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5G: Too Good to be True?

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With trials and commercial deployments of 5G already underway and many CSPs expecting to deploy 5G technology in the next one to two years, the promise of 5G is fast becoming a reality. Data speeds of up to 20 times faster than existing LTE deployments at 10 or even 20 gigabits per second will make new apps and services—such as ultra-HD video and fixed wireless Internet—a reality over the mobile network. Low latency data transmission of 1 millisecond, making data connection and transmission almost instantaneous, will become commonplace and enable a whole new wave of services.

Due to the higher frequency of 5G (above 6GHz) and the additional available bandwidth, several orders of magnitude more connections can be supported per square kilometer. These additional connections will become critical as more and more IoT devices are supported. Even now, applications like 'smart' appliances, home security systems and connected cars are driving up the number of connections needed. The high-frequency ranges of 5G will also allow for improved efficiency and reduced interference through the use of beamforming, where cellular signals can be targeted at individual customers or devices, reducing interference and allowing more information to be exchanged between the subscriber and the network.

Through virtualization of networks and the implementation of network slicing, CSPs will be able to dedicate specific network resource profiles to specific services: for example, higher bandwidth for ultra-high definition video streaming versus low latency and guaranteed connectivity for gaming. In addition, the network and service reliability will be significantly improved through virtualization of the networks, network slicing and various requirements included in the 5G specification, providing five 9's availability. All of this will come at a lower cost to CSPs by moving away from macro-cell architecture to more distributed small cell deployments that are less costly to build and have a smaller footprint.

New Monetization Opportunities

The promise of 5G will create many opportunities for CSPs to generate new revenue streams by improving current services and creating new ones. These opportunities include:

- Enhanced wireless broadband
- Fixed wireless Internet offered to homes and enterprises

- Support for services that require higher bandwidth and consistent connectivity, such as ultra-high definition video streamed directly to your device, virtual and augmented reality applications, fully autonomous or semi-autonomous vehicles, or drones
- IoT everywhere—smart appliances, connected homes and enterprises, cars, and smart cities. 5G's ability to handle millions of connections per square kilometer will enable this.
- Mission-critical applications that require reliable and low latency connectivity: for example, telemedicine surgery being performed remotely.
- New applications and innovations

Sounds too good to be true. What's the catch?

The Technical Challenges of 5G

As with any major technology shift, the move to 5G comes with a number of technical and business challenges which operators will need to address. First and foremost, the 5G standard has only been recently defined and will see many iterations as 5G technologies are implemented and evolve.

Because 5G uses higher frequency ranges, cellular signals won't be able to travel as far as existing 3G or 4G signals. From a network infrastructure perspective, CSPs will therefore need to increase the number of cell sites they have, moving away from traditional macro-cell deployments to more numerous small cells. The Small Cell Forum predicts that the number of cell sites will increase tenfold, growing to 70 million worldwide in 2025. All of these small cells will need to be managed.

In order to support the flexibility of 5G, CSP networks will need to embrace virtualization and related technologies like NFV and SDN. These technologies can be complex and will require dedicated skillsets and new partnerships. The move to virtualization is necessary as the network must be able to manage the flexibility required to support multiple types of services with very different functionality and performance profiles across a common network infrastructure.

All of this will mean that CSPs will need to monitor and operate networks that have multiple new services and technologies, resulting in thousands of new data points to track. The sheer volume of data that will be generated will be staggering—and analysis will only be possible using big data analytics platforms with the flexibility to spin up new use cases on demand. In addition, artificial intelligence (AI) and machine learning will need to be implemented in order to analyze the massive amount of customer and machine data to properly operate the network, making in-the-moment decisions and driving real-time remedial actions back into the network. There is no point in having the flexibility of 5G if it takes 12 months to spin up a new service, slice the network or allocate elastic resources when required. The emergence of new services and use cases will be a constant and these tasks need to be automated.

What about the Business Case: How Can 5G be Justified?

The business case for 5G and the requisite investment in spectrum and new radio access network infrastructure will need to be justified. In order to enhance revenues and achieve a return on their investment, CSPs will need to target the right customers with new 5G services and devices. Which customers are most likely to migrate to 5G? Which customers will most benefit from a move to fixed wireless access? What will spur them to action? The need to understand the target audience is critical in order to design the right products and services. Real data points are crucial to understanding why one product of service offering was successful and another failed.

The secret is in the data. Having real-time access to data allows marketers and new product groups to understand their customers' interests as well as their needs and expectations. Millennials and Gen Zers expect relevant, tailored content, a la YouTube suggested videos. This must all be done in real-time so that offers can be presented to customers when they are interested, not after they have chosen someone or something else.

How can CSPs take the volume of data generated by the network and turn it into useful, consumable information that helps them grow their business and increase their top line without destroying their bottom line?

AI: Understanding the Unknowns, Predicting and Taking Action

AI-driven analytics can help CSPs ingest the hundreds of billions of data flows that will be generated by 5G networks, enrich and categorize them in real-time, and turn them into meaningful insights. These insights can be used to interpret customer behavior and experience and generate recommended actions. This foundational data and insight will help both ensure high-quality customer experience and drive new revenues.

By employing machine learning and artificial intelligence technologies, CSPs can predict emerging content and future usage trends, enabling them to stay one step ahead of the competition. Making data-driven decisions ahead of time regarding the right services and offerings will be key to market adoption. For example, an emerging augmented intelligence application may be the tipping point for many customers to move to 5G. Knowing this ahead of time will enable CSPs to make the maximum impact with their marketing campaigns.

In addition, understanding location-based customer behavior and device usage will provide an extra level of intelligence for personalized services and offerings. For instance, if you know that your customer, a Pokemon Go gamer, is standing near an augmented reality (AR) billboard ad for the latest release of a competing game, you have a critical piece of information on the ideal time to send a notification. The customer simply could point his phone at the billboard and see a trailer of the new game on his phone. This kind of targeting needs to be done as close to real-time as possible so that CSPs are presenting the most relevant information available at any point in time.

5G promises both tremendous opportunity and challenges. By leveraging AI and analytics, CSPs will be better positioned to capitalize on the former and mitigate the latter.