5G Simply Explained

Introduction: 5G and CBRS technologies are in their infancy and there are many moving parts such as standards, technology innovations, FCC/international regulations, dependent IoT technology, new network architectural element such as Spectrum Allocation Server (SAS) and in general a completely new real time spectrum allocation algorithm approach, approved by FCC, that will change the cellular wireless business as we know it.

At Monetti & Associates Consulting LLC, we have combined have 50+ years of experience in cellular wireless technology from its inception in its software development, testing, end-to-end architecture, solution development, product and project management and standardization and IoT devices (sensors). Some key 5G/CBRS consulting services are listed below.

- We actively monitor market and standards development as 5G/CBRS initial standards are completed
- Research and develop relationships with new IoT vendors and technology available with 5G/CBRS
- Monitor and participate as need in FCC regulated, SAS testing and verification process
- Work with vendors to evaluate new CBSD and NR radio development for 5G and CBRS
- Help navigate 5G network initiatives for machine to machine type communications (mMTC) and ultra-reliable low latency communications (URLLC)
- Adoption of 5G into CBRS at later stages will be a natural next step which we can help in.
- We hold FCC approved CPI certification for architecting and installing CBRS radios.

Technology and Standards: Initially, the term 5G was defined by the ITU IMT-2020 standard, which required a theoretical peak download capacity of 20 gigabits. More recently, the industry standards group 3GPP has included any system using NR (New Radio) software. The 3GPP standards do not require any particular performance level.

ITU-T has divided 5G network services into three categories. They are as follow:

1. Enhanced Mobile Broadband (eMBB) or handsets.

2. Ultra-Reliable Low-Latency Communications (URLLC), which includes industrial applications and autonomous vehicles

3. Massive Machine Type Communications (MMTC) or sensors.

Initial 5G deployments will focus on eMBB and fixed wireless, which makes use of many of the same capabilities as eMBB. 5G will use spectrum in the existing LTE frequency range (600 MHz to 6 GHz) and also in millimeter wave bands (24–86 GHz). 5G technologies have to satisfy ITU IMT-2020 requirements and/or 3GPP Release 15; while IMT-2020 specifies data rates of 20 Gbit/s, 5G speed in sub-6 GHz bands is similar to 4G.

IEEE covers several areas of 5G with a core focus in wireline sections between the Remote Radio Head (RRH) and Base Band Unit (BBU). The 1914.1 standards focuses on network architecture and dividing the connection between the RRU and BBU into two key sections. Radio Unit (RU) to the Distributor Unit (DU) being the NGFI-I (Next Generation Fronthaul Interface) and the DU to the Central Unit (CU) being the NGFI-II interface allowing a more diverse and cost-effective network. NGFI-I and NGFI-II have defined performance values which should be compiled to ensure different traffic types defined by the ITU are capable of being carried. 1914.3 standard is creating a new Ethernet frame format capable of carrying IQ data in a much more efficient way depending on the functional split utilized, this is based on the 3GPP definition of functional splits. Multiple network synchronization standards within the IEEE groups are being updated to ensure network timing accuracy at the RU is maintained to a level required for the traffic carried over it.

Conclusion: We are at the cusp of the 4th industrial revolution driven by the Internet of Things and new communications developments like 5G and Private LTE. This is a global revolution where strategic go-to-market and business decisions will require careful planning on how to implement these technologies and take advantage of the regulatory changes at the FCC and other international regulatory bodies. Understanding where not to move forward with these technologies, like in low bit rate IoT sensor deployments, is almost as important as knowing where best to move forward with them. Monetti & Associates are uniquely positioned to help you sort through these choices to come up with comprehensive decisions based on your unique business needs.