REMARKS OF
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Good morning. Thank you Professor Zajic for having me here today. It is a treat to be able to join you because the IEEE Communications Society is an important force in the innovation economy. You are working on some of the most cutting-edge issues in communications—from the development of LTE and dynamic spectrum access to the coming Internet of Things.

Plus, the work you do supports our work at the Federal Communications Commission. But it has been too long since a Commissioner has visited with you for this conference. So I decided it was time and made the trek to Atlanta today.

Of course, speaking before a group of engineers can intimidate. Your papers for this conference are impressive. I will not tell you that I understand every detail. But I can clearly see how your work today lays the foundation for the networks of tomorrow.

As we head into this brave new world, the work of the engineers at the FCC will only grow more important. That is why we are so fortunate at the FCC to have Julie Knapp at the helm of our Office of Engineering and Technology. He is a national treasure. And he is here today. So I hope you get the opportunity to meet him.

As I look ahead to what the FCC will be working on in the future, I know that Julie and all of our engineers will be an important part of everything we do. I also know that as communications technologies evolve and grow more complex, so do our regulatory challenges. We will need new ways of thinking and new ideas to help us navigate these challenges.

So I thought it would be useful to share a few new ideas—three, actually—about how to address the communications challenges ahead. After all, standing before a group of engineers sounds like a pretty good place to talk about thinking outside of the proverbial box.

So first idea: To get outside the box, government needs to do more work in the sandbox.

Now just from the sound of it, my children might find that one intriguing, so let me explain.

As many of you know, software developers often code "sandboxes" into their programs. This code allows others access to a portion of a program without harming the host platform. Think of third-party applets that display on a section of the webpage without touching the rest of the site. Outside developers can experiment within the four corners of this virtual sandbox, without risking damage at large scale.

The technology industry has been extending the sandbox concept to all sorts of development. It means that innovators no longer have to perfect new concepts in obscurity only to bet the farm on launches of large yet unproven ideas. Instead, they can set up small experiments—sandboxes—to tinker with their projects and expose them to real world conditions. This way they can apply the scientific method to creativity: develop a new idea, experiment, examine the result. If the data looks promising . . . find a way to build on it.

Sandboxes encourage creative thinking—and they limit risk. No wonder this concept has gained traction among innovators. It has been incorporated into the thinking of entrepreneurs in high-tech centers from across the country in Silicon Valley to across town at the Advanced Technology Development Center at Georgia Tech.

I think we need to build more sandboxes in Washington—and at the FCC. Because back at home, our big policy initiatives follow the traditional approach to innovation. We toil in isolation, generate ideas from deep within large federal buildings, and refine them with some outside input, a series of summits, panels, and the occasional Blue Ribbon commission. Then, without the benefit of having tested our thoughts in the real world, we unveil a finished product, cross our fingers, hold our breath, and hope everything turns out for the best.

But what if instead of always relying on the big reveal, we set up small-scale policy experiments? What if we examined the effects of new rules before unleashing them all at once? Could our efforts in Washington improve if we made more space for policy sandboxes?

I think the answer is yes.

I think there are definitely places in communications policy where small sandboxes could have big impact.

Here's one example—our experimental spectrum licensing process.

At the FCC, we understand that new technologies do not arrive on the scene without exhaustive study. Experimentation is important and necessary.

So just a few months ago we updated our rules to allow more flexible licensing for wireless experimentation. We created a new program license that reduces regulatory burdens and helps innovators test new ideas using our airwaves. These licenses mean more power to explore at research laboratories and universities, more ability to play with power levels, and more opportunity to dream big and create. In the past, experimental licenses have produced systems to support rocket launches, patient monitoring equipment, and robotic technology for the armed forces. Pretty neat. Going forward our new sandbox policies for experimental licensing could lead to even more innovation.

Still, I believe we can do more to make these sandboxes more powerful. Because for the first time in over a decade, the FCC is also taking a serious look at how new radio equipment is approved. We are looking at ways to expedite the equipment authorization process. Right now,

new devices can sometimes take months to make it through our certification process. Because the number of devices in this process is expanding, our systems deserve an update to meet this demand. By moving new devices through our approval process more quickly we can move them from sandbox to market much faster.

But ultimately our sandboxes do not need to be limited to wireless policy.

Right now, the FCC is considering steps to foster the nationwide transition to next-generation Internet Protocol—or IP—networks.

To explain this effort, let me start with some FCC numbers. This is a time of extraordinary change in communications networks. At the turn of the millennium, we had roughly 200 million switched access lines—or traditional phone lines. By the start of this year, we had only 96 million. On top of that, we had 42 million VoIP lines—an increase of nearly 80 percent since 2008. Add to this that according to the Centers for Disease Control right here in Atlanta—more than one in three households has cut the cord entirely and uses only a wireless phone.

What is clear from these numbers is that our networks are evolving—at breathtaking speed. In Washington, the effort to think about these network changes is sometimes called the "IP Transition." Simply put, this is an effort to understand how FCC rules can be built for the networks of the future—and not just the past.

For my part, I think the IP Transition must be informed by the four enduring values that have always informed communications law—public safety, universal access, competition, and consumer protection.

So far, so good. But after you get past these principles, what is the best way to facilitate the IP transition? How do you deal with the thorny technical issues? How do you navigate the complexities of federal, state, and local authority? How do you simply make it all work?

Again, I think the answer starts with the sandbox. We can kick-start this policy initiative with targeted experiments. We can test our ideas in a limited way before unleashing them at large. After all, big issues are at stake—how to foster deployment, how to spur investment, and how to best serve consumers. Trying them out on a small scale just makes sense. So I am hopeful that the FCC can work with carriers and come up with location-specific and service-specific IP trials to better understand the consequences of our policy choices. Actually, I am more than hopeful—because tomorrow the team at the FCC working on these issues is sharing a presentation on how they intend to proceed. It sets the stage for sandbox experimentation—and I think that's a good thing.

But enough about sandboxes. **I want to move from the ground to the sky and talk about a second idea—the more efficient use of spectrum.**

Again, the numbers are a good place to start. There are already more wireless phones in this country than there are people. Roughly half of these are smartphones, which generate 35

times the traffic of traditional wireless phones. One in three adults now uses a tablet computer, which generates 121 times the traffic of traditional wireless phones. But we are only getting started. Worldwide, mobile data traffic is expected to increase by 13 times in the next five years.

Yikes. Spectrum is the consummate scarce resource. We are not making more. So we have to use what we have more efficiently—to help manage this great escalating demand.

The good news is that at the FCC we already have efforts underway. We have on deck a variety of spectrum auctions to support new mobile broadband use. And we are looking at new topologies like small cells—especially in the 3.5 GHz band.

But to meet this escalating demand we need to do more. We need to create incentives for all users to be more efficient with their spectrum. We need to support technologies—from dynamic spectrum access to frequency agile radios to smart antenna systems—that make this possible.

So I want to offer an idea building on the thoughts of a wireless legend—Marty Cooper. Forty years ago Marty Cooper took to the street in New York City with a clunky, 10-inch brick costing $4000—the first wireless phone. He spoke and he made history. Fast forward four decades and consider the wireless world that his one call wrought.

This past Summer, the father of the cell phone himself visited the FCC and spoke about the experience. He also threw around some ideas about making our airwaves more efficient. I want to seize on one of them.

What if we issued a challenge? Think of it as Race to the Top, the Spectrum Edition. Imagine that we decided that the first person who finds a way to make spectrum use below 5 GHz 50 times more efficient over the next decade will be rewarded with 10 megahertz of spectrum suitable for mobile broadband. This is no small prize. Because if the winner can truly use spectrum 50 times more efficiently, they can make their 10 megahertz do the work of 500 megahertz.

Think of the power of this kind of prize. We can all benefit from the winning idea when it is introduced at scale. But for that one winner, there will be any number of near misses. And we could see across the board, throughout the wireless economy, the multiplied benefits of all of these efforts together.

This contest could generate some real interest. Maybe even a few of you here might make a go of it.

I think it sounds cool. But I will admit it is not something that the FCC can do on its own. Still, I think this is one of those think big, bold, and strange ideas that is worth a look.

Third and final idea. Sandboxes and spectrum efficiency have something in common—they benefit from engineers.

Engineers are deployed throughout the FCC. All in all, we have more than 250 of them.

They are at work on the experimental licensing issues we just discussed.

They are an integral part of our deliberations on the IP transition.

They are also a formidable part of our upcoming work on spectrum auctions.

To get all of this work done we need lawyers, economists—and engineers. In fact, I think the work ahead would really benefit from an increase in our FCC engineering ranks.

So here's an idea. Over the past several years, the FCC has been able to recruit talented, young legal professionals through an honors attorney program. In fact, one of the alumni of this program is a young lawyer named David Goldman. He is on my staff and here with me today. He is legal spectrum guru of the first order and just the kind of professional we want to recruit to public service.

I think the program that brought David to the FCC needs an engineering counterpart. So I think we should create an honors program for young engineers. It would bring new vigor to the ranks of our technical experts. By mixing young men—and women—with experienced engineers already on staff, the FCC could be better prepared to face the challenges of next-generation communications networks.

So there you have it. Three ideas for the road ahead. Three ideas for making sure the policies we develop in Washington keep pace with the technology you are developing around the world. I think more sandboxes on the ground, more spectrum efficiency in the sky, and more engineers all around are ideas worth pursuing. But here's another one. I think going forward, the FCC and the IEEE can work together more. Because I think with your technical expertise we can bring better communications to more places and do more big things.

Thank you.