

Attachment—Additional Questions for the Record

**Subcommittee on Communications and Technology
Hearing on
“Legislating to Secure America’s Wireless Future”
September 27, 2019**

**Mr. Dean R. Brenner, Senior Vice President
Spectrum Strategy & Tech Policy, Qualcomm Incorporated**

The Honorable Anna G. Eshoo (D-CA)

- 1. Please explain the role encryption plays in protecting the American people from potential vulnerabilities in telecommunications equipment. To what degree does the encrypting of calls and internet traffic mitigate risks related to potential vulnerabilities in telecommunications equipment?**

Response: As I discussed in my testimony, security of the entire cellular communications system is a top priority for Qualcomm. To that end, Qualcomm is working, and often leading, several activities in this area. From the perspective of ensuring security of the underlying cellular technology, Qualcomm is actively involved in 3GPP, the leading organization responsible for the 4G and 5G global standards. Also, as stated in my testimony, one of our engineers, Dr. Farrokh Khatibi, was appointed to lead the FCC CSRIC VII Working Group on Managing Security Risk in Emerging 5G Implementations.

In addition, Qualcomm is engaged in activities to ensure supply chain risk management. An example of this effort is the work taking place in the ATIS (Alliance for Telecommunications Industry Solutions) 5G Supply Chain Working Group in collaboration with the Department of Defense. The aforementioned FCC CSRIC VII is also working on supply chain security. These efforts include the development and standardization of several important techniques to ensure the security of communications systems, including mutual authentication, encryption, and integrity protection.

All of these activities are aimed at protecting the American people from any potential vulnerabilities in the cellular communications system.

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The Honorable Yvette D. Clarke (D-NY)

1. As you know, we are in the midst of a race to 5G.

a. Mr. Brenner, given your work in this area, what are your strategy recommendations to Congress that will help us win the race?

Response: As I stated in my testimony, ensuring 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 in the U.S. Congress is to be commended for enacting legislation, such as the Mobile NOW Act, which has contributed to new spectrum availability. Going forward, it’s essential that Congress continue to exercise its oversight authority to ensure the goals of the Mobile NOW Act are achieved, and to continue to pursue new legislation, such as the SHARE Act (H.R. 4462), which would encourage the development and use of advanced sharing techniques so that spectrum can be used more efficiently by the Government.

As I explained in my oral testimony, I believe that Section 2 of the SHARE Act should be amended to include two additional tools: “Look Before Talk” and “Synchronization.” Use of these additional tools, which take advantage of the speed of the new 5G radios and the improved directionality of 5G transmissions using narrow beams, can produce better, faster mobile broadband, as well as power savings for mobile devices.

b. What are your recommendations to the FCC? NTIA?

Response: My recommendation to the FCC is to continue to press forward in making new spectrum available for 5G. This effort should include, in addition to the upcoming millimeter wave auctions, making the entire 6 GHz band available for unlicensed use, and allowing C-V2X to have access to a portion of the 5.9 GHz spectrum. Qualcomm’s specific recommendations to the FCC on these topics are available [here](#) and [here](#).

My recommendation to the NTIA, as described in my testimony, is to continue to serve as the lead coordinator between federal agencies and the private sector on spectrum sharing. It’s critical that NTIA continue to play a coordinating role amongst these entities and to speak with a unified voice for the Executive Branch to make progress toward greater sharing. No other federal agency is capable of serving in this role, so it’s paramount that NTIA continue to serve in this capacity.

2. I personally struggle with the traffic in New York City. It has become a great challenge to solve. 5G technology is one of the solutions that is in the current conversation to make traffic flow more efficiently.

a. Mr. Brenner, could you explain C-V2X and the impact it would have on dense traffic areas like New York City?

Response: C-V2X is a ground-breaking technology that has great potential to save lives, improve traffic flow in congested areas, such as New York City, and conserve energy. C-V2X enables direct, peer-to-peer communications between vehicles (“V2V”), vehicles and vulnerable persons such as pedestrians and cyclists (“V2P”), and vehicles and transportation infrastructure (“V2I”), as well as communications between vehicles and mobile networks (“V2N”). Importantly, recent testing completed by the 5G Automotive Association (“5GAA”), which is a rapidly growing global association comprising many of the world’s major automotive, technology and telecommunications companies, demonstrates that the C-V2X V2V mode consistently outperforms an older technology known as DSRC in key areas such as non-line-of-sight operations, resiliency and range. Qualcomm’s primary objective in designing C-V2X has been to improve road safety. However, C-V2X will also allow cities to take advantage of V2V, V2I and V2P communications to provide a variety of traffic mitigating solutions, such as traffic flow optimization, hazard protection and potential reduction in traffic rule violations. In addition, C-V2X, which will begin using 4G technology, has an evolutionary path to 5G, which will provide even greater safety and traffic efficiency benefits, including enabling robust communications for fully autonomous cars.

As mentioned in my testimony, unfortunately, current FCC rules allow only for DSRC to have access to the 5.9 GHz spectrum, the same spectrum for which C-V2X is designed. DSRC was developed over twenty years ago and does not have the performance advantages of C-V2X. Currently, no automaker has plans to deploy DSRC in the United States. Meanwhile, Ford has announced plans to deploy C-V2X in all new cars in the U.S. beginning in 2022. The 5GAA has submitted a [waiver request](#) to the FCC that, if granted, would allow C-V2X to have access to a portion of the 5.9 GHz band, while allowing DSRC to continue to have access to a separate portion of the band. In addition, 5GAA has proposed a fuller band plan for the 5.9 GHz spectrum that would accommodate 5G-based C-V2X, while also retaining the ability for DSRC to have access to the band. It is imperative that the FCC grant the 5GAA waiver request soon and consider the fuller proposal for the 5.9 GHz spectrum, which currently is under-utilized, resulting in the public being denied the safety and traffic efficiency benefits that C-V2X can provide. Absent prompt FCC action, this new technology, which could improve safety and traffic in New York City and other areas around the country, cannot be launched.

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The Honorable Robert E. Latta (R-OH)

- 1. Mr. Brenner: The SHARE Act contemplates developing new spectrum sharing tools in the 3100-3450-megahertz band, as well as in 7 gigahertz. Would you offer your thoughts as to where NTIA should train their focus with these new tools, if enacted?**

Response: As stated in my oral testimony, the SHARE Act should be amended to include two new tools, in addition to the nine already contained in Section 2 of the bill. These two additional tools are “Look Before Talk,” and “Synchronization.” The technical name for look before talk is “coordinated multipoint transmission” (CoMP). Synchronization enables a technique called “spatial division multiplexing” (SDM). Use of these advanced sharing techniques, which Qualcomm has demonstrated, will increase spectrum efficiency and assist the Government in uncovering the best ways to achieve the highest utilization of scarce spectrum resources, including in the 3100-3450-megahertz band and in the 7 GHz band.

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The Honorable Susan W. Brooks (R-IN)

- 1. Can you explain the process Qualcomm uses to ensure your products are secure from outside intrusion?**

Response: Qualcomm has recognized security as one of the key attributes of our products (chipsets and related software) since the early days of the company. Over the years, we have made significant investments to continuously improve the security of our products to counter ever-increasing cyber security threats. We believe the most effective way to approach the security of our products is to build security measures into all phases of the product development lifecycle and provide specific security trainings to our workforce. In the early product concept and design phase, we apply threat modeling to identify potential attacks and follow security design principles to build a strong security foundation. In the implementation and validation phases, we use a variety of tools and methods to prevent and detect security vulnerabilities that may appear in our products. Post product launch, our effective incident response process addresses issues reported by security researchers and attacks in the public domain, and releases security patches to our customers in a timely manner. We established our vulnerability rewards program in 2016 to work with the security research community to further improve the security of our products. We continue to be vigilant against new types of attacks on our products and continually seek ways to further improve our comprehensive and effective approach to security.

- 2. How do you protect your equipment from being compromised when it is used in conjunction with ZTE or Huawei products in specific devices?**

Response: We use the same process described above with all the manufacturers (so-called OEMs) to whom we supply our products, and we have found our process to be very effective in ensuring the security of our products.

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The Honorable Tim Walberg (R-MI)

1. **I'm pleased to see H.R. 4500 on today's hearing, a bipartisan bill I've introduced with my fellow 5G Caucus Co-Chairs, Ms. Dingell and Ms. Brooks. In Ms. Stempfley's testimony she talked about the need to understand changes in supply chain components and systems as we move ahead in time, which inherently leads to a software or component bill of materials. NTIA currently plays a critical role coordinating how to share software bills of materials across the Federal government, promote transparency, and how to communicate vulnerabilities of components downstream in the supply chain.**
 - a. **As companies like yours participate in global standards setting bodies that shape future technologies like 5G, how important is it for Qualcomm and others to have a strong partnership with the technical experts in the Federal government supporting their work in the communications standards body arena?**

Response: Qualcomm plays a lead role in standards bodies, including in 3GPP, which has developed, and continues to develop, the global 4G and 5G standards. NTIA is a regular participant in 3GPP, which unites seven telecommunications standard development organizations from around the globe and has provided a constructive environment for standards development. Other organizations from the US government that participate in 3GPP include the Federal Communications Commission, Department of Defense, the Department of Transportation, and several US government research laboratories. Within 3GPP activities, Qualcomm interacts on a regular basis with US government technical experts, and these interactions are valuable for the US government, Qualcomm, and the wireless industry writ large.

2. **You mentioned that small carriers lack economies of scale, making it difficult for trustworthy network suppliers to be competitive in price. What are your thoughts on allowing several small carriers to join together in placing orders to help achieve scale replacement?**
 - a. **Do you have any thoughts on this idea?**

Response: Qualcomm does not sell core network equipment to U.S. carriers. As such, we are not the experts in this area.