

**TESTIMONY OF STEVE B. SHARKEY
DIRECTOR, CHIEF ENGINEERING AND TECHNOLOGY POLICY,
T-MOBILE USA, INC.**

on

**CREATING OPPORTUNITIES THROUGH IMPROVED GOVERNMENT SPECTRUM
EFFICIENCY**

before the

**SUBCOMMITTEE ON COMMUNICATIONS AND TECHNOLOGY
HOUSE COMMITTEE ON ENERGY AND COMMERCE**

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DIRECTOR, CHIEF ENGINEERING AND TECHNOLOGY POLICY, T-MOBILE USA, INC.

Introduction

Good morning Chairman Walden, Ranking Member Eshoo, and Members of the Subcommittee. My name is Steve Sharkey, and I am Director, Chief Engineering and Technology Policy for T-Mobile USA, Inc. T-Mobile, headquartered in Bellevue, Washington, offers nationwide wireless voice and data services to individual, business and government customers. It is the fourth largest wireless carrier in the United States and serves approximately 33 million subscribers. I have overall responsibility for T-Mobile's technical policy agenda before government. Thank you for inviting me today to testify regarding efforts to create opportunities to make additional spectrum available for commercial broadband services through improved government spectrum efficiency.

The Need for More Spectrum

The need for additional spectrum for commercial mobile broadband services is well documented. As FCC Chairman Genachowski has noted, spectrum is the "oxygen" of the wireless industry, and "if we don't free up more spectrum, we're going to run into a wall that will stifle mobile innovation, hurting consumers and slowing economic growth." T-Mobile wholeheartedly concurs. We have repeatedly stated that more spectrum is essential for carriers to accommodate the changing wireless market and to meet increasing demands from consumers.

According to a 2012 report by Recon Analytics, the Nation's mobile communications industry is a significant economic engine, directly or indirectly supporting 3.8 million jobs, or 2.6 percent of all U.S. employment, contributing \$195.5 billion to the U.S. gross domestic

product and driving \$33 billion in productivity improvements in 2011. The industry is expected to expand as businesses and consumers increasingly rely on wireless technologies, including bandwidth-intensive smartphones, tablets, and other hand-held devices as well as machine-to-machine communications. A recent report issued by Cisco, for instance, predicts that global mobile data traffic will increase 18-fold between 2011 and 2016 at a compound annual growth rate of 78 percent.

To help meet this demand, wireless carriers continually implement new and more efficient technologies and techniques to maximize the capacity of our limited spectrum. In fact, T-Mobile, which initially implemented technology evolutions every seven to eight years, now updates its technology almost annually to provide leading edge services that make the most of the spectrum we have. For instance, our predecessor Voicestream Wireless began providing service in 1994 using GSM technology. In 2002, T-Mobile launched the U.S.'s first Blackberry device using one of the first General Packet Radio Service, or GPRS networks. In 2006, we deployed EDGE technology in the network and also purchased additional spectrum for approximately \$4.3 billion at auction. Service using that new spectrum was launched in 2008 with a UMTS 3G deployment that was quickly upgraded to HSPA technology. In 2009, T-Mobile was the first carrier to launch an HSPA+ network, and in 2011 was the first carrier to launch an HSPA+ dual carrier network. Finally, in 2012, we announced our plan to launch LTE, or Long-Term Evolution, service in 2013.

In addition to using the newest technology, commercial wireless networks typically offload traffic to Wi-Fi systems where available to reduce the demand on commercial broadband spectrum, thereby reducing the overall need for additional spectrum. However, these and similar

industry efforts to use our spectrum more efficiently are simply not enough. To meet the ever-increasing demand for mobile broadband, more spectrum must be made available.

There are two potential sources for additional spectrum – reallocating spectrum used either for existing non-government operations or by Federal users. On the non-government side, Congress earlier this year passed legislation authorizing the FCC to reallocate television broadcast spectrum through the use of voluntary incentive auctions. Previous efforts relocated private users of valuable fixed microwave spectrum that could be used for mobile services. While the wireless industry continues to look for opportunities to use private sector spectrum more efficiently and for the services that are most highly valued, these efforts will be insufficient to meet the growing demand. We must therefore also look to spectrum used by government agencies to ensure that it is used as efficiently as possible and to seek opportunities to make some of the government spectrum available for commercial use.

T-Mobile recognizes the essential role spectrum plays for government users, just as it does for commercial entities. However, according to a 2011 GAO study, the Federal government operates in approximately 70 percent of the spectrum below 3 GHz – 18 percent on an exclusive basis and 52 percent on a shared basis with non-government users. Just as it is appropriate to ensure that spectrum available to the private sector is being used efficiently and for the most highly valued services, we must evaluate the Federal government's use of its spectrum and when it can be made available for commercial operations, it should be. The President recognized the need to provide additional spectrum for broadband services and to look at Federal spectrum as part of this effort when he issued a Memorandum in June 2010 directing NTIA to review Federal spectrum use and provide a plan to make 500 megahertz available.

The 1755-1780 MHz Band Is Uniquely Suited for Commercial Mobile Broadband

The 1755-1780 MHz band is particularly appropriate for commercial use and T-Mobile is actively working with other carriers, manufacturers and industry associations to demonstrate how it can be allocated for commercial use. In the United States, the 1755-1780 MHz band is currently used by DoD and other Federal agencies. However, the band is identified internationally for commercial mobile services and is used for that purpose throughout most of the world. The configuration would therefore harmonize U.S. allocation of spectrum with international use. The 1755-1780 MHz band is also immediately adjacent to existing domestic wireless spectrum and would therefore fit seamlessly into the current mobile broadband spectrum portfolio allowing for more immediate equipment development and deployment. Manufacturers could easily migrate existing and developing technologies to these bands. Creating a domestic allocation that is consistent with international use will produce economies of scale and scope, making for a more robust equipment market for the band, lowering costs and speeding implementation. International harmonization of this spectrum will also facilitate consumers' use of their wireless devices while traveling to other countries by alleviating compatibility problems. T-Mobile and other wireless carriers therefore believe this band can and should be reallocated for commercial operations.

There is also broad support in the wireless industry for pairing the 1755-1780 MHz band with spectrum currently available for licensing at 2155-2180 MHz. The Middle Class Tax Relief and Job Creation Act, or Jobs Act, requires that band to be licensed by February 2015. The 1755-1780 MHz band should be available in the same time frame so that the two bands can be made available together. The benefits of pairing 1755-1780 MHz with 2155-2180 MHz, which will permit alignment with existing services, facilitate faster deployment of services, and

maximize efficient use of the spectrum, are also reflected in how the spectrum is valued. One study found that auctioning the 2155-2180 MHz band by itself would yield \$3.6 billion – but auctioned together with 1755-1780 MHz band, the pair would generate \$12 billion. Auctioning these bands on a paired basis would therefore ensure the best economic return for taxpayers, as well as the most efficient use for broadband services. The value and benefits of reallocating the 1755-1780 MHz band consistent with this pairing are recognized by H.R. 4817, introduced by Representatives Stearns and Matsui, which would require reallocation of the band on the same timeframe as the reallocation and auction of spectrum mandated by the Jobs Act.

A Cooperative Process Can Facilitate Transition of the Spectrum

Reallocation of the 1755-1780 MHz band for commercial use is consistent with efforts that date back to the 2000 World Radiocommunication Conference. NTIA issued studies and reports in 2001, 2002, and 2010 that addressed use of the band for commercial services and the spectrum was also identified in the *National Broadband Plan* as potentially available for reallocation.

NTIA's most recent report, released March 2012, focuses in part on the 1755-1780 MHz band and makes clear that, given the Federal operations in the band, there are considerable challenges to making the band available for commercial use. However, studies of the potential to reallocate the band have largely been undertaken with little input from the private sector and, T-Mobile believes, have resulted in overly pessimistic results. Our own experience in relocating Federal users from the 1710-1755 MHz, or AWS-1 band, showed that, while relocation is challenging by nature, it is feasible when all of the parties involved act cooperatively. In relocating Federal users from the AWS-1 band, we found that fundamental misunderstandings of how our respective systems operate led to unnecessarily pessimistic predictions of potential

interference. As a result of more detailed technical discussions between T-Mobile and Federal users that took place as part of the relocation process, we were able to build a deeper understanding of how the systems would interact. These discussions resulted in T-Mobile being able to deploy services years earlier than originally anticipated, allowing consumers to benefit from early access to broadband services prior to completing the full transition of the band from Federal to commercial use. The experience that T-Mobile gained in relocating Federal users from the AWS-1 band should inform the potential relocation of Federal users from the 1755-1780 MHz band and points to the importance of a cooperative dialogue that takes into consideration the realistic operations of both the government and commercial operations.

Fortunately, several steps have now been taken that, T-Mobile is optimistic, will lead to the conclusion that use of the 1755-1780 MHz band is possible for commercial use.

T-Mobile Has Obtained Special Temporary Authorization to Explore the Prospects for Limited Sharing of the 1755-1780 MHz Band

First, T-Mobile has begun to work cooperatively with appropriate Federal entities to examine the impact of commercial use in the 1755-1780 MHz band and to assess whether there may need to be temporary or permanent exclusion zones for certain Federal operations, or whether sharing can be facilitated through coordination procedures. We are pleased to report that on August 14, the FCC, working with the NTIA, granted our request for special temporary authority, or STA, to test the suitability of mobile broadband services in the 1755-1780 MHz band. As part of this effort, we are implementing a program, working with other carriers and DoD, to monitor operation of and gather accurate information about several of the systems identified in NTIA's 2012 report that appear to be the most difficult, costly or time consuming to relocate.

As a first step, we have begun to work with the DoD to identify the locations at which we will monitor the use of the 1755-1780 MHz band and are pleased with the spirit of cooperation that has characterized our work with DoD and others so far. Once the site selection process is finalized, we will establish our monitoring facilities in coordination with DoD. We are also working with NTIA's lab in Boulder, Colorado to conduct additional focused monitoring and to perform interference modeling and simulations. We anticipate that both of these steps will be largely completed before the end of this year, which will enable us to conduct field testing after that. We are mindful, as we hope our government partners are, that we need to keep the process moving productively forward to ensure an outcome that makes the best sense for this spectrum, especially considering the deadline to auction the companion 2155-2180 MHz band.

Commerce Spectrum Management Advisory Committee ("CSMAC")

Second, we are participating in Working Groups created under the auspices of NTIA's CSMAC. Working Groups have been created to study each of the Federal systems operating in the 1755-1850 MHz band. These groups provide a forum for an exchange of technical information between Federal entities and industry regarding their respective systems and to discuss and explore potential solutions for relocation of Federal operations or for sharing. T-Mobile is hopeful that the information exchanged in these discussions will provide a path forward for making this spectrum available for commercial broadband operations.

New and Existing Laws

Third, new and existing laws will fully protect DoD and other Federal users in the 1755-1780 MHz band and provide the potential for modernizing Federal equipment. In the Jobs Act, Congress made important changes to the Commercial Spectrum Enhancement Act, or CSEA, which provides resources for government agencies to study relocation options and to update

equipment to facilitate clearing or shared use of spectrum. In particular, the Jobs Act allows NTIA to provide Federal agencies with compensation from the Spectrum Relocation Fund for “relocation or sharing costs” associated with the reallocation and auction of spectrum from Federal to non-Federal or shared use prior to auction. Those funds can be used for planning, equipment upgrades, spectrum sharing costs, and pre-auction planning costs associated with relocation or sharing. These changes to the CSEA provide the resources necessary to study and implement relocation or modernization of Federal systems.

These new protections are in addition to other important provisions, which ensure that Federal operations are not harmed as a result of a reallocation of spectrum. *First*, relocation costs, now including “the acquisition of state-of-the-art replacement systems,” are covered by the Spectrum Relocation Fund, would be funded through the proceeds of the auction of the band to commercial licensees. *Second*, the Secretaries of Defense and Commerce and the Chairman of the Joint Chiefs of Staff would have to certify that relocation spectrum identified by NTIA and the FCC “provides comparable technical characteristics to restore essential military capability,” as required by the National Defense Authorization Act for Fiscal Year 2000. *Finally*, Federal agencies would also have the procedural protections of the CSEA, as recently amended, which requires NTIA review and approval of Federal spectrum users’ relocation plans.

Given the extent of protections for Federal operations, particularly provisions for auction proceeds to cover relocation costs, it is imperative that estimates of relocation costs be as accurate as possible. Overstating these costs could lead to a false conclusion that the spectrum should not be reallocated, producing a missed opportunity to deliver the benefits of broadband to all Americans.

NTIA's March 2012 report examining the feasibility of using the 1755-1850 MHz band for commercial operations provides little information about how it determined the nature and extent of the use of the band by Federal users. There is no data, for example, on the cost of equipment or other expenses that Federal users would incur in relocating. Based on the AWS-1 relocation process, NTIA's economic and engineering impacts may be overstated. The NTIA's Fifth Annual Report on the progress of relocation from the AWS-1 band shows that relocating outdated analog surveillance systems from the AWS-1 spectrum to more efficient digital systems has cost approximately \$691 million. However, in its March 2012 report on the entire 1755-1850 MHz band, NTIA estimates that relocating these systems will cost over \$3 billion dollars. Thus, according to NTIA, it would cost more than four times more to clear users from approximately 40 percent of the spectrum. NTIA's March report also examined the entire 1755-1850 MHz band. NTIA did not provide estimates for relocation of just the 1755-1780 MHz band. While reallocation of the entire band may ultimately be desirable, the immediate focus should be on 1755-1780 MHz.

NTIA's estimates, even for the entire band, seem inconsistent with past estimates. We note in particular that NTIA's estimated costs for relocating systems from the entire 1755-1850 MHz band would be \$18 billion, but DoD earlier estimated that it would cost only \$4.6 billion to clear the entire band. We respectfully urge this Subcommittee and the Spectrum Task Force to seek a more refined review of the costs for reallocating Federal users from these 25 megahertz of spectrum.

Limitation on Sharing

While the wireless industry is fully engaged in evaluating all solutions to spectrum shortages, we continue to believe that in order to most effectively use the 1755-1780 MHz band

and other spectrum now employed by the Federal government, the bands should be reallocated for commercial use on an exclusive, or near-exclusive, basis. In most cases, carriers need exclusive use of spectrum to provide service to the public. Sharing can be a tool to facilitate the transition of government spectrum to commercial use, but the ultimate goal should be reallocation to the extent possible. Except for limited cases shared spectrum is an inadequate resource because it is available only some of the time in particular places. Such a resource can help supplement a provider's exclusive spectrum, but it cannot replace it, nor does it provide the incentives or certainty necessary for carriers to make the very substantial investments needed to deliver world-leading, high quality mobile broadband services to American consumers.

That said, T-Mobile recognizes that there are instances where sharing may be necessary and feasible and where advances in technology offer new techniques for implementing sharing. First, there are instances where sharing spectrum may mean that it is not available for non-Federal use only in limited rural areas where there is an identified Federal installation or where Federal use is limited in time. In those cases, carriers can plan around the identified geographic or temporal exclusion zones and still offer a commercially acceptable service.

Second, sharing may be appropriate as a transition mechanism while spectrum is being cleared by Federal users. In that case, Federal users and commercial providers can plan where and when spectrum will be available, allowing entities like T-Mobile to begin to implement systems using the newly available spectrum while protecting Federal users as they transition to alternative communications solutions.

T-Mobile supports continued study of technologies that can facilitate greater and more dynamic spectrum sharing, but the technologies for such sharing are not available today, have not yet been proven effective, and will not yield the capacity required to satisfy the growing

demand for broadband capacity. Sweeping conclusions that shared use is the only future are simply inappropriate. It is one of many available tools, and as technology advances it may provide additional opportunities for maximizing efficient use of the spectrum. The appropriate approach, whether shared use, reallocation for exclusive commercial use, or some mixture of the two, must be considered on a case-by-case basis.

Applied to the 1755-1780 MHz band, this means that relocation of Federal operations should be the first option. In some cases, however, Federal systems in the band will take too long, be too expensive, or prove too difficult to relocate. It is this subset of operations where coexistence and sharing should be further explored – either to facilitate commercial use during an extended transition period or in a very limited number of cases where sharing is limited to rural areas or where Federal use is infrequent and it may be feasible to share indefinitely. Sharing is therefore merely one tool, and for now a limited tool, that is available for use in making spectrum available for broadband. The focus should remain on clearing as a first priority where feasible.

Conclusion

T-Mobile believes that the cooperative efforts I have described will serve as the foundation for demonstrating that the 1755-1780 MHz band can be allocated for commercial use, paired with the 2155-2180 MHz band, and auctioned without a requirement that all government facilities be cleared completely from the spectrum before commencement of commercial operations, while fully protecting government operations. Spectrum sharing for at least an interim period will allow much earlier deployment of broadband services in the spectrum than otherwise would be possible and will help facilitate competition in the nationwide deployment of wireless broadband services, ultimately benefitting millions of U.S. wireless consumers.

T-Mobile appreciates this Subcommittee's continued focus on this important issue and it applauds the formation of the Spectrum Working Group task force. Interest by Congress and the Administration in making more Federal government spectrum available for commercial use is an important driver that provides the focus, resources and tools necessary to implement the processes I've described.

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Thank you again for the opportunity to appear before you today. T-Mobile looks forward to continuing to work with you on these important and timely issues.