Let's Talk Fast Data

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One of the arguments for 5G, and all of its uber capabilities, is the upcoming densification of networks. That densification will create huge volumes of data.

The latest buzz word in this environment is "fast data." Now, this is not your run of the mill normal data. This is data that has latency and bandwidth requirements far beyond what present networks are capable of handling.

We are not talking smartphones, either. We are talking true 5G enhanced mobile broadband (eMBB) – high data rates across wide coverage areas. That will require Ultra-Reliable Low-Latency Communications (URLLC) with precise requirements, for latency and reliability, for mission-critical communications, such as remote surgery, autonomous vehicles, real-time multimedia, and the Tactile Internet, etc.

There is quite a bit to this. However, the main requirements are low-latency and high speed (aka bandwidth). The bandwidth part is easier part – low latency, a bit more challenging. However, it all needs are wide spectrum slices.

eMBB is a primary 5G New Radio (NR) use case platform. It is defined, by the 3GPP, as part of its SMARTER (Study on New Services and Markets Technology Enablers) project. SMARTER was developed to identify high-level use cases and drill down on features and functions that will require 5G advanced technologies. The other two are URLLC and massive machine-type-communications (MMTC).

eMBB requirements vary by scenario, depending on where densification is taking place. One example of "hotspot" scenario is of a dense, close quarters, sporting event loaded with spectators. Here, there will be lots of data going back and forth, but mobility will be low. On the other side of this coin, a good example will be high-speed rail. Here, the demand will be for a high degree of mobility but lower traffic density.

In either case, certain metrics of 5G will be necessary; 10 megabits per second per square meter, average data transfer rates of up to 1 Gbps, with peak data transfer rates in the tens of Gbps. Situational traffic volume may be as high as 1 terabit per second per square kilometer in the more extreme cases. And, latency of 1 millisecond with the ability to sustain up to one million connections per square kilometer.

Early marketing of eMBB use cases center on the consumer market. One case is the need for better and faster connectivity to handle higher quality video content. Another is the growth in user-generated content and our expectations of being able to stream what we want, where we want and when we want, without needing to log onto a Wi-Fi network.

While there is a lot of hype around the consumer eMBB, that is not going to be the first area to ramp up. There is much noise about super-fast video downloads, virtual "X," unrestricted streaming of various content and near-fiber speed web browsing. However, it will be some time before these use cases materialize with any meaningful revenue.

The first use cases for eMBB are going to be in the enterprise and business sectors. These will be enhanced connectivity to support mobile workers. Industrial, fully immersive virtual, real-time video monitoring and virtual meetings with 360 degrees of visibility (hologram, eventually) are likely scenarios. 3D video, real-time interaction and even real-time translation for participants speaking different languages are other possibilities.

URLLC is another platform that 5G will enable. It will play large in areas such as industrial automation. It will accelerate the technologies in what is being called the fourth industrial revolution. 5G networks will be the platform for much of the factory automation using URLLC.

URLLC will also be the enabler for intelligent transportation. It will empower segments such as autonomous vehicles, road safety, and traffic efficiency services. Here, especially, latency will be the primary consideration.

Still another emerging area is telemedicine. There is concern about the shortage developing in skilled medical providers. Doctors will be spread thinner for the foreseeable future, necessitating efficiency and optimum use of resources.

Telemedicine promises to address that by eliminating many of the inefficiencies such as waiting rooms and ER crunches by off-loading analysis and certain treatments to other, less busy, facilities. It also will enable remote patient monitoring and communications with devices measuring vital signs such as electrocardiograms, pulse, blood glucose, blood pressure, and temperature. The remote treatment and response based on monitored data can be life-critical for a patient, requiring immediate, automatic or semi-automatic response. Triage can be augmented by telemedicine, as well.

URLLC will also play large in remote surgery and crisis incidents. Remote surgery is about applications in ambulances, disaster situations and remote areas requiring precise control and feedback, in real-time, across many resources. In such scenarios, communication mechanisms must be instantaneous.

Another major use case platform will be MMTC, which targets the cost-efficient and robust connection of billions of devices in a network. The first use case that comes to mind is the Internet of Everything/Everyone. This will the defining case for MMTC with, ultimately, billions to trillions of devices busily chattering amongst themselves.

The gamut will go from low-data rate with very intermittent operation to super-high data rate devices. Most low data rate devices include remote sensors in agriculture, utilities, smart homes, weather and similar applications where change is relatively slow. High data rate devices are those involved in medicine, public safety, the vehicular infrastructure, transportation, retail malls, city centers, smart buildings, industrial complexes and more. In a sense, all of this can fit under the IoX umbrella so we will leave it at that for now.

These are, of course, only some of the use cases that will evolve as 5G evolves. However, they are the three most global platforms most use cases will live under as 5G, and they, mature.