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# 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 is seeking to provide the impetus that would move television broadcasters out of 700 MHz spectrum currently in use for the old, analog technology — thereby ending these broadcasts. Channels at 700 MHz would subsequently be available for other uses. Both public safety communications networks and commercial advanced wireless service companies are eager to have access to frequencies already designated for their use but not released. In addition, budget reconciliation (S. 1932) requires that some of the cleared spectrum be auctioned to contribute at least $7.363 billion toward closing the budget gap. The Conference Report (H.Rept. 109-362) of the bill also sets a date of February 17, 2009 for the release of the spectrum, with auctions scheduled for 2008. Among specified uses of the auction proceeds are funds to facilitate the transition to digital TV. The Digital Television Transition Act of 2005, included in the Deficit Reduction Act of 2005 (H.R. 4241), contained some sections that were omitted in the Conference Report; these included provisions for must carry of digital broadcasts, cable and satellite transmissions, and spectrum allocation requirements. Some of these issues are addressed in other bills or could be reintroduced in new legislation during the 2nd Session. Other bills in the 109th Congress dealing with the transition to digital television and spectrum use include H.R. 1646 (Representative Harman), S. 1268 (Senator McCain), and S. 1600 and S. 1767 (Senator Snowe). This report will be updated.

## The Scope of the Debate

Broadcasters are currently using radio frequency channels in the 700 MHz[1] band for analog-technology television that will be vacated as they switch to digital broadcast

[1] Wireless (radio frequency) spectrum is measured in cycles per second, or hertz (Hz). Standard abbreviations for measuring frequencies include kHz — kilohertz or thousands of hertz; MHz — megahertz, or millions of hertz; and GHz — gigahertz, or billions of hertz. Spectrum allocations are assigned within bands that are divided into bandwidths or channels.

technology. Communications managers for public safety are waiting to build new networks on channels at 700 MHz that have been assigned to them but are not yet available. Companies that have purchased the few channels made available for auction in recent years would like to move forward with new services; this group is represented by The 700 MHz Advancement Coalition.[2] Another industry group urging the early release of spectrum is the High Tech DTV Coalition.[3] Its members would like to use frequencies at 700 MHz to deploy new technologies, such as WiMAX (Worldwide Interoperability for Microwave Access), that support high-speed Internet access and new services such as DTV to wireless devices. Spectrum not already assigned will be auctioned to providers of these new services. The Congressional Budget Office has reportedly placed an auction value of $12.5 billion on this spectrum.[4] The Deficit Reduction Act of 2005 (S. 1932) allocates $7.363 billion of these auction proceeds toward closing the budget deficit.[5] Other provisions of the budget resolution relating to the digital television transition are summarized below.

## Deficit Reduction Act

Not all the issues that Congress would like to resolve regarding the transition to digital television have been included in the budget reconciliation process; these could be treated in other bills being prepared for introduction. Among the provisions in the Conference Report for S. 1932 (109-362) are:

- Set a definite date of February 17, 2009 for the release of spectrum at 700 MHz currently held by broadcasters [Section 3002, (a) (1) (B)].

- 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. [Section 3003, (a) (1) "(v)].

- Extend the FCC's authority to hold auctions, which currently expires in 2007, until September 30, 2011 [Section 3003 (b)].

- Create a fund, the Digital Television Transition and Public Safety Fund [Sec. 3004 (3) "(E) "(I) and (ii)], 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 [Sec. 3005]; a grant program of up to $1,000 million for public safety

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[2] See [http://www.700MHz.org/]. Viewed December 21, 2005.

[3] Formed April 2005. Members include Alcatel, Aloha Partners, AT&T, Dell, Cisco Systems, IBM, Intel, Microsoft, Qualcomm, Texas Instruments and a number of associations. See [http://www.dtvcoalition.com/]. Viewed December 21, 2005.

[4] A previous estimate of $10 billion was increased to $12.5 billion as reported in "Deadline for Digital TV Transition Is Now All But Final," by Amol Sharma, CQ TODAY, December 21, 2005 - 1:25 p.m.

[5] S. 1932, Sec. 3004 (3) "(E) "(iii).

agencies to deploy systems on 700 MHz spectrum they will receive as part of the transition [Sec. 3006]; payments of up to $30 million toward the cost of temporary digital transmission equipment for broadcasters serving the Metropolitan New York area [Sec. 3007]; 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 [Sec. 3008]; a program funded up to $65 million to reimburse low-power television stations in rural areas for upgrading equipment from analog to digital technology [Sec. 3009]; up to $106 million to implement a unified national alert system and $50 million for a tsunami warning and coastal vulnerability program [Sec. 3010]; 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)[Sec. 3011]; and up to $30 million in support of the Essential Air Service Program [Sec. 3012]. The fund and disbursements are to be administered by the National Telecommunications and Information Administration.

The Conference Report for the Deficit Reduction Act was passed by the House on December 19, 2005. Changes on points of order were made by the Senate, which consequently returned the bill to the House. The provisions summarized above were not affected. The House reportedly is expected to take up the budget reconciliation bill when it reconvenes on January 31, 2006.[6]

## Possible Future Legislation

If the budget reconciliation process flounders, it is possible that legislation will be introduced to provide for spectrum release dates, auctions, and plans to assist the transition to digital television covered in the Conference Report. Also, legislation could be introduced to cover provisions from other bills that were not in the Conference Report of S. 1932. A pivotal issue that may be reconsidered for legislative action is whether cable systems and satellite televison should be required to carry all the programs of over-the-air broadcasters. Must-carry provisions in the 1992 Cable Act[7] set the requirements for cable television companies to carry local television programs transmitted by over-the-air broadcasters. Under the act, the FCC regulates televison transmissions and must carry rules. With analog technology, broadcasters can transmit only one over-the-air channel of programming on a specific frequency allocation. Digital technology can handle three to five, or possibly six, broadcast streams simultaneously.[8] Taking regulatory steps to clarify the application of must carry rules to digital broadcasts, the FCC ruled that cable operators are not required to carry more than a single digital programming stream, referred to as the primary video, from any particular broadcaster. The House Digital

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[6] "Final Action on Budget Deferred," by Steven T. Dennis, CQ Weekly - Weekly Report Budget, December 26, 2005.

[7] The Communications Act of 1934 as amended by the Cable Television Consumer Protection and Competition Act of 1992 (P.L. 102-385, "1992 Cable Act"); 47 U.S.C. §521 et seq. Similar rules apply to satellite television as of January 2002.

[8] As part of the digital transition, most broadcasters received the same amount of spectrum that was required for a single, analog channel (6 megahertz). Digital technology uses spectrum more efficiently and is expected to become even more efficient in the future.

Televison Transition Act supported current FCC rules that require must carry for a single primary video stream only (not multi-casting must carry).[9] It also contained provisions covering delivery of signals by satellite companies[10] and would have modified existing law so as to permit cable companies to retransmit digital signals in a downgraded, analog mode.[11] Also eliminated from the Conference Report were provisions touching on band plans and access to auctions by small wireless companies.[12]

## Spectrum Allocation and Auctions

Although estimates vary, spectrum auctions of frequencies in the 700 MHz band have typically been projected to gross $20 billion to $30 billion.[13] 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. Proposals have also been made that would reduce the amount of spectrum auctioned, in which case the revenue, all things being equal, would presumably be less.

In a study requested by Congress,[14] 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."[15] It qualified this statement by observing that spectrum is only one factor in assuring access to mobile broadband services for emergency response. 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.[16]

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[9] H.R. 4241, Sec. 3410 (a).

[10] H.R. 4241, Sec. 3410 (c).

[11] H.R. 4241, Sec. 3410 (b); would have amended 47 USC § 543.

[12] H.R. 4241, Sec. 3413.

[13] "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.

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

[15] *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 lxcal emregency response providers,* Federal Communications Commission, December 19, 2005, paragraph 99, at [http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-262865A1.pdf]. Viewed December 27, 2005.

[16] *ibid,* paragraph 100.

**Unlicensed Spectrum.** There are also some who advocate that some portion of the freed spectrum be unlicensed,[17] although most industry experts favor licensing for technical reasons related to the unique quality of signals at 700 MHz. Unlicensed spectrum would not be sold to the highest bidder and used for the services chosen by the license-holder but would instead be 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.

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 7 is used in the New York City area and in the Washington, DC area, but not in Baltimore. Beginning in May 2004, the FCC requested comment on proposals for considering the use of spectrum in television broadcast bands (Docket No. 04-186) but has yet to reach a decision. Representatives of the televison broadcast industry have filed comments containing engineering studies that show harmful interference would occur; other studies show no significant interference would occur.

**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. The usability of spectrum is an important factor as well. There is a disincentive to invest in a non-performing asset, such as spectrum that is blocked by other users, or spectrum that does not serve an immediate market because new technology is not ready for deployment. In the case of spectrum at 700 MHz, there is a risk that the spectrum will remain encumbered, despite hard dates, thereby tying up resources indefinitely and hampering investment in new communications technologies and services. As presently configured, 874 licenses in 60 MHz would be available for auction. Of these, 280 licenses are considered encumbered by television broadcast stations.[18]

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[17] For example, Gene Kimmelman of the Consumers Union has reportedly confirmed that consumer groups "would not support the establishment of a firm deadline unless Congress funds converter boxes and makes spectrum available for unlicensed service and new entrants." Source: "Consumer Groups Urge Protection for 70M TV Viewers," Telecommunications Reports, July 15, 2005.

[18] 700 MHz Advancement Coalition at [http://www.700MHz.org/700_MHz_band.htm].

## Time Line

### Digital TV Transition and Auction of Analog Broadcast Spectrum

(Key Dates, based on S. 1932, S. Rept 309-362 unless otherwise indicated)