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## 10 Ingredients for Realizing the 5G Promise and 2022 Predictions with Jio

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The telecom industry has been characterized by the ‘generational’ evolution of technology in the past four decades.

Mobile telephony took shape starting from 1G in 1979, when the first cellular network was launched in Japan. This was soon followed by the rollout of 1G in Finland, Sweden, Denmark, and Norway in the early 1980s. The next decade witnessed an inflection point, with 2G being launched in Finland in the 1990s. 2G was also known as GSM, which became popular across the world, and made cellular voice telephony ubiquitous.



The industry witnessed two more advancements, namely 3G (in 2001) and 4G (in 2009) that aimed at offering faster data speeds. These important milestones in cellular data telephony fueled the massive growth of the Internet and digitized our lives.

While 1G and 2G introduced voice and text as the ‘killer apps’, 3G and 4G offered mobile broadband connectivity in the comfort of our hands—enabling the OTT and smartphone ecosystem.

Today, we find ourselves at the cusp of another revolution—5G.

5G will not only enable person-to-person communication, but it will also digitize society and industries by connecting billions of machines and “things” in addition to people. Consumers will experience blazing fast speeds at lower latencies, leading to more per-capita data consumption. Everything that we touch, experience or “wear” will generate data, which will be connected via

5G. Early indicators of this trend are visible, through the popularity of wearable devices for example, and smart connected homes.

This explosive demand for data and low latency interactivity will be fulfilled by 5G, which will fuel revenue growth in the retail consumer segment.

Businesses, on the other hand, will leverage 5G to automate their industrial setups and supply chains as well as connect their assets through sensors for business intelligence. Data-driven decision-making will be facilitated through 5G proliferation as machine-to-machine communication gets deployed in volumes. This will yield benefits in OPEX optimization.

These strategic directions of 5G adoption will have a larger macro-economic impact as the benefits of technology will directly contribute to businesses' bottom lines, either through new revenue streams or through greater OPEX savings.

## **Bridging the chasm between promise and practice**

From the point of view of carriers, the 5G standard is not a mere “upgrade” from its predecessor. It is a complete overhaul of how telecom networks are architected, designed, and deployed. Carrier networks today are encumbered by legacy software, and with 5G the network is reimagined into a cloud-native, composable and nimble architecture.

5G opens an entirely new market that extends far beyond the traditional revenue streams of voice, messaging, and Internet connectivity.

To bridge the gap between the promise of 5G and its realization, there are ten key ingredients which will require flawless execution:

### ***1. Cloud-native standalone 5G: ease of deploying new use cases***

5G embraces the cloud ‘by design,’ rather than as an afterthought. Traditional network “boxes” have been rearchitected as network functions and organized around service-based interfaces.

5G network functions are packaged as portable images, which can be deployed either on-premises or in the public cloud. Hybrid models are also supported through this architecture, which may involve both the public as well as the private cloud.

As a result, hyperscalers such as Google, Microsoft and Amazon have become potential deployment choices. This accelerates the lifecycle of new services and use cases that are developed over 5G. Moreover, it gives carriers and their customers an asset-light option for scaling new services on-demand.

## **2. Ultra-low latency capabilities: expanding the horizons**

5G defines ultra-reliable low latency communications (uRLLC) as a key capability. Use cases such as cloud gaming, telemedicine, robotics, and drones leverage this 5G capability. Industrial automation through robotics will get a new impetus through 5G integration.

This Industry 4.0 revolution is positioned to add new value to existing businesses, as well as open up new platform business models with 5G integration.

Many of these automation opportunities were not feasible using older technologies, and hence 5G adds value to industries through this key capability.

## **3. Massive machine-type communications and hyperscale IoT**

While narrowband and wideband IoT were introduced with 4G networks, their mass adoption will be possible only with disaggregated 5G networks.

5G adds huge capacities of connected sensors that can run into the millions. Sensor networks will be essential for industrial automation as well as a wide array of use cases in supply chain and logistics.

## **4. Network slicing and QoS – multi tenancy**

Network slicing allows carriers to carve out logical resources from the network and dedicate them for business services.

Slicing is a key capability possible only in 5G networks. Industries can leverage this to ensure service awareness and differentiated QoS. Conversely, it is also possible for a network slice to be multi-tenant in nature.

The ability to provision slices, and to be able to “meter” them is a key capability for 5G SA networks and business support systems.

Network slicing allows new monetization models, such as “pay as you go” through subscription-based bundles.

## **5. Closed loop automation**

While automation is not an alien concept for telecom, it is fast blending into the network with 5G.

With all 5G network functions being cloud native, there are new opportunities to automate the lifecycle of network elements.

On the radio front, with O-RAN taking its baby steps, there are fresh areas emerging in RAN automation. It is due to this reason, that real-time and near-real-time RIC (RAN Intelligence Controller) architectures are becoming popular.

On the core network front, 3GPP has done considerable work to enable automation through network functions such as the NWDAF (Network Data Analytics Function).

The long-pending dream of closed loop automation would become a reality with the amalgamation of these technology trends.

## **6. Edge computing – private and enterprise 5G**

Multi-access edge computing (MEC) has been popular on the Internet for more than a decade, as the Internet architecture has always been distributed and hierarchical in nature.

Some key examples include DNS services and CDNs, which are distributed in nature and closer to the customers' point of consumption. However, telecom networks were lagging in the adoption of edge computing. Initial adoption of MEC happened in the 4G era, but these were encumbered by legacy network designs.

Cloud-first 5G network functions help in simplifying the task of network automation in the data center cloud as well as on multiple edge clouds. This allows carriers to deploy smaller and highly disaggregated networks for private and enterprise use.

With private networks gaining interest, 5G has found new footholds in Industry 4.0 transformation as well as other areas of digitization, such as healthcare, retail, security, robotics and defense.

Many industry verticals are embracing automation for their long-term survival and profitability, and this is where private and enterprise 5G networks become relevant.

Whether it is automating a warehouse, or tracking in logistics, from richer retail buying experiences to immersive gaming and entertainment, 5G delivers lower latencies and high bandwidths at the “far edge” (factory floor and the enterprise premise).

## **7. Digital BSS – subscription billing**

One of the key functionalities of cloud services is the ability to subscribe to them and bill them in the most seamless manner possible. Platform companies such as Google and Apple have perfected this art of recurring revenues. Carriers are now adopting subscription models in a more ubiquitous manner through digital BSS and marketplaces.

To monetize 5G use cases, frictionless onboarding and billing will be a necessity. Traditional channels of telco onboarding are cumbersome, and hence a cloud-native BSS is critical in conjunction with 5G.

Therefore, not only telco networks are witnessing a transformation in their technology fabric, but the BSS systems are also evolving concurrently, from traditional SIM card sales to serving digital businesses from the cloud.

This requires a major shift in mindset in organizational processes, which is much beyond mere technology adoption.

### **8. Open RAN – poster boy of 5G NR**

Open RAN has emerged as a new “poster boy” of 5G radio networks. The possibilities of mixing and matching radio components (RU, DU and CU) are very attractive to carriers, as it helps attain a leverage against vendor lock-in.

However, an open approach to RAN can be a double-edged sword if not executed well. It is not just a question of technology, but the long-term evolution of an O-RAN compliant multivendor arrangement, where the roadmaps of different vendors need to be in alignment.

O-RAN continues to grow in the industry, and it may find greater synergies with private and enterprise 5G networks.

### **9. API Exposure - network as a service**

The 3GPP standards define a unique capability, which enables API exposure from the 5G network. This is termed as CAPIF (Common API Framework).

The CAPIF is an enabler to expose functionality not only for IoT and MMTC use cases, but it also has its application in network slicing and slice-based policy control.

How the industry brings together these solutions for OPEX efficiency is yet to be seen, as carriers are still searching for concrete use cases.

The network-as-a-service paradigm has been mooted for a decade, but with these standardization directions, it seems that finally there will be some light at the end of the tunnel.

### **10. Intersection of 5G with AI/ML and blockchain**

Earlier network technologies existed as disparate islands, with little interaction with sister disciplines of the software world. However, with 5G networks, an interplay with AI/ML and blockchain is imperative. While AI and ML are making inroads into the radio network through RIC

designs and even the NR physical layer, there are applications of ML in network operations (MLOps).

Blockchain, on the other hand, has a pivotal role to play in the ecosystem creation for 5G services, so that innovative business models can be operationalized. While these are nascent developments, it remains to be seen how these intersections play out, with 5G standalone deployments accelerating in 2022.

## Predictions for 2022

This brings us to nine key predictions for 2022.

5G software providers will make inroads in the enterprise and private 5G market by directly collaborating with industry players.

Hyperscalers will enable faster rollout of enterprise 5G services. Adoption for mainstream carrier networks will remain limited.

Carriers will move to standalone 5G networks to protect their 4G customer base and compete for new business opportunities in Industry 4.0. This trend is expected to accelerate in 2022-23.

IoT/MMTC will come of age with 5G standalone networks. The lukewarm adoption of NB-IoT/WB-IoT will get a new lease of life as private and enterprise 5G deployments increase.

New revenue-share models and ecosystem revenues will garner interest in conjunction with technologies such as blockchain.

Network slicing revenues will add cushion to the bottom line of carriers, and this segment is expected to grow through 2022-23.

O-RAN will either flourish or perish by 2023. Important steps to product-manage O-RAN combinations need to be taken for large-scale deployment.

IT service integrators will gain, as more 5G use cases are trialed and commercialized. We can expect this industry to ride the 5G wave and move to the next orbit of growth.

Cloud CRM and subscription management will see hyper-growth as more 5G use cases come to life.