. Delays in procurement further affect revenue and increase OPEX. Deploying current multivendor bare metal equipment also leads to higher training and testing costs.

The entire cycle of traditional capacity planning, procurement and deployment can take more than a year, while current planning techniques use offline network data as input, which becomes obsolete by the time planning is complete.

With conventional planning, actual subscriber demand either leads or lags the installed capacity, giving low average utilization of network elements. It can also lead to more demand than capacity, potentially losing revenue.

Cloud-based just-in-time deployment of capacity means subscriber demand follows installed capacity very closely, for much higher average utilization. Lower planning, procurement and deployment effort leads to savings in related costs, while improved utilization allows lower TCO over time.

Figure 3: Just-in-time capacity augmentation improves network utilization and enables faster implementation (* excluding all instances when utilization exceeds 90 percent)



Temporary capacity issues must also be considered. These include festivals and other events that may require re-sizing of the network for just a day or a week. When all network capacity is virtualized, it is easier to meet such transient demand by scaling resources up or down very quickly.

Near real-time and just-in-time capacity planning is efficient and by using common off-the-shelf IT hardware, better hardware utilization is achieved. It also protects revenue from uneven demand. As well as reduced revenue risk from long deployment cycles, Nokia estimates up to 70 percent reduction in planning, procurement and deployment efforts, and 11 percent lower CAPEX.

Automated operations benefit customers

Technology and automation provide error-free, quick and efficient services to customers. The telco cloud makes resources for new functions available within minutes, while automation allows operators to quickly deploy and test new services, and remove them if they do not succeed - all at minimal cost.

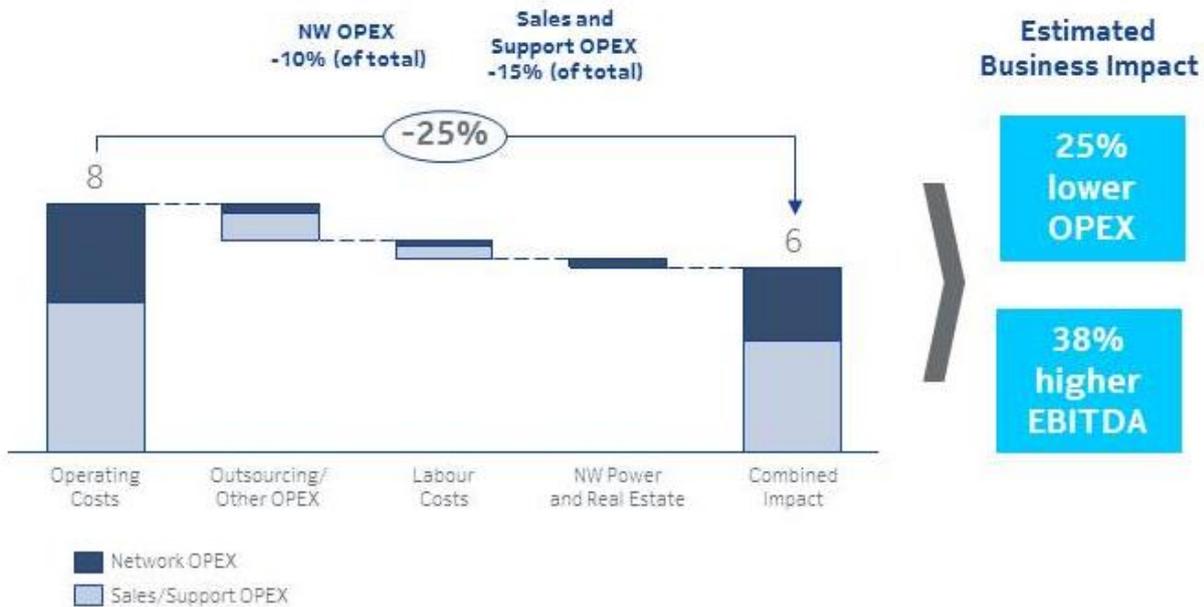
To understand the potential OPEX savings, we can break them down into categories. The OPEX model considered here is based on available research¹. The OPEX impact is examined in terms of technology onboarding (network OPEX) and changes to the operating model (non-network OPEX).

If we assume an ARPU of 15 EUR, then based on the model in the study, network OPEX-related savings of 0.8 EUR/sub (equal to 10 percent of total OPEX) and Sales/Support operations cost savings of 1.3 EUR/sub (equal to 15 percent of total OPEX) are achieved. The results are driven by savings from automation and simplification. This OPEX reduction helps to achieve a 38 percent increase in adjusted EBITDA². Actual savings will depend on the scope of the cloud network and the operator's situation.

1 ADL and Bell Labs Report (Reshaping the future with NFV and SDN, May 2015)

2 Network OPEX comprises OPEX from access/aggregation, service platforms, core, transmission, network monitoring and management. Sales and support operations costs includes OPEX from sales & marketing, customer care, G&A, IT, facilities. 60 percent of adjusted revenue is OPEX; 8.3 percent of revenue is interconnect (ICX) and handset sales.

Figure4: Potential impact of cloud on operator OPEX – example



Key value drivers for OPEX reduction are technology on-boarding and revised operating model.

Technology on-boarding involves adopting software-based network functions, saving data-center costs such as floor space and power. The benefits become significant as more functions are virtualized and cloud hardware delivers higher performance than legacy hardware.

Improved service fulfilment costs are achieved with cloud based inventory management, activation and optimization processes. Improved service assurance costs come from using near real-time network analytics. Telco cloud data offers a global view of services as seen by the customer. This information allows automated fault and performance actions and reassignment of workload in minutes.

This can also reduce the time-to-repair by automatically pinpointing exact causes of problems. Improved service delivery costs are achieved by automating the ordering, configuration, and deployment of these network functions with NFV technology.

The new operating model is based on using flexible new technologies to streamline operations from marketing, sales, back-office and associated IT. A more efficient service assurance process can help call center staff to reduce the number of escalated customer complaints. Automated service creation also saves time.

Less waste, more innovation through openness

Meeting telco cloud’s diverse requirements demands an architecture that combines traditional enterprise cloud features and telecom specific requirements and functions. With an open ecosystem, we can avoid the duplication of effort that occurs in competing, proprietary systems,

while using its common resources to produce innovative new solutions. An open ecosystem requires open interfaces, industry alignment and a partner ecosystem and is ultimately one of the components making up the TVO of a solution.

Open interfaces: The open interfaces in Telco Cloud are between the layers of the ETSI reference architecture. The main interfaces are between NFV Infrastructure and the VNF Manager, between umbrella level OSS/BSS and the element management system, between umbrella OSS and orchestration and between orchestration and VNF Manager. Yet existing 3GPP architecture and open interfaces are unchanged.

Open source: Using open source based solutions instead of proprietary ones have helped enterprises achieve significant cuts in TCO. Open source solutions also often provide better quality and security than closed solutions. Vendors can add value on open source code with their own applications as well as provide services supporting open source deployments.

Industry alignment: Industry alignment is achieved through a large number of initiatives such as ETSI Network Function Virtualization Industry Specification Group (NFV ISG) and in the Open Platform for NFV (OPNFV). ETSI NFV ISG has defined telco use cases and the NFV reference architecture. The second phase of ETSI standardization is sharpening and enhancing the standards. OPNFV is a Linux Foundation collaborative project implementing a carrier-grade open source reference platform based on ETSI standards and architecture and designed to accelerate the introduction of new products and services. As a strong contributor to both efforts, Nokia is committed to keeping its architecture closely aligned.

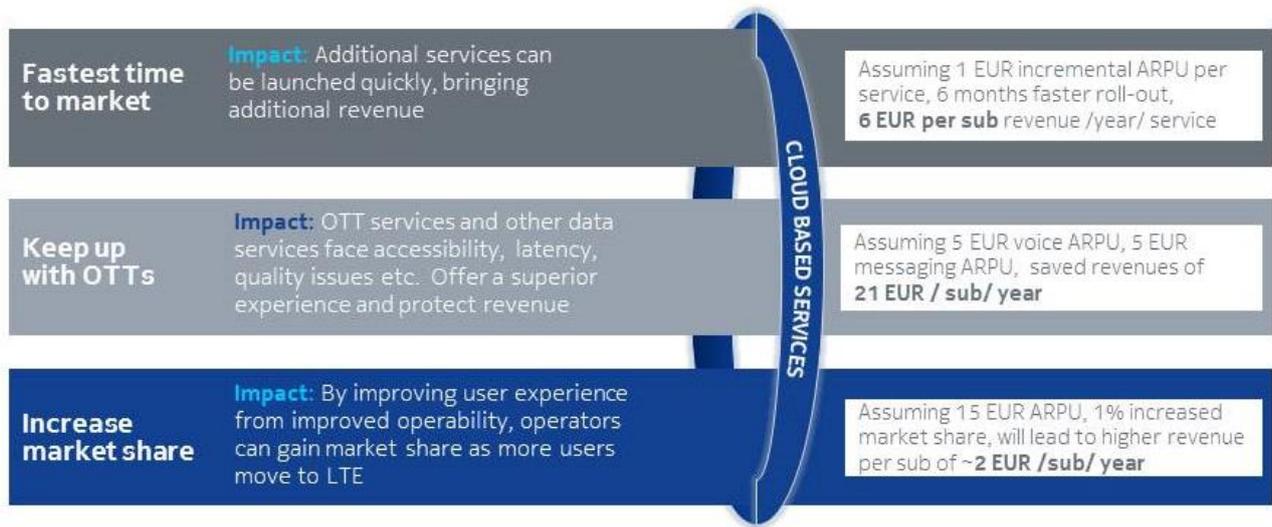
Partners: A strong partnership ecosystem between vendors means operators can work with multiple vendors without interoperability issues.

A faster way to innovate

Agile introduction of new services: Operators face increasing competition from over the top (OTT) vendors that operate on the cloud and introduce new services very frequently. The cloud allows resources for new functions to be available within minutes instead of months.

A quantitative estimation of the possible financial benefits of faster innovation is shown in figure 5.

Figure 5: Cloud brings IT-like agility to launch new services and improve user experience



DevOps is paramount for achieving cloud agility: DevOps is about people, processes and technology. DevOps is simply a culture that brings Development and Operations together to improve the customer experience. DevOps is complementary to Agile principles as it extends the continuous integration and release process and ensures that code is ready for production.

Figure 6: Use of DevOps methodologies by operators can help them to work more efficiently with external suppliers



Anticipated changes when implementing DevOps: Across the entire organization, teams must be willing to take ownership, including expanded responsibilities, while managers need to accept the decision-making power of teams.

Business process evolution: Virtualized infrastructure requires subtle changes in both business processes and operational procedures. For example, changes are needed in security, troubleshooting and repair, business service planning and implementation and network planning and implementation processes.

Nokia Telco Cloud

Nokia believes that openness is key to a healthy industry ecosystem, with open standards and open source playing important roles. Open standards help to ensure industry compatibility between different implementations, whereas open source implementations can be used where one implementation is adequate for the industry. Nokia's commitment to openness is proven by its long history in open standards and support for open source initiatives including OPNFV, Open Compute Project (OCP), OpenStack and Telecom Infra Project (TIP). Nokia also expects 3GPP architecture to evolve over time to help optimize the cloud.

Partnering is another fundamental part of Nokia's approach. Our partnering strategy is based on:

- achieving cost effectiveness and agility by offering partners' components
- increasing innovation so operators can enhance their customer experience by collaborating with trusted partners
- dynamic collaboration for customer benefit. For example, there are 60+ partners in the Nokia CloudBand Ecosystem, allowing a range of solutions to be developed using different components to suit a customer's particular needs.

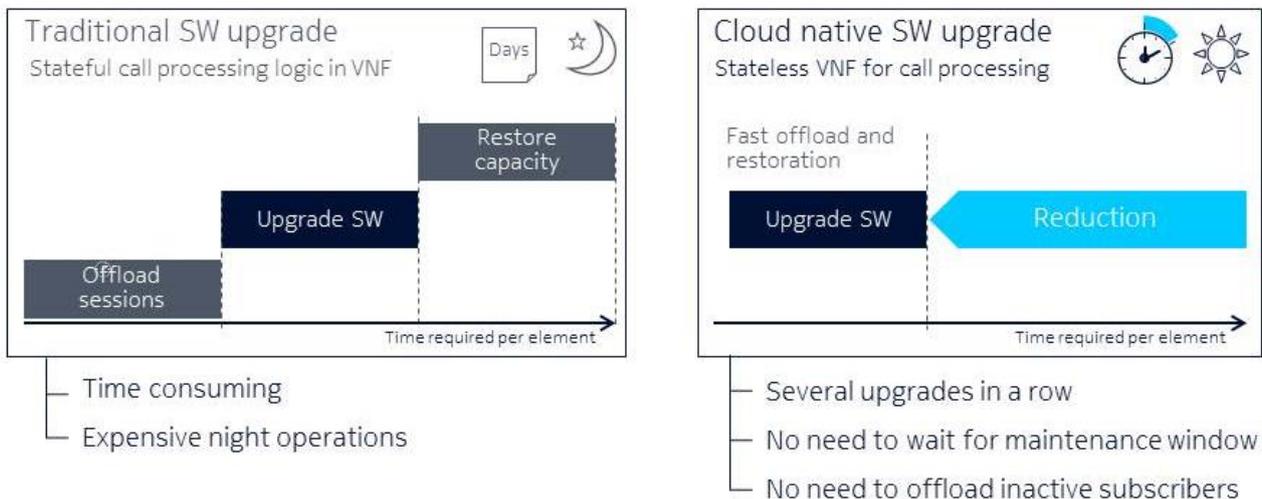
Nokia already has several NFV and SDN solutions to enable business benefits, for example:

- Nokia AirFrame data center portfolio for both telco and IT workloads, both in centralized and distributed deployments.
- CloudBand portfolio makes it simple to host, orchestrate, automate and manage virtualized network functions (VNFs) and services. Its scalable and flexible products help to reduce time to revenue for new services and use automation and optimization to make network operations lean. With CloudBand, operators benefit from the rapid pace of open-source innovation and get a carrier-grade product that is ready for deployment.
- Nokia SDN solutions include Network Services Platform offering a unified approach to carrier SDN for IP and optical networks, whereas the Nuage Networks Virtualized Services Platform provides data center automation.
- Complete portfolio of virtualized network functions for operator networks, including for example, Nokia AirScale Cloud RAN, Nokia TAS and IMS, Nokia Virtualized Service Router (VSR), Nokia Cloud Mobility Manager, Nokia Cloud Mobile Gateway.
- Nokia cloud wise services help operators go commercial with a strong multivendor suite of services. With our data center services we help operators build a robust infrastructure efficiently with our DevOps processes and automation. Innovations like Telco cloud index and cloud verification services showcase our thought leadership in cloud. We also provide services around hybrid and full cloud operations and maintenance.

- Shorter innovation cycles and DevOps through open APIs provided by Nokia VNFs and APIs provided by the Nokia shared data layer solution.

Nokia Shared Data Layer supports a common session database architecture serving cloud native VNF applications. Could native applications allow faster, less costly software upgrades. Based on analysis of the impact for IMS core applications, Nokia estimates that a Shared Data Layer based solution can deliver associated OPEX savings of up to 26% through simplifying operations and enabling automated procedures. Nokia Shared Data Layer also helps improve overall system redundancy while helping reduce the overall computer resources required.

Figure 7: Faster software upgrades with stateless VNFs lead to lower TCO



Shorter innovation cycles allow operators to launch new services to increase ARPU and to compete and/or partner with OTT services, while providing faster time to revenue.

Conclusion

Technological advances in IT are transforming the telco industry. Powerful centralized data centers based on low cost hardware and fast networking are creating new ways for the telco industry to transform networks. Nokia is using all these technological advances to create an innovative IoT and

5G-supporting cloud solution that goes beyond virtualization and simply rebuilding current network architecture in the cloud.

Nokia's vision is to enable operators to transform to the next generation cloud-based telecommunications network. Using its expertise and long experience, Nokia has built its telco cloud solution with four key goals in mind:

- To support massive (potentially unlimited) scale and elasticity to meet the demands of next generation converged networks.
- To offer best-in-class TCO with serviceability and operability based on automation.
- To foster ecosystem development to allow third party services to use operator infrastructure, while ensuring security and data privacy.
- To enable operators to innovate faster, match OTT innovation cycles and offer telco grade reliability as a key differentiator.

By promoting a dynamic ecosystem and open solutions, Nokia also ensures operators get the highest possible TVO for their investments, with value going beyond the mere cost of the solution.

The telco cloud value proposition will further expand in the future with innovative solutions and use cases developing rapidly. Telco cloud also brings fundamental changes to the culture of operators as it enables rapid response to customer demand and integrates IT and telecoms into one entity. This means operator organizations must also evolve.

As a central component of the future programmable network, telco cloud represents a substantial advance in network capability that will create new value for operators globally. NFV and SDN provide a cost-effective and scalable platform for the IoT. Cloud technology transformation is happening now, and forms the foundation for 5G networks.

Acronyms

3GPP	3rd Generation Partnership Project
API	Application Programming Interface
ARPU	Average Revenue per User
BSS	Business Support Systems
DevOps	Development and Operations
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
IaaS	Infrastructure-as-a-Service
IETF	Internet Engineering Task Force
IMS	IP Multimedia Subsystem
IoT	Internet of Things
ISG	Industry Specification Group
MANO	Management and Orchestration
NFV	Network Functions Virtualization
OCP	Open Compute Project
ONF	Open Networking Foundation
OPNFV	Open Platform for NFV
OSS	Operations Support Systems
OTT	Over-the-Top
SDL	Shared Data Layer
SDN	Software Defined Networking
TAS	Telephony Application Server
TCO	Total Cost of Ownership
TIP	Telecom Infra Project
TVO	Total Value of Opportunity
VNF	Virtualized Network Function



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