



September 10, 2013

TO: CPB Board of Directors

THROUGH: Pat Harrison

FROM: Mark Erstling

SUBJECT: Spectrum Overview (Background)

**Spectrum Allocation**

Smart phones, tablet computers, and other mobile Internet products are driving demand for wireless broadband access. One of the Obama administration’s goals, which enjoys bi-partisan support in Congress, is to ensure that all Americans have access to robust broadband services. The Federal Communications Commission (FCC), in their 2010 National Broadband Plan, said in order to make this a reality, more spectrum would need to be made available to wireless broadband service providers across the country. And, in order to make it available, the FCC has to reclaim spectrum that has already been allocated to some other private or governmental use.

The illustration in Figure 1 shows the usable parts of the electromagnetic spectrum and the allocation of that spectrum to vast numbers of different users and uses. The spectrum is used for everything from garage door openers to remote controls, satellite communication, smart phones and radio and TV broadcasting. Basically, if it’s wireless, it uses some part of this spectrum.

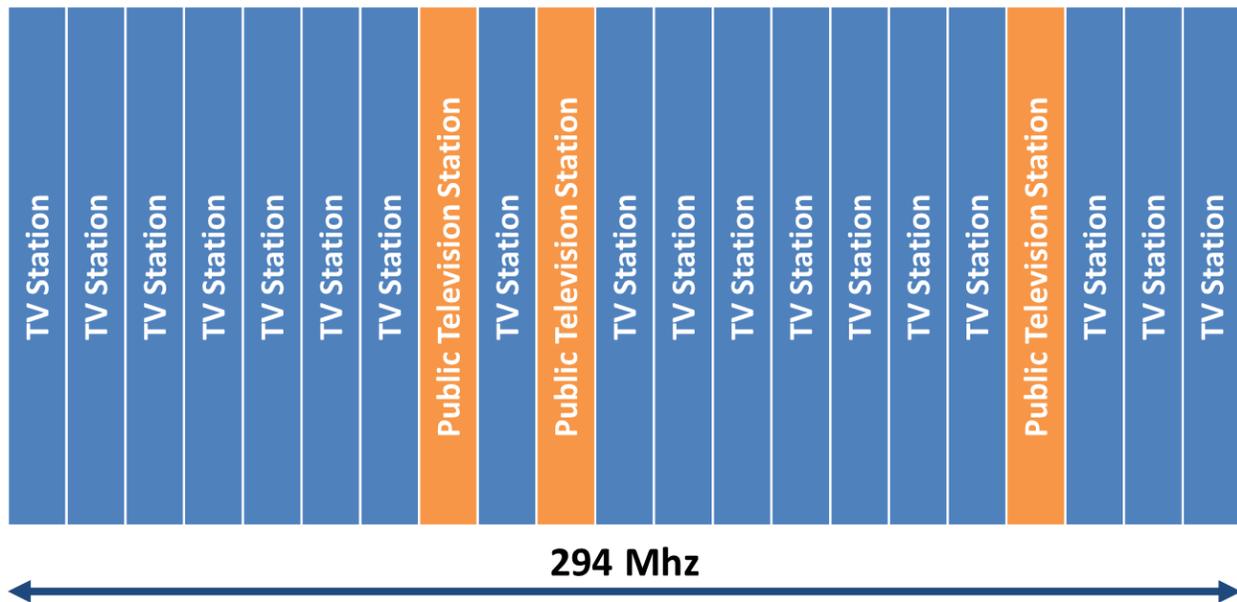
*Figure 1: U.S. Spectrum Configuration*



The sizeable blue band near the top in the yellow circle is AM radio spectrum and in the center in the green circle is FM radio. The red circles indicate the spectrum that is currently being used by broadcast television stations, both commercial and public. This is the spectrum the FCC considers beachfront property – it has characteristics that make it work for wireless broadband.

As depicted in Figure 2, below, when aggregated, the spectrum available for broadcast television adds up to 294 megahertz. Each television transmitter utilizes six megahertz. All television stations, both commercial and public, occupy one of these six megahertz segments.

*Figure 2: U.S. Television Broadband Spectrum Makeup*



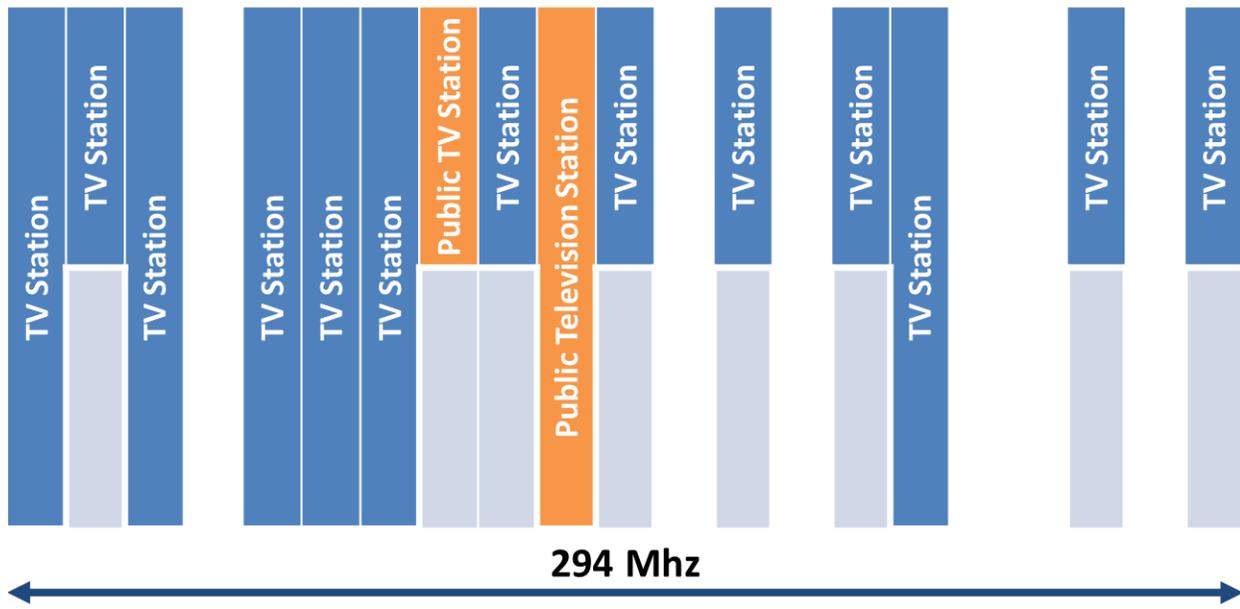
In its Broadband Plan, the FCC envisioned creating incentives for individual television stations to voluntarily relinquish their spectrum, and in return to receive a portion of revenue derived from the auction of that spectrum to wireless broadband companies. As some commercial and public stations elect to relinquish their spectrum, or to share a six megahertz channel with another station, the remaining stations would be moved to a different channel. This process is called “repacking.” The goal is to secure 120 megahertz of contiguous spectrum for wireless applications. The auction process and repacking are described in greater detail below.

**Spectrum Auctions and Impact**

On February 2, 2012, the President signed the Middle Class Tax Relief and Job Creation Act, which provided the FCC with the authority to auction television spectrum that broadcasters volunteer to give up, and to compensate these broadcasters out of the auction proceeds. That compensation provides the incentive for broadcasters to give up their spectrum.

The goal of the legislation was to clear a portion of the television UHF band spectrum for wireless broadband use. This will occur through a spectrum auction, depicted in Figure 3.

*Figure 3: Spectrum Auction*



The spectrum auction process actually involves two auctions – referred to in the legislation as a Reverse Auction and a Forward Auction. The Reverse Auction is the process in which television stations will bid for compensation in exchange for surrender of their channels. It will be followed by a repacking process in which the FCC will, in effect, re-organize the UHF band to clear a large amount of spectrum at the top for wireless broadband. Finally, there will be a Forward Auction in which the FCC will then sell to wireless companies the spectrum thus made available.

If successful, this process will mean that stations (mostly, if not entirely, in the largest television markets) volunteering to participate and submitting winning bids in the Reverse Auction will go off the air completely, shift from a UHF channel to a VHF channel, or share channels with other stations, in order to make channels available for reallocation. Also, many other television stations across the country that did not participate (or did not submit a winning bid) in the Reverse Auction will have to go through a transition to new channel assignments as part of the repacking process. This means that many or most television stations will have to make changes to their transmission facilities. Those changes may in some cases be disruptive and expensive.

### **The Reverse Auction**

In the Reverse Auction process, individual television stations, including public television stations, will be able to submit bids that will represent the lowest price at which they would be willing to surrender their spectrum.

In addition to submitting the price at which it will, in effect, sell or swap all or part of its channel, a television station choosing to participate in the Reverse Auction has three options: 1) it can completely surrender its broadcast license and discontinue any over-the-air broadcasts; 2) it can agree to share spectrum with another broadcaster who is also willing to share spectrum, which means that both stations will continue to broadcast an over-the-air signal but both will be

limited in the nature and number of program streams that they can air, or 3) it could agree to have its station moved from the UHF band to the less desirable VHF band.

The VHF band is considered less desirable in the digital television world because it suffers from reception problems in urban areas, and because it cannot be used for reception on small hand-held devices.

A television station, regardless of whether commercial or public, could receive compensation from the auction process if it submits a winning bid agreeing to any of these three alternatives. However, a station choosing to surrender its license entirely in the auction would lose its cable and satellite carriage rights, while a station either sharing spectrum or moving to the VHF band would retain its cable and satellite carriage rights.

### **The Forward Auction**

The FCC will also conduct a Forward Auction to “sell” the spectrum in the upper UHF band that is made available by the Reverse Auction and the repacking process. Bidders are likely to include AT&T, Verizon and other existing wireless carriers, as well as other companies seeking to enter the wireless broadband business.

The FCC has to plan and implement the Reverse Auction, the repacking process, and the Forward Auction, to ensure that the results match up – it must recover and repack enough spectrum to clear – nationwide – the block of spectrum to be auctioned to wireless carriers.

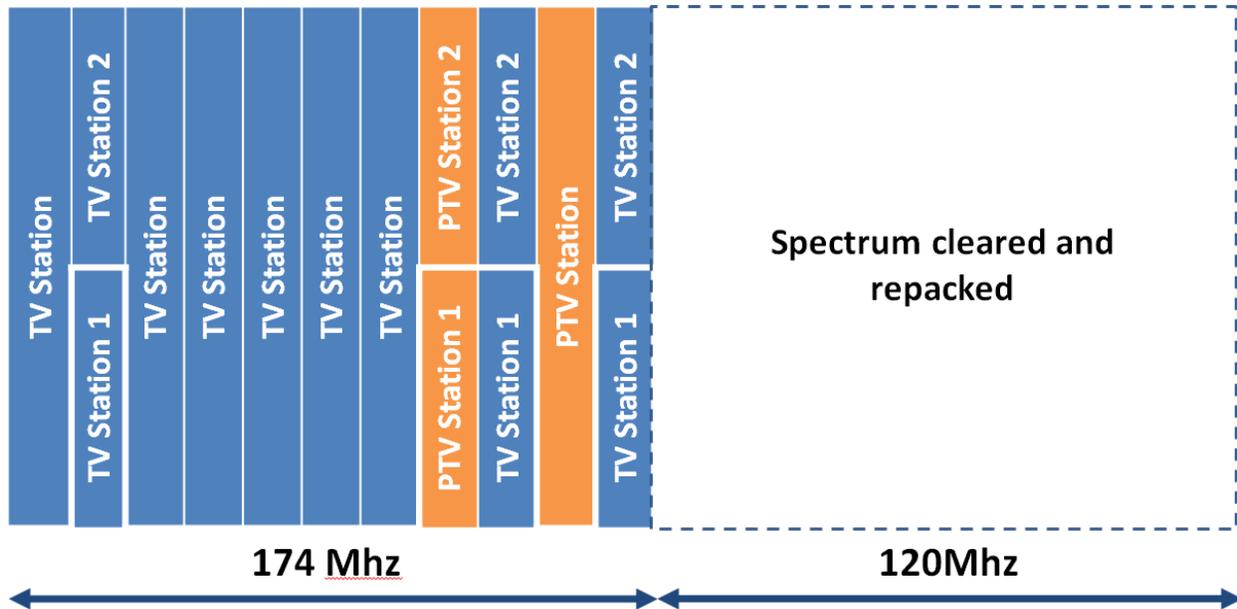
The underlying theory is that the repackaged spectrum for wireless broadband use will be worth more than the same spectrum is worth for broadcast television, and that the Forward Auction revenue will be enough to cover payments to the stations surrendering their spectrum as a result of the Reverse Auction, plus the costs to reimburse other stations for their repacking costs, plus the FCC’s administrative costs, plus some contribution to the United States Treasury. However, if the Forward Auction bids fall short, the whole process could be called off.

### **Spectrum Repacking**

In between the Reverse Auction and the Forward Auction, there will have to be a spectrum repacking scheme completed. In order to clear spectrum at the top of the UHF band nationwide for wireless carriers to bid on in the Forward Auction, the FCC will have to devise a plan to repack the television stations remaining after the Reverse Auction.

As mentioned above, repacking is a process of assigning new channels to many or perhaps most of the remaining television stations, including those stations that have agreed to share their spectrum with another station. The repacking process is depicted in Figure 4.

*Figure : Spectrum Repacking Process*



The goal of the repacking process is to move the remaining stations into a tightly packed lower portion of spectrum in order to free up the upper portion of the spectrum for wireless carriers to bid on.

Repacking will likely result in the need for many, if not most, television stations across the country to change channels, and thus to update or replace their transmission equipment. In some cases, it may even require a station to change its transmitter site, which could be a significant undertaking.

Congress required that the FCC make all “reasonable efforts to preserve existing station coverage and population served.” Congress also prohibited the FCC from moving any station involuntarily to the VHF band, as well as from requiring any station to share a channel with another station. However, there is no guarantee that a station will be able to maintain its signal strength and coverage area as compared to what it currently possesses.

Ultimately, the repacking process will result in a new “Table of Allotments” that assigns every station to their portion of the broadcast spectrum which is being developed for TV stations nationwide. This will be similar to the digital television transition that occurred several years ago. However, it will probably be much harder to accomplish for at least two reasons: 1) The FCC will be packing stations more densely while trying to preserve their existing coverage; and 2) this will be a “flash cut” transition – there will be no transitional channels running side by side for a period of time. One day stations will be operating on their old channels and facilities; the next day they will either be operating on their new channels with new facilities or they will be off the air while they are installing new equipment.

Congress is allowing \$1.75 billion from the Forward Auction to be used for the reimbursement of costs arising from a reassignment of channels. While allowable costs and timing of payments have yet to be determined, it appears clear that there will be no recovery for revenue lost while

off the air. Moreover, it is not clear whether the \$1.75 billion fund will be large enough to cover all allowable station costs.

## **Timeline**

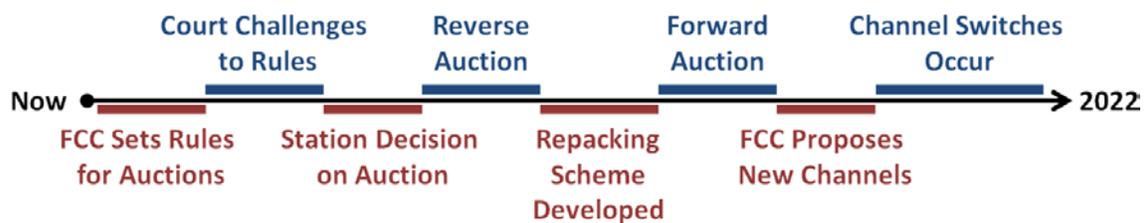
When will the auction process begin? The only thing we know for sure is that Congress has required the two auctions be completed in ten years -- by the end of FY 2022. Last year, FCC staff suggested that the auctions could take place as soon as the end of 2013 – or the beginning of 2014. Other observers stated that they believed that the FCC’s assessment was overly optimistic.

What is clear is that there will be enormous burdens on the FCC to effectuate all this – rule makings to establish rules for both auctions, for the process of repacking and reimbursement of expenses, for the development of the new TV Table of Allotments, for the reallocation of spectrum to wireless services, and the rules for those new wireless services.

In addition to the development of the rules, time will need to be set aside for the actual conduct of the auctions, the development of the repacking plan, and for broadcasters to make the technical changes required to implement the repacking plan.

Of course, one can reasonably expect there may be legal challenges that will further slow down the process. In addition, there could be changes in political outlooks or outcomes in Congress, the Administration and/or at the FCC that affect these activities.

*Figure 5: Spectrum Auctions Timeline*



## **Implications for Public Television Stations**

CPB and the relevant national organizations (PBS and Association of Public Television Stations -- APTS) and public television stations (individually and collectively) have been engaged in this process, broadly and specifically weighing in on FCC rule-making regarding the ground rules for the auctions, the repacking process, and the funding of transition expenses.

While in many cases, public television station interests will align with those of the commercial stations, there may be specific issues that warrant separate consideration for public television. Public television stations are, after all, stewards of spectrum on behalf of their communities, and not exactly owners. They will need to be at the table in the FCC process to represent this point of view.

In any event, stations will have to decide whether they want to participate in the Reverse Auction. This means deciding whether to leave the over-the-air transmission business entirely, share a channel, or move to the VHF band. If they do participate, they need to know how to accurately value their spectrum. In addition, stations that choose to retain all or some of their spectrum will have to follow the FCC process for repacking anyway, and will need to consider issues of coverage losses, and related costs and reimbursements.

Some public television stations may decide to give up their channels altogether, or enter into sharing arrangements with other public or commercial television stations. Ultimately, shifting the channels of broadcasters in one market will likely have a domino effect across the nation, requiring broadcasters everywhere to change channels.

The value of spectrum is directly related to how many people have access to it. There are numerous public television stations operating in congested metro areas, such as New York, Los Angeles, Chicago, Philadelphia, Washington D.C., and Boston. In Figure 6, the chart shows that amount of spectrum occupied by public television licensees in the top twenty-five markets. Their spectrum allows them to reach a significant portion – more than 44% – of the U.S. population.

*Figure 6: Spectrum Assigned to Public TV Stations in Top 25 Markets*

RANK	DESIGNATED MARKET AREA (DMA)	# OF 6-MHz CHANNELS		
		VHF	UHF	TOTAL
1	New York	2	4	6
2	Los Angeles		4	4
3	Chicago		3	3
4	Philadelphia	1	4	5
5	Dallas - Ft. Worth		1	1
6	San Francisco - Oakland - San Jose		5	5
7	Boston (Manchester)	1	3	4
8	Washington, DC (Hagerstown)		6	6
9	Atlanta	1	1	2
10	Houston	1		1
11	Detroit		1	1
12	Seattle - Tacoma	1	2	3
13	Phoenix (Prescott)	1		1
14	Tampa - St. Petersburg (Sarasota)	1	1	2
15	Minneapolis - St. Paul	2	3	5
16	Miami - Ft. Lauderdale		2	2
17	Denver	3	2	5
18	Cleveland - Akron (Canton)		2	2
19	Orlando - Daytona Beach - Melbourne		3	3

Previously we stated that the UHF spectrum is considered to be the most desirable part of the spectrum – akin to “beachfront property.” While stations in the VHF spectrum can enter the

Reverse Auction, their bids will only be accepted if the FCC determines that their spectrum is needed for purposes of repacking.

The process of changing channels will also require television stations to purchase new equipment and possibly to relocate transmitters, all of which can be very expensive. While a portion of the Forward Auction proceeds will be set aside to cover these costs, there is concern that the reimbursement pool will not be sufficient.

During the digital transition, television stations operated their analog and digital channels simultaneously for a few years before they had to turn off their old analog channel. This allowed for a smooth transition and a well-prepared public. Under the existing auction plan, television stations will instead have to turn off their old channel before turning on their new channel. Further, because of the sheer number of stations as well as the number of facilities that may need to be retrofitted, a station may find itself having to go off the air for some period of time. This could result in a loss of revenue that will not be covered by the FCC.

Moreover, there is no guarantee the new channel to which a station is assigned will cover the exact same area, or reach the same audience, as its former channel. This is especially true of stations choosing to relocate to the VHF spectrum. Rural stations, in particular, could be at risk of losing portions of their audiences, as the translators they rely on to reach remote or mountainous areas are not protected during this process, and they may be required to relocate to a new channel at their own expense or go off the air.

### **Implications for Funding for Public Broadcasting**

In June 2012, the Corporation for Public Broadcasting, at the direction of Congress, provided a report to House and Senate Committees on Appropriations on alternative sources of funding for public broadcasting stations which examined, among other issues, whether opportunities exist for funding from sales of public broadcasting spectrum. This Report noted a number of uncertainties (all still unresolved) concerning the potential proceeds from participation by public television stations in this incentive auction process. This section of the report is included under Tab D for your review and information.

### **Conclusion**

As the spectrum auction process moves forward, CPB Board and management will need to consider a number of issues, including: How will spectrum decisions impact our notion of universal service? What, if any, changes will need to be made to Community Service Grant policy? How will the spectrum auction process impact large, multi-station markets? How will the auction of spectrum impact the financial health of stations across the system? Do public broadcasters have unique obligations or responsibilities that should inform their decisions? In the coming months, CPB staff will be discussing with the Board our response as both public and CPB policy develops concerning the reallocation of broadcasting spectrum.