



Tango Telecom & Network Functions Virtualisation

Enabling extreme competition



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Mobile operators face an increasing threat from OTT applications consuming their data bandwidth: Smartphone messaging applications such as WhatsApp are using mobile data networks bandwidth to replace the world's SMS service; Facebook and Netflix consume bandwidth for their services without creating significant revenues for mobile operators.

Current telecommunications technology has failed to foster a microclimate in which new services and commercial initiatives can flourish and develop quickly in response to market demand. Mobile operators lack the technology and tools to compete with OTT vendors and have been on a course towards becoming a utility: a dumb data pipe serving the profits of OTT vendors.

Network Functions Virtualisation (NFV) is a network architecture concept that proposes using IT virtualisation related technologies, to virtualise entire classes of network node functions into building blocks called Virtualised Network Functions (VNFs) that may be connected or chained together to create telecommunication services.

NFV enables mobile operators to reduce costs through the gradual replacement of existing large in-house vendor specific and hardware specific solutions with virtualised Software as a Service (SaaS) systems. In addition, NFV gives mobile operators the flexibility to increase service velocity in direct response to market opportunities and requirements. Short-term opportunities can be seized through the extra agility enabled by NFV with changes to existing services being launched in a fraction of the time that it currently takes to adapt legacy vendor solutions.

Traditionally, Tango Telecom's solutions have used open APIs and have been hardware and operating system independent. This approach led to an easy transition to the full virtualisation of the Tango iAX™ software platform. All Tango Telecom's solutions are fully virtualised and cloud-available globally, enabling operators to benefit now from the many advantages of network functions virtualisation (NFV).

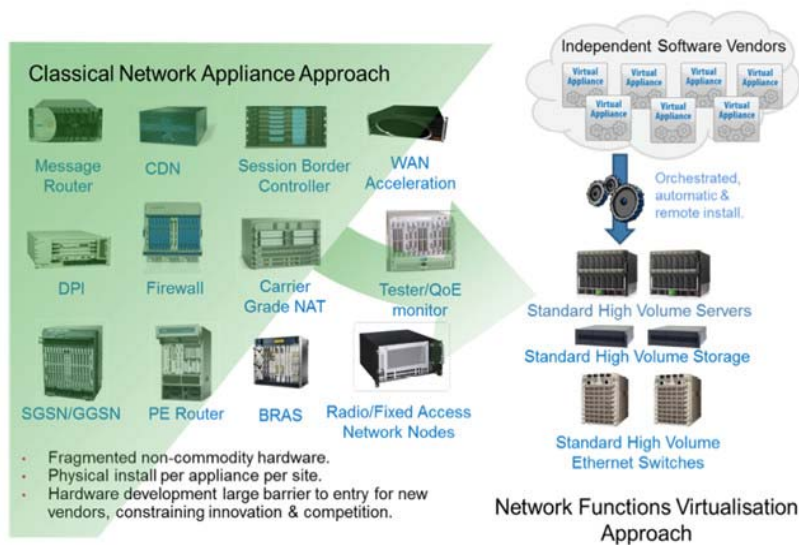


Subscribers' appetite for OTT applications continues to exceed expectations

Introduction to NFV

NFV virtualises data network node functions into VNFs that may be connected together to create telecommunication services.

Software Defined Networks (SDN), a technology that can be used as an enabler of NFV, is a networking approach that allows the remote administration of network services through the decoupling of the control plane from the data plane. The control plane communicates with the data plane via a communications protocol which enables remote controllers to determine the path of network packets through a network of switches and routers. The SDN framework facilitates the creation of a virtual mobile network via a set of dedicated virtual instances of each network component. SDN will be used to route an operator’s traffic through their own dedicated instances, partitioning the actual network into domains controlled by individual operators and service providers.



The management and configuration of the VNFs in an NFV environment is achieved by the Management & Orchestration function (MANO).

Integration with the MANO is necessary to facilitate the rapid deployment times associated with a true NFV environment.

The NFV MANO is the framework for the management and

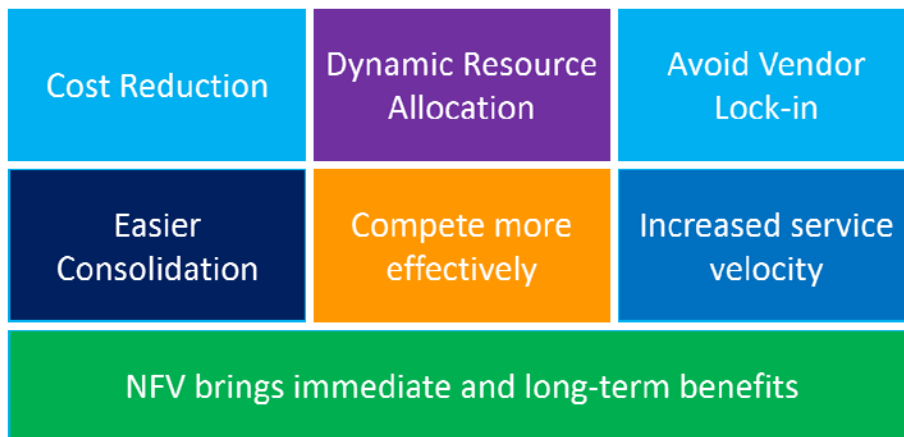
orchestration of all resources in the cloud data center. This includes computing, networking, storage, and virtual machine (VM) resources. The main focus of NFV MANO is to allow flexible on-boarding and rapid spin up of network components.

For the NFV MANO architecture to work properly and effectively, it must be integrated with open application program interfaces (APIs) in the existing systems. The NFV MANO layer works with templates for standard VNFs, and gives users the power to pick and choose from existing NFV resources to deploy their platform.

ETSI NFV Vision—Source: ETSI

Benefits of NFV

NFV enables increased service agility and significant cost reductions, providing both immediate and long-term benefits for mobile operators. NFV will transform networks not just evolve them: NFV will make technology *an enabler of* and not a barrier to innovation.



Reducing costs

The SaaS model used to provide NFV services enables telecommunications vendors and service providers to easily provide services to multiple operators through the use of multi-tenant software functions. This multi-tenancy approach decreases the cost for individual mobile operators.

An NFV datacentre composed of commercial off-the-shelf (COTS) hardware will manage the hardware (HW) upgrade path, replacing existing COTS servers with the latest HW versions, transparently to the mobile operator. This results in the VNF software taking advantage of the latest hardware industry improvements in speed & efficiency without any effort or time expended on the mobile operator’s part.

The SaaS systems comprising the virtual network are charged via an Opex model, which replaces the Capex & software license model traditionally used by network equipment providers. Some industry commentators pitch the Opex savings from NFV to be as much as 75%, representing millions of dollars in annual savings for mobile operators.

Shortening innovation cycles—Increasing service velocity

NFV enables shorter test cycles, shorter installation times and hence significantly faster service rollout times. The configuration and provisioning of a new network via the MANO is achieved quickly and easily on a single system, without a resource consuming multivendor project requiring huge co-ordination, management and time control. Instances of VNFs can be launched in minutes rather than in weeks and months required by traditional telecommunication vendor functions.

These virtualised functions can be quickly replaced by a superior alternative vendor solution, enabling a quick migration to best of breed vendor solutions. This aspect of NFV solutions will mark the end of the traditional uncompetitive vendor silos, and rid mobile operators of 'vendor lock-in'.

Dynamic scaling of resources

A key feature of NFV technology is the ability to dynamically scale resources as needed to accommodate spikes in traffic, such as New Year's Eve, religious holidays & sports events. New instances of key data network functions are launched automatically when triggered by rising traffic levels. Once these spikes in traffic levels revert to normal, software instances can be automatically taken down and hardware resources immediately freed to be used by other functions.

Facilitating consolidation

Mobile operators have been reacting to the threat of increased competition by reducing costs across their organisations. The merging of two operator affiliates from the same country into one network is now a regular occurrence. This type of merger enables operators to maintain their brands while sharing certain resources:

- Radio Access Network (RAN) resources – Base stations & other RAN related infrastructure are shared. Unnecessary duplication of resources across the two operator affiliates leads to the de-commissioning of superfluous RAN resources
- Network Resources –SMSC, GGSN/PGW, etc.
- Technical and Organisational Resources—Network Planning, Design, Operational, Interconnect, Regulatory, Billing and Fraud

For example, in North America, mobile operators have been exploring outsourcing the RAN function. It makes financial sense for all operators in a country to outsource the RAN function to a 'RAN only' operator.

The RAN operator then runs a ~99.9% coverage RAN and then sells the capacity via an Opex model to mobile operators and MVNOs. This reduces the number of base stations in operation across the country, increases the efficiency of the RAN operation and removes the operational costs from individual operators.

The sharing of technical network elements in a merger normally happens via a series of technical migrations, where the primary system, i.e. the SMSC, of usually the larger operator is chosen to carry the traffic of both operators.

Organisational consolidation, where two operator groups consolidate organisational functions, such as procurement, has been noted recently where operator groups are looking to cut costs and remain competitive. The next step in consolidation of mobile operators is for these partnerships to procure data network functions based on NFV technology from a single vendor, thus reducing costs further.

Easy Change of Vendors

The Telecommunications Network Equipment Providers (NEPs) have traditionally been large companies (such as Ericsson, Alcatel-Lucent, Nokia Networks, etc.) that have produced large, customised, expensive 'in house' deployments, based on a Capex and licence-based pricing model. Changes to existing systems installed by these NEPS have been expensive and slow. Traditional large NEPs have taken advantage of 'vendor lock-in' to charge high prices for minor change requests or licence increases, in the knowledge that a vendor replacement project was a costly, time-consuming process dreaded by mobile operators

The transition to the NFV model allows:

- new and specialised service providers to quickly address the changing mobile operator market and produce cost-effective virtualised network components.
- a cheaper, faster, change of vendor. Simple IT-based connectivity facilitates interoperability testing and use of NFV technology.
- a near-zero Capex investment, due to lack of on-site hardware and simplified integration process.

Reducing competitive threats

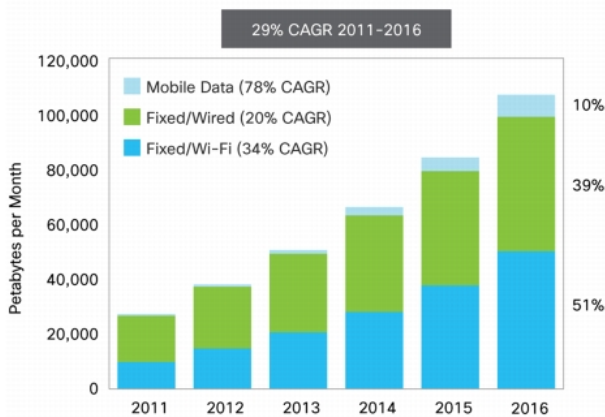
Competition from OTT

OTT players continue to gain market share with Whatsapp reporting over 64 billion messages sent daily in April 2014 and Apple reporting over 40 billion iMessages sent daily for the same period. NFV now allows mobile operators and service providers to compete on a level playing field with OTT players through increased service velocity at a lower cost.

Competition from wifi

According to the Cisco Visual Networking Index™ (Cisco VNI™), by 2016, 51 percent of IP

Global IP Traffic by Local Access Technology
By 2016, Fixed/Wi-Fi Traffic Surpasses Fixed/Wired Traffic



Source: Cisco VNI Global Forecast, 2011-2016

Wifi network roll-out costs 1/5 that of a mobile network

traffic will be delivered over wifi networks, with about 10 percent of mobile data delivered over mobile networks. Wifi mobility threatens the mobile networks' air interface.

Current figures indicate that the cost of rolling out a wifi infrastructure is one fifth of the cost of rolling out the equivalent mobile network coverage. Similarly, the cost of a wifi provider acquiring a new customer is one fifth of the cost of a mobile operator acquiring a new subscriber.

Mobile operators must compete with wifi

providers and NFV gives them a technological leap forward, enabling a more cost efficient rollout of services.

Regulatory pressures creating competition

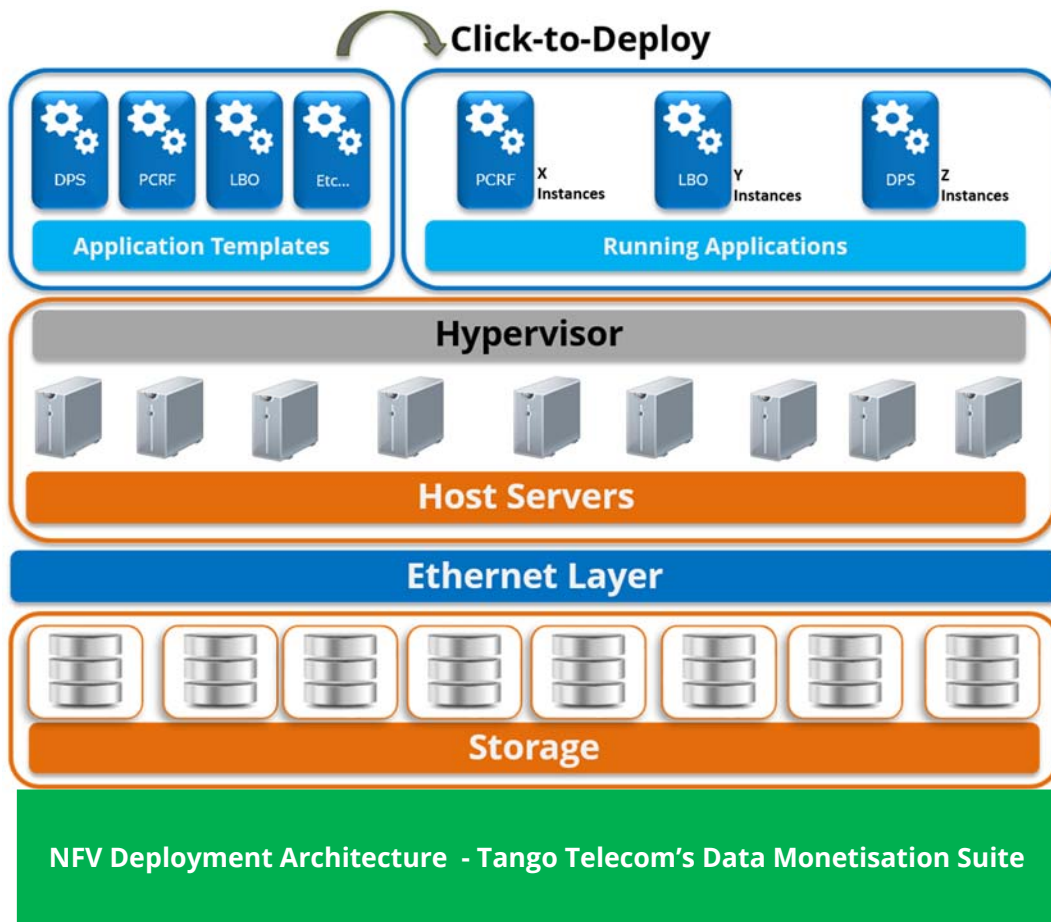
Regulatory pressure may lead to further competition from NFV powered MVNO players. Recently, EU regulators have actively sought to cultivate competition in the market through the introduction of billshock and data roaming legislation, further pressurising mobile operators to search for cost reducing strategies.

Tango Telecom's position in the NFV environment

Traditional voice, SMS, MMS & other legacy services are becoming less and less significant due to networks moving to all-data network environments such as LTE. The data plane is now seen as the only network domain that will experience significant traffic growth and as a consequence is receiving the majority of investment from mobile operators.

NFV technology is most effective on the data plane, which is the new frontier governing all future mobile services. Data network elements such as PCRF, PCEF, GGSN & Data Subscription/Plan Management are ideally positioned to reap the profits of migration to an NFV environment.

Tango Telecom has traditionally used open APIs such as HTTPs-REST to enable ease of integration with other network elements. This approach has enabled Tango Telecom to efficiently migrate its software components to the VNF model allowing full control of the software via the MANO.





Tango Telecom's solutions have traditionally been hardware and operating system independent, in order to flexibly work with a mobile operator's hardware vendor of choice. This hardware independence led to an easier transition towards the full virtualisation of the Tango iAX™ software platform, on which all Tango Telecom products reside. All of Tango Telecom's solutions are fully virtualised and available for quick and easy deployment into either a mobile operator's private cloud or a cloud provider partner of choice.

Tango Telecom has several field deployments of its mobile data software, including deployments of Policy, Data Roaming & Dynamic Pricing services running on KVM-based hypervisors and hypervisors from VMWare, VCE and Cisco amongst others. Tango Telecom's solutions are also certified to run on the IBM® Pureflex® platform.

Tango Telecom virtualised Data Monetisation Solutions are currently being rolled out in Europe, Asia and North America through a network of business partners. These partnerships leverage the versatility of the Tango Telecom's solutions to rapidly and efficiently deploy revenue generating data services to multiple operators in a cost-effective manner.

**Contact Tango Telecom (info@tangotelecom.com)
for a trial of our Data Monetisation Solution.**

Enabling Extreme Competition - Tango Telecom and NFV

Tango Telecom is the leading global provider of Data Monetisation Solutions for evolving mobile networks. Our high performance solutions are deployed at the core of some of the world's most demanding networks including América Móvil, Telefónica O2, Indosat and the Axiata Group and currently supports over 130 live systems serving 650 million subscribers in 40+ countries.

The Tango Telecom Data Retail Engine, the Tango DRE™, drives service innovation and service velocity to successfully monetise the growing demand for mobile data while optimising the use of network resources. Our solutions are fully virtualised and cloud-available globally, enabling operators to benefit today from the many advantages of network functions virtualisation (NFV). Our recent wins include deliveries to Tier 1 mobile operators in APAC, LATAM and North America for advanced Data Monetisation use cases such as Policy Control, Local Breakout Roaming Packages and Dynamic Discounting for Data.

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