Solution Offering for NFV Enablement

By   **Venkat Suresh**
AVP - Communication Media & Entertainment

Prasun Banerjee
Senior Architect, Telecommunication

Amit Malhotra
Senior Analyst, Application Delivery Unit

Pradeep Patil
Technical Architect, Telecom OSS Tools

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Executive Summary

NFV and SDN have been among the most discussed topics in the telecommunication industry lately. Operators have started incorporating NFV/SDN design considerations into their network and BSS/OSS upgrades/expansions. They have PoCs in line with their products, infrastructure and network technologies, and have started laying down the implementation roadmap and future offerings.

This white paper provides an approach on how IT Services companies in general, and Mphasis in particular, will play a vital role complementing the network, infrastructure, and product vendors to realize the business values of communications service providers' NFV adoption.

The approach complies with the industry standards pioneered by the European Telecommunications Standards Institute (ETSI).

Introduction

A few members of the ETSI created the Industry service Group (ISG), and the first white paper on Network Function Virtualization (NFV) was published in October 2012. NFV along with Software-defined Networks (SDN) has substantial qualitative impacts on the telecom industry. The combined impact is expected to reach the industry by 2020 based upon our observation. We also see that these technologies will largely influence purchasing decisions of the total addressable market of network solutions. The industry understands that NFV and SDN should bring the necessary change in operating models, and business landscape in the next 5 years, based upon the initiatives taken by the tier 1 Communications Service Providers (CSPs). They are making decisions to replace some existing purpose-build network functions with virtualized third-party network functions. Some CSPs prefer developing in-house infrastructure, whereas others rely on disruptive newcomers. The industry is on the verge of a major transformation within the next 5 years.

What is NFV?

Network Functions Virtualization (NFV) is an architecture concept that recommends virtualization of network services that are now being carried out by proprietary, dedicated hardware.
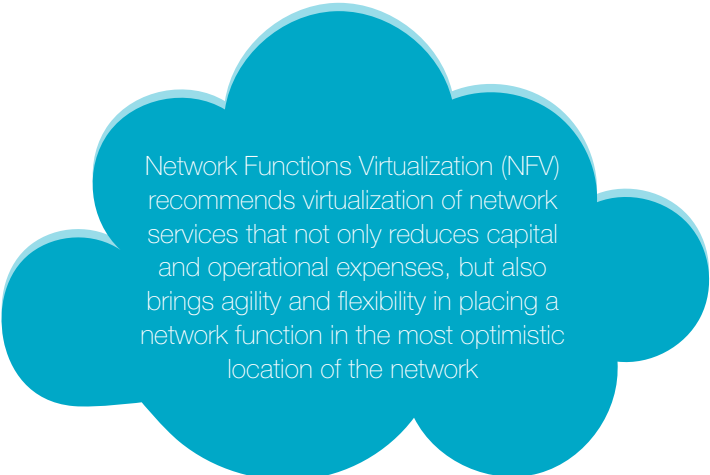
Declining Voice & SMS RPU, and OTT War are some of the key drivers for telecommunication operators adopting NFVs

It not only reduces capital and operational expenses, but also brings agility and flexibility in placing a network function in the most optimistic location of the network.

As consumers have gravitated towards cutting the cord as well as using alternate Over-the-Top (OTT) players such as Skype, Google Talk, Netflix, Hulu Plus, Viber, WhatsApp, etc., the pressure on voice, SMS and traditional PayTV ARPU for CSPs is mounting.

To grab the market from OTT players, CSPs face the need to bring agility and flexibility to their existing OSS/BSS offerings. They need to operate in hybrid environments with legacy and virtualized network functions running in parallel.

Network Functions Virtualization (NFV) recommends virtualization of network services that not only reduces capital and operational expenses, but also brings agility and flexibility in placing a network function in the most optimistic location of the network

They need to relook at their vendor web (i.e. avoid vendor lock-in and adopt a dynamic procurement and operational environment) across network, systems and services eco-systems. This white paper gives a snapshot of the solution offering based on NFV and SDN technologies, key benefits of adopting these offerings, and how system integrators bring value to CSPs in implementing NFV/SDN technologies. These offerings are interoperable with CSPs' existing service offerings, and are compliant with ETSI recommendations.

Key Drivers

Given below are some key causes that trigger telecom operators to take the NFV initiative & adopt quickly:

Declining Voice and SMS ARPU

Voice ARPU has been on a steady decline in all of the growth-leading and emerging markets, making it hard for the operators to survive without optimizing their network and operational resources.

In fact, the demand of optimizing OPEX is much more than the promise made by traditional transformation projects.

The OTT War

OTTs are constantly seizing away the voice & text market from traditional telecommunication operators by innovative offerings and by creating superior customer experience, which again rides on top of the operators' own data.

It is time for the operators to break their traditional shell and bring out-of-the-box products and service offerings with significantly reduced product lifecycles.

Challenges

The telecommunication industry is on the brink of a huge transformation. A lot of such challenges have already been highlighted by industry experts and leaders in different forums.

Below, we have listed down a few challenges that are critical and must be overcome to realize the benefits that NFV has to offer from the *system Integration point of view*. These challenges have already started raising alarms among the operators.

Heterogeneity across the Industry [1]

It is hard to get the ability to implement the solution framework in a widely heterogeneous environment - one where different standardization practices exist among telecom operators from different regions with different business models and maturity. Same can be said about the variety of vendors actively contributing to different pieces of the big picture.

In short, the solution has to be very flexible to fit a wide variety of operators willing to adopt NFV.

Migration & Compatibility with Operators Strategic Stack [1]

NFV is a paradigm shift from the way network is perceived today. Very naturally the new, end-to-end stack is going to be quite different from the strategic stack where the operators have heavily invested.

The NFV stack would definitely need to be compatible with the operator's strategic stack.

Considering the fact that NFV is a coveted goal of the industry as a whole, different paths of migration would be suitable for different operators, and depending on their strategic stack the integration strategy would be diverse.

High Risk of Investment

It is a huge capital investment for telecom operators who look to adopt NFV.

To begin with, it cannot replace the strategic stack any sooner – both will need to co-exist.

The other area of concern is ROI, which is mostly long-term/very long-term before it has meaningful revenue impacts to the operator. (e.g., TCO, OPEX)

In short, both CAPEX & complexity will be multiplied for the operator for the foreseeable future.

There are definitely other areas of concerns like:

- Performance
- Stability
- Security

These are mostly in the purview of NFV, infra and network vendors, and are being considered seriously before the actual adoption.

Mphasis Offerings

As described before, to create differentiated products and services, CSPs will have to consider their strategic stack, relative TCO/ROI, and address interoperability, modularity, security, stability, and performance across their network, systems, facilities and applications. As vendors/service providers bring their piece of the puzzle into the complex mix, choosing the right, experienced System Integrator capable of creating seamless, superior user experience is a critical business decision for CSPs. Mphasis offers a standards-based implementation approach.

The Focus

Mphasis focuses on the following aspects in line with telecom operators' roadmap for NFV adoption.

1. Return of NFV investment at the earliest.
2. Enabling telecom operators to win over the OTTs.
3. Handhold operators to expand their partner networks among diverse VNF providers.
4. Proactive and readymade adoption strategy based upon operators NFV readiness.
5. Minimized customization at operators end, and re-use investment on the strategic stack.
6. De-couple the NFV layer from the north-bound system.
7. Bring the knowhow of industry standardizations and best practices in BSS/OSS gained from serving leading CSPs across the world.

Mphasis has significant experience in these technologies, and has developed new service offerings in the BSS/OSS space. Our innovative service offerings such as "security solutions on demand" are brand new in the industry. These solution offerings provide applications on demand with integrated end-to-end management on a virtualized infrastructure. They work along with the CSP's existing OSS capabilities.

Based on the recommendations from TM Forum's ZOOM project and ETSI, we developed these offerings in a de-coupled architecture model. They are programmable and are designed to work in a multi-vendor environment.

Mphasis recommends to use the below layers in tandem with NFV software providers to align with the focus.

> Mphasis Offers innovative services such as "security solutions on demand" that work along with the CSP's existing OSS capabilities.

Components of Proposed Service Stack

Acceleration Layer

Each telecom operator needs to customize its AS-IS BSS & OSS stacks to complement the parallel NFV stack. While the level of customization can be manageable for the clients who already follow a loosely coupled SOA-based architecture, it can be harder for CSPs who still could not come out of the monolithic or partially-monolithic architecture.

The Accelerator Layer is designed to ease out the burden. It comprises a custom services layer, which otherwise, each operator had to build around their applications/COTS, an online mediation plugin in addition to the traditional mediation software and a proactive assurance plugin in addition to assurance are some examples.

This layer can be subscribed directly (point-to-point) as well as through the operator's ESB layers. While this layer is totally optional, this can bring out significant benefits by keeping operator's end customization at minimal for those who need it.

Abstraction Layer

This layer contains the low-level resource orchestration required in addition to operator's existing customer and service orchestrations that would interoperate with SDN controllers, NFV software and a series of other strategic activation systems.

This layer de-couples the NFV software (e.g., HP NFV director stack), the SDN software (e.g., HP Van SDN controller) and the operator's strategic activation sub-systems.

This is the essential ingredient of the offering that makes NFV/SDN software totally transparent to the operator's north-bound subsystems & interfaces.

At the same time, this complements the NFV vendor's orchestrator (NFV orchestrator) functionalities, bridging the GAP between south-bound & north-bound systems.

The (Virtual) Element Management Layer

This layer contains the layer of element managers that talk directly to the VNFs. This creates an abstraction to the different VNF vendors providing multiple capabilities – helping the operator to transparently and organically grow its VNF partner network. This layer can be optional for operators who already use generic element managers.

The VNF along with Optional VNFM (VNF Manager) Layer

This layer vouches for Mphasis' capabilities in virtualizing emerging network services in line with ETSI standards. This comes with an optional VNF Manager Layer for systems that do not come with one.
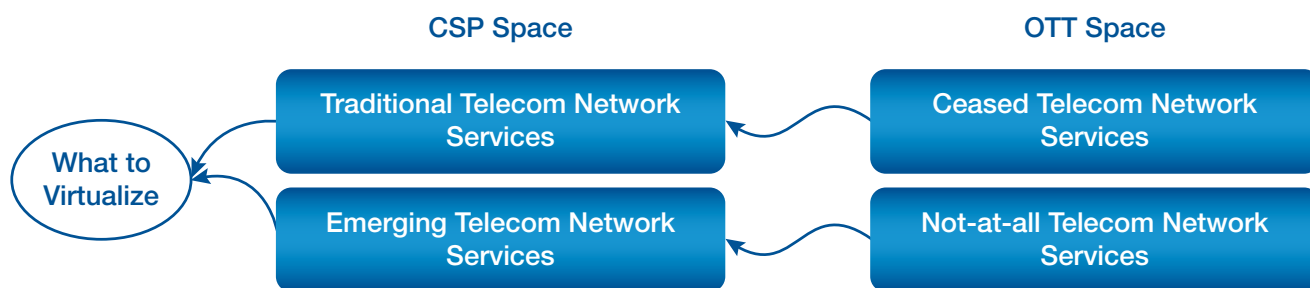

Figure 1: Roadmap of Virtualization

Key Benefits

1. The solution (Acceleration Layer) tackles the first challenge of heterogeneity by increasing the reach of NFV to a wider audience of telcos with ready-made accelerators to reap the benefit of NFV.

2. The same layer also minimizes the impact of NFV-related customization required by the operator's BSS/OSS subsystems.

3. The solution (Abstraction Layer) tackles the second challenge and establishes quick interoperability, and eliminates vendor lock-in by loose-coupling the NFV, SDN and other south-bound systems.

4. The solution (Element Management Layer) provides a framework of rapid integration to a VNF with the north-bound systems to allow the operator to choose its VNF partners from a wide range and rapidly integrate.

Why Mphasis?

1. With Mphasis' solution framework, the operator do not need to wait long to realize ROI (instead, start observing the impacts by reducing OPEX). It rather gives the operator a chance to deploy the disruptive offerings (by carefully choosing the VNF to deploy first).

2. The solution gives the operator a fair chance to win over OTT (ref to the use case). It allows the operator to replace OTTs by choosing strategic VNF (e.g. DPI) to implement right at the first go.

3. It simplifies the process of VNF deployment by the use of extensible frameworks and speeds up time-to-market.

Mphasis High Level Reference Architecture for NFV

The picture given below visualizes the concept and shows the logical architecture of the proposed framework. Legends are as follows:

1. *Strategic* systems are operators' existing BSS/OSS investment (in COTS or custom-built apps), which they cannot get rid of – for the foreseeable future due to interdependencies and interoperability requirements; they might have a roadmap for future decommission as well.

2. *Capable* layer is the perfect area for Mphasis to play its role as NFV System Integrator, as well as the VNF vendor.

3. *Optionally capable* layer promises to accelerate NFV system integration for diverse range of operators and faster go-to-market. This as well, is part of Mphasis' expertize in this domain.

4. *Leveraged* layer consists of the NFV/SDN in-the-box subsystems provided by Mphasis/CSP partners - bringing in the virtualization, infrastructural capabilities on the table which, at the least, should be ETSI compliant.
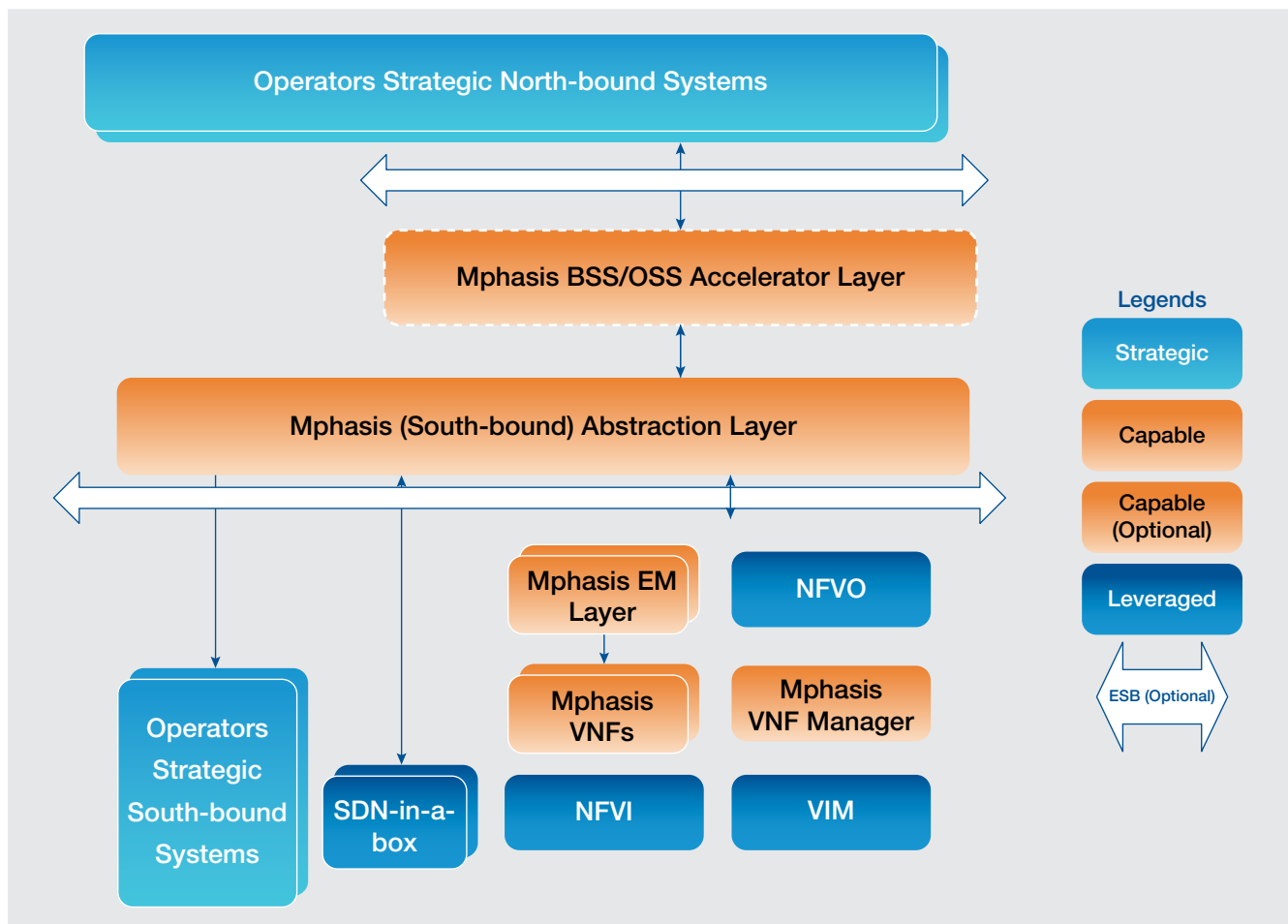

Figure 2: Reference architecture for operators E2E NFV stack (assuming the NFV components following the ETSI standard)

Use Case I: Parental Control through DPI VNF

Description:

This use case introduces self-configured, near-real-time, parental control of internet traffic landing on a web interface. Similar to existing parental control features provided by OS/Antivirus vendors, it allows end-users blacklist URLs in real-time.

In contrast, here, the feature can be provided by a telecom operator as a pay-as-you-go service, eliminating subscription fees.

The user immediately gets a message after consumption of this service. The rate is dynamically determined by the time of the day, and traffic at that time.
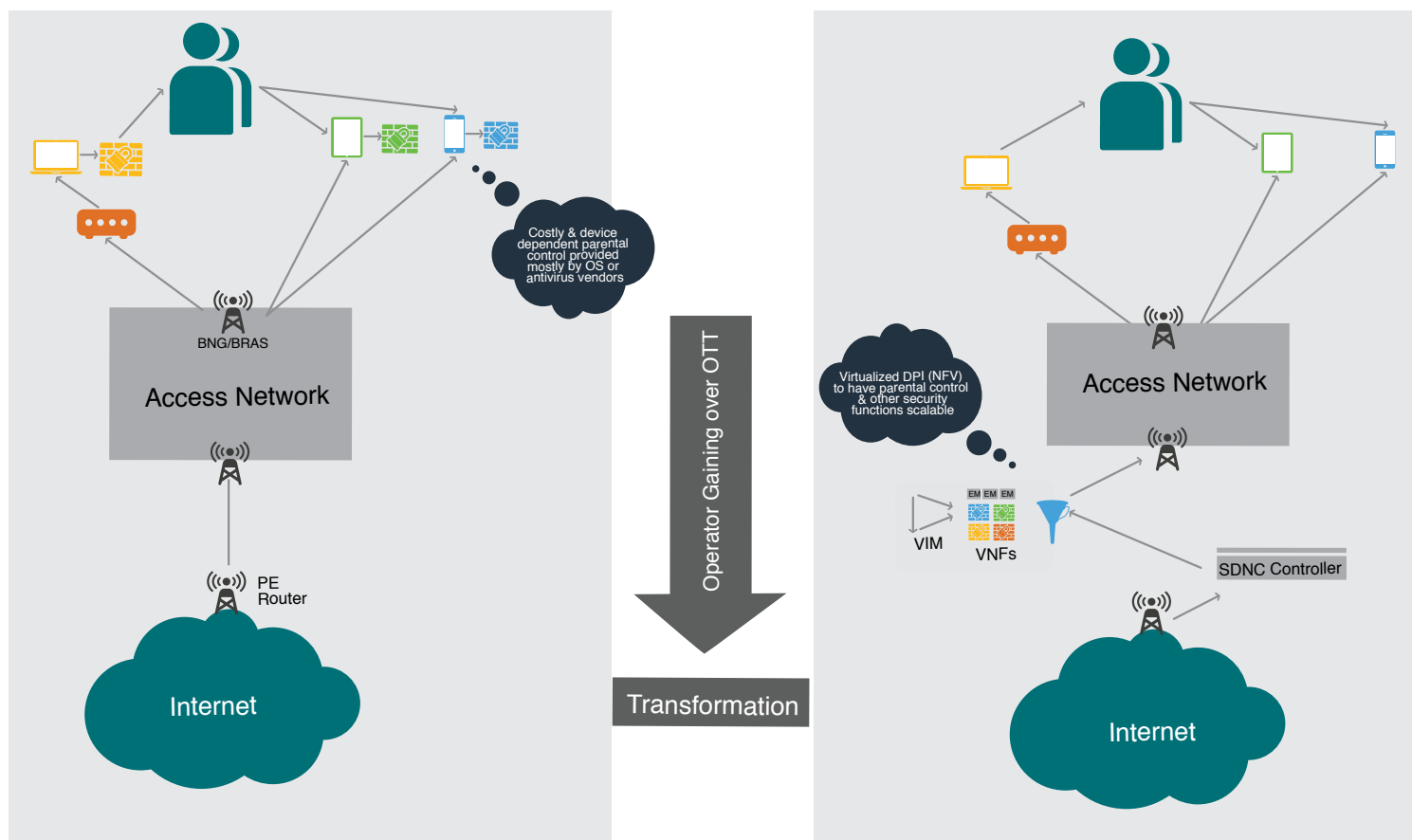

Figure 3: Virtualization of parental control as a network service (use case)

Benefits:

It's a win-win for both the operator and end-subscriber as:

1. It helps the telecom operator to eliminate OTTs and explore new paths of revenue outside traditional voice, text and data.

2. It relieves the end-user from the burden of using antivirus (for parental-control), frees up users' network, processor and memory required to run the feature; at the same time the usage fee is expected to be competitive compared to OTTs.

What's next?

With a slight modification to this use case, it can be extended to develop enterprise security-as-a-service with additional VNFs like firewall, DPI, router and virtualized equipment.

Mphasis welcomes Vendors & Partners to jointly build the solution, and offer end-to-end services in the NFV space.

Glossary

ARPU	Average Revenue Per User	OPEX	Operational Expense
BNG/BRAS	Broadband Network Gateway/ Broadband Remote Access Server	OS	Operating System
		OSS	Operations Support System
BSS	Business Support System	OTT	Over-the-top
CAGR	Compound Annual Growth Rate	PE Router	Provider Edge Router
CAPEX	Capital Expenditure	PoC	Proof of Concept
COTS	Commercial off-the-shelf	ROI	Return On Investment
CSP	Communications Service Provider	SDN	Software-defined Network
DPI	Deep Packet Inspection	SMS	Short Message Service
DSLAM	Digital Subscriber Line Access Multiplexer	SOA	Service-oriented Architecture
EM	Element Manager	TCO	Total Cost of Ownership
ESB	Enterprise Service Bus	TMForum	TeleManagement Forum
ETSI	European Telecommunications Standards Institute	URL	Uniform Resource Identifier
		VIM	Virtualized Infrastructure Manager
ISG	Industry Specification Group	VNF	Virtualized Network Function
IT	Information Technology	WAN	Wide Access Network
LAN	Local Access Network	ZOOM	Zero-touch Orchestration, Operations & Management
MANO	Management and Orchestration		
NFV	Network Functions Virtualization		

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Venkat Suresh
AVP - Communication Media & Entertainment

Venkat has been working for nearly two decades in ADM, serving global clients across industries. For the last 10 years, he has been contributing his expertise to the Telecom and Media Domain.

He is a key member of the NFV practice at Mphasis and is crucial in enabling the NFV strategy empowering the team.

Prasun Banerjee
Senior Architect, Telecommunication

Prasun comes with 12 years of rich experience working with a dozen telcom clients in the OSS & BSS domains. His expertise covers Implementation, Consulting, Architecture and Pre-Sales.

He is involved in architecture blueprinting, sweet spot analysis and creating the roadmap for NFV within the organization. He also drives PoC and demonstrates techno-functionality.

Amit Malhotra
Senior Analyst, Application Delivery Unit

Amit's expertise lies in strategic aspects of solution selling and comes with very strong experience through his time at C-DOT Centre for Development of Telematics.

He is involved in deriving Go-To-Market (GTM) strategy and participating in NFV roadmap creation within the organization. Amit is a key member driving the NFV initiative.

Pradeep Patil
Technical Architect, Telecom OSS Tools

Pradeep brings in strong experience in telecom functions' automation for assurance and expertise to the HP CMS Suite of Assurance products, which he has been a part, for 11 years now.

He is a part of the NFV conceptualization and drives it with use case PoCs, technical setups and demos. He also contributes to firming up NFV offerings within Mphasis.

About Mphasis

Mphasis is a global Technology Services and Solutions company specializing in the areas of Digital and Governance, Risk & Compliance. Our solution focus and superior human capital propels our partnership with large enterprise customers in their Digital Transformation journeys and with global financial institutions in the conception and execution of their Governance, Risk and Compliance Strategies. We focus on next generation technologies for differentiated solutions delivering optimized operations for clients.

For more information, contact: marketinginfo@mphasis.com

www.mphasis.com

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