Before the

Subcommittee on Telecommunications and the Internet

United States House of Representatives

Hearing on "Staff Discussion Draft of the DTV Transition Act of 2005"

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Introduction

I am Peter K. Pitsch, director of Intel's global spectrum and communications policy efforts. Intel is the world's largest semiconductor manufacturer and a leader in technical innovation. Intel is also a leading manufacturer of communications and networking chips. Our mission is to accelerate the convergence of computing and communications through silicon-based integration.

Prior to joining Intel seven years ago, I worked on telecommunications policy issues at the FCC from 1981 to 1989 as chief of staff to Chairman Dennis Patrick and as chief of policy and planning for Chairman Mark Fowler and in private practice from 1989 to 1998. In total I have worked on spectrum and other telecommunications policy issues for nearly 24 years.

It is an honor to appear before this Subcommittee to testify on the benefits of setting a date certain for completion of the digital television (DTV) transition. Let me begin by saying that Intel has long recognized the great potential of DTV and has invested significant R&D in DTV including the development of DTV tuners for PCs. In 1998 Intel and the PBS teamed up to deliver "Frank Lloyd Wright"—the first digital television trial that allowed viewers to obtain Web-based content while watching TV. Also, Intel's experimental station KICU, broadcasting from Intel's headquarters in Santa Clara, was one of the first over-the-air DTV broadcasters in the Bay area.

The staff discussion draft of the "DTV Transition Act of 2005" would set a date certain of December 31, 2008 for completion of the DTV transition. In so doing it would make an additional 700 MHz band spectrum available—60 MHz for

commercial wireless broadband use and 24 MHz for public safety use. Today, I want to address two topics:

- **Estimates of the larger societal benefits of setting an early date certain for completion of the DTV transition; and**
- **The particular benefits of freeing the 700 MHz spectrum for WiMAX and other wireless broadband uses, especially in rural and underserved areas.**

The Larger Societal Benefits of an Early Date Certain

This Subcommittee has already heard much testimony on the costs and benefits of setting an early date certain for completion of the DTV transition. On the cost side, there will be transition costs for owners of analog sets used to receive over the air broadcast signals.

On the benefit side, there will be four substantial advantages. First, setting an early date certain will give consumers, manufacturers, retailers, broadcasters and all interested parties substantial advance notice and the ability to plan and minimize transition costs. Second, auction of the cleared 60 MHz of unassigned spectrum allocated to commercial use will generate billions of dollars in auction proceeds. Third, setting an early date certain will clear the 24 MHz of spectrum allocated to public safety which should give "first responders" communications systems with greater interoperability and new broadband capabilities. Finally, new wireless broadband services and capacity will generate consumer benefits from the new capabilities, lower prices and additional usage made possible.

This morning I want to focus on new information and analysis relevant to this debate that has been generated for Intel by Coleman Bazelon, an economist formerly with CBO and now at the Analysis Group. We will submit the Bazelon study to this Subcommittee when it is finalized early next week. I would like summarize key conclusions this forthcoming study reaches regarding auction proceeds, consumer benefits from new wireless broadband uses and the opportunity cost of the public safety spectrum.

Auction revenues

Two independent analyses of the market value of the 60 MHz that would become available for auction generate estimates ranging from $20 to $28 billion. Both of these analyses are based on a review of recent auctions and transactions. The prices generated in these "comparable sales" clearly factored in the previously announced 90 MHz of advanced wireless spectrum expected to be auctioned approximately a year from now. Both analyses recognize that auctioning the 60 MHz cleared by completing the DTV transition could generate a lower average price (in dollars/MHz/pop). They account for this downward pressure in various ways.

The Bazelon study rigorously addresses this factor by estimating the elasticity of demand for spectrum and the increase in spectrum supply made available by completing the DTV transition. The study estimates the resulting price would be 17 percent below that predicted based on comparable sales. Importantly, even this more conservative analysis of the market value of the spectrum made available for auction estimates the proceeds to be a substantial sum--$20 to $24

billion. By raising more than sufficient money to fund a transition program for those households who rely on over the air broadcast signals, these auction proceeds should make it possible to create a "win-win situation."

Consumer surplus

The Bazelon study also estimates the consumer benefit (or, in economic parlance, the "consumer surplus") that would be generated by clearing the 700 MHz spectrum. The consumer benefit generated from making increased spectrum available is typically many times the auction proceeds. Intuitively, these benefits come from new services and capabilities, the additional minutes of use and the lower prices the additional spectrum will make possible. Applying existing studies of the consumer benefit from adding spectrum, the Bazelon study estimates the added consumer benefit to be 10 to 18 times the expected auction proceeds—that is, at least $200 to $432 billion!

Public safety

Completing the DTV transition will provide significant benefits to society by allocating 24 MHz of 700 MHz spectrum to public safety. While it is difficult to estimate the value of this additional public safety spectrum, from a public policy perspective the foregone proceeds that this spectrum could have garnered in an auction represent the "opportunity cost" to the government of that spectrum. Of course, the actual benefits might be larger, but the opportunity cost provides a logical lower bound of the value that policymakers are placing on these benefits. The Bazelon study (again employing its estimate of the demand elasticity of spectrum)

estimates that the opportunity cost of the public safety spectrum to be $8 to $10 billion.

The Benefits of the 700 MHz Spectrum for WiMAX

Moore's Law is going to revolutionize Marconi's transmitter. In the past 30 years, microprocessors have increased 1,000 times in speed and decreased 100 times in cost. These phenomenal "silicon" improvements will produce profound effects in radio technology. Radios will become ever smarter, more flexible and ubiquitous.

One new radio technology Intel is particularly excited about is WiMAX. Like Wi-Fi (802.11), WiMAX is an IEEE technology (802.16) that is expected to be accepted as a global standard. WiMAX is expected to be deployed for both licensed use (like Cellular) and unlicensed (like Wi-Fi) applications. With the latest in modulation techniques (such as OFDM) and antennae techniques (such as MIMO) WiMAX has been architected to cost effectively deliver broadband services. It will be deployed for Line of Sight at ranges of up to 50 kilometers and non-Line of Sight applications at shorter ranges.

A wireless ISP using a small 802.16 installation could provide sufficient shared data rates (up to 75 Mbps) to simultaneously support more than 60 businesses with T-1 style connectivity and hundreds of homes with DSL-speed connectivity.[1] In the 2007- 2008 timeframe, WiMAX will begin to be deployed in laptops. (Intel has announced that it intends to put WiMAX radios in its chipsets by 2007—just as it has done with Wi-Fi in its Centrino ™ chipsets beginning in 2003.)

WiMAX is expected to improve bandwidth and service while radically reducing radio costs. As a result WiMAX should dramatically spur wireless

[1] WiMAX Press Teleconference Script, April 8, 2004.

broadband deployment as a third broadband pipe augmenting DSL and Cable. WiMAX holds special promise in rural areas or developing markets where service providers have not deployed wired infrastructure. Countries around the globe are already beginning pre-standard trials of WiMAX.

The television spectrum would offer enormous advantages for wide area wireless broadband services such as WiMAX. The frequencies currently available for wireless broadband are in the 2.5, 3.5 and 5.8 GHz region. In contrast, TV channels are much lower in frequency—from 700 MHz all the way down to 76 MHz.[2]

The ability to use TV frequencies would accelerate the growth, expand the reach, reduce the cost and improve the quality of broadband wireless service. Even when compared to the 2.5 GHz frequencies—the best alternative available to WiMAX in the U.S.—the TV frequencies make it far more economical to serve rural areas and to compete with wireline broadband alternatives in urban areas. For a given level of quality to a given coverage area, the 700 MHz frequencies require fewer antennas and use less power.

Based on Intel's internal analysis of the advantages of 700 MHz *vis a vis* 2.5 GHz frequencies, we estimate that to cover the same geographic area using 2.5 GHz frequencies would require 4 to 5 times as many base stations to achieve equal geographic area coverage, for a given air interface and bandwidth. Of course, one could "make up" for this loss by introducing innovative antenna enhancements or

[2] 76 MHz, VHF Channel 5, is the lowest channel considered in the FCC Unlicensed Operation in the TV Broadcast Bands NPRM, and hence potentially available for wireless broadband. Broadcast television in the US begins at 54 MHz, channel 2.

increasing the transmit power at 2.5 GHz. The former is being done in the WiMAX standard but at increased system costs. The latter—a greater than ten-fold increase in transmit power—is not feasible. Receiving devices would have to exceed FCC power limitations to successfully transmit back to the base station.

Also, because TV frequencies better penetrate walls, they would be less dependent on line of sight transmission to outdoor antennas. Besides the value that consumers could derive from portability, indoor use would also facilitate self-installation, avoid expensive truck rolls, and make it attractive to launch market-wide marketing and advertising campaigns. And indoor service to untethered laptops will accelerate the integration of WiMAX radios into microprocessors thereby generating the efficiencies from Moore's Law that I discussed earlier.

The cumulative impact of these differences on the feasibility of providing wireless broadband service in rural areas bears emphasis. The upshot for some rural areas is that opening the TV frequencies to wireless broadband use would likely make the difference between a high quality wireless broadband alternative and none at all. That is, frequencies below 1 GHz are premier beach front property. Intel believes the allocation of these frequencies for licensed use could dramatically accelerate broadband deployment with nationwide benefit, but with particular benefit to rural and underserved areas.

Thank you.