INDIA'S FIRST MAGAZINE ON LEGAL AND CORPORATE AFFAIRS

LEX WITNESS

Volume 10 Issue 12 | July 2019

₹65 US $6 UK £4

the pondering pill

Krishna Venkat
Co-founding Partner, Anoma Legal
P52

expert speak

Sumit Makhija
Partner,
Deloitte India
P17

Aurelia Menezes
Principal Associate,
King Stubb & Kasiva
P36

Maneesha Dhir
Managing Partner,
Dhir & Dhir Associates

Karan Kanwal
Sr. Associate
Dhir & Dhir Associates
P22

Niraj Singh
Partner, RNS Associates
P56

ipr corner

Vikrant Rana
Managing Partner,
S.S. Rana & Co.

Isheta Srivastava
Associate,
S.S. Rana & Co.
P42

let's arbitrate

S. Ravi Shankar
Sr. Partner,
Law Senate
P66

Budget 2019

A New India in the Making?

P08

expert speak

Hardeep Sachdeva
Senior Partner, AZB & Partners

Ambika Khanna
Associate, AZB & Partners

P30

expert speak

Rohan Swarup
Senior Associate,
Singh & Singh

P46

expert speak

Shantanu Malik
Partner, Hammurabi & Solomon

Shuchi Sejwar
Sr. Associate, Hammurabi & Solomon

P62

Implementation of 5G Network in India and its Regulatory Challenges

Rohan Swarup

Hi-Speed mobile networks have revolutionized the telecommunication sector. Mobile networks have evolved over the years. It began as early as the mid-40s to the late-70s with 0G, which is referred to as the mobile radio telephone. This technology was essentially communication via analogue radio having switchboard operators, which was required to connect calls. And, its commercial use was mainly limited to being installed in vehicles as it was very large. Later, during the early 70's, the device size was reduced and switchboard operators were no longer required. In 1981, first generation of mobile networks was established with 1G. Like 0G, 1G as well used analogue signals and was limited to transmitting just voice - with speeds up to 2 kilobits per second. However, the only difference was that the radio technology was miniaturized enough to fit in a single device when no wires protruding, allowing communication devices to take on a more mobile phone-eques shape.

During the early 90's, i.e. in 1992, 2G network was introduced and the phones became mobile in the true sense as it became smaller and affordable enough to garner massive attention from the general public. It introduced digital standards which allowed for short text messages to be sent and had speeds ranging from 14 to 64 kilobits per second. Over the years, the speed increased and in the year 2001, 3G network was introduced. It was the first mobile broadband solution with integrated high-quality video, data and voice - essentially bringing the mobile phone online, with speeds initially ranging from 144 kilobits per second up to 2 megabits per second. There was constant upgrade of speed from 2 megabits per second to 10 megabits per second with the roll out of 3.5 and 3.75G standards. And, in 2011, after exactly 10 years, the present generation mobile networks, 4G network debuted. The primary purpose of 4G network has been to bring faster speeds, while other generations of mobile networks have added new functionality to the mobile devices. The first phase of 4G is Long Term Evolution, which is popularly known as LTE having minimum speeds of 10 megabits per second ranging up to a theoretical 100 megabits per second.

However, as of now, the theoretical speeds in the majority of covered areas is yet to be achieved. The questions that arises here is how will it improve to reach faster speeds? The evolution of 4G is correlated to 5G

SINGH & SINGH

C-139, Defence Colony
New Delhi - 110024, India
T: +91 11 - 4987 6099
T: +91 11 - 4982 6000 to 6099
E: email@singhandsingh.com

technologies. 5G is on pace to improve many aspects of current generation mobile networks. Some of these major factors include speed, latency, bandwidth, energy consumption and more. But, in order to achieve this, it will require various technologies and communication techniques working together in unison.

The first of these technologies and possibly the most important of all is millimetre waves. From the inception of mobile networks, all devices have been in the frequency spectrum between 3 kilohertz to 6 gigahertz. This wasn't an issue in the past as devices were limited to mainly mobile phones; however, with the emergence of the internet of things, self-driving cars, smartwatches, VR, AR and countless other technologies that requires constant fast connections, these frequency bands are becoming increasingly jammed. If all these devices are to remain within the currently established frequency spectrum, no device would be able to get an appropriate amount of bandwidth to operate as designed, which equates to slower operation and dropped connections. Millimetre waves open up the frequency spectrum from 6 gigahertz all the way up to 300 gigahertz allowing for much more bandwidth. This will ensure constant high speed and low latency connections; therefore, a shared spectrum is key and ensuring these devices are always connected. For example, you wouldn't want a self-driving car to drop connection because someone next to you got on a phone call. The shared spectrum is also designed with consumer use in mind, if in your location, the shared spectrum space isn't being accessed and there is a high density of consumer devices, some spectrum space can be allocated for temporary use. Now you may be wondering why millimetre waves haven't been used as of yet, this is because -

a) We didn't require them, as there weren't as many mobile and connected devices requiring bandwidth

b) Higher frequencies are more easily absorbed by the atmosphere and can also be scattered and absorbed by weather events and buildings; thus, they require nearly line of sight communication. As such, the technologies required the millimetre waves to become widely adopted weren't previously available.

The second primary technology for 5G networks is the massive MIMO. It is required to provide connection for the high-density of devices in particular areas. MIMO stands for multiple input multiple output, and will be applied to the cellular base stations. Currently, MIMO technology is used in a much smaller form with base stations having between 8 to 12 antennas to handle all the traffic they transmit and receive. Massive MIMO takes this idea and expands on it with the ability to add hundreds of antennas per base station. Just this year, Ericsson started shipping 64 antenna array systems, with multiple companies such as Huawei, ZTE and even Facebook successfully demonstrating 96 to 128 array systems. The number of antennas per base station is only set to increase as testing and refinement continues. It is expected by 2020, the average consumer will have at least 6 to 8 connected devices, bringing 3 with them wherever they go. If you multiply this single person with the population density of cities, you can begin to see why massive MIMO is so essential in providing all those devices connectivity. Massive MIMO in deployment will be able to provide connectivity to over 1 million devices per square kilometre, which is enough to provide quality connection in the city hubs, stadiums and other tightly packed areas where current 4G systems often fail or struggle. The main problem with Massive MIMO is the interference that all these intersecting waves will create due to how tightly packed together the antennas are. This would result in distorted or destroyed data which wouldn't be good at all. The next technology we'll be discussing is essential in solving the issues millimeter waves and massive MIMO have.

Beamforming is an essential data transmission technique required for massive MIMO to work as expected and reduce the signal propagation loss due to the higher frequencies of millimeter waves. Base stations are constantly broadcasting signals not necessarily aiming for a particular target. When your device receives a transmission from a cell tower, there was a lot of interference produced elsewhere to ensure your signal was received. Beamforming acts like a crossing guard, only sending out signals exactly where and when they are needed by spatially tracking them until they reach their target device. Like massive MIMO adding more antennas to base stations, there will also be more antennas added to devices as well, ranging from 4 to 16 plus. This addition of antennas is key for beamforming allowing for more precise advanced spatial tracking. This addition of antennas will allow our devices to connect to the best station in their vicinity to establish a line of sight communication. Taking it one step further, beamforming will be spatially aware enough to bounce signals off obstacles in the environment to ensure they reach their target location.

Before delving deeper, it is important to know about the benefits of 5G and its economic impact.

ECONOMIC IMPACT OF 5G

As per a report by a government-appointed panel, implementation of 5G technology is anticipated to create a cumulative economic impact of $1 trillion in India by 2035[1]. However, as per another report by Ericsson, 5G-enabled digitalisation revenue potential in India will be above $27 billion by 2026. Additionally, global telecom industry GSMA has forecast that India will have about 70 million 5G connections by 2025.[2]

CHALLENGES IN IMPLEMENTATION OF 5G

South Korea and the United States of America became the first countries to launch 5G services. Even China has given commercial licenses of 5G to its major carriers. And, trials in India will begin by mid-September. During the first term of the BJP led government, a target of 2020 for the commercial launch of 5G services was set, which was largely in line with rest of the world. For the trials to begin, the government needs to allot certain amount of spectrum to telecom companies. This is where the major challenge comes in for implementation of 5G.

The government plans to undertake spectrum auction in 2019. In a first step towards preparing for these auctions, the Telecom Regulatory Authority of India (TRAI) had in August 2018 recommended that entire available spectrum be put to auction in the upcoming sale. Therefore, a total of 8,644 MHz of spectrum will be put on sale, making it the largest ever such auction. The total base price of the total airwaves on sale is about ₹4.9 lakh crore. The regulator has suggested a pan-India reserve price of about ₹492 crore per MHz for unpaired spectrum.

Bharti Airtel and Vodafone Idea have expressed their apprehensions regarding the auction. They have stated that reserve price of these airwaves is way too high. The Cellular Operators Association of India (COAI), which is a telecom industry body, has also expressed concerns about the financial health of the sector amid intense competition and recent phase of consolidation. Currently, the industry's cumulative debt is pegged at around ₹7 lakh crore. They have also highlighted the fact that 5G is overpriced by at least 30% to 40% as compared to international standards and auction in other markets such as South Korea and the U.S.

Apart from this, there are other challenges as well which could hamper meeting the timeline. Right of Way (RoW) and lack of uniform policy framework is another major challenge. The present regulatory framework for installing network infrastructure has always been one of the most argumentative issues in the industry. Rolling-out of Optical Fibre Cables (OFC) and telecom towers by the services providers have been impacted because of delays owing to complex procedures across states, non-uniformity of levies together with administrative approvals. Going ahead, densification of network as propagated by 5G use cases, is expected to require deployment of extensive infrastructure; however, any discrepancies and delays while securing RoW may further result in complex distribution and longer build time.

A sturdy backhaul network is a key requirement to meet the high output and low latency expectations from 5G technology. And, India has about 1.5 million Kms of fibre installed with less than 25% of the telecom sites connected through fibre. In addition, India is listed below several countries in the ICT Development and Global Connectivity Index and needs to hasten across digital transformations through technology enablers such as broadband networks concurrently with cloud, big data, data centres, and Internet of Things. Nevertheless, enabling broadband networks through fibre implementation could be a long capital-intensive project and will necessitate an estimated investment of USD 8 billion to surge fibre footprint and reach 77-80% of tower assets in significant urban areas.

Aside these, network modernisation and densification will be a complex procedure. Unlike the earlier generations, 5G requires a closely packed - denser small cell network architecture. Small cell-based network densification is yet to be realized at a substantial scale using 4G network backhaul. Building commercial 5G use cases over 4G networks with existing 4G network coverage may pose a challenge in the coming time. Furthermore, strengthening the security apparatus with evolving technologies is equally important to avert the risk of cyber-attacks.

From the above, it is clear that even though there is an urgency and eagerness to bring 5G technology in India, challenges need to be addressed first in order for its implementation. Regulatory support from the government by providing the adequate ecosystem for R & D, regulatory framework for spectrum, data and information security, IoT, digital along with inclusive business environment to encourage domestic and international players to invest in the technology would help in its implementation.

Rohan is currently working with Singh & Singh Law Firm as a Senior Associate under Mr. Tejveer Singh Bhatia, Partner. His practice areas include Telecommunication & Broadcasting Litigation and Consumer Protection litigation before the Hon'ble Supreme Court, Hon'ble Delhi High Court, Telecom Disputes Settlement and Appellate Tribunal, and National Consumer Disputes Redressal Commission. He also has a keen interest in media and sports law.

[1] https://www.thehindu.com/business/how-will-a-5g-network-power-the-future/article27698653.ece
[2] https://www.thehindu.com/business/how-will-a-5g-network-power-the-future/article27698653.ece