
Auctioning Encumbered Spectrum

Peter Cramton

University of Maryland

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*Much of this is joint work with
Evan Kwerel and John Williams, and
Larry Ausubel and Paul Milgrom*

Auctioning Encumbered Spectrum

- Prior spectrum allocations no longer efficient
 - Microwave users in PCS band
 - UHF TV broadcasters in 700 MHz band
- FCC must reallocate encumbered spectrum for new use
- How to achieve efficient clearing of incumbents?

Alternative Approaches to Clearing

- Post-auction negotiation
- Parallel auction (clearing simultaneous with FCC auction)
- Two-sided auction (clearing integrated with FCC auction)
- Clearing pre-auction (before FCC auction)

Post-Auction Negotiation

- How to structure negotiations between entrants and incumbents?
 - Doesn't matter if no bargaining costs
 - But bargaining costs may be substantial
- Alternative relocation rules
 - Right to stay
 - Right to move without compensation
 - Right to move with compensation
 - Delayed right to move

Efficiency

- c = cost of relocating incumbent (public)
- v_i = value to incumbent of current use
- v_e = value to entrant of clear spectrum
- Take action with least cost or smallest value loss
 - Relocate if $c < v_i$ and $c < v_e$
 - Clear if $v_i < c$ and $v_i < v_e$
 - Accommodate if $v_e < c$ and $v_e < v_i$

Outcome Under Each Rule without Negotiation

Case	Efficient outcome	Right to stay	Right to move without compensation	Right to move with compensation
1. $c < v_i < v_e$	Relocate	Accommodate	Relocate	Relocate
2. $c < v_e < v_i$	Relocate	Accommodate	Relocate	Relocate
3. $v_i < c < v_e$	Clear	Accommodate	Clear	Clear
4. $v_i < v_e < c$	Clear	Accommodate	Clear	Accommodate
5. $v_e < c < v_i$	Accommodate	Accommodate	Relocate	Accommodate
6. $v_e < v_i < c$	Accommodate	Accommodate	Clear	Accommodate
Pr(Efficient)	1	1/3	2/3	5/6

Negotiation Difficulties

- Values are privately known; cost is public
- Holdout problem
 - Many incumbents may need to be cleared in particular market
- Free-rider problem
 - Clearing an incumbent may benefit multiple entrants

Relocation Policy

- Best policy depends on priors about desirability of relocating, clearing, or accommodating
- Right to stay requires difficult negotiation most often
- Right to move with compensation greatly reduces holdout problem, yet makes incumbent whole
- Relocation rule is important even if do not rely on post-auction negotiation

Parallel Auction

- FCC auctions encumbered spectrum
- Private auction for options to clear incumbents run at same time
 - Incumbent states clearing cost by year
 - Incumbent sells option to clear according to these terms
- Difficulties
 - Requires participation by incumbents
 - New licenses and old licenses are strong complements
 - Should be bundled together, but how to price separate parts?

Two-Sided Auction

- Same as parallel auction, but now FCC conducts a single integrated auction, allowing improved coordination
- Incumbents offer their licenses with reserve prices
- Bundling is likely desirable, due to strong complements, but how to price parts?
- Combinatorial bidding may be desirable if bidders differ in extent/form of complementarities; otherwise, bundle
- Allows incumbent to either buy or sell depending on prices

Clearing Pre-Auction

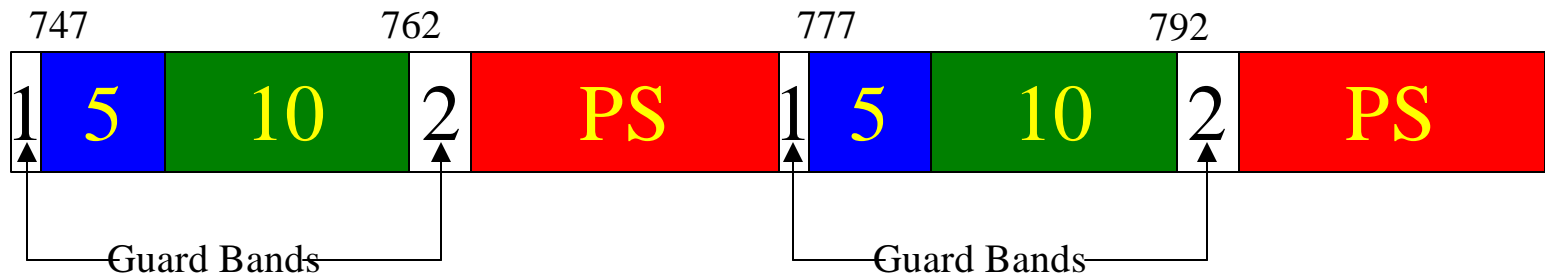
- Resolve clearing issue before FCC auction
- Identify the least-cost clearing solution
- Appropriate when multiple license holders can compete to be the one to clear
- Reduces uncertainty and delay
- Improves auction efficiency; bidders compete equally for clear spectrum

700 MHz Auction

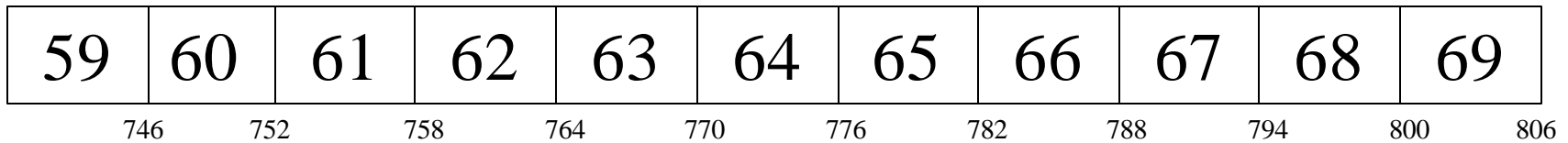
- FCC to auction 30 MHz in 700 MHz band on September 6
- 700 MHz spectrum offers potential for wireless competition in broadband market
- Spectrum is encumbered by existing UHF broadcasters, blocking use by new licensees in most major markets
- Spectrum is worth *much* more if clear of incumbent broadcasters

700 MHz Band Plan

Commercial / PS Band Channels

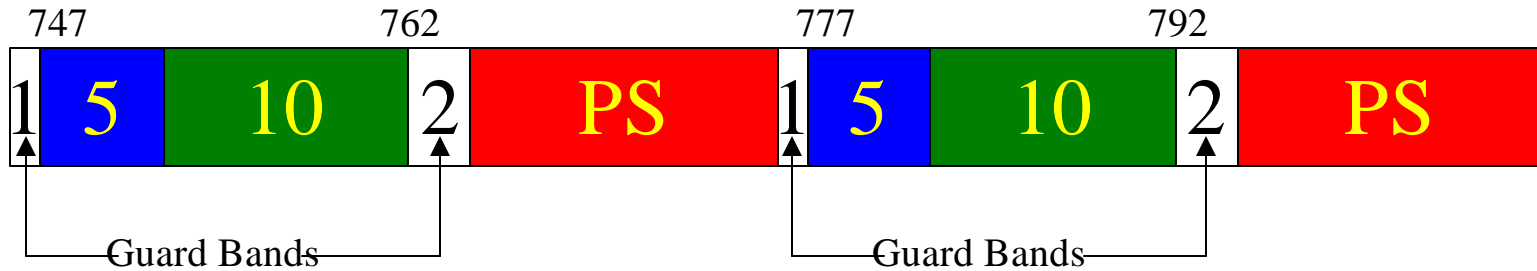


UHF TV Channels

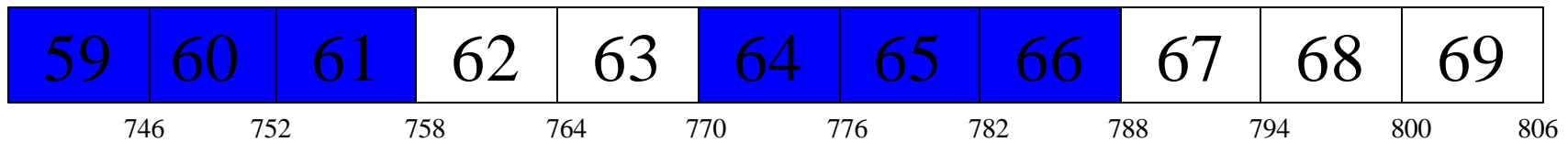


Incumbent broadcasters have co-channel and adjacent-channel protection

Commercial / PS Band Channels



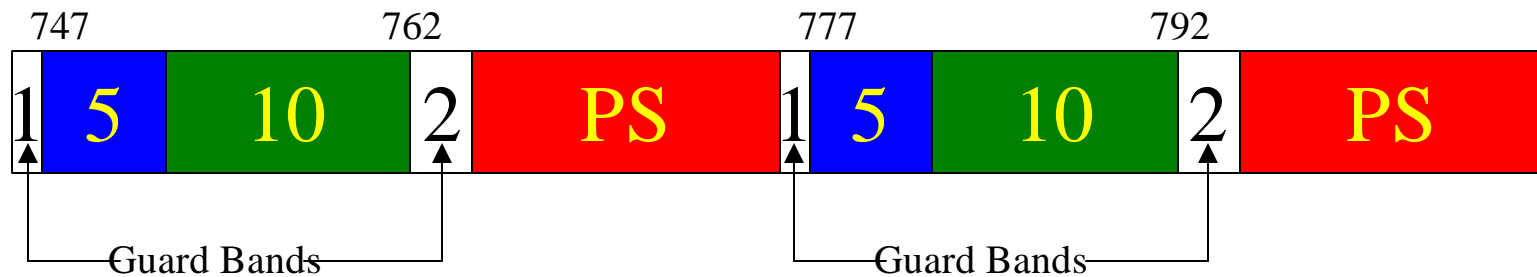
UHF TV Channels



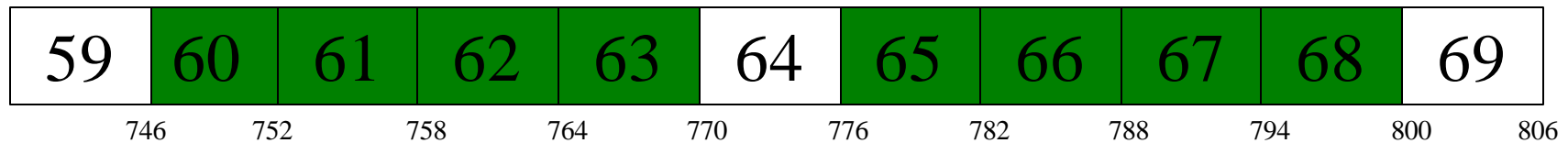
License C winner must clear 59-61 and 64-66

Incumbent broadcasters have co-channel and adjacent-channel protection

Commercial / PS Band Channels



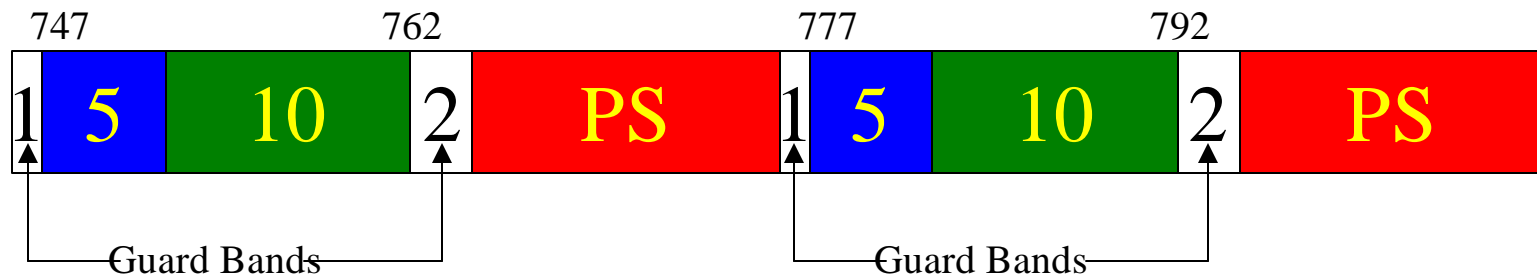
UHF TV Channels



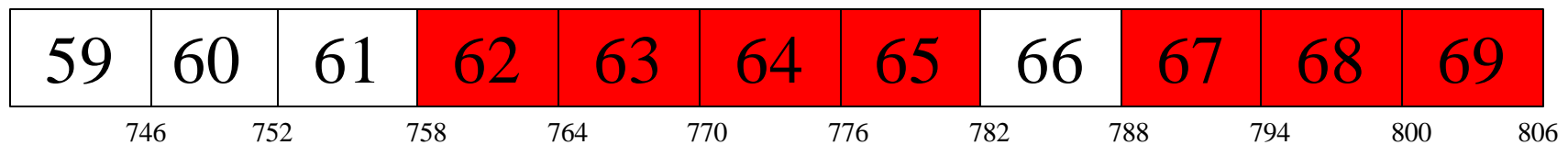
License D winner must clear 60-63 and 65-68

Incumbent broadcasters have co-channel and adjacent-channel protection

Commercial / PS Band Channels

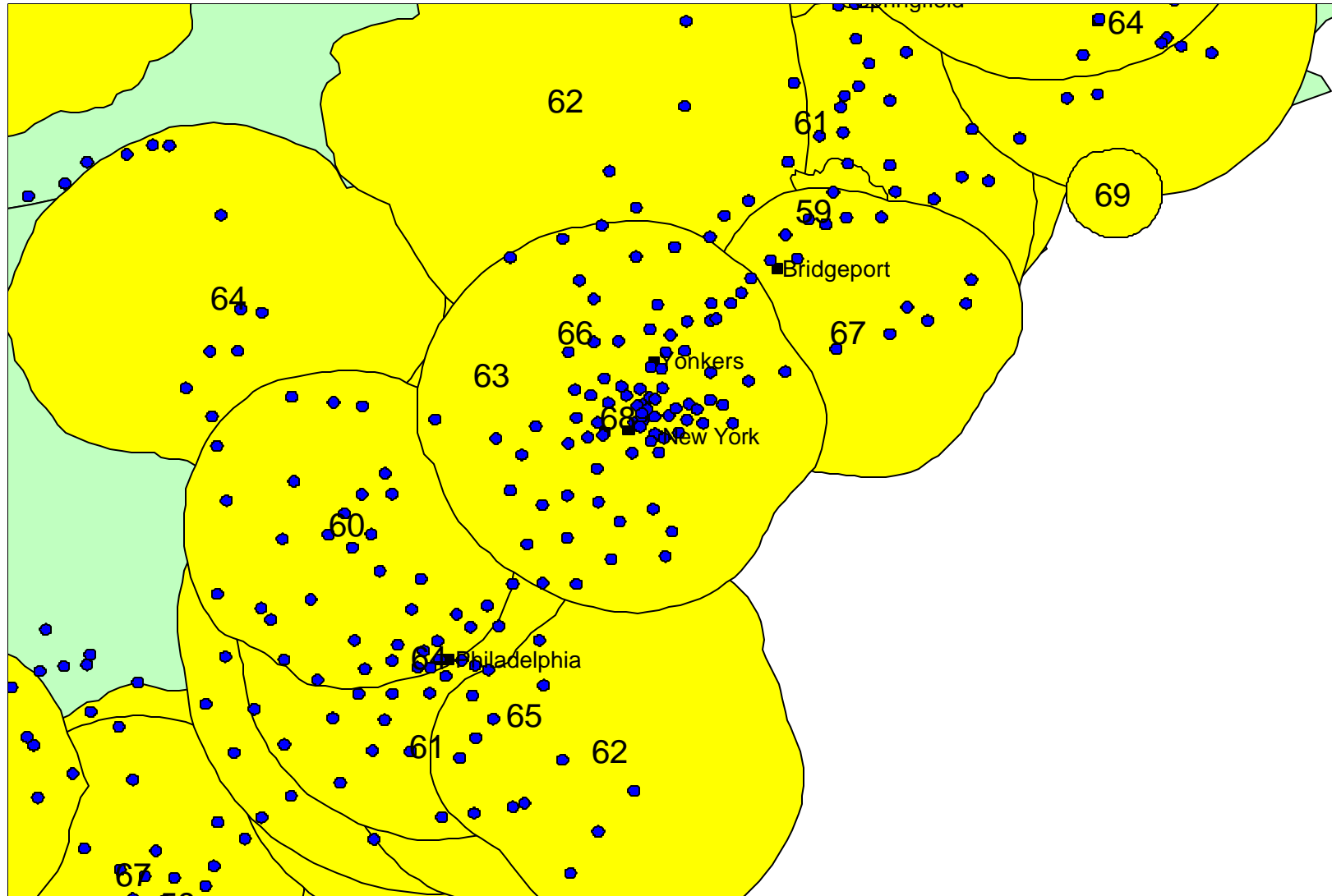


UHF TV Channels



Public Safety must have 62-65 and 67-69 cleared

Is interference a problem? UHF Ch 59-69 in Greater NY



Spectrum Exchange Plan

- New broadband services in 700 MHz band require that broadcast operations in the band be cleared much sooner than the end of the transition to DTV
- Spectrum Exchange will conduct a private auction for the purpose of clearing the encumbered spectrum
- The Spectrum Exchange Auction will enable bidders in the FCC's 700 MHz Auction to bid with confidence that the spectrum will be cleared at an early date — and at a known cost

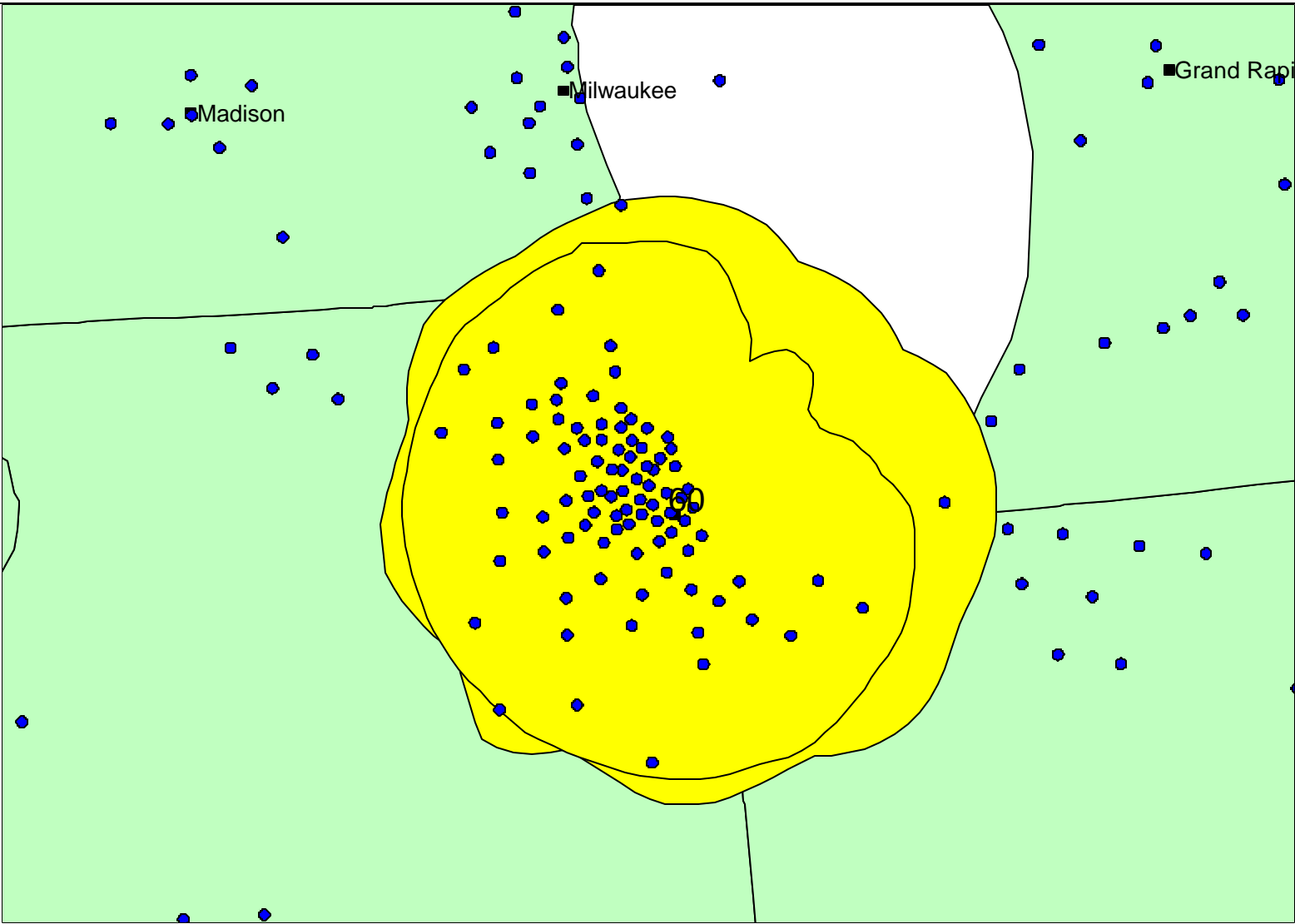
Importance of Early Clearing Agreements

- Without agreements,
 - Holdout will delay or prevent efficient spectrum use, destroying public value
 - Winning bidders may be those best able to deal with incumbents, rather than those best qualified to use the spectrum
- Introducing one or more “comparable” stations and holding a clearing auction dramatically improves the situation
 - The competition shifts the bargaining away from the value of the cleared spectrum and toward the cost of clearing
 - Those stations that can clear at lowest cost will do so, thus minimizing any loss of broadcast service

Example of Relocation: Chicago

- Four stations, collectively encumbering 100% of the commercial band, need to clear
 - WEHS 60 (Aurora, IL): broadcasts off Sears Tower
 - WJYS 62 (Hammond, IN): broadcasts 24 miles from Chicago (and its DT counterpart is licensed to broadcast off Sears Tower)
 - WGBO 66 (Joliet, IL): broadcasts off Hancock Tower
 - WEHS-DT 59 (Aurora, IL): licensed to broadcast off Sears Tower
- However, there is a total of 9 comparable analog stations (the 3 above, plus 6 other analog UHF stations) that could clear

Chicago: UHF 60, 62, 66, 59DT



The Mechanics of the Clearing Auction

- Spectrum Exchange enters into contracts with applicants in the FCC Auction and with incumbent broadcasters
 - FCC applicants agree to pay for the clearing at a price determined by the private auction
 - Broadcasters agree to make their bids in the private auction contractually binding
 - Incumbent broadcasters (Channels 59–69) receive incentive payments in return for their commitment to clear or relocate
 - If an incumbent broadcaster (Channels 59–69) wins the private auction, then it receives both the incentive payment and the amount determined by the private auction

The Mechanics of the Clearing Auction (cont.)

- The auction identifies stations that can clear at lowest cost
- The auction proceeds as a “descending clock”: the auction begins with the auctioneer naming a high price and allowing it to descend toward zero
- Stations periodically indicate whether they are “in” at the current price (i.e., willing to clear at that price) or “out”
- The auction concludes when only as many stations as are needed to clear remain in the auction

How the FCC Can Facilitate Clearing

- Allow early transition to DTV-only
- Assure transitioning broadcasters of continuing cable carriage
- Establish relocation rule for channel 59–69 broadcasters