

# Update on Broadcast Spectrum Auctions and Repacking

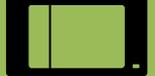
# Considering the government's planned broadcast spectrum recapture process and possible implications for public media

- Today, CPB and Booz & Company will cover:
  - Auction context and project background
  - Station decision-making
  - Auction impact drivers and expected results
  - If/then scenarios for considering possible responses
  - Next steps

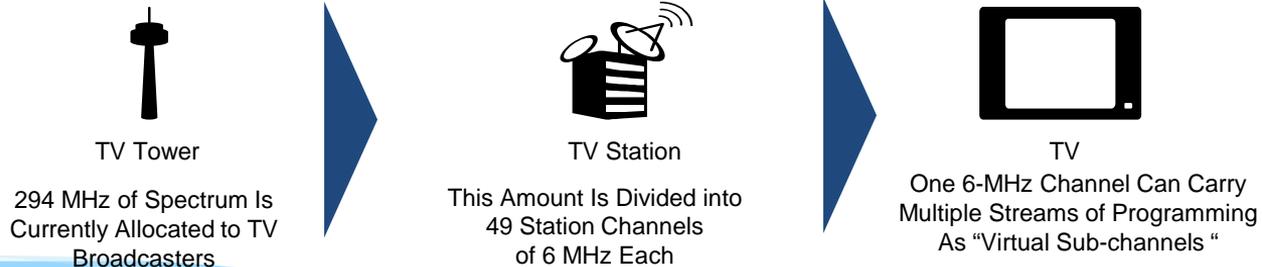
# The FCC allocates spectrum for a variety of uses in the U.S., with 49 channels allocated for TV broadcasting

**Wireless Spectrum**

← Increasing Range      Decreasing Range →

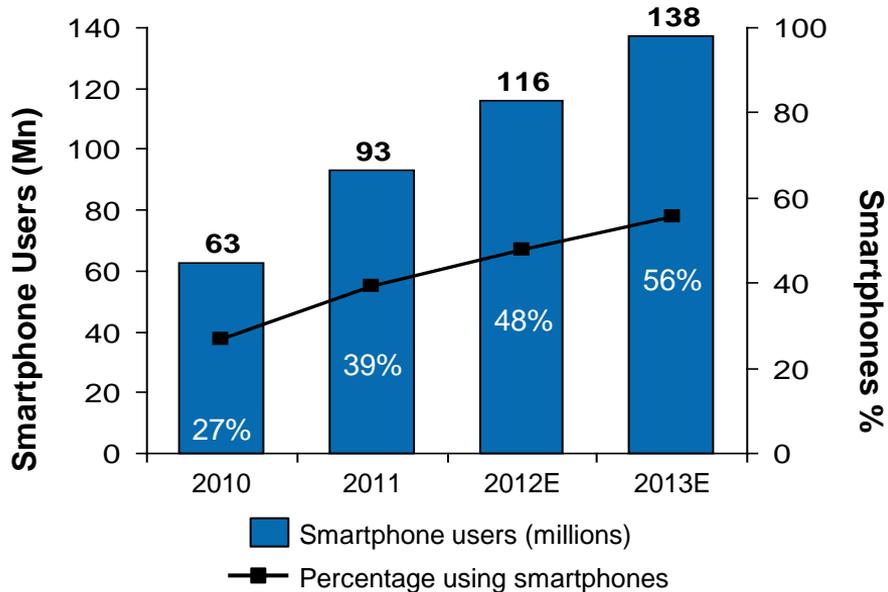
VHF	LF	MF	HF	VHF	UHF	SHF	EHF
Very Low Frequency	Low Frequency	Medium Frequency	High Frequency	Very High Frequency	Ultra High Frequency	Super High Frequency	Extremely High Frequency
3 KHz–30 KHz	30 KHz–300 KHz	300 KHz–3 MHz	3 MHz–30 MHz	30 MHz–300 MHz	300 MHz–3 GHz	3 GHz–30 GHz	30 GHz–300 GHz
 		  		  		 	
<ul style="list-style-type: none"> <li>Maritime navigation signals</li> <li>Navigational aids</li> </ul>		<ul style="list-style-type: none"> <li>AM radio</li> <li>Radiotelephone</li> <li>Aviation air to ground com.</li> </ul>		<ul style="list-style-type: none"> <li>VHF TV</li> <li>FM radio,</li> <li>Nav. aids</li> </ul>	<ul style="list-style-type: none"> <li>UHF television</li> <li>Cellular phone</li> <li>GPS</li> </ul>	<ul style="list-style-type: none"> <li>Space and satellite com.</li> <li>Radio astronomy</li> </ul>	

## TV Allocation Range (~ 55 MHz–692 MHz)

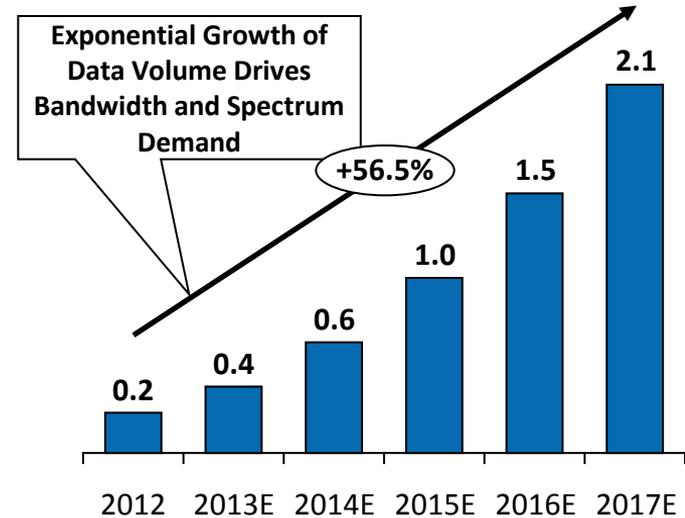


# In recent years demand for wireless broadband service has increased rapidly, driving up demand for spectrum in turn

## U.S. Smartphone Penetration



## Monthly Mobile Data Exabytes/Month North America, 2012–2017



# In light of these trends, the FCC has set a goal of reallocating 40% of current television spectrum to wireless

## Current State of Broadcast Television



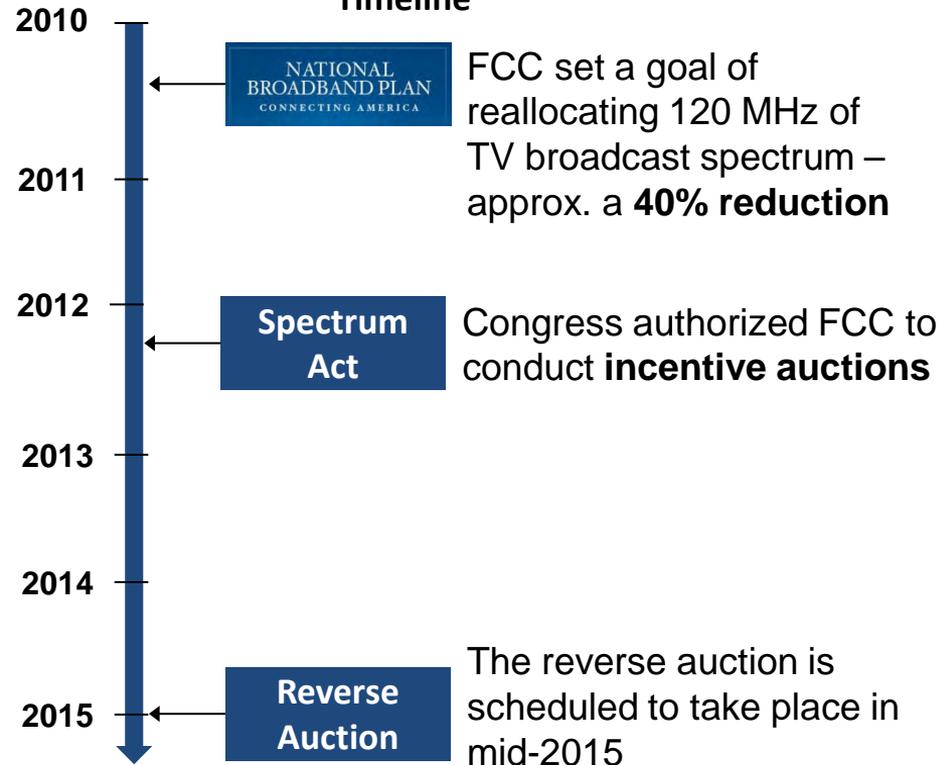
TV Station



TV Tower

- Current broadcast television is **highly localized**, providing for the needs of individual areas
- ~ **10%–20% of U.S. households** rely *only* on over-the-air (OTA) broadcast TV
- Reliance solely on over-the-air signal **varies significantly** by geography and demographics
- Cable and satellite providers rely on OTA signal to access content for redistribution

## Timeline

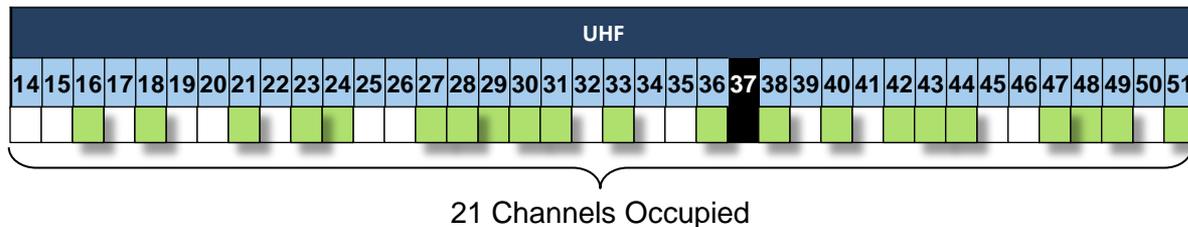


To achieve this, the FCC will move some stations to different channels so it can clear a contiguous block. In some areas, the FCC will offer auction incentives for stations to give up their spectrum.

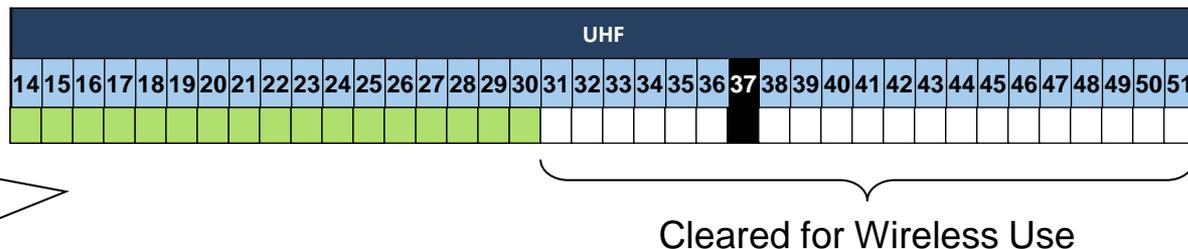
Pre-auction Channel Occupation in a Hypothetical Local Market

EXAMPLE

- Channel
- Station on channel
- Reserved special use
- Cleared spectrum

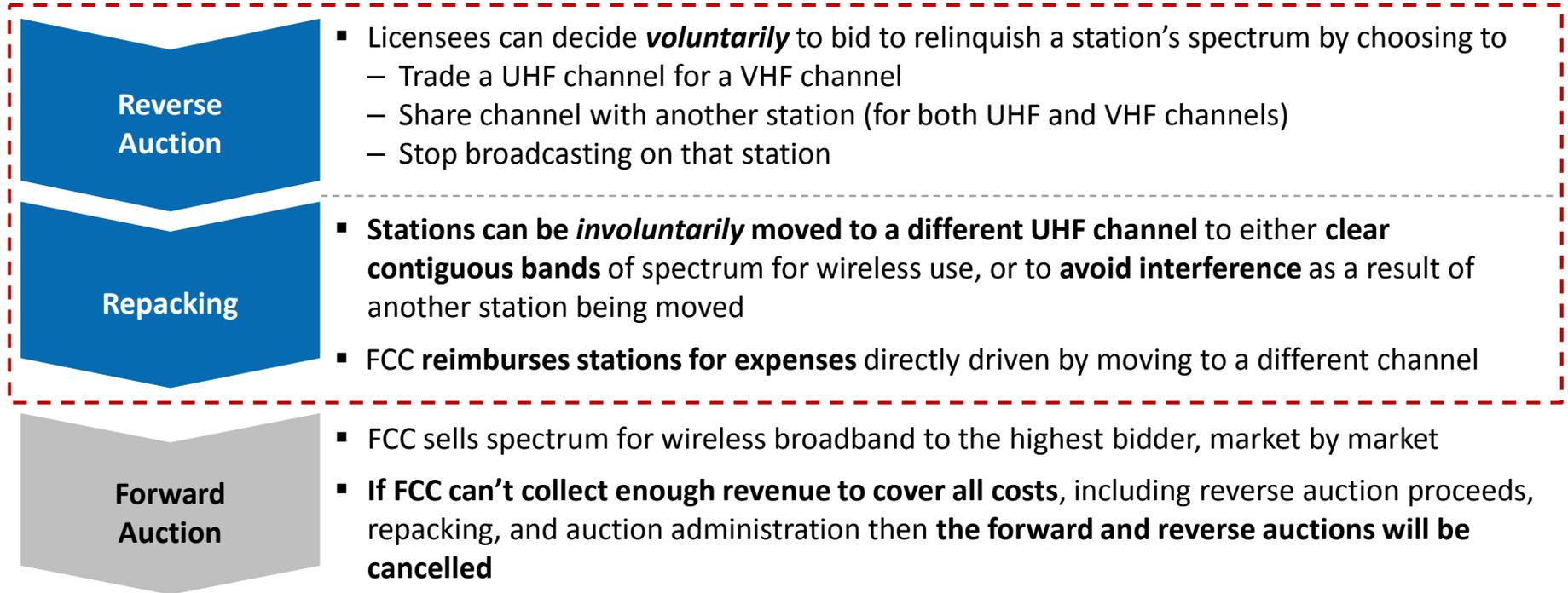


Post-auction Channel Occupation



To Fulfill Target Goal of Freeing Up 120 MHz, a Minimum 4 Channels Need to Give Up Their UHF Spectrum

# Proposed FCC auction and repacking process



 Areas impacting broadcasters

# CPB actions to date

- CPB has worked with APTS and PBS to file formal comments with the FCC, and CPB executives and staff have met with FCC commissioners and staff during:
  - 2009 - 2010 — preparation of National Broadband Plan
  - 2010 - 2012 — rulemaking on channel-sharing
  - 2012 - 2013 — rulemaking on incentive auctions and spectrum repacking

# Booz & Company provided policy research and an assessment of the implications for public broadcasting

August 12

Booz & Company Approach

October 21

## Initial Auction Assessment

## Data Gathering and Discovery

## Impact Assessment and Modeling

## Final Report

- Expected auction demand across markets
- Options for rationalizing channels by stations
- Potential programming and distribution implications
- Potential impacts to public broadcasting funding practices and mission

- Policy and market research
- Expert and stakeholder interviews/consultation
  - CPB, PBS, APTS, APT
  - Station executives
  - Additional industry experts
- Dynamic inquiry

- Auction impact assessment at station level
- Implications to system as a whole

- Consolidation and documentation of findings
- Presentation to senior stakeholders

# What we heard in talking with station executives

- Station executives' **understanding of the auction and repacking process varies widely**
- They **have no consistent way of gauging whether an auction will occur in their market**
- Some are **open to participation in the auction**
- Most **believe that continuing to offer multicast, over-the-air channels is critical** to their public service mission
  - Diversity of content for under-served audiences
  - Preferred or accessible distribution for under-served communities
- There is mixed concern about interference in the VHF band, and **some are considering a move to VHF**

Auction context and project background

## **Decision-making framework for stations**

Auction impact drivers and expected results

If/then scenarios for considering possible responses

Next steps

# Stations have four options where auctions occur

A

Do Not Bid

- Do not participate in any way in auction process

B

Give Up Spectrum and Shift to a Lower Band

- **Submit a bid to move to VHF channel (for UHF stations) or low VHF (for high VHF stations), giving up rights to current spectrum.** May be accepted by FCC in the case where offer price is low enough and insufficient space is available for simple repacking

C

Offer to Share Spectrum

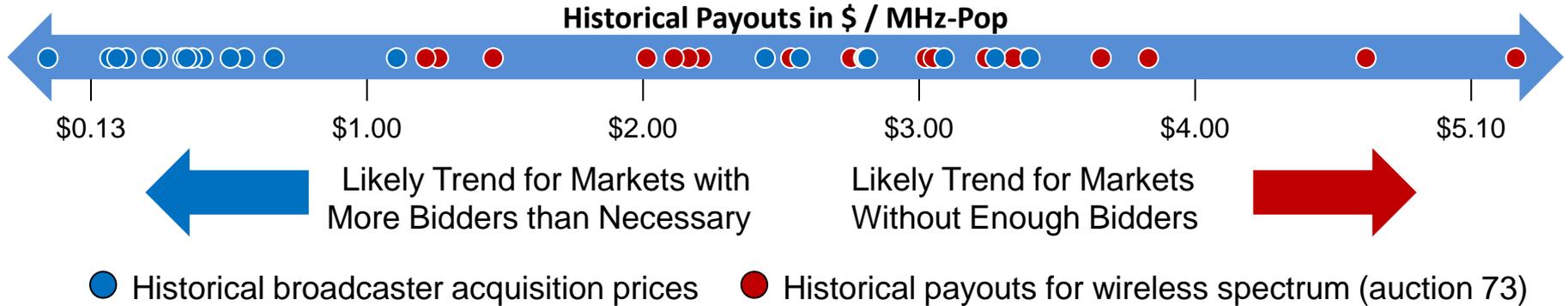
- **Create a contract with another station to share a channel.** Submit a bid to relinquish spectrum and participate in auction. With channel partner, develop plans to share spectrum, auction proceeds, and operating costs. Does not require station consolidation. Partner could be either a public or commercial broadcaster

D

Offer to Give Up Spectrum and Stop Broadcasting

- **Submit a bid to simply give up spectrum.** Could apply to a subset or all of 6-MHz channels. Licensee could move some programming to broadband distribution, arrange for cable distribution instead of broadband, or simply cease programming distribution

# Historical transactions suggest a wide range of prices is possible



## Market dynamics affecting pricing

- Level of market congestion
- Likely number of bidders and resulting competition
- Auction mechanics

# Option A: “Do not bid” implications

## Option Details

- Station does not submit a bid, does not receive any auction proceeds
- Stations in uncongested markets will not be able to participate, though they may attempt to
- Station may still be repacked, and is entitled to repacking reimbursement from FCC if so

+

### Pros

- Maintain **full multicast channel mix**
- Maintain option to leverage spectrum using future technology (e.g., ATSC version 2.0 on-demand capabilities, mobile broadcasting)
- Maintain option to **participate in any future (speculative) 600-MHz spectrum auction**
- Avoid costs associated with participation and unsuccessful bid

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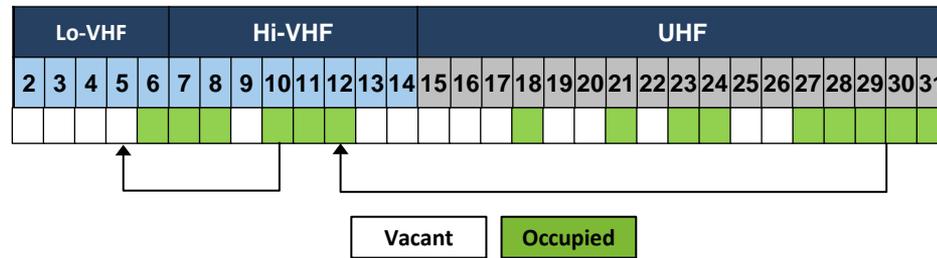
### Cons

- For struggling stations, the auction could **improve financial sustainability**
- If the reverse auction is not successful **Congress may instruct the FCC to free spectrum involuntarily with no compensation**
- Stations could arrange with service providers for participation costs to be contingent upon a successful bid

# Option B: “Migration to lower band” implications

## Option Details

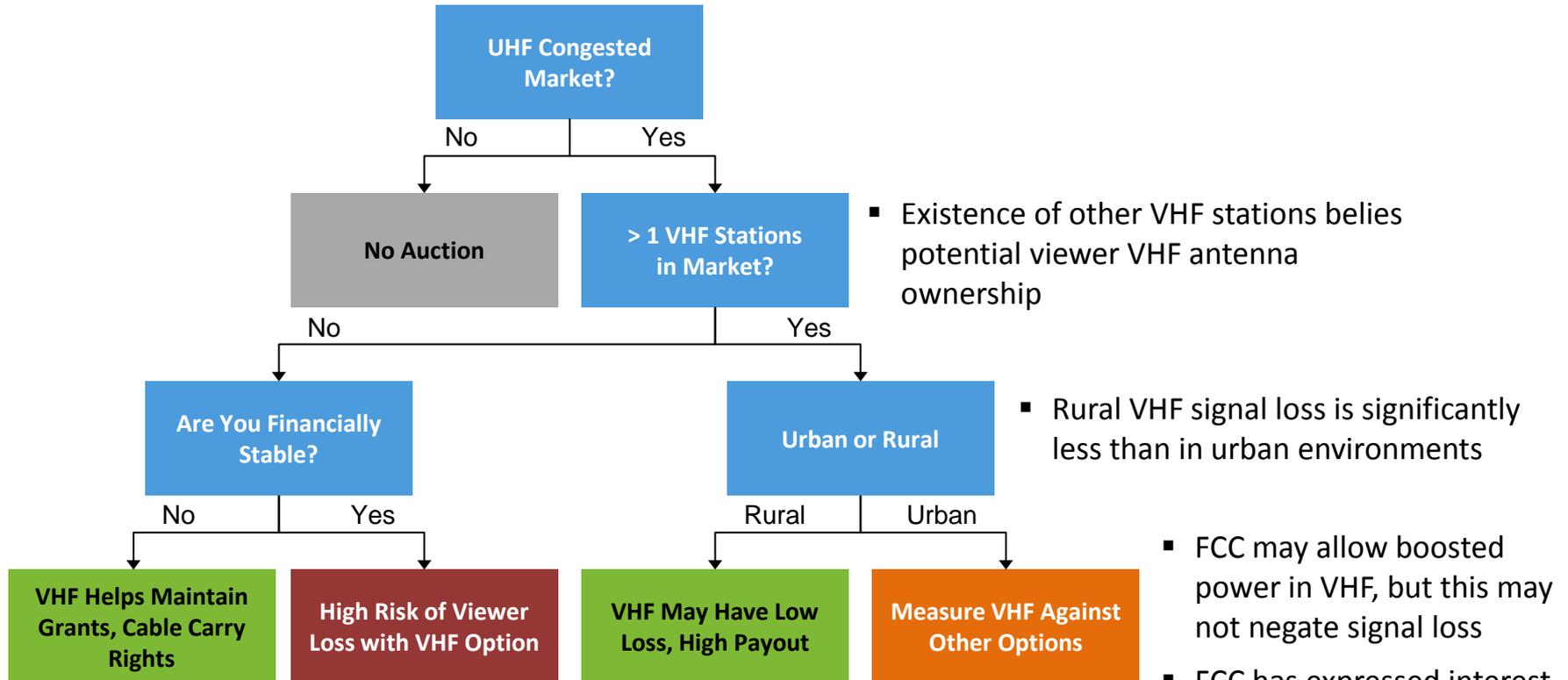
- Station bids to move from UHF to VHF or from high VHF to low VHF
- Station’s full broadcast channel is preserved



+ Pros
<ul style="list-style-type: none"> <li>Preservation of same must-carry and will-carry cable rights and broadcast channels</li> <li>60% average lower power consumption for VHF versus UHF</li> <li>Avoidance of channel interference from tightly-packed UHF post auction</li> </ul>

- Cons
<ul style="list-style-type: none"> <li>Higher environmental interference rate in VHF</li> <li>Potential drop-off in viewers due to loss of signal penetration</li> <li>Viewers may not own VHF antennas</li> <li>Potential loss of access to mobile distribution</li> <li>Complex transition costs and operations</li> </ul>

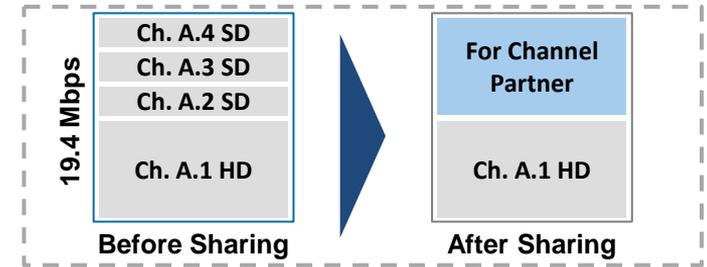
# UHF move to VHF: Decision tree



# Option C: “Channel sharing” implications

## Option Details

- Station bids to share with another station in the same market
- Station must reduce either the number of multicasting channels or the visual quality of the programming (or both)



## Pros

- Potential reduction in operating expenses if partner has comparable transmission cost
- No fear of losing viewers due signal penetration or antenna type
- May access more customers if moving to new antenna with higher output power



## Cons

- Likely reduce # of channels broadcast and # carried on cable; membership revenue loss may result
- Potential loss of coverage area if moving to a new tower location or antenna height
- May need to reduce image quality due to compression
- If multicasting with partner with much higher transmission cost, operating expenses may go up

# Three alternatives for channel sharing

## Public Station Option



Pros



Cons

### Share with Commercial Station

- **Many potential stations** to share
- Greater diversity of stations– **more negotiation flexibility**
- Public stations likely own tower

- Concerns if partner goes out of business
- **Savings limited** to broadcasting ops.
- Portion of **auction proceeds exits public media**

### Loose Collaboration with Public Broadcaster

- **Auction proceeds stay public media**
- Option to increase degree of collaboration in the future with no need for near-term commitment

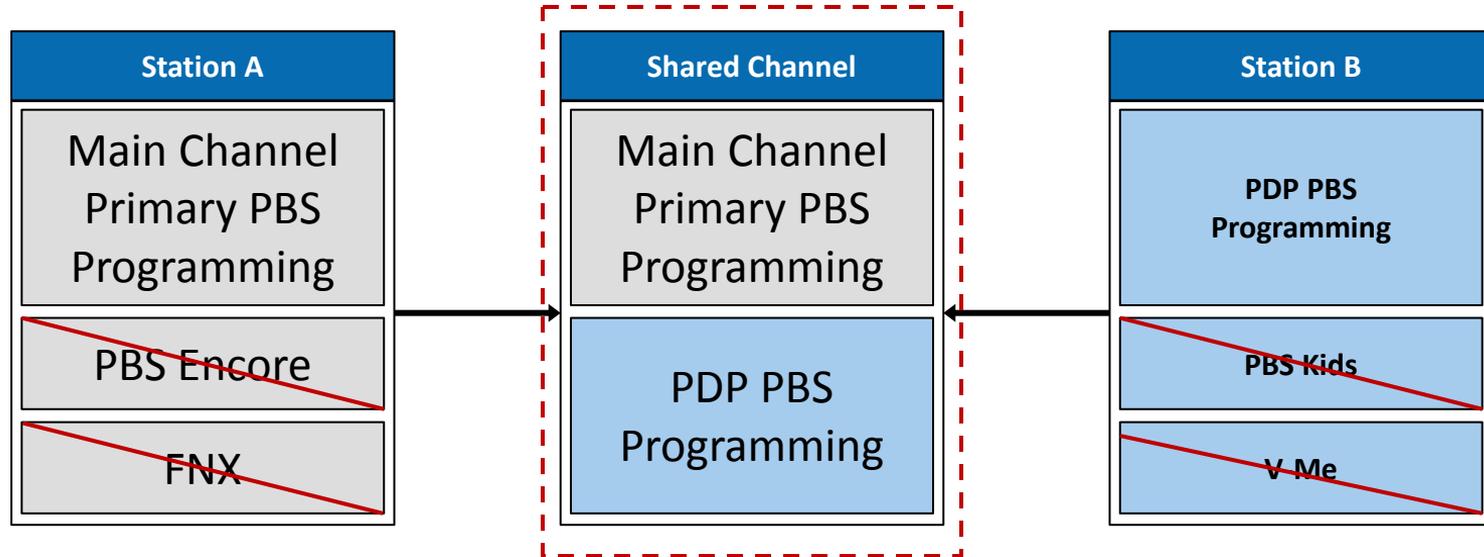
- **Few opportunities** for most broadcasters
- Sharing with nearest public broadcaster **may cut off viewers** in original area

### Close Collaboration with Public Broadcaster

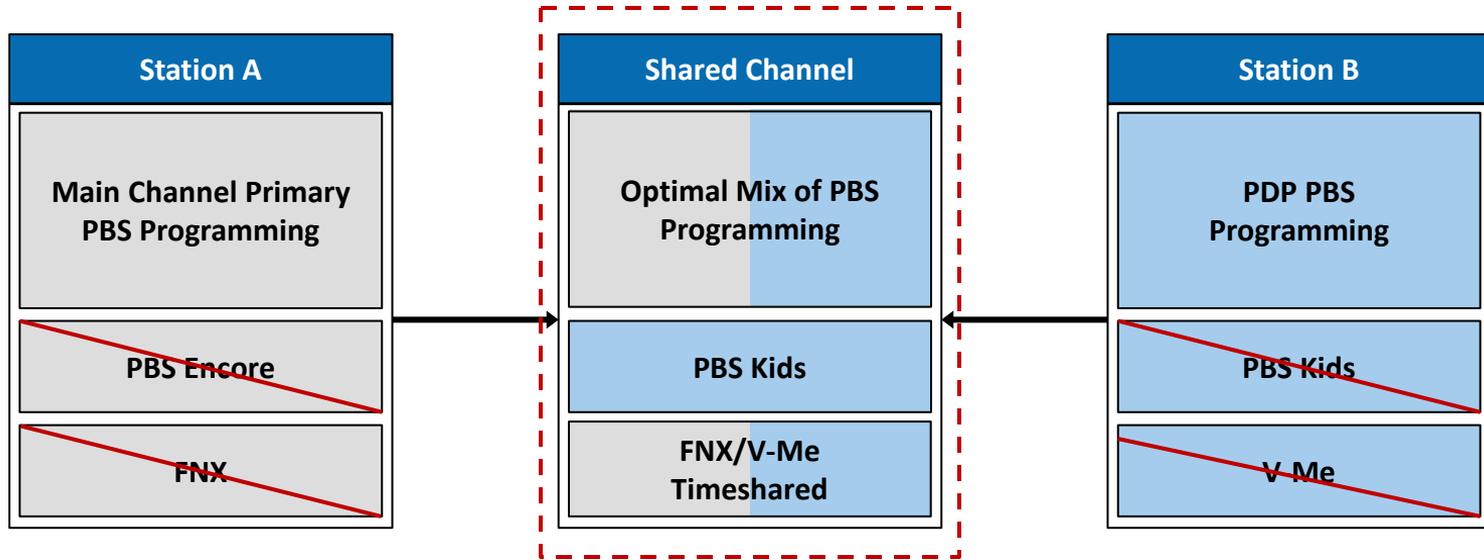
- **Maximizes synergies**
- Maximizes impact of auction proceed investment in public media
- Minimizes programming diversity loss

- May be **difficult to work out details** of agreement for stations with misaligned styles or missions
- **Lack of incentive** to start the discussion

# Loose collaboration may result in content diversity loss

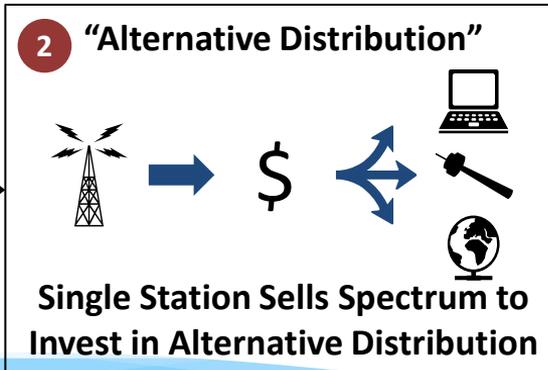
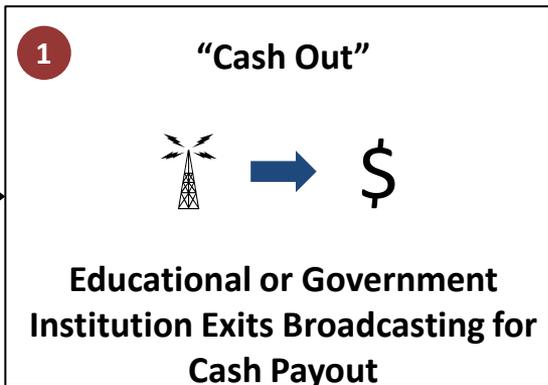


# By working together closely , public broadcasters can reduce content diversity loss



# Option D: “Stop broadcasting” implications (1/2)

Full Channel  
Exit Situation



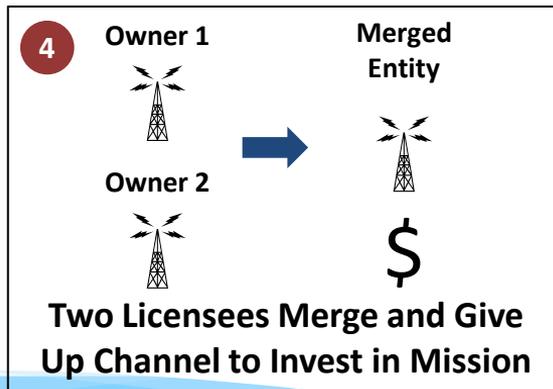
- **Adherence to mission:** May fail in educational mission to students and audiences or provide service statewide
- **Meaningful payout:** Auction payout may be a “drop in the bucket” compared to state or university operating budgets
- **Finances:** Ceasing broadcasting will cut off **all CPB funding**. Other revenue also reduced
- **Auction proceeds:** Returns provide insufficient ongoing operating cost support
- **“White Areas”:** Viewers, esp. in low-income or rural areas, may rely entirely on broadcast; ceasing broadcasting may shut viewers off

# Option D: “Stop broadcasting” implications (2/2)

“Multi-station”



“Full Merge”



- **Cable carry:** Signal loss to cable heads means associated cable viewers will be lost
- **“White Areas”:** Populations may lose access to public television entirely, but likely not entire metropolitan areas
- **Investment value:** Stations must trade off investment return against risk of some viewers losing access to signal or some programs
- **Same as above**
- **Finances:** Operating savings higher than if two licensees were to share channels
- **Mission:** Keeps proceeds in public broadcasting if weaker licensee would otherwise exit market

Auction context and project background

Decision-making framework for stations

## **Auction impact drivers and expected results**

If/then scenarios for considering possible responses

Next steps

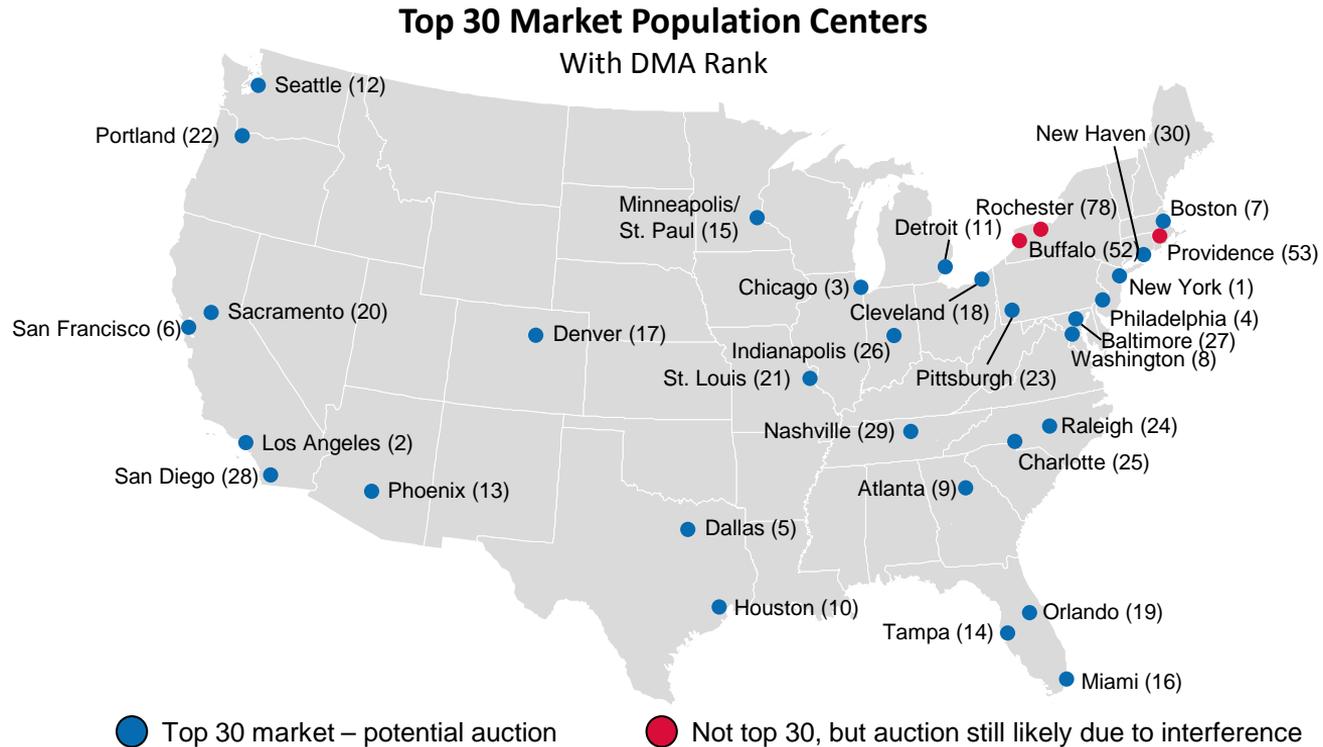
# Auction impact drivers and expected results

- In total, there are 355 full-power public television stations nationwide
- If the FCC pursues an **ambitious 120-MHz clearing scenario, 110-130 stations will have to move to different channels in the repacking**
- **A reverse auction will occur in “congested markets”** and possibly border situations
  - Analysis indicates **from 25 to 55 markets will experience auctions**, in which
  - **55 to 85 public television stations might be eligible** to participate
- In the most ambitious spectrum-clearing scenario, as many as
  - **200 to 250 public broadcasting translators** (used for remote or hard-to-reach rural areas) **may have to change channels** (with costs not reimbursed)
  - **Up to 200 more translators may have to cease broadcasting**

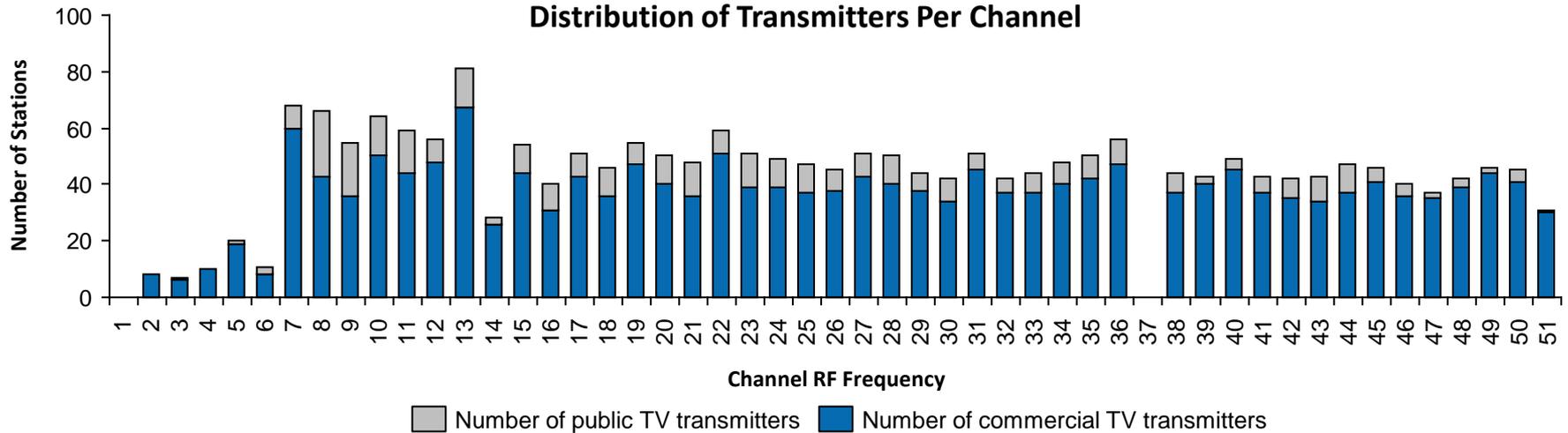
# Auctions will occur in “congested markets”, driven by several factors which will result in large variability in auction size

Drivers	Description
<b>Population Density</b>	<ul style="list-style-type: none"><li>▪ High correlation between population density, auction and stations in a market – <b>top 30 markets are likeliest to have an auction</b></li></ul>
<b>Overlap from Other Markets</b>	<ul style="list-style-type: none"><li>▪ Congestion can also be caused by bordering states or towns</li><li>▪ Example: Congestion in Philadelphia that results from Scranton</li></ul>
<b>Spectrum Use Border Agreements</b>	<ul style="list-style-type: none"><li>▪ Spectrum agreements with Canada and Mexico restrict the use of frequencies, sometimes leaving little for U.S. broadcasters</li></ul>
<b>Technology Concerns</b>	<ul style="list-style-type: none"><li>▪ <b>Near channel interference:</b> may prevent certain stations from being repacked, increasing the number to be vacated in a market</li><li>▪ <b>T band restrictions:</b> some metropolitan areas restrict use of certain channels in the “T Band” (channels 14–20) for emergency use, increasing the number of stations which would need to exit</li></ul>

# Larger markets may experience an auction, though opinions differ on auction size by market



# We estimate 800–850 commercial and 110–130 public TV stations may be repacked in a 120 MHz clearing scenario



Target Clearing Area	Estimated Commercial Transmitters Repacked	Estimated Public Transmitters Repacked
120 MHz (20 channels)	800–850	110–130
84 MHz (14 channels)	550–600	70–80
60 MHz (10 channels)	375–425	50–60

# Average repacking cost per transmitter estimated at \$1.4m to \$2.6m – possibility that the FCC’s budget will be insufficient

## Total Repacking Costs

By Cost Estimate and Repacking Scenario, Consistent Repacking Scenarios

Clearing Scenario	Number of Impacted Transmitters	Low Repacking Cost	High Repacking Cost	Total Repacking Public Television
120 MHz Consistent Clearing	910–980	\$1,300Mn	\$2,500Mn	\$160Mn–\$340Mn
84 MHz Consistent Clearing	620–680	\$890Mn	\$1,760Mn	\$100Mn–\$210Mn
60 MHz Consistent Clearing	425–485	\$610Mn	\$1,260Mn	\$75Mn–\$155Mn

Does Not Include “Write-down” of Hardware Not Yet Depreciated

<b>Total FCC Allocated Repacking Budget</b>	\$1,750Mn
<b>- Repacking Budget Allocated to Move Channel 37 users</b>	\$300Mn
<b>= Net Reimbursement Proceeds Available to Stations</b>	\$1,450Mn
<b>Maximum Estimated Potential shortfall</b>	<b>\$1,050Mn</b>

 Above FCC allocation

# Repacking process may have broad impact on TV translators, cutting off access for some rural populations

- **Congress did not authorize the FCC to protect translators** in spectrum repacking
- Up to 250 translators that carry public broadcasting on high UHF channels may be forced to change channels as part of the repacking process
  - **They would receive no compensation** to pay for the switch
  - **Total unreimbursed cost systemwide of \$3Mn–\$4Mn**
- **Up to 200 translators** whose signal overlaps with auction markets may lose all broadcast rights, introducing rural “white areas”
- Utah, New Mexico, Oregon, Wyoming, Idaho, Colorado, and North Carolina are all highly reliant on translators to get over-the-air public television to rural populations

Auction context and project background

Decision-making framework for stations

Auction impact drivers and expected results

**If/then scenarios for considering possible responses**

Next steps

# Potential scenarios for consideration

1. **“Empty Zones” in some Cities**
  2. **“Empty Zones” in Rural Areas**
  3. **Many Licensees Have Less Bandwidth to Program**
  4. **Auction “Winners” and Repacking “Losers” with Uneven Distribution of Benefits and Costs**
  5. **Repacking Underfunded**
- 
- Reduced nationwide access
  - Reduced programming diversity
  - Major drop in membership and revenue
  - Reduced content provider funding, especially PBS
  - Damaged brand
  - Potentially lower Congressional funding
  - Increasing pressure on public broadcasting and more stations go under over time
  - A few stations in large markets establish major endowments and benefit in the long-term
  - Capital campaigns for repacking fatigue viewers; some stations cannot afford repacking costs

# Public stations considering auction participation must assess impacts on revenue, cost, and service, tempered by feasibility

## Feasibility drivers

- Will an auction occur in a market?
- Are there stations to consolidate with?
- Is there room to move in UHF or VHF?
- Is there room to channel share in UHF/VHF?

## Revenue drivers

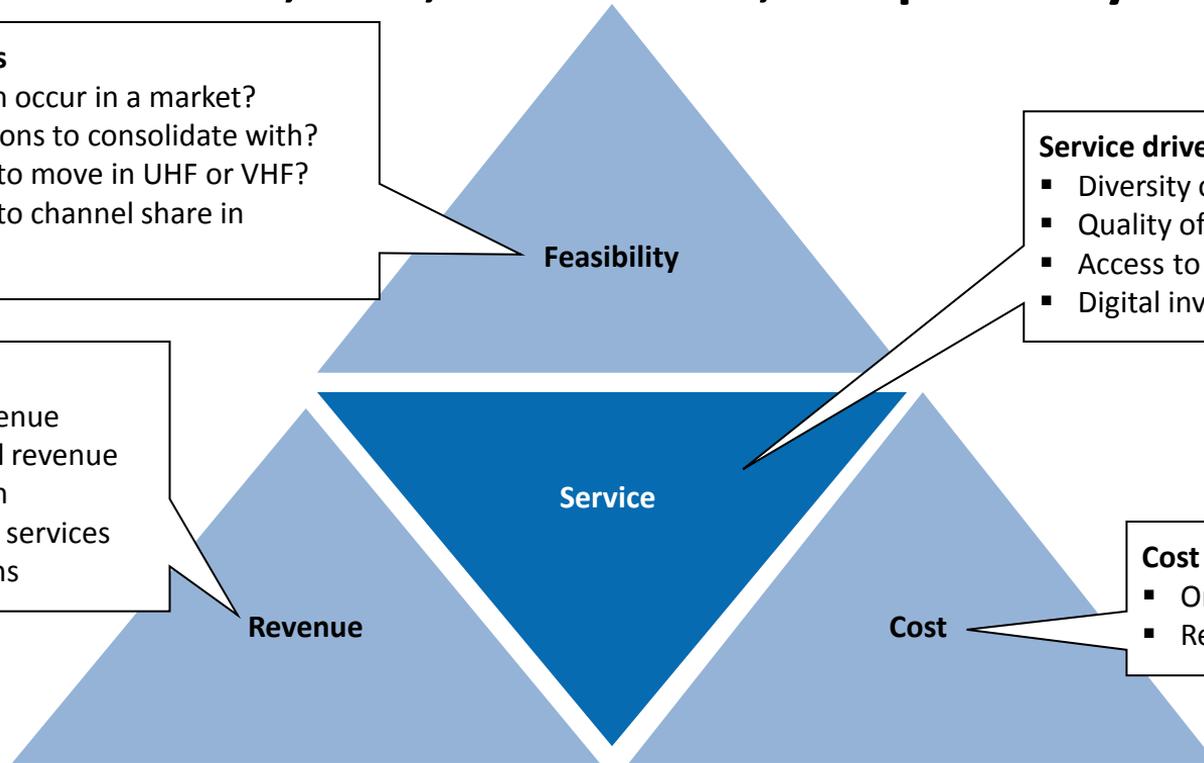
- Governmental revenue
- Non-governmental revenue
- Expected return on investment in new services
- Endowment returns

## Service drivers

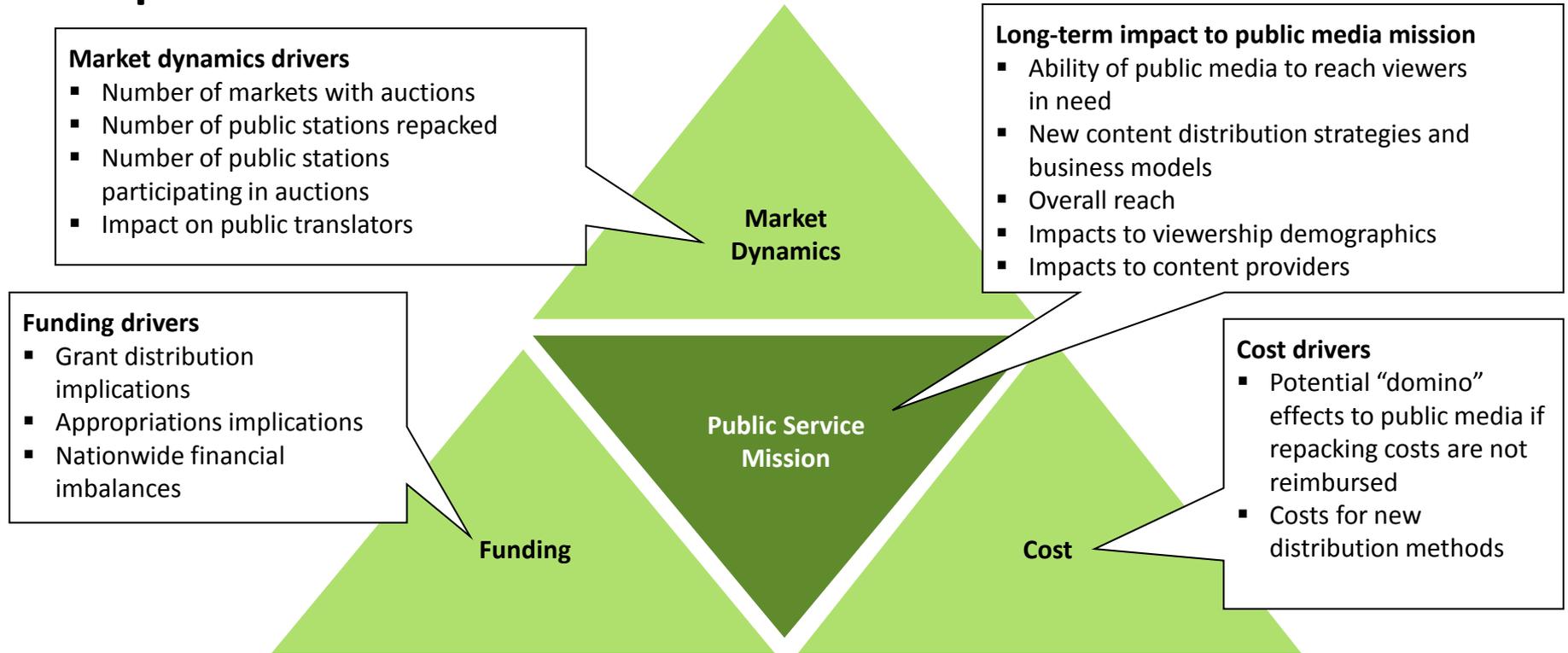
- Diversity of content
- Quality of content
- Access to viewers/segments
- Digital investment

## Cost drivers

- One-time costs
- Recurring costs



# CPB must also consider implications of the recapture process for public media as a whole



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