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CREATING AN INTEROPERABLE PUBLIC SAFETY NETWORK

HEARING

BEFORE THE

SUBCOMMITTEE ON COMMUNICATIONS AND TECHNOLOGY

OF THE

COMMITTEE ON ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

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CREATING AN INTEROPERABLE PUBLIC SAFETY NETWORK

WEDNESDAY, MAY 25, 2011

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON COMMUNICATIONS AND TECHNOLOGY,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:34 a.m., in room 2322 of the Rayburn House Office Building, Hon. Greg Walden (chairman of the subcommittee) presiding.

Members present: Representatives Walden, Terry, Stearns, Shimkus, Bilbray, Bass, Gingrey, Scalise, Latta, Kinzinger, Barton, Upton (ex officio), Eshoo, Doyle, Matsui, Barrow, Christensen, Towns, Dingell, and Waxman (ex officio).

Staff present: Ray Baum, Senior Policy Advisor/Director of Coalitions; Neil Fried, Chief Counsel, Communications and Technology; Debbee Keller, Press Secretary; David Redl, Counsel, Telecom; Tim Torres, Deputy IT Director; Alex Yergin, Legislative Clerk; Charlotte Baker, Press Secretary; Phil Barnett, Democratic Staff Director; Shawn Chang, Democratic Counsel; Jeff Cohen, Democratic FCC Detailee; Sarah Fisher, Democratic Policy Analyst; and Roger Sherman, Democratic Chief Counsel, Communications and Technology.

OPENING STATEMENT OF HON. GREG WALDEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Mr. WALDEN. I call the hearing to order. Good morning everyone and welcome. We are here this morning to have a productive discussion of how spectrum policy can advance public safety, promote broadband, generate revenue for the U.S. Treasury, and create jobs. This hearing will focus on how we can bring new and innovative tools to our Nation's first responders.

Look, we all share the goal of providing America's first responders with a state-of-the-art communications network. We are by no means the first Congress to attempt to bring public safety these tools. Interoperable public safety communication has been an objective of this country since even before the tragic events of September 11 of 2001. Yet even though Congress and the FCC have tried time and again to provide the tools and impetus to make this a reality, today's public safety users are only marginally closer to the interoperable communications they need. We are here to get it right this time.

Now, what we are not here to do is to point fingers for past failures. Nobody doubts the good intentions and the hard work of

those who have worked on this issue in the past. But the fact remains we have not been successful. Today's hearing gives us an opportunity to hear the lessons of the public safety community, the wireless sector, and the engineers who make wireless networks work. Taking the innovation and expertise of the wireless industry alongside the bravery and knowledge of the public safety community, we can all work to provide needed resources to both.

The successful creation and management of an interoperable public safety network will need to focus on four elements: spectrum, equipment, governance, and funding.We have provided public safety with nearly 100 megahertz of spectrum for their exclusive use. Given that fact, it is strange to me that the debate on public safety communications has been so focused on the 700 megahertz D Block. Public safety has more spectrum than the vast majority of wireless providers, who, as it is oft cited, provide a 16-year-old customer with more capabilities than those available to our first responders. As recently as our 2005 DTV legislation, Congress cleared 24 megahertz of spectrum for an interoperable public safety network. Yet 6 years later, that spectrum lays woefully underused. In fact, far from providing next-generation interoperable services, more than half of that spectrum has been dedicated to the legacy, narrowband voice communications that NYPD Deputy Chief Charles Dowd called "extremely limited" at our April hearing. Clearly, something in our approach isn't working. Could we be better using that 24 megahertz for the broadband network that public safety needs?

Congress has also tried to address the finances of a public safety network. Chairman Upton's amendment to the 2005 DTV legislation provided $1 billion to public safety to help defray the cost of radios, and, according to the Congressional Research Service, more than $13 billion in Federal funds have been invested in public safety communications since 9/11. So I look forward today to hearing how these resources have been used to further their intended goals and what we can learn from how those funds were spent.

Now, the last piece of this equation—the governance of the network—may indeed be the most difficult and yet most critical part. We need to figure out how this network should be built, operated, and maintained. I continue to support the idea of a public/private partnership between commercial wireless providers and public safety to address first responders' needs. Initial FCC efforts to hardwire such a partnership into the auction of the D Block, however, failed to find a commercial provider sufficiently interested in purchasing the license. This failure is widely attributed to poor auction design that asked bidders to sign up for a vaguely defined obligation to negotiate with the Public Safety Spectrum Trust—an entity created to govern the use of the 24 megahertz spectrum for public safety. We should continue to examine better ways of creating a public-private partnership.

Public safety radio networks have traditionally been characterized by local control of nearly all elements of the network, from choosing the equipment vendors to oversight of the standards evolution. It is our goal to create a nationwide, interoperable network, this kind of local communications fiefdom cannot continue to dominate the public safety communications debate.

We need to find the right balance between local input and national coordination. That is why I am glad to see the Public Safety Alliance has provided us a witness for the second consecutive hearing on this topic. The Public Safety Alliance represents a sweeping scope of public safety entities working together toward a common goal, and interoperable communications will require a level of coordination far above the local police and fire chiefs, and a level of wireless expertise that, frankly, few can provide.

To that end, I believe that any governance structure for public safety communications should recognize the nationwide scope of this critical issue and the incredible pace of innovation in the wireless communications sector. Public safety wireless devices have begun to lag behind the capabilities available to commercial users. The end result has been firefighters and police officers relying on their personal wireless devices sometimes in times of emergency. That is not what we want. This cannot be the "new normal" for America's first responders.

I thank the witnesses for their participation today. I think I can speak for all of us when I say we thank each of you for your commitment to increasing public safety and look forward to a vibrant discussion of the communications needs of America's first responders. With that I yield to the gentlelady from California, Ms. Eshoo, for her opening statement.

[The prepared statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

We're here this morning to have a productive discussion of how spectrum policy can advance public safety, promote broadband, generate revenue for the U.S. Treasury, and create jobs. This hearing will focus on how we can bring new and innovative tools to our Nation's First Responders.

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What we are not here to do is point fingers for past failures. Nobody doubts the good intentions and hard work of those who have worked on this issue in the past. But the fact remains, we have not been successful. Today's hearing gives us an opportunity to hear the lessons of the public safety community, the wireless sector, and the engineers who make wireless networks work. Taking the innovation and expertise of the wireless industry alongside the bravery and knowledge of the public safety community, we can all work to provide needed resources to both.

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The last piece of this equation—the governance of the network—may indeed be the most difficult and the most critical. We need to figure out how this network should be built, operated, and maintained. I continue to support the idea of a public/private partnership between commercial wireless providers and public safety to address First Responders' needs. Initial FCC efforts to hard-wire such a partnership into the auction of the D block, however, failed to find a commercial provider sufficiently interested in purchasing the license. This failure is widely attributed to poor auction design that asked bidders to sign up for a vaguely defined obligation to negotiate with the Public Safety Spectrum Trust—an entity created to govern the use of the 24 MHz of public safety spectrum. We should continue to examine better ways of creating a public-private partnership.

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I thank the witnesses for their participation today and I think I can speak for all of us when I say we thank you for your commitment to increasing public safety and look forward to a vibrant discussion of the communications needs of America's first responders.

OPENING STATEMENT OF HON. ANNA G. ESHOO, A REPRESENTATIVE FROM THE STATE OF CALIFORNIA

Ms. ESHOO. Thank you, Mr. Chairman, for having this very important hearing and to all the witnesses that are here today. I can't help but think that the most common occurrence in our hearings is that we're hearing from the private sector. But at each table here, ours and yours, we are all public servants for the most part in this. And the importance of what we do and what needs to be built simply cannot be underscored enough. This has great significance to our country, the creation of an interoperable public safety network.

We are approaching the 10th anniversary of the horrific attack on our country. It's not a source of pride to any of us that first responders remain unable to seamlessly communicate with each other. The attacks on 9/11, Hurricane Katrina, and the shootings at Virginia Tech are among the incidences that remind us why we need a robust, next-generation public safety network. We owe it to our first responders. You put your lives on the line for our country, for our communities every single day. So there has to be a 21st

Century network that's put together so that you can really carry out what you do so well.

Over the past several years, we've grappled with the question of how to best build and maintain such a network. Should we reallocate the D Block or auction the spectrum and use the proceeds to build out a public safety network as the FCC's national broadband plan recommended last year? I've given this question significant thought. And I think the plan we commit to must be properly funded, which is a big thing. It's a simple phrase but it needs to be properly funded. And use the spectrum available to its maximum efficiency and bring forward the expertise of those in the telecommunications sector as well.

We have one chance to build this network and we need to do it right. I don't want to have to revisit this. I don't want you to come in and say it's broken. Congress does things and if the legislation doesn't get it right, we don't get back to it for at least another decade, and I don't think we can afford to do that at this stage in the life of our country.

I think the recent draft discussion by Senators Rockefeller and Hutchison offers a well thought out proposal that should be given consideration within this committee. I strongly believe that we have to leverage the strength of the private sector and establish an independent entity that has the responsibility for building and overseeing the network. I believe that public safety in our country are expert at public safety. But I also think that there are expertise that needs to be brought to public safety that you simply don't possess. I mean there are some that may know something about it, but our private sector can really be highly instructive in this.

I want to hear from our witnesses today on how much spectrum is really needed, what are the next-generation applications that first responders expect to use, and are there opportunities to use some of the spectrum to support commercial broadband networks? We should also give significant consideration to the devices that public safety will use once a network is built.

By one estimate, approximately 80 percent of the public safety narrowband equipment market is held by one company. Last Congress I joined with Representatives Harmon and Shimkus as a cosponsor of the Next-Generation Public Safety Device Act, which would address this serious problem. Spectrum is the foundation for any national public safety network, but without a competitive device market, our efforts to achieve interoperability and lower the cost of public safety devices could be blocked. We're planning to introduce this legislation and I would ask the chairman that it be considered as part of the comprehensive public safety bill that this committee agrees to.

As we work on the needs of our first responders, we can't forget about our Nation's 9-1-1 call centers, which are often the first line of defense for those in distress. Every day, 9-1-1 call centers receive more than 650,000 calls across the country. A next-generation 9-1-1 system will enable first responders to receive photos, video, and text messages, which can improve the quality and the speed of emergency response. I think this all needs to be integrated. These upgrades should be incorporated into comprehensive public safety legislation.

So I thank all the witnesses that are here today for not only being here today to give us your testimony and your views but also to the public safety chieftains of our country for what you do for our communities and our country day in and day out. I think that you are real heroes of our country. And in response to your needs, I think that we can produce a bipartisan, bicameral legislation that will honor your work and give you the necessary tools to operate a robust interoperable communication network for our country.

Thank you, Mr. Chairman, and I yield back.

Mr. WALDEN. Thank you. And now I recognize the chairman of the full committee, who has put an enormous amount of work into this issue over many years, Mr. Upton, for his statement.

OPENING STATEMENT OF HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. UPTON. Well, thank you, Mr. Chairman. And I share Ms. Eshoo's enthusiasm and Mr. Walden's as well by putting together a bipartisan plan that really gets to the finish line.

And today's hearing, as we know, is focused on the technology and the expertise needed to produce an interoperable communications network for our Nation's first responders. This is by no means the first hearing on this issue, nor the first attempt by Congress to give public safety the tools needed to make interoperability a reality.

The '05 DTV legislation cleared a 24 megahertz block of spectrum nationwide for the public safety's exclusive use—a key recommendation of the 9/11 Commission. I proposed the amendment that was successful and worked with my friend Mr. Stupak to that legislation that provided $1 billion for interoperable equipment. In all, CRS reports that public safety has been given $13 billion dollars from the Federal Government for radio equipment since 2001. But despite those tools, the interoperable network still remains elusive.

The question is what will bring us closer to making interoperable voice and broadband communications a reality? Some say we should reallocate the D Block. But current law requires that spectrum to be auctioned and doing otherwise would create roughly a $3 billion hole in the budget that most of us know that we cannot afford.

So today we will discuss ways to meet public safety's technological needs while leveraging the competition and innovation that have characterized the commercial wireless marketplace. The dialogue is a critical component of a winning public safety strategy. America's commercial wireless providers are world leaders in technology for sure, spectrum efficiency, and innovative services. Cooperation between the robust commercial sector and the critical public safety sector will not only permit each to focus on what they do best, but will make both sectors stronger in the tough economy. I now yield to Mr. Barton.

[The prepared statement of Mr. Upton follows:]

PREPARED STATEMENT OF HON. FRED UPTON

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no means the first hearing on this issue, nor the first attempt by Congress to give public safety the tools needed to make interoperable communications a reality.

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Mr. BARTON. Thank you, Chairman Upton. This is a very important issue. It is a very vexing issue. I mean we can say that back in 2001 there was a legitimate excuse not to have an interoperable network, but 10 years later, and as Chairman Upton just pointed out, $13 billion being spent at the federal level, the Digital Transition Act, which I helped pass when I was chairman that freed up 24 megahertz of spectrum for the public sector, I don't see that there is any real excuse to not have an interoperable network. And I am not sure it is a spectrum issue.

In my congressional district in my home county, my firemen, policemen, sheriff's department have double-digit number of systems, very few of whom communicate with each other. It is not a lack of spectrum. It may be lack of funding at the local level. But, you know, this is an important hearing.

As the subcommittee chairman said, we need to get the policy right, but we also need some honest answers from our witnesses about what is going on in the real world. So I appreciate the opportunity to be here and I appreciate the full committee chairman and the subcommittee chairman giving this a priority. And I yield to Congressman Terry of Nebraska.

[The prepared statement of Mr. Barton follows:]

PREPARED STATEMENT OF HON. JOE BARTON

Thank you, Mr. Chairman, for bringing a comprehensive panel before the committee to discuss a very important topic: spectrum. I would like to thank all of our witness for being here today, and I look forward to hearing from them.

The discussion of "how to best use our spectrum" is one that I know all too well. As Chairman of this committee, I had the privilege of ensuring that broadcast spectrum was cleared for public safety and wireless broadband uses through the passage of the Digital Television Transition and Public Safety Act of 2005 (DTV). I heard from many public safety witnesses on the importance of spectrum and the increased need for more spectrum. The DTV legislation passed during the 109th Congress, provided public safety with 24 MHz of spectrum, and made available an additional 10 MHz of spectrum for commercial use in the D-block.

I believe that before we allocate more spectrum, we should look at the efficiency and current usage of the available spectrum. It is to my disappointment to learn that public safety officials have not effectively used the spectrum allocated to them. We have yet to see a concrete plan of a nationwide public safety network, but we hear that there is a need for more spectrum. As for wireless broadband, I understand that there has been a major increase in demand from our consumers, but

there is still unallocated spectrum available that has yet to be successfully auctioned. I hope to gain a better understanding of why this is the case from this hearing.

I yield back.

Mr. TERRY. Thank you. Mr. Chairman, I don't think anyone here doesn't share in the same goal of an interoperable system, but it is confusing to me as we sit here 5, 6 years after supposedly putting us on a road to interoperable that we spent $13 billion, we provided 24 megahertz, and now we are being told that to solve this problem, we need more money, more spectrum, and new governance by way of a new government agency, bureau, whatever we want to call it. Frankly, I don't think any of those solve the problems. I don't know what the problem is. But that is why we are having these hearings.

If you aren't using the 24 megahertz properly or efficiently, why would we give you 10 more? It doesn't make sense to me. If 13 billion hasn't solved the problem, then what is? These seem to be overly simplistic requests to solve a problem. I think the problems are much deeper than this.

The second point I want to make is we have been pushed, continually asked why don't we just take up the Senate bill? Well, the Senate bill I don't think really attacks or goes to the problem. And I am not going to apologize. I will defend what this subcommittee is doing is deemed diligent, asking the tough questions and trying to find the right answers to solve this problem. That is what our job is. And so I want to thank our subcommittee chairman and our full committee chairman for being diligent. Yield back.

Mr. WALDEN. The gentleman's time has expired. We will now go to the witnesses.

Mr. WAXMAN. Mr. Chairman?

Mr. WALDEN. Oh, I am sorry. We won't go to the witnesses. We will go to Mr. Waxman. My apologies. We now go to Mr. Waxman for——

OPENING STATEMENT OF HON. HENRY A. WAXMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. WAXMAN. Thank you very much, Mr. Chairman, for recognizing me. We have to be diligent, but we have to do more than that. We have got to solve this problem.

The 10th anniversary of 9/11 is approaching within a few months. Our goal should be to have legislation on the President's desk to provide public safety with nationwide interoperable broadband before then as a tribute to the brave first responders who risked their lives to save others.

Although there is a broad agreement that we need to get this done, there are different views on the best way forward. Some want the FCC to auction the D Block to a wireless provider and encourage collaboration between the winning bidder and public safety. Others want Congress to reallocate the D Block to public safety. Both approaches could work, but recent developments appear to favor reallocation. The reallocation approach is strongly preferred by public safety leaders and President Obama, and it has bipartisan support in the House and the Senate.

In particular, I want to commend Senator Rockefeller and Senator Hutchison for their leadership. Senator Rockefeller has been a tireless champion of the reallocation approach and has put forth a discussion draft with Senator Hutchison that is worthy of our careful consideration. Their bipartisan draft goes a long way towards addressing concerns about governance, accountability, interoperability, and how we pay for the public safety network.

Last month, I approached Chairman Upton and Chairman Walden and suggested that we emulate our Senate counterparts and work together on a bipartisan House bill that would provide for a nationwide public safety network and make new spectrum available through incentive auctions. I hope they will take us up on this offer.

I appreciate the fact that doing this right is complex and challenging. But with the 10th anniversary fast approaching, we need to settle on a path forward and move quickly and the only way that is going to happen is if we do it together on a bipartisan basis. There is no reason why Congress cannot act before this somber anniversary.

This hearing is an important step in this process. We have a panel of distinguished experts before us today, and I look forward to their testimony.

Mr. Chairman, I want to yield the balance of my time to my colleague from California, Ms. Matsui.

Ms. MATSUI. I thank the ranking member for yielding to me. And I also would like to thank the witnesses for being with us today.

This is our second hearing on spectrum this year, and I understand we will have a third next week. As we continue to consider spectrum policy, it is my hope that some of the outstanding issues out there will be answered so we can move forward and determine how best to proceed in a bipartisan manner. I plan to follow up on my questions from the last spectrum hearing we had last month regarding who will govern and oversee the public safety network that would ultimately possess significant responsibilities. It will have responsibility over highly valuable spectrum and significant public funding, not to mention needing to ensure the success of this vitally important network for first responders.

That being said, we must provide public safety with interoperable capabilities they need and deserve to protect our Nation during challenging times. We are all very cognizant as we approach the 10th anniversary of the tragic events of September 11. It is not acceptable that our Nation does not have a public safety communications system with a nationwide level of interoperability in place. More recently, we are seeing how tragic events such as the tornadoes in the Midwest have hampered emergency communication efforts in some areas.

While we debate the merits on how to fund and construct a nationwide public safety system, we can all agree that we must find a path that provides the funding required to build an interoperable system that fulfills the needs and securities of our public safety goals. We must also do it in a fiscally responsible manner. It won't be easy but we must get there, and we must get there soon.

I thank you, Mr. Chairman, for holding this important hearing, and I yield back the balance of my time.

Mr. WALDEN. I thank the gentlelady. We will move on now to the witnesses, get this order right.

We will start with Mr. Steinberg. We appreciate your willingness to come and testify, the chief technology officer for Motorola Solutions. Sir, you know how to use a microphone. Yes, if anybody can't figure out the microphones, that is going to be at least a 2-meg penalty on your spectrum.

Mr. Steinberg, go ahead.

Mr. STEINBERG. Thank you, Chairman Walden, Ranking Member Eshoo, and others members of the subcommittee.

Mr. WALDEN. But I think you actually have to push it. Does it light up?

Mr. STEINBERG. Yes, is green go?

Mr. WALDEN. You may have to get a little close to these microphones.

Mr. STEINBERG. Is that OK?

Mr. WALDEN. No.

Mr. STEINBERG. The right green button?

Mr. WALDEN. No.

Mr. STEINBERG. No?

Mr. WALDEN. Maybe we should grab that other microphone. Why don't you just grab Mr. Martinez's microphone if it will move there. Maybe we can get our technical people in here and rewire the whole process.

Mr. STEINBERG. Is that working? How is that?

Mr. WALDEN. Get real close.

Mr. STEINBERG. Hello?

Mr. DINGELL. Try and use your big boy voices.

Mr. STEINBERG. It is also——

Mr. WALDEN. Well, exactly. Yes. No, we got to get a microphone that works here. Mr. Hanley, will you try your microphone? Why don't we start with Mr. Hanley and we will have our technical operations officers come and fix Mr. Steinberg's microphone and Mr. Martinez's microphone.

Mr. UPTON. Mr. Chairman, we may be able to set an example by sharing if we can't get it to work.

Mr. WALDEN. Yes, right. So let us go to Mr. Hanley first while we get the mikes fixed. Vice president, Technology, Planning, and Services for Telephone and Data Services. Mr. Hanley, please go ahead.

STATEMENTS OF JOSEPH R. HANLEY, VICE PRESIDENT, TECHNOLOGY, PLANNING AND SERVICES, TELEPHONE AND DATA SYSTEMS; CHRIS IMLAY, GENERAL COUNSEL, AMERICAN RADIO RELAY LEAGUE; PAUL STEINBERG, CHIEF TECHNOLOGY OFFICER, MOTOROLA SOLUTIONS, INC.; DENNIS MARTINEZ, CHIEF TECHNOLOGY OFFICER, HARRIS RF COMMUNICATIONS DIVISION; JEFFREY D. JOHNSON, CHIEF EXECUTIVE, WESTERN FIRE CHIEFS ASSOCIATION, ON BEHALF OF THE PUBLIC SAFETY ALLIANCE; AND JOE HANNA, PRESIDENT, DIRECTIONS

STATEMENT OF JOSEPH R. HANLEY

Mr. HANLEY. Thank you. Chairman Walden, Chairman Upton, Ranking Member Eshoo, Ranking Member Waxman, and members of the committee, thank you for the opportunity to provide U.S. Cellular's perspectives on this important issue. Today's topic is of great importance to all of us as citizens who rely on our first responders for our safety and as consumers and businesses that need mobile broadband to create jobs and compete in the global economy.

The public interest requires a strategy that can deliver on both of these goals. First, we must provide nationwide interoperable broadband services for public safety. This network must serve the entire Nation, not just a few select communities, and it must be provided at the lowest cost to taxpayers by leveraging commercial operators' networks, capabilities, and shared use of the spectrum, as well as harnessing market forces to reduce the cost of devices and equipment.

Second, we must expand competitive broadband services for consumers. Broadband is a powerful catalyst for economic growth. However, spectrum is increasingly concentrated in the hands of a few carriers, and more spectrum is needed to ensure the availability of advanced services, competition, and consumer choice.

The good news is that these two goals are highly complementary, and your decision does not have to be couched as for one and against the other. Shared networks and shared use mean lower costs and better services for all users of the network. Also, the D Block and the public safety block share the same band class, band class 14 in the LTE standard.

In today's world, public safety agencies may pay several thousand dollars for a single handset that works on public-safety-only networks. The economies created by combined the commercial and public safety user base will drive cost-effective equipment for this band and enable public safety to benefit from the ongoing innovation driven by the commercial market.

FCC studies also point to the benefits of the shared network approach. An FCC white paper concluded that a stand-alone public safety network would cost as much as $20 billion more by failing to leverage commercial resources and technologies.

Now, a casual observer of this protracted debate might conclude that it all boils down to a binary choice between holding an auction for D Block licenses versus reallocating the spectrum to public safety. In fact, neither approach ensures nor precludes the optimal network build and operation. Rather, each approach requires that

Congress and the FCC adopt a framework promoting regional partnerships that leverage the best commercial networks in each area.

This framework must ensure that (1) sufficient funding is available to build and operate and maintain a high quality network in rural and urban areas; (2) public safety enters into partnerships with commercial operators that leverage the experience and network assets of those operators; (3) the network is designed to be fully interoperable and is deployed and used with spectral efficiency in mind, recognizing the scarcity of this national resource; and (4) fair long-term opportunities are provided for a range of qualified commercial operators to partner with public safety and those operators can use available capacity on the network wherever feasible.

In conclusion, Congress and FCC must go beyond choosing between holding an auction of D Block licenses and reallocating the spectrum to public safety. U.S. Cellular is prepared to support either approach, provided the needed safeguards are adopted. Without those safeguards, we all risk missing the opportunity that is before us today. An incomplete solution could result in sporadic coverage that favors urban markets and leaves rural communities behind, needlessly inflates the cost of equipment for public safety users, permits the inefficient use of the spectrum, fails to spur competition, and adds to the burden on the taxpayer.

The worst course of action, however, is continued inaction. While we have studied and debated the right course to take, we have left the D Block and most of the public safety block idle. This inaction has meant no interoperable public safety network, it has foreclosed spectrum from commercial uses, and is has deprived the Federal Treasury as well as public safety of revenues from this spectrum. Now is the time to advance the two complementary goals of meeting public safety needs and expanding competitive wireless broadband services for consumers by adopting a framework that encourages shared public-private networks and regional public-private partnerships.

Thank you for the opportunity to provide this testimony and I look forward to your questions.

[The prepared statement of Mr. Hanley follows:]

WRITTEN STATEMENT

of

MR. JOSEPH R. HANLEY, VICE PRESIDENT – TECHNOLOGY, PLANNING, AND SERVICES

TELEPHONE AND DATA SYSTEMS, INC.

before the

HOUSE SUBCOMMITTEE ON COMMUNICATIONS AND TECHNOLOGY

Using Public/Private Regional Partnerships to Create an Interoperable Public Safety Network

Hearing on "Creating an Interoperable Public Safety Network"

May 25, 2011

INTRODUCTION

Chairman Walden, Ranking Member Eshoo, and members of the Committee, it is a pleasure to appear before you today. My name is Joe Hanley and I am Vice President – Technology Planning and Services for Telephone and Data Systems, Inc. I am testifying on behalf of United States Cellular Corporation, which is a subsidiary of Telephone and Data Systems.

As background, U.S. Cellular is the sixth largest mobile operator in the nation. We serve over 6 million customers in rural, suburban and urban markets in 26 states, providing wireless service to meet the needs of public safety agencies, businesses, and consumers. We are a member of the Rural Cellular Association and of CTIA – The Wireless Association®. We provide award-winning call quality and customer service. U.S. Cellular was rated the best cell phone service provider by Consumer Reports in January 2011,[1] and received numerous J.D. Power awards over the last five years.[2]

U.S. Cellular's customers demand high-quality mobile services for business and personal communications. Our wireless services provide critical infrastructure for jobs and economic growth in all types of communities. The company's commitment to meeting customers' needs includes the on-going deployment of cell towers and advanced technologies to provide voice and broadband services to many unserved and underserved areas. Our aggressive investment in third-generation broadband networks already reaches about 98 percent of our customers.

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[1] Consumer Reports, "Consumer Reports cell-service ratings: AT&T is the worst carrier," ConsumerReports.org (Dec. 6, 2010).

[2] J.D. Power, "U.S. 2011 Wireless Call Quality Performance Study – Volume 1: Overall Call Quality Momentum Halts Due to Shifts in Wireless Call and Data Usage Patterns," JDPower.com (Mar. 3, 2011).

In the next step, U.S. Cellular announced on May 6, 2011 that we will deliver high-speed fourth-generation services and 4G-enabled devices to more than 25 percent of our customers across two dozen markets in time for the 2011 holiday season. The technology standard for our fourth-generation network, LTE, is the same as the standard selected by the Federal Communications Commission for the interoperable public safety network.

SUMMARY OF TESTIMONY

Thank you for the opportunity to address the issue of creating an interoperable public safety network. Today's topic is of great importance to the public safety community as well as all users of wireless services. The right approach to this objective will enhance the effectiveness and reach of public safety services, and also spur jobs, economic growth, competition and more effective services in all sectors of government and society.

Importantly, today's topic is not simply about choosing between a commercial auction for 700 MHz D Block licenses or reallocating this spectrum to public safety. In fact, neither approach ensures nor precludes the optimal network build and operation. Rather, each approach requires that Congress and the FCC adopt a framework promoting regional public/private partnerships that fully leverage the best commercial networks in each area.

If developed appropriately, we believe that this initiative can advance two key and complementary policy goals: meeting public safety needs and expanding competitive wireless broadband for American consumers and businesses. With proper legislative safeguards, reallocating the spectrum to public safety could succeed in advancing these goals. Another viable option is a commercial auction of D Block licenses followed by negotiated public/private

partnerships. Under either approach, regional public/private partnerships have strong benefits. A fiscally and technically-sound solution involves commercial operators constructing and operating the shared network and working in partnership with public safety to ensure interoperability and prioritization of use for the first responders.

Likewise, if Congress chooses to reallocate the D Block, we must do more than reassign the spectrum to public safety and hope for the best. Whether the D Block is auctioned or reallocated, the legislative and regulatory framework must ensure that: (1) sufficient funding is available to build, operate, and maintain a high quality network with broad coverage; (2) public safety enters into partnerships with commercial operators that leverage the experience and both local and core network assets of those operators; (3) the network is designed, deployed and used with spectral efficiency in mind, recognizing the scarcity of this national resource; and (4) fair long-term opportunities are provided for a range of qualified commercial operators to work with public safety to build, operate, and continue to upgrade the network and those operators have an opportunity to use available capacity on the network wherever feasible.

Future competition in broadband services depends on making network capacity available to consumers through a variety of commercial operators. This approach will also ensure that more rural communities will see the needed infrastructure deployed more quickly by empowering operators with strong commitments to rural communities.

TWO PUBLIC POLICY GOALS FOR PUBLIC SAFETY AND COMMERCIAL CUSTOMERS

Since 2007, U.S. Cellular has been actively engaged in the debate over how to create a nationwide, interoperable wireless broadband public safety network. In testimony before House subcommittees on four prior occasions,[3] U.S. Cellular supported the regional public/private partnership model, which provides the economies of shared networks and efficient use of spectrum.

As Mary N. Dillon, President and Chief Executive Officer of U.S. Cellular, recently testified before this Subcommittee, U.S. Cellular believes that Congress should quickly adopt the correct framework for creating an interoperable public safety network:

- ***First*** and foremost, a national interoperable broadband network should be rapidly deployed, meeting public safety's technical and availability requirements.
- ***Second***, there should be opportunities to expand competitive broadband services subject to the needs of public safety.
- ***Third***, the approach to creating an interoperable public safety network must ensure efficient use of public spectrum resources and taxpayer dollars.

This hearing aims to examine options for creating a nationwide interoperable broadband wireless network supporting the needs of the public safety community. There are two fundamental public policy goals for the spectrum in the 700 MHz PSBL and D Blocks. Both goals

[3] LeRoy T. Carlson, Jr., "Area Licensing: A Solution for the Public/Commercial Partnership in the 700 MHz D Block," Testimony before the House Committee on Homeland Security, Subcommittee on Emergency Communications, Preparedness and Response (Sept. 16, 2008); Joseph R. Hanley, Testimony before the House Subcommittee on Communications, Technology, and the Internet (Sept. 24, 2009); Joseph R. Hanley, Testimony before the House Subcommittee on Communications, Technology and the Internet (June 17, 2010); Mary N. Dillon, "Critical Need for Additional Spectrum to Meet Growing Consumer Demand for Mobile Services," Testimony before the House Subcommittee on Communications and Technology (Apr. 12, 2011).

are essential to the public interest. Fortunately, the two goals are complementary, not in conflict, if the right framework is adopted.

One goal in creating this network is to provide nationwide interoperable broadband services for public safety uses. These services are critical and must be made available throughout the nation, not just for a few select communities. These services should be provided at the lowest possible cost to taxpayers and resource-constrained public safety agencies by leveraging commercial operators' existing networks, financing capabilities, and shared use of the spectrum. Along with efficient use of fiscal resources, these services should be provided with efficient use of spectrum, a national resource in scarce supply that is vital to wireless broadband services.

The second goal in creating this network is to expand competitive broadband services for consumers nationwide. Wireless broadband services provide critical infrastructure for economic growth, with additional benefits for energy, environmental, health care, educational and other policy goals. However, spectrum is increasingly concentrated in the hands of a few carriers, and more spectrum must be made available to ensure universal availability of advanced services, competition and consumer choice. Doing so will spur job creation and improve the lives of Americans in many ways.

This second goal must be part of the consideration of how to create an interoperable public safety network. This Subcommittee heard testimony last month, including from U.S. Cellular and others, on the need to address the exploding demand for commercial broadband services. The range of new mobile services is huge and the growth in demand for them is breath-taking. Some of the drivers are:

- In 2010, mobile data traffic nearly tripled, for the third year in a row. Cisco forecasts that the volume of mobile data usage will grow 21-fold from 2010 to 2015.[4]

- As FCC Chairman Genachowski recently highlighted, the number of mobile applications downloaded grew to 5 billion in 2010 from just 300 million in 2009; and mobile online shopping brought in nearly $4 billion in revenue in 2010, up from $1.4 billion in the prior year.[5]

- Smartphones generate 24 times more traffic than a basic wireless handset, and consumers are rapidly shifting to these devices. In 2010, smartphones accounted for 35 percent of all handset connections, and average data traffic per smartphone doubled during that year. Smartphone sales in the U.S. are expected to increase by 42% this year. Tablets, the fastest-growing category of devices, average about 122 times the mobile data traffic of a basic handset, and analysts project sales of 55 million tablets this year.[6]

The 700 MHz PSBL and D Blocks are prime, scarce spectrum that must be efficiently used, with or without reallocation of the D Block to public safety. The FCC's National Broadband Plan points to the growing demand for mobile broadband services and recommends that the federal government make 500 megahertz of spectrum newly available for broadband within ten years, of which 300 megahertz should be made available for mobile uses within five years.[7] This year, in the State of the Union Address and subsequent release of a National Wireless Initiative to "win the future" through expanded wireless access, President Obama called for nearly doubling wireless spectrum available for mobile broadband.[8] As explained in the next section, the

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[4] Cisco, "VNI Mobile U.S. Fast Facts" (Mar. 2011).

[5] FCC Chairman Julius Genachowski, "Remarks as prepared for delivery: CTIA Wireless 2011" at 5 (Mar. 22, 2011).

[6] Id. at 4-5; Cisco, supra; http://www.gartner.com/it/page.jsp?id=1550814.

[7] FCC, National Broadband Plan: Connecting America at XII (Mar. 2010).

[8] The White House, "President Obama Details Plan to Win the Future through Expanded Wireless Access" (Feb. 10, 2011).

interoperable public safety network offers the opportunity to increase the supply of spectrum for competitive commercial services.

COMPLEMENTARITY OF PUBLIC SAFETY AND COMMERCIAL SERVICES GOALS

Congress should not view the PSBL and D Blocks as posing an irreconcilable choice between helping public safety or facilitating competitive broadband services for businesses and households. These goals are highly complementary, as shown in a short review of equipment costs and spectrum utilization.

The PSBL and D Blocks operate within the same band class defined by the Third Generation Partnership Project (3GPP) for use in LTE networks, band class 14. By sharing the band class, commercial utilization of this spectrum and the much larger base of wireless devices that will result from commercial use will provide significant scale benefits to public safety. In fact, commercial use may be essential to driving the necessary volumes of handsets and other devices needed by public safety. As commercial use of this spectrum rises, the prices for public safety handsets should continue to decline.

FCC engineering and economic analyses of the interoperable public safety network point to the strong complementary benefits to public safety and commercial users of the shared network approach. In April 2010, a FCC white paper analyzing equipment and costs concluded that a stand-alone public safety network would suffer from in excess of $20 billion of higher

costs in failing to leverage commercial resources and technologies (including cell sites, towers, construction and operations capabilities, and access to handsets and other equipment).[9]

Among the recent support for the complementary nature of these goals, consider the following highlights from presentations at the March 4, 2011 forum hosted by the FCC on the technical framework for the public safety mobile broadband network to ensure nationwide interoperability:

- U.S. Department of Homeland Security: "'Game-changing' acquisition approach: Transition from stove piped government-owned and operated narrowband voice to shared public safety and commercially-provided broadband voice and data services".[10]

- North Carolina State Highway Patrol: "Broadband Design: ... An integrated solution with Public Safety, Commercial, White-Space, data-casting, and WiFi... possibly satellite .... Technology must evolve with commercial offerings." "Public Safety will benefit with a broad partnership".[11]

- Vice-Provost of the Illinois Institute of Technology: "Needed to Make A Positive Future for Public Safety Happen: ... Supportive Regulatory Structure Enabling Competition to Create Shared Public Safety-Commercial Networks" "Significant Public Safety Advantages with Commercial Partnerships".[12]

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[9] FCC White Paper, "A Broadband Network Cost Model: A Basis for Public Funding Essential to Bringing Nationwide Interoperable Communications to America's First Responders" (OBI Technical Paper No. 2) (Apr. 23, 2010).

[10] John Santo, Executive Director, Wireless Systems Program Office, U.S. Customs & Border Protection, U.S. Department of Homeland Security, Presentation at FCC Interoperability Forum at 6, 9 (Mar. 4, 2011).

[11] P. A. Sadowski, IT Manager, North Carolina State Highway Patrol, "Solutions for the deployment of Radio Access Network equipment to achieve Nationwide Operability and Interoperability," Presentation at FCC Interoperability Forum at 11, 12, 15 (Mar. 4, 2011).

[12] Dennis Roberson, Vice Provost & Research Professor Illinois Institute of Technology, "A Responsible Way Forward", Presentation at FCC Interoperability Forum at 2, 10 (Mar. 4, 2011).

Either an auction of D Block licenses or reallocation of this spectrum to public safety could succeed in promoting the complementary goals of an interoperable public safety network and advancing competitive commercial services. Yet, it is not enough to embrace one of these paths and hope for an optimal network. The policy goals require that Congress and the FCC move the public safety network forward by adopting the principles described in the next section.

PRINCIPLES FOR ACHIEVING THE COMPLEMENTARY PUBLIC SAFETY AND COMMERCIAL GOALS

U.S. Cellular believes that the public safety and commercial goals for the PSBL and D Blocks require Congress and the FCC to implement four fundamental principles through legislation and regulations.

First, public safety should enter into partnerships with commercial operators to construct and operate the network. Public safety should leverage the commercial operators' financing capabilities, operating efficiencies and advanced technologies in order to promote rapid build-out, greater coverage, and lower costs for both public safety and commercial users.

Second, the framework should encourage efficient usage of scarce spectrum resources through joint public/private design and use of network capacity. The public safety spectrum -- regardless of whether the D Block is reallocated or not -- should not remain fallow or be subject to low utilization because of the design of the network infrastructure or rules for access to capacity. Commercial use should generate revenues or cost benefits for public safety, and the legal framework must provide these incentives to public safety.

Any allocation of the D Block spectrum to public safety should include standards that encourage private sector commercial use of portions of this spectrum whenever it is not fully utilized by public safety. Congress should not encourage models that set up public agencies as quasi-commercial operators or simply maintain substantial spectral or network capacity in permanent reserve. In order to fully leverage the advantages of a shared network, operators must have confidence that the network capacity under this partnership will be available on a long-term basis to support commercial operations.

Third, there must be a competitive process for the regional selection of commercial operators to partner with public safety. The process must be fair and open, not biased in favor of any particular class of wireless carriers. The legislation must address the definition of geographic areas for the partnerships. Smaller partnership opportunities -- whether through smaller license areas in a commercial auction of the D Block, or through smaller regional competition to team with public safety in using public safety spectrum -- would benefit both public safety and commercial users of the network. The best approach to obtain a nationwide, interoperable public safety network is through regional network partnerships that are coordinated, much like roaming on commercial networks.[13]

Selection of partners on a regional basis would lead to the involvement of locally strong carriers that could leverage their existing network infrastructure and operations in an area. With multiple operators building area networks, network deployment will be faster and more extensive. Additionally, multiple smaller partnerships will produce a more reliable network

[13] See Dr. Dennis Martinez, Chief Technology Officer, Harris RF Communications Group, "How to Ensure Nationwide Interoperability for Public Safety Broadband Utilizing LTE 4G Technology", Presentation at FCC Interoperability Forum at 5 (Mar. 4, 2011) ("Sample Template for Building an Interoperable Network of Networks").

than under a nationwide or mega-region approach, as there will be no single point of failure that can shut down the whole country or large swaths of territory.

Fourth, Congress will need to provide a substantial part of the funding necessary to construct and operate the public safety broadband network. As the FCC's technical and economic analyses showed, such funding is needed in some areas to meet public safety's demands regarding capacity, applications, coverage, reliability, security and other features.[14] The shared network approach and competitive selection of regional commercial operators should be used to minimize the burden on taxpayers.

These four principles apply regardless of whether Congress decides on a commercial auction of the D Block or reallocation of this spectrum. If Congress chooses reallocation, Congress must do more than reassign the spectrum to public safety and hope for the best. Without a framework implementing these principles, we could risk a lose-lose outcome where the nationwide, interoperable public safety network is not built and American consumers, businesses, and taxpayers receive no benefit from this scarce spectrum.

CONCLUSION

Congress must go beyond choosing between an auction of D Block licenses and reallocating this spectrum to public safety. U.S. Cellular is prepared to support either approach, provided the needed safeguards are adopted. Without those safeguards, we risk missing the opportunity that is before us. An incomplete solution could result in sporadic coverage that favors urban

[14] FCC, National Broadband Plan: Connecting America at Section 16.1 (2010).

markets and leaves rural communities behind, needlessly inflates the costs of equipment for communities, permits the inefficient use of the spectrum, fails to spur competition, and adds to the burden on the taxpayer. Therefore, both paths require a legislative and regulatory framework that encourages shared public/private networks and regional public/private partnerships. This framework will advance the two, complementary goals of meeting public safety needs and expanding competitive wireless broadband services for commercial customers.

Creating an interoperable public safety network requires that Congress and the FCC implement four principles: (1) sufficient funding is available to build and operate a high quality network with broad coverage; (2) public safety enters into partnerships with commercial operators that leverage the experience and both local and core network assets of those operators; (3) the network is designed, deployed and used with spectral efficiency in mind, recognizing the scarcity of this national resource; and (4) fair long-term opportunities are provided for a range of qualified commercial operators to work with public safety to build, operate, and continue to upgrade the network and those operators have an opportunity to use available capacity on the network where technically feasible.

The worst course of action is continued inaction. Over the past three years since Auction 73, while the federal government and other stakeholders studied and debated the right course of action to take, the nation has left the D Block and most of the PSBL Block idle. This inaction has meant no interoperable public safety network, foreclosed spectrum from commercial uses, and deprived the federal Treasury as well as public safety of revenues from this spectrum. The

federal government should move forward now by adopting a process for selecting commercial operator partners and creating the shared network.

Thank you for the opportunity to provide this testimony.

Mr. WALDEN. Thank you, Mr. Hanley.

We will go next to Mr. Imlay, who is the general counsel for the American Radio Relay League, known more informally as the Ham Radio Operators. So Mr. Imlay, we are glad to have you here. We look forward to your testimony, sir.

STATEMENT OF CHRIS IMLAY

Mr. IMLAY. Thank you very much, Chairman Walden and members of the committee. Is it a great honor and a privilege to appear before you today and to represent the interest of the 700,000 amateur radio operators in the United States. We are not first responders, but we are proud to provide support communications, emergency restoration communications, and emergency temporary interoperability communications for first responders and for those involved in local and regional disaster relief. The ARRL has memoranda of understanding with FEMA, with the National Communication System, and the Department of Defense, with the American National Red Cross, the Salvation Army, and the National Weather Service, and we routinely are involved in that period of time during and immediately after the occurrence of a natural disaster in the United States when communications systems are disrupted, overloaded, or fail.

We are very much supportive of both the creation of a nationwide interoperable broadband network for public safety. It has been proven to be an absolute necessity. And we are also supportive of the allocation of the D Block to public safety as well. In the immediate aftermath of a natural disaster, the ability of any network to provide interoperable communications is going to necessitate a certain amount of bandwidth. Bandwidth translates into the ability of public safety officials to communicate large volumes of traffic which are the inevitable need for immediate post-disaster communications.

There is before the subcommittee now H.R. 607, which provides for both the creation of a nationwide broadband network and for the reallocation of the D Block to public safety. Those are admirable goals and the amateur radio community supports them. The problem, though, with H.R. 607 is that Section 207(d) of that bill provides uniquely for a commercial auction and reallocation of the 420 to 440 megahertz and 450 to 470 megahertz bands. They are referred to in the bill as "paired bands," but they are really not. The concept apparently behind that Section 207(d) is that as a quid pro quo for the allocation of the D Block, these 2 segments of spectrum would be reallocated and auctioned as a means of paying for the creation of the broadband network using the D Block.

The problem is that those frequency segments would displace a number of critical uses. In addition to the amateur service in the 420 to 440 megahertz band, the United States Government uses that band for military radars, including PAVE PAWS radars for early detection of offshore surface launch missiles. And they also use the band for airborne radars for drug interdiction purposes.

In the 450 to 470 megahertz segment, there are many thousands of business and industrial radio uses which supports small business in the United States for dispatch communications. Broadcast radio stations use that segment for remote pickup units to provide

breaking news to the American public. The band is used for security and alarm systems for the station monitoring security industry. And they are many other uses. These are not public safety allocations. And the displacement of all of these important uses in these two band segments is not necessary to the creation of an interoperable public safety network.

We urge the deletion of Section 207(d) of H.R. 607 if the subcommittee decides to use this version of this legislation in any future markup.

And we are grateful for the opportunity to bring these to your attention. Thank you.

[The prepared statement of Mr. Imlay follows:]

Statement of Christopher D. Imlay, General Counsel
On behalf of
ARRL, the national association for Amateur Radio

Hearing on "Creating an Interoperable Public Safety Network"

Before the Subcommittee on Communications and Technology

Committee on Energy and Commerce

U.S. House of Representatives

May 25, 2011

I. Summary of Testimony

1. In emergencies, and during disasters and their immediate aftermath, when other communications systems have failed, volunteer Amateur Radio operators are ready, willing, able and prepared to provide restoration communications; interoperable communications for first responders which lack that capability; and operations and support communications for disaster relief organizations and served agencies.

2. Radio Amateurs quickly re-establish communications during that critical window of time between a disaster's occurrence and the re-establishment of normal communications.

3. ARRL is fully supportive of the creation of a nationwide interoperable broadband network for Public Safety, and of the developing standards for interoperable narrowband communications for public safety in the 700 MHz band. However, new public safety interoperable networks will be subject to disruptions, overload, or failure under certain circumstances. It will continue to be necessary in the future for Amateur Radio operators to provide temporary communications and facilities for first responders and disaster recovery agencies at the outset of local and regional disasters and it will be necessary to provide temporary interoperability between and among first responders and disaster relief agencies.

4. Before the Committee on Energy and Commerce is the "*Broadband for First Responders' Act of 2011*" H.R. 607. This Bill proposes to allocate the "D-Block" of frequencies in the 700 MHz band to the Public Safety Radio Service, and the creation of an interoperable Public Safety wireless network. These goals are admirable, but this Bill uniquely includes a provision for the reallocation and commercial auction of the frequency bands 420-440 MHz and 450-470 MHz. These are not public safety bands and their reallocation would displace an extremely large number of critical, non-Public Safety uses of these frequency bands (services which would derive no benefit at all from the allocation to Public Safety of the D-Block or the creation of a Public Safety broadband network) including the Amateur Radio Service.

5. ARRL urges the deletion of Section 207(d) of H.R. 607 should the Committee decide to use this version of the legislation in any future markup.

II. Statement of Christopher D. Imlay General Counsel; ARRL, the national association for Amateur Radio

Thank you, Chairman Walden and other members of the Subcommittee for this opportunity to testify on the topic of creating an interoperable public safety network.

I have had the privilege of serving for the past 30 years as General Counsel for ARRL, the national association for Amateur Radio (formally known as the American Radio Relay League, Incorporated). ARRL is a Connecticut non-profit association which has for the past 97 years represented and advocated the interests of the nation's 700,000 Amateur Radio operators, all of whom are licensed by the Federal Communications Commission to serve the public, especially in times of natural and other disasters. Amateur Radio exists for a number of reasons, principal among which (as the FCC regulations put it) is its value "to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications." The FCC has at times described the Amateur Service as a "model of volunteerism" and a "priceless public benefit."

Amateur Radio operators are not first responders. But in emergencies, and during disasters and their immediate aftermath, when other

communications systems have failed, volunteer amateur radio operators are ready, willing, able and prepared to provide restoration communications; interoperable communications for first responders which lack that capability; and operations and support communications for disaster relief organizations and served agencies such as the American National Red Cross and the Salvation Army. Amateur Radio is durable and is not susceptible to the same disruptions caused by disasters as are broadband networks; cellular networks; and even public safety dispatch systems. This is because Amateur Radio does not rely on centralized or decentralized infrastructure. Because of Amateur Radio operators' technical self-training and flexibility, they can and do provide emergency communications with no infrastructure at all. Amateur Radio mobile and portable facilities can be established on site and at strategic locations off-site to provide reliable, immediate disaster relief communications instantly, within or outside the disaster area, over any path distance and to any location whatsoever. This flexibility makes it possible to provide communications for first responders and served agencies, as well as temporary interoperability facilities for first responders. A good recent example of this ability was demonstrated in the aftermath of Hurricane Katrina, during which radio Amateurs provided communications (as but one example) from helicopters to first responders on the ground to facilitate

rescue operations. Amateurs are best known for their immediate responses to hurricanes, tornadoes, earthquakes, snow and ice storms, floods and other natural disasters, and their preparedness for immediate, organized deployment in large numbers. They are immediately available during and in the aftermath of such events, and they provide communications in support of public safety and disaster relief agencies and state emergency response agencies without any advance request to do so. The level of organization and preparedness comes from regular drills, exercises and emergency simulations and they are integrated into emergency planning. ARRL conducts emergency communications certification courses that provide the educational background necessary for such serious work.

Radio Amateurs have proved over and over again that because of their training and their willingness to bring personal radio gear into disaster areas that they can quickly re-establish communications during that critical window of time between a disaster's occurrence and the re-establishment of normal communications. These are the times of great threat to life and property: the "hottest" phase of the disaster's aftermath. Radio Amateurs are also trained and prepared to provide supplementary communications after normal communications have been restored. We have always been interoperable. For us it is not a goal, it is a fact. Although we are not first

responders, we have a long history of cooperating with first responders when needed to help them perform their essential tasks for the public.

The absence of disaster-susceptible communications infrastructure inherent in Amateur Radio insures a unique level of resilience in times of disaster and afterward. The same cannot, unfortunately, be said for other telecommunications systems. ARRL is fully supportive of the creation of a nationwide interoperable broadband network for Public Safety, and it is supportive of the developing standards for interoperable narrowband communications for public safety in the 700 MHz band. Improvements in public safety interoperability will permit more immediate responses and a better level of organization among disparate public safety agencies and at different levels of government.

That said, however, no one should believe that new public safety interoperable networks, be they broadband or narrowband, and regardless of the way these networks are designed, will be substantially more durable than are current public safety communications systems. Because of their system architecture, all are subject to disruptions, overload, or failure under certain circumstances. It will continue to be necessary in the future for Amateur Radio operators to provide temporary communications and facilities for first responders and disaster recovery agencies at the outset of local and regional

disasters and it will be necessary to provide temporary interoperability between and among first responders and disaster relief agencies. Federal Emergency Management Agency (FEMA) Director Craig Fugate, at an FCC earthquake forum concerning emergency communications planning earlier this month, stated that:

> "Finally, I have got to get back to Amateur Radio…They are the first ones in the first days getting the word out as the other systems come back up. I think that there is a tendency (to believe) that we have done so much to build infrastructure and resiliency in all of our other systems, we have tended to dismiss that role -when everything else fails, Amateur Radio often times is our last line of defense. And I think at times we get so sophisticated, and we have gotten so used to the reliability and resilience in our wireless and wired and our broadcast industry, and in all our public safety communications, that we can never fathom that they will fail. They do. They have. They will. When you need Amateur Radio (operators), you really need them."

Amateur Radio is available, ready, willing and able to do provide these services at no cost to anyone. As FEMA Director Fugate noted, Amateur Radio operators are always there, using their own radios, on their own frequencies, and "nobody pays them." Indeed, we will be there "when all else fails."

Among the frequency bands principally used and relied upon for Amateur Radio emergency communications work is the band 420-450 MHz. This band is shared very cooperatively and successfully between Federal

radiolocation (military radar) and the Amateur Radio Service. There is a small portion of this band that is available now for narrowband public safety operation, but it is only in the 420-430 MHz segment and it is limited to the areas around Buffalo, Cleveland and Detroit (near the Canadian border). There is no public safety allocation at all in the 430-440 MHz segment, and such would be contrary to the International Table of Frequency Allocations.

There is pending before the Committee on Energy and Commerce the "*Broadband for First Responders' Act of 2011,*" H.R. 607. This Bill proposes to allocate the "D-Block" of frequencies in the 700 MHz band to the Public Safety Radio Service, and for the creation of an interoperable Public Safety wireless network. The goals of this legislation are not unique, but this Bill is unique among legislation providing for allocation of the so-called "D-Block" of frequencies to Public Safety, in that it provides for the reallocation and commercial auction within ten years of passage of the Bill of the "paired" (sic) bands 420-440 MHz and 450-470 MHz. Specifically, in the context of encouraging the migration of Public Safety from incumbent spectrum to the 700 and 800 MHz bands used by Public Safety, Section 207(d) of the Bill provides as follows:

> (1) Auction. – Not later than 10 years after the date of enactment of this Act, the paired electromagnetic spectrum bands of 420 – 440 megahertz and 450 – 470 megahertz recovered as a result of

> the report and order required under subsection (c) shall be auctioned off by the Federal Communications Commission through a system of competitive bidding meeting the requirements of section 309 of the Communications Act of 1934.

ARRL is supportive of (1) the construction and maintenance of a national Public Safety interactive broadband network in the 700 MHz Public Safety bands; and (2) the allocation to Public Safety of the "D-Block" of spectrum. However, Section 207(d) of H.R. 607 is conceptually flawed and stands to seriously disrupt Amateur Radio emergency communications. First, neither the 420-440 MHz band nor the 450-470 MHz band is Public Safety spectrum. As we understand the matter, the drafters of the Bill envisioned in effect a "spectrum swap" of old Public Safety spectrum for new. Section 207(d) does not do that, however. Instead, the auction of the segments 420-440 MHz and 450-470 MHz would displace an extremely large number of critical, non-Public Safety uses of these frequency bands (which would derive no benefit at all from the allocation to Public Safety of the D-Block or the creation of a Public Safety broadband network). The victims of this reallocation include the Amateur Radio Service; the Government Radiolocation Service; the Private Land Mobile Radio Service (including the thousands of business and industrial radio service facilities throughout the United States which provide, in the 450-470 MHz band, operational radio

communications for large and small businesses); the Broadcast Auxiliary Service (which enables radio broadcasting stations to conduct newsgathering and conduct remote broadcasts from breaking news events in the 450-451 and 455-456 MHz segments); the security and alarm industry; and the General Mobile Radio Service and the Family Radio Service, which are used by millions of citizens for private family communications using channels in the 450-470 MHz band).

It is unclear why the 420-440 MHz band was included in this Bill, inasmuch as the segment is *not* a public safety allocation. There is no justification to be found anywhere in H.R. 607 for the reallocation of the 420-440 MHz band, and therefore the specification of that band in the Bill as a *quid pro quo* for the allocation to Public Safety of the D-Block, or to pay for the creation of a nationwide public safety interoperable network, is ill-conceived and unnecessary.

While ARRL is opposed to the inclusion of Section 207(d) in this Bill, this is unrelated to our support for the allocation of the D-Block to Public Safety and/or the creation of the nationwide, interoperable broadband public safety network pursuant to other legislation that does not have the serious defect inherent in H.R. 607.

ARRL is a member of the Governing Board of the National Public Safety Telecommunications Council (NPSTC), a federation of more than a dozen public safety telecommunications organizations. NPSTC has noted that it is very concerned about Section 207(d) of H.R. 607 and believes that the Bill needs to be amended to address the concerns of public safety and the amateur radio users." A copy of NPSTC's letter to ARRL on this subject is attached to this testimony.

ARRL is grateful for the opportunity to make our concerns known to the Subcommittee. We are well-aware of the increasing difficulties of providing adequate support for public safety telecommunications. We urge the Subcommittee to make adequate provision for a nationwide, interoperable public safety network in the 700 MHz band and to provide adequate means for funding the construction and operation of this network. It is not necessary in the process of doing that, however, to disrupt or preclude the ability of a huge cadre of qualified, self-trained volunteers to provide the restoration communications and temporary interoperability facilities in support of public safety that is necessary now and will be necessary for the foreseeable future.

Respectfully submitted,
Christopher D. Imlay
General Counsel
ARRL, the national association for Amateur Radio

NPSTC

NATIONAL PUBLIC SAFETY TELECOMMUNICATIONS COUNCIL

March 8, 2011

via e-mail
n3kn@arrl.org
k1zz@arrl.org

Ms. Kay C. Craigie, President
ARRL, The National Association for Amateur Radio
225 Main Street
Newington, CT 06111

Mr. David Sumner
Executive Vice President
ARRL, The National Association for Amateur Radio
225 Main Street
Newington, CT 06111

Re: The Broadband for First Responders' Act of 2011, H.R. 607

Greetings:

NPSTC is in receipt of your letter dated February 24, 2011 stating ARRL's position on H.R. 607, the *Broadband for First Responders' Act of 2011*. The NPSTC Governing Board, of which ARRL is a member, had an opportunity to discuss this legislation at its Governing Board meeting held February 28 through March 1. We want to let you know that NPSTC's Governing Board understands your serious concerns about Section 207 of this Act, and we share those concerns.

As you know, the allocation of the "D-Block" spectrum to public safety is critical to deploying a nationwide interoperable broadband network. Public safety is united in its support for H.R. 607 because the Act would allocate the D-Block spectrum to public safety to build a 20 MHz nationwide broadband network. The Act also would provide sufficient funding for the construction and maintenance of a nationwide Public Safety broadband network.

The Act, however, requires public safety to "give back" spectrum above 400 MHz and below 512 MHz to "off set" the cost of allocating the D-Block. The Act also requires the Federal Communications Commission to auction spectrum in the 420-440 MHz and 450-470 MHz after public safety has migrated their systems above the 700 MHz spectrum band. NPSTC is very concerned about the impact the migration requirement will have on public safety entities that are currently licensed to operate Land Mobile Radio (LMR) systems in the spectrum band.

We are aware that the Amateur Radio Service shares the 420-440 MHz band on a secondary basis with the Government Radiolocation Service and Amateur Radio operators can

use that band for critical emergency and public service communications. We are also aware that the extensive Amateur Radio repeater systems, which are very important in supporting public safety operations, require control and interconnect links located in the 420-440 MHz band. Finally, we are aware of the narrowband experimentation and satellite and terrestrial infrastructure in this band which cannot be moved.

For the above reasons, NPSTC is very concerned about Section 207(d) of the Act and believes that the section needs to be amended to address the concerns of public safety and the amateur radio users.

While NPSTC believes ARRL's opposition to Section 207(d) is appropriate, this is unrelated to our support for the provisions in the remainder of the Act. We are pleased to have ARRL's active participation in NPSTC. Please let your members know of NPSTC's appreciation of their efforts in support of Public Safety.

Yours sincerely,

National Public Safety Telecommunications Council

Ralph Haller, NPSTC Chair

cc: Mike Corey, ARRL
Christopher D Imlay, ARRL

8191 Southpark Lane, #205 · Littleton, CO 80120 · Phone 866-807-4755 · Fax 303-649-1844 · Website www.NPSTC.org

Mr. WALDEN. Thank you, Mr. Imlay. We appreciate your testimony. It is part of why we are having these hearings, to find out who is using what spectrum and the various issues.

Mr. Steinberg, I have been advised you should test your microphone to see if it works now.

Mr. STEINBERG. How is that?

Mr. WALDEN. Keep talking.

Mr. STEINBERG. Keep talking? I will keep talking. Still talking.

Mr. WALDEN. All right. All right. Mr. Hanley, will you just help us out here and move your mike down to Mr. Steinberg.

Mr. STEINBERG. Would you like me to just speak loudly?

Mr. WALDEN. No, because——

Mr. HANLEY. Testing.

Mr. WALDEN. There we go. Is yours working, Mr. Martinez?

Mr. MARTINEZ. No, it is not.

Mr. WALDEN. Oh, OK. Don't pull too hard. You will have to get out a soldering iron. Mr. Steinberg, please.

STATEMENT OF PAUL STEINBERG

Mr. STEINBERG. Thank you, Chairman Walden, Ranking Member Eshoo, and other members of the Subcommittee for this opportunity to testify on the topic of Interoperable Public Safety Communications. My name is Paul Steinberg and I am the chief technology officer of Motorola Solutions, Incorporated. Prior to my current position, I worked at Motorola Networks, where I was their chief architect for cellular and broadband commercial infrastructure products serving customers such as Verizon.

Motorola Solutions—formerly Motorola, Incorporated—has been committed to innovation in communications and electronics for more than 80 years. Motorola has served the public safety sector continuously over these 8 decades, and the company is very proud of its history in this regard. Motorola has remained committed to the marketplace and has listened closely to needs of public safety and providing public safety with reliable, state-of-the-art equipment and innovative solutions.

There are three key points that I would like to emphasize from my written testimony. Point number one, based on a detailed analysis, public safety will need broadband capacity that will surpass what would be afforded by the 10 megahertz the Public Safety Spectrum Trust sector below. We recently confirmed this by working with public safety officials on network capacity analyses to understand how broadband networks can enhance emergency response and better protect the safety of all involved. During these scenarios, we found that a network infrastructure based solely on the existing 10 megahertz public safety allocation will struggle to provide the necessary capacity forthcoming. Adding the additional 10 megahertz D Block spectrum would effectively double the network capacity for public safety and improve incident response. It is important to remember that not only does the catastrophic event that benefits from this increased spectrum, day-to-day situations ranging from an overturned gasoline tanker on the expressway to storms and tornadoes, toxic situations in a residence can all benefit from the enhanced situational awareness, command and control, and that is enabled through this additional spectrum.

Point number two, FCC Chairman Genachowski has stated as recently as last Thursday at the CIA conference that broadband spectrum needs are predicted to grow 35 times in the next few years. Consumer use and demand for broadband application is indeed exploding, as are public safety's broadband requirements.

Point number three, there are additional costs that need to be factored into an auction scenario that we believe will quickly offset the proceeds of an auction. These costs are driven by two main items: the need for additional capacity that public safety will have to secure and pay for when carriers exhaust their 10 megahertz of capacity. A little-known fact is that today public safety spends about $2 billion handling for carrier services and an independent analyst projects that this will climb to over $5 billion handling in 5 years.

The second incremental cost is the need to mitigate the interference between a commercially-operated D Block and the adjacent PS base. The equipment cost or capital expenditure to build out a 20 megahertz LTE network with the D Block allocated is basically the same as to build out 10 megahertz LTE network. However, the cost to build the network with 10 megahertz initially and to add additional spectrum later would be considerably more.

We all share a common goal of equipping our first responders with the best and most innovative technology possible so that they can safely and effectively perform their mission. In order to achieve this, we at Motorola Solutions certainly support the commitment for nationwide interoperability, leverage of commercial standards such as through the LTE and private-public partnership. These need to be coupled with sound spectrum policy. We have a unique opportunity to carve out spectrum that provides the best current capabilities and economics for public safety while maximizing future options as the technology evolves.

So in conclusion, Mr. Chairman, Ranking Member Eshoo, and other members of the subcommittee, Motorola Solutions welcomes the opportunity to compete in a standards-based environment to help public safety realize its vision to have a truly interoperable nationwide broadband network. We look forward to working with the subcommittee to further realize our shared vision of a competitive market providing innovative solutions for public safety communications. Thank you very much.

[The prepared statement of Mr. Steinberg follows:]

Motorola Solutions, Inc.
Hearing on "Interoperable Public Safety Communications"
Before the Subcommittee on Communications and Technology
Committee on Energy and Commerce
U.S. House of Representatives
May 25, 2011

SUMMARY OF TESTIMONY

- Motorola Solutions, Inc. has served the public safety community for over 82 years and remains steadfast in its commitment to providing reliable, state-of-the-art equipment and innovative solution. We are committed to open standards-based technologies and have committed significant resources to assist industry efforts to embrace open standards. We concur with the Committee's desire to ensure a robust competitive marketplace.

- Reallocation of the 700 MHz D block spectrum from commercial to public safety use is necessary to ensure that our first responders have the capacity available to effectively respond to day to day wide scale incidents.

- Public safety currently has 24 MHz of spectrum in the 700 MHz band. Of this total, 12 MHz is reserved for narrowband uses and is not able to provide the types of video and data communications described above. That leaves public safety with only 10 MHz of spectrum to accommodate mobile broadband applications – a total that the FCC has confirmed is inadequate for wide scale emergency response.

- Allocating D block to public safety means a contiguous 20MHz of spectrum that could result in significant savings-doubling public safety's network capacity with a small increase in deployment costs.

- Costs would be less with an allocation of the D Block to Public Safety than an auction of the D-Block due to unanticipated LTE service charges, lack of unlimited data plans, priority service expenses, and RF interference mitigation – in addition to decreased communications independence for public safety.

- The Phoenix Center, a nonprofit organization that studies broad public policy issues with a specialty in telecommunications reported that while the issue is complex, the economics weigh in favor of allocating the D Block to public safety.

- Adequate spectrum is necessary before broadband networks can accommodate mission critical voice traffic in addition to the video and data traffic.

- While more needs to be done, public safety has made great strides in achieving interoperability since 9/11. This is due in large part to the focus state and local government has placed on the need to improve public safety first response to major incidents, as well as the adoption and implementation of the Project 25 (P25) standard supporting public safety interoperability.

Statement of Paul Steinberg
Chief Technology Officer
Motorola Solutions, Inc.

Hearing on "Interoperable Public Safety Communications"
Before the Subcommittee on Communications and Technology
Committee on Energy and Commerce
U.S. House of Representatives
May 25, 2011

Thank you, Chairman Walden, Ranking Member Eshoo, and other members of the Subcommittee for this opportunity to testify on the topic of Interoperable Public Safety Communications.

My name is Paul Steinberg and I am the Chief Technology Officer at the newly independent Motorola Solutions, Inc., which, following its split from Motorola Mobility this past January continues to focus on the needs of the public safety community.

For almost 20 years, I have been fortunate to work at Motorola with an extremely knowledgeable and talented team of people who help deliver innovative and best-in-class technologies to our customers. Prior to being appointed CTO in January 2011, I was Chief Architect for Integrated Command and Control and Private Broadband Solutions for Public Safety Systems.

Motorola Solutions, Inc. (formerly Motorola, Inc.) has been committed to innovation in communications and electronics for over 82 years. The Company is headquartered in Schaumburg, Illinois, employs over 25,000 people in over 65 countries globally. Motorola pioneered mobile communications in the 1930s with car radios and public safety networks. We made the equipment that carried the first words from the moon in 1969. We commercialized the

first handheld portable scanner in 1980. Today, as a global industry leader, excellence in innovation continues to shape the future of the Motorola.

COMMITMENT TO INTEROPERABILITY

Motorola has served public safety continuously over these eight decades, and the company is proud of this history. Motorola has remained committed to the marketplace and has listened closely to public safety's needs, providing public safety with reliable, state-of-the-art equipment and innovative solutions.

Motorola agrees that a robust competitive marketplace can help provide interoperable services – including broadband services – to public safety in a cost-effective manner. Motorola is actively competing in the marketplace today to help public safety realize its vision to have a truly interoperable nationwide broadband network. We are committed to open standards-based technologies and have committed significant resources to assist industry efforts to embrace open standards.

REALLOCATION OF THE D BLOCK

Reallocation of the 700 MHz D block spectrum from commercial to public safety use is necessary to ensure that our first responders have the capacity available to effectively respond to wide scale incidents. But it is important to remember that it is not only the catastrophic events that can benefit from this increased spectrum. Day to day situations ranging from an overturned gasoline tanker on the beltway; a tornado in Joplin, Missouri or a hostage situation at a school can all benefit from the enhanced situational awareness and command and control that is enabled through this additional spectrum.

As FCC Chairman Genachowski has stated as recently as last Thursday at the TIA conference, broadband spectrum needs are predicted to grow 35 times in the next few years. Consumer use

and demand for broadband applications is experiencing explosive growth as are the public safety's broadband requirements.

We recently confirmed this by working with public safety officials on a network capacity analysis to understand how broadband networks can enhance emergency response and better protect the safety of all involved. This involved performing a step-by-step assessment of the communications requirements through an emergency situation's "life cycle" – from start to SWAT team deployment to resolution.

During these "stress test" scenarios, we found that a network infrastructure based solely on the existing 10 MHz public safety allocation will struggle to provide the necessary capacity. Adding the additional 10 MHz D-Block spectrum would effectively double the network capacity for public safety and improve incident response.

Commanders directing response teams need real-time situational awareness at the onset. A tightly coordinated response means all those involved need access to the right information at the right time. With multiple agencies working together to resolve the incident, interoperability is crucial to creating one shared operational view for maximum coordination. Content, including streaming video, can be sent to a command and control center from various cameras on the scene. This video can be collected, monitored and redistributed to first responders in the field with command and control serving as the "director" of the content, dynamically choosing the views and information to propagate from multiple sources.

In many incident scenarios, video information is critical. Live video feeds from well-placed specialty units, overhead aircraft, and remotely operated robots provide different angles and views that can be streamed in real time over a Public Safety broadband network. Using a wide area broadband network is much safer, and quicker to activate, than deploying a temporary local network. More importantly, it allows officers to immediately survey the area in its crucial first stages without the risk and complexities associated with establishing local communications equipment.

Applications such as real time hot-spot video to reduce crime in certain areas; in-car video that is live and networked back to command and control centers; detailed building diagrams relayed to firefighters; video of trauma patients being fed directly to emergency rooms; and wild fire thermal and weather imaging, are just a few of the broadband applications that can make a difference to public safety and the communities they serve. More spectrum is required to make this a reality, not just in certain communities, but for public safety throughout the country.

Public safety currently has 24 MHz of spectrum in the 700 MHz band. Of this total, 12 MHz is reserved for narrowband uses and is not able to provide the types of video and data communications described above. That leaves public safety with only 10 MHz of spectrum to accommodate mobile broadband applications – a total that the FCC has confirmed is inadequate for wide scale emergency response. In contrast, commercial service providers have requested an additional 500 MHz of spectrum for advanced wireless services.

Allocating the D block to public safety means a contiguous 20 MHz of spectrum that could result in significant saving – doubling public safety's network capacity with only a small increase in deployment costs. The build-out of one network that leverages existing infrastructure will cost far less at the $6.5 billion estimated by the FCC than the build-out of a second network on a non-adjacent spectrum. There is also potential for additional cost savings if other agencies are permitted to use the public safety network.

Motorola believes that costs would be less with an allocation of the D Block to Public Safety than an auction of the D-Block due to unanticipated LTE service charges, lack of unlimited data plans, priority service expenses, and RF interference mitigation – in addition to decreased communications independence for public safety. Further, should commercial carriers operate in the D block spectrum, we believe it will be necessary to use guard bands to protect current public safety operations in the adjacent spectrum and the economic impact of such guard bands could potentially be billions of dollars.

In terms of the economic value of the spectrum from a public safety standpoint, a report was issued earlier this year by the Phoenix Center, a nonprofit organization that studies broad public policy issues with a specialty in telecommunications. The Phoenix Center report concludes that while the issue is complex, the economics weigh in favor of allocating the D Block to public safety.

Highlighting that the allocation of D Block to public safety creates a unique opportunity to create a contiguous 20 MHz of spectrum for public safety broadband, the report notes that the spectrum can create significant value to public safety – which the Phoenix Center values at $2 to $6 billion.

Alternatively, assigning 10 MHz in the future in some other spectrum band would cost about $4 billion in additional deployment costs and offer inferior performance. In contrast, the Phoenix Center notes that at best, the D Block would bring auction revenues in the $1 to $3 billion range, and probably much less. Service obligations or conditions that may be placed at auction could reduce that revenue by as much as $1 billion.[1]

KEY TECHNICAL CONSIDERATIONS

Motorola concurs with the vision that LTE is the right technology for the interoperable Public Safety 700 MHz broadband network. With adequate spectrum available, a properly designed public safety network based on standardized LTE technology can support our nation's first responders in the field with the information-rich applications like high speed data and video which is currently unavailable. LTE also provides the opportunity to leverage the larger economies of scale of commercial technologies.

[1] "Public Safety or Commercial Use? A Cost/Benefit Framework for the D Block, "Phoenix Center Policy Bulletin No. 26, March 2011, George S. Ford, PhD., Lawrence J. Spiwak, J.D.,

Eventually, the integration of voice and data services over the LTE platform could provide public safety even greater operational benefits. To achieve this goal, additional efforts must be directed at addressing two critical areas.

First, public safety officials and the vendor community must collaborate to define and develop key features associated with mission critical voice on narrowband networks in order to enable their support on broadband networks.

Public safety users demand a lot from their voice communications service. For example, they expect to be able to complete a one-to-many group call set up immediately at the push of a button. They also demand to be able to communicate directly "unit-to-unit" when they are beyond network coverage.

Public safety voice systems must provide high availability to users with multiple levels of back-up. Finally, the devices must be rugged and suitable for public safety environments.
These features are currently supported as fundamental operational features in existing standards-based, mission critical voice networks. Public safety users identify these as key features that must be replicated before voice services can be transitioned to broadband networks.

However, the current LTE standards do not cover these mission critical voice services, only consumer telephony services, as the 3GPP standards committee is primarily driven by the requirements of the cellular carriers and have not addressed these services. Various federal and public safety customer associations are in the process of specifying the requirements and examining the alternatives for standardization in the various standards setting bodies. There is no firm commitment on how and when these critical standards will be completed.

Second, adequate spectrum is necessary before broadband networks can accommodate mission critical voice traffic in addition to the video and data traffic. If the majority of public safety voice operations are transitioned to the 700 MHz broadband network, then the network must support the necessary voice capacity in a completely consistent and dependable fashion as is the

case with narrowband networks today. Technical evaluations are underway to better understand the impact that moving narrowband communications from multiple frequency bands would have on the 700 MHz broadband public safety network.

The timelines to address these two considerations are subject to debate with some arguing that standards could be completed in as little as three years, while others argue that achieving the full feature and performance requirements within a coordinated set of standards could take at least five to seven years, with a completion timeframe of eight to 10 years for development of production grade equipment and deployment.

The length of time the process can take is driven by the selection of a willing standards body, creation of the necessary standards for mission critical, public safety voice services, and then followed by the product development, certification and field testing to ensure the operational requirements of public safety are being met.

SYSTEM ARCHITECTURE AND GOVERNANCE CONSIDERATIONS

From an architecture standpoint, we believe the best approach is one that deploys regionally distributed infrastructure as this will ensure more robust physical site redundancy and disaster tolerance. This would mirror the architecture currently used in commercial carrier networks where regional LTE core components are deployed into major markets to reduce overall costs.

LTE cores are actually a small fraction of overall deployment costs and will be reduced even further as low cost small scale cores emerge. The initial costs of locating cores closer to the local traffic are recouped by reduced backhaul costs. This helps avoid routing traffic from regional cell sites to a far distant core and back to the local agencies over a national backbone.

Regionally based cores also allow a first responder to access both local and national applications from anywhere within the nationwide network as needed and as authorized. Interoperability with the 911 PSAP (Public Safety Answering Point), current land mobile systems and Next

Generation 911 would also be enhanced as the network and functions are locally/regionally based.

At the same time, while we support a regional architecture approach, we believe these regional cores should share a common nationwide network identification number which will essentially result in creating a single nationwide network by enabling all devices to operate in all areas of coverage of the public safety common architecture. The only roaming required would be from the public safety network onto commercial networks.

In addition to the network ID numbers, there are other architectural and governance components that also are best managed at the national level. These include, for example, the national IP backbone, the roaming clearinghouse to commercial carriers, the deployment of national interoperability applications, and the establishment of a nationwide network numbering plan and regional partitioning.

Overall, this regionally-focused architecture model may involve varying levels of national control that will impact overall system governance. We anticipate the model to be formed through collaboration between Congress, the Administration, state/local government and public safety users. As someone who designs public safety systems, I would just note there are good operational reasons to consider some level of regional control as this will best reflect how public safety operates today through local/regional Computer Aided Dispatch and incident command structures.

PROGRESS ON NATIONWIDE INTEROPERABILITY

While more needs to be done, public safety has made great strides in achieving interoperability since 9/11. This is due in large part to the focus state and local government has placed on the need to improve public safety first response to major incidents, as well as the adoption and implementation of the Project 25 (P25) standard supporting public safety interoperability.

Today, 27 states have deployed, or are in the process of deploying, statewide P25 public safety communications systems, with another four states planning upgrades of their existing statewide networks to the standard. There are a total of 187 P25 state and local systems in place today, a majority of which have been built with the help of federal funding. The vendor community has invested heavily in the standard -- the Project 25 Technology Interest Group identifies in excess of 12 vendors that produce compliant mobile and portable subscriber equipment. Some examples of "best practices" in public safety interoperability include the following:

State of Michigan

The Michigan Public Safety Communications System (MPSCS) is P25 standards-based 800 MHz radio system that enables first responders to communicate with each other regardless of jurisdiction or geographic location. There are over 1200 local, state and federal agencies representing over 60,000 first responders utilizing the MPSCS system today.

State of Ohio

MARCS (Multi-Agency Radio Communication System) is an 800 MHz radio and data network that provides statewide interoperability to its subscribers throughout Ohio. There are currently over 33,000 voice units and over 1,800 mobile data units on the MARCS system with over 700 public safety and public service agencies utilizing the system today.

State of Colorado

The Colorado Statewide Digital Trunked Radio System (DTRS) is a P25 standard-based system using 700 and 800 MHz frequencies. Today the DTRS supports 53,000 radios from over 990 user agencies representing all levels of local, county, tribal, state and federal government. This includes the recent integration of the Pikes Peak Regional Communications Network (PPRCN), providing interoperability with the Colorado Springs metropolitan and El Paso County areas, serving an additional 5,400 public safety responders.

State of Minnesota

Minnesota has invested in the Allied Radio Matrix for Emergency Response (ARMER) system; an 800 MHz P25 standards-based communications system for public safety agencies in the state. The system was recognized by FEMA in 2007 report (U.S. Fire Administration/Technical Report Series - I-35W Bridge Collapse and Response, Minneapolis, Minnesota, USFA-TR-166/August 2007) were it identified the system as a best practice in the public safety response to the incident, stating "the new 800 MHz radio system streamlined communications and enabled successful connections among a variety of organizations and agencies."
(http://www.usfa.dhs.gov/downloads/pdf/publications/tr_166.pdf)

San Diego County, California

The San Diego County Regional Communications System (RCS) provides seamless wireless voice and data communications for public safety and public service agencies in San Diego and Imperial Counties. The San Diego RCS incorporates the P25 standard and supports 217 government agencies and 15 dispatch centers, with over 20,000 radios operating on the system today.

CONCLUSION

Mr. Chairman, Motorola welcomes the opportunity to compete in a standards-based environment to help public safety realize its vision to have a truly interoperable nationwide broadband network. We look forward to working with the Subcommittee to further realize our shared vision of a competitive market providing innovative solutions for public safety communications.

Thank you.

Mr. WALDEN. Thank you, Mr. Steinberg. We appreciate your participation in the hearing. Dr. Martinez, we will go to you next, the chief technology officer with Harris RF Communications Division. We appreciate your being here as well, sir.

STATEMENT OF DENNIS MARTINEZ

Mr. MARTINEZ. Well, good morning, Mr. Chairman, Ranking Member, and members of the committee. First, let me thank you for inviting me to testify about key steps that must be achieved rapidly to develop and deploy a truly interoperable nationwide public safety broadband network.

Let me begin by first introducing you to the Harris Corporation. Harris is an international communications and information technology company serving commercial and government markets worldwide. Headquartered in Melbourne, Florida, the company has approximately 16,000 employees, annual revenues of approximately $6 billion, and nearly 7,000 engineers and scientists. Harris is a leading global supplier of secure radio communications products, services, and systems, embedded high-grade encryption software and products for the military, government, and public safety purposes. Harris is a pioneer in the development of internet protocol, or IP-based networks for private radio and broadband applications. We supply the industry with market-leading narrowband, broadband, and multiband networks, services, and devices.

I serve as the CTO of Harris Corporation's RF Communications Division. I also chair the FCC's Emergency Response Interoperability Center, Public Safety Advisory Committee, Security and Authentication Work Group. I have spent most of my career bringing advanced technologies to public safety, national defense, and homeland security markets. In these roles, I have learned how leveraging commercial technology innovation can have a profound impact on our Nation's ability to procure and deploy state-of-the art products and services for these mission-critical markets. I have also seen that a robust supply chain fostered by appropriate business models and multi-source procurement practices must be implemented to ensure that all levels of government will procure these capabilities in a cost-effective manner.

Today, Smartphones, supported by a vast ecosystem of application providers, have unleashed enormous capabilities of modern 3G and 4G wireless networks. These capabilities literally are revolutionizing the socioeconomic structure of the world. However, our Nation's first responders, charged with protecting lives and property, are not yet able to take full advantage of this capability. Public safety must be enabled to leverage broadband technology in ways that will leverage and significantly enhance their ability to perform their missions. It is time for our Nation to build this hardened nationwide interoperable broadband network in the 700 megahertz dedicated spectrum. We support the reallocation of D Block spectrum to public safety and we commend Congress' examination of this critical issue.

Two key ingredients—policies that have opened the 700 megahertz broadband spectrum to public safety and the availability of broadband technology—now enable construction of this nationwide

network. It is now time to finalize two final elements: governance and procurement.

The broadband network, properly constructed, will serve first responders and government agencies charged with the public safety mission, and this involves federal, state, local, and tribal organizations. Establishing a governance structure to ensure nationwide interoperability among these organizations is essential. While we must provide this interoperability capability, we must also ensure that we are addressing the interoperability requirements that are unique to each of those organizations.

For example, the city of Los Angeles, by virtue of its size, population, and geographic location has needs that differ from a smaller inland location such as Bend, Oregon. A key goal in creating a relevant governance structure for all is to ensure that these stakeholders can participate in the establishment process and ongoing governance structure that is created.

The activities of the FCC Commission in the past and ongoing rulemakings are to be applauded. They serve as a model for governance in matters outside of their jurisdictional authority. A governance entity must oversee all aspects of the network lifetime cycle, through design, implementation, operations, and maintenance. That entity must ensure implementation of a procurement model that ensures the achievement of nationwide interoperability.

In this regard, we must now finalize a regulatory framework and determine what interoperability means as a threshold matter. Considerable time and effort has been spent defining interoperability from technical and operational perspectives. Here we want to discuss what interoperability means from the perspective of governance and procurement. Indeed, technical and operational considerations alone will not yield the desired outcome. I do repeat, indeed, technical and operational consideration alone will not yield the desired outcome.

We can draw from many examples of success in the commercial world. As consumers and users in the commercial world, we understand what this means. It means we can procure these items in an open and competitive environment. Our expectations drive the need not just for interoperability, but beyond that, interchangeability. We choose the device that suits our needs, on the network that provides the service we require, in a highly competitive and innovative market. Market demands drive commercial service providers to deliver interoperability. In turn, commercial service providers drive interchangeability throughout their supply chain to ensure uninterrupted availability of competitive and innovative products. Their business success relies on having multiple sources within their supply chain. This is the model that should guide the governance structure and procurement process for this network. In this way, interoperability will become not just a mandate; it will become the outcome.

Interoperability, therefore, is the ability to procure the devices—network building blocks—that are fully interchangeable. This definition will allow our first responders to purchase equipment in a highly competitive and innovative environment. They can purchase this equipment with confidence that it will plug-and-play. Creating

this market dynamic will require funding mechanisms that drive this model.

And finally, let me close by saying that it is essentially that we ensure economic viability of the public safety broadband network. The need for federal funds to launch the initiative is well understood. Also understood are the challenges in this difficult financial time. Here, we want to discuss how these challenges can be alleviated.

First is the benefit of leveraging a vast commercial ecosystem. Second is to realize the savings that will come about through a competitive business practice, a competitive procurement practice. And third is that we will move to a converged network with converged devices and that convergence process itself will save enormous cost in the future.

In conclusion, the public safety broadband network will bring unprecedented capabilities to our Nation's first responders and agencies that support the public safety mission. Built on a competitive market and the latest broadband standards, supported by this ecosystem, this network will enable interoperability to become a reality.

Once again, Mr. Chairman, I want to applaud the committee's leadership on this issue, and I appreciate the opportunity to testify today. I look forward to further working with you in the future to make this a reality.

[The prepared statement of Mr. Martinez follows:]

TESTIMONY OF:

DR. DENNIS MARTINEZ, CHIEF TECHNOLOGY OFFICER

RF COMMUNICATIONS DIVISION

HARRIS CORPORATION

BEFORE THE UNITED STATES HOUSE OF REPRESENTATIVES

COMMITTEE ON ENERGY AND COMMERCE

HEARING ON:

CREATING AN INTEROPERABLE PUBLIC SAFETY BROADBAND NETWORK

MAY 25, 2011

GOOD MORNING, MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE. FIRST, LET ME THANK THE COMMITTEE FOR INVITING ME TO TESTIFY ABOUT KEY STEPS THAT MUST BE ACHIEVED RAPIDLY TO DEVELOP AND DEPLOY A TRULY INTEROPERABLE PUBLIC SAFETY WIRELESS BROADBAND NETWORK (PSWBN).

LET ME BEGIN BY INTRODUCING YOU TO THE HARRIS CORPORATION. HARRIS IS AN INTERNATIONAL COMMUNICATIONS AND INFORMATION TECHNOLOGY COMPANY SERVING GOVERNMENT AND COMMERCIAL MARKETS IN MORE THAN 150 COUNTRIES. HEADQUARTERED IN MELBOURNE, FLORIDA, THE COMPANY HAS APPROXIMATELY $6 BILLION OF ANNUAL REVENUE AND MORE THAN 16,000 EMPLOYEES — INCLUDING NEARLY 7,000 ENGINEERS AND SCIENTISTS. HARRIS IS A LEADING GLOBAL SUPPLIER OF SECURE RADIO COMMUNICATIONS PRODUCTS AND SYSTEMS, AND EMBEDDED HIGH-GRADE ENCRYPTION SOFTWARE, FOR THE MILITARY, GOVERNMENT, AND PUBLIC SAFETY. HARRIS IS A PIONEER IN THE DEVELOPMENT OF INTERNET PROTOCOL (IP) BASED NETWORKS FOR PRIVATE RADIO AND BROADBAND APPLICATIONS, AND SUPPLIES INDUSTRY-LEADING NARROWBAND, MULTIBAND, AND BROADBAND NETWORKS, SERVICES, AND DEVICES.

I SERVE AS THE CTO OF HARRIS CORPORATION'S RF COMMUNICATIONS DIVISION, AND I ALSO CHAIR THE FCC'S EMERGENCY RESPONSE INTEROPERABILITY CENTER (ERIC) PUBLIC SAFETY ADVISORY COMMITTEE

(PSAC) SECURITY AND AUTHENTICATION WORK GROUP. I HAVE SPENT MOST OF MY CAREER BRINGING ADVANCED TECHNOLOGIES TO PUBLIC SAFETY, HOMELAND SECURITY, NATIONAL DEFENSE, AND OTHER MISSION CRITICAL MARKETS. IN THESE ROLES, I HAVE LEARNED HOW LEVERAGING CONTINUAL TECHNOLOGY INNOVATION CAN HAVE A PROFOUND IMPACT ON OUR NATION'S ABILITY TO PROCURE AND DEPLOY STATE-OF-THE ART PRODUCTS AND SERVICES FOR THESE MISSION-CRITICAL MARKETS. I HAVE ALSO SEEN THAT A ROBUST SUPPLY CHAIN FOSTERED BY APPROPRIATE BUSINESS MODELS AND MULTI-SOURCE PROCUREMENT PRACTICES MUST BE IMPLEMENTED TO ENSURE THAT ALL LEVELS OF GOVERNMENT WILL PROCURE THESE CAPABILITIES IN A COST-EFFECTIVE MANNER.

TODAY, SMART PHONES, SUPPORTED BY A VAST ECO-SYSTEM OF APPLICATION PROVIDERS, HAVE UNLEASHED THE CAPABILITIES OF MODERN 3G AND 4G WIRELESS BROADBAND NETWORKS. THESE CAPABILITIES LITERALLY ARE REVOLUTIONIZING THE SOCIO-ECONOMIC STRUCTURE OF THE WORLD. HOWEVER, OUR NATION'S FIRST RESPONDERS, CHARGED WITH PROTECTING LIVES AND PROPERTY, ARE NOT YET ABLE TO TAKE FULL ADVANTAGE OF THIS CAPABILITY. PUBLIC SAFETY FINALLY MUST BE ENABLED TO LEVERAGE BROADBAND TECHNOLOGY IN WAYS THAT WILL SIGNIFICANTLY ENHANCE THEIR ABILITY TO PERFORM THEIR MISSIONS. IT IS TIME FOR OUR NATION TO BUILD THIS HARDENED NATIONWIDE INTEROPERABLE WIRELESS BROADBAND NETWORK ON DEDICATED SPECTRUM IN THE 700 MHZ BAND. WE SUPPORT THE

REALLOCATION OF D BLOCK SPECTRUM TO PUBLIC SAFETY AND WE COMMEND CONGRESS' CLOSE EXAMINATION OF THIS CRITICAL ISSUE.

TWO KEY INGREDIENTS - POLICIES OPENING THE 700 MHZ BROADBAND SPECTRUM TO PUBLIC SAFETY AND THE AVAILABILITY OF BROADBAND TECHNOLOGY - ENABLE CONSTRUCTION OF A NATIONWIDE INTEROPERABLE PUBLIC SAFETY BROADBAND NETWORK. IT IS NOW TIME TO FINALIZE TWO IMPORTANT ELEMENTS: GOVERNANCE AND PROCUREMENT.

THE PSWBN, PROPERLY DEPLOYED, WILL SERVE FIRST RESPONDERS AND GOVERNMENT AGENCIES CHARGED WITH THE PUBLIC SAFETY MISSION, WHICH INVOLVES STATE, LOCAL, FEDERAL, AND TRIBAL ORGANIZATIONS. ESTABLISHING A GOVERNANCE STRUCTURE TO ENSURE NATIONWIDE INTEROPERABILITY AMONG THESE ORGANIZATIONS IS ESSENTIAL. WHILE WE AS A NATION MUST PROVIDE NATIONWIDE INTEROPERABILITY, CARE MUST BE TAKEN TO ENSURE THAT THE OPERABILITY REQUIREMENTS UNIQUE TO INDIVIDUAL STATE, LOCAL, FEDERAL, AND TRIBAL ORGANIZATIONS ARE ALSO SATISFIED. FOR EXAMPLE, THE CITY OF LOS ANGELES, BY VIRTUE OF ITS SIZE, POPULATION, AND GEOGRAPHIC LOCATION HAS NEEDS THAT DIFFER FROM A SMALLER IN-LAND LOCATION SUCH AS BEND, OREGON. A KEY GOAL IN CREATING A RELEVANT GOVERNANCE STRUCTURE FOR ALL IS TO ENSURE THAT THESE STAKEHOLDERS HAVE SIGNIFICANT PARTICIPATION IN THE ESTABLISHMENT PROCESS AND OPERATION OF THE GOVERNANCE STRUCTURE.

THE ACTIVITIES OF THE FCC IN PAST AND ON-GOING RULE MAKINGS ARE TO BE APPLAUDED AND CAN SERVE AS A MODEL FOR GOVERNANCE IN MATTERS OUTSIDE THE JURISDICTIONAL AUTHORITY OF THE FCC. A GOVERNANCE ENTITY MUST OVERSEE ALL PHASES OF THE NETWORK LIFECYCLE; DESIGN, IMPLEMENTATION, OPERATIONS, AND MAINTENANCE. THE GOVERNANCE ENTITY MUST ENSURE IMPLEMENTATION OF A PROCUREMENT MODEL THAT ENSURES THE ACHIEVEMENT OF NATIONWIDE INTEROPERABILITY.

IN THIS REGARD, WE MUST FINALIZE A REGULATORY FRAMEWORK AND DETERMINE WHAT INTEROPERABILITY MEANS AS A THRESHOLD MATTER. CONSIDERABLE TIME AND EFFORT HAS BEEN SPENT DEFINING INTEROPERABILITY FROM TECHNICAL AND OPERATIONAL PERSPECTIVES. HERE WE WANT TO DISCUSS WHAT INTEROPERABILITY MEANS FROM THE PERSPECTIVE OF GOVERNANCE AND PROCUREMENT. INDEED, TECHNICAL AND OPERATIONAL CONSIDERATIONS ALONE WILL NOT YIELD THE DESIRED OUTCOME.

WE CAN DRAW FROM MANY EXAMPLES OF SUCCESS IN THE COMMERCIAL WORLD. AS CONSUMERS AND USERS OF COMMERCIAL TELECOMMUNICATION PRODUCTS AND SERVICES, WE UNDERSTAND THIS ISSUE. IT MEANS WE CAN PURCHASE THESE ITEMS IN AN OPEN AND COMPETITIVE ENVIRONMENT – OUR EXPECTATIONS DRIVE THE NEED NOT ONLY FOR INTEROPERABILITY, BUT EVEN MORE, FOR INTERCHANGEABILITY. WE CHOOSE THE DEVICE THAT SUITS OUR

NEEDS, ON THE NETWORK THAT PROVIDES THE SERVICE WE REQUIRE, IN A HIGHLY COMPETITIVE AND INNOVATIVE OPEN MARKET. MARKET DEMANDS DRIVE COMMERCIAL SERVICE PROVIDERS TO DELIVER INTEROPERABILITY. IN TURN, COMMERCIAL SERVICE PROVIDERS DRIVE INTERCHANGEABILITY THROUGHOUT THEIR SUPPLY CHAIN TO ENSURE UNINTERRUPTED AVAILABILITY OF COMPETITIVE AND INNOVATIVE PRODUCTS. THEIR BUSINESS SUCCESS REQUIRES HAVING MULTIPLE SOURCES WITHIN THEIR SUPPLY CHAIN. THIS IS THE MODEL THAT SHOULD GUIDE THE GOVERNANCE STRUCTURE AND PROCUREMENT PROCESS FOR THE PSWBN. IN THIS WAY, INTEROPERABILITY BECOMES THE OUTCOME, NOT JUST A MANDATE.

INTEROPERABILITY THEREFORE SHOULD BE THE CAPABILITY FOR PUBLIC SAFETY ORGANIZATIONS TO PROCURE THE BUILDING BLOCKS OF THE NETWORK AND DEVICES THAT ARE INTERCHANGEABLE AND CAN BE USED TOGETHER REGARDLESS OF BRAND OR NETWORK LOCATION. THIS DEFINITION WILL ALLOW EVERY FIRST RESPONDER TO COMMUNICATE ACROSS THE NATION AND WILL DRIVE SUPPLIERS TO THIS INDUSTRY TO PRODUCE HIGHLY INNOVATIVE AND COST-EFFECTIVE PRODUCTS THAT PUBLIC SAFETY AGENCIES CAN PROCURE AND DEPLOY WITH CONFIDENCE – THAT WILL "PLUG AND PLAY". CREATING THIS MARKET DYNAMIC WILL REQUIRE FUNDING MECHANISMS THAT DRIVE THE PROCUREMENT PROCESS TO ENFORCE THIS PROCUREMENT MODEL.

FINALLY, IT IS VITAL TO ENSURE ECONOMIC VIABILITY FOR THE PSWBN. THE NEED FOR FEDERAL FUNDS TO LAUNCH THIS INITIATIVE IS WELL UNDERSTOOD. ALSO UNDERSTOOD ARE THE CHALLENGES IN DOING SO UNDER CURRENT ECONOMIC CONDITIONS. HERE WE WANT TO BRIEFLY DISCUSS HOW THOSE CHALLENGES CAN BE ALLEVIATED.

(1) THE BENEFIT OF LEVERAGING TECHNOLOGY SUPPLIED BY A VAST ECO-SYSTEM OF MANUFACTURERS WILL GENERATE LONG-TERM SAVINGS ON AN ON-GOING BASIS. THIS DIFFERS MARKEDLY FROM THE RATHER LIMITED SUPPLY BASE AVAILABLE TO PUBLIC SAFETY TODAY FOR CONSTRUCTING ITS MISSION CRITICAL NETWORKS.

(2) FULLY REALIZING THOSE SAVINGS WILL REQUIRE MANDATING COMPETITIVE BUSINESS PRACTICES AS DISCUSSED EARLIER. PROCUREMENT OF NETWORK ELEMENTS, WHERE ECONOMIES OF SCALE CAN BE REALIZED, WILL ENABLE IMPLEMENTATION OF BEST COMMERCIAL PRACTICES THROUGH MULTI-SOURCING.

(3) BUILDING THIS NEXT GENERATION PUBLIC SAFETY NETWORK ON 4G TECHNOLOGIES WILL ENABLE CONVERGENCE – A SINGLE NETWORK WITH DEVICES THAT CAN SERVE THE NEEDS FOR VOICE COMMUNICATION AND A MYRIAD OF MISSION-CRITICAL APPLICATIONS. THE COST SAVINGS FROM CONVERGENCE WILL BE LARGE AND WILL FURTHER ENSURE LONG-TERM ECONOMIC VIABILITY OF THE PSWBN.

IN CONCLUSION, THE PUBLIC SAFETY BROADBAND NETWORK WILL BRING UNPRECEDENTED CAPABILITIES TO OUR NATION'S FIRST RESPONDERS AND GOVERNMENT AGENCIES THAT SUPPORT THE PUBLIC SAFETY MISSION. BUILT UPON A COMPETITIVE MARKET AND THE LATEST BROADBAND STANDARDS, AND SUPPORTED BY A LARGE EMERGING ECO-SYSTEM, THE PSWBN WILL ENABLE NATIONWIDE INTEROPERABILITY TO BECOME A REALITY.

ONCE AGAIN, MR. CHAIRMAN, I APPLAUD THE COMMITTEE'S LEADERSHIP ON THESE ISSUES AND GREATLY APPRECIATE THE OPPORTUNITY TO TESTIFY TODAY. I LOOK FORWARD TO FURTHER WORKING WITH YOU TO MAKE THE INTEROPERABLE PSWBN A REALITY.

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Mr. WALDEN. Thank you, Dr. Martinez. We appreciate your testimony and comments. We are going to go now to Mr. Johnson, Jeffrey Johnson, Chief Executive, Western Fire Chiefs Association on behalf of the Public Safety Alliance, Bend, Oregon Fire League. So we are delighted to have you here.

STATEMENT OF JEFFREY D. JOHNSON

Mr. JOHNSON. Thank you, sir. Good morning, Chairman Walden, Ranking Member Eshoo, and members of the subcommittee. I am Jeff Johnson, immediate past president of the International Association of Fire Chiefs and the chief executive of the Western Fire Chiefs Association. And today I testify on behalf of the Public Safety Alliance, which represents nine associations representing all the leadership in the public safety community.

In the past 50 years, America's domestic defenders have been allocated thin slices of spectrum in each new band as it became available. That is why today we have more than 55,000 public safety agencies each operating its own mission critical radio system over six or more different radio bands. Connecting disparate frequency slices among and between agencies and jurisdictions to achieve interoperability requires the purchase, programming, and deployment of electronic patching equipment operating under a governing protocol. This makes our goal of interoperability limited, difficult, and expensive.

Mr. WALDEN. Mr. Johnson. Let me stop you for a second. Can you try your mike? Apparently, we are having—got it. All right. Mr. Johnson, if you would like to resume your testimony. I apologize for the interruption.

Mr. JOHNSON. Thank you, sir. Following numerous major events and other significant disasters which demonstrate communications failures, we know that a new model is necessary. Required is a national architecture for public safety wireless communications.

To create and construct a nationwide public safety wireless broadband network, three key ingredients are requisite: the D Block spectrum, number one; number two, federal funding; and number three, a governance structure which makes it all operate.

To achieve connectivity coast-to-coast and border-to-border, the 10 megahertz block of D Block spectrum, currently slated for auction by the FCC, must be added to the 10 megahertz of spectrum licensed to Public Safety to build out a network with sufficient capacity. Local control of the network by public safety agencies is critical. Utilizing a single technology with adequate spectrum will ensure nationwide interoperability and allow us to effectively manage day-to-day operations, as well as major events.

Public safety expects to enter into a public-private partnership with states, counties, local governmental agencies, federal partners, utilities, and other agencies such as water and highways who respond to emergency incidents routinely. But public safety must have control over the operation of the network in real time to give public safety assurance that they will have full preemptive priority over its spectrum on a when-needed basis. The network must be "mission critical" from the outset. In the beginning, this system will handle only data and video. At some future time—years away—we believe there will be a migration to mission critical voice

over this broadband network. This migration will happen only when technology is developed and tested and public safety has confidence in it and it is affordable.

Funding is important for the build-out of the public safety broadband network. The Public Safety Alliance supports the auction of spectrum by the FCC—from incentive auctions, auctions of the unsold portion of the Advanced Wireless Spectrum, or auctions of designated federal spectrum—with the proceeds priority-marked for funding the construction, operation, and maintenance of a nationwide public safety network.

A governance structure must be created to manage and operate this new nationwide public safety broadband network. Key among the seven Public Safety Alliance guiding principles listed in my written testimony are, number one, that Public Safety First Responder delegates constitute a majority of the governing body; and second, the Public Safety 10 megahertz and the D Block megahertz would be combined under a single license issued to the governing body.

Public safety is supported in its quest for the D Block by the "Big 7", the seven national associations which represent state and local governments. We also are supported by the two top U.S. telecommunications carriers, as well as primary manufacturers of telecommunications equipment.

The 9/11 Commission recommended in its report that an interoperable communications system be established for public safety. At a Senate hearing on March 30, former commission chairman Governor Thomas Kean said, "We support the immediate allocation of the D-block spectrum to public safety. We must not approach these urgent matters at a leisurely pace. We don't know when the next attack or disaster will strike. Further delay is intolerable. We urge the Congress to act."

Mr. Chairman, I thank you and this subcommittee for today's hearing on this vital issue for public safety. I am looking forward to answering any questions you may have. Thank you.

[The prepared statement of Mr. Johnson follows:]

CREATING AN INTEROPERABLE PUBLIC SAFETY NETWORK

Testimony of

Chief Jeffrey D. Johnson, EFO, CFO, MIFireE

Presented to the

SUBCOMMITTEE ON COMMUNICATIONS AND TECHNOLOGY

of the

COMMITTEE ON ENERGY AND COMMERCE

U. S. House of Representatives

May 25, 2011

INTERNATIONAL ASSOCIATION OF FIRE CHIEFS • 4025 FAIR RIDGE DRIVE • FAIRFAX, VA 22033-2868
703.273.0911 • FAX 703.273.9363

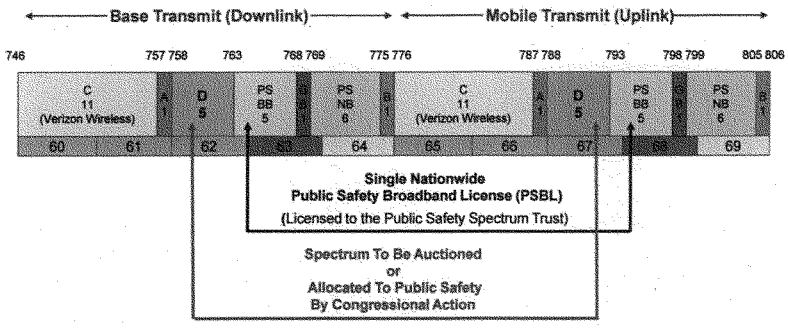
Good Morning Chairman Walden, Ranking Member Eshoo, and members of the subcommittee. I am Chief Jeffrey Johnson, immediate past president of the International Association of Fire Chiefs (IAFC) and currently chief executive officer of the Western Fire Chiefs Association. I testify today on behalf of the Public Safety Alliance comprised of nine national associations representing the leadership of public safety: International Association of Chiefs of Police, International Association of Fire Chiefs, National Sheriffs' Association, Major Cities Chiefs Association, Metropolitan Fire Chiefs Association, Major Counties Sheriffs' Association, Association of Public-Safety Communications Officials-International, National Emergency Management Association, and National Association of State Emergency Medical Service Officials. We are also joined with the formal support of approximately three dozen other national associations and business entities including organizations representing over 2 million rank and file first, second and situational responders.

Over the past fifty years, America's domestic defenders have been allocated thin slices of spectrum in each new band as it became available. That is why, today, we have over 55,000 public safety agencies each operating its own mission critical radio system over six or more different radio bands. Connecting disparate frequency slices among and between agencies and jurisdictions to achieve interoperability requires the purchase, programming and deployment of electronic patching equipment operating under a governing protocol. This makes our goal of interoperability limited, difficult and expensive. After numerous major events and other significant disasters demonstrating communications failures, it is clear that a new model is necessary. What is required is a national architecture for public safety wireless communications.

To create and construct a nationwide public safety broadband network three key ingredients are requisite: the D Block of spectrum, federal funding, and a governance model.

To achieve our plan of connectivity coast to coast and border to border, the 10 MHz of "D Block" spectrum, currently slated for Federal Communications Commission (FCC) auction, must be added to the current 10 MHz of spectrum licensed to Public Safety in order to build out a 20 MHz network with sufficient capacity. The currently licensed public safety spectrum abuts the D Block and is perfect for public safety. (See band plan below):

New Upper 700 MHz Band Plan - Adopted by FCC on July 31, 2007



Only with this particular spectrum configuration, and none other, can public safety be assured that it will have the ability to build the network it needs now and into the future.

Local control of the network by public safety agencies is a critical component to realizing a nationwide interoperable public safety broadband network. Utilizing the Long Term Evolution (LTE) technology standard with sufficient spectrum will ensure nationwide interoperability and allow us to effectively manage day-to-day operations, as well as major incidents. We cannot have commercial providers defining when an emergency is taking place and deciding which communications should have the highest priority. Public safety transmissions have to go through without delay. A "no service" signal is not acceptable. The lives of firefighters, the lives of medics, the lives of law enforcement officers depend on this. It is our responsibility.

Public safety expects to work with others and enter into public-private partnerships. We will work with state, county and local governmental agencies, federal partners, utilities, and other agencies including water and highways who respond to emergency incidents. But, public safety must have control over the operation of the network in real time. It cannot rely on commercial operators to provide its critical governance needs. Network control will give our responders the assurance that we will have full, pre-emptive priority over our spectrum on a "when-needed" basis.

The network must be "mission critical" at the outset. In the beginning, this system will handle only data and video. At some future time – years away – we believe there will be a transition to mission critical voice. We all need to take a long term view – to start out with sufficient spectrum so that we will have the ability to migrate to mission critical voice. This migration will happen only after the technology is developed and operationally tested, public safety has confidence in it, and it is affordable. Here are the key elements of "mission-critical:"

- The network must be hardened to public safety requirements. This means towers must be able to withstand the elements that might disable them. Towers in hurricane-prone areas and tornado alleys must be designed accordingly. Back up electrical power must be available 24/7. Redundancy is necessary.

- The public safety mission critical voice network must have the ability to broadcast and receive "one-to-one" and "one-to-many" and the ability to broadcast and receive without the network infrastructure being operative. This is called "talk around" mode. This is a command and control imperative. You know well that we operate under extremely hazardous conditions. If the network, for any reason, cannot provide connectivity, then we need the capability to communicate without the network. This is the essence of public safety communications.

- The network must have back-up capabilities in the event of network loss and these capabilities must be built to public safety requirements. We envision satellite capability for the network to be available when a tower is disabled or other crippling malfunction. Satellites also can cover remote areas that do not have towers. Our mission is geography-oriented, whereas commercial carriers are concerned with population.

Funding is important for the build-out of the public safety broadband network. The Public Safety Alliance supports the auction of spectrum by the FCC – from incentive auctions, auctions of the unsold portion of the Advanced Wireless Spectrum, or of designated federal spectrum - with the top priority that the derived proceeds are marked for funding the construction, operation and maintenance funds to construct the nationwide public safety network.

A governance structure must be created to manage and operate this new nationwide public safety broadband network. The PSA recommends the following guiding principles in establishing the governing body:

- Public Safety First Responder delegates constitute a majority of the governing body that sets the rules and enforcement for network operation and facilitates nationwide build-out. The governing body should include private sector representation from commercial and other stakeholder groups.

- The governing body would be established as an independent quasi-governmental entity with rule-making ability.

- The governing body has authority to enter into contractual agreements either public or private and the responsibility to delegate the authority to regional, state, tribal or local operators.

- Accommodations for regional or large entity sub-governance (local presence but under the single license for purposes of technology, etc.) to facilitate regional access and presence.

- The Public Safety 10 MHz and the D-Block would be combined under a single license issued to the governing body.

- The governing body would be authorized to receive and distribute federal, grant, and other funds designated for its operation and for creating and facilitating operation of the nationwide broadband network.

- The governing body shall assume the responsibilities of the current licensee.

A nationwide public safety broadband network will offer capabilities not now available to law enforcement, fire or emergency medical services (EMS). In the fire and EMS field, we envision firefighter/medics with a device which would deliver building diagrams, hydrant locations, maps, and highway information as well as video to provide instantaneous situational awareness of major fire and hazmat incidents in real-time to incident command. A future capability for emergency medical operations is the ability for digital imaging, portable EKGs and ultrasounds, field blood work, and video of an accident scene – all transmitted to an emergency department and a physician many miles away. Law enforcement plans to use the wireless broadband network for numerous applications from field fingerprint identification to the rapid access of criminal records. Sophisticated broadband applications are available to the general public today through commercial carriers, but are not available to public safety. It is time to bring mission critical public safety communications into the 21st Century.

The urgent need for this network has been vigorously voiced by public safety over the past several years. Congress has responded with the introduction of bi-partisan legislation in both the House and Senate supported by public safety. Hearings have been held. And, the administration has clearly voiced its support for the construction of this proposed network through its budget submission to Congress.

Public safety is supported in its quest for the D Block by the seven national associations representing state and local governments known as the "Big 7." We also are supported by the two top U.S. telecommunications carriers as well as the primary manufacturers

of telecommunications equipment. Additionally, there are more than 150 state and local associations that join in this effort.

The National Commission on Terrorist Attacks Upon the United States (also known as "the 9/11 Commission") recommended in its report that an interoperable communications system be established for public safety. At a Senate hearing on March 30th , former commission chairman Governor Thomas H. Kean, said: "We support the immediate allocation of the D-block spectrum to public safety. We must not approach these urgent matters at a leisurely pace. We don't know when the next attack or disaster will strike. Further delay is intolerable. We urge the Congress to act."

Mr. Chairman, I thank you and this subcommittee for today's hearing on this vital issue. I will be pleased to answer any questions.

Mr. WALDEN. Thank you, Mr. Johnson. We appreciate your testimony as well. Now, we will go for our final witness, Mr. Joe Hanna, President of Directions. Mr. Hanna, welcome, and hopefully your microphone works.

STATEMENT OF JOSEPH L. HANNA

Mr. HANNA. Let us hope so.

Chairman Walden and Ranking Member Eshoo, members of the committee, my name is Joe Hanna and I currently serve as the president of Directions, which is a public-safety-focused wireless telecommunications consulting practice. Prior to starting this practice, I retired from public safety communications and the public policy arena after 30 years of service. The comments I have prepared for today's hearing are solely my views and should not be construed as representing any client or past affiliation.

I operate from the assumption that everyone in this room agrees that our first responders should have the tools they need to serve the public, including access to state-of-the-art communications systems. Some of us, however, fail to agree on the fact that there are two distinct and viable paths that can provide public safety with the wireless broadband services that they need and deserve.

Congress has provided public safety with 24 megahertz of spectrum in the 700 meg band. If prudently utilized, this allocation can provide public safety with the capacity they need for day-to-day needs. Using that capacity in conjunction with commercial spectrum in the 700 megahertz band, as proposed in the FCC's National Broadband Plan, will give public safety the bandwidth necessary for situations in which the public safety allocation may become overloaded. The difference between those pressing the reallocation to the D Block to public safety and that of the paradigm envisioned in the National Broadband Plan is that the LTE platform now standardized as the interoperable vehicle for a public safety network provides an automatic, seamless, priority-accessible mechanism that can be triggered in the event of an overload of the baseline public safety network.

Equally as important, partnering with commercial entities, a cornerstone to the National Broadband Plan, will allow first responders to take advantage of both reductions in the cost of building the core network while taking advantage of the benefits of commercial networks and the economies of scale for user devices needed by the first responders.

I wholeheartedly agree with my public safety counterparts that the core of this proposed public safety broadband network should be centered around a dedicated public-safety-grade broadband network. And this network should recognize no distinction between urban, suburban, and rural boundaries. My fellow panelists and I also seem to agree that the widespread financial crisis facing cities, counties, and States throughout the Nation will now allow America to realize the nationwide implementation of a dedicated public safety network without an infusion of federal funds.

I would also like to note that several legislative proposals that have emerged around this debate the past year will help public safety use the spectrum that they have been allocated more effectively by providing for the flexible use of 700 megahertz public

safety spectrum currently allocated for narrowband communications. Failure to provide this flexibility will result in critically needed spectrum lying fallow in many parts of the Nation.

The greatest flaw that I see in reallocation of the D Block to public safety in lieu of the current law and the proposals of a National Broadband Plan, however, will be the unintended consequences of creating an island ecosystem. With no commercial economies of scale, public safety will again find itself held hostage by a limited number of providers resulting in the same low-volume, high-cost marketplace faced every day in the public safety land mobile environment.

Additionally, budget estimates for a public safety network is calculated for the National Broadband Plan were based on a model in which the dedicated public safety network would be built in conjunction with commercial rollouts of LTE networks. The broadband cost estimates for a standalone public network more than triples the cost of a shared deployment. With a shortfall in federal funds, public safety will be faced with a difficult choice of determining either how to ask Congress for billions of additional dollars of funding or to choose where the network will be built and where it will not be built.

Instead of building a bridge to nowhere, we are now faced with building half a bridge, then forcing you to the unnecessary expenditure of additional billions of dollars to complete the bridge or leaving a substantial portion of America's first responders without the broadband service they deserve.

One of the most significant issues that must be addressed by any legislation considered by this Congress is the provision for a well-defined governance and administrative structure that will be required for the deployment of this initiative. Let there be no doubt; this proposed multibillion-dollar venture is massively complex. If we fail to adequately address the issue of governance and administration of this effort at the outset, we guarantee extended delays in implementation, massive needless cost, and failure to have services implemented nationwide in an acceptable time frame.

Last, we must be cognizant of the fact that we have other equally-pressing public safety communication demands that must not be overlooked as precious and limited federal resources are budgeted.

Subcommittee Member Shimkus and Eshoo, who were both cofounders of the Next Generation 9-1-1 caucus, they are well versed in the needs of the Nation's public safety answering points to upgrade their 9-1-1 capabilities to bridge this critical length in the public safety continuum. At the end of the day, we must all recognize the fact that there is a finite pool of funds, and we must ensure that we responsibly address the myriad telecommunications requirements needed to serve both the public and our first responders.

Again, I would like to thank you for the invitation to speak before this committee, and I would be glad to answer any questions you have.

[The prepared statement of Mr. Hanna follows:]

TESTIMONY OF JOSEPH L. HANNA

PRESIDENT, DIRECTIONS

CREATING AN INTEROPERABLE PUBLIC SAFETY NETWORK

Before the

Committee on Energy and Commerce

Subcommittee on Communications and Technology

UNITED STATES HOUSE OF REPRESENTATIVES

May 25, 2011

TESTIMONY OF JOSEPH L. HANNA

PRESIDENT, DIRECTIONS

Introduction

Good morning Chairman Waldon, Ranking Member Eshoo, and members of the Subcommittee. My name is Joe Hanna and I currently serve as the President of Directions, a public safety wireless telecommunications consulting practice. Prior to starting this practice, I retired from the public safety communications and public policy arena after 30 years of service. Additionally, I had the privilege to serve on the Association of Public Safety Communications Officials – International, or APCO, International Board of Directors from 1996-2000 and I served as its President during the 1999-2000 period. Since starting my consulting practice, I have remained an active member of APCO, the National Emergency Numbering Association (NENA), and have actively participated in meetings of the National Public Safety Telecommunications Council (NPSTC), Federal Communications Commission (FCC) events related to public safety, and have had the privilege to speak at numerous national conferences on topics related to public safety wireless communications. I have served as a public safety advisor to the 800 MHz Transition Administrator and currently serve as a Senior Fellow for the Center for Digital Government. I was an active participant in the DTV clearing process that led to the availability of the 700 MHz spectrum now under discussion, and was among the first to introduce the concept of broadband to the public safety community. Thank you for inviting me to join this panel to address the need for a nationwide interoperable network for first responders. The comments I have prepared

for today's hearing are solely my views and should not be construed as representing any client or past affiliations.

Summary

Everyone in this room agrees that our first responders should have the tools they need to serve the public, including access to state-of-the-art communications systems. Congress has provided public safety with 24 megahertz of spectrum in the 700 MHz band. If prudently utilized, this allocation can provide public safety entities with the capacity they require for day-to-day needs. Using that capacity in connection with commercial spectrum in the 700 MHz band, as proposed in the FCC's National Broadband Plan, will also give public safety the bandwidth necessary in disaster situations. Equally as important, partnering with commercial entities will allow first responders to take advantage of the benefits of widely deployed commercial networks and the state-of-the-art functionality of devices that consumers take for granted.

Public Safety Must Have a Nationwide Interoperable Network

As I am sure that you will hear from all of the panelists, it is inexcusable that almost ten years following the tragic events of September 11th and the devastation inflicted upon the residents of the Gulf Coast following Hurricane Katrina, America's first responders still find themselves ill-equipped to communicate to the degree they need and deserve. The catastrophic tornados that ripped through the Southeastern part of the United States and the wildfires that consumed over a million acres in my home state of Texas during the past two months only serve to highlight this point.

Today, my real estate agent can take me to a home, take out her laptop computer and pull up photos of the interior of the house, tax records, surveys and plats, and a list of comparable values in the neighborhood. But if that same house is burning, a firefighter cannot pull up a floor plan to aid in a search and rescue or identify known hazardous conditions inside. A pedophile in a park can sit on a bench with a smart phone, take photographs of vulnerable children, and then instantly send his pictures to other pedophiles around the world. But a police officer who has responded to that park to investigate this suspicious person cannot upload or download a photograph or scanned fingerprint of that person to a local, state or national database to help determine if this subject is indeed a known threat to the community.

I believe that every member of this panel can agree on a common set of principles for a public safety broadband network that will best serve our Nation. First, America's first responders deserve and require at least the same communications capabilities used every day by our real estate agents and junior high school students. Second, these core communications capabilities should be centered around a dedicated, public safety grade broadband network. Third, America's first responders' need for these communication capabilities recognize no distinction between urban, suburban, and rural boundaries. In fact, rural America may have the greatest need for high-speed data. An accident victim in the Upper Peninsula of Michigan or Webster County, West Virginia bleeds just as fast as an accident victim in New York City or Los Angeles, California. The only difference is that the time it takes to respond to that victim and to transport him or her to the nearest medical facility may be measured in hours rather than minutes. The Deputy stopping a suspicious van on a dark highway in

Brewster County, Texas recognizes that his closest backup may be 20 to 30 minutes away. The volunteer fire fighter understands that fire burns as quickly in Kirkland, Illinois as it does in Dallas, but the nearest resources will take considerably longer to respond.

Public Safety Users Need Funding and a Plan for the Efficient Use of the Existing Spectrum Allocation

I also believe that every member of this panel will agree that, at a minimum, there are two fundamental tools for providing America's first responders with a wireless broadband network -- dedicated spectrum and funding. I assume that my fellow panelists will agree that the widespread financial crisis facing cities, counties, and states throughout the Nation will not allow America to realize the nationwide implementation of a dedicated, public safety broadband network without a massive, unprecedented infusion of federal funds. At a time when we are seeing major cities laying off substantial numbers of police officers, and as fire departments are not able to upgrade critical equipment with more reliable or efficient models, communications systems far too often fall victim to these fiscal realities. One need look no further than the 22 jurisdictions that have been granted waivers by the Federal Communications Commission for early deployment of 700 MHz public safety broadband networks. Only 8 of these 22 jurisdictions have initiated meaningful steps to actually deploy their network. The remaining 14 jurisdictions have not. The difference between the 8 who are actively attempting to deploy and the 14 who are not? Funding from the federal government in the form of a grant from the Broadband Technology Opportunity Program, or BTOP or

other federal grant programs. While I agree with the views of some of my fellow panelists on the overwhelming number issues surrounding a dedicated, public safety broadband network, unlike some of them, I don't believe that first responders need be the licensees of all the spectrum they may need to use. Working through one of the most ambitious schedules imposed by the Obama Administration, the FCC was charged with development of a National Broadband Plan. One key element of that Plan was the proposal for the deployment of a nationwide, interoperable dedicated public safety wireless broadband network. The proposal was made possible through tens of thousands of person-hours of intensive research, interviews, and a thorough understanding of technical requirements needed to implement this network. While the FCC's proposal is not perfect, I believe that the National Broadband Plan fundamentally "got it right." In addition to the proposal's recognition of the need for funding, the cornerstone of the proposal is a dedicated public safety broadband network utilizing the 10 megahertz of spectrum allocated to public safety by Congress in 1997. Recognizing that a September 11 or Hurricane Katrina situation could tax any dedicated spectrum allocation, the National Broadband Plan also proposed to allow first responders to utilize the capacity of commercial wireless carriers on a priority basis. The fundamental assumption of the National Broadband Plan was that the 10 megahertz of public safety spectrum would be more than adequate for the day-to-day, routine needs of the national network. This basic assumption remains true today. The question is how to address spectrum needs when faced with infrequent, but critical events that require additional capacity.

This question is faced every day by every public safety entity in the nation. While designing and managing my communication center in Richardson, Texas, I had to evaluate our daily, annual, and average call volumes to determine the number of call takers, dispatchers, and support personnel. While we all try to provide resources based on our heaviest need, no public safety entity can provide enough telephone trunks, radio channels, or personnel to handle the extreme cases such as September 11 or the unprecedented outbreak of tornados that ravaged the Southeast this past month. I could have equipped my suburban call center with 500 trunk lines instead of 7, but I would not have 500 people to answer the overload of calls if faced with any catastrophic situation. Even if I could produce 500 people to answer the phones, there would not be 500 first responders on the street to respond to the 500 calls being answered.

There are other Avenues to Meet Public Safety Broadband Spectrum Needs

While I don't believe that the reallocation of the D Block is the key to an effective first responder broadband network, I do strongly support provisions of the currently introduced and draft proposals circulating on the Hill that will help public safety use the spectrum they are already allocated more effectively. For example, language in several legislative proposals would provide for the flexible use of the 700 MHz public safety spectrum currently allocated for narrowband communications. While the early reviews of this provision by public safety entities have not been unanimously favorable, failure to provide this flexibility will result in critically needed spectrum to remain fallow in many parts of this Nation. New York City representatives, for example, have made multiple public statements that they have no desire to deploy any new voice systems that utilize

narrowband land mobile radio, or LMR, technology. If New York City's position remains unchanged, the 12 MHz of beachfront 700 MHz spectrum currently assigned to them for narrowband technology will lie fallow in one of the most spectrum-pressed jurisdictions in the Nation. While use of the same spectrum for narrowband and broadband applications in neighboring jurisdictions can be challenging, it can be accomplished and this flexible use can provide additional broadband capabilities within the current public safety allocation.

Public safety has multiple other spectrum resources; in particular, the 50 megahertz of spectrum in the 4.9 GHz band already allocated for first responders is well suited for many emerging broadband applications. Public safety cannot allow this, or any spectrum to lie fallow or under-used in an era in which a "spectrum crisis" has been identified by the Administration. While the 4.9 GHz spectrum is not necessarily an appropriate backbone for a national public safety broadband network, it can certainly be used to put flesh on the skeleton.

LTE Technology Allows Public Safety Sharing of Commercial Networks

One of the principal reasons that the National Broadband Plan does not call for the allocation of the D Block for public safety is that there is a viable alternative for first responders accessing *non-public safety* spectrum in an overloaded broadband network. As you may be aware, the public safety community has embraced, and the FCC has recently required that it use, a technology known as Long Term Evolution, or LTE, as the technology for the proposed national public safety broadband network. The FCC has, for justifiable cause, broken a longstanding tradition of technical neutrality and

required LTE as the communications protocol for the future public safety broadband network. While this requirement will not only satisfy the critical feature of interoperability within the public safety network, this same technology will enable first responders to seamlessly and automatically tap into the networks operated by commercial carriers on a priority basis. Those commercial networks will also be using LTE technology.

Public safety has correctly specified and demanded preemptive capabilities that will give it priority over all users in an emergency. Current LTE standards provide this capability today. Through a mutually agreeable partnership between the public safety broadband network and a commercial wireless operator, public safety can be guaranteed automatic and seamless access to additional capacity on a priority basis-providing the functional equivalent of "ruthless preemption" in today's circuit switched networks. From a functional perspective, this process gives public safety control of this shared spectrum when it needs it, a requirement that public safety has identified as critical. This critical access to commercial spectrum will flow from implementation of the National Broadband Plan, which contemplates that a commercial carrier operating in the 700 MHz D Block will build a network that public safety can use, reducing the building requirements of a public safety-only network.

The fly in the ointment for the shared spectrum concept is the willingness of current or future wireless carriers to agree to such an arrangement. Some national carriers have made public statements that they have no desire or intent to enter into a spectrum sharing arrangement with public safety, as they do not wish to potentially degrade services to their subscriber base. Their position is both unreasonable and contrary to the public interest. Commercial users of shared spectrum in an LTE world

will not be totally preempted, but just put at the rear of the network access line in emergencies. Thus, the policy question is whether an additional ten megahertz of spectrum should be made available to commercial carriers who would be required to make their networks available for first responders, or to give that ten megahertz to first responders who have neither the routine need for it or funds to deploy it. The choice should be simple. Commercial carriers hold their FCC licenses to serve the public interest and should not be permitted to decline participation in a shared network. In an environment in which spectrum is a national resource, slower access to commercial applications in emergencies is a relatively minor trade-off for having a more robust public safety network more quickly.

A Public – Private Partnership with the D Block Licensee will Provide First Responders with Significant Benefits

The greatest flaw with Congressional reallocation of the D Block to public safety in lieu of the current law and the National Broadband Plan, however, is the unintended consequence of creating an island technology – a technology that only first responders will use. Even though public safety has been given billions of dollars over the past 20 years, there is still little interoperability in traditional land mobile communications. Quite simply, public safety land mobile communications has been balkanized into a number of technologies scattered over thousands of jurisdictions. With the limited public safety equipment market, technology has changed relatively little (in terms of basic functionality), but costs have soared. It is the norm for a single, portable land mobile radio, or LMR handset to cost $5,000, with some models costing considerably more.

Contrast that with the commercial wireless market over its 20 year life span, where prices for terminal products have decreased significantly, while the capabilities of these devices have developed exponentially. The difference? The scope of the marketplace.

Current estimates for the total number of first responders range from 2 to 3 million users, a fragmented market divided among thousands of independent purchasing units. Trade press reports estimate that Verizon sold 1 million iPhones during their first week of sales. Another report noted that Samsung delivered over 10 million units of one phone model in the last six months of 2010, plus 1 million tablet computers during the month of December.

Additionally, the cost of public safety broadband network would be driven down if it were built in conjunction with carrier LTE networks. Co-located sites, sharing of key network components, and simultaneous deployment will unquestionably result in reduced costs. These simultaneous or shared build outs would also permit public safety to access commercial sites where they might have elected to forego infrastructure deployments. As noted in the current round of early deployment as proposed by the City of Los Angeles, the initial public safety network will be built with approximately 350 sites. In that same geographic area, one of the nation's four largest carriers currently has over 5,500 sites already in operation. A public safety network with a limited number of sites requires each site to work at higher power levels – meaning greatly diminished cell-edge coverage and performance. There are two ways to overcome those limitations. One is to add significantly more spectrum to the network. The other – which commercial carriers use – is to add cell sites. Under the National Broadband Plan, which envisions that public safety entities will have access to those additional

commercial sites, public safety could take advantage of this more responsible strategy as well.

Budget figures in legislation pending before the Congress are already below the cost projections made in the National Broadband Plan's concept of a *shared* build out. If the paradigm shifts to one in which public safety builds a stand-alone network that includes the D Block, projected costs will soar dramatically. With a shortfall in federal funds, public safety will be faced with the difficult choices of implementing an inadequately designed and underperforming network, forced to return to Congress for billions of additional dollars in funding, or to choose where the network will be built and where it will not. Instead of building a bridge to nowhere, giving public safety more spectrum with inadequate funding and no access to commercial infrastructure is building half a bridge, then forcing the unnecessary expenditure of additional billions of dollars to complete the bridge or leaving the remainder of the bridge unbuilt – with a substantial portion of America's first responders not having the broadband services they deserve.

The Critical Element of Governance Must Be Addressed

While various legislative proposals have addressed many of the key elements needed to make a nationwide, dedicated public safety network a reality, most of these proposals have missed one key element-- the governance and administrative structure required for the deployment of this complex undertaking. The decades-long absence of a national strategy to manage public safety land mobile communications has created an unacceptable lack of interoperability. While billions of local, state, and federal funds

have been poured into legacy land mobile voice communication systems, those funds have generally been allocated and spent with no national strategy to ensure interoperability. As complex as interoperability within land mobile voice systems may be, it pales in comparison to the complexity of ensuring an interoperable broadband network. If we fail to address the issue of governance and administration of this proposed network at the outset, we are guaranteed extended delays in implementation, massive needless costs, and failure to have services implemented on a nationwide basis in an acceptable timeframe.

Public safety is well suited to define its operational needs, but has relatively little sophistication in network architecture. It is also unreasonable to expect any project for which billions of dollars are allocated to be managed by a small group of well meaning associations and their volunteer members. Given the fact that we have already watched 12 years pass from the time that the 700 MHz band was first allocated until it was made available to public safety, and, given the fact that we have been actively trying to take concrete steps to get broadband services in the hands of first responders for almost 6 years, any legislation proposed by this Congress should ensure the creation of a multi-disciplinary governance/management structure that can deliver this network to those that critically need it without having to wait another 6 or 12 years. If we fail to find an appropriate alternative to the practices of the past, we are doomed to repeat the failures of the past.

As I mentioned earlier, 22 waivers granted have been by the FCC which allow public safety to build out 700 MHz broadband spectrum today. While there has been discussion about creating a "network of networks" within these waiver jurisdictions, each

of these waiver jurisdictions is effectively proceeding on its own – initiating procurements, negotiating and implementing interoperability plans, and engaging in certification and compliance testing protocols Each jurisdiction will build and staff a network operating center to manage these complex centers. Without a governance structure that understands and controls issues such as these from the outset, the road to a nationwide interoperable broadband system is guaranteed to be bumpy and paved with expensive, redundant capabilities.

There are Competing Public Safety Needs That Must be Recognized

Last, we must recognize the impact of this debate on other public safety-related communications issues that face us today. While most of the national spotlight on public safety telecommunications has focused on the need for the nationwide interoperable broadband network, we cannot overlook the other side of the equation-that of how citizens communicate with public safety. Over the past several years, the concept of Next Generation 9-1-1, or NG9-1-1 has moved from theory to reality. There are far too many similarities between the fragmented public safety land mobile radio world and our 9-1-1 network. As we now look at the challenges of deploying a next generation 9-1-1 system that makes it as easy to reach a public safety answering point as it is to reach hundreds of millions of wireless users around the world, we must acknowledge that it, like a nationwide broadband network, will require significant public resources. Representatives Shimkus and Eshoo, both co-chairs of the NextGen 9-1-1 Congressional Caucus have demonstrated outstanding leadership on this issue and can, far better than I, share their views on the critical need for a major infusion of federal

funds if we are to realize the implementation of this next generation 9-1-1 system. I will assume that all members of this Subcommittee appreciate the finite amount of funds in the coffers and recognize that the decisions made regarding the distribution of those finite funds for a public safety broadband network have a direct impact on equally significant needs in the public safety communications world.

Conclusion

I again commend Chairman Upton for his leadership in making this issue a priority. At the end of the day, my greatest fear is that this debate will linger far too long. In the six years since I helped introduce the concept of broadband to the public safety community, we have seen the commercial sector move through three generations of broadband technology. In the midst of high-minded policy debates and national policy discussions, it is easy to overlook the simple fact that broadband is not a political issue; it is not a "I win, you lose" contest, but instead, is a matter of life and death for our first responders on the street and the citizens they serve. We should ask ourselves why it took 12 years for public safety to gain access to the 700 MHz spectrum that it desperately needed and why it has been another 6 years since the debate over a dedicated public safety broadband network has lingered with no results. The bottom line is that there are two fundamental approaches that can provide the same functional product to the police officer, fire fighter, or EMT on the street. In one model, public safety can forge ahead on its own as it has in the narrowband world-a world that does not take full advantage of the power of the opportunities available in the broader marketplace. The other option is to leverage the fundamental constructs of the National

Broadband Plan that will allow the most prudent stewardship of both our limited spectrum resources and precious federal funds.

I appreciate your time and look forward to working with you on this critical issue.

Public Safety Alliance
Dedicated to First Responders...First

D Block Spectrum: Setting the Record Straight

The Public Safety Alliance (PSA) is setting the record straight on the top five D Block Spectrum Myths. We are working together with more than 27 of the nation's leading public safety and state and local government associations to support legislation that would allocate this spectrum to America's first responders to build a nationwide interoperable broadband network.

"We support the immediate allocation of the D-block spectrum to public safety. We must not approach these urgent matters at a leisurely pace. We don't know when the next attack or disaster will strike. Further delay is intolerable. We urge the Congress to act."

–Thomas Kean and Lee Hamilton, Chairmen of the 9/11 Commission

Congressional Supporters of Public Safety include:

Senator Jay Rockefeller (D-WV), Senator Kay Bailey Hutchison (R-TX), Senator John McCain (R-AZ), Senator Joseph Lieberman (I-CT), Senator Harry Reid (D-NV), Senator Charles E. Schumer (D-NY), Senator Kirsten Gillibrand (D-NY), Senator Amy Klobuchar (D_MN), and Senator Barbara Boxer (D-CA), Senator Michael Bennet (D-CO), Senator Benjamin Cardin (D-MD), Senator Al Franken (D-MN), Senator Thomas Harkin (D-IA), Senator John Kerry (D-MA), Senator Frank Lautenberg (D-NJ), Senator Bill Nelson (D-FL), Representative Peter King (R-NY3), Representative Bennie Thompson (D-MS2), Representative John Barrow (D-GA12), Representative Shelley Berkley (D-NV1), Representative Leonard Boswell (D-IA3), Representative Vern Buchanan (R-FL13), Representative Yvette Clarke (D-NY11), Representative Chip Cravaack (R-MN8), Representative Keith Ellison (D-MN5), Representative Jim Gerlach (R-PA6), Representative Michael Grimm (R-NY13), Representative Jesse Jackson (D-IL2), Representative Sheila Jackson-Lee (D-TX18), Representative Eddie Johnson (D-TX30), Representative James Langevin (D-RI2), Representative Thomas Latham (R-IA4), Representative David Loebsack (D-IA2), Representative Billy Long (R-MO7), Representative Nita Lowey (D-NY18), Representative Carolyn McCarthy (D-NY4), Representative John Mica (R-FL7), Representative Michael Michaud (D-ME2), Representative Candice Miller (R-MI10), Representative Erik Paulsen (R-MN3), Representative Dave Reichert (R-WA8), Representative Laura Richardson (D-CA37), Representative Michael Rogers (R-AL3), Representative Heath Shuler (D-NC11), Representative Edolphus Towns (D-NY10), Representative Rob Wittman (R-VA1), and Representative Donald Young (R-AK).

The main goals reflected in H.R. 607, S.28, S.1040 and S.911 – allocating D Block to public safety and providing funding for network build out derived from revenue generated by auction of other spectrum as the top priority -- have earned bi-partisan backing including President Obama, Sens. McCain and Lieberman, Chairmen of the 9/11 Commission Gov. Tom Kean and Rep. Lee Hamilton, Senate Commerce, Science, and Transportation Committee Chairman John Rockefeller, Ranking member Sen. Kay Bailey Hutchison, House Homeland Security Chairman Rep. Peter King and Ranking member Rep. Bennie Thompson, as well as approximately another 30 Members of Congress as co-sponsors, and from both sides of the aisle.

D Block Spectrum: Facts vs. Myths

1. MYTH: Building out a nationwide public safety network will cost $30 to $45 billion.
   FACT: In its Broadband Network Cost Model, the FCC provided a range of cost estimates from $7.8B to $47.5B to build and operate a public safety network for over a ten-year period. This myth stems from taking the *worst case scenario* from the FCC's model, which assumed building brand new cell sites requiring zoning, permits and construction of a towers and facilities. The fact is that public safety fully intends to leverage its existing facilities wherever possible and will augment with existing commercial facilities when needed. The fact is that building a 20 MHz network would cost approximately the same amount as building a 10 MHz network. We agree with

Congressional leaders that the $10 to $12 billion in federal funding for network construction and sustainment reflected in S.1040, S.28 and H.R. 607 is adequate.

2. MYTH: Managing a public safety network may require a new federal bureaucracy.
   FACT: There are no proposals to create a federal agency for the public safety broadband network. The PSA has consistently advocated that the network should be managed by public safety with the private sector in a public-private partnership. Proposed legislation addresses this through a non-profit corporation that would transition over the current public safety broadband license (PSBL) and combine it with the D Block within the non-profit's authority.

3. MYTH: America's public safety community lacks a rollout plan for deploying a nationwide interoperable network.
   FACT: Once the spectrum has been allocated and a specific funding model established, the PSA has a plan to establish a nationwide outreach and coordination effort that will document every eligible public safety entity contact and their readiness for broadband. The public safety community is eager and ready to deploy this 21st Century network in order to protect our citizens and save lives.

4. MYTH: A commercial D-Block auction process will help ease the federal deficit.
   FACT: A commercial D-Block auction process will actually cost taxpayers significantly more than allocating the D Block to public safety. An analysis by The Phoenix Center[1] suggests that the loss of auction revenues today is more than offset by higher auction revenues and lower public safety network deployment costs tomorrow. Thus, the auction adds, rather than relieves stress to the public budget. The study, conducted by a noted economist and former high-level FCC official, also found that assigning the D Block to public safety provides at least $3.4B more in social benefits as opposed to an auction. Additionally, the FCC has stated that public safety will need more than 10 MHz for broadband in the future, and we know that it cost no more to build out 20 MHz than 10 MHz for LTE when the spectrum is contiguous and is built out together. Yet, if the D Block is not allocated to public safety and not joined with the current and contiguous 10 MHz that public safety has repurposed for broadband already within the 700 band, then it will cost more than twice as much to identify and build out an additional 10 MHz of noncontiguous spectrum in the future.

5. MYTH: Connect Public Safety Now is a credible and legitimate voice for the public safety community.
   FACT: Connect Public Safety Now has *no* connection to public safety. CPSN is a front group for cellular industry heavy-hitters including Sprint Nextel and is still operating on funding provided by T-Mobile before they withdrew from the coalition. Its goal is to have the D Block auctioned for commercial use, to bid on the spectrum and ultimately use it to increase its own corporate profits and shareholder value through unrestricted commercial use. The coalition does not care to provide public-safety grade, mission-critical network capabilities that public safety requires such as higher security, redundancy, "ruthless preemption" level priority access, roaming, build out to geography vs. population (meaning equal priority for rural areas) and back-up requirements.

   Public safety's approach, the public-private partnership which the National Broadband Plan proposed to abandon, creates competition and jobs, enhances public safety and reduces the deficit. CPSN's plan jeopardizes all else just to try to create competition, and at its best, may only get them part of the way there with only 10 MHz.

To learn more please visit: http://www.psafirst.org/

[1] To view the Phoenix Center study visit: http://www.phoenix-center.org/PolicyBulletin/PCPB26Final.pdf.

International Association of Chiefs of Police | International Association of Fire Chiefs
National Sheriffs' Association | Major Cities Chiefs Association
Major County Sheriffs' Association | Metropolitan Fire Chiefs Association
Association of Public-Safety Communications Officials International
National Emergency Management Association | National Association of State EMS Officials

Mr. WALDEN. Thank you very much, Mr. Hanna. I appreciate your comments, your testimony. I really think we have got a terrific panel of witnesses that really span the spectrum of the topic we are discussing today, from the technical level to the user level. And so we appreciate all your testimony.

I would ask unanimous consent—we have two letters from the FCC Chairman Genachowski in response to congressional inquiries on public safety equipment. We have Motorola's response to the same letter to the FCC in a report from Congressional Research Service on federal funds spent on public safety radios. I ask unanimous consent that they be made part of the record. And I would recommend to my colleagues on the committee on both sides to take advantage of actually reading these documents. A lot of work has gone into the answers, which I think will play into whatever we do legislatively.

I will start off with questions.

Mr. Hanley, first of all, I want to confirm a statement that you made that a standalone public safety network would cost in the order of $20 billion. Is that what you testified to?

Mr. HANLEY. Thank you for the question.

Mr. WALDEN. Please turn on your——

Mr. HANLEY. OK.

Mr. WALDEN. There you go. Just get real close to it.

Mr. HANLEY. Better? OK.

I think I was referencing the FCC's analysis of that question. You know, clearly, a network that leverages existing cell towers, existing radio equipment is going to be much more cost-effective than one that starts from scratch.

Mr. WALDEN. All right. I want to ask you and Mr. Hanna. Part of what we are looking here at is the 24 megahertz that public safety was given as part of DTV. Ten of it is currently, as I understand it, being used for broadband. There is a 2 megahertz sort of barrier wall between that and push-to-talk technology. As we look at that, it looks to me like at some point in time, there is another at least 12 megahertz that could be dedicated to broadband and perhaps LTE, whatever, which is more than what we are talking about in D Block. So I guess the question I am trying to resolve is what can be done today with 10 megahertz of broadband spectrum? And might that be enough to close this gap in terms of technology and migrate everybody into an interoperable broadband network that uses that 10 megahertz that is now, frankly, not being very efficiently used, although push-to-talk is a communication. I mean, I got all that with the new technology. So, you know, we are talking 2 to 3 billion users, not 100 million users like some of the commercial providers have on 10 megs. So could that 10 or 12 megs be used for broadband and satisfy this interoperable need? Mr. Hanna, do you want to start? And then Mr. Hanley.

Mr. HANNA. Well, I think the question is well asked. There is, unfortunately, a conflict with part of the spectrum at 700 meg public safety allocation, and that is that there are—although not widely deployed—there are a number of large 700 meg narrowband systems already deployed or in the process of being deployed. So that spectrum is being built out already.

Mr. WALDEN. Is that an efficient use of that spectrum when we look at LTE and all in the future? I mean, aren't we creating new islands?

Mr. HANNA. I think in the long term—and Chief Johnson mentioned this as well—in the long term, I think we could certainly make better use of it if that were ultimately moved into the broadband allocation. Unfortunately, right now, there simply is not a technology in play that would allow broadband mission-critical voice communications there.

Mr. WALDEN. Would that apply also, then, to the other 10 in the D Block?

Mr. HANNA. Absolutely. At this stage, there is nothing on the table for mission-critical voice in the broadband allocation.

Mr. WALDEN. And so what would the time horizon be for mission-critical voice in that allocation?

Mr. HANNA. As Chief Johnson mentioned, and I would echo, it is down the road a ways because at this stage——

Mr. WALDEN. What does that mean, 3 to 5 years?

Mr. HANNA. I mean, I would say five to ten at least.

Mr. WALDEN. All right. I didn't mean to cut you off here, but we have limited time here. Mr. Hanley?

Mr. HANLEY. Yes, I would concur with what Mr. Hanna said. I think that we should envision the narrowband spectrum being used down the road to augment the broadband spectrum, and we should have a definitive plan for addressing that migration as soon as it is practical to do so. I think in the short run, whether the 10 megahertz is sufficient depends on the model that is built around it. If we have roaming capabilities with other spectrum, that may be a way of augmenting the 10 megahertz. The way the network is designed and architected could make more efficient use of 10 megahertz allocation.

Mr. WALDEN. You know, part of our discussion, too, is about the equipment. And from my days either as an amateur radio operator—as a broadcaster who sent both your companies money over time, good equipment, the rock solid Motorola in the trunk of the mobile unit we had at a base station—but I also know that the commercial side spends that equipment a lot cheaper for mass use.

We have got a letter—and maybe my colleagues can address that as my time is running out—from the FCC that did that evaluation where some of the hardened equipment for public safety comes in at $5,000, and the same sort of communication device in the private, commercial side may be a couple hundred bucks. So I won't ask it because my time has expired, but I think it is an issue I think we have to dig into. Say can you get capability with greater innovation more often at 1/10 of the cost of what we are all paying as taxpayers today?

My time has expired. I will recognize the gentlelady from California for her questions.

Ms. ESHOO. Thank you, Mr. Chairman, and thank you to each one of you for your excellent testimony today. I think it has been highly instructive for the members of the subcommittee.

Let me just pick up where the chairman left off. This is a report from the Federal Communications Commission. This is on the cost of public safety communications. It says that "This is at least part-

ly because public safety"—going back to the cost—"is unable to capture the benefits of competition and economies of scale associated with equipment and devices that are manufactured for the commercial consumer marketplace. Commission staff expect that leveraging the commercial mass market could reduce cost for public safety devices substantially." These are substantial cost differentials here.

So who would like to comment on this? Maybe we should go to Motorola first, since there are some questions surrounding how competitive, you know, this whole area is. You mentioned in your testimony that you looked forward to a competitive market. I don't know how you define that, but do you want to speak to the costs on this just very briefly? And anyone else want to lean in on it?

Mr. STEINBERG. Sure.

Ms. ESHOO. It looks like we are going to be picking up the tab on this, so we have to pay attention to the cost.

Mr. STEINBERG. Is this working at all?

Ms. ESHOO. Yes, speak louder.

Mr. STEINBERG. OK, thank you.

Ms. ESHOO. We are dying for your answer.

Mr. STEINBERG. Thank you for the question. It is——

Ms. ESHOO. Sure. No, go ahead.

Mr. STEINBERG. I think it is going around a lot and I appreciate the opportunity to clarify.

The ASPs are thousands of dollars less on average than what are typically quoted. And we do compete competitively for all products, for example, with——

Ms. ESHOO. Well, where does this figure come from then? I mean do you disagree with this with the FCC's estimates that a state-of-the-art consumer cellular device typically costs a few hundred dollars? A typical land-mobile radio for public safety communications may cost as much as 5,000? Is that false?

Mr. STEINBERG. So I disagree with the $5,000 number.

Ms. ESHOO. So how much is it?

Mr. STEINBERG. It is considerably less than that.

Ms. ESHOO. What is considerably less?

Mr. STEINBERG. If I could please——

Ms. ESHOO. No, I don't have a lot of time, so if you want to answer it, fine. If not, I am going to go to someone else.

Mr. STEINBERG. So we will be happy to get back to you with the specific data.

Ms. ESHOO. Great. OK.

Mr. STEINBERG. That is not my area of expertise.

Ms. ESHOO. Thank you. To Dr. Martinez, thank you for your testimony. And I think that you centered in on the two areas that are so critical, and that is governance and procurement. I think you really were helpful to us in how you built your testimony.

Obviously, interoperability is vital to a seamless communications system, and the FCC has recently mandated that all public safety broadband networks adopt the LTE as a common technology platform. What, in your view, are additional safeguards that are needed to promote competition in the public safety equipment market?

Mr. MARTINEZ. Yes, Congresswoman, thank you. You know, we need to learn from the success of the commercial telecom industry.

That industry has succeeded in innovating rapidly, bringing capability to market quickly, providing a cost-effective solution. And how have they done that? Well, they do that through a very competitive process.

Ms. ESHOO. Um-hum.

Mr. MARTINEZ. And we call that process multi-sourcing, which means that they look at every major component, subsystem of their networks, and they ensure that they have multiple sources of supply. They do not engage in sole-source practices.

Ms. ESHOO. Um-hum.

Mr. MARTINEZ. They frequently do not single-source. Multi-sourcing is the answer because it provides for a competitive environment——

Ms. ESHOO. If I might, how do we ensure that the equipment market keeps pace with the innovation taking place in the commercial sector?

Mr. MARTINEZ. The first step, of course, was to adopt the common platform, LTE. That was the first step. Pretty much unanimous support——

Ms. ESHOO. Right.

Mr. MARTINEZ. —in the record for that decision on the Commission's part. Now, having done that, we can't do it halfway.

Ms. ESHOO. Um-hum.

Mr. MARTINEZ. And we discussed this just yesterday. And I believe that was a comment from Mr. Steinberg. We must do it all the way. We must continue to follow the standard as it evolves. We must leverage the ecosystem as it continues to develop. We must ensure that the same competitive practices that have made the carriers so successful are applied as we implement a governance organization or a structure for the public safety network.

Ms. ESHOO. Great. I just want to get one more question in. Thank you very much.

To Chief Johnson, thank you for your testimony. At the same time that you advocate for local control of the network, which is obviously very important, and you mentioned that in your testimony, would there be tension between a national governance structure and the local control that you testified?

Mr. JOHNSON. Thank you, Congresswoman. I think this is how we see it operating. The national governance body would set technology standards so that we have one technological approach to make sure that things work as they should. They would set standards and regulations for the network, but you are going to need—in some cases it may be a large city; in other places it may be statewide or may be regional. The end point is we need local and regional presence for operating the dial as it were. Public safety views these events and says we have to control the dial. When we need the network, we have to reach up, figuratively, and turn it over so public safety has access. And I think I don't expect there will be tension between the two. I think, in fact, the local presence will make the national governance model stronger.

Ms. ESHOO. Thank you. Thank you, Mr. Chairman.

Mr. WALDEN. Thank you for your questions. We will turn now to the vice chair of the subcommittee, Mr. Terry.

Mr. TERRY. Thank you, Mr. Chairman. And if I can start off with thanking everybody. I agree with Mr. Walden that this is a pretty impressive panel and appreciate your expertise in sharing it with us.

My question, it is really three parts to the same question of the shared system. And it may be too long with these three to actually get real answers from you, so if you guys would like to submit longer answers. But specifically to Mr. Hanna and Mr. Hanley, and I will ask Mr. Hanley if there is enough time. Mr. Hanna, I will let you otherwise, you and others could submit it. But can you comment on the specifics as to why a shared system built out of a network is less expensive than the one in which standalone public safety one would be? And would this shared system also—we talked about the 12 for narrowband, 2 for guarding, and 10 for broadband of the current 24 that has been set aside through the digital transition. Are you talking about those 24 plus the 10 to set up a shared system? And then last, I think one of the ultimate questions is taking all levels of an emergency from your basic wreck on the interstate to a 9/11 or Birmingham or Joplin where systems are wiped out of a complete city, is there a risk in a shared system that at a time of an emergency that public safety wouldn't have enough of the spectrum to operate in both narrow and broadband areas? So Mr. Hanley, three questions.

Mr. HANLEY. OK. So first of all, I think the shared network can be lower cost because it is going to leverage existing assets of the network operators already have in place. It is going to leverage the capabilities that those operators have to efficiently operate networks and their knowhow in those areas. I think those are the quick answers to that question. We can provide more detail in writing.

To your second question, our vision of a shared network involves the 20 megahertz of the D Block in the adjacent public safety broadband license spectrum. So that is what we are talking about when we envision the 20 megahertz shared network. But other constructs certainly could be part of that as well.

And then I think to your last question about the different types of emergencies, I think that you can envision a number of operation constructs to be either developed in rules or negotiated between operators and public safety agencies to go as far as 100 percent utilization of the capacity in an emergency situation. I think that that depends on the way the model is set up and what other resources the other network operator has to serve its base of commercial customers.

Mr. HANNA. Well, I think the first question certainly is that, the cost-savings from co-location at the outset. I mean if you are putting in two systems at the same time, same location, obviously there are some savings there.

To the third question, I think there is a spin I haven't heard yet. If you are co-located or have a commercial partner, if you have a major disaster—so, for example, what we witnessed the last few weeks with the tornadoes—in a public safety environment, at least in the initial deployments that I am looking at, in one major jurisdiction, public safety was looking at building out 350 sites, which sounds like a lot. In that same jurisdiction, that same coverage

area, one commercial carrier has 5,500 sites. So just by sheer numbers, if you have something like a tornado or an earthquake or whatever, the probability of having sites in play, as well as effective use of spectrum in more sites I think certainly gives you an advantage that you don't have in that standalone, you know, purely hardened public safety network. There has to be that core public safety piece. Don't get me wrong there. I support that. But if you are co-locating and co-serving with a commercial partner, you gain the access to, in this case, thousands of additional sites that somebody else has already paid for.

Mr. TERRY. Thirty seconds, Mr. Johnson?

Mr. JOHNSON. Thank you. I think the general discussion in the public safety community is if we are allocated the 20 megahertz of spectrum, we fully intend to have a commercial partner for all the reasons my colleagues here have articulated. It would not be cost-efficacious to go out and to replicate the kind of systems that exist out there. Some jurisdictions may want to but we actually see, as part of the D Block approach, having a commercial partner. The last thing I think we want is to shut down and overwhelm a commercial system because we are the output of the emergency response system and the call from someone trapped in their collapsed house is the input. And to shut down either of those at the expense of either is not helpful to the system.

Mr. WALDEN. I believe next is Ms. Matsui from the list I have. Go ahead for 5 minutes.

Ms. MATSUI. Thank you, Mr. Chairman. As I mentioned in my opening statement, one of the important issues that I believe has not been fully addressed but is central to ensuring an efficient and effective public safety network is who will govern and oversee this vast network that possess significant responsibilities.

This question is to Chief Johnson and Mr. Hanley. In your opinion, who should oversee and possess ultimate responsibility and accountability for ensuring the development and deployment of a broadband public safety network, an achievement of nationwide interoperability? Chief Johnson?

Mr. JOHNSON. Thank you, Congresswoman. We think that the provisions in S28, the Rockefeller bill, come very close to what we envision, which is we wouldn't expect the Federal Government to fund a network and then not have some presence in terms of the governance model. So in that particular model there are four cabinet-level positions in it.

Second, public safety needs to have a prominent position in terms of the governance and so do local governments for all the reasons I have articulated already.

But lastly, we believe strongly that our private-sector commercial partners and the people that are manufacturing the devices and can see over the horizon better than someone like myself, they need to be present and active as part of the governance model. So I think those are the three pieces.

Ms. MATSUI. So is this like a public-private kind of a nonprofit sort of partnership here you are talking about?

Mr. JOHNSON. Yes, I think, Congresswoman, I don't know if I could articulate what is the best legal construct for the governance

model, but I do think those three pieces have to be present in terms of who sets policy on the network.

Ms. MATSUI. Mr. Hanley?

Mr. HANLEY. I would agree that there needs to be some level of national governance and the constitution that Chief Johnson mentioned is probably an appropriate representation. A lot of the standards work needs to be overseen at that level. There may be applications that should be hosted on a nationwide basis. So I think it is a federal system in the end with governance from some type of national entity as well as a lot of local flavor.

Ms. MATSUI. OK. It seems like it is sort of floating at this time. And we don't want it to keep floating like this. Now, as we know, the current licensee of the existing 10 megahertz of the public safety broadband spectrum is the Public Safety Spectrum Trust. Chief Johnson and Mr. Hanna, if a new entity was to hold the license and/or be responsible for governance and oversight of the network, would you support transferring the Public Safety Spectrum Trust License to this new entity?

Mr. JOHNSON. Yes, Congresswoman, we would.

Ms. MATSUI. OK. And Mr. Hanna?

Mr. HANNA. Absolutely.

Ms. MATSUI. OK. And what would need to happen to ensure a smooth transition? Either of you want to comment on that?

Mr. JOHNSON. Congresswoman, I think we would have to lay out a pretty rational and detailed plan about how you transfer the license. There is all sorts of detail that have to be vetted at your level, frankly, and at the administrative level to make sure that we are legally going about it properly. And then that governance body is going to have to go to work about setting the standards and making sure that this thing deploys effectively.

Ms. MATSUI. OK. Now, if we create a new entity to manage this public safety network, they will have awesome responsibilities and have responsibility over highly valuable spectrum and significant public funding, not to mention needing to ensure the success of this vitally important network for first responders. Mr. Hanley, Dr. Martinez, and Chief Johnson, that said, how would we ensure accountability and success of any new entity to manage the public safety network? And Dr. Martinez first, if you would comment.

Mr. MARTINEZ. If you create an independent entity, then obviously, as you have stated in your question, then there is therefore a need to have a responsibility and accountability. That is certainly the challenge with an independent organization, a nonprofit organization is how do you hold it accountable for spending taxpayers' precious funds? I would suggest to you it will require extensive oversight certainly from bodies such as this one. It will require oversight and participation from the states and local entities to ensure that, first of all, their needs are being met in a responsible way, funds are being responsibly spent. As I have advocated earlier in my testimony, that their procuring equipment in a competitive and open market. And therefore it is going to require continued oversight from organizations such as this committee.

Ms. MATSUI. Right. OK. Mr. Hanley?

Mr. HANLEY. First of all, clear objectives that are agreed to by policymakers so that there is a clear benchmark against which the

organization can be measured. I think the examples that Dr. Martinez cited are appropriate as well in terms of oversight. I think some type of an audit process would also be important to make that work.

Ms. MATSUI. OK. Chief Johnson, just a quick comment because I am running out of time.

Mr. JOHNSON. I concur. I just think that we are going to have to lay this out very clearly when we charter the governance body with what our expectations and timelines are, and it has to have the mix we discussed and we have to hold people accountable.

Ms. MATSUI. Well, thank you very much. And I think we are talking about something that is sort of theoretical now at this point that we are going to have to figure out how we deal with this. So I will continue to ask questions. So thank you very much.

Mr. WALDEN. Thank you for your questions and for the answers.

I believe Mr. Bass, actually, was here when the gavel fell and so you would be up next, Mr. Bass.

Mr. BASS. Thank you, Mr. Chairman. And it is an interesting hearing and I appreciate the fact that the subcommittee is addressing this complex issue in an orderly and pragmatic manner. And I think these hearings are helpful to us understanding, you know, what our side of the capital will do with this issue.

Mr. Hanna and Chief Johnson and Dr. Martinez, can you explain to us or give us your perspective on why we will don't even have voice interoperability yet for public safety, let alone any broadband network? Chief Johnson?

Mr. JOHNSON. Thank you, Congressman. I think it has its roots in the thin slices of spectrum that have been given to public safety over the years. And there were reasons that that happened, but those reasons don't apply in this market today. Technology has surpassed the reason for doing that originally. So what happens is in the street equivalent, it is like everybody is operating on their own road.

Mr. BASS. Yes.

Mr. JOHNSON. And then the public expects us to cooperate and be co-productive at the local level when we respond. Now we need to talk. So what we have had to do is we have had to build lanes between our own roads. And it is such a broken model. I think the public safety community's perspective on this is we would love to stop spending money on interoperability, have a vision for national architecture which we are articulating, and spend our money there rather than connecting these thin slices. And that makes so much sense on a lot of fronts. And most of all of those is this D Block spectrum paired with the 10 megahertz we have eventually will be capable of radio-over-IP communications, but it is capable of data. And it is contiguous to the 700 narrowband channels which we have. And what that allows us to do is it allows a single technological approach. And I think that is why we are focusing on moving away from the thin slices and spending money on interoperability and move to one swath that will help us get all of it done.

And Mr. Chairman, if I might, with your pleasure, sir, we would like to introduce one additional piece of communication from the Public Safety Alliance into the record, sir.

Mr. WALDEN. Without objection.

Mr. JOHNSON. Thank you.

Mr. BASS. Mr. Hanley? I mean Dr.—well, either one of you two guys.

Mr. MARTINEZ. You know, if we look at how 13 billion plus, that was at the federal level plus what was spent at the state and local level, it is a large sum of money. The predominant practice has been really one of looking backwards. And by that we mean the predominant practice has been about focusing on operability, not interoperability. Significant amount of energy and emphasis spent on backwards compatibility as opposed to future interoperability. The procurement process has gone astray. It didn't focus on the core fundamental issue. We have to procure systems that are interoperable. You have to drive this car looking through the windshield, not through the rearview mirror. And so sad to say that most of that money was spent in a manner that did not move the ball as far forward as it could have and should have. We have learned that. We must not repeat that mistake.

Mr. HANLEY. I think it is a question of priorities and local resources. For the commercial sector interoperability was essential from the beginning. Folks had to be able to roam and have a seamless experience wherever they went. It was imperative that we have interoperability. The focus has been on operability in the local incident environments in public safety, so I think that is the reason.

Mr. BASS. Mr. Steinberg, just a quick comment because I have other questions. Do you have any comments on this?

Mr. STEINBERG. I mostly would agree with Chief Johnson. It is the fragmented spectrum that has been the root of the problems that we have had from the beginning. The only thing I would also offer is that we have made substantial progress, maybe albeit not as rapidly as we would have liked on creating interoperable networks with the deployment of the APCO–25 standard across 27 States. We cited several instances of good practices where we are achieving many, many agencies of interoperability within a State such as Michigan, Colorado, Ohio, Minnesota, San Diego to name a few. So there has been some progress made but more needs to be accomplished.

Mr. BASS. On the cost side, is there an appropriate division in responsibility between the Federal Government and state and local law enforcement or first responders? How much should the States and localities be responsible for? And I have 14 seconds left so somebody answer it quickly.

Mr. JOHNSON. Any time you deploy a large system, this issue comes up and the best way to answer it is I think all of us will end up contributing to it. The formula, I don't have a great recommendation for you on except that state and local governments have infrastructure that will drastically lower the cost of deploying if they share. And it is sharing backhaul, it is sharing towers and infrastructure, it is sharing building. All of those things will contribute to lowering the cost of the system, and that may be the way they share. Or they may share real dollars.

Mr. BASS. Thank you, Mr. Chairman.

Mr. WALDEN. Thank you for your questions. We go now to the gentleman from Pennsylvania, Mr. Doyle.

Mr. DOYLE. Thank you, Mr. Chairman, for this hearing and thanks to all the panelists for your testimony. It has been very instructive.

Chief Johnson, there has been a lot of discussion in recent years about the optimal nature of the spectrum at 700 megahertz band for broadband. The propagation characteristics of these frequencies allow wireless signals to penetrate buildings and other topographic obstacles while transmitting high-capacity data signals. If public safety owns the D Block on the 700 megahertz band through a reallocation solution, how are you going to make sure that this spectrum will be used in the most efficient manner at all times?

Mr. JOHNSON. Thank you, Congressman, for the question. The spectrum that public safety has, we often hear about the 100 megahertz we have. About 50 megahertz of that is in 4.9, and 4.9 is really good short distance to backhaul data but is not good for penetrating buildings. It is not good for going through windows. And when the public safety community talks about how we feel about the 4.9, we are often saying that is one we are least likely to use because its short distance would be cost prohibitive to build a tower network around it. So when we start talking about that would be the one we would be capable of relinquishing in terms of likelihood, the response we usually receive is well, yes, you want to give us back the one that isn't very useful on the street.

And that is kind of our point is it is not very useful. It is allocated to us but it is not as useful as the 700 megahertz. So the 700 megahertz, the big advantage with that is the data is likely to perform the same as the voice does, and when the voice and the data perform the same at street level I am talking, then the police officer or fire fighter are able to count on having voice access and data access. The minute they become dissimilar, then you quit relying on them. Say, voice works and data doesn't. And that is a critical factor in terms of people actually using it at the street level. The 700 spectrum is optimal. It is optimal because of how the wave performs and it is also optimal because it is beside our voice channels.

Mr. DOYLE. So how do we make sure, though, when you are not using it that we are getting the most efficient use of that whole spectrum, though?

Mr. JOHNSON. Thank you, Congressman. I think the model we envision with a commercial partner would allow roaming onto that network while that spectrum is not being used. And what that would do is that would generate some enterprise money, which would help offset the cost of operating the system and building the system and dealing with some of the technological flip-overs that will naturally occur.

Mr. DOYLE. Thank you. Mr. Steinberg and maybe Dr. Martinez and Chief Johnson also, the size of the public safety community is routinely described as consisting of about three million first responders and, you know, if we look at a smaller subset, maybe a half a million or so that actually are in the field and are in need of mobile communications. So I am just curious, why is Verizon's 22 megahertz of the 700 megahertz spectrum sufficient to launch its 4G LTE service to 100 million subscribers, yet you need almost that same amount for public safety? Why is that?

Mr. STEINBERG. Thank you for the question, Congressman. There are several reasons why that is different. We are really kind of somewhat comparing apples to oranges here if I may. The public safety networks are built to be ultimately resilient and reliable such that even if the complete network has failed, the devices can communicate with each other. That is part of the reason for the additional cost that was alluded to earlier in the handsets. They are engineered to a different grade of service, a different resiliency. So the way that they use the spectrum and the mode of communication is considerably different. The network service level that it is engineered to is considerably higher, especially from a coverage point of view and a grade of service that it provides to the end users overall.

Mr. DOYLE. Dr. Martinez, do you have any——

Mr. MARTINEZ. You know, in scientific terms the problem is that communications in public safety is very lumpy in time and space. A good day is not when you use the spectrum efficiently; i.e., you are utilizing it heavily. That is a bad day. That means lots of things are going wrong. You can't apply the same metrics to the spectrum efficiency utilization in a commercial carrier network that public safety has. The issue in public safety is not one of global capacity. It is when an incident happens, you need localized, high-capacity communications. And that is the problem. And you don't know where incidents happen, so therefore, we have to create that capacity everywhere because an event can happen anyplace, as we all know.

Mr. DOYLE. Right.

Mr. MARTINEZ. That is the fundamental problem in comparing those two business cases.

Mr. DOYLE. Thank you. Chief?

Mr. JOHNSON. Congressman, I think to compare commercial and public safety use, I guess I would say commercial systems are more likely to have broad use throughout the community. When public safety needs a network, it is very likely to just overwhelm a single site. When you land a plane in the Potomac, that is not going to do much for us in New England. That is going to light up that cell site and all the cell sites around it. And the capacity is required to move that amount of traffic at that site, and that site could be about anywhere in the Nation. And I think the network engineers and architects could attest to why you need that much from an engineering perspective. As a practical perspective, you need that much because when we need it, we need it.

Mr. DOYLE. Thank you very much. Mr. Chairman, thank you so much.

Mr. WALDEN. Mr. Hanley, did you have something you wanted to add?

Mr. HANLEY. I just wanted to add public safety networks are engineered for the peak demand at its given time and place and that is really one of the strongest arguments for making sure that we have a mechanism for commercial utilization because while you are engineered for the peak and you are going to have——

Mr. WALDEN. Right.

Mr. HANLEY. —incidents—you are going to have a lot of spare capacity most of the time. We need to make sure that is used effectively.

Mr. WALDEN. Well, I think that is part of our discussion here is how often do you need that 10—you need it when you need it, but how often is it just going to sit there fallow and are there other uses during that period? Yes, well, I guess I am chairman. Dr. Martinez?

Mr. MARTINEZ. And the problem is that if you try to use that capacity for commercial purposes, you devalue its commercial value——

Mr. WALDEN. Right.

Mr. MARTINEZ. —because it is subject to preemption. When you need it in an event, a horrific event, then you will have commercial users trying to communicate on a network that is overwhelmed with public safety——

Mr. WALDEN. But it doesn't——

Mr. MARTINEZ. That was the lesson learned from the D Block.

Mr. WALDEN. Well, that and the way it was structured and the unknowns. You buy it and then we will tell you what you have to do.

Mr. MARTINEZ. Certainly as well.

Mr. WALDEN. I am going to get myself in trouble with my colleagues here again. Mr. Bilbray, I think you are up next.

Mr. BILBRAY. Thank you, Mr. Chairman. I appreciate you clarifying it. One of the big problems with the D Block is nobody knew what they were buying, you know, especially when you have other commodities on the market and that lack of definitive explanation of what you were buying for your constituency, you know, wasn't there.

I appreciate Mr. Steinberg being here because I just remember 20 years ago we were putting in a unified system for a county of three million people with federal and state agencies in there down in San Diego, so I appreciate you bringing that up. But I think that we have got some real challenges, and I think a lot of it is not just technology. A lot of it is mindset. I remember being mayor of a small city of 30,000, we had a dispatcher for the police department, one for the fire department, one for the public works, and one for the lifeguards. You know, but each one of them had to have their own little pie.

Chief, your comment about the need to have the private sector at the table I think is quite appropriate, though, understanding that those of us in government who use the system won't even know what is possible if we do not have those guys at the table, right?

Mr. JOHNSON. That is correct, Congress. That is our view.

Mr. BILBRAY. Now, my question is we do have a vehicle—and maybe I am dating myself—by the Disaster Preparedness Councils in every region is sort of the hybrid between a local, regional, and fed because it is actually a federally mandated agency that really works with these problems. In fact, I think that was really the key in San Diego we used to put it together. Maybe that is a component of a hybrid between the federal, local, and regional that needs to be considered of rather than reinventing the wheel, take a look at

what we have restructured, used again, and move forward. A comment about that, Chief?

Mr. JOHNSON. Sir, I am really not very familiar with who comprises that. I guess I would say it is important at the national level and at the local level, whatever that is, that you have people on there that understand public safety and they understand networks. And I think the same mix we talked about has to be present at the local level as well because a network operation is, after all, what we are after.

Mr. BILBRAY. And that is really a challenge because those two disciplines don't tend to meet very often.

Question, Mr. Hanna. We have allocated the 4.9 megahertz. Should public safety be using that spectrum as part of this solution?

Mr. HANNA. Oh, absolutely. As Chief Johnson said, at this time, 4.9 is not really optimum spectrum for any type of broad-based application. It certainly has great potential for offloading traffic in hotspot-type zones. It has backhaul provisions. In some areas, it is used widely. In many areas, it is not used much at all. And I think there are a couple of studies that have shown that 4.9, you know, if paired with this network certainly can enhance the spectrum that we already have. So I think if we just take a look at how we reengineer that and build that into the network, I think we have great application for that.

Mr. BILBRAY. OK. Let me sort of throw something out, too. Mr. Hanley, you are probably the youngest one on the panel, wouldn't you guess? What do we got? How old are you?

Mr. HANLEY. Forty-four.

Mr. BILBRAY. OK. Is he the youngest, guys? OK. I just think it is appropriate we bring up these items that we don't like to talk about in proper company, but Chief, can we admit that there may be a whole generational gap that we are ignoring here and that is with data? I think you and I know we grew up not texting our friends, not being comfortable in the text and the data file, but I see that like the cruisers that we put computers in, we never implemented the swipe card technology, though it was there, you know, back when we were implementing systems in the late '70s, early '80s. Don't you think that there may be a heck of a lot more opportunity for data to be used in public safety than what we accept now just because we have always been used to grabbing that mike on our sleeve and talking into it, and especially with the next generation who is coming in with a whole new set of tools. These are videogame kids that are flying Predators now, and I think just as much as the old army didn't accept the Predator, now we embrace it. I think there is a real challenge for all of us to sort of look over the horizon and be able to see what the next generation may take of this.

Mr. JOHNSON. Congressman, your observations are quite insightful. The young firefighters we are hiring today are astonished at the lack of technological capability that we have. And the reality is is that because we don't have a mission-critical grade data network today, it really is impeding efficiencies. And I will be specific. If you don't have the ability to receive and transmit GPS or automatic vehicle location data in the field, then you can't efficiently

deploy your resources, which means that you deploy them statically and you have holes that pop up and you have no way to sense that and adjust to it.

Secondly, just even things like controlling traffic signals as opposed to using light to get close to it and turn the signal. The system ought to be able to sense we are coming, it ought to know where we are going, and it ought to clear the route and heal the route as we pass through it. I think, you know, the networks that we deal with, the commercial partners, they are quick to tell you that in the last 5 years, they have grown between 5,000 and 8,000 percent in terms of throughput of data on their networks. The same thing is going to happen in public safety because the industry has not yet fathomed what public safety needs and designed aggressively to it because we don't have a network to put it on.

And I think you are correct in assuming that we are going to see some amazing evolutions in terms of the technology brought to public safety.

Mr. BILBRAY. Thank you, Mr. Chairman. I just want to make sure that as we move forward with a national upgrade that we do not continue to try to apply an alpha code in the world of GPS. And for those of you who don't know alpha code, you can go back and study Lord Nelson and everything else. Thank you.

Mr. WALDEN. I didn't know you knew him. OK. And I just want to say, Mr. Johnson, I think you are right on target, and this is what we are trying to capture is that innovation and not have an isolated network that fails to capture that. So we are just trying to figure out how to get there because my iPhone, I can plug in a coordinate and up comes the GPS and it walks with me through town. There is ability there.

I am going to go Mr. Gingrey and that I think is our last on the panel.

I will just tell you in advance and not on Mr. Gingrey's time, we have got a whole bunch of questions. Remarkable panel, thank you for your testimony. And we are going to submit those because they do require longer answers than we have time for today and I will do so formally later. But thank you.

Mr. Gingrey?

Dr. GINGREY. Mr. Chairman, thank you, and I agree. We do have an excellent panel. Unfortunately, I have been going back and forth between this committee and another subcommittee hearing a markup. That happens a lot up here and I apologize for that. But you have done a great job and we appreciate you being here.

Mr. Hanna, I am going to turn to you first. How important is it that public safety partners with commercial providers if we are going to accomplish these goals that we all agree we need to accomplish?

Mr. HANNA. I appreciate that question. When I first started working with this issue about 6 years ago, I came to public safety talking about broadband on the basis of that relationship between commercial and public safety. I think it is only through that relationship, particularly where you have the economies of scale and the broader ecosystem that we really take full advantage of what this has to offer. So I think that element is really paramount to the success of this network.

Dr. GINGREY. Thank you. And let me go to Mr. Steinberg, Dr. Martinez, and Mr. Hanley, and all three of you can respond. How soon will voiceover internet protocol over LTE be available? Are we talking 1 year, 2 years, 3 years? How soon could public safety migrate from narrowband and utilize broadband for the entire 24 megahertz, the DTV legislation cleared for public safety?

Mr. STEINBERG. I will start if you don't mind.

Dr. GINGREY. Yes.

Mr. STEINBERG. Thank you for a very insightful question. That is one that goes around a lot. It is difficult to predict exactly when but let me talk to some of the things that have to occur. Moving voice to broadband, commercial-grade voice, which I think you will see carriers start to do. I have seen an announcement even from one carrier recently that they are heading in that direction in 2012. The difficulties of transcending that to public-safety-grade mission-critical voice, there are a few things we have to overcome to make that occur. Most of them are nontechnical.

One is we need an interoperable standard. There is no standards body in place today that specifies push-to-talk, mission-critical voice type communications. So we would want that in place and we want to make sure that we create interoperability.

Two is we have to make sure that the network is built out to the coverage requirements that are necessary to support mission-critical-grade voice.

Three, there are few things in 3GPT standards, nothing major, that have to occur to support that to actually function properly.

And then four is we have to actually make sure that once we get there, we truly do achieve interoperability, but not just for voice. We need to think about, as I think the previous question was instructive, about push to X, push to media, so that are thinking about not just the past but we are thinking about the future as well.

So how long will that take is difficult to answer. I heard answers earlier in the 5- to 10-year range, perhaps while you were out of the room. That is probably not unrealistic considering the maturation that will be required to achieve mission-critical-grade push-to-talk.

Dr. GINGREY. Let us have Dr. Martinez and Mr. Hanley quickly.

Mr. MARTINEZ. Yes. Congressman, we at Harris have been delivering mission-critical voice over IP for over a decade. We understand how to do that. We understand, too, Mr. Steinberg's point that there is work to be done in developing of standards. We believe the technology is here today to do that. We believe it will take time to further develop the devices and to the right form factors for our first responders and other public safety organizations, but we believe that is going to take about 2 to 3 years. We believe there is a point where you have to mature the technology Chief Johnson made reference to earlier. We must do this in a responsible manner.

I would say from an operational perspective, we are probably 3 to 5 years away from that being an effective tool in the field.

Dr. GINGREY. Mr. Hanley, would you tend to agree with that?

Mr. HANLEY. I do agree with that. I think that we need a resilient network that will support mission-critical applications and we

need voice quality that is acceptable. And that is the time frame that is appropriate.

Dr. GINGREY. I will continue with Dr. Martinez and Mr. Steinberg in my final question. Some have criticized the public safety equipment community for using a narrow definition of interoperability. How do you define interoperability? And would your definition permit seamless use of competitors' public safety radios with your company's network elements?

Mr. MARTINEZ. Mr. Congressman, as I have testified earlier, I believe we have addressed interoperability from a technical and operational perspective, yes indeed. We believe that the definition of interoperability really is the notion that you can procure interchangeable equipment. Your own experience in the use of cell phones and Wi-Fi devices, you already understand this. You purchase it with confidence that it is going to work. No matter which cell phone manufacturer I purchase from or which operator I operate on, we have the ability to communicate. We can text, we can send images, and so on and so forth. Those are fully interoperable systems but they are built on a base of interchangeable devices and technologies. We believe that is the model going forward in how we are going to achieve interoperability is to enforce the procurement process to implement that model.

Mr. STEINBERG. And if I could just amplify a bit.

Dr. GINGREY. Yes, please.

Mr. STEINBERG. I believe Dr. Martinez spoke correctly that I believe today we have the interoperable standards of the P25 APCO standards that allow this to occur. Interoperation does occur on networks today between competitive handsets and networks. I would just offer as well that Motorola solutions offers at no charge to our competitors or other suppliers of equipment an interoperability test facility that they may bring the devices into and validate that they conform and work.

Dr. GINGREY. Thank you all. And Mr. Chairman, I yield back.

Mr. WALDEN. Recognize the gentleman from Louisiana.

Mr. SCALISE. Thank you, Mr. Chairman.

Mr. Steinberg, given that the absence of a nationwide network both since September 11 as well as we experienced with Hurricane Katrina, a time consideration clearly is going to have to be a consideration in all of this. One of the things I want to ask from a technical standpoint, what would promote a quicker deployment of a nationwide network? Reallocating an additional 10 megahertz to public safety for a new build-out or supplementing public safety's existing spectrum working with commercial providers to create that existing network?

Mr. STEINBERG. That is an excellent question and thank you for the opportunity to address it.

I think there are several factors that have to go into achieving what you stated is an excellent goal. First, I do believe that one of the problems we spoke of earlier that has contributed to interoperability issues is the hodgepodge or the fragmented spectrum that public safety has accumulated over the years. So that is one of the reasons why we do face an opportunity with the 700 megahertz spectrum band and the opportunity to reallocate the D Block if we can work out all of the other logistics to go with that to create

a nice wide swath of spectrum that everybody can operate upon in a consistent fashion.

To your question about what actually gets us there quicker, I think it is a combination of really both factors that have to be brought to bear to actually move us along in that direction.

Mr. SCALISE. All right. Mr. Hanna, from what I have been hearing and, you know, whether it is testimony here just talking with various groups, there are a number of ways to achieve interoperability and I think some have been touched on today, but if you could talk to me about the benefits of creating a nationwide interoperable system in connection with commercial spectrum in the 700 megahertz band as proposed by the President's National Broadband Plan.

Mr. HANNA. Well, the concept is if you're working on a common platform, which is the LTE platform, if you have the network sharing agreements, then you have the ability to roll over from one network to the other. So you are simply taking advantage of each other's spectrum in that regard. And what we have talked about earlier is on a day-to-day basis, public safety does not need the entire block of spectrum. So on those days that you have the bad days that were mentioned earlier, then you can move into that spectrum, that commercial spectrum, and vice versa in some circles as some people proposed. So I think in that regard, you know, you are making maximum use. It is good stewardship of the spectrum that we have.

Mr. SCALISE. Do you have an idea of both low end and high end when there is low utilization, high utilization how much spectrum would be covered on each of those extremes?

Mr. HANNA. I don't think I could be in a position to tell you, you know, how many megahertz we are going to be using in a given day. That is a bit outside my expertise.

Mr. SCALISE. OK. I don't know if anybody else——

Mr. HANLEY. Let me just say it is a function also of how densely the cell sites are architected as well, how much capacity is deployed in a given location. So without seeing an architectural design, it is hard to comment on that.

Mr. SCALISE. Yes, and I know that is——

Mr. HANLEY. I think you probably can use all the capacity in a serious emergency concentrated time and place. You are going to have a lot of times when you are using much less than that.

Mr. SCALISE. Yes, and I think that is one of the things that the chairman talked about at the outset of the hearing is the importance of putting a real structure in place so that you are not just throwing money and maybe underutilizing spectrum, not using it to the best of our ability when it is such a scarce resource so that we can get the best bang for our buck but also push those timelines so that we are not facing the 10th anniversary of whether it is September 11 or Katrina or some other disaster and you still don't have that interoperability where we can best achieve that goal.

Thank you, Mr. Chairman. I yield back.

Mr. WALDEN. I thank the gentleman. We recognize, now, the gentleman from Florida, Mr. Stearns.

Mr. STEARNS. Thank you, Mr. Chairman. Let me also—I didn't get a chance to welcome Dr. Martinez who is from a company in

Florida, Harris Corporation. He is the CTO. I have had the experience of touring Harris, and actually, when I was an Air Force officer when it was Radiation Incorporated I used to come in there and fly and accept satellite ground stations for the Strategic Air Command. So I want to welcome Dr. Martinez.

And one thought I was thinking about is assuming—in your mind, what government oversight should there be to make the interoperable system work? Maybe you can give us some ideas on that, what oversight should be done.

Mr. MARTINEZ. We, of course, recognize that this network will serve federal, state, local, and tribal organizations. Clearly, they all have to participate in a significant way in the governance structure, however it evolves. It is important that we don't get to a point that those organizations find themselves looking at the structure from the outside in. They have to be part of it, a fundamental part of it.

The National Broadband Plan articulated that 3 organizations in particular that were important: the Federal Communications Commission and what it is doing, the Department of Commerce, and the Department of Homeland Security. We believe those three organizations must continue to play a significant role and collaboration in defining the structure, however it emerges. And those organizations continue to provide oversight from regulatory perspective, from policy perspective. But ultimately, we need to assure that those organizations, the stakeholders are able to perform the day-to-day governance functions.

Mr. STEARNS. What would be the worse fear, the worst thing that you would be concerned about?

Mr. MARTINEZ. That is a great question. My worst fear is this issue of economic viability. And I touched upon it very briefly. We must ensure that this network remains economically viable. And that means two things: that it is cost-effective and affordable and that we never put it into a position where we are unable to sustain it. And so I would say that my biggest concern today would be that we wouldn't make the full commitment to ensure that it remains adequately funded and that we make the commitment to ensure that we are funding it correctly.

And I have made the point repeatedly that we have to procure it in a responsible way that allows for innovation and competition and multi-sourcing we believe is the key vehicle.

Mr. STEARNS. Anyone else on the panel who would like to comment, perhaps what their worst fears are or what the role of oversight should be on the interoperable system? Anyone else? Yes, sir, Mr. Hanna?

Mr. HANNA. On the governance model, you know, I have had a chance to look at great detail at the proposal you mentioned earlier that has been presented to Senate. I would say that while I am not enamored with all the provisions of the bill, I am highly impressed with the governance model that they have laid out in that document so far.

I am not quite sure if the rest of my panel shares my concerns. I have deep concerns about a governance model run strictly by the government because I think our record in that area is rather replete with not being the most successful models. And I think my

public safety counterparts would agree that a model run purely by public safety, you know, not including people from industry and those people who are paying for it also has its issues. So I would say that the model that I have seen so far in Senator Rockefeller's bill or the draft that has been presented I find I like it very much.

Mr. STEARNS. Mr. Hanna, let me just follow up with a question for you. We have provided the first responders with approximately 13 billion in federal funding over the last decade, as well as approximately 100 megahertz of spectrum for their exclusive use. Where have those resources gone? What worked, what didn't, and why?

Mr. HANNA. Well, that question has been—we have partially addressed that. I mean, one of the unfortunate things is that it has gone many places, and that is part of our problem. It has been put out in piecemeal, fragmented basis. I would say we have had a lot of jurisdictions who have received a lot of that money. They have put it to good use in their local jurisdiction. There has been no requirement, though, that they have interoperability with others. And I would also suggest that, you know, we have enabled—the Congress has enabled this process by, you know, many times we kneejerk to a situation. After 9/11 we put a great deal of money on the table, which was admirable to respond to a need, but I don't know that it was put out, you know, with the planning that was needed to ensure a unified approach.

So I think the very fragmented nature of public safety communications, we have soaked that in, it has been used locally, but we haven't had the coordination that we would like to see out of this bill.

Mr. STEARNS. Mr. Chairman, I was just going to ask that same question to Chief Johnson if I could.

Mr. JOHNSON. Thank you, Congressman. I think it has mostly been spent looking backwards, but I think there has been 3 causal areas. One, interoperability, which everyone talks about, and we use the name to do other things. I think there has been plenty of this money spent on core operability and buying equipment for core operability that is interoperable-capable and therefore met the terms of the grant requirements, for example.

And I think, second, the Federal Government has had a little piece of responsibility here in that as we ask all the public safety responders in the Nation to narrowband their radios, for many of them, if not most of them, that meant a wholesale replacement of their radios. So when you are facing a wholesale requirement to replace your entire radios—mountaintop, handheld, mobile, et cetera—to meet the narrowbanding requirement, then you start looking for money. And that money is either some of it earmarked for interoperability, which you can do on your path to narrowbanding, and some of it operability with interoperable-capable. And I think it is worth adding that one of the benefits for the Federal Government in narrowbanding is they recapture the spectrum that is left behind when you narrow that band. That band, I assume, will at some point in time be repackaged, reformed at auction and in part offset some of the expenses that have been made in this area.

Mr. STEARNS. Good. Thank you, Mr. Chairman.

Mr. WALDEN. Thank you, Mr. Stearns. Gentleman, we really appreciate your testimony, your insights. As I mentioned earlier, we will have some additional questions we would appreciate your response to. And I think I can speak on behalf of the whole subcommittee how impressive this panel has been and how helpful in our work you have been. And we look forward to continuing the conversation as we work to get it right this time and make sure that you have the interoperable network that you need at a price we can afford and that we are maximizing use of the spectrum along the way.

So thank you all, and with that, the subcommittee stands adjourned.

[Whereupon, at 12:37 p.m., the Subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

PREPARED STATEMENT OF HON. CLIFF STEARNS

Thank you, Mr. Chairman. I'd like to thank you for holding this important hearing and all our witnesses for sharing their insights, particularly Mr. Martinez, CTO of Harris Corp., which is based in Florida.

With the ten-year anniversary of September 11th quickly approaching, the time is now for Congress to act towards creating an interoperable public safety network.

In the DTV legislation we cleared spectrum in the 700 MHz band, known as the D Block, to be auctioned for commercial use. Against my objections, the FCC moved forward with a conditioned auction that, as I predicted, resulted in no bidders showing up.

The D Block now sits fallow and valuable spectrum goes unused while we face a looming spectrum crunch. I look forward to hearing the testimonies of our witnesses as we explore the best and most cost-efficient way to utilize the D Block and build an interoperable public safety network.

PREPARED STATEMENT OF HON. JOHN D. DINGELL

Thank you, Mr. Chairman, for holding this important hearing. I would also like to extend a warm welcome to our witnesses this morning. Thank you for appearing before the Committee to give testimony and answer our questions.

The problems with constructing a national interoperable public safety network are not new. The debate about whether it is better to reallocate or auction the D Block also has become alarmingly long in the tooth. In brief, we have made precious little progress since 9/11 in improving the resources available to first responders.

I intend to use this morning's hearing to productive ends. I will ask our witnesses questions about reallocating the D Block and how to guarantee public safety has the resources with which to construct and maintain a national interoperable network. I also welcome our witnesses' opinions about how to make certain cash-strapped municipalities do not face undue burden in modernizing their communications equipment and infrastructure, as well as how to strike an appropriate balance between broadband and broadcast media in times of emergency.

I note that there are a number of public safety bills circulating Congress. Many of them would reallocate the D Block and pay—at least partially—for the construction and maintenance of a public safety network by allowing the Federal Communications Commission to conduct voluntary incentive auctions of broadcast spectrum. I am deeply suspicious of what the Commission would do with broad authority to conduct incentive auctions. As such, I will not consider granting the Commission that authority until the Commission has explained sufficiently to this Committee how it would use it.

I look forward to a productive hearing and yield back the balance of my time.

Questions for the Record
to

Mr. Joseph R. Hanley, Vice President – Technology Planning and Services, Telephone and Data Systems, Inc.

Hearing entitled "Creating an Interoperable Public Safety Network"

June 24, 2011

The Honorable Greg Walden

1. **Can use of the full 24 MHz of the 700 MHz public safety allocation for broadband meet public safety's broadband needs?**

The demands on a public safety network depend on the needs of the local public safety organizations, the populations they serve, the geography of the service area, the kinds of applications they intend to employ, the cost of deployment, and how effectively each agency utilizes its existing spectrum allocations. At present, 10 MHz of the 24 MHz allocation is assigned to narrowband use. We have not made a detailed study of the considerations involved in repurposing the 700 MHz narrowband spectrum. However, it is immediately adjacent to the broadband allocation and thus would be a logical resource for augmentation of the existing block should a phased growth approach be adopted. This is an instance where clear policy direction would be beneficial since some standards and technology development will be required to accomplish this repurposing and this work should commence right away. Also, public agencies utilizing or planning to utilize this spectrum for narrowband purposes would need appropriate consideration from a transition perspective. If policymakers choose to dedicate the entire 24 MHz to broadband it is likely that this amount of spectrum would be sufficient for day-to-day public safety communications, even in urban areas. In certain emergency scenarios, even 24 MHz may be inadequate and it is in those situations that the ability of public safety users to roam[1], with priority access, on commercial networks becomes critical. In addition to providing this ability to flexibly expand public safety's capacity, the ability to operate on commercial networks would also enhance the resiliency and reliability of public safety broadband operations by making capacity available on different networks with different points of failure from each other and from the core public safety network. It is critical to note, however, that these benefits are only available under a framework that promotes interoperability of commercial and public safety devices across the 700 MHz band.

[1] "Roam" and "Roaming" as used in these responses refers not only to traditional roaming (i.e. a user accessing

2. **First Responders are currently planning to use 10 MHz of spectrum for broadband out of the 24 MHz the DTV legislation already cleared. What can be done today with 10 MHz of broadband spectrum? Might it not be enough in the short term, until public safety can also migrate the rest of the 24 MHz for broadband, especially since there are only 2-3 million First Responders as compared to tens of millions of commercial users?**

It is possible to deploy an LTE network using 10 MHz of spectrum and commercial operators may do so, particularly in their initial deployments. When more spectrum becomes available, the channel sizes can be increased to take advantage of the additional spectrum. With the advent of LTE-Advanced and its carrier aggregation feature, it will also be possible to deploy larger channel sizes by adding non-contiguous spectrum from other bands. As noted in the answer to question 1, it is difficult to predict the point at which additional spectrum beyond the current 10 MHz broadband allocation would be useful or essential to public safety. That timing will depend on the types of applications used by public safety and the intensity of that use. There may be substantial variation across jurisdictions and between urban and rural areas. Given the nature of public safety uses, it is also reasonable to expect that peak traffic demand in emergencies will be far larger than non-peak demand. This argues for two important features, regardless of how much spectrum is allocated for the network. First, as noted previously, priority roaming onto commercial networks should be available to address high demand situations; and second, provision should be made to share excess capacity with commercial operators when the network is experiencing non-peak levels of demand. Development of this two-way capacity sharing capability must be a high priority.

3. **Is the spectrum used for the amateur radio service in the 400 MHz band appropriate spectrum for mobile wireless broadband services?**

The current LTE standards do not define band classes for operations in the 400 MHz range. The lowest spectrum currently supported by 3GPP is 698 MHz. From an RF propagation perspective, frequencies around 400 MHz would be suitable for 4G mobile services. They have been used for previous generations of cellular technology, and have been discussed as possible bands for LTE in Europe and elsewhere. Their use for LTE would require the completion of work in standards and related technology development.

4. **Should we require that the lease of excess capacity on the public safety network be at market based rates so we don't unfairly under-price commercial networks with a taxpayer funded competitor?**

Spectrum is a scarce national resource. Congress and the FCC must take steps to ensure that the public safety broadband network is designed and operated for maximum spectral efficiency, and that unused capacity is available to serve commercial users and foster competition in the wireless marketplace.

The focus of any new public entity created as part of this process should be on providing interoperable broadband services for public safety users. It should not morph into a government-owned retail wireless company. The excess capacity of the network should be made available on a fair and equitable wholesale basis to strengthen competition amongst the retail commercial operators. This can be accomplished as a natural part of the shared network partnership we proposed in our testimony. Or, if the network is to be owned and operated by public safety, the capacity can be made available at market rates through wholesale arrangements available to all commercial carriers. What the FCC and the Congress should not allow are block leasing arrangements that inefficiently lock up spectrum, particularly if those arrangements are made with the nation's largest carriers, which already enjoy substantial spectrum holdings. In order to spur more competition in commercial wireless services, the selection process for leasing such excess capacity must be fair and open to all commercial carriers without bias in deployment area size or in other terms which favor awards only tothe largest carriers. Market-based rates for leased capacity will also provide an incentive for public safety agencies to make capacity available for commercial uses, leading to more efficient network design, construction and operation as well as reasonable preemptions for emergencies.

5. **There has been much focus on technical issues but not on agency coordination across jurisdictions (local, tribal, state, and federal) or oversight of construction, operation, and funding. What mechanisms need to be in place to address these needs?**

Along with the public/private partnership model, we have long advocated that regionality should be built into the auction or reallocation models. Goverance is an extremely important issue that needs to be examined closely because there needs to a system of accountability. There are a number of ways that agency coordination across jurisdictions can be implemented to ensure consistency of network policies; coordination of state and local planning; spectrum efficient, cost effective and timely deployment; maintenance; upgrades; and roaming on a nationwide basis. We have generally supported state and comparably-sized regional deployment models as a reasonable way to manage this process. Having regional public/private partnerships allows for closer coordination between commercial operators, public safety agencies, and the entities responsible for public safety coordination. This model also creates accountability for network construction because it will be clear that each operator must meet specific buildout mandates. Partnering public safety agencies with commercial operators in a shared network will give public safety agencies benefits in operational coordination, on matters such as roaming, network construction to minimize signal interference, tower sharing, and payment settlements.

6. **Given the economies of scale and coordination that will be necessary to achieve the level of interoperability desired, would it make sense for state CIOs to be a part of the governance solution?**

The governance structure and operations of the nationwide interoperable public safety network should be integrated with and take advantage of existing public safety communications bodies and expertise, including state CIOs and 700 MHz regional planning committees.

7. **How much would a nationwide, interoperable public safety network cost to construct? How much would be needed annually for operations and maintenance?**

We continue to support the FCC's analysis of the cost of deploying, operating and maintaining a nationwide, interoperable broadband network as outlined in its OBI Technical Paper Series"A Broadband Network Cost Model: A Basis for Public Funding Essential to Bringing Nationwide Interoperable Communications to America's First Responders" (April 2010).

The FCC estimates that there would be $6.3 billion of capital expense in constructing the public safety broadband network as an overlay network that exploits existing commercial and public safety narrowband infrastructure. The FCC estimates that the cost of funding operating costs will reach approximately $1.3 billion per year by the 10th year of construction under this approach.

For comparison purposes, the FCC estimates a $15.7 billion capital cost for a stand-alone public safety network. The FCC estimates that the lower bound of the ongoing costs over a ten year period for a stand-alone public safety network would be 1.5 times this capital cost.

8. **What can we do to reduce the cost of the public safety network?**

Policymakers must decide soon whether reallocation or auction is the model that will be adopted in order to leverage the economies of scale for the current buildout of LTE networks. In either model a public/private partnership will dramatically reduce the cost of buildout and maintenance of the network. In the event the D Block is reallocated, Congress should require public safety: (1) to conduct fair and open procurements which permit commercial operators to bid on the construction and operation of the public safety broadband network; (2) to enter into long-term contracts with commercial mobile providers that allow those commercial operators to share the network's available excess capacity; (3) to deploy networks based on standards which are interoperable with commercial LTE technologies leveraging the global scale of the LTE standard and (4) to participate in a broadly interoperable device market supported by a mandate of interoperability across the 700 MHz band for all commercial devices.

Device issues are critical since it is not only the cost of the network, but also the ongoing cost of devices that will burden public safety if steps are not taken to appropriately engage the commercial industry and its 300 million subscribers. Put simply, the key to device availability, choice, and cost effectiveness, is a shared ecosystem with sufficient scale. Part of the solution is for that shared ecosystem to embrace the entire 700 MHz band. The second part of the solution is to foster commercial use of band class 14 through arrangements that allow commercial operators to leverage the excess capacity of the public safety broadband network. Joint commercial/public safety use of band class 14 networks will ensure that public safety benefits from the much larger base of commercial users which drives innovation, standards development, and cost effectiveness.

The Honorable Henry A. Waxman

1. **What can Congress do to ensure that public safety benefits from partnerships with commercial service providers and manufacturers? Does Congress need to mandate interoperability between handsets or spectrum bands to make sure this happens?**

In response to the first question, the most crucial policy Congress must implement to ensure a successful partnership between public safety and commercial operators is to establish a partner selection process that fosters 1) broad operator participation; 2) long-term partnership opportunities; and 3) opportunities for commercial operators to utilize excess network capacity. We have long proposed that regionality should be built into any process, regardless of whether the D Block is auctioned or reallocated. If Congress allows an auction to proceed, it should ensure that the Commission auctions the spectrum in reasonably sized regional licenses, not mega-regional or national licenses. If the D Block is reallocated, the bill should require a fair process that would permit public safety to select regional commercial partners for network construction and operation which will make those commercial operators full partners with long-term opportunities to share capacity.

With respect to the second question, the LTE device market is evolving into a fragmented set of ecosystems, with each separate ecosystem driven and supported by one large commercial operator. This state of affairs is bad for competition and it is bad for public safety because it limits interoperability, which is one of the key objectives of the network. The key to a resilient, reliable, and flexible public safety broadband network is the opportunity to roam[2], with priority access, onto commercial LTE networks deployed in the 700 MHz band. We believe it is essential for Congress to mandate interoperability between handsets and spectrum bands to ensure that public safety devices can work on multiple carrier networks. Handsets that are interoperable across all relevant 700 MHz bands are important to public safety users because they facilitate economies of scale as well as capacity in the event of emergencies. As initial commercial LTE device deployments demonstrate, without an interoperability requirement, devices will be narrowly designed to work on only the frequencies required by each operator and public safety will be forced to draw on a device ecosystem limited to the relatively small base of public safety users.

2. **Assuming that public safety would retain priority access, if not a right of preemption in order to ensure public safety retains access to the spectrum capacity it needs, under what conditions and fee structures would US Cellular be willing to accept as part of an agreement to obtain secondary access to the public safety broadband spectrum?**

U.S. Cellular is willing to accept and pay for secondary access to the public safety broadband spectrum under clear rules on the conditions and procedures for preemption as well as adequate incentives for shared use and an assurance of long-term access. When such conditions and procedures are sufficiently defined, secondary access can be valuable for commercial uses even

[2] "Roam" and "Roaming" as used in these responses refers not only to traditional roaming (i.e. a user accessing another carrier's network when they are outside the operating footprint of their home network), but also to in-market system re-selection during capacity situations.

though no one can predict when or where emergencies will occur and how long they will last. The public interest would be best served and commercial carriers will pay for secondary access if the rules allow for and provide financial incentive for public safety to permit commercial use. Fee structures should provide public safety incentives to allow commercial users access when capacity is not needed for public safety purposes.

3. **In his testimony, Chief Johnson stated that public safety "cannot have commercial providers defining when an emergency is taking place and deciding which communications should have the highest priority." What's your reaction? How can Congress create incentives for public safety to enter into public-private partnership for the construction and maintenance of this broadband network, especially in the event the D block is to be auctioned rather than reallocated?**

Public safety officials must have the ability to determine when and where an emergency situation exists and to determine which communications on the public safety broadband network should be prioritized under such circumstances. As good stewards of a public resource, we trust public safety officials to exercise reasonable discretion in defining the duration and geographic scope of emergencies, with the first consideration always being the availability of access for first responders where and when they need it. This level of public safety control is consistent with partnerships that involve experienced commercial operators in the design, construction, operation, and shared use of the public safety broadband network.

4. **You mentioned during the hearing that depending on how the network is designed and architected, the public safety network could make more efficient use of the current 10 MHz that public safety holds. How should the network be designed to be most efficient?**

Typically commercial operators (especially smaller carriers that have limited spectrum and financial resources) have strong incentives to deploy spectrally efficient networks because the spectrum they hold is a scarce resource with economic value. They are willing to deploy capital on technology and architectures that drive spectral efficiency because they have to pay for additional spectrum they acquire. The goal should be for public safety networks to be designed to achieve the LTE spectral efficiencies found in commercial mobile provider LTE networks, i.e. currently a minimum of approximately 1.5 bps/Hz/sector, and with more advanced Multiple Input Multiple Output (MIMO) antenna configurations achieving values as high as 2.4 bps/Hz/sector.[3] In order to do so, incentives should be created for public safety networks to be deployed and evolved with the same range of sophisticated dynamic sharing techniques as are used by commercial mobile providers with the goal of getting the most capacity out of the spectrum available.

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[3] Rysavy Research, Transition to 4G, at 55 (Sept. 2010), it is important to recognize that commercial mobile wireless providers have long deployed dynamic spectrum sharing technologies in their networks to achieve more efficient and productive use of spectrum among the millions of subscribers they serve. Indeed, the Commission has already recognized that mobile wireless providers deploy cognitive radio http://www.rysavy.com/Articles/2010_09_HSPA_LTE_Advanced.pdf ("Rysavy Transition to 4G").

5. **Assuming that the D Block should be reallocated public safety, in the largest-scale emergencies, will 20 megahertz be enough? How much spectrum would be needed for "day-to-day" operations, both for the densest urban environments, as well as for rural environments?**

The demands on a public safety network depend on the needs of the local public safety organizations, the populations they serve, the geography of the service area, the kinds of applications they intend to employ, the cost of deployment, and how effectively they utilize their existing spectrum allocations. 20 MHz is likely to be sufficient for day-to-day public safety communications, even in urban areas. However, in certain emergency scenarios, even 20 MHz may be inadequate and it is in those situations that the ability of public safety users to roam, with priority access, on commercial networks becomes critical. In addition to providing this ability to flexibly expand public safety's capacity, the ability to operate on commercial networks would also enhance the resiliency and reliability of public safety broadband operations by making capacity available on different networks with different points of failure from each other and from the core public safety network. It is critical to note, however, that these benefits are only available under a framework that promotes interoperability of commercial and public safety devices across the 700 MHz band.

There may be substantial variation across jurisdictions and between urban and rural areas. Given the nature of public safety and the number of users compared with commercial networks, it is also reasonable to expect that the relationship between peak demand experienced in emergencies and non-peak demand will be very large. This argues for two important features, regardless of how much spectrum is allocated for the network. First, as noted previously, priority roaming onto commercial networks should be available to address high demand situations; and second, provision should be made to share excess capacity with commercial operators when the network is experiencing non-peak levels of demand. Development of this capability must be a high priority.

6. **Some public safety entities have plans to deploy 700 MHz public safety broadband networks, based on waivers granted by the FCC. How can we make sure that such networks become integrated with a future, nationwide network, without impacting nationwide interoperability or adding costs?**

The FCC's proceeding to establish this technical framework is still pending. A number of public safety entities have argued that the FCC should not have hard and fast rules at this early stage of public safety broadband planning, that individual public safety entities should have flexibility to design systems which meet their unique needs and/or that the public safety community should not be forced to bear this financial risk. We recommend that Congress provide for continuing Federal oversight of public safety technical requirements and standards, especially requirements intended to assure nationwide interoperability.

7. **If Congress reallocates the D Block to public safety, how much of this additional spectrum will public safety need right away? If Congress decides to auction the D block, what is the timeframe by which public safety's spectrum needs will grow so as to need the full 20 megahertz of spectrum? Should the 20 megahertz be fully demanded and utilized by public safety, couldn't most or all of public safety's existing 12 megahertz of 700 MHz narrowband spectrum be repurposed for broadband at that time?**

It depends on whether spectrum effciency and other technical framework guidelines are adopted and importantly whether they are enforced. If they are not rigorous or not enforced, there will be strong incentives from a cost savings standpoint for public safety to develop the types of high site RAN networks (i.e. conventional public safety network architectures) which require less infrastructure and use spectrum resources less efficiently. Under this scenario the entire 20 MHz could be "needed" almost immediately. With spectrum-efficient design and construction of a shared network, the FCC's analysis concluded that the 20 MHz (or at present even 10 MHz) would give public safety substantial excess capacity in all areas except in emergency situations, which will tend to apply for a limited amount of time in specific geographic areas. In those instances, as mentioned previously, 20 MHz will not be enough and it becomes critical that priority roaming access be available, supported by a 700 MHz device interoperability requirement.

We have not made a detailed study of the considerations involved in repurposing the 700 MHz narrowband spectrum. However, it is immediately adjacent to the broadband allocation and thus would be a logical resource for augmentation of the existing block should a phased growth approach be adopted. This is an instance where clear policy direction would be beneficial since some standards and technology development will be required to accomplish this repurposing and this work should commence right away. Also, public agencies utilizing or planning to utilize this spectrum for narrowband purposes would need appropriate consideration from a transition perspective.

8. **If the D Block is reallocated to public safety, how can we ensure that devices capable of operation across the D Block and the public safety broadband spectrum, referred to as "Band Class 14," are made available for public safety use, and at prices reflective of commercial economies of scale?**

See the second part of the answer to question 1 for a discussion of the importance of interoperability across the paired 700 MHz band classes. Expanding on that answer, the key to device availability, choice, and cost effectiveness, is a shared ecosystem with sufficient scale. Part of the solution is for that shared ecosystem to embrace the entire 700 MHz band. The second part of the solution is to foster commercial use of band class 14 through arrangements that allow commercial operators to leverage the excess capacity of the public safety broadband network. Joint commercial/public safety use of band class 14 networks will ensure that public safety benefits from the much larger base of commercial users which drives innovation, standards development, and cost effectiveness.

9. What is the best way to ensure that individual public safety agencies have a role in developing the network, while also ensuring uniformity in deployment, nationwide interoperability, economies of scale in equipment costs, and otherwise keeping the overall process as efficient as possible?

There is a level of uniformity under the structure for standardization of infrastructure and device requirements which works for the commercial provider industry. In the case of public safety, the value of this type of uniformity should be paramount. The FCC's Emergency Response Interoperability Center is one model for multi-party coordination in planning the network, including input from a wide range of public safety agencies and representatives and there could be others. We strongly support the establishment of a binding techical framework to guide the design, build out, operation, coordination of co-channel and adjacent channel frequency uses, the prevention of harmful interference to other frequency uses and the periodic upgrades of technologies.

Within a national standards framework that provides for necessary uniformity, local needs must also be addressed. Public/private partnerships, *defined at a regional level*, would provide greater responsiveness to individual public safety agencies.

10. To what extent does public safety utilize commercial wireless networks to meet their communications needs, including for broadband communications? How much does public safety spend for commercial wireless service? What has been the experience with using commercial services? Please cite to a few specific examples.

U.S. Cellular has many public safety customers and it is our understanding that the services of the commercial wireless industry are widely used by public safety agencies throughout the country. U.S. Cellular does not have data on the total public safety spend for commercial wireless services. We would defer to the public safety agencies in relating their experience with commercial services, though we appreciate that one driver of the public safety broadband network is the need for a network designed, built, and operated with greater levels of resiliency and redundancy than are present in any individual commercial network. It is for this reason, among others, that we support the creation of a public safety broadband network built to those standards. It is also our belief that experienced commercial operators are best positioned to build and operate such a network for public safety, subject to public safety control of emergency definition and priority access registration. Furthermore, the goal of a maximally resilient network is advanced by leaps and bounds when the capabilities of multiple, separate wireless networks are available as part of an expanded and fully interoperable, multi-carrier priority roaming arrangement. Even the most robust public safety network is still only a single network and it will have points of potential failure and vulnerability that can be mitigated if a backed up by multiple commercial networks with separate towers, nodes, and points of failure.

June 24, 2011

The Honorable Greg Walden
Chairman
Subcommittee on Communications and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Walden:

Thank you again for inviting me to testify at the Subcommittee on Communications and Technology's May 25, 2011 hearing entitled "Creating an Interoperable Public Safety Network."

I also appreciate the opportunity to respond to Subcommittee Members' additional questions as shared in your letter of June 10, 2011. Enclosed are my responses to those questions. Please let me know if I can be of further assistance to you or the Subcommittee as you continue your work.

Respectfully,

Paul Steinberg
Chief Technology Officer

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The Honorable Greg Walden – Question 1:

Congress has provided billions in federal funding over the last decade as well as approximately 100 MHz of spectrum for the exclusive-use of public safety. Where have those resources gone? What worked, what didn't, and why?

Congress has provided much needed support over the past decade to address a number of key issues hampering public safety interoperable communications.[1] This support has taken the form of federal funding programs, linkage of grants to industry-developed standards, and new spectrum allocations (e.g., 700 MHz spectrum). As a result of this multi-dimensional approach, 36 States now have shared statewide radio systems supporting multiple State, local and Federal agencies, and more are planned. 27 of these statewide systems are compliant with the Project 25 standard. There are also 165 local Project 25-compliant systems that have been implemented to date. In all, at least 70% of the population has public safety Project 25 coverage today. Congress should continue to build on this progress, but as it moves forward to address new broadband capabilities for public safety, it is particularly important to avoid repeating the process of fractured piecemeal spectrum allocations. Public safety has had no choice but to work with the spectrum resources they have been provided, but this approach does not work well for achieving interoperability.

Sufficient Compatible Spectrum is Essential for Interoperability

The approximately 100 MHz of spectrum currently held by the public safety community is scattered across the 30 MHz, 150 MHz, 450 MHz, 700 MHz, 800 MHz and 4.9 GHz bands. As shown below, each of these bands has been made available for use at different times in history.[2] Most of public safety's spectrum holdings are small slivers of spectrum as opposed to contiguous blocks that can be used for next generation broadband networks. First responders cannot always communicate with each other as units from one department might have radios on one portion of the spectrum while units from a neighboring department or jurisdiction might be on a totally different portion. Over the past 60 years, each time the FCC opened up more spectrum for wireless communications, public safety was given another sliver of spectrum in the new band and never enough to consolidate its communications into a single band segment. As summarized in a recent whitepaper by Andrew M. Seybold, a well-respected wireless industry analyst, "[T]here has never been an allocation of enough spectrum in a common radio band to permit all

[1] In 2003, the National Task Force on Interoperability outlined key issues hampering emergency response wireless communications -- incompatible and aging communications equipment, limited and fragmented budget cycles and funding, limited and fragmented planning and coordination, limited and fragmented radio spectrum, and limited equipment standards. National Task Force on Interoperability, Why Can't We Talk? February 2003. This report may be found at: http://www.safecomprogram.gov/NR/rdonlyres/322B4367-265C-45FB-8EEA-BD0FEBDA95A8/0/Why_cant_we_talk_NTFI_Guide.pdf

[2] Note that the relative magnitude of the number of licensees among the various bands does not necessarily equate to a similar comparison in the number of users because the prevalent licensing structure is not the same across the various bands. For example, the 700 and 800 MHz bands support a higher concentration of trunked systems shared across multiple agencies than the UHF and VHF bands. Accordingly, a given license in the 700 MHz band will tend to support many more users than a license in the VHF and UHF bands.

of the various Public Safety agencies to migrate to a single portion of the spectrum and be able to interoperate between all agencies." [3]

The following chart summarizes the current limited and fragmented public safety spectrum environment.

Public Safety Band	Amount of Spectrum	First Available for Use	Number of licensees[4]	Comment
25-50 MHz	6.3 MHz	1940s	Approx 17,000	-Physics make this band interference-prone and it has limited equipment availability
150-174 MHz	3.6 MHz	1950s	Approx. 80,300	-High coverage per site especially beneficial in rural areas
450-470 MHz	3.7 MHz	1960s	Approx. 29,900	-Undergoing Narrowbanding
470-512 MHz	Available only in top 11 metros; Amount varies by market	Early 1971	Approx. 2800	-Undergoing Narrowbanding
700 MHz Broadband 763-768/793-798	10 MHz	Most deployment awaiting completion of policies & rules	One nationwide license issued to the PSST	-FCC has granted 22 conditional waivers -Grantees with funding are in process of deploying
700 MHz Guardband 768-769/798-799	2 MHz	N/A	N/A	-Part of the PSST nationwide license; Helps minimize interference to Narrowband 700
700 MHz Narrowband 769-775/799-805 MHz	12 MHz	Band cleared nationwide June 2009; some pockets of use earlier where no TV incumbency	Approx. 400, incl. one for each state	-Major systems in place and building -Location in spectrum enables 700/800 Mhz band interoperability
806-824/851-869 MHz	9.5 MHz	3.5 MHz- avail mid 1970s; remaining 6 MHz avail. Late 1980s	Approx. 10,000	Supports major statewide and regional multi-agency systems
4940-4990 MHz	50 MHz	Mid 2003	Approx. 2200	The location in the spectrum makes this 50 MHz dissimilar from other public safety bands; it requires too many sites to be cost effective for wide-area mobile use but can be beneficial for Fixed use, e.g., backhaul for broadband systems.

[3] Public Safety Voice Interoperability, Andrew M Seybold, CEOP and Principal Consultant, Andrew Seybold, Inc. June 2, 2011
[4] Source: FCC Data Base.

While improvements in technology and spectrum efficiency have occurred over time, the increasing demand for more public safety communications capability has outpaced technology improvements. In the commercial world, technology improvements are made, but additional spectrum is still required, as evidenced by the initiative to find 500 MHz of additional spectrum for commercial mobile broadband to be added to the approximately 500 MHz already available. Therefore, it should not be surprising that public safety will also need additional spectrum to support a viable nationwide interoperable broadband network.

Industry-Developed Standards Have Been a Critical Enabler

Adherence to industry-developed standards is another key element that works to help make interoperability a reality at the level for which the standard is applied. If a particular standard is required nationwide, e.g., through an FCC requirement, it helps form the foundation for nationwide interoperability.

However applied, standards-based equipment provides emergency response agencies the flexibility to select equipment that best meets their unique technical requirements and budget constraints. The Project 25 (P25) standards have been developed by the public safety users, working in cooperation with the manufacturers, and are published by the Telecommunications Industry Association (TIA). Project 25 has been supported by most public safety user organizations and has also received support at the federal level from agencies such as the Department of Defense, the Department of Homeland Security (DHS), and the Federal Communications Commission (FCC) for selected bands.

Continued support for P25 in the major Federal law enforcement and emergency management agencies, the FCC, and Congress is important because many States are in the process of upgrading their statewide systems to modern digital P25 technologies and the Federal support for the standards have had an important impact on State and local procurement decisions. Motorola has supported this standard as a user-driven initiative, consistent with our belief that the real users of this public-service technology should be part of specifying the solution.

Grant Funding Is Essential But Must Be Deployed Strategically

Given the funding challenges faced by State and local governments, the grant funding provided by Congress has been critical to seeding interoperable communications systems across the country. At the same time, given the limited availability of grant dollars, the grant guidance for these programs has been critical to ensuring that this funding is leveraged effectively and reflects a comprehensive approach to interoperability, one that includes not only a technological solution but also planning and training. A good example of strategic leveraging of federal grant funding is NTIA's Public Safety Interoperable Communications (PSIC) Grant Program which required as a condition of receiving funding that all States align their investments to a DHS-approved Statewide Communications Interoperability Plan (SCIP).

Substantial Progress Has Been Made in Achieving Nationwide Mission Critical Voice Interoperability

Public safety radio systems were historically built and operated by single agencies for their own users. There has been a clear trend towards public safety system consolidation, with radio networks developed to cover and serve multiple agencies across large counties, regions, and even states. A key enabler that has worked to improve interoperability is the existence or planned deployment of statewide or regional public safety networks.

Many States are striving to achieve the technical, operational, and financial advantages gained by combining multiple State and local agencies onto a common shared radio system. As noted above, 36 States now have shared statewide radio systems, 27 of which are P25-compliant, and there are another 165 P25-compliant systems that have been implemented at the local level. Many other systems are currently being planned at both the State and local level.[5] In all, at least 70% of the population has public safety P25 coverage today.

Nationwide assessments by DHS provide strong evidence of progress for interoperable emergency communications. For example, Congress required DHS to develop the National Emergency Communications Plan (NECP) as a strategic plan that sets goals and identifies key national priorities to enhance governance, planning, technology, training and exercises, and disaster communications capabilities. Such leadership is an important element in setting the foundation for improved interoperability. The NECP provides recommendations, including milestones, to help emergency response providers and relevant government officials make measurable improvements in emergency communications over the next three years. To measure progress, strategic goals were established, including an initial goal that by 2010, 90 percent of all high-risk urban areas designated within the Urban Areas Security Initiative (UASI) would be able to demonstrate response-level emergency communications within one hour for routine events involving multiple jurisdictions and agencies. Response-level emergency communications[6] were consistently demonstrated for routine events, technology capability was adequate, and equipment functioned well when used as documented in Standard Operating Procedures.[7]

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[5] A good synopsis of the progress that has been made by States in achieving interoperability can be found in this Homeland Security Today article: http://www.hstoday.us/single-article/recent-disaster-responses-demonstrate-big-leap-in-emergency-communications-officials-say/15b53bf93ac2e1494e28f0e0ba8a168a.html.

[6] Response-level emergency communication refers to the capacity of individuals with primary operational leadership responsibility to manage and make timely decisions during an incident involving multiple agencies, without technical or procedural communications impediments.

[7] Emergency Response Council November 2010 Meeting Report, NECP Goal 1 Observations Discussion https://ercmeeting.com/DHS/docs/SAFECOM_November_2010_ERC_Meeting_Report_Final.pdf

The Honorable Greg Walden – Question 2:

First Responders are currently planning to use 10 MHz of spectrum for broadband out of the 24 MHz the DTV legislation already cleared. What can be done today with 10 MHz of broadband spectrum? Might it not be enough in the short term, until public safety can also migrate the rest of the 24 MHz for broadband, especially since there are only 2-3 million First Responders as compared to tens of millions of commercial users?

It is possible to initiate broadband service with 10 MHz of spectrum, as the requests from waiver grantees have demonstrated. With this 10 MHz of spectrum, it is possible to provide some video functionality, for example, but there is substantial improvement in the amount and quality of video that can be supported at a public safety incident with 20 MHz as opposed to only 10 MHz of spectrum.[8] We believe specifying only the 10 MHz in the waiver requests was influenced more by understandable FCC reluctance to grant a waiver in the D block while the issue is being deliberated in Congress, rather than a determination that public safety did not ultimately require the full 20 MHz including the D block. Also, we expect the benefits public safety will see from broadband will cause increased demand for additional spectrum capacity and such demand will increase at a faster rate than the combined time needed to have viable mission critical voice on broadband and to migrate systems already being built in the 700 MHz narrowband spectrum out of the band.

As noted in the response to Question One, a key contributor to the interoperability problems public safety faces today is that too short a horizon was considered when spectrum allocation decisions were made, which resulted in succesive fractured spectrum allocations over time.

Market researcher Nielsen indicates that the amount of data used by the average smartphone user has surged by 89 percent in the last 12 months. The company says the distribution of data consumption is "even more shocking," as data usage by the top 10 percent of smartphone users is up 109 percent while the top one percent skyrocketed by 155 percent. FCC Chairman Genachowski and industry forecasters are predicting a 35-fold increase in mobile broadband traffic in the next five years. Similarly, we would expect public safety usage and capacity needs to expand as well.

For broadband, we have an opportunity to learn from past public safety allocation approaches and take a more strategic path at the outset of broadband deployment that provides sufficient spectrum to meet both current and expected future growth all in the same band. Should the needs of public safety be relegated to a lower priority and the D block auctioned, the result would again lead to piecemeal spectrum blocks in different bands and broadband interoperability would be hampered from the outset.

Determining the amount of spectrum required involves many other factors in addition to the number of users. There are fundamental differences in operational requirements between public safety and commercial users that impact the spectrum required. For example, key factors include: (1) the demand from each user; (2) the number of users that are concentrated in a given sector of a cell, i.e., not just the aggregate users over the entire country; (3) the mix of applications needed, e.g., how much is full motion video, how much is a still image, how much is data, etc.;

[8] Motorola Ex Parte presentation, pp. 4-14, WT Docket 06-150 and PS Docket 06-229, April 12, 2010.

(4) the quality of video needed when it will be used for evidentiary purposes versus that for casual consumer use; and (5) the margin of safety needed to guarantee public safety sufficient capacity when a major incident occurs. Because of these critical and unique factors, the requirements for public safety exceed those of individual members of the public. In addition, the uplink/downlink ratio of information transfer required for public safety is expected to be different from consumer use.[9]

As noted above, there are fundamental differences between the operational requirements of public safety and commercial users/consumers. For example, the location and time where and when additional capacity is needed to serve the general public is generally known in advance, e.g., at a sports stadium, shopping mall, etc. and commercial carriers can plan their system accordingly.

In contrast, public safety agencies cannot predict where, when, and how severe an incident will be. Incidents requiring response from a high concentration of public safety first responders can occur anywhere and at any time. These are also the locations and times when the most traffic is generated and the most information is needed to ensure the safety of every officer, firefighter, emergency medical professional, SWAT team member, etc. that responds to the incident. When an incident occurs, an increase in use by the general public will often occur at the same location where public safety's communications capacity requirements are also extremely elevated. The result is an over-taxed commercial system which cannot adequately accommodate both sets of users.

Therefore, a key success factor is to provide sufficient broadband capacity to serve these first responders wherever and whenever an incident occurs. This is one of the reasons that public safety today does not rely on "priority" over a commercial system as a viable substitute for a dedicated public safety system.[10]

Public safety also uses its networks differently. Public safety routinely shares information in real time across a group of officers, firefighters, etc. For current voice systems, this is known as a 'talk group'. In a city this could be 40 to 100+ officers in a constant "conference call." Translating that to broadband will mean real-time sharing of data or video among a similar group of responders. This is in contrast to commercial sysetms on which most traffic from the general public is between two people or between one individual and the Internet. On a system based on commercial technology, traffic flows between a user and the nearest cell. Real time group sharing like that, routinely done as part of public safety operations today for safety reasons, will require resourcing a link from each member of the group to/from the cell site.[11] This is in contrast to today's public safety voice systems which can use one voice channel resource to support a conversation among all the members in a talk group as long as they are communicating through the same cell.

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[9] Motorola Ex Parte presentation, pp. 4-14, WT Docket 06-150 and PS Docket 06-229, April 12, 2010.

[10] See *Subject To Debate*, a newsletter of the Police Executive Research Forum (PERF), Vol. 24, No. 3, March 2010.

[11] There are capabilities under consideration in 3GPP LTE standards, notably eMBMS (enhanced Multimedia Broadcast Multicast Service), that have the promise of enabling improved efficiency for group communications.

Another difference between typical public safey and consumer use is uplink versus downlink or information generated by an officer versus information sent to an officer from a dispatcher or headquarters. Most carriers are intentionally designed to dedicate most of the capacity to downloading rather than uploading information because that matches typical consumer patterns. The reverse is often true for public safety. For example, sending video from a scene to other officers is often more important than receiving video. Typical ratios for public safety may be 1:1 or even 1:2 with twice as much uplink.

The Honorable Greg Walden – Question 3:

Public safety users have an allocation at 4.9 GHz. How should public safety be using this spectrum as part of a broadband solution?

The spectrum allocation at 4.9 GHz can be beneficial for fixed use -- point-to-point operations that are part of the backhaul functions needed to connect base transmitter sites (called eNodeB's in LTE) to the core locations that provide control functions for the 700 MHz public safety broadband interoperable network. Significant amounts of backhaul will be needed as the system is deployed nationwide, which will require funding to lease microwave or fiber links. The 4.9 GHz spectrum is a resource that can be used to support portions of that backhaul requirement to reduce those lease costs.

The 4.9 GHz spectrum is not a substitute for the additional 700 MHz band capacity provided by the D block. For mobile communications, when all other factors are equal, the higher the spectrum, the shorter the coverage extends from the center of the cell site. The 4.9 GHz band spectrum is simply not suitable for wide-area network use because it requires far too many sites to be cost effective for wide-area mobile use. Substituting the 4.9 GHz spectrum for the D block would require a drastic increase in funding required to deploy and maintain a public safety nationwide broadband network.

An examination of the current public safety uses at 4.9 GHz underscores its suitability for fixed point-to-point use. FCC records indicate approximately 2200 licenses have been granted in the 4.9 GHz band. Approximately 20 percent of these licenses are being used to authorize deployment of 1384 point-to-point sites, 66 percent of which are already constructed according to FCC records.[12]

No information is available in the FCC data base regarding the status of the remaining 80 percent of the licenses. Note that for fixed point-to-point operations, FCC rules require a jurisdiction to get licenses for specific sites and give the jurisdiction 18 months to submit construction notifications. For "mobile" licenses, e.g., ones that would allow communications between a police car and a hotspot, there is no specific site info and no construction requirement; each jurisdiction gets a license for the full 50 MHz over the area of their jurisdiction.

While there have been some hot spot uses of the 4.9 GHz band for video surveillance and temporary communications at pre-planned events, the band is currently regarded as much more appropriate for current and future fixed backhaul use and, in fact, that is how it is being used.

[12] 4.9 GHz license statistics cited are as of June 1, 2011.

The FCC has even upgraded fixed broadband use in the band to co-primary status rather than secondary status as required in the original 4.9 GHz rules.[13]

If the 4.9 GHz band capacity exceeds that required by public safety, eligibility in the band could be expanded for other compatible uses. For example, 4.9 GHz continues to be seen as a way to handle various transportation applications, including cameras along highways to monitor road conditions and weather, real-time feeds to websites for traffic management, and links to programmable message signs along the roadway. These applications and the importance of 4.9 GHz for transportation applications were recognized at an FCC workshop earlier this year.

Also, utilities are increasing their advocacy for access to 4.9 GHz spectrum. They see it as suitable for automatic meter reading, video surveillance on towers and for power generating stations, and for controlling flood water pumps among other applications. Utilities are seeking eligibility to gain access to 4.9 GHz spectrum on a co-primary basis with public safety. They have filed comments before the FCC to this affect. Other markets where 4.9 GHz could prove useful include universities, stadiums, ports, customs and borders.

Given the need for backhaul to support the public safety broadband interoperable network, as well as other uses noted above, we believe the 4.9 GHz band will be much more heavily used going forward.

The Honorable Greg Walden – Question 4:

Some have criticized the public safety equipment community for using a narrow definition of interoperability. How do you define interoperability and would your definition permit seamless use of competitors' public safety radios with your company's network elements?

Motorola Solutions supports the definition of interoperability developed by SAFECOM, that has since been proposed for incorporation into the FCC's rules. SAFECOM defines interoperability, in relevant parts, as: "the ability of emergency responders to work seamlessly with other systems or products without any special effort. Wireless communications interoperability specifically refers to the ability of emergency response officials to share information via voice and data signals on demand, in real time, when needed, and as authorized."[14]

This definition has been vetted by the broad range of public safety experts who are members of SAFECOM and, therefore, should represent the operational requirements public safety views to be most appropriate.

Motorola Solutions tests the interoperability of P25 systems as required by the P25 Compliance Assessment Program (P25 CAP). Public results of interoperability testing can be downloaded from the FEMA Responders Knowledge Base (RKB) website -- https://www.rkb.us/. To date,

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[13] See Amendment of Part 90 of the Commission's Rules, *Report and Order and Further Notice of Proposed Rulemaking,* WP Docket No. 07-100, 24 FCC Rcd 4298 (2009).

[14] See http://www.safecomprogram.gov/SAFECOM/interoperability/default.htm

Motorola Solutions' P25 systems have shown successful interoperability with ten different P25 radio manufacturers.

In some cases, our public safety customers identify operational needs that are outside the scope of the P25 standard. As a leading edge manufacturer, it has been Motorola Solutions' practice to develop innovative products that respond to these market demands. Indeed, Motorola Solutions invests more on research and development than any direct competitor – about $1 billion per year.[15] It is also important to recognize that any additional features or functionalities added to P25-compliant equipment in no way impacts interoperability and, therefore, does not render the equipment "proprietary." They only give public safety users additional capabilities to allow them to do their jobs more safely and effectively. While it may be the case that users are unable to obtain equipment with similar functionality from other manufacturers, that tradeoff is simply part of the decision that the user makes in choosing what equipment to purchase. It is no different than in the commercial market – for example, cellular handsets from different manufacturers can operate on a given carrier's network and handsets from one carrier can roam onto another carrier's network, but users typically choose which handset to purchase based on the innovative features and applications they offer. It would be a disservice to the public safety community to stifle innovation and limit their equipment choices.

The Honorable Greg Walden – Question 5:

How much would a nationwide, interoperable public safety network cost to construct? How much would be needed annually for operations and maintenance?

In May 2010, the FCC released "A Broadband Network Cost Model," OBI (Omnibus Broadband Initiative) Technical Paper No. 2,[16] in which it estimates that the total capital expenditures for building out a nationwide public safety broadband network would be approximately $6.5 billion over a 10-year period. This is based on a number of assumptions that are detailed on page three of the FCC's paper. Motorola agrees with the FCC's assessment of construction costs based on current assumptions and known information.

Funding will also be needed for annual operations and maintenance, as well as to "refresh and update" the network to keep pace with commercial deployments. The FCC estimates on page four of the paper that operating costs of the network will reach approximately $1.3 billion per year by the tenth year of construction. While it is difficult to predict operating, maintenance and upgrade costs at this early stage when the network is not yet built, Motorola Solutions views the FCC's assessment to be directionally correct.

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[15] Motorola Solutions, Inc. 2010 Annual Report at p. 3.

[16] This paper may be found at: http://transition.fcc.gov/pshs/docs/ps-bb-cost-model.pdf.

The Honorable Greg Walden – Question 6:

What can we do to reduce the cost of the public safety network?

The FCC's $6.5 billion cost estimate, as noted in response to the previous question, is based on a number of assumptions, many of which involve leveraging existing commercial infrastructure. We agree with this approach as a way of substantially reducing the construction costs of the nationwide public safety broadband network. In addition to hardening and reusing commercial antenna sites, other ways of reducing construction costs include increased sharing of public safety land mobile radio sites, reuse of fire houses and municipal facilities for site location and fiber connectivity.

Notably, there is a distinction between using the commercial network and having a dedicated public safety network in which sites required are obtained by utilizing both commercial and land mobile sites. Using the commercial network alone opens public safety to the problem of an overtaxed system when an incident occurs and both public safety and consumer traffic demand significantly increases. Using a dedicated public safety network ensures the capacity is all available for public safety; sharing towers or other antenna structures helps save costs, but does not impact capacity.

The benefits of leveraging across existing land mobile and commercial operator sites can include shared backhaul, shared site routing and switching, shared towers, shared shelter facilities, power supplies and backup power, and shared equipment for heat and air conditioning.

On a more general level, the potential to share facilities will be dependent on the ability to reach agreements with the various agencies that control these facilities. For the reasons explained below, a directive forcing these agencies to make available all necessary facilities to a centralized nationwide authority will not be effective.

State and local entities typically have developed shared facility agreements that have been created to address the key requirements of all users. Security, interference mitigation, capacity, loading, physical requirements, operational priorities and cost sharing are key elements of most of these agreements. For example, the State of Michigan has developed a comprehensive set of requirements, based upon their experience of deploying a statewide network, that must be agreed upon in order to share state owned facilities. The State of Michigan has 17 separate requirements for tower co-location.[17]

The same situation exists in most States and regions. A Federal mandate will not consolidate access to all necessary State and locally owned facilities. Each agreement is based upon the specific needs of each individual agency. This is a key reason behind the need to engage States and regions to reach agreement on facilities and deployment based upon agreed common national conformance standards, not under a single Federal mandate. In other words, leveraging existing public safety infrastructure will be greatly facilitated by delegating most of the responsibility for procurement and implementation of the network to state and local governments.

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[17] See Michigan Public Safety Communications System Policy 4.1.17 on MPSCS Member and Non-Member Co-Location Procedure: http://www.michigan.gov/mpscs/0,1607,7-184--211275--,00.html.

Shared use of the public safety broadband network by other agencies could also help offset ongoing operations and maintenance costs while limiting any impact to capacity as long as public safety controls the prioritization. These opportunities include lower-priority government operations as well as next generation, machine-to-machine applications. Some analysts have projected that this will grow to over 15 billion devices over the next five years. A portion of these will be part of government-controlled networks. Key users and applications include:

- Water departments
- Utilities
- Traffic signals
- Parking meters
- Parking enforcement
- Animal control
- Transportation
- Security cameras
- Airport security
- Federal agencies
- Border protection

A third area of focus could be developing effective relationships with the carriers and operators to provide cost effective solutions that meet the mission critical needs of public safety. Motorola Solutions has adopted a strategy to embrace, not replace, usage of public carriers in roaming and interoperability. As an example, Motorola Solutions is forging relationships with major wireless carriers to take full advantage of carrier networks now deploying LTE and then interconnect those networks with the Private LTE networks being used by public safety and first responders.

Public and private sharing of network capabilities is based on the concept of making applications, devices and the entire user experience available to public safety no matter which network they are using. This would represent a considerable cost savings by eliminating the need to replicate capabilities that the carrier may be able to provide.

The Honorable Greg Walden – Question 7:

How long will it take to transition the public safety 700 MHz spectrum to broadband? What steps can we take to accelerate that transition?

To transition the 700 MHz narrowband spectrum to broadband use requires two key sets of activities -- one to make the broadband network "mission critical voice ready" and the other to clear the narrowband spectrum so broadband can be deployed.

If and when the 12 MHz of narrowband spectrum could be converted to broadband depends on: (1) when broadband systems could serve as a viable substitute for narowband voice systems; and (2) the timeline that would be required to relocate existing narrowband operations.

Mission Critical Voice on Broadband

Our testimony indicated a completion timeframe of eight to 10 years for development of production-grade equipment and deployment, given that additional work that must be done in the

standards body, follow-on development and testing of mission critical broadband voice solutions to meet those standards, and the need to have relatively complete broadband coverage to meet public safety lifeline voice requirements. Broadband systems will have to be able to support the voice and console features that users rely on today, over the same range, and under the same conditions. This will require LTE to support public safety features such as group call, push to talk, emergency, etc. It would also require that LTE accommodate the features necessary to implement these and other applications, similar to those defined in P25. This might include making sure public safety standardizes how short messages are transmitted or how a group call is set up in order to accommodate multiple users at the same time.

Additional factors to be considered are geographical coverage, not just population coverage, which must be as good as or better than the system it replaces; continued ability to be able to talk to neighboring jurisdictions; and, whether there is enough capacity to move users to 700 broadband, while what is currently 700 narrowband is repurposed. There would also need to be a standard developed to handle mission-critical voice over LTE, as current approaches to commercial voice over broadband are proprietary.

While some of the steps outlined above can be done simultaneously, most have to be handled sequentially. Deployment of almost ubiquitious LTE coverage, even in very rural areas that have 700 MHz and 800 MHz coverage today, will take time and money and will not be aggressively completed until practical and techical issues are resolved. The work being done by SAFECOM under their "dual path" strategy which is under development will highlight many of the challenges public safety will face during this transition. The steps outlined above could each take between two to five years. A lack of funding to implement and complete this process will add time to this estimate.

Potential Conversion of 700 MHz Narrowband Spectrum to Broadband

Assuming broadband had become a viable substitute to support mission critical voice operations, any narrowband operations would need to be relocated before the narrowband spectrum could be converted to broadband capacity. Since one 5 MHz broadband channel overlaps 400 narrowband 12.5 kHz channels, it is impractical from an interference perspective to convert narrowband spectrum to broadband without first migrating out existing narrowband operations.

As public safety experienced in the 800 MHz rebanding initiative, this takes time and funding, and in the 800 MHz case, the time has significantly exceeded that originally targeted. Rebanding was supposed to be completed in three years. So far, it has taken over five years and has cost approximately $2 billion and is still not complete.

The Honorable Henry A. Waxman – Question 1:

If the D Block were auctioned, you stated in your testimony that guard bands would be necessary between the D Block and the existing public safety broadband spectrum, with a potential cost of "billions of dollars." Why do you believe guard bands would be necessary? Why would this be any different than how commercial bands are commonly adjacent to each other? What is the basis for your opinion this would result in billions of dollars?

In the event of a D block auction, coverage holes will appear due to adjacent channel interference between D block Base Sites and Public Safety Base Sites. These interference-based coverage holes will result in unexpected and unpredictable dropped calls for first responders.

The coverage holes may appear anywhere across the broadband coverage area as radio frequency shadowing and multipath phenomenon create unpredictable coverage gaps where a user connection would become suddenly terminated. The probability of a coverage hole appearing increases as the public safety user travels toward the coverage edge of a public safety Base Site and arrives in closer proximity to a D block site. Additionally, as the D block commercial operator builds out its network to increase coverage in "hot spots" or indoor locations using microcells or picocells, the probability of a coverage gap will increase.

Users traveling within 80 meters of a D block site increase their probability of a sudden communications outage by over 20 percent and of capacity degradation by over 50 percent.[18]

Commercial carriers operating on adjacent blocks experience similar interference situations but, of course, the impact to emergency communications is more critical in most instances. In addition, public safety usage does not follow the same predictable patterns as commercial users because emergency incidents can happen anywhere and anytime. Thus, it's difficult for public safety networks to design their coverage to prevent these interference holes across the entire service area. On the other hand, commercial carriers know where their "hot spots" are and ensure that sufficient coverage and capacity are provided to those locations.

In short, disassociating the D block from the public safety broadband spectrum will result in interference scenarios similar to those experienced by public safety in the 800 MHz band. The effort to resolve the 800 MHz interference is ongoing, with significant costs involved. Under the FCC's 2004 rebanding order to mitigate interference to public-safety radio systems, Nextel was obligated to pay all costs associated with rebanding 800 MHz and broadcast TV licensees in upper bands. Under the FCC order, Sprint Nextel was obligated to pay at least $2.8 billion to fund the endeavors, but there is no cap on the costs. It can be expected that the D block licensee, or perhaps even the Government, would bear a similar financial burden to mitigate interference to public safety users in the adjacent band.

The only practical solutions to mitigating this potential interference are spectrum guard bands or co-located base station facilities between public safety and the D block networks. Assuming the guard bands would come from the commercial spectrum allocation, this would competitively disadvantage D block licensees. Any required co-location of commercial and public safety base sites effectively prohibits public safety from competitive partnerships with other 700 MHz carriers, and introduces substantial issues with coordinating the timing of deployments between

[18] Motorola Ex Parte presentation, p. 18. WT Docket 06-150 and PS Docket 06-229, April 12, 2010.

public safety needs in a given region and the commercial D block operator's budgets and operating plans.

The Honorable Henry A. Waxman – Question 2:

In your written testimony, you cite to the deployment of the Project 25 (P25) interoperability standard for public safety communications systems. How many years from inception did it take to finalize the P25 standard? How much does each P25 radio cost?

For over 30 years, Motorola Solutions has been committed to developing and supporting standards based devices and systems, further we have worked closely with the industry and standards organizations to provide insight and resources to support the process. Soon after the APCO 16 recommendations were established in 1979, Motorola used these defined features for minimal analog public safety interoperability to develop devices for our public safety customers.

When the APCO Project 25 (APCO P25) initially defined the standards for digital conventional technologies in the early 1990s, we ensured that the standard was available as an option in our radios. That initial definition was followed with the publication of the baseline standards for the P25 trunking standard. After the baseline standards were finalized in 2000, Motorola was able to offer its Federal, State and local public safety customers P25 standards-based and standards-compliant devices and systems.

Since 2003, all of Motorola's new devices and systems for our public safety customers are P25 compliant and have been available to public safety, Federal users and enterprise customers. Motorola has also been very collaborative with other P25 vendors by providing them with essential P25 open standard intellectual property and access to our state of the art test labs for certifying interoperability – all at no charge.

To help ensure backward compatibility and avoid simultaneous system obsolescence, customers can also choose to purchase features that interoperate with analog technology.

While the exact prices of Motorola Solutions' handsets is commercially sensitive, today there are over 12 suppliers offering a wide range of interoperable Project 25 (http://www.project25.org) standards based radio models tailored to meet public safety's mission specific requirements with an industry average sales price of $1,860 in 2009.[19] However, each supplier's Project 25 radio model is tailored to meet a set of specific public safety requirements for operating frequencies, protocols, ruggedness and operations in extreme conditions, high-power unit to unit communication, encryption and backward compatibility. Since public safety radios are tailored to meet public safety's needs and, due to their ruggedness and high-power design, they incorporate more materials, and are more durable and dependable, and are more expensive to develop and manufacture.

In contrast to cellular phones, public safety radios are subjected to high heat during fires, excessive moisture in rainstorms, and violent impact or crushing in a number of circumstances. Public safety radios are built and tested to military standards. Most cell phone warranties are voided if devices are exposed to moisture, whereas some public safety radios, including

[19] IMS Researched Licensed Mobile Radio – World – 2009 Report.

Motorola's, are guaranteed to perform even after withstanding 30 minutes of immersion in one meter of water.

Although the initial cost of a public safety radio is higher than a cellular phone, it pays off over time since it is not uncommon for a public safety communications system and its associated radios to be used for over ten years. In contrast, the average life of a cellular phone rarely exceeds two to three years, even without being subject to public safety's extreme operating conditions.

Public safety solutions are built as long-life solutions, both for equipment and system reliability and for maximum beneficial use of communities' capital investment and operating expenses in communications systems. Furthermore, the total cost of ownership over its lifetime is surprisingly similar to what a consumer pays to use high-end cellular devices. Considering that the unsubsidized price of a high-end smart phone is $500-$750[20] and will provide a typical consumer two to three years of use, the phone price for 10 years will cost the average consumer more than $2000, plus the added cost of accessories with each new phone. The typical consumers 10-year high end phone cost is in the same price range as a single Project 25 radio that will typically last a public safety user that same 10-year period.

Additionally, economies of scale play a role in the price of public safety radios. The volume of cellular handsets purchased in the US in 2009 was approximately 184 million units, and the total number of cellular devices purchased in the US over the past decade easily surpasses one billion units. In recent years, the average volume of public safety Project 25-capable radios purchased in the U.S. has been about 300,000 units per year. This volume is further fragmented with significantly different models optimized for specific missions such as firefighters, SWAT teams, or police officers on motorcycles. The lower volume of public safety radios, in addition to the more costly mission critical design, means the development and manufactured costs of public safety radios exceeds the costs of consumer handsets.

We are unable to provide the kind of product-specific cost information requested since this information will become a part of the public record and is competitively sensitive, but we would be happy to discuss this further with you in a private meeting.

The Honorable Henry A. Waxman – Question 3:

What non-P25 proprietary systems has Motorola marketed in the past?

Prior to completion of the P25 and APCO 16 standards, Motorola offered a proprietary trunking network to public safety users. We have offered radios that would allow the users to migrate from proprietary trunking systems to standards-based systems. Similarly, as with pre-standards voice systems, Motorola offered proprietary mobile data networks.
Motorola has developed and deployed commercial networks that were proprietary starting with the Nextel iDEN network as well as other digital commercial networks directed primarily at non-public safety use.

[20] Apple unlocked iPhone pricing June 2011.

We fully support the P25 standard and the ability to certify subscribers from multiple vendors on infrastructure from multiple vendors. We submit our equipment for third party testing and we make our systems available for other vendors to test their equipment.

The Honorable Henry A. Waxman -- Question 4:

In his testimony, Dr. Martinez states that interoperability "should be the capability for public safety organizations to procure the building blocks of the network and devices that are interchangeable and can be used together regardless of brand or network location." Do you agree with this statement, and is this reflective of the equipment Motorola is presently marketing to public safety for public safety broadband networks? If not, how would you define interoperability?

In our view, the correct definition of interoperability is driven by public safety user requirements, not by any particular vendor's view on equipment. Motorola Solutions supports the definition of interoperability developed by SAFECOM that has since been proposed for incorporation into the FCC's rules. SAFECOM defines interoperability, in relevant parts, as: "the ability of emergency responders to work seamlessly with other systems or products without any special effort. Wireless communications interoperability specifically refers to the ability of emergency response officials to share information via voice and data signals on demand, in real time, when needed, and as authorized."[21]

This definition has been vetted by the broad range of public safety experts who are members of SAFECOM and therefore, should represent the operational requirements public safety views to be most appropriate.

Motorola Solutions tests the interoperability of P25 systems as required by the P25 Compliance Assessment Program (P25 CAP). Public results of interoperability testing can be downloaded from the FEMA Responders Knowledge Base (RKB) website -- https://www.rkb.us/. To date, Motorola Solutions' P25 systems have shown successful interoperability with ten different P25 radio manufacturers.

For broadband, Motorola Solutions has stated on the record with the FCC that it will comply with LTE standards and interoperability requirements imposed on public safety through waiver conditions or rules. It is also important to understand what "interchangeable" may mean in this context. While public safety is moving into a realm where it is able to leverage highly standardized global technology for the commercial market that does not mean that all network components will be readily interchangeable. In fact, commercial carriers today do not interchange network components at every defined standard interface point and some levels of interchange have never been tested. Therefore, a broad interchangeability mandate could actually move public safety away from the commercial technology curve.

In some cases, our public safety customers identify operational needs that are outside the scope of the P25 standard. As a leading edge manufacturer, it has been Motorola Solutions' practice to develop innovative products that respond to these market demands. Indeed, Motorola Solutions invests more on research and development than any direct competitor – about $1

[21] See http://www.safecomprogram.gov/SAFECOM/interoperability/default.htm.

billion per year.[22] It is also important to recognize that any additional features or functionalities added to P25-compliant equipment in no way impacts interoperability and, therefore, does not render the equipment "proprietary." They only give public safety users additional capabilities to allow them to do their jobs more safely and effectively. While it may be the case that users are unable to obtain equipment with similar functionality from other manufacturers, that tradeoff is simply part of the decision that the user makes in choosing what equipment to purchase. It is no different than in the commercial market – for example, cellular handsets from different manufacturers can operate on a given carrier's network and handsets from one carrier can roam onto another carrier's network, but users typically choose which handset to purchase based on the innovative features and applications they offer. It would be a disservice to the public safety community to stifle innovation and limit their equipment choices.

The Honorable Henry A. Waxman – Question 5:

In his testimony, Dr. Martinez discussed the benefits of multi-sourcing. Do you generally agree that multi-sourcing could help enable best commercial practices and lead to long-term savings? Would you support legislation that directly prohibits sole-sourcing? How about single-sourcing, are there any circumstances under which single-sourcing would be appropriate?

The answer to the question of whether or not multi-sourcing enables best commercial practices may depend on the particular circumstances of the procurement. It may be the best model in a situation where a variety of different services might be needed by a particular customer. In such a case, many companies may not have sufficient expertise to provide all facets of the desired competency for that customer. However, sole-sourcing can be the most appropriate option in circumstances where, for example, a customer has a particularly unique need and utilizes a company possessing expertise directly on point.

Current procurement legislation has been time tested and generally has been found to suit the needs of the particular jurisdiction. Motorola Solutions supports existing procurement legislation at the federal, state and local levels, and believes that sole-sourcing is, and will continue to be, an appropriate procurement methodology under limited circumstance.[23] Federal, State and local governments will continue to need this flexibility.

Overly prescriptive procurement regulation could have the unintended consequences, such as delaying implementation of the nationwide public safety broadband network by, for example, interfering with the ability of state and local governments to use cooperative purchasing agreements that enable one State to take advantage of competitive pricing already negotiated by

[22] Motorola Solutions, Inc. 2010 Annual Report at p. 3.

[23] For example, the Department of Commerce's Procurement regulations applicable to grants to State and local governments identifies certain circumstances under which sole-sourcing is permissible. See 15 CFR Section 24.36(d)(4)(i).

another State. A good example of this dynamic taking place is the Western States Contracting Alliance (WSCA).[24]

The Honorable Henry A. Waxman – Question 6:

While equipment vendors endeavor to meet the unique needs presented by public safety with specialized equipment, such efforts also put public safety at a disadvantage because of the absence of commercial economies of scale that has led to remarkable innovation and reduced costs in the commercial marketplace. How can public safety leverage commercial developments in the equipment market to benefit from innovation and lower equipment costs? Does Congress or a regulator need to intervene in the equipment market to make sure it is competitive?

The public safety community, the FCC, and industry including Motorola Solutions have all fully endorsed the commercially driven Long Term Evolution (LTE) standard for deployment of the nationwide interoperable broadband public safety network. That means the system architecture and equipment will in fact leverage economies of scale driven by the commercial markets. Further, as broadband is deployed, the costs of key components of the network such as the regional cores will continue to come down. In addition, chipsets needed for public safety handset development will also enjoy economies of scale from commercial operations in the 700 MHz band, even if public safety requires some handsets that are not identical to consumer handsets.

Public safety requires the adoption of the development, life cycle and innovation cycles that make sense for them over the long term. Specifically, the rapid innovation cycles that commercial operators and consumers strive for might create premature obsolescence for public safety. Continued demand to upgrade operating systems in mobile communications is an example which makes the task of managing investments over a long cycle of use more difficult.

Since the public safety device industry agrees that the standard for public safety broadband will be LTE, robust competition in the public safety marketplace should be ensured. Moreover, since this decision has been made prior to the widespread deployment of public safety broadband systems, competitors within this market are all starting from the same vantage point. Consequently, we do not believe there is need for Congressional or regulatory intervention in order to ensure active competition.

The Honorable Henry A. Waxman – Question 7:

Assuming that the D Block should be reallocated public safety, in the largest-scale emergencies, will 20 megahertz be enough? How much spectrum would be needed for "day-to-day" operations, both for the densest urban environments, as well as for rural environments?

Many demands are placed on the emergency responders who safeguard our communities; this means the mission critical technologies our public safety officials use every day must meet

[24] Further information about public safety equipment that may be purchased under WSCA may be found at: http://www.aboutwsca.org/contract.cfm/contract/w9-2003

exceedingly high standards as well. As the sheer volume of interactions continues to increase, the challenge is to integrate all communications, applications and data to and from the public safety command center.

According to the National Emergency Number Association (NENA), in the U.S. alone, a staggering 240 million 9-1-1 calls are received by Public Safety Answering Points (PSAPs) annually across the nation and this volume of calls continues to increase.

Next generation features will introduce multimedia to current workflows. NG9-1-1, video, converged voice, messaging, and data will provide access to information leading to safer and smarter decisions and faster and more positive outcomes. However, as technology continues to transition, officials will need to assimilate, assess and integrate applications using available bandwidth for incident response.

While it is difficult to predict how much spectrum would be needed for day-to-day operations as well as large scale emergencies, if commercial data usage is any barometer, actual consumption is wildly exceeding all forecasts.[25] Similarly, we would expect public safety usage and capacity needs to expand as well.

Determining the amount of spectrum that is "enough" involves many factors. For example, key factors include: (1) the demand from each user; (2) the number of users that are concentrated in a given sector of a cell, i.e., not just the aggregate users over the entire country; (3) the mix of applications needed, e.g., how much is full motion video, how much is a still image, how much is data, etc.; (4) the quality of video needed when it will be used for evidentiary purposes versus that for casual consumer use; and (5) the margin of safety needed to guarantee public safety sufficient capacity when a major incident occurs.

For all these factors, the requirements for public safety typically exceed those of an individual member of the public. In addition, the uplink/downlink ratio of information transfer required is expected to be different for public safety than for consumer use.[26]

Expanding beyond current voice communications to video is one of the communications tools that will place demands on the spectrum because video is a much more content-rich application. A questionnaire by the Police Executive Research Forum (PERF)[27] indicated that:

- 62% plan to increase in-car video capability, up to 84 percent of their fleet;
- 61% plan to increase real-time video surveillance capability, up to 81 percent of their fleet;
- 52% of those increasing real-time video capability would use this capability on all traffic stops.

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[25] Market researcher Nielsen indicates the amount of data used by the average smartphone user has surged by 89 percent in the last 12 months, data usage by the top 10 percent of smartphone users is up 109 percent while the top one percent skyrocketed by 155 percent. FCC Chairman Genachowski and industry forecasters are predicting a 35-fold increase in mobile broadband traffic in the next five years.

[26] Motorola Ex Parte presentation, pages 4-14. WT Docket 06-150 and PS Docket 06-229, April 12, 2010.

[27] http://members.policeforum.org/library/critical-issues-in-policing-series/perfpresentation.pdf

Whether first responders are called to a barricaded suspect incident, a terrorist or bomb scare, a neighborhood shooting or other event – and whether rural or urban, Motorola Solutions believes that public safety and the American public has a need for the additional advantages that the 10MHz of D block would bring to their efforts.

To understand the amount of spectrum that various public safety agencies would use in response to an emergent incident, Motorola Solutions recently worked with a major U.S. law enforcement agency to recreate a barricaded suspect incident response analysis – while this may sound like a sensational event, these high-risk situations can be a weekly occurrence. The result of this exercise clearly indicated that the use of broadband by first-responders through aircraft video, sniper video, robots, helmet video, negotiator data, command post data, computer-aided dispatch, and additional uses, demonstrated the need for the availability of at least 20MHz of spectrum.[28]

The Honorable Henry A. Waxman – Question 8:

Some public safety entities have plans to deploy 700 MHz public safety broadband networks, based on waivers granted by the FCC. How can we make sure that such networks become integrated with a future, nationwide network, without impacting nationwide interoperability or adding costs?

The FCC has mandated that all early deployments must conform to the requirements of a national network if and when one becomes a reality. Motorola Solutions has agreed to meet such requirements with our early adopter customers.

We believe all local jurisdictions should be able to move forward now and not wait for regulations to take effect. We are doing our country a disservice by delaying our first responders' access to state of the art technology that will help save the lives of our citizens. As we mentioned above, all early adopters that are customers of Motorola Solutions will be able to conform to any and all requirements of features and interoperability based on commercial LTE standards when they are defined for the nationwide network.

The Honorable Henry A. Waxman – Question 9:

If Congress reallocates the D Block to public safety, how much of this additional spectrum will public safety need right away? If Congress decides to auction the D block, what is the timeframe by which public safety's spectrum needs will grow so as to need the full 20 megahertz of spectrum? Should the 20 megahertz be fully demanded and utilized by public safety, couldn't most or all of public safety's existing 12 megahertz of 700 MHz narrowband spectrum be repurposed for broadband at that time?

Public safety continuously finds ways that communications tools can make their operations safer and more efficient. Over time, this increased usage requires additional spectrum capacity to support public safety operations. We are at the outset of public safety use of new broadband data,

[28] For additional information, including graphs of data usage, see: http://www.motorola.com/web/Business/_Documents/Application%20Briefs/Static%20Files/Motorola_Barricaded_Suspect_Analysis.pdf.

imaging and video applications, so it is difficult to predict with certainty the timeframes involved. What we do know is that throughout history, each time a spectrum allocation was made to public safety it proved to be insufficient to sustain requirements. Additional allocations were made, but because spectrum in the same band was otherwise used by that time, each successive allocation to public safety resulted in a fractured spectrum environment that has signifiantly hampered interoperability. Because of these fractured spectrum allocations, there has never been enough spectrum in a common radio band to permit all of the various public safety agencies to migrate to a single portion of the spectrum and be able to interoperate between all agencies. If Congress does not reallocate the D block to public safety, a similar result can be expected as we all embark on broadband.

If and when the 12 MHz of narrowband spectrum could be converted to broadband depends on: (1) when broadband systems could serve as a viable substitute for narowband voice systems; and (2) the timeline that would be required to relocate existing narrowband operations.

Mission Critical Voice on Broadband

Our testimony indicated a completion timeframe of eight to 10 years for development of production-grade equipment and deployment, given that additional work that must be done in the standards body, follow-on development and testing of mission critical broadband voice solutions to meet those standards, and the need to have relatively complete broadband coverage to meet public safety lifeline voice requirements. Broadband systems will have to be able to support the voice and console features that users rely on today, over the same range, and under the same conditions. This will require LTE to support public safety features such as group call, push to talk, emergency, etc. It would also require that LTE accommodate the features necessary to implement these and other applications, similar to those defined in P25. This might include making sure public safety standardizes how short messages are transmitted or how a group call is set up in order to accommodate multiple users at the same time.

Additional factors to be considered are geographical coverage, not just population coverage, which must be as good as or better than the system it replaces; continued ability to be able to talk to neighboring jurisdictions; and, whether there is enough capacity to move users to 700 broadband, while what is currently 700 narrowband is repurposed. There would also need to be a standard developed to handle mission-critical voice over LTE, as current approaches to commercial voice over broadband are proprietary.

While some of the steps outlined above can be done simultaneously, most have to be handled sequentially. Deployment of almost ubiquitious LTE coverage, even in very rural areas that have 700 MHz and 800 MHz coverage today, will take time and money and will not be aggressively completed until practical and techical issues are resolved. The work being done by SAFECOM under their "Dual path" strategy which is under development will highlight many of the challenges public safety will face during this transition. The steps outlined above could each take between two to five years. A lack of funding to implement and complete this process will add time to this estimate.

Potential Conversion of 700 MHz Narrowband Spectrum to Broadband

Assuming broadband had become a viable substitute to support mission critical voice operations, any narrowband operations would need to be relocated before the narrowband spectrum could be converted to broadband capacity. Since one 5 MHz broadband channel overlaps 400 narrowband 12.5 kHz channels, it is impractical from an interference perspective to convert narrowband spectrum to broadband without first migrating out existing narrowband operations.

As public safety experienced in the 800 MHz rebanding initiative, this takes time and funding, and in the 800 MHz case, the time has significantly exceeded that originally targeted. Rebanding was supposed to be completed in three years. So far, it has taken over five years and has cost approximately $2 billion and is still not complete.

The Honorable Henry A. Waxman – Question 10:

If the D Block is reallocated to public safety, how can we ensure that devices capable of operation across the D Block and the public safety broadband spectrum, referred to as "Band Class 14," are made available for public safety use, and at prices reflective of commercial economies of scale?

It will be important to leverage the commercial LTE standard so that public safety can take advantage of the economies of scale for development and manufacturing of devices on a similar platform. This vision is also generally accepted by public safety agencies, commercial carriers, and other vendors.

Motorola Solutions supports this vision, and its devices are being designed to be suitable for use on the PSST block and the D Block if fully reallocated to public safety. Interoperability requirements should be defined and implemented at the device level. The Department of Homeland Security has begun to do some work in this area. Once public safety is on a standards based commercial network technology path with LTE it should attract a host of device vendors to this market. We estimate that the majority of the components for public safety devices in Band Class 14 will be the same as those for commercial LTE devices.

At the same time, the substantial difference in volume of commercial devices versus public safety devices will likely result in pricing for components used in public safety devices to be somewhat higher. Nonetheless, public safety will still derive some cost benefits from the similarities at the component level. Public safety may still require unique features, such as ruggedization, or specific function requirements such as laser scanners, finger print readers, etc., which may also result in some additional costs.

The Honorable Henry A. Waxman – Question 11:

What is the best way to ensure that individual public safety agencies have a role in developing the network, while also ensuring uniformity in deployment, nationwide interoperability, economies of scale in equipment costs, and otherwise keeping the overall process as efficient as possible?

An appropriate balance is needed between the direct responsibilities of a national governance entity and those responsibilities that should be delegated to state/local governments. Such a balance will better reflect the real world differences in operational needs from one jurisdiction to another and recognizes the essential role of State/local government in deciding how best to meet their unique public safety needs.

Decision-making authority over elements of the network such as the regional cores, sites and local applications should be delegated to state/local governments. At the same time, a centralized entity should have some level of oversight responsibility for these activities to ensure the appropriate level of consistency in network deployment across the country and to ensure that implementation activities proceed in accordance with the nationwide build-out schedule.

In addition, the centralized entity should be directly responsible for those activities related to implementation of national level components (e.g., nationwide IP backbone, common applications and services), a network evolution plan for technology and standards, and the establishment of national interoperability requirements.

The necessary governance structures to accomplish this are already largely in place in the form of a Statewide Interoperability Governing Board (SIGB) or Statewide Interoperability Executive Committee (SIEC). Among the advantages of a less centralized governance approach should be faster implementation, greater competition in the procurement process, lower costs, and increased network resiliency. Notably, fewer regional cores increases backhaul costs and vulnerability, so the full set of tradeoffs need to be recognized in deciding on an architecture approach.

The Honorable Anna G. Eshoo – Question 1:

According to FCC estimates, a typical land mobile radio (LMR) for public safety communications may cost as much as $5,000. Please provide us with an itemized list of products your company sells to public safety entities, the number of units sold since September 11, 2001, and the cost per unit of those items.

The unique mission critical operations of first responders require specific features, performance, and reliability in dedicated communications systems. First responders require technology solutions be enhanced to meet their needs – and hence, while commercial technologies may be adapted for public safety products they are not identical to the products used by civilians.

Today there are over 12 suppliers offering a wide range of interoperable Project 25 (http://www.project25.org) standards based radio models tailored to meet public safety's mission specific requirements with an industry average sales price of $1,860 in 2009.[29] Each supplier's Project 25 radio model is tailored to meet a set of specific public safety requirements for operating frequencies, protocols, ruggedness and operations in extreme conditions, high-power unit to unit communication, encryption and backward compatibility. Since public safety radios are tailored to meet public safety's needs and, due to their ruggedness and high-power design, they incorporate more materials, and are more durable and dependable, and are more expensive to develop and manufacture.

In contrast to cellular phones, public safety radios are subject to high heat during fires, excessive moisture in rainstorms, and violent impact or crushing in a number of circumstances. Public safety radios are built and tested to military standards. Most cell phone warranties are voided if devices are exposed to moisture, whereas some public safety radios, including Motorola's, are guaranteed to perform even after withstanding 30 minutes of immersion in one meter of water.

Although the initial cost of a public safety radio is higher than a cellular phone, it pays off over time since it is not uncommon for a public safety communications system and its associated radios to be used for over ten years. In contrast, the average life of a cellular phone rarely exceeds two to three years, even without being subject to public safety's extreme operating conditions.

Public safety solutions are built as long-life solutions, both for equipment and system reliability and for maximum beneficial use of communities' capital investment and operating expenses in communications systems. Furthermore, the total cost of ownership over its lifetime is surprisingly similar to what a consumer pays to use high-end cellular devices. Considering that the unsubsidized price of a high-end smart phone is $500-$750[30] and will provide a typical consumer two to three years of use, the phone price for 10 years will cost the average consumer more than $2000, plus the added cost of accessories with each new phone. The typical consumers 10-year high end phone cost is in the same price range as a single Project 25 radio that will typically last a public safety user that same 10-year period.

Additionally, economies of scale play a role in the price of public safety radios. The volume of cellular handsets purchased in the US in the year 2009 was approximately 184 million units; the

[29] IMS Researched Licensed Mobile Radio – World – 2009 Report.
[30] Apple unlocked iPhone pricing June 2011

total number of cellular devices purchased in the US over the past decade easily surpasses one billion units. In recent years, the average volume of Public Safety Project 25 capable radios purchased in the US, per year, has been about 300,000 units. This volume is further fragmented with significantly different models optimized for specific missions such as firefighters, SWAT teams, or police officers on motorcycles. The lower volume of radios that public safety procures, in addition to the more costly mission critical design of public safety radios, means the development and manufactured costs of public safety radios exceeds the costs of consumer handsets.

We are unable to provide the kind of product-specific cost information requested since this information will become a part of the public record and is competitively sensitive, but we would be happy to discuss this further with you in a private meeting.

HARRIS

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June 24, 2011

Honorable Congressman Walden
Chairman
Subcommittee on Communications and Technology

Chairman Walden,

It was a privilege to appear before the Subcommittee on Communications and Technology on May 25, 2011, to testify at the hearing entitled "Creating an Interoperable Public Safety Network." The work of your committee is of vital national interest for it is attempting to enable access for our nation's first responders, and others charged with protecting life and property, to communications technology that can greatly enhance the ability of these brave men and women to perform their critical missions.

The Committee's keen insight and thoughtful questions will continue this important discussion at the level required to realize the goal of constructing a nation-wide interoperable broadband network for public safety. It is my hope that we can be of assistance to you as your Committee continues this vital process.

To that end, attached please find responses to questions posed by Committee members. Please don't hesitate to solicit further input as your work continues.

Thank you again for the privilege of assisting you on this matter of great national concern.

Sincerely,

Dennis Martinez, Ph.D.
Chief Technology Officer
RF Communications Division
Harris Corporation

cc: The Honorable Anna G. Eshoo, Ranking Member,
Subcommittee on Communications and Technology

Attachment

The Honorable Greg Walden

1. **Congress has provided billions in federal funding over the last decade as well as approximately 100 MHz of spectrum for the exclusive-use of public safety. Where have those resources gone? What worked, what didn't, and why?**

   Over the last decade, Federal, State and Local government agencies have undertaken numerous efforts to upgrade and modernize their Land Mobile Radio (LMR) systems, as well as comply with mandates designed to increase the efficient use of spectrum. A significant influence in these efforts has been the general shift in technology from analog to digital. Harris estimates that in 2001 approximately 95% of our nation's public safety personnel used analog technology to support their primary means of voice communication. Today that number has shrunk to 50%, with digital technologies now being used to support 50% of public safety user communications. (IMS reports indicate there were approximately 0.2 million P25 users in 2001 vs. approximately 1.9 million in 2011). In tandem, additional effort has been focused on improvements to satisfy communications operability requirements faced by State and Local jurisdictions. Over the last 5 years, increased focus has been placed on interoperability, with notable progress at all government levels. For example, public safety communications systems based on the Project 25 (P25) standards are being deployed at an increasing rate. Availability and purchase of multi-band radios and IP-based networks are beginning to enable communications interoperability across the disparate bands used today in public safety.

   Undoubtedly progress has been made, but our collective goals of achieving nationwide interoperability remain elusive. Development and completion of standards has taken too long. Excessive focus on backwards compatibility vs. future interoperability has served to limit competition and reinforce outdated market dynamics. Public safety LMR systems continue to be procured on a small scale, with a resulting complex patchwork of systems that are not interconnected. This lack of interconnection prohibits the formation of a cohesive and interoperable nationwide network.

   The availability and assignment of spectrum continues to be problematic for public safety. It is true that public safety has access to nearly 100 MHz of spectrum, although half of it is at 4.9 GHz, which is not suitable for building wide area mobile broadband networks. The remaining portions are split among VHF, UHF, 700 MHz and 800 MHz, and the majority of it is licensed on a regional basis for implementation of jurisdictionally defined, narrowband LMR systems. A single 5 x 5 MHz band is currently available nationwide for broadband, subject to finalized rule making by the FCC. There are obvious benefits to band consolidation, and in the long term, public safety interoperability can be achieved by band consolidation and convergence of voice, video and data on a nationwide broadband network. Getting to this state will initially require more spectrum – such as that defined by the D-Block. Assigning this spectrum to public safety will begin the process that will ultimately enable spectrum consolidation and repurposing of narrowband spectrum, potentially reducing the overall allocation of dedicated spectrum to public safety below its current allocation.

2. **First Responders are currently planning to use 10 MHz of spectrum for broadband out of the 24 MHz the DTV legislation already cleared. What can be done today with 10 MHz of**

broadband spectrum? Might it not be enough in the short term, until public safety can also migrate the rest of the 24 MHz for broadband, especially since there are only 2-3 million First Responders as compared to tens of millions of commercial users?

A public safety network built on 10 MHz of spectrum will provide significant capability to our nation's first responders, certainly above and beyond the capabilities they have today with mixed LMR and commercial cellular networks. However, it is easy to imagine scenarios during which peak demand will exceed the capacity of this network. Large numbers of first responders who converge on a scene of incident, particularly when video is being distributed to mobile users or high bandwidth applications are being utilized (such as situational awareness) can easily overwhelm the network. It also is reasonable to expect that demand for capacity will grow over time, particularly as it becomes possible – and available – to offer converged voice, video and data services over the network.

There is, however, an important dynamic to consider – the relationship between capacity, coverage and cell density. For a given level of network capacity, a 10 MHz network will cost significantly more to deploy than a 20 MHz network, when that 10 MHz network requires a higher cell density to realize that capacity (Figure 1). The reason for this is well known in the cellular industry. Cellular technologies can be deployed in ways that provide for economic tradeoffs between capacity, coverage and cell density. Given a fixed amount of spectrum, network capacity can be increased by increasing cell density, i.e. by adding more cell towers. Cellular operators rely on this fact when they need to provide higher capacity in areas that serve large numbers of users. This business model works. Cell tower density (cost) and user density (revenue) is balanced in a financially viable manner. In order to increase network capacity, the alternative to deploying more cell towers is to provide additional spectrum. The financial model for public safety inherently is driven by tower density, and in public safety networks, tower density and user density are only marginally related, in direct contrast to commercial networks. Therefore, the question becomes not when or whether 10 MHz of spectrum is enough, but rather what cell tower density can public safety afford.

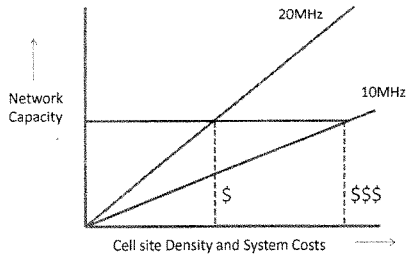


Figure 1

Even more challenging is network evolution. Starting with a 20 MHz network will enable leveraging an emerging eco-system that is investing in Band Class 14 devices and network infrastructure, bringing competition and economies of scale into the equation. If public safety starts with a 10 MHz network, and at some future date attempts to evolve it into a 20 MHz network, considerable expense will be incurred, compounded by significant complexity.

As a further consideration, the nature of public safety communications differs markedly from commercial networks. Hence, it is difficult to compare public safety's use of spectrum on the basis of number of users per MHz of bandwidth. Commercial networks predominantly operate on a "best effort" basis in order to provide comparable service to all commercial users. In these networks, cell densities are deployed in accordance with expected/desired traffic conditions. Therefore, cell densities often are based on capacity requirements and not simply to provide a given level of coverage.

In contrast, public safety communications networks are designed to provide relatively high Grade of Service (GoS) to first responders, with a variety of priority and preemption mechanisms to manage peak load during high capacity demand that occurs when a large number of users are responding to localized events. Tower densities in these networks are implemented to achieve a required level of coverage, which may vary based on terrain, land use (urban, rural, forest, etc.) and the degree to which in-building coverage is required. Seldom, if ever, are tower densities related to capacity. By its very nature, emergency response may be necessary anywhere – and the number of users responding to an incident may have no bearing on population density in the area. Thus the practice in public safety is to provide baseline capacity across entire jurisdictions. Cost is minimized by minimizing the number of tower sites.

For all reasons stated above, the most economical path forward for public safety is to begin with a 20 MHz network in a contiguous band. A 20 MHz network will also facilitate a higher degree of convergence (voice, video, and data), which at some future date may enable re-purposing of narrowband spectrum.

3. **Public safety users have an allocation at 4.9 GHz. How should public safety be using this spectrum as part of a broadband solution?**

   The 4.9 GHz spectrum is suitable to support two key applications. One is for localized communications, referred to as hot spots (similar to Local Area Networks). A second is for backhaul communications involving Point-to-Point or Point-to-Multipoint configurations. Backhaul for 700 MHz LTE networks will pose challenges to public safety that are markedly different from backhaul requirements for LMR. Spectrum at 4.9 GHz may prove important for meeting this challenge.

4. **Some have criticized the public safety equipment community for using a narrow definition of interoperability. How do you define interoperability and would your definition permit seamless use of competitors' public safety radios with your company's network elements?**

Over the last decade there has been much effort to define interoperability. The vast majority of the conversation has been from an operational perspective, leading to many viewpoints. Rather than introduce yet another operational viewpoint, we believe the problem should be viewed differently. We should draw from our experience in the commercial cellular market, in which a very high degree of interoperability has been achieved. In the commercial cellular world we can communicate with other users without regard to who provides the service, what vendors supplied the network equipment, or what subscriber devices users purchase. Comprehensive standards that enable interchangeability, implemented through multi-sourcing procurement practices make this possible. So, in its simplest rendition, interoperability is the implementation of communication networks with interchangeable building blocks, supplied by a competitive eco-system, and procured through multi-sourcing in which major building blocks are procured from more than one supplier. Sole or single-sourcing business practices common in public safety today cannot deliver these benefits.

5. **How much would a nationwide, interoperable public safety network cost to construct? How much would be needed annually for operations and maintenance?**

In the National Broadband Plan submitted by the FCC to Congress, estimates were provided for CapEx and OpEx expenditures, specifically:

- *"Using a 99% population coverage model, deployment of this network will require as much as $6.5 billion in capital expenditure in 2010 dollars over a 10-year period"*

- *"Ongoing costs, including operating expense and appropriate network improvement costs are expected to rise from zero at the beginning of FY2011 to a peak of as much as $1.3 billion per year in year 10 of the capital build program, following a substantial ramp-up that coincides with the network's expansion."*

- *"The total present value of the capital expenditure and ongoing costs over the next 10 years is approximately $12–16 billion."*

Detailed analysis of these estimates are provided in FCC OBI TECHNICAL PAPER No. 2 – "A Network Cost Model - A Basis For Public Funding Essential To Bringing Nationwide Interoperable Communications To America's First Responders."

Two key assumptions should be noted. First, coverage is based on a population model, not covered land area, which is the commonly accepted practice in public safety. Second, "An incentive-based partnership model is assumed for the estimates … under which public safety network operators will partner with commercial operators or systems integrators to construct and operate the network." In the first assumption, one would have to escalate the cost of building this broadband network in sparsely populated areas to bring it in line with coverage requirements typical of public safety networks today. At this time, we do not have independent analysis on what level of escalation is appropriate. The report further notes,

"Our analysis indicates that a stand-alone public safety network would be substantially more expensive than a network constructed under the incentive-based partnership approach. Conservatively, the stand-alone network would require at least 2.5 times more capex, excluding deployable equipment, and proportionally even more in ongoing costs. The total present value of the capital expenses and ongoing costs for the standalone network over the next 10 years is approximately $34.4 billion, taking into consideration that capex is $15.7 billion and ongoing costs are 1.5 times the total capex amount."

These estimates represent a broad range, reflecting the fact that there are many variables that will determine ultimate cost. It is also useful to compare current public safety levels of expenditures to further understand the economics. At present, Harris estimates that U.S. public safety spend is approximately $2B per year for LMR products and services, and another $1.5B per year for cellular data products and services, for an annual total of $3.5B. Over a 10-year period, apart from escalation and other factors, this equals $35B, which is commensurate with the upper range estimates for the broadband network on dedicated spectrum. Therefore, it is plausible that in the long run, a converged network providing voice, video and data will not only provide significantly more operational capability than today's status quo, it will also allow consolidated investment that is not too distant from current spend levels, or in some cases may be below those levels.

6. **What can we do to reduce the cost of the public safety network?**

There are two approaches to this issue. One is to reduce total cost of ownership (CapEx +OpEx) and the second is to share costs. With respect to total cost of ownership, we maintain that it is essential to force competitive business practices so that there is competition throughout the lifecycle of the system – i.e. the multi-source procurement model described above. Further, also as noted above, construction of a 20 MHz network will permit lower cell densities than a 10 MHz network to achieve a given level of network capacity. Utilizing the full 20 MHz of spectrum at the start will enable leveraging an emerging eco-system that is developing Band Class 14 equipment (covering both the D-Block and 10 MHz of spectrum allocated for public safety broadband) and will avoid the costly step of future expansion in an alternate frequency band.

As for cost sharing, there is widespread support to enable sharing network resources on a secondary and non-interfering basis with other critical infrastructure industries such as utilities and transportation. Under a strict interpretation of Section 337 of the Communications Act, enabling users other than public safety practitioners to use this network may require Congressional action.

7. **How long will it take to transition of the public safety 700 MHz spectrum to broadband? What steps can we take to accelerate that transition?**

Conversion of 700 MHz narrowband spectrum to broadband is a complex issue that includes many considerations. At present, a number of 700 MHz narrowband systems are fully deployed and operational, with many more under construction. Moving these users to an alternate band (such as

800 MHz) will resemble the ongoing 800 MHz re-banding initiative, which is intended to mitigate interference from cellular systems to public safety communications systems. We can draw from this experience to scope the effort in order to replicate it in the 700 MHz band.

In August 2004, the FCC enacted important rule-making on the topic of the 800 MHz Public Safety Interference Proceeding. That rule making initiated the process of 800 MHz re-banding, which when complete, will consolidate 800 MHz public safety systems and isolate them from cellular networks. Today, nearly 7 years later, the process is not yet complete; indeed, some jurisdictions have yet to begin the re-banding process. It is reasonable to expect that from start to finish, nearly a decade will have elapsed from the Report and Order to completion of the process. Therefore, a reasonable upper bound on the time to replicate this at 700 MHz is 10 years.

Accelerating this timeframe would require timely feasibility and impact studies, rule-making and funding availability.

The Honorable Henry A. Waxman

1. **In his testimony, Mr. Steinberg pointed to the adoption and implementation of the Project 25 (P25) standard as an example of how public safety has made great strides in achieving interoperability since 9/11. Do you agree with that statement? What lessons can Congress learn from the experiences of deploying the P25 standard for traditional land mobile systems as we look forward to creating a public safety broadband network?**

The adoption and implementation of the P25 standard primarily has addressed spectrum efficiency mandates and has contributed incrementally to achieving our nationwide interoperability goals. As Mr. Steinberg also noted in his testimony, one current challenge is that public safety operates in multiple disparate frequency bands. Today, the vast majority of P25 implementations utilize single-band radios that cannot operate across all these bands, and with very rare exception, P25 systems are not interconnected to enable roaming across jurisdictional networks. We continue to have a situation where public safety networks are virtual islands and there is no cohesive nation-wide network.

As noted earlier, continued focus on backward system compatibility vs. future interoperability has further stifled our progress on interoperability.

Achieving nation-wide interoperability requires several key ingredients:

1) Open Standards. The adoption of LTE as the baseline standard for 700 MHz broadband is a great and important first step. In contrast, P25 is a proprietary standard and as such requires licensing of patents, payment of royalties and permits vendor proprietary/non-interoperable implementation of key features.

2) Competition. The telecommunication industry serves as a model for how competition via multi-sourcing procurement practices results in a robust supply chain that is innovative and enables

competition throughout the lifecycle of a technology. A key ingredient of multi-sourcing is ensuring interchangeability of key network and device building blocks across multiple vendors.

3) Governance. Local jurisdictional control, responsibility, and accountability must be delicately balanced with a cross-jurisdictional regulatory framework and structure.

2. **While equipment vendors endeavor to meet the unique needs presented by public safety with specialized equipment, such efforts also put public safety at a disadvantage because of the absence of commercial economies of scale that has led to remarkable innovation and reduced costs in the commercial marketplace. How can public safety leverage commercial developments in the equipment market to benefit from innovation and lower equipment costs? Does Congress or a regulator need to intervene in the equipment market to make sure it is competitive.**

Public safety can leverage commercial developments to reduce costs in several ways. First, adopt and use commercial standards where applicable. We strongly endorse the FCC's recent ruling on the use of 3GPP LTE standards for the public safety broadband network. Second, public safety must ensure that it implements a business model that enables competition and stimulates innovation. As noted above, we believe that public safety must implement a multi-source procurement model that enables both interoperability, and more so, interchangeability. A multi-source model will ensure competition, which will reduce costs. It is appropriate and recommended that Congress mandate competitive procurement practices to achieve this desired outcome. Federal funding for relevant Research and Development will also be valuable to facilitate development and maintenance of a robust and innovative supply chain.

3. **Assuming that the D Block should be reallocated public safety, in the largest-scale emergencies, will 20 megahertz be enough? How much spectrum would be needed for "day-to-day" operations, both for the densest urban environments, as well as for rural environments?**

A 20 MHz broadband nation-wide network will fundamentally change the way first responders and public safety practitioners perform their mission. For the first time, State, Local, Federal and Tribal users will be able to communicate via voice, video and access/exchange data as they respond to large-scale emergencies that require inter-governmental collaboration. Day-to-day operations will be enhanced as we enable voice, video and data convergence for first responders – on a single public safety grade network. This differs markedly from today's capabilities, comprised of narrowband voice and use of best-effort commercial cellular data networks, neither of which are suitable for delivery of video services or applications that drive bandwidth consumption (such as situational awareness).

As these capabilities become widely deployed, it is inevitable that demand for capacity will increase over time. There is no guarantee that a single 20 MHz network will meet every potential scenario. However, as noted above, the capacity of cellular networks can grow by increasing cell tower densities, which is why we urge that we begin with a 20 MHz network from the onset, with an initial baseline cell tower density. This will create the opportunity for continued capacity increase in an incremental way as demand increases, simply by adding cell towers in the future.

4. **Some public safety entities have plans to deploy 700 MHz public safety broadband networks, based on waivers granted by the FCC. How can we make sure that such networks become integrated with a future, nationwide network, without impacting nationwide interoperability or adding costs?**

   All systems, whether constructed on license waivers or broader-based licensing in accordance with rule-making in process, must adhere to two basic principles: Compliance with established and mandated standards verified by robust interoperability testing in a multi-vendor environment. Standardized LTE equipment is available from many suppliers. Because a public safety specific Interoperability Testing (IOT) process is yet to be defined and implemented, it is extremely important that systems deployed under waiver utilize building blocks from multiple vendors. Only in this way will it ensure that they are implemented in a manner that limits the risk of deploying equipment that may not be interoperable with the nationwide network. Equally important, we must ensure that systems developed under waiver do not become "de facto standards" in lieu of open standards.

5. **If Congress reallocates the D Block to public safety, how much of this additional spectrum will public safety need right away? If Congress decides to auction the D block, what is the timeframe by which public safety's spectrum needs will grow so as to need the full 20 megahertz of spectrum? Should the 20 megahertz be fully demanded and utilized by public safety, couldn't most or all of public safety's existing 12 megahertz of 700 MHz narrowband spectrum be repurposed for broadband at that time?**

   It is important to draw a distinction between cell capacity and network capacity. A 20 MHz cell site has proportionally higher capacity than a 10 MHz cell site. Network capacity is determined by the combination of cell density and cell capacity. As noted earlier, there are two ways to increase network capacity – increase cell capacity and/or increase cell tower density. Allocation of the D-Block to public safety permits the realization of network capacity with fewer cell sites in the initial deployment. The further benefit is that these cell sites have higher capacity than 10 MHz cell sites, and hence are better positioned to support localized peak capacity demands typical of public safety communications. So, while it may be a long time before the need for 20 MHz network capacity is necessary, there are both financial and operational benefits of beginning with 20 MHz cell sites.

   Repurposing 12 MHz of narrowband spectrum for broadband has significant operational and financial challenges. The spectrum plan for this configuration would need to be defined very early on, so as to enable definition of this band within the 3GPP body that is responsible for LTE standards. With this migration plan, the eco-system that is currently being tooled for Band Class 14 would have to be re-tooled for this new band configuration. In effect, this would delay the adoption of public safety LTE by several years. In addition, public safety would face the operational challenges of re-banding with all the associated costs therein.

6. **If the D Block is reallocated to public safety, how can we ensure that devices capable of operation across the D Block and the public safety broadband spectrum, referred to as "Band**

Class 14," are made available for public safety use, and at prices reflective of commercial economies of scale?

Please see the response to question 2 above.

7. **What is the best way to ensure that individual public safety agencies have a role in developing the network, while also ensuring uniformity in deployment, nationwide interoperability, economies of scale in equipment costs, and otherwise keeping the overall process as efficient as possible?**

Public safety is not a monolithic market; it is comprised of a diverse collection of State, Local, Federal and Tribal jurisdictions with multiple functional disciplines within the broad classifications of law enforcement, fire service, and emergency medical services. There are many advocacy groups that collectively represent the interests of these stakeholders. Many public safety agencies do not have the scale or resources to play a direct role in the processes mentioned above, and hence these advocacy groups play a pivotal role. However, there are certain functions that historically are reserved for properly chartered organizations operating under the auspices of a sovereign government entity. These functions include spectrum licensing, construction, and operation of public safety communication networks. In part, it is the myriad of such entities together with their diverse set of local issues that complicates implementation of interoperability. Inherently, much of the focus in these organizations is on operability issues.

It is constructive to look at this problem from a different perspective such as through the lens of the national highway system. All levels of government and numerous advocacy groups play an active role to ensure we have safe and "interoperable" roadways. Suitable Federal oversight of construction standards is balanced with construction and maintenance/operations at the State and Local level. Funding mechanisms are shared among all levels of government.

Built on this analogy, the Federal Government has a key role to play in shaping the top-level of the governance structure, with focus on processes that adopt and promote commercial standards and, where appropriate, Federal standards such as FIPS. Under the oversight of the Department of Commerce, the FCC and NIST must play key roles at this level. Federal funding mechanisms must include procurement policy that ensures a robust eco-system of suppliers in order to drive innovation and competition. There is historical precedent for States to serve as focal points for the administration of spectrum designated for interoperability purposes and as funnels for driving Federal funds down to Local entities. In keeping with the analogy, States should have responsibility and accountability for ensuring interoperability within the State, and in collaboration with Federal agencies mentioned above, to ensure inter-state interoperability. Multi-state collaboration in design, construction and operation of the network will prove vital, in part to achieve economies of scale that will drive cost downward.

June 24, 2011

Mr. Jeffrey D. Johnson
Chief Executive
Western Fire Chiefs Association
727 Center Street N.E., Suite 300
Salem, OR 97301

Dear Mr. Johnson,

Thank you for appearing before the Subcommittee on Communications and Technology on May 25, 2011, to testify at the hearing entitled "Creating an Interoperable Public Safety Network."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for 10 business days to permit Members to submit additional questions to witnesses, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and then (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please email your responses, in Word or PDF format, to the legislative clerk (Alex.Yergin@mail.house.gov) by the close of business on Friday, June 23, 2011.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Greg Walden
Chairman
Subcommittee on Communications and Technology

cc: The Honorable Anna G. Eshoo, Ranking Member,
Subcommittee on Communications and Technology

Attachment

The Honorable Greg Walden

1. Congress has provided billions in federal funding over the last decade as well as approximately 100 MHz of spectrum for the exclusive-use of public safety. Where have those resources gone? What worked, what didn't, and why?

   Please see the attached report by Andrew Seybold that answers the question. I request this be made part of the hearing record.

2. First Responders are currently planning to use 10 MHz of spectrum for broadband out of the 24 MHz the DTV legislation already cleared. What can be done today with 10 MHz of broadband spectrum? Might it not be enough in the short term, until public safety can also migrate the rest of the 24 MHz for broadband, especially since there are only 2-3 million First Responders as compared to tens of millions of commercial users?

   Part of the reason why Public Safety has worked so hard to secure the D Block and funding to build out a separate, nationwide, hardened mission critical grade broadband network for first responders is because the way in which public safety utilizes a network is at times fundamentally different from that of commercial network use. Commerical networks support a steady stream of data and voice throughout the course of a day. Public safety networks, on the other hand, are often silent unless an active incident is being dispatched and managed or routine operational messages are being transmitted. And, commercial networks are concerned with population concentrations, while public safety is concerned primarily with geographical coverage.

   Much like the commercial networks, public safety will also use a steady stream of their spectral allotment to send voice, video and other communications. Recent legislation would allow the public safety community to lease unused spectrum on a secondary basis to secondary users, therby ensuring more efficient spectrum use. But by contrast, in the case of an accident or other small-scale event, which public safety handles on a daily basis, events such as these are often confined to a small geographic area covered by a single cell sector. Additional capacity must be available for not just police, but fire, EMS and even utilities and critical infrastructure, depending on the situation.

   This is why the D Block for public safety is integral to the development of a nationwide interoperable broadband network for first responders. The additional 10 MHz of spectrum it would provide would allow multiple users from multiple agencies to run data-heavy communications not just from the field units back to central command, but among and between those individuals working together at the scene of the accident.

   Therefore, I feel strongly that this issue should not be framed in terms of the number of public safety users versus the amount of allocated spectrum, but instead in terms of how well a mission

critical-grade network for public safety would be able to support 200-300 first responders using the network at an incident in order to improve response, mitigation and recovery operations. A cell sector begins to overload much more quickly on a standard 5 x 5 network (10 MHz system) because the network's capacity simply cannot sufficiently provide a combination of the essential services that are needed by first responders, including video surveillance, telemedicine, geospatial awarness, CAD-CAD operations, biometric monitoring, chemical and biological sensors, hazardous responses services, and ultimately, in the future, mission critical voice communications. A 5 x 5 (10 MHz) system at a cell sector near the incident will be insufficient to meet the daily operational needs of first responders at the scene of most incidents. The speed and capacity that can be achieved on a the 5 x 5 network will be insufficient to meet the increasing mission critical data, video and voice communications needs of public safety.

With a 20 MHz system, public safety will not only be able to meet most mission critical needs during everyday emergencies, but also be able to share the capacity during times the network is not being fully utilized with commercial carriers (especially in rural areas), critical infrastructure, and state and local government users to reduce the cost of build out and maintenance and improve interoperability across at all levels of incident management.

While some have argued that public safety should use the full 24 MHz of spectrum for broadband, this proposal ignores the hundreds of millions of dollars that have been spent or are in the process of being spent to build out statewide and regional mission critical voice communications systems in the 700 MHz band. Attached is a report of 700 MHz narrowband systems that are currently licensed for local, state and regional operations. Repurposing the 700 MHz narrowband spectrum will have a devastating impact on current systems and will establish an unfunded mandate that will be too costly for state and local operation to bear and justify to their elected officials and constituents.

3. Public safety users have an allocation at 4.9 GHz. How should public safety be using this spectrum as part of a broadband solution?

The 50 MHz of allocation in the 4.9 GHz, which is the largest spectrum block public safety has ever been allocated, is designated for low-power, local communications just as today's unlicensed Wi-Fi bands are allocated for citizens' use. The average coverage of a single 4.9-GHz access point is less than 300 feet, and in most systems, this spectrum is used for point-to-point communications for video transmissions from fixed-location cameras, or for on-scene local broadband services and mesh networks. 4.9 GHz wil not support wide area broadcast which is required for public safety operations.

This spectrum block was allocated solely to public safety operations, but the lack of coordination requirements by the FCC makes it difficult to manage efficiently. Public safety supported Section 207 subsection (c) in S. 1040, the Broadband for First Responders Act,

introduced by Senators Lieberman and McCain that would authorize the FCC to issue secondary licenses in the 4.9 GHz band to non public safety users. We believe this will ensure more efficient use of the spectrum and require the necessary coordination needed to reduce the potential for interference.

4. While First Responders know their needs, are they the right ones to be building and operating the network? Are there appropriate state entities that can manage the day-to-day management task of wireless communications?

First responders are not the ones that will be building out and managing the network.

I will be the first one to tell you that a cop on the street or a fire fighter running into a building does not care who is managing the network. What they care about is will their equipment work when they need it. That is why we hire public safety communications professionals to build out and maintain our networks. These professionals are sometimes located in public safety agencies themselves, but they can also be found in state supporting agencies, such as CIO offices, unified commuications departments, and the like.

For more than 80 years, public safety communications professionals, who support first responders have been responsible for building out and managing communications networks across the country. They have worked with the public safety industry including Motorola, Harris, Northrop Grumman, Raytheon, Kenwood, Qualcom, Erricson, Cisco, and many others to build out networks that meet the mission-critical needs of first responders. These complex systems are built to be reliable, secure, and redundant than current commercial systems.

Realizing the new broadband communications technology is a challenge that public safety is taking on now. Working with our industry partners including Verizon and AT&T we are able to leverage the LTE technology to build out a network that capitalizes on consumer standards and while building a network that meets our first responders needs.

This network will be built in partnership with commercial carriers, critical infrastructure, and federal resources. However, such partnerships can only be accomplished in 20 MHz network. A 10 MHz network would considerably limit public safety's ability to leverage the commercial technology and could potentially result in building a system that is too different from the commercial systems, thus increasing costs and placing public safety in a niche market once again.

5. There has been much focus on technical issues but not on agency coordination across jurisdictions (local, tribal, state, and federal) or oversight of construction, operation, and funding. What mechanisms need to be in place to address these needs?

We agree with you that agency coordination across jurisdictions (local, tribal, state, and federal) and close oversight of construction, operation, and funding are essential to building out the broadband network, which is why we support language in S. 911 that establishes the governance structure of a new nonprofit Corporation. We strongly believe, however, that public safety must hold majority representation on the Board of Directors of the new Corporation. This framework must ensure there is a requirement for state and local coordination with the new Corporation but this coordination requirement must not impede the build out of the network. The governance of the new Corporation must be transparent and held accountable to build out the nationwide network and ensure interoperability.

6. What can we do to reduce the cost of the public safety network?

Allocate the D Block to public safety!

Our industry partners, which include Alcatel Lucent, Motorola, Harris, and many others have stated for the record that the cost of building out a 10 MHz network and building out 20 MHz would be about the same. However, if public safety had to build out a 10 MHz system today, and five years down the road build a separate 10 MHz system on a different band to gain additional capacity, the cost would be double and we would have the same interoperability problem that we have today with our voice systems.

With the benefit of the additional spectrum, public safety will be able to leverage any excess capacity and partner with public, private, federal, and critical infrastructure to offset the build out and maintenance cost of the network. The cost, however, of a 10 MHz system will mostly be paid for by local, state, and federal money, because there will be little excess capacity to leverage.

The attached cost benefit analysis that was prepared by the Pheonix Center demonstrates that the decision to auction the D Block would cost the American taxpayer much more than the allocation. The allocation of the D Block is not only a good fiscal policy, but it is a policy that will ultimately reduce cost while at the same time making our country safer.

7. Some high profile projects on the west coast, notably BayWEB and your state's Oregon Wireless Interoperability Network have had significant governance concerns. Why should public safety run a wireless network in addition to their public safety duties?

The duties of public safety communication professionals are building and maintaining public safety communications systems. There are over 100,000 professionals in public safety that are responsible for managing every part of their communications operations including how 9-1-1 calls are answered and how emergency services are dispatched. The notion that public safety is incapable of managing a communications system is false and underestimates the tremendous role our communications personnel play in supporting our first responders.

I agree that we have enormous governance challenges to overcome, and that is why public safety has embraced a new model of governance for building out the nationwide network. This is the first time public safety has agreed to a nationwide architecture that would create the framework to build a network that will meet the opeerational needs of our first responders.

In short, the job of public safety communications professionals is to run a wireless network. It is their duty and their responsibility, and they are the people we trust to get the job done.

The Honorable Henry A. Waxman

1. The Public Safety Alliance recently posted on its website a reaction to the Subcommittee's hearing. In this posting, the Public Safety Alliance disputed that $13 billion has been provided by the federal government since 9/11 to achieve interoperability. However, the Public Safety Alliance did not offer its own estimate. Accordingly, please provide an estimate of how much has been provided by the federal government in grant dollars for achieving interoperability since 9/11/01?

   Please see the attached report by Andy Seybold that estimates the federal funding to be $4 billion. As previously requested above, I would like to submit this report for the record.

2. The Public Safety Alliance advocates that current federal grants could be authorized and prioritized by Congress to help pay for the broadband network. Are there specific programs you would include, and how much money in terms of grants dollars would that involve?

   There are a number existing grant programs that can be used to assist with the build out of the broadband network, including the State Homeland Security Program (SHSP), the Urban Area Security Initiative Grant Program (UASI), the Metropolitan Medical Response System (MMRS), Emergency Management Performance Grants (EMPG), Interoperable Emergency Communications Grant Program (IECGP), Regional Catastrophic Preparedness Grant Program (RCPGP), and Preparedness Grants, the Community Oriented Policing Services (COPS) Technology, Department of Justice's State, Local, and Tribal Terrorism Prevention Training and Technical Assistance National Initiative Program, and the Justice Assistance Grant (JAG) Program. However, appropriations for these grant program are less than certain and with the proposed cut backs and consolidation of the grant programs, the ability of public safety agencies to depend on funding for a two to five year project will not be sustainable. Competing uses for the limited federal dollars could ultimately slow down the build out of the nationwide broadband network.

   A dedicated source of funding realized through other spectrum auctions will provide the necessary and sustainable funding source to build out the network.

3. While a lot of focus is on achieving a nationwide level of interoperability for an LTE-based network dedicated for broadband data communications, what needs to be done to address the so far elusive

goal of achieving a nationwide level of voice interoperability? Is eventual migration of voice communications to the broadband network one part of the solution?

There needs to be more federal funding for research and development of new technologies.

Yes, the eventual migration of mission critical voice communications to the broadband network is one part of the solution, however, to achieve this solution, we must quickly develop standards and technology needed to provide mission critical push-to-talk and one-to-many voice capabilities in connection with the LTE standards. To do this, Congress must authorize sufficient funding for research and development of technologies that will drive innovation, create competition and reduce equipment cost.

4. How will public safety ensure the most efficient use of the broadband spectrum? For example, bandwidth-intensive applications such as streaming video certainly could be vital to saving lives and protecting property. But if not properly managed, such high-bandwidth uses can overwhelm even 20 MHz of spectrum.

   This is absolutely correct. We must have the ability to manage network resources at cell tower and base station(s) at the scene of an incident. This is precisely why public safety has urged that the LTE platform serve as the internaitonal standard for emergency communications. One of the key characteristics of LTE is the ability to prioritize data packets to efficiently and effectively manage the flow of traffic through a single cell sector. A new generation of communications managers will not only monitor the traffic during an incident, but will be responsible for the close coordination between incident commanders and communications specialists, as well as monitoring network resources and managing user access to the system.

   Public safety also needs to establish the necessary operational standards that will identify the functional priority levels for mission-critical and non-mission-critical use. The goal for developing the operational standards will be to ensure efficiency while fully maximizing the use of the network to manage all incidents.

5. Public safety has allocated to it 50 MHz of spectrum in the 4.9 GHz band, which is most useful for short-range communications, "hot spot" local communications networks, and backhaul. Therefore, this band could be ideal for handling bandwidth-intensive, short-range broadband communications so as to take pressure off of the LTE macro network, such as for fixed video. During your testimony, you noted that this band is "least likely to be used." However, is there not such a role for the 4.9 GHz band to complement the 700 MHz network?

   There is a role for the 4.9 GHz band to complement the 700 MHz network, but this role will not be realized as the incident is occurring but rather after the incident has been mitigated and recovery operations have started. However, because it will take time and resources to set up such a "hot spot" system it is unlikely that such a system will be fully utilized. It is important to

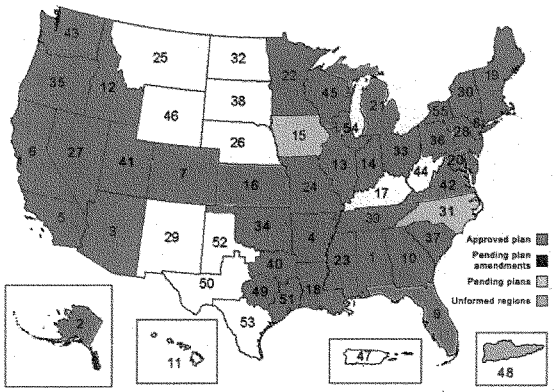
note also that public-safety does utilize the 4.9 GHz band for point-to-point microwave operations to provide back-haul support for their wireless networks.

To your specific reference of 4.9 GHz complementing the 700 MHz network, we are concerned about dissimilar device performance. For example, voice works inside a building while 4.9 GHz bounces off glass and does not penetrate buildings well. If devices are inconsistent or unreliable, responders will quit using them.

6. Can the Public Safety Alliance estimate the extent of deployment of 700 MHz narrowband systems? How much money has been spent so far for 700 MHz narrowband? How many states and localities are planning new or expanded 700 MHz narrowband systems?

Please see the attached report that provides the number of licensees by state and county that have been issued in the 700 MHz band for narrowband operations.

The map below provides a snapshot of the 700 regional plans that have been approved by the FCC. These plans must be approved by the FCC before any 700 systems can be deployed.



To our knowledge, the actual dollar amount that has been spent on 700 narrowband systems is not available because such figures are not being tabulated by the DHS or the FCC; however, it is safe to estimate that each deployment of 700 MHz systems is in the hundreds of millions of dollars.

7. The Public Safety Alliance advocates that public safety be able to leverage excess network capacity as a way to help fund the network. First, please explain how the desire to lease excess capacity is consistent with requesting Congress to reallocate the D Block for public safety use? Second, has public safety been presented with a business case for leasing spectrum capacity that demonstrates

leasing as a commercially feasible enterprise? Assuming that public safety would retain priority access, if not a right of preemption in order to ensure public safety retains access to the spectrum capacity it needs, who are the potentially interested parties, and under what conditions and fee structures would they be willing to accept to obtain secondary access?

The ability – not the desire – to lease excess capacity only becomes a viable option if the D Block is allocated to public safety. On a data-driven 10 MHz network, day-to-day public safety use would push the capabilities of the system to its limit. Not only would the ability to lease excess capacity on a 10 MHz network be nonexistent, but overall transmission speeds of critical video and data would be impeded, endangering the lives of first responders victims alike.

As previously stated, most emergency incidents occur within one or two cell sectors. When there is no incident and public safety's demand on those cell sectors are low, we believe that it would be more efficient to lease the excess capacity for secondary operations. This will ensure the networks is operating efficiently, and resources are being fully utilized. However, when an incident does occur, public safety will need to preempt the secondary use to respond to the incident. In other words, on a 20 MHz network, the ability to lease excess capacity becomes much more of a reality.

Public utilities and critical infrastructure, state and local government services, federal agencies, and commercial carriers (including rural cellular service providers) are good potential partners for use of the public safety network. These partnerships would greatly assist the public safety community in terms of funding the build-out and deployment of critical infrastructure as well as funding the maintenance of the network through subscription or lease agreements.

With regards to the conditions and fee structures for secondary access; the spectrum licensee or network operator must be able to negotiate with a variety of potential public and private partners, to reduce cost while maintaining the network's integrity. The licensee will need to have the flexibility to develop Requests for Proposal (RFPs) that foster competition.

8. Would agreements permitting secondary access lead to a potential conflict of interest, especially during an emergency when spectrum would be in high demand by both public safety and the spectrum lessee? If so, how should such conflict be resolved?

Any contract with a potential non-public safety subscriber or lessee who wished to lease spectrum on a secondary basis would clearly define the terms of use, especially regarding an emergency scenario where first responders with the appropriate credentials would prempt the non-public safety user. Assuming this information is clearly stated up front during the negotiation process, the real question becomes determining the kinds of scenarios that would implicate such terms of secondary use.

9. You state in your testimony that "public safety must have control over the operation of the network in real time." Do you mean in terms of defining operational and tactical needs, so that they are taken into consideration in the design of the network? Would you also seek to have public safety act as operators of this advanced wireless broadband network?

   Yes, public safety must be able to ensure that the network as designed meets its needs. As for managing the daily operation of the network, that will be done through the established governance model; however, local public safety officials including incident commanders and communications personnel must be able to access network resources to monitor, manage and control the network at the scene of an incident so mission-critical operations are not compromised.

10. You also stated that public safety expects to enter into public/private partnerships. To what extent do you believe it is important for public safety to leverage the existing resources, infrastructure, and expertise of wireless carriers deploying 4G networks? How does the concept of leveraging commercial networks fit into public safety's desire to have operational control of the network?

    It is very important to leverage not only the existing resources, infrastructure, and expertise of wireless carriers but also the existing public safety, state, local and federal government infrasture, not to mention other public and private network operators including utilities, highway departments, water agencies, etc.

    The ability of public safety to "ride the wave" of commercial technological innovation is a fundamental component to the overall success of the public safety broadband network. One of the major reasons the public safety community pushed the FCC to adopt LTE as the platform for the broadband network was to leverage the technology's build-out on a global basis. This push is extending well beyond the United States to include Canada, Europe and Australaia. The resulting economies of scale will help drive down the cost of the devices and applications that will ride the public safety network, while driving innovation for mission critical-centric products.

11. While equipment vendors endeavor to meet the unique needs presented by public safety with specialized equipment, such efforts also put public safety at a disadvantage because of the absence of commercial economies of scale that has led to remarkable innovation and reduced costs in the commercial marketplace. How can public safety leverage commercial developments in the equipment market to benefit from innovation and lower equipment costs? Does Congress or a regulator need to intervene in the equipment market to make sure it is competitive?

    As mentioned earlier, public safety pushed the FCC to adopt LTE as the standard for the broadband network to capitalize on the commercial market place. Public safety is also working globally to adopt LTE as the standard for public safety agencies in many parts of the world. We support the Administration's budget to put more than $500 million towards research development of open-source technologies and applications that will reduce cost and create

greater competition. We believe these measures and other initiatives will go a long way to reducing the cost equipment and long-term viability of the network.

12. Assuming that the D Block should be reallocated public safety, in the largest-scale emergencies, will 20 megahertz be enough? How much spectrum would be needed for "day-to-day" operations, both for the densest urban environments, as well as for rural environments?

No, 20 MHz will not be enough for the largest-scale emergencies, but 20 MHz is much more than 10 MHz. For day-to-day operations, public safety will need to have access to 20 MHz of spectrum to respond to emergencies. While public safety may not be using the full 20 MHz of spectrum every minute of the day, it will need to use the spectrum fully (in other words preempt other users) when it is responding to an emergency. When public safety is not fully using the spectrum, it could benefit by allowing non-public safety subscribers to use the network or lease the excess capacity to ensure the spectrum is used efficiently. This will help drive down cost and create a revenue stream to maintain the network.

To our understanding, not even commercial providers can provide an accurate account of how much spectrum is needed to support public safety currently on a daily basis in the densest urban environments and rural areas. Spectrum usage will vary depending on the types of applications and equipment that are operating on the network, and the amount of bandwidth they are consuming. While urban areas might have more users on the network, rural areas might depend on more intensive applications that need more spectrum to operate effectively such as diagnostic medical equipment to triage patients that are miles away from the nearest hospital.

13. Some public safety entities have plans to deploy 700 MHz public safety broadband networks, based on waivers granted by the FCC. How can we make sure that such networks become integrated with a future, nationwide network, without impacting nationwide interoperability or adding costs?

It is important that the waiver entities, as they begin to build out their networks, work closely with the existing public safety broadband licensee and the future Corporation that will take over the license to ensure their systems are going to be interoperable with the nationwide network. There must be close coordination between to the governing body that is going to manage the future build out of the nationwide network and existing waiver recipients to ensure the systems can be integrated. Ultimately, however, we must recognize that one value in allowing such early deployments is to learn from their experiences. Given the newness of the technology and the complexity of achieving nationwide interoperability, we have to expect that those experiences will include both successes and failures.

14. If Congress reallocates the D Block to public safety, how much of this additional spectrum will public safety need right away? If Congress decides to auction the D block, what is the timeframe by which public safety's spectrum needs will grow so as to need the full 20 megahertz of spectrum? Should the

20 megahertz be fully demanded and utilized by public safety, couldn't most or all of public safety's existing 12 megahertz of 700 MHz narrowband spectrum be repurposed for broadband at that time?

Public safety will need the full 20 MHz at the very start of network operations. This network must be mission critical at the outset. Current studies show that public safety's application needs such as high-resolution video and large data pulls are going to exceed the 10 MHz of spectrum at the onset. The time frame is now.

No, the 12 megahertz of 700 MHz narrowband spectrum is not capable of being re-purposed in the time frame which public safety is going to need the additional spectrum. It will take up to 15 to 20 years to re-purpose the narrowband spectrum for broadband. By the time public safety is able to re-purpose the narrowband spectrum, public safety will need additional spectrum to meet increasing broadband demands. In other words, there is a strong possibility that, in 20 to 25 years, public safety might be using the full 34 megahertz of spectrum in the 700 MHz band for broadband communications. Public safety is not only looking at the short-term needs of 20 MHz but the long-term needs for future growth of broadband systems.

15. If the D Block is reallocated to public safety, how can we ensure that devices capable of operation across the D Block and the public safety broadband spectrum, referred to as "Band Class 14," are made available for public safety use, and at prices reflective of commercial economies of scale?

    First, Congress can fund the build out of the network to capitalize on commercial technology and increase demand. Second, Congress can fund research and development that will drive innovation and competition. Third, Congress can authorize secondary use of the network to increase the market place. Fourth, Congress can create the appropriate regulatory framework to ensure that all 700 MHz devices are able to operate in "Band Class 14."

16. What is the best way to ensure that individual public safety agencies have a role in developing the network, while also ensuring uniformity in deployment, nationwide interoperability, economies of scale in equipment costs, and otherwise keeping the overall process as efficient as possible?

    There needs to be a requirement for coordination between local public safety agencies and the licensee in building out the network in a geographic region. However, the requirement for the coordination should not slow down or hinder the build out the network in the region. Close coordination and cooperation is needed to ensure that the network is fully utilized by all local, state and Tribal public safety agencies.

17. To what extent does public safety utilize commercial wireless networks to meet their communications needs, including for broadband communications? How much does public safety spend for commercial wireless service? What has been the experience with using commercial services? Please cite to a few specific examples.

Public safety does not use commercial wireless networks for mission-critical voice. For secondary cellular service, the use will vary according to the agency and locality. For low-speed data, some systems are supported in the existing public safety spectrum allocations. For high-speed broadband, today, public safety with few exceptions relies on commercial services. Depending on the size of the agency, the annual cost could range from $25,000 to more than $300,000. In many of the metropolitan areas the costs are much higher and in some areas could be in the millions.

"As we have seen many times, commercial systems have shown the greatest amount of stress during major City disasters and special events such as:

- ***September 11th attacks in New York and the Pentagon***
- ***American Airlines Flight 587: 11-12-01***
- ***Staten Island Refinery Explosions: 2-21-03***
- ***Staten Island Ferry Crash: 10-15-03***
- ***Midtown Building Collapse: 7-10-06***
- ***Cory Lidle Plane Crash: 10-11-06***
- ***Midtown Steam Pipe Explosion: 7-18-07***
- ***Multiple Crane Collapses: March and May 2008***
- ***Miracle on the Hudson: 1-15-09***
- ***Helicopter/Plane Crash on the Hudson 8-8-09***
- ***Annual and Special Events (i.e. NY Yankees Parade: 11-6-09)***

In many of these instances the commercial networks were overloaded with users confined to a small area rendering the networks unusable. In other cases the networks were rendered inoperable due to the lack of sufficient battery back-up or emergency power. These, as well as other real life examples, demonstrate that commercial networks are not designed to function under the stress of critical incidents and when needed the most, cannot perform as required." **(NYC - 700 MHz Broadband Public Safety Applications And Spectrum Requirements, February 2010)**

700 MHz Narrowband

Count of Assigned Frequency			
Location State	Location Coun	Radio Service	Total
AK	ANCHORAGE	SY Trunked Public Safety 700 MHz	117
	KENAI PENINS	SY Trunked Public Safety 700 MHz	4
	MATANUSKA-S	SG Conventional Public Safety 700 MHz	2
		SY Trunked Public Safety 700 MHz	4
	(blank)	SY Trunked Public Safety 700 MHz	41
AK Total			168
AL	BALDWIN	SG Conventional Public Safety 700 MHz	10
	ETOWAH	SY Trunked Public Safety 700 MHz	18
AL Total			28
AZ	LA PAZ	SG Conventional Public Safety 700 MHz	1
	MARICOPA	SY Trunked Public Safety 700 MHz	191
	MOHAVE	SY Trunked Public Safety 700 MHz	2
	PINAL	SY Trunked Public Safety 700 MHz	10
	YAVAPAI	SY Trunked Public Safety 700 MHz	10
	(blank)	SG Conventional Public Safety 700 MHz	26
		SY Trunked Public Safety 700 MHz	56
AZ Total			296
CA	ALAMEDA	SY Trunked Public Safety 700 MHz	38
	CONTRA COST	SY Trunked Public Safety 700 MHz	25
	LOS ANGELES	SY Trunked Public Safety 700 MHz	18
	ORANGE	SY Trunked Public Safety 700 MHz	4
	RIVERSIDE	SG Conventional Public Safety 700 MHz	44
		SY Trunked Public Safety 700 MHz	599
	SAN BERNARD	SG Conventional Public Safety 700 MHz	3
		SY Trunked Public Safety 700 MHz	38
	SAN DIEGO	SY Trunked Public Safety 700 MHz	17
	SAN FRANCISC	SY Trunked Public Safety 700 MHz	63
	SAN MATEO	SY Trunked Public Safety 700 MHz	210
	(blank)	SG Conventional Public Safety 700 MHz	5
		SY Trunked Public Safety 700 MHz	93
CA Total			1157
CO	ADAMS	SY Trunked Public Safety 700 MHz	33
	ARAPAHOE	SY Trunked Public Safety 700 MHz	33
	BACA	SG Conventional Public Safety 700 MHz	3
	BOULDER	SY Trunked Public Safety 700 MHz	16
		TT TV Translator Relay	1
	DENVER	SY Trunked Public Safety 700 MHz	3
	DOUGLAS	SY Trunked Public Safety 700 MHz	2
	ELBERT	SY Trunked Public Safety 700 MHz	12
	GARFIELD	SG Conventional Public Safety 700 MHz	2
	KIOWA	SG Conventional Public Safety 700 MHz	3
	MESA	LP Broadcast Auxiliary Low Power	3

	PUEBLO	SY Trunked Public Safety 700 MHz	16
	WELD	SY Trunked Public Safety 700 MHz	6
	(blank)	SG Conventional Public Safety 700 MHz	11
		SY Trunked Public Safety 700 MHz	110
CO Total			254
CT	FAIRFIELD	SY Trunked Public Safety 700 MHz	60
	(blank)	SG Conventional Public Safety 700 MHz	8
CT Total			68
DE	KENT	SY Trunked Public Safety 700 MHz	16
	NEW CASTLE	SY Trunked Public Safety 700 MHz	32
	SUSSEX	SY Trunked Public Safety 700 MHz	16
DE Total			64
FL	CITRUS	SG Conventional Public Safety 700 MHz	3
	HILLSBOROUG	SY Trunked Public Safety 700 MHz	20
	LAKE	SY Trunked Public Safety 700 MHz	31
	MARTIN	SY Trunked Public Safety 700 MHz	15
	MIAMI-DADE	SG Conventional Public Safety 700 MHz	3
		SY Trunked Public Safety 700 MHz	38
	ORANGE	SG Conventional Public Safety 700 MHz	12
		SY Trunked Public Safety 700 MHz	27
	PALM BEACH	SY Trunked Public Safety 700 MHz	16
	PINELLAS	SY Trunked Public Safety 700 MHz	11
	POLK	SY Trunked Public Safety 700 MHz	20
	SEMINOLE	SY Trunked Public Safety 700 MHz	6
	ST. LUCIE	SY Trunked Public Safety 700 MHz	3
	(blank)	SG Conventional Public Safety 700 MHz	3
		SY Trunked Public Safety 700 MHz	110
FL Total			318
GA	BULLOCH	SY Trunked Public Safety 700 MHz	14
	CHATHAM	SY Trunked Public Safety 700 MHz	21
	COWETA	SG Conventional Public Safety 700 MHz	1
		SY Trunked Public Safety 700 MHz	10
	DADE	SG Conventional Public Safety 700 MHz	10
	GLYNN	SY Trunked Public Safety 700 MHz	8
	(blank)	SG Conventional Public Safety 700 MHz	9
		SY Trunked Public Safety 700 MHz	31
GA Total			104
IA	POTTAWATTAI	SG Conventional Public Safety 700 MHz	4
IA Total			4
ID	ADA	SG Conventional Public Safety 700 MHz	6
		SY Trunked Public Safety 700 MHz	29
	BANNOCK	SY Trunked Public Safety 700 MHz	23
	BINGHAM	SY Trunked Public Safety 700 MHz	21
	BLAINE	SY Trunked Public Safety 700 MHz	15
	BONNER	SY Trunked Public Safety 700 MHz	4
	BONNEVILLE	SY Trunked Public Safety 700 MHz	27

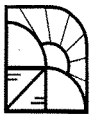
	BUTTE	SG Conventional Public Safety 700 MHz	2
	CANYON	SY Trunked Public Safety 700 MHz	74
	CARIBOU	SY Trunked Public Safety 700 MHz	5
	CASSIA	SY Trunked Public Safety 700 MHz	6
	CLARK	SY Trunked Public Safety 700 MHz	12
	CUSTER	SG Conventional Public Safety 700 MHz	1
	FREMONT	SY Trunked Public Safety 700 MHz	9
	JEFFERSON	SY Trunked Public Safety 700 MHz	4
	JEROME	SY Trunked Public Safety 700 MHz	6
	KOOTENAI	SG Conventional Public Safety 700 MHz	5
		SY Trunked Public Safety 700 MHz	68
	MADISON	SY Trunked Public Safety 700 MHz	16
	POWER	SY Trunked Public Safety 700 MHz	6
	TETON	SY Trunked Public Safety 700 MHz	3
	(blank)	SG Conventional Public Safety 700 MHz	3
		SY Trunked Public Safety 700 MHz	139
ID Total			484
IL	BOND	SG Conventional Public Safety 700 MHz	3
	COOK	SG Conventional Public Safety 700 MHz	14
		SY Trunked Public Safety 700 MHz	13
	DUPAGE	SG Conventional Public Safety 700 MHz	2
		SY Trunked Public Safety 700 MHz	149
	GRUNDY	SG Conventional Public Safety 700 MHz	9
	KANE	SG Conventional Public Safety 700 MHz	2
	MADISON	SG Conventional Public Safety 700 MHz	1
	ST. CLAIR	SG Conventional Public Safety 700 MHz	2
	STEPHENSON	SG Conventional Public Safety 700 MHz	1
	WILL	SY Trunked Public Safety 700 MHz	6
IL Total			202
KS	COFFEY	SG Conventional Public Safety 700 MHz	2
	JOHNSON	SY Trunked Public Safety 700 MHz	48
KS Total			50
KY	DAVIESS	TS TV Studio Transmitter Link	2
	MADISON	SG Conventional Public Safety 700 MHz	7
KY Total			9
LA	ACADIA	SY Trunked Public Safety 700 MHz	42
	ALLEN	SY Trunked Public Safety 700 MHz	28
	ASCENSION	SG Conventional Public Safety 700 MHz	10
		SY Trunked Public Safety 700 MHz	79
	ASSUMPTION	SY Trunked Public Safety 700 MHz	6
	AVOYELLES	SY Trunked Public Safety 700 MHz	43
	BEAUREGARD	SY Trunked Public Safety 700 MHz	28
	BIENVILLE	SY Trunked Public Safety 700 MHz	6
	BOSSIER	SY Trunked Public Safety 700 MHz	8
	CADDO	SY Trunked Public Safety 700 MHz	26
	CALCASIEU	SY Trunked Public Safety 700 MHz	52

CALDWELL	SY Trunked Public Safety 700 MHz	8
CAMERON	SY Trunked Public Safety 700 MHz	2
CLAIBORNE	SY Trunked Public Safety 700 MHz	6
CONCORDIA	SY Trunked Public Safety 700 MHz	8
EAST BATON R	SY Trunked Public Safety 700 MHz	42
EAST CARROLL	SY Trunked Public Safety 700 MHz	8
EAST FELICIAN	SY Trunked Public Safety 700 MHz	8
EVANGELINE	SY Trunked Public Safety 700 MHz	40
IBERIA	SY Trunked Public Safety 700 MHz	6
IBERVILLE	SY Trunked Public Safety 700 MHz	42
JACKSON	SY Trunked Public Safety 700 MHz	7
JEFFERSON	SG Conventional Public Safety 700 MHz	10
	SY Trunked Public Safety 700 MHz	88
JEFFERSON DA	SY Trunked Public Safety 700 MHz	22
LA SALLE	SY Trunked Public Safety 700 MHz	33
LAFAYETTE	SY Trunked Public Safety 700 MHz	82
LAFOURCHE	SY Trunked Public Safety 700 MHz	65
LINCOLN	SY Trunked Public Safety 700 MHz	14
LIVINGSTON	SY Trunked Public Safety 700 MHz	59
MADISON	SY Trunked Public Safety 700 MHz	21
MOREHOUSE	SY Trunked Public Safety 700 MHz	8
NATCHITOCHE	SY Trunked Public Safety 700 MHz	10
ORLEANS	SG Conventional Public Safety 700 MHz	5
	SY Trunked Public Safety 700 MHz	44
OUACHITA	SY Trunked Public Safety 700 MHz	35
PLAQUEMINES	SY Trunked Public Safety 700 MHz	59
POINTE COUP	SY Trunked Public Safety 700 MHz	42
RAPIDES	SY Trunked Public Safety 700 MHz	98
RICHLAND	SY Trunked Public Safety 700 MHz	8
SABINE	SY Trunked Public Safety 700 MHz	21
ST. BERNARD	SG Conventional Public Safety 700 MHz	7
	SY Trunked Public Safety 700 MHz	47
ST. CHARLES	SY Trunked Public Safety 700 MHz	24
ST. HELENA	SY Trunked Public Safety 700 MHz	38
ST. JAMES	SY Trunked Public Safety 700 MHz	28
ST. JOHN THE	SY Trunked Public Safety 700 MHz	40
ST. LANDRY	SY Trunked Public Safety 700 MHz	43
ST. MARTIN	SY Trunked Public Safety 700 MHz	35
ST. MARY	SY Trunked Public Safety 700 MHz	35
ST. TAMMANY	SY Trunked Public Safety 700 MHz	84
TANGIPAHOA	SY Trunked Public Safety 700 MHz	85
TENSAS	SY Trunked Public Safety 700 MHz	35
TERREBONNE	SY Trunked Public Safety 700 MHz	80
UNION	SY Trunked Public Safety 700 MHz	42
VERMILION	SY Trunked Public Safety 700 MHz	12
VERNON	SY Trunked Public Safety 700 MHz	49

	WASHINGTON	SY Trunked Public Safety 700 MHz	42
	WEBSTER	SY Trunked Public Safety 700 MHz	8
	WEST BATON	SY Trunked Public Safety 700 MHz	28
	WEST CARROL	SY Trunked Public Safety 700 MHz	21
	WEST FELICIA	SY Trunked Public Safety 700 MHz	45
	WINN	SY Trunked Public Safety 700 MHz	28
	(blank)	SY Trunked Public Safety 700 MHz	30
LA Total			2115
MA	(blank)	SG Conventional Public Safety 700 MHz	31
MA Total			31
MD	ANNE ARUND	SY Trunked Public Safety 700 MHz	4
	BALTIMORE	SY Trunked Public Safety 700 MHz	10
	CARROLL	SY Trunked Public Safety 700 MHz	3
	HARFORD	SY Trunked Public Safety 700 MHz	24
	MONTGOMER	SG Conventional Public Safety 700 MHz	3
	PRINCE GEOR	SY Trunked Public Safety 700 MHz	25
	(blank)	SG Conventional Public Safety 700 MHz	12
		SY Trunked Public Safety 700 MHz	42
MD Total			123
ME	HANCOCK	SG Conventional Public Safety 700 MHz	28
ME Total			28
MI	DELTA	SG Conventional Public Safety 700 MHz	2
	OAKLAND	SG Conventional Public Safety 700 MHz	14
		SY Trunked Public Safety 700 MHz	6
	(blank)	SG Conventional Public Safety 700 MHz	8
MI Total			30
MN	ANOKA	SG Conventional Public Safety 700 MHz	1
	CARVER	SG Conventional Public Safety 700 MHz	1
	CHISAGO	SG Conventional Public Safety 700 MHz	1
	DAKOTA	SG Conventional Public Safety 700 MHz	2
	HENNEPIN	SG Conventional Public Safety 700 MHz	16
	RAMSEY	SG Conventional Public Safety 700 MHz	12
	WASHINGTON	SG Conventional Public Safety 700 MHz	1
MN Total			34
MO	JACKSON	SY Trunked Public Safety 700 MHz	5
	ST. CHARLES	SY Trunked Public Safety 700 MHz	6
	(blank)	SG Conventional Public Safety 700 MHz	27
		SY Trunked Public Safety 700 MHz	6
MO Total			44
MT	SANDERS	TS TV Studio Transmitter Link	2
MT Total			2
NV	CHURCHILL	SY Trunked Public Safety 700 MHz	1
	CLARK	SY Trunked Public Safety 700 MHz	49
NV Total			50
NY	BRONX	SG Conventional Public Safety 700 MHz	1
	KINGS	SG Conventional Public Safety 700 MHz	24

	NEW YORK	SG Conventional Public Safety 700 MHz	12
	QUEENS	SG Conventional Public Safety 700 MHz	1
	RICHMOND	SG Conventional Public Safety 700 MHz	1
	(blank)	SG Conventional Public Safety 700 MHz	23
NY Total			62
OH	ALLEN	SG Conventional Public Safety 700 MHz	2
	FULTON	SY Trunked Public Safety 700 MHz	18
	MIAMI	SG Conventional Public Safety 700 MHz	1
	MONROE	SG Conventional Public Safety 700 MHz	1
	STARK	SG Conventional Public Safety 700 MHz	9
	SUMMIT	SG Conventional Public Safety 700 MHz	1
	VAN WERT	TI TV Intercity Relay	1
	(blank)	SY Trunked Public Safety 700 MHz	30
OH Total			63
OR	BENTON	SY Trunked Public Safety 700 MHz	28
	CLACKAMAS	SY Trunked Public Safety 700 MHz	24
	JOSEPHINE	TS TV Studio Transmitter Link	1
	LINN	SY Trunked Public Safety 700 MHz	37
	MULTNOMAH	SY Trunked Public Safety 700 MHz	24
	(blank)	SY Trunked Public Safety 700 MHz	30
OR Total			144
TN	ANDERSON	SY Trunked Public Safety 700 MHz	5
	BRADLEY	SY Trunked Public Safety 700 MHz	10
		TS TV Studio Transmitter Link	1
	CAMPBELL	SY Trunked Public Safety 700 MHz	5
	CARTER	SG Conventional Public Safety 700 MHz	1
	HAMILTON	SY Trunked Public Safety 700 MHz	5
	KNOX	SY Trunked Public Safety 700 MHz	43
	LOUDON	SY Trunked Public Safety 700 MHz	23
	MCMINN	SY Trunked Public Safety 700 MHz	5
	MEIGS	SY Trunked Public Safety 700 MHz	5
	MONROE	SY Trunked Public Safety 700 MHz	5
	POLK	SY Trunked Public Safety 700 MHz	5
	RHEA	SY Trunked Public Safety 700 MHz	5
	ROANE	SY Trunked Public Safety 700 MHz	10
	SEVIER	SY Trunked Public Safety 700 MHz	35
	WASHINGTON	SG Conventional Public Safety 700 MHz	3
	WAYNE	SG Conventional Public Safety 700 MHz	3
	(blank)	SY Trunked Public Safety 700 MHz	116
TN Total			285
TX	BEXAR	SY Trunked Public Safety 700 MHz	40
	BRAZORIA	SY Trunked Public Safety 700 MHz	18
	COLLIN	SG Conventional Public Safety 700 MHz	5
		SY Trunked Public Safety 700 MHz	4
	DALLAS	SG Conventional Public Safety 700 MHz	9
		SY Trunked Public Safety 700 MHz	24

	DENTON	SY Trunked Public Safety 700 MHz	4
	GALVESTON	SY Trunked Public Safety 700 MHz	6
	HARRIS	SY Trunked Public Safety 700 MHz	84
	HOUSTON	SY Trunked Public Safety 700 MHz	6
	KAUFMAN	SY Trunked Public Safety 700 MHz	6
	LIBERTY	SY Trunked Public Safety 700 MHz	6
	PANOLA	SY Trunked Public Safety 700 MHz	6
	SMITH	SY Trunked Public Safety 700 MHz	8
	TARRANT	SG Conventional Public Safety 700 MHz	20
		SY Trunked Public Safety 700 MHz	9
	TRINITY	SY Trunked Public Safety 700 MHz	6
	UPSHUR	SY Trunked Public Safety 700 MHz	6
	WHARTON	SY Trunked Public Safety 700 MHz	5
	(blank)	SG Conventional Public Safety 700 MHz	3
		SY Trunked Public Safety 700 MHz	272
TX Total			547
VA	ARLINGTON	SY Trunked Public Safety 700 MHz	6
	FAIRFAX	SY Trunked Public Safety 700 MHz	6
	LOUDOUN	SG Conventional Public Safety 700 MHz	4
		SY Trunked Public Safety 700 MHz	6
	PRINCE WILLI	SG Conventional Public Safety 700 MHz	14
	ROCKINGHAM	SG Conventional Public Safety 700 MHz	1
	STAFFORD	SY Trunked Public Safety 700 MHz	10
	(blank)	SY Trunked Public Safety 700 MHz	10
VA Total			57
WA	KING	SY Trunked Public Safety 700 MHz	60
		YO Other Indust/Land Transp. 806-821/851-866 MHz, Trunked	1
	PEND OREILLE	SG Conventional Public Safety 700 MHz	3
	PIERCE	SY Trunked Public Safety 700 MHz	66
	SNOHOMISH	SY Trunked Public Safety 700 MHz	2
	(blank)	SY Trunked Public Safety 700 MHz	34
WA Total			166
WI	MILWAUKEE	SG Conventional Public Safety 700 MHz	4
WI Total			4
(blank)	(blank)	SG Conventional Public Safety 700 MHz	95
		SY Trunked Public Safety 700 MHz	153
		TI TV Intercity Relay	1
		TS TV Studio Transmitter Link	2
		TT TV Translator Relay	1
		YG Industrial/Business Pool, Trunked	1
(blank) Total			253
Grand Total			7244



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PUBLIC SAFETY OR COMMERCIAL USE? A COST/BENEFIT FRAMEWORK FOR THE D BLOCK

Abstract: The issue of whether the government should assign the D Block of spectrum to public safety or auction the spectrum for commercial use requires an assessment of the relative benefits and costs of these two alternatives. We propose such a framework, and preliminary analysis suggests that the 10 MHz D Block plausibly provides at least $3.4 billion more in social benefits if assigned to public safety rather than to commercial use. Much of this difference is attributable to the unique opportunity to create a contiguous 20 MHz block of spectrum, and to the fact that this opportunity exists only for the public safety community. As for the lost auction revenue, we observe that the loss of auction revenues today is more than offset by the gain of higher auction revenues and lower public safety network deployment cost in the future. Thus, an auction of the D Block adds, rather than relieves, stress to the public budget. Finally, we estimate that if policymakers choose not to give public safety the D Block and instead opt to require service obligations on other 700 MHz spectrum that would permit the encroachment of public safety users during episodes of resource scarcity, then such encumbrances could materially diminish the auction value of any newly allocated 700 MHz spectrum by as much as 86%.

I. Introduction

As part of the reallocation of the spectrum made available by the digital television ("DTV") transition, the Federal Communications Commission boldly attempted to create, and fund, a nationwide interoperable public safety network. To make a very complicated story simple, as

part of the DTV transition, Congress set aside approximately 10 MHz of the new spectrum for public safety use (commonly referred to as the "Public Safety Broadband" allocation or "PSB"). When the FCC set up its auctions for the DTV spectrum, it placed the PSB next to a contiguous 10 MHz of spectrum (the D Block) that was to be auctioned, so the theory went, to create a public/private partnership that could be used for both commercial and public safety purposes utilizing both the D Block and the PSB.[1] However, due to the public service obligations imposed on the D Block auction and the questionable logic of the scheme, the auction effort failed, an outcome of little surprise to anyone.[2] Today, three years after the failed auction, the debate about what should be done next about the D Block is fully engaged.[3]

Given the observed failure of the "public/private partnership" approach, the rapid rise in public safety capacity demands, and the unique benefits of combining the PSB and the D Block, the public safety community has requested that the Federal government forgo the auction of the D Block and directly assign it to public safety. This allocation would thus provide for a full 20 MHz of contiguous prime spectrum that could be used to construct a modern, interoperable nationwide public safety communications network.[4] The FCC to date has rejected this request, planning instead to auction the D Block on an unencumbered basis for commercial use (subject to technical capability for public safety broadband use),[5] although the agency has granted some waivers to begin operations in the PSB.[6] In the FCC's view, any shortfall in capacity on the

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1 *In the Matter of Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems; Section 68.4(a) of the Commission's Rules Governing Hearing Aid-Compatible Telephones Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services; Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission's Rules Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010 Declaratory Ruling on Reporting Requirement under Commission's Part 1 Anti-Collusion Rule*, FCC 07-132, SECOND REPORT AND ORDER, __ FCC Rcd ___ (rel. Aug. 10, 2007) at ¶¶ 325-36.

2 *See, e.g.*, Art Brodsky, *Public Safety Doomed "D Block" Auction To Failure*, Public Knowledge Blog (March 26, 2008) (available at: http://www.publicknowledge.org/node/1479); Mathew Lasar, *700 MHz D Block Autopsy: Public Safety Net Concept Was Doomed*, ARS TECHNICA (April 27, 2008) (available at: http://arstechnica.com/old/content/2008/04/700mhz-d-block-autopsy-public-safety-net-concept-was-doomed.ars).

3 Auction 73 was closed on March 18, 2008 (http://wireless.fcc.gov/auctions/default.htm?job=auction_factsheet&id=73).

4 *See, e.g.*, Public Safety Alliance, *"What's at Stake"*, available at: http://www.psafirst.org/what-is-at-stake.

5 CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN, Federal Communications Commission (March 16, 2010) (available at: http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296935A1.pdf) (hereinafter the *National Broadband Plan*) at 86.

6 *See In Re Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, WT Docket No. 06-150; *Implementing a Nationwide Broadband, Interoperable Public Safety Network in the 700 MHz Band*, PS Docket No. 06-229; *Amendment of*

(Footnote Continued....)

public safety network can be resolved by roaming agreements with commercial carriers.[7] And, of course, an auction brings with it the potential to enrich the Treasury with much needed revenues.[8]

Interestingly, the White House has rejected the FCC's proposal and has sided with the public safety community, explicitly calling for the reallocation of the full 20 MHz of contiguous spectrum to build a modern, interoperable nationwide public safety network.[9] Such a position is consistent with the "Public Safety Spectrum and Wireless Innovation Act" recently introduced by Commerce Committee Chairman Senator Jay Rockefeller (D-WV), which would also give public safety the entire 20 MHz of the D Block and PSB.[10] This plan has received wide bi-partisan support,[11] although the FCC was reportedly opposed to it.[12] Other policymakers from both political parties, however, have views more aligned with those of the Commission,

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Part 90 of the Commission's Rules, WP Docket No. 07-100; *Third Report and Order* and *Fourth Further Notice of Proposed Rulemaking*, FCC 11-6, ___ FCC RCD __ (rel. January 26, 2011) at ¶ 4.

[7] *A Broadband Network Cost Model: A Basis for Public Funding Essential to Bringing Nationwide Interoperable Communications to America's First Responders*, OBI TECHNICAL PAPER NO. 2 (May 2010) at 1 (available at: http://download.broadband.gov/plan/fcc-omnibus-broadband-initiative-(obi)-technical-paper-broadband-network-cost-model-basis-for-public-funding-essential-to-bringing-nationwide-interoperable-communications-to-americas-first-responders.pdf) (hereinafter *"Broadband Network Cost Model"*); *see also* Jon Peha, *The Public Safety Nationwide Interoperable Broadband Network: A New Model for Capacity, Performance and Cost*, FCC White Paper (June 2010) at 18 ("The network is based on the availability of 10 megahertz of spectrum dedicated to public safety use by Congress, which provides public safety with substantially more spectrum per user than major commercial networks, providing them with the required capacity and performance for critical communications needs. Roaming and priority access will provide additional capacity on up to 70 megahertz or more of spectrum")(available at: http://fcc.gov/pshs/docs/releases/DOC-298799A1.pdf).

[8] *See, e.g.*, Oral Testimony of Coleman Bazelon, The Brattle Group, U.S. House of Representatives, Committee on Energy and Commerce Subcommittee on Communications, Technology, and the Internet (June 17, 2010).

[9] White House Press Release, *President Obama Details Plan to Win the Future through Expanded Wireless Access* (February 10, 2011) (available at: http://www.whitehouse.gov/the-press-office/2011/02/10/president-obama-details-plan-win-future-through-expanded-wireless-access).

[10] Available at: http://commerce.senate.gov/public/?a=Files.Serve&File_id=6321ae2e-fc48-412a-8eaf-15c848bc7047. To alleviate the "spectrum crunch", Senator Rockefeller is also including the bold idea of "incentive auctions" to try to coax broadcasters to free up additional spectrum. According to a study by CEA and CTIA, such incentive auctions can be expected to generate over $30 billion in new revenue, some of which can be used to fund the new public safety network. *See, Broadcast Spectrum Incentive Auctions*, White Paper prepared by CTIA: The Wireless Association and CEA: Consumer Electronics Association (February 15, 2011).

[11] http://www.house.gov/apps/list/hearing/ny03_king/dblockreallocation.html.

[12] Sara Jerome, *Rockefeller: FCC was "Not Happy" with his Public Safety Communications Plan*, THE HILL (February 6, 2011) (available at: http://thehill.com/blogs/hillicon-valley/technology/142345-sen-rockefeller-fcc-was-not-happy-with-his-public-safety-plan).

and are calling for the prompt auction of the D Block for commercial purposes.[13] This intra-governmental quibbling proceeds unabated as the public safety community waits to build a modern communications network.

Resolution to the D Block issue is a complex problem. Here, we present an economically-valid framework—heretofore absent from the debate—within which we can evaluate the cost and benefits of the relevant alternatives. While we cannot claim to answer every question relevant to the allocation decision and some of our estimates are necessarily speculative (e.g., what is the social value of public safety?), our analysis suggests that the assignment of the D Block to public safety is advised, with a net benefit of $3.4 billion dollars even when we pointedly ignore the benefits of the additional spectrum for the provision of public safety. The cost-benefit calculus depends largely on the benefits arising from the technical and economic advantages of contiguous spectrum and the relatively small impacts of a temporary, incremental increase of 10 MHz of spectrum on market outcomes. While more research on this topic is warranted, we hope future contributions will adhere to an explicit, rational framework for analysis.

II. A Decision Framework

A sensible decision framework begins by recognizing there are costs and benefits to all actions. If alternatives are mutually exclusive, as is the assignment of a *particular* 10 MHz block of spectrum, then assignment to one party excludes assignment to any other. In other words, assignment has an opportunity cost, and the proper accounting of such costs and their offsetting benefits is critical to rational decision making. The goal of public policy is to maximize economic well-being by choosing the option with the highest net value to the people of the United States.

A review of the D Block debate suggests the following characterization. Today, there is 10 MHz of spectrum that can be allocated either for public safety or for commercial purposes.[14] This D Block is contiguous to the 10 MHz PSB block already dedicated to public safety, permitting a unique opportunity for a public safety network of 20 MHz using contiguous

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[13] *See, e.g.*, Sara Jerome, *Blackburn Supporting D Block Auction*, THE HILL (January 24, 2011); Sara Jerome, *GOP Torn Between Homeland Security, Fiscal Restraint in Public Safety Fight*, THE HILL (January 26, 2011) (available at: http://thehill.com/blogs/hillicon-valley/technology/140475-gop-torn-between-homeland-security-fiscal-restraint-in-public-safety-fight); Rep. Henry Waxman, *Emergency System Needs Upgrade*, ROLL CALL (July 8, 2010)(available at: http://www.rollcall.com/features/Technology_Telecommunications/tandt/-48166-1.html).

[14] We ignore other alternatives not part of the present debate.

spectrum.[15] In the relatively near future, according to the FCC and the Obama Administration, there will be much more spectrum available. The Federal government is in the process of adding an additional 500 MHz of spectrum for commercial use, with 300 MHz of that spectrum intended to be online by 2015.[16] The need for additional spectrum for the commercial sector has been established, and the evidence indicates that public safety's current and expected needs exceed 10 MHz.[17] Thus, we assume there will be another 10 MHz that must be allocated to whichever party does not receive the current allocation. However, this new spectrum will not be contiguous to the PSB, and the D Block will not be contiguous to this new spectrum. Additionally, this future 10 MHz block allocation is assumed to be part of a contiguous block, an option likely to become available as the government reassigns 500 MHz of spectrum to commercial uses. The issue, therefore, is about the timing of benefits and costs, with one type accruing now and the other later.

Given this specification, there are two relevant options to consider in a cost-benefit tradeoff. In the first option, the D Block spectrum, which is contiguous to the PSB 10 MHz already assigned to public safety, is allocated to the public safety community, which precludes its auction now to the commercial sector. This choice permits the benefits and costs derived from public safety's use of the spectrum to accrue now, while postponing the benefits and costs from commercial use of this additional 10 MHz of spectrum into the future. That is, allocating the

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[15] *See, e.g.*, Public Safety Alliance, *House of Cards: FCC's Capacity White Paper Built on Assumptions and Conjecture* (July 2, 2010) at 3 ("Since the D-Block spectrum is adjacent to the public safety broadband allocation, it is uniquely positioned to provide the needed additional capacity throughput for a public safety agency's entire coverage area including the cell edge where throughput decreases significantly. Any alternative spectrum offered in other bands will be less efficient. Additional components would be required which would increase the cost and reduce performance of broadband devices. Non-adjacent spectrum blocks of the same size as the D Block will not provide as much throughput capacity, since greater efficiency is achieved through spectrum aggregation.").

[16] *National Broadband Plan* at XII ("Make 500 megahertz of spectrum newly available for broadband within 10 years, of which 300 megahertz should be made available for mobile use within five years."); Remarks by Lawrence H. Summers, *Technical Opportunities, Job Creation and Economic Growth* (June 28, 2010) (available at: http://www.whitehouse.gov/administration/eop/nec/speeches/technological-opportunities-job-creation-economic-growth); *Plan and Timetable to Make Available 500 Megahertz of Spectrum for Wireless Broadband*, Department of Commerce (October 2010)(available at: http://www.ntia.doc.gov/reports/2010/TenYearPlan_11152010.pdf).

[17] Bill Schrier, Chief Technology Officer, City of Seattle, *Public Safety, Government, Wireless and Spectrum*, National League of Cities (May 27, 2010) (""[M]ost urban areas will rapidly outgrow the capacity of the 10 MHz allocated by the FCC for the public safety networks."); Andrew Seybold, *Response to Roberson and Associates, LLC White Paper entitled "Technical Analysis of the Proposed 700 MHz D-Block Auction, dated August 23, 2010, contracted for by T-Mobile USA, Inc.",* (September 10, 2010) at 5 (available at: http://andrewseybold.com/wp-content/uploads/2010/09/ResponseT-MobileWP09-10-10FNL.pdf) ("Data usage has grown on commercial networks in the order of 5000% in only the past three years. Demand will follow the same curve as the commercial broadband sector as new applications and devices become available for Public Safety…").

contiguous D Block to public safety only *postpones* the allocation of an additional 10 MHz for commercial purposes (which the "new" block comes from the 500 MHz of spectrum promised by the FCC and the Obama Administration). In the second option, the D Block is auctioned for commercial purposes now, precluding its assignment for public safety purposes. In this case, the incremental benefits and costs from commercial use accrue now, but the benefits and costs of public safety's use are postponed. Framed in this way, the relevant issue is not whether the 10 MHz is used for public safety or used for commercial use, but rather *when* and *which* 10 MHz is put to use in both, and how the size and timing of benefits compare between these two alternatives.

More formally, let B_s^t represent the incremental benefits and C_s^t the incremental cost of an additional 10 MHz of spectrum assigned to sector s at time t, where s has values P for public safety and A for commercial application, and where t is 0 for the present and 1 for the future. The incremental net value of public safety assignment of the D Block today is $V_P^0 = B_P^0 - C_P^0$ today, and $V_P^1 = B_P^1 - C_P^1$ in the future. In the same way, we have net benefit V_A^0 if the 10 MHz is auctioned for commercial purposes today, and V_A^1 given future allocation. Applying the constraint that each party receives a 10 MHz block, then the best policy decision is simply to take the highest value of the two sums $V_P^0 + V_A^1$ (i.e., public safety now, auction later) and $V_A^0 + V_P^1$ (i.e., auction now, public safety later).[18] The D Block spectrum should be given to public safety if $V_P^0 + V_A^1 > V_A^0 + V_P^1$, or equivalently, $V_P^0 - V_P^1 > V_A^0 - V_A^1$. Notably, all the costs and benefits that enter into these valuations are incremental to the status quo. That is, costs and benefits are measured only for the additional 10 MHz allocation.[19]

Armed with this simple but useful framework, we can provide some meaningful commentary on this important issue and interpret some of the available evidence in a pertinent manner. In what follows, we evaluate some of the evidence and issues using the cost-benefit framework, and we believe this exercise is highly informative.

III. Assigning the D Block to Commercial Use

The total economic benefits of commercial use include profits and consumer surplus, where these benefits are only those added by the addition of 10 MHz of spectrum. As for profits, assuming there are a few relatively homogeneous bidders, the profits from the added spectrum

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[18] We ignore the possibility of either party getting both allocations.

[19] The upper 10 MHz of the D Block is already allocated to public safety and a network will be built to use that spectrum. Those costs are not incremental to the D Block.

will be largely dissipated at auction.[20] Based on an econometric analysis of the more recent spectrum auctions in the U.S., if the FCC auctioned the D Block on a truly unencumbered basis, then we could expect the auction to generate revenues in the range $1.3 to $3.3 billion.[21] There are, however, many reasons to expect this range of potential revenues is too high, including the Commission's recent track record of trading off auction revenues for other goals.

First, as seen in the earlier attempt to auction the D Block, public service obligations levied on the commercial license holder substantially reduce the value of spectrum. Only one bid was received in that auction ($472 million) and it was well below the minimum bid established by the Commission ($1.3 billion). The public safety encumbrances, therefore, imposed costs of about $0.8 to $2.8 billion, as reflected in the low bid value.[22] Given the lack of any service rules for the re-auction of the D Block, it is unclear what public safety encumbrances will be placed on the spectrum. The *National Broadband Plan* proposes that the commercial use be "technically compatible with the public safety broadband services," so some constraints will be placed on a commercial winner.[23] If there is an auction, and in light of the current debate, then we suspect there will be significant political pressure to impose public safety obligations on the D Block.[24] Thus, the expected auction revenues should be reduced to account for some types of public service obligations. If these obligations are even half as burdensome as those in the original auction, then the reduction in auction revenue would still be a sizeable 40%.

Second, the Commission has imposed certain obligations on spectrum blocks set for auction. For example, the Commission imposed stringent open platform obligations in the C Block auction of the 700 MHz spectrum, with disastrous results. Indeed, the conditions placed on the C block reduced auction revenues by a whopping 32%, with little to no perceptible benefit.[25]

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[20] G.S. Ford, T.M. Koutsky and L.J. Spiwak, *Using Auction Results to Forecast the Impact of Wireless Carterfone Regulation on Wireless Networks*, PHOENIX CENTER POLICY BULLETIN NO. 20 (Second Edition) (May 2008) (available at: http://www.phoenix-center.org/PolicyBulletin/PCPB20Final2ndEdition.pdf).

[21] Estimated from the regression analysis and data presented in *Using Auction Results, id.* The difference between the lower and upper estimates is based on the REA and Auction 73 premium.

[22] Assuming an unencumbered auction revenue range of $1.3 to $3.3 billion.

[23] *National Broadband Plan, supra* n. 5, p. 76.

[24] *See, e.g., Whitepaper: Technical Analysis of the Proposed 700 MHz D-Block Action*, Prepared for T-Mobile by Roberson and Associates, Inc. (August 23, 2010) (available at: http://fjallfoss.fcc.gov/ecfs/comment/view?id=6015952735), arguing that the D Block can effectively be shared under a public safety obligation. We provide no comment on the legitimacy of the analysis, but simply note that its relevance presumes the FCC will impose a public safety obligation on the D Block and that such obligations reduce expected auction revenues.

[25] *Using Auction Results, supra* n. 20.

Although the Commission did not go as far when it promulgated its recent *Open Internet Order*, the Commission did impose some obligations on wireless network operators and, equally important, threatened to extend the full C Block conditions to other commercial licensees if circumstances warrant.[26] Accordingly, it is not unreasonable to expect that the Commission could extend obligations to the D Block, including C Block-type obligations, and, as such, we expect the auction revenues for the D Block to be lower than a naïve model would predict.

Third, given the Commission's recent *Harbinger* decision[27] and concerns expressed in its *14th CRMS Report* about industry concentration[28], it is also not unreasonable to assume that the Commission may exclude some bidders from the auction.[29] A reduction in the number of bidders, particularly if these potential bidders are large firms, is likely to reduce the expected auction revenue (ceteris paribus).[30]

Finally, the economic health of the country has deteriorated since the bidding in Auction 73. Thus, the D Block auction should not be expected to produce as much revenue as the earlier auctions. Coleman Bazelon estimates that the economic crisis will reduce the expected value of spectrum by approximately 20%.[31]

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[26] *In re Preserving the Open Internet, Broadband Industry Practices*, FCC 10-201, REPORT AND ORDER, ___ FCC Rcd ___ (rel. December 23, 2010) at ¶135 (hereinafter "*Open Internet Order*").

[27] *In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993 Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, FOURTEENTH REPORT, FCC 10-81, __ FCC Rcd __ (rel. May 20, 2010) (hereinafter "*Fourteenth CMRS Report*").

[28] *In the Matter of SkyTerra Communications, Inc. and Harbinger Capital Partners Funds, Applications for Consent to Transfer of Control*, MEMORANDUM OPINION AND ORDER AND DECLARATORY RULING, DA 10-535 (rel. March 26, 2010) (hereinafter the *Harbinger Order*). For a full discussion of *Harbinger Order*, *see* George S. Ford and Lawrence J. Spiwak, *The Broadband Credibility Gap*, PHOENIX CENTER POLICY PAPER NO. 40 (June 2010) (available at: http://www.phoenix-center.org/pcpp/PCPP40Final.pdf), *and forthcoming in* 19 COMMLAW CONSPECTUS (2011).

[29] *C.f.*, Public Knowledge, "Spectrum Reform" ("The best method for ensuring that the spectrum is not simply bought by incumbent broadband providers is by limiting their eligibility to bid – either through a flat prohibition or spectrum caps.")(available at: http://www.publicknowledge.org/issues/spectrum-reform); Gregory Rose and Mark Lloyd, *The Failure of FCC Spectrum Auctions*, Center for American Progress (May 2006).

[30] Auction theory indicates that a reduction in the number of bidders will reduce auction prices in an ascending, second-price auction. *See, e.g.*, L. Phlips, THE ECONOMICS OF IMPERFECT INFORMATION (1988), Ch. 4. Accordingly, a cynical interpretation of the debate might be that the D Block presents an opportunity for some industry participants to buy spectrum at reduced prices due to the likelihood the present Commission will exclude some bidders, and in doing so establish precedent for such exclusions in future auctions.

[31] C. Bazelon, *The Need for Additional Spectrum for Wireless Broadband: The Economic Benefits and Costs of Reallocations*, The Brattle Group (October 2009) (available at: http://www.brattle.com/_documents/uploadlibrary/upload809.pdf).

Given these four factors, we expect the auction revenue from the D Block to be considerably less than the estimated range based on prior auctions ($1.3 to 3.3 billion). An auction of the D Block, depending on the rules, could produce less than $1 billion in revenue, and we suspect this low revenue amount is plausible given the current regulatory climate. We suspect auction revenue is unlikely to exceed $2 billion in the best *plausible* scenario but, again, such predictions are necessarily speculative.

Factors Reducing Auction Value of the D Block
1. Public Safety Obligations
2. Other Obligations, such as Open Internet/Platform Obligations
3. Excluded Bidders
4. Economic Crisis

As for consumer surplus additions, this relatively small addition of spectrum to the commercial sector (currently licensed 572 MHz by the Commission's count) is unlikely to be a game changer.[32] The consumer surplus gains from commercial assignment are limited to what little competitive effects may arise from the added spectrum. To evaluate this issue, we adopt a common, widely-used model of price formation familiar from previous analyses in telecommunications. Assuming Cournot Competition in Quantities, unit elasticity of demand, and a Hirschman-Herfindahl Index ("HHI") of 2500, we estimate the addition of 10 MHz of spectrum will reduce prices by about 0.6%.[33] Given a total market size of $160 billion, consumer

[32] *OBI Technical Paper No. 6*, p. 15 ("547 MHz, in total, is currently licensed under flexible use rules, which allows for mobile broadband and voice services").

[33] Price is defined as $P = cN/(N - 1)$, where c is marginal cost and N is the number of firms, taken to be the numbers-equivalent of the HHI (=1/HHI). Based on recent estimates, we assume an HHI of 2,500 producing an N of 4. *See 14th CMRS Report, supra* n. 27, at 51 (2,848) and Table 41 (2,200). Assuming 547 MHz of spectrum available, the addition of 10 MHz of spectrum is treated as the equivalent of adding 0.07 firms, resulting in a price cut of 0.6%. *See, e.g.*, J. Sutton, *Sunk Costs and Market Structure* (1995), Ch. 3; J.B. Duvall and G.S. Ford, *Changing Industry Structure: The Economics of Entry and Price Competition*, PHOENIX CENTER POLICY PAPER NO. 10 (April 2001) (available at: http://www.phoenix-center.org/pcpp/PCPP10Final.pdf) *and reprinted in* 7 TELECOMMUNICATIONS & SPACE LAW JOURNAL 11 (2001).

surplus gains (net of transfers) from this price cut are then about $600 million, annually.[34] While other models of price formation would yield different results, the Cournot approach used here is familiar, plausible, and implementable using relatively little information.

Another piece of the valuation puzzle arises from the fact that the future 10 MHz of spectrum could be part of a contiguous block. Turning again to the econometric analysis of previous auctions, the auction revenue from a contiguous 10 MHz block is expected to bring a premium of $2 to $6 billion (other things constant).[35] We assume that a 10 MHz block auctioned to commercial use in the future will be contiguous and will have an auction premium of $4 billion (the mid-point of the range).

Turning to the question of value, we can use this analysis to get a rough approximation of $V_A^0 - V_A^1$. Assuming the auction revenues are $2 billion, consumer surplus gains are $0.6 billion annually, the contiguous block premium is $4 billion, and the difference between time 0 and 1 is five years, the value difference from delay of the auction of 10 MHz is about $0.6 billion (= 2B + 2.6B - 4B).[36]

IV. Assigning the D Block to Public Safety

Perhaps the most daunting, yet relevant, question regards the social benefits of "public safety." Such benefits are real but difficult to quantify and, absent immediate crisis, prone to be undervalued. If we faced another event like 9-11 or Hurricane Katrina, we believe the 20 MHz would be allocated to public safety immediately and the network fully funded in a week's time. Fortunately, we are not presently victims of such a crisis and, though the lack of crisis makes the spectrum allocation decision a more difficult one, this is a burden we welcome. For the moment, we choose to set aside the quantification of the benefits of an additional 10 MHz of spectrum for public safety, looking instead at the cost side of equation.

Spectrum is not homogeneous. Not only is the 700 MHz spectrum highly valuable because its technical properties are well-suited for mobile communications, including broadband

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[34] The change in consumer surplus under unitary elasticity is market size in terms of expenditures (about $160 billion in 2010) multiplied by the natural log of the ratio of the new price to the old price. For expenditure data, see *Wireless Industry Indices: Mid-Year 2010 Results*, CTIA (November 2010) (available at: http://files.ctia.org/pdf/CTIA_Survey_Midyear_2010_Graphics.pdf).

[35] *Using Auction Results, supra* n. 20.

[36] We assume a discount rate of 4.4%. The discount rate is the government recommended discount rate for social projects evaluated over a twenty-year window. *See* OMB Circular No. A-94, APPENDIX C (Revised December 2009) (http://www.whitehouse.gov/OMB/circulars/a094/a94_appx-c.html).

Internet services, but for the public safety community the D Block has added value because it is contiguous to the PSB, which is already allocated to the public safety community. A contiguous block of 20 MHz of spectrum is substantially more valuable than 20 MHz of non-adjacent spectrum. As noted above, a 10 MHz block of contiguous spectrum in the 700 MHz band is worth about $2 to $6 billion more than a non-contiguous block of the same size.

While this value differential is estimated based on commercial use, much of this premium is based on the lower cost of deploying network for contiguous spectrum, which would likewise apply to public safety. Evidence suggests that the cost of the public safety network using 20 MHz of spectrum is probably about $10 billion.[37] Andrew Seybold, a highly regarded wireless industry expert, suggests that expanding a 10 MHz public safety network to 20 MHz adds about 15% to 25% to network deployment costs.[38] By this standard, the incremental cost of the additional 10 MHz is about $1.5 to $2.5 billion.[39] Alternately, adding a non-contiguous block of 10 MHz of spectrum to the public safety network would cost about $5 to $7.5 billion in deployment costs.[40] Assignment of the D Block to public safety, therefore, is likely to reduce the cost of the public safety network by around $4 billion in network deployment costs alone. Operational costs are likely to be lower as well, perhaps adding billions more to the savings.

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[37] White House, *supra* n. 9 (assigning $7 billion in construction costs); *Broadband Network Cost Model*, *supra* n. 7 ($6.3 billion for a 10 MHz network).

[38] A. Seybold, *Comments on the FCC White Paper: Federal Communications Commission Omnibus Broadband Initiative A Broadband Network Cost Model: A Basis for Public Funding Essential to Bringing Nationwide Interoperable Communications to America's First Responders*, Working Paper (April 26, 2010), p. 15 (available at: http://andrewseybold.com/wp-content/uploads/2010/04/Comments-FCCWP-Final-April-27-2010.pdf). The FCC study, *Broadband Network Cost Model*, *supra* n. 7, claims an additional 10 MHz of spectrum would substantially *increase* the cost of the public safety network, but we find the extreme assumptions of that analysis to be unreasonable and in violation of economic logic. Seybold, *supra* n. 38 also rejects the agency's argument ("The Commission seems to believe that there are only two choices for building out the public safety broadband network. The first choice is its option to essentially combine it with the commercial networks except for some of the radio equipment. The second is to provide a totally separate and standalone network. The FCC does not take into account that between these two extremes is a number of options that can and should be explored.").

[39] Expanding commercial networks is also costly. There is little reason to suspect that the cost of a commercial expansion to additional 10 MHz will be much different than for the public safety community. For example, it was announced that Verizon is expected to spend $4 billion in equipment alone to deploy LTE, which is about $180 million per MHz of 700 MHz spectrum. For 10 MHz, the cost would be about $1.8 billion. *Verizon Wireless Awards Alcatel-Lucent Contract Expected to be Worth US $4 Billion for Ongoing 3G Network Expansion and LTE Build out*, Alcatel-Lucent Press Release (Nov. 4, 2010) (available at: http://www.alcatel-lucent.com/wps/portal/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLd4x3tXDUL8h2VAQAURh_Yw!!?LMSG_CABINET=Docs_and_Resource_Ctr&LMSG_CONTENT_FILE=News_Releases_2010/News_Article_002258.xml).

[40] Seybold, *supra* n. 38 at p. 15.

Moreover, the cost to deploy the 700 MHz band is much lower than other bands (some estimates are 70% lower than other bands). Thus, depending on what additional spectrum is provided to the public safety community if they do not receive the current 10 MHz block, the ultimate deployment costs could be substantially higher (though this differential may also apply to the commercial licensee). We leave a more sophisticated assessment of such costs to others, and assume here that the cost difference is $4 billion.

While we have not addressed the benefits of public safety's use of the additional 10 MHz of spectrum, which could be quite large, we can see that the contiguous spectrum premium of $4 billion is itself sufficient to offset the value of commercial assignment of an additional 10 MHz ($0.6 billion). Let Z be the marginal benefits from enhanced public safety created by the combination of the D Block for public safety use. From our cost-benefit framework, the relevant decision criterion for assignment to public safety is

$$V_P^0 - V_P^1 > V_A^0 - V_A^1, \tag{1}$$

approximated here to be

$$Z + \$4 \text{ billion} > \$0.6 \text{ billion}, \tag{2}$$

which plainly holds, even without sizing Z (where $Z > 0$ and potentially is very large). Even if the 10 MHz provided zero benefit in terms of enhanced public safety, then assignment of the D Block to public safety produces $3.4 billion in additional social value over and above the commercial value of the same block. (Of course, this is a result of the constraints we imposed on the problem, i.e., 10MHz of spectrum would be provided to public safety one way or another.) We have also ignored the value of spectrum currently used for narrowband purposes by public safety that may be repurposed for commercial use as a result of migrating existing public safety capacity demands to the D Block and PSB.[41]

Notably, much of this value spread arises from the unique opportunity to create significant value by allocating a contiguous block of spectrum to public safety, and then doing so in the future for commercial use. This value is foregone by commercial allocation of the D Block today. While some may contest our estimates, it is necessary to account for the economic value arising from contiguous spectrum.

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[41] For example, Section 205(3) of the Rockefeller Bill, *supra* n. 10, requires the Commission to conduct a report within five years of enactment that examines, among other things, to determine whether there is an "opportunity for return of any spectrum to the Commission for auction to commercial providers to provide revenue to the Treasury of the United States."

V. An Alternative: Public Safety Encumbrances on Commercial Networks

Thus far in this analysis, we have assumed that if the D Block is used for commercial services, then an additional, non-contiguous 10 MHz block will be assigned for public safety use in the future. A realistic alternative to this grant of additional spectrum for public safety is simply to impose encumbrances on other 700 MHz spectrum that permit the encroachment of public safety users during episodes of resource scarcity. Unfortunately, however, it was exactly this approach that produced such miserable results in the first D Block auction. There are many complex issues that must be resolved with any sort of sharing scheme of this type, and such resolutions can be very costly. As revealed in Auction 73, public safety encumbrances substantially reduce the value of spectrum. Auctions revenues from an unencumbered D Block would have been about $3.3 billion, whereas the only bid for the encumbered block was a paltry $472 million—a mere 14% of its revenue potential.

Consider, for the moment, that incentive auctions for broadcast spectrum, which have been proposed in the Rockefeller bill, permit the recovery and repurposing of 120 MHz of quality spectrum. One study estimates that the auction revenues from this spectrum would be $35 billion, with a net value of $33 billion after relocation of existing licensees.[42] Our earlier research suggests that these predicted auction revenues are plausible.[43] Applying public safety obligations on this spectrum, however, would materially diminish its value. From the failed D Block, we might conclude that public safety obligations would reduce the auction value of the 120 MHz of spectrum to as little as $5 billion (= 35 × 0.14), a loss in revenues of $30 billion or 86% of its potential. This calculation likely represents the upper boundary of lost auction revenues since it presumes the encumbrances apply equally to all 120 MHz. Alternately, at the other extreme, using the size of the D Block in proportion, the reduction in auction revenues would be more to the tune of $2.5 billion, which is still a sizeable amount and probably more than the sale price of the D Block in a present day auction.[44] Notably, both numbers are underestimates of the total value loss since they measure only the loss in private value from the spectrum. We have ignored in these calculations the higher cost and diminished value to the public safety community (and those they serve) due to the reduced functionality inherent to a sharing of networks purposed mainly for commercial use. The fact of the matter is that no

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[42] *See supra* n. 10.

[43] We estimate a 10 MHz block could yield $3.3 billion in auction revenue. A total of 120 MHz of spectrum, in turn, would render about $40 billion. We note there are factors that could raise or lower auction revenues in the future such as encumbrances, market conditions, the number of bidders, and so forth.

[44] A 10 MHz block is 8.3% of a 120 MHz block. Assuming $35 billion in unencumbered auction revenues, each 10 MHz would bring $2.9 billion (on average). Applying the 14% factor from Auction 73, an encumbered D Block would yield only $408 million in auction revenue, cutting auction revenues by about $2.5 billion.

government agency can guarantee public safety quality access to commercial spectrum on an as-needed basis.

In all, we believe the use of encumbrances will be more costly than the assignment of an additional 10 MHz in the future (as we have modeled the issue above). So that our estimates are conservative, we do not incorporate the costs of this alternative in our calculations. Any proposal adopting this option for supplying spectrum resources to the public safety network should provide a careful study of the loss of auction revenues and the dollar value of the reduced functionality and higher costs of such a network.

VI. Conclusion

The assignment of the D Block spectrum to public safety or commercial use requires an assessment of the relative benefits and costs of these two alternatives. We propose an economically sensible cost-benefit framework in the POLICY BULLETIN. An assessment of the Commission's record and other evidence within this framework suggests that D Block assignment to public safety has a higher value, producing no less than $3.4 billion more in social benefits than commercial use. Much of this difference is attributable to the unique opportunity to create a contiguous 20 MHz block of spectrum, and the fact that this opportunity exists only for the public safety community. We recognize that this issue is complex and our analysis is preliminary. That said, our work includes many of the "big ticket items", such as potential auction revenues. However, the calculations ignore any incremental benefits to society from the use of the additional 10 MHz block by the public safety community. As these gains are likely to be large, the economics seems to lean strongly in the direction of an assignment of the license to public safety. We suggest more research on this topic, but encourage future contributions to adhere to an explicit, rational framework for analysis.

At the forefront of the debate over the D Block is the potential for auction revenue. If the D Block is assigned to public safety, then the auction revenues from the 10 MHz block are forgone. The argument has been made that auctioning the spectrum will provide revenues to help fund the public safety network and perhaps aid in deficit reduction. We argue that this argument is invalid; we observe that the loss of auction revenues today are more than offset by the gain of higher auction revenues in the future and lower public network deployment costs . Thus, the auction adds, rather than relieves, stress to the public budget. Moreover, the Rockefeller bill, which allocates the D Block to public safety, also permits the use of incentives auctions to recover high-quality broadcast television spectrum that can then be re-purposed for mobile services. According to some, this spectrum is expected to generate just over $35 billion in auction revenues, the sum of which could be used for funding the public safety network and deficit reduction. Thus, while the D Block may offer a unique opportunity for the public safety network, it is not exceptional in its ability to generate auction revenues for the federal coffer.

The allocation of spectrum resources is an inherently complex issue. In the case of the D Block, complicating the choice is the fact that while the economic benefits of public safety are exceedingly difficult to quantify, the social goal of ensuring the safety of all Americans is nonetheless at stake. Fortunately, even if we value this security benefit at zero, our analysis shows that allocation to public safety is still preferred even on purely economic grounds. In our view, based on the analysis presented above, and absent evidence to the contrary, we believe the D Block should be combined in a contiguous 20 MHz block for use by the public safety community.

ANDREWSEYBOLD

June 2, 2011

Public Safety Voice Interoperability

Some in Congress and on the House Energy and Commerce Committee are pointing to a March 18, 2011 memo from the Congressional Research Service (CRS)[1] to assert that the Public Safety Community has wasted more than $13 billion in federal grants for radio communications systems since 2001. In reality, the grants have totaled less than $4 billion and they have, in fact, provided for a higher level of Public Safety interoperability than ever before. In order to fully understand the impact of these grants, it is important to understand the many and varied issues that must be addressed if the ultimate goal of nationwide interoperability is to be achieved for both voice and data services for Public Safety.

Interoperability between various Public Safety agencies had been an issue long before it was brought to public attention during 9/11, Katrina, and other disasters. Articles dating back several decades have pointed out both the need and the issues that must be overcome in order to provide the Public Safety community with interoperable voice and data.[2] Indeed, Public Safety and the Big 7 state and local government associations initially secured the 24 MHz derived from digital TV transition in the wake of the communications failures first responders experienced at the site of the domestic terrorist bombing of the Alfred Murrah building in Oklahoma City in 1994. At that site, firefighters and police officers conducting search and rescue could not speak to each other on their radios within different floors of the building and had to resort to talking to dueling command centers set up outside the site, and couriers running back and forth between the two command centers.

Three major factors have significantly hindered Public Safety's efforts to achieve mission-critical voice interoperability:

1) Public Safety's currently allocated spectrum is in small segments spread out over at least seven different portions of the radio spectrum.
2) Because this spectrum has been in use by Public Safety for many years, interoperability must start at the local level, then the regional, state, regional interstate level, and finally at the national level (and at international borders as well).
    a. Most of the money expended to date has resulted in better interoperability on a local, regional, and state level, interstate regional, and on international borders, but because of the lack of enough spectrum in any given FCC allocation, this process is slow, tedious, and expensive.
    b. The Public Safety broadband network will be built on greenfield, that is, unused spectrum. Therefore, it will be possible to design and implement this new network as a fully interoperable network from the beginning, something that has never before been possible for the Public Safety community.

3) Within each portion of the allocated spectrum, different Public Safety departments make use of different types of radios and radio configurations to meet their own individual coverage requirements.

[1] Congressional Research Service, Memorandum to Congressional Distribution, March 18, 2011 from Linda K. Moore

[2] Volume 1, No. 5, December 1980, Andrew Seybold's Report on Mobile Emergency Communications. A Limited Natural Resource

The main reason for a lack of Public Safety voice interoperability is the fact that while the FCC has continued to allocate more spectrum over the years for use by the Public Safety community, these new allocations have been in very different portions of the spectrum. Today, Public Safety voice communications are authorized in small segments of the spectrum from 30 MHz up to 800 MHz, and except for the spectrum in the 700 and 800-MHz bands, the Public Safety channels are comingled with channels used by business, taxi services, truckers, paging services, and others. In short, there has never been an allocation of enough spectrum in a common radio band to permit all of the various Public Safety agencies to migrate to a single portion of the spectrum and be able to interoperate between all agencies.

Frequency Band	Type of Radio Channels	Band Shared with other Users?
30-50 MHz shared spectrum (6.3 MHz of spectrum)	Narrowband voice channels	Yes, business, utilities, government others
150-170 MHz shared spectrum (3.6 MHz of spectrum)	Narrowband voice channels	Yes, business, paging, utilities, other
220 MHz channels (only one area of U.S. near Canada)	Narrowband voice channels	No
450-470 MHz shared spectrum (3.7 MHz of spectrum)	Narrowband voice channels	Yes, business, alarm, utilities, paging, local government, others
470-512 MHz (shared TV channels certain areas only)	Narrowband voice channels	Shared with TV station and business radio/wireless mikes
700 MHz narrowband (12 MHz of spectrum)	Narrowband voice/data	No—contiguous spectrum
700 MHz broadband (10 MHz of spectrum)	Broadband data	No—contiguous spectrum
800 MHz narrowband (9.5 MHz of spectrum)	Narrowband voice/data	NO AFTER rebanding is completed
4.9 GHz broadband (50 MHz of spectrum)	Low-power data	Suited only for local use and does not penetrate buildings

Note: Cleveland, Buffalo, and Detroit are using shared NTIA channels in the 421-430 MHz band
Note: There are a few 220 MHz systems in use in other areas such as Long Beach, CA.

As the chart above illustrates, today's Public Safety mission-critical voice channels are spread across seven vastly different portions of the spectrum. It should be noted that except for the 700 and 800-MHz voice allocations, all of the other portions of spectrum allocated to Public Safety are shared with other services. It should also be noted that a radio system operating on the 30-MHz band, 150 MHz, 450 MHz, or 800 MHz will have different coverage capabilities on each; the higher in the spectrum that you operate a system, the more infrastructure is required to cover the same given geography.

When those outside the Public Safety community look at the spectrum allocations already made, they oftentimes do not take into account that the 4.9-GHz spectrum (50 MHz) is not suited for wide-area broadband service. In reality, it is designated for low-power, local communications just as today's unlicensed Wi-Fi bands are allocated for citizens' use. The average coverage of a single 4.9-GHz access point is 300 feet or less, and in most systems today, this spectrum is used for point-to-point communications for video transmissions from fixed-location cameras, or for on-scene local broadband services. This spectrum is not available or useful for Public Safety as part of the nationwide broadband network that is being planned to provide wide-area coverage across the nation.

Today, in many urban areas there are not enough radio channels in a given portion of the allocated spectrum to meet the requirements of Public Safety. Radio signals do not stop at city, county, or state (or international) boundaries, therefore the channels in use in a given area must be coordinated with adjacent users to prevent or minimize interference between systems. In many areas this means, for example, that the police departments will operate in the 450-MHz portion of the spectrum while fire and emergency medical services (EMS) units will operate in the 150-MHz portion of the spectrum. Providing interoperability between police, EMS, and fire in these areas requires either specialized equipment in the dispatch centers to patch channels together or the installation of two or more radios in each vehicle; which is an expensive and ineffective method of obtaining interoperability between systems.

If Public Safety had been allocated sufficient spectrum in any one of these bands to satisfy the number of radio channels required for true nationwide interoperability, the result would have been twofold:

1) We would, today, have a truly interoperable voice system nationwide.
2) The cost of Public Safety radio equipment would be at least 50% less than what it is today because it could have been built to operate on a single portion of the spectrum, providing[3] economies of scale and reducing per unit price for Public Safety radios. Today, equipment vendors must build radios for a specific portion of the spectrum, and therefore the quantities they produce for each portion of the spectrum are less.

Other Factors Hindering Mission-Critical Voice Interoperability

Because the narrowband voice spectrum is already heavily used, nationwide interoperability cannot be achieved until it is first made available on a local, regional, and then statewide basis. Much of the funding that has been granted to Public Safety since 2001 has in fact resulted in better regional and statewide interoperability. From 2001 until today, the number of new regional and statewide systems constructed and operational has grown rapidly as the various jurisdictions have sought out their own ways of providing mission-critical voice interoperability.

For example, in California, technology advances have provided fire service with the ability to purchase and install radios capable of more than 300 channels in the 150-MHz band. There is a standard plan in place so that most of the fire departments can and do have interoperability not only between city, county, and state fire units, but also with federal government fire units. However, in major cities such as San Diego, Los Angeles, and San Francisco, there are not enough of these channels to provide for day-to-day fire operations, so fire departments are operating on other portions of the spectrum. During major incidents, agencies responding from out of the area are not able to directly communicate with fire equipment from the large cities without either a second radio in each vehicle or some other form of non-automatic channel sharing equipment.

Many regions have built and installed regional radio systems that are used as interagency communications systems during mutual aid situations. Many of these serve as overlay systems since very few have the channel capacity to serve all of the various local entities. This also requires multiple radios in each vehicle. Several states such as Wyoming, Florida, Vermont, Montana and others have recently built or are in the process of building statewide interoperable mission-critical voice systems in

[3] Tetra radio prices in Europe are approximately 50% of P25 prices in the United States because they are on a common portion of the spectrum and one radio can be built and shipped to all European Countries

order to provide statewide interoperability, but in many cases, these systems augment rather than replace the local systems that are still needed on a daily basis to meet the capacity requirements of each local Public Safety agency.

In a recent memorandum from the Congressional Research Service (CRS)[4] dated March 18, 2011, the data used as a baseline was taken from a survey conducted by the National Emergency Management Association (NEMA).[5] This report was, in fact, based on Emergency Management Association directors' estimates of funds thought at the time to be necessary for states to achieve full statewide interoperability and did not, as portrayed in the CRS report, reflect actual amounts of funding received by the states and local agencies. Further, specific grant programs put requirements on accessing the funds that led to an emphasis on local, regional, and statewide interoperability (as opposed to nationwide), and there were conflicting requirements among and between grant programs causing a lack of greater interoperability.

When working toward the goal of both voice and data interoperability as is the desire of the Public Safety community, it should be stated again that trying to provide interoperable voice services when the agencies are already using spectrum spread out over seven different portions of the spectrum and on which, today, during peak hours, there is already severe network congestion that must be approached from a local, then regional, then statewide basis. However, the opportunity, with the 700-MHz broadband network is to design and implement it on spectrum that is unused, therefore, the network can be constructed from the ground up based on the requirement for nationwide interoperability.

Different Types of Systems

In addition to the shortage of radio channels in any given portion of the allocated Public Safety narrowband spectrum, there is yet another issue that makes mission-critical voice interoperability even more difficult. Namely, over the years, each local city, county, and region has built out different types of radio systems using differing technologies. Therefore, even two agencies in the same geographic area operating within the same portion of the spectrum are not always able to communicate with each other. Mission-critical voice communications systems, today, make use of two very different air interfaces. Many are still using the 30-year-old voice technology referred to as analog or FM voice communications. Newer systems have moved to the digital voice standard known as P25 or APCO project 25, which is a standard for digital voice systems. However, even within these two different types of voice systems, there are many variations of how they are deployed. Small rural areas might use a simple radio base station and radios in vehicles. Larger departments might elect to repeat all of the traffic on a given channel using repeater stations, while others have tied a number of repeaters together in what are called simulcast systems. Still others are grouping between five and twenty radio channels together into what is known as a trunked radio system. Not many of these radio systems are compatible with the other types, and, in many areas, the common way to provide interoperable voice communications is to use unit-to-unit, direct, or off-network voice channels so those on the scene of an incident can communicate with each other (provided they are all operating in the same portion of the spectrum).

The chart below reflects the complexities of working toward the goal of providing full interoperable mission-critical voice communications. As it shows, there are many variables that must be considered,

[4]Congressional Research Service, Memorandum to Congressional Distribution, March 18, 2011 from Linda K. Moore

[5] Letter from NEMA to CRS: http://www.psafirst.org/uploads/documents/CRS_Letter_FINAL_05_27_11.pdf

and the grants have been provided on a city, county, regional, or state basis with no substantial coordination between grants or agencies receiving the grants. The reality is that the grant funds already provided to Public Safety have advanced the state of interoperability with an emphasis on local-to-statewide interoperability, and so only achieved on a local, regional, and statewide basis.

Possible Combinations of Systems that need to be Interoperable:

Frequency Band	Analog FM	P25 Digital	Base to Mobile	Repeater	Simulcast	Trunked
30-50 MHz	X		X	X	X	
150-174 MHz	X	X	X	X	X	X
220 MHz	X	X		X		X
450-470 MHz	X	X	X	X	X	X
470-512 MHz	X	X	X	X	X	X
700 MHz NB	X	X	X	X	X	X
800 MHz NB	X	X	X	X	X	X

Conclusions

Given (1) the number of different portions of the spectrum in use today for Public Safety mission-critical voice communications, (2) the insufficient amounts of spectrum within each portion of spectrum provided to Public Safety, (3) the multiple types of systems in use within each portion of spectrum and throughout all of the different portions, and (4) the focus on interoperability for mission-critical voice on local, then regional, then statewide, and only recently on a nationwide level, the funds provided to Public Safety have been used wisely and have achieved much improved interoperability within and among voice systems in most localities in the United States.

One reason Public Safety must have enough contiguous spectrum on a nationwide basis for broadband services is to make sure that systems being built adhere to nationwide standards, use the same technology, adhere to the same system design and, therefore, provide for full interoperability from the very beginning. Public Safety can never again be placed in the position it has been in over the last thirty or more years where spectrum is not contiguous, there is not enough to handle the demands in major metropolitan areas, and there is a lack of financial resources to build the nationwide interoperable broadband network that will, for the first time, provide Public Safety with the resources it needs to accomplish the goal of true interoperability while realizing the cost savings of using a worldwide air interface standard (LTE) to provide Public Safety with economies of scale for the first time.

Public Safety needs the D Block spectrum and it needs federal funding in order to accomplish this goal. If enough spectrum is not made available this time, or if funding is lacking, the only option is to duplicate the mistakes that have resulted in the lack of nationwide interoperable voice and the problem and issues described above.

The Public Safety community has neither wasted the grants allocated since 2001, nor wasted any of the valuable and very limited spectrum provided. The Public Safety community has accomplished much with the little it has had to work with over the years. Today, more regions of the country have interoperable mission-critical voice communications than ever before, but full nationwide mission-critical voice

interoperability is not achievable over the course of the next decade or two given the multitude of spectrum allocations, the differences in technologies being deployed, and the lack of a nationwide long-term plan.

We also believe that given enough broadband spectrum (20 MHz) and funding, Public Safety can and will build out a nationwide, mission-critical broadband network that will provide the level of interoperability needed on a daily basis for data and video services. Over time, this network will serve as a model to solve the nationwide voice interoperability issues that remain.

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June 10, 2011

Mr. Joe Hanna
President, Directions
6805 Clear Springs Circle
Garland, TX 75044

Dear Mr. Hanna,

Thank you for appearing before the Subcommittee on Communications and Technology on May 25, 2011, to testify at the hearing entitled "Creating an Interoperable Public Safety Network."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for 10 business days to permit Members to submit additional questions to witnesses, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and then (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please email your responses, in Word or PDF format, to the legislative clerk (Alex.Yergin@mail.house.gov) by the close of business on Friday, June 23, 2011.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Greg Walden
Chairman
Subcommittee on Communications and Technology

cc: The Honorable Anna G. Eshoo, Ranking Member,
Subcommittee on Communications and Technology

Attachment

June 27, 2011

The Honorable Greg Walden, Chairman
Subcommittee on Communications and Technology
U. S. House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515-6115

Chairman Walden:

First, I would like to thank you for the opportunity to testify before the Subcommittee on Communications and Technology May 25, 2011 on the topic of "Creating an Interoperable Public Safety Network." Without question, the creation of a dedicated public safety broadband network is critical to the safety and welfare of both the nation's first responders and the public they serve. I thank you for the opportunity to address questions that arose from this hearing.

Responses to questions from the Honorable Greg Walden:

Question 1: Congress has provided billions in federal funding over the last decade as well as approximately 100 MHz of spectrum for the exclusive-use of public safety. Where have these resources gone? What worked, what didn't, and why?

> **Response:** To date, the federal government has indeed provided billions of dollars in the broad arena of public safety communications. Unfortunately, these funds have come from a variety of funding sources, few of which have communicated with each other during the funding process. Unlike the current proposal to build a nationwide broadband network from the top down, previous funds have been allocated primarily on a local, agency-by-agency basis. Outside of a requirement to use the P-25 standard, there has been little requirement for any requirement for inter-agency coordination following receipt of these funds. The funds granted to date have been fragmented, piecemeal, and often reactionary.
>
> Regarding the public safety spectrum allocation, there is indeed a current pool of almost 100 MHz of spectrum dedicated for public safety. Unfortunately, this allocation is spread across multiple frequency bands ranging from 150 MHz to 800 MHz. Of the 100 MHz pool, 50 MHz of this spectrum is in the 4.9 GHz band. While this 4.9 GHz allocation has some limited value for near distance applications, it has little value for either land mobile voice communications or wide area broadband applications.
>
> While the current public safety frequency allocation is large in total, much of this allocation is interleaved with commercial users in the 150, 450, and 800 MHz bands. Users in rural areas find the propagation characteristics of lower band

spectrum (i.e., 150 MHz and 450 MHz) to serve their users at a high level of quality at lower costs. 700MHz and 800 MHz channels have been put to somewhat more effective use by urban and suburban agencies.

If one could start deployment of a nationwide voice network from scratch, there is little doubt that there could be a better band plan, possibly with less spectrum than currently in use. Unfortunately, it is difficult to unring a bell and the cost and effort to bring all public safety users into a common spectrum allocation for land mobile communications would far exceed the projections for a nationwide, wireless broadband network.

The lesson learned from the billions of dollars spent over the past ten years is the need/mandate to minimize the opportunity for fragmentation and to learn from commercial players who have deployed integrated, nationwide broadband networks.

Question 2: First Responders are currently planning to use 10 MHz of spectrum for broadband out of the 24 MHz the DTV legislation already cleared. What can be done today with 10 MHz of broadband spectrum? Might it not be enough in the short term, until public safety can also migrate the rest of the 24 MHz for broadband, especially since there are only 2-3 million First Responders as compared to tens of millions of commercial users?

Response: Without question, public safety can build an adequate dedicated broadband network within the current 10 MHz allocation. To gain maximum benefit from this allocation, however, public safety will be required to build this network with a deployment design similar to those currently operated by the commercial carriers. Network capacity is a function of both technology and deployment. If too few base stations are deployed, capacity and throughput is hampered. In other words, through proper spectrum stewardship, the current 10 MHz of spectrum currently allocated to public safety for broadband services can meet their objections on a daily basis. That said, there will be events that will tax this network. The question, however, is whether spectrum sharing agreements with commercial partners can provide spectrum resources in these crisis events.

In the long term, reallocation of the remaining 14 MHz of the public safety allocation within the 700 MHz band holds considerable promise for expanded broadband use. This goal, however, is somewhat complicated by the fact that there are already numerous entities that have either deployed, or are planning to deploy, narrowband land mobile voice communications networks in this 14 MHz block of spectrum. Equally, the realistic forecast for possible deployment of mission critical voice communications is hard to predict, as there is no timetable for public safety to even define mission critical service over broadband. There are, without questions, substantial challenges that face public safety in their quest for broadband-based, mission critical voice communications.

Question 3: Public safety users have an allocation at 4.9 GHz. How should public safety be using this spectrum as part of a broadband solution?

Response: As noted above, the allocation at 4.9 GHz represents over 50% of public safety's current spectrum allocation. Unfortunately, this frequency band has limited use outside short range applications. To some degree, this 4.9 GHz allocation is swamp land, but then again, swamp land has value for some purposes. As many public safety users have touted the need for video applications, 4.9 GHz spectrum provides an excellent vehicle to for these services in many applications, with the video stream then feed through the backhaul network to be routed where appropriate to public safety users. It would appear that those entities using 4.9GHz have focused more on point-to-point applications than for mobile use. Point-to-point services, including video and sensors, would be excellent candidates for offloading data streams otherwise consumed by an expanded 700MHz allocation.

Unfortunately, 4.9GHz spectrum is considerably less valuable in rural areas than in urban areas. That said, due to the lower number of users in rural areas, the 10 MHz of spectrum in the 700 MHz pool should be more than adequate to meet their broadband needs.

Question 4: Why do you think reallocating the D-Block to public safety is a mistake?

Response: In an ideal world, providing public safety with the D-Block is an attractive option. Over time, public safety's need for additional broadband capacity will, without question, emerge. From a public policy perspective, however, there is a question as to whether a substantial block of an invaluable, limited commodity is best used for a dedicated public safety network when other alternatives are available. As noted in my testimony, I am a firm believer that public safety would be far better served to have access to commercial networks during major events that might tax the dedicated public safety allocation.

Equally, I would reiterate my position that the allocation of the D-Block to public will, without question, create an island technology that will be extremely costly to public safety community. With no commercial partners in the D-Block, there will be no economies of scale to bring down the costs of user equipment. Quiet simply, with no commercial partners in the D-Block, public safety will continue to be victimized by low volume, high margin (i.e., high cost) user equipment.

Question 5: While First Responders know their needs, are they right ones to be building and operating the network? Are there appropriate state entities that can manage the day-to-day management task of wireless communications?

Response: In many respects, I believe that the overwhelming portion of the public safety community has failed to recognize the complexity of deploying and managing the day-to-day operations of an LTE broadband network. I am not

aware of any public safety entity that has the experience or expertise to manage such a network. One need look no farther than the smallest of wireless carriers to understand the complexity of deploying and managing a broadband network on a daily basis. Without relying on a partnership with a commercial provider, public safety will be required to recruit, train, employ a substantial workforce that is skilled in broadband network design, deployment, and operation. In effect, a network designed, deployed, and managed by public safety is equal to the creation of a new Verizon Wireless, AT&T, Sprint, or T-Mobile. While I believe that state should also have a strong voice in the overall operation of a national broadband network, I equally believe that state-level management of such a network may well lead to fragmentation of the effort. To that end, the debate may well need to shift from the question of management of the proposed network by public safety or states to that of governance of the network. By no means are these two terms synonymous.

Question 6: There has been much focus on technical issues, but not on agency coordination across jurisdictions (local, tribal, state, and federal) or oversight of construction, operation, and funding. What mechanisms need to be in place to address these needs?

Response: Traditionally, public safety communications has been within the purview of individual entities. Municipalities, counties, tribal jurisdictions, states, and various arms of the federal government have all focused on their communications needs within something of a vacuum. While this autonomy has allowed each of these jurisdictions to address their unique issues, it has done little to foster interoperability at any level. If the proposed national, dedicated public safety broadband network is to have any potential for success in reaching across jurisdictional and department lines, there must be a fundamental paradigm shift in the concept of governance and management.

As noted above, there must be a totally new focus on the overarching governance structure that will facilitate a management structure for the actual operating network. Public safety will certainly need to have a strong voice in this governance structure, but there also needs to be a recognition that the nation's Chief Technology Officers and Chief Information Officers tend to be the current administrators of data networks and thus have a role in this effort. Additionally, groups such as the National Guard, often a first responder following major natural disasters, should be considered as players in this governance structure.

The governance structure should be exactly that-one of governance. With oversight of issues such as functional requirements, funding, and timetables for system implementation, the issues of day-to-day management and administration may well be best left to entities that specialize in such matters. With no such distinction in roles and responsibilities, there is potential for creation of a massive bureaucracy not consistent with the current Congressional desires to allow

private industry to manage that which they manage best and minimize the growth of government.

Question 7: What can we do to reduce the cost of the public safety network?

Response: First and foremost, a single governance structure and network is required to minimize duplication of costs. Even with the best of structures, the proposed nationwide public safety broadband network will be costly. Jurisdictions attempting to jumpstart the broadband movement through waivers issued by the FCC are well intentioned and may provide some valuable insights into the deployment of LTE networks. That said, each of the 22 current waivers has embarked on independent procurements, thus no economy of scale. As some waiver jurisdictions are individual cities, some counties, some regions, some states, there is no readily apparent governance structure. Deployments by one jurisdiction may well not mesh with another jurisdiction. Without a national-level oversight structure, there is considerable risk that many of the federal dollars already committed to these initial deployments may well have to be spent a second time.

Second, the Federal Communication Commission's National Broadband Plan fundamentally got it right in pressing for a simultaneously deploying the public safety network in conjunction with commercial carriers. There is considerable potential for savings in a shared deployment at both the site level and at the infrastructure level. We can little afford to take a position that the public safety network must be a totally independent system.

Last, as noted above, one must recognize the realities that allocation of the D-Block to public safety will have on the cost of a network. With public safety being the sole occupant of Band Class 14 (the D Block plus the current 10 MHz public safety allocation), there is little incentive for any of the current consumer user equipment providers to enter the market place. Rural carriers already argue that they are disenfranchised in the retail market. If these commercial carriers are having difficulty obtaining the latest user products, public safety can hardly expect to have better success. Thus, we will continue to see an extremely low number of players entering this space. With few providers, there is little reason to believe that public safety will see any different pricing than currently found in the land mobile radio marketplace.

Responses to questions from the Honorable Henry A. Waxman:

Question 1: Assuming that the D Block should be reallocated public safety, in the largest-scale emergencies, will 20 megahertz be enough? How much spectrum would be needed for "day-to-day" operations, both for the densest urban environments, as well as for rural environments?

> **Response:** Unfortunately, the public safety community has yet to provide a detailed engineering study that actually addresses their capacity needs. There is no doubt that the current 10 MHz allotment may not be sufficient for the largest-scale emergency, but that statement is equally true for a 20 MHz allocation. It was for that reason that the Federal Communication Commission's National Broadband plan envisioned a process whereby public safety could tap into the commercial networks for those rare "largest-scale emergencies." With no governance structure in place, there is nothing to provide guidelines for appropriate and inappropriate use of the public safety broadband allocation.
>
> There is little debate of the adequacy of the current broadband allocation in rural environments. The more challenging question is how to manage the excess capacity in the rural areas.

Question 2: Some public safety entities have plans to deploy 700 MHz public safety broadband networks, based on waivers granted by the FCC. How can we make sure that such networks become integrated with a future nationwide network, without impacting nationwide interoperability of adding costs?

> **Response:** While I was initially in favor of the current FCC waiver process, I have come to believe that the good intentions of the process may not be serving the national interest. The challenge of the current situation is how best to address the pent up demand of a number of jurisdictions for broadband services without creating the very question posed above. The bottom line is that each unique, one off deployment creates challenges for integration into a future nationwide network. Giving up control over procurement processes, local use and governance, and becoming subservient to another authority in the future are all valid questions. To that end, it is imperative that some legislation or regulation be finalized at the earliest possible date to minimize the complications envisioned in this question.

Question 3: If Congress reallocates the D Block to public safety, how much of this additional spectrum will public safety need right away? If Congress decides to auction the D block, what is the timeframe by which public safety's spectrum needs will grow so as to need the full 20 megahertz of spectrum? Should the 20 megahertz be fully demanded and utilized by public safety, couldn't most of all of public safety's existing 12 megahertz of 700 MHz narrowband spectrum be repurposed for broadband at that time?

Response: As noted above, it is unfortunate that there is no current engineering study that validates how much spectrum public safety requires now or in the future. One can speculate, based on commercial operations, that broadband needs will grow. How much is needed, how much will be needed, when it may be needed, however, tend to be wrapped up in a series of statements that "we don't have enough, we will need more" with an unfortunate lack of hard engineering analysis to define how much, when.

Repurposing the 12 MHz of spectrum currently allocated for narrowband voice communications may well be an option. That said, the timeframe for such a repurposing will be considerably down the road, as there are a number of public safety who have already spent or obligated several billion dollars in procurements for narrowband voice systems. Prudent public policy would require that these jurisdictions, all of whom made these procurements in good faith consistent with spectrum allocations on the books for the past 10 years, be allowed to get some reasonable "return on investment" of these channels before seeing these channels repurposed to broadband classification.

Question 4: If the D Block is reallocated to public safety, how can we ensure that devices capable of operation across the D Block and the public safety broadband spectrum, referred to as "Band Class 14." are made available for public safety use, and at prices reflective of commercial economies of scale?

Response: A cornerstone of my testimony before the Subcommittee is the premise that transfer of the D Block to public safety will ensure that there are indeed no economies of scale equivalent to that of the commercial marketplace. If there is no commercial involvement in the D Block, public safety will indeed be the sole occupant of Band Class 14. The underlying problem within public safety land mobile communications is the limited audience being served by only a handful of players. During the early periods of a nationwide public safety network, the number of terminal products purchased by public safety may well be below one million units. Once nationally deployed, there will be less than three million users on this network.

Major handset providers have universally noted little interest in production of products at these minimal levels. As noted above, this will again place public safety in the position of buying low volume, high margin devices far above that found in the commercial arena.

Question 5: What is the best way to ensure that individual public safety agencies have a role in developing the network, while also ensuring uniformity in deployment, interoperability, economies of scale in equipment costs, and otherwise keeping the overall process as efficient as possible?

Response: As noted in a response above, I strongly believe that public safety is facing a major paradigm shift regarding "control" and efficiency. Quite simply put, we face the current lack of interoperability and high costs due in large part to the notion of local control. One only ask whether we should allow each city, county, state, tribal authority, and federal government agency to deploy their own wireless voice telecommunications system and expect to do so with the efficiency and economic models followed by the major wireless providers.

The underlying principle of the nationwide public safety network has long been rooted in a top-down, coordinated network that will provide a governance structure that will require interoperability and commonality. To the extent that there is a continued question regarding local control, the notion of interoperability and economies of scale is moot.

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