 

# SDN Inter-Carrier Organization for Future Networks

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***Abstract:*** ***There is massive transformation in data communications network which is pushing service providers to re-think connectivity. With OTT (Over the top players) eating into revenues of the telcos, the telcos are rethinking of a future network that could deliver self-service, ON demand and seamless cloud connectivity for their customers. The future network is a network that can deliver Orchestrated network services to enable digital transformation in a seamless fashion. This will include Network itself being delivered as a service through an automated, orchestrated, managed software based service orchestrator.***

***Key Drivers: The Need for Future Network***

## I. I. INTRODUCTION

This paper describes the future of networks and how the telcos are consolidation and collaborating to defend their territory against OTTs. This new third generation network will also enable services between, not only physical service endpoints used today such as Ethernet ports (UNIs), but also between virtual service endpoints located on blade servers in the cloud in order to connect to Virtual Machines (VMs) or Virtual Network Functions (VNFs)[1][2].The industry vision of the future network make the network appear to the user as the user's own virtual network with value-add services. This enables IT administrators to in a dynamic and on-demand way create, modify and delete services via customer web portals or software applications. This can be achieved by building upon various cloud centric technologies like SDN, NFV and APIs.

Orchestration over multiple provider networks is one of the biggest challenges to create third generation future network services[3]. The customers today are looking for below

### A. Cloud Connectivity

The end customers are looking for cloud connectivity with multiple cloud service providers. Initially this connectivity was provided over the public Internet; the requirement of security, predictable and guaranteed performance are difficult to achieve on public internet[4]. Hence there is a need for connectivity between multiple cloud providers to meethe defined service level objectives

### B. On Demand Services

The service providers are under immense pressure to match the roll out of network connectivity services in par with the cloud centric services offered by the OTT. With the continued rapid growth of cloud services as a new revenue source for communications service providers, network connectivity services must also evolve to align with cloud services' Short service activation times and variable service durations[5][6]. Additionally, on-demand network connectivity servicesenable faster time to revenue balanced by the duration of theservice[7].

### C. End to End Quality

In the current market dynamics more and more services are being consumed from cloud by the end users[8]. This creates a necessity for networks to perform well so that the user applications can run seamlessly on these networks supporting the cloud

### D. Growing up the value chain

The telcos want to grow up the value chain vis a vis just being dumb pipe provider. Below is quick snapshot on the telco evolution model as seen by the industry


Digital transformation that is driving enterprises to embrace cloud computing and build hybrid IT infrastructures must include the network. The solution is not to add more routers or full-time IT personnel; closing this gap requires companies to adopt a new approach to managing the network. The hybrid IT environment has become the norm as enterprises decide to employ infrastructure-as-a-service (IaaS) and software-as-a-service (SaaS) offerings rather than build and maintain

capex-based systems and applications in their data centers[9]. The future network should be able to offer network as on single fabric talking to devices and with applications running on different use cases

### E. Evolution of Telecom and Network Services

The network of future would have multiple applications running in the shared environment. This shared environment introduces the possibility of resources conflict that may cause service degradation. Real-time media communications using voice over IP (VoIP) and video, for example, are decoupled from what was formerly an application-specific infrastructure of telephones (devices) and the PSTN (network). Now, real-time media communications are an 'app' that runs on computers, tablets, smartphones and IP phones that connect over a general-purpose packet-based network and often the 'best effort' Internet[10].

The underlying network must transform to facilitate cloud service delivery with agility in a way that connects people and devices in real-time, on-demand, with an assured quality of experience.

## II. THE ATTRIBUTES OF THIRD GENERATION FUTURE NETWORK

The future network would be based on three key attributes Agility, service assurance and service orchestration

### A. Agility:

Agile refers to the service providers' ability to rapidly introduce new, on-demand services leveraging new technologies together with the necessary transformation of the operational environment. Service agility is achieved via proper product, service, and resource abstractions leveraging open APIs and service orchestration. SDN and NFV enable significant network agility for the new Third Network, but require the service providers' operational environment to be at least as agile in order to achieve accelerated time-to- market for new service introduction. Service and network provisioning must move away from hard-coded paradigms to re-usable building blocks that will be more dynamic and model driven.

### B. Service Assurance

Given the dynamic, on-demand nature of a Third Network, subscribers self-provision their services and the related workflows are completely automated with little to no involvement on the part of the Operator. The ability for subscribers to gain visibility into how well their service is working and analytics-based insights into how well their applications are performing form the basis of an assured service

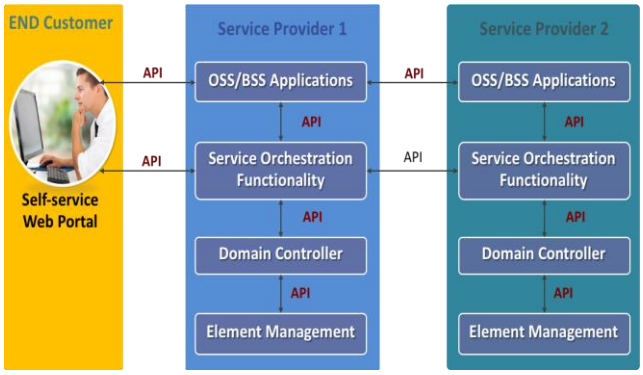
### C. Service Orchestration

Orchestrated refers to dynamic and automated service management of the entire lifecycle of connectivity services that may encompass network domains within a single Operator's network or across multiple Operator networks. This includes service fulfillment, control, performance, assurance, usage, analytics, policy, and security. Since no service provider has a network footprint in all locations, such automation must include that for peering between service providers for automated ordering, provisioning, and management of access or transit connectivity services that reach off-net subscriber physical or virtual locations required for a given virtual tenant network[11]. This is is achieved programmatically through APIs that provide abstraction from the particular technology used to deliver the service.

## III. PROPOSED METHODOLOGY

The future network vision, will enable network connectivity services to be delivered to physical or virtual service endpoints with a set of dynamic service attributes. These dynamic service attributes enable network connectivity services to better align with on-demand cloud service capabilities. For example, many real-time applications measure network performance. In the future, these applications could automatically communicate their requirements via an API on how they want voice, video or data conferencing treated in terms of bandwidth, packet loss, jitter and delay requirements. No longer will there be a need for a tenant being forced to statically provision Classes of Service (CoS) at a given site for a given application. Instead, the Third Network will be inherently elastic so that when an application dynamically enables additional features for a given session, the Third Network will automatically adapt to the application's needs, having eliminated static provisioning models which are very common in today's business networks. For example, a Unified Communications application session might be initiated only for voice communication and then dynamically evolve on demand into a multiparty conference, with high definition video and application/white-board sharing, these being supported by the appropriate Classes of Service created dynamically in the network response to triggers in real-time by the application. The below Schematic shows the interconnectivity between two telecom operators. Using a set of open, standards-based APIs enables orchestration of a set of technology domains in both the north-south and inter- provider east-west directions. Open North-South APIs allow orchestration of technology domains regardless of the particular vendor-specific or open source implementation of the technology domain. Open East-

West APIs between providers enables automation of inter-provider workflows around ordering, serviceability, and other aspects of the service lifecycle Below Block diagram represents how a third network can be implemented.




## IV. RESULT ANALYSIS

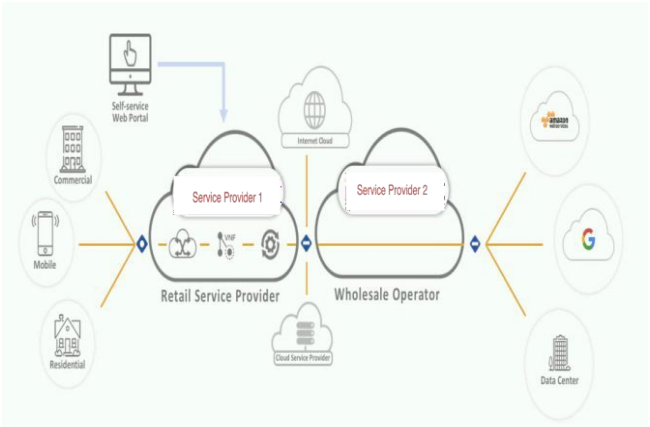
In order to realize the potential of a third-generation network that is agile and automated, the industry's strategy is to embrace and address the emergence of LSO, SDN, and NFV as the foundational layers for third generation networks..

The Industry today is working on the following

- Information models
- Network as a service definition
- Resource Orchestrator functionality
- Standardization of APIs
- Reference Implementation

The third network will enable creation of new service revenue for multiple telcos. The same can also be extendedto any public cloud connectivity as highlighted below.

## V.




## VI. CONCLUSION

A significant transformation is taking place in data communications networks that will accelerate network operators' abilities to deliver self-service, on-demand services over interconnected , multi-operator networks. this transformation can be achieved by combining the on- demand agility and ubiquity of the Internet with the performance and security assurances of today's business networks. In summary, the goal of the industry next generation network is to enable agile networks that deliver assured connectivity services orchestrated across network domains between physical or virtual service endpoints. The industry bodies like MEF, CORD, Open-O, ODL, OPNFV, ONF, ON.Lab and TM Forum are working together to address a number of issues to ensure that services and related functions work reliably across multi-operator networks.

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