Remarks of FCC Commissioner Michael O'Rielly
Before the American Society of Civil Engineers'
Engineering Smart Mobility for the Smart City Conference
"Disruptive Technologies: Powerful Enablers for Policymakers and Operating Agencies"
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Thank you, Eva, for that very kind introduction. My deep appreciation for being included in this all-star line-up of speakers and guests joining here today.

It truly is a pleasure to be with you this morning to discuss one of my favorite topics: me and my work. Kidding aside, this is a very interesting forum for someone from the Federal Communications Commission. We don't often interact with civil engineers. Radio spectrum engineers, totally. Computer engineers, sure. Mechanical engineers, sometimes. But, civil engineers? Not often at all. I suggest it is opportune and with great foresight that ASCE invited the FCC to its biggest conference of the year. Of course, I jumped at the chance, because I recognize that the worlds of technology, communications, infrastructure, and city planning are colliding all around us.

When I think about civil engineering, I am reminded of Albert Einstein's quote, who foolishly once stated (Can you say that about a universally-acknowledged genius?), "I was originally supposed to become an engineer but the thought of having to expend my creative energy on things that make practical everyday life even more refined, with a loathsome capital gain as the goal, was unbearable to me." Perhaps it was best that Einstein focused on other matters, but the truth is that society cannot function without civil engineers, so lucky for us you all didn't come to the same conclusion. You are the doers, converting a visionary idea into tangible structures for the betterment of all mankind. In the end, your work is part inspirational and part functional. Rarely are those words ever said about my line of work.

Background

To give those unfamiliar with the FCC a bit of context, we are an independent federal agency that operates outside of the traditional Executive Branch. With a little more than 1,400 employees and an approximate budget of $450 million, we oversee the communications marketplace, including most voice, video, and data services, although as technology advances, some of the latest communications tools fall outside our bailiwick. Still, services ranging from broadband and smartphones to television, cable, and satellite keep us quite busy.

As consumer preferences evolve and communications technology becomes even more ubiquitous, the old lines governing which federal agency oversees a particular matter are quickly blurring. Its replacement is a more shared universe. Regulation of any service is beginning to look more like a construction site, where different agencies cycle through to ensure their piece of the project is on track and up to code. While messy in the short-term, the end result will be a much leaner and functional oversight process that regulates only when necessary to fulfill the mission.

From my vantage point, one of the hottest areas in this multi-faceted regulatory environment is so-called Smart Cities. As I have stated before, the term Smart City is a bit amorphous, but many experts tend to refer to it as the collection, analysis, and use of enormous amounts of data retrieved from sensors, interconnected devices, and the like, to increase functionality, reduce cost, and improve efficiency of local governments and their communities. And this doesn't have to be isolated to large,

urban centers, as many smaller and mid-size communities may adopt advanced technologies into their overall planning and operations.

This is relevant for our current conversation, because it dovetails with the development and deployment of 5G wireless networks. Many of you are probably fairly familiar with the buzzword, 5G, but what does it truly mean? Here again, there is not one set definition for the envisioned technology. But, compared to 4G wireless services, which will continue to evolve and operate along side 5G, industry experts anticipate that wireless speeds will increase 20 to 100 fold or up to 10 Gbps, latency will drop to perhaps below a millisecond from approximately 50 milliseconds, and wider channel use will expand capacity by 4 or 5 times. 5G is also likely to produce what I and others have called wireless fiber networks. Yes, there will still be a need physical fiber but in densely populated areas it is possible to experience a near wireless world. Additionally, the computing power is likely to move closer to the user and the edge, away from centralized servers, dramatically impacting consumer usage and helping to produce the low latency expectations.

At the risk of overhyping the technology, 5G is an opportunity to truly revolutionize communications. The combination of improvements I just outlined is like converting from the Indy pace car to that of the winning driver. In essence, the real benefits of 5G come outside traditional smartphone use. It's no longer about what can be done with a wireless device but the doors are being opened for the innovators to incorporate seamless wireless capabilities within other technologies.

Indeed, what truly makes 5G such a game changer is the introduction of new use cases, both on the consumer and enterprise sides. For our purposes of considering Smart Cities and Smart Mobility, it is important to consider things like autonomous vehicles, the connection of billions upon billions of devices (better known as the Internet of Things) the connection of the sensors at the heart of a functioning smart city, the use of wearable health devices to diagnose and care for citizens, and so much more. In terms of enterprise use, where 5G may have a more immediate impact, it's the complete revamping of manufacturing and industrial settings. Consider vast use of robots, automation, remote monitoring and control and the like in an ever increasingly complex business environment. Wow.

FCC Activity to Implement Smart Technologies

Unlike many of the distinguished panelists and engineers in this room who will be actively involved in planning and deploying the next-generation networks, smart cities, and connected transportation systems of the future, the Commission's role is to provide the environment that will allow much of the relevant technology to happen. Key to this is making the necessary resources available to those focused on deployment and ensuring that the regulatory – or, better put, the deregulatory – structure is in place to promote the network construction needed to bring these new, disruptive services to the American consumer. At the risk of boring everyone to death, let me walk the audience through a few areas that the Commission is working on.

1. Spectrum

First, the Commission has been hard at work identifying spectrum to support the technologies that you and your counterparts may seek to deploy, such as autonomous cars and smart city applications. It will likely take 100 megahertz channels with a mix of low-, mid- and high-band spectrum to meet the needs of the various use cases. But, this is not an easy task, as fallow spectrum is not just laying around. Recently, our attention has been focused on high-band and mid-band spectrum, with high bands

providing the capacity needed to connect the plethora of devices and the mid bands offering both good capacity and added coverage.

On that note, the Commission launched an era of millimeter wave auctions late last year and now is in the process of licensing both 28 and 24 GHz spectrum that was recently acquired. This will place more than 1.5 gigahertz of spectrum into the marketplace nationwide. And, starting in December of this year, the Commission will auction the much sought after 37, 39, and 47 GHz bands that will provide an additional 3.4 gigahertz. Other bands are also under consideration, such as the 26 and 50 GHz bands, that will create the spectrum pipeline of the future. While this is a promising start, we will need to step up our efforts to allocate mid-band spectrum, which will be an important component of many mobile networks.

In the near term, the Commission will make the spectrum at 3.5 GHz available. The band will host new licensed and unlicensed-like operations, while protecting U.S. Navy radar using spectrum sharing databases. We recently completed the review of the 3.5 GHz licenses to ensure that 70 megahertz of spectrum would be attractive to not only small-scale deployments, but also attract the needed investment and provide the certainty for large-scale deployments. And, 80 megahertz of unlicensed-like spectrum should be available later this summer.

Speaking of unlicensed spectrum, we are also extremely active on that front. Specifically, the Commission is in the process of opening up 1.2 gigahertz of spectrum for unlicensed use in the 6 GHz band. Besides satellite, there are also numerous wireless fixed services and other operations in this band. One of the contentious issues that has come to light is whether to require a database for indoor use, such as for in-home Wi-Fi routers, which would slow deployment and increase costs. These are the kind of specifics that we struggle with, but such details can have significant repercussions when making decisions in a Smart Cities environment.

2. Infrastructure

Second, an interesting point was raised recently about how modern construction materials may attenuate signals at a higher rate than we account for in our spectrum analyses. This should be of great interest to civil engineers, because, impenetrable building materials may make it more difficult to extend wireless networks to all intended areas. On the other hand, if the radio waves do not permeate modern walls and windows, different indoor and outdoor operations may exist without causing harmful interference. Industrial and business clients could operate proprietary networks in factories and headquarters, critical infrastructure could have abundant spectrum resources for plant operations, residences could use vast amounts of unlicensed spectrum for high-speed Wi-Fi systems, all without affecting the outdoor networks utilizing the same bandwidth and vice versa. I ask interested parties in this room to consider helping the Commission determine how building materials can facilitate spectrum reuse.

Additionally, to implement smart city and transportation networks, you will need to place the requisite antennas for such large-scale deployments. The Commission, under Commissioner Carr's direction, took action last year to facilitate infrastructure siting for small cells, such as placing shot clocks on the local permitting process, promoting collocation of small cells on existing infrastructure, limiting the excessive fees charged by municipalities, and streamlining and reducing the costs the tribal lands approval process, among other things. We've also eased regulations regarding pole replacements to enable modifications to add wireless facilities and allowed one touch make ready to facilitate antenna

placement on existing utility poles. While there is still more work to do to facilitate macro tower siting, these deregulatory actions will facilitate and lower the cost of deploying networks for next-generation smart technologies.

3. Transportation

Third, the Commission is actively engaged on issues involving intelligent transportation systems. Twenty years ago, the Commission allocated the 5.9 GHz band for automobile safety systems, known as dedicated short-range communications, or DSRC, systems. However, DSRC adoption has been somewhat underwhelming, with very limited test deployments, little technology advancement, and the one car line that was fitted with the technology has been discontinued. Further, many of the safety applications that were envisioned in this band have been implemented using other spectrum, such as radar. Today, there is also a competing technology, C-V2X, based on standard LTE technology that can be upgraded to 5G, that many automobile companies support. I was at a demonstration of this technology Friday, and C-V2X functionality now appears to have surpassed DSRC. The Commission may soon start a proceeding to weigh these varying uses, to ensure our rules reflect recent developments.

4. Privacy/Surveillance

Lastly, a significant concern with the extensive data collected, used, and analyzed in Smart Cities is what happens if it is used for mischievous purposes, or worse, to increase the surveillance of innocent Americans. There are known examples globally of nations using advanced technology to keep track of their citizens and take action against unapproved behavior. More concretely, Google's Smart City effort in Toronto has come into increased scrutiny due to concerns regarding its surveillance capabilities and its approach to privacy.   This should cause everyone pause.

Today, many cities maintain networks of cameras and surveillance technology — all used presumably to protect public safety. But with Smart Cities, the level of data available on individual citizens will be astronomical.

I see a real issue developing over the combination of data with police and military powers, and a government's ability to use data for the purpose of controlling or punishing its citizenry. How governments can create a comfort level with the potential privacy implications of Smart Cities remains to be seen and represents an increasingly problematic area.

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As you can see, Smart Cities and the issues involved with their development interact with the Commission's jurisdiction and are of great interest to me. If anyone in the audience or elsewhere finds themselves engaged in related issues that touch on FCC matters — either expectedly or unexpectedly — please do feel free to reach out for assistance. With that, I'll stop there and thank you again for including me in this wonderful event.