**REMARKS OF FCC CHAIRMAN AJIT PAI
AT CARNEGIE MELLON UNIVERSITY'S
SOFTWARE ENGINEERING INSTITUTE**

"BRINGING THE BENEFITS OF THE DIGITAL AGE TO ALL AMERICANS"

PITTSBURGH, PENNSYLVANIA

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Thank you for that warm welcome. Everybody's been so nice since I arrived in Pittsburgh that I forgive you for the Steelers' 43-14 humiliation of my beloved Kansas City Chiefs during Week 4 of the NFL season. To be clear, I'm still holding a grudge for the Steelers knocking the Chiefs out of the playoffs. Some things are unforgivable.

But on a more serious note, it's great to be back in Pittsburgh. In fact, this is my *third* trip to the Steel City since joining the FCC. In 2012, just weeks after my Senate confirmation, I came to Carnegie Mellon to deliver my first formal remarks as a Commissioner. A year later, I returned for what you could call an anniversary speech. And today, I'm here to make my first major policy address as FCC Chairman.

Now, I know you might be thinking: The last time Pittsburgh was the backdrop for Part Three of a trilogy, Batman's evil nemesis Bane blew up Heinz Field. Rest assured: No person or local landmark will be harmed during my remarks.

When I chose Pittsburgh as a speech venue to showcase digital opportunity in 2012, it was still a somewhat novel concept. But I keep coming back here for good reason: Pittsburgh tells a powerful and timely story about American resilience and reinvention.

Pittsburgh built this nation. America's great bridges and skyscrapers; the ships, tanks, and weapons that won World Wars; they were made with Pittsburgh steel. On this manufacturing foundation, Pittsburgh built a thriving middle class. Back then, you knew that if you were willing to work hard, you could get a job and you could get ahead.

But by the early 1980s, Pittsburgh had entered a different, darker chapter. This one-time symbol of economic might had become synonymous with economic hardship. It was once home to more Fortune 500 headquarters than any city besides New York and Chicago. But it became home to nearly 20% unemployment and a rapidly dwindling population.

Many wrote off Pittsburgh. But the leaders of this community—some of whom are here today—thought otherwise. You bet on its people, its assets, its grit, its ingenuity. That bet is paying off.

Just take a look around. Google took over the abandoned Nabisco factory, where it now employs more than 400 engineers. In 2015, Uber opened its Advanced Technology Center. Last year, that facility's self-driving cars began to hit the roads. In 2016, Facebook's Oculus opened an office to focus on virtual reality research. Carnegie Mellon's Collaborative Innovation Center has opened up its research labs to the likes of Apple, Disney, and Intel. And this afternoon, I plan to visit Amazon's new Pittsburgh office, which is working on software-automated translation, among other things.

It's not just established companies that are expanding in Pittsburgh. Just last month, the artificial intelligence company Argo AI received a billion-dollar investment from Ford to develop a virtual driver system for the automaker's autonomous vehicle, which is scheduled to be released in 2021.

During 2012 and 2013, venture capital in area projects was $343 million. But for 2014 and 2015, that number was up to $499 million. Indeed, Pittsburgh has been in the top five cities in the nation for venture capital deals per capita.

In the three years following my first speech in Pittsburgh, the tech sector here added nearly $1 billion in payroll. Tech now accounts for more than 300,000 area jobs—nearly a quarter of the area's workforce.

In short: Pittsburgh is back. The population is now holding steady. And it's getting younger as recent college graduates are staying in or moving to Pittsburgh to work at good jobs.

Now, there's still much work to be done. But there is no denying that—a generation after some gave up on this city—it's on the rise.

Pittsburgh's story shows how technology can revitalize areas that have experienced economic distress. It's a particularly resonant story today.

Looking at some of our nation's top-level economic indicators over the past few years, you would think people might have been feeling pretty good about how things are going. The official unemployment rate, after all, has been under 5%. But those statistics too often haven't matched people's daily reality. Last November, the American people sent a pretty loud message that they felt something different. And the results from Pennsylvania, Michigan, and Ohio sent perhaps the loudest message of all.

America has always been the land of opportunity and optimism—a beacon of hope that attracted people like my parents to come here to fulfill their dreams. But that vision is being tested. People remain uneasy about the future. In a Pew survey taken last fall, more than twice as many Americans said the future for the next generation will be worse than things are today: 49% worse versus 24% better.

Here's an interesting and sobering fact. When I gave my first Pittsburgh speech in 2012, the numbers were almost identical. Forty-seven percent said things would get worse; less than a quarter said better. So this isn't a blip. It reflects persistent worry.

What's been happening?

Two things. First, millions of well-paying industrial jobs you could get without a college degree are gone. That was a tremendous blow from which it takes a long time to recover. As Mayor Bill Peduto has observed, "Pittsburgh's overnight success story took 30 years."

Pittsburgh gets so much attention because you're ahead of the curve. But things look different for some of the other great industrial powerhouses of the Midwest, or smaller towns that don't have the research universities, newly-minted graduates, and other resources.

For months, the non-fiction best-seller lists have featured *Hillbilly Elegy*. I read that book recently. Much of the story takes place in Middletown, Ohio, a once-thriving steel town. People there feel like the good jobs are gone and aren't coming back. They fear that their

choices no longer matter because whatever they do, they won't get ahead. There's a reason this book has struck a chord.

Too many Americans today live in communities where the population is declining. And they worry that economic opportunity is disappearing as well. In my home state of Kansas, for example, the population has dropped in over three-quarters of our counties over the last 15 years. And the county where I grew up has shed almost one out of ten people. This is happening over large swaths of our country.

But there's a second, interrelated cause of America's uneasiness. It's a cliché to say that advances in technology have brought us to one of the great inflection points in human history. It's also true.

Technology is disrupting almost every aspect of our lives—how we work; how we learn; how we interact with friends and loved ones; you name it. Not surprisingly, this massive disruption is a source of significant angst. But it's not just the scale of change that has people feeling uneasy; it's that the change is coming so fast and will only get faster.

As it turns out, one of the clearest voices on this point is a Carnegie Mellon grad. Eric "Astro" Teller is the head of the Google X R&D lab for "moonshot" projects. Teller thinks the rate of technological change has accelerated beyond the pace at which society adapts to change. In an interview last year, Teller said, "the time between when a new technology is introduced and when it's completely changed the world has continued to shrink at a fast rate. It's now probably five to seven years . . . . If the world is now changing faster than we can accommodate, it causes a huge incremental level of anxiety for society at large. That is our challenge."

If Google's "Captain of Moonshots" finds the rate of advances unsettling, imagine how the average American must feel. Think of, say, the roughly 3 million Americans who drive for a living. How do you think they feel every time they see a new story about driverless cars or long-haul trucks?

But here's the thing: Change may be today's only constant. So trying to stop it isn't realistic. Perhaps we should heed the wisdom of famed country music singer and sausage entrepreneur Jimmy Dean: "I can't change the direction of the wind, but I can adjust the sails to always reach my destination."

That's what you've been doing right here in Pittsburgh. You've adjusted your sails, and the wind is now blowing Pittsburgh in the right direction.

I'm here to say that the FCC is right there with you and all cities and towns trying to navigate the path to the future. We want our policies to help bring the benefits of the digital age to all Americans.

So how are we going to achieve that? This morning, I'd like to outline some of my guiding principles as Chairman, and then discuss some specific proposals we will pursue.

First, I believe in the power of Internet-based technologies to create jobs, grow our economy, and improve people's lives in countless ways. That's why, despite the challenges we face as a country, I'm optimistic about America's future.

High-speed Internet access, or broadband, is giving rise to what I have called the democratization of entrepreneurship. With a powerful plan and a digital connection, you can raise capital, start a business, immediately reach a worldwide customer base, and disrupt an

entire industry. Never before in our country has there been such opportunity for entrepreneurs with drive and determination to transcend their individual circumstances and transform our country.

Broadband can level the playing field. For instance, it can help students seize educational opportunities. It used to be that students who could afford SAT prep classes had a leg up in college admissions. But today the most popular SAT-prep class with tailored instructions for your needs is available for free online, thanks to the Khan Academy. A disadvantage has been deleted—provided everyone is connected.

This concept of digital empowerment brings me to my second core principle: I believe that every American who wants to participate in our digital economy should be able to. Access to digital opportunity shouldn't depend on who you are or where you're from. Whether you live in Manhattan, New York or Manhattan, Montana (population: 1,520), we want you to be digitally empowered.

As I said earlier, Pittsburgh highlights how technology can drive revitalization. But it also sends a powerful message that technological innovation doesn't have to be confined to the coasts. Accordingly, as Chairman, I plan to focus more time and attention than the FCC traditionally has on places where people feel left behind—places that Washington too often looks past.

After my time here, I won't be heading to the airport. Following a little indulgence at Primanti's, I'll be driving to Youngstown, Cleveland, and Detroit. Like Pittsburgh, each of these cities has gone through tough times. And like Pittsburgh, broadband can help revitalize their economies. I want to learn about the successes and the challenges that these communities have seen.

For anybody who's been paying close attention, this is what I do, and what I enjoy doing. Over the past five years, I've met with innovators and entrepreneurs in just about every small and mid-sized city that will have me, from Kansas City to Kalamazoo to Columbus; from Nashville to Fargo to Reno; from Sioux Falls to Savannah to Cincinnati; from Bozeman to Birmingham to Barrow. The places couldn't be more diverse, but the story's always the same. Everywhere I go, I find Americans with big ideas and can-do attitudes. Increasingly, the Internet is key to bringing those ideas to life.

My third guiding principle is that a competitive free market is crucial to unleashing private-sector ingenuity. The public interest is best served when the private sector has the incentives and freedom to invest and create. That's why we must eliminate unnecessary barriers to investment that could stifle new discoveries and services. In particular, the government should aim to minimize regulatory uncertainty, which can deter long-term investment decisions. The government should also be as nimble as the industry we oversee. That's easier to say than to achieve, but it must be the goal.

Fourth and finally, I believe that a healthy respect for the free market doesn't mean that government has no role. For example, the FCC must protect consumers and promote public safety. And it will be critical for the agency to be proactive in freeing up more wireless spectrum to allow consumers to benefit from the next generation of wireless services, known as 5G.

So those are the four principles: the importance of digital empowerment, the need for ubiquitous Internet access, the power of competitive free markets, and light-touch regulation.

Let me turn to how we plan to translate these principles into policies to promote infrastructure and innovation.

I'll start with infrastructure. The FCC has tools it can use to help close the digital divide: We can modernize our regulations, we can direct subsidies, and we can ask elected officials to change the law. The FCC is already hard at work putting that toolkit to work.

We're reforming our regulations to cut away red tape and bring down the costs of deployment. On Friday, I'll be visiting Rocket Fiber in Detroit. When the company launched, government slowed its growth. The company's co-founder said, "You had to go through like seven different [city] departments to get a permit to cross the street." Thankfully, the city eventually took steps make the process easier, and Rocket Fiber's network is now delivering gigabit service in the Motor City.

But the challenges that the company faced are all too common across our country. That's why we've established a Broadband Deployment Advisory Committee. It's composed of experts who will focus on the best ways to promote broadband deployment. One of the group's key tasks will be to draft a deployment-friendly model code that any city or town can use to deliver faster, cheaper, and better broadband for its residents.

And that's why I've instructed all of the Commission's bureaus to identify FCC rules that are raising the costs of broadband buildout. If the benefits of those rules don't outweigh their costs, we'll begin the process of repealing them. Moreover, we must get rid of rules that force companies to spend money filling out paperwork instead of installing broadband. And finally, we must make it easier for providers to upgrade infrastructure, such as replacing copper with fiber. For every dollar spent maintaining an old network is a dollar that can't be spent connecting more Americans to a next-generation network.

We also know that, in some areas, the business case for broadband deployment will just not be there absent government help. That's why, last month, the FCC adopted on a bipartisan basis a $4.5 billion plan to make 4G LTE mobile broadband available in parts of rural America without wireless service. And that's why we finalized bipartisan rules to deliver $2 billion to provide fixed broadband to unserved Americans through our Connect America Fund. And in the very first vote under my Chairmanship, we directed $170 million to spur broadband deployment in upstate New York.

I mentioned working with elected officials, too.

Recently, the President proposed that Congress pass a major bill to upgrade our nation's infrastructure. I support the President's bold vision on this issue. In the digital age, I believe our wired and wireless broadband networks are core components of our nation's infrastructure. That's why my position is clear: If Congress moves forward with a major infrastructure package, broadband should be included.

Now, that raises the important question of how those investments should be made. And on this topic, I have a couple of ideas.

First, any direct funding for broadband infrastructure appropriated by Congress as part of a larger infrastructure package should be administered through the FCC's Universal Service Fund (USF) and targeted to areas that lack high-speed Internet access.

Here's why this proposal makes sense.

To maximize the impact of these investments, you need to minimize waste. And we are now on course to do just that with our USF programs. Our newly revised rural deployment programs are designed to get the most bang for the buck. They use a reverse auction in which the FCC awards subsidies based on cost-effectiveness. This is not some hypothetical model, but the reality now.

They also reduce wasteful spending by preventing subsidies in areas where the private sector is already investing in networks, so there's no risk of government investment in over-building.

Moreover, our universal service programs have bipartisan support, both at the Commission and on Capitol Hill. These days, if you can get bipartisan buy-in on a policy approach, you should take it.

And finally, our track record is frankly better than that of other agencies. The 2009 stimulus bill gave direct funding for broadband deployment to both the Commerce and Agriculture Departments. The Government Accountability Office found that many USDA projects were delayed and dozens wound up being cancelled altogether. Indeed, one profile of the USDA program used the headline "Wired to fail." And the Commerce Department's program fared no better—indeed, it's best known for duplicating existing networks in Colorado and wasteful spending in West Virginia.

Although there's no timeline yet for a congressional infrastructure bill, we have the experts in place ready to move if Congress gives us the responsibility to do so.

Second, Congress should include in the infrastructure bill my proposal for creating Gigabit Opportunity Zones. This proposal was at the core of the Digital Empowerment Agenda I introduced last September in Cincinnati. The idea is to update Jack Kemp's vision for enterprise zones for the digital age. Under my proposal, we would provide tax incentives for Internet service providers (ISPs) to deploy high-speed broadband services in low-income neighborhoods. We would require local governments to make it easy for ISPs to deploy these networks. And we would offer tax incentives for startups of all kinds to take advantage of these networks and create jobs in these areas.

Just last week, a study of broadband deployment in Cleveland suggested that fiber was much less likely to be deployed in the low-income neighborhoods. This highlights the need to establish Gigabit Opportunity Zones, which would give the private sector the incentives to expand next-generation networks into high-poverty areas and help revitalize them.

Smarter regulations, modernized subsidies, updating the law—those are some of the ways we'll work to close the digital divide. They'll help us bring faster, better, and cheaper broadband to all Americans—the infrastructure side of the equation. Now, let me talk about what we can do to unleash the other side: innovation.

Entrepreneurs are constantly developing new technologies and services. But too often, they're unable to bring them to market for consumers quickly because outdated rules or regulatory inertia stand in the way. This is a problem throughout the federal government, including at the FCC.

Going forward, I want the FCC to facilitate, rather than frustrate, innovation. And we're off to a good start. Last month, for example, we proposed to allow television broadcasters to

fully enter the digital era by adopting the next-generation television standard on a voluntary market-driven basis.

We also authorized the first-ever LTE-unlicensed (LTE-U) devices in the 5 GHz band—a significant advance for wireless innovation and spectrum sharing. This means wireless consumers will get to enjoy the best of both worlds: a more robust, seamless experience when their devices are using cellular networks and the continued enjoyment of Wi-Fi, one of the most creative uses of spectrum in history.

But here's an important note on our approval of LTE-U devices. It took too long for us to take action. We need to speed our processes to allow new services and devices to come to market. That brings me to another proposal.

Starting today, we are going to breathe life into Section 7 of the Communications Act— or maybe the more proper metaphor would be to add teeth. For those who don't know, which is basically everyone, that law says, "The Commission shall determine whether any new technology or service proposed in a petition or application is in the public interest within one year after such petition or application is filed."

Unfortunately, the FCC hasn't enforced Section 7. When someone proposes a new technology or service, we don't make a concerted effort to say yes or no within a year. Indeed, the FCC rarely mentions Section 7, let alone abides by it. But that changes now.

Today, I'm directing agency staff to follow Section 7. And I'm putting our Office of Engineering and Technology (OET) in charge of ensuring that we comply with it. Going forward, if a petition or application is filed with the FCC proposing a new technology or service, we'll supply an answer within a year. To be clear, our answer won't necessarily be yes. There could be many reasons why a new technology or service wouldn't be in the public interest, like interference with an existing service. But we will provide an answer with dispatch.

Also, it's important to note that a Section 7 petitioner must actually propose a new technology or service. OET will make an independent assessment of this. And if the technology or service isn't new, it won't qualify for speedier treatment.

Here's one example of how the Section 7 process could work. As part of our so-called "Spectrum Frontiers" proceeding, we asked questions about allowing novel wireless uses and technologies in frequencies above 95 GHz. Those frequencies haven't traditionally been used for mobile wireless technologies. But I believe that, instead of having regulators decide which frequencies are useful, we should put spectrum out there as a testbed and leave it to the innovators to figure out how to use it. Applications for experimentation above the 95 GHz band could qualify for Section 7 treatment. And this determination, in turn, could accelerate the deployment of cutting-edge wireless services and other innovations.

I'd like to offer one last note on promoting innovation—and I realize this could be its own speech. The United States must continue to lead the world in wireless innovation. We led the way in the deployment of 4G LTE, and we must do the same in 5G. With 5G, we can use millimeter wave spectrum to produce multi-gigabit speeds. 5G could transform the wireless world and provide even more robust competition to wired networks.

Last year, the FCC opened up nearly 11 GHz of spectrum in the bands above 24 GHz for mobile use. This gives operators a clear path to launching 5G and other innovative millimeter wave services in the United States. Moreover, we designated portions of these spectrum bands

for both licensed commercial wireless use and for unlicensed or short-range devices, recognizing that there is a synergy between them that makes possible new applications, including the Internet of Things.

Our efforts to facilitate 5G deployments haven't stopped there.

We've authorized operators to launch 5G trials at cell sites across America. They'll be starting those trials by the middle of this year. And we're currently considering whether to open up even more spectrum in the millimeter wave bands for 5G and other uses. It's my intent to move forward quickly to do just that.

Finally, to bring everything full circle, 5G will require a lot of infrastructure, given the "densification" of 5G networks. We'll need to deploy millions of small cells across the country, as well as many more miles of fiber. So when it comes to realizing the promise of 5G, streamlining rules to lower the cost of infrastructure deployment will be as important as allocating spectrum.

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Let me close with this. One of Pittsburgh's all-time greatest innovators was not a scientist, but an artist: Andy Warhol. This pioneer of pop art once said, "They always say that time changes things. But you actually have to change them yourself." Whether it's time or technology, it's easy to feel that the future is written by powerful forces that are beyond our control. But Warhol reminds us that real change doesn't come from external forces alone, but from human initiative. Real change comes from us. You are proving that here in Pittsburgh.

The FCC's job is to be your partner in that journey. By helping to close the digital divide and promoting innovation, we can empower more Americans to change their own lives. That's the mission ahead of us. Let's get to work!