



## 5G will be a Gateway to New Technologies, Services, and Applications

**By: Rajan S. Mathews, DG, COAI**

Budget 2018-19's 5G thrust is a clear indication that the Government is committed to fostering a vibrant 5G ecosystem, in tandem with the rest of the world. The Department of Telecommunications is also collaborating with IIT Chennai to set up a test bed for 5G technologies such as IoT and M2M, to ensure country's leadership in the execution of next-generation technologies. Ericsson has also launched the country's first "Centre of Excellence (CoE) and Innovation Lab" for 5G at the Indian Institute of Technology (IIT) Delhi. The 5G innovation lab is an open platform and aims to help the industry and the academia to leverage the 5G technology to develop new 5G-based apps and business models.

India has always been slow in adopting new technologies when compared to the rest of the world, especially when it comes down to network adoption, be it 2G, 3G or 4G. Adoption of 4G was quicker than the previous generations of mobile networks and the roll-out and adoption of 5G are expected to be much faster, thanks to India's fast economic growth, remarkable technological advancements and unique steps that the Government and the industry have taken (and is taking) towards this end.

Moreover, the industry established the 5G India forum (5GIF), so that all stakeholders, private and public, big and small, can collaborate and deliberate on the

challenges and opportunities to make 5G a reality in India, together with experts from around the world. 5G, as a technology, requires huge investments in terms of downstream innovation, if compared to previous generations of communication systems. The benefits, however, are many and far-reaching.

5G will naturally evolve from existing 4G networks but will mark an inflection point in the future of communications, bringing instantaneous high-powered connectivity to billions of devices. 3G and especially 4G technologies were designed primarily for the faster mobile internet services. 5G changes this paradigm and expands on the delivery of services, not only beyond high-speed mobile services but also targeting the vertical markets, which encompass several segments, including health, agriculture, Vehicle to Everything Evolution, smart grids and smart cities, among other things.

5G will create a reservoir, full of opportunities for better business models, better healthcare, better education, smart manufacturing, smart cities, smart logistics and overall enhanced lifestyle for everyone. The Digital India goal and better telecom and internet infrastructure cannot be separated from each other. In fact, 5G will play an instrumental role in catalysing India's transition towards an all-round digital empowerment.

The industry also came together to launch the much coveted India Mobile Congress, one of the biggest telecom events in South East Asia, on the same lines as the Mobile World Congress that takes place in Barcelona and China. This will be the perfect platform for showcasing emerging technologies such as IoT, M2M, automation, and robotics. The idea is to project India as a voice in the global ICT arena, share knowledge, best practices, and innovations, in addition to sharing the 'India story' and providing a platform for new entrepreneurs to gain exposure and create connections.

It is pertinent to note that the spectrum will be the key ingredient in ensuring early roll-out and early adoption of 5G services. Different use cases will require different frequency bands, each different from the other. Moreover, we would need both licensed and unlicensed spectrum to accomplish a seamless system for providing the desired quality of service to end consumers. As IoT and its application proliferate, the number of devices accessing the internet will multiply manifold.

Technologies such as beam-forming, massive Multiple Input Multiple Output (massive-MIMO) will need higher frequencies due to their shorter wavelengths. Likewise, some services will require wide and contiguous bandwidth to enhance data delivery efficiency. In terms of network as well, various networks need to be planned, on the basis of the type of service. Cell size might reduce in dense areas, as it would enable larger area traffic capacity.

For a 5G spectrum to be effective, some of the key aspects that should be considered include peak data rates, latency, user type, spectrum efficiency, energy efficiency, user density, network capacity, reliability, and mobility. In terms of frequency bands, there are sub-6Ghz frequencies which warrant for full area coverage, allowing for cost-effective delivery of mobile services and wider bandwidths than those of today. Thus, new bands below 6GHz should be identified for 5G.

Similarly, above 24GHz frequencies are required for applications that demand very high data rates. Such frequencies also accommodate wider channel bandwidths. Thus, 5G needs spectrum in three key frequency ranges in order to provide wide coverage and support for varied use cases. These are Sub-1 GHz, 1-6 GHz and above 6 GHz. To realise the ultra-high-speed vision for 5G on low-cost devices, WRC 19 is vital (WRC-19 will consider spectrum requirements for uses ranging from identifying spectrum for fifth generation “5G” broadband applications to global safety and distress systems). Furthermore, significantly new and widely harmonised mobile spectrum is needed to ensure that 5G services meet future expectations and deliver a wide array of potential capabilities.

Some countries such as the USA, China, South Korea, Japan, Sweden, and Estonia have already begun deploying some or the other form of 5G, which is not for commercial use yet.

India is perfectly poised to ride the 5G wave on the back of excellent software development infrastructure and skilled manpower. Developers are already building compelling services and potentially game-changing apps that will act as a “catalyst” for India’s flagship Digital India mission. The country is also collaborating with other nations on 5G adoption. The new technology will ring in an era where technology will infuse life into everything, from IoT to autonomous cars to robotics.

Experts claim that 5G adoption in India will happen at a faster pace if compared to its preceding technologies, even though the commercial roll-out won’t happen before late 2019 or early 2020. Operators are readying themselves, investing in R&D partnerships with reputed equipment vendors to test and experiment with 5G’s expansive potential.

The Government’s Digital India program that aims to connect every citizen and provide the consumers seamless access to Government and other key information services on demand, hinges on a strong telecom sector and best-in-class connectivity infrastructure. Therefore, to transform India into a digitally empowered society and knowledge economy, there is an urgent need to exploit technologies such as 5G for delivery of services to individual citizens as well as to enhance internal efficiencies within the – Government, public and private sector using digital technologies to achieve the Sustainable Development Goal (SDGs) targets for India.