Before the

United States House of Representatives

Subcommittee on Communications & Technology

Hearing on

"Legislating to Secure America's Wireless Future"

Testimony of

Dean R. Brenner

Senior Vice President, Spectrum Strategy & Tech Policy

Qualcomm Incorporated

September 27, 2019

Chairman Doyle, Ranking Member Latta, and Members of the Subcommittee, my name is Dean Brenner, and I'm here today on behalf of Qualcomm, which was founded in a San Diego living room, but is now the world's leading supplier of chips—an entire modem-RF system—for smartphones and other wireless devices, and the world's leading inventor and licensor of new wireless technologies. The technologies we develop, especially 5G, and the chips we design depend on one key input controlled by the government: spectrum.

As this Subcommittee has recognized, enabling a steady stream of new spectrum—low, mid, and high band; and, licensed, unlicensed, and shared—is essential for the rapid, broad 5G roll-out. We're working on 5G at a feverish pace, but our work depends on the continued, steady stream of new spectrum, so thank you for continuing to make spectrum a high priority.

5G is now launched on four continents. More than thirty 5G networks, including those of all four US national operators, have launched and are expanding. Over twenty manufacturers are selling or developing 5G devices—more than six times as many as in 4G's first year. Qualcomm's chips are in more than 150 5G devices which have been, or soon will be, launched—including phones, hotspots, and fixed wireless devices. Our chips support both sub-7 GHz and millimeter wave bands, and the US was the first country to launch 5G in both sub-7 GHz and millimeter wave. 5G is delivering far better mobile broadband at a much lower cost per bit.

Let me explain several 5G game-changers, which will launch soon and accelerate the 5G rollout:

- Dynamic Spectrum Sharing (DSS) enables an operator to run 5G in spectrum already in use for 4G. Instead of having to empty a 4G spectrum band before launching 5G—which could take ten years or more—DSS will enable a band to be used simultaneously for both 4G and 5G.
- Enhanced millimeter wave will enable 5G fixed wireless to be used for rural broadband. Qualcomm has developed new antenna modules which enable 5G fixed wireless service one mile away from a rural base station, covering a much larger area than anyone thought possible.
- A new version of 5G optimized for unlicensed spectrum will enable 5G to be used for ultra-low latency, ultra-reliable 5G in factories, warehouses, and other venues. This

technology, along with new forms of Wi-Fi that Qualcomm is working on, would be deployed in new 6 GHz unlicensed spectrum now under consideration by the FCC.

- Qualcomm's 5G small cell chips will expand 5G to more people and locations, particularly indoors using millimeter wave spectrum.
- Last, cellular vehicle to everything (C-V2X) technology, first with 4G and then 5G, enables cars to communicate with other cars and infrastructure with much greater range and reliability than is possible with older DSRC technology. For C-V2X to be deployed, the FCC must waive or change the rules for 5.9 GHz spectrum, which only allow deployment of DSRC.

Let me turn to 5G security, which has been a high priority for Qualcomm ever since we started working on 5G, even though we don't manufacture core network equipment. Qualcomm has worked on 5G security internally, with many other companies, and in the 3GPP global standards group which sets 5G standards. In addition, for many years now, Qualcomm has been an active participant and leader in CSRIC, the FCC's Communications Security, Reliability & Operability Council.

Most recently, we appreciated the bipartisan May 9th letter sent from the Chairmen and Ranking Members of this Subcommittee and the full Committee to FCC Chairman Pai asking that CSRIC examine 5G security. Subsequently, one of our engineers, Dr. Farrokh Khatibi, was appointed to lead the CSRIC Working Group on Managing Security Risk in Emerging 5G Implementations. The members of this CSRIC group include experts from DHS, a county government, a non-profit, government contractors, network operators, tech companies, standards groups, and a trade association. We look forward to advancing 5G security through this multi-stakeholder group.

Finally, Qualcomm has been working on spectrum sharing for many years. We have worked directly with NTIA, the Defense Department, and other government agencies, as well as with private sector colleagues. Often, a spectrum band analyzed for sharing involves multiple Cabinet departments and multiple entities in those departments. Over the years, NTIA has played a coordinating role, gathering technical input from the government players, working with industry, leading joint public-private technical work, and speaking for the Executive Branch with a unified voice to make progress toward greater sharing. This process culminated most recently in the initial commercial deployments which have begun in the 3.5 GHz CBRS band—a great

development which increases the amount of mid-band spectrum for 4G and 5G. We're very pleased with the heightened interest across the federal government in sharing spectrum with industry, and we look forward to continuing to work through this process to enable more intensive spectrum sharing.

Thank you, and I look forward to answering your questions.