U.S. FEDERAL COMMUNICATIONS COMMISSION

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CONSUMER AND GOVERNMENTAL AFFAIRS BUREAU

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NATIONAL HEARING ON THE RELIABILITY AND CONTINUITY OF COMMUNICATIONS NETWORKS

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THURSDAY
FEBRUARY 28, 2013

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The Field Hearing convened in the NASA Ames Research Center, Building 152, Moffett Field, Mountain View, California, at 1:05 p.m.

FCC STAFF PRESENT:

JULIUS GENACHOWSKI, Chairman
MIGNON L. CLYBURN, Commissioner
ROBERT McDOWELL, Commissioner
AJIT V. PAI, Commissioner
JESSICA ROSENWORCEL, Commissioner

ALSO PRESENT:

ALEX PADILLA, Senator, California State Senate, 20th District
LEW BRAXTON, Deputy Center Director, Ames Research Center, NASA

PANEL 1:

HIROHITO NODA, NTT DOCOMO USA, Inc.
NAYEEM ISLAM, Qualcomm
HARESH KAMATH, Electric Power Research Institute
THOMAS NAGEL, Comcast

PANEL 2:

ALICIA JOHNSON, Resilience and Recovery Manager, Department of Emergency Management, City of San Francisco
FRED WOLENS, Public Policy Team Member, Facebook
ARI GESHER, Senior Software Engineer and Engineering Ambassador, Palantir Technologies
GEORGE CHAMALES, Principal, Rogue Genius, LLC

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P-R-O-C-E-E-D-I-N-G-S

(1:05 p.m.)

MR. CLARK: All right. I think we are set to go. Welcome, folks. Appreciate everybody coming out to NASA Ames. Welcome to Building 152. This is one of our newer conference centers that got commissioned last year.

Jerry Clark from the Protective Services Fire Prevention Office. I will be here for your safety briefing.

And we do have kind of an unusual arrangement here, kind of a long conference area, and with the stage here we have kind of got a strange arrangement here. But I just want everybody to make note that we do have the two exits to the rear of the auditorium here that go off to the left.

There is also a second exit that goes down the hallway and all of the way out to the back end of the structure. So in the event that we have some sort of a fire or

other emergency that requires you to evacuate the building, please make your way to those exits.

For the panel/board members, I would ask for you to go straight out that door. And the assembly area for the building is directly across the street in Chase Park, over there by the eucalyptus trees.

It is very important that you do make your way over there as quickly as possible, because if we do have some sort of an emergency that requires the evacuation, we need to make sure everybody is accounted for.

Also, remember, in the event that we do have any kind of a medical emergency, make sure that you contact one of the staff, either Claudia or Anna, to dial 911 and get Moffett dispatch. We'll have the fire department, also our medic ambulance, respond out here as well.

Bathrooms are to the rear and to your right on the right-hand side down the

hallway.

And if there is no other questions, again, welcome. And I hope you have a great conference.

Thank you.

Let me go ahead and introduce the Deputy Director for NASA Ames, Mr. Lou Braxton.

DIRECTOR BRAXTON: Welcome, everybody. Glad to see that you could make it out here to our fine institution here at Ames Research Center. Let me welcome you to the site. I would like to mention the fact that, you know, we take great pride in the fact that at Ames Research Center, which is part of the NASA family, we pride ourselves on discovery, innovation, and solutions.

If you ever get the opportunity to walk the streets and visit some of our facilities, you will see how excited we are about getting tough problems, dealing with challenging activities.

We have been around for a while. A lot of people don't realize there is a NASA facility in Northern California. Normally, when they think of the Right Stuff, they think of Southern California, think of Dryden Flight Research Center or they think of JPL because the Curiosity just recently landed on Mars.

What they don't realize is is that a lot of the activities that take place within this agency, we have what we call Ames Within. An example of that is Curiosity. We assisted tremendously in the seven minutes of terror they like to refer to, because if they didn't come to us to deal with the testing of the parachutes they may not have worked. If they didn't come to us with the heat shield, they may not have worked.

So we are heavily involved in a lot of the stuff behind the scene within the agency, and we helped the agency become very successful as a result.

Now, let me tell you a little bit about where you're at here. We started off as basically a tenant to the U.S. Navy. This is Moffett Field. And eventually what happened is the Navy made some decisions about how to go and restructure their capabilities, and the entire facility here became part of NASA Ames. It's over 1,900 acres. We have an airfield that we use to be able to deal with our platform research that we do on the space science side of the house and earth science side of the house.

We have a number of hangars that we lease out to the tenants in order for them to make sure that they provide our opportunity to deal with platform aircraft-type research.

Our core here is aeronautics. We started back in 1939 when there was a perceived threat on the Pacific Rim. I think most of you who understand your history realize that that was just before World

War II. And we were provided the aeronautic research that is necessary for us to develop the aircraft that fought during that period of time.

After that period of time, we got into the ability to develop different types of flight characteristics. The swept wing that you see today was actually invented and developed here.

The blunt body concepts for reentry into space was developed here. The shuttle tiles were produced and researched and developed here. A lot of people don't realize that.

But as we moved on, we realized that, you know, we need to ask some fundamental questions. What's up there in space? So space science, earth science, and life science came here. And we do a lot of research in those particular arenas.

But as time progressed, which is similar to what we're going to be hearing

about today, we got into the electron. We started developing things associated with computing capability. We have the high end computing capability for the entire agency here to deal with complex problems. We deal with autonomous symptoms. We deal with robotics. We deal with those data storage -- mass data storage.

So if there is anything that individuals within the agency want to embark on associated with the IT technology necessary to solve problems, they normally come to us. And if we can't solve it, we go to Silicon Valley, since we're in the heart of the Silicon Valley.

And, lastly, we are in relative size to a NASA center kind of small. We only have a $900 million. Even though our agency's budget is around $17 billion, but we're $900 million.

We have 1,200 civil servants and roughly 1,200 contractors. And at our height

during the summertime we have over 900 students. We pride ourselves because of our size and our desire to do things quickly and to what we call low cost missions.

So if there is anything that needs to take place within the agency, which seems to be the bandwagon today, you come to Ames and we will try to figure out how to do something within a relatively quick turnaround time. In NASA terms, that is normally about three years to two years. So even though some kids will have problems with that time, for us that's quick.

Okay. And that brings us to the facility. A lot of people don't realize -- I believe the -- I don't know if I'm going to state this correctly, but what I do know is that the internet hub for the western region is on our property. And it's one of those things that we are very concerned about. If we have an earthquake, what do we do to try to make sure we support the local area to

sustain it.

The other thing people don't realize is that we have a disaster relief capability. We call it DART. So when there is things that happen within the United States, whether it was the Trade Center or whether it was Haiti, or whether it was some other location, we have people here to go all over the world to be able to provide relief, because of the expertise that we have retained. And I think that's some of what you are probably going to be discussing about today.

So we've got a broad base. We're into a lot of things, but the fundamental basics are there. So what I will tell you is, welcome to Ames Research Center, and it's an honor on our part to be able to host the Federal Commission -- Communications Commission West Coast Field fearing on disaster readiness response.

And I'm proud to introduce Julius

Genachowski, sworn in as the Chairman of the Federal Commission -- Communications Commission in June of 2009. Julius Genachowski has focused the agency on unleashing the opportunities of wired and wireless broadband, pursuing policies to promote investment and job creation, has driven innovation, fostered competition, and empowered consumers.

Under Genachowski's leadership, the FCC has been a model for excellence in government, named the Most Improved Federal Operation or Agency in the government, and one of Wired Magazine's top seven disruptors.

Prior to his FCC appointment, Genachowski spend more than a decade working in the technologies and media industry as an executive, investor, and board member. He was the Chief Business -- Chief of Business Operations and General Counsel of the IAC, Interactive Corporation; Special Advisor at the private equity firm of General Atlantic;

and co-founder of the technology incubator LaunchBox Digital.

Genachowski received a J.D. from Harvard Law School -- sorry, I went to Harvard Business School, but we get along -- in 1991, and is a graduate of Columbia College.

I would like us all to join me in welcoming the FCC Commissioner, Julius Genachowski. Thank you.

(Applause.)

CHAIRMAN GENACHOWSKI: Thank you very much. Well, thank you, Deputy Director Braxton. Thank you for lending us this facility today. And welcome, everyone, to the Federal Communications Commission's field hearing on improving the resiliency and reliability of America's communications networks during disasters.

We are very pleased to be out here. I'm going to ask each of my colleagues on the Commission to make some opening

remarks. Before I do that, I'll have a few words. I want thank, first of all, our staff, who worked hard to put this together -- David Tretsky, the Chief of our Public Safety and Homeland Security Bureau, Charles Mathias, and others.

It's important for the FCC to get out of Washington to do field hearings to engage with experts around the country. It is also more challenging for us to have to organize than when we just stay in Washington and do hearings in our meeting room.

There are a couple here I want to acknowledge -- my former FCC colleague on the staff and now CPUSC Commission, Cathy Sandoval. It's nice to see you. And California State Senator Alex Padilla is here, has been very involved in these issues, and appreciate all of the work you are doing, both of you, on behalf of our broadband future.

It is fitting that we are holding

this hearing here in Silicon Valley, because today's hearing will focus on how next generation technologies and social media tools can enhance communications during times of emergency, including the aftermath of an earthquake.

As you heard, Ames Research Center is a hub for cutting edge research and development, and Moffett Field itself here is a staging area for FEMA in times of disaster.

Now, this is our second field hearing examining challenges to America's communications networks during disasters. Earlier this month we held sessions in New York and New Jersey, both on the same day, in areas that were particularly hard hit by Superstorm Sandy.

Every disaster, whether natural or manmade, underscores for all of us both the importance and the challenges of maintaining reliable communications during emergencies. Modern communications like

mobile and broadband have become essential to our daily lives. Twenty years ago, if someone had said during a disaster you might be able to communicate with people wherever you were through a handheld device, you would say, “Wow, that’s incredible.” But now it has become so central to our lives that not having very high reliability for a service like that becomes a major problem.

This is especially true at a time when an increasingly high percentage of our population -- over 30 percent -- relies exclusively on mobile communications. They don’t have landline phones at home. And so today whether you’re calling 911 for help checking on the well-being of loved ones or just trying to return to work in the days following a crisis or keep business going in those days, modern communications like broadband and mobile are essential.

These times also remind us that media-like broadcasts -- cable, satellite TV

-- also play an incredibly important role in providing information during times of crisis. The good news is that we now have more and more redundant means of accessing information. Of course, the challenge is we rely on each of them. There are more elements of communications infrastructure and more complexity to worry about during times of disaster.

Now, our nation's communications infrastructure is critical to public safety and national security. As I mentioned, consumers can communicate in more ways than ever before, and yet it is completely unacceptable for people not to be able to reach 911 during times of emergency.

We have had challenges in this regard, and it will take smart action from all sectors to ensure that communications networks are working when people need them the most. And there is great opportunity to leverage advances in technology to improve

disaster time communications.

At the FCC, the issue of public safety communications is something that is core to our mission. It's why we have a Public Safety and Homeland Security Bureau. And these are areas that, together with my colleagues and our terrific staff, we have been focused on for quite some time.

We are working to accelerate the deployment of next generation 911, which will make emergency communications more resilient, give public safety workers more information to use in assessing and responding to emergencies, give consumers more ability to reach 911, including by text and ultimately sending photos.

Along with my colleagues, we are laying the groundwork for next generation 911 to develop -- to transition this complex infrastructure as quickly as possible. We have taken steps at the FCC to launch wireless emergency alerts, so that local and

state, as well as federal officials, can send geographically targeted text messages during and after or before times of emergency.

We extended our network outage reporting requirements to include interconnected VoIP providers, which now supplier one-third of households with phone service. FCC staff analyzes these network outage reports during crises to identify issues and trends and works with FEMA, state and local authority, and industry to address problems in real time.

We also use our disaster information reporting system to track outages and restoration efforts. We did this recently after Superstorm Sandy, Hurricane Isaac. We play an important role in providing situational awareness around our communications networks and outages working, as I said, closely with FEMA state and local authorities, to ensure continuity of service.

Our FCC staff conducted a

comprehensive analysis of the 911 service failures that occurred in the Midwest and Mid-Atlantic region after last summer's derecho storm. Based on those findings, I called for a rulemaking to improve the reliability of 911 networks, and I expect that the Commission will consider a notice of proposed rulemaking at our March open meeting.

We have a network operations center at the FCC that is 24/7 all year. And when a disaster strikes, our staff is there to support communications providers and government partners with restoration efforts. These range from things like granting very quickly STAs, temporary authorities to help keep mobile broadcasts, others, on the air. We work with FEMA state and local authorities to ensure that fuel supplies can reach mobile towers and antennas -- a recurring issue during times of disaster.

The Commission's field hearings

are part of the process for us to help us determine what steps we can and should take to ensure reliability and continuity of service. We are focused on advancing four core goals, and these will come up over the course of the hearing today.

One, improving network resiliency. How can communications outages be prevented in the first place?

Two, improving restoration. When outages do occur, how can network recovery be hastened?

Three, empowering the public. How can the American people be better prepared for and better cope with disasters?

And, four, unleashing technological solutions. How can new technologies be harnessed to promote the resiliency and restoration of communications networks as well as emergency care and response?

Our first hearing focused on the

complex challenges exposed by Superstorm Sandy. The interdependency of our electric grid, our power grid, and our communications networks emerged as a key challenge that as a society we must tackle. Simply put, keeping communications networks operational during disasters requires keeping them powered.

That is why I am pleased that our first panel today will discuss, among other things, smart power solution, mesh and self-healing networks, and other cutting edge technologies that can improve the performance of communications networks.

So our first panel is going to be on networks and equipment. Our second panel will discuss innovative social media, open data, geolocation apps, that can help Americans communicate during emergencies. Both topics share a common theme. How can we take advantage of technological innovations to improve communications and keep Americans safer when disasters strike?

I'm looking forward to a productive and informative session. We will have two panels. On the first panel, we will -- on each of the panels we will ask each of our witnesses to deliver statements for five minutes each, and then each of the Commissioners will have a chance to ask questions for seven minutes each.

We will try to stay on the clock. Our experience is that this is a forum where we can generate good ideas, important information, and it is part of an ongoing process. This hearing is being streamed online, and it will be available both in real time and afterwards to consumers. It will become part of our record.

And as is inevitable, there will be many topics for followup. And so I want to thank each of our panelists on this panel, and the next panel, not only for making the time to be with us today, and for putting the work in preparing your testimony and in

engaging with our staff leading up to the hearing today, but I want to thank you because I know that this is the beginning of ongoing engagement with the Commission.

We can't do our work without the kind of expertise and input that each of you provide. We appreciate it very much, and so I thank you in advance for what I know will be important followup.

With that, let me turn to my colleagues for statements. We will begin with Commissioner McDowell, and then I will ask Commissioner McDowell to introduce Commissioner Rosenworcel and Commissioner Pai.

I will just say, none of us are used to actually being introduced at Commission proceedings. So I will just tell you that we have an excellent group of experienced Commissioners with diverse backgrounds whose commitment to addressing public safety issues is very high. And we

all enjoy working together on these and other very important issues.

So, Commissioner McDowell, the floor is yours.

COMMISSIONER McDOWELL: Thank you, Mr. Chairman. And I want to thank the folks at NASA's Ames Research Center and here at the historic Moffett Field. It is great to actually finally be here. So thank you for donating your facilities and helping us make this happen.

I would like also to thank all of the California state government officials who are here, and as well as a former FCC Commissioner and state PUC Commissioner as well, Rachelle Chong, and fellow trekkie. So good to see you here.

(Laughter.)

I remember those days. Very good. Very good. Well done.

I also want to thank all of the native Californians for arranging for such

gorgeous weather for us winter-weary folks who reside in Washington.

As the Chairman said, over the past year the Midwest and Mid-Atlantic states experienced the so-called derecho storm while the northeast was devastated by Hurricane Sandy. These storms produced extraordinary hardships and catastrophic loss for our fellow citizens. They were incredibly disruptive and exposed fundamental weaknesses in our communications systems that we must start strengthening right away.

The silver living in these destructive storm clouds is that these natural disasters have served as a wakeup call for government and industry alike across the country. So I'm very pleased that the Chairman has initiated this series of field hearings to undertake a rigorous effort to analyze the effects of natural disasters and other emergency situations on America's communications systems.

We will take what we learn from these hearings, along with public comment, to examine new ideas to prevent or minimize degradation to America's communications infrastructure in the future.

Crises resulting from any cause demonstrate how essential our communications networks are to all Americans, but especially critical service providers. Police, firefighters, and EMS personnel rely on our nation's communications networks to provide emergency services to those most in need in times of crisis.

Furthermore, Americans depend on these systems for information regarding catastrophic weather events, for access to their loved ones, and for the ability to contact, for instance, E-911 for help.

All information that we acquire from catastrophic events will prepare us better for the next hurricane, blizzard, earthquake, tsunami, tornado, wildfire,

flood, mudslide, or whatever else will be undoubtedly thrown our way at some point.

For instance, the damage caused by last summer's derecho storm in the Mid-Atlantic region was simply overwhelming. This destructive windstorm that many people had never heard of before came with little warning and, among other things, left millions without electrical power.

Also, upwards of two and a half million people in the greater Washington, D.C. area were without access to 911 services as a result of this natural phenomenon. In a report conducted by the FCC's Public Safety and Homeland Security Bureau, as the Chairman mentioned, found that many of the outages could have been prevented with reliable and functional backup power, monitoring systems, and implementation of industry best practices.

The lessons learned here today will hopefully be noted by other communities,

so they can work to ensure that such mistakes will not be replicated as they prepare for tomorrow's emergency situations.

More recently, Superstorm Sandy resulted in one out of every four cell towers losing service throughout a 10-state area. The damage was worse in areas that felt the blow of Sandy's center. So, for instance, in New York City, Long Island, and Westchester, 500,000 wired telephone lines were knocked out of service, while 3,500 cell sites fell offline. Much of the wireless network loss was due to power outages.

Our mobile infrastructure relies on access to, of course, electricity and is, therefore, highly susceptible to power outages. If the power grid fails, then backup power sources are needed to ensure that crucial communications facilities remain functional during emergencies.

And all too often, backup power systems do not function properly or long

enough until downed power grids can be restored.

In the meantime, wireless devices are proliferating at an unprecedented rate. Fifty-one million new devices were connected to U.S. mobile networks in the last year alone, to bring the total of American mobile-enabled devices to 424 million, according to the latest statistics. This number is expected to grow to 775 million mobile connected devices in 2017.

As Americans become more and more dependent on mobile devices, ensuring that our wireless networks remain operational, has become paramount. Unfortunately, we can't prevent disasters from happening. Although it may be impossible to fully prepare for and anticipate any contingency, it is important for government and the private sector to work together to make sure Americans can connect with emergency responders and one another when they need to the most.

By studying what went wrong, but also what went right, and to analyze lessons learned, we can and will help make the American public safer for the next event. Not only must we be prepared for unforeseen natural phenomena, but we must also be mindful that we need hardened and reliable communications systems to be prepared for potential terrorist attacks as well.

In so doing, it is my hope that regulators allow the entrepreneurial brilliance of the private sector to shine at its most powerful level without inhibition.

Accordingly, I look forward to hearing from today's panelists, to learn more about the latest technological advancements that may be deployed to create resiliency, reliability, and redundancy in our communications infrastructure, and how current innovations, such as social media and wireless applications are being used to rapidly disseminate life-saving information

during emergencies.

So I thank all of the panelists for coming today, and I look forward to learning from them very much.

Thank you.

And I am now supposed to introduce Commissioner Jessica Rosenworcel, who needs no introduction.

(Laughter.)

COMMISSIONER ROSENWORCEL: Good afternoon. Thank you to Chairman Genachowski for scheduling this meeting today, and thank you to our friends at NASA Ames Research Center for their commitment to research, exploration, and of course their willingness to host us today. And while we're at it, given their scientific prowess, we will also thank them for the weather.

We are here today to understand what happens when disasters wreak havoc with our communications systems and how modern technology can provide us with the tools to

restore our networks, make them more resilient, and make us more safe.

I want to start by telling you about two recent images that are informing my thinking. First, I just returned from Barcelona where I was privileged to attend the Mobile World Congress. Seventy-thousand people came from across the globe to the capital of Catalonia.

They packed in wide halls and sat in narrow conference rooms to witness new wireless technologies and hold discussions. It was as diverse a group as I have ever seen, yet they had one thing in common -- a deep, abiding belief in the ability of digital age wireless services to remake the world we live in, expanding opportunity, fostering economic growth, and improving civic life everywhere.

This is the image that stays with me, and this is an image that inspires.

Second image -- shortly after

Hurricane Sandy tore apart parts of the Mid-Atlantic, I toured a telecommunications central office in lower New York.

Weeks after the flood waters had receded from the streets, the subterranean rooms where our networks come together were still damp. Technicians rushed this way and that, trying to make sense of an impenetrable snarl of lines and the harm done to so many submerged switches and servers.

The imagine was post-apocalyptic. After all, these are the networks we depend on every day. These two images strike me, because together they demonstrate vividly the great power of the digital age and also its extraordinary fragility. Our lives are wildly enhanced by and also wildly development on communications infrastructure.

So what we are doing today is wrestling with this power and fragility, with the possibilities from enhancement and the consequences of our dependence. We began

this conversation earlier this month in New York and New Jersey, both of which were hard hit from Hurricane Sandy.

Continuing it here in California makes good sense. After all, the West Coast faces unique natural challenges from earthquakes and wildfires, and it is home to Silicon Valley, the tip of the sphere of innovation, where new network, energy, and social media technologies are being developed that have the potential to transform network resiliency and emergency response.

So today we have an opportunity to learn how new technologies can help us answer tough questions. For instance, an increasing portion of the population no longer relies on traditional wire line phones. More than one in three households now relies only on wireless service.

Wireless phones and the towers that serve them are dependent on commercial power. What happens when the power goes out?

How do we ensure that backup power is where it needs to be? And that providers have access to fuel for generators? And how do we make sure that consumers are prepared, too, with backup batteries or solar chargers?

We also have an opportunity to talk about social media and crowd sourcing technologies that can help us respond to emergencies and change the way we gather and disseminate information. We have a lot of ground to cover.

So I want to thank you to the participants who are joining us today. You will help us build your record. You will help us grapple with the images I laid out at the start, the ways the digital age makes us more powerful and the ways we need to reduce the fragility that comes with our dependence.

You will help us make us all more safe. So we look forward to hearing from you, and thank you again for your participation.

Now I want to introduce my friend and colleague, Commissioner Ajit Pai.

COMMISSIONER PAI: Well, thank you, Commissioner Rosenworcel. Thank you, Chairman Genachowski, for convening this hearing. And thank everyone at the NASA Ames Research Center and at Moffett Federal Air Field for hosting today's event.

I will say it has come to my attention that we at the FCC are not the most exciting guests to be participating in an event at Moffett Air Field. I understand that the cast and crew of Mythbusters, for example, have used your hangars to test whether aircraft can be made out of concrete and, you know, other interesting questions like that.

But we appreciate your hospitality, nonetheless, and we hope that we will rise to the challenge this afternoon.

I also want to thank the disaster assistance and rescue team for the

informative presentation they gave me before today's hearing. What they are accomplishing based on virtually an all-volunteer force with limited funds is truly extraordinary.

They are being dispatched everywhere from California to the East Coast, and the work they do every day in the United States and abroad is really testament to not just NASA but really to the American character, their willingness to serve their communities at times of need.

Today's hearing is a valuable complement to the Superstorm Sandy field hearings that my colleagues have mentioned that we held earlier this month. In New York and New Jersey, we learned a lot about the damage to our communications system that were wrought by Superstorm Sandy.

We also learned about what steps can be taken to harden our networks against hurricanes and flooding. But our nation is vast and geographically diverse. Mother

Nature challenges each of our regions in different ways, whether it's hurricanes in the east, earthquakes in the west, or tornadoes in the Midwest.

So I think it's important as we think about how to keep our communications networks up and running during emergencies to remember that our country's complexities might require something other than a one size fits all solution.

Take earthquakes, for example. Whether it's a minor tremor or the "big one," earthquakes offer distinct challenges for network operators. So I want to know how providers in California, in particular, have adapted to that. Are wires more secure if they are up on poles as opposed to buried in conduits?

We heard at our previous hearings also that copper is more brittle than alternatives like coaxial cable or fiber. How does that play out when an earthquake

hits? Are newer deployment technologies, like mesh networking, an effective way to make our networks more resilient? I look forward to hearing the experience of our American operators, as well as the views of our guest from Japan, Mr. Hirohito Noda.

I understand that Japan's wire line networks, for instance, use flexible underground conduits and sliding joints. These features enabled wire line networks in Japan to perform relatively well in the immediate aftermath of the devastating Fukushima earthquake in 2011.

What lessons can we in the United States learn from that experience? By contrast, power outages caused major problems for wireless networks following that earthquake. How did Japanese carriers overcome this and other challenges? What should we in the United States be doing to prepare our communications networks for a major earthquake?

Another thing we learned at the Sandy hearings was that effective disaster preparation and relief efforts require open communications and coordinations among all parties -- first responders, utilities, and network operators.

That has certainly been the case here in California. For instance, in the 2007 wildfires near San Diego, the flames spread so quickly that many people found themselves trapped in harm's way before they were able to evacuate. One family was trapped in their ranch just outside San Diego. Thankfully, a few days earlier, Verizon had deployed to that area a mobile cell vehicle called a Cell on Wheels, or a COW.

This COW allowed the family to use a cell phone to call local authorities before it was too late. The local fire chief and police chief arrived, they broke down the gate to the ranch, and with flames literally

30 feet behind the family's car, the two men were able to save that family. That particular rescue effort was nothing short of heroic, and that exemplary coordination in that case between local authorities and Verizon is a model for disaster relief and rescue efforts across this country.

Yet another thing we learned at the Sandy field hearings was the value of getting useful information about emergencies to the public. In California, that is happening in all sorts of innovative ways. One example is Google's new public alerts feature available through Google Maps.

In addition to a catalogue of national emergencies available online, the feature lets users search for nearby alerts in any way they want. Searches run from the mundane, like Storm Watch, to the serious, like Earthquake Relief, apparently to the fatalistic, like Zombie Apocalypse, which is in fact a real search that has been

conducted.

We need to figure out new and useful ways to get people the information they need when they need it, and that is precisely what innovators in this area are aiming to do. I look forward to hearing from our witnesses today about recent developments on this front.

We also need to examine how emergency information is reaching, or not reaching as may be the case, diverse communities. And there is no better place to study that issue than California.

According to 2011 data from the Census Bureau, 43 percent of California residents speak a language other than English in their homes. An estimated 112 languages are spoken in the Bay area alone.

Today, California broadcasters are transmitting programming in a wide variety of languages, including Spanish, Vietnamese, Portuguese, Mandarin, Cantonese,

Korean, and Tagalog. What are these radio and television stations doing to provide viewers and listeners with important public safety information?

Speaking of other languages, I am truly amazed at some of the pioneering ideas coming out of California companies for bridging the language gap that we see all too often. During a visit last month to a public safety answering point in Virginia near Washington, D.C., I heard how 911 call centers are using a Monterey-based hone service called Language Line to provide interpretation services to its emergency personnel.

At low cost, Language Line lets public safety officials reach a translator almost instantly no matter what language is needed. That is the kind of innovation that we need if we're going to confront the challenges of the 21st century emergency communications network.

So, inclusion, it's my hope that today's hearing will continue this productive exchange of information and enable us to make better decisions on a federal, state, and local level about how to make our communications networks more resilient during emergencies.

I thank you all for coming, and I look forward to hearing the testimony of our witnesses.

I also want to introduce by video our colleague, Commissioner Clyburn. Commissioner Clyburn was not able to be here, but I can assure you that she shares the same priority that we all do when it comes to the public safety aspects of our communications network. And I hope you will enjoy, as much as we will, her video presentation.

Thanks.

COMMISSIONER CLYBURN: Good afternoon, everyone. I am very sorry that I could not join you in person, but allow me to

thank the Ames Research Center, the career staff of the FCC, and all others who made it possible to hold this critically important hearing.

As a native South Carolinian, I know all too well how terrifying catastrophic weather events can be. And as an FCC Commissioner, I take very seriously the obligation Congress gave us in the very first section of the Communications Act -- to promote safety of life and property through the use of wire and radio communications.

Three weeks ago, we held discussions in New York's lower Manhattan and Hoboken, New Jersey, two areas that suffered substantial damage to their infrastructure and networks during Superstorm Sandy. Millions experienced significant communications outages, and we heard testimony from first responders, communications service providers, and government officials about what went right

and what went wrong.

In this, our section national hearing, we continue to explore ways that stakeholders can promote greater network reliability, so we all have access to communications services when we need them the most -- during emergencies.

Those discussions highlighted a few areas worth nothing. First, we tend to treat each network as independent in our current telecommunications reliability framework. But the reality is that one network is inextricably linked to the other. A person in crisis may have a wireless device to call for help, but that call won't be answered by a dispatcher without dependable wire line and electrical networks.

Second, we have to be prepared for the unexpected. As the fires in Breezy Point, New York, demonstrated, related disasters can quickly follow severe weather events. So we need to be more nimble, and

one way to do this is by continuously reviewing laws and regulations and eliminating those that have unintentionally erected barriers to preventing, for example, temporary cell towers from being sighted and fuel trucks from entering communities that desperately need held.

Third, we should ensure that we can handle calls from diverse communities, including those facing communications difficulties, such as language barriers or accessibility challenges.

And what about our warning networks? Are emergency alerts able to be understood by all? True preparedness requires clear communication. We may not have as many wildfires or experience the magnitude and intensity of earthquakes as the Golden State, but what is universally clear is the fact that addressing the challenges we face, and preparing for future disasters, will require constant review and fresh

thinking.

I look forward to reviewing the testimony from the panelists, and thank you very much.

CHAIRMAN GENACHOWSKI: Well, thank you to each of my colleagues for your opening remarks. I mentioned that we have with us California State Senator Alex Padilla, who is the Chair of the State Senate Standing Committee on Energy Utilities and Communications.

And before we turn to our witnesses, let me ask Senator Padilla to present a few remarks.

SENATOR PADILLA: Good afternoon, everybody. Chairman, I want to thank you for the invitation, the opportunity, to be part of this field hearing. As you mentioned, I chair the Policy Committee in the California State Senate that oversees energy utilities and communications.

And so we are happy to be part of

this important national dialogue clearly on the resiliency and reliability of our communications networks in times of natural disasters.

I want to also say I just appreciate your leadership on this issue. In recognition of your hearing just two weeks ago in New York and New Jersey, we were almost simultaneously holding a hearing in the State Capitol discussing California's implementation of next generation 911, texting to 911, the new wireless emergency alert systems, and our emerging public safety broadband networks.

Our goal, I think collectively, is to establish a state-of-the-art IP-based communications platform that enables both the public to contact emergency services during a crisis as well as for government to keep the public informed on how to stay safe in an emergency.

So today's hearing is certainly

timely as a followup to those conversations and underscore I think the necessity for combined federal and state initiatives to harness modern technology to meet today's critical public safety challenges.

I applaud you for conducting the national hearings. Several of you focused already on a need to not just have a northeast or east coast conversation, but to recognize that in the west and everywhere in between the different geographic regions of our nation have their unique challenges.

While hurricanes such as Sandy and Katrina are major threats to public safety on the Atlantic and Gulf coasts, and tornadoes and blizzards in the Midwest and Great Plains, our geography and climate here in the West require emergency preparedness for wildfires, rainstorms, mudslides, floods, and, worst of all, earthquakes and tsunamis.

And as many of you recognize, it's fitting that the FCC decided to hold its

hearing here in Silicon Valley. The innovations of California-based entrepreneurs are changing every aspect of modern life and will surely transform public safety communications as well.

In California, we consider ourselves the epicenter of the global internet economy and the new app economy. The reality is that we are also a seismic epicenter as well. In 1989, the epicenter of the magnitude 6.9 Loma Prieta earthquake was just 30 miles south of here.

That quake was the largest to hit the Bay area since the great San Francisco earthquake in 1906. It claimed 63 people in that earthquake, and another 1,700-plus were injured. There was about $6 billion in damage.

Just five years after that earthquake, a magnitude 6.7 earthquake hit the Northridge community in my own district, in Los Angeles. That quake left 60 people

dead, 7,000 injured, 20,000 homeless, and 40,000 buildings damaged.

Just as east coast residents remember the names of hurricanes, Californians remember the epicenters of our earthquakes -- Loma Prieta, Northridge, Whittier Narrows, Sylmar, on and on.

In 2008, the uniform California earthquake rupture forecast released a report that included a prediction of a 99.7 percent likelihood of a magnitude 6.7 earthquake within the next 30 years.

In January of this year, our friends at the California Institute of Technology and at the Japan Agency for Marine Earth Science and Technology published a study which concluded for the first time that a state-wide megaquake involving both Los Angeles and the San Francisco metropolitan areas is indeed possible. Not a Frankenstorm like in the east, but a megaquake in the west.

Californians live with the reality that it is not a matter of if, but a matter of when, the next big one will hit, and the next big one just possibly got bigger. We know that we can't prevent earthquakes, but I do believe that we can and should do everything we can to prepare and mitigate harm. And that means utilizing today's wireless and broadband networks and our mobile devices to better prepare ourselves and safe lives by providing critical advanced warning when possible.

As I mentioned, our friends at Cal Tech and UC-Berkeley and the U.S. Geological Survey, and others, have developed a demonstration earthquake early warning system known as the California Integrated Seismic Network. It is an important first step.

Unfortunately, this project, which has been demonstrated to work and seeks to grow, hasn't been able to do so due to

lack of funding. A comprehensive earthquake early warning system would utilize telecommunications facilities in two significant ways -- telemetry to transmit detected seismic activity to central processing locations, and two, for sending earthquake warnings to the public.

Such a system would provide Californians critical seconds to take cover, to assist loved ones, to pull to the side of the road, or exit a building. It would also provide the necessary time to stop a train, to power down critical infrastructure, and turn off industrial machinery, or trigger other automated shutdowns that could save lives.

And such a system would not only alert the public, but speed the response of police and fire personnel by quickly identifying the areas hardest hit by an earthquake.

Systems like this are not a

vision of the future. Indeed, they are already in place -- Japan, Mexico, Turkey, Italy, China, just to name a few countries that either have a system or are currently deploying one.

Japan's earthquake early warning system provided the public with critical advanced warning of the 9.0 magnitude Tohoku earthquake in March of 2011. A public emergency announcement was sent out automatically within seconds of the sensors detecting the quake. The announcement interrupted TV and radio programming and activated cell phone apps.

About 52 million received an early warning and millions more downloaded the app soon after in order to be alerted of large aftershocks.

I look forward today to the presentation of several individuals on the first panel, because I think it's a demonstration that we have a lot to learn

from each other. And I thank the FCC for convening not just national experts but international experts, so we can best benefit from the best available technologies.

Let me end just by saying this. I want to be clear in my communication to the FCC here today that I believe that using modern communications technology to mitigate harm from an earthquake should be one of the nation's highest priorities.

In a state where the loss of life and devastation from earthquakes are not-so-distant memories, and the potential threat of the next earthquake being so great, and given California's prominence in population and in economic output, I think making it a national priority is clear.

So I thank you, Mr. Chairman, and the entire Commission for the opportunity to participate today and remind us all that, yes, California is home to the Silicon Valley, but we are also home to the San

Andreas Fault. Let's put our innovation and creativity to work to meet the public safety challenges that lurk beneath our soil.

Thank you.

CHAIRMAN GENACHOWSKI: Thank you, Senator Padilla, very much.

Let's proceed to our panelists. Thank you, again. We are pleased to have with us Mr. Hirohito Noda, who is the Senior Vice President of NTT DOCOMO; Nayeem Islam, the Vice President of Engineering from Qualcomm Research; Haresh Kamath, Energy Policy Research Institute, Program Manager for Energy Storage, the Electric Power Research Institute; and Thomas Nagel, Senior Vice President and GM Wireless Services for Comcast Cable.

Let's begin with Mr. Hirohito Noda with brief opening remarks, and we'll ask Roger to keep us on schedule.

Please.

MR. NODA: Thank you, Chairman

Genachowski and Commissioners, for allowing us to share our experience and lessons from the great East Japan earthquake. The earthquake on March 11, 2011, caused widespread devastation.

NTT DOCOMO is Japan's leading mobile operator. We experienced service suspension due to extensive damage caused by the earthquake and tsunami. The disaster resulted in 6,720 base stations being inoperable in East Japan, particularly in Tohoku -- 4,900, 45 percent of total 11,000 stations, power -- get out of operation.

Power outage was the biggest cause, as Commissioner McDowell pointed out in the case of Superstorm Sandy, which accounted for 86 percent. And transmission line disruption was next, about eight percent of the total.

DOCOMO promptly started restoration by deploying COWs and mobile or portable power generators from across the

nation. It took 19 days to complete most of emergency restoration. And in about seven weeks we recovered almost pre-disaster-level cellular coverage.

In response to the experience and lessons of that earthquake, DOCOMO devised and implemented new disaster preparedness measures based on three basic categories. Number one, security communications for key areas and facilities, such as administrative centers and densely populated areas.

We have installed large zone base stations throughout the country, separately overlaying regular base stations in a total of 104 locations covering 30 percent of national population. They are capable of covering a seven kilometers radius with 360-degree antenna.

For vital facilities such as administrative centers or municipal halls, we have installed generators or large 24-hour batteries to 1,900 base stations covering 65

percent of population.

So, number two, swift response to disaster-stricken areas. DOCOMO prepared 3,000 units of satellite mobile phones for immediate distribution. And we have also increased number of mobile satellite entrance lines and deployed emergency micro entrance systems for quick and flexible restoration in the future.

Number three, further improvement of customer convenience during disasters. We started and have expanded services designed for disaster, including restoration area maps, which inform our customers of restored cellular coverage.

After the earthquake, maximum voice traffic reached 60 times the usual volume in Tohoku region. We had to implement call restriction to 80 to 90 percent of outbound calls. But packed traffic did not spike to the same degree; only about 2.5 times. We could go through with less than 30

percent restriction.

DOCOMO's email server continued to deliver messages throughout these hours. Packet data communication was proven to be a robust means for communication in the event of disaster. Thus, DOCOMO developed and started file-based voice message service utilizing disaster-resistant packet communication.

And DOCOMO has been providing priority cellular subscriber contracts to the organizations such as governments and public infrastructure operators, which are free from traffic control, to ensure communications for their disaster response. We also reserve priority channels in our network that can be preferentially assigned to them under heavy congestions.

I hope our experience will be of some help for more resilient communication during disaster, not just in the United States, for all over the world.

Thank you so much.

CHAIRMAN GENACHOWSKI: Thank you very much. Mr. Islam?

MR. ISLAM: Thank you. First off, I would like to thank the FCC for inviting Qualcomm to participate in this important hearing. It is a pleasure for me to be here a long with you all and the FCC Chairman and Commissioners.

Today, I will talk about three technologies that Qualcomm is working on that are relevant to improving the reliability of communications during emergency situations, including natural disaster. The first is a technology that enables device-to-device discovery and communication over LTE called LTE Direct.

LTE Direct is a synchronous system that is designed to work in licensed spectrum, and, thus, will be particularly reliable. It is one of the enhancements being proposed in 3GPP by many companies for

inclusion in LTE Release 12 and includes use cases for both commercial and public safety.

On the commercial side, LTE Directive enables an operator-controlled context aware platform. The popularity of mobile apps has really exploded in the last couple of years. Autonomous proximity-based applications represent the latest trend in the mobile app space. However, these applications have seen limited mainstream adoption due to the scalability, power, and privacy challenges they face with existing over the top paradigms.

A key goal of LTE Direct is to enable the discovery of relevant, proximate applications and peers in an autonomous and battery efficient manner without compromising user privacy. LTE Direct can enable long-range, up to 500 meter, discovery of thousands of services and devices, with minimal battery impact and minimal spectrum resources.

This discovery and subsequent communications can occur on a device-to-device basis, which means without relying on infrastructure that may be unavailable in the event of the natural disaster or emergency situation.

Not surprisingly, there is a significant amount of interest in LTE Director's device-to-device communication and discovery capability by the public safety community. A key requirement of first responders is the ability to communicate with each other in a disaster scenario even if the macro network is unavailable.

This distributed traffic scheduling and discovery design of LTE Director provides the ability for the devices to discover each other and communicate with each other with very low latency in these public safety scenarios where there is no macro network coverage.

The next technology is the

precise indoor location capabilities that are currently available as part of Qualcomm's IZat location platform. These new indoor positioning capabilities enhance the end-to-end IZat location platform, which is designed to deliver ubiquitous, always-on location.

The platform is based on Qualcomm's broad technology portfolio, including cellular, global navigation satellite system WiFi sensor, and cloud-based assistance data solutions, as well as the industry's most widely deployed location core, already found in more than one billion devices on mobile networks worldwide.

With its leadership position, Qualcomm can now deliver new indoor location capabilities on a large number of mobile devices. The enhanced IZat location platform enables more precise positioning, within three to five meters, inside buildings to ensure an optimal consumer experience.

IZat indoor solutions provide up

to 10 times greater accuracy in both open and closed environments over existing platforms. In addition to enhancing the location capabilities of mobile devices, the IZat location platform includes infrastructure technologies that enable WiFi networking customers to deliver location-aware networks.

Qualcomm's latest 802.11ac and 802.11n access point solutions feature advanced WiFi-based positioning calculations to pinpoint locations with greater accuracy.

The third technology I want to discuss is the usefulness of small cell technologies during emergency situations. As many of you know, Qualcomm is constantly researching and developing means of squeezing the most capacity out of currently available spectrum. We are working on a number of technologies to address the burgeoning mobile traffic demand on today's wireless networks using new, clear spectrum, as well as spectrum that cannot be cleared in a

reasonable timeframe or may never be cleared.

The industry is now preparing for a staggering 1,000-times increase in data demands. Conceptually, our efforts to meeting this 1,000-times challenge can be summed up into three main groups. Enabling the use of more spectrum, both in low bands and higher bands, such as around 3.5 GHz, which is especially suitable for small cells.

Enabling operating deployment of small cells everywhere, both indoors and outdoors. To reach 1,000x capacity we need a lot more small cells indoors, outdoors, at all possible venues, residences, enterprises, all types of technologies -- 3G, 4G, WiFi, and all types of femtos, picos, relays, and remote access radios, distributed antenna systems, et cetera.

Essentially, extremely dense deployment of small cells brings the network closer to the user to provide capacity where needed. We call these networks hyper-dense

networks.

In emergency situations where there is a dense network, there is a much greater likelihood that public safety personnel and the general public will have connectivity.

The third component of the small cell strategy is to provide end-to-end efficiency across the system. One important example is the small center interference management solutions that are currently required for the deployment of hyper-dense networks.

Providing communications during emergency situations is critically important. Qualcomm's approach to enabling such communications is through enabling network densification as well as enabling communications among a neighborhood of users via LTE Direct. These technologies enable data and voice connectivity to as many users as possible when communications are needed

most.

CHAIRMAN GENACHOWSKI: Thank you very much. Mr. Kamath?

MR. KAMATH: Thank you. Thank you, Mr. Chairman, and members of the Commission. I'm Haresh Kamath, Program Manager for Energy Storage and Distributed Generation for the Electric Power Research Institute. EPRI is a nonprofit collaborative organization conducting research and development relating to the generation, delivery, and use of electricity for the benefit of the public.

EPRI has been voluntarily supported by the electric power industry since our founding in 1973. Our members -- public and private -- account for 90 percent of the electricity generated and delivered in the United States, with international participation extending to more than 30 countries.

We do appreciate this opportunity

to participate on this panel examining the challenges to the nation's communications networks during natural disasters and other times of crisis. My remarks will concern backup power options that can support the availability and reliability of communication networks in such contingencies.

Modern communication networks rely on the electric grid to supply primary electrical power to their constituent parts, from central offices and switching stations to antenna towers to the individual fixed and mobile devices directly used by consumers.

When the grid is unavailable, as may occur during natural disasters and other emergencies, these networks must rely on backup power from a variety of other sources built into the system. Today, valve-regulated lead acid batteries and diesel generators are the most commonly used forms of backup power in telecommunications systems.

In the future, more advanced technologies may allow for longer backup times, lower capital and maintenance costs, and higher reliability for the communication network as a whole.

Electrochemical batteries have been used to power telecommunications systems since the days of the earliest telegraphs over 175 years ago. While modern telecommunication batteries are based on the same lead acid chemistry developed in the 1850s and ‘60s, continuous improvements in materials and manufacturing techniques have made batteries much more reliable and easy to use.

Despite these advances, modern batteries still have relatively short run times and most backup battery systems are limited to providing power for only a few hours. The reliability of battery backup systems has also been called into question on occasion, as batteries can be sensitive to

operating temperatures and other environmental conditions and have relatively short useful lives.

Newer battery technologies, such as lithium ion batteries, can store much more energy in a given weight and volume than conventional lead acid batteries. Lithium ion batteries may also provide backup power for longer periods of time, as well as having higher reliability.

These advantages come, however, at a significantly higher initial capital cost, at least at present. Research and development towards lower cost lithium ion batteries continues, as well as research into more advanced battery technologies, such as solid state batteries and flow batteries. These latter technologies show promise in backup applications, but still are at a very early stage of development, and most likely to require more testing and development before they can be widely deployed in backup

power applications.

Diesel generators are often used to extend the operating times of critical telecommunications equipment in times of contingency. These machines are relatively durable and moderate in cost to procure and install and are generally a good option for emergency power. However, they require regular maintenance and there are often concerns with engine starting and fuel aging, particularly in cold climates.

While a great deal of progress has been made in reducing emissions from diesel generators, some jurisdictions are concerned with these emissions. These issues have led many to search for new technologies that address these perceived shortcomings.

Many researchers have proposed the use of natural gas-based generators in the place of diesel generators, advanced natural gas-based power sources, such as micro turbines and fuel cells, may also be

suitable for providing backup.

Such devices have already been deployed for backup power as demonstration projects with very encouraging results. It is important to recognize, however, that such technologies require the natural gas mains to also remain operational during an emergency.

In many jurisdictions, gas mains are automatically turned off during such emergencies. Gas mains may also rely on electrically driven pumps to maintain pressure, and these pumps will naturally require their own backup power sources. Without the gas mains, a natural gas generator must also have a local supply of fuel to provide backup power.

Finally, the use of renewable energy sources, such as solar and wind, cannot be ignored as a possible source of energy during emergency periods. While these power sources are intermittent and so cannot be the sole source of power in a community,

when paired with a storage system or other backup generator, they can be used to provide power for long periods of time.

These devices must of course be made to survive the likely natural disasters in an area. The rapid reduction in cost of these renewable power sources has made them an increasingly attractive choice for operators.

EPRI believes that the proper use of backup power technologies is important to ensuring that telecommunication networks are resilient and reliable in the event of future emergencies. While the electric grid is itself a highly reliable system, backup power can be invaluable in those unusual circumstances when power is lost due to a natural disaster or other event.

EPRI will continue to work with its members and other collaborators to investigate the use of backup power technologies in these circumstances.

CHAIRMAN GENACHOWSKI: Excellent. Thank you. Mr. Nagel.

MR. NAGEL: Chairman Genachowski, Commissioners McDowell, Rosenworcel, Pai, thank you for allowing me to participate on this panel.

Over the last year, our nation has lived through events that reinforce how important it is to have resilient and reliable communications networks available on a broad scale and as quickly as possible following a natural disaster.

For Comcast's part, one important aspect of our efforts is to ensure that our broadband customers stay connected in these situations is our rapidly growing WiFi network. Over the last few years, we have undertaken a major new investment to deploy tens of thousands of WiFi access points throughout our footprint.

This investment has extended our existing network in ways that make it more

reliable, more flexible, more interoperable and easier to use. Consumers can use any WiFi equipped device to gain access to and enjoy high-speed wireless internet service, and Comcast is partnering with other cable operators to build one of the world's largest WiFi networks with hundreds of thousands of access points around the country that any of our customers can use.

WiFi networks also play an important role in disaster recovery, as demonstrated in the aftermath of Superstorm Sandy and Windstorm Nemo. After Sandy, Comcast and other cable operators decided to open up over 20,000 access points in the hard-hit areas to anyone with a WiFi equipped device, not only our customers but anyone.

We also opened up our WiFi network in areas affected by Nemo. And during the week after the storm, we carried, you know, almost seven more terabytes of data than we did the week before.

These efforts provided affected Americans with easy access to the internet, so they could obtain important emergency information and have a reliable way to contact their families. For years, policymakers have been taking about the need for an interoperable wireless network that would allow people to connect regardless of device or air interface during a time of emergency.

These discussions often focused on public safety and first responders. But citizens also benefit from access to the internet in an emergency. From the consumer's perspective, I believe we have a solution in WiFi.

As these FCC hearings have shown, large-scale national disasters can leave entire communities in the dark and out of touch for long periods of time. In that situation, making even one WiFi access point available can provide broadband access to

anybody with a WiFi-equipped device.

Getting a WiFi access point online will have more impact in getting a cell site reestablished, because almost every consumer today is equipped with a WiFi -- with WiFi, but not every consumer device can work on every cellular network.

When an entire network of WiFi access points is brought back online, emergency information can reach just about any consumer with a WiFi-enabled device. Therefore, policies that promote commercial deployment of WiFi networks and that ensure that these networks have sufficient spectrum, will allow us to be better prepared to provide communications following a disaster, ultimately accelerating the pace of recovery.

Another lesson we have learned is that because of the limited access to spectrum, our WiFi access points, once restored, are often overwhelmed with demand. Consumers have devices and we have the access

points up and running, but the unlicensed spectrum crunch limits the full effectiveness of the technology.

Of course, growing demand for WiFi is an everyday problem. The continued success of WiFi does depend upon having additional spectrum across a number of bands to keep WiFi services robust every day, and particularly during disaster recovery situations.

To that end, Comcast commends the Commission's recent efforts to identify and allocate additional unlicensed spectrum. The Commission's incentive auction proceeding, as well as the proposal for 3.5 and 5 GHz bands, represents significant and necessary steps toward providing the spectrum needed for robust WiFi.

In particular, Comcast looks forward to seeing harmonization within the 5 GHz band and will enable -- which will enable next generation wide-band WiFi to

thrive.

As we have seen in the aftermath of large-scale national disasters, WiFi can provide high-speed wireless internet access to citizens that need it, where they need it, and when they need it. WiFi networks, like expanding WiFi and cable WiFi, already have proven a substantial and tangible public interest benefits of having robust WiFi networks deployed throughout the country.

Comcast and other providers want to deploy additional access points and expand WiFi networks to even more communities. The more we do to promote WiFi, the more effective we will be in meeting our nation's connectivity needs.

CHAIRMAN GENACHOWSKI: Great. Thank you very much to each of our panelists for excellent and helpful input.

Let's proceed to questions. Commissioner Pai, why don't you start us off.

COMMISSIONER PAI: Sure. Thank

you, Mr. Chairman. And thanks to the witnesses for their presentations.

Your discussions made it clear that there are several pieces to the puzzle here. One is spectrum, of course, over communications will travel. One is the infrastructure piece of it. And one piece of it is of course power.

I guess I would like to start with the spectrum portion of the question. And this question would be for Mr. Nagel and Mr. Islam. Mr. Nagel, you mentioned near the end of your presentation that Comcast in particular is interested in harmonization within the 5 GHz band. Mr. Islam, you talked about the possibilities that the 802.11ac-based services could provide in a public safety context.

I was wondering if both of you could expand on why 5 GHz in particular is of interest to you. As you mentioned, Mr. Nagel, the Commission has recently taken

steps to make that 5 GHz spectrum usable on the commercial side.

MR. NAGEL: Well, I think one of the reasons why it is attractive is because it exists and it is in a lot of devices as we speak. So that is probably the most important aspect of it.

Getting an ecosystem built around a brand-new band just takes time, and I think the fact that 5 GHz is already in a lot of these devices allows us to do things I guess in a way that supports the underlying investment that has already been made. So that is an important part of it.

I mean, the other part of the 5 GHz is that it is a band that allows for high capacity and a smaller footprint. So the more that we are able to sort of support these high capacity channels, I think 5 GHz is a very good fit for that as well.

MR. ISLAM: Yeah. From my perspective, I'd say that we see WiFi as a

very interesting way for us to provide angle positioning solutions. So going to the higher bandwidth is also very useful for that. And so I think that's a -- and that's a natural progression and evolution for WiFi.

COMMISSIONER PAI: Okay. Mr. Noda, I had a question to your presentation. You discussed DOCOMO's use of large zone base stations following the earthquake. And I was wondering whether you think the deployment of large zone base stations could enable the management of an increased amount of cell traffic after an emergency here in the United States as well, or whether it is unique to the topology of Japan in particular?

MR. NODA: Yes. So when we use such a large zone base station, so we -- so sometime based on the traffic volumes, but we have to introduce some kinds of traffic access control. So for -- to save our networks at the same time. Yeah.

COMMISSIONER PAI: All right.

And I also understand that DOCOMO provided priority cellular subscriber contracts to --

MR. NODA: Yes.

COMMISSIONER PAI: -- local governments. I was wondering if you could amplify in more detail what the service provides and what the criteria is to obtain one of those --

MR. NODA: Yes.

COMMISSIONER PAI: -- contracts.

MR. NODA: Telecommunication business role -- cell phone providers, major telecommunications, even the underwriting operators to offer such a priority subscribers. So based on that role, we provide that kind of services.

And technically, so we follow the 3GPP standardization, so -- for the access control. So we have several different class for each subscribers. So usually it's -- so normally we provide zero to nine class for normal subscriber. But for that -- so

priority subscribers, we offer that, so 12, 13, 14, that kind of super numbers that cannot be entitled to any traffic control.

COMMISSIONER PAI: Okay. Before my time runs out, I want to make sure I tackle the power aspect of this as well. Mr. Kamath, I was wondering if you could discuss some of the factors that you believe the carrier should take into account as they consider whether and how to establish backup power for their networks.

MR. KAMATH: Absolutely. So if you think about the technical requirements for backup power, fundamentally you have to have a system that is able to be operational for long periods of time without interruption. But also, it has to be in readiness without a lot of maintenance costs and without a lot of work needed to keep it operational.

So a backup solution has to be something that sits at a cell tower or at a

switching station and not require a lot of maintenance and have a very long life at the same time as having a relatively low cost to being able to achieve that.

COMMISSIONER PAI: And since I do have a little bit more time, if I could ask Mr. Islam one more thing. Is there anything that you believe the FCC should do to facilitate small cell deployment? We share your enthusiasm for more textured, richer network architecture. And if there is anything from a regulatory perspective that we can do, we are all in favor of meeting that 1,000-times data challenge.

MR. ISLAM: Yeah. I think there is ongoing discussions, and so I think this is -- I mean, I think we're very, very enthusiastic about small cells. We think that is one of the only ways we are going to meet this tremendous challenge that we have with data services.

COMMISSIONER PAI: All right.

Thank you.

Thank you, Mr. Chairman.

CHAIRMAN GENACHOWSKI: Thank you.

COMMISSIONER ROSENWORCEL: Let me start by building on that last question about small cells. We are facing this tremendous 1,000-times increase in mobile data traffic. We want to make sure that we create every incentive possible for small cells to be deployed to help us meet that demand.

So I think I'm going to ask the inverse of Commissioner Pai's question. What policies are there out there that might be impediments to that kind of widespread deployment? Do any of them involve local zoning or land use ordinances?

MR. ISLAM: Yeah. I think there are -- I think that's an evolving area. As this evolves, there will be issues that come up, and I think we are right at the beginning of trying to understand some of these issues.

So, obviously, you know, when you

go into residences and all of the indoor -- so small cells definitely require both just -- not just outdoor deployments but a lot of indoor deployments to be effective. And so I think we are just going to start understanding them as we sort of build those systems out. But we are in the early days right now.

COMMISSIONER ROSENWORCEL: Well, you have to keep us posted.

Let me ask a question about power. After Hurricane Katrina, some years later, the FCC tried to put in place a generic backup power rule for all wireless towers. I think it is fair to argue this rule was overbroad and a little simplistic, and eventually the Office of Management and Budget disallowed it.

But here we are again some years later, after Hurricane Sandy, and we saw in the affected areas that one in four wireless towers was out of service. And in fact, in

those areas that were hardest hit, including some of the Barriers Islands off of New Jersey, that figure was significantly higher.

So the question I have is, as a matter of policy or practice, what should we be doing now to make sure that we have reliable backup power where we need it?

MR. KAMATH: Again, if you look at the technical requirements for what is necessary in those cases, certainly every carrier has to take a look at their own service territory and their -- the way that they are providing cellular service and make sure that they have a sufficient number of towers to provide the communications that are required.

It is very important to recognize that every tower has a different requirement for backup. There are some that are going to be more susceptible to problems than others. There are going to be some that are more accessible than others.

If you have one that is in a particularly inaccessible area, it may be difficult to get diesel fuel to it, for instance, if you have a diesel generator. And it may be better served by a solar facility or something like that.

On the other hand, if it's something that is relatively close by to a major service area, then perhaps it is easier for the service provider to actually have a more conservative backup solution that does not have -- that you can refuel or do whatever you need to with.

Essentially, making a one size fits all rule for these is very difficult to -- it's difficult from a technical standpoint to understand what the requirements would be that would allow you to institute one design for all service areas like that.

So it would take -- it is probably better to have these service providers look at what they need to maintain

their entire network and develop a plan on that basis.

COMMISSIONER ROSENWORCEL: Could I just ask Mr. Noda to respond to the same? Tell us what you know or what you have learned regarding backup power in Japan.

MR. NODA: Yes. So particularly in that time of such disasters, so we -- so preparation for the backup power, so support of a generator or mobile generators that can carry the vehicle. So it's pretty important to quick restoration.

So if we have a couple of days, so many areas can be -- so in many areas we can regain the power supplies in many cases. But for the immediate --o immediately after the disaster, so we need to cover immediately, and we need to -- so secure our communication by providing the backup power, emergency backup power, so -- by bringing our portable generator or portable so -- mobile generators.

COMMISSIONER ROSENWORCEL: While I have a little time left, I'm going to ask Mr. Islam a very quick question. I am completely intrigued by the idea of turning your devices into nodes, into a mesh network, particularly in the aftermath of disaster.

But a very quick question. Does turning those devices into nodes drain their battery power faster?

MR. ISLAM: That's a very good question. I think in the way we have approached LTE Direct that was one of the major design constraints that we had, and we think we have a good solution. So --

COMMISSIONER ROSENWORCEL: Okay.

CHAIRMAN GENACHOWSKI: Okay. Thank you.

Commissioner McDowell?

COMMISSIONER McDOWELL: Thank you, Mr. Chairman. All terrific questions.

And, actually, I want to drill down maybe a little bit further from

Commissioner Rosenworcel's questions on backup power, because I think this is absolutely vital. And, actually, I'm the only member left on the Commission who voted for that overly broad and simplistic order.

(Laughter.)

And we can learn from our mistakes. It was good intent and it was unanimous. But I did have reservations at the time, which you will see in my statement. But, nonetheless, I did vote for it, and so here we are.

But so I want to drill down a little bit further in terms of I guess one of the things perhaps each of you might say, but I don't want to put words in your mouth, is depending on the unique situation of each tower or wherever that wireless signal meets a piece of fiber or fire, the backup power situation is unique. Is that -- the best backup power situation is unique, is that accurate?

MR. KAMATH: Definitely. Definitely would say that.

COMMISSIONER McDOWELL: Okay. So, and then to drill down a little bit further on what you said, so, you know, upon reflection over the past five and a half years, since I voted for that overly broad and simplistic order --

(Laughter.)

-- I am skeptical of the FCC's authority to actually have a mandate here, let alone the practical implications, as you've sort of pointed out. So just to drill down a little bit further, you're saying that actually a mandate really would not be helpful in this regard? And what would be the best way for us to be positive and constructive at convening for and trying to come up with industry solutions to make this better? Or what? What would you recommend we do?

MR. KAMATH: So from my

standpoint, let me just state that EPRI, as a 501(c)(3), we are not actually able to make any kind of policy recommendations in this respect.

COMMISSIONER McDOWELL: We use that all the time.

(Laughter.)

Especially when you're being asked.

MR. KAMATH: But from a technical standpoint, again, I think the important consideration is the reliability of the system. And the service providers each have to provide their own requirements on -- or their own understanding of what is required to meet a certain level of reliability.

So perhaps -- you know, perhaps Mr. Nagel has some opinions on that, but certainly every service provider is going to have a different approach to how they achieve that level of reliability.

COMMISSIONER McDOWELL: So either

from Comcast or NTT DOCOMO, any suggestions? Obviously, in Japan, earthquakes are a common phenomenon, and the unfortunate experience with the tsunami as well.

MR. NODA: So we, NTT DOCOMO, have a strong sense of missions to secure the lifeline -- so communication as a lifetime. So we are pretty much waiting to -- so implement those backup batteries to secure the communication by ourselves. So --

COMMISSIONER McDOWELL: So you do it by yourselves.

MR. NODA: Yeah.

COMMISSIONER McDOWELL: So the government does not mandate -- the government of Japan does not mandate --

MR. NODA: Yes. We are not mandated. Just by ourselves.

COMMISSIONER McDOWELL: Are there discussions in Japan about some sort of mandate?

MR. NODA: Yes. So --

COMMISSIONER McDOWELL: On backup power.

MR. NODA: This is -- yeah. This is a part of our competition. So how to -- so provide secure and so -- resilient communication, even under the disaster. Of course, we have many different types of disaster, including the earthquake, typhoon, or such.

And we -- in several times over a year we experience that kind of disruption in a small area of the -- of Japan. So, and all three operators are competing, so how to implement a more reliable network by --

COMMISSIONER McDOWELL: So you're saying essentially the marketplace --

MR. NODA: Yes.

COMMISSIONER McDOWELL: -- will resolve --

MR. NODA: Exactly.

COMMISSIONER McDOWELL: -- and customers will --

MR. NODA: Yes.

COMMISSIONER McDOWELL: -- gravitate towards those networks that don't go down.

MR. NODA: Yeah.

COMMISSIONER McDOWELL: Okay. So, and what's interesting, too, about it also, you know, we -- small cell technology, WiFi, or whatever, that is still dependent upon electricity.

But I wanted to drill down a little bit on Qualcomm's LTE Direct. Could you maybe give us more detail on how far apart, what is the coverage area, how much power is needed, so -- from transmitter to end user or between end users, what is sort of the footprint here? And then how dynamic is that if one transmitter, let's call it that, goes down due to a power outage?

MR. ISLAM: So the LTE Direct can operate without the macro network. So this is device-to-device communication, and that

is approximately 500 meters. And the actual transmit part that -- it depends on the distance these devices are, when they start communicating how far apart they are.

COMMISSIONER McDOWELL: Five hundred meters.

MR. ISLAM: Yeah.

COMMISSIONER McDOWELL: Okay.

MR. ISLAM: Zero and five. So it could be anywhere in that.

COMMISSIONER McDOWELL: Zero --

MR. ISLAM: Yeah, yeah.

COMMISSIONER McDOWELL: -- to five. But we hope it's more in the 500 than the zero.

MR. ISLAM: Yeah. So -- right.

COMMISSIONER McDOWELL: Okay. Very good.

All right. Very good, Mr. Chairman. In the observance of time, I have five, four, three, two -- okay. Now we're out of time.

CHAIRMAN GENACHOWSKI: Thank you. Let me ask -- Mr. Islam, let me start with you. Different disasters put different pressures on communications networks. In the derecho last year in the D.C. area, in the earthquake in Japan, and I presume this would happen in an earthquake here, in the immediate aftermath there is tremendous overload potential on communications networks, everyone at the same time calling friends and family, calling 911.

And so let me ask you to address that. What are the steps that can be taken to increase the likelihood that immediately after a sudden disaster the networks operate for people calling 911, for example? Let me ask Mr. Islam, and then I'll ask Mr. Noda.

MR. ISLAM: Yes. So I think one of the -- so this is the beauty of LTE Direct, because the macro network is not needed for this communication. So we think LTE Direct will be a very good solution for

some of these disaster scenarios, and will give you the opportunity to sort of communicate, for example, first responders so we will be able to communicate in these --

CHAIRMAN GENACHOWSKI: Let me make sure I understand that. So in an LTE Direct world, if the derecho had happened, are you saying that if people then called 911, it would be as if it was an ordinary time and people would be able to get through?

MR. ISLAM: No. So I think -- what I'm saying is that with LTE Direct there is obviously a limited area in which you can communicate with, you know, peers, so within 500 meters sort of distance. And so that would be -- sort of the range at which you could communicate.

CHAIRMAN GENACHOWSKI: And so, Mr. Noda, maybe you can help on this, too. What has been the thinking in Japan on this? How to handle that immediate period after a disaster when so many people are trying to

use mobile to communicate with emergency services or family?

MR. NODA: So in the immediate aftermath, so when we have a huge amount of traffic, so the voice communication -- so that needs a simultaneous connection. So it is very difficult to handle, actually. And so as I explained in my statement, so we experienced 60 times traffic volume as usual -- than usual. So, and that cannot be handled by our network.

So -- but so on the other hand, so packet transmission, so data communication, is by just 2.5 percent. And even -- so also at the time of the -- right after the great earthquake, we can still communicate via email. So our email server can handle the messages, so we strongly recommend our users to use packet data transmission for their immediate communication after the -- after such big disaster.

CHAIRMAN GENACHOWSKI: So let me build on that and ask the panel, what are steps that should be taken to help consumers understand, one, how to prepare most effectively for a disaster -- sometimes we know they are coming, like hurricanes -- and what they should do immediately after a disaster, given some of these challenges.

Mr. Noda, let me ask you, and then Mr. Nagel.

MR. NODA: Yes. It is somewhat difficult, but so we started providing -- so voice guidance for -- for sending a message to -- so message board for the time of disaster. So to inform their families or relatives of their safety, of their place, of their -- whatever.

So, because some of our customers did -- is not accustomed to -- are not accustomed to using data communications. So it is so difficult, so -- for them to use the -- so data communication only at a time of

disaster. So we started providing voice guidance, so easier to guide them to use that kind of communication method. So that is about --

CHAIRMAN GENACHOWSKI: Yes. Mr. Nagel?

MR. NAGEL: Yeah. I think the point that for -- you know, in an emergency, there is two types -- one that you know is coming, and it's a lot easier. So a great example was Sandy for us where we were in the path of the storm, and the prognosticators got it right, and so we knew ahead of time there was going to be something bad.

And so we actually decided before to open up the WiFi network, and we used a series of communications just to try to get the word out both to the governmental agencies, but also just through communications that we had, and it worked for us because what happened is once we opened it up, you know, for -- we'd allow people who

aren't our customers on each month anyway. But once we did that, we were getting like -- I wrote it down, like eight times the sessions that we got the week before from these customers. We got 20 times the tonnage, 15 times the megabit per user.

So what we learned is that we can email these folks, we let them know things are coming, and that we do our best that when they come to the WiFi access point and they try to log on, we put a message up there that you can get on for free, it's going to be for a while, and so that worked for us.

The idea of a packet communication or data communication was very powerful, because the voice networks do get overwhelmed.

CHAIRMAN GENACHOWSKI: Let me ask you, Mr. Nagel, you did a very effective job of explaining the benefits of WiFi during times of emergency, and I think we all appreciate that that is the case.

As you are rolling out more and more WiFi in your areas, how do you think about the power issues when it comes to maintaining WiFi after disasters?

MR. NAGEL: It's a great question. Power is obviously the life blood of our businesses. And, you know, I am just looking at the number of electronics here on the panel just that we are using. They all have to be plugged in.

What we do in our networks is that we actually have network powering. So if you can connect to our network and you -- your product works, our network is powered, you can -- the active components of the network work.

So, and in a situation like where you have a really bad environment, we are putting -- every place that we put WiFi -- and we do this even without WiFi, it exists, but we are putting additional power supplies everywhere throughout our network to take on

the load of all of these different WiFi access points.

And that what it does is that even -- if a wire is broken, I can't do anything about that; it's broken. But if my wire is not broken and power is out to the homes, they can utilize through their homes and all of their devices, as long as they have powers in these things, they can get access because we drive power.

And the reason why we can do that if we have lower loads than a cell tower does. A cell tower has a lot more wattage coming out of it, it has a lot more power that it needs, and so we are in a little different place. It's one of the reasons why we are trying to drive more coordination with the power company and the cable company, so when you have a disaster they always think of us as video, and so we have become a second tier sort of first responder.

And so we are trying to convince

people that we ought to be able to be with the power company as we get networks up and running. So those are the steps that we are seeing and that are helpful.

CHAIRMAN GENACHOWSKI: I think my time is close to up, so let me just -- one more comment and a question. There is -- some of the input we've got is that a one size fits all rule on backup power is likely to be both over- and under-inclusive and has challenges.

We heard a suggestion that relying on competition is one way to see networks compete with each other for resilient networks, and yet it's unclear how consumers can find out how different networks compare on their resiliency. And so in the absence of that, it is hard to know how that is a solution, and perhaps greater transparency is something that we can explore as a way to empower consumers and support more resilient networks.

But let me just conclude with a question with Mr. Kamath. From a consumer preparation perspective on the power side, what would you want consumers to know, both in preparing for a disaster or immediately after a disaster, that could help them prepare for and respond to disasters given the challenges around power and communications?

MR. KAMATH: Right. Very briefly, keep your devices charged as much as possible.

(Laughter.)

What we found in the aftermath of Sandy and the other disasters that has passed recently is that actually people have significant amounts of backup power in their backup devices, in their cell phones and in their laptops. And when they do, then they can keep their communications going for longer than they expected, as long as the -- of course, the network is up and running.

So, you know, if there is anything that, you know, we would draw from that, it's really that those devices, especially your laptop, you can use your laptop to charge your cell phone. So keep your laptop charged, and that's a good option to have some backup power.

CHAIRMAN GENACHOWSKI: Great. And I'll mention, your car is another source of power. I will mention briefly that after one of the first disasters that we had several years ago -- I can't remember which one it was -- but the FCC worked with FEMA and others to develop a set of best practices and advice for consumers.

And I think all of us working together to perform that material and to use all of our distribution channels to get those to consumers would be helpful.

With that, let me thank each of our panelists, and thank you, again, in advance for the help that you will provide

after the session as we ask you followup questions and encourage you to continue to submit ideas.

With that, the first panel is concluded. Let's take a five-minute recess, and we'll begin in five minutes with the second panel.

(A brief recess was taken.)

CHAIRMAN GENACHOWSKI: All right. We are going to reconvene.

Welcome to our second panel, a panel on cool stuff and communication. And we have Alicia Johnson, who is the Resilience and Recovery Manager for the City of San Francisco, Department of Emergency Management; Fred Wolens from Facebook, Public Police Director there; Ari Gesher, who is Engineering Ambassador at Palantir Technologies; and George Chamales -- did I pronounce that right -- principal at Rogue Genius, LLC.

So we will follow the same

procedure we followed for the first panel. We will ask each of our panelists to do short opening statements, and then we will have questions. We thank you each for participating.

Ms. Johnson, please.

MS. JOHNSON: Thank you. Good afternoon, Mr. Chairman and Commissioners. My name is Alicia Johnson, and I am the Resilience and Recovery Manager for the San Francisco Department of Emergency Management.

I have served with San Francisco for nearly two years, and previous to that I worked in emergency management throughout the intermountain west. It is a pleasure to speak before you today.

We know social media and all forms of new media are not a passing fad. Social media and its usage are here to stay. News of Osama bid Laden’s death, Beyonce’s baby bump, Christopher Dorner’s manifesto and his standoff, and most recently the crash at

the Daytona 500 which injured some 33 fans in the stands, have all spread by the use of social media and new media technologies.

At one point perhaps, even a few months ago, we spoke of managing social media, but that is no longer true. For emergency managers worldwide, social media is a vital source of connection, which requires interaction and abiding trust with the audience.

The river of information from any given, be it earthquake, manhunt, or hurricane, is vast and requires more effective analysis. Currently, we lack capable tools to analyze the amount of data, coal for vital nuggets of information, and process it accordingly.

As an emergency management agency, we desire to understand and communicate, but without analysis much of what do is only the tip of the iceberg.

The San Francisco Department of

Energy Management believes that communicating preparedness on all levels is simply an opportunity to build a more resilient community. We aim to meet people where and when they are, and as such have developed SF72, our latest community resilience initiative.

The thought behind SF72 is an open source, community-based capability. Contrary to many media portrayals, we know disasters, be they micro or macro, bring a community and a neighborhood together. SF72 hinges on that evidence. The premise of SF72 is something San Francisco emergency management has believed for many years.

Preparedness is more than a kit. It is about the social mesh that we build every single day within our own communities. We believe that an empowered and connected community is more likely to survive a catastrophe.

SF72 is but one tool in an ever-

growing toolbox designed to reach across demographic, cultural, and technological barriers. While the focus today might be emerging and established technologies, we know that engaging the whole community involves reaching out to them with all methods of communication and conversation, be they traditional or emerging.

Our aim, as noted, truly is to meet people where and when they are. From Twitter to church, the more actively we interact and engage with people, the more likely we are to build trust and influence change.

Social media does not replace traditional tools. Rather, it enhances our ability to interact directly with a growing audience and amplify that message beyond existing boundaries. It is a tool that cannot be ignored. Indeed, it must be embraced.

Recent events have taught us that

like a rip tide social media cannot be fought against. Survival and success hinges on ongoing -- hinges on going with the current and learning to operate with a new environment.

I am often told that San Francisco is on the cutting edge, but we have barely scratched the surface of the use of emerging technologies. There is much more to learn and many opportunities in the coming months and years to help influence our community to become more connected and more resilient from disaster.

Thank you.

CHAIRMAN GENACHOWSKI: Great. Thank you very much.

Mr. Wolens?

MR. WOLENS: Thanks. Thank you, Mr. Chairman, and thanks to the rest of the Commissioners for giving us an opportunity to speak about some of our efforts in this area.

And I actually want to start this

story back in January 2010 when a devastating earthquake struck Haiti, and the response in the days and weeks after underscored the internet, but, more importantly, social media's critical role in connecting the world's population in times of tragedy.

Facebook launched the Disaster Relief on Facebook page, where millions of people could educate themselves and find out how to help not only in Haiti but wherever disaster and unfortune may strike. We wanted Disaster Relief on Facebook to serve as a collaborative for individuals, nonprofits, governments, and industry to raise awareness for those in need around the world, and to play a pivotal role in disaster relief and preparedness.

As such, Facebook is inviting relief organizations, government organizations, media partners, private industry, to be part of this effort, so we can all improve preparation for disaster and

contribute to relief efforts and bring to the forefront the needs of the victims in moments of crisis.

Facebook's mission is to give people the power to share and make the world more open and connected. Disaster Relief on Facebook seeks to harness the power of sharing to better prepare the world for disasters and provide resources to aid in the relief and recovery of communities.

We have and will continue to better share knowledge and expertise, distribute information on disaster preparation, and contribute to the recovery and relief effort when disasters occur. By staying connected, we can all make a difference no matter where we are in the world.

And while the disaster relief page launched in January 2010, following the Haiti earthquake, the movement on disaster relief is actually -- pre-dates this much

more. Going all the way back to the Banda Aceh earthquake of 2004, we saw activity on the internet really blossom. And while much of this activity has originated from external stakeholders, there are several examples of Facebook disaster relief initiatives.

First, Facebook Causes has been used by several NGOs to raise money for disaster relief and recovery missions, including the $100,000 raised by Oxfam America, for the Help Earthquake Survivors in Haiti cause.

A large part of the over $4 million raised in the weeks following the tragedy by over 20 different projects also helped -- was also originated from Facebook and Facebook-related organizations. Facebook credits have been used to raise money for disaster relief, including the ability to buy water for Haiti -- excuse me, to buy a water for Haiti charity gift through Oxfam America.

Facebook Live segments have aired

to help distribute relief messages, raise money, and provide live streams of events around the world. This includes the Hope for Haiti Benefit.

This is in addition to President Clinton's Facebook address instructing users how they can help with the Haiti Relief effort and the Haiti Today/Haiti Tomorrow Facebook Town Hall with U.N. Secretary Ban Ki-moon.

Following the development by third party developers, Facebook embedded a Haiti earthquake person finder application on the Global Disaster Relief page, and this aided in helping to connect people both looking for loved ones and those loved ones who have been found.

And it's not just Facebook. It's other nonprofits, it's other corporations that have been using the platform. The American Red Cross page alone has over a quarter of a million fans and delivers

disaster news, has a blog, and they will ask for people to donate both money and blood and future stories.

There has been effective use by government on Facebook. Government organizations, including the U.S. Department of State, which have used their Facebook page to push information and provide resources for those in Haiti, Japan, Chile, and Christchurch following disasters in those areas.

NOAA and FEMA both provide real-time updates on the -- provided real-time updates on the Gulf Coast oil spill as well as providing resources for those in the affected areas. CNN's Impact Your World page gives users an opportunity to get informed about disasters and provides information on how to get involved.

Of particular note for the private corporations was Air New Zealand, which set up an Air New Zealand Christchurch

Quake Support page in response to the devastating earthquake that struck the city of Christchurch, New Zealand. This page provided live updates and support for those affected.

Moving forward, disaster response and mitigation will depend on the interoperability of technologies and the ability for stakeholders to communicate across a wider range of platforms. First responders, NGOs, and the public need technologies that can easily communicate with one another to ensure completeness of data and the reduction of latency as information traverses across different platforms.

The pursuit of interoperability will also decrease the costs associated with recovery, because it limits the need for multiple technologies. It will hopefully produce a more complete picture of ground troops. Additionally, we believe that the success of future relief operations will

continue to highly -- will be highly dependent upon stakeholders' ability to both push data out to people and pull data into systems, first responders, and others to prioritize and deploy resources during a disaster.

By employing a multi-stakeholder approach that is premised on widely adopted, interoperable technologies that focus on ease of use, for consumers we can benefit all people at any stage of a disaster, whether it's preparation, response, or resiliency building.

We look forward to working with the FCC on this issue and hope we can help those in need when the worst has occurred.

CHAIRMAN GENACHOWSKI: Thank you very much. Mr. Gesher?

MR. GESHER: My thank you to the Chairman and the Commissioners for being able to talk on this very important topic.

Palantir Technologies is a

software company based in Palo Alto, California. We design, build, and deploy Palantir's data fusion platform, software designed to integrate all available information about some problem out in the world and present it in a way that allows subject matter experts and people who know the most about the data -- about the real-world that the data represents to intuitively and efficiently make sense of a situation, collaborate, and figure out a course of action to remedy that situation.

The software itself is an empty vessel suitable for a whole range of tasks. Many of our initial customers were in the military and civilian intelligence agencies, but we also provide software to commercial banks, local and federal law enforcement, big pharmaceutical companies, the Centers for Disease Control, and various other government agencies. We also do extensive work in cyber security.

Our interest in disaster recovery has been ongoing for a number of years. Hurricane Sandy was the first true field test of our capabilities in this regard. To help with the response to Sandy, we partnered with two nonprofit organizations, Direct Relief International and Team Rubicon.

Direct Relief is a provider of donated essential medical supplies to underserved populations and disaster victims. Team Rubicon is a veteran volunteer organization that deploys veterans to do the essential work of cleaning up when disaster strikes.

In a disaster relief context, our data platform allows the rapid integration of data from many different sources into a coherent picture of the humanitarian side of disasters. Additionally, our Smartphone client, Palantir Mobile, allows assets in the field to collaborate with back office analysts using geospatial analysis to map out

disasters in real time.

In Hurricane Sandy, Direct Relief integrated information about power outages, storm tracks, pharmacy availability, and the location of at-risk populations to figure out where to pre-position and ship essential drugs and medical supplies after the hurricane and subsequent northeaster hit the New York City area.

After the storm passed, Direct Relief sent teams to survey sites inside areas without power to assess the best way to distribute essential medical supplies. Their efforts have been extensively chronicled on their blog available on their website.

Team Rubicon's model is to mobilize a large roster of veterans into the disaster zone. They essentially set up a forward operating base and coordinate the workers or volunteers to clean up after disaster. In the case of Sandy, this primarily consisted of removing sand and

water from the basements of homes in Rockaway, Queens. A large tidal storm surge flooded that area as the hurricane made landfall, leaving an entire neighborhood awash.

Team Rubicon has a lot of experience dealing with this sort of work, but this was the first time they attempted this sort of recovery work using Palantir software. Palantir sent four engineers into Rockaway with Team Rubicon. They brought laptops and Smartphones loaded with our mobile software.

The Palantir software was running on service hosted in a data center far from the disaster. Essential to being able to leverage the software for Team Rubicon's operations was internet protocol connections to talk to the central server. This was accomplished using the data service on the Smartphones and cellular modems to connect the laptops.

Power was out in the entire region, so the laptops were powered using onsite gasoline generators and solar cells. The Smartphone users use auxiliary batteries that could keep them running under heavy use all day. At night, the team would retreat to an area with grid power to make sure all of the batteries were fully charged for the next day's operations.

In the early phases of recovery, Team Rubicon sent out scout teams to assess damage and triage the response. Each team would head to a pre-determined zone and walk from house to house gathering information about the work that needed to be done and contact information for the residents of each home.

These reports were relayed instantly via the mobile client including imagery and geospatial information about the site. Also in the Team Rubicon Palantir instance was New York City's 311 repair

service data, power outage information, citizen reports collected via web interface, about work that needed to be done as well as NOAA aerial overhead imagery taken to assess damage immediately after the storm passed.

Citizen reports were mostly collected onsite at Team Rubicon's forward base of operations in a parking lot in the middle of Rockaway. Since the power was out, people could not submit reports from their normal internet connections. WiFi operated by Team Rubicon at the operations base allowed volunteers to collect data on tablet computers and upload via the cell modems.

What was the result of all of this technology? It was, in a word, transformative. One lesson that has been learned over and over in disaster recovery circles is there is usually enough equipment and supplies available. The challenge is figuring out how to quickly and efficiently use that material where it is most needed.

This was especially apparent in some well-known cases following Hurricane Katrina. In America, disaster relief information is the scarce resource.

In the interest of time, I'll cut a whole number of great anecdotes about how this actually changed things and cut to the chase. What do we think the FCC can do to help with these sort of efforts?

The first is to establish -- when you are in kind of a quality of service or priority of service situation, to establish disaster recovery as a third category of communications behind first responders and priority. In a situation with limited bandwidth, disaster recovery should be prioritized above general communications, and relief organizations should be able to register for this priority access. We recognize this is a major structural shift in post-disaster communications and not something that can happen overnight.

And something maybe a little simpler to do is work with carriers to coordinate with disaster relief organizations to figure out how to prioritize repairs and deploy assets like mobile cell towers or WiFi trucks, such that they contribute the most value to recovery operations.

One suggestion would be to run a hot line where the disaster relief organizations can report their needs to a central authority rather than trying to get in touch with the right contacts at each of the various carriers.

The last thing I will leave you with -- it was actually very exciting -- what has come out of our prototyping work with this disaster response is actually a recent commitment that we made along with these disaster relief organizations to the Clinton Global Initiative, to take our work and expand it into a platform that is going to be available to major metropolitan areas in the

United States, working with Office of Emergency Management and that sort of thing, to really revolutionize the way that we respond to these disasters.

Thank you.

CHAIRMAN GENACHOWSKI: Excellent. Thank you very much.

Mr. Chamales?

MR. CHAMALES: Thanks a lot, Mr. Chairman. So my background is in computer security, and that requires that I maintain a certain amount of professional paranoia in everything that I do.

And that is really effective when you start thinking about dealing with disasters, because, you know, what are disasters if not the time when a lot of worst-case scenarios are happening at once.

Now, over the last couple of years I found myself doing more and more work in the disaster response and crisis space. This began a couple of years back during the

nationwide flooding in Pakistan where we were able to put together a team to support folks on the ground who were crowd sourcing the location of flooded villages that had been completely cut off from the rest of the country and had their crops destroyed.

We were able to distribute that information to an online team of volunteers all over the world, including a group here that came together at Carnegie Mellon and here at NASA Ames, to identify where these were, actually literally put them on the map by tracking down this information.

We used the same technology shortly thereafter, during contested elections in Egypt and Sudan. It is really fantastic to be living in a country where the people that control the airwaves are on our side. In places like Sudan and Egypt, we had to deal with outages that were intentional caused by the government restrictions that were put in place on mobile communications,

and also targeted censorship of our online platforms.

Most recently, I worked with the United Nations during the early days of the Libyan Revolution. When hostilities first broke out in Libya, the U.N. had very little insight into what was happening on the ground. And so you reached out to a group that I was working with and said, “What can you see over social media? What is out there on the internet that we don’t know about?”

We were able to put together a team and assist them in 24 hours and begin collecting information, which was then passed on to response organizations. As a result, response agencies who were staging along the border with Egypt had a much better idea of what was happening right across the closed borders. They get a sense of the refugee populations and where they were pooling, so they could prepare to respond better once those borders turned down.

Now, working in places like Pakistan and Sudan and Libya, you know, there's a lot of worst-case scenarios, there's a lot of things that can go wrong. And I found myself able to square those concerns with my security background, because while there are challenges we can deal with them.

We can mitigate the threat; we can do things that enable these technologies to really have a major impact. And today I'd like to talk about three particular areas that I am really excited to be a part of.

The first is ubiquitous access to information. You've heard it talked about a couple of different points throughout the day. We are getting to the point where all of the information that has been collected has shifted from being stored on paper and now it's on computers, and then from computers onto computers and the internet. And that's great; that makes it really easy

to access it.

The challenge, though, is that those systems are distributed all over the internet, here and there in nooks and crannies, and they are in their own particular format. But the good thing is that to a computer data is data, and we are moving towards a point where we will have computer systems capable of ingesting any information in any kind of format and making it available to you immediately.

And these systems, like the ones that Palantir builds, they are capable of doing this in a way that not only, you know, presents it to you, but presents it to you in a way that is customized specifically to what you need, and it can be further customized to the needs of a particular disaster that you are working in.

So you won't find yourself in a position where you have to click through 35 different menus to find the information you

want. We will be able to modify the system to put a big red button right on the front page that you will be able to click to get exactly what you need.

And being able to get access to lots of information is really good. The next challenge, though, is when you have too much information. And that is where crowd sourced information processing comes in. What it gives us the ability to do is to be able to marshal surge capacity to churn through this information to find the things that are particularly important to you.

So we will be able to separate the signals from the noise and get you that information which is really critical as soon as it is out there, despite the millions of other messages that aren't relative.

And together, you know, these types of communications makes it possible to turn citizens on the ground during disasters from victims into assets, but we think we can

do better than that. We want to turn citizens on the ground into partners. They have the ability to not only produce information but to be queried, for you to be able to ask information to them to find out information that you don't have in place of the existing response organizations.

And we think that together these new capabilities are really going to have a revolutionary effect on the ways in which that we deal -- the ways in which we deal with disasters. And we're going to get to the point 10 years from now where we will be wondering how we ever made do without them.

And on behalf of myself and my fellow earthquake-living-area Californians, I would like to thank you and the rest of the Commission for the opportunity to have this discussion.

Thank you.

CHAIRMAN GENACHOWSKI: Great. Thank you very much to each of you. Let's

start with Commissioner McDowell on questions.

COMMISSIONER McDOWELL: Thank you, Mr. Chairman. And I see that we're starting to run out of time, but also in the spirit of sequestration, I'm going to use 2.3 percent less time.

(Laughter.)

And hopefully that won't be catastrophic. So I do want to thank all of you, and then you, as sort of the faces representing thousands of others here in California and throughout the country who are working on new technologies that, as you are designing them, may have the intent initially of saving lives in the case of emergencies, but also there might be technologies being produced that no one has actually thought that that might be a nice byproduct. So that's one of the great things of innovation.

So I want to thank each of you for being here.

Ms. Johnson, I'd like to talk to you -- it ends up, according to the Chairman, I was the first FCC Commissioner to text to 911. And there are a number of --

MS. JOHNSON: Congratulations.

COMMISSIONER McDOWELL: Thank you. That and three dollars will get you a cup of coffee at Starbuck's.

So can you elaborate a little bit on what might be happening in San Francisco or more broadly, if you know, the State of California in those abilities?

MS. JOHNSON: I'm not able to elaborate on the State of California. But in San Francisco specifically, we have not moved to a technology that will allow text-based 911. There are some discussions but nothing concrete.

COMMISSIONER McDOWELL: So is there anything we can do or maybe stop doing to help you with that?

MS. JOHNSON: I think one of the

major things that can be done is really, frankly, more research into the capabilities, and then also more discussion with vendors who provide computer-aided dispatch capabilities, to help make that feasible.

There is major concerns, not only in San Francisco but nationwide, about receiving text alerts and not being about to process those quickly enough or handily enough, and not getting enough real solid information as you would from a person-to-person phone call. And so I think some of those questions really need to be ironed out before any community signs on to text-based 911 wholeheartedly.

COMMISSIONER McDOWELL: Right. And we've found, thanks to the Chairman's leadership, that generationally there are people texting to 911 not knowing that it's not --

MS. JOHNSON: That it's not being answered.

COMMISSIONER McDOWELL: -- being answered.

MS. JOHNSON: Yes.

COMMISSIONER McDOWELL: And it's -- yeah. Generationally, more people are texting than using voice communication, so hopefully public safety answering points can catch up.

So the other category of questions -- and I want to make sure I'm within my sequestration budget -- but has to do with social media. So, interestingly, yesterday I had breakfast with the San Francisco Area Broadcasters. And we were discussing the tragic shootings in Santa Cruz that happened this week and how they were trying to find out in real time, you know, what was happening and trying to get some journalists on the scene as quickly as possible.

But the first thing they do before they can do it is they go onto social

media. And they had no idea that we were going to have this panel actually. They were saying how much disinformation was out there.

And any suggestions as to how we can, you know, sift through that. We certainly, at least from my perspective, don't want the government getting into your space to try to sift through that. But, you know, what can be done? I mean, people do rely on it.

They are going to be -- it could be any situation in the world, and initially there might be a lot of just bad information. And sometimes there is maybe a cyber security issue behind it, maybe there's some malicious, or most often it's not, it's just good-hearted people giving the wrong information.

MR. WOLENS: You know, I think fortunately the solution actually lies within the problem, whereas that there is such a busy market place of information out there

that the marketplace itself actually can sort itself out, that while there is disinformation it is -- we have really found that -- you know, through our experience that the information that is the most useful, and information that is truly, actually does bubble up to the top through social verification methods.

And that by having this marketplace of allowing people to come together and not only submit what -- that information they have on hand but also to collaborate and say, “Yes, this is something I experienced, too,” or just having feedback mechanisms in place where you can say, “Yes, that’s something I have experienced” or, you know, it can be as lightweight as a “like,” right? Just because we’re talking about Facebook in particular, and you really see the cream rising to the top where the bits of information that are liked the most or that are collaborated on the most are the pieces

that are the most true.

And, you know, by -- it's lucky that there is a feedback mechanism in place by having more and more people that collaborate and that work and produce this information, the more and more socially verifiable pieces you can pull out of it.

So, you know, I think that by promoting the, you know, crowd sourcing of technologies you actually help the problem by, you know, asking for more of it almost. So that's -- I think it's useful to consider.

COMMISSIONER McDOWELL: Anyone else want to add anything?

MR. CHAMALES: I would also like to add that you can also reach back and call people and ask them. You know, I think there's a tendency to look at all of the information that is coming out and thinking that you have to just deal with that.

You have the ability to proactively go out and find new information.

So if you know from the information you have collected that there are eight different people in that area, you can reach back and start talking to them directly.

MR. GESHER: I mean, there's a number of different strategies you can take there as well including like actually I guess something George was talking about with crowd source verification where you can actually build up sort of pipelines of people who are willing to do this verification and find those sources.

When you have a really big fire hose of information, you can assemble volunteers into some sort of human processing structure, which is usually the best way to get through figuring out what is separating the wheat from the chaff and what is true and what is misinformation.

COMMISSIONER McDOWELL: Very good. Well, with our reshuffling of the deck, Commissioner Rosenworcel is still in

the middle. So sorry about that.

COMMISSIONER ROSENWORCEL: Earlier this month, as you have probably heard, we held hearings in New York and New Jersey, and one of our witnesses in New Jersey was from the New York City Fire Department. It was a woman named Emily Rahemi, and she did some really extraordinary things.

When service was out in New York -- and by that I mean phone service, both traditional and wireless -- and people weren't able to call 911, she sat as a warrior with her keyboard and took in Twitter messages and called 911 dispatch on her own.

And two things struck me from that. First, she is an extraordinary hero, and she probably saved lives and ameliorated bad circumstances for a lot of people. But the second thing that struck me from it was, wow, that's awfully ad hoc. That's one great person sitting behind a keyboard in the

middle of a disaster and having an extraordinary gut about the right thing to do.

So what I'm wondering -- and I guess I would ask anyone who cares to answer -- is, how do we take those processes, which today feel sort of ad hoc, and integrate them more broadly into our existing emergency infrastructure?

MS. JOHNSON: I can go ahead and start with that. From our perspective as an Emergency Management Department, when we activate for events and/or disasters because we activate regularly, we always have a social media section, not just a public information officer, but someone who sits at a keyboard and is monitoring various hashtags or various Facebook feeds or other media resources that might possibly provide us with some situational awareness, because we are often stuck in a room and not necessarily on the ground. And although we rely on radio

traffic from our responders, we also feel that people who are using those social media tools are in a way able to provide us with additional situational awareness.

And I think that's one of the key elements from an emergency operations perspective is to recognize that that does exist and you cannot ignore it, and it can be used to your benefit. And then I think as Ari eluded to before, and he can talk more about this, is enabling the crowd and the volunteer sources to really assist you in what you are looking for and to help direct those individuals, whether they be in the same community or across the U.S. or across the world, to help facilitate your data collection.

MR. GESHER: So one thing I would add maybe from a technical perspective is that it is important for people to engineer things for interoperability and improvisation. So one of the things that we

ran into in -- not in the response rates but in the recovery phase was this motion of catastrophic success. So you're Team Rubicon, you've got your, like, hundred volunteers, you are doing very well, and someone shows up with a thousand volunteers on buses. What do you do? Like, how do you even figure out what to do?

Given that they had all of their information already in a system that could let them easily create it, one of our programmers actually sat down in the space of about an hour and was able to slap a geoclustering algorithm on top of our platform. Now, the platform itself took like 100 engineering years to build. It's a huge investment, but it was built so that you can improvise on top of it.

And so he was able to very quickly implement this thing that would look at all of the available work orders, split it up into six major regions, and then split up

these like 350 volunteers out to go and do these different things. And without having that initial investment, this is something Facebook has done a good job of in terms of building a platform, and Twitter has as well, an extendable platform. You never know what you are going to run -- I mean, the great thing about disasters, or the horrible thing about disasters, is that you actually have no idea what you are going to run into on the other side. There are these incredible inflection points of predictability.

And so having all of the pieces in place to be able to improvise on whatever the unique problem is that you run into with that disaster I think is the most important thing to do.

MR. CHAMALES: Just really quickly in the last minute, it is a fantastic story out of New York. And the fascinating thing that I hear when I think about that is she was acting as a dispatcher. And there is

an extensive body of knowledge and information available on how to act as a dispatcher. What there isn't is how to act for a dispatcher -- as a dispatcher who is processing information from social media.

That introduces new challenges in the flood, in the separation, and how you deal with it, but also a significant number of new opportunities. And so I think that adapting the existing processes to take advantage of those new opportunities gives us a place to build from and towards.

CHAIRMAN GENACHOWSKI: Thank you. Commissioner Pai?

COMMISSIONER PAI: Thanks, Mr. Chairman. My first question is for Ms. Johnson. One of the things that I find appealing about your platform is that you have the ability to reach vulnerable communities such as those with disabilities and language minorities.

And, arguably, there is no place

more in need of that functionality than San Francisco. In terms of language minorities, for example, I understand that 18 percent of residents speak Chinese at home, 11 percent speak Spanish, four percent speak Tagalog, two percent speak Russian, and one percent speak Vietnamese. And that alone is over one-third of the population.

So I guess my question is, what do you believe your platform enables you to do uniquely to address the needs of, you know, disabilities, language minorities, and others who are especially vulnerable during emergencies?

MS. JOHNSON: I think that when we talk about the platform of SFDM, there is far more than just SF72, which I mentioned today, which is primarily English based, although we have additional languages to support that, both online, mobile, and on paper form as well.

And then, the language thing that

I believe you mentioned earlier, our 911 services use that as well. And so there are really deep connections in terms of embracing the diversity that San Francisco brings and also what that means for the message.

For example, when we talk about things you may need to be comfortable during a disaster, to survive a disaster, if you are talking to a specific population you may be using -- you may be asking them to acquire certain types of foods, whereas if you were talking to an English-speaking population you might use something like granola bars, and yet when you're talking to another culture that might be something that they have no recollection of or even desire to eat.

So I think there is an importance in recognizing that in that diversity comes strength, but it also requires an understanding and a sensitivity both in the text messaging, the text-based messaging, but also in the interpersonal-based messaging

that we communicate with those individuals and help them recognize that they are what gives the community their strength.

COMMISSIONER PAI: Okay. Mr. Wolens, I don't want to detract from the powerful platform that you face because, as well, if you'd like to expand on that.

MR. WOLENS: Yeah. No. Actually, it was an incredibly insightful point. And one thing I -- you know, one thing that is worth noting is that online people aren't really delineated by geography as much as they are delineated by languages. And, you know, online, at least one other way that we think about it at Facebook is that we don't have U.S. users inasmuch as we have English users.

And that when you sign onto Facebook, you choose what language you want to operate Facebook in, and then that is the language you get it in. And so, you know, we -- and we will -- you know, whatever "wall"

is in your language or “poke,” you know, then you get it and it can be in pirate, it can be in French, it can be in Spanish. You know, it doesn’t matter.

And this also speaks to the crowd sourcing, too, because Facebook isn’t translated by Facebook employees, by and large. You know, we work on our help center content, but the actual -- all of the text that you see on the site is done by volunteers all around the world who crowd source the translations and go out.

And so, you know, there is no upper limit for the number of languages you can get Facebook in, because they’re constantly being translated, and I think there is over 75 or even more now. And, you know, when you go ahead and distribute disaster information, the geo -- you know, the geoboundaries are important, because that does delineate, you know, what the intensity of the damage is or, you know, where

resources are in relationship to them.

But just as importantly are the languages that somebody is receiving it in. And if that person is -- has a disability and they are using assistive technology -- technology really helps bridge that gap and does a lot of the work for you.

So you don't need to think, oh, I need to be distributing Spanish-speaking materials over here or Russian-speaking materials over here. The user simply chooses how they want to consume that information, and then it does the hard work for you.

And so it can really help leverage what is being done on your end and cut out a lot of the busywork with having to make those choices.

COMMISSIONER PAI: Great. One question I had, before my time is up. Mr. Chamales, I was intrigued by something you said. Quite often we speak in this context about the scarcity of information during

emergencies, but I'm intrigued by the surplus of information. I was wondering if you could amplify, from technical or other perspective, how it is that you sift through information and provide information that is tailored to the particular user, just how that happens and --

MR. CHAMALES: Sure. One of the projects that we are just wrapping up with the U.S. Navy is a modular microtasking system. And the idea is you start off with a whole bunch of information, and then you put it into an assembly line.

The first step in the assembly line is someone just taking a look at the information and deciding if it is useful at all. It's got a yes or no question. We've got it as simple as they just keep their fingers on their keyboard, yes, no, yes, no, yes, no.

Those can move on to any number of a series of modules, so there is a

translation module so we can have language speakers go through and translate into whatever language we're dealing with. And the idea is that as it moves through each of these processes, the ones that take the longest amount of time -- for example, geolocation -- those are saved all the way towards the end.

And we also have the ability in the future to be able to dynamically move things up and down the queue. So we want to get to the point is where that person who is doing the filtering, if they come across something that is really important, they not only say yes, but they say oh, really, yes, maybe sign a flag on it.

And that pops at the top of the queue, and the idea is that we can keep this running throughout a disaster to make sure that we are constantly filtering out the information we need.

COMMISSIONER PAI: Great. My

time is up. Thank you, all.

And thanks, Mr. Chairman.

CHAIRMAN GENACHOWSKI: Great. Thank you. All of the different, exciting opportunities that you have each talked about, are vulnerable to the issues we were talking about chiefly on our first panel, which is the networks going down, not being available to consumers.

One of the issues that we talked about in the first panel -- I don't know if you were all here -- was the challenges of thinking about backup power given all of the different elements of a communications grid. Different tower sites in different areas might have different backup needs depending on accessibility, et cetera. It is only getting more challenging with smaller cells, et cetera.

My question is, you know, we have on this panel people who have spent a lot of time thinking about big data, analytics, and

I'm wondering if any of you have any thoughts on ways that some of the new thinking in Silicon Valley -- your companies represent them really well -- can help the carriers figure out where and how to put resources to get backup power right.

You know, they see information every time there is any kind of outage. Do you have any thoughts on that? Any of you? Several of are nodding. Ari, why don't you go first?

MR. GESHER: Sure. I was actually thinking about this when it came up on the first panel, and sort of the interplay between industry and policymakers, that I think the best high-level thing to do is actually just set up some kind of SLA that must be met during a disaster as much as possible, some sort of target, some service-level agreement. For the carrier to say, look, you need to be able to handle this much voice traffic, this much data traffic, in

these priorities, and then let them figure it out, sort of in the private sector what the right way to meet that is.

I think too often -- and see this in -- and, again, this comes up in terms of how you monitor computers -- too much of a focus on the -- what do I need for this particular cell tower? What do I need for this site? And the real question is, what is the resiliency of the overall network? And if this tower goes down, it's fine as long as there are other towers around that can support it.

And so that really taking a holistic view of what the requirements are for a network in a disaster or understanding what can happen, like what does it mean if there's flooding, if there's high winds, if there's fire, and how does that -- what do the failure modes look like?

And let them do sort of big simulations and design about how the network

can degrade gracefully but still function and support response and recovery operations.

MS. JOHNSON: I think right along with that is just having a true understanding of the risk of the area in which that tower or set of towers remains.

And by that I mean not just the -- you know, in San Francisco or in the Bay area, we are at risk for fires, floods, earthquakes, et cetera, but also what that might look like for your infrastructure to get new pieces of infrastructure in or out to those roads work, do you have electricity, does the water work, how are you going to house your individuals when they come in, those kind of things, looking at the cascading impacts of the risk.

MR. WOLENS: I don't think I can be terribly helpful on a solution to the problem. But just in conceptualizing the problem itself, I think that, you know, there is the reflection of how the network looks

versus when it is fully operational. But, you know, trying to get the network back to fully operational may not be the best answer. Maybe it's a case of you need to execute against what people need, and what people need may not be exactly what you had before disaster, but it may be something different.

And by really trying to tap into, you know, whether it's social media, whether it's 911 calls, you know, maybe it's traditional media, that people are telling utilities, they are telling the government what they need and where they need it. And just being able to tap into that stream of information may help better conceptualize what the problem is. And, I'm sorry, I can't really help on the solution.

CHAIRMAN GENACHOWSKI: But let me ask you -- let me flip it.

MR. WOLENS: Sure.

CHAIRMAN GENACHOWSKI: Your remarks were focused on disaster relief and

things that are happening at Facebook and that others of you are working on are really amazing. Let me ask about sort of a neighboring area, which is consumer preparedness.

You know, there are some basic things that you think we all know but we forget, and it would be helpful to be reminded about, you know, charge your devices, your car is an option, et cetera.

Is there more that can be done by carriers, state and local, federal government agencies, in thinking about Facebook and other social media, to help educate consumers on how best to prepare themselves?

MR. WOLENS: Yeah. I think there is two interesting parts here. One is that it is important to have a plan, right? That's one thing we hear from FEMA, from DHS, is that, you know, it's important to have a plan. And, you know, part of the plan is, you know, making sure you have your kit,

making sure where you meet people, but, you know, people are always on Facebook and they're on Twitter and they're on their phones, and an electronic plan is just as important as your physical plan, because that's where people are looking.

And so I think one thing that can be useful is actually incorporating Facebook and Twitter and other consumer technologies that you are using every day as part of your emergency plan, because, you know, while text may not work, you may still be able to get on WiFi and leave somebody a note on Facebook.

And so knowing what to look for and who to look -- and who you are looking for can help. And, you know, you have things like telephone trees, so maybe you should have a Facebook messenger tree or, you know, a Facebook wall tree, or a Twitter tree, or whatever it is. And so I think there are ways to think about how you take technologies that consumers are using every day and

incorporating them into that plan. I think that's one.

The second point is is that one thing that Facebook excels at and one thing we try and pride ourselves on is just making the world more social, making the world more open and connected, and I think that you can apply that to disaster preparation.

And, you know, it may be as simple as saying -- as, you know, encouraging people to have a social experience when they prepare. You know, I prepared, you know, and here are my friends that helped me prepare. Or, you know, it could just be as simple as, you know, a theme app for Facebook where it's like Fred and however many of his friends prepared for this disaster.

And that allows you to not only have it be very social, but you can also have it very, very targeted. You can have somebody in Northern California preparing for an earthquake and somebody in Florida

preparing for a tornado, but they do it together. And, you know, that can really help leverage and you can do things like gamefy, to use kind of a buzz word in the Valley.

And you can make it -- you know, there's lot of different things you can leverage on the consumer side that makes preparation more palatable for people and make it as part of their everyday activity, which I don't think it is right now.

CHAIRMAN GENACHOWSKI: Any other quick thoughts on consumer preparedness?

MR. GESHER: Yeah. I mean, I think what we're seeing over time with social media is that people's attention is actually shifting from the public airwaves more to basically these privately controlled conduits.

And I think government doesn't have the same lever that it does to do things like public service announcements, which you

can -- you know, you can say this portion of your broadcast must be used for sending out things like, “Hey, are you prepared for this earthquake?”

It would be a good thing that may be out of the purview of the FCC, but to think about how you replace that missing resource in plugging up people’s attention to get those messages out for preparedness. And it might be something that Facebook can do in a philanthropic capacity or something like that, but it’s definitely a dwindling resource of attention.

MR. CHAMALES: And I would say that disasters offer the opportunity to get prepared for the next disaster. There was a significantly large crowd sourcing effort done during the Haiti earthquake to collect information from -- over SMS from people on the ground.

And over time that effort, as they moved into response and recovery, was

picked up by a local Haitian organization which kept the system online where it was in place in time for the cholera outbreak. And people were aware that they knew how to use it and it was staffed with people who knew what they were doing.

And I think these types of technologies do give us the opportunity to not only work once, but then establish the networks and the standards of operation that can be used for the next disaster as well.

CHAIRMAN GENACHOWSKI: Well, listen, thank you. Our time is up. I want to thank the City of San Francisco for coming down here and participating in this; to each of you and your companies, for setting aside the time to help us think through some of these issues.

And let me thank each of my colleagues for participating and for excellent questions. And for everyone who helped bring this together, thank you very

much.

And we are adjourned.

(Whereupon, at 3:43 p.m., the proceedings in the foregoing matter were adjourned.)