

# THE BROADCAST TELEVISION SPECTRUM INCENTIVE AUCTION

## *Innovation in Policy to Ignite Innovation for Consumers and Business*

### FCC Staff Summary

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#### **INTRODUCTION: Spectrum as an Economic Engine**

In key areas, the United States leads the world in wireless infrastructure and innovation. However, our successes in building a first-class wireless industry have also created our greatest challenges; the skyrocketing usage of our wireless networks is dramatically increasing demands on both licensed and unlicensed spectrum. The mobile wireless landscape is undergoing a transformation as mobile broadband networks are emerging not only as the foundation for communications services in the 21<sup>st</sup> Century, but also as the infrastructure supporting economic growth and innovation in such wide-ranging areas as entertainment, health care, public safety, education, and social service. Like the railroads in the 19<sup>th</sup> Century, and the electrical grid in the 20<sup>th</sup> Century, our mobile broadband networks are primary economic engines for our country. Spectrum is a critical building block for these networks.

Given the important role that spectrum plays in the American broadband ecosystem and the American economy at large, our country faces a major challenge to ensure that we are making the best use of this resource. Meeting this challenge is essential to continuing U.S. leadership in technological innovation, growing our economy, and maintaining our global competitiveness.

In its 2010 National Broadband Plan, the Federal Communications Commission (“FCC”) emphasized the importance of wireless spectrum and proposed incentive auctions as one means to facilitate its economically beneficial reallocation. The plan describes an incentive auction as a voluntary, market-based means of repurposing spectrum by encouraging existing broadcast television licensees to voluntarily relinquish spectrum usage rights in exchange for a share of the proceeds from an auction of new licenses to use the repurposed spectrum. This innovative and unprecedented process brings market forces to bear on many of the most important decisions about spectrum reallocation (e.g., how much spectrum and in what markets should spectrum be reallocated).

Congress, in passing the Middle Class Tax Relief and Job Creation Act of 2012 (“Spectrum Act”) in early 2012, authorized the FCC to conduct incentive auctions, with the first auction to be of broadcast television spectrum. Congress further directed that certain net proceeds from the broadcast incentive auction are to be deposited in the Public Safety Trust Fund to fund a national first responder network, state and local

public safety grants, and public safety research, and the balance is to be used for deficit reduction.

In October 2012, the FCC launched a proceeding to hold the world's first incentive auction, implementing the Spectrum Act and acting on the vision first outlined in the National Broadband Plan. The broadcast television spectrum incentive auction will be the first incentive auction ever attempted. It will be a groundbreaking event for the broadcast television, mobile wireless, and technology sectors of the U.S. economy.

The incentive auction will present a significant financial opportunity for broadcasters who wish to relinquish spectrum rights, while also allowing other broadcasters to remain on the air and continue providing the public with local, free over-the-air television service. At the same time, the spectrum reclaimed through the auction will promote economic growth; enhance America's global competitiveness; increase the speed, capacity and ubiquity of mobile broadband service; and accelerate the smartphone and tablet-led mobile revolution, benefitting consumers and businesses throughout the country. The incentive auction proceeding is an important component of the Commission's unprecedented efforts to make additional licensed and unlicensed spectrum available for broadband. The FCC intends to conduct the broadcast incentive auction in 2014.

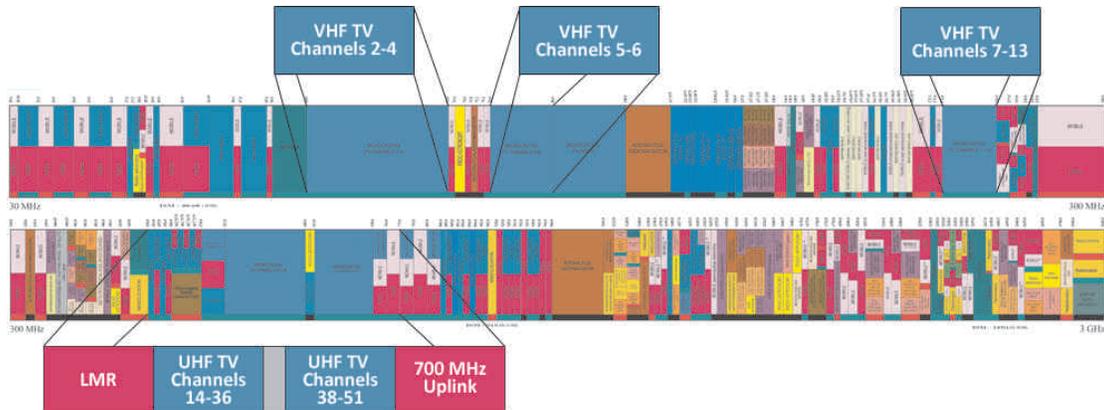
### Road to the Broadcast TV Spectrum Incentive Auction



For a more complete discussion, readers should review the [Notice of Proposed Rulemaking in Docket No. 12-268](#), FCC 12-118, released October 2, 2012. This document presents an overview of the [Notice](#). In the event of any inconsistency between this Summary and the [Notice](#), the terms of the [Notice](#) govern.

## THE CURRENT LANDSCAPE: Broadcast Television Spectrum Today

Broadcast television in the U.S. occupies 294 MHz of spectrum and is divided into five Very High Frequency (“VHF”) and Ultra High Frequency (“UHF”) bands.



There are currently 8,402 total television stations operating in the UHF and VHF bands, each of which has been assigned a 6 MHz block of spectrum covering a particular geographical area.

Television stations are designated as full power (“Full Power”), Class A low-power television (“Class A”), low-power television (“LPTV”), or TV translator (“Translator”) and, depending on their designations, are subject to differing treatment under the FCC’s rules. Most importantly for the purposes of the incentive auction, the Spectrum Act states that only Full Power and Class A commercial and noncommercial licensees are eligible to participate in the auction. The number of television stations in any television market varies significantly across the United States.

Nielsen Market (Rank)	Full Power	Low Power Services		
		Class A	LPTV	Translator
United States Total	1,782	465	1,980	4,175
New York, NY (1)	22	4	33	13
Los Angeles, CA (2)	27	5	32	87
Chicago, IL (3)	16	9	9	5
Philadelphia, PA (4)	21	5	9	4
Dallas-Ft. Worth, TX (5)	18	3	19	7
...				
Helena, MT (206)	2	0	14	6
Juneau, AK (207)	2	0	1	1
Alpena, MI (208)	2	2	2	4
North Platt, NE (209)	2	2	2	4
Glendive, MT (210)	1	0	14	1
* These represent the top 5 and bottom 5 ranked designated market areas by number of TV households. All categories include both commercial and noncommercial stations.				

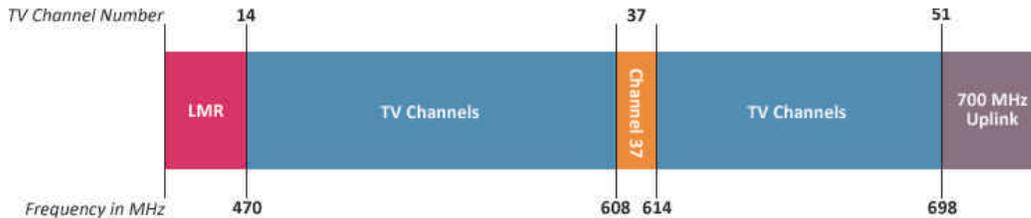
Although broadcast television continues to be a vital source of local news and information for most Americans, other offerings in the marketplace have diverted much of broadcast television’s over-the-air viewing audience over the years. For example, during the 2011-2012 television season, the Nielsen Company estimates that only 10.7 million television households nationwide, or approximately 10 percent of total U.S. television households, rely solely on over-the-air broadcast television service.

As the viewership for over-the-air broadcast television service has decreased over the years, the value of broadcast television spectrum for mobile broadband uses has conversely increased. The propagation characteristics of spectrum in the UHF bands (e.g., further reach and better penetration through buildings than higher frequencies and, therefore, the need for fewer transmitters to cover the same area) make spectrum in these bands especially well-suited for mobile broadband uses.

The particular suitability of UHF spectrum for mobile broadband is why the incentive auction process holds such promise. Through the incentive auction, a portion of the spectrum currently occupied by broadcast television licensees will be made available for mobile broadband. The FCC will use its unique authority to replace the broadcast licenses that it reclaims in the reverse auction with flexible use licenses for the cleared spectrum that may cover large geographic areas that were previously occupied by numerous individual stations. Without the FCC’s authority and coordination, the creation of such licenses suitable for deploying mobile broadband service nationwide would be impossible.

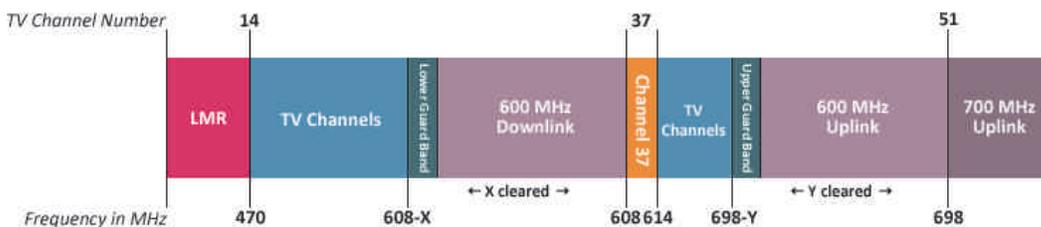
### 600 MHz Band Pre Incentive Auction

The following diagram depicts the 600 MHz UHF broadcast television spectrum as it is currently configured. Immediately below channel 14, spectrum is allocated to land mobile radio, or LMR. Above channel 51 is the 700 MHz band, which is currently used to provide mobile broadband service. Channel 37 is occupied by the Radio Astronomy Service and Wireless Medical Telemetry Systems.



### Proposed 600 MHz Band Post Incentive Auction

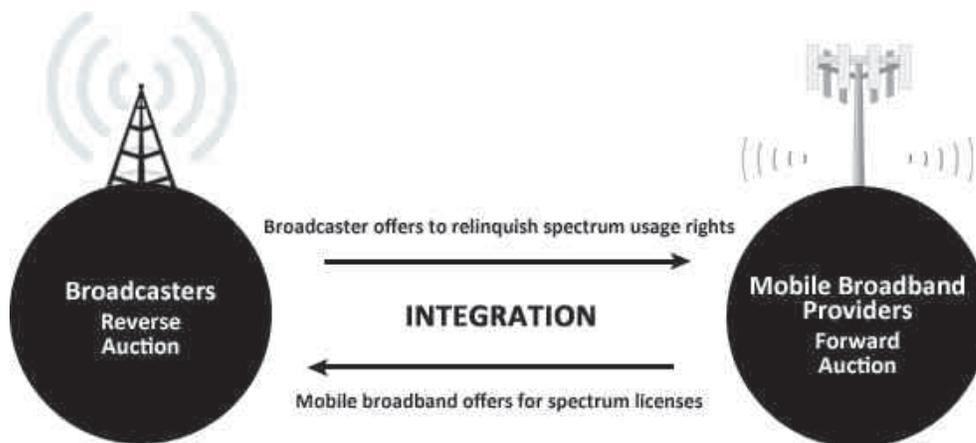
The next diagram depicts one of several proposals for the general configuration of the 600 MHz band after the incentive auction. In this configuration, the uplink band would begin at channel 51 and expand downward toward channel 37 and the downlink band would similarly begin at channel 36 and expand downward.



## PROPOSED AUCTION DESIGN: A Novel Design for a Novel Process

The broadcast television spectrum incentive auction will be the first such auction ever conducted and, accordingly, requires a new and unique design. The incentive auction itself will actually be comprised of two separate but interdependent auctions -- a reverse auction, which will determine the price at which broadcasters will voluntarily relinquish their spectrum usage rights, and a forward auction, which will determine the price companies are willing to pay for flexible use wireless licenses.

The lynchpin joining the reverse and the forward auctions is the “repacking” process. Repacking involves reorganizing and assigning channels to the remaining broadcast television stations in order to create contiguous blocks of cleared spectrum suitable for flexible use.



In order to be successful, each of the components must work together. Ultimately, the reverse auction requires information about how much bidders are willing to pay for spectrum licenses in the forward auction; and the forward auction requires information regarding what spectrum rights were tendered in the reverse auction, and at what price; and each of these depend on efficiently repacking the remaining broadcasters.

Finally, though the processes involved in conducting the incentive auction have complex aspects, the FCC has proposed an overall structure that would place the overwhelming share of the computational burden on the Commission itself. The actual implementation, while it will be thoroughly explained and illustrated in technical documents and rules, is designed to place the complex elements “under the hood,” with an aim to make participation as straight-forward and easy as possible from the bidder’s perspective.

**The Reverse Auction** – The reverse auction will determine the prices at which broadcasters will voluntarily relinquish their spectrum usage rights and the amount of spectrum available in each market in the forward auction. In economic terms, the reverse auction is the supply side of the market for repurposed broadcast television spectrum.

In short, the reverse auction will be a system by which broadcasters compete against one another by naming the prices at which they would be willing to give up some or all of their spectrum rights. Broadcasters would have at least four options: (1) do not participate in the auction and stay on the air on the same or another channel in the same band, as determined in the repacking process; (2) participate and bid to give up all rights to their channel and go off the air; (3) participate and bid to give up all rights to their channel but share a channel with another broadcaster after the auction; or (4) participate and bid to give up all rights to their channel but move from UHF to VHF and remain on the air. Each of these options involves different business and strategic tradeoffs and may appeal to different types of broadcasters. All options are designed to help make the auction accessible to the widest possible range of broadcaster participants (e.g., commercial stations with low revenues might prefer one option and public broadcasters another). The FCC is also considering additional options and has sought comment on other possibilities in the Notice.

The actual auction format could be structured in a number of different ways, including a single-round auction, with broadcasters submitting sealed bids (familiar to anyone who has gotten bids to paint a house or build an addition), or a multiple-round auction, in which broadcasters indicate whether they would accept progressively lower prices until final winners are determined. Regardless of the underlying mechanics, the FCC will make sure that the auction is simple for broadcasters.

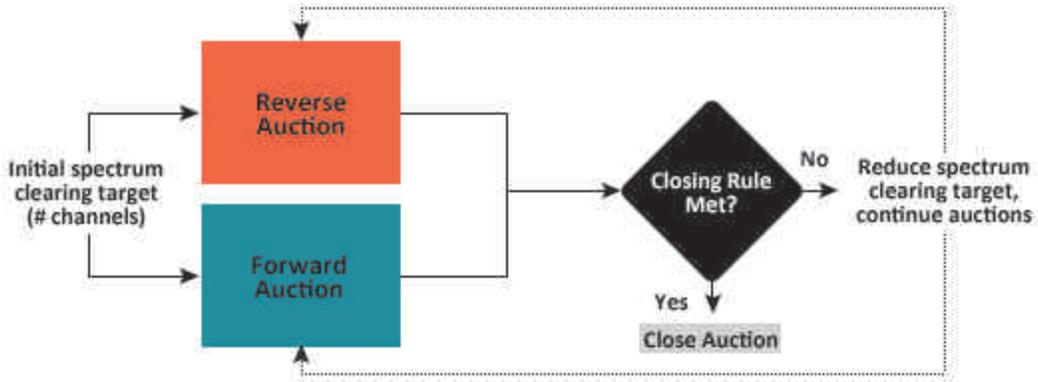
**The Forward Auction** – The forward auction will identify the prices that potential users of repurposed spectrum pay for new flexible-use licenses. In economic terms, the forward auction defines the demand side of the market. The FCC is familiar with forward auctions in the spectrum context, and has been conducting them for nearly two decades. However, the forward auction piece of the incentive auction will differ from the typical spectrum auction because, unlike in typical spectrum auctions, the number and locations of licenses available in the forward auction will depend upon the results of the reverse auction. The FCC is considering innovative new approaches to auction design to manage this interrelationship and integrate the different auction components.

The FCC is also considering another innovation in the forward auction, bidding for “generic” blocks, which can then be translated into specific licenses at the end of the auction. This practice is common in European spectrum auctions. Under this proposal, bidders would bid for a desired number of paired and/or unpaired blocks of spectrum in a geographic market. The FCC is considering proposals to ensure that spectrum blocks in the auction are fungible, therefore reducing bidder concern for obtaining specific

blocks. Bidding for generic blocks would be expected to speed up the forward auction, reducing the time and, therefore, the cost of bidder participation.

**Integration of Reverse and Forward Auction** – In the broadcast television spectrum incentive auction, the reverse and forward auctions must be integrated. In order to ensure that both auctions function in concert, the FCC is considering multiple options, including either (a) running the reverse and forward auctions concurrently in a series of stages; or (b) running the auctions sequentially. The concurrent approach would provide reverse and forward auction bidders with relevant information about supply and demand at certain stages in the process.

As part of the Notice, the FCC released for public comment an auction design option developed by its team of expert auction consultants, *Auctionomics* and *Power Auctions*. A simplified version of the overall decision chart for the auction model proposed by *Auctionomics/Power Auctions* would look like this:



For the reader who seeks additional details, the remainder of this document briefly describes three key areas of the incentive auction process: (1) the repacking mechanism used to determine the amount of spectrum that will be available in the reverse auction, (2) the proposed band plan used to determine the amount and organization of spectrum which will be available in the forward auction, and (3) the treatment of unlicensed spectrum as an important and integral part of the overall incentive auction.

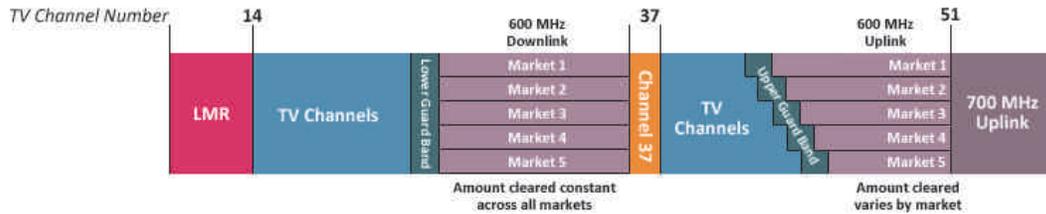
## **(1) Repacking of Broadcast Stations**

As part of the reverse auction, the FCC must repack those broadcast television licensees that do not participate in the reverse auction or whose bids are not accepted. Repacking involves reorganizing the broadcast television bands so that the television stations that remain on the air following the incentive auction occupy a smaller portion of the UHF band, thereby allowing the FCC to reconfigure a portion of the UHF band into contiguous blocks of spectrum suitable for flexible use. The Spectrum Act requires the FCC to make all reasonable efforts to preserve the “coverage area” and “population served” of television stations involved in the repacking. With respect to both coverage area and population served, the FCC is considering approaches that will provide repacked stations with the required protections.

## **(2) A Flexible Band Plan**

Designing a band plan in the incentive auction context is complicated by the uncertainties regarding the quantity and location of available spectrum. Expecting that the reverse auction may yield different amounts of spectrum in different geographic areas (for example, along the Canadian and/or Mexican border), the FCC proposes to adopt a band plan that accommodates varying amounts of available wireless spectrum in different markets rather than requiring that a uniform set of television channels be cleared nationwide. The FCC proposes keeping the downlink spectrum band consistent nationwide while allowing variations in the amount of uplink spectrum available in any market.

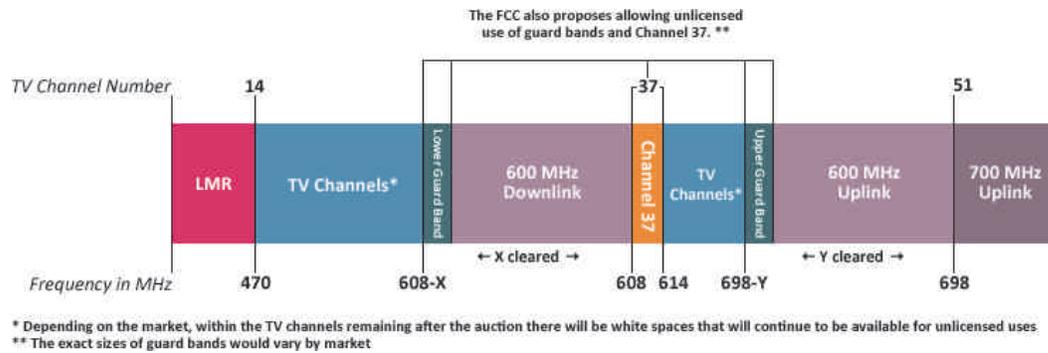
The following diagram provides more detail than the band plan diagram on page 5 above and demonstrates how the band plan could be structured to accommodate uplink variability by market.



### (3) Unlicensed Spectrum

The FCC has pioneered the use of unlicensed spectrum. Unlicensed spectrum is a designation that the FCC assigns to spectrum in which users can operate without an FCC license but must use certified radio equipment and must comply with certain technical requirements. Users of unlicensed devices may not cause harmful interference to radio services and must accept any interference they receive. A wide range of innovations owe their existences to the availability of unlicensed spectrum, including Wi-Fi, Bluetooth, radio-frequency identification (“RFID”), cordless telephones, wireless baby monitors and numerous other wireless electronic devices. The FCC recently developed provisions for unlicensed devices to operate on TV channels that are not used at any given locations, called “white spaces.” Interference is avoided by controlling access to the spectrum through a database of protected service areas. The white spaces in the TV spectrum offer an opportunity for a new generation of products such as Super Wi-Fi and wireless broadband services for communities, particularly in rural areas.

In the incentive auction proceeding, the FCC proposes to make a substantial amount of additional spectrum available for unlicensed uses. First, the Commission proposes to continue allowing the operation of white space devices in the broadcast television spectrum in the newly repacked band. In addition, the FCC proposes to make the guard bands in the new band plan available for unlicensed use. Under the plan discussed above, the two proposed guard bands would be 6 MHz wide and could be larger when accounting for the addition of “remainder spectrum” resulting from the uneven division of 6 MHz wide television channels into 5 MHz blocks. Furthermore, the FCC proposes allowing unlicensed devices to operate for the first time on Channel 37 by establishing appropriate protections for existing operations in the white space database.



Taken together, the FCC’s proposals will enable a substantial amount of spectrum use by unlicensed devices. A significant portion of this spectrum will be available on a nationwide basis, which is important because there currently is little or no white space in the TV bands in parts of many major markets. In making these proposals, the FCC seeks to promote greater innovation in new products and services, including increased access for wireless broadband services across the country.

## CONCLUSION

With the start of the broadcast incentive auction proceeding, the Commission has begun a process by which it will leverage the collective expertise of the leading authorities in telecommunications, computer science, engineering, economics and law, as well as members of the public at large, to craft the best possible incentive auction. The FCC will rely on the marketplace of ideas to ensure that the incentive auction is well-designed. Ultimately, as directed by Congress and envisioned in the 2010 FCC Broadband Plan, the auction itself will bring market forces to bear on repurposing spectrum to meet the nation’s growing demand for mobile broadband spectrum and may influence the way that spectrum is assigned around the world.