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CRS Report for Congress

Spectrum Use and the Transition to Digital TV

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Summary

The United States, like most of the world, is moving to replace current television technology with a new, technically superior format generally referred to as digital television (DTV). As part of this transition, Congress has acted to move television broadcasters out of spectrum currently in use for the old, analog technology. Both public safety communications networks and commercial advanced wireless service companies are eager to have access to the freed-up radio frequencies. These are now scheduled for release in accordance with provisions of the Deficit Reduction Act of 2005 (P.L. 109-171), which sets a date of February 17, 2009, for the release of the spectrum. Auctions for commercial uses are to be scheduled no later than 2008. Among specified uses of the auction proceeds are funds to facilitate the transition to digital TV.

Issues related to the release of spectrum (other than for pubic safety use) and the transition to digital TV that could be addressed by the 110th Congress include reconsideration of the allocation of released radio frequencies and access to unassigned frequencies between the new digital TV channel allocations, referred to as "white space." Legislation in these areas introduced in the 110th Congress includes S.93 (Senator Stevens), amending the Deficit Reduction Act to release funds for 911 programs; S.234 (Senator Kerry), providing terms for the release of white space spectrum for unlicensed use; and S. 337 (Senator Sununu), providing terms for the release of white space spectrum for unlicensed or licensed use and addressing authority over the use of the spectrum.

Deficit Reduction Act

Broadcasters are currently transmitting analog TV signals using radio frequency channels that will be vacated as they switch to digital broadcast technology. The Deficit Reduction Act of 2005 (P.L. 109-171, Title III) requires broadcasters to end analog broadcasting by February 17, 2009, in most cases, freeing the spectrum for other uses.

Some of the channels, usually referred to as the 700 MHz band,[1] have been assigned for public safety communications; a few channels have been auctioned; and the remainder (60 MHz) are slated for auction no later than February 2008. The Congressional Budget Office (CBO) has placed an expected auction value of about $12.5 billion for this spectrum;[2] many industry estimates are significantly higher. Based on the CBO estimate, the Deficit Reduction Act allocates $7.363 billion of these auction proceeds toward closing the budget deficit. Other provisions in the Deficit Reduction Act, Title III are:

- Set a definite date of February 17, 2009, for the release of spectrum at 700 MHz currently held by broadcasters.

- Require auctions by the Federal Communications Commission (FCC) of the freed spectrum to begin not later than January 28, 2008 with funds deposited not later than June 30, 2008.

- Extend the FCC's authority to hold auctions, which currently expires in 2007, until September 30, 2011.

- Create a fund, the Digital Television Transition and Public Safety Fund, to receive spectrum auction proceeds and disburse designated sums to the Treasury and for other purposes. Among these purposes are: a program that would expend up to $1,500 million on coupons for households toward the purchase of TV set top boxes that can convert digital broadcast signals for display on analog sets; a grant program of up to $1,000 million for public safety agencies to deploy systems on 700 MHz spectrum they will receive as part of the transition; payments of up to $30 million toward the cost of temporary digital transmission equipment for broadcasters serving the Metropolitan New York area; payments of up to $10 million to help low-power television stations purchase equipment that will convert full-power broadcast signals from digital to analog; a program funded up to $65 million to reimburse low-power television stations in rural areas for upgrading equipment from analog to digital technology; up to $106 million to implement a unified national alert system and $50 million for a tsunami warning and coastal vulnerability program; contributions totaling no more than $43.5 million for a national 911 improvement program established by the ENHANCE 911 Act of 2004 (PL. 108-494); and up to $30 million in support of the Essential Air Service Program. The fund and disbursements are to be administered by the National Telecommunications and Information Administration (NTIA).

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[1] Radio frequency spectrum is measured by the frequency of cycles per second, or hertz (Hz). Standard abbreviations for measuring frequencies include kHz — kilohertz or thousands of hertz; MHz — megahertz. For example, the 700 MHz band refers to those channels that are designated for technologies that transmit signals at speeds within or near 700 million cycles per second.

[2] Congressional Budget Office Cost Estimate, S. 1932, Deficit Reduction Act of 2005, January 27, 2006, page 22. At [http://www.cbo.gov/showdoc.cfm?index=7028&sequence=0].

Effective October 1, 2006, the NTIA will be able to borrow some of the authorized funds from the Treasury, secured by the expected proceeds of the auction required by the bill. These funds can be used to implement transition programs for digital television and for some public safety projects.[3]

Spectrum Allocation and Auctions

Although private-sector estimates vary, spectrum auctions of frequencies in the 700 MHz band have typically been projected to gross $20 billion to $30 billion.[4] Revenue potential is dependent on a number of factors, including timing of auctions and the date at which spectrum will be cleared and available. Estimates for the amount of revenue raised from spectrum auctions assume that 60 MHz of prime spectrum will be auctioned, with all channels available.

Allocations to Public Safety. Once broadcasters have moved to new frequencies, wireless communications networks operated by first responders and other public safety groups will receive 24 MHz of spectrum at 700 MHz for their exclusive use. This spectrum is assigned, not auctioned, and is not part of the 60 MHz slated for auction in 2008. In a study requested by Congress,[5] the FCC sought comment on whether additional spectrum should be made available for public safety, possibly from the 700MHz band. Comments received from the public safety community overwhelmingly supported the need for additional spectrum, although other bands besides 700 MHz were also mentioned. The FCC did not make a specific recommendation for additional spectrum allocations in the short-term although it stated that it agreed that public safety "could make use of such an allocation in the long-term to provide broadband services."[6] It further announced that it would move expeditiously to see whether the current band plan for the 24 MHz at 700 MHz currently designated for public safety could be modified to accommodate broadband applications.[7]

The FCC was petitioned by a company called Cyren Call Communications Corporation, requesting the reallocation of 30 MHz (half of the 60MHz currently designated for auction for commercial use by the Deficit Reduction Act)[8] to a "Public

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[3] Availability of funds for digital transition, P.L. 109-171, Sec. 3005 (b); availability of funds for public safety communications, P.L. 109-459, Sec. 4; availability of funds for emergency alerts, P.L. 109-347, Sec. 606 (c); bill to make funds available for 911, S. 93 (Sen. Stevens).

[4] "Analysis of an Accelerated Digital Television Transition," prepared by the Analysis Group, sponsored by Intel Corporation, May 31, 2005, page 6 at [http://www.itic.org/archives/DTV%20Transition%20Report.pdf]. Viewed November 16, 2005.

[5] P.L. 108-458, Title VII, Subtitle E, Sec. 7502 (a).

[6] *Report to Congress; on the Study to Assess Short-term and Long-term Needs for Allocations of Additional Portions of the Electromagnetic Spectrum for Federal, State and Local Emergency Response Providers*, Federal Communications Commission, December 19, 2005, paragraph 99, at [http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-262865A1.pdf]. Viewed May 9, 2006.

[7] Ibid., paragraph 100.

[8] P.L. 109-171, Sec. 3003.

Safety Broadband Trust."[9] According to the proposal, the trust would lease capacity not used by public safety to commercial operators that would provide the network infrastructure. The FCC denied Cyren Call's petition, citing, among other reasons, the congressional mandate to auction the spectrum Cyren Call proposed to use.[10] Other proposals for joint operations have also been submitted. [11] In December 2006, the FCC issued its own proposal that would turn over management of the 24MHz of spectrum designated for public safety to a not-for-profit group that would, among other responsibilities, hold a national license that would support public safety with a broadband wireless backbone.[12]

Spectrum Value. A significant factor in valuing spectrum is the size of the market served. Usually this value is expressed in terms of dollars per MHz-Population. Using this methodology, a value of $1.65 per MHz-Population, for example, yields a potential value of $28 billion for 60 MHz of spectrum at 700 MHz. Dollar per MHz-Population estimates for upcoming auctions are derived from results of earlier auctions for similar spectrum. This estimated value is then typically increased or decreased depending on assumptions about a number of variables. The different weight that analysts give to the impact of hard-to-measure market conditions largely explains the wide range of valuations predicted for 700 MHz auctions. For example, poor economic conditions may depress all markets and put downward pressure on prices for spectrum, just as an exuberant market — eager to implement new technology — may place an unusually high value on obtaining new licenses. As presently configured, 874 licenses in 60 MHz would be available for auction.[13]

Unlicensed Spectrum. Unlicensed spectrum is not sold to the highest bidder and used for the services chosen by the license-holder but is instead accessible to anyone using wireless equipment certified by the FCC for those frequencies. Among the advantages of unlicensed spectrum is the opportunity to test new technology directly with consumers instead of going through spectrum license-holders. One of the disadvantages of unlicensed spectrum is the possibility of interference among the transmissions of the various users, both within the assigned bandwidth and with other bandwidths.

Some advocates for unlicensed spectrum would like to see spectrum set aside in the 700 MHz band, where channels will be released by television broadcasters as they move from analog to digital transmission. An alternative proposal for providing unlicensed spectrum as part of the DTV transition is to designate so-called "white spaces" among the new digital TV channels. To avoid interference among TV station broadcasts, channels are assigned in one market area and left vacant in adjoining areas. For example, channel

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[9] For a summary of the proposal and a copy of the filing, see [http://www.cyrencall.com]. Viewed January 9, 2007.

[10] FCC, *Order,* RM No. 11348 released November 3, 2006.

[11] Proposals and legislation covering spectrum for public safety use are discussed more fully in CRS Report RL33838 *Emergency Communications: Policy Options at a Crossroads*, by Linda K. Moore.

[12] FCC, *Ninth Notice of Proposed Rulemaking,* Docket No. WT 96-86, released December 20, 2006; see paragraph 4 for summary.

[13] 700 MHz Advancement Coalition at [http://www.700MHz.org/700_MHz_band.htm].

7 is used in the New York City and Washington, DC, areas but not in Baltimore; in Baltimore, spectrum designated for channel 7 is vacant and could be used for unlicensed purposes. This checkerboard pattern is repeated across the United States. Beginning in May 2004, the FCC requested comment on proposals for considering the use of spectrum in television broadcast bands (Docket No. 04-186). In response, representatives of the televison broadcast industry have filed comments containing engineering studies that suggest harmful interference would occur; other studies suggest no significant interference would occur. On September 11, 2006, the FCC announced that it would move forward with the docket and laid out a timetable for completing the process so that devices could be developed and ready for retail sales by February 2009.[14] Of particular interest to the FCC is how to avoid interference with television broadcasts, as well as with other uses that have been permitted to operate in adjacent spaces.

The FCC's examination of allowing access to empty spectrum between digital television broadcast zones has focused on assigning available channels for unlicensed use. As part of its review for further rule making, the FCC is seeking comment on the possibility of designating all or some of the spectrum in the white spaces for licensed use.[15] Rules regarding interference differ between licensed and unlicensed spectrum.

S. 234 (Senator Kerry) would require the FCC to complete Docket 04-186 and issue a final order, among other requirements, within 180 days of the bill becoming law. S. 337 (Senator Sununu), would provide terms for the release of white space spectrum for unlicensed or licensed use, prohibit the FCC from banning the marketing of technologies that work on the white space, and address uncertainty stemming from legal proceedings regarding authority over the use of the spectrum, among other uses.[16]

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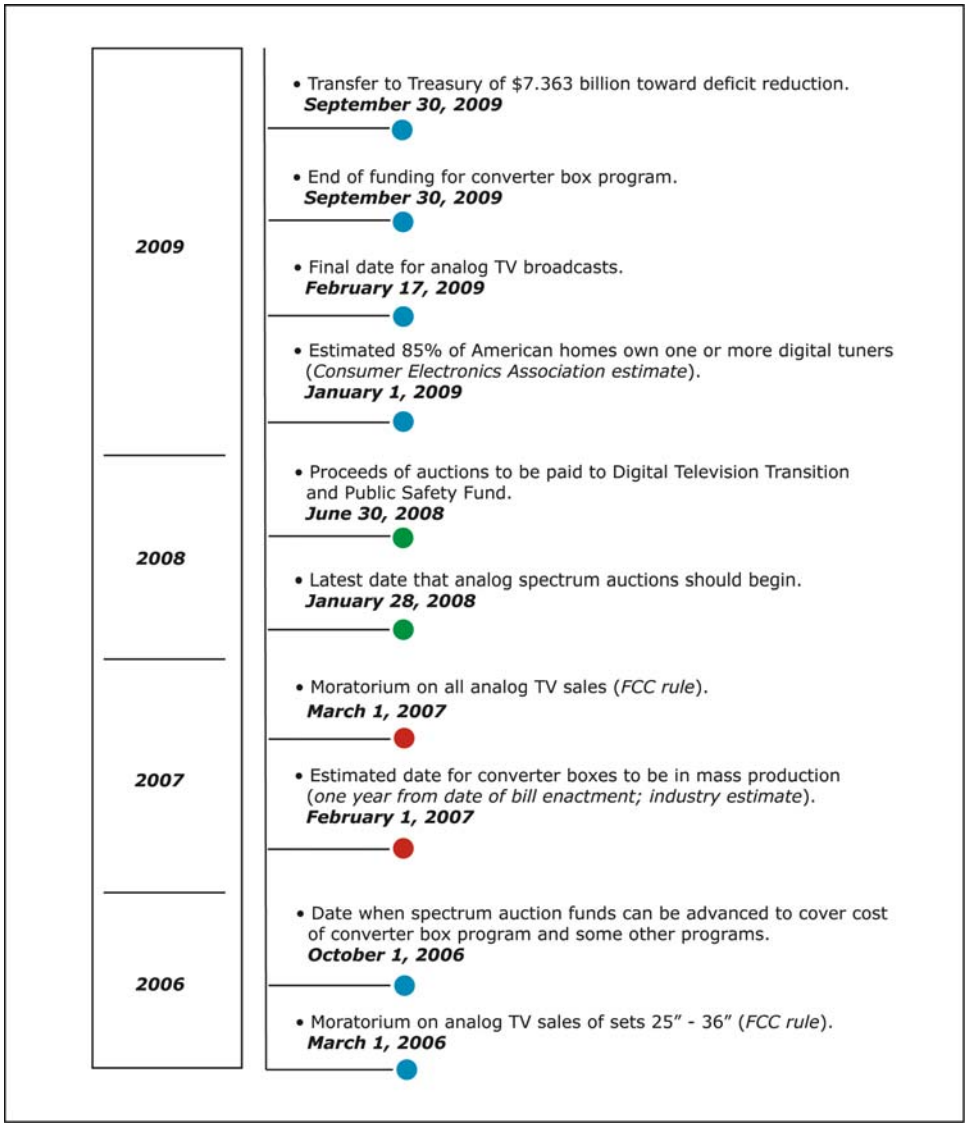
[14] FCC, *First Report and Order and Further Notice of Proposed Rule Making*, ET Docket No. 04-186, released October 18, 2006.

[15] *Ibid*., paragraphs 3, 24, 26 and others.

[16] "One-Time Co-Sponsors Part Ways on Bill to Promote Unlicensed Devices," by Cheryl Bolen, Daily Report for Executives, January 22, 2007.

Digital TV Transition and Auction of Analog Broadcast Spectrum: Time Line

(Key Dates, based on P.L. 109-171 unless otherwise indicated)



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