

# **CBO TESTIMONY**

**Statement of  
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**on  
Digital Television**

**before the  
Committee on the Budget  
United States Senate**

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## **NOTICE**

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**CONGRESSIONAL BUDGET OFFICE  
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Mr. Chairman and Members of the Committee, I am pleased to appear before you to discuss the Congressional Budget Office's (CBO's) estimates of the receipts that might be generated by two proposals associated with television broadcasting technologies. For simplicity, I will refer to those proposals as Option I, technically known as the "analog return proposal," and Option II, sometimes called the "second-channel auction." My testimony today makes three points.

- o First, the radio spectrum is a valuable public resource. Auctioning licenses permitting use of the spectrum ensures that those licenses are granted to the parties who value them most and makes a substantial contribution to federal receipts. The Congress may choose among many different options in trying to capture those receipts to reduce the deficit. Prominent among the options are two proposals that direct the Federal Communications Commission (FCC) to pursue different strategies in moving the nation to a new television broadcasting technology.
  
- o Second, we stand at a fork in the road to the television of the future. The proposals discussed here today will lead to different allocations of a valuable part of the radio spectrum. The most important factors in choosing a course for the future are that the ultimate allocation of the spectrum produce the most value for society and that the benefits



of transition be equitably shared among broadcasters, viewers, and taxpayers.

- o Third, although federal receipts are an important factor in choosing a strategy for transition, the uncertainties involved in estimating spectrum receipts make CBO's estimates for the two proposals so close as to be indistinguishable.

#### THE SPECTRUM RESOURCE AND THE BUDGET

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The radio "spectrum" does not exist as a physical object; rather, it is a conceptual tool used to organize and map a set of physical phenomena. Electric and magnetic fields produce waves that move through space at different frequencies, and the set of all possible frequencies is called the electromagnetic spectrum. The subset of frequencies from 3,000 cycles per second to 300 billion cycles per second--or 3 kilohertz (KHz) to 300 gigahertz (GHz)--is known as the radio spectrum.

Given the technology available, the supply of usable radio spectrum is limited: two parties attempting to use the same frequencies simultaneously and in sufficient proximity will find their signals interfering with each other. The supply cannot, however, be used up: turning an interfering signal off restores the spectrum's original



capacity. Moreover, improvements in technology effectively increase the supply by allowing higher frequencies within the radio spectrum to be used and lower frequencies to be used more intensively. Digital technologies now being widely adopted will dramatically increase the capacity of the spectrum to carry information--so much so that wireless communications may be on the verge of a new epoch.

The demand for telecommunications services drives the demand for the radio spectrum. The right to use a part of the spectrum is an indispensable ingredient in producing such private goods as cellular telephone service and television broadcasting and such public goods as communications for law enforcement and national defense. Digital technology increases the supply of usable spectrum, but it also opens the prospect of new services and increases the demand for the radio spectrum. The balance ultimately struck between the supply-side and demand-side ramifications of digital technology will be a major factor in determining the future course of spectrum prices and FCC auction receipts.

The Omnibus Budget Reconciliation Act of 1993 was a point of departure from the past both in the way the government manages the spectrum and in the relationship between the spectrum resource and the budget. For the first time, the market--in the form of auctions--replaced administrative proceedings and lotteries as the means of assigning the initial rights to use the radio spectrum. Those auctions have been widely heralded as a success. From a budgetary perspective, the radio





spectrum, sometimes referred to as the "invisible resource," became anything but invisible as the receipts from the FCC's first eight auctions began to mount. Winning bids from those sales will total \$18 billion (near-term receipts will be less since some auction winners will have up to 10 years to pay off their bids). The press reports predictions of even larger numbers in the future, particularly for digital television. It is not surprising then that both the Congress and the Administration have looked to the FCC auctions--and not exclusively prospects involving television--in efforts to balance the budget.

The recent Balanced Budget Act included provisions that both CBO and the Office of Management and Budget (OMB) estimated would generate \$15.3 billion over seven years. One provision--estimated to produce \$6.5 billion in receipts over seven years--extended the FCC's auction authority beyond 1998 and permitted the commission to auction more different types of licenses. A second provision directed the FCC to relocate lower-value users from a commercially attractive area of the spectrum and bring 100 megahertz (MHz) of spectrum to auction. A third provision directed the National Telecommunications and Information Administration--the federal agency managing the government's use of the spectrum--to transfer an additional 20 MHz of commercially attractive spectrum from federal to nonfederal use and ordered the FCC to auction that spectrum. CBO estimated that the second and third provisions together would produce \$8.8 billion in receipts.



In December 1995, H.R. 2530, popularly called the coalition budget, proposed adding the Administration's television transition plan--Option I, the proposal for analog return--to the spectrum auction provisions of the Balanced Budget Act passed by the Congress. I will discuss that proposal at some length in a moment. However, in the context of the budget packages considered by the Congress and the Administration thus far, the point is that OMB estimated the proposal would produce receipts of \$13 billion, whereas CBO estimated \$6 billion. In the heat of budget negotiations, a \$7 billion difference is large. Yet in the uncertain world of auction receipts seven years in the future, one should view CBO's and OMB's estimates as being close together rather than far apart. (CBO's new estimating assumptions close that gap by over half, but OMB has since increased its implicit estimate by almost a comparable amount.)

Although the law requires that CBO provide point estimates of the potential receipts from any proposal affecting the FCC auctions and that we keep our baseline estimates constant during the budget cycle, the uncertainty of the receipts is significant. Receipts depend on many factors, some of which are subject to change. Those factors include assessments by investors of future market conditions, rapidly changing technologies, the progress of deregulation in the larger telecommunications industry, and the FCC's future decisions about what pieces of the spectrum to make available for which uses under what conditions.



To date, receipts have been higher than CBO estimated. For example, our 1993 estimate of five-year receipts to the Treasury generated by FCC auctions was \$7.2 billion. Our December 1995 baseline estimate of receipts for that 1994-1998 period was \$11.7 billion. When we update our figures again to reflect the most recent auctions, we will increase that number even more. The estimates that are provided today for the alternative approaches to the transition to digital television are no more certain than those offered in the past. They are heavily influenced by private evaluations of such factors as technical advances, market conditions, the regulatory environment, and general economic conditions. Thus, in choosing between proposals, the Congress should not attach great significance to the small differences between the receipts that different proposals might generate.

The remainder of my testimony will provide some background on the impending changes in the television industry, describe two proposals related to those changes, present CBO's most recent estimates of the receipts that each proposal might generate, and briefly explore some other considerations related to the proposals.

## THE TRANSITION TO DIGITAL TELEVISION

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Today, slightly more than 400 megahertz of the radio spectrum is allocated to television broadcasting in several frequency blocks between 54 MHz and 806 MHz.



Adopting digital technology will decrease problems of interference and allow the frequencies allocated to television broadcasting to be used twice as intensively, in effect creating twice as many 6 MHz slots (the amount of spectrum now granted to a single analog television channel) in each television market.

Digital or advanced television was at one time synonymous with a dramatically improved picture and higher-quality sound--so-called high-definition television (HDTV). Digital technology would permit a broadcaster to offer two HDTV-quality film programs or a single sports program with a 6 MHz slot. Broadcasters, however, may wish to explore other options opened by the new technology, including using the information transmitting capacity of the 6 MHz slot to offer four to six programs of current quality. To watch digital television, however, viewers will need to replace their current TV sets or acquire set-top boxes similar to those now used by direct broadcast satellite subscribers.

The FCC began considering the issue of advanced television in 1987. The commission now proposes to provide each holder of a current broadcast license with an additional 6 MHz slot. The FCC does not have the authority to auction broadcast licenses. Thus, the "second channels" would be given to incumbents without charge. During a transition period of 15 years or longer, broadcasters would have the use of both their old analog slot and a new digital slot, allowing them to transmit both an analog and a digital signal and thus giving viewers time to adopt the new technology.





The recently enacted Telecommunications Act of 1996 requires broadcasters who choose to use a part of their digital spectrum to provide services other than advertiser-supported television--for example, local paging--to pay a fee based on the price paid at auction by other licensees to provide similar services.

At the end of the transition period, broadcasters would stop transmitting the analog signal and would return that spectrum to the FCC to allocate for other uses--such as additional cellular telephone service. Ultimately, the new digital channels could be accommodated within about 60 percent of the spectrum that is now allocated to television broadcasting and would be arranged within that spectrum (repacked) to free up large contiguous blocks of spectrum for those other uses. According to preliminary analysis, between 130 MHz and 150 MHz of spectrum would be available for auction after the 15-year transition period. CBO has not provided an estimate of the receipts that auctioning those frequencies might generate in the distant future.

## PROPOSALS

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Two prominent proposals would either modify or significantly change the FCC's long-standing proposal. Option I, the analog return proposal, would accelerate the FCC's plan to auction the returned analog spectrum but would not auction licenses permitting digital television broadcasting. Option II, the second-channel auction,



would auction the new digital television slots but would not free up spectrum for nonbroadcast uses.

H.R. 2530 included Option I, as proposed by the Administration. Option I would put into law major elements of the FCC's proposal. The key difference between Option I and the FCC's current proposal is that the transition period would not extend beyond 2005. Moreover, the rights to use the new spectrum would be sold in 2002--three years before the winning bidders could use the spectrum.

Option II, the proposal to auction the second channel, has not been presented in legislative form but has been articulated in general terms before the Congress and the FCC and widely discussed in the press. That proposal would create a number of new digital slots equal to the number of analog channels.

As early as 1997, the new digital slots would be auctioned to the highest bidders. The winners would be required to offer a minimum amount of advertiser-supported broadcast service. But they would be otherwise free to put any excess capacity to whatever use was most profitable and did not interfere with the rights of other license holders. Analog broadcast licensees could continue to broadcast indefinitely and would be permitted to buy a digital slot without selling their analog channel. To that end, legislation would have to specify relief from current limits on



station ownership. Current licensees could also convert their analog license to a digital license after a period of time and notification to their service area.

### ESTIMATED AUCTION RECEIPTS FOR OPTION I

CBO estimates that, as part of a package similar to H.R. 2530, auctioning the analog spectrum as Option I proposes could add about \$11 billion to auction receipts in 2002. The estimate is higher than the \$6 billion estimate made in December for the same proposal because new data from the FCC auctions point in that direction.

In general, CBO's estimates of the receipts from future spectrum auctions assume that large blocks of contiguous spectrum under 3 GHz are a valuable commodity. For example, 60 MHz of spectrum allocated for personal communication services (PCS)--a new generation of cellular telephone service--offered in two 30 MHz blocks generated more than \$7.5 billion in receipts in the recently concluded "A" and "B" block auction. CBO assumes, however, that the value of such spectrum will fall from the levels paid in the auctions as more spectrum is brought to market. That assumption is based on trends in technology, policy, and regulation and their effect on increasing the supply of spectrum available to telecommunications markets. Specifically, those trends are:



- o That improved telecommunications technologies will allow more intensive use of parts of the spectrum already in wide commercial use and permit higher frequencies to be put to profitable use;**
  
- o That under current policy, the FCC will follow the PCS allocation of spectrum for new wireless services with additional allotments of desirable frequencies for commercial uses, including those frequencies designated for transfer from federal to nonfederal use as directed by the Omnibus Budget Reconciliation Act of 1993; and finally,**
  
- o That the FCC has demonstrated over the past several years that it will relax regulatory barriers impeding current holders of FCC licenses from expanding service definitions and applying their spectrum to new markets and services.**

**Taken together, those three trends will increase the supply of spectrum for nonbroadcast wireless services and intensify competition in telecommunications service markets. Competition will decrease service prices, profits, and eventually the prices that bidders are willing to pay for spectrum.**

**Consistent with that outlook, CBO's estimating approach takes into account the total amount of spectrum to be auctioned in a legislative proposal. To illustrate,**





if the 150 MHz of analog return spectrum were the only frequencies to be reallocated and directed for auction in a legislative package, CBO would estimate more than \$15 billion in offsetting receipts. The legislative proposals that CBO has reviewed, however, also include 120 MHz of spectrum comparable to the analog return spectrum (large blocks of frequencies under 3 GHz). With 270 MHz to be sold at auction rather than 150, CBO estimates that the market-clearing price would be lower and that the analog return spectrum made available by Option I would add \$11 billion to total auction receipts.

The general approach that CBO has taken to estimating FCC auction receipts does not preclude accounting for other factors in evaluating a specific proposal. In the case of Option I, those factors include uncertainty about the amount of spectrum that will ultimately be made available and about the time when winning bidders would actually be able to use that spectrum.

CBO's working assumption has been that the analog return spectrum would total 130 MHz to 150 MHz. The most recent information, however, points toward the lower end of that range. Concerning timing, Option I requires that the returned spectrum be available for use in 2005. In that option, provision is made to subsidize the purchase of converter boxes by households that have not bought a digital receiver by that time. If the percentage of households unable to receive the digital signal in 2002 is large, however, it is reasonable to expect that the 2005 deadline might be



extended or that bidders would be cautious for fear that the deadline would be extended some time in 2003 or 2004.

## ESTIMATED AUCTION RECEIPTS FOR OPTION II

CBO has estimated that auctioning all of the new digital slots in 1997 as Option II proposes, including those that would be provided to public television licensees under the current FCC proposal, would increase receipts by a total of \$12.5 billion in 1997 and 1998. That estimate would fall to \$9.4 billion if digital slots for public broadcasting licensees were set aside. CBO's estimate is based on a financial model of the digital broadcasting industry and a review of other estimates of the value of digital channels.

A key assumption of CBO's financial model is that the new digital channels would represent the first opportunity to enter local digital television broadcasting. The model provides estimates of the present value of a stream of profits for the digital channels, based on the assumption that licensees use them primarily to provide four streams of advertiser-supported TV programming, plus some software and data broadcasting, pay-per-view events, and advertising enhancements, such as additional product information that can be delivered to a viewer's home computer.



Other analysts have used different methods to try to estimate potential receipts from a second-channel auction. The commonly heard figure of \$70 billion, for example, is the upper end of a range from \$11 billion to \$70 billion that the FCC calculated by extrapolating the per-person, per-MHz prices received in the first four spectrum auctions. No connection exists between the markets for PCS and paging services and the television market, however, and hence the winning second-channel bids should not be expected to bear any particular relationship to those observed in previous auctions.

The FCC has also analyzed data on sale prices, advertising revenues, and depreciation costs of current TV stations and obtained second-channel estimates in the narrower range of \$23 billion to \$38 billion. Those data, though more germane than the PCS auction prices, are still difficult to relate to the value of the digital channels. Such channels may ultimately be more profitable than today's analog channels, but they will not be viewable until consumers acquire digital TV sets or set-top boxes.

The recent auction of a slot for direct broadcast satellite (DBS) service provides another relevant comparison point for a second-channel auction, one that yields dramatically lower estimates of potential receipts. Because the capacity of the DBS slot is equivalent to 40 6-MHz terrestrial channels--roughly three times the number proposed for terrestrial digital TV--MCI's winning bid of \$682.5 million



suggests that receipts from a second-channel auction might be on the order of a few hundred million dollars. Several factors could make the second-channel licenses more valuable to bidders than the DBS slot was, particularly the desires of viewers for local programming and the interest of advertisers in reaching local audiences. But the DBS result is certainly grounds for caution in estimating receipts from a second-channel auction in the tens of billions of dollars.

In summary, although CBO recognizes the large uncertainties surrounding any estimate of the potential receipts from Option II, we believe that our current estimate of \$12.5 billion is within the appropriate range provided by evidence from related services. In particular, we do not now find any persuasive arguments to support estimates significantly higher than ours.

#### OTHER CONSIDERATIONS

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CBO's estimates of auction receipts from the leading proposals--\$11 billion for Option I and \$12.5 billion for Option II--are so close as to be essentially indistinguishable, given the uncertainties involved. Accordingly, if the Congress wishes to choose between the two proposals, it may want to make the choice on other grounds, such as their total contribution to the nation's economy. Both proposals have their advantages and disadvantages in that regard.





Even if the auction receipts could be predicted with perfect certainty, they would not settle the question of which proposal would be more economically valuable because each one auctions only part of the current TV spectrum. Option I would auction licenses to use the returned analog spectrum but not those for digital TV broadcasting; Option II would auction the digital TV licenses but not the existing analog TV licenses. From the point of view of the economy as a whole, the combined value of the services provided by holders of both the auctioned and unauctioned licenses is the appropriate measure. If the economic value of a given proposal is thought of as a pie, the estimate of the proposal's auction receipts corresponds to the size of some wedge of the pie but does not bear any direct relation to the size of the pie as a whole.

One reason to think that Option I might yield a larger economic pie is that it allows the FCC to reclaim the channels occupied by today's TV stations and repack the digital channels, thus creating sizable blocks of nationwide clear spectrum for new uses. All things being equal, large blocks of spectrum should be at least as valuable to the economy as small blocks because they allow a larger set of potential uses.

Conversely, one reason to think that Option I might be less economically efficient is that, in order to reclaim the analog channels, it forces all broadcasters to make the transition to digital at roughly the same pace, regardless of the circumstances of local markets. Some of the investments that broadcasters are



required to make under this plan may be uneconomical, particularly in smaller markets. Similarly, the plan forces viewers to choose between adapting and losing service on each analog TV set by a nationally determined date. Some households might otherwise prefer to replace or adapt some of their sets for digital TV, while continuing to receive analog signals on other sets until those wear out.

In contrast, Option II allows choices in a decentralized market to determine the pace of the transition from analog to digital television. That approach avoids possible inefficiencies of the centralized FCC plan but does not reclaim the analog channels, thereby forgoing the opportunity to create the valuable blocks of nationwide clear spectrum. The relative size of those two effects is unknown at present.

Other factors also distinguish the two proposals. For example, Option I may be more hospitable to developing high-definition television. The knowledge that analog TV sets will have to be replaced or adapted by a certain date might give a critical mass of consumers the incentive to upgrade to high-definition TV sets. Another distinction is that Option II can be easily modified to reduce the number of channels auctioned, since it does not have to provide every current broadcaster with an additional 6 MHz. Auctioning a smaller number of channels could reduce various problems involving congestion and loss of service to areas in large markets, cross-border coordination with Canada and Mexico, and displacement of existing low-



power television stations. At the same time, it could lower auction receipts and the benefits to digital TV viewers.

## **CONCLUSION**

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CBO's estimates of the Option I analog return and Option II second-channel auction proposals differ by a relatively small amount given the uncertainties involved. CBO estimates that either proposal would generate a substantial amount of auction receipts. The Congress's action on those matters will have important implications for the efficient use of the radio spectrum and the welfare of television broadcasters and viewers. Those implications deserve more attention than auction receipts, and they should play a larger role in Congressional decisions about the future of television broadcasting.

