Testimony of
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Chairman Boucher, Ranking Member Stearns and members of the Subcommittee on Communications, Technology and the Internet, I am very pleased and honored to appear before you today to testify on the draft legislation that would provide funding for constructing and maintaining an interoperable public safety broadband network and on H.R. 4829, the "Next Generation 9-1-1 Preservation Act of 2010." My name is Dale Hatfield and I am the Executive Director of the Silicon Flatirons Center for Law, Technology and Entrepreneurship at the University of Colorado at Boulder. In the interest of full disclosure, I should also mention that I am on the board of directors of Crown Castle International, a major operator of radio towers for the wireless industry here in the United States and in Australia and I also engage in a limited amount of independent consulting activities including with the Shared Spectrum Company, a developer of spectrum-sensing cognitive radio technology.

I have been involved in telecommunications policy and regulatory issues for more than four decades and during that period I have had a hand in many of the major issues associated with public safety communications, especially as related to the technical aspects of spectrum management and 9-1-1 matters. With regard to that involvement, I have had the honor of serving in senior technical and policy positions at both the Federal Communications Commission ("FCC" or "Commission") and at the National Telecommunications and Information Administration ("NTIA") in the U.S. Department of Commerce. Currently, I am serving as the co-chair of NTIA's Commerce Spectrum Management Advisory Committee ("CSMAC"). While my testimony here today is based upon my experience and my current academic research interests, it reflects solely my own views and any recommendations that I offer should not be ascribed to any of the institutions with which I am affiliated.

I would be remiss if I did not begin my testimony by commending you for taking up an issue – the funding of a nationwide, interoperable public safety broadband network – that is so vital to the safety of life and property and to homeland security more generally. Past experience with large scale manmade and natural disasters such as the 1995 Oklahoma City bombing, the 2001 attack on the World Trade Center, and Hurricane Katrina in 2005 have clearly demonstrated the price we may pay in the future without such an interoperable network. Moreover, the challenges we have had in the past in developing and deploying an interoperable narrowband (voice) network for public

safety use provide a strong warning of the hard work that lies ahead of us all if we, as a Nation, are going to realize the full benefits envisioned by a nationwide, interoperable public safety broadband network. Fortunately, in my opinion, legislation along the lines that have been set forth in the staff draft coupled with the recommendations and analyses presented in the National Broadband Plan released by the Commission last March provide the necessary policy direction, funding sources, and analytical framework to ensure the successful deployment of such a nationwide network.

In the balance of my testimony, I will focus my attention on four areas:

- *First*, I will address the importance of taking into account commercial equipment and technologies and the evolution of the commercial wireless networks in establishing rules to ensure the deployment of the interoperable network. That is, I will address Sec. 101 of Title I of the discussion draft.

- *Second*, building upon some earlier testimony that I delivered to the Subcommittee in December of last year in conjunction with the proposed Radio Spectrum Inventory Act, I will speak to the importance of spectrum flexibility and sharing as raised in Sec. 103 of Title I of the discussion draft.

- *Third*, I will address the issue of the adequacy of the 10 MHz of spectrum in the 700 MHz band that is already allocated to public safety for broadband networking – an issue that came into even sharper focus with the release by the Commission of a report on that topic on Tuesday of this week.

- *Fourth*, and finally, I will address several, less over-arching issues to which I would like to call to your attention.

1. Specifications for Achieving Interoperability

Among other things Section 101 (b) of Title I of the discussion draft directs the Commission to take into consideration certain commercial factors in adopting the rules necessary to achieve interoperability in the public safety broadband network. More specifically, the Commission is directed to consider (1) the extent to which particular technologies and user equipment are, or are likely to be, available in the commercial marketplace; (2) the availability of necessary technologies and equipment on reasonable and non-discriminatory licensing terms; (3) the ability to evolve with technological developments in the commercial marketplace; and (4) the ability to accommodate prioritization for public safety transmissions. I believe these provisions are essential to developing the interoperable public safety broadband network.

I believe they are essential because of the sheer size of the commercial market relative to the public safety market and to the extensive geographic coverage already offered and planned by commercial mobile service providers. By taking into account, as appropriate, commercial equipment and technologies and the evolution of the commercial

wireless marketplace, the public safety broadband network will benefit from, among other things:

- The economies of scale associated with the development and production of end user and network equipment,

- Increased competition associated with the potential of more vendors and a reduction in vendor "lock-in" due to proprietary solutions and vendor unwillingness to license critical technologies on reasonable and non-discriminatory licensing terms,

- Increased ability to roam onto and gain priority access to commercial networks during significant emergencies and during periods and/or at locations where the public safety broadband network may not be able to provide service,

- Increased ability to enter into financially beneficial routine spectrum sharing arrangements with commercial entities,

- The rapid performance improvements and other technology advancements that are the result of the large R&D expenditures associated with commercial wireless operators and their vendors.

In my opinion, and the opinion of many others as well, it was largely a public policy failure – not fully taking into account the four considerations included in Section 101 (b) of the discussion draft – that led to the current limitations associated with public safety narrowband voice interoperability after more than two decades of effort.

2. Spectrum Flexibility and Sharing

In my testimony before this subcommittee in December of last year, I bemoaned what I regarded as the excessive rigidities associated with the management of spectrum resource. These rigidities include prohibitions (a) against (or in some cases the lack of incentives for) changing how spectrum is used in the face of rapid marketplace and technological trends and (b) against voluntary sharing of the resource among users even when it is beneficial to the parties involved and interference is controlled to satisfaction of all parties to the proposed transaction. Because of this excessive rigidity, it is not unusual to find through actual field measurements that large blocks of spectrum or large numbers of channels are unused or only lightly used even in areas of the country and at times when spectrum congestion and scarcity is apt to be most acute. This includes in the existing public safety bands. In my previous testimony, I noted that in the spectrum management field, we refer to this form of scarcity as *administrative* scarcity to distinguish it from true scarcity in a physical sense.

Because of my strongly held belief that we simply cannot afford to have continued administrative scarcity given the dramatic increase in demand for this critical

natural and national resource, I was pleased when I first read Section 103 of Title I of the discussion draft. I was pleased because that section instructs the Commission to allow certain spectrum specified in the draft legislation to be used in a flexible manner, including for public safety use. More specifically it addresses the existing narrowband public safety spectrum as well as the guard band and the unoccupied guard band as defined in the draft. The importance of this provision can be understood through an example. It may well be that, as the broadband networks evolve to effectively handle narrowband voice traffic, certain areas of the country may make more rapid progress in shifting that traffic to the interoperable broadband public safety network. Thus a situation could arise wherein one area of the country was using more broadband spectrum and less narrowband spectrum respectively while the opposite was true in another part of the country. In this situation – as long as no channels needed for narrowband interoperability were involved and as long as any change in the interference environment was dealt with – it makes sense to give the FCC the flexibility to change the proportion of narrowband and broadband channels in the respective areas. Another example would be where a technology change or an adjustment in usage might make it feasible to utilize otherwise wasted guard band spectrum.

In terms of spectrum sharing, the same section of the discussion draft instructs the Commission to permit, with certain conditions, public safety entities to allow other entities including, presumably, commercial entities to access or share their spectrum in exchange for a financial consideration. As I noted in my prior testimony, spectrum sharing can be accomplished on a static or long-term basis or, especially with recent technological advances, on a more dynamic basis or "real-time" basis. The potential for static sharing could arise in a situation where the public safety entity does not intend to fully utilizing its broadband spectrum in either the spectrum and/or geographic dimensions for some period of time. Leasing the under-utilized spectrum to a commercial entity not only provides a source of funds for reinvestment in the interoperable broadband network but also serves the additional public interest objective of not wasting a scarce resource. Opportunities for short-term, voluntary, non-interfering uses of public safety spectrum also arise when peaks in usage between the public safety broadband network and other broadband (e.g., commercial) networks do not coincide in time. In this approach a commercial entity would utilize public safety spectrum in a given locale until it was needed by a public safety entity during one of its peak usage periods. When required, the commercial entity would abandon its use of the spectrum to accommodate higher priority public safety transmissions.

The advantage of such sharing can be illustrated by referring to a simple analogy. It would be extremely wasteful to permanently reserve a special lane on a highway for use only by emergency vehicles. Instead, when an emergency vehicle is present, the non-emergency vehicles move to the side and the emergency vehicle is allowed to pass. In spectrum management, this is sometimes referred to as the "lights and siren" approach. Just as it generally does not make sense to have a separate lane devoted to emergency vehicles on a highway, in these times of rapidly growing spectrum demand, it does not make sense to let spectrum lie unused when it can be dynamically assigned.

Although not explicitly mentioned in the draft legislation, sharing in the other direction – i.e., public safety entities using commercial broadband spectrum in the 700 MHz band can produce substantial benefits as well. Indeed, as I will discuss in more detail in a moment, not only would such sharing provide significantly more broadband capacity for public safety entities in emergency situations, it will be facilitated by the requirement noted earlier that the Commission must take into account the four considerations included in Section 101 (b) of the discussion draft. To summarize, we can no longer afford to have vast stretches of valuable spectrum lying idle much of the time when there is technology available to allow the "lights and siren" approach to succeed. For all of these reasons, I believe that Section 103 of the draft is critical to the successful development and evolution of the public safety interoperable broadband network and to sound management of the increasingly scarce radio spectrum resource.

3. Adequacy of Spectrum

As the Subcommittee is well aware, the proposal to auction the D-block spectrum as called for in the National Broadband Plan and in the discussion draft has engendered considerable controversy. As I touched upon earlier, that issue came into sharper focus on Tuesday of this week when the FCC released a white paper containing an extensive analysis of the capacity requirements for a nationwide, broadband network to serve public safety needs. Prior to the release of the white paper, I had familiarized myself with other studies of the capacity, performance and cost of public safety networks and with the public statements and materials that Dr. Jon Peha, the Chief Technologist at the FCC, had provided prior to the release of the white paper itself. In brief, the white paper concludes that the 10 MHz of spectrum already allocated to broadband public safety use within the 700 MHz band "will provide the necessary capacity and performance necessary for day-to-day communications and serious emergency situations." It goes on to suggest a concept wherein public safety entities could gain access to substantial amounts of additional spectrum through priority access to – and roaming across – commercial broadband wireless spectrum.

With regard to the D Block issue and to the white paper, I would like to offer three thoughts for the Subcommittee's consideration. *First*, I have known the principal author of the white paper, Dr. Peha, for many years and have frequently interacted with him on a professional basis. I am familiar with his extensive research regarding technical and policy issues in the field of Information Communications Technology ("ICT"). Based upon that familiarity, I have always found Professor Peha's research to be objective and based on a sound technical and economic footing. *Second*, based upon my review of the white paper, I am in general agreement with the analysis contained therein and, in particular, with the two conclusions I summarized a moment ago. In my previously referenced testimony before this subcommittee last December, I noted the challenges associated with relying upon some of the more traditional ways of accommodating growth in the demand for spectrum but I also spoke very favorably about the prospects for increased frequency reuse and more dynamic spectrum management techniques as ways of alleviating shortages in spectrum capacity. These techniques are consistent with the types of solutions identified in the white paper. *Third*, what the

Commission is suggesting in terms of priority access and roaming on commercial broadband wireless spectrum is consistent with my strongly held belief that better spectrum management requires more dynamic sharing of the increasingly scarce spectrum resource. Furthermore, I would note – as I touched upon before – that requiring the Commission to take into account the four considerations included in Section 101 (b) of the discussion draft would facilitate the creation of such sharing arrangements.

5. Miscellaneous Provisions

I would like to complete my testimony by raising some questions regarding certain details of the discussion draft. First, in reading through the draft, it is a little unclear to me as to what costs can be recovered from the Construction Fund and what costs can be recovered from the Maintenance and Operation Fund. Under Section 202 of Title II of the discussion draft, grants from the Construction Fund can be used (a) for the construction of a new public safety broadband interoperable network using commercial infrastructure, or public safety infrastructure, or both and (b) for the improvement of existing commercial networks and construction of new infrastructure to meet public safety requirements as defined by the Commission. Under Section 203, funds from the Maintenance and Operation Fund can be used for the reimbursement of expenses that "are attributable to the maintenance, operation and <u>improvement</u> of the public safety interoperable network [emphasis added]." The operation of an evolving network normally involves some sustaining level of capital expenditures to expand capacity or to replace, for example, obsolete equipment. Based upon the language in the discussion draft, it is not clear whether these sustaining levels of capital investment would be recovered from the Construction Fund or from the Maintenance and Operation Fund under the rubric of an "improvement." Since under the draft legislation the fraction of the eligible amounts that can be reimbursed varies between the two funds and because the two funds would be administered by two different agencies, additional clarity may be appropriate.

Second, in establishing the grant program associated with the Construction Fund, Section 202(d)(5) of the discussion draft specifies that priority should be given to grants for "projects that ensure maximum population coverage." In radio system design, engineers often distinguish between breadth and depth of coverage where the former refers to the geographic extent of the coverage (the coverage "footprint") while depth of coverage refers to how deep the coverage is into buildings and other hard to serve locations within that footprint. Viewed from this perspective, increased population coverage can be obtained by extending the geographic coverage – the footprint, by providing more in-building coverage or by some combination of the two. Thus there is some degree of ambiguity in terms of what it means to ensure maximum population coverage and, once again, additional clarity may be appropriate.

Third, Section 302 of the discussion draft directs the Commission to conduct a study and submit a report to Congress on the spectrum held by public safety entities or dedicated to the public safety interoperability network. The first report would be due within five years and subsequent reports would be due every five years thereafter. The

required study would examine how such spectrum is being used as well as provide a recommendation for whether more spectrum should be made available to meet the needs of public safety entities. In my previously referenced testimony before this Subcommittee, I strongly supported the idea of a spectrum inventory based upon a study of license records for example. However, I readily conceded that there were potentially significant shortcomings to relying upon paper studies in certain cases. While I won't take the time today to identify the potential shortcomings of such studies, I believe it is critical to augment paper studies with field measurements of actual spectrum utilization in order to accurately ascertain the situation "on the ground." Therefore, I would recommend that the Subcommittee consider requiring that the Commission conduct statistically valid measurements of actual public safety spectrum use on at least a selective basis in order to confirm – or not – the results of the regularly scheduled studies of public safety spectrum use as called for in Section 302.

Mr. Chairman that concludes my testimony and once again I want to express my appreciation for being invited to testify here today on these important pieces of legislation. I would be happy to respond to any questions that you might have.