NATIONAL PRESS CLUB LUNCHEON WITH FCC CHAIR TOM WHEELER

SUBJECT: FEDERAL COMMUNICATIONS COMMISSION CHAIR TOM WHEELER WILL LAY OUT THE FRAMEWORK FOR WHAT HE THINKS THE AMERICAN VISION FOR 5G SHOULD BE, SO THE U.S. CAN CONTINUE TO LEAD THE WORLD IN WIRELESS AND DELIVER THE BENEFITS OF NEXT-GENERATION WIRELESS NETWORKS TO AMERICA'S CONSUMERS AND BUSINESSES.

MODERATOR: THOMAS BURR, PRESIDENT OF THE NATIONAL PRESS CLUB

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THOMAS BURR: (Sounds gavel.) Welcome to the National Press Club. My name is Thomas Burr; I'm the Washington correspondent for the *Salt Lake Tribune* and the 109th President of the National Press Club. Our guest today is Tom Wheeler, the Chairman of the Federal Communications Commission. I would like to welcome our C-SPAN and Public Radio audiences. And I would like to remind you that you can follow the action on Twitter using the hashtag NPCLive. That's NPCLive.

Now it's time to introduce our head table guests. I'd ask each of you to stand briefly as your name is announced. Please hold your applause until I have finished introducing the entire table. From your right, Andrew Feinberg, a freelance journalist. Todd Gillman, Washington Bureau Chief of *The Dallas Morning News.* Amy Fickling, an editor at Warren Communications. Larry Strickling, Assistant Secretary for Communications and Information at the U.S. Department of Commerce. Art Swift, managing editor and news director of Gallup. Jordanian Wilkins, Chief of the Wireless Telecommunications Bureau at the Federal Communications Commission. Jerry Zremski, Washington Bureau Chief of the *Buffalo News,* a former Press Club President who is sitting in today as the Chair of the Speakers Committee.

Skipping over our speaker for now—I'll get to you, don't worry, Tom, Matt Mlynarczyk, President of the Advocatus Group, LLC. and the Press Club member who

organized today's Luncheon. Thank you, Matt. Julius Knapp, Chief of the Office of Engineering and Technology of the Federal Communications Commission. Craig Gordon, managing editor of Bloomberg News in Washington. Chris Bing, Technology and Cybersecurity reporter at FedScoop. And Tam Harbert, an independent journalist. Thank you all.

[applause]

THOMAS BURR: Tom Wheeler became the Chairman of the Federal Communications Commission on November 4, 2013. For over three decades Chairman Wheeler has been involved in the telecommunications and cable sector as a policy expert, advocate, and entrepreneur. He has been a venture capitalist and lobbyist for the wireless and cable industries. He has served as President and CEO of both the National Cable Television Association and the Cellular Telecommunications Industry Association and known as the CTIA, but as a journalist I found it more interesting that a lifetime ago the Chairman worked for syndicated columnist Mark Shields, a friend of mine. He managed the Ohio State University's Distinguished Speaker Series, OSU's version of the Press Club's Speaker Luncheon Series that brings all of you here today.

Given that Chairman Wheeler used to be an industry lobbyist, his record at the FCC is rather surprising. He introduced the commission's strongest ever rules enforcing net neutrality. He fined AT&T 100 million dollars for capping speed on unlimited data plans. He increased competition among the makers of cable boxes and worked to give more internet access options to people in rural areas. Chairman Wheeler put the entire fixed and mobile broadband industry under a stricter regulatory regime. He has done so many things that have angered his former employers at the NCTA and CTIA have sued the FCC during his tenure. He explains his action by saying, "I used to be an advocate for corporate interests, and I hope I was a good one, but today my client is the American people and I want to be the best damn advocate for the American people that I can be."

America is the leader in the wireless technology and spectrum innovation, occupying the top spot in worldwide 4G wireless network utilization. New 5G wireless networks will offer even faster wireless broadband services. Stakeholders around the world have begun shaping the new 5G landscape to benefit their national and commercial interests, and today Chairman Wheeler will share the framework for what he thinks the American vision for 5G should be in a speech entitled "The Future of Wireless: A Vision for U.S. Leadership in a 5G World". Ladies and gentlemen, please join me in welcoming to the National Press Club Federal Communications Commission Chairman Tom Wheeler.

[Applause]

TOM WHEELER: Thank you very much, Tommy. You certainly proved your journalistic credentials with some of that research that you dug up there. It's an honor to be here at the National Press Club and it's an honor to be with my colleagues who really are the ones who make the things happen that I'm talking about. Julie Knapp, who is the

Head of our Office of Engineering and Technology, John Wilkins who is the Head of our Wireless Bureau, and my colleague Larry Strickling who we work like this together with Larry at NTIA and the Department of Commerce on spectrum policy. There are so many familiar faces and friends in the audience. And I am going to make the terrible decision to call out a couple.

First is my good friend and former colleague, Ron Nesson, who it's a real pleasure to see you sitting here, Ron. We haven't seen each other for a long time. The other is hiding back in the back, is the same who started the spectrum revolution at the FCC, former Chairman, Reid Hunt. It was back in 1994 that this crazy idea of opening up more spectrum, creating more opportunity, and building what we will be talking about today began, and that was under Reid's leadership.

But I am most please and most surprised to find Karen Smith in the audience today. Karen had to change her name from Karen Wheeler [Laughter] but my sister from Annapolis who is no stranger to telecom issues herself, having been the Executive Director of Tech Corp, which was that great operation that followed through. Remember Net Day? Okay. And then okay, we have pulled all the fiber through the schools. Now what do we do? And Karen organized volunteers throughout the country and was-- I was always proud of her and what she did in that.

[Applause]

TOM WHEELER: Yes. You know, a few months ago I found myself in a situation that I never would have imagined when I became FCC Chairman. I was in Dallas, Texas. I was at the helm of an excavator, a big piece of heavy machinery, digging up dirt. And for those of you who want to picture that scene in your mind, yes, I was wearing a suit. [Laughter] I was also wearing a pair of virtual reality goggles and I hadn't left the FCC. And while I may have been in Washington physically I can tell you I was at the excavation site in Dallas 1400 miles away. I sat in the mockup of the excavator and I had complete control sensitivity to the equipment 1400 miles away.

Now, granted, digging up dirt in Dallas probably isn't high on the list of transformational advancements that will define the 21st century, but I want you to think of something. Why don't you replace the heavy machinery with a scalpel so that a world class surgeon can move from hospital to hospital without leaving her surgical suite, or how about students sitting in a classroom, taking a virtual tour inside the human body. Now we have all heard of amazing things, stories like that in the past, but making these kinds of activities possible without a fat cable leading to the virtual reality headset could not be accomplished because of three limiting factors.

One, the speed of the wireless connection. We all know the difference in performance of a direct fiber connection compared to a wireless connection. The next generation of wireless must be mobile fiber, 10 to a hundred times faster than what we're used to today. Second limiting issue was responsiveness. The surgeon's scalpel needs to be immediately responsive, not a blink later. The technical folks call this latency. It

currently averages about 10 milliseconds or one one-hundredth of a second. Now that may sound pretty fast to you and me, but it's a snail's pace in computing. Latency needs to be less than one millisecond, less than one one-thousandth of a second to provide for real time interactions.

And the third limiting factor is spectrum capacity, because if you're going to have that kind of high speed and latency you have to have the ability for digital information to race down broad chunks of spectrum, multiples of what we know today.

So to overcome these challenges and to seize the opportunity before us we need the next generation of wireless connectivity, a fifth generation or 5G. And if the United States is going to continue to be a world leader in wireless we need to speed the deployment of 5G here on our shores. The virtual reality example that I gave is but one sample of the effects of high speed low latency connectivity, and while, and why American leadership in 5G must be a national priority. That VR example that I gave you was just one example of how the driving force of the 21st century will be powerful processing, centralized in the cloud, and wirelessly connected to thin clients. Autonomous vehicles will be controlled in the cloud. Smart city energy grids, transportation networks, and water systems will be controlled in the cloud. Immersive education and entertainment will come from the cloud. But such futures won't come to pass unless the pathway to and from the cloud is low latency, ultrafast, and secure.

Now if we have learned anything in the generational march through wireless connectivity, it's that we have always underestimated the innovation that would result from new generations of wireless networks. The first generation wireless, 1G, was voice. In the early 1980s McKenzie told AT&T there would be 900,000 cell phone subscribers by the turn of the century. Well, it turns out there were 109 million. There were only off by a factor of a hundred or so. The second generation, 2G, allowed both talk and text, but no one understood the power of text from shifting the way an entire group, teenagers, would communicate to developing, to a developing world tool for banking the unbanked, innovators seized on the new capability of texting in unimaginable ways. The third generation, 3G, married wireless and digital networks to open the door to connecting with other new, the other new technological development of the time, the internet, in a limited way. And today's technology, 4G, completed that digital migration, enabling higher speeds for sophisticated applications, including video. Again, greater capability in the network led to unanticipated innovation. Without 4G there would not have been Waze or Uber or SnapChat or Instagram or the list keeps going on.

But I have listed some examples earlier, a moment ago about what 5G makes possible, but if anyone tells you that they know the details of what 5G is going to become run the other way, because it is the capacity to use this new capability that will determine what our future looks like. Yes, 5G will connect the internet of everything, if something can be connected it will be connected in a 5G world, but the predictions, but with the predictions of hundreds of billions of microchips connected in products from pill bottles to plant waterers, you can be sure of only one thing: the biggest internet of things application has yet to be imagined.

Yes, 5G will connect the unconnected and compete with the uncompetitive. Millions of Americans can't access high speed connectivity because it's too costly to run the fiber to the home. Verizon's CEO, Lowell McAdam, has begun speaking lately about using 5G connectivity to expand high speed broadband service to rural areas and fiber fast wireless connectivity will deliver the long sought goal of competitive high speed internet access for consumers.

But let's stop the imagining for a moment. Here is the key. The interconnected world that we live in today is the result of decisions made a decade ago. The interconnected world of the future will be the result of decisions we must make today. And that is why 5G is a national priority and why this Thursday I am circulating to my colleagues proposed new rules that will identify and open up vast amounts of spectrum for 5G applications. We call it the Spectrum Frontiers Proceeding and we will vote on it on July 14th.

Our 5G proposal is the final piece in the spectrum trifecta of low band, mid band, and high band airwaves that will open up unprecedented amounts of spectrum, speed the rollout of next generation wireless networks, and redefine network connectivity for years to come. I'm confident that the actions will lead to a cornucopia of unanticipated innovative uses and will generate tens of billions of dollars in economic activity.

But let's revisit that spectrum strategy for a moment. Rule number one is that the technology should drive the policy, rather than the policy drive the technology, and technology for 5G is not one thing, it is many things. The marriage of Moore's Law and wireless connectivity involves smart antenna systems, new more efficient transmission formats, low energy systems, network virtualization, and much more. And on the spectrum side these technologies require new access to spectrum in multiple bands. The wireless future will not be a one size fits all future.

So, our spectrum trifecta begins with low band spectrum that is optimal for wide area coverage applications. At this very moment we are in the midst of the world's first incentive auction to make green field low band spectrum available. The broadcasters have stepped up to bring spectrum to the market. Shortly the wireless industry will have the opportunity to fulfill their repeated requests for more spectrum with this beachfront spectrum.

Mid band spectrum is kind of the Jan Brady of the spectrum world. [Laughter] You know, the overlooked middle child. But its characteristics enable an order of magnitude increase in spectrum efficiency. The commission's recent AWS 3 and new citizen's broadband radio service in 3.5 gigahertz were landmarks in using new sharing tools to open up new mid band spectrum and we need to continue looking for other mid band opportunities. And it's high band spectrum that will be the focus of our actions next month. These bands, the high bands offer huge swaths of spectrum for superfast data rates with low latency and are now becoming unlocked because of technological advances in computing and antennas.

If the commission approves my proposal next month the United States will be the first country in the world to open up high band spectrum for 5G networks and applications, and that is damn important, because it means that U.S. companies will be the first out of the gate. We will be repeating the formula that made the United States the world leader in 4G. It's a simple formula. Lead the world in spectrum availability, encourage and protect innovation driving competition, and stay out of the way of technological development. Unlike some countries, we do not believe that we should spend the next couple of years studying what 5G should be or how it should operate and how to allocate spectrum, based on those assumptions. Like the examples I gave earlier, the future has a way of inventing itself. Turning innovators loose is far preferable to expecting committees and regulators to define the future.

We won't wait for the standards to be the first, to be first developed in the sometimes arduous standards setting process or in government led activity. Instead we will ample spectrum available and then rely on a private sector led process for producing technical standards best suited for those frequencies and use cases. Leadership in networks leads to leadership in uses, which quickly moves across borders. So a result of this national leadership is the creation of a home field advantage, similar to what we knew in 4G. But the main value of 5G will not be found in work sheer or intellectual property. The main value of 5G by orders of magnitude will be in consumption rather than production. It will be in material gains and improvements in the quality of life and economic opportunity.

And I would also emphasize that the development of 5G is not anything like an international zero sum game. Rather, it is a contest in which everyone can win. Our success and that of others redounds to the benefit literally of everyone in the world. We're already seeing the industry gearing up to seize this opportunity. I have seen 5G hardware and firmware. The technology is here. It is also important, however, to recognize that 5G technology will be a constant evolution. It would be a mistake to think that 5G can be frozen in a snapshot. It's more like a video with many new scenes, all building on each other. The systems and standards for 5G will be continually improving and evolving. And on the network side Verizon and AT&T tell us they will begin deploying 5G trials in 2017 and these efforts will of course help inform the standards process by putting stakes in the ground. And the first commercial deployments they're talking about are expected in 2020. This timeline requires that we act to pave the path today.

With the new rules that I am proposing in our Spectrum frontiers order, we take our most significant step yet, down the path to our 5G future. The big game-changer is that 5G will use much higher frequency bands than previously thought viable for mobile broadband and other applications. Such millimeter wave signals have physical properties that are both a limitation and a strength. They tend to travel best in narrow and straight lines, and they do not go through physical objects as well. This means that very narrow signals in an urban environment tend to bounce around buildings and other obstacles, making it difficult to connect to a moving point.

But brilliant engineers have developed new antennas that can aim and amplify signals, coupled with sophisticated processing that allows a moving device to pick up all of the signals that are bouncing around, and create one coherent connection. Now to make this work, the 5G build-out is going to be very infrastructure-intensive, requiring massive deployment of small cells.

But it also opens unprecedented opportunities for frequency reuse in denser, more localized networks. The ability to use this high frequency Spectrum opens much bigger chunks of Spectrum. Current blocks of licensed low band Spectrum are usually five to ten megahertz in width. With 5G, however, we're talking about blocks of Spectrum that are at least 200 megahertz in width. And this will allow the networks to carry much more traffic per user, gigabits of throughput in place of megabits of throughput.

And the key point here is that, by opening up these higher frequency bands, we're making available more licensed Spectrum for mobile than in the cumulative history, dating back to Reed Hunt, that the FCC has heretofore made available. And we're not done.

As part of our July 14 action, we also plan to ask for comments on opening up other high frequency bands. And what we'll be considering on July 14th is not just licensed Spectrum, but unlicensed will continue to play a critical role in future 5G networks. And our plan proposes a massive 14 gigahertz unlicensed band. Consider that, 14,000 megahertz of unlicensed Spectrum, with the same flexible use rules that allowed unlicensed to become a breeding ground for innovation. Opening up Spectrum and offering flexibility to operators and innovators is the most important thing that we can do to enable the 5G revolution. But it's not the only thing.

We also need to work our way through Spectrum sharing issues. Sharing is essential for the future of Spectrum utilization. Many of the high frequency bands that we will make available for 5G currently have some satellite users, as well as some Defense Department applications, or at least the possibility of future satellite and defense users. This means sharing will be required between satellite and terrestrial wireless, an issue that is especially relevant in the 28th gigahertz band.

It is also a consideration in the additional bands that we will identify for future exploration. We will strike a balance that offers flexibility for satellite users to expand, while providing terrestrial licensees with predictability about the areas in which satellites will locate. However, we must reject the notion that the 5G future will be the sole providence of urban areas. The 5G revolution will touch all corners of our country.

Three months ago I indicated, as directly as I am capable, that it would be advantageous for the satellite and mobile industries to come together to propose realistic ideas for their coexistence in the upper bands and to do so quickly. Satellite and terrestrial stakeholders have suggested a range of sharing options. And the Draft Spectrum Frontiers Order seeks to provide a balanced solution that addresses the needs of both parties. I am

confident that we will adopt rules that will enable satellite, terrestrial, and federal operations to coexist and thrive.

To make sure that we have this connectivity with high band Spectrum will require a lot more small cells, which means a lot more antenna siting decisions by local governments. That's why it's important that the Commission has strengthened our environmental and historical preservation rules, and tightened our shot clock for siting application reviews. America's local governments will play an important role in determining how we fulfill this national priority.

In addition, all these small cells need to be connected. So we'll need a lot more backhaul. That's a challenge that we're going to address through our proceeding on business data services, the kind of dedicated access that wireless providers need to connect cell towers and antennas to their networks. These backhaul networks, these backhaul connections can be as much as 30 percent of the cost of operating a wireless network. And with the additional sites required to support the use of millimeter wave Spectrum, that percentage is likely to increase to as much as 50 percent.

But in many areas, competition in the supply of backhaul remains limited. And that can translate into higher prices for wireless networks, and then higher prices for consumers. Lack of competition doesn't just hurt the deployment of wireless network today, it threatens, as well, the delay of the build-out of 5G networks, with the demand for many, many more backhaul connections to many, many more antennae.

Before the end of this year, the Commission will take up a reform proposal, supported by all the nation's leading wireless carriers save one, that will encourage innovation and investment in business data services while ensuring that lack of competition in some places cannot be used to hold 5G hostage.

As we build the next generation network, a lesson learned from our previous experiences is that it must be secure. So this is the third leg of the stool. New platforms, systems, software, and technologies will mean new vulnerabilities. Cyber security issues must be addressed during the design phase of the entire 5G ecosystem, including devices. This will place a premium on collaboration amongst all stakeholders. We continue to prefer an approach that emphasizes that industry develop cyber security standards, just as we have done in the wired networks. But security is an essential component of where we go on networks. And we will have the ability to think about it first as a forethought rather than an afterthought.

So in conclusion, in the spirit of the election season, I thought I'd close these remarks by referencing a campaign speech from the '60s. Now a lot of my friends here think I'm going to be talking about the 1860s. [laughter] But actually, I'm talking about the 1960s, because on July 15, 1960, John F. Kennedy strode to the podium at the Los Angeles Coliseum to accept the Democratic nomination for President. And he famously challenged the American people to be pioneers of a new frontier. He spoke of harnessing the power of the technological revolution and exploring uncharted areas of science and

space. JFK's vision charted a path that took us to the moon and laid out the foundation of the internet.

This July 14th, 56 years less one day from when JFK talked about the new frontier, we will have the opportunity to take an historic step to open up yet another frontier that promises to propel our nation and the world forward. Once again, we're looking to the sky to unlock new discoveries and unleash American ingenuity. We are the pioneers of a new Spectrum frontier. Working together, we can write this next chapter in the mobile revolution, a revolution that has already transformed our lives and society. Working together, we can unleash new waves of innovation and discovery that we have yet to imagine.

Thank you very much.

[applause]

THOMAS BURR: Thank you Mr. Chairman. I'll note that I'll use the wireless microphone, and you can have the hardwired microphone. [laughter]

TOM WHEELER: It's not fast enough, you know, this is the problem.

THOMAS BURR: For the American consumer who is not in this room right now, it may seem that 4G is just in its infancy. We've just seen television ads in the last year or so about that. So why is 5G so urgently important?

TOM WHEELER: It's a great question, Tommy. And it goes back—I had one line that really deserves further explanation. All of the things that powerful computing makes possible can't be done on the chip on a handset. They have to be moved to a centralized place that we have now come to call "The cloud," so that the work gets done up there in the cloud, and it is connected to the less powerful computing power in our handsets or, as I said, our pill bottles, or automatic watering systems.

And that connection is what 5G is all about. It has to be fast. It has to be latency-free. And it has to be secure. And if we can't move at high speeds between that power and its use, then we will not be able to bring that power into our hands and other places.

THOMAS BURR: That leads to the next question, which is, as you've talked about the cloud quite a bit here, how concerned are you about cyber terrorism? And are we doing enough to prevent it as we move forward?

TOM WHEELER: So I think we have to recognize that networks have always been a pathway for attack. I don't care whether they were roads or waterways, all right, it's always been a path for attack. And so the current networks are no different, which places on those who build and operate the networks and those who oversee that activity, a special responsibility.

Under the leadership of Admiral Dave Simpson, we have moved forward aggressively with a program that works with those who are running networks to meet agreed-to performance standards, if you will, as to how you secure those networks, and then to have the ability to check that that's happening, and the ability to, from that experience, be able to share with everybody else. We had been playing catch-up ball. The issue is—Look at this. My phone is ringing. This is the power of the connected network, folks, the ever-connected network.

The issue is that we now, with 5G, know the threat and have an opportunity to address it from the get-go.

THOMAS BURR: We talked about how the United States is leading when it comes to 5G. What are other countries doing? And how do we maintain that leadership spot compared to Europe or somewhere else?

TOM WHEELER: So the European Union, China, Japan, and South Korea have all signed a Memorandum of Understanding that they would all work together to develop 5G. the European Union has put up 700 million Euros to do 5G research. As I referenced in my remarks, we think that's the wrong way to go. We think that the making the Spectrum available, and standing out of the way of technology development, is far better than, "Well let's sit around and wait until we decide what it's going to do, and then make the Spectrum available. And let's micromanage the technology process." That's not the way that we're going to be approaching it.

THOMAS BURR: Are there lessons to be learned from the rollout of 4G technology in the U.S. and elsewhere, that will apply to the start of 5G?

TOM WHEELER: Sure. There are lots of them, not the least of which is the wireless network relies on base stations. They're going to have more base stations than ever before. And the wireless network relies on wired connections, which is why we're moving on this business data services proceeding, to make sure that those connections are charged for fairly and are competitive.

You know, the interesting thing about moving from 3G to 4G was, it was kind of like throwing a switch. And okay, we're moving over here to new Spectrum. There is a whole new set of expectations. I think 5G, as I said, is not going to be a one-size-fits-all, it's going to be multiple pieces of Spectrum. It's going to be multiple technologies. And they are constantly going to be evolving.

So I think that we can follow the 4G playbook in terms of how we get national leadership. And that's why it is a national priority. But that the 5G execution in that playbook becomes one of constant innovation, constant improvement, that American technology can lead the way.

THOMAS BURR: As I was talking about when we started the question time, Americans and consumers are just finally kind of seeing what 4G may offer. It seems like

there's a lot of talk about what 5G is. Is this a branding exercise you're starting now? And do you think that we will be able to identify what 5G is to consumers?

TOM WHEELER: You know, I was asked that question in an international conference in Barcelona last year. And Barcelona is the home of the Picasso Museum. And I had just been there. And I said, "You know, 5G is kind of like a Picasso. Different people look at it and see different things." But the fact of the matter is, that 5G is this high speed, low latency connectivity, that is crucial to whether or not we're going to be able to exploit the increased processing power that is offered us by the cloud.

THOMAS BURR: You're taking action this summer, July 14th I think you said. But when will this Spectrum actually be in consumers' devices? When will consumers actually notice this technology?

TOM WHEELER: Well, as I said, I think we're going to see some trials in 2017 and roll out into some markets in 2020, which again is a schedule that will put us ahead of the world.

THOMAS BURR: Okay, and you just referenced the moon shot. Talk to me about what most excites you. What do you think is the most exciting thing about the opportunities when they exist under a 5G network?

TOM WHEELER: Wow, Tommy. As my friend Ron knows, I'm a huge history buff. And I actually have looked at the—had a hobby of studying the history of networks. And I think there is one truth that comes out of the history of networks. And that is, that it is never the principal technological change that is transformational, but it is the secondary effects of that. And what I was trying to say is, we don't know what the secondary effects are going to be. We've got some ideas, but we don't know what they're going to be.

But when you take that incredible process—I keep pointing to the cloud up here—that incredible processing power up in the cloud, and you make it available on a mobile distributed basis down to the ultimate user, the ultimate, you know, you, I didn't envision Uber at a 4G.

THOMAS BURR: You probably wish you had.

TOM WHEELER: Back in my venture capital days, I wish I had. And I know that there are things that we can't envision now. But let me give you one example that was fascinating. I was out in Silicon Valley last week. Here is a statistic I learned. We hear an awful lot about the connected car, right. All the activity for the connected car is going to happen up here in the cloud because my car is going to have to know where your car and John's car and the school bus that's coming through, and all of this information is going to have to be processed, real, with serious processing capability up here in the cloud, because you can't do it just down here on the car unless you want to put a huge computer in the trunk.

And the average household today uses about 50 gig of digital throughput. I was told that a connected car—in a month. I was told that a connected car uses 50 gig a day. And we need the throughput to be able to handle that kind of demand.

THOMAS BURR: Okay, I'm from a very small town originally, in Utah, rural area. How does that translate to beyond urban areas to areas that may not have even a 4G yet?

TOM WHEELER: Yeah. The problem with our current distribution is that it's expensive to run the cable or the fiber out to remote areas. We have a subsidy program that helps carriers get over that, but it's still a significant expense. And there are still significant areas that you referenced that aren't covered.

Wireless is helpful in getting there, important in getting there, but has lower speeds and can be more costly. But, as I said, Verizon is talking quite seriously about using these focused, high-speed, broad bandwidth shots into rural areas, to be able to deliver the equivalent of fiber to your home, for a price that is far more competitive and realistic than what we've seen heretofore.

THOMAS BURR: People who don't cover technology like myself are probably sitting here wondering this exact question. How are you able to create new rules for a technology that does not yet exist?

TOM WHEELER: That is the $64 dollar question and what is at the heart of what we're trying to do. We are not going to create rules for the technology. We are going to open up the Spectrum. We are going to make sure that the innovation that is driven by competition is protected and promoted. And we are going to say, "We are not in the technology rules decision have-at-it."

THOMAS BURR: One last question on 5G, and we have a few other subjects. But you were at the helm of the wireless industry when it went from being a kind of a specialized service to a ubiquitous and dispensable part of everyday life for consumers and businesses. How does the next evolution relate to your experience then? And are we on the brink of something entirely new and different?

TOM WHEELER: You ain't seen nothing yet. I think that's a yes.

THOMAS BURR: I'm assuming.

TOM WHEELER: No, I mean truly. You transform the nature of connectivity to mobile, high-speed connectivity, and you know, innovation is always about unanticipated applications. And I think we're going to see them by the boatload. That's a technical term, boatload.

THOMAS BURR: Boatload. Got you, thank you. The D.C. Circuit Court last week upheld—

TOM WHEELER: Oh, I thought you'd never get around to that. [laughter]

THOMAS BURR: I've been trying to talk about 5G—[simultaneous conversation] [laughter] The D.C. Circuit Court last week upheld controversial net neutrality rules, a big win for the Commission. With this success, will you now publicly commit to stepping down as FCC Chairman next year to pave the way for your colleague Jessica Rosenworcel's Senate confirmation? [laughter]

TOM WHEELER: You know, I think the reality is this, that Commissioner Rosenworcel ought to be confirmed, standing on her own. That I understand that it is tradition for FCC Chairmen to—for the incoming President to have an opportunity to name the new FCC Chairman. And I have told the Senate, when I was asked this question in a hearing, that as a fellow who studies history, I understand the precedent. And I respect the precedent. And let's see what happens. There's a little thing going to happen in November. And let's see what happens then.

THOMAS BURR: We'll get to November in a second. Do you think the FCC will revisit its decision not to regulate internet rates in the wake of the net neutrality decision from the D.C. Circuit?

TOM WHEELER: Yeah. We're very clear in saying that we are forbearing from ex-ante regulation and the need to file tariffs and all this sort of stuff. And that's not changing.

THOMAS BURR: Presidential candidate Donald Trump has said he will reverse your net neutrality regulation. If he wins, and limits FCC's authority, what impact will that have on consumers?

TOM WHEELER: We are—we've just been talking about the Spectrum future, the connectivity future, and how this country maintains national leadership. There are three components. Spectrum must be fast, so we were talking about it all through here the increase speeds. Access to Spectrum must be fair. We need to make sure that, in rural Utah, people are connected so they can enjoy the benefits. And access to Spectrum has to be open, because access to networks has to be open. Because we can't stand in a position where there are gatekeepers who are deciding what will or will not be offered to consumers.

We're leading and we'll continue to lead the world, because our networks are open. And we'll remain open for innovators to use, without permission, for consumers to be able to access anybody they want, anyplace they want to go on the web, without permission, without blocking, without throttling, without pay prioritization, and with full transparency so that both the consumer and the edge provider know just what the heck they're doing.

THOMAS BURR: And you didn't use the words "Donald Trump" at all in answering that. I just wondered if it was because—Last week a coalition of paid TV providers and independent programmers presented the Commission an alternative set top box proposal that will allow consumers to ditch their cable boxes altogether while addressing these significant copyright concerns that the content community has raised about the FCC's proposed approach. Are you open to compromise in the closer collaboration moving forward with these companies?

TOM WHEELER: Well I think it's absolutely terrific that the cable industry came forward with this proposal. I had been asking them to do this. And I think that by coming forward, they indicated that a lot of the arguments that had been put up against our set top box, free the box proposal, really fell by the wayside, that copyright can be protected, that consumer privacy can be protected, that small networks can continue to thrive, and that you don't have to rebuild the network in order to do this.

So I think that what they've done is say, "Yes," that the approach that the FCC suggested is an approach that can be taken. And what I'm interested in now is engaging in constructive dialogue with them on the specifics of just how do you write the regulations to achieve that? There have multiple times in the past been situations where the industry has said they would do similar kinds of things, and it never came to pass. Let's make it come to pass now.

Ninety-nine percent of American consumers have no choice but to pay the monthly set top box fee. It runs an average of $230 bucks per household per year. The Congress said there needs to be choice. The Section 629 of the Communications Act says the FCC shall, not may or should think about, the FCC shall provide that there are competitive navigation devices for consumers. And we're going to follow through on that statute.

THOMAS BURR: Besides set top boxes, your other big priority at the Commission has been business data services. Can you explain, what are the problems with these services? And what are you going to do?

TOM WHEELER: So it's a really arcane area that we actually tried to change the name. It used to be called Special Access, because it was a way in which a carrier sells to another party, usually another carrier, a specific quality guaranteed delivery of service. And the competition in that, you know, we follow the rule that competition, competition, competition, where that as competition increases, regulation should decrease. And what we're trying to do is to look at the BDS market and say, "How do we apply those same kind of concepts?" Because this is a market that hasn't been revisited by the Commission in a dozen years. And a few things have changed in technology over those dozen years. And so we're going to revisit those.

But, as I said in my remarks, it is absolutely essential that we do this because this is going to be—The 5G wireless future is going to move on wired networks. And those wired networks, if not competitive, need to at least be fairly priced.

THOMAS BURR: Pay TV providers are famous for their poor customer service. In fact, it's so poor that the Senate will investigate it at a hearing this week. Is there anything the FCC or Congress can do to force companies like Comcast to respond to customer complaints faster?

TOM WHEELER: So I think it's great that the Senate is going to have a hearing on this. The complaints that we hear from consumers on this topic are legion. As we look at the scope of authority that Congress has given us, however, it is rather limited in this area.

THOMAS BURR: I'm going to switch you spots for a second. Before I move to the final question, I have a few announcements. A quick reminder, the National Press Club is the world's leading professional organization for journalists. And we fight for a free press worldwide. For more information about the Club, please visit www.press.org. Once again, that's press.org. I'd also like to remind you about some upcoming programs. Tomorrow Michael Middleton, the University of Missouri System interim President will speak here. Wednesday, Labor Secretary Tom Perez will join us. On June 30th, National Transportation Safety Board Chairman Christopher Hart will address the Club. And on July 14, Admiral Mike Rogers, the Director of the National Security Agency will speak at the Press Club Luncheon.

Now I'd like to present our guest with the traditional National Press Club mug. [laughter]

TOM WHEELER: Perfect.

[applause]

TOM WHEELER: Thank you.

THOMAS BURR: It's not wireless, I'm sorry.

TOM WHEELER: There really is one last question? Or can I go?

THOMAS BURR: There's one last question, sorry. And I'm going to make it a tough one, actually. Public officials are supposed to feel the public's pain. That being the case, can you tell us any personal stories about any nightmare encounters with customer service representatives of Verizon, Comcast, or other telecommunications firms? [laughter]

TOM WHEELER: Is there something a little stiffer I could put in here? [laughter] So, like I said, we hear from consumers all the time about this. And yes, public officials are real people who have real ongoing experiences too. My most recent experience like that was less with a customer service rep, and more with my wife calling me and saying the IRS was after us. [laughter] Because there had been a spoofing

incident where, what's been happening increasingly, is that fraudsters, principally from abroad, are using the internet to connect over here and call random numbers and announce to them that they're the IRS, and "I need to be paid. And here is where you send the check," and all of this sort of thing.

And so (a) that happened to us. (b) Last week, we started getting threatening phone calls from an individual who had been himself on the receiving end. But the phone number was my phone number. [laughter] Okay. This is something that is a legitimate concern. This is something that they're individuals that can be held responsible for this. And one of the things that we are actively doing right now is trying to figure out exactly what the right way to go after this is. But we're not going to sit around and suck eggs while this goes on.

[applause]

THOMAS BURR: Well thank you for being here. Thanks to the National Press Club staff and the staff of the Journalism Institute, our nonprofit arm. We are adjourned.

(Gavel)

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