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BEFORE THE
ILLINOIS COMMERCE COMMISSION
BUILDING SMART CITIES WITH SMALL CELL NETWORKS
Wednesday, June 7, 2017
Chicago, Illinois

Met, pursuant to notice, at 10:30 A.M.,
at 160 North La Salle Street, Chicago, Illinois.

- PRESENT:
- BRIEN J. SHEAHAN, Chairman
 - SADZI MARTHA OLIVA, Acting Commissioner
 - SHERINA E. MAYE EDWARDS, Commissioner
 - JOHN R. ROSALES, Commissioner

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I N D E X

PANEL I

MODERATOR:

MS. MEAGAN PAGELS, Legal and Policy Advisor to
Chairman Sheahan - ICC

PRESENTATION BY:

MR. CHRIS BONDURANT, AVP Construction and
Engineering AT&T Technology Operations

MR. PATRICK HAYES, General Counsel, Illinois
Municipal League

MR. KEN SCHIFMAN, Director of Government Affairs,
Sprint

DR. JIM ZOLNIEREK, Bureau Chief,
Public Utilities - ICC

PANEL 2

MODERATOR:

MR. WEI CHEN LIN, Legal and Policy Advisor to
Chairman Sheahan - ICC

PRESENTATION BY:

MR. BENJAMIN J. ARON, Director, State Regulatory,
CTIA

MR. JASON CALIENTO, Senior Vice President,
Network Strategy, Mobilitie

MR. MICHAEL KUBERSKI, Director IT
UComm, Exelon

1 CHAIRMAN SHEAHAN: Good morning, everyone, and
2 welcome to the Illinois Commerce Commission's policy
3 session on Building Smart Cities with Small Cell
4 Networks.

5 This session is convened pursuant to
6 the Open Meetings Act, and our guests and panelists
7 should be aware that a court reporter is present. A
8 transcript of this session will be posted on the
9 Commission's website.

10 With me today are Commissioners
11 del Valle, Rosales, and Acting Commissioner Oliva.
12 Commissioner Edwards just joined. We have a quorum.

13 I would like to thank all of our
14 panelists for taking the time to participate in
15 today's session and for all of you for attending.

16 I recognize that it takes a lot of
17 time and effort, and I speak for all of the
18 Commissioners when I say we are very appreciative.

19 I'm personally very excited about this
20 policy session as it is the first telecom-specific
21 policy session that we have held in several years.

22 I was Commissioner Harvel's assistant

1 for telecom, so I have a personal interest in the
2 topic as well. It's been a topic that is top of
3 mine lately: How the telecommunications industry
4 will make the move from current 4G networks to the
5 emerging 5G networks and beyond.

6 We are experiencing a time when all
7 customers want faster speeds and better efficiency.
8 One thing is certain, the shift will require
9 investments in new infrastructure, so it is critical
10 that we understand the next generation of wireless
11 network infrastructure and how solutions like small
12 cell networks are able to assist in meeting the
13 needs brought on by increasing ubiquity of the
14 Internet of things.

15 It is also important to think about
16 whether policies and regulations currently in place
17 help or hinder the deployment of network upgrades
18 needed to meet these needs.

19 Another exciting aspect of the next
20 generation of wireless infrastructure is how
21 will it enable our cities to become smarter. While
22 we have had a great Smart Cities policy session in

1 the past, today we will focus specifically on how
2 robust wireless networks are critical in delivering
3 Internet protocol access and bandwidth on a citywide
4 scale.

5 We will discuss how cities can use
6 already existing infrastructure to support required
7 upgrades to network infrastructure and will also
8 explore ways that improve wireless connectivity to
9 help improve Smart Cities overall.

10 Specifically, we will discuss public
11 safety, infrastructure management, transportation
12 systems, and remote monitoring of public systems.

13 My hope is that this session will keep
14 all stakeholders and regulators informed on
15 telecommunication network upgrades and industry
16 changes that we anticipate in the future.

17 To begin today's meeting, I would like
18 to introduce Meagan Pagels. Meagan is one of my
19 legal and policy advisors, and she will be leading
20 our first panel this morning.

21 Meagan.

22 MS. PAGELS: Thank you Mr. Chairman. As the

1 Chairman said, my name is Meagan Pagels, and I am
2 the moderator for Panel 1, Network Upgrades and
3 Aligning Policy and Technology.

4 The discussion and questions will
5 explore the next generation of wireless network
6 infrastructure and what solutions are necessary to
7 meet the Internet of things infrastructure needs for
8 5G and beyond.

9 This panel will also address policy
10 issues that telecommunication providers and
11 communities face in implementing these network
12 upgrades.

13 The format of the panel will consist
14 of three presentations by each of our panelists
15 followed by a series of questions. If time remains
16 at the end, we will take questions from the
17 audience.

18 Before I begin, I would like to
19 introduce our panelists. First, we will be hearing
20 from Jim Zolnierek, Bureau Chief of Public Utilities
21 here at the ICC, then we will hear from Chris
22 Bondurant, AVP of Construction and Engineering at

1 AT&T Technology Operations.

2 Following Mr. Bondurant, we will hear
3 from Ken Schifman, Senior Counsel and Director of
4 State Government Affairs at Sprint and, last, but
5 not least, we will hear from Patrick Hayes, General
6 Counsel at the Illinois Municipal League.

7 Please join me in welcoming our
8 panelists.

9 (applause.)

10 Dr. Zolnierrek, you are free to
11 begin when you are ready.

12 PRESENTATION

13 BY

14 DR. ZOLNIERREK:

15 Thank you. First, I would like to
16 thank the Chairman and Commissioners for inviting me
17 to participate in this panel, and I would like to
18 thank Meagan for putting this session together. I
19 appreciate it.

20 Before we launch into where are we
21 going, I thought it would be interesting just from
22 my perspective on how we got to this point and just

1 from my perspective explore the evolution of this
2 industry in the last few years.

3 (Slide presentation.)

4 Prior to --

5 CHAIRMAN SHEAHAN: You might have to wing it,
6 Jim.

7 DR. ZOLNIEREK: Prior to coming to the
8 Commission, I worked in the Federal Communications
9 Commission. I started in 1997 shortly after the --

10 COMMISSIONER MAYE EDWARDS: Jim, is your mic on?

11 DR. ZOLNIEREK: It is on.

12 COMMISSIONER MAYE EDWARDS: Can you move it
13 closer.

14 DR. ZOLNIEREK: Sure.

15 Before coming to the Commission, I
16 started with the Federal Communications Commission.
17 There I started in 1997 working for the Industry
18 Analysis Bureau. One of the first jobs I had after
19 the passage of the 1996 Telecommunications Act was
20 working with a team to look at competition in the
21 local telecom industry, and, looking back I find
22 this interesting, because in our first report we put

1 out at the FCC in 1998, the report looked at local
2 telecom competition and it didn't include any
3 assessment of -- there was no mention of wireless,
4 broadband, or VoiP.

5 At that point wireless provided very
6 little competition for the traditional local
7 telephone service. It was basically considered
8 everyone would have their own phone and you might
9 have a cell phone, but it wasn't really a
10 replacement for the home phone.

11 In fact, this was even, as late as
12 2003, verified by the Center for Disease Control.
13 They do this study each year, which started in 2003,
14 of a health survey. They did a health survey, and
15 one of the questions they asked was whether the
16 patient had a home telephone and whether they had a
17 wireless available to them, and at that first
18 datapoint in 2003 only 2.9 percent of adults lived
19 in households only had wireless service. This was
20 in 2003.

21 Around the same time, the wireless
22 bureau at the Federal Communications Commission put

1 out their first statement about wireless competition
2 and they reported that in 1984 there were about
3 10,000 mobile subscribers, and then right before the
4 study was published in about 1984 there were 24
5 million U. S. mobile licensed subscribers, but even
6 then in 1984 they indicated that the wireless -- as
7 you see, there was some conjecture that the wireless
8 interconnection fee would be -- 90 percent of this
9 would be major growth in technology. Looking back,
10 it was quite an understatement.

11 We look today, wireless subscription
12 today, in the FCC's most recent report on VoiP
13 telephone service, wireless was a big part of that
14 in that reporting. They reported 338 mobile --
15 338 million U. S. mobile VoiP subscriptions, and if
16 we look at the data of that report for Illinois,
17 there's 2.3 million VoiP phones -- 2.6 million VoiP
18 phones and 13.8 million mobile phones.

19 So mobile phones are clearly a strong
20 competitor in many ways. It surpasses some local
21 telephone service in terms of penetration.

22 In 1950 mobile wireless competition

1 the FCC reported that there were almost 400 million
2 mobile wireless connections, and this signifies
3 another change, and I think for a long time the
4 mobile competition report looked at mobile and
5 looked at basically VoiP mobile service, and I think
6 competition in -- I think mobile service has become
7 much, much more than VoiP competition, you know,
8 includes things like tablets, non-connective cars,
9 machine communications, AMI meters, appliances, and
10 things of that nature, so mobile has become much
11 more than it was before.

12 From my perspective, utilities measure
13 competition in the industry means that measurement
14 is really risky. It's hard to figure out even what
15 your measurement is in Illinois.

16 With the local telephone service, you
17 just look at the lines of a house and says does it
18 have one line, you know, it may be one provider,
19 another provider services the neighbor.

20 Now it's more than just do they have a
21 wire in the house or do they have broadband and
22 wireless service, do they have tablet use as a

1 substitute for other services they have to measure
2 becomes very messy and it becomes such competition
3 from many different levels.

4 The latest CDC estimates began looking
5 at how many customers have only wireless phones and
6 reported that over 50 percent of American homes have
7 wireless only and no wire line, so we have come a
8 long way in a very short time in terms of where the
9 mobile industry is going.

10 Just a brief overview, and I'm sure
11 that the panelist to my left will go into much more
12 detail than I have. In a summary of 1200 wireless,
13 it's growth, but I'll still put it into perspective,
14 first generation mobile was analog voice; second
15 generation was digital with talk and text; third
16 generation was a lot of Internet connectivity, and
17 now we're talking about a fourth generation LTE.
18 That's really getting us around in the morning.
19 It's just VoIP connectivity.

20 Just to look at penetration in terms
21 of the broadband mobile network, the 19 Mobile
22 Wireless Report of 2016 reported that almost a

1 hundred percent, 99.9 percent, of the population has
2 access to a mobile wireless, a LTE, broadband
3 connectivity. Figures range from 99.5 to 99.7
4 percent population.

5 Now when you look at areas of the
6 country, it's a little bit less in terms of road
7 miles and other communities are rolled out in square
8 miles. It's lower. That increased more than the
9 population, so some areas still won't get coverage,
10 but the majority of the population is covered.

11 So, again, I think I'll start to
12 narrow that down a little bit now, kind of looking
13 back over the next subset of the communication into
14 more detailed market data in the networks, but, you
15 know, right now this seems like a small cell
16 distributed antenna system and the way perceived
17 they have sort of the micro -- of the macro cellular
18 network use to fill dead spots, create hot spots,
19 generally they increase range of value in
20 densely-populated areas and can also work in low
21 power and reduce handset battery life through
22 reduced power consumption, then there's cyber.

1 I think to some extent 5G still
2 involves higher frequency millimeter bandwidth
3 technology. It doesn't travel far but it carries a
4 lot of capacity.

5 As I said, it's a lot of work, virtual
6 reality, all kinds of distributed analysis data, and
7 there may be flexibility in this new network that
8 allows prioritization of streaming video, so you
9 might prioritize that or might be a quick response
10 to generate some flexibility to the customers'
11 needs.

12 I just thought it was interesting that
13 just as I was preparing my remarks, there was an
14 announcement shortly before that Apple had recently
15 filed an application with the FCC to test the 5G
16 technology in Cupertino, California.

17 The iPhone was introduced less than
18 ten years ago, and sort of an incredible quick
19 reaction in wireless back to technology development.

20 I'm going to go a little bit off
21 script now to put kind of put in context the
22 information, and I just want to talk briefly about

1 some jurisdictional issues here at the Commission.

2 The Commission certifies wireless
3 carriers right now in certification. The
4 certification is not very big. There's no
5 managerial-type goals and financial requirements
6 like there is in a lot of some other aspects of
7 telecommunications, but the carriers are certified.

8 The Commission does not actively
9 regulate wireless carriers. That's pursuant to
10 certain of the statutes in Illinois. I have cited
11 1304, 13-203(4) in particular, not trying to put a
12 rush here. I just tried to give you a review.

13 We don't actively regulate wireless
14 carriers. In fact, there is a telecom federal law
15 on trademark regulations driven by wireless carriers
16 and rates of wireless carriers. At this point the
17 state does not have wireless carrier certification.

18 Probably more interesting, I think for
19 today's topic is the FCC through the Federal Telecom
20 Act has some authority over wireless citing
21 facilities' billing, but broadband has over 99.6,
22 reserve the authority of state and local governments

1 to make decisions regarding the placement,
2 construction, and modification of personal wireless
3 facilities, subject to a few limitations, so this
4 kind of dual state/federal relationship that's a
5 state, local, and federal relationship.

6 The federal authorities can insure
7 that the state and local municipal governments
8 respond to wireless facilities within a reasonable
9 period of time, so we can set limits on
10 applications.

11 And, finally, state and local
12 authority can, pursuant to federal law, regulate,
13 plan provisions of personal wireless services.

14 So the FCC has over time issued a
15 number of different decisions that place limitations
16 on state and local authorities, and at this time
17 local authorities still have significant authority
18 over wireless, and in this state we have currently
19 the local authorities that make decisions pursuant
20 to their laws -- state laws, that kind of govern
21 what the local authorities can do here and our
22 municipal and county codes, municipalities and

1 ratepayers of the local can do, and I guess I'll
2 stop there. Thank you.

3 MS. PAGELS: Thank you so much, Dr. Zolnierek.

4 And next up is Chris Bondurant.

5 PRESENTATION

6 BY

7 MR. BONDURANT:

8 Okay. Good morning. My name is Chris
9 Bondurant. I work for AVP and I'm responsible for
10 construction and engineering activities in about
11 14 states. So today I want to talk about IOT's
12 Smart City grid and a lot of these small cells, and
13 what's the need for it, and why it's so important to
14 our future.

15 You hear a lot of talk about small
16 cells and the need of small cells for 5G, but
17 there's not a lot of talk about why you need it for
18 4G. I think I want to elaborate on that a little
19 bit, because there's a need today, not necessarily
20 by 2020 or 2023, and so I think that's an important
21 piece.

22 So with that being said, I'm going to

1 jump right in. You've seen a small cell. What is a
2 small cell? So we did bring in an example of a
3 small cell. It's back in the corner, straight back
4 here to my left, and it's -- you can pull that out,
5 Ken. If maybe you would like to look at that.

6 Basically, it's an antenna, and it's
7 in an actual cage that we had made for the small
8 cell radios, and you can see that over the last year
9 or two there's been examples of antennas. As you
10 can see, they have used the latest and greatest.

11 In the last few years, there has been
12 a real push from the carrier side of the business to
13 the OEM to say, hey, we need something smaller. No
14 city, nobody really wants any of these in their
15 front yard.

16 How do you make these things look like
17 they blend in with the city, whether it's the color
18 or the size of it, you name it.

19 So a small cell is basically low
20 profile, compact, scaleable, unobtrusive, and very
21 low power. These are generally 5 watt, maybe 10
22 watt. They're generally in the 5 watt range, so

1 very low power.

2 When you think about a light bulb
3 fixture, that's about 40 to 60 watts. These are
4 five, so very low power. If you look at the top of
5 that fixture, you will see some examples of some
6 small cells that are deployed across the Midwest in
7 one of the 14 states.

8 I think the important thing to notice
9 is they blend in many cases with where they're at,
10 same thing with the bottom left-hand side, the blind
11 side or in the dirt. They fit within the grid. You
12 can change the color. They're not obtrusive.

13 The reason we need them is they
14 provide capacity and increased connectivity, speed
15 and data, so four speeds and high frequency data.

16 We often look in the industry and see
17 where data has grown over the last few years in
18 really large numbers and every single year charts
19 look like this in our data consumption in our
20 company.

21 So we are having to take, you know,
22 everything we can, look at -- from every dense area

1 we are having to look at to address some of the hot
2 spots, to address some of the in-building
3 situations, to address the street coverage and then
4 back to the traditional micro, so we have to build
5 some micro sites, but to really cover the traffic
6 and especially when you start moving into 5G, that
7 spectrum has a very high frequency, which means it
8 doesn't penetrate buildings. They don't really
9 penetrate buildings very well.

10 So we still need the micro network.
11 We do need the powerful small cells and, in some
12 cases, we need more decisions, so it's going to be a
13 combination of all the above.

14 Why do we need them? I've already
15 mentioned it's a growing demand today for data
16 consumption, but our next generation is 5G, but
17 don't forget about 4G, because today in many cases
18 our path is trying to get to the gigabit of speed.

19 What does that mean to you? That
20 means that you download a movie to your mobile
21 device in five seconds or somewhere around that time
22 frame, so the need for that is, you know, everybody

1 wants it.

2 If you look at the traditional way
3 that the users are using their devices today, they
4 use it on the wi-fi, but, as, you know, the
5 landscape is very competitive on the carrier side of
6 the business and people don't always have wi-fi, so
7 they use it on the actual wireless network, so that
8 path to 5G, 4G is the path as well.

9 We've got a few cities within the
10 Midwest right now where we are deploying small cells
11 and it's very favorable in those towns. Our speeds
12 are somewhere -- anywhere from one to 200 megawatts
13 per second and we are working toward that one
14 gigabit per second, but we don't get there unless we
15 have that Smart City grid. It's just as simple as
16 that.

17 When you start talking about the
18 Internet of things, we have to do, in our opinion,
19 all the above. We have got to do all that to really
20 maintain the data consumption and to really be ready
21 for the next phase of data consumption, because
22 every year this gets a little bit more and more

1 intensive. As I mentioned, Smart Cities you have to
2 do this if you want to be a Smart City.

3 Spectrum exhaust, there's only so much
4 spectrum that's provided to the carriers, and you
5 can see that all the carriers spend millions and
6 billions of dollars on their resources every year.
7 It's very expensive and it's never enough, so they
8 are going to have to continue to build these in
9 order to support that.

10 Increased capacity and speed also data
11 from macro. The macro invoice I have thousands of
12 cell sites in the next few years that will be at
13 capacity if I don't build another grid, and so what
14 does that mean? That means working on bad
15 performance, dropped calls, underserved
16 neighborhoods, even worse than that, so you have to
17 continue this, and, most importantly, is these small
18 cells suffering from 4G.

19 The macro towers will be overloaded if
20 you don't keep up with their demand. Where do we
21 need them? I would tell you we are really focusing
22 in urban areas now. That's not our single focus.

1 We are focusing on the urban/suburban, and then
2 ultimately we will -- we need to know now that we
3 have got urban grids providing the key cities that
4 we need to build.

5 We talked a lot about small cells in
6 cities this morning. So with that, we have to make
7 sure that we are building these, so clearly it's
8 kind of all the above is the answer of where we need
9 them.

10 Really the focus is in
11 urban/suburban. General process and determining
12 factors, capacity, you have got hot spots at the
13 same events. Municipality requirements, and
14 obviously that's a huge piece of it, that we are
15 going to build.

16 If you are seeking availability not to
17 be able to be the first choice, we like going to
18 utility poles in the right-of-way. There's so many
19 municipal streetlights, traffic signal poles, side
20 mountings on the buildings, all the above really
21 support for us the cost of the build. The
22 difference in the macro versus the micro is in the

1 macro we determine that in terms of miles, one to 30
2 miles depending on the area.

3 These small cells it's more likely in
4 feet, 10 to 30, 5, so very tight. I know I'm
5 running out of time, so I will speed along here.

6 Construction we have to transport
7 these with the proper connection. Overhead
8 underground microwave is really those three things.
9 Placing a pole is simply it's a three-day process.
10 The barriers time is extremely important.
11 Replacement of the right-of-ways in deep holes is an
12 important restriction. Building new versus using a
13 pole already there. We have applications that are
14 timely. Every city is different.

15 Most important is the cost, and it's
16 tremendous in some of our cities as compared to what
17 the cost structure should to be. Remember, the
18 micro is one to 30 miles compared to micro or peak
19 which we try to build in terms of feet, so very
20 different. I know I'm out of time, so I'm finished.
21 Thank you.

22 MS. PAGELS: Thank you very much. Thank you very

1 much, Mr. Bondurant.

2 Next up we have Mr. Ken Schifman.

3 PRESENTATION

4 BY

5 MR. SCHIFMAN:

6 Thanks, Meagan. Hi, everybody. My
7 name is Ken Schifman. I'm a senior attorney and
8 director of Sprint, and I appreciate the opportunity
9 to be here in front of the Commission. Mr. Chairman
10 and all the Commissioners, thank you very much for
11 inviting me.

12 I've worked with Dr. Zolnierek on lots
13 of occasions over the years. I've been in this room
14 multiple times, but I've usually been sitting over
15 there, not up at this desk, so I appreciate the
16 opportunity to be here and to be able to do this.

17 So I thought I would give you guys our
18 perspective at Sprint. We have been very much
19 engaged in the process of building small cells
20 throughout the country. We are very interested in
21 this. We see lots of opportunities both here in
22 Illinois and across the country to really improve

1 our wireless service and to demonstrate lots of
2 benefit for the cities and the states that we are
3 operating in.

4 (Slide presentation.)

5 I'll just start off with some
6 pictures. Those are pictures of the deployed small
7 cells similar to what AT&T showed, Kansas City,
8 Missouri outside of NRG Stadium in Houston where we
9 deployed a bunch of small cells in preparation for
10 the Super Bowl. That red arrow is pointing to a
11 utility pole. That's a newly-built utility pole
12 with an antenna on top of that. It's hard to see
13 from that picture right now, but you guys can get
14 the pictures on our website and you will be able to
15 see it on our website.

16 Also, we are in lots of major cities,
17 New York City and Los Angeles. As you see, a lot of
18 the deployment are on light poles in the cities.
19 Those are usually available vertical infrastructures
20 that are in the rights-of-way in the city, and I'll
21 talk about how important that is to access that type
22 of vertical structure.

1 So we call it -- what are small cells?
2 Similarly, when AT&T talked about a small radio
3 antenna typically located on locations in the
4 right-of-way, they would be attached to existing
5 light poles -- to existing utility poles, buildings,
6 placed indoor venues, can be place on
7 newly-installed poles like that example I showed
8 from Houston.

9 So why small cell? Same reason as
10 AT&T talked about. Right now we are using them for
11 our 4G LTE network, and it will increase our speed
12 significantly, you know, somewhere in the 100 to 200
13 megabit download range, depending upon the
14 technology that we are using at that particular
15 site.

16 So they are being utilized right now
17 to increase capacity. It's not so much an issue of
18 coverage in lots of places. We do have coverage
19 from a macro site, but what we are talking about is
20 trying to increase our capacity to utilize the
21 wireless spectrum that we have and to provide those
22 download speeds and reliable connections that all of

1 our customers wants.

2 So small cells are crucial to us
3 continuing to provide the type of service that
4 everybody wants when they up their -- when they pick
5 pick up their cell phone and hook it up to whatever
6 they need to.

7 I want to note that I just saw on the
8 plane on the way here today -- I looked on Twitter
9 right before I got on and there was this story that
10 the U.S. is twenty-eighth in the world in mobile
11 download speed. I mean, that's really unacceptable.
12 We should not be twenty-eighth in the world on
13 mobile download speed.

14 Yes, we have a huge area to cover, but
15 we have the know-how. We have the technology now to
16 improve that, and we'll talk about some ways that we
17 can improve that.

18 Also, I just want to talk a little bit
19 about the type of economic development that we are
20 talking about for small cells and what it can lead
21 to.

22 Essentra published a report that we

1 have been talking about. Just in Chicago alone once
2 we get to 5G, it's -- there's 9,000 jobs projected
3 to be utilized in Chicago when we get to 5G in the
4 next couple of years. It's \$14 billion of GDP
5 growth just in Chicago, so we are talking about a
6 huge economic engines growing in these networks and
7 use of these networks as we go forward.

8 Real quick, I'll talk a little bit
9 about what Jim said is that the wireless network
10 infrastructure reform is very prominent at the FCC
11 right now. There's two petitions -- two notices of
12 public comments that are open right now. One is on
13 the fees, and we'll talk little bit about that, and
14 another one is really on delays and other ways of
15 attempting to kind of break through some of the log
16 jams that carriers are seeing at municipalities.

17 So we divided up regulatory barriers
18 to large cell/small cell deployment into three
19 buckets. One is we give the restricted access to
20 the right-of-way or the vertical structures, too, we
21 find burdensome or no processes by municipalities
22 for allowing the placement of small cells, and the

1 third bucket is excessive application attachment and
2 right-of-way usage fees, and so each one of those
3 there's a huge amount of information that we can
4 provide, lots of barriers that they're seeing in
5 cities here in Illinois and also around the country,
6 and the way to solve those regulatory barriers are
7 by doing some of the things we have done around the
8 country, which is we are attempting to provide
9 statewide uniformity to make sure we have access to
10 the right-of-way and access to municipal vertical
11 structures.

12 We want to make sure that we get
13 attachment fees, and application fees, and use of
14 right-of-way fees that incent deployment, and really
15 they're based on the actual direct costs put aside
16 for municipalities to review those applications and
17 to make sure that the attachments that we are
18 placing are not -- that they can inspect them and
19 make sure that they're done in the way that cities
20 think they're attractive.

21 And, finally, streamline applications,
22 an exciting process. We'd like to get these things

1 cited in 60 days. The application should be
2 processed within that.

3 We believe that as long as we are
4 providing the small cell similar with AT&T that's on
5 the back of the pole there, these are uniform
6 deployments, and they should be approved in an
7 administrative process. They should not be part of
8 the zoning review by municipalities, so that's what
9 we mean by streamline application and siting
10 process.

11 We had a bill here in Illinois, Senate
12 Bill 1451, that's kind of small. I won't go through
13 all those things, but you can look at them. It
14 passed the Senate 47 to 8. It's gone to a vote
15 amendment right now at the Illinois General
16 Assembly. I believe there's a deadline at the 10th
17 of June for it to be considered. It had one vote.
18 I believe it's going to come again for another vote.
19 We can talk further about the items that are in that
20 bill, but we worked with Mr. Hayes of the Illinois
21 Municipal League, all the carriers in the room here
22 did. We believe that we came up with a fair and

1 balanced bill that balances the interests of the
2 cities, along with the interests of wireless
3 carriers on the deployment network.

4 So we are hopeful that we can get
5 passage of this bill and put it on the Governor's
6 desk sometime in the summer.

7 So, in conclusion, I'll just show you
8 some more pictures we have got. In the middle
9 there's two light poles in Chicago that we deployed
10 on Chicago Department of Transportation poles, other
11 small cells that we have throughout the country, and
12 I'll be happy to answer any questions. Thank you.

13 MS. PAGELS: Thank you, Mr. Schiffman.

14 COMMISSIONER ROSALES: Meagan.

15 MS. PAGELS: Commissioner Rosales.

16 COMMISSIONER ROSALES: Good morning, and I don't
17 mean to be adversarial at all, but why in your best
18 practices do you feel that you had the right to
19 utilize these poles in the public way where in every
20 part of your business previously to 5G it was a
21 business decision where you put these antennas and
22 pay for those either private building or a public

1 building? I'm not sure where you're coming from to
2 the best practices. I'm sure it would be easier for
3 you to put it on these poles, but why is it that you
4 feel that you have a right to do so?

5 MR. SCHIFMAN: Good question, Commissioner.

6 And really what we're talking about is
7 because of the need for small cells to be closer to
8 where the users are and actually a need to be
9 supplier network in a way that we need now for
10 capacity and for 5G vertical infrastructure of
11 municipalities is the logical place to go.

12 Federal law talks about the ability to
13 utilize the rights-of-way for wireless carriers also
14 and how local regulations prohibited or be affected
15 of prohibiting the provisions of telecommunication
16 service, and so when we think about how we site
17 small cells, the vertical infrastructure in the
18 cities is the most logical place where we're happy
19 to pay for the actual and direct costs that the
20 cities incur as a result of us placing our
21 facilities on their light poles and traffic signals,
22 but it's really because it's going to promote

1 economic development in the cities and make a better
2 use case for everybody as they use the wireless
3 phones.

4 COMMISSIONER ROSALES: So the second question
5 would be, as you begin, it seems like it's doable
6 and doesn't seem very intrusive at all, but as the
7 businesses grow, at some point will it become just
8 only where you can't do it any more? You have an
9 antenna. You have an antenna and you have an
10 antenna and he doesn't have an antenna.

11 You see what I'm saying where it gets
12 to be like you're hopeless. When you see these
13 buildings where antennas are on top, it's massive
14 and, you know, you can't do that on a pole.

15 MR. SCHIFMAN: Exactly. That's why the buildings
16 that you see with the antennas on the top are macro
17 sites and so those antennas are much larger and take
18 up a lot of space and have a lot more ground
19 equipment around them, and so the idea was small
20 cells is to be able to put them on a pole, if it's
21 available, if not, to erect a new pole, but, I mean,
22 there are thousands of poles around the country and

1 municipalities. There's thousands of utility poles
2 around the country that we are utilizing right now
3 also.

4 So it's not only municipal assets,
5 there's also utility poles, and federal law gives us
6 the opportunity, the right to be on investor-owned
7 utility poles, and so we are pursuing attachment on
8 new poles as well.

9 COMMISSIONER ROSALES: So it's become a first
10 come/first serve, because when you look at that
11 antennas it seems doable and you can add another one
12 and that seem doable. At what point do you stop?

13 MR. SCHIFMAN: Right. A pole has specific
14 loading characteristics, and Chris is very familiar
15 with that I'm sure, too, but that's only -- when we
16 are talking about light poles, there's probably one
17 or two carriers that can go on a particular light
18 pole.

19 I have seen there's some cities around
20 the country that are asking for multiple wireless
21 carriers to be on a particular pole, but basically
22 it depends on the engineer and the load

1 characteristics of a pole and, you know, if the pole
2 cannot hold our equipment where it doesn't have the
3 electronic wiring on the inside so that we can run
4 the power up the pole, what we do is carriers will
5 replace that pole, if it's necessary.

6 So we work with the cities on doing
7 that. There seems in a lot of cities there's a
8 process for doing it.

9 What we are thinking about -- what we
10 are trying to do across the country is to make it
11 more uniform so that all the cities have the ability
12 to understand how we are going to deploy and to be
13 able to so. We can replace poles, if necessary, in
14 a uniform manner.

15 COMMISSIONER ROSALES: Last question. So, again,
16 if proliferation gets to the point where AT&T will
17 go to Sprint or go to Verizon, then at some point
18 then when the poles are out
19 there they're either got to get a higher pole or
20 work with you on the antenna?

21 MR. SCHIFMAN: Exactly. When we get to that
22 point where the poles are used up, I think it's

1 going to take quite some time to do that, but I'm
2 sure the carriers will be able to work out ways to
3 attach multiple facilities to the poles.

4 And another thing, Commissioner, is as
5 we go on and the technology's getting smaller, and
6 smaller, and smaller, so you saw macro sites and now
7 we have an antenna that's three feet high right
8 there, and when 5G comes along new radios will be
9 even smaller and the antennas will be smaller, too.

10 COMMISSIONER ROSALES: Thank you.

11 MS. PAGELS: Thank you, Commissioner Rosales.

12 And thank you, Mr. Schiffman.

13 And next up we have Mr. Patrick Hayes.

14 Thank you.

15 PRESENTATION

16 BY

17 MR. HAYES:

18 I would like to see more of my time
19 go to Commissioner Rosales. That was going very
20 well.

21 (laughter.)

22 I have been General Counsel with the

1 Illinois Municipal League since December of last
2 year. Prior to that for 11 1/2 years I served as
3 chief counsel for the City of Rockford, Illinois.

4 On behalf of our president of our
5 board, Karen Darch, and our Executive Director Brad
6 Cole, I would like to thank the Commissioners for
7 having me here to speak with you today. We really
8 appreciate it.

9 There's my disclaimer. These are
10 mine, not necessarily my client. The deployment now
11 we believe in that from a public perspective and you
12 can see it happening in communities throughout the
13 state that are employing this technology right now
14 that have arrived at agreements with carriers for
15 cell deployment, small cell deployment, so it's
16 happening in Illinois right now and under the
17 existing regulations and mostly local ordinances.

18 Last year late in the session in 2016,
19 telecoms passed legislation with a bill similar to the
20 ideas within Senate Bill 1451, and that was bottled
21 up in the legislature because of timing. It's at
22 the Illinois legislature right now.

1 This year we did two things: First of
2 all, we put out over the winter a novel small cell
3 lens so that all the communities throughout Illinois
4 have a template where they can address small cell
5 applications.

6 Mr. Schifman mentioned that some
7 municipalities won't be in the process. He's
8 correct, but on our site there's all of the 1298
9 cities narrowing it down have access to the model or
10 template and they looked at it, and if it doesn't
11 have anything they want, even in a bill presented,
12 but it's a workable template, so municipalities
13 believe in the economic power of technological
14 deployments like this.

15 We believe in balancing interests and
16 allowing telecom to use the right-of-ways. We feel
17 that the amount of ordinary space and steps in that
18 direction does accommodate the needs of the
19 industry.

20 We have, as mentioned Senate Bill 1451
21 I'm glad my colleague described it to you all, and I
22 will just mention a couple of things, because the

1 bill limits home rule authority. It requires 71
2 votes in the House to pass. If it falls well short
3 of that mark when it was postponed in the last day
4 of the House session in May.

5 We do believe that the bill likely
6 will address -- there were members absent -- It
7 would likely be addressed later in the session. We
8 are actually in June.

9 So I'm not going to further describe
10 the bill, other than to highlight the issue that
11 Commissioner Rosales kind of touched on.

12 What is offensive to many
13 municipalities is the fact that this infrastructure
14 is being deposited on their infrastructure, so 5G
15 deployment is the industry putting their stuff on
16 municipalities' stuff, and, you know, just
17 interaction, that's unsettling. This is a major
18 change in philosophy.

19 The FCC for years has indicated
20 they're going to leave that issue alone and that and
21 let local government determine how that's all going
22 to work out. This Senate bill takes all of their

1 issues on and revolves them pretty much in the
2 industry's favor and severely forced deployment and
3 not so much toward the status quote.

4 I want to talk about a few of the main
5 issues that press me when I was discussing this bill
6 with members of Telecom, and I think this bill
7 mirrors the bills that are present throughout the
8 nation many of which have passed and I think a
9 handful of them probably past state legislators.

10 So the telecoms have been
11 successful with their basic premise of this bill.
12 The main thing that took a lot of our time is
13 operation capacity.

14 From my years at Aqua (sic) I looked
15 at, hey, these are people getting these permits on
16 their desks and they have to do the work to move
17 them along, so industry wants to approach with an
18 unlimited amount of permits, and that's daunting,
19 because it's new technology. More to the point,
20 they're putting material on municipal
21 infrastructure, which wasn't designed to have more
22 stuff put on it, and so those devices are small, but

1 they aren't inconsequential to a light pole as it
2 relates to a road, the power attachments, and things
3 like that.

4 So do municipalities even have the
5 expertise to judge these issues, and the cost of
6 engineering and planning, the reality of shared
7 space in an operational environment.

8 What happens when a pole comes down in
9 an automobile accident? How do you deal with that
10 operationally. Those were concerns that we tried to
11 answer and big issue that came up is public safety.
12 Municipalities use their vertical infrastructure for
13 all types of public safety devices and more are
14 coming, some of it is technology from the very
15 telecom promotions that are going on here.

16 5G is going to help our firefighters
17 communicate to one another inside a structure that's
18 burning, but right now they have limitations.
19 They're still on analog, so there are analogies that
20 municipalities envy that are very important to them
21 that come with 5G, and we want to accommodate that,
22 but right-of-way access -- I see I'm running out of

1 time -- right-of-way access this being
2 a created use throughout the community, that's
3 typically something that local municipalities deal
4 with, not something that is imposed by state
5 law, so this again, is another one of those areas
6 that municipalities are really struggling with.

7 Esthetics, underground, I don't know
8 if you know the cost of underground. The eventual
9 act of underground is huge and municipalities made
10 that investment and they're not eager to dig a bunch
11 of new holes in the ground, so these are the
12 realities that we are looking at.

13 Of course, municipalities take zoning
14 restrictions very seriously. Too many of these
15 concepts that allow deployment is really important
16 to understand how that impact communities.

17 One of the questions we asked and
18 never got an answer to is there any path now. Will
19 industry take no for an answer because, no, you can
20 because everybody needs and wants this technology.

21 Permitting fees, well, it's not only
22 the money but the money's a pretty interesting

1 thing. We really want to have it cover our cost, so
2 that's an important thing to know.

3 In many communities throughout
4 Illinois they don't have staff on board to do this.
5 They have to outsource it, which is a real cost
6 there. Permitting fees should cover those costs.

7 Finally, pole attachment rates.
8 That's where the big money is right now out in their
9 communities charging a thousand dollars per month
10 per pole. Industry proposals in Illinois was \$20
11 per year. That a pretty big gap to negotiate
12 through.

13 We did manage to come up with language
14 in the bill, but that's certainly gathered the ire
15 of a number of municipalities, so we don't have any
16 consensus among some memberships.

17 There are clearly conflicting
18 interests here. I'm know I'm out of time and I want
19 to be careful about that, but without the full
20 burden of the utilities, telecom contracts will
21 depend on all bring access, low cost with no cost to
22 permitting and the pole attachment rates and should

1 they get all that, there's not going to be universal
2 coverage, because what about the disadvantaged
3 communities, disadvantaged parts of the communities
4 are they going to get technology, and that's usually
5 this kind of app list. That is a policy that is
6 needed to be measured out. We need to do that
7 before this gets out there.

8 Finally, can we all get along? Yes,
9 we can, and I think, you know, I was really happy
10 with spending over 40 hours with Ken on the phone
11 and his colleagues this spring throughout many
12 sessions, almost 20 of those hours both Tom Fisher
13 and Senator Terry Link was in the room with us, so
14 part of that there was a lot of focus on it in
15 trying to get it right, and I really appreciate your
16 attention today, and, again, thank you for you
17 allowing Municipal League to be present.

18 MS. PAGELS: Thank you, Mr. Hayes.

19 On behalf of the Commission, I would
20 like to thank the presenters for educating us on the
21 current state of our wireless network
22 infrastructure, what will be needed to meet future

1 needs, and the policy considerations intertwined
2 throughout. We appreciate your perspective and
3 expertise in these areas.

4 We will now move into the Q and A
5 portion of our panel. I will pose a question to the
6 entire panel and anyone can feel free to respond,
7 but before we dive into questions, I to make sure
8 that Mr. Bondurant and Mr. Schiffman have time to
9 show off their equipment in the back to kind of give
10 our audience a better idea of and explain these
11 pieces of equipment.

12 MR. BONDURANT: Okay. Thank you. I have help
13 here to roll that to the center of the floor so
14 everyone can see it.

15 Basically, you can yes get again /-P
16 of how this technology if you were maybe a year or
17 so ago. If we were having this conversation, you
18 are probably needed four people to do this. They're
19 a lot bigger, a lot bigger cabinet.

20 I'm showing you the difference in the
21 size here. It's probably a similar story no matter
22 which carrier we are using the same. We're using

1 the same OEM equipment manufacturer.

2 As you can see, the antenna that JC is
3 holding here is basically 12 port handling basically
4 all the technology, even the technology that we
5 really don't have deployed yet.

6 We have got full capabilities for the
7 multiple carriers, so a lot of times you hear about
8 when we deploy equipment we deploy it first
9 year, then we deploy multiple carriers afterwards.

10 This is -- this equipment here is set
11 up so that we are not coming back a year later and
12 say, hey, I need to put in more equipment because
13 this is basically taking care of that for a few
14 years.

15 One thing to point out here is the
16 size of the radio, and maybe, Mike, you can maybe
17 touch the radio so they can see which are the radio.

18 MR. BURGHART: There's three radios in the
19 center.

20 MR. SCHIFMAN: Yes, there's three radios. If you
21 close the door there, so you can kind of get a
22 glimpse of what this looks like, this one hangs from

1 the pole. This one is in one of the previous
2 pictures I had. It's basically hanging on a pole,
3 so everything is in the equipment, only thing you
4 have separate would be neater, so obviously the and
5 deal would be at the top.

6 And the important thing to note
7 also about small cells, it's not necessarily where
8 that data is located. It's more about in there that
9 antenna is located, so it's the placement on there,
10 and so sometimes we can put that small cell
11 equipment, maybe not necessarily in the bottom of
12 the pole but maybe a little bit of a distance, a
13 little distance from there.

14 MS. PAGELS: Thank you.

15 MR. SCHIFMAN: And not a lot of difference with
16 our small cells. The antenna's at the top there.
17 The utility that's in the middle is what we call a
18 UE relay, so it's your equipment relay that's
19 wireless backhaul.

20 So that particular -- that particular
21 small cell does not use fiber for backhaul, so you
22 don't have to dig into the street at all in order to

1 access our wireless network. It does so wirelessly,
2 so that will communicate back to a macro site and so
3 it does add on a wireless network and communicates
4 back to our macro site and then utilizes on our own
5 spectrum. The bottom part of that is the radio for
6 that unit.

7 So, as you can see, these are painted
8 in whatever way a city wants them to be. They can
9 be a shroud. The radio unit at the bottom has a
10 shroud on it. The back haul unit has a shroud on it
11 or could be included on the same shroud, so it
12 depends upon the design characteristics that the
13 city wants to utilize -- is looking for, and we work
14 with the cities to try to match those esthetics
15 consideration.

16 MS. PAGELS: Thank you both very much.

17 And diving into some specific
18 questions, I'm going to start with some technology
19 specific questions, and Dr. Zolnierek, you
20 summarized the development of wireless networks by
21 describing 1G through 5G, and 2G is likely being
22 deprecated, and 3G must be on its way out, but what

1 is the time line for full 5G deployment? I know we
2 have heard Mr. Bondurant mention 2020 and 2023, but
3 what is the time line for this deployment?

4 DR. ZOLNIEREK: I'll defer to the carriers at
5 this point.

6 MR. BONDURANT: So 5G the standards have not been
7 written for 5G yet, and we are hearing they're
8 coming in 2018. There's trials across the country
9 right now and we're all doing trials for 5G. The
10 issue is the standards, the standards are not
11 written. The FCC has to give the thumps up on that,
12 so the deployment would have to happen after the
13 standards are given a thumps up which will be 2
14 similar to and beyond.

15 MR. SCHIFMAN: So as those standards get
16 developed, the OEMs manufacturers already are
17 developing equipment that Sprint is working with
18 Qualcomm and our corporate parent Soft Bank to
19 develop a radio.

20 So this is an active consideration
21 right now. We've had it filed in New Orleans
22 earlier where we have over 700 megabits inside a

1 basketball arena in New Orleans utilizing 5G
2 equipment and spectrum.

3 So it's not something that is Star
4 Wars out in the future. This is something that's
5 happening very quickly.

6 MS. PAGELS: And, Mr. Bondurant, you explained
7 that macro towers would be overloaded if we don't
8 build small cells that could cause slower speeds,
9 and bad connection, and make Smart cities
10 impossible, but it's well known that multiple
11 carriers can share a macro cell tower. So can
12 carriers also share small cells as they do on macro
13 cells or will there just be several -- they will be
14 so numerous they will become obtrusive in access?

15 MR. BONDURANT: Yes. So a lot of discussion
16 around that right now. That's what we're trying to
17 determine. If the answer is no right now because of
18 interference and technical reasons from AT&T's
19 perspective, certainly we're interested as we move
20 forward to get to come to terms with that because
21 that's not considered in the future. We understand
22 there's a need there, so certainly we can.

1 MS. PAGELS: So every carrier has their own small
2 cell?

3 MR. BONDURANT: Every carrier has their own.
4 Small cell.

5 MS. PAGELS: And as we think more about
6 resiliency and cyber security and physical security,
7 what are the power requirements of these small
8 cells? Because that when a macro cell has a power
9 failure a generator could be hooked up to that. So
10 what happens when there is a power failure and now
11 all these numerous small cells fail?

12 MR. BONDURANT: So, as I mentioned before, the
13 power on these -- from these small cells was
14 somewhere around 5 watts, so they're low power. As
15 far as the service, these support the wireless
16 network, so you have the macro billed. All the
17 small cells could go down for a temporary amount of
18 time or you can use your data input, so certainly
19 there's nothing more to augment what we already
20 have, so we would not place generators and such.
21 Many times these are connected to the cities' power
22 grid. In some cases we've had individual, you know,

1 meters at each one of the poles, but we still have
2 the macro network to rely on when the power's down.

3 MR. SCHIFMAN: We have utilized electric utility
4 power, but as technology continues to evolve and
5 these things get smaller and smaller, we are looking
6 at solar powered types of ways of doing it, so
7 powering our small cells. There's a lot to come on
8 that, and, you know, I think the technology will
9 continue to evolve, so it will assist in outages in
10 that way.

11 MS. PAGELS: And looking into the future,
12 is there already a vision of what might be beyond 5G
13 for example, 6G, and, if so, should we just, you
14 know, jump to 6G, and, you know how are these things
15 going to be future proof?

16 MR. SCHIFMAN: I would say that I don't think we
17 can jump to 6G. We're still -- as Chris said, we're
18 still trying to figure out the standards for 5G, and
19 you know, usually these technologies take -- or each
20 evolution is about a five-to-ten-year period, so
21 really what we are talking about with 5G is really
22 low-maintenance-type of services, and high speeds,

1 and the ability to connect millions of devices, and
2 so to jump to 5G is going to be significant, and I
3 think, as Jim said, there's going to be use cases
4 developed for 5G that we can't even imagine right
5 now, and so it's important for us to develop the
6 standards for 5G to be able to intensify our
7 infrastructure in a way that 5G is rolled out in a
8 cost-efficient way and also in a way that benefits
9 the people in Chicago and throughout the state with
10 the kind of economic benefits I talked about in this
11 discussion.

12 DR. ZOLNIEREK: It's somewhat of a
13 simplification. There could be different variations
14 of the 5G where people might not consider 6G yet,
15 but it's 5G.

16 MS. PAGELS: Great.

17 And now we are going to move on to
18 some of the policy considerations that we have
19 already been discussing among the panelists and we
20 heard about some of the challenges associated with
21 deploying small cell and municipalities, referring
22 to Mr. Schiffman about some of the struggles that

1 carriers face as restricted access to the
2 right-of-way, excessive fees and lack of
3 consistently and processes for implementation, and
4 we also heard about some of the challenges that
5 municipalities face, such as the esthetics and
6 design and the access to the right-of-way, receiving
7 compensation, as well as staffing concerns to handle
8 all the applications that are coming in.

9 This is kind of a big question, but,
10 you know, who should have jurisdiction over the
11 siting and, you know, should there be uniform siting
12 regulations within the state or from state to state?

13 MR. BONDURANT: I'll take that. I'm actually on
14 the BDAC, the Broadband Deployment Advisory
15 Committee, with Chairman Bosley which I'm one of the
16 members. We were addressing those issues and
17 Chairman Bosley giving us the challenge of finding
18 the answers to those and creating a model code.

19 So as we -- and I can't really talk
20 about the working group, what we do, I am a partner
21 on one of those working groups that creating that
22 working code for municipalities, so there are some

1 standards of what should be, you know, given to the
2 cities.

3 Right now it is interesting, because
4 it's such a diverse group of people. We have got
5 carriers and we have got folks that are from
6 municipalities. It's a great project and we'll
7 continue to work on it, but certainly the FCC's very
8 interested in this subject and that's why we created
9 these working groups.

10 MR. HAYES: I think that's a tremendous
11 challenge, as many ways as the states address what
12 municipalities do and don't do, they stay away from
13 what individual municipalities might decide with
14 regard to the physical environment of those
15 communities.

16 So when you talk about the FCC, which
17 is about as far away from your local government as
18 you can get, what is going to happen in every
19 community in the nation, it just seems like that is
20 a very difficult, you know, premise, and certainly
21 from a municipal perspective, we appreciate the
22 FCC's position to-date, but we understand it's going

1 to undergo change. It's part of what motivated the
2 League to get into these negotiations with the
3 industry and find a template that would work, and we
4 think that there's some sensibilities, and I think
5 anybody who worked on that bill had some regrets
6 about outcomes and certainly there's a risk coming
7 in from many of our members, but some of them
8 support it and they recognize that compromise is a
9 bunch of issues, so esthetic issues and the true
10 cost and the big shift away from the market-based
11 rate those are the big three items that really are
12 perplexing.

13 I think over time there will be the
14 design and esthetic elements, the physical
15 environment issues where you are really going to
16 have on the back end where it starts getting
17 deployed. That when a lot more of that reaction
18 will occur when people see it in the environment and
19 determine whether they like it or not.

20 As small as that is in comparison to
21 macro towers, there's still people in a lot of
22 communities the are going to look at that and say

1 get it out of my neighborhood, even though they may
2 articulate that through their smart phone, through
3 their local elected official that that's what's
4 coming.

5 MR. SCHIFMAN: And I would say that it's really
6 all three levels of government, federal, state, and
7 local all should be involved here.

8 The FCC has indicated the desire to
9 really address some of these issues.

10 There was a petition filed back in
11 November, December by Mobility regarding the types
12 of costs that municipalities should be able to
13 assess when talking about deployment of small cells
14 and I think it will be important for the FCC to not
15 legislate a particular fee but to really give a
16 guidepost for the cities around the country and the
17 states to determine, okay, what is a reasonable type
18 of way of thinking about it. Is it market-based
19 rate? Is it 3,000 to \$6,000 per pole, per year,
20 which we are seeing in lot of Illinois cities right
21 now or should it be something that's more akin to
22 the actual direct costs that the city incurs for

1 this type of deployment, and then at the state level
2 I think it's reasonable and, as Patrick said, we
3 have lots of negotiations about -- it's more
4 detailed than what the FCC is going through, but we
5 believe it still gives cities lots of power and
6 review over the type of facilities that are going
7 into communities, and then the cities are going to
8 have to implement a code that comport with federal
9 and state laws that are imposed, and to do so in a
10 way that where they can manage the process and still
11 feel that they have input, because they do under
12 these types of processes.

13 Now they'll issue a building permit.
14 They will issue a right-of-way permit. They'll
15 determine if the esthetic standards are met.
16 They'll determine if a particular -- if a particular
17 pole is not -- they don't want a new pole in a
18 particular underground area then they'll be able to
19 say, well, I would rather for you to attach to an
20 existing pole. So, in summary, all three levels of
21 government.

22 CHAIRMAN SHEAHAN: I wonder if Chris and Ken can

1 address the economics of leases of facilities when
2 you are going from some nodes that cover a mile or
3 30 miles to nodes that cover feet.

4 I would -- people who pay their phone
5 bill are not going to pay what it would cost to pay
6 a thousand or 2, \$3,000 a node when there's one
7 every 50 feet as opposed to one every mile pole.

8 MR. SCHIFMAN: These things cover a lot less
9 area, cover less territory. They do provide more
10 capacity. They do need more fight to put them up,
11 but the equipment here for one of these sites is
12 many, many magnitudes less expensive than equipment
13 for macro sites.

14 So when we're implementing a macro
15 site that covers a large area, we'll have the
16 ability to enter into a lease negotiate. If we
17 don't think we have the kind of decision we want
18 from the city, then maybe we will fight in court,
19 maybe it will be worth it to fight it, but when we
20 are talking about intensifying our networks to
21 certain types of deployment that we need, these
22 cells cost much, much less and we are going to need

1 to put them in a lot more places, and so we just
2 don't aren't going to have the ability to litigate
3 every single site as we go through the process.

4 MR. BONDURANT: I think we have got to ask
5 ourselves do we want to be a smart city. Does each
6 city want to be a smart city, and the answer is yes.
7 There has to be -- it has to be economical for
8 carriers.

9 You know that if you look at Chicago,
10 it's the most expensive in the country for us when
11 it comes to street-wise, and that says a lot. I
12 mean, what happens is in those situations, we build
13 where we have to build versus where we'd like to
14 build.

15 There's a very big difference in that,
16 and I get to see it across the country. I get to
17 look at where we -- where it's stable with
18 municipalities and states.

19 We build it and we build it right.
20 That's the truth. When it's not favorable, you have
21 to build it where you can build, and right now
22 Chicago is at the top of the cost and so it really

1 puts a lot of pressure on us to manage that.

2 CHAIRMAN SHEAHAN: Patrick, I'm glad you are
3 here. I was Governor Edgar's representative as a
4 staff member. I worked with Ken closely for many
5 years, but in my private practice as a lawyer, I
6 also represented a carrier and helped them with some
7 tower locations, none of the carriers represented
8 today, and really for the most part I think was
9 successful in negotiating with municipalities to get
10 sometimes very difficult sites together, but
11 occasionally we would run into a local government
12 entity that was just completely unreasonable. They
13 wanted way too much, far more than the market rate,
14 and I really struggled with the fact that their
15 residents want better cell coverage. They want
16 faster connection and, yet, many of the local
17 officials just did not want to let the carriers, you
18 know, have antennas.

19 So how do you balance that from a
20 local government perspective? I mean, on the one
21 hand you want to be respectful of local leaders
22 making esthetic decisions, and so forth, and that

1 was something that I found carriers were always very
2 willing to work around, and the fact that the people
3 want it but sometimes the local officials just will
4 not do it.

5 So how -- at some point how do you get
6 the municipality to yes? I think it's a fair
7 question, you know, is there any circumstances
8 that's a no, but how do you get a municipality to a
9 yes.

10 MR. HAYES: Well, I was in private practice when
11 those poles were going up, too, and I remember I had
12 two lines coming and folks who didn't like it in the
13 neighbor's yard because it was ugly and folks who
14 didn't like it in the neighbor's yard because they
15 wanted a lease.

16 So I think municipalities are driven
17 by their residents to take those positions a lot of
18 them, but, you know, there's 1298 of them, so you
19 pick and choose.

20 I do think that the industry's done a
21 lot with regard to placement that made some sense.
22 A lot of folks, you know, in our area -- I'm from

1 Rockford -- made use of parks which seem kind of
2 odd, but they're the perfect spot to put them on
3 poles, because you tuck them in behind a couple of
4 trees. It wouldn't affect it, it had great service
5 and nobody would see them, except for the middle of
6 winter.

7 So I think the industry's come forward
8 with not putting it maybe in the absolute best spot
9 but finding a spot where it works, and that's going
10 to be even tougher with all these other sites, but I
11 do think that making the economic case is a way to
12 get municipalities to turn to reality that it's
13 coming.

14 One thing that -- one tool for us is,
15 you know, the FCC, the public comments from the
16 chairman and the members of the FCC that what's
17 coming our way has really guided a lot of the needs
18 in Illinois to look at our efforts to improve and
19 see there's practical sort of compromises, but you
20 are right to point to the reality that it's a
21 consumer demand that will drive this, and that's a
22 great place to start the conversation. CTIA and

1 these folks have done a good job putting together
2 materials that I have utilized and it's been helpful
3 to understand why and then you get into the lion of
4 things.

5 There's always going to be holdouts.
6 There's always going to be, you know, folks who are
7 just going to be stubborn and maybe the last to
8 adopt the technology, but I do think the broader
9 brush is going to be compelled by the
10 economic case to accommodate this.

11 CHAIRMAN SHEAHAN: So what's the right answer
12 though? I mean, I think if carriers have to pay
13 sort of what a market rate is for a mono pole now
14 for an antenna that's every 50 feet instead of a
15 mile or many miles, tenth of a mile, it's just not
16 going to happen, right?

17 MR. HAYES: You know, what competes with the
18 negotiations at the city council chamber is the
19 chief economist. You talk to the business entities
20 that want to utilize technology, a big thing that
21 affects municipalities now is creating and
22 maintaining a tower, and so what does our new

1 generation want? They're going to demand this type
2 of city infrastructure around the city. People
3 haven't gotten there. We're not necessarily wrong,
4 but that's just my advocacy, but I do think that,
5 you know, that the economic case, the reality of
6 what's in the future, that's where it is.

7 Now from a regulatory point of view,
8 when do you apply the stick, and I think that's an
9 important thing to understand and municipalities do
10 and not looking forward to the ax coming down and
11 one thing our organization does is to try to
12 be familiar with that when that occurs. That may
13 be the ultimate solution for some of the
14 communities.

15 I do think what helped us in the room
16 with Ken on the other phone, but, you know,
17 discussing from each party's perspectives and
18 finding a middle ground moving forward, but that's
19 hard to do in a municipal environment when you have
20 got, you know, 65 angry residents in a room that
21 only holds 40 people, right. It gets hot in those
22 rooms. I have been in them. I know how often it

1 gets hot here, but it gets hot in those rooms that's
2 looking an awful lot like this, and that's where
3 you'll see change. That's where the resistance is,
4 but that's America. That's local government.

5 I think local municipalities should be
6 given that to make decisions even if sometimes
7 people don't agree with them.

8 COMMISSIONER ROSALES: Let me jump in. I agree
9 with Chris that everything in Chicago is expensive
10 and if you are from Chicago, and I agree with you as
11 well, but I want to point this out, and I know we
12 are going to get to it in the next session, but I
13 can't -- our jobs as Commissioners -- the Chairman's
14 always made us look forward, envision forward,
15 forward, I can't envision the next grid, not smart
16 cities, the next grid without 5G. I just can't.
17 It's going to be a necessity, and what I believe
18 what is going to happen, and I know I'm on record
19 here, but I believe what is going to happen is the
20 actual record is going to come through the back door
21 instead of presenting what, what opportunities and
22 advantage you have from 5G when you start -- when

1 this start to make its way across the country, it
2 will come to a point where this is what you don't
3 have and other communities have, and I believe
4 that's going to be -- so you tell me this now or in
5 20 years from now you look back and say, yeah, he
6 said this is going to be this way. This is the way
7 it's going to be, I believe that it's going to come
8 through the back way instead of here's what we have,
9 it's going to be here's what you don't have and this
10 is what you need, and then they start working it
11 out. If it's needed, how do they go about putting
12 it together, but our job is the balls and strikes
13 and there's still a lot of things to be discussed,
14 and that's why we are here today and appreciate the
15 Chairman putting this together, because there's some
16 communities that don't have these poles. What
17 happens with the suburbs, like in Oak Lawn, whatever
18 where it's all underground right now. That's going
19 to be really expensive, and where are you going to
20 put those and who's going to pay for it? There's a
21 lot of questions that need to be answered and we're
22 not going to do it today, but I appreciate the

1 invitation.

2 COMMISSIONER MAYE EDWARDS: I think on that note
3 I want to piggyback. We had a conversation about
4 this a couple of weeks ago, but it boils down to the
5 haves and have notes where we are going to get to a
6 point where people are trying to establish these
7 smart cities/smart networks. That is the future of
8 everything, but, yet, there's just going to be some
9 locations, some places that just are not able to
10 take it to that level, right?

11 So will it then have a separate
12 segregated system? I think that's the concern.

13 As we continue to talk about
14 integrated resources and getting to that next level,
15 I think that's a major concern. Who will be left
16 out and why would they be left out? Would it be the
17 underemployed or will it be the underprivileged
18 people who don't have access to funds? How are we
19 going to make sure that everyone's integrated and
20 now boil down to the haves versus have nots.

21 MR. SCHIFMAN: I think that's a great point.

22 Underprivileged areas I think there's lot of

1 statistics that the FCC has cited basically saying
2 that the underprivileged utilize their smart phones
3 as their only way to access the Internet. They
4 don't have computers at home with Broadband
5 connection, so when we think about deploying our
6 wireless network, not thinking about privileged or
7 underprivileged, we are thinking about where do we
8 have the ability -- where do we need more capacity
9 to provide service to our customers, and we use very
10 precise techniques to determine where those spots
11 are, and so I really do think it's about having the
12 ability to intensify our network in a way that
13 allows us to serve the entire community, the people
14 that need it, the people that use our facilities the
15 most.

16 I do one small quick Sprint
17 commercial. We have a project called the One
18 Million Project and where we are at out there in the
19 City of Chicago one of places where we are providing
20 internet access and devices to kids who don't have
21 the ability to access the internet and have a
22 homework gap at home, because they get assigned

1 homework and they don't have the ability to access
2 the internet, so that's our primary corporate
3 project in a way, and so when we are deploying our
4 network, we want to make sure we are deploying our
5 network so people who are utilizing those services
6 have the ability to use them.

7 COMMISSIONER ROSALES: But you are not leaving
8 here until you answer the question on the rural
9 part, because it's great in the urban areas where
10 you have antennas on a number of poles, but placed
11 in the rural areas the pole are much farther apart,
12 so how do you address those situations with this 5G?

13 MR. SCHIFMAN: So we are deploying small cells in
14 rural communities. A lot of places like we have
15 truck stops out in rural America that are user when
16 truckers go by, they stop. They utilize a lot of
17 the data when they stop, and they want to be able to
18 use their smart phones when they stop, so we are
19 seeing that.

20 In areas where we have very high
21 roaming expenses where, we may not have a network
22 there, so what we are doing we are placing small

1 cells in those areas. We are placing small cells in
2 those areas and I think you are going to see
3 carriers with deployment in rural communities
4 because there are large capacity issues in rural
5 communities as well as urban communities as the
6 video demand just continues to explode on our
7 phones.

8 MR. BONDURANT: A lot of our focus is actually on
9 the agricultural and the farming industry. That's a
10 huge piece to 5Gs. These rural areas are as
11 important as the urban.

12 We do follow the demand and the demand
13 is pretty high right in the urban and suburban
14 areas, but that's not leaving out the rural areas,
15 because it's a critical piece to our overall plan
16 strategy.

17 If you look at the equipment for
18 farming today, it's going wireless, if it's not
19 already there. It is the future there, it is
20 extremely important for the carriers.

21 MS. PAGELS: Thank you, Chairman and
22 Commissioners, for your questions. That's all the

1 time we have for questions, but I want to truly
2 thank you again for your participation.

3 Give our panelists a round of
4 applause, please.

5 (applause.)

6 We will now break for lunch from
7 12:20 to 1:20, so we will see you back here at 1:20.
8 Thank you.

9 (Whereupon, a luncheon
10 break was taken.)

11 CHAIRMAN SHEAHAN: Can we have everybody's
12 attention. Welcome back. I would like to thank our
13 panelists from our morning session for sharing their
14 insights and perspectives on necessary network
15 upgrades and aligning policy and technology.

16 We will now hear from experts who will
17 discuss how 5G and beyond will be able to assist in
18 implementing smart cities.

19 To lead this discussion, I would like
20 to introduce my legal and policy advisor, Wei Chen
21 Lin. Please join me in welcoming Wei Chen to our
22 afternoon panel.

1 (applause.)

2 MR. LIN: Thank you, Mr. Chairman and
3 Commissioners. My name is Wei Chen Lin and I will
4 be your moderator for Round 2. We will be
5 discussing how the next generation of wireless
6 infrastructure will enable cities to become smarter
7 and how to improve our wireless connectivity to
8 create improvements in public safety, traffic
9 management, transportation systems, and remote
10 monitoring of public systems.

11 The format will be the same as what
12 you are familiar with from this morning. We will
13 start with presentations from each of the panelists
14 and then we will move on to a Q and A session.

15 Before we begin, I would like to
16 introduce our panelists. With us today are Benjamin
17 Aron from CTIA. He is the Director of State
18 Regulatory and External Affairs; Jason Caliento,
19 Senior Vice President of Network Strategies and
20 Mobility; and Michael Kuberski, who is Director of
21 IT at Exelon. Please join me in welcoming our
22 panelists.

1 (applause.)

2 Mr. Aron, please start us off.

3 (slide presentation.)

4 PRESENTATION

5 BY

6 MR. ARON:

7 Sure. Thank you for having us here
8 today. On behalf of CTIA, I am very much
9 appreciative of the opportunity to present to you on
10 5G and the benefits that it's going to deliver.

11 Today in America wireless is
12 everywhere. We actually should have updated this
13 slide, but it says here there's 380 million wireless
14 connections in the country. I think the latest
15 numbers have actually jumped about 15 million, but
16 what's consistent is that there are more wireless
17 connections in America today than there are
18 citizens, so not only everywhere, but we are
19 doubling up and are growing continuously.

20 Today in America 99.6 percent of
21 Americans have coverage through 4G through the
22 carrier 4G LTE Network. We are doing everything we

1 can to make sure that our country is at the
2 forefront of wireless connectivity and that we are
3 able to innovate and create jobs.

4 Along those lines, our industry
5 generates \$400 billion annually for the U.S.
6 economy, so we are a tremendous driver of atomic
7 energy in this country.

8 Directly and indirectly we employ
9 4.6 million Americans, so we are a huge employer in
10 the economy, and we also have -- one of the slides
11 we saw earlier showed development of the network and
12 one of the things that we have seen within the 3G --

13 COMMISSIONER ROSALES: Just one clarification.
14 99.6 of Americans have access. What do you consider
15 access, that they could purchase a phone or that
16 they have a phone?

17 MR. ARON: Coverage.

18 COMMISSIONER ROSALES: Coverage?

19 MR. ARON: Yes. There are -- there are pockets
20 of the geography where our country does not have
21 coverage, but those pockets tend to be quite
22 unpopulated.

1 So while it's certainly possible to
2 point to spots off a map where people do live and
3 they don't have service, when you look at the
4 population, basically that's what the 99.6 number
5 is. It's the actual population.

6 So there are Americans today -- the
7 estimates are I think it's in the nature of
8 10 million, maybe estimated less than that, so out
9 of a country of 700 million, they are a small
10 percentage of the population, but that's what we
11 mean by coverage.

12 Go to the next slide. I'm sorry. But
13 4.6 million jobs -- 1.6 million of those jobs were
14 what we call the "active economy." That's enabled
15 by developing our networks, 3G and 4G Networks.

16 Just to bring this home, Illinois is
17 the fourth largest state for app economy jobs, so
18 one of the benefits that we observe throughout the
19 country is certainly felt here in Illinois where you
20 guys have a lot of these app economy jobs.

21 When we talk about wireless in
22 Illinois, we have 13.367 million wireless

1 subscribers, and it's up 11 percent since 2010 with
2 half a million more, and this is consistent with
3 what we said a few slides ago, a half a million more
4 connections -- wireless connections in Illinois than
5 you have citizens.

6 And, finally, there's six wireless
7 providers that offer service in Illinois. Americans
8 love wireless, and this is not surprising to anybody
9 in the room. Most of us the first thing we do in
10 the morning, after we created a text, better than
11 half -- half of us look for our phone before we do
12 anything else in the morning just to see what went
13 on while we were asleep.

14 Three out of four Americans believe
15 that wireless mobile is more important to our lives
16 than it was five years ago, and Americans used
17 25 times more mobile data in 2015 than they did in
18 2010.

19 So when you look at that chart, it
20 tracks from 2009 all the way up to 2015, and that's
21 9.6 trillion megabits of data, but the growth data,
22 as Chris said earlier, is better seen here.

1 So that 17.8 -- 17 trillion megabits
2 of data is 2016 total, but if we project this out to
3 2021, this is just a mountain volume of data and we
4 expect mobile data to grow by five times by 2021 and
5 we expect that mobile connections will increase by
6 approximately 30 percent.

7 So its astronomical growth on the use
8 of our networks and continued growth in technology
9 to improve, and rolling out 5G will be more and
10 better use spaces and we will have more growth on
11 our networks than we have going on today.

12 So how do we meet that demand? We
13 meet that by rolling out what we have talked about
14 today, rolling out our 5G Networks. These networks
15 are going to be up to a hundred times faster than
16 networks are today. They're going to allow a
17 hundred times more devices to be attached to the
18 network than they are today.

19 If you can imagine a day when we walk
20 around and we have a cell phone, maybe you have a
21 Smart watch -- and that's two devices -- and maybe
22 you have an iPad or a tablet that's connected to a

1 wireless network, so maybe three devices. We're
2 talking about you use your refrigerator that told
3 you you are out of eggs, and your car that drives
4 you to work, the buses that are giving you citizen
5 services that we're not really, you know, we don't
6 know how we will be able to do those lights, et
7 cetera, and so stoplights that align themselves for
8 traffic patterns and the like.

9 So we talk about a hundred times
10 devices in that kind of world where it's connected
11 to a level that we are not through scratching the
12 surface, and perhaps most impressively five times
13 more responsive, and this is the one that really
14 brings us home. At 60 miles an hour a car in
15 today's 4G environment, the fastest in a 4G
16 environment, a car will travel 60 miles an hour,
17 4.6 feet signals the network "What should I do?"
18 The network signals back "stop." That message takes
19 4.6 feet under the wheels of a car.

20 With a 5G environment, same car, same
21 highway, same conditions, just the 5G network, one
22 inch; the car went one inch between asking what do I

1 need to do and it's being told you need to stop.

2 So it's an illustration of how it's
3 going to be different from what do I do different.
4 It looks like that type of impactful difference that
5 will save lives, will change lives, will make
6 everything different and better than they are today.

7 When you talk about 5G networks, we
8 try to quantify the benefits that are going to be
9 delivering 3 million jobs into our country and our
10 economy.

11 We will contribute \$500 billion to the
12 Gross Domestic Product. We anticipate \$275 billion
13 in wireless investment, and that's separate from the
14 GDP to go out there, and, finally, approximately
15 \$160 billion, so quite an impact to our community
16 beyond just our daily lives.

17 When we talk about Chicago and how
18 this will look affect Illinois, these are the
19 numbers that we project. Ken Schiffman earlier
20 talked about 90,000 jobs in Chicago. That's the
21 greater metropolitan area. The line number is just
22 Chicago itself, not the metro area, but 25-1/2

1 thousand jobs in Chicago, 1400 in Rockford,
2 Springfield 1100, 380 in Quincy, and the GDP growth
3 going from 4.1 billion in Chicago down to 62 million
4 in Quincy, Smart City benefits of 1.01 billion in
5 Chicago, and 12 million in a smaller city like
6 Quincy, so a range of benefits to cities of all
7 sizes, but it's going to be impactful and it's going
8 to be very helpful for those economies

9 When we talk about 5G, we are talking
10 about what these benefits -- we try to look at the
11 sectors of the economy that it will impact, and so
12 this is an illustration of some of them. We are
13 certain we will be able to see the benefits, so
14 industrial IOT, consumer IOT, connective cars, these
15 are areas where we know.

16 As an example, for the Smart
17 communities and connective cars, Smart grids, we
18 anticipate that the statements will be \$1.3 trillion
19 nationally by enabling new wireless technologies
20 Smart grids within the electric system. Automaton
21 cars we anticipate could save 20,000 lives by
22 accident avoidance as well as \$400 billion in

1 savings through efficiency where cars consuming gas,
2 the time they spend sitting in idle waiting to get
3 more gas and things like that.

4 So those are some of the benefits that
5 we anticipate and can quantify, and to do this we
6 have been talking all day about the big thing -- the
7 small things, the small cells.

8 We absolutely need small cells to make
9 these benefits accrue. If we can find a way to get
10 these deployed, all of what I have just spoken of
11 will occur as well as all the benefits that we can
12 only imagine today.

13 So I really appreciate again the
14 opportunity to be here and speak with you all and
15 look forward to any questions that you may have.

16 MR. WIN: Thank you, Mr. Aron.

17 Mr. Caliento.

18 PRESENTATION

19 BY

20 MR. CALIENTO:

21 Mr. Chairman, Commissioners, guests,
22 staff, again, thank you for the opportunity to be

1 here today.

2 So I'm the Senior Vice President for
3 Mobilite, and in Mobilite we plan, design, build
4 wireless networks for the wireless carriers, so our
5 clients are the wireless carriers, Benjamin's
6 clients, clients at CTIA.

7 So what we really do is in three main
8 areas. One is in the development of small cell
9 networks where we work throughout the country for
10 wireless carriers to build out networks.

11 Second is we go to large venues and
12 stadiums that support stadiums. We built out Toyota
13 Park here in the Chicago area for what's called "gas
14 networks" which provide capacity within those
15 high-density, high-populated areas so that we can
16 all be using our devices at the same time.

17 And, third, we have an advanced
18 technology group which consults wireless carriers
19 about the next generation technology and how to plan
20 and design the networks.

21 COMMISSIONER ROSALES: Let me ask you a question.

22 So when you go to Toyota Park and you use your --

1 what do you do so that everybody has access, because
2 there's all different types of plans, different
3 types of companies. Do they work on everything?
4 Does it work for everyone?

5 MR. CALIENTO: It does. The way that we set it
6 up is what we call a "neutral host," so we will set
7 up a network of nodes within the stadium so that
8 everybody's not coming to use the same connections
9 to their network. We break it down literally by
10 sections.

11 So if you are sitting in Section 101,
12 you have your own transmit/receive function within
13 that stadium, then that will go to what's called a
14 "head-in room" within the stadium and the wireless
15 carriers individually plug into that head-in, so
16 it's called a "neutral host."

17 So similar to some of the questions
18 earlier about small cells serving multiple carriers
19 -- definitely this is on the road map -- we see
20 opportunities for that, and as neutral host
21 providers we work on those types of applications.

22 But right now, to your earlier

1 question, those are all kinds of -- each carrier is
2 doing its own thing. I'll talk a little about how
3 we start going out in the next few years.

4 So what I'm going to talk about a
5 little bit here is 5G somewhat takes on a very kind
6 of conceptual construct. It's very heady, so I'm
7 going to play a little bit of a technologist here
8 but also try to round this in what are we really
9 going to do.

10 So to give you a better sense of the
11 underpinnings of all this, just look in a room like
12 this, there's a board meeting called the
13 International Telecommunications Unit where
14 literally globally all the countries get together
15 and say how are we going to roll out these types of
16 technologies? How is my phone going to work in
17 Japan, in the United States, in Sweden, and wherever
18 across the world.

19 For years those groups are together
20 and decide standards on things like the next
21 generation of communications, so 3G, 4G, 5G, are all
22 being governed by this type of environment.

1 all of us want a better use of our experience. All
2 of our demands are showing that we want this type of
3 use case, so enhanced home broadband if it is super
4 enhanced.

5 The second is ultra-reliable low
6 latency connections, and so that's a car, for
7 example. So when you think about that as, hey, do I
8 want to give up driving my car and turn it over to
9 Tesla or somebody else? That's a public policy
10 thought, but there's certainly massive improvements
11 that can be made in our trucking industry, in our
12 shipping industry, in our railroad environment and
13 railroad safety.

14 All of this takes connections, that is
15 ultra-low latency meaning connections, how quickly
16 that connection gets made and the decision can be
17 made off of it, so that's the ultra reliable/low
18 latency case.

19 The last one here is massive machine
20 which, you know, sounds like somebody from a
21 Terminator movie, but it's effectively the idea that
22 all of these devices then get connected to the Cloud

1 and the Cloud just insures -- everybody nods in
2 agreement -- the Cloud is not really the Cloud.
3 It's the server formed in Phoenix so all of these
4 connections would be able to be made, and then we
5 decided really -- and there's massive demand to be
6 able to connect things as simple as on the meter
7 read -- to be able to read meters instantly, know
8 what the impact is and how the connection to a meter
9 on the side of my house or a thermostat inside,
10 which maybe, you know, what we should lower or raise
11 the temperature right now because nobody's at home
12 or we should lower the temperature.

13 When we look at that not just from a
14 consumer perspective but from an industrial
15 perspective, a medical perspective, there's all
16 kinds of connections that you choose.

17 I think to Ben's point about there's
18 500,000 million more -- there's 500,000 devices in
19 Illinois connected to devices than there are people,
20 so what that translates into is very much that these
21 machine-to-machine connections are going to outpace
22 the people-to-people connection, and that's a big

1 part of what we see.

2 So from those use cases, we then go
3 into those technical standards, and this is really a
4 group of people with the pocket protectors and
5 really high, you know, doctorates in computer
6 science who would sit down and really figure out how
7 to do a rating system on that, how we do this based
8 on the spectrum that's used, the speed, the latency,
9 and, as Chris found out, this global parking in
10 2020, but there is massive investment right now and
11 we have to be investigating that now in order make
12 that a reality in 2020. So Sprint talked about what
13 they're doing, AT&T has 5G trials, T-Mobile the
14 same.

15 So when you take those use cases, that
16 technical standard application, the first two that
17 creates all kind of solutions at the consumer level,
18 commercial, public safety, and one of the
19 Commissioners mentioned at a public safety level,
20 how our firefighters, for example, have a connection
21 when they're inside of a burning building; from the
22 police perspective, having the ability to watch

1 drums instantaneously on hearing gun shots, having
2 cameras being able to react in certain parts of the
3 city are all of the kinds of applications that
4 apply, not just from a consumer perspective, but
5 then also from a Smart City perspective.

6 I know we are running a little bit
7 long on time, but then the last two that I want to
8 adhere is when an industrial and education -- as
9 education expense increases, we are certainly seeing
10 more and more applications around virtual learning
11 and huge investment in virtual learning, and I think
12 as we look at those enablers for education,
13 certainly technology, and having high speed and low
14 latency connections are at the forefront of that.

15 Okay. So why should cities care about
16 this? As Ben said, a \$275 billion investment that's
17 really a very targeted time frame over the next
18 seven years; job creation, the one million to
19 3 million kind of jobs that we see created, and
20 then, finally, the near term direct city
21 applications that we talked about here in our
22 examples. So all of that means additional

1 infrastructure, and that's what we are talking about
2 here today.

3 What I want to do here is show some of
4 that very real infrastructure, and if you can't see
5 it in this picture, it says the picture is taken
6 from a human perspective, meaning this is what it
7 looks like when you take an iPhone 7 and take a
8 picture down the street, not just of the specific
9 small cell, but just looking at the street here, so
10 this is a site on the left-hand side there about a
11 block away.

12 Here's one in front of Bloomingdale.
13 Here's a ComEd attachment in Mount Prospect, and
14 then here's a streetlight attachment from a
15 different perspective, another ComEd attachment in
16 an alley in Chicago.

17 The reason I point those out is when
18 you think about the balance of what 5G can do
19 versus the real infrastructure that we are talking
20 about, not zoomed-in views like this, really in the
21 context of what we are talking about it's really a
22 considerable tradeoff, meaning it's not much -- it's

1 not much of a trade.

2 All this means additional investment
3 in the cities and the use cases that we are all
4 asking for, and so when we look at that in respect
5 to the cities, we just see that the balance of the
6 use cases and the balance of the infrastructure is
7 really the way toward we want this investment to
8 facilitate 5G, to facilitate Smart Cities and
9 consumer needs.

10 COMMISSIONER ROSALES: Can I ask what are we
11 looking at?

12 MR. CALIENTO: I would love to quote you on that.

13 CHAIRMAN SHEAHAN: This is the cell. There's
14 Walgreen's.

15 COMMISSIONER ROSALES: Traffic on the right side
16 of Lake Shore Drive and there's traffic on the --

17 MR. CALIENTO: So it's a great reason of why we
18 need the site there.

19 So everybody knows Lake Shore Drive is
20 a parking lot, right? So everybody there, whether
21 we like it or not, are using their phone, so we need
22 small cell to service Lake Shore Drive to make sure

1 that to make phone calls that I love, but those are
2 the types of use cases where you have that much
3 capacity. We need something that offset. Does that
4 make sense?

5 COMMISSIONER ROSALES: Yes, I guess.

6 MR. CALIENTO: Thanks. I'm sorry.

7 PRESENTATION

8 BY

9 MR. KUBERSKI:

10 All right. I'm Michael Kuberski.

11 I am the Director of UComm Communications for
12 Exelon. I support six utilities throughout the
13 United States towards their private communication
14 system and that's where we think fiber wireless
15 communications.

16 So one of the things I want to talk
17 about today is when we look at this from an
18 engineering perspective, because that is my
19 background, the first thing that's going to come up
20 is is 5G still a promise? There's lots of things
21 that 5G promised to put out there.

22 We saw a lot with LTE when our

1 5G broke out. I think 5G is going to take us much
2 further than we ever thought it would or we could
3 imagine, and the key things are high bandwidth and
4 low latency. Low latency is so important, because
5 it's the time to make that decision. If you can
6 shorten that time, you can make your system much
7 faster and that system will have a much higher
8 latency.

9 So if you were to take that car that
10 you saw and move that from feet to inches and
11 convert that in time, you'd see a very small
12 percentage -- a very small amount of time it takes
13 to do that.

14 They have the capacity of running
15 lower battery requirements and the battery's going
16 to become more smaller and a more effective use of
17 power. You know, this is going to drive the
18 Internet of things.

19 Everybody is going to get the Internet
20 of things. It's where the vertical technology --
21 and that vertical technology now is connected to the
22 Internet and things like that.

1 I think you have spectrum efficiency.
2 What does that means is that you are going to have a
3 more connected phone, the same connection that we
4 talked about today.

5 So I look at it from ComEd's
6 perspective now, and one of the things that came out
7 of this is the utilities are out there. We've
8 managed a massive amount of infrastructure today.

9 We are running distribution lines,
10 technician lines. We stay connected all the way to
11 every customer's home. We have an obligation to
12 serve here. We are good at managing infrastructure,
13 and, as that goes forward, we have access throughout
14 to help to grow a 5G network, anything from
15 distribution poles to communications towers.

16 We are the power company. We can
17 deliver power to those devices, everyone's devices
18 you've heard. We got that power from somewhere. We
19 have the ability to do that and we know how to
20 manage that infrastructure well.

21 We also have fiber deployment out
22 there, so everybody talked about wireless today and

1 it's going to be focused on, so there is going to be
2 a backhaul requirement on the fiber. We have fiber
3 communications into that system and can kill more of
4 that fiber as we do additional build-outs in our
5 system.

6 The potential advantages of the
7 5G network is to use your imagination here. You
8 know, we've heard Smart City, we've heard Smart
9 grid, and, you know, my definition of smart now is
10 the ability to communicate, so we -- you connect
11 that connectivity. That's what makes things smart
12 now.

13 Before things operated alone. They
14 operated independently. They didn't have
15 visibility, and when you connect things, that's what
16 makes them smart. That's where the Smart grid came
17 from.

18 It could have -- you know, like I
19 said, talking about using fiber connectors to bring
20 the backhaul into the main stations to be deployed
21 or to some of the sites throughout there, we are
22 doing some of that already. There's much more

1 opportunity out there for it.

2 This capacity, not just mobile
3 communication, but it's got video, it's got
4 stationary capabilities. You could put voice onto
5 it, and it's really a big thing that comes out of
6 this in terms of machine-to-machine communication,
7 and the reason I bring that up is we talked about a
8 couple of other things, how utilities can be used.

9 So, as I start to think about this, of
10 what a utility can do, you know, with the utility --
11 as we operate our electric system, we get much more
12 visibility closer to the customer's house by putting
13 more and more lines out there, and some of those
14 lines could have much more data in there that we
15 bring back to today's technology.

16 So we can bring back oscillography,
17 which means that we can look at the actual
18 performance of the system in terms of other
19 technology to make better improvements on that.

20 We can monitor distributed energy
21 control systems out there to support anything from
22 solar to micro grid and storage devices. We have

1 electric vehicles that's going to be out there to
2 control those and giving the information back.

3 You have mobile workers that are going
4 to be out there; how much information can we get for
5 the workers so they can better do their jobs, access
6 to infrastructure on-site so they can, you know,
7 respond to those things quicker.

8 On machine-to-machine conversion will
9 promote use of the smart grid. When we look at
10 machine-to-machine, we can start making certain
11 decisions at a much faster pace so that if I do have
12 a pole in the city and, you know, if a line is down,
13 I can isolate that pole and insert it from another
14 source so that we have less effect to the customer.
15 It is all about what we do for the customer.

16 And then you also heard video. Video
17 3000 is a big piece of this, but the thing about
18 video surveillance we have key facilities that need
19 to be monitored and impacted.

20 So I'll talk a little bit about cyber
21 in a minute, but part of that is being able to get
22 that information back. This all is being able to

1 get that information.

2 The 4 or 5G, okay, so one of the
3 things we got to think about -- I misspoke. One of
4 the things we've got to think about is standards
5 must be solved. They have got to finalize the
6 standards in 2020, 2023.

7 There's a lot of investment. There's
8 a lot of work in this space. These standards don't
9 happen overnight. It took time to develop.

10 As these standards do get developed,
11 one of the benefits of that is interruptibility
12 between devices. If I could start to run more and
13 more things on the standard space, it makes it
14 easier for things to communicate with each other.

15 Cyber security. You didn't hear a lot
16 of talk about cyber security today. More and more
17 technology is out there and more and more
18 connectivity is out there. Cyber security must be
19 addressed. It's been addressed today and we look at
20 it and we analyze it. We make ways to mitigate it.
21 It's about mitigating the risk.

22 When we look at it from this

1 perspective as we have new technology, so cyber
2 risk, and we have really, really smart people out
3 there thinking about ways to perfect that and
4 looking at ways to protect that data.

5 From a utility perspective, this is a
6 couple of shorts that I am working with and we
7 collaborate with our carriers in the space.

8 We need -- from an electric utility
9 perspective, you know, we have priority value
10 networks and we need to go to these control electric
11 systems.

12 We need to be able to do that before
13 somebody selects their TV. You know, we are the
14 ones that are providing power for every one of the
15 customers. We've got to make sure that we have that
16 priority one. Each system must be reliable and cost
17 effective.

18 You heard that mentioned today, but if
19 I look at it from the utility perspective, when I
20 have a radio system that I maintain today, this
21 isn't the last resort. I need to have that system
22 up and available when an emergency comes through or

1 weather comes through. How am I going to address
2 that? So I need to be able to make sure I have that
3 communication out there to be able to support that.

4 And then the last point here
5 utilities --

6 COMMISSIONER ROSALES: Okay. So 5G -- so 5G
7 would be the system that you use there, that you
8 commit that you would have during an earthquake.
9 Would that work?

10 MR. KUBERSKI: I'm saying that 5G could be a
11 system we'd use if we built a regular amount of
12 reliability. So those are the things we need to
13 think about and what we have to do with our private
14 communication system. As I said, this is one of our
15 system's last resort.

16 And then, you know, it's actually
17 having some access to some of the bandwidths. We
18 have to create our own infrastructure to maintain
19 and support this when I talk about reliability
20 and redundancy.

21 That's all I have for today. Any
22 questions?

1 MR. LIN: Thank you. Thank you very much.

2 We will move on to the Q and A portion
3 of the panel.

4 Mr. Kuberski, you were talking about
5 cyber security. How does the IOT change the
6 security posture of networks introducing all of
7 these new devices onto the network?

8 If we do realize the decision of the
9 Smart Cities and introducing all of these new
10 devices, that may or may not be our goal over the
11 industry. How does that change the security
12 posture?

13 MR. KUBERSKI: So when you look at security, you
14 look at the devices themselves. Security has to be
15 thought out when you start to build the product.
16 You don't worry about security later. You have got
17 to think of security out of the gate.

18 If I have an application and I look at
19 security along with the application, I control it
20 from the application, and that's your best input as
21 far as you push security all the way to the end
22 device, so that's one way to think about looking at

1 this.

2 So you start to see this -- you have
3 got to look, for example, at a cell phone. You talk
4 about -- again, how many times did you hear about
5 1G networks being on your phone or using your phone,
6 you get 4G. You do not hear that too much any more,
7 because they figured out how to put the security in
8 the devices, how to authenticate the devices, how to
9 make sure it's controlled, I suppose, to be on the
10 network to the person that you think is using it.

11 MR. CALIENTO: Certainly a huge part of what the
12 standards were at the time for developing
13 probability standards and core standards, being not
14 just what the device is going to do but how all the
15 calls get routed in all the back-end systems, if you
16 will, a huge part of all that is about security, and
17 there needs to be in this day and age something that
18 the international community is looking at as well as
19 domestic products and interests.

20 MR. ARON: I will just add that one of the things
21 we hear from regulators is the frustration that we
22 keep stealing the people that we train, so we're

1 taking it very seriously.

2 Our industry employed an army of cyber
3 experts. Their entire job is to keep cyber attacks
4 from happening. That's probably not a big priority
5 right now. You know, again we acquire people, we
6 train them, we keep them. We make sure that they're
7 available to keep the system safe and to insure
8 users have the experience that we want them to have,
9 not a long interrupted experience, but for results.

10 MR. LIN: And we have all had the experience of
11 an e-mail server going down and an active directory
12 server going down in the office and everyone has to
13 basically stop working.

14 As we become more reliant on these
15 solutions in the Smart City, what happens if there's
16 a cyber attack and the traffic management system
17 goes down or something else like that goes down?
18 What are the backup systems?

19 MR. ARON: You know, I think one of the things
20 that we try to do is build in the right level of
21 resiliency in the system so you are not having to
22 deal with a single point failure.

1 There are certainly instances that we
2 have all read about where there's been outages and
3 the like, but from event to event to event, one of
4 the things that I've learned is being brilliant and
5 applying that knowledge going forward.

6 So if you look at -- you know, I don't
7 really think there's been sort of a massive cyber
8 event that has become public or otherwise there's
9 something that's a denial of service attack and
10 things of that nature.

11 One of the reasons that there hasn't
12 been a critical mass attack in the wireless network
13 is that we prevent them from happening all the time.
14 It's not that we are not getting attacked. We
15 absolutely are. The army of experts that we employ
16 have prevented them, but we have to do an even
17 better job. There are people that try to create it.

18 To give an example, the FCC had a
19 denial of service attack just a few weeks ago, and
20 that happens, but I sort of decided to look at our
21 carriers nationally and found where they're
22 suffering a denial of service attack, and I think

1 the incidents are very, very low, and they're very,
2 very low because we absolutely prioritize not
3 allowing it to happen.

4 But back to your original answer, and
5 it's a very good question. It's one that I think a
6 lot of engineers are going to spend an awful lot of
7 time figuring out and looking at is what is the best
8 way to make sure if it happens there's an answer
9 instead of every single light in the city is red.

10 So there should be an answer to provide
11 as each case accelerates, and we're starting to
12 incorporate more automation into every process. I
13 think that there will be some better answers than I
14 can provide today.

15 I assure you that people are working
16 furiously to make sure that we stay a step ahead in
17 getting those answers and reporting the information.

18 MR. LIN: Speaking on the uses --

19 MR. CALIENTO: Let me just add one thing, because
20 it's related to this infrastructure being on the
21 property as well.

22 So when you think about -- to your

1 earlier question about why on public property, one
2 of the reasons is there is no question of access.
3 We are engaged in it, and I realize there's public
4 safety tradeoffs in some cases to that, but it's
5 closer to the end user. We can access it 24/7.

6 We can work with the city that has the
7 same interests of how to resolve things quickly, so
8 I think it's not just the carrier's own efforts to
9 prevent those attacks, but as we look at this
10 infrastructure as really an essential service as we
11 head into the future here, how do you have ready
12 access to a big part of why they're choosing to put
13 it on the utility poles in cities like Chicago as
14 well.

15 MR. LIN: In all these applications that we
16 talked about, what is the time line for deployment?
17 How many of these applications are -- we've already
18 seen trials with this. Which of them are sort of on
19 the horizon and how many of them are always going to
20 be 15 years away?

21 MR. ARON: So to try to attack that on a few
22 levels, 2018 is the day for release of 2015 -- I'm

1 sorry -- the 5G standards. So, as we sit here today
2 in mid-year, we are literally a year away from the
3 first 5G standards and the first ability to rollout
4 early the 5G network.

5 My understanding that those networks
6 are essentially overlapped on top of 4G networks --
7 and Jason probably has better knowledge of this than
8 I do -- but it is literally on top of 4G networks to
9 improve the performance but not achieve their goals
10 set in 2018 and then in 2019 when they called in,
11 looked at all the new radio standards and the
12 standalone 5G.

13 This is what a 5G standalone system
14 basically looks like. I think that's 2019, so it's
15 not long off. It is really just at the cusp, and
16 Jason pointed out that the international
17 organizations are currently negotiating what are the
18 standards, what does the signals look like for 5G,
19 has the system worked, what is the speed, what do
20 they all look like.

21 So the overall answer is 2018 -- when
22 we first see it in 2019, we'll start seeing a real

1 full-blown rollout, and then each case is a little
2 bit different.

3 Getting an automaton vehicle requires
4 more than just figuring out how a car drives itself,
5 as California found out. You have to make it
6 available to develop these things, and companies
7 might move to places like Arizona where most of the
8 development right now in automaton cars is taking
9 place.

10 So there's a lot of give and take at
11 the regulatory level to make sure these things go
12 well, but that is very local, but I think we'll
13 start seeing use cases in different technologies
14 starting to develop with the 2018-2019 rollout.

15 MR. KUBERSKI: One thing I want to add about
16 these standards. All the manufacturers are
17 developing their standards and they all have their
18 own time of how to get there. They're trying to
19 bring the brightest together and develop standards
20 to be applied across the industry.

21 MR. CALIENTO: I relate it back to what we saw in
22 4G, who's the largest transportation company in the

1 world. It didn't exist four years ago. They have
2 more people and more products than anyone else
3 combined, the largest provider of components.

4 All these things have come out of 4G
5 and the accessibility of smart phones and our
6 ability to do things, you know, and connect in ways
7 we haven't been able to do before.

8 So sometimes when asked what's your
9 favorite app, and truly it's Docusign, but I don't
10 sign a document any more that I design for our
11 business, you know, and just a huge investment in
12 productivity.

13 (laughter.)

14 As you see the infrastructure rollout,
15 all of those use cases start coming, and that's kind
16 of the Silicon Valley aspect of this. They're
17 thinking about all of this and let me know what the
18 platform is in connection with the rollout of the
19 platform.

20 CHAIRMAN SHEAHAN: I want to ask a question, sort
21 of a follow-up on both of those.

22 If you were to imagine Ben's diagram,

1 and you've got 5G technology, apps, and utilities
2 are the three bubbles, so where they overlap there's
3 challenges and opportunities. I'm kind of
4 interested in their thinking on what those might be.

5 MR. CALIENTO: You want to -- you want me to take
6 that?

7 CHAIRMAN SHEAHAN: All three of you.

8 MR. CALIENTO: 5G.

9 CHAIRMAN SHEAHAN: 5G --

10 MR. CALIENTO: Utility --

11 CHAIRMAN SHEAHAN: -- utilities and applications
12 or uses.

13 MR. CALIENTO: So the one that I will start with,
14 and, again, I know this really well, the utility
15 monitoring -- wireless utility monitoring literally
16 got its start ten years ago and now I think ComEd
17 throughout -- you are going to know this much better
18 than I, but I think that 80 percent of your grid
19 that's now covered by the wireless network.

20 MR. KUBERSKI: Much higher than that.

21 MR. CALIENTO: I'm surmising, but I think even
22 that advancement in the last 10 years is huge, and

1 then when you think about how that then relates to
2 electrical usage over time, and if we can really
3 flip switches on the electrical grid based on what's
4 being used at the time, without -- because you have
5 real-time monitoring, not just of how the grid is
6 being used, but also devices within a business or
7 residence for example, I think there's massive
8 opportunities for more efficient use of -- you know,
9 I'm not trained in this in any way. I think there's
10 intuitively massive opportunities to improve how you
11 use the electric grid and how you use other
12 utilities as well.

13 I read something recently that a
14 criminal in Rockford used a billion gallons of water
15 every year that's just gone, and so what level of
16 sensoring can you put in place that then monitors
17 that, and how do you -- what devices do you send
18 down into the water mains?

19 All of that is going to require some
20 connection with other things leading upstream. When
21 you think about traditional electric, water and gas,
22 I think the big opportunities are in monitoring, and

1 alerts, and how those things are being used, not
2 just at a kind of a growth level, but really at a
3 device level as well.

4 MR. KUBERSKI: What I would like to add on
5 besides monitoring, is actually control, too. So
6 the fact that you have been able to make decisions
7 and make switching decisions -- and we didn't have
8 TV cable before -- it's getting access to the data.
9 You hear talk about that out there and being able to
10 pull that data back, so the data's out there and you
11 can't analyze it. There's a lot to do.

12 So when you start to look at this,
13 this is where the applications will start to
14 develop. One of the challenges is the distinction
15 how do I get access to data, how do you get access
16 to information, how do I bring that back out.
17 That's where it all starts to come together, and
18 then I can process a lot of information. I can make
19 more intelligent decisions to see what's going on in
20 the network or in the scenario that you talked
21 about, and you got the same power. You have that in
22 place to be able to use other technology and have

1 more time for communication, and the key word here
2 is this is getting as close to real-time
3 communications as we've ever seen other than fiber
4 itself.

5 MR. ARON: So I guess I would comment just from
6 the -- to get back to the very first slide -- the
7 1G, 2G, 3G, 4G slides, and there are some things
8 about -- there is a point that Chairman Wheeler had
9 made. There is something about the development of
10 those.

11 So we went from 1 to 2G just to
12 improve voice quality. There used to be a crackling
13 on the line if you get a bad connection. Right now
14 we have connections that's pretty consistent.
15 That's critical.

16 There's this afterthought of a service
17 with texting, right, that was added on when we had
18 digital and nobody used it. It was actually made in
19 1994. Nobody used it, then you see when you look at
20 the growth of texting, right, for those of you who
21 watch -- I forget the name of the show. It's a
22 music show. It used to be you'd text, maybe it's

1 the text you want to win. This was actually an
2 explicit use of text messaging and it really started
3 to take off, and then at some point CTIA with its
4 member carriers stepped in and said this is kind of
5 ridiculous. You guys can't communicate with each
6 other unless you are on the same network, so they
7 standardized it, and today it seems inconceivable
8 what you've done, computer tech from AT&T, or
9 T-Mobile, or what have you.

10 The point is technology can be
11 disruptive. We developed the 3G network because of
12 Internet Explorer and we really wanted to be able to
13 allow people to check out the Internet on its own.
14 What we didn't anticipate was the iPhone. The
15 iPhone changed the entire universe of apps. It
16 didn't exist before. We didn't create the 3G
17 network. We had no idea who did it. It's just that
18 some genius created this device and this concept
19 that exploded and changed our entire society.

20 So I guess what I would sort of -- I
21 would suggest is I think the answer to your question
22 is probably more exciting than we can sit here as a

1 panel and discuss because of that divergence. It's
2 what happened with texting. It's what's happened
3 when the iPhone came out. It's just the capability
4 that offers this possibility that you're going to
5 figure out something so exciting.

6 We're sitting here today and what
7 could happen. On the one hand then a more mundane
8 level imagine just as, for instance, ABAB for
9 electric vehicles, so I can't drive more than 60
10 miles in my Nissan or, I don't know, Chevy Volt. I
11 can't drive more than 60 miles.

12 What if somebody came up with an app
13 that I can plug in my house, now you piggyback your
14 60-mile trip across the country, on the one hand,
15 and then I think more tangibly the more connections
16 you have the more that you vigorously allow
17 deployment, the more points there are to locate
18 people within our society and with that translates
19 into better public safety, right?

20 Right now for the location technology
21 we rely mostly on triangulation (sic) and satellite
22 if you are outside, and we put out these systems

1 with more wi-fi hot spots as more exploring
2 technology enfolds in the city infrastructure around
3 the ability to try to locate a user very, very
4 granularly lowbrow, and that's important to keep all
5 of us safer.

6 I think my primary answer to that is
7 it will be exciting to see what the answer is.

8 MR. LIN: You mentioned earlier there's a
9 possibility of telecoms using the fiber network and
10 backhaul and things on utilities.

11 Are there any other regulatory
12 roadblocks to these efficiencies that we might be
13 able to have?

14 MR. KUBERSKI: Well, as with any technologies,
15 there's going to be a lot of technology challenges
16 you have to work through and think through.

17 You know, I'm sure we will be -- you
18 know, it will be network segmentation that we are
19 ultimately going to be focused on. We may not be
20 sharing the exact same fiber, other than
21 communication technology, and so we'll have to look
22 at the design on that and how do we do that.

1 I don't think it is an easy answer, just to
2 say, you know, that we will be sharing all the same
3 specific ways. I think that it will be segmented
4 out is my point.

5 MR. CALIENTO: I can answer it very generally.
6 Utilities like ComEd, and specifically ComEd, are
7 absolutely our partners. As I showed you in photos,
8 we have at certain times demonstrated just working
9 with ComEd and throughout Illinois, throughout
10 Chicago, and looking at from both where there is
11 fiber available, as well as sort of where power's
12 available, and then using those existing poles is
13 really kind of key for us going into neighborhoods,
14 residential areas, as well as throughout the city,
15 finding locations that we can use.

16 MR. ARON: I'll try to take a little bit of a
17 different angle and use it as a checking off point
18 to answer that question.

19 Commissioner Rosales asked earlier
20 about rural America and 5G. I think much like we
21 just heard, you know, identifying where the fiber is
22 and it needs to be very important, but as we see

1 things like automaton takes care and needs to have
2 growth, even in very rural areas, America is going
3 to be there to make that happen.

4 We are going to have connectivity
5 along those roads. When they're fiber or
6 fiber-based, we have the ability then to spiral them
7 out into more communities.

8 So I think that fiber, or macro wave,
9 or what have you, is going to be a challenge to get
10 it to everywhere it needs to be really makes these
11 very, very high-tech concepts into reality, but I
12 think that there's going to be a lot of benefits
13 that accrue once you push that connectivity from
14 where it is today.

15 MR. LIN: As we talked about a little bit in our
16 first panel, there are some municipalities that have
17 elected to have all the utilities underground.

18 Are there any alternatives to the
19 vertical infrastructures to single-cell deployment?

20 MR. ARON: Not really. I would say not
21 universally, so a few things, and Jason can mention
22 and probably have a better answer.

1 Some of the reasons that we put in
2 these vertical pieces of real estate, the advances
3 in technology is such that you are talking about
4 taking -- if you're around a regular wave and a
5 macro acceleration, and you see three sets of
6 panels, panel one is on one side of the tower and
7 another on the back of it, so you've got three busy
8 sectors.

9 In traditional macro cells you have
10 sectors, right, one, two and three, and that's
11 pretty much it, but as technology is advancing,
12 they're literally slicing the sectors into tiny
13 little chunks that get into the weeds very quickly.

14 The intent of technology is certainly
15 incredibly advanced. If you take that same and kind
16 of mount on the wall, then you lose the ability to
17 use that technology, that sector slicing. I forget
18 the exact name of it, but it's feedback vis-à-vis,
19 but to get the full benefit of it to sort of reduce
20 the number of these cells that you need.

21 Yes, you can mount them on walls and
22 water towers and load down on traditional -- even on

1 traditional communities, you can do that, but you
2 lose a lot of the advantages that would otherwise be
3 there.

4 While I think it's true that if push
5 came to shove and you have to figure out where I'm
6 going to put them, but as has been talked about in
7 this room today, the question really needs to be how
8 great do you want the service.

9 I mean, Chris touched on this this
10 morning. Do you want the best possible system that
11 you could have or do you just want a good enough
12 system, and cities are going to decide.

13 We will not be able to battle -- Ken
14 said this this morning we're not going to get over
15 the battle city by city by city. The city is
16 underground and they're adamant that they want to
17 stay underground.

18 When you start to think they're going
19 to have an awesome, awesome system, and the question
20 is it seems easier and better in the long run and
21 that's not for us to decide, we are going to build
22 where we can.

1 My sense is different. Invest in the
2 least path of resistance, and we're not going to be
3 able to fight. We're going to be building. So when
4 you look at the many states nationally, there are up
5 to ten now, you are talking about cities like
6 Denver, you're talking about cities like Phoenix,
7 cities in Florida, cities in Texas, Minneapolis,
8 St. Paul, all across the country there are cities
9 that have -- in states that have gone ahead and
10 passed legislation much like they did in Illinois,
11 my guess is you are going to see a mass amount of
12 global investment into those states and you are
13 going to see it now. You are going to see it
14 accelerate in 2018 building plants for about 10 to
15 18 months long, and you don't just wake up one day
16 and decide you want to outlet and download a system.
17 You plan it. You have it in your capital budget.
18 You implement it.

19 We are looking from certain industries
20 where can we meet, where is 5G really going to work,
21 because we know we can get 700 sites built at
22 x-number of dollars versus, you know, 70 sites at

1 some much higher number.

2 I'm going to build the 700 because my
3 customer experience is going to continue and they're
4 really going to enjoy it as opposed to 70 sites
5 where maybe -- you know, like you saw from the
6 slides, maybe I could really make the rush hour
7 experience along Lake Shore Drive great, but I can't
8 make it great on Michigan Avenue. You know, those
9 are bad decisions that I have to make.

10 So I think the key communities that
11 get it and that welcome us and really try to attract
12 us, those are the places we're going to invest in to
13 build and if underground really wants to stay
14 underground, I think the answer is you are going to
15 have a really mediocre experience and a network
16 loss.

17 MR. CALIENTO: A technical answer would be is our
18 equipment work underground as well as your phone
19 works underground. I mean, it's very literally the
20 same thing, so underground meaning -- it's basically
21 prohibition.

22 If somebody says I don't want no

1 above-ground infrastructure for this, there's
2 nothing I can really do. I agree with Ben when we
3 asked so what compromises can we make when we find
4 -- we understand residential neighborhoods really
5 well. Do you want to look at commercial and
6 industrial areas for parts of the town where there
7 is going to be less intrusive bus stops but a lot of
8 other things on football stadium lights, and so
9 we're trying to find compromises, but, as Ben said,
10 the investment will follow where it's practical to
11 make investments.

12 We don't want to invest in fights. We
13 don't want to invest in conflict. We want to invest
14 where that investment does need to be connected in a
15 city, so that's where our commitment is, but the
16 real technical answer, and we probably answer this a
17 hundred times a week, is unfortunately, no, it just
18 doesn't. It's the same if you would bury your
19 phone.

20 MR. KUBERSKI: The other thing is poles really
21 need to be above ground and all your electronics
22 should be hidden or tucked and put below ground.

1 MR. CALIENTO: If it's cost effective.

2 MR. KUBERSKI: If it's cost effective.

3 MR. CALIENTO: Because earlier what Jim was
4 talking about was deploying something that's been
5 deployed feet or yards is very different than macro,
6 so to vault these things underground, for example,
7 could be expensive. That's something which, again,
8 you look at.

9 There's all kinds of studies that can
10 be raised, and we've certainly worked through lots
11 and lots of those, but I think that's the balance of
12 what we're looking for. I think it shows -- lots of
13 photographs show in context that this is not very
14 inclusive, and actually blend in quite well with the
15 urban landscape, and that has to be balanced with
16 what the cost would be.

17 MR. LIN: CTIA does everything wireless. Are
18 there any other wireless spectrums that are more
19 conducive to this or that would be complementary for
20 a Smart City application?

21 MR. ARON: Sure. So when you develop the case
22 for 5G and develop the standards for 5G, you're

1 primarily going to hear about millimeters with it,
2 so every -- if you go back to high school physics
3 and radio waves, we literally have peaks and valleys
4 of waves.

5 The size of the wave is when you hear
6 terms like 800 megahertz, 900 megahertz, and
7 2 gigahertz. All that means is that the wave is
8 shrinking, right, and the higher the number in
9 gigahertz, right, the wave declines.

10 A ship-to-shore radio that's, you
11 know, down into the kilohertz, right, so you are
12 going the wrong way, not that that was forever,
13 whereas, what we deal with is what we call low band,
14 mid-band, and high band.

15 The high band is a millimeter wave and
16 a little bit bigger than a millimeter wave. The
17 high band we are talking most of the time seems to
18 be using a millimeter wave. One of the reasons that
19 it is so great is when we talk about it, it has
20 great data.

21 You need a hundred, maybe 200 megs of
22 spectrum all contiguous. You can split it up. It's

1 all continuous, and that's not possible in the
2 lower, so being taken for 3G and 4G and distributed
3 out that was the technology that worked.

4 So you have really a lot of spectrum
5 available on high band, and that's also conducive to
6 carrying massive amounts of data.

7 In mid-band there will be some
8 applications that are the CBRS radio. It's Citizens
9 Broadband Radio -- I forget what it stands for -- so
10 CBRS radio 3.5 is a sharing experience where the
11 radar used by the Navy today where they keep their
12 dead air time but offers a unique service at 5G and
13 that's three out of five.

14 But one of the interesting things in
15 talking to an engineer a couple of weeks ago, a lot
16 of the innovation that the ITs have come up with how
17 does the system work, the radio wave characteristics
18 versus the signal characteristics, all of those
19 things, one thing they have to be able to do is take
20 that as long as you can recreate all of their
21 technical factors and different bands, for instance,
22 very low band, they will still be a 5G system.

1 One of the things that as we get there
2 we as an industry we're talking tug-of-war to build
3 more capacity in the City of Chicago so that we have
4 all the advanced services and everything is there,
5 text or talk, and these waves are not in that
6 direction all the same time.

7 Should we build more capacity into
8 that or the other end of the spectrum should we be
9 building where we don't have as much service and we
10 don't have 4G service yet, so the tug-of-war is
11 between urban capacity and suburban/rural coverage.

12 One of the interesting things is that
13 as 5G gets more mature, you are going to see the
14 ability to take lower band spectrums. You are going
15 to be able to use your lower band spectrum you have
16 put together and to offer 5G not only in cities but
17 in the rural areas.

18 So I think the answer to your question
19 is it's very, very spectrum-specific. In cities it
20 can be disastrous to try to use a low-band spectrum
21 to offer 5G. You don't want that.

22 You actually want little circles so

1 you can have a lot of data for a lot of people all
2 at once, but in a rural area you want spectrum to
3 travel.

4 So one of the nice things is you'll be
5 able to use different spectrums for different use
6 cases, but it will be the ability to offer 5G in
7 rural areas. It's just that at the forefront you
8 are really seeing the push for this little
9 millimeter stuff that you hear about, but, yes,
10 different spectrums work better in different areas
11 that potentially we will be able to offer 5G on many
12 different spectrums in many different use data.

13 MR. LIN: One last question for everyone. Maybe
14 the municipalities have been sort of so overwhelmed
15 by the number of applications that they put a
16 moratorium on applications, and that's something
17 that's contemplated by the Senate bill.

18 What are some of the things that the
19 other companies can do to make these proposals more
20 palpable for municipalities so they don't enter into
21 these places and are able to be collaborative and go
22 through the process?

1 MR. CALIENTO: So I think the main thing that we
2 find that we could work with the municipalities on
3 is height, location, and format, and that is
4 overwhelming.

5 What's the height of this going to be?
6 Is it attached to something or is it going to be a
7 new pole? In what location and what the esthetics
8 instead of that's what we try to do in all
9 municipalities and explain upfront here is the
10 height this will be, here's the location, and here's
11 the format.

12 I think when we do that well and I
13 think to Ken's earlier comments about looking for
14 uniformity and that helps drive some of that that
15 will help the individual municipalities say, okay,
16 this is within the limits of what we all can agree.

17 Right now we deal with something like
18 10,000 jurisdictions across the country, and all of
19 them have a question about height, location, and
20 format. We try to answer upfront so that we can
21 avoid any kind of moratorium, and I think that's --
22 I think that's the main sticking point. If we can

1 get through those things, it can drive some
2 uniformity to it.

3 In terms of the jurisdiction, we had a
4 suite of different things that we did, and so in the
5 City of Chicago we agreed to an application fee
6 increase in order to pay for incremental staff to
7 offset the cost of processing the application. That
8 was easy for us as an industry to do. That's not
9 hard at all. We agreed to those things because we
10 don't think it should be taxpayers subsidizing. We
11 think we can pay for processing time, and legal
12 fees, and whatever those things that are reasonable.
13 We were happy to offset those things.

14 We also regularly agreed to what an input
15 and output is with jurisdiction, so I'll use the
16 City of Houston as an example.

17 In Houston we have -- I would say we
18 put in 40 applications per week and that's the
19 approximate time and that lines up with their
20 application process and the fees that we pay, so
21 it's a simple kind of engagement that says this is
22 how we can do it.

1 So when we talk with jurisdictions, we
2 think solving those primary questions, agreeing to a
3 fee structure, but really this is where, and I think
4 with exception, some of the panel came from.

5 The biggest thing for us is who's the
6 person on the other side of the floor, who's the
7 champion at the scene; that's where cities can
8 really help us so they help themselves; who's the
9 designated person, because this is coming. This is
10 happening in time. It's not something just down the
11 road, and we regularly work with cities and say who
12 can be in charge of this policymaking so we can sit
13 down together and come to a conclusion on how this
14 is going to work, and sometimes that's really
15 difficult to get to.

16 So at times we see that's when they
17 throw up their hands and say we don't want to deal
18 with that now so they know until we resolve these
19 three main things.

20 MR. ARON: I think the only thing I would like to
21 add that I absolutely agree with Jason. It's great
22 to be able to come, as we did today, and hear from

1 municipalities and have the sharing of ideas.

2 To the extent that we can educate them
3 in advance about what our needs are and what our
4 applications look like and have them aware so it's
5 not always just saying they are going to get an
6 application, here's what the app looks like, that
7 kind of dialogue is important, like today.

8 We are here, they are here, and they
9 have to understand where we are coming from and what
10 we are going to be able to bring to their city hall
11 by way of application. That of engagement is very
12 important.

13 So, as we move forward, we should see
14 these applications uptick with 4G going ahead that's
15 coming and continuing and anticipating the next
16 year. That engagement is absolutely essential to
17 our appreciation to things happening down there. We
18 are altogether and can hear each other out and what
19 we need to make it even better.

20 MR. LIN: And on that note, join me in thanking
21 the panelists.

22 (applause.)

1 CHAIRMAN SHEAHAN: Let me just take a minute to
2 thank everybody again. The morning panel and the
3 afternoon, thank you for your time and the staff
4 time, of course, they were prepared.

5 Meagan and Wie Chen did a great job, I
6 think the best panel we have had so far in terms of
7 organization. Honestly important conversation and
8 more to come, so thanks for being here, everybody.

9 (applause.)

10 (Whereupon, the above
11 matter was adjourned.)

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