

# REMOVE LIMITATIONS TO THE MOBILE TELCO ARCHITECTURE: TELCO-OVER-CLOUD (ToC)

The Mobile Telco architecture is composed of a large number of expensive physical devices, each segregated in its own area. This offers little to no flexibility, making the overall architecture hardly scalable for the future. Technologies such as Software-Defined Networking (SDN) and Network Function Virtualisation (NFV) are sparking numerous innovations in the networking landscape. One of them being Telco-over-Cloud, which can be directly applied to the Mobile Telco architecture to remove its current limitations, making it more cost-effective, flexible, powerful and easily scalable for the future.

## INTRODUCTION

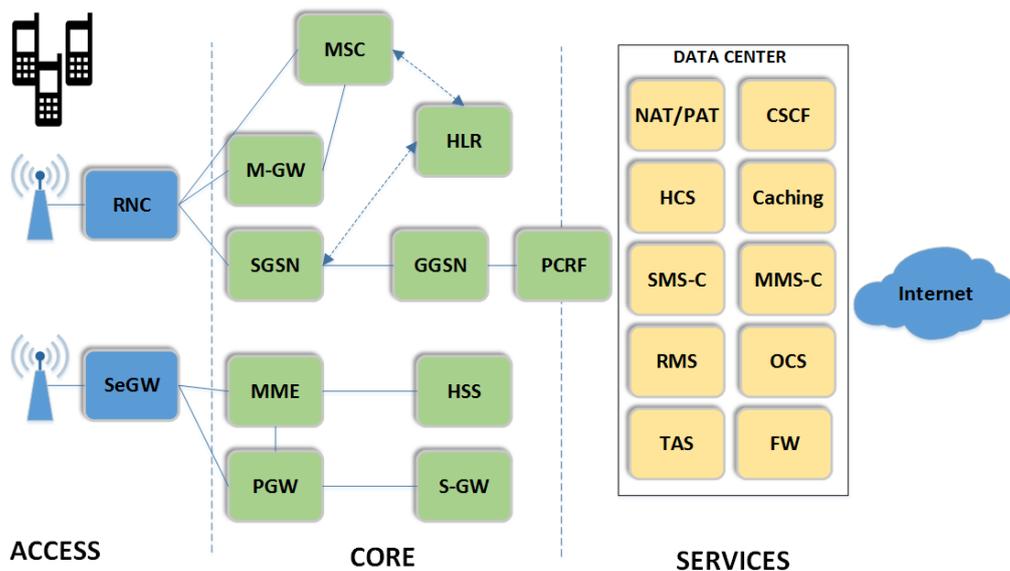
Mobile networks have undergone significant changes in the past decades, seeing various advancements in speed and technologies ranging from GSM to 4G networks. With all of these changes the Mobile Telco Architecture remains composed of three very distinctive areas: Access, Core and Services, which will be explained briefly in the first part of this document. The purpose of Telco-over-Cloud is to gather all the different components of the mobile telco architecture belonging to each of these three areas, and move them inside a cloud compute environment. In this proposed scenario, the cloud will be a technology centre (similar to a data centre) inside which all the different components of the mobile telco environment (e.g. SGSN/GGSN, HSS, SMS-C nodes and so on) can be created and deleted as virtualised instances at will, depending on the requirements.

The introduction of the Telco-over-Cloud concept is catalysing many changes to the mobile communications architecture, helping define its future. The purpose of this paper is to discuss what some of these changes are by comparing them to today's architecture, and by showing what the main benefits brought by such changes will be.

## EVOLUTION OF THE TELCO ARCHITECTURE

**TRADITIONAL MOBILE TELCO ARCHITECTURE.** A mobile telco network is composed of three main areas: Access, Core and Services. The Access area is where end-users are directly connected to the Telco network, usually through antennas. The Core is where the processing of voice and data traffic, as well as mobile management, takes place. Finally, the Service area is where all the services such as SMS and MMS Centre, NAT/PAT, Firewalls and many more are hosted.

An example of a traditional mobile telco architecture is illustrated in Figure 1 below:



**Figure 1:** Traditional 3G and 4G Mobile Telco Network

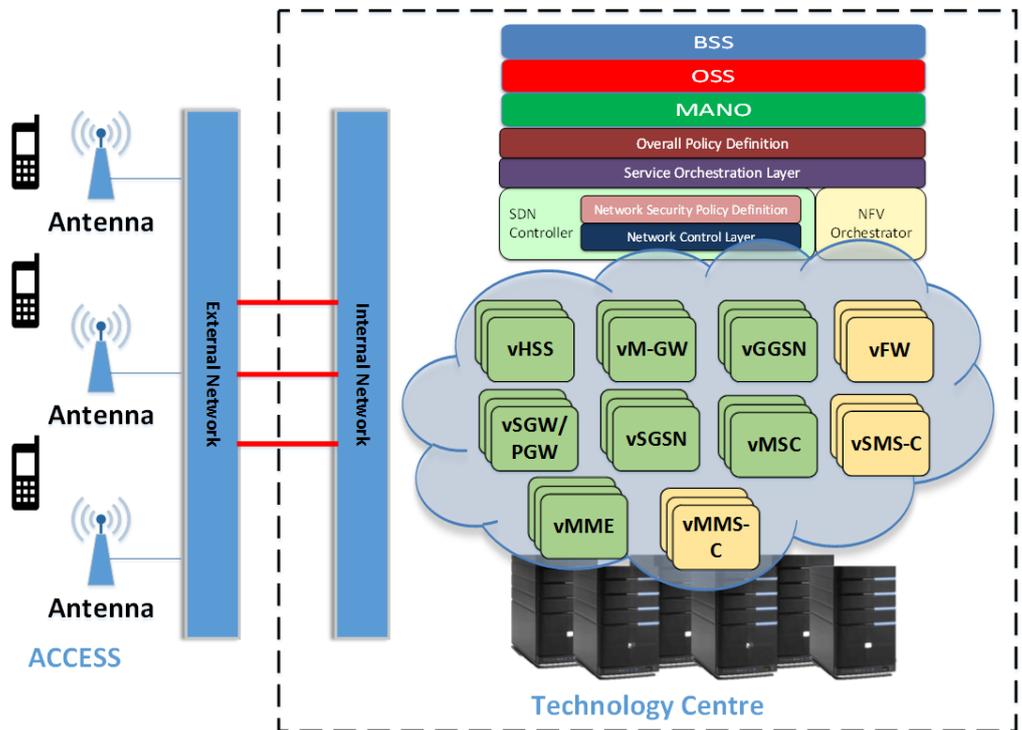
The traditional architecture is very static. Each component is physical, usually implemented with dedicated, specific and expensive proprietary hardware. This is often designed and provided by specialised hardware vendors, who by closing their platform make interoperability more difficult. In addition to this, each area of the network is not only logically separated, but also physically segregated as well. Thus components for each area (Access, Core & Services) remain in their respective domains, which results in a rigid network with limited flexibility.

This could prove problematic in situations such as when the network needs to be scaled up - when support for large traffic loads is required, or scaled down - when there is little traffic going through.

**TELCO-OVER CLOUD.** A more flexible and agile network for communications providers can be obtained by using the principle of Telco-over-Cloud (ToC) through the use of new technological advancements. Firstly, the Telco-over-Cloud architecture takes advantage of Network Function Virtualisation (NFV) principles, by virtualising communication services components and using an NFV orchestrator to control them. Secondly, all of the now virtualised components will be connected together using Software-Defined Networking (SDN) concepts and technologies, by centralising the network control plane to have full control and complete, granular visibility over the whole network from a single logical point (i.e. SDN Controller). Finally, the concept and implementation of MANO (Management and Orchestration) systems will be used to manage and orchestrate the whole environment in a holistic, policy and service-oriented way.

Figure 2, below, illustrates the evolved ToC architecture, where the physical resources used to host most of the components of the Telco environment are simple COTS (Commercial Off-The-Shelf) x86 servers and standardised network hardware (typical cloud data centre equipment).

The only elements that will not be virtualised inside the cloud environment are the antennas in the Access network, i.e., even though radio towers will still remain physical, most of their more complex components, such as the Base Station and eNodeB services, will also be potentially virtualized inside the technology centre. Ultimately, antennas and radio towers will end up being really simple devices, only responsible for transmitting and receiving radio signals.



**Figure 2:** Telco over Cloud

## BENEFITS & OPPORTUNITIES

By leveraging technologies, such as SDN and NFV and advancing to a Telco-over-Cloud architecture, an organisation can realise benefits and opportunities that were either not possible in the past or prohibitive due to their high cost.

Overall, some of the benefits that can be realised by introducing Telco-over-Cloud in an organisation are the following:

- **Lower CapEx**, by reducing and standardising hardware costs through virtualisation (NFV)
- **Lower OpEx**, by increasing ease of operation and making everything manageable from a single central logical point (SDN and more particularly the SDN Controller)
- **Standardisation** of all the components and protocols (taking place through organisations such as ONF and ETSI) will also significantly simplify the design, development and deployment of new components
- **Speed, agility, flexibility and scalability**, allowing for faster and more granular service deployment, more closely tailored to the customer needs
- **New revenue opportunities** and **faster ROI** by providing a considerably shorter time-to-market
- **Increasing number of services available** thanks to faster and constant service innovation

## CONCLUSIONS

Telco-over-Cloud is a use case for SDN and NFV, which when applied to the Telco environment will completely change the way Mobile Telco Networks are implemented. This will bring unprecedented agility, flexibility and scalability to the network, providing considerable advantages and benefits over traditional designs that are not ready for the current and future demand in mobile connectivity.

Many operators have started early implementations of this Use Case, and some examples are mature enough to be deployed in live networks.

## NET REPLY'S OFFERING

Through its distinct competencies, Net Reply assists clients in realising the benefits and dealing with the impacts of the disrupting technologies on their environments. Net Reply leverages real-world experience in SDN & NFV consulting for the TMT market, having worked with global Telco providers and established strong relationships with all major SDN vendors.

Through active collaboration with various vendors and , by forming partnerships with educational institutions, as well as performing internal research & development, Net Reply creates and supports innovative projects around new technologies, such as SDN & NFV.

Some of the more detailed offerings in the area of SDN & NFV include, but are not limited to, the following:

- SDN/NFV Requirements Definition

- Solutions Evaluation (including RoI, TCO)
- Architecture Design and Technical Consulting
- Security Assessments
- Proof of Concepts (PoCs) Design, Plan and Testing

Net Reply builds upon this knowledge and partners with its clients to define their strategy and identify the trajectory they should follow towards adopting these disruptive technologies, for future proofing their environments and their investments. Net Reply builds on the basis of understanding the customer requirements and selecting the optimal solution towards programmability, service agility, automation and openness in their networks, in a vendor agnostic way.



Net Reply is the Reply Group company specialising in Network Transformation. In a world where Software and Networks are converging, Net Reply provides a proven combination of software development, agile delivery and network expertise to help organisations simplify, automate and integrate Network service delivery.

Using advanced Network analytics Net Reply can help resolve the operations and security challenges of migrating to cloud environments, optimising infrastructure investment and protecting critical infrastructure.

Whether adopting new technologies or transforming the way you deliver Networking solutions, Net Reply can help you migrate, automate and secure your Network services.