TATA CONSULTANCY SERVICES

Successful 5G Adoption: A Strategic Lever to Achieve Business 4.0 Vision

Abstract

As Communications Service Providers (CSPs) transform into Digital Service Providers (DSPs) they are rapidly moving towards 5G adoption to improve productivity, enhance agility, create real-time experience and deliver personalized experience. Leveraging 5G ecosystems not only helps meet the demand of modular architectures, multi-tenancy, automated functionality but also drives intelligent insights for improved decision making. However, these demands can only be met with an advanced communication framework based on 5G standards, that has flexibility and elasticity to keep up with the expected change. Organizations taking smart risk to embrace an advanced communication network are extremely agile. They are not only equipped to adopt automation and leverage intelligent devices but also maximize cloud usage to realize Business 4.0 vision. This enables enterprises to provision at the communication and collaboration layer and provide common, reliable and all-pervasive connectivity for human and machine consumption in a technology agnostic manner. The paper brings to light a step-wise approach that telcos should consider for adopting 5G architecture into their networks.

Reimagining the Business in 5G Ecosystem

Moving from CSP to DSP requires leveraging different engineering approaches – an imperative to build a robust, resilient and highly available underlying technology framework in line with Third Generation Partnership Project (3GPP). This means companies not only need to enable network slicing but also manage inter/intra slice control, network programmability while ensuring security and standardizing of application layer interface. This requires decoupling, taking advantage of AI/ML and cloud native applications and changing the technology stack through extreme automation, virtualization, APIfication, orchestration.

This will help transform network capabilities into customer facing services and address monetization using open digital architecture (ODA) framework. The result: a rich digital network culture across the technology and enterprise matrix as shown in fig1.

	Core Business	Extended Opportunities		New Horizons
New opportunity		Immersive video communications	Virtual presence	Automated controls Real-time telematics Real-time video uplink Remote control
Evolution	IP multimedia services - Based Services Mobile broadband Very high - speed broadband internet access Mobile hot spots Low cost mobile broadband Thin clients Cloud services		Private networks First responder connectivity Ultra HD content delivery Augmented reality Wearables	eHealth Smart metering Sensors networks
	Mass market		Verticals	

Technology 4G,4G+ - > 5G

Market

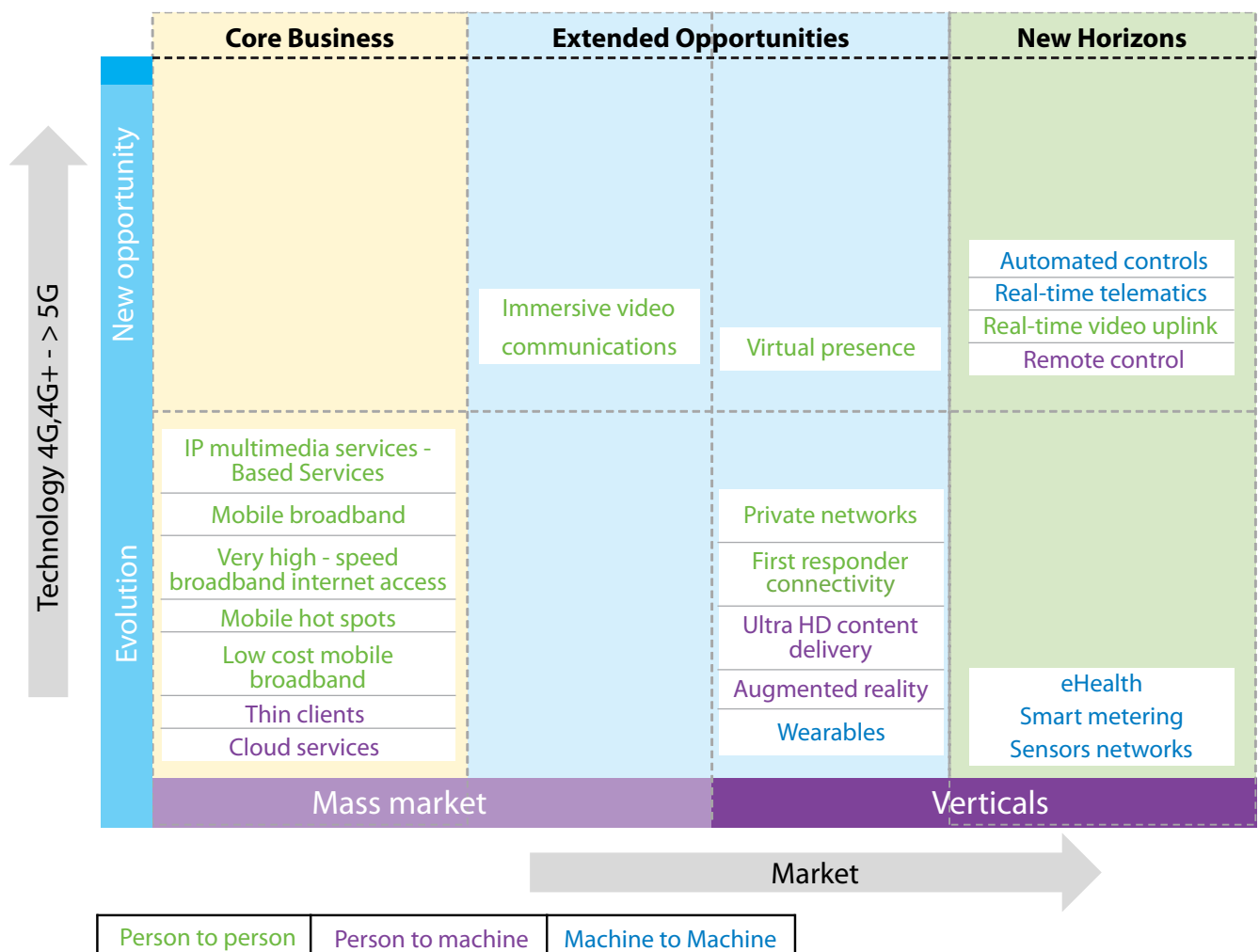| Person to person	Person to machine	Machine to Machine

Figure 1: 5G Adoption Matrix

For CSPs to reimagine their businesses in a 5G ecosystem that includes legacy and next generation networks they need to transform from a B2C provider to a B2B provider. The reason:

As businesses across industries and economies adopt new technology and processes, they would need mobile network that supports economic models, policies, and frameworks and helps interconnect technologies such as IoT, robotics, automation and virtualization. At the same time, as 5G will be adopted incrementally, and existing networks will continue to exist in parallel, as shown in fig 2 below, 5G ecosystem will create a layer that will help accelerate transformation in areas such as artificial intelligence, agility, automation, and cloud. CSPs with reliable, agile and scalable 5G network therefore will not only improve human-to-human communication but also enhance human-to-machine or machine-to-machine collaboration.
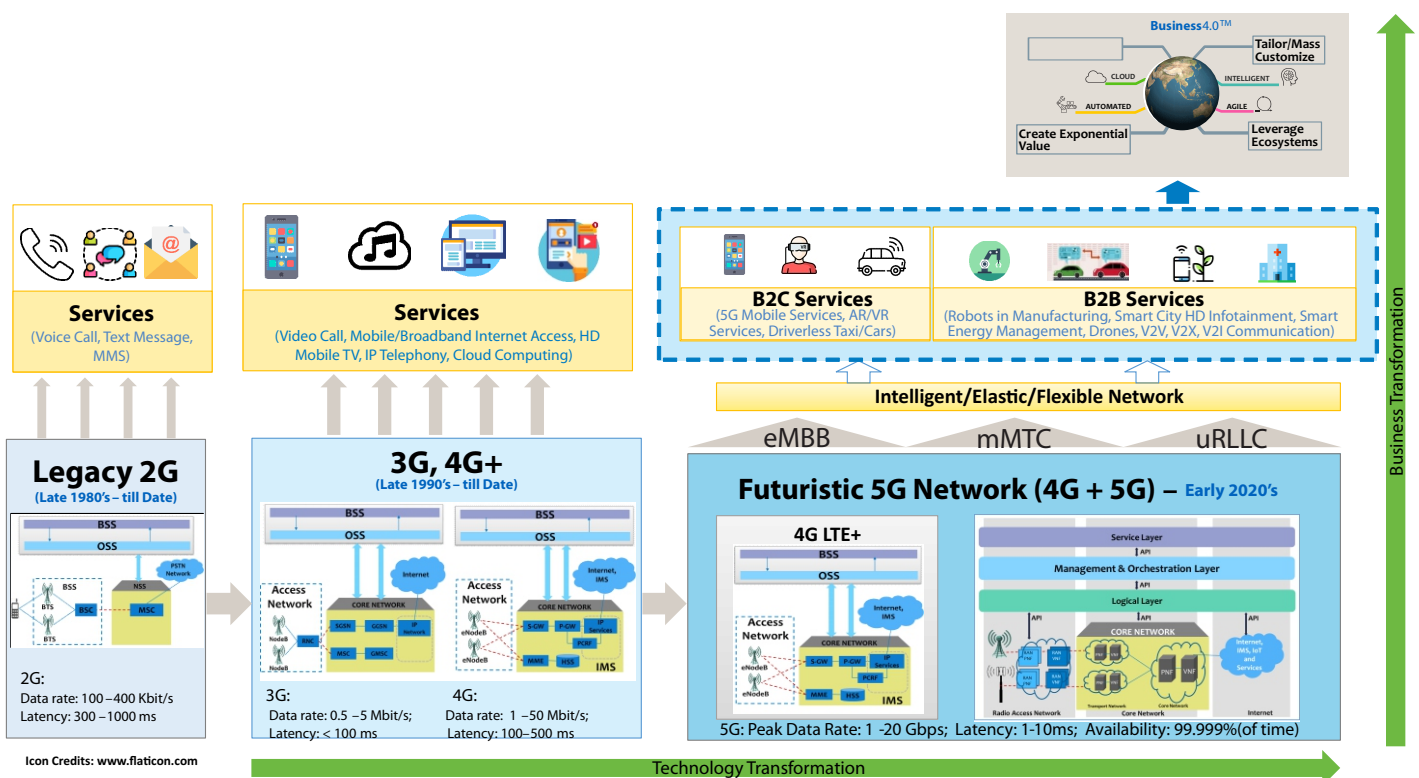

Figure 2: Realising Business 4.0™ Organisation on back of Next Generation 5G Transformation

Monetizing 5G Enabled Services

With standards for 5G monetization yet to be set the key for creating robust 5G network is simplifying the technology based on 5G capability triangle. This will help improve services and revenues. However, for creating a seamless relationship, between network capabilities and commercial offers CSPs need to define the network characteristics. This requires creating a service based architecture that enables a highly configurable 5G network service factory driven by the specific customer demand. This way CSPs will be able to offer multiple commercial offers and bundle different capabilities to enhance customer experience.

Similarly, CSPs can monetize 5G attributes such as latency, reliability, and elasticity for B2B vertical service based on Next Generation Mobile Network (NGMN) guidelines that require enterprises to define network characteristics based on commercial offers. This means enterprises will need to adopt network based on external customer requirement for latency and reliability. However, to meet the changing customer expectation, the network capabilities should also be translated to customer facing service (CFS). This requires deep understanding of typical CFSs of a 5G factory and the services which are exposed from 5G to Business Support System (BSS).
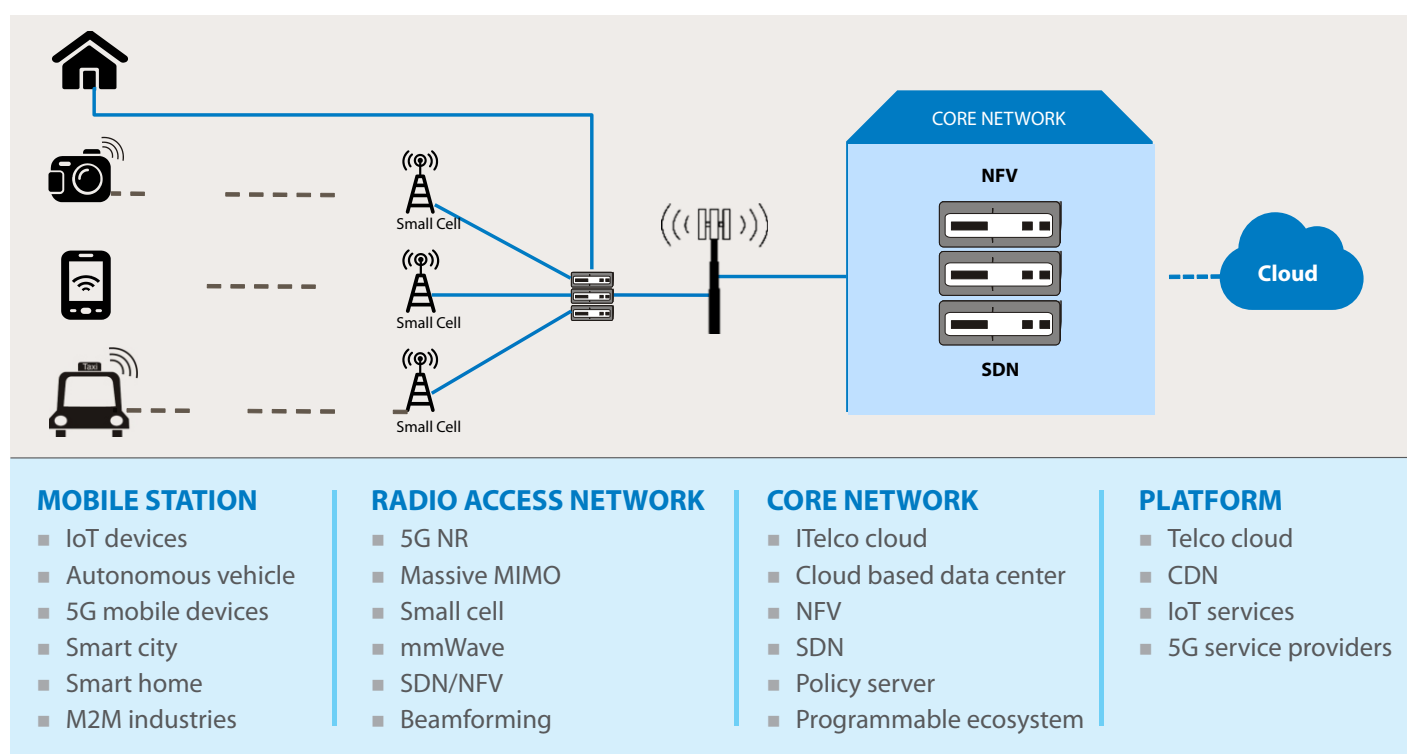

MOBILE STATION	RADIO ACCESS NETWORK	CORE NETWORK	PLATFORM
■ IoT devices	■ 5G NR	■ ITelco cloud	■ Telco cloud
■ Autonomous vehicle	■ Massive MIMO	■ Cloud based data center	■ CDN
■ 5G mobile devices	■ Small cell	■ NFV	■ IoT services
■ Smart city	■ mmWave	■ SDN	■ 5G service providers
■ Smart home	■ SDN/NFV	■ Policy server	
■ M2M industries	■ Beamforming	■ Programmable ecosystem	

Figure 3: End-To-End view of technology changes

Building Robust 5G Network Through End-to-End Technology Transition: A Step-wise Approach

For a robust and resilient 5G network, transforming networks across Radio Access Network (RAN), transport, Core and Edge networks is a must. As listed in fig 3, the steps to do it includes:

Step 1: Move from Non-standalone to standalone

On the RAN end, operators are still adding 5G New Radio (NR) in a non-standalone configuration, so that it can continue using existing Evolved Packet Core (EPC) with LTE Evolved Node B (eNB) as the controlling base station. However, this configuration should be replaced with the standalone configuration with further evolution of the network.

Step :2 Ensure maximum usage of existing network

While planning the transition from non-standalone to standalone configuration operators can continue leveraging their existing assets. The transition strategy therefore would be based on 5G service monetization, technical possibilities, and maximum possible usage of existing assets.

Step 3: Upgrade Mobile Backhaul

Operators need to upgrade their mobile backhaul to ensure infrastructure is not a bottleneck for seamless bandwidth availability as key 5G services such as Augmented Reality (AR)/Virtual Reality (VR), gaming, telemedicine, and smart robotics are dependent on a robust data pipeline.

Step 4: Ensure Network Densification

CSPs need to shift focus on network densification to completely utilize available spectrum for ensuring the best mobile experience to the end user.

Step 5: Enable Successful C-RAN Architecture Deployment

As Centralized Radio Access Network (C-RAN) architecture expands across networks CSPs need to ensure minimum latency and dynamic allocation of radio resources by leveraging Network Function Virtualization (NFV) and cloud on the RF end.

Step 6: Mature into Cloud Native Architecture

To enable successful transition it is crucial to progress from monolithic to hybrid network, and finally mature into a cloud native architecture. CSP would also require to decouple the network and the Infrastructure layer for ensuring network slicing and facilitating multi-tenancy.

Step 7: Manage Network Virtualization

To plan network operations managing Virtualized Network Function (VNF), orchestration, and enabling slicing control is important to tap opportunities in extreme automation and AI. This will help create a self-defining and self-controlled network with minimum external intervention.

Step 8: Map BSS and Operations Support System

Additionally, it is vital to map BSS and Operations Support Systems (OSS) with Open Digital Architecture and micro-service architectures respectively

Achieving the Common Vision of 5G Transformation

5G transformation is a tight interplay between industrial enterprise and the telco ecosystem. For Telcos the successful 5G adoption means assimilating, adopting and integrating the underlying 5G next-generation technology requirement into the existing networks. This requires key stakeholders to work towards a common vision of targeting network model services and customers and building flexibility, elasticity and security in the network while meeting regulatory norms. Additionally, businesses need to evaluate relevant 5G use cases, create a strong and deep engagement with the academia and participation in research projects and interact with standards bodies and working groups across different enterprise verticals. Through partnership with labs and startups focused on developing solutions for 5G consumers and investment in skill building to create capacity for 5G specific relevant areas, businesses will be able to rapidly achieve their 5G vision. This will not only accelerate 5G technology adoption in Telco industry but also across a broad range of industrial sectors ensuring high level of productivity an increasing the standard of living across geographies.

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About The Author

Rahul Hak

Rahul Hak, a senior domain consultant with TCS' Communications, Media, and Information Services (CMI) business unit has over 22 years of experience in IT and telecom. He owns the 5G practice for CMI NSG group and has lead multiple customer relationships for Original Equipment Manufacturers and Communications Service Providers across the globe. He leverages his extensive experience in product engineering, customer relationships and technology sales to deliver business and technology solutions to support TCS' clients in their journeys.

Karthe SJ

Karthe is a Pre-sales consultant with TCS' Communications, Media and Information Services (CMI) business unit. An electronics and communications engineer, Karthe has seven years of experience with expertise in technology research, business analysis and pre-sales.

Contact

Visit the Communications, Media & Technology page on www.tcs.com

Email: global.cmi@tcs.com

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