TV Spectrum Repack Update

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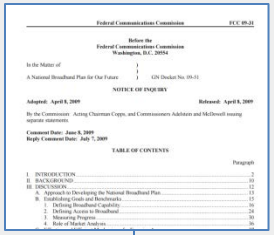
Presentation Agenda

- Spectrum Auction Update
- Repack Rules & Regulations
- Channel Change Impact on RF System
- Preparing for Repack
- Q&A

Spectrum Auction Update

An Auction Six Years In the Making



Federal Communications Commission FCC 09-31

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)
)
A National Broadband Plan for Our Future) GN Docket No. 09-51

NOTICE OF INQUIRY

Adopted: April 8, 2009 Released: April 8, 2009

By the Commission: Acting Chairman Copps, and Commissioners Adelstein and McDowell issuing separate statements.

Comment Date: June 8, 2009
Reply Comment Date: July 7, 2009

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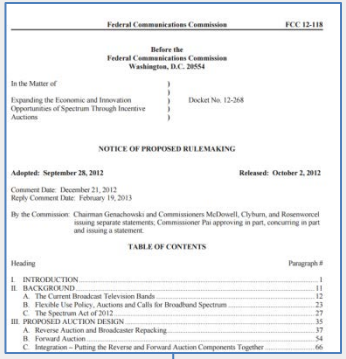
CONNECTING AMERICA:
THE NATIONAL BROADBAND PLAN

PUBLIC LAW 112–96—FEB. 22, 2012

MIDDLE CLASS TAX RELIEF AND JOB CREATION ACT OF 2012



Federal Communications Commission FCC 12-118

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)
)
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions) Docket No. 12-268

NOTICE OF PROPOSED RULEMAKING

Adopted: September 28, 2012 Released: October 2, 2012

Comment Date: December 21, 2012
Reply Comment Date: February 19, 2013

By the Commission: Chairman Genachowski and Commissioners McDowell, Clyburn, and Rosenworcel issuing separate statements; Commissioner Pai approving in part, concurring in part and issuing a statement.

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Federal Communications Commission FCC 14-50

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)
)
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions) GN Docket No. 12-268

REPORT AND ORDER

Adopted: May 15, 2014 Released: June 2, 2014

By the Commission:

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Apr. 2009

Mar. 2010

Feb. 2012

Oct. 2012

June 2014

In What Stage Will the Auction Close?

Final Stage Rule

- Part 1:

Clearing target ≤ 70 MHz	Avg. $1.25 MHz-pop for category 1 blocks in 40 largest PEAs
Clearing target > 70 MHz	$1.25 MHz-pop * 70 MHz * total category 1 pops in 40 largest PEAs

- Part 2: Forward auction revenues exceed costs (reverse auction + repacking + FCC costs)

Why Stages Are Important

If auction closes in one stage:

Event	Original Estimate
Incentive Auction Ends / FCC Releases Reassignment PN	September 2016 **FAILED**

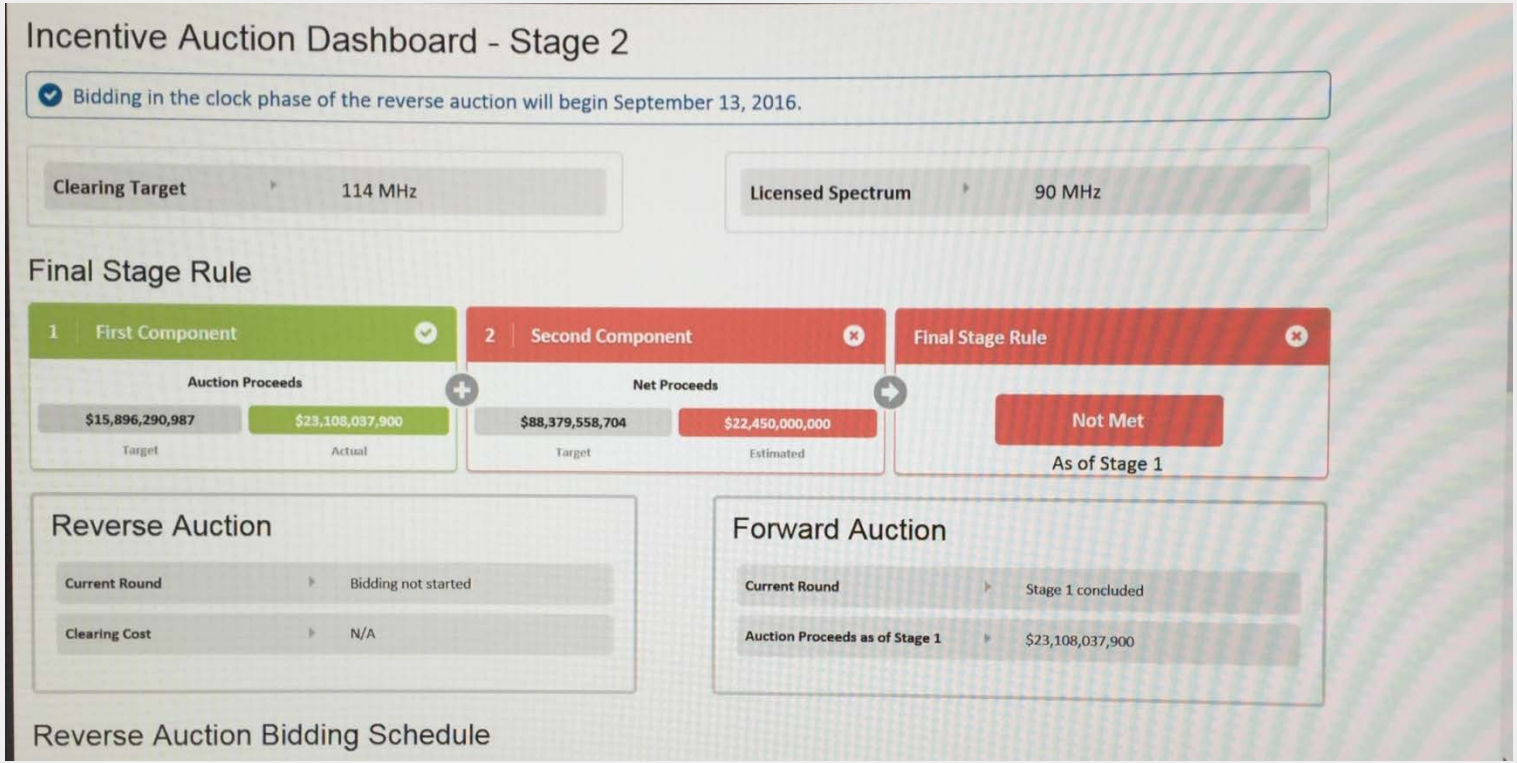
Event	Actual Start date
Stage 2 Begins	September 13, 2016
Incentive Auction Ends / FCC Releases Reassignment PN	???

Event	Estimated Start date
Stage 3 Begins	December 2016
Incentive Auction Ends / FCC Releases Reassignment PN	???

Stage 1 Status

- Stage 1 clearing target - 126MHz
  - UHF band reduced to CH14 – 29
  - Wireless spectrum = 10 channel pairs
- Reverse auction cost = $86.4B + repack & auction costs estimated $1.9B = $88.3B to close
- Forward auction bids = $23.1B after 27 rounds
- Stage 1 **FAILED** with $66B gap

FCC Auction Status Dashboard



How Many Stages Until Success?

- Auction must be conducted in steps
  - 126 MHz ⟶ 114 MHz ⟶ 108 MHz ⟶ 84 MHz
  - Cost to acquire stations drops with each clearing target reduction
  - Amount of spectrum available to wireless drops
  - Will supply and demand eventually close the gap between buy an sell?

Repack Timeline

Event	
FCC Runs Post-Auction Channel Optimization	Once Final Stage Rule is Satisfied
FCC Sends Confidential Letters With Post-Auction Channel Assignment	After Optimization is Complete
FCC Issues Channel Reassignment Public Notice	Once Forward Auction is Complete

Repack Timeline

Event	
File CP for Modified Facility	3 months after reassignment PN
Post-Auction Filing Windows (channel changes or expanded facilities) • Window 1: Stations unable to meet technical parameters in reassignment PN • Window 2: All other stations assigned to new channels	After staff processes initial applications
Construction Deadline	***Up to*** 39 mos. after reassignment PN

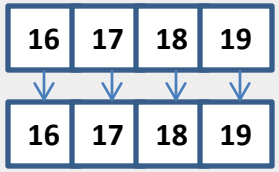
Repack Rules & Regulations

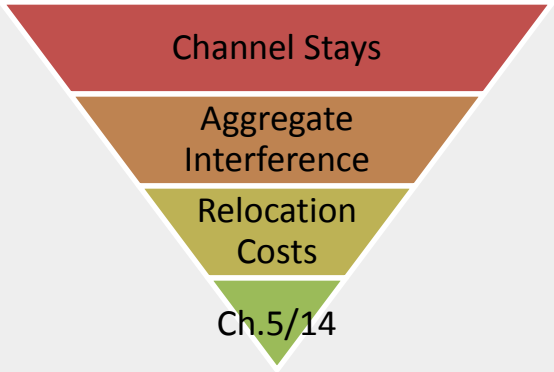
“There are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know. ”

- Former Defense Secretary Donald Rumsfeld

What's Next - Reassignment Public Notice

- Between Rounds = Feasibility
- After Auction = Optimization
  - Priority 1: Maximize Number of Channel Stays





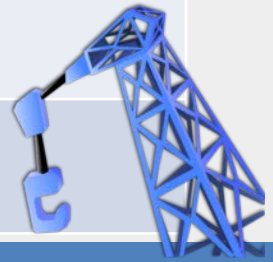
  - Priority 2: Minimize New Aggregate Interference Experienced By Any Station
  - Priority 3: Avoid Reassignment of Stations with High Relocation Costs
  - Priority 4: Prioritize Assignments to Channel 5 in Low VHF and Off Channel 14 in UHF
- Must achieve 95% optimization at each subsequent level
- **No** optimization for stations assigned to 600 MHz band

What's Next – Auction Winners

Event	
FCC Delivers Auction Proceeds	Rolling basis after forward auction licenses issued (~ 2-3 months after auction)
"Go Off-Air" Stations Must Cease Broadcasting	3 months after proceeds received*
Channel Sharing Stations Must File CPs	4 months after proceeds received*
Channel Sharing Stations Must Implement Sharing	6 months after proceeds received*

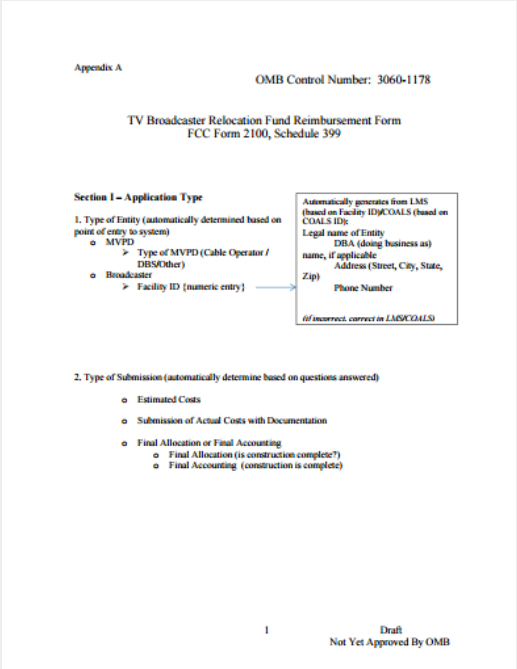
What's Next – Stations On the Move

Event	
File CP for Modified Facility	3 months after reassignment PN
Post-Auction Filing Windows (channel changes or expanded facilities) • Window 1: Stations unable to meet technical parameters in reassignment PN • Window 2: All other stations assigned to new channels	After staff processes initial applications
Construction Deadline	***Up to*** 39 mos. after reassignment PN



Reimbursement Procedure

- **Estimate of Reimbursement Costs**
  - Must be submitted via LMS within three months of Reassignment PN
  - 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 1 – Application Type

1. Type of Entity (automatically determined based on point of entry to system)
   - MVPD
     - Type of MVPD (Cable Operator / DBS/Other)
   - 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)
   - Estimated Costs
   - Submission of Actual Costs with Documentation
   - Final Allocation or Final Accounting
     - Final Allocation (is construction complete?)
     - 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
- **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 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 Would be Released**
  - The revision is expected later in October

Open Issues for Full Power/Class A Stations

- **How to Repack Broadcasters Within 39 Months**
  - Case-by-case exceptions for 39 months deadline?
  - Regional repack?
  - Pallone “Viewer Protection” bill would authorize Media Bureau to extend deadline so no station forced to stop broadcasting
- **Whether $1.75 Billion Will Cover Reimbursement Expenses**
  - Pallone bill would create $1 billion reserve
- **How to Account for Loss of Translators**

What's Next – LPTV/TV Translators

Event	
Limited Displacement Window • Priority for displacement DRTs • Last resort auction	After full power and Class A application windows
600 MHz Licensee Intent to Commence Operations	Notice at least 120 days in advance
LPTV/Translators Must Cease Operations or Reduce Power to Avoid Interference	Date specified in notice
LPTV/Translators Must Cease Operations in Guard Bands	39 months after reassignment PN

Open Issues for TV Translator Stations

- **How Many "Vacant Channels" Will be Unavailable for Displacement?**
  - FCC Proposal: reserve one vacant channel for unlicensed use in all areas; two channels where a broadcast channel has been assigned to duplex gap
  - NAB vs. Google
- **How Long Will it Take for Wireless Operators to "Commence Operations"?**
  - FCC: Commencement occurs when "site commission testing" begins using "permanent base station equipment"
  - What effect will full power transition schedule have on commencement date?

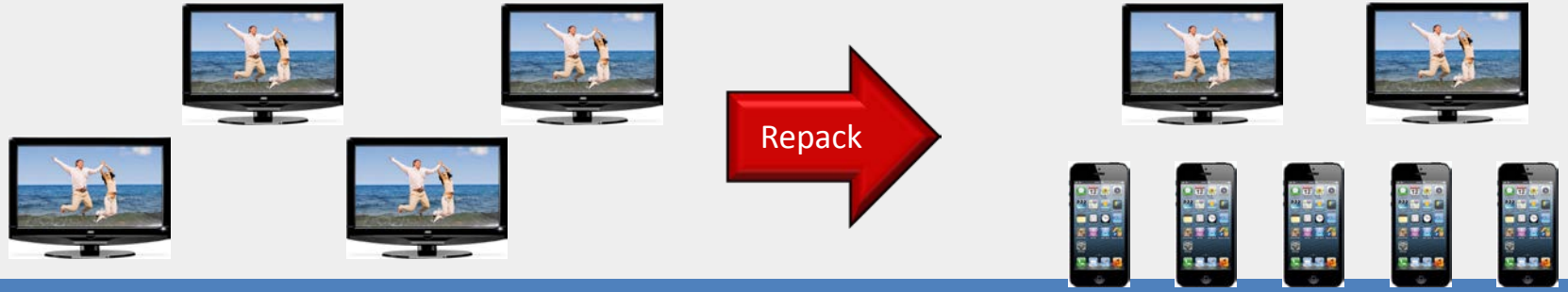
Television Spectrum Repack Impact, Process & Challenges

What is TV Spectrum “Repack”?

- FCC’s Definition of “Repacking”

(Source: http://wireless.fcc.gov/incentiveauctions/learn-program/repacking.html)

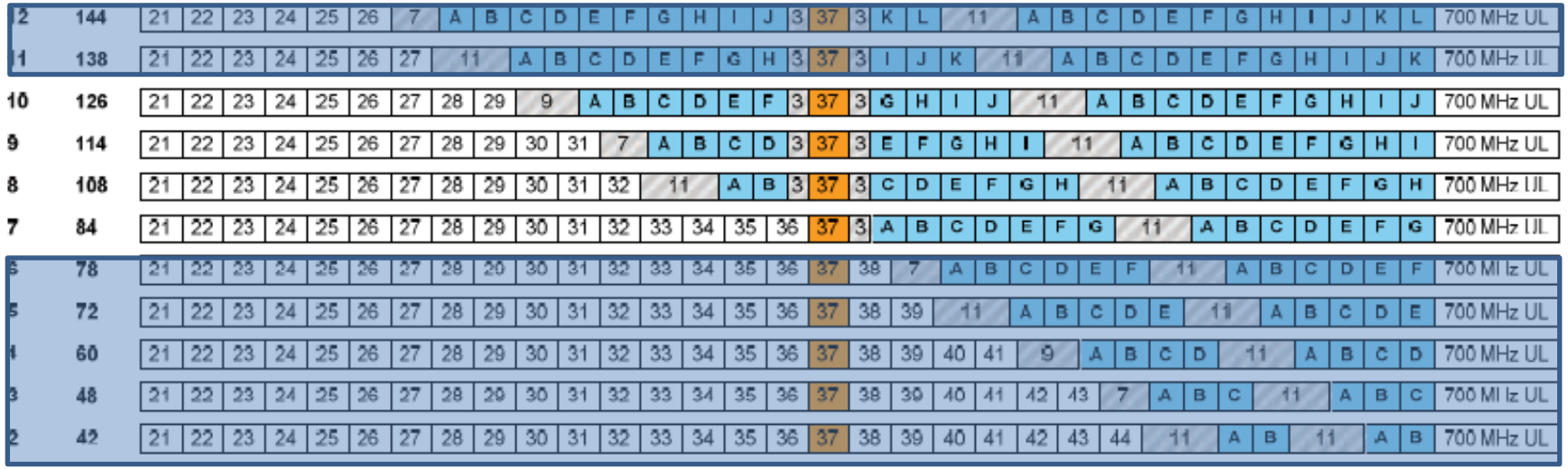
“Repacking involves reorganizing television stations in the broadcast television bands so that stations that remain on the air after the incentive auction occupy a smaller portion of the UHF band, thereby freeing up a portion of that band for new wireless services uses.”



UHF Band Plan specified by FCC PN 14-191A1

- Nationwide clearing target
  - Minimum 84 MHz up to 126 MHz (Original 120MHz + CH37 = 126MHz)
- Guard bands between Wireless and TV services
  - Between 3 and 11 MHz depending on actual clearing
- Wireless duplex gap
  - Nationwide uniform position of 11 MHz gap required for mobile device interoperability
  - Partial duplex gap TV assignments may be made as ***impaired spectrum***
- Channel 37 remains and protected by 3 MHz guard bands….but not assigned for TV service

UHF Band Plan specified by FCC PN 14-191A1



- Wireless spectrum channelized into 5 MHz pairs
- TV service remains 6 MHz channels
- Duplex gap between wireless uplink and downlink
- Guard band spectrum between services

WHITE – TV Channels **Gray – Guard bands** **Blue – Wireless Channels**

How Many Stations Directly Impacted?

Spectrum Recovered MHz	Highest Remaining TV Channel	Full Power Stations	Class A Stations	Total Stations Directly Impacted*
84	36	593	144	737
108	32	656	162	818
114	31	695	164	859
126	29	922	211	1133

Directly impacted stations are those currently assigned to spectrum that is to be cleared for wireless services

*Some will be participating in the auction thus reducing the number of directly impacted stations

Spectrum Clearing Impact For 126 MHz

Estimated Range

	LOW	High
Eligible UHF Stations	**1706**	**1706**
Stations Eliminated to Clear Spectrum	415	443
Stations Remaining On Channel	400	167
Stations Required to Repack	860	1065

- Estimated ranges based on DTC Study and FCC's simulations

Spectrum Clearing Impact For 84 MHz

Estimated Range

	LOW	High
Eligible UHF Stations	**1706**	**1706**
Stations Eliminated to Clear Spectrum	222	249
Stations Remaining On Channel	433	262
Stations Required to Repack	1020	1164

- Estimated ranges based on DTC Study and FCC's simulations

How Likely Is Repack For My Station?

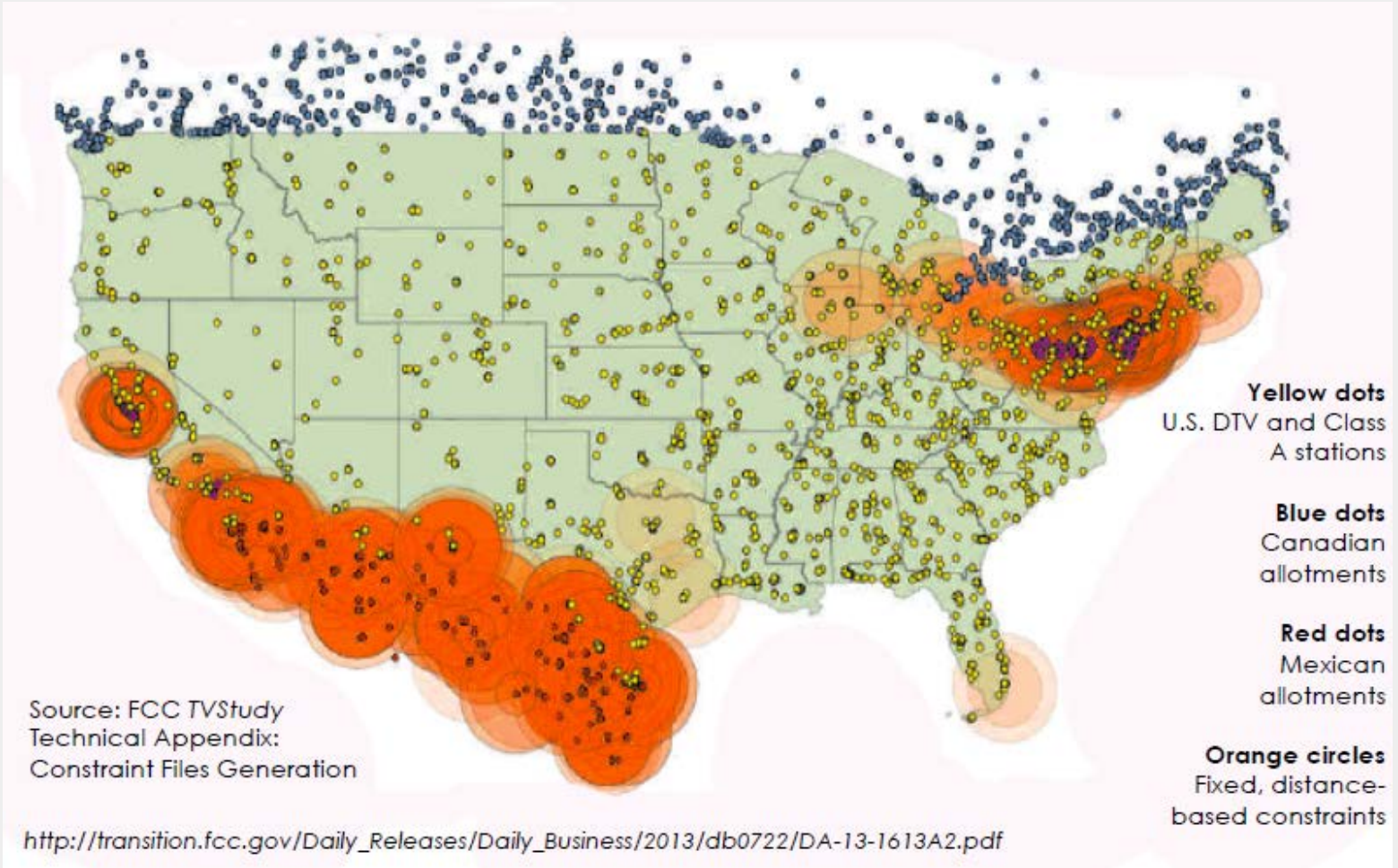
- UHF stations currently located within clearing target and not participating in the auction…..100%
- UHF stations participating in auction with election to move to VHF….100%*
- UHF stations currently located below clearing target and not participating in the auction…..> 20%
- VHF stations not participating in the auction…> 5%

* Assumes that bid was accepted

Will Stations Not Changing Channels Be Impacted?

- **Possibly if stations….**
  - Share a Tower
  - Have stacked 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)**


Yellow dots
U.S. DTV and Class A stations
Blue dots
Canadian allotments
Red dots
Mexican allotments
Orange circles
Fixed, distance-based constraints
Source: FCC TVStudy Technical Appendix: Constraint Files Generation
http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0722/DA-13-1613A2.pdf

Chaos or Organized?

AT&T Urges strong, centralized, FCC leadership during post auction transition

Tuesday, March 15, 2016 | By Colin Gibbs

AT&T (NYSE: VZ) once again urged the FCC to lay the foundation for a smooth spectrum reorganization process following the upcoming incentive auction, saying that "strong, centralized FCC leadership on the transition will be essential."

The FCC later this month will begin a "reverse" auction that will eventually see it buy back unwanted airwaves from TV broadcasters. That spectrum will then be auctioned off later this year to companies looking to use it to launch mobile communications services.

But the spectrum will have to be "repacked" to make the licenses available to wireless network operators while TV broadcasters move to other channels. The FCC has proposed a 39-month timeline for repacking, although that schedule has come under fire by TV broadcasters who say it doesn't provide enough time.

AT&T didn't offer an opinion on the proposed timeline in its latest filing**, but it did cite the 800 MHz rebanding effort, which began in June of 2005 was expected to take 36 months but continues today.**

NAB Proposes Regional Approach to Efficient Repacking

- Rather than a disorganized scramble, organize repacking by logical regions
  - Prioritize regions most needed by wireless carriers
  - Break interference “daisy chains”
  - Make efficient use of tower and equipment resources
  - Allow equipment orders to be staggered
  - Clear spectrum more quickly within a large region

NAB Recommendations

- Regions should be large enough so that repacking and clearing meet needs of wireless carriers and facilitate efficiency
- Choose boundaries to avoid impacting major markets
- Geographic distribution of stations suggests some logical regional boundaries
- Take advantage of terrain to limit inter-region interference
- Follow state boundaries where possible to facilitate resolution of local regulatory issues, such as zoning
- Where possible, regions are large enough to permit work during any time of year – i.e., work in the southern part of the region could take place in winter, work in northern portion in summer

Broadcaster Relocation Planning

August 2016

Constructing an approach

Any approach to repacking must leverage lessons learned from past efforts and apply consistent policies and procedures to create a regional management structure that builds into a nationwide plan while minimizing risks

Basis of our approach

Lessons learned

By understanding the complications of relevant previous spectrum relocations, due in part to financial, regulatory, and logistical challenges, any approach must leverage the leading practices from those initiatives to mitigate the potential risk factors

Processes and procedures

Standardized processes and procedures, influenced by past relocation efforts, should inform a series of clear time-bound steps for broadcasters to follow in a transparent manner relevant to industry stakeholders while accounting for daisy chain impacts

Our approach

Regional management

Our approach identifies the daisy chain impacts and areas of easy decoupling, and manages the process by aggregating those locations

Nationwide plan

Our nationwide plan builds upon the regional management model, by using sub-regions to decouple daisy chain impacts and assigning super regions for effective management and transparency, while preventing delays across regions

Key assumptions

Our approach is based on a series of technical assumptions to create a sequenced national repack plan

Key assumptions underlying our vision for the broadcaster relocation:

- Clearing target of 126 MHz (which can be adjusted as needed)
- Assumed repacking of 1,026 UHF stations nationwide (excluding auction winners, transfers to VHF, and designated 600 MHz encumbering stations)
- Regions chosen to minimize cross-region dependencies and with boundaries correlated to PEAs where possible
- Sites over 1,000 feet used as proxies for beacon sites and not incorporated into analysis (instead highlighted to give perspective on effort required to support repack)
- Canada and Mexico addressed in a parallel effort
- Assumed that all stations can complete engineering studies and submit cost estimates within the 90-day FCC deadline
- Transition planning attempts to minimize time on auxiliary or temporary transmission facilities
- Installation difficulty to be estimated based on antenna height

Lessons Learned

Analysis of past relocation efforts revealed different understandings applicable to the current 600 MHz repack

Past efforts

Three key past efforts highlighted detrimental factors including: project delays, insufficient cost estimates, non-standard processes, conflicting priorities and resource management, lengthy negotiations, revenue losses, and relocation avoidance

- **800 MHz**
- **AWS-1**
- **DTV Transition**

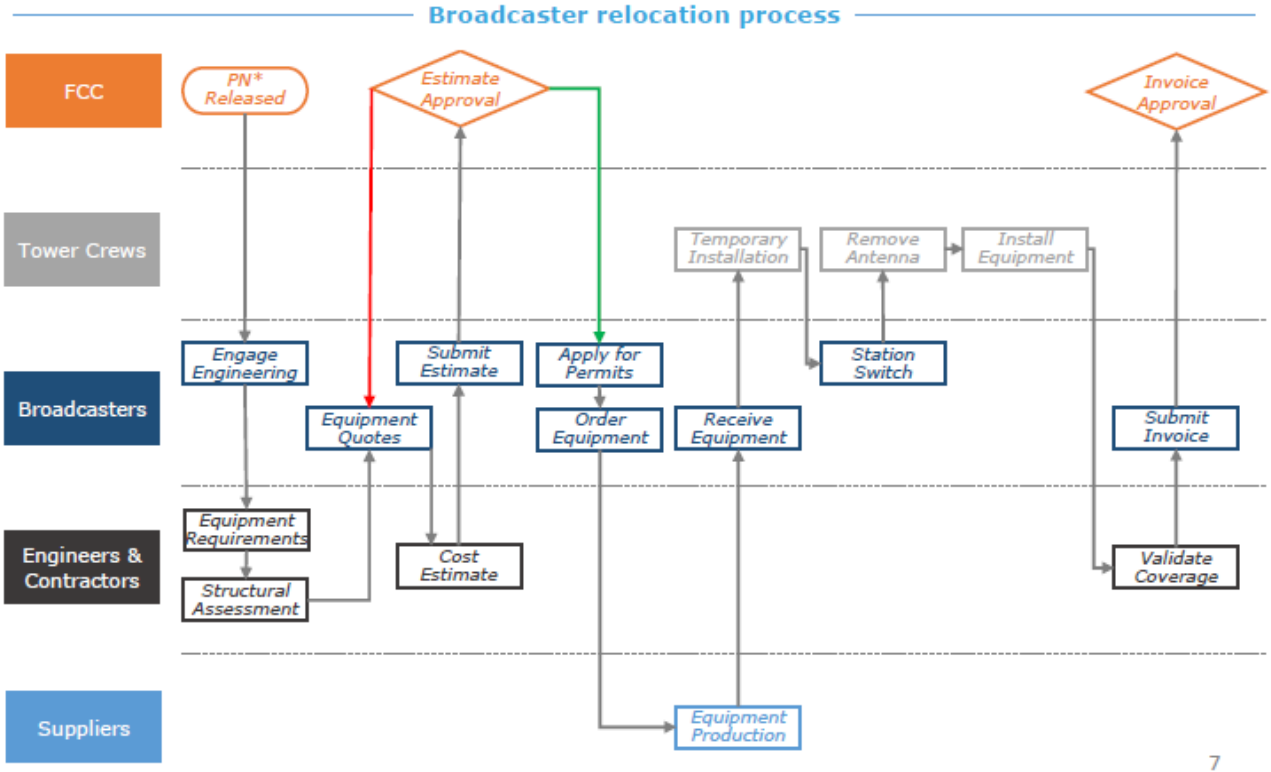
Lessons leveraged

The following key lessons should be applied to the 600 MHz transition:

- *Successful transitions involve flexible, dynamic stakeholder coordination*
- *Large, complex relocation exercises require realistic time and cost estimations*
- *Risks can be mitigated through clear planning for each project milestone*

Processes and procedures

The average broadcaster subject to repacking will be required to take specific steps to complete the relocation process



Managing daisy chain impacts

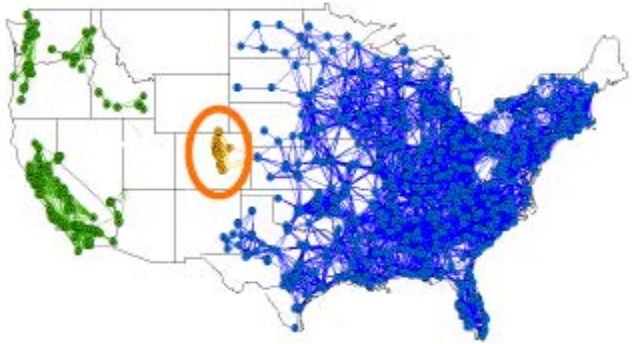
Our approach recognizes that daisy chains require effective logistics management measures to anticipate and mitigate risks

Daisy chain management will require stakeholder coordination, infrastructure planning, regional approaches, and logical prioritization

The proposed repack approach should feature a list of final dates, reporting requirements, and implications up and down the stack

Denver case study

- A case study of the Denver market provides insights on likely problems and scenarios to consider while developing the nationwide repack strategy
- The Denver market was used because of its isolation and representativeness of potential interference dependencies between 15 stations; it allowed development of a daisy chain process that could be extrapolated to other sub-regions
- The Denver area was chosen because it is small enough that optimization could be validated by hand
- Resources to be deployed to clear phases while Phase 0 stations will be used to balance resource loading



FCC Post Auction Transition Plan PN 16-1095

- FCC proposed a post auction scheduling plan for stations that must relocate to a new channel
  - All stations will be categorized into one of 10 possible transition phases
- FCC also released a proposed phase alignment tool to estimate how long it will take each station
  - Tool looks a many variables including complexity of station's move and tower height.
  - Many unverified assumptions are baked into the plan
  - There appears to be no consideration for zoning, permitting and land use changes, weather factors, tower structural changes or supplier delays

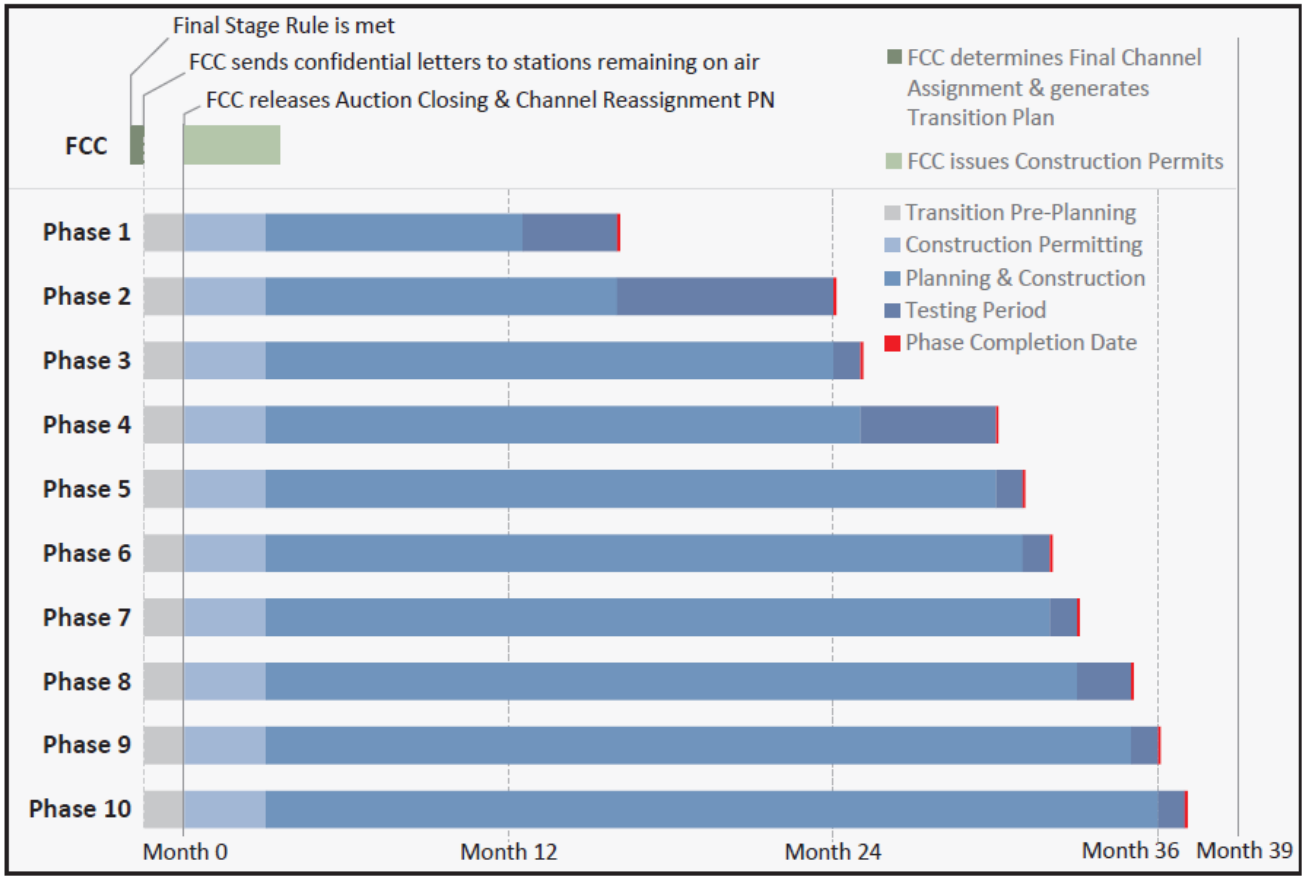


Figure 13: *Phase timelines at 84 MHz*

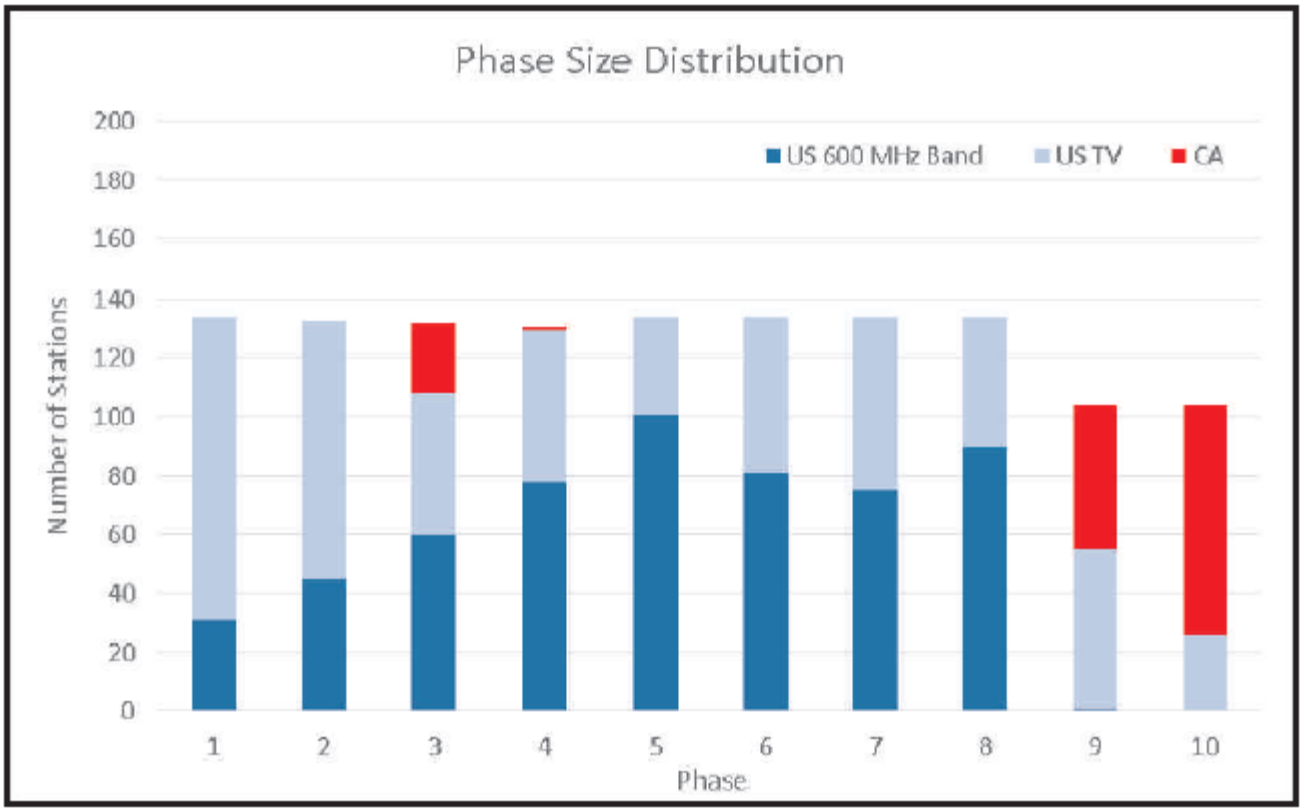
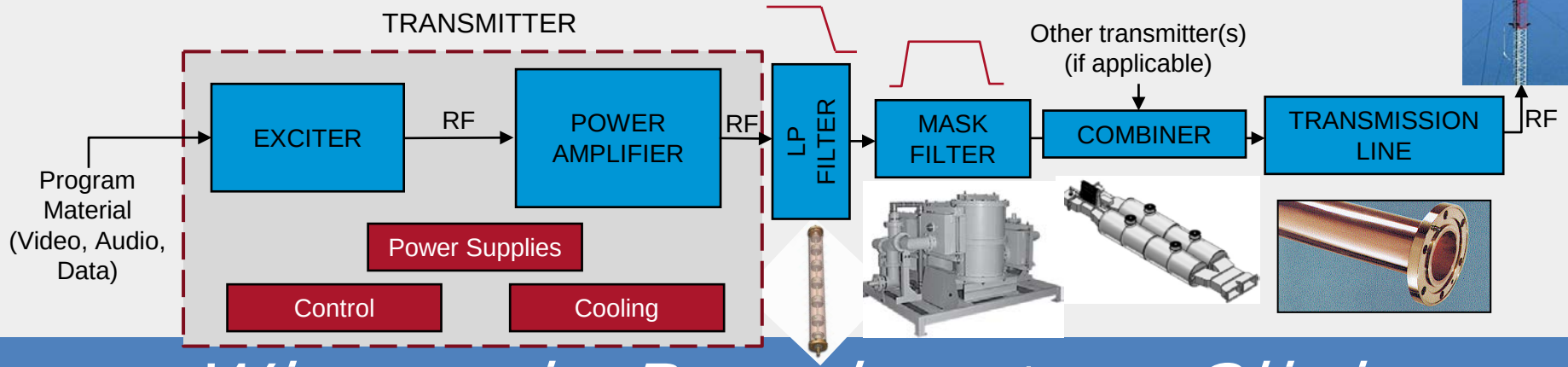


Figure 6: *84 MHz scenario with 50 temporary channels*

Channel Change Impact on the RF System

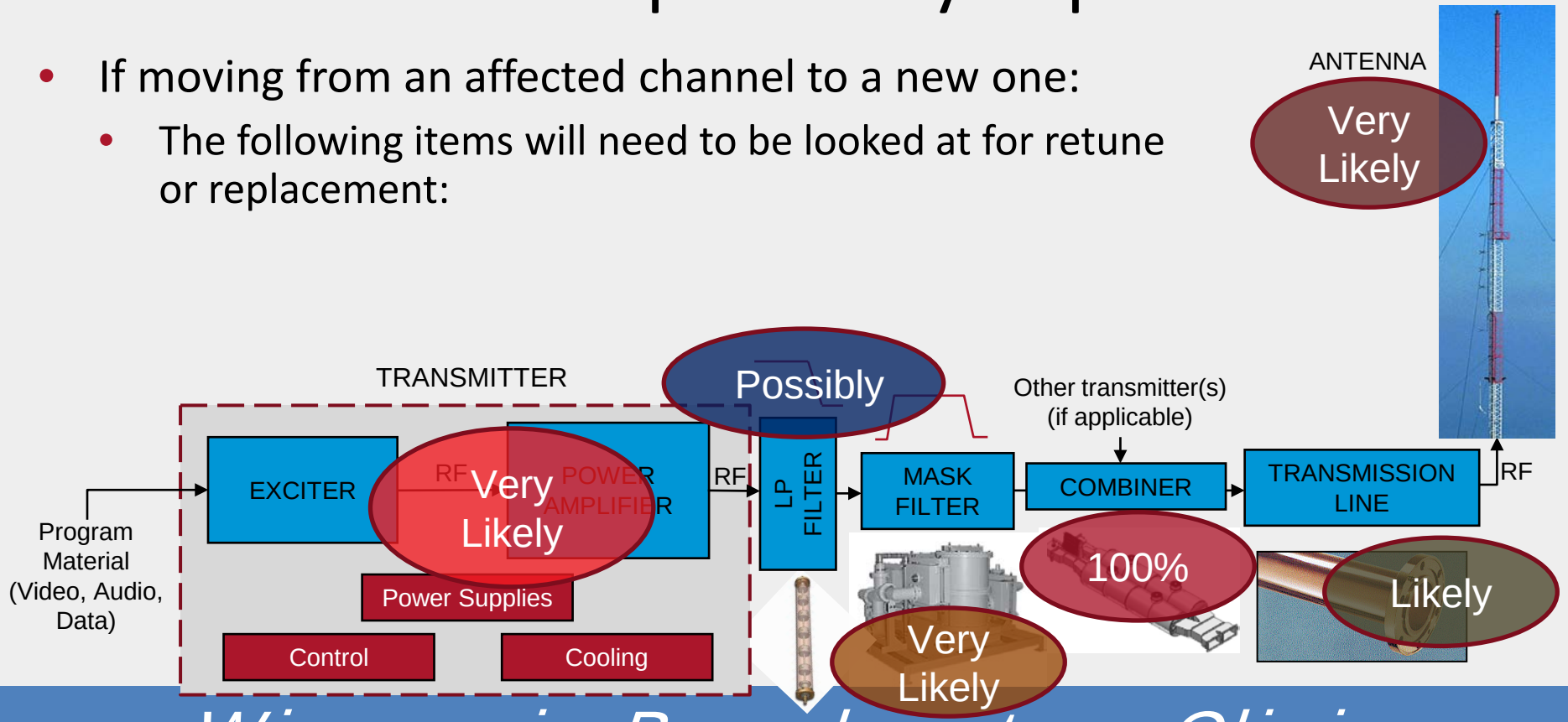
A Typical DTV Transmission Plant

- Basic transmission system blocks:
  - Transmitter, comprising:
    - Exciter
    - Amplifier
    - Power Supplies
    - Control
    - Cooling System
  - External RF Items:
    - Mask Filter
    - RF Combiner
    - Transmission line
    - Antenna



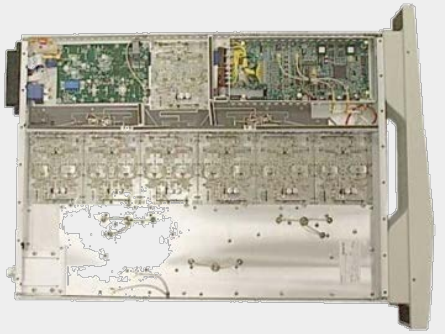
What's Impacted by Repack?

- 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 transmitters are ~10 - 20 years old
- Older UHF transmitters designed around band segments
  - May require new amplifier pallets, combiners or driver modules - availability of obsolete devices unlikely



Channel Change Cost vs. Replacement

- Carefully evaluate the cost of conversion versus replacement
- In many cases, a good argument for tx replacement can be made:
  - Much higher efficiency
    - Save on Electricity costs (over 50% in some cases)
  - Broadband
  - Serviceability – ease of maintenance
  - Long-term support
  - Tube prices and availability
  - Safety (low Voltage vs. High)
  - Future proof (ATSC 3.0 Ready)

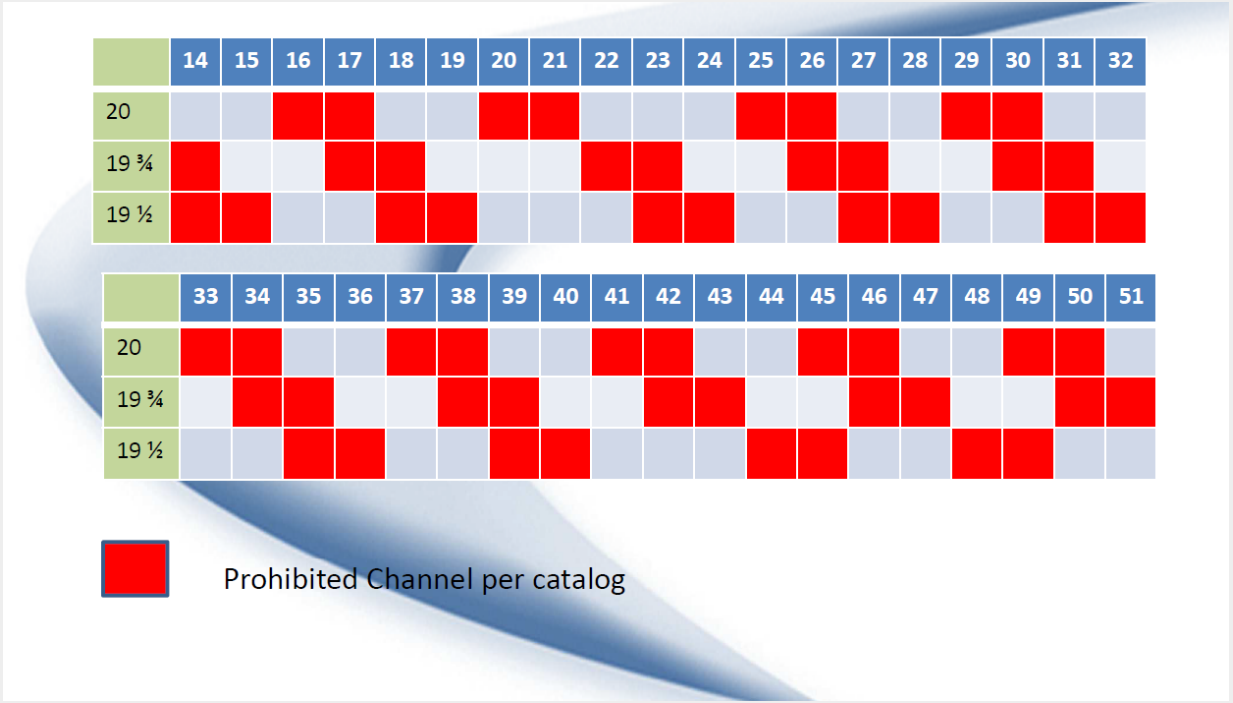
Cost Estimate Checklist:
Tx upgrade in-band
or - Tx upgrade out-of-band
or - New Transmitter
RF System Components (Mask Filter, etc.)
Antenna
+ Antenna change-out cost
RF Line
+ RF Line change-out cost
Tower Study & modifications (if needed)

High Power RF Output Systems

- Waveguide bands
- WR1800, WR1500, WR1150
- Mask Filter Cavities per Channel
- In general, a new RF system will be needed

Channel Compatibility of Transmission Line

Transmission Line Section Lengths

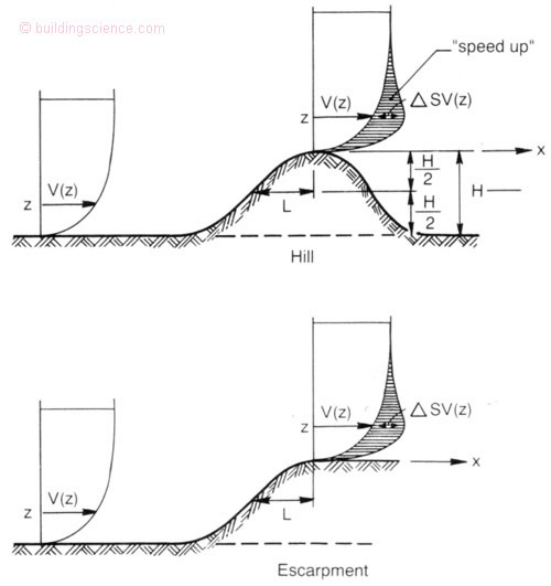


Dielectric

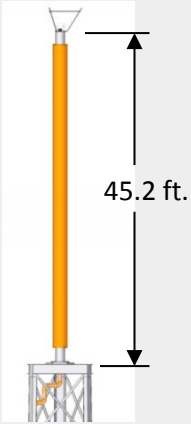
Tower Structural Analysis

- TIA-222 Rev G
  - Ice
  - Wind Speed
  - Topography
  - Shape Factors

- Tower owner will need to get a structural analysis

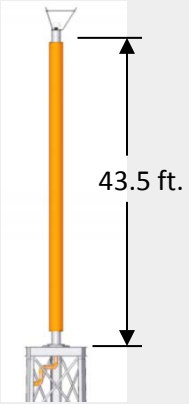


Replicate with Same Size Antenna



Channel 51
TFU-30JTH-R O4
Ø10.75” Pipe
27 Gain

(EPA) = 42.4 ft^2
W = 3800 lbs.

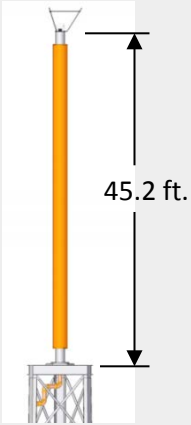


Channel 24
TFU-22JTH-R O4
Ø10.75” Pipe
20 Gain

(EPA) = 45.0 ft^2
W = 3600 lbs.

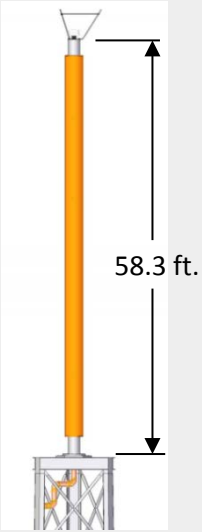
SAME SIZE AND WINDLOAD –
LOWER GAIN

Replicate with Same Gain Antenna



Channel 51
TFU-30JTH-R O4
Ø10.75” Pipe
27 Gain

(EPA) = 42.4 ft^2
W = 3800 lbs.



Channel 24
TFU-30JTH-R O4
Ø14” Pipe
27 Gain

(EPA) = 68.7 ft^2
W = 7000 lbs.

REQUIRES LARGER HEAVIER ANTENNA

Impact on Broadcast Technical Resources

- Large demand on consulting engineers time
- Structural analysis
- Transmitter installers
- Tower crews – new towers and antenna installation
- May impact planed Radio projects
- May need to look for alternative resources
- Projects may get delayed

Planning For Repack

Staying On Air During Repack

- Initial equipment and services requirements may be driven by factors such as the type of transition…ad hoc vs market or regional coordinated
- Your station will likely need a temporary antenna, transmission line and replacement or standby transmitter to maintain service while rebuilding the primary transmission system

On Channel Transition Scenario

1. Install temporary antenna and transmission line for existing channel or move to standby antenna if available
2. Transition current channel operations to temporary or standby antenna (Likely at reduced power and coverage)
3. Remove former main channel antenna and possibly transmission line
4. Install new main antenna and possibly transmission line
5. Install new transmitter and RF system
6. Commence operation at full power and coverage on new channel
7. Remove or retune old transmitter as standby

New Channel Transition Scenario

1. Install temporary antenna and transmission line for new channel
2. Install new transmitter or retune existing standby transmitter to new channel
3. Install new RF mask filter and RF system
4. Transition operations to new channel (Likely at reduced power and coverage)
5. Remove former main channel antenna and possibly transmission line
6. Install new main channel antenna and possibly transmission line
7. Commence operation at full power and coverage on new channel
8. Remove old transmitter if unable to retune as standby TX

Shared Antenna Transition Scenario

1. Install temporary antenna and transmission line for current channel or rely on a backup antenna if available
2. Transition operations to temporary antenna or backup antenna (Likely at reduced power and coverage)
3. Remove former main channel antenna(s) and transmission line(s)
4. Install new main multichannel antenna and transmission line
5. Install RF combining system for multiple stations
6. Install new transmitter, mask filter and RF system for each station
7. Switch all stations over to new channels
8. Remove old transmitter(s) or retune if possible as standby TX's

How To Prepare For Repack

- Conduct a facility review of the station's transmission plant and identify all items that might be affected by a channel change
- Update the transmission plant inventory
- Work with the transmitter manufacturer to determine if the transmitter is capable of being re-channelized; if possible, how long it might take and what is the cost?

How To Prepare For Repack

- Determine the current tower compliance, the capacity for added loading and the need for any tower structural modifications
- Sweep transmission line to determine what channels it will not support
- Determine what permits might be required for tower changes, building modifications, land use, etc.

How To Prepare For Repack

- Prepare initial estimates of cost for replacement transmitter, RF system, antenna, transmission line and other related costs as deemed necessary following the facility review*
- Develop list of resources and suppliers that will be needed during the repack

*FCC will require accurate estimate of costs to be filed with CP Application within 3 months after auction end

How To Prepare For Repack

- Line up commitments with suppliers and contractors such as RF consultants, tower crews, transmission equipment installers and other contractors that will be needed
- If transmission facility and tower is leased, begin discussions with owner
- If FM radio stations operate from the same tower, begin discussions on possible impact during construction

Repack and Preparing for ATSC 3.0

- 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 addition money to the purchase
  - Substantial longer term savings gained by not having to replace an antenna later

ATSC 3.0 and Transmitter Replacement

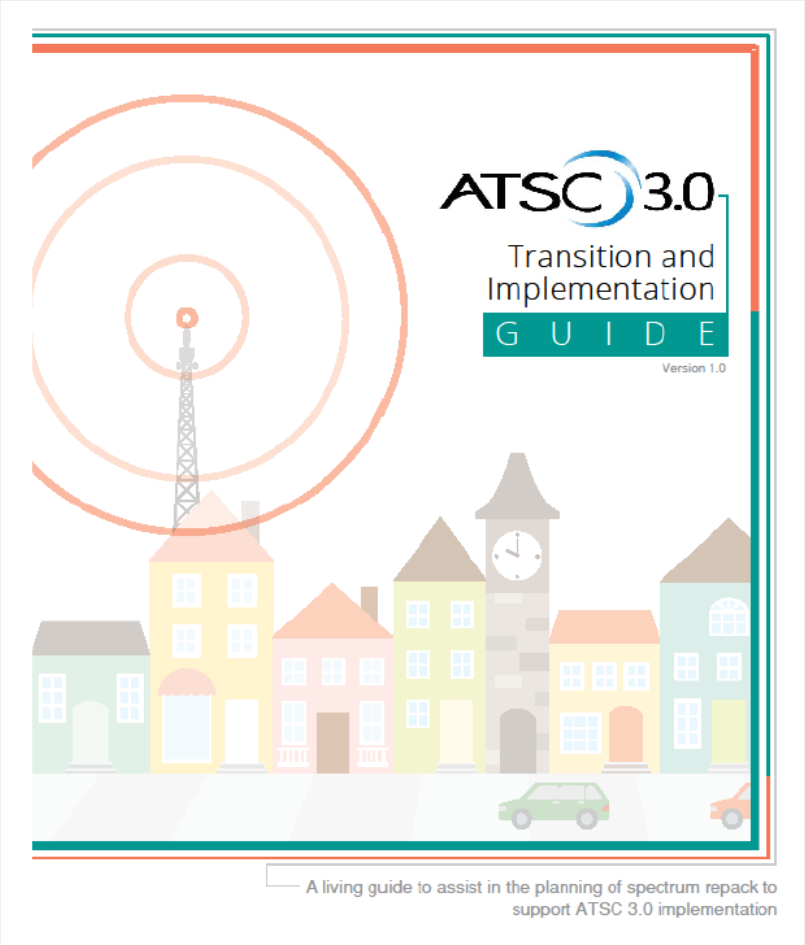
- Three considerations when selecting a replacement transmitter during repack
  - Is the exciter(s) upgradable to ATSC 3.0?
  - Will the transmitter support the additional 2dB of PAPR?
  - If adding V Pol, will the transmitter have sufficient power?
- Stations will likely have to add capital to if the replacement is higher power than the current TX
  - Longer term saving from not having to replace the transmitter when transitioning to ATSC 3.0

Key Takeaways

- **All** stations are possible repack candidates
- Even **stations not required to change channels** can be **impacted**
- Staying **ON AIR** during repack will **most likely require some additional equipment**
- The **time** allocated for **CP application and reimbursement filing** will **over burden industry resources**
- **Preparation** for repack should begin **ASAP**
- In most markets and regions, **cutover** will need to be **coordinated and carefully managed**

Key Takeaways

- 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**



ATSC 3.0 Transition& Implementation Guide

Coming Soon!

Q & A