

**REMARKS OF FCC CHAIRMAN AJIT PAI
AT THE WI-FI WORLD CONGRESS 2019**

TYSONS CORNER, VA

MAY 14, 2019

I guess I should start by saying happy 20th anniversary! Only one more year until Wi-Fi is old enough to drink. I trust that next year's Wi-Fi World Congress is going to be in New Orleans. But today, we gather in Tysons Corner, a place synonymous with . . . traffic congestion. I get the subtle message you're sending. You want more spectrum for Wi-Fi. Trust me. We're working on it.

Just 20 years after Wi-Fi's launch, it can be hard to remember what life was like without it. For my part, Wi-Fi was a revelation. I was looking to buy a personal computer sometime in 2001. One of the options I noticed was a new Apple laptop that had a built-in chip that allowed you to surf the Internet without being tethered to a wall with a cable. This new thing—"Wi-Fi"—sounded too good to be true! I took the plunge—and never wanted to come up for air. I was amazed that I could download a song or send an email wirelessly from any room of my apartment. Yes, I know this sounds ridiculous nowadays because it's so commonplace, but back then, this was a big deal.

This is certainly how Wi-Fi's pioneers saw it. You know, in the very first minute of my very first speech as an FCC Commissioner, in 2012 at Carnegie Mellon University, I paid tribute to Professor Alex Hills, who built the world's first wireless Internet network. Named "Wireless Andrew," it was the forerunner of today's Wi-Fi networks. The next year, I had the privilege of meeting Professor Hills in his adopted home of Palmer, Alaska. After a great chat, he shared his book with me—"Wi-Fi and the Bad Boys of Radio." The book has a great passage that explains the enduring appeal of this technology. One day in the late 1990s, Professor Hills noticed a student sitting on the floor, holding his laptop above his head and pointing it in various directions. He was connected to Wireless Andrew—and giving a friend at MIT a virtual tour. As Hills puts it, the student "wanted to be sure his MIT friend knew about the 'cool' new service, one not available at MIT. And he wanted to rub it in." Hills concluded, with some understatement, "I began to think that we were working on something more than just an interesting research project." I'd say.

Professor Hills had a feeling, as did I and many others, that Wi-Fi would turbo-charge the Internet. It sure did. And there is no turning back.

Early on, the primary use of Wi-Fi was to connect our computers to home networks. Today, Wi-Fi is the fabric that binds together all our devices. It has become a foundational technology for the Internet of Things, connecting to the home network our TVs, thermostats, baby monitors, refrigerators, washing machines, toys, and even toilets. You name the device, there's a good chance it'll have Wi-Fi.

And we've all come to rely on it—if not outright demand it. You may have seen a survey a few years ago that showed that half of all business travelers considered free Wi-Fi a deciding factor when it came to choosing a hotel. Half! This was more than three times the next factor—a free breakfast. You know you've struck a nerve when Internet access trumps daily sustenance.

Now, this new way to connect didn't come from a government regulatory process. It was the result of the genius of this industry to find ways to use spectrum that was of little value or limited use to others. The creators of Wi-Fi spun gold from straw.

And Wi-Fi only continues to evolve and improve. The next generation of Wi-Fi, Wi-Fi 6, is rolling out in earnest this year. It'll be over two and a half times faster than Wi-Fi 5 and will offer better performance for connected devices. And the economic value created by Wi-Fi in the U.S. is projected to double by 2023—reaching nearly \$1 trillion.

Today—astoundingly, for those who remember what it was like in the early days—Wi-Fi carries more than half of the Internet’s traffic. It has arguably kept cellular networks afloat by reducing the traffic load on those networks. And as Wi-Fi has become more popular, so has the demand for more unlicensed spectrum to accommodate this traffic.

This brings us to the obvious question: what is the FCC doing to make the future of Wi-Fi brighter? The answer is: a lot!

For example, in March, in our *Spectrum Horizons* proceeding, we made over 21 GHz of spectrum above 95 GHz available for use by unlicensed devices. While some people may think that the spectrum bands are too high to be practical, I’d note that the same was said of the 2.4 GHz band 30 years ago. Back in March, we also created a new category of experimental licenses. This will give innovators strong incentives to develop new technologies using these airwaves while also protecting existing uses.

Of course, we’re not just making high-band millimeter-wave spectrum available for unlicensed use. We’re also working hard to free up mid-band spectrum. I know there’s a lot of excitement about what we’re doing in the 6 GHz band—what could be a massive, 1,200-megahertz test bed for innovators and innovation.

But first I’d like to talk about its next-door neighbor on the spectrum chart—the 5.9 GHz band. There’s been a lot of debate about this band, and I’d like to share with you today my view on the right way forward.

In a funny coincidence, the roots of the debate about the right approach to the 5.9 GHz band actually trace back to 1999. Exactly 20 years ago, the Commission reallocated 75 megahertz of spectrum in this band for a service called Dedicated Short Range Communications. Commonly known as DSRC, this technology was designed to allow car-to-car communications, including accident prevention. Unfortunately, while Wi-Fi hit the gas in 1999 and never looked back, DSRC has been stuck in neutral.

As a result, a lot of people are wondering whether this 75 megahertz of spectrum—a public resource, remember—is really being put to its best use.

In the automotive industry, many are now backing a new technological standard, Cellular Vehicle to Everything (C-V2X). C-V2X would use standard cellular protocols, such as 4G LTE, to provide direct communications between vehicles, between vehicles and infrastructure like light poles, and between vehicles and others on the road, like cyclists, pedestrians, and road workers. Meanwhile, unlicensed advocates have called for either sharing the band between unlicensed use and automotive communications technologies or reallocating the band entirely for unlicensed.

Given the swirl of the debate and the vast technological changes that have occurred since the Commission allocated the 5.9 GHz band 20 years ago, I believe that the time has come for the FCC to take a fresh look at this band. We should open up a rulemaking proceeding, seek comment on various proposals for the band’s future, and use the record that we compile to make a final decision on how the band should be allocated.

What are our choices? First, we could maintain the status quo. Given the history of and outlook for DSRC, I am quite skeptical that this is a good idea. But we shouldn’t rule it out entirely before we even begin a review of the band’s future. Second, we could allocate the 5.9 GHz band for C-V2X specifically or for automotive communications technologies generally. I know that many in the automotive industry are interested in ideas like these, and I believe that they merit thoughtful consideration.

Next, we come to options that should be of more interest to the people in this room. We could allow for sharing between unlicensed devices and automotive communications technologies in the lower 45 MHz of the band, while reserving the upper 30 MHz exclusively for vehicle-to-vehicle technologies. We could split the band, with the lower 45 MHz allocated exclusively for unlicensed and the upper 30

MHz allocated exclusively for vehicle-to-vehicle technologies. Or we could allocate the entire 75 MHz band exclusively for unlicensed use.

Making the right choice won't be easy. Automotive safety is obviously important—that's why I led the FCC to allocate a large contiguous band of spectrum (76–81 GHz) exclusively for vehicular radars back in 2017. And as we evaluate the future of the 5.9 GHz band, we'll need to consider what the future of automotive safety technology is likely to look like and the spectrum needs of such technologies, including whether they will require specifically dedicated airwaves.

But making more spectrum available for unlicensed devices is also important and could have a big impact. What kind of potential are we talking about for the 5.9 GHz band? Well, this past November, Rand put out a study that said opening up these airwaves for Wi-Fi could add between \$60 and \$105 billion annually to our nation's gross domestic product.

That's a lot of potential.

I know that reasonable people may disagree about the future of the 5.9 GHz band. But that is not a reason to avoid the conversation. Most people of good faith will agree on at least this: We can't keep kicking this can down the road. This valuable mid-band spectrum is largely lying fallow, and it has been so for two decades now—just as the Internet has gone from dial-up modems to gigabit Wi-Fi. Given this, inertia isn't a responsible thing for policymakers to indulge. It is time to launch a comprehensive review of the future of the 5.9 GHz band, make a sober assessment of the facts, and then make a timely decision on the best way forward.

As excited as I am about what we're doing with the 5.9 GHz band, the Commission's work on the 6 GHz band could be even bigger.

This past October, the FCC began to explore opening up 1,200 megahertz of spectrum between 5.925 GHz and 7.125 GHz for different types of unlicensed uses. Now, having grown up in America's heartland, I was raised to value modesty and humility. That's why I would like to use the words of our wise mutual friend Claus Hetting to describe the FCC's 6 GHz proceeding. Quote: "This is without a doubt the single biggest opportunity in Wi-Fi—and probably in wireless—in a generation."

Who am I to argue with today's host? But, wait—there's more.

Claus also said, "The truth is that this 6 GHz spectrum boost will launch the Wi-Fi industry into a new growth trajectory. It will boost Wi-Fi's massive indoor dominance. And surely—with the help of emboldened entrepreneurs everywhere—it will bring low-cost Wi-Fi (and unlicensed) connectivity to places where it has never been."

He's right. This is a big opportunity. But opportunity doesn't have to be realized. That brings me to one of the most important messages I want to deliver today: We are going to need help to make this work.

The 6 GHz band is populated by microwave services that are used to support utilities, public safety, and wireless backhaul. Each of these serves an important function that we must protect. We're working through some complex technical issues both internally and with outside stakeholders, and that includes many in this room. I appreciate your input. But questions remain and the clock is always ticking, so I urge you to help us find creative solutions. Let's enable a speaker at a Wi-Fi Congress twenty years hence to pin this as a breakthrough moment for the wireless innovation of the future.

I've probably kept you too long at this point, so I'll close with an observation about Wi-Fi and those who shape it. I don't think it's an exaggeration to say that so much of how this technology has developed has reflected the best of America. Perhaps the ideal example of this is Hedy Lamarr. Born in Austria in 1914, she fled the Nazis and her marriage in the late 1930s and came to the United States. She then became a major Hollywood actress—frequently considered one of the most glamorous of her day. But she didn't want to be known for her beauty; at heart, she was a tinkerer. And one of the things she

helped develop in the middle of World War II was frequency hopping, a spread-spectrum technology that underlies Wi-Fi.

So many involved in unlicensed innovation, from Hedy Lamarr to Alex Hills to Wi-Fi NOW, inspire us all with that can-do American spirit—the determination to create something that hasn't been done before, even when others think it can't be done. One of the great joys of this job is to help the FCC enable your work. Through our policies—including many I've talked about today—the FCC is aiming to open the door for all of you. I can't wait to see what the next twenty years bring as you walk through it.