The U.S. has completed auctions of the 28 GHz and 24 GHz bands [4][5] and began auctions of the 37 GHz, 39 GHz and 47- GHz bands in December of 2019[6]—the largest award of millimeter wave spectrum ever. Carriers spent $2.7B+ in recent mmWave auctions, and the sum of the high bids in the auction currently underway has already exceeded $7 billion as of January 13th of 2020.

The FCC began allocating these mmwave spectrum bands for 5G in 2016. Since then, deployment of mmW for 5G in the US has been ongoing, and as of the end of 2019, three of the four US national operators have launched 5G mmWave commercially. AT&T mmW 5G is now live in 35 markets. Its first commercial launch was on Dec, 21, 2018, using NETGEAR® Nighthawk 5G Mobile Hotspot devices and Samsung Galaxy S10 5G. The focus of the AT&T service so far has been on business users. Verizon mmW 5G is now live in 31 markets, its first smartphone launch was in April 3, 2019, and their 5G mmW device portfolio now includes Moto z3 and z4 with 5G moto mod, Samsung Galaxy S10 5G, Samsung Galaxy Note10+ 5G, LG V50 ThinQ 5G & Inseego MiFi Hotspots. The Verizon deployment also includes many sports venues (football (NFL) and basketball (NBA) stadiums. T-Mobile mmW 5G is now live in 6 cities. Their service launched in June of 2019 in 28GHz with Samsung S10 5G. T-Mobile is targeting to be the 1st with national coverage using its 600 MHz spectrum, in addition to mmW. In general, mmWave will be a strong requirement for devices launching in the US this year.

Qualcomm® Snapdragon™ X50 Modem-RF System[2] and the second-generation X55 and X52 Modem-RF Systems [3] all support 5G operation in both the sub-6 GHz and multi-band millimeter wave (mmWave) spectrum. These Snapdragon 5G Modem-RF Systems deliver the world’s only comprehensive modem-to-antenna system for 5G multimode devices using mmWave or sub-6 GHz. All system elements, including baseband, RF transceiver, RF front-end components and antenna modules, are designed to work together to implement advanced techniques not possible with discrete components, delivering consistently high cellular speeds in more conditions and places, providing superior coverage and outstanding power-efficiency, in sleek form factors. The systems solve major design complexities to enable OEMs to commercialize 5G multimode devices early and quickly at global scale by reducing development effort, cost, and time-to-launch. Virtually all the first wave of 5G devices launched in 2019 was based on Qualcomm Technologies’ solutions.

Qualcomm 5G solutions are also designed to bring 5G to a broad array of connected devices: from mobile devices, such as smartphones or mobile hotspots, to fixed wireless devices, such as routers and CPEs, to 5G PCs, XR devices, cars, and more. 5G mmWave is scheduled to be available in more affordable devices this year based on Qualcomm Snapdragon 800-, 700- and 600-series Mobile Platforms. In addition to the flagship mobile platform of Snapdragon 865, Qualcomm also announced Snapdragon 765 to make 5G more broadly available. Snapdragon’s expanded portfolio of 5G mobile platforms is designed to support all key regions and frequency bands including mmWave and sub-6 GHz. This year 5G mmWave will also be available in more device segments such as Fixed Wireless Access CPEs and 5G PCs such as the [Lenovo Yoga 5G](https://www.windowscentral.com/lenovo-announces-worlds-first-5g-pc-lenovo-yoga-5g).

5G mmWave coverage and service is more resilient than generally perceived. [A study from highly-regarded analyst firm Signals Research](https://www.qualcomm.com/news/onq/2019/10/23/benchmark-global-study-proves-5g-performance-coverage-and-power-efficiency)[1] debunks various misconceptions about mmWave coverage and performance. These misconceptions are a product of the complexity in understanding mmWave behavior and characteristics, combined with speculative statements and anecdotal observations by testers relying solely on the 5G icon indicator on their smartphone and speed test applications. The study proved 5G mmWave operating in non-line-of-sight scenarios. It showed that mmWave signals can reflect off buildings and provide enough signal strength to sustain a mobile data connection. Additionally, reflections can extend coverage around corners and even behind buildings that lie between the cell site and the smartphone. mmWave indoor deployments also show favorable results. In their study[1], Signals Research Group pointed out 5G millimeter wave deployments were already occurring with very favorable results. They’ve documented close to ubiquitous coverage within the seating area of one NFL stadium, along with data speeds that frequently exceeded 1 Gbps and peaked at just over 2 Gbps.

5G mmWave is expected to launch commercially this year in more regions including Europe, Japan and South Korea. In 2021 and beyond it is expected to launch in Australia, Latin America, South East Asia and possibly in China.

**Reference**

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