October 30, 2014

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

Re: In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, GN Docket No. 12-268, Notice of *Ex Parte* Communication

Dear Ms. Dortch:

On October 28, 2014, Victor Tawil, Bruce Franca and the undersigned of the National Association of Broadcasters ("NAB") met with Gary Epstein, Howard Symons, Dorann Bunkin, Mary Margaret Jackson, A.J. Glusman, and Evan Kwerel of the Incentive Auction Task Force, Melissa Dunford, Madelaine Major, Martha Stancill, Brett Tarnutzer, Jonathan McCormack and Sasha Javid of the Wireless Telecommunications Bureau, Julius Knapp, Mark J. Colombo, and Martin Doczkat of the Office of Engineering and Technology, John Williams of the Office of Strategic Planning and Policy Analysis, and William Scher of the Office of General Counsel.

During the meeting, NAB asked questions concerning the Commission's approach to repacking non-participating broadcasters during the voluntary incentive auction, including issues described in the attached presentation.

Please direct any questions concerning this matter to the undersigned.

1771 N Street NW
Washington DC 20036 2800
Phone 202 429 5300

Respectfully submitted,

Patrick McFadden
Vice President, Strategic Planning
National Association of Broadcasters

cc: Gary Epstein
Howard Symons
Dorann Bunkin
Mary Margaret Jackson
A.J. Glusman
Evan Kwerel
Melissa Dunford
Madelaine Major
Martha Stancill
Brett Tarnutzer
Jonathan McCormack
Sasha Javid
Julius Knapp
Mark J. Colombo
Martin Doczkat
John Williams
William Scher

Repacking & Auction Design

October 28, 2014

Topics

- Same three topics discussed in February 11, 2014 meeting
  - Auction design (forward and reverse)
  - Pre- and post-auction optimization techniques
  - How does the FCC plan to implement market variability

Forward and Reverse Auction Update & Discussion

AUCTION DESIGN AND SEQUENCING

Auction Design

- Auction Sequence
  - *One vs. two step process*
    - Will the FCC complete the reverse auction first before starting the forward auction, or run both auctions/repacking process simultaneously?
    - Is the intent to conduct the forward auction in two steps: (1) bidding on fungible "generic blocks" and (2) rebidding on both "impaired" or "unimpaired" blocks – or to conduct the forward auction in one step?
    - If the forward auction is conducted in one step, will impaired blocks for each PEA be determined during the auction, or will the FCC compute the universe of impaired blocks on every possible station and on every possible channel prior to the start of auction?

Auction Design

- Auction Sequence *(continued)*
  - *One vs. two step process*
    - Will the universe of impaired blocks be based on a pair-wise or aggregate stations repacking results?
    - If the FCC computes the universe of impaired blocks prior to the start of a simultaneous auction, will that information be used in determining the value of a 6 MHz channel of a TV station?
  - *Selection of initial spectrum clearing target*
    - Will the FCC establish an initial spectrum clearing target based on reassigning and accommodating all the stations that do not volunteer within that clearing target? Is the spectrum clearing target derived from national, regional or market-by-market repacking scenarios?

Auction Design

- Auction Sequence *(continued)*
  - *Selection of initial spectrum clearing target*
    - What other constraints, if any, will be included between each successive round of bidding for a spectrum clearing target that will preserve/alter the initial baseline repacking run?
    - What factors will be used to determine when to change the spectrum clearing target? Will the FCC develop a new baseline repacking run or reuse the earlier one?
    - What role, if any, does market-to-market variation play in the decision to move from one round to another within a given spectrum clearing target? To move to a lower spectrum clearing target?

Auction Design

- Auction Sequence *(continued)*
  - Weighting Factors
    - "Weighting" factors based on interference and population-based metrics. Where and how are these factors going to be applied?
    - For example, weighting factors could be used to determine the degree of impairment between different blocks for a given PEA in the forward auction, or when accepting a station bid in the reverse auction. Will weighting factors be used both in the forward and reverse auctions? Will they be used in the repacking phase or only between rounds to determine which bid to accept in the reverse auction?
    - How do you plan to rank these weighting factors?

Reverse Auction Update & Discussion

PRE- AND POST-AUCTION OPTIMIZATION TECHNIQUES

Optimization Techniques

- Algorithms for the auction
  - Will they include operating ranges, boundary conditions and expected performance for different initial conditions and repacking scenarios?
  - How difficult is it to implement these algorithms using software? Will they be made available in a specific software form for evaluation?

Optimization Techniques

- Pre-auction optimization techniques
  - Has the FCC explored optimization techniques to improve the efficiency of repacking prior to or during the feasibility solution stage of repacking?
  - Does the propositional formula used for the feasibility testing (*i.e.* Kevin Leyton-Brown's work) only consider technical constraints? Are there plans to modify these technical constraints and/or add new ones?
  - Based on the work to date by the wireless industry and NAB's analysis of the 100 sample repacking profiles, the SAT solver offers a wide range of repacking solutions that achieve the same spectrum recovery target. Is the FCC attempting to improve or narrow the difference between solutions? If so, how?

Profile Comparison

- Numbers of stations that must go off air in different repacking profiles.

Recovery Target	Statistics	Population	DMA	Pop/Block
120 MHz	Minimum*	415	376	390
	Maximum**	443	394	411
	Median***	433	382	400
84 MHz	Minimum	222	186	200
	Maximum	249	212	228
	Median	231	199	212

**Profile that achieved the lowest of stations to volunteer for a given spectrum target*
***Profile that achieved the highest of stations to volunteer for a given spectrum Target*
****Median statistics for all 100 profiles*

Optimization Techniques

- Post-auction optimization techniques
  - Once the forward auction is completed, the FCC proposes to optimize the final repacking plan. What criteria are being considered to optimize the plan?
  - How will these techniques be applied? Will they include operating ranges, boundary conditions, trade-off etc.?

Update & Discussion

MARKET-BY MARKET VARIATION

Summary of Band Plan

- Down from TV channel 51 FDD band plan
- Paired Uplink/Downlink (5 MHz channels)
- Fixed 11 MHz Duplex Gap
- Min. 7 MHz Guard Band between TV and Wireless
- Band Plan is a "*Near National Band Plan*" and will accommodate market variability. Amount cleared will be determined during the auction. Partial Economic Areas (PEAs) are minimum licensed service areas for wireless

- *Example of a variable Plan configuration for 84 MHz Nationwide Plan on next slide.*

IS OUR CONFIGURATION CORRECT?

Variable Plan Configuration for an 84 MHz "Near National Plan"

(84 vs. 78 MHz)

TV Band Plan	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
84 MHz Plan	37	GB 3	A	B	C	D	E	F	G	Duplex Gap 11 MHz	A	B	C	D	E	F	G
78 MHz Plan	37	8 MHz	B	C	D	E	F	G	Duplex Gap 11 MHz	GB 5	B	C	D	E	F	G

Variable Plan Configuration for an 84 MHz "Near National Plan"

(84 vs. 72 MHz)

TV Band Plan	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
84 MHz Plan	37	GB3	A	B	C	D	E	F	G	Duplex Gap	A	B	C	D	E	F	G
72 MHz Plan	37	38	7 MHz GB	C	D	E	F	G	Duplex Gap	12 MHz	C	D	E	F	G	

Variable Plan Configuration for an 84 MHz "Near National Plan"

(84 vs. 60 MHz)

TV Band Plan	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
84 MHz Plan	37	G B 3	A	B	C	D	E	F	G	Duplex Gap 11 MHz	A	B	C	D	E	F	G
60 MHz Plan	37	38	12 MHz		C	E	F	G	Duplex Gap 11 MHz	15 MHz			D	E	F	G

Variable Plan Configuration for an 84 MHz "Near National Plan"

(84 vs. 48 MHz)

TV Band Plan	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
84 MHz Plan	37	GB 3	A	B	C	D	E	F	G	Duplex Gap 11 MHz	A	B	C	D	E	F	G
48 MHz Plan	37	38	39	GB 11 MHz		E	F	G	Duplex Gap 11 MHz	GB 5	47	GB 9 MHz		E	F	G

Market Variation

- Market variability parameters
  - While the FCC seeks flexibility to avoid the “least common denominator,” the goal is to minimize variability. How will the FCC decide the amount of variability to permit and the areas where it should occur?
  - How will the FCC balance minimizing variability with maximizing the amount of spectrum recovered? What metrics will be used to minimize spectrum variability? Will there be a cap on the number of stations that will be operating under a variable market configuration?
  - What criteria would the staff use to decide to move to a lower spectrum recovery target rather than increase the number of variable market configuration?

Market Variation

- Software implementation of market variability
  - How will market variability be incorporated in software? Will it be implemented on the fly in the SAT solver phase, or as a separate process before or after repacking? Will the amount of market variability be used to decide whether to move between rounds?
  - Will the degree of impairment in a block be used to decide which markets will be selected as variable markets? If so, how?
  - Will the auction software be made public prior to the auction?