



Planning for TV Spectrum Repacking and the Transition to ATSC 3.0

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Featuring
GatesAir's



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Planning for TV Spectrum Repacking and the Transition to ATSC 3.0

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BIGGER PICTURE and at the
CENTER OF IT ALL

Joe Seccia
GatesAir

FCC Auction Status Dashboard

Incentive Auction Dashboard - Assignment Phase

✓ Bidding in the incentive auction has concluded.

Clearing Target ▶ 84 MHz

Licensed Spectrum ▶ 70 MHz

Final Stage Rule

1 | First Component ✓

Average Price

\$1.25

Target



2 | Second Component ✓

Net Proceeds

\$12,011,676,822

Target



Final Stage Rule ✓

Met

As of Clock Phase

Reverse Auction

Current Round ▶ Bidding concluded

Clearing Cost as of Stage 4 ▶ \$10,054,676,822

\$10 B

Forward Auction

Current Round ▶ Bidding Concluded

Auction Proceeds after Assignment Phase ▶ \$19,768,437,378

\$20 B

Will Stations Not Changing Channels Be Impacted?

- **Possibly, if stations....**

- Share a Tower
- Have stacked tower top antennas
- Operate on a shared antenna and transmission line

...with a station that is forced to change channel

- **FM stations on a shared tower with TV**

- **Additional issues**

- **Who will pay the cost for accommodating these stations?**
- **Potential increased interference from neighboring stations (0.5% of population per other station)**

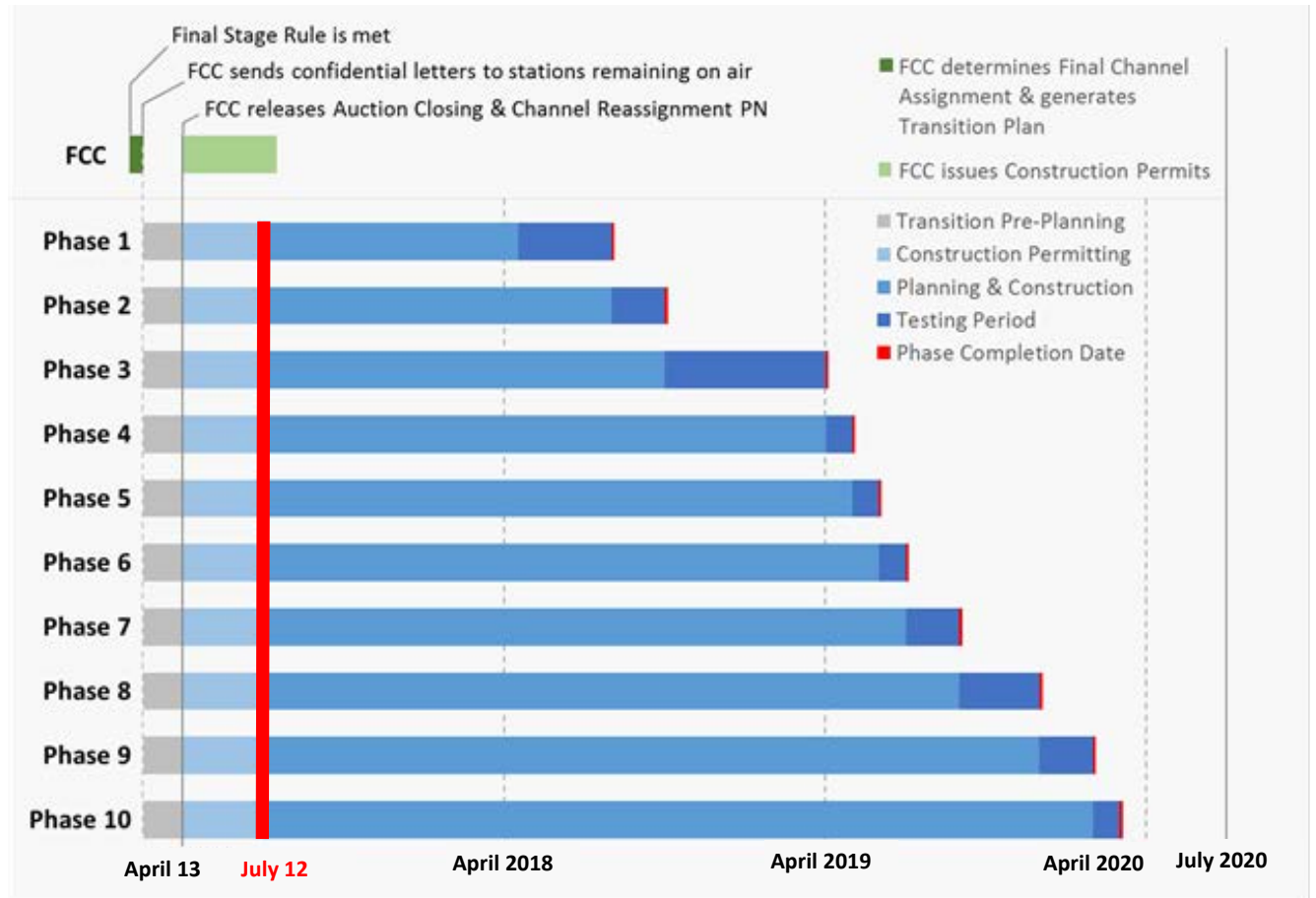




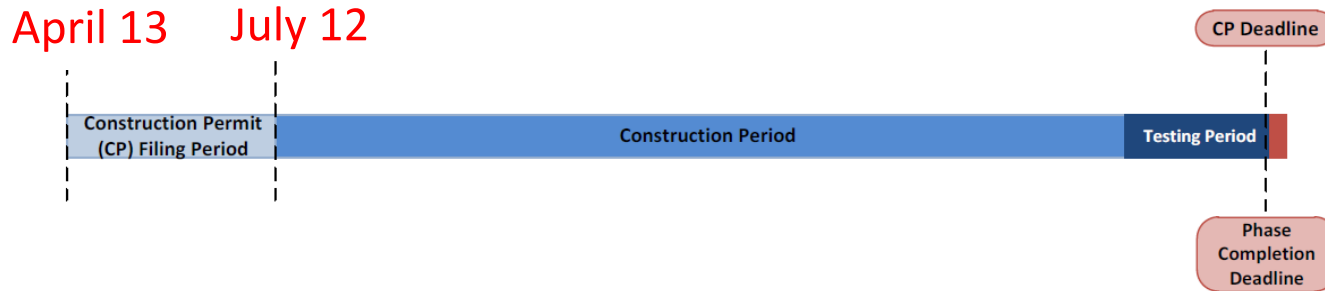
We're on the clock!

REPACK TIMELINE

Construction Phases



Basic Timeline



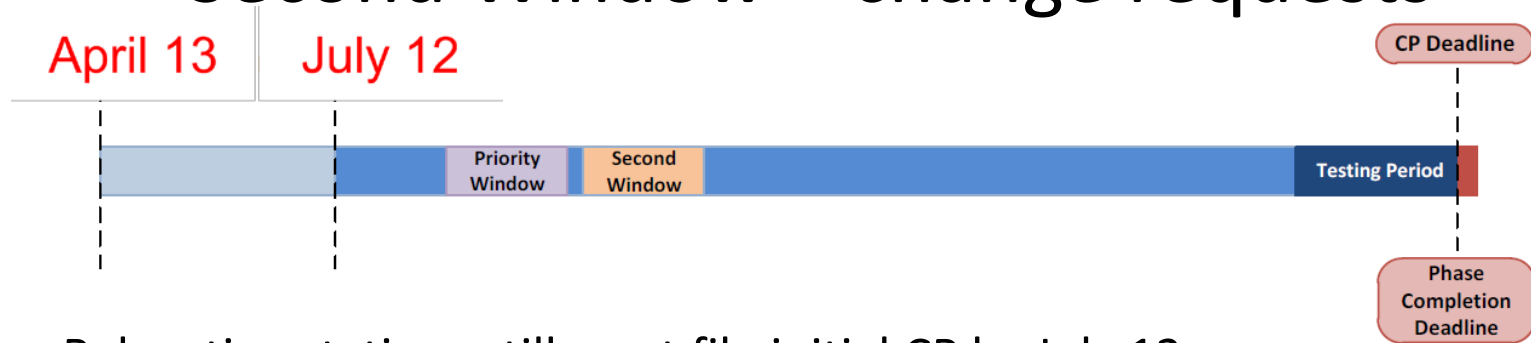
- File electronically in LMS
- File early, FCC will process on a rolling basis.
- Expedited Processing: FCC staff expects to process qualifying CP apps within 10 business days if:
 - Station not seeking expanded coverage beyond what was specified in the PN
 - Seeking authorization for no more than 5% smaller than what was specified in the PN.

First Priority Window



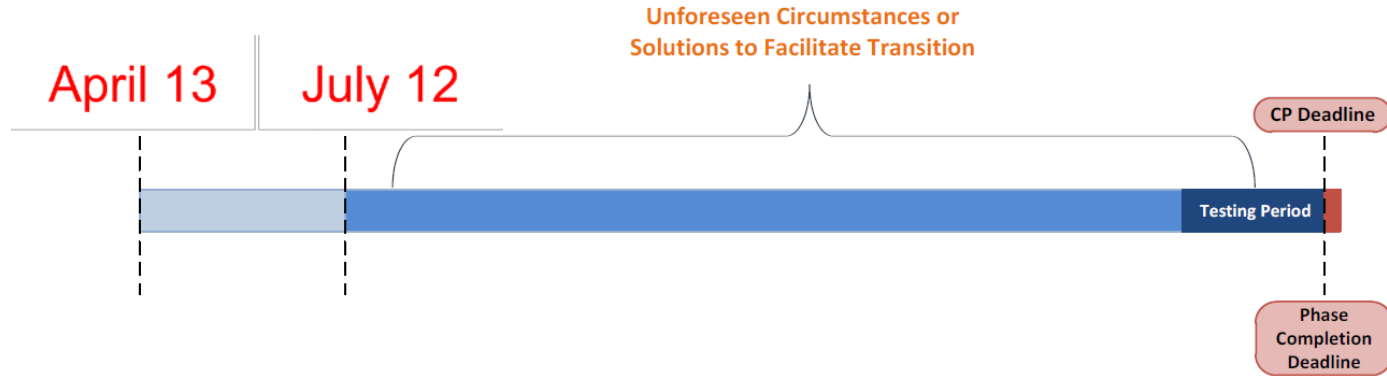
- Limited to:
 1. Unable to construct – extraordinary technical or legal circumstances
 2. Repacked stations predicted to experience a loss in excess of 1%
 3. Non-repacked stations predicted to experience a loss in excess of 1%
 4. A small number of specific displaced Class A stations ineligible for repacking protection.
 5. Detailed deadlines for each of the above cases.

Second Window – change requests



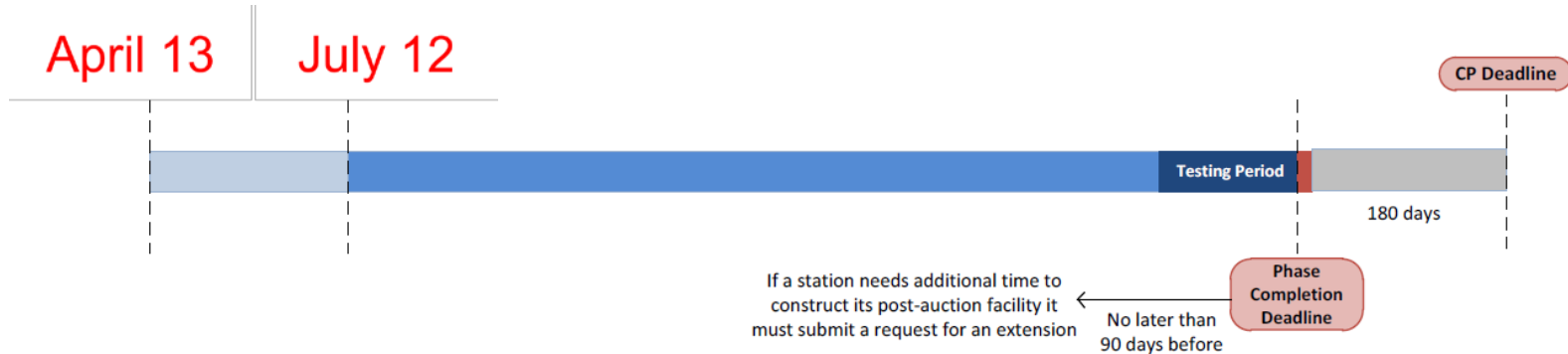
- Relocating stations still must file initial CP by July 12.
- Second window likely to open 14-30 days after 1st priority window.
- Stations may use this window to request, among other things, an expanded facility, a different channel or channel swap with in-market station.
- Alternate channels considered major change; subject to public notice and opportunity for petitions to deny and subject to filing fee.

Construction Period



- Unable to construct new facility by the phase completion deadline
- Unable to cease operations on pre-auction channel by the phase completion deadline
- Propose a creative solution to assist the transition process.

Unable to construct on time



- Station may seek a single extension of up to 180 days; extension application must be filed at least 90 days before deadline.
 - Station may seek additional time beyond 180 days ONLY pursuant to “tolling”
 - Tolling: Acts of God, delays due to administrative or judicial review, ...
- Extending the CP deadline does not extend the phase completion date. Unless station is granted an STA otherwise, the date the station must cease operation on it’s pre-auction channel on the phase completion date.



REIMBURSEMENT

Reimbursement Catalog

- **FCC Commissioned a Catalog of Repack Expenses**
 - Original catalog was published in 2013
 - Widelity Report covered equipment and services
 - FCC P/N asked for comments
- **Time and Technology Advanced**
 - Many transmitter technology advances made the original catalog obsolete
 - Cost of services changed as a result of cost increases over at least 4 years.
- **FCC Announced a revised catalog. Make sure you update!**
 - Estimates exceeding catalog advice will likely raise a red flag and will need justification.

Reimbursement Procedure

- **Estimate of Reimbursement Costs**
 - Must be submitted via LMS by **July 12**.
 - Specific cost items:
 - Transmitter
 - Antenna
 - Transmission Line
 - Tower Equipment and Rigging
 - Outside Professional Costs
 - Other Expenses
 - For costs outside catalog, must submit supporting evidence and certify estimate made in good faith

Appendix A

OMB Control Number: 3060-1178

TV Broadcaster Relocation Fund Reimbursement Form
FCC Form 2100, Schedule 399

Section I – Application Type

1. Type of Entity (automatically determined based on point of entry to system)

- o MVPD
 - > Type of MVPD (Cable Operator / DBS/Other)
- o Broadcaster
 - > Facility ID [numeric entry] →

Automatically generates from LMS (based on Facility ID)/COALS (based on COALS ID):
Legal name of Entity
DBA (doing business as) name, if applicable
Address (Street, City, State, Zip)
Phone Number
(if incorrect, correct in LMS/COALS)

2. Type of Submission (automatically determine based on questions answered)

- o Estimated Costs
- o Submission of Actual Costs with Documentation
- o Final Allocation or Final Accounting
 - o Final Allocation (is construction complete?)
 - o Final Accounting (construction is complete)

1 Draft
Not Yet Approved By OMB

Reimbursement Procedure

- **Initial Allocation**
 - Deposited to individual treasury accounts
 - Commercial stations: up to 80% of estimated costs
 - Noncommercial stations: up to 90% of estimated costs
 - Percentage will depend on total cost of repack vs. the \$1.75B repack fund
- **Progress Reports**
 - Stations must report progress on implementing their channel transition plan
- **True-Up**
 - Broadcasters must submit documentation of actual expenses and estimated remaining expenses
 - FCC will distribute additional funds or reclaim remaining funds, as appropriate

Reimbursement Caveats

- Stations *indirectly impacted* not eligible for reimbursement
 - FM's on tower
 - Canadian neighbors (62 stations!)
- \$1.75 B broken down
 - \$1B authorized to borrow from treasury, \$750m from auction proceeds
 - Funds subject to sequester, 6 – 9%
 - Key words are “up to” (80 % / 90% Non-Comm)

Reimbursement Example

- Hypothetical: Reimbursement requests total \$2.5 B
- \$1.75 B allocated, \$1 B available now.
- Assume 9% fund sequester
- Your station estimate submitted is \$750,000
- Your initial reimbursement would be:
 - $\frac{(1-9\%(1))}{2.5} \times \$750,000 \times 0.8 = \$218,400$
- Second reimbursement when forward auction proceeds fund the remaining \$750m (of the \$1.75 B)
- Will congress step up and cover all the costs?



REPACK ISSUES

Repack Issues - \$

- **Questions about whether \$1.75 Billion Will Cover Reimbursement Expenses**
 - FCC Reauthorization Act of 2016 requires FCC to report statistics on the repack process including funding and acknowledges a concern on cost of the transition and the potential lack of funding.
 - Viewer Protection Act (“Pallone bill”) would create \$1 billion reserve
- Station doesn’t necessarily get like-for-like replacement. New facility needs based on repack assignment PN.

Repack Issues - \$

- What do the numbers say?
 - 987 repack stations
 - 77 Aux facilities eligible for reimbursement
 - 19 DTS facilities eligible for reimbursement
 - $\$1.75\text{B} / 1083 = \1.6 m @
 - This doesn't include MVPD reimbursement
 - Will it be enough?
 - Will indirectly impacted stations litigate to participate in the fund?

Repack Issues - Logistics

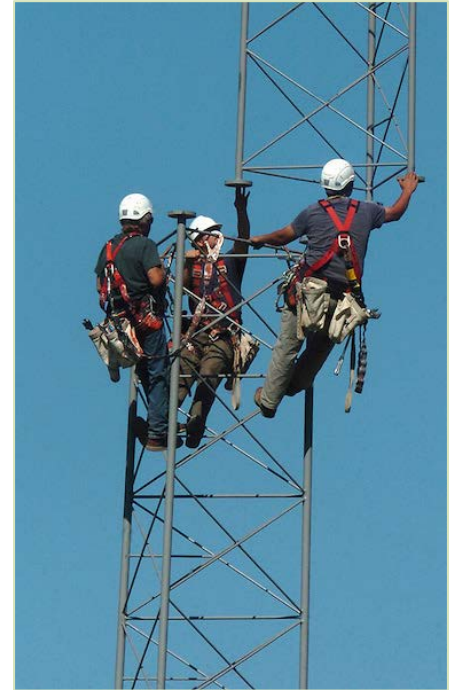
- **How to Repack Broadcasters Within 39 Months**

- Case-by-case exceptions for 39 months deadline?
- Regional repack?
- Viewer Protection Act would also authorize Media Bureau to extend deadline so no station forced to stop broadcasting.
- <https://democrats-energycommerce.house.gov/newsroom/press-releases/pallone-unveils-bill-to-protect-broadcast-television-viewers-and-mobile>
- https://democrats-energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/FUND_03_xml.pdf

- **How to Account for Loss of Translators**

Impact on Broadcast Technical Resources

- Large demand on consulting engineers time
- Structural analysis
- Transmitter installers
- Tower crews – new towers and antenna installation
- May impact planned radio projects.
- May need to look for alternative resources.



Rectangular waveguide,

$$F_c = \frac{1}{2 * \pi * \sqrt{\mu \epsilon}} * \sqrt{\left(\frac{m\pi}{a}\right)^2 + \left(\frac{n\pi}{b}\right)^2} \quad \text{①}$$

Where, F_c = cut off frequency (Hz)

a = Broad dimension (meters)

b = short dimension (meters)

m = Number of $\frac{1}{2}$ wavelength across 'b'

n = Number of $\frac{1}{2}$ wavelength across 'a'

μ = permeability

ϵ = permittivity

CHANNEL CHANGE IMPACT ON THE TRANSMISSION PLANT

A Typical DTV Transmission Plant

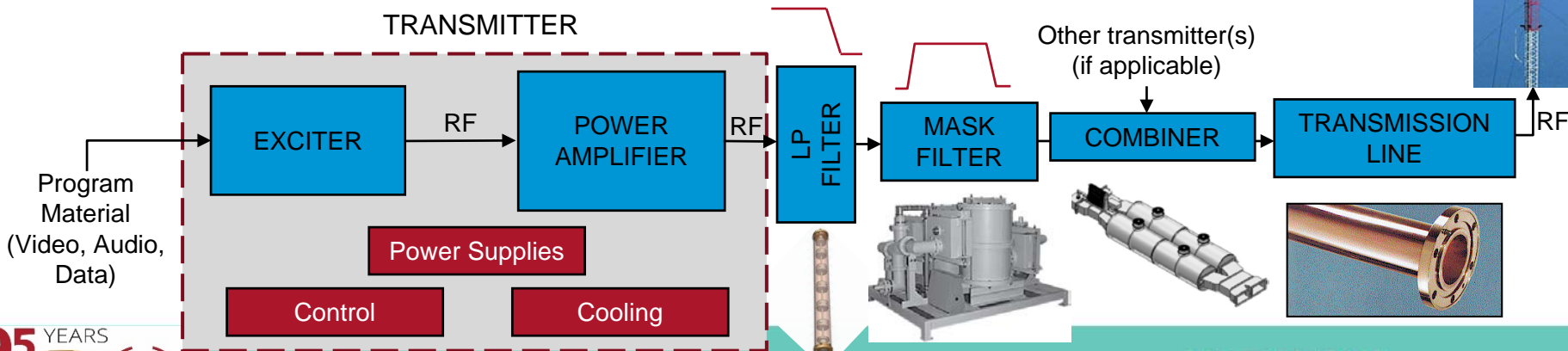
- Basic transmission system blocks:

- Transmitter, comprising:

- Exciter
- Amplifier
- Power Supplies
- Control
- Cooling System

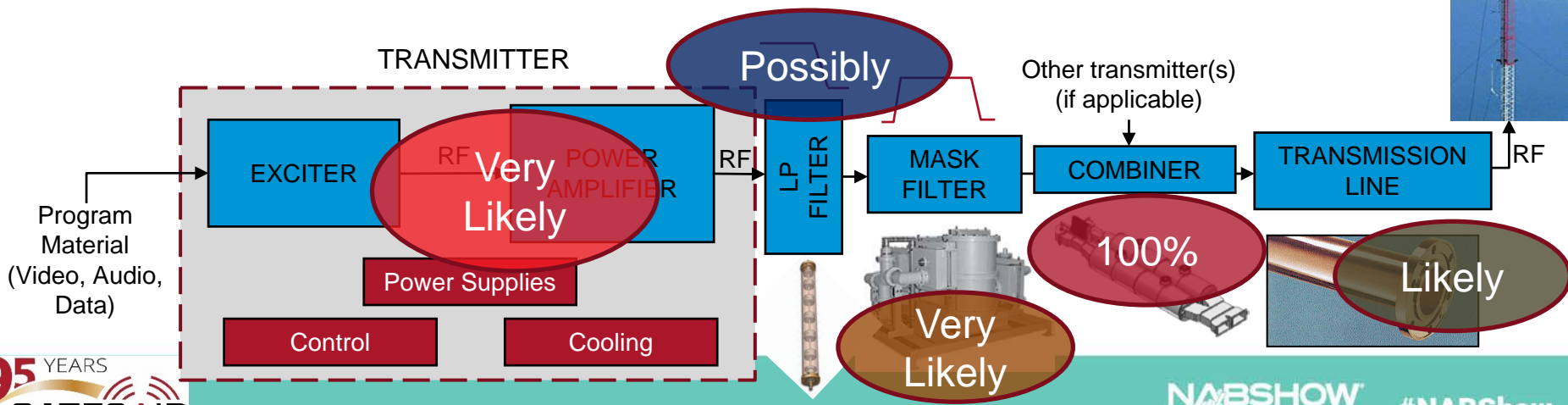
- External RF Items:

- Mask Filter
- RF Combiner
- Transmission line
- Antenna



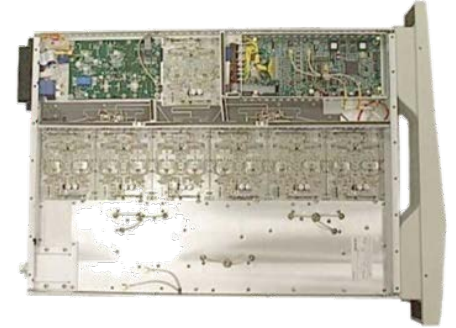
What's Impacted by Repack?

- If moving from an affected channel to a new one:
 - The following items will need to be looked at for retune or replacement:



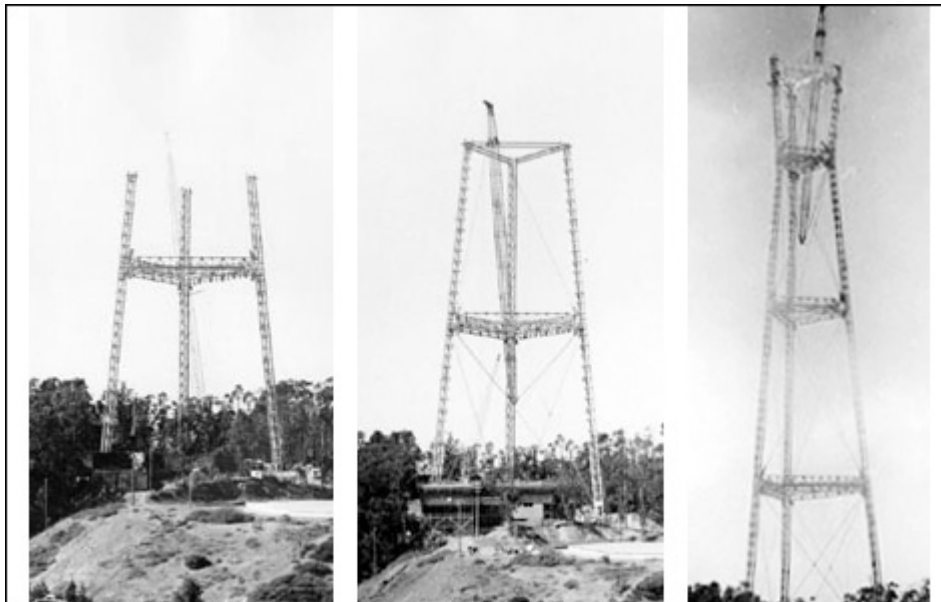
Transmitter Replacement is Likely

- Most 8-VSB transmitters are ~ 10 - 20 years old
- SS UHF transmitters of that era not necessarily wideband.
 - May require new amplifier pallets, combiners or driver modules - availability of obsolete devices unlikely



Channel change effects

- Higher channel moving down-band
 - Less power for equivalent coverage
 - Larger antenna
- Lower channel moving up-band
 - If station was maximized at 1 MW ERP, likely that coverage will be lost
 - Smaller antenna



PLANNING FOR REPACK

Staying On Air During Repack

- Initial equipment and services requirements will be driven by phase assignments.
- Your station may need a temporary antenna, transmission line and replacement or standby transmitter to maintain service while rebuilding the primary transmission system

Preparing for ATSC 3.0 amid Repack

- Two major considerations during repack will impact your future transition to ATSC 3.0
 - Purchasing the right antenna
 - Purchasing the right transmitter



ATSC 3.0 and Antenna Replacement

- ATSC's Physical Layer was designed to reach mobile, portable, handheld and receivers with indoor antennas.
 - Signal density, lower C/N and improved error correction
 - All stations should consider adding V Pol if replacing an antenna during repack. Stations may have to add additional money to the purchase.
 - Substantial long term savings gained by not having to replace an antenna later

ATSC 3.0 and Transmitter Replacement

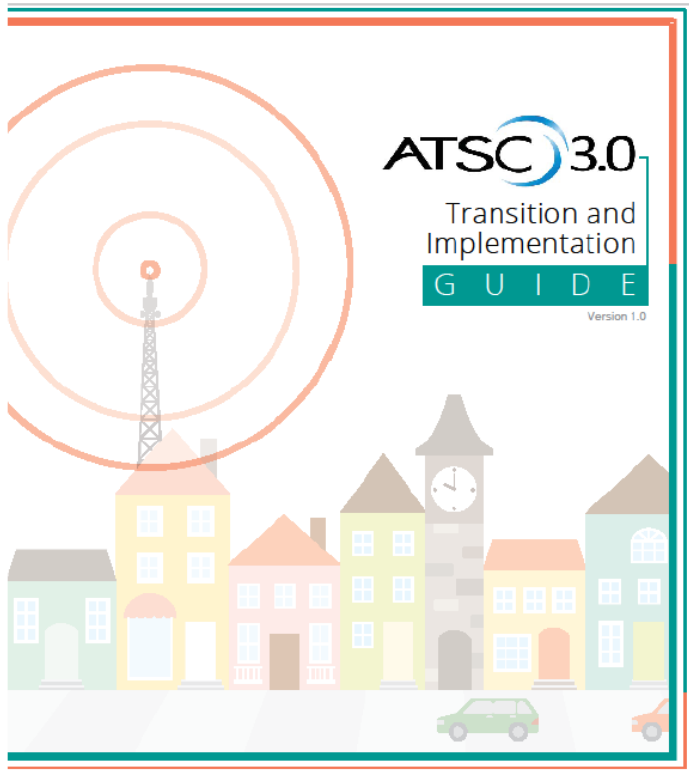
- Considerations when selecting a replacement transmitter during repack:
 - Are the exciters upgradable to ATSC 3.0?
 - If adding V-Pol, will the transmitter have sufficient power capability?
 - Example: To maintain licensed H-Pol power, adding 30% V-Pol requires a 43% TPO increase.
 - $1/0.7 = 1.43$. Similarly 20% V-Pol $\Rightarrow 1/0.8 = 1.25$ Tx sizing.
 - Stations will have to add capital to if the replacement is higher power than the current Tx
 - Long term savings from not having to replace or add power to the transmitter when transitioning to ATSC 3.0

Key Takeaways

- **Stations not required to change channels may be impacted**
- Staying **ON AIR** during repack will **most likely** require some **additional equipment**
- The **time** allocated for **CP application** and **reimbursement filing** will likely **over burden** industry resources
- **Preparation** for repack should begin **ASAP if not done already!**
- Testing phases & cutover will need to be **coordinated** and **carefully managed**

Key Takeaways

- The Chips have fallen. Auction is over. **Time to act.**
- Repack will have a **direct impact on FM stations** that share towers with television stations
- Stations that are forced to repack should use this as an **opportunity** to prepare for the **transition to ATSC 3.0**



— A living guide to assist in the planning of spectrum repack to support ATSC 3.0 implementation

<http://info.gatesair.com/atsc-3.0-guide-download>



Additional Suggested Readings

- FCC References
 - <https://www.fcc.gov/about-fcc/fcc-initiatives/incentive-auctions/resources>
 - Post-Auction Transition Workshop – Timelines and Deadlines
 - <https://www.fcc.gov/news-events/events/2017/03/post-incentive-auction-transition-workshop>
- repackready.com
- ATSC A/300: ATSC 3.0 System
 - ATSC.org ... Standards \ Candidate Standards \

Thank You

Q & A

Joe Seccia