

Corporation for Public Broadcasting

Facing the Spectrum Incentive Auction and Repacking Process

A Guide for Public Television Stations
and Governing Boards

7/8/2014



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for Public
Broadcasting

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1 Introduction

In mid-2015, the Federal Communications Commission (FCC) is planning to hold a voluntary spectrum incentive auction¹ in which television stations, including public television stations, will be able to bid on surrendering their licenses, moving from a UHF channel to one in the VHF band, or sharing a different channel with other stations, in exchange for cash.

Stations participating in the spectrum incentive auction could realize large monetary gains, but at the cost of restricting or eliminating their existing or future services. Following the spectrum incentive auction, the FCC will “repack” the remaining television stations, both commercial and noncommercial, into a smaller segment of spectrum, requiring many to change channels and modify their transmission facilities accordingly.² Stations that are forced to move to a different channel will likely experience disruption in their broadcast service and incur relocation expenses, most, but perhaps not all, of which will be reimbursed, and may not be able to provide as much coverage as before.

This spectrum incentive auction and repacking process presents several challenges for the public media system, including the potential for: (1) holes being created in public television’s nationwide over-the-air coverage if public television stations that are the only providers of services in their area make a license relinquishment bid in the auction and go off the air; (2) channel sharing stations being limited in their future program services; and (3) some licensees receiving large sums of money for their stations’ channels, while many other stations face the disruption and perhaps some of the expense of repacking.

The spectrum incentive auction and repacking process may also present some public media stations with certain opportunities, including the ability to: (1) use significant cash proceeds from their participation in the auction to strengthen or expand the creation of content and services, and/or the use of distribution platforms other than terrestrial broadcasting; (2) reduce service duplication in markets with multiple PBS stations; and (3) realize significant cost savings by entering into channel sharing agreements with other (commercial or noncommercial) stations.

The Corporation for Public Broadcasting (CPB) presents this white paper consistent with its responsibility under the Public Broadcasting Act to foster the growth and development of public

¹ The FCC’s 2010 National Broadband Plan called for such an auction as one of the principal means of making possible a reallocation of spectrum from broadcast to wireless broadband services. While the auction is described as “voluntary,” the FCC has indicated that it will set initial prices “very high” in an effort to encourage as many stations as possible to enter the auction. Broadcasting & Cable, *FCC’s Wheeler Circulates Incentive Auction Item*, 4/18/14. The FCC has also indicated that it will be conducting targeted outreach to licensees to generate interest in the auction. TVNewsCheck, *FCC Readies Auction Pitch for Broadcasters*, 6/23/14; TVNewsCheck, *FCC Going Door to Door with Auction Pitch*, 1/30/14. In addition, FCC Chairman Tom Wheeler has been aggressively promoting channel sharing as an option for broadcasters, calling it “a once-in-a-lifetime opportunity for broadcasters for an infusion of cash to expand their business model...”.

² The stations most likely to be repacked by the FCC are those currently operating on the channels most likely to be cleared which the FCC has indicated are from channel 51 down to channel 38 and then from channel 36 to channel 34. However, it could extend down as far as channel 31 if the FCC is successful in clearing the National Broadband Plan goal of a full 120 MHz. It should be noted that repacking may also result in some stations currently operating on lower UHF or even VHF channels being impacted by a new neighbor or being required to move to a different channel because of adjacent channel interference issues.

media in the United States, as well as in its role as the steward of the federal appropriation. In doing so, CPB seeks to provide relevant information to aid public media licensees and their governing boards who will have to decide whether to participate in the spectrum incentive auction.

At the same time, CPB would call attention to the essential value of local public media in the nation’s communities and the decades of investment that Americans have made individually and through their federal, state and local governments, as well as through businesses and foundations.

2 Background

The radio frequency spectrum is a natural resource³ that is central to many functions that we take for granted in our daily lives, from the more obvious uses such as mobile phones, televisions, and radio, to less obvious uses such as garage door openers and microwave ovens. It is also used to support the communications needs of industries that use wireless broadband services (high-speed Internet access) to transmit large quantities of information quickly and reliably, as well as a variety of government functions, such as scientific research, national defense, homeland security, and other vital public safety activities.

Examples of Services by Frequency Band

Examples of general use									
Frequency	3 kHz	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz	3 GHz	30 GHz	300 GHz

Source: GAO.

Spectrum capacity is necessary for wireless broadband, and broadband deployment will boost the nation's capabilities in many important areas. As the demand for spectrum has increased, policymakers have expressed concern about a developing shortage of available spectrum.

2.1 Spectrum Management, Usage and Regulation

The purpose of spectrum policy, law and regulation is to manage an intangible natural resource for the benefit of the public. Radiofrequency spectrum refers to the properties in the air that, with technology, transmit electromagnetic signals and can deliver communications in the form of

³ The radiofrequency spectrum is the part of the natural spectrum of electromagnetic radiation, lying between the frequency limits of 3 kilohertz (kHz) and 300 gigahertz (GHz). Radio frequencies are grouped into bands and measured in units of hertz, or cycles per second. The term kHz refers to thousands of hertz, MHz to millions of hertz, and GHz to billions of hertz. The hertz unit of measurement is used to refer to both the quantity of spectrum and the frequency bands.

sound, text, still and moving images and executable computer programs (for example wireless gaming).

The ability to use spectrum is limited by the constraints of technology. Thus, spectrum policy requires making decisions about how radio frequencies will be allocated – in terms of both frequency and geography – and who will have access to them. Current spectrum policy is based on managing channels of radio frequencies to avoid interference.

Spectrum is managed by the FCC for commercial and noncommercial uses. The Department of Commerce’s National Telecommunications and Information Administration (NTIA) oversees the federal government’s use of spectrum.

Access to spectrum is controlled by assigning rights to specific license holders or classes of users. The assignment of spectrum rights does not confer ownership. The FCC authorizes the use of spectrum under two regimes, unlicensed and licensed.

The “unlicensed” spectrum use regime allows select frequencies to be used for certain defined and regulated uses without the need for the user to hold a license issued by the FCC. Unlicensed radio operations are generally confined to lower powers that are not likely to cause interference. Examples of unlicensed use include garage door openers, microwave ovens, and Wi-Fi.

However, for higher power operations such as over-the-air television signals and cellular mobile radio systems, the FCC generally requires the user to obtain a license. Further, the more valuable the frequency, the more likely it is to be licensed on an exclusive use basis – often within a specific geographic area. Examples of exclusive use licenses include cellular mobile radio, television, AM radio, and FM radio.⁴ While FCC licenses are typically issued for a fixed period of time, both renewals of FCC licenses and FCC consent to sales in which licenses are transferred to other eligible licensees are routine. As a result, for financial reporting purposes, licensees generally treat FCC licenses as indefinitely-lived intangible assets.⁵

Today, the most highly sought-after spectrum is that used for radio and television broadcasting and for wireless telecommunications.⁶ The wireless spectrum includes the former upper end of TV spectrum in the 700 MHz band, which was made available for wireless use in the transition to digital terrestrial television broadcasting (“DTV transition”), cellular mobile radio spectrum in the 800 MHz frequency range, Personal Communications Service (“PCS”) spectrum in the 1.9 GHz frequency range, and Broadband Radio Service spectrum in the 2.6 GHz frequency range.

In order to promote more efficient use of spectrum and to meet anticipated future needs, the government, in recent years, has increasingly adopted more market-oriented approaches to spectrum management.⁷ For broadcasters and wireless service providers alike these approaches

⁴ Spectrum licensed for television, AM radio and FM radio broadcasting comes with certain public interest obligations and is heavily regulated by the FCC which sets limits on content, requires public disclosure and record keeping, and exacts penalties, including revocation of license for noncompliance and infractions.

⁵ PricewaterhouseCoopers, *Using Qualitative Impairment Testing for FCC Licenses*, December 2012.

⁶ New York Times, *New Limits Considered in Airwaves*, 9/25/12.

⁷ See Communications Act of 1934, 309(j)(2)(A); 47 U.S.C. 309(j)(2)(A) including using Congressionally authorized competitive bidding process or auctions to assign spectrum licenses to commercial users. Previously, the

to spectrum management have brought into sharp relief the changes in their revenue structure. For the former, intense competition for advertising revenues has increased their reliance on other revenue generators, such as retransmission consent fees and political advertising. For the latter, the rapid adoption of smartphones and tablets has created new revenue opportunities with subscribers and advertisers at the expense of other industries, including broadcasters.

2.2 The Attractiveness of Broadcast Spectrum

Over-the-air television broadcast spectrum currently consists of:

- Low VHF band (channels 2-6 between 54-88 MHz);
- High VHF band (channels 7-13 between 174-216 MHz); and
- UHF band (channels 14-51 between 470-698 MHz, except for channel 37).⁸

Not all spectrum is created equal. As the FCC has noted, these bands of spectrum, and in particular the UHF band, “has excellent propagation characteristics that make it well-suited for digital broadcasting; especially the provision of mobile broadband services, in both urban and rural areas.”⁹

Many policymakers find the reallocation of broadcast television spectrum to be appealing because they believe this spectrum has historically been inefficiently managed by the FCC.¹⁰ In the National Broadband Plan, the FCC claimed that “only a fraction” of the available channel capacity in the current allocation of 294 MHz of VHF and UHF spectrum to television broadcasters is used for television broadcasting.¹¹ Moreover, approximately 80 to 90 percent of households receive their broadcast television programming through cable, satellite or other

FCC assigned licenses where there were mutually exclusive applications on the basis of comparative hearings. Because the process came to be viewed as administratively cumbersome and inefficient, Congress authorized the FCC to conduct lotteries in the early 1980s as a means to choose between competing applications. In the 1990s, Congress gave the FCC the authority to conduct auctions to choose among competing applications after it became clear that lotteries resulted in inefficient outcomes. See The Aspen Institute, *Rethinking Spectrum Policy: A Fiber Intensive Wireless Architecture*, 2010, p.4.

⁸ See generally, National Telecommunication and Information Administration Office of Spectrum Management, United States Frequency Allocations: The Radio Spectrum, U.S. Department of Commerce (August 2011). Channel 37 is set aside for radio astronomy and wireless medical telemetry and will likely continue to be set aside for those uses following the incentive auction.

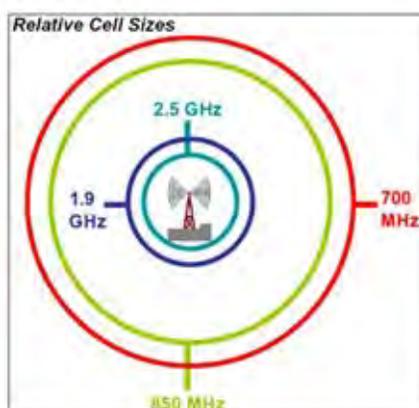
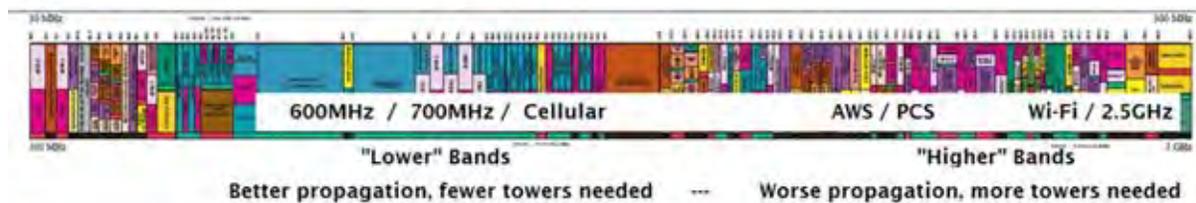
⁹ The wavelength of a frequency is a key determinant of its best uses. Certain frequencies are not as conducive to mobile communications as are other (lower) frequencies that require less energy to transmit signals over a given distance and are more capable of penetrating walls and buildings. In fact, the most highly valued spectrum lies between 225 MHz and 3700 MHz, as these frequencies have properties well suited to mobile devices, and television broadcasting. See GAO, Spectrum Management: Federal Relocation Costs and Auction Revenues, Report to the Committee on Armed Forces, U.S. Senate (May 2013).

¹⁰ See generally, comments provided in response to Modernizing U.S. Spectrum Policy, April 1, 2014, Energy and Commerce Committee, U.S. House of Representatives, available at: <http://energycommerce.house.gov/sites/republicans.energycommerce.gov/files/analysis/CommActUpdate/20140104WhitePaper-Spectrum.pdf>; and Charles M. Davidson & Michael J. Santorelli, *Seizing the Mobile Moment: Spectrum Allocation Policy for the Wireless Broadband Century*, 19 CommLaw Conspectus 1 (2010).

¹¹ Federal Communications Commission, *Connecting America: The National Broadband Plan* (2010) at p. 89. However, the strength of this claim appears to be based on a faulty assumption that in every DMA all 49 channels (representing the full 294 MHz in the television bands) could be used. See *Id.*, at fn. 92 on p. 102.

Multichannel Video Programming Distributor (MVPD) services, leaving an average of approximately 10 to 20 percent of households watching over-the-air broadcasts only.¹²

Spectrum Location



Source: SNL Kagan webinar April 17, 2014, *The Present and Future of US Wireless and Mobile Entertainment*

Policymakers have also found the reallocation of spectrum from broadcast to wireless appropriate because they assume that in some places and in some cases broadcaster use of UHF spectrum is less valuable than the prospective use of that spectrum by wireless service providers. It is this assumption that is the underpinning of the National Broadband Plan, the Spectrum Act and the spectrum incentive auction that it authorizes.¹³

2.3 Public Media's Role

Public media was born with the FCC's decision in 1938 to set aside spectrum for noncommercial educational broadcasting. Licenses for most public television stations were issued beginning in 1952 when the FCC reserved 242 channels – 80 VHF and 162 UHF – for educational use in individual communities across the nation.¹⁴ The goal was universal service through a locally based public service infrastructure.¹⁵

¹² See discussion below at fn. 56 partially explaining the range of numbers.

¹³ The National Broadband Plan asserted that “[e]nabling the reallocation of a portion of this spectrum to broadband use in a way that would not harm consumers overall has the potential to create new economic growth and investment opportunities with limited potential impact on broadcast business models.”

¹⁴ See FCC, Amendment of sec. 3.606 of the Commission's Rules and Regulations, Docket Nos. 8736 and 8975 (1952) The FCC, in its *Sixth Report and Order*, adopted a new and expanded allocations table that provided for more than 2,000 station assignments in nearly 1,300 communities across the country. Moreover, based on extensive

Congress launched the modern system of public television and radio with the Public Broadcasting Act of 1967, including national programming services to supplement local programming and other essential community services provided by public television and radio stations.¹⁶ The Act outlined the universal service mandate of noncommercial broadcasting, framing it as a matter of national policy to “make public telecommunications services available to all citizens of the United States.”¹⁷

Forty-seven years later, there are now 171 noncommercial, educational licensees that operate 363 CPB-recognized public television stations which serve all 50 states, the District of Columbia, Puerto Rico, U.S. Virgin Islands, Guam and American Samoa.¹⁸ Of the 171 licensees, 87 are non-governmental, not-for-profit organizations (“community licensees”), 58 are public or private colleges or universities, 20 are state government agencies, boards or commissions and six are local educational authorities or municipal governments.

Governance for any non-profit organization or institution can be defined as the structures and processes that determine how power is exercised, how decisions are made and how the public connects with the organization. It is through its governance structure that a public media station is held accountable for the programming it presents and the funds it raises and expends.

Regardless of licensee type, almost every station has a governing board, which holds the station’s broadcast licenses and stewards the station's financial and editorial reputation. The governing board is also responsible for complying with regulatory requirements and for ensuring that station management meets its stated goals.

engineering studies, the FCC concluded that the 12 existing VHF channels would be inadequate for a nationwide system of television and that there was not enough additional VHF space available to meet the needs of a television-hungry national audience. Accordingly, the FCC added 70 additional channels in the then new UHF band (channels 14 to 83) to the allocations table. The *Sixth Report and Order* also designated 617 VHF and 1,436 UHF channels for commercial television and reserved 80 VHF and 162 UHF stations for educational use. In developing the new allocations table, the FCC's goal was to provide for service to every part of the country from at least one station, with the great majority of citizens enabled to receive two or more signals. The first educational television station, KUHT in Houston, Texas, began broadcasting in May 1953.

¹⁵ See *id.* [section] 396(a)(9) (stating the government's public interest in ensuring that all citizens "have access to public telecommunications services through all appropriate available telecommunications distribution technologies").

¹⁶ The Act set forth a number of goals, including: responsiveness to the people’s interests, diversity and excellence in noncommercial programming, and the provision of service to all citizens of the United States. Section 396(a)(5) of the Communications Act declares that “it furthers the general welfare to encourage public telecommunications services which will be responsive to the interests of people both in particular localities and throughout the United States, and will constitute an expression of diversity and excellence, and which will constitute a source of alternative telecommunications services for all the citizens of the Nation.” Section 396(a)(7) further states, “it is necessary and appropriate for the Federal Government to complement, assist and support a national policy that will most effectively make public telecommunications services available to all citizens of the United States.”

¹⁷ See 47 USC 396(a)(7).

¹⁸ To be recognized as a public television station, a station must provide programming designed to reach a general audience. There are 395 noncommercial educational television stations currently licensed to operate in the United States. Of the 32 stations that are not recognized as public television stations, many provide programming designed to reach specific audiences such as sectarian, religious audiences or the students of local schools and colleges.

Ideally, the members of these governing boards represent the people served by the station or stations – the viewers, listeners, and users of other services that the station provides to the community it serves. In some cases, however, the governing board represents other, broader groups who engage with a station’s “parent” institution in ways that have little to do with public media activities in particular. Moreover, with many college/university and local government licensees, the public media stations’ top executives report to their stations’ governing boards only through higher-level executives of the “parent” institution.

Accessible at no cost and over the air to more than 99 percent of the nation’s population, public media today plays a vital role in the telecommunications ecosystem as a trusted source of information, education, and culture for millions of Americans, including, in disproportionately large numbers, underserved populations such as rural Americans, minorities, older Americans, lower-income families, and persons with disabilities.

With their one-to-many architecture, public broadcasting stations make effective use of their spectrum providing critical services to the American public, including children’s educational programming, news and information and cultural content that cannot be found anywhere else on television, as well as a broad range of services that provide emergency alert messaging, recognize geographic and ethnic diversity, and ensure accessibility in order to meet the needs of every community across the nation.

Backed by content grants from CPB and investments by the public television system and its supporters, public television stations throughout the nation are using their multicast capacity to offer the communities they serve a diverse array of programming. Public stations select from a variety of services, including, for example: expanded children’s programming; the World channel; Create TV; V-me, and First Nations Experience, as well as local and regional services such as the Minnesota Channel, the Ohio Channel, and the South Carolina Channel. Each station selects the specific content that it believes will best serve its particular community.

Further, public media’s national organizations and stations have been at the forefront of using new platforms and technologies to offer a range of distribution platforms, including:

- Use of the Internet to deliver content such as PBSKids.org, one of the most popular video websites in the world, which delivered more than 255 million streams via the PBS Kids Video for iPhone/iPad App in December 2013.¹⁹
- Use of the Internet to offer IP-based platforms that distribute its content to station websites, streaming video services, and social media.
- Development of interactive educational video games and other interactive content including hosting user-generated content, and provision of platforms for user participation and feedback. Offering a diverse set of audio podcasts and RSS feeds to distribute targeted content to users onto multiple devices.

¹⁹ www.pbs.org/about/pbskids

- Provision of iOS and Android applications that have been very popular with iPad, iPhone, and Android device users and provide yet another platform for accessing public media digital content.
- Use of channels set aside for educational use on XM/Sirius Radio to expand the reach and breadth of public radio content;
- Development of an internal Public Media Platform that will provide “publish once, distribute multiple times on multiple platforms flexibility” to provide local stations with access to a wide range of content and the ability to use it in a way that best suits their audiences’ needs.

Public media has a particularly good story to tell regarding the extent to which stations are deploying mobile DTV, HD, multicasting and educational data-casting offerings. In fact, public media stations are optimizing the flexibility afforded by digital television capabilities, delivering data at very fast speeds by dedicating part of their digital bandwidth to providing educational data services and ancillary and supplementary data services.²⁰

Public television’s broadcast services, essential to the public in their own right, have the added benefit of serving as an entry point through which underserved populations can gain access to essential on-the-ground resources and can begin to explore the many possibilities of broadband, discovering how on-line content and applications can be useful and relevant to them.

PBS and public television stations complement on-air broadcast services by making educational and other noncommercial content and services available on IP-based platforms such as PBS.org and PBSKids.org, as well as station websites, streaming video services, social media, blogs, and interactive educational video games. In addition, some stations have developed online services to provide customizable video clips, aligned to state educational standards, for teachers to use in classrooms. This locally-driven approach in creating standards-aligned digital content for classroom use has served as a best practice for states wishing to tailor content to the unique learning needs of their students.

Many stations also serve the public interest by offering services in public safety and public health. Public television stations deliver Commercial Mobile Alert System (CMAS) alerts through free, over-the-air digital TV signals to mobile device users who will receive these critical messages as 90-character text messages with a unique alert tone.²¹

This is all part of a “digital bridge” that public media has been building from its long-standing commitment to free, over-the-air broadcasting, relying solely on the reservation of

²⁰ See In the Matter of Innovation in the Broadcast Television Bands: Allocations, Channel Sharing and Improvements to VHF,” ET Docket 10-235, comments of the Association of Public Television Stations, NPR, PBS and the Corporation for Public Broadcasting (March 18, 2011).

²¹ PR Newswire, TeleCommunication Systems Enables PBS Warning, Alert and Response Network Connection to FEMA, 9/16/13. CMAS is also known as Wireless Emergency Alerts (WEA). In fact, public broadcasting’s one-to-many video and data service is the most efficient wireless delivery system for high demand content. As people rely more and more on smart phones and tablets to access video content, a greater burden will be placed on our over-burdened cellular networks. When thousands of people are trying to access the same information at the same time -- which frequently occurs during emergencies -- wireless networks can quickly be overwhelmed, leaving the one-to-many broadcasting model as the most reliable means of reaching people with critical information.

noncommercial channels, to a diversified present and future where its use of broadcast spectrum is the cornerstone of a multimedia ecosystem that increases the effectiveness with which public media uses its bandwidth to meet its universal service mission.

2.4 Broadband Explained

Broadband refers to telecommunication that provides multiple channels of data over a single communications medium, typically using some form of frequency or wave division multiplexing. More recently, it has become a marketing term for any kind of relatively high-speed computer network or Internet access technology, providing for full two-way communications. Users can gain access to broadband services through a variety of two-way high-speed transmission technologies, including both wireline and wireless technologies.

- Wireline broadband connects a home or business to the Internet using wired technologies, such as Digital Subscriber Line (DSL), coaxial cable, and optical fiber. The providers of wireline broadband technology include “landline” telephone companies, cable systems, various other industries, and state or local governments.
- Wireless broadband connects a home or business to the Internet using a radio link between the customer’s location and the service provider’s facility. The providers of wireless broadband technology include not only mobile telephone carriers, but a plethora of newer entrants including landline telephone companies, cable systems, state and local governments, and retail and media companies.
- Wireless broadband can be mobile or fixed. Wireless technologies using longer-range directional equipment provide broadband service in remote or sparsely populated areas where DSL or cable modem service would be costly to provide. Wireless broadband Internet access services offered over fixed networks allow consumers to access the Internet from a fixed point while stationary and often require a direct line-of-sight between the wireless transmitter and receiver.
- Wireless Local Area Networks (WLANs) provide wireless broadband access over shorter distances and are often used to extend the reach of a "last-mile" wireline or fixed wireless broadband connection within a home, building, or campus environment.
- Wi-Fi networks use unlicensed devices and can be designed for private access within a home or business, or be used for public Internet access at "hot spots" such as restaurants, coffee shops, hotels, airports, convention centers, and city parks.
- Mobile wireless broadband services are available from mobile telephone carriers and are used generally by highly-mobile customers.

In 2008, Congress saw enhancing access to high-speed Internet service through broadband connections as a means of spurring economic development in rural and other regions of the country that were bearing the brunt of the economic downturn. The following year, Congress passed the American Recovery and Reinvestment Act ("ARRA"), the primary goal of which was

to provide a boost to the nation's economy. ARRA provided \$7.2 billion in broadband stimulus funds to develop and expand broadband and stimulate economic development. ARRA further tasked the FCC with developing a plan for ensuring that all Americans reap the benefits of broadband.²²

2.5 The National Broadband Plan

In March 2010, the FCC, in response to Congress's ARRA request, unveiled its National Broadband Plan for expanding the availability and adoption of high-speed Internet nationwide.²³ The Broadband Plan, which set forth a vision for universal access to broadband Internet and made a series of recommendations for addressing competition, adoption and access, was based on the premise of growing consumer expectations of being able to watch video on their mobile devices. This growing expectation will mean wireless providers' demand for spectrum will outstrip supply in certain areas unless more capacity is released. The FCC also concluded that the market value of spectrum used for mobile broadband is 10 times greater than that used for over-the-air broadcast television.²⁴

The Broadband Plan recommended that an additional 500 MHz of spectrum be made available within 10 years to meet the growing need for spectrum in the United States, particularly for mobile broadband, and set a goal of repurposing up to 120 MHz of the 294 MHz of broadcast television spectrum.²⁵

Specifically, the Broadband Plan recommended that broadcast television spectrum be reallocated via a series of steps, including:

- Revising the Table of Allotments to ensure the most efficient allotment of 6-MHz channel assignments to serve specific communities;
- Developing licensing rules to let two or more stations share a 6-MHz channel;
- Reconfiguring part of the UHF/VHF bands for broadband by allowing individual stations to participate in an incentive auction, to "opt out," or to participate and keep a primary stream by sharing a channel; and
- Setting rules for an auction to sell spectrum reclaimed from television broadcasters to wireless service providers.

The Broadband Plan envisioned that reallocation would focus mostly on major markets "where the broadcast TV bands are most congested and the need for additional spectrum for broadband use will be greatest."²⁶ Under an incentive auction, current licensees would be encouraged to voluntarily relinquish their spectrum rights in exchange for a portion of the proceeds of auctioning new licenses to use the repurposed spectrum. The spectrum acquired from

²²American Recovery and Reinvestment Act of 2009, Pub.L.111-5, 123 Stat. 115, enacted February 17, 2009.

²³ See Federal Communications Commission. The National Broadband Plan: Connecting America. <http://www.broadband.gov/plan/>.

²⁴ *Id* at Chapter 5: Spectrum.

²⁵ *Id* at Chapter 5.4: Making More Spectrum Available Within the Next 10 Years.

²⁶ *Id*.

broadcasters, together with spectrum cleared through repacking, would be reconfigured in terms of both frequencies and geography to create more value for wireless service providers. It would then, in turn, be sold to wireless carriers in auctions conducted by the FCC, with the revenue divided between participating broadcasters and the U.S. Treasury.²⁷

Three months after the FCC delivered the National Broadband Plan to Congress, President Obama signed an executive memorandum that reached the same conclusion on the need for additional spectrum for broadband, stating: “The world is going wireless, and we must not fall behind.”²⁸

In February 2011, the President unveiled a Wireless Innovation and Infrastructure Initiative (Wi3) that set a goal of wireless broadband coverage for 98 percent of Americans within five years. Wi3 aims to free spectrum via incentive auctions, create a nationwide public safety wireless network, and raise nearly \$10 billion for deficit reduction.²⁹

2.6 The “Spectrum Act”

The Middle Class Tax Relief and Job Creation Act of 2012, contained provisions in Title VI that expedite the availability of spectrum for commercial use. The provisions in Title VI – also known as the Public Safety and Spectrum Act (“Spectrum Act”), included providing the FCC with the authority to conduct incentive auctions, whereby spectrum capacity may be relinquished for auction by some license holders who would then share in the proceeds.³⁰

As directed by Congress, the incentive auction of broadcast television spectrum will have three major parts, which may be conducted sequentially or together:

2.6.1 Reverse Auction. Current owners of TV broadcast channel rights may volunteer to participate in this auction by submitting bids to relinquish their spectrum. While the exact structure of an actual bid is to be determined, in its most basic form a “bid” is an offer to relinquish an entire channel in exchange for a cash payout and, depending on the bid, potentially additional rights.³¹ Any owner of a high-power or Class A license to broadcast television – including both UHF and VHF broadcasters – may participate, though of course not all bids will be accepted.³²

²⁷ *Id.*

²⁸ Presidential Memorandum: Unleashing the Wireless Broadband Revolution, 6/28/10.

²⁹ Press Release, The White House, President Obama Details Plan to Win the Future through Expanded Wireless Access, 2/10/11.

³⁰ *Middle Class Tax Relief and Job Creation Act of 2012*, Pub. L. No. 112-96, 126 Stat. 226 (Feb. 22, 2012) (codified at 47 U.S.C. §1452).

³¹ See Station Options (including Moving from UHF to VHF; Channel Share; Moving from High VHF to Low VHF) *Infra* at Section 5.2.3.

³² Certain broadcasters, due to idiosyncrasies of their broadcasting situation (antenna location, height above terrain, radiated power, the location or assigned channel of other transmitters) may be very difficult to repack. The FCC plans to take this “ease of repacking” into its “scoring” consideration when accepting bids, potentially accepting higher bids for some bidders to ensure that the market is cleared of such “difficult to repack” stations.

2.6.2 Repacking. In order to free up contiguous space for wireless in a process called “repacking,” the FCC will require certain broadcasters to cease broadcasting on their current channel and start broadcasting on a different channel instead.³³ In making any reassignments or re-allotments of channels in the repacking, the Act directs the Commission to “make all reasonable efforts to preserve...the coverage area and populations served of each broadcast television licensee....”³⁴ Congress also instructed the FCC to reimburse stations for costs directly related to repacking.³⁵

2.6.3 Forward Auction. Spectrum reallocated to wireless is sold to the highest bidders. If the proceeds from the forward auction are insufficient to cover all costs in the rest of the auction, including repacking reimbursements (statutorily capped at \$1.75 billion), reverse auction payouts, and administrative costs, then the FCC will cancel the entire auction.

In addition, the auctions would divide the proceeds between payments to broadcasters for their relinquished licenses, reimbursement of broadcasters for the cost of changing channels, and the U.S. Treasury, with a certain amount of revenue to be dedicated to funding the First Responder Network (FirstNet) – a national integrated public safety communications network for responders use for both daily incidents and larger disasters.³⁶

2.7 Public Media’s Advocacy in Response to the FCC’s Spectrum Incentive Auction Rulemaking Process

After Congress enacted the Spectrum Act authorizing the incentive auctions³⁷ and the FCC adopted a *Report and Order* establishing rules for two or more broadcasters to share a single broadcast channel,³⁸ the FCC, on September 28, 2012, commenced a lengthy and complex rulemaking process, when it adopted a Notice of Proposed Rulemaking to establish the rules and procedures for a future incentive auction involving the U.S. television broadcast spectrum.³⁹

³³ Repacking will affect a station if either (a) the FCC decides to clear spectrum on the channel and in the place where that station currently broadcasts; or (b) the FCC does not decide to clear spectrum where that station broadcasts, but due to interference it must move the station anyways to accommodate other repacking moves for other stations.

³⁴ “As of the date of the enactment of the Act...and as determined using the methodology described in OET Bulletin 69 of the Office of Engineering and Technology of the Commission.”

³⁵ It should be noted that winning a bid in the reverse auction does not necessarily preclude a station from being repacked – it could, for instance, choose to share a channel with another station which in turn must be repacked; however, winning a bid does preclude a “sharee” station from receiving repacking reimbursements.

³⁶ See Spectrum Act § 6413(b)(2), (4), (6), & (7).

³⁷ *Middle Class Tax Relief and Job Creation Act of 2012*, Pub. L. No. 112-96, 126 Stat. 226 (Feb. 22, 2012) (codified at 47 U.S.C. §1452) (*Spectrum Act*).

³⁸ *Innovation in the Broadcast Television Bands: Allocations, Channel Sharing and Improvements to the VHF*, ET Docket No. 10-235, *Report and Order*, 27 FCC Rcd. 4616 (2012) (*Channel Sharing Report and Order*) In response to the Notice of Proposed Rulemaking in this proceeding, CPB, PBS, APTS, and NPR filed comments on March 18, 2011.

³⁹ *In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, FCC 12-118, 27 FCC Rcd. 12357 (rel. Oct. 2, 2012) [“Incentive Auction NPRM”]. Available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db1002/FCC-12-118A1.pdf.

CPB together with PBS and APTS have provided several sets of comments to the FCC since the initial incentive auction NPRM was released, including:

- Comments of APTS, CPB and PBS January 25, 2013 in GN Docket No. 12-268, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions
- Reply comments of APTS, CPB and PBS March 12, 2013 in GN Docket No. 12-268, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions
- Reply comments of APTS, CPB and PBS April 5, 2013 in ET Docket No. 13-26, Office of Engineering and Technology Releases and Seeks Comment on Updated OET-69 Software
- Comments of APTS, CPB and PBS November 4, 2013 in GN Docket No. 12-268, Catalog of Eligible Expenses and Other Issues Related to the Reimbursement of Broadcaster Channel Reassignment Costs
- Comments of NAB, APTS, CPB and PBS March 18, 2014 in GN Docket No. 12-268, Potential Interference Between Broadcast Television and Wireless Services
- Reply Comments of PBS, CPB, and APTS May 6, 2014 in GN Docket No. 12-268, Widelity Report and Catalog of Potential Expenses and Estimated Costs

Moreover, APTS, PBS and CPB have individually provided *ex parte* comments to the FCC, including:

- APTS *ex parte* letters filed May 2, 2013 and September 17, 2013 on meetings of APTS, CPB, and PBS with the FCC Incentive Auction Task Force
- APTS *ex parte* letter filed January 23, 2014 to Marlene Dortch providing greater detail on proposals that had been discussed in previous meetings with Media Bureau staff
- CPB *ex parte* letter to Chairman Tom Wheeler January 27, 2014 in GN Docket No. 12-268, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions
- CPB Board of Directors Resolution of April 24, 2014 submitted *ex parte* to Chairman Tom Wheeler, and Commissioners Rosenworcel, Clyburn, Pai and O’Rielly.
- APTS, CPB, and PBS *ex parte* letters filed on April 24, 2014 on meetings with FCC Chairman Wheeler, key senior staff, and with the FCC Incentive Auction Task Force.

Moreover, CPB, PBS and APTS have made *ex parte* filings with the FCC reflecting meetings they have had with individual FCC Commissioners, including:

- CPB, PBS, APTS Re: In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, May 5, 2014 in Docket No. 12-268 (Meeting with Commissioner Rosenworcel)
- CPB, APTS Re: In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, May 6, 2014 in Docket No. 12-268 (Meeting with Commissioner O’Rielly)
- CPB, PBS, APTS Re: In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, May 6, 2014 in Docket No. 12-268 (Meeting with Commissioner Pai)
- PBS, APTS Re: In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, May 7, 2014 in Docket No. 12-268 (Meeting with Commissioner Clyburn)

In these various filings and appearances, public media has consistently made the following points: that universal access to public media’s service must be maintained and that public media stations continuing to provide service must be held harmless in terms of both repacking cost reimbursement and maintaining coverage of existing populations served.

2.8 The FCC’s Report and Order

On May 15th, the FCC adopted its *Report and Order*⁴⁰ that established a framework of rules to implement the spectrum incentive auction and repacking process⁴¹ and the eventual licensing and operation of wireless operators in the newly-created “600 MHz band” at the upper end of the current UHF band.

The rules are designed to decrease the amount of spectrum devoted to television broadcasting and to reallocate a portion of the current television spectrum to wireless use. As provided for in the Spectrum Act, the process will have three parts. In the first part, broadcast television stations willing to relinquish some or all of their rights to their currently-assigned channels can participate in a “reverse” auction that will compensate them for the rights they surrender. In the second part, the FCC will repack the remaining stations into a smaller portion of the current television broadcast band and compensate them for certain specified costs of the repacking process. In the third part, the FCC will re-organize the recovered spectrum in the 600 MHz band and conduct a “forward” auction of the spectrum to wireless service providers. The funds received from the forward auction will pay for the compensation to broadcast television stations relinquishing spectrum, the costs of the repacking process and FirstNet.

⁴⁰ GN Docket No. 12-268; https://apps.fcc.gov/edocs_public/attachmatch/FCC-14-50A1.pdf

⁴¹ Todd D. Gray of Gray Miller Persh LLP memoranda to CPB, Summary of FCC *Report and Order* on Spectrum Incentive Auction, 5/16/14; updated and expanded on 6/12/14.

Working collaboratively, APTS, CPB and PBS have advocated on behalf of public media in the incentive auction rulemaking. To date, public broadcasting has secured many, but not all, of its objectives⁴²:

- **No protection against the creation of public television “white areas.”** The FCC rejected public television’s call to ensure that the auction left no community without at least one CSG-eligible television station. The *Report and Order* states, however, that if any white areas are created, the FCC “will consider appropriate actions to address such losses, such as by inviting applications to serve areas that have lost service.”
- **High initial reimbursement rates for repacking expenses.** Public television stations will benefit from a higher initial outlay – up to 90 percent – of reimbursement funds.
- **Improved signal contour protection.** The FCC agreed to try to ensure that broadcasters remaining in operation post-auction continue to reach the same viewers, not simply the same *number* of viewers. But the agency also adopted a controversial updating of its signal contour calculation methodology (the *TVStudy software*), which may affect the contour that the FCC actually will strive to replicate. The FCC also deferred a decision on whether to set any cap on the aggregate amount of interference from multiple sources.
- **No priority for public television translators.** The FCC rejected public television’s request for priority treatment of public TV translators that are displaced in the repacking process.
- **Longer protection of television translators.** The FCC agreed to permit television translators that eventually will be displaced by new wireless licensees to remain on the air until the wireless facility is built and ready to begin operating. They will have an opportunity to apply for alternative channels, and if there are mutually exclusive applications, the parties will be able to try to work out settlements, rather than going to auction.
- **Increasing the repacking time frame to at least 39 months.** The FCC extended its original proposal for an 18-month build-out deadline to potentially as long as 39 months, although the agency will evaluate station circumstances on a case-by-case basis and warns that it may set tighter deadlines for individual broadcasters, but also acknowledged stations that are owned by governmental or public entities may need more time to construct.
- **Consumer education costs reimbursable.** The FCC will allow involuntarily repacked broadcasters to be reimbursed for compliance with new consumer

⁴² The following was excerpted, in part, from a Select Summary of the FCC’s *Report and Order* produced by Rosemary C. Harold of Wilkinson Barker Knauer LLP for APTS, PBS and CPB and a similar summary prepared by Todd D. Gray of Gray Miller Persh LLP for CPB and other clients.

education requirements, while the agency expects winning auction participants to cover their costs out of auction proceeds.

The FCC stated that there would be further proceedings including a separate rule-making concerning Low Power Television Stations and Television Translators,⁴³ and a series of Public Notices seeking public comment on the actual implementation of the spectrum incentive auction, including factors to be used in setting opening prices for the auction. That will be followed by another Public Notice (the *Incentive Auction Procedures PN*) that will specify final procedures for the auction, including dates, deadlines and details of the application and bidding processes.

2.8.1 Auction Timing

The FCC has stated that it intends to commence the auction process in mid-2015, but the documents released to date do not propose a specific date for commencement of the auction or provide any guidance on the question of how much time the FCC expects the auction process to take.

2.8.2 Reverse Auction

The reverse auction is intended to augment the recovery of broadcast spectrum in the repacking by allowing full-power and Class A low power stations to voluntarily relinquish some or all of their rights to broadcast on their assigned channels. The National Broadband Plan espoused a goal of recovering 120 MHz – 20 television channels – of spectrum from the broadcast band. At this point, the FCC has not established how much spectrum it will seek to clear. It will set an initial target before the spectrum incentive auction begins based on indications it receives from television stations regarding their willingness to enter a bid at the FCC's opening price for the various options applicable to each station.⁴⁴

The FCC specified a multiple round “descending clock” auction format in which broadcast bidders will indicate their willingness to accept a progressively lower price set by the FCC, until only bids the FCC is prepared to accept remain outstanding. The bidding will take place in phases. In the first phase, the FCC will try to obtain its highest goal of cleared spectrum. If the FCC is unsuccessful in that effort, additional auction phases will be conducted in which the FCC tries to clear progressively less spectrum.

⁴³ A television translator station rebroadcasts the signal of a full-power television station, but generally operates on a channel different than that of the main station it retransmits. Translator stations typically serve communities that cannot receive the signals of free over-the-air TV stations because they are too far away from a full-power television station or because of geography (such as uneven terrain or mountains). Many translator stations operate in mountainous or more remote areas of the country. Low-power television (LPTV) stations usually provide a locally-oriented or specialized television service in the communities they serve. These communities may be in rural areas or may be individual communities within larger urban areas.

⁴⁴ The band plan for recovered spectrum, however, suggests that the FCC anticipates recovering between 42 MHz (14 TV channels) and 144 MHz (24 TV channels) of TV spectrum.

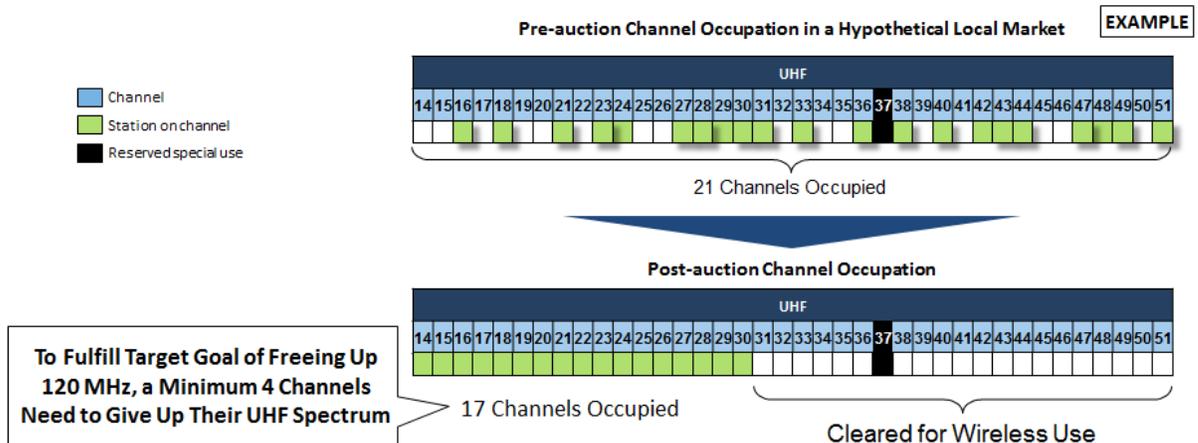
The FCC will accept only enough bids to achieve its spectrum clearance goal through repacking without introducing interference. In many areas of the United States where broadcast television spectrum is not heavily used, the FCC will likely not accept any bids at all because sufficient spectrum can be cleared simply by reorganizing the existing broadcasters in those less congested areas.

The FCC will maintain the confidentiality of bidders' identities. Winning bidders will be identified upon completion of the reverse and forward auctions. The identity of reverse-auction bidders whose bids were not accepted will remain confidential for an additional two years. In addition, the FCC will prohibit bidders from communicating directly or indirectly with each other on auction bids or bidding strategies.

2.8.3 Spectrum Repacking Process

The FCC established a process for repacking remaining TV stations into a smaller portion of spectrum, thereby accomplishing its goal to free up contiguous spectrum for the forward auction to wireless providers. The repacking will involve moving two categories of stations: (1) auction participants that voluntarily agree to relinquish their UHF channel to move to a VHF channel; and (2) auction nonparticipants located on channels the FCC needs to clear as a result of the incentive auction process or other channels due to domino effects, and that will be involuntarily moved to new UHF channels (or a new VHF channel if relocated and already on VHF). The Spectrum Act, however, did not require the FCC to protect secondary or unlicensed services in the broadcast band – most importantly for public television, TV translator stations – and the FCC has determined that it will not protect those services.

To achieve this, the FCC will move some stations to different channels so it can clear a contiguous block. In some areas, the FCC will offer auction incentives for stations to give up their spectrum.



2.8.3.1 Preserving Coverage Area and Population Served

The Spectrum Act mandates that the FCC make all reasonable efforts to preserve the coverage area and population served by each full-power and Class A broadcast television licensee as of the date of the Act – February 22, 2012. The FCC interprets this as requiring preservation of the “specific viewers” served by a station as of that date, so long as doing so does not “sacrifice the objectives of the incentive auction.”⁴⁵

The FCC will also apply a *de minimis* exception, allowing a loss of up to 0.5 percent of a station’s current population served from interference from any other particular station. The FCC has not at this point established an overall interference threshold when all sources of interference are taken into account, and plans to address that issue through further proceedings.

The FCC will calculate (*i.e.*, predict, using a computer model) both “before” and “after” coverage using the methodology of OET Bulletin 69 of the FCC’s Office of Engineering and Technology, as required by the Spectrum Act. However, the FCC will “update” the computer software and input values used to implement that methodology, a move which has sparked opposition from broadcasters who believe that the changes will result in reduced coverage of some repacked stations and which may prompt litigation by the commercial broadcasters.

2.8.3.2 Border Issues: Canada and Mexico

The Spectrum Act requires the FCC to coordinate its repacking of spectrum in the Canadian and Mexican border areas with the governments of those countries. For U.S. public television stations near major Canadian cities (KCTS/Seattle and KBTC/Tacoma, Washington near Vancouver; Prairie Public Broadcasting/North Dakota near Winnipeg; WTVS/Detroit near Windsor; WNED/Buffalo near Toronto; Vermont PBS and Mountain Lake PBS/Plattsburgh, New York near Montreal), over-the-air service in Canada and carriage on Canadian cable systems is vital for reaching significant portions of the U.S. stations’ total audiences. Moreover, membership contributions from subscribers to Canadian cable systems, underwriting revenues from businesses in nearby major Canadian cities, and payments for retransmission consent all provide significant revenues for public television stations that are near major Canadian cities. The FCC says that it is making an “all-out effort” to reach arrangements with Canada and Mexico, but that it doesn’t need to complete coordination before the auction or the repacking process. It is not clear what effect a lack of timely agreement with Canada and/or Mexico on the auction and repacking process might be, but some have suggested that it might require the FCC to be more aggressive in clearing spectrum in the border regions or to carve out separate band plans for these border regions following the auction.

⁴⁵ The FCC notes, however, that because signals propagate differently on different frequencies, the signal of a station reassigned to a different channel will not generally be received in precisely the same locations within the station’s contour as it was on its original channel. That said, since many stations being reassigned will probably be moving to a channel that is lower in the band, where signals generally propagate better, that problem may be ameliorated.

2.8.4 Low Power Television (LPTV) Stations and Television Translators

The FCC will not extend protection to low power or translator stations during the repacking process, noting the “secondary” nature of these facilities and finding that protecting them would “unduly constrain flexibility in the repack process and undermine the likelihood of meeting the objectives for the incentive auction.” However, to help preserve the important services provided by LPTV stations and TV translators, the FCC will open a special filing window for displaced stations to select a new channel. Further, the FCC stated that it will initiate a rulemaking proceeding to “consider additional means to mitigate the potential impact of the incentive auction and the repacking process on LPTV and TV translator stations.” Further, the FCC agreed with the public television (APTS, CPB and PBS) proposal to ensure spectrum clearing in low occupancy markets does not exceed major market recovery, so the near-nationwide band plan will have market variability only in the downward direction. This should leave room for some rural translators to operate in the condensed television band. Moreover, the FCC adopted, at public television’s urging, measures to allow newly out-of-core translators to continue operating unless and until the actual wireless build-out, which may not occur in some circumstances.

2.8.5 Transition Plan

The FCC proposes an aggressive transition timeframe between the close of the reverse and forward auctions and the ultimate clearing of channels and commencement of post-auction service.

At the end of the auction, the FCC will issue a Public Notice announcing the auction results. This Public Notice will also specify the channel assignments for television stations that will continue to broadcast, including those that submitted winning bids to change channels in the reverse auction.

The FCC will pay auction proceeds to licensees that successfully bid to turn in their licenses or share a channel “as soon as practicable” following the conclusion of the auction. These stations will have three months from their receipt of auction proceeds to cease operations on their pre-auction channels.

Stations that have been assigned to different channels will have three months to file applications for construction permits for the resulting changes to their facilities and cost estimates. Following the application deadline, stations will have up to 36 months to transition to their new channels. The actual deadline, however, for any given station may be shorter – the FCC will assign the deadline for each station “tailored to its individual circumstances.”

The deadlines may vary by region, by the complexity of construction tasks, or by other factors the Media Bureau finds appropriate (such as weather and seasonal issues and the

construction plans of forward auction winners). As a result of public television efforts, the FCC recognizes that stations owned by governmental or public entities may need additional time to complete construction because they are required to follow a mandatory competitive bid process that could delay purchasing equipment or hiring a tower crew.

Stations will be permitted to seek a one-time extension of up to six months to construct their new facilities, but no station will be allowed to continue operating on its old, reallocated channel for more than 39 months following the end of the auction process.⁴⁶

2.8.6 Reimbursement of Relocation Costs

The Spectrum Act requires the FCC to “reimburse costs reasonably incurred by” broadcasters that are reassigned new channels as a result of the spectrum repacking process through a program called the TV Broadcaster Relocation Fund. The amount that may be paid to all broadcasters under this program totals \$1.75 billion.

Under the law, funds must be disbursed to eligible broadcasters within three years of the completion of the reverse and forward auctions. The FCC intends to borrow up to \$1 billion from the U.S. Treasury to use toward the payment of relocation costs, when the results of the reverse and forward auctions and the repacking process are announced.

The FCC adopted procedures to reimburse costs reasonably incurred by television stations that are reassigned to new channels in the repacking process, as well as MVPDs (such as cable systems) to continue to carry such stations.⁴⁷

2.8.7 Forward Spectrum Auction

In the forward portion of the spectrum incentive auction, wireless companies will bid to acquire spectrum that broadcasters vacate through the reverse auction and repacking process.

2.8.8 Future Wireless Spectrum Band Plan (“The 600 MHz Band”)

The FCC will create two separate bands of wireless spectrum within the upper portions of the current UHF broadcast band. One band would be used for “uplink” communications (those signals from the user device to the carrier’s network), and one would be used for

⁴⁶ Stations will need to apply for any such extension at least 90 days before their construction permit expiration date. The FCC states that the following circumstances may justify an extension: weather-related delays, unavailability of equipment or tower crew, tower lease disputes, unusual technical challenges, zoning or other government approval delays, and delays caused by mandatory competitive bidding. Other circumstances may support an extension, so long as they are unforeseeable or beyond the licensee’s control. Financial hardship may be considered in limited circumstances (such as bankruptcy).

⁴⁷ Public television worked with the FCC to expand the list of eligible repacking expenses to the greatest extent possible. Details on the procedures adopted by the FCC are set forth below in “Facing the Incentive Auction and Repacking Process,” in Section 5.3.1 “Reimbursement of Relocation Costs” on p. 54.

“downlink” communications (those from the carrier to the user device). The uplink band would descend downward from current Channel 51, followed by a “duplex gap” of spectrum intended to provide a buffer to avoid interference between the uplink and downlink bands, followed by the downlink band. These bands would be divided into 5 MHz blocks which would be licensed to wireless carriers in the forward auction on a “paired” basis – *i.e.*, a 5-MHz uplink block would be paired with a 5-MHz downlink block. There would also be guard bands between the wireless bands and the portion of the spectrum that will continue to be used for broadcast television. In addition, the FCC has determined that Channel 37 will continue to not be used for wireless or broadcast purposes.

2.8.9 Unlicensed Spectrum

The FCC will make spectrum resulting from the repacking process (in particular, between 14 and 20 MHz of guard band spectrum, TV channel 37 where it is not otherwise used for its incumbent purposes, and “at least one channel not assigned to a TV station in all areas at the end of the repacking process”) available for use by “unlicensed” devices.

2.9 Future Related FCC Proceedings

As mentioned above, the FCC’s *Report and Order* will be followed by other Public Notices in which the FCC will seek public comment on issues involving the actual implementation of the auction, including:

- Opening Prices. The methodology for determining the starting prices offered to broadcasters (scoring) for each bidding option, and the minimum opening bids for licenses to be offered in the forward auction;
- Bid Adjustment Factors. The factors, such as a station’s potential for interference with other stations, that affect the value of stations in clearing spectrum;
- Final Stage Rule. The specific benchmarks in the forward auction (price per MHz-pop and the amount of spectrum) for the final stage rule, which will determine whether a particular stage of the auction is the closing stage;
- Market Variation. How much market variation to accommodate under different spectrum recovery scenarios;
- Parameters for price changes from round to round. How prices will be reduced as rounds progress in the reverse auction and increased as rounds progress in the forward auction;
- Activity rules. Standards for bidder activity in each round to assure that bidders bid throughout the auction and to keep the auction moving at a reasonable pace; and
- Upfront payments and bidding eligibility. Typically used in FCC spectrum auctions and related to activity requirements.

The FCC will also adopt rules to prevent harmful “inter-service interference” between television and wireless broadband operations in the same or adjacent frequencies following the spectrum

incentive auction and repacking process. The FCC will also determine whether to include in the repacking process a “cap” on the aggregate interference to a broadcasting station from other broadcasting stations.⁴⁸

3 Discussion

Universal service is the principle that all Americans should have access to communications services, in this case public television service. It is an integral part of the promise on which public media is founded – that regardless of a household’s financial resources or geographic location, it can receive a unique and robust noncommercial service, including high-quality educational content and trusted news and information. For more than three decades, public media’s free over-the-air broadcast platform with its unparalleled reach to consumers, has uniquely delivered on this promise. Today, 99 percent of the U.S. population has access to public media’s over-the-air signals.

Two policy decisions by the FCC have been central to the development and growth of public media. The first was in 1938 when it set aside spectrum for noncommercial broadcasting in the early days of radio (and before television was introduced at the 1939 World’s Fair). The second was in 1952 when the FCC laid the foundation for universal public television service by reserving 242 broadcast channels for noncommercial stations and siting the reserved channels with the aim of providing access to public television for Americans throughout the nation⁴⁹ through a locally-based public broadcasting infrastructure.⁵⁰

Below, this white paper will first consider the most likely opportunities the spectrum incentive auction may provide individual public broadcasting stations for expanding or diversifying their services or realizing cost savings. Next, it will consider the potential existential threat to public broadcasting’s universal service posed by the spectrum incentive auction. Then it will consider other risks to public broadcasting stations’ ability to serve their local communities. Finally, it will suggest factors that individual public television stations need to evaluate as they consider participation in the spectrum auction and the repacking process, as well as factors that the public

⁴⁸ Federal Communications Commission Fact Sheet: Summary of Upcoming Proceedings Related to the Incentive Auction, 5/15/14

⁴⁹ See Amendment of Section 3.606 of the Commission's Rules and Regulations, 41 F.C.C. 148, 152 (1952) (describing the demand for broadcasting service from local stations as a justification for reserving channels for their future use); 47 C.F.R. 73.621 (2002) (concluding that the FCC should set aside noncommercial channels “based upon the important contributions which noncommercial educational television stations can make in educating the people both in school – at all levels – and also the adult public”). See also History of Public Broadcasting in the United States, timeline: 1950s-'60s, Current, <http://www.current.org/history/timeline/timeline-1950s-60s.shtml>. PBS currently provides programming and services to 355 noncommercial stations serving all 50 states, D.C., Puerto Rico, Virgin Islands, American Samoa and Guam.

⁵⁰ See Section 396(a)(9) of the Communications Act (stating the government's public interest in ensuring that all citizens "have access to public telecommunications services through all appropriate available telecommunications distribution technologies"). Channels used by public media stations are reserved for noncommercial broadcasters so that there is at least one in every area and typically more than one in many metropolitan areas.

media system as a whole needs to consider as it attempts to develop policies and practices to address the changes that will be forthcoming.

3.1 Opportunities Presented by the Spectrum Auction

The spectrum incentive auction may provide opportunities for certain successfully participating public media stations, providing them resources with which to have a greater impact in their communities. In addition, licensees benefitting from spectrum auction proceeds could engage jointly in activities that could benefit the public on a larger scale.

3.1.1 Use of Auction Proceeds as a Major Capital Infusion

The incentive auction may give some public television stations an opportunity to use proceeds from their participation to expand or diversify the content and services they provide their communities; and/or to develop distribution platforms other than terrestrial broadcasting that may enhance their future service. For example, a public television station may decide to surrender some of its broadcast capacity in order to produce additional broadcast programming or to enhance its use of digital platforms if it believes that it can better serve its communities, including those persons who are presently unserved or underserved, over those platforms.

3.1.2 Addressing Perceived Inefficiencies in Market Coverage

In a few markets with multiple public television stations, the spectrum incentive auction may provide some stations with an opportunity to address perceived inefficiencies of coverage and programming duplication. Setting aside the question of whether reducing programming duplication will yield favorable outcomes for viewers, stations, program producers or the system as a whole, the proceeds that would presumably be obtained from participation in the auction, may be a favorable outcome for the licensee exiting broadcasting, for the surrounding community that may benefit from other public media services provided on non-broadcast platforms, or other philanthropic investments, but it will not necessarily be a favorable outcome for the public media system.

3.1.3 Enhancing Efficient Operations

The spectrum incentive auction offers some public television stations an additional opportunity to realize cost savings by entering into channel-sharing agreements with other (commercial or noncommercial) stations. The result would be shared broadcast transmission operations on a single antenna, at a single location, using a single 6-MHz channel of spectrum. Thus, a station participating in a channel sharing arrangement could theoretically reduce its transmission system costs by as much as 50 percent. It should be noted that broadcast stations can already realize very significant cost savings by sharing technical operations such as satellite interconnection uplinks and downlinks, content intake and storage, web services hosting, online streaming, and broadcast master control. CPB has long encouraged (and often provided initial capital funding for) public television stations (for example, WGBH in Boston and New Hampshire Public Television) to outsource and/or collaborate with other (commercial or noncommercial) stations in such operations. In addition, it has made substantial investments in the creation of several regional and

national networks of joint master control facilities, which allow stations to enhance efficient operations without reducing the capacity of their licensed spectrum to serve local communities.

3.2 The Threat to Universal Access / Universal Service

The spectrum incentive auction and repacking process being advanced by the FCC could pose a threat to the public's access to public media's service and undermine decades of its development and growth through the creation of "white areas."

"White areas" – holes in public television's nationwide over-the-air coverage or, put differently, black-out zones where Americans will no longer have access to free over-the-air public television service where it once existed – could happen in a number of ways:

- If the licensee of a sole public television station serving a community submits a successful license relinquishment bid in the reverse auction;
- If the licensees of all overlapping public television stations serving a community independently submit successful license relinquishment bids in the reverse auction without communicating and coordinating in some fashion;
- As a result of a channel-sharing arrangement with a station on a channel that has reduced or different coverage;
- Through the loss of public television translators in the repacking process; and
- Through a reduction in a public television station's service area in the repacking process due to facility changes or new interference.

3.2.1 White Areas Created Through a Relinquishment Bid in the Reverse Auction

If the FCC accepts a license relinquishment bid from a sole provider of public television service to a community or all of the providers of public television service to a community, then a "white area" will be created and service to thousands and even millions of Americans could be lost.⁵¹ While the probability of a "white area" being created in this way may be relatively low, the consequences would be dire, as not only will current over-the-air service be terminated, but any future restoration of over-the-air service will likely be difficult if not impossible, and universal access to public broadcasting service denied. Moreover, the FCC's effective de-reservation of a channel in such circumstances would be unprecedented.

The following is a list of some of the larger markets where a single public television licensee serves the area:

Albany-Schenectady-Troy (WMHT Educational Telecommunications); Austin, Texas (Capital of Texas Public Telecommunications Council); Baltimore (Maryland Public Broadcasting

⁵¹ This encompasses both the permanent loss of over-the-air service as well as the loss of "must carry" rights on local cable and DBS services. The loss of "must carry" rights would result in cable and DBS subscribers losing access to that national public broadcasting content unless or until the local cable or satellite provider obtains another public broadcasting station's signal.

Commission); Boston (WGBH Educational Foundation); Buffalo (Western New York Educational Broadcasting Association); Dallas (North Texas Public Broadcasting, Inc.); Detroit (Detroit Educational Television Foundation); Hartford-New Haven (Connecticut Public Broadcasting, Inc.); Houston (University of Houston System); Kansas City (Public Television 19, Inc.); Las Vegas (Clark County School District); Minneapolis-St. Paul (Twin Cities Public Television, Inc.); Norfolk-Portsmouth-Newport News (Hampton Roads Educational Telecommunications Association, Inc.); Phoenix (Arizona Board of Regents for Arizona State University); Portland, Oregon (Oregon Public Broadcasting); Raleigh-Durham (University of North Carolina); Richmond-Petersburg (Commonwealth Public Broadcasting Corporation); Sacramento (KVIE, Inc.); St. Louis (St. Louis Regional Public Media, Inc.); San Antonio (Alamo Public Telecommunications Council) and San Diego (Board of Trustees, California State University, for San Diego State University).

At this time it is not clear how many licensees are planning to relinquish all spectrum rights for any of their stations. What is clear is that some licensees may ultimately find participation in the spectrum incentive auction to be attractive in some form, for reasons of financial distress, or where the licensee's mission (for example, a university or a local school board) extends beyond operating a public television station, and proceeds from their participation in the auction could be used to strengthen or expand other perceived critical activities.^{52,53}

3.2.2 White Areas Created Through a Channel-Sharing Arrangement with a Station Operating on a Channel That Has Reduced or Different Coverage

If the FCC accepts a channel-sharing bid from a sole provider of public television service to a community, in which the participating station has agreed to share a channel with a station that serves a smaller or substantially different coverage area, it is possible that all over-the-air public television service to many thousands of Americans could be lost. While the possibility of a “white area” being created in this way may be relatively low, the consequences would be serious, as not only will current over-the-air service be terminated in some communities, but any replacement of over-the-air service will likely be difficult, if not impossible, and universal access to public broadcasting service denied. Moreover, the station's must-carry rights could shift based on the new location and contour, potentially increasing the size of the blackout zone in access to public television's service.

In addition, in the event that a public television station shares a channel with another (presumably commercial) station, and it relies on that station's physical facilities to transmit its signal, the public television station must share control of the maintenance and operation of such facilities. In the event of disruptions in transmissions caused by factors including poor maintenance or even business risks such as bankruptcy, the public television service could be

⁵² While “state licensees” typically are special-purpose agencies created specifically to facilitate public broadcasting, a State's governing authorities could reach a similar conclusion.

⁵³ Access to any local public television service might also be lost if a licensee of both a public television station and a public radio station in the same community chose to participate in the reverse auction, relinquishing spectrum rights for the channel on which the television station operates, in order to use auction proceeds to enhance its other public media activities, e.g., to focus exclusively on public radio broadcasting.

lost, at least temporarily, due to circumstances over which the public television station may have little or no control.

3.2.3 White Areas Created Where a Television Translator Must Vacate its Current Channel and Does Not Have Another Available Channel on Which to Relocate or Cannot Afford Relocation

Television translator stations are unmanned, low-power, television facilities that receive a signal from a “parent” television station and rebroadcast (or “translate”) the signal on a different channel, thereby extending the coverage of the full-power television station. In many areas of the United States, but particularly in rural areas of the Mountain West, daisy-chains of translators, each picking up the signal of an earlier translator in the chain and transmitting it to the next translator in the chain, are the only way to bring over-the-air broadcast service to communities. In addition, some translators, called fill-in or digital replacement translators, operate on the parent station’s channel and within its contour to fill-in gaps that developed during the digital transition.

Should the FCC order a public television licensee’s television translator to vacate its current channel in the repacking process, it is conceivable that in some places there would be no other television broadcast channel available on which the translator could operate. In addition, if that translator is a link in a chain of translators, the chain would be broken and all “downstream” translators would lose their input signals. In such circumstances, many individuals could lose access to their only over-the-air public television service in that area. It should also be noted that public television service to viewers who receive their service via a cable or satellite provider may also be at risk if a translator is not able to continue to deliver service to a cable or satellite receive facility.⁵⁴

There are approximately 565 CPB-recognized public television translators. If the FCC decides to clear 120 MHz of broadcast spectrum, approximately 40 percent of the CPB-recognized public television translators may have to move to another channel in the repacking process. CPB estimates that as many as 200 CPB-recognized public television translators may not have another channel available on which to relocate, resulting in the creation of an extensive constellation of small “white areas.” While the possibility of “white areas” with the attending loss of universal access being created in this way may be substantial, the sheer numbers of people affected would likely be limited as compared to the loss of a public television station in a metropolitan area. Nonetheless, the loss of access to over-the-air public television service by any individual is significant not only because it would be permanent and replacement service by other means would be neither free nor local. In addition, in many rural areas, a public television translator

⁵⁴ It is possible that the number of viewers who could lose access to public television service in this manner would be greater than the number of viewers who could lose over-the-air service from the loss of a translator. CPB-Qualified Stations commonly deliver to many MVPD headends using an over-the-air signal. For example, using over-the-air signals Blue Ridge PBS in Roanoke, Virginia feeds 190 MVPD headends, Wisconsin Public Television in Madison, Wisconsin feeds nearly 140 MVPD headends, and UNC-TV in North Carolina feeds over 160 MVPD headends.

station may be the only over-the-air public television signal available, thus the loss of the service might deprive viewers of any over-the-air public television service.⁵⁵

To provide a sense of the extent and location of translator usage in the system, here are some statistics that public television has highlighted for the FCC:

- KNPB in Reno, Nevada uses 28 translators to reach 423,000 of its 845,000 viewers, including 27 tribal communities with about 32,400 residents;
- Approximately 50 percent of New Mexico public television viewers are reached by 31 CPB-Qualified Stations' translators. The Navajo Nation in New Mexico would be disproportionately affected by loss of translator service;
- KBYU in Utah uses approximately 90 translators to reach communities throughout the state;
- Idaho Public Television relies on 43 translators to provide public television services to viewers across the state of Idaho; and
- In Wyoming, translators provide service to 69 percent of the public television stations' coverage area.

3.2.4 White Areas Created Through a Reduction in a Public Television Station's Service Area in the Repacking Process Due to Actual Facility Changes, New Interference or Changes in the Software Used by the FCC

Where the FCC assigns a sole provider of public television service in a community to a different channel through the repacking process, it is possible that individuals within the prior coverage area may experience loss of access to over-the-air public television service due to interference from different broadcast sources or changes in transmission facilities⁵⁶ necessitated by the channel change. While it is likely that a public television station's coverage area may be modified in small ways through the repacking process, the possibility of a "white area" being created in this way is relatively modest. However, the denial of access to any individual who formerly had access is significant. In addition, costs associated with remedying such losses of access to over-the-air service through, for example, fill-in translators,⁵⁷ are not eligible for reimbursement out of auction proceeds under the FCC rules.

⁵⁵ Stations serving rural areas may be unable to reach significant portions of the populations they seek to serve due to terrain or geographic reasons. Translators allow those broadcasters to fill in gaps in this coverage by transmitting their signal.

⁵⁶ For example, a station may be forced in the repacking process to make changes in antenna position, tower location, or directional pattern.

⁵⁷ A fill-in translator is used to fill in gaps in a digital television station's broadcast coverage area that were created during the digital transition (1997-2007) when the station ceased its prior analog transmission. Most often fill-in translators are deployed in densely populated metropolitan areas to address issues arising from stations changing channels during the digital transition. Certain areas that had received service from an analog transmitter could no longer receive service from the digital transmitter operating on the new channel.

As noted above, the FCC will calculate “before” and “after” coverage contours for full power stations using the methodology of OET Bulletin 69 of the FCC’s Office of Engineering and Technology, as required by the Spectrum Act. However, the FCC has stated that it will “update” the computer software and input values used to implement that methodology, a move that has generated controversy because broadcasters believe the software changes could lead to the creation of “white areas.”⁵⁸

3.3 The Consequences of the Loss of Universal Access to Public Broadcasting

The creation of “white areas” in public television’s nationwide over-the-air coverage would be contrary to Congress’ universal service goal as first set forth in the Communications Act of 1934, which established the FCC and provides the legal framework for the licensing of broadcasting stations, and contrary to the congressional universal service goal in the Public Broadcasting Act of 1967.⁵⁹ Further, it would be contrary to the FCC’s own history of support for the statutory universal service goal,⁶⁰ particularly its commitment to reserving approximately 25 percent of television channels for noncommercial use.⁶¹

This set-aside and reservation of channels exclusively to provide noncommercial content and services, represents a longstanding policy of shielding not-for-profit providers of content and services from the potentially overwhelming economic power of for-profit commercial enterprises in the marketplace. While this shielding from unconstrained rival market power has been validated repeatedly by lawmakers, including Congress’s exemption of public broadcasting station licenses from auctions in the Balanced Budget Act of 1997, which required the FCC to

⁵⁸The National Association of Broadcasters (NAB) is contemplating suing the FCC over its decision to update the OET-69 calculus for TV station coverage areas and population served. Both the NAB and public television assert the Spectrum Act requires using the calculation methodology in place when the legislation was passed. Broadcasters pushed for language in the Spectrum Act they believed made it clear that coverage areas would not be changed. The Act provides: “The Commission must make all reasonable efforts to preserve, as of the date of the enactment of this Act, the coverage area and population served of each broadcast television licensee, as determined using the methodology described in OET Bulletin No. 69 of the Office of Engineering and Technology of the Commission.” In the *Report and Order*, the FCC maintains that the new software it is using to update the OET-69 calculations is the only way to get the repacking done efficiently where the “software previously used to implement OET-69 cannot support the incentive auction because it cannot undertake, in a timely fashion, the volume of interference calculations necessary to ensure that all stations that will remain on the air following the auction are assigned channels in accordance with the provisions of the Spectrum Act.” Multichannel News, “*FCC Won’t Hold Stations ‘Harmless’ in Auction*,” 6/2/14.

⁵⁹The Communications Act of 1934, Public Law No. 416, June 19, 1934, 73d Congress; Sec. 1 states that it is in the public interest “...to make available, so far as possible, to all the people of the United States a rapid, efficient, Nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges...” and Sec. 307(b) “It is hereby declared that the people of all the zones established by this title are entitled to equality of radio broadcasting service, both of transmission and of reception, and in order to provide said equality the Commission shall as nearly as possible make and maintain an equal allocation of broadcasting licenses, of bands of frequency, of periods of time for operation, and of station power, to each of said zones when and insofar as there are applications therefor; and shall make a fair and equitable allocation of licenses, frequencies, time for operation, and station power to each of the States and the District of Columbia, within each zone, according to population.”

⁶⁰ See, e.g., In the matter of the Amendment of the Television Table of Allotments to Delete Noncommercial Reservation of Channel *16, 482-488 MHz, Pittsburgh, Pennsylvania, *Report and Order*, MM Docket No. 01-276, Sec. 42 (rel. July 16, 2002); The Public Broadcasting Act of 1967 (47 U.S.C. § 396).

⁶¹ See In the Matter of Deletion of Noncommercial Reservation of Channel *16, 482-488 MHz, Pittsburgh, Pennsylvania, *Memorandum Opinion and Order*, 11 FCC Red. 11700, Sec. 17-18 (rel. Aug. 1, 1996).

use auctions to resolve most mutually-exclusive license applications, it was not preserved in the Spectrum Act or in the FCC's recent spectrum incentive auction *Report and Order*.

The displacement of public media stations from reserved channels through a termination bid would mark a fundamental shift in a 75-year commitment that the United States has made to public media, with spectrum having been set aside as the equivalent of national parkland to ensure that free, over-the-air public media content is available to all Americans.

Today, an estimated 59.7 million Americans rely exclusively on over-the-air television broadcasting. In terms of households, 19.3 percent of all U.S. households with televisions rely solely on over-the-air signals to watch television programming.⁶² However, this is not uniformly distributed. For example: Fairbanks, AK (27.8 percent), Boise, ID (26.2 percent), Milwaukee, WI (20.9 percent), Houston, TX (17.4 percent), Tulsa, OK (16.4 percent), Phoenix, AZ (15.5 percent), and Memphis, TN (12.6 percent).⁶³

The oft-stated assumption that viewers in an area stripped of over-the-air television service would be easily served through other platforms⁶⁴ is not valid. Over-the-air broadcast television is the vehicle by which public media ensures availability of linear 24/7 channels of public television programming to 99 percent of the U.S. population. MVPDs (such as cable television or DBS systems) are subject to limitations based upon geographic reach, cost, or some combination thereof.⁶⁵ All other broadband platforms – such as 3G and 4G mobile networks, and optical fiber networks – are subject not only to the same geographic and cost limitations,⁶⁶ but also to technological limitations on their ability to efficiently deliver full-time linear channels of

⁶² See GfK Media & Entertainment's "The Home Technology Monitor" research series, finding the estimated number of Americans relying exclusively on over-the-air television broadcasting increased to 59.7 million in 2013, up from 54 million in 2012, and 19.3 percent of all U.S. households with televisions relying solely on over-the-air signals to watch television programming, up from 17.8 percent of homes reported as broadcast-only in 2012. See also, Press Release, National Association of Broadcasters, *Over-the-Air TV Renaissance Continues as Pay TV Cord-Cutting Rises* (June 21, 2013). However, for a contrary view, see Nielsen's January 7, 2013 "The Media Universe" report, which stated that in September 2012, only 9 percent of Americans in television households (*i.e.*, about 26 million persons) owned no television reception device other than an over-the-air broadcast receiver – down from 16 percent in 2003. And, in a story that took note of an emerging trend – how over-the-air television is getting a second wind in the U.S., because of the increasing amount of online video programming and the opportunity for people to save money on expensive cable television subscriptions – former FCC Chairman Julius Genachowski was quoted as saying that the percentage of viewers watching broadcast over the air, rather than through cable or satellite, had fallen to less than 10 percent. Wall Street Journal, *Over-the-Air TV Catches Second Wind, Aided by Web*, (2/21/12).

⁶³ See PBS Station Audience Report, May 2013 (Based on Nielsen Station Index data).

⁶⁴ See, for example, Thomas W. Hazlett, *If a TV Station Broadcasts in the Forest... **, An Essay on 21st Century Video Distribution, 4/20/11.

⁶⁵ Further, carriage of a public television station's programming by MVPDs depends generally on the presence of a broadcast signal.

⁶⁶ The FCC's *8th Broadband Progress Report* (adopted in August 2012) found that "approximately 19 million Americans – six percent of the population – still lack access to fixed broadband service at threshold speeds. In rural areas, nearly one-fourth of the population – 14.5 million people – lack access to this service. In tribal areas, nearly one-third of the population lacks access. Even in areas where broadband is available, approximately 100 million Americans still do not subscribe. The report, the FCC's most recent, concluded that "broadband is not yet being deployed 'to all Americans' in a reasonable and timely fashion."

programming (i.e., not subject to viewer “on-demand” choice and selection) to mass audiences.⁶⁷ Over-the-air broadcast television is thus an irreplaceable platform in achieving the goal of universal service.⁶⁸

The creation of “white areas” and the concomitant loss of universal access to public television’s over-the-air service would result in a two-tiered society with public media haves and have-nots – where many households, by virtue of their circumstances described below, would have access to public television’s education content and trusted news and information, and some households would not.

3.3.1 Geographic Impacts

It is a reflection of public media’s commitment to universal service that many public television stations deliver a signal to places that would not otherwise have access to any free, over-the-air television. Public media has made significant investments in rural communities, addressing the challenges of deploying service to these areas. Of the 170 public television licensees now receiving Corporation for Public Broadcasting support, 60 serve predominantly rural populations. Twelve of these 60 licensees are statewide networks – eight licensed to state government agencies and four to not-for-profit organizations (community licensees) – for which transmission facilities have been planned, built and operated to ensure service to even the least populous areas of the states they serve.

Service to these and other hard-to-reach populations often comes through full power stations, particularly in the case of statewide networks that were designed to serve all parts of a state. More often, public television service to these populations comes through public television translators. Sixty-two of the 170 public television licensees supported by CPB currently operate approximately 565 translators in 35 states. While the FCC classifies translators as a secondary service, and their continued operation is considered to be a lower priority, as a practical matter, many public television translators, like the ones serving Hoopa, California, Guymon, Oklahoma, and Mansfield, Pennsylvania are of primary importance to their communities.

Should the FCC decide to clear 120 MHz of broadcast spectrum, and actually achieve that goal, it is likely that a number of public television stations will be included among the stations choosing to go off the air, a significant number of public television stations will need to move to another channel in the repacking process, and as many as 40 percent of the CPB-recognized public television translators may also have to move to another channel in the repacking process or go off the air. While all remaining public television stations will have another channel to move to, up to 200 of the translators may disappear because there will not be channels available

⁶⁷ At least one wireless service provider, Verizon, is reportedly moving away from a strategy in which it would provide linear television offerings as an over-the-top (OTT) service on its LTE network. CableFax, *Intel Media’s Erik Huggers Leaving Verizon, Shift in OnCue OTT Strategy*, 6/2/14.

⁶⁸ See footnote 50 *supra* at p. 25.

for them once television stations have been repacked,⁶⁹ resulting in the creation of “white areas.”⁷⁰

As mentioned above, the possibility of “white areas” being created in this manner is substantial. Individuals living in rural parts of our nation, who often rely on translators for free over-the-air television service, will be disproportionately impacted. As a result, it is likely that some will be left without any over-the-air public television service after the reallocation of spectrum has been completed.

Indeed, it will be unfortunate if, as has too often been the case, rural Americans are the ones left behind by the spectrum auction and repacking process. As the FCC’s report to Congress on rural broadband noted: “For years, large parts of rural America have languished on the sidelines of the digital revolution. . . . Rural America has for most of our history been deemed too remote, too sparsely populated, or too inaccessible to be fully connected with our nation’s infrastructures.”⁷¹

Public media’s mission makes its stations uniquely positioned to reach underserved and hard-to-reach rural and urban communities with digital offerings, such as emergency alerts and datacasting. Thus, the one “sweet spot” of an underserved demographic the National Broadband Plan identified as a priority is already being served by public media, but may be in jeopardy.

For individuals who have depended on television broadcasters for information when danger is headed towards their community, the creation of “white areas” could be the difference between life and death. The FCC’s incentive auction and repacking process could significantly interfere with television stations’ ability to keep their viewers informed. The changes to the FCC’s software models that predict the coverage area of a broadcaster’s signal could leave viewers in rural parts of the nation without access to the local television programming – and vital information – they currently depend on.

3.3.2 Socio-Economic Impacts

A large number of Americans, particularly those who earn less than \$30,000 a year, including seniors on fixed incomes and the young, continue to rely on over-the-air broadcast television to stay informed.⁷² However, as mentioned above, this is not uniformly distributed.⁷³ The creation of “white areas” through either the spectrum incentive auction or repacking process, and the

⁶⁹ Booz & Company, Update on Broadcast Spectrum Auction and Repacking, presentation to CPB Board of Directors, December 9, 2013, at <http://www.cpb.org/aboutpb/spectrum/reports/CPB-spectrum-slides.pdf>.

⁷⁰ This may be mitigated somewhat by the FCC allowing translators to continue operations until/unless the wireless mobile providers use the spectrum.

⁷¹ Michael J. Coppins, Acting Chairman, FCC, *Bringing Broadband to Rural America*, Report on a Rural Broadband Strategy, 5/27/09.

⁷² According to GfK Media & Entertainment, lower-income households trend towards broadcast-only television, with 30 percent of homes having an annual income under \$30,000 receiving TV signals solely over-the-air (up from 22 percent in 2010). By comparison, 11 percent of homes with incomes \$75,000 or more currently rely exclusively on over-the-air broadcast signals.

⁷³ See text at pp. 30-31, and footnote 63 *supra* citing the PBS Station Audience Report, May 2013 (based on Nielsen Station Index data) and discussion text identifying markets in which a substantial share of the television households rely exclusively on over-the-air broadcast.

concomitant loss of universal access to public television's over-the air service, will result in many low-income households being deprived of public television's educational programs and trusted news and information. As such, individuals who stand to benefit most from access to over-the-air broadcast television programming will be sacrificing those benefits in order for other individuals – often wealthier people in urban areas – to obtain enhanced wireless broadband services.

3.3.3 Impact on Diverse Communities and Public Media's Mission to Serve Unserved and Underserved Audiences

The history of public broadcasting in the U.S. is defined, in large part, by its ability to facilitate diverse voices. These voices are often overlooked by commercial media where diversity of programming does not align with business plans. The National Broadband Plan acknowledged the risk of impacting the “number and diversity of broadcast ‘voices’ in a community.”

Over-the-air broadcast television is vital in terms of reaching underserved populations. In 2013 GfK Media & Entertainment found that minorities make up 41 percent of all broadcast-only homes, up from 38 percent in 2010. In its study, GfK specifically found that 23 percent of Asian American households (down from 30 percent in 2010), 22 percent of African American households (up from 12 percent in 2010) and 25 percent of Latino households (up from 23 percent in 2010) rely on over-the-air broadcast television.

The Public Broadcasting Act requires public broadcasters to “serve unserved and underserved audiences, particularly children and minorities.” The creation of “white areas” through either the spectrum incentive auction or repacking process, and the attending loss of universal access to public television's over-the air service will result in many unserved and underserved minority individuals being deprived of public television's educational programs and trusted news and information.

3.3.4 Impact on the Public Media System

The creation of “white areas” and the resulting loss of universal service could also undermine the financial underpinnings of the public media system.

For example, because it would undercut the universal service goal in Section 396 of the Communications Act, and because the auction and repacking process theoretically will facilitate expansion of alternative wireless distribution platforms, a significant loss of service to communities across the country could be cited as an argument for reducing or eliminating Federal funding for public broadcasting.

It is important to bear in mind, that revenues that may be derived from the sale of spectrum would flow on a one-time only basis and solely to television licensees willing and able to surrender their spectrum in the incentive auction. Even if the proceeds could be aggregated they

would not be sufficient to provide an ongoing source of funding for public television that could replace the federal appropriation.⁷⁴

Moreover, the loss of service to existing viewers who currently support their local public television stations would undoubtedly result in a decline in viewer support, local business underwriting and state government and institutional support. A significant loss of service could also undercut underwriting support for national programming, to the extent that such support is predicated upon the delivery of a complete national audience. In addition, a diminution in available bandwidth would undermine the market for diverse content.

Finally, the creation of “white areas” and the attending loss of universal service could weaken an extraordinarily useful national teaching tool, diminish the most trusted source of news and public affairs programs in the nation, erode our national memory and exceptional culture, and compromise our civil defense and emergency alert system.

3.3.5 Disruption and Expense in the Repacking Process

If the FCC manages to clear 84 MHz of spectrum, Booz & Company (now known as PwC Strategy&) estimated that 70 to 80 of the 355 public television stations would be reassigned to new channels. If it clears 120 MHz of spectrum, Booz estimated that there would be 110 to 130 of the 355 public television stations reassigned to new channels.⁷⁵

Congress established a \$1.75 billion fund to reimburse broadcasters for channel relocation expenses if they choose to retain their spectrum, stay in business and are required to relocate as a result of the repacking process. The FCC has determined that, once its repacking plan is announced, stations will have three months to apply for a construction permit for the required transmission system changes, and at most three years to complete the construction process. The FCC will determine how much time each station will have, with some stations being required to complete construction in less time. While the FCC has also stated that stations will be allowed to apply to extend their construction periods, at the end of the three-year period all stations being

⁷⁴ The Spectrum Act provided for the payment of reverse auction proceeds solely to the licensees of the spectrum rights surrendered. While a trust fund for public broadcasting has been discussed by public broadcasters and elected officials for several decades, Congress did not provide for one in the Spectrum Act. Further, as CPB’s *Alternative Sources of Funding for Public Broadcasting Stations Report* to the U.S. House and Senate Committees on Appropriations in 2012 noted, “spectrum sales would not provide an ongoing source of funding for public television and radio stations generally that could replace federal funding” and “that it would be revenue at the cost of services lost.” CPB, *Alternative Sources of Funding for Public Broadcasting Stations*, pp. 42-43 (June, 2012) The Report further stated that “in the absence of some sort of requirement that funds from the sale of public television channels be placed into a trust fund to support public television stations generally...any such revenue would flow on a one-time basis and only to the particular television station giving up its channel.”

⁷⁵ If the FCC seeks to clear at least 72 MHz of spectrum, as it has most recently indicated, that would mean that any station currently operating on a channel that is numbered 39 or higher is likely to be repacked. Examples of stations currently operating on those channels include: WEDW (Bridgeport, CT), WNJN (Montclair, NJ), KLCS (Los Angeles, CA), KOCE (Orange County, CA), and WTTW (Chicago, IL). As mentioned below in section 3.2.5.1, Widelity noted that some stations, such as those whose facilities are on Sutro Tower in San Francisco, on Willis Tower in Chicago, and on 4 Times Square in New York City, will face a complicated channel relocation process. Further, stations that operate on channels lower than 39 with facilities in these locations may be affected by the modification or replacement of other station’s facilities at those locations.

repacked will have to cease operating on their old channels. In such circumstances, if a station's new facilities are not ready, the station will have to go off the air – at least temporarily.

In the report and catalog of potential expenses and estimated costs that Widelity Inc. provided to the FCC, it concluded that the repacking process “will pose significant challenges to the industry” and that “a number of potential bottlenecks in the post-repacking transition process . . . may potentially extend the amount of time a station needs to complete construction of its new facilities.”⁷⁶

3.3.5.1 Disruption

There is significant concern in the broadcasting industry about the timely availability of new transmission equipment, alternative tower sites, and tower crews needed to make changes both to towers and equipment installed on towers, given that many stations around the country will be acquiring new equipment and having to make tower changes at the same time. In addition, there may be additional, unrelated demands from both the broadcasting and wireless industries for these same scarce resources.

Thus, the repacking process has the potential to cause over-the-air service interruptions, which, may be for extended periods of time, even where a station has not successfully participated in the auction.

Widelity estimated that, while certain modifications might be completed in less than a year, a complicated modification, such as one involving broadcasters transmitting from Sutro Tower in San Francisco, would take approximately 41 months *assuming there were no problems*. The *Widelity* report raises serious questions about whether the post-auction transition can be completed in 36 months (the statutory deadline for reimbursement of relocation costs and the time frame specified by the FCC for repacked stations to leave their old channels).

If there are extended service interruptions in multiple markets where many households rely on over-the-air television for their news and information or cable and satellite providers relying on over-the-air reception of broadcast signals at their headends, it could have a negative effect on the larger public media programming economy.

3.3.5.2 Expense

In addition to identifying, generally, what is involved in changing a station's channel, *Widelity* considered the costs that stations might face in the repacking process. Notably, the repacking expenses ranged from \$588,000 to \$2.7 million per station.⁷⁷

Should the FCC clear its original stated goal of 120 MHz of spectrum, the \$1.75 billion repacking fund may not be sufficient to cover the cost of repacking the full-power stations

⁷⁶ See *Widelity, Inc., Response to the Federal Communications Commission for the Broadcaster Transition Study Solicitation – FCC13R0003, December 30, 2013 (“Widelity Report”)*.

⁷⁷ The sudden increase in demand for new transmission equipment and tower crews following the spectrum auction could translate into rapidly escalating costs for licensees needing to make changes both to towers and equipment installed on towers within a fixed 39-month period.

affected, and would result in repacked broadcasters having to pay part of the repacking process out of their own funds.

In addition, the FCC has established a process that apparently contemplates that some amount of funding (\$1 billion) may be available in advance for stations to pay repacking costs, but at this point it is not clear whether stations may have to “front” some portion of the expense out of their own funds even if they ultimately are reimbursed for all their costs.

Further, as noted above, the repacking process could affect up to 40 percent of the 565 CPB-recognized public television translator stations, and the process established by Congress and the FCC does not provide for any financial assistance for translators that need to change channel in the repacking process.

Forcing public television stations to “front” or ultimately bear repacking expenses out of their own funds is particularly unfair to those that did not participate in the spectrum incentive auction and did not receive substantial compensation in exchange for their spectrum. It now appears that, to some extent, some public television stations could be harmed by the spectrum incentive auction and repacking process – contrary to the intent of Congress, which specifically provided that broadcaster participation in the auction was to be voluntary.

4 Conclusion

Five years ago, the public media system – national organizations and stations – set out a vision for the future of public media in the digital age, emphasizing that broadband and broadcast are complementary.

Today, public media is a “best case” example of television channels being used efficiently and effectively, deploying multicast capabilities and relying on unimpeded coverage areas to reach diverse communities with content and services that address the policy challenges we face locally and nationally.

The value of the spectrum held by public media stations, on behalf of the communities they serve, that the FCC would repurpose goes well beyond the market prices they could well command in this auction. Narrow financial calculations cannot measure the value of serving the educational needs of the nation’s children, providing trusted news, reliably delivering emergency alerts, presenting diverse viewpoints that would not otherwise be heard, and numerous other benefits provided today and in the future by the nation’s public media stations through over-the-air broadcasting.

Unfortunately, while the spectrum incentive auction and repacking process would address one problem (the need for more spectrum for wireless broadband), it would likely do so at the expense of public media’s ability to meet the mandates of the Public Broadcasting Act – undermining communities’ ability to address the policy dilemmas they face as well as the nation’s need for universal service and local content and diversity of programming in an increasingly consolidated media environment.

Given the irreplaceability of spectrum to deliver programming to serve their communities, and the potential challenges and opportunities that lie ahead in terms of Ultra High Definition service, a transition to a new broadcast standard, and a possibly greater role in public alerting, CPB believes that public media licensees should carefully assess their participation in the incentive auction process and consider the benefits of flexibility so they will not be locked into technology that will prevent them from remaining relevant and competitive in a converging media and telecommunications world.

Finally, as public media stations continue to work to meet the challenges of tomorrow’s media and the needs of our audiences, CPB believes the FCC should not be urging broadcasters to abandon broadcasting in favor of broadband distribution. As they have been demonstrating for the past five years, public media stations can, and should, do both.

5 Facing the Incentive Auction and Repacking Process

The following section is intended to help public broadcasting licensees who are committed to their mission of serving the public interest, but who do not know if the FCC's spectrum incentive auction will affect their stations⁷⁸, and want to be able to evaluate the risks and opportunities presented by spectrum auction through options such as channel sharing or a move to VHF. In addition, many licensees will need to understand the repacking and the TV Broadcaster Relocation Fund (which will reimburse broadcasters for at least some repacking-related costs).⁷⁹

5.1 Issues for Station Managements and Governing Boards to Consider

Public television licensees will need to decide whether and in what way to participate in the spectrum incentive auction with respect to their station (or each of their stations, if they are licensed for more than one), and many stations will be required to make changes to their operations by moving to a different channel in the repacking process.

The decision whether and in what way a station may participate in the spectrum incentive auction, however, is not entirely up to the station's governing board. At some time, the FCC will decide whether to offer *any* starting price for surrender of that station's current spectrum rights, and at some (perhaps later) time, the FCC will decide what the starting price offered for that station will be. The FCC has not yet revealed how and when it will make known to stations whether it will offer *any* starting price for a particular station's spectrum rights, or what that starting price might be.

Nevertheless, the management of these stations and their governing boards will need to consider many important issues in connection with these activities – not the least of which is the permanent nature of participation in the auction. For example, once a licensee has accepted an opening price, its offer to relinquish spectrum rights at that price is irrevocable – and subject to the FCC's discretion, permanent. Given the FCC's proposed timing of the auction process – possibly only a year from now – if stations have not begun to deal with these issues, they need to do so forthwith.

Here is an outline of strategy, auction, and repacking questions that station management and governing boards will need to consider. More detailed analysis of certain issues follows below:

What is my station's public media service strategy for the next 10-20 years?

- How does my station define the community it serves?

⁷⁸ FCC PowerPoint slides: *Broadcast Incentive Auction 101* at slide ##13, 14; 6/24-27/14 at

http://wireless.fcc.gov/incentiveauctions/learn-program/Broadcast_Incentive_Auction_101_slides.pdf.

⁷⁹ Substantial portions of this section are drawn from *Summary of the FCC Report and Order* prepared by Todd D. Gray of Gray Miller Persh LLP, 6/12/14, and from Booz & Company, Update on Broadcast Spectrum Auction and Repacking, presentation to CPB Board of Directors, 12/9/13, at <http://www.cpb.org/aboutpb/spectrum/reports/CPB-spectrum-slides.pdf>.

- Should we define the community we serve solely in geographic terms, or are there potential audience members or groups of potential users whom we seek to serve and whom we define in other ways?
- What role does broadcasting play (*i.e.*, providing full-time linear channels of programming as opposed to collections of individual programs accessible on demand) in our service strategy? How would that change if we were to shift toward a greater emphasis on making content available on demand?
- What role do our current spectrum assets play in our service strategy? And how would that change if we were to surrender some or all of our spectrum rights?
- How do we anticipate using (or want to use) our spectrum assets in the future? Do we want to broadcast programming (or non-television data) to a broad mix of both fixed and mobile user devices?
- How quickly will we need to move to implement new technical standards for television (e.g., ATSC 3.0)? Do we want to be able to broadcast programs of significantly higher visual quality (e.g., Ultra High Definition)?

Does the spectrum incentive auction demand my station's attention and resources?

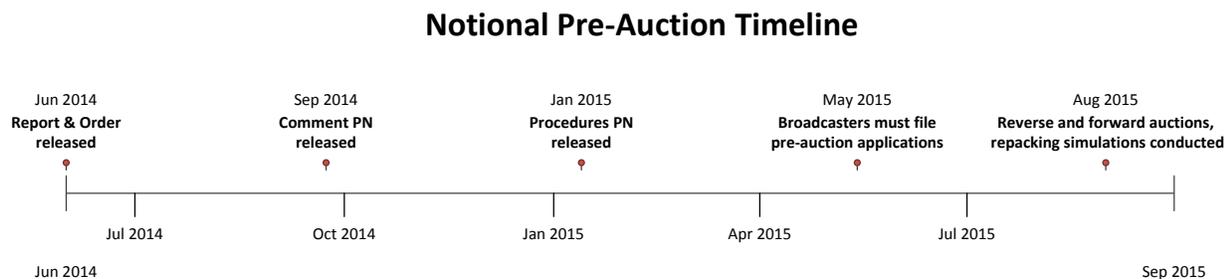
- How badly does the FCC need my station to surrender its channel in order to free up 120 MHz or 84 MHz of spectrum nationwide?
- What bid(s) would my station want to consider and under what circumstances?
- What is likely to be the opening price for each of the possible bid options for my station's channel?
- Is the opening price worth surrendering my spectrum rights for (the opening price is almost certainly not the final price to be offered in the "descending clock" auction scheme)?
- What is the long-term value of my station to the community we serve and to the entity that holds our license? How is that value measured?
- What could my station or its licensee do with auction proceeds of that magnitude?
- As the price drops in the descending clock auction format, how will my station evaluate what it could do with those diminished proceeds?
- What kind of bidding strategy will my station need?
- What kind of business, legal, economic and technical advice will my station need?
- Could my station submit a license termination bid and still deliver services to the audience in some other manner?
- Could my station structure a channel-sharing arrangement compatible with our service strategy? Is my station a good candidate for channel sharing? How would resources related to transmission operations be shared (people, tools, etc.)? Would any other (non-transmission-related) operations or operating resources be shared?
- Is my station eligible for UHF-for-VHF swap and if so, could we still deliver the services to the same audiences on a VHF channel of the FCC's choosing?

- Is my station eligible for high VHF-for-a low VHF swap and if so, could we still deliver the services to the same audiences on a low VHF channel of the FCC's choosing?
- How should my station structure a conversation and decision-making process with the licensee's administration and/or governing board concerning these issues? How should my station structure the conversation with the community it serves, balancing the need for transparency regarding its possible participation in the spectrum incentive auction with business considerations that require confidentiality in auction decisions and strategy?
- Considering public media's shared mission (universal service, localism, diversity, education, news and information, providing emergency alert services), what are the consequences of my station's participation for other public media stations and/or for the public media system as a whole?

Is my station or any of my translators likely to be required to move to a different channel in the repacking process?

- What channel relocation costs can my station expect not to be reimbursed for – and how will it deal with that? How will we pay for the relocation of translators? If my station needs to undertake greater consumer education efforts than those which the FCC mandates, how will we pay for it?

5.2 Station Auction Considerations



5.2.1 General Considerations

Public broadcasters need to be able to make informed decisions regarding a number of issues.

As a threshold matter, for licensees to be able to decide whether they would like to participate in the auction, they will need to know from the FCC the details of how the reverse auction will be conducted and a concrete sense of the maximum amount they could get for their participation in the auction. In its May 15th *Report and Order*, the FCC decided some of these issues, but other

important details, such as stations the FCC would like to encourage to participate, and the opening bid prices for those stations will not be known until later.⁸⁰

In weighing their possible participation, licensees will need to consider over-arching and critical questions about their service strategy for the next 10 – 20 years. What role do their current spectrum assets play in their service strategy? And how will that change if they were to surrender their spectrum or share spectrum with another station?

Of course, the first option that licensees have is to simply retain their full 6 MHz of spectrum and to continue to operate after the auction. This option will be particularly attractive to those licensees who want to broadcast at least one high definition channel and one or more digital multicast channels and/or mobile DTV. It will also be attractive to licensees who believe that the future of over-the-air broadcasting is bright as a result of innovations such as ATSC 3.0, broadcasting in 4K or 8K, and/or leasing excess capacity for downlink broadband use (datacasting).

If the licensee decides to participate in the auction with respect to one or more of its stations, will it accept limited spectrum rights and continue as a broadcaster, or will it surrender all spectrum rights and cease broadcast operations? The approach to this question will likely be different depending on whether the licensee has a single station or multiple stations. In the latter case, it may differ further depending on whether two or more of the stations have the same coverage areas and population served.

It is critical to note that if a single-station licensee surrenders spectrum rights for its station, that station loses program distribution rights, and must-carry rights on cable, teleco and DBS platforms. It may also lose negotiated carriage (will-carry) rights on these platforms, because carriage agreements are predicated on the existence of a broadcast signal for copyright licenses and for receipt of good quality signals at cable headends. In addition, under the statute, it will also lose its Community Service Grant (“CSG”).⁸¹

If a single-station licensee enters into a channel sharing agreement, Congress and the FCC have determined that it will retain must-carry rights, although the extent of those rights may vary depending on the location and signal reach of the channel on which they operate following the

⁸⁰ In fact, it is not known whether the FCC will disseminate this information through a Public Notice available for all to see or by a private communication to each licensee. It is also not known which or how many stations may be directly encouraged to participate by the FCC in advance of the auction – or whether these “pitches” will be made in a transparent manner. These are details that will be worked out over the next several months in the post-rulemaking proceedings, including: an *Incentive Auction Comment Public Notice* that will solicit input on final auction procedures and details, including factors to be used in setting opening prices for the auction; an *Incentive Auction Procedures Public Notice*, currently slated for the first quarter of 2015, that will specify final procedures for the auction, including dates, deadlines and details of the application and bidding processes.

⁸¹ Aside from a successful license relinquishment bid by a single-station licensee or by a multi-station licensee for all of its stations, the issue of the impact of successful participation in the spectrum incentive auction on CSG eligibility has yet to be considered by CPB, and will likely be a subject in a future system consultation. Regarding the issue of the impact of successful participation in the spectrum incentive auction on the amount of a station’s CSG, it should be noted that auction proceeds will not qualify as NFFS because they will come directly or indirectly from the federal government.

auction. The effect of channel sharing on negotiated carriage rights is not clear. Also not known at this time is whether cable systems or others will legally challenge must-carry rights for all broadcast stations.

These outcomes will be somewhat different with respect to program distribution rights and CSG-eligibility for a multi-station licensee surrendering spectrum rights for some, but not all of its stations.

5.2.2 The Bidding Process

Stations that decide to participate in the auction will be required to file well in advance of the auction a pre-auction application that will establish their legal, technical and other qualifications to participate in the auction, disclose which relinquishment option(s) the station may bid on, and provide up-to-date ownership information for a noncommercial station.⁸²

For stations interested in channel sharing, the pre-auction application will also have to provide information on the details of the channel sharing arrangement and provide a copy of the executed channel sharing agreement.⁸³

As noted above, the FCC specifies a multiple round “descending clock” auction format in which bidding stations will indicate their willingness to accept a progressively lower price set by the FCC, until only bids the FCC is prepared to accept remain outstanding.

The FCC states whenever a bidder accepts a price for one of the relinquishment options, whether it is the opening price or a lower price as the auction proceeds, the station makes a binding and irrevocable commitment to accept that relinquishment option if the FCC ultimately selects that bid as a winning bid.

The bidding will take place in phases. In the first phase, the FCC will try to obtain its highest goal of cleared spectrum. If the FCC is unsuccessful in recovering the initial spectrum target in the first phase of the auction, additional auction phases will be conducted in which the FCC tries to clear progressively less spectrum.

The FCC will also allow “intra-round” bidding – wherein a bidder will be able to indicate the lowest price at which it is willing to accept an option for its station.⁸⁴

⁸² It is not clear whether the filing of a pre-auction application will constitute a binding agreement to participate in the auction and accept an opening price, or whether a station could withdraw from the auction before accepting an opening price. This issue will be resolved in the *Auction Procedures Public Notice*, which is currently slated for the first quarter of 2015.

⁸³ The *Report and Order* specifies certain particulars for these agreements, requiring them to address at least the following points: access to shared transmission facilities; allocation of bandwidth; operation, maintenance, repair and modification of facilities; and termination and transfer/assignment rights.

⁸⁴ The FCC provided this example of what that means in the *Report and Order*: “if in a bidding round the price drops from 10 (which the bidder was prepared to accept) to 8 (which the bidder is not willing to accept), instead of just dropping out of bidding, the bidder can offer another price (such as 9) that it would accept.”

The FCC has not yet stated whether every eligible station will be offered an opening price. Nor has it stated the opening prices that it will offer for television stations' spectrum. These will be determined in the pre-auction process. We have been told, however, that opening prices will begin high, in an effort to incentivize participation by licensees in the process.

The prices that the FCC offers for bid options in any given phase will be based on “the value of the station’s bid ... to relinquish spectrum usage rights.” That value will NOT be based on the market or enterprise value of the station for television broadcasting, but “objective factors” that affect the availability of channels in the repacking process, such as the location and potential for interference with other stations. This means that licensees may receive individualized bid offers for each transmitter rather than a generic bid for any station in a given market.

Throughout the reverse auction, as any previously bidding station drops out, the FCC will be continually processing repacking solutions using what the FCC calls a “feasibility checker.” The auction will continue until every station has either been provisionally assigned a channel in the repacked TV spectrum band or has been selected to have its bid accepted because no feasible channel could be found for it in the repacking process.

At that point, if the reverse auction in that particular phase has cleared the spectrum target for that phase, the FCC will begin the forward auction bidding process to determine whether wireless companies are prepared to bid enough for licenses to the cleared spectrum to cover the payments going to stations for relinquishing their spectrum, the costs of reimbursement in connection with the repacking process, the FCC’s administrative costs for the auction and repacking process, and funds that will be dedicated to FirstNet. If so, and if the amounts bid by wireless companies meet a minimum value benchmark that the FCC will establish in the pre-auction proceedings, the auction will be concluded.

Ultimately, the FCC will issue a *Channel Reassignment Public Notice* that will announce the results of the auction – identifying both the winning bidders and winning bids – and new channel assignments for broadcasters remaining on-air. It will also kick-off a transition period of up to 39 months for implementing the outcomes of the auction and repacking process.

5.2.3 Auction Options

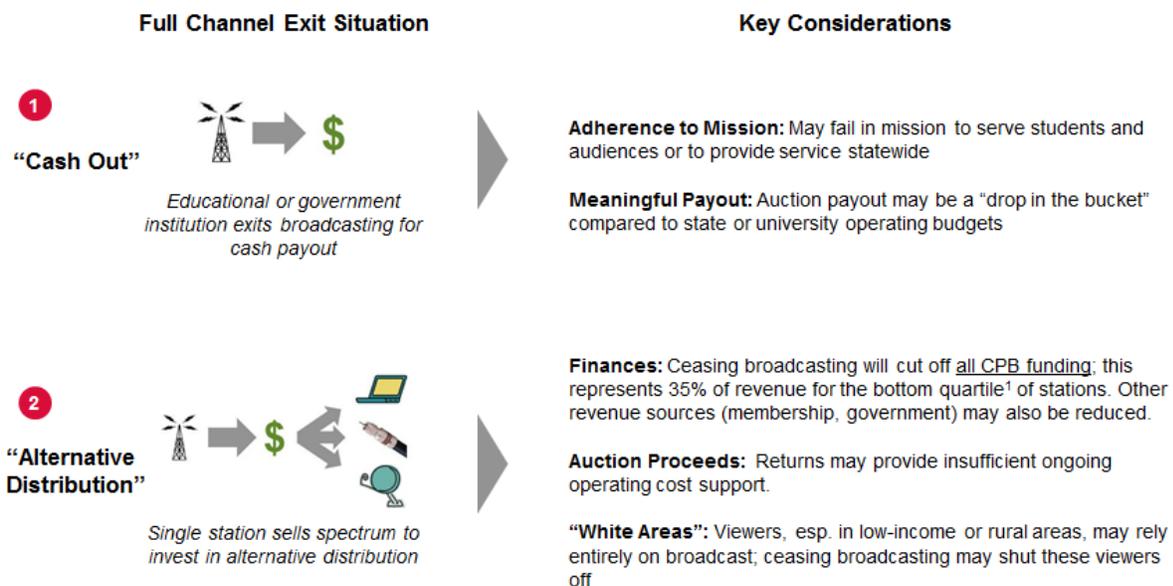
Licensees will have several options in the reverse auction. They can:

- A. Drop Out**
- B. Participate and Go Dark (License Relinquishment Bid)**
- C. Move from UHF to VHF**
- D. Channel Share**
- E. Move from High VHF to Low VHF**

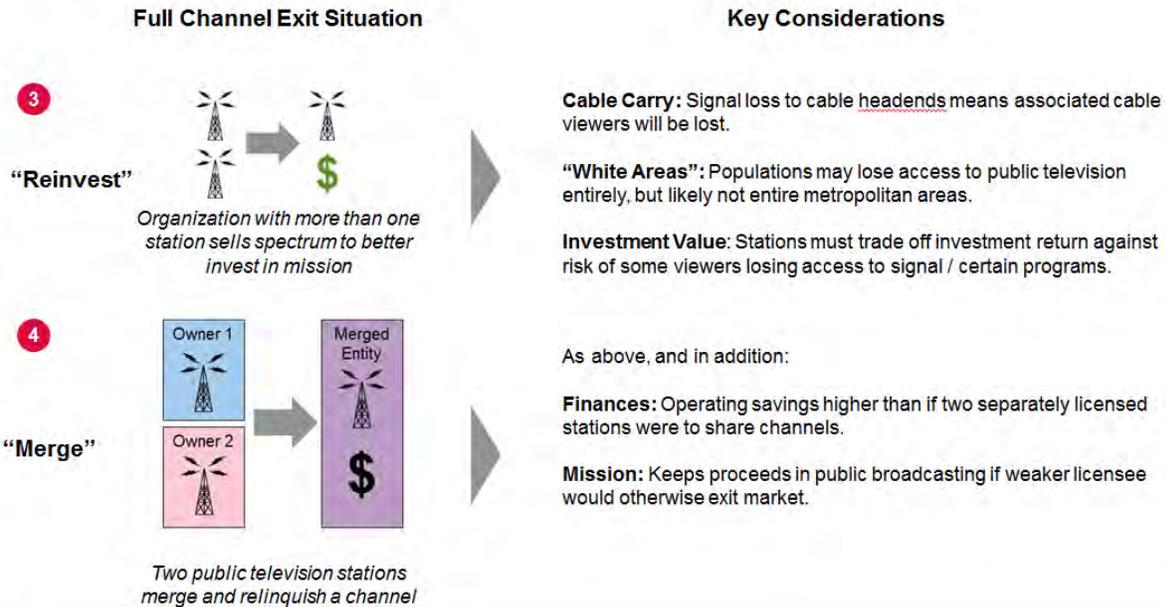
5.2.3.1 Option A: Drop Out. Beginning with the “initialization step” the first option that stations will have is to drop out of the auction, retain their 6 MHz of spectrum and to continue to operate.

5.2.3.2 Option B: Participate and Go Dark (License Relinquishment Bid). Perhaps the least complicated option for licensees interested in participating in the spectrum incentive auction is to sell their station’s 6 MHz of spectrum and, if their bid is accepted, to cease broadcast operations. The FCC has stated that broadcast operations of these stations will be required to cease three (3) months following their receipt of auction proceeds, but it is not clear how quickly after the auction concludes auction proceeds will be paid out.

Option B: “Participate and Go Dark” Implications



...while other stations may wish to relinquish channels to invest in public broadcasting



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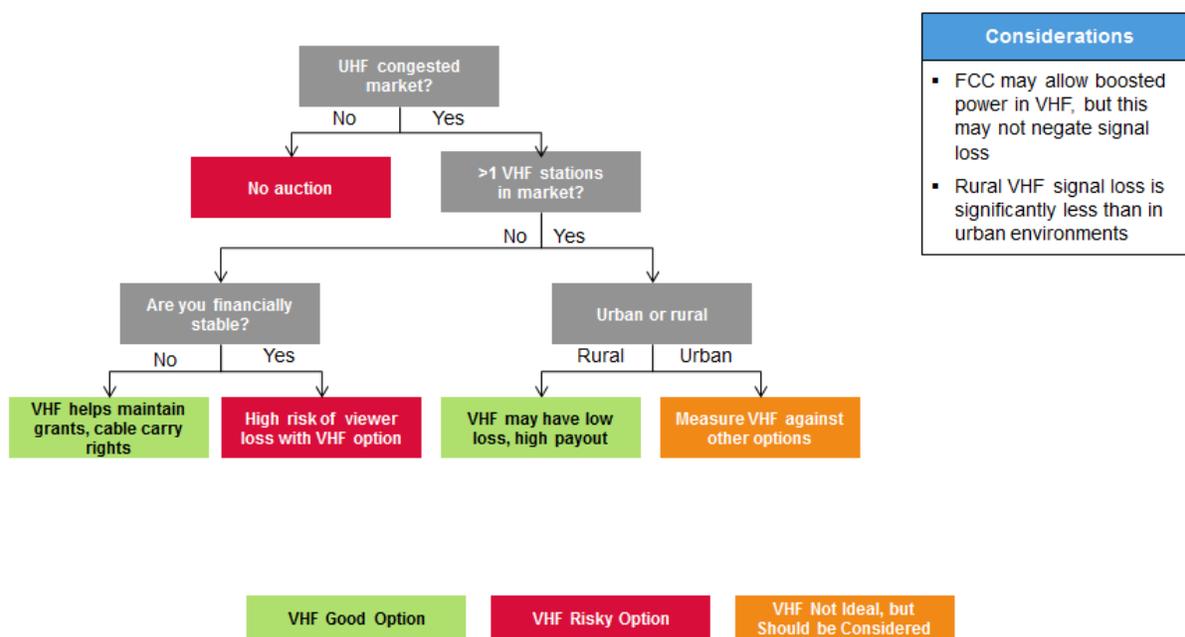
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While one of the FCC’s auction goals is to make participation by licensees as easy as possible, those interested in this option will need to think about the value of their spectrum and develop a strategy for how to participate in the auction.

Licensees interested in making relinquishment bids will need to determine at what price they would no longer be interested in continuing to participate in the auction. They will also have to consider how to best serve their community following the auction and how to use auction proceeds to provide services to the community. The decision to terminate service may be made by institutions or state agencies that hold licenses and seek to use auction proceeds for purposes not related to public media.

Obviously, CPB is concerned about any loss of reserved spectrum and associated services in the local market and across the country, but in particular CPB is concerned about maintaining universal public television service throughout the United States, consistent with longstanding congressional and FCC policy.

Option C: Move from UHF to VHF

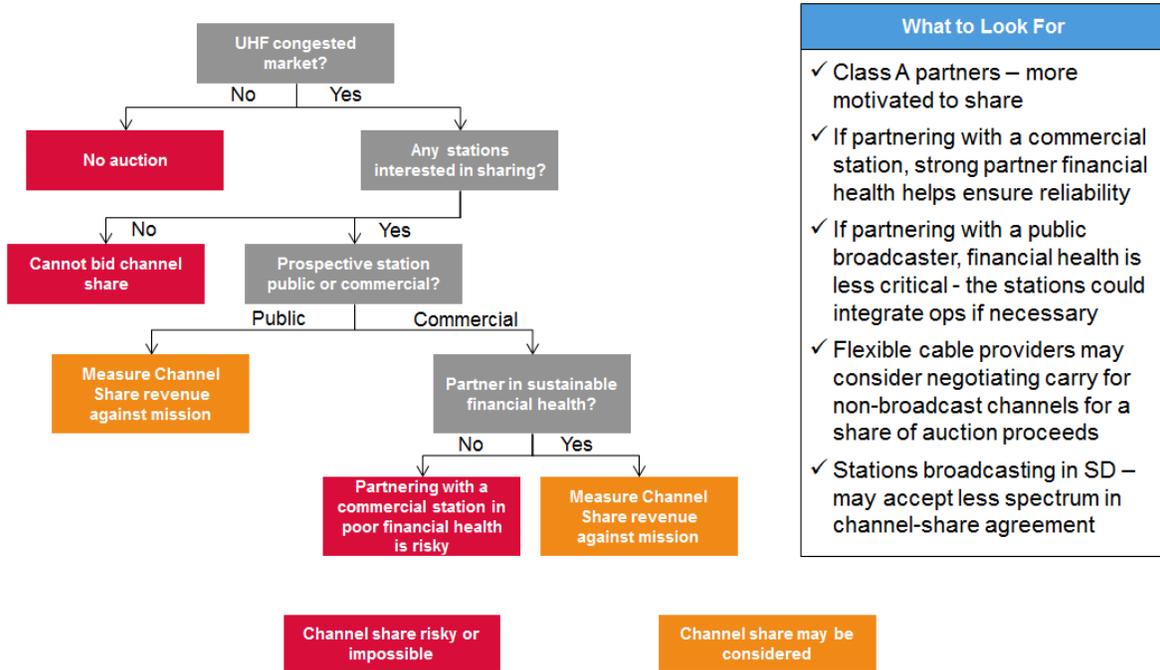


5.2.3.3 Option C: Move from UHF to VHF. Under this option, a licensee would exchange a 6 MHz channel in the UHF band for a 6 MHz channel in the VHF band, with the station able to select upper or lower VHF band and the FCC selecting the channel within the chosen band. Licensees contemplating this option would have to consider the superiority of spectrum they would be giving up in the UHF band for transmission of digital broadcast signals.

For those licensees who want to retain the ability to broadcast multiple, high-quality program streams, but who are willing to trade some over-the-air capability for spectrum auction revenue this could be an attractive option if the compensation is adequate. It should be noted that broadcasters digitally transmitting television streams on VHF channels experience greater interference challenges than their UHF counterparts, due to interference “noise” and in part the lower power levels at which VHF stations operate.

A station that decides to move from a UHF to VHF channel could face greater interference, a loss of coverage (particularly in urban areas), and a reduction in its ability to offer certain services (such as Mobile DTV) in its license area.

Option D: Channel Share



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5.2.3.4 Option D: Channel Share. The FCC views channel sharing as a key component of its spectrum clearing strategy to make room for more wireless broadband service. Under a simple channel sharing arrangement, two stations would enter into an agreement in which one of the stations would bid to relinquish its channel in the auction and, if its bid was accepted, the two stations would, following the auction, share the other station’s 6 MHz channel. Auction proceeds would be shared by these two stations according to a formula on which the stations would agree in advance, and going forward they would share a single transmission plant thereby reducing each of their operating costs. It is worth noting that multiple stations could enter into a channel sharing arrangement and make separate auction bids relating to a single channel-sharing agreement. Also as noted above, a channel-sharing agreement, contingent on having a bid accepted, would need to be executed prior to auction and filed with the FCC during the pre-auction process, as early as spring 2015.

Channel sharing usually requires loss of some multicast capability for each sharing station, but has significant cost savings upside

Option Details

- Station bids to share with another station in the same market
- Station must either compress content or reduce channel count (or both)



Channel-sharing Considerations		Interviewee / Dynamic Inquiry Impact Feedback	
Pros	▪ Potential reduction in operating expenses if sharing with partner with comparable transmission cost	3	
	▪ No fear of losing viewers due to loss of signal penetration capability or viewer antenna type	2	
	▪ May access more customers if moving to new antenna with higher output power	1	
Cons	▪ May need to reduce image quality due to compression, depending on number of channels	2	
	▪ If multicasting with partner with much higher transmission cost, OPEX may go up	1	
	▪ Potential loss of coverage area if moving to a new tower location or antenna height	2	
	▪ Usually must reduce the number of channels broadcast and therefore the number carried on cable	4	
	▪ Membership / membership revenue may decrease with reduction in channels	1	
1	Infrequently mentioned / mentioned as minor consideration	Frequently mentioned / mentioned major consideration	4

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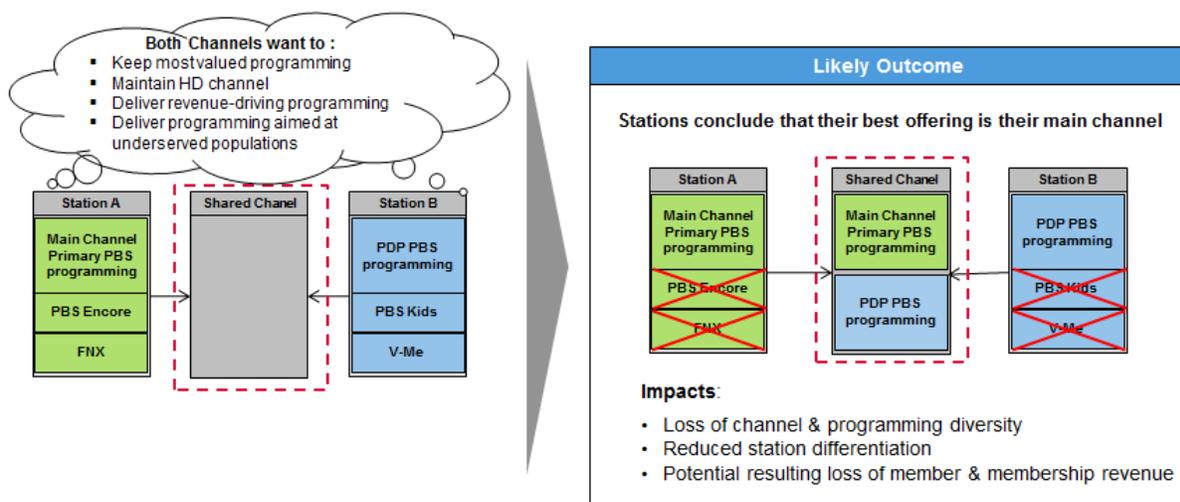
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If two (or more) public television stations entered into a sharing agreement it is possible their cooperation could lead to greater collaboration, reduction of duplication and expanded services to the community. However, the reduction in bandwidth available to each party will require each of the channel sharing partners to make tradeoffs between the visual quality of their program services (e.g., ceasing HD broadcasts) or reducing the number and diversity of the program services they are providing.⁸⁵

While channel sharing may offer some public television stations an opportunity to receive a capital infusion, the resulting reduction in bandwidth could constrict either the visual quality of their program streams or their capacity to offer a diverse array of content to their communities. Should the latter happen in enough local television markets, it will impact the ability of other public television stations nationwide to continue to offer the diverse array of content required to serve the needs of unserved and underserved audiences.

⁸⁵ The FCC, in its *Channel Sharing Report and Order*, established a floor for the visual quality of the program services in channel sharing agreements. See also 47 C.F.R. § 73.3700 providing that “channel sharing agreements shall contain a provision requiring that each channel sharing licensee shall retain spectrum usage rights adequate to ensure a sufficient amount of the shared channel capacity to allow it to provide at least one Standard Definition (SD) program stream at all times.”

In a market with 2+ public broadcasters, the net result of channel sharing between them is likely that program diversity is reduced



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Further, channel sharing by public television stations could not only constrict their capacity to continue or expand the diversity of content they present that serves our increasingly diverse nation, but it could also inhibit their ability to broadcast programs with significantly higher visual quality, e.g. 4K and/or 8K. The result could be a patchwork public television system marked by “gray areas” of service with some households being able to access public media in 4K or 8K and others not.⁸⁶

The emergence of a patchwork service, in turn, could be cited as an argument for reducing Federal funding for public broadcasting by those elected officials who represent States or Congressional districts marked by “gray areas” of service. Moreover, the disparate treatment of existing public television viewers who currently support their local public television stations could result in a falloff of their support, as well as that from state governments and local institutions.

⁸⁶ However, the possible loss of lines of service may be ameliorated by the quickening pace of current developments in compression technology.

To assess the efficacy of channel sharing, stations must value their current channel use against any potential new benefits

	Category	Impact	Rationale
Revenues	Membership revenue	Mixed	Membership may drop if members are discontented by lower broadcast quality or fewer channels; but opportunity exists to focus resources on better programming, raising revenue
	Underwriting revenue	Mixed	Access to viewers and repeats of program broadcasts may reduce, hurting underwriting; but better content may yield underwriting improvements
	Investment returns	Positive	If auction proceeds are used to invest in internal projects such as new shows, it could add additional revenue streams
	Endowment returns	Positive	If auction proceeds are invested in a non-profit endowment, the station could expect between 3-5% return per year as additional return
Costs	One-time channel sharing infrastructure set-up cost	Negative	Cost of setting up multicast channels, updating compression equipment and setting up fiber connection between facilities
	Broadcasting operations costs	Positive	Broadcasting cost will decrease significantly as they will be shared with the partner
	Back-office operations costs	Positive	Back office operations cost will only decline if the partner stations decide to merge some of their back-office operations i.e. HR, Legal, Fundraising
Mission	Programming Quality Improvement	Positive	Auction proceeds could be invested to improve the quality of programming
	Programming Quantity Loss	Negative	Channel sharing could result in a reduction in the number of programs distributed
	Viewer access	Mixed	If sharer has different coverage area from sharee, sharee could lose its current viewer reach; but in some situations the reverse would be true
	Digital	Positive	Ability to invest in future technology can be enhanced via appropriate spend of auction proceeds

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Finally, while the recent Los Angeles channel sharing project with KLCS and KJLA yielded a better understanding of some of the technical parameters of channel sharing, stations exploring a the possibility of a channel sharing arrangement must carefully consider the legal and business consequences of undertaking such an arrangement. Sharing a channel under the terms of this incentive auction is a permanent arrangement. And sharing a channel with a partner that has an unsustainable business model or incompatible technology intentions could threaten not only the operating arrangement, but also the continuation of both parties' services.

Developing a channel sharing arrangement between two unrelated entities will be complicated. As a threshold matter, a station's channel-sharing partner(s) must be from the same DMA. The selection of a channel sharing partner and the construction of channel sharing agreements will require substantial foresight, business management and legal counsel. Some of the issues that will need to be addressed include:

- How the agreement will be structured (and potentially amended in the future);
- Whether and in what circumstances the agreement can ever be terminated;
- Rights of each party in the event of business failure or sale of the other party, and related options and/or rights of first refusal to take over the whole channel;
- How auction proceeds and future transmission-related operating costs will be shared;
- Which channel will be retained and shared and which channel will be offered in the auction, and how that decision affects over-the-air coverage, must-carry and retransmission consent rights of the parties;

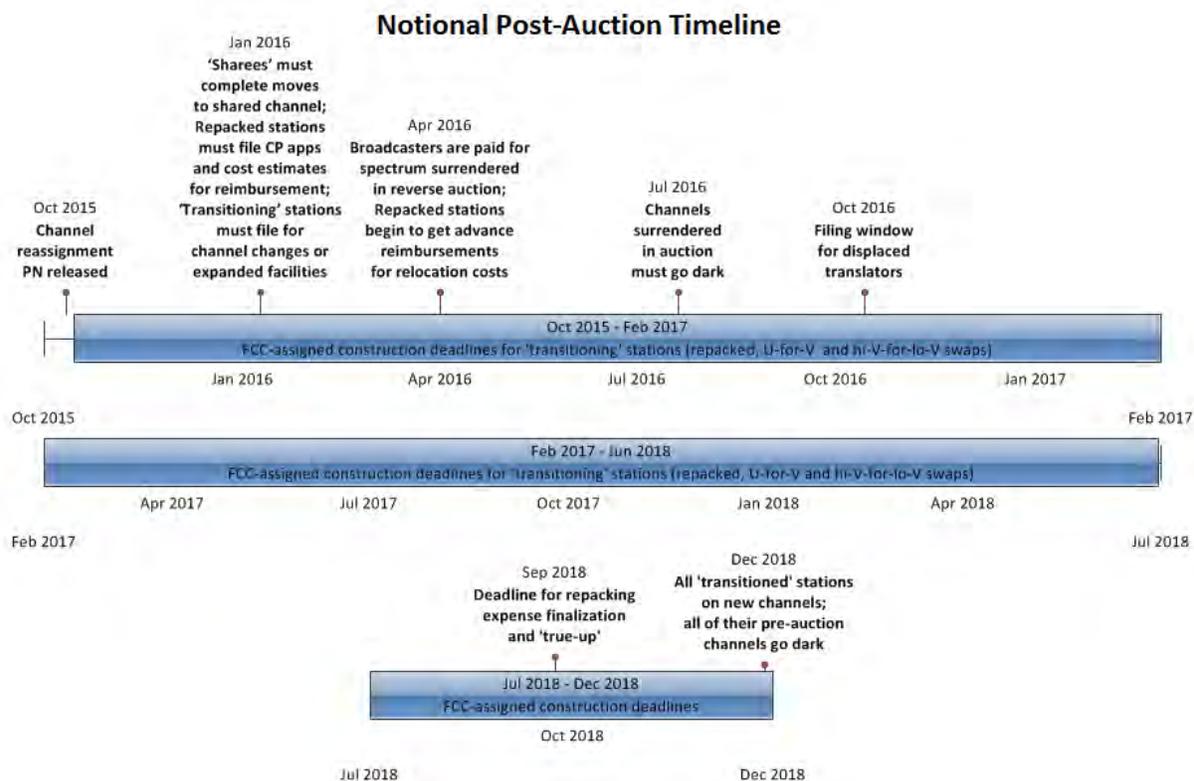
- How the bandwidth between the stations will be divided following the auction, and whether and how the bandwidth split will be dynamic and/or subject to future changes;
- How will future investments in the facilities be undertaken;
- How maintenance and repair of the transmission plant will be ensured;
- How day-to-day operating decisions will be made; and
- How and when the parties will decide whether and when to adopt new technical transmission standards.

It bears repeating that stations interested in channel sharing need to pay close attention to the pre-auction application deadline and be prepared to provide a copy of the executed channel sharing agreement to the FCC with their pre-auction application.

5.2.3.5 Option E: Move from High VHF to Low VHF. Under this option, a licensee would trade a 6 MHz channel in the upper part of the VHF band for a 6 MHz channel in the lower VHF band. Licensees contemplating this option would have to consider the advantages of the spectrum they would be surrendering in the upper part of the VHF band.

5.2.4 Transparency

While the FCC, as noted above, will protect the confidential information of all stations participating in the reverse auction, the stations themselves are under no obligation to withhold information about the mere fact of their participation in the spectrum incentive auction. In fact, it can be argued that public media stations have an *ethical* obligation to their communities to conduct their activities in a transparent and accountable manner, consistent with their *legal* obligations with respect to open records and open meetings. In many cases, stations would not exist were it not for the financial support of their communities. Stations should regularly and openly provide information to the public about their mission, activities, accomplishments, and decision-making processes. In the context of the spectrum incentive auction, the need for transparency may have to be balanced with the need for confidentiality with respect to certain business and legal decisions. However, because its ethical obligation to its community arises from the fact that they hold spectrum in trust for service to that community, the obligation for transparency is strongest where a public media station is considering entering a bid in the incentive auction that would terminate its service to its community.



5.3 Station Repacking Considerations

Many stations that remain on the air after the auction will be “repacked” – placed onto contiguous or near-contiguous channels at the lower end of the UHF band in order that a cluster of contiguous spectrum at the upper end of the UHF band can be repurposed for mobile use. Under the Spectrum Act, the FCC is obligated to make “all reasonable efforts” to preserve the coverage area and population served as of February 22, 2012, of any licensed full power or Class A station that remains on the air after the auction.⁸⁷

The FCC proposes an aggressive transition timeframe between the close of the reverse and forward auctions and the ultimate clearing of channels and commencement of post-auction

⁸⁷ Specifically, the FCC will protect: (1) new full power stations that were authorized (i.e., holding construction permits) as of February 22, 2012, but were constructed on licensed after that date; (2) full power facilities authorized in outstanding CPs issued to effectuate a channel substitution as of February 22, 2012, so long as the facilities are constructed and licensed prior to the Pre-Auction Licensing Deadline; (3) full power and Class A modified facilities that we authorized by CPs on or before April 5, 2013 (when the FCC imposed a freeze on certain applications), so long as such facilities are constructed and licensed prior to the Pre-Auction Licensing Deadline; and (4) Class A facilities authorized by CPs to implement the transition to digital operations, again so long as they are constructed and licensed prior to the Pre-Auction Licensing Deadline. The “Pre-Auction Licensing Deadline” will be announced by Public Notice at some point in the future. The FCC states that the deadline will be at least 90 days following the public notice.

service. At the end of the auction, the FCC will issue a *Channel Reassignment Public Notice* that will specify the specific channel assignments for TV stations that will continue to broadcast.

Stations whose channels have changed will have three months to plan and file applications for construction permits for the resulting changes to their facilities. Following the application deadline, stations will have *up to* thirty-six months to transition to their new channels. However, the actual deadline for any given station may be shorter – the FCC will assign the deadline for each station “tailored to its individual circumstances.” Stations will be permitted to seek extensions of time to construct their new facilities, but no station will be allowed to continue operating on its old, reallocated channel more than thirty-nine months following the end of the auction process.

5.3.1 Reimbursement of Relocation Costs

The Spectrum Act requires the FCC to “reimburse costs reasonably incurred” by broadcasters that are reassigned new channels as a result of the spectrum repack. The Act created a program called the TV Broadcaster Relocation Fund. The maximum amount that may be paid to all broadcasters under this program is \$1.75 billion. Under the statute, such funds must be disbursed to eligible broadcasters within three years of the completion of the reverse and forward auctions.

The FCC has stated that it intends to issue eligible stations an “initial allocation” of funds, in designated individual accounts in the United States Treasury, to cover “the majority” of their estimated costs. As mentioned above, noncommercial stations will receive up to 90 percent of estimated costs in advance, while commercial stations will receive up to 80 percent.⁸⁸

5.3.2 Eligibility

The FCC will reimburse costs reasonably incurred by stations that are reassigned to new channels in the repacking process, as well as MVPDs (such as cable systems) that have to make changes to continue to carry such stations. The FCC will NOT reimburse stations that are winning auction bidders (such as stations bidding to relocate to the VHF band) or stations that are not reassigned a new channel in the repacking process.

5.3.3 Process

No more than three months following the release of the *Channel Reassignment PN* (the same date as the deadline for construction permit applications), stations will be required to submit an estimate of their eligible costs on a cost form to be developed the Media Bureau, with reference to the Catalog of Eligible Expenses also to be issued by the Media Bureau.

The FCC delegated to the Media Bureau authority to prepare and issue a Catalog of Eligible Expenses, and to calculate the amount of the reimbursement allocations for each station. The FCC declared that it intends to reimburse only those costs that “are reasonable to provide

⁸⁸ See Section 2.8 *supra*.

facilities comparable to those that a broadcaster...had prior to the auction.” This will include both “hard” expenses (such as new equipment) and “soft” expenses (such as legal and engineering services).⁸⁹

The FCC expects stations to obtain the lowest cost equipment that most closely replaces their existing equipment. A station cannot seek reimbursement for new features that are not already present in the equipment that is being replaced. The FCC will also reimburse costs for interim facilities in certain cases where they are necessary to avoid prolonged periods off the air.

The FCC states that stations should reuse their own equipment to the extent possible, rather than obtaining new equipment paid for by the Relocation Fund. To the extent that stations seek reimbursement for new equipment, they must provide a justification as to why it is reasonable in the circumstances to purchase new equipment rather than modify current equipment. The FCC also “encourages” broadcasters to seek out previously used equipment no longer needed by other stations, and to make any equipment that is no longer needed available for use by other stations.

In preparing its estimate of eligible costs, stations may select the applicable cost estimates pre-determined by the Media Bureau in its Catalog, or provide, justify and document their own individualized estimates if they believe that the Catalog does not fully account for their specific circumstances. Stations will have to certify that they believe in good faith that they will reasonably incur all of these costs, will use all money received only for expenses eligible for reimbursement, will comply with all policies and procedures relating to the drawing down of funds, will maintain detailed records of costs actually incurred, and will file all required documentation of expenses as instructed by the Media Bureau.

The FCC’s Media Bureau will review the estimated cost forms and will issue stations an “initial allocation” of funds, in designated individual accounts in the United States Treasury, to cover “the majority” of a station’s estimated costs. As mentioned previously, for public television stations the initial allocation may be up to 90 percent of their estimated eligible costs. The funds will be available to be drawn upon as expenses are incurred.

Prior to the end of the three-year reimbursement period, stations will provide information regarding their actual and remaining estimated costs. Additional funds will be allocated as necessary, subject to the overall \$1.75 billion limit. The FCC’s states that it expects the \$1.75 billion fund will be sufficient to pay all eligible costs, but delegates to the Media Bureau authority to develop a prioritization scheme in the event there is a short-fall in the fund. If there is money left over in a station’s Treasury account once all expenses have been paid and/or three years after the auction concludes, that money will revert to the U.S. Treasury.

⁸⁹ Public television has worked with FCC staff to expand the Catalog of Eligible Expenses to ensure it is as comprehensive as possible, while recognizing that it cannot plan for all potential contingencies.

5.3.4 Likely Channel Relocation Issues

Stations that have to change channels will most likely face at least the following issues⁹⁰:

- New antenna and transmission line
- Possible need to modify buildings and electrical systems temporarily for second transmitter
- Installation of new transmitter
- Installation of new channel mask filter
- Removal of original antenna
- Removal of original transmission line
- Installation of new transmission line
- Installation of new antenna
- Conducting system proof tests
- Cut over to new channel
- Removal of original transmitter or convert to new channel as back up transmitter
- Grant-funded equipment storage, transportation, insurance, and/or disposal

Some of these needs may be aggravated by a desire to install facilities for the new channel before taking the existing channel out of service. Alternatively, the station will face a period of time off the air when it removes the existing station equipment and replaces it with the equipment for the new channel.

A station likely to be required to move can make some preparations before the incentive auction is commenced, including:

- Determine tower compliance and added loading capacity;
- Prepare a range of initial cost estimates for the possible channels to which they may be required to move, including transmitter, RF system, antenna and other related costs;
- Assemble a list of equipment and experts that may be needed, as well as the suppliers thereof;
- Develop a notional timeline and an implementation plan; and
- Line up commitments with suppliers and contractors such as tower crews.

⁹⁰ Booz & Company, Update on Broadcast Spectrum Auction and Repacking, presentation to CPB Board of Directors, December 9, 2013, at <http://www.cpb.org/aboutpb/spectrum/reports/CPB-spectrum-slides.pdf>, *See also* Jay Adrick Presentation to PBS Tech.Con, 3/26/14. Stations that do not have to change channels, but that share towers, have stacked antennas, and operate on a shared antenna and RF system may still have to change filter components, reduce power or suspend operation for limited periods of time.

5.4 Duty of Care: Questions for the Entire Public Media System

Here is an outline of higher-order issues the management and governing boards of individual public television stations, as well as various station membership organizations, and national public media organizations will need to consider.

- What can my organization do to help ensure that universal access/service is maintained?
- If “white areas” are created through the spectrum auction and repacking process, what will public media need to do to facilitate restoration of service in this new unserved area?
- What degree of transparency to the community that a station serves should there be with regard to possible participation of a local station in the spectrum incentive auction?
- How will the relinquishment of spectrum rights by some stations through the incentive auction affect the development and acquisition of shared programming as well as public media’s financial health and long term sustainability?
- Will the spectrum incentive auction affect the future of program distribution rights?
- How will the incentive auction and repacking process affect next-generation “must-carry” and “will-carry” rights?
- What can public media do to harmonize a number of other concerns that will be arising during the incentive auction and repacking process timeframe, including: revision of the Communications Act (possibly including a revision of the Public Broadcasting Act); the development of a new interconnection architecture; the development of and transition to new technical standards for television; and progress towards universal availability of broadband service.
- What, if any changes, should be made to the CPB Community Service Grant policy as a result of stations participating in the incentive auction?
- Will successful participation in the spectrum incentive auction impact PBS membership policies?
- How will public media address the disruption from entities that stand between stations and their audiences, including MVPDs, wireless carriers, as well as providers, distributors and operators of alternative platforms?
- How does public media leverage its high quality mass audience content, local presence and service, and superior transmission architecture of one to many?
- How does public media become a driver in the Internet universe?
- How does public media become even more intensely responsive to the audiences and communities it serves?

6 Glossary of Terms Used in this White Paper

600 MHz Band — an as-yet-undetermined amount of spectrum at the upper end of the current UHF television band (i.e., ranging up to 698 MHz), which the FCC intends to reallocate from television broadcasting to flexible uses for fixed and mobile wireless communications as a result of the spectrum incentive auction and repacking process.

700 MHz Band — consists of 108 megahertz of spectrum, ranging from 698 to 806 MHz, which the FCC reallocated from television broadcasting to fixed and mobile wireless communications as a result of the transition of terrestrial television broadcasting from analog to digital encoding (*see* “DTV transition”).

4K or 8K television — *see* UHDTV (ultra high definition television)

AM radio broadcasting — the process of radio broadcasting using amplitude modulation (AM), which was the first method of impressing sound on a radio signal and is still widely used today. In the US, AM radio stations broadcast on 10-kHz channels between 540 and 1610 kHz.

ATSC (Advanced Television Systems Committee)— an international, non-profit organization formed in 1982 to develop voluntary standards for advanced (and later, more specifically, digital) television. ATSC member organizations represent the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite and semiconductor industries.

ATSC technical standards — a set of technical standards developed by the Advanced Television Systems Committee for digital television transmission over terrestrial broadcasting, cable television, and satellite broadcasting networks. The FCC adopted the ATSC’s proposed standards for digital television, with some changes, in 1996. Those rules remain in force for digital television broadcasting today.

ATSC 3.0 — a future, third-generation set of technical standards for digital television, currently under development by the Advanced Television Systems Committee. When adopted and implemented, these future standards will accommodate ultra-high-definition picture displays, immersive audio, interactivity, multiscreen viewing, mobile devices and hybrid services, but they will not be “backward compatible” with the equipment used today by either broadcasters or viewers.

Broadband — telecommunications technologies that provide multiple channels of data over a single communications medium, typically using some form of frequency or wave division multiplexing. More recently, it has become a marketing term for any kind of relatively high-speed computer network or Internet access technology, providing for full two-way communications. Users can gain access to broadband services through a variety of two-way high-speed transmission technologies, including both wireline and wireless technologies.

Channel — **1.** a specific radio frequency, pair or band of frequencies, usually allocated by national spectrum management authorities and/or by international agreement for licensed or

unlicensed use exclusively in a specific type of communications service, such as terrestrial television broadcast, AM radio broadcast, private land mobile radio, direct-broadcast satellite, public safety communications, or cellular telephone. **2.** (sometimes called a **linear channel**) a full-time (usually 24/7) service of television programs in which the *broadcaster*, rather than the viewer, chooses what programs are to be broadcast and at what times they are broadcast. In contrast, video on demand services permit *viewers* to choose what to watch from a library of program content, when to watch it, and often whether to interrupt their viewing for a brief pause or for resumption of viewing much later or on a different device in another location.

Class A television stations — certain low-power television (LPTV) stations in the US, which were given greater protection in the reassignment of television stations to new channels in the DTV Transition, as a result of the Community Broadcasters Protection Act of 1999. A full-service television station could not displace a Class A LPTV station from its broadcast channel, except in rare cases. In contrast, traditional LPTV stations often found their frequencies assigned to full-service DTV operations, forcing them to relocate to another frequency. Under the Spectrum Act, Class A stations will be eligible to participate in the spectrum incentive auction and will be accorded greater protection in the repacking process accompanying the auction.

CMAS (Commercial Mobile Alert System) — a system to deliver emergency alerts through free, over-the-air television broadcast signals to mobile device users, who receive these alerts as 90-character text messages with a unique alert tone. CMAS is also known as Wireless Emergency Alerts (WEA).

DBS (Direct-broadcast satellite)—satellite television broadcasts intended for home reception, rather than, for example, satellite transmission of television program channels to the headends of cable television systems.

DTV (digital television) — the transmission of audio and video by digitally processed and multiplexed signal, in contrast to the totally analog and channel -separated signals used by analog television.

DTV Transition — the process, extending from 1990 to 2015, by which US terrestrial television broadcasters have converted their broadcast transmissions from analog to digital technologies and consumers have adopted new equipment for receiving and displaying those transmissions. The transition will be completed when all US terrestrial television broadcasters are required by law to cease analog transmissions.

Fixed wireless — the operation of wireless devices or systems to connect two fixed locations (e.g., building to building or tower to building) using a wireless link, such as a terrestrial microwave transmission, rather than copper wires or optical fiber, making it possible to connect with users in remote areas without needing to lay new cables. In rural areas where wired infrastructure is not yet available, fixed-wireless broadband has become a viable option for broadband Internet access. Fixed wireless devices usually derive electrical power from the public utility mains, unlike battery-powered mobile wireless or portable wireless user devices such as smartphones or tablets.

FM radio broadcasting — the process of radio broadcasting using frequency modulation (FM) to provide high-fidelity sound over broadcast radio. In the US, FM radio stations broadcast on 200-kHz channels in the VHF frequencies from 87.8 to 107.9 MHz, which lie between the “low VHF” and “high VHF” television broadcasting bands.

Hz (hertz), kHz (kilohertz), MHz (megahertz), GHz (gigahertz) — Radio frequencies are measured in units of hertz, or cycles per second. The term kHz refers to thousands of hertz, MHz to millions of hertz, and GHz to billions of hertz. The hertz unit of measurement is used to refer to a specific wave frequency, the width of a channel or band of spectrum, or a total quantity of non-contiguous spectrum, and sometimes as a name used to denote a specific frequency band, e.g., the “600 MHz band” or the “2.5 GHz band”.

IP (Internet Protocol) — the principal communications protocol for relaying data across network boundaries. Its routing function enables internetworking, and essentially establishes the Internet.

IP Transition — a short-hand expression for multiple technology transitions ongoing today in which networks that transmit communications services are changing from networks built for one specific purpose (e.g., telephone calls or television programs) to IP-based networks built for a variety of purposes (e.g., broadband, video, data, voice, etc.). Transitioning these networks often involves a change in the network equipment used to transmit signals, and a change in the language, known as “Internet Protocol” or “IP,” the equipment uses to communicate.

IPTV (Internet Protocol television) — a system through which television services are delivered using the Internet protocol suite over a packet-switched network such as a local area network or the Internet, instead of being delivered through traditional terrestrial, satellite signal, and cable television formats. Unlike downloaded media, IPTV offers the ability to stream the media in smaller batches, directly from the source. As a result, a client media player can begin playing the data (such as a movie) before the entire file has been transmitted. This is known as streaming media.

ISP (Internet service provider) — an organization that provides services for accessing, using, or participating in the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

LPTV (low-power television) station — broadcasts a full-time channel of television program service, at much lower power and to a much smaller area than does a full-power television station, usually providing a locally-oriented or specialized television service in the communities they serve. These communities may be in rural areas or may be individual communities within larger urban areas. *See also* Class A television stations.

LTE (Long-Term Evolution) — commonly marketed as **4G LTE**, a technical standard for wireless communication of high-speed data for mobile phones and data terminals. Using a different radio interface, together with core network improvements, it increases the capacity and speed of a network, relative to prior standards.

MF (medium frequency) — refers to radio frequencies (RF) in the range of 300 kHz to 3 MHz. Part of this band is the medium wave (MW) AM radio broadcast band.

Mobile television — television watched on a small handheld or mobile device, including both pay TV service delivered via mobile phone networks or and programming received free-to-air via terrestrial television stations. Regular broadcast standards or special mobile TV transmission formats can be used. In 2009, the ATSC-M/H "Mobile DTV" standard offered a mobile and handheld enhancement to the HDTV standard that improved handling of multipath interference while mobile, but broadcasters were never able to convince the smartphone and tablet makers and their wireless partners to include "Mobile DTV" tuners in their devices. Broadcasters' attention today is focused more on potential enhancements in the future standards known as ATSC 3.0 for transmitting broadcast signals to mobile and handheld devices.

Mobile telephone — (also known as a cellular phone or cell phone) a phone that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.

Mobile wireless broadband —also called **mobile broadband**, technologies include services from mobile phone service providers that allow a more mobile version of Internet access. Consumers can purchase a PC card, laptop card, or USB equipment to connect their PC or laptop to the Internet via cell phone towers. This type of connection would be stable in almost any area that could also receive a strong cell phone connection.

MVPD (multichannel video programming distributor) —a service provider that delivers video programming services, usually for a subscription fee (pay television). These operators include cable television (CATV) systems, direct-broadcast satellite (DBS) providers, and wireline video providers (including Verizon FiOS as well as AT&T U-verse) and competitive local exchange carriers (CLECs) using IPTV.

NTIA (National Telecommunications and Information Administration) —a division of the US Department of Commerce that manages and regulates federal government uses of radiofrequency spectrum

OTT (over-the-top) content — delivery of audio, video, and other media over the Internet without a cable television system operator being involved in the selection, control or distribution of the content, unlike purchase or rental of video or audio content from an Internet service provider (ISP), pay television video on demand or an IPTV video service. Unlike IPTV, in which content is delivered over a service provider's own infrastructure, OTT content is delivered over the public Internet. OTT refers to content that arrives from a third party, such as Hulu, myTV, or Netflix. Consumers can access OTT content through internet-connected devices such as desktop and laptop computers, gaming consoles, set-top boxes, smartphones, smart TVs and tablets.

Repacking — the process of reassigning incumbent licensees authorized to use channels in a band or bands of spectrum to use different channels, generally in a band or bands of reduced

size. In connection with the planned US spectrum incentive auction, the FCC intends to reassign to new channels many of the television broadcast stations that intend to continue broadcasting after the reallocation of spectrum to fixed and mobile wireless services.

Reserved spectrum — spectrum that the FCC has reserved exclusively for the use of noncommercial, educational (NCE) licensees, which must adhere to laws that prohibit the broadcasting of commercial and political advertisements. Only certain kinds of state and local government agencies, public and private educational institutions, and not-for-profit organizations may apply for and hold licenses to broadcast on these reserved channels.

RF (radiofrequency or radio frequencies) — the part of the natural spectrum of electromagnetic radiation lying between 3 kilohertz (kHz) and 300 gigahertz (GHz). Radio frequencies are grouped into bands and measured in units of hertz, or cycles per second.

Telco — A telephone company, telephone service provider, or telecommunications operator that provides telecommunications services such as telephony and data communications access. In the US, they are also called local exchange carriers. With the advent of mobile telephony, telephone companies now include wireless carriers or mobile network operators. Most telephone companies now also function as internet service providers (ISPs).

TV translator station — retransmits, at much lower power and to a much smaller geographic area, the signal of a full-power television station. It generally operates on a channel different than that of the main station it retransmits. Translator stations typically serve areas that cannot receive the signal of a free, over-the-air TV station, either because they are too far away from the full-power station or because of geography (such as uneven terrain or mountains) that blocks reception of that signal in an area closer to the full-power station. Many translator stations operate in mountainous or more remote areas of the country.

UHDTV (ultra high definition television, also known as Ultra HD television, UltraHD or UHD) — as defined by the Consumer Electronics Association, displays that have an aspect ratio of at least 16:9 and at least one digital input capable of carrying and presenting native video at a minimum resolution of 3840×2160 pixels. This includes both 4K UHD (progressive scan of 2,160 horizontal rows of pixels, or 2160p) and 8K UHD (4320p), which are two digital video formats defined and approved by the International Telecommunication Union (ITU). In Europe and Asia, where current technical standards for digital television can accommodate it, special events such as World Cup football matches have been broadcast in UHDTV formats, but in the US, UHDTV programming has been transmitted only over cable television systems.

UHF (ultra high frequency) — spectrum between 300 MHz and 3 GHz (*i.e.*, 3,000 MHz), used currently in the US for television broadcasting, cordless telephones, walkie-talkies, personal radio services, satellite communications, cellular telephones, GPB (Global Positioning System), amateur radio and many other applications

VHF (very high frequency) — spectrum between 30 MHz and 300 MHz, used currently in the US for television broadcasting, FM radio broadcasting, land mobile stations (emergency, business, private and military uses), air traffic control communications and air navigation

systems, long range data communication with radio modems, amateur radio, and marine communications

Wi-Fi —a wireless local area networking technology that allows an electronic device to exchange data or connect to the internet using 2.4 GHz UHF and 5 GHz SHF radio waves. Many devices, e.g., personal computers, video-game consoles, smartphones, some digital cameras, tablet computers and digital audio players can use Wi-Fi technology to connect to a network resource such as the Internet via a wireless network access point. Such an access point (or hotspot) has a range of about 65 feet indoors and a greater range outdoors.

WLAN (wireless local area network) — links two or more devices, using some wireless transmission method and usually providing a connection through an access point to the wider Internet.