

**The Greatest Auction in History:  
Allocating Spectrum Efficiently  
(and Raising Billions)**

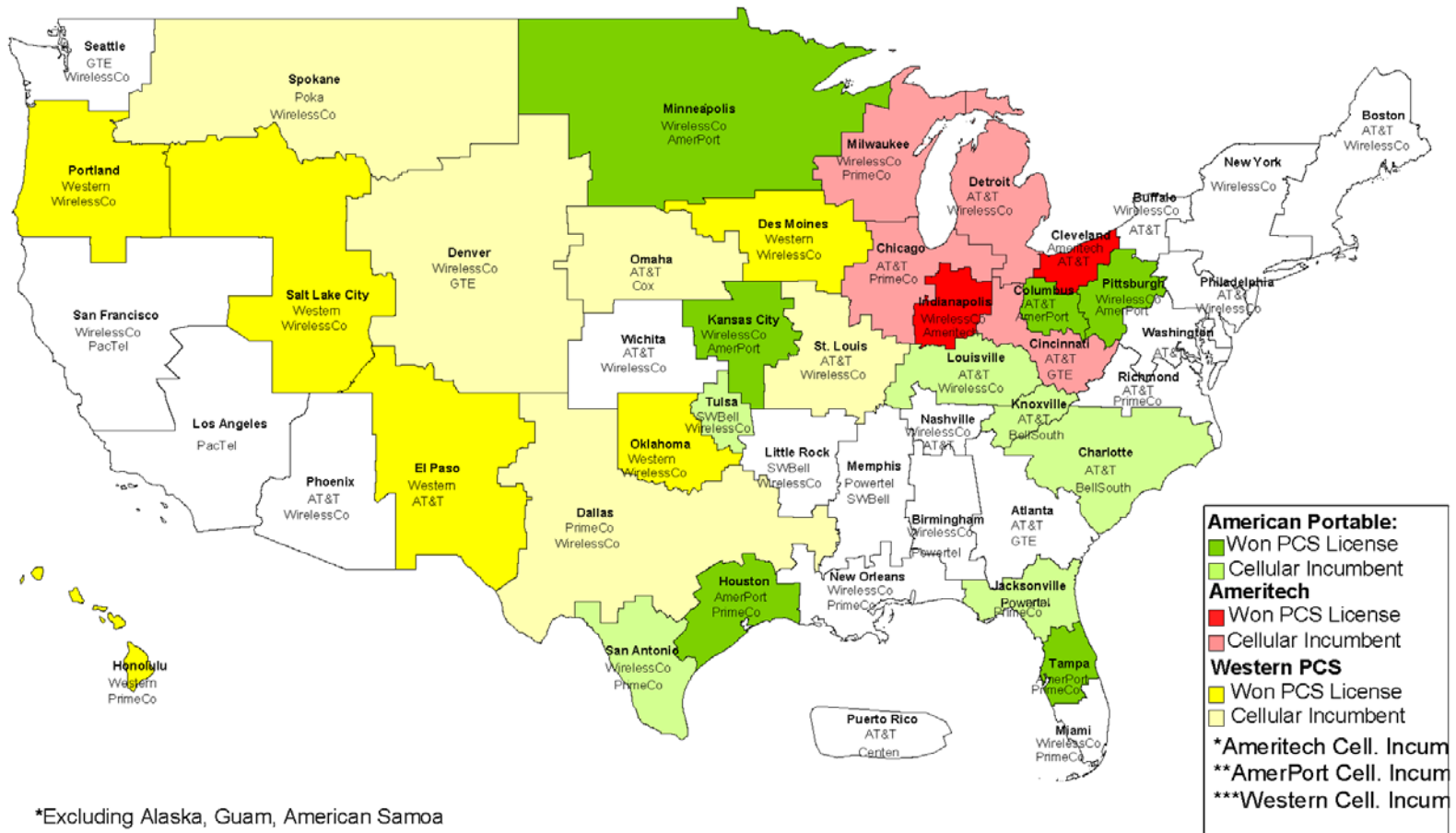
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# Advent of FCC Spectrum Auctions

- **Congress passed a bill in 1993, authorizing the FCC to allocate spectrum licenses via auction (instead of using beauty contests or lotteries)**
- **Spectrum licenses cover assorted geographic areas, there are typically multiple licenses for a given geographic area, and there are synergies**
- **Academic economists proposed the very idea of spectrum auctions, and devised the auction rules that worked successfully in 1994**
- **Auction theory has been an active area of NSF-funded research, 1980-2010**

# A/B-Block Auction (two licenses per region)

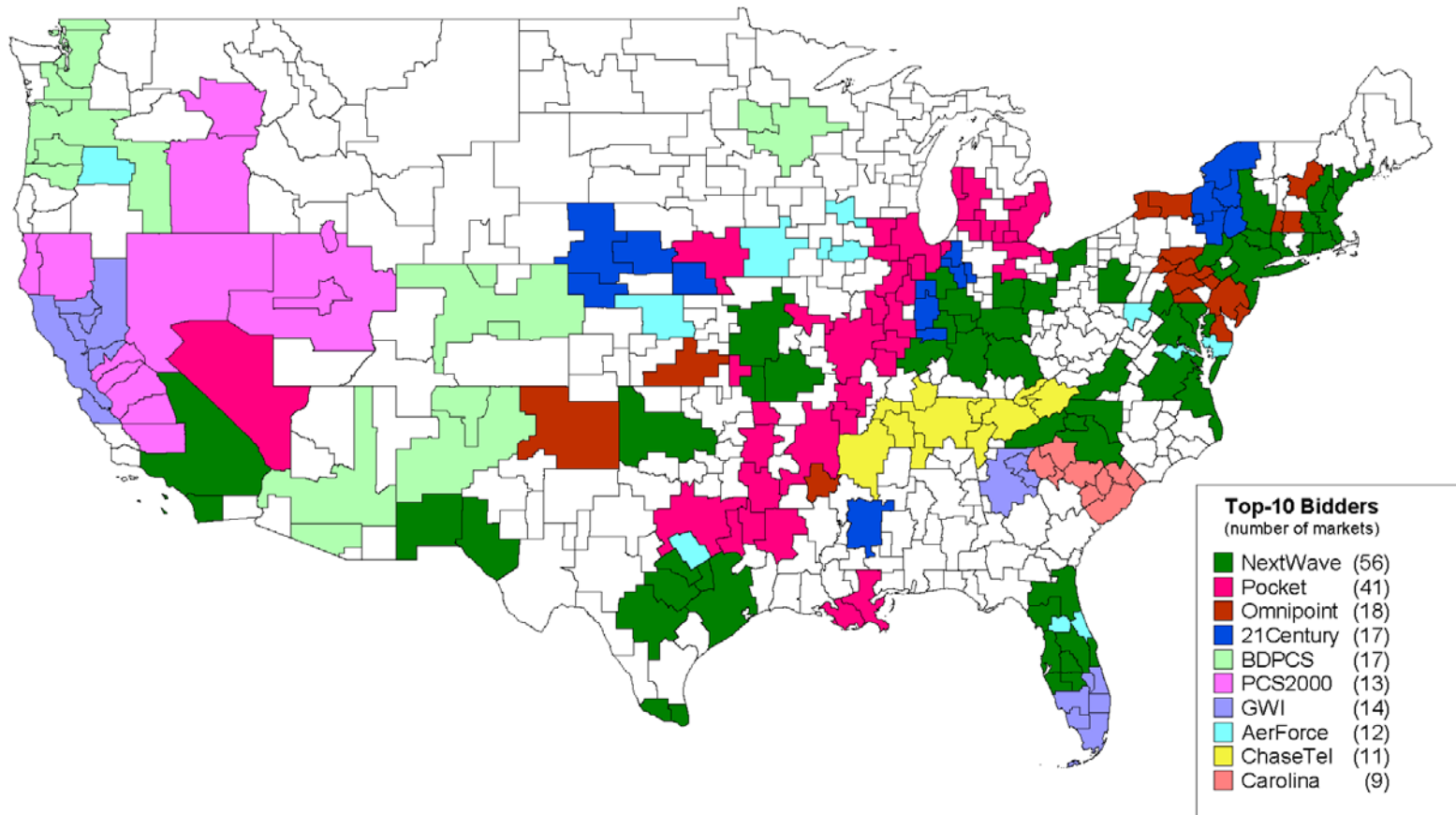
## Winning Bidders and Sample Footprints in MTA Broadband PCS Auction\*



\*Excluding Alaska, Guam, American Samoa

# C-Block Auction (one license per region)

**Footprints of Top-10 Bidders  
in C-Block Broadband PCS Auction**



# Prior Practice

- **Department of the Interior (oil lease auctions)**
  - ◆ Items are auctioned simultaneously in independent sealed-bid auctions
- **Sotheby's / Christie's (art auctions)**
  - ◆ Items are auctioned sequentially in open-outcry English auctions
- **Fatal flaws in prior practice**
  - ◆ Difficult or impossible to assemble rational packages that reflect the synergies and scale economies
  - ◆ Revenues are consequently low

# The Simultaneous Ascending Auction

- All licenses are auctioned *simultaneously*
- In each round, any bidder can raise the high bid on any license (subject to eligibility and activity rules)
- Bidders have an eligibility based on their deposit
- Bidders must keep active to maintain their eligibility:  
$$\text{Activity} = \text{Standing High Bids} + \text{New Bids}$$
- Bid withdrawal penalties
- Minimum bid increments specified for each license
- Stopping Rule: Auction does not end on *any* license until bidding stops on *all* licenses

# The Simultaneous Ascending Auction

- The “activity rule” is regarded to be the key feature:
  - ◆ Each license is assigned a number of points
  - ◆ Activity = Standing High Bids + New Bids (expressed in points)
  - ◆ Activity in a given round must be at least  $x\%$  of the bidder’s eligibility ( $x$  is generally 80% early in the auction and 95% later in the auction)
  - ◆ A bidder whose activity is less than that required has its eligibility permanently reduced, commensurately
  - ◆ In short, in order for a bidder to be able to bid on licenses late in the auction, the bidder is required to bid early in the auction

# An Area of Continuing Improvements

## ■ Clock auctions

- ◆ The next generation of auctions after the FCC simultaneous ascending auction
- ◆ The India 3G Auction (scheduled to begin on April 9) is a clock auction

## ■ Package bidding

- ◆ Package bids are all-or-nothing bids on *sets* of licenses
- ◆ Auctions with package bidding are theoretically superior but difficult to implement
- ◆ The two most recent UK spectrum auctions were “package clock auctions”

# Non-Ideological

- **Initially proposed by Ronald Coase (1959)**
- **Enacted by a Democratic Congress and signed by President Clinton in 1993**
- **Championed by Reed Hundt and Al Gore**
- **William Safire: “The Greatest Auction Ever” (1995)**
- **Bob Dole: Let the free market work and stop the giveaway (digital TV spectrum, 1997)**

# Examples of Future Applications

- **The US Treasury owns 27% of Citibank shares**
  - ◆ **Classic approach would be to hire investment banks**
  - ◆ **Better approach is to conduct a sealed-bid auction**
  - ◆ **The weight of academic economics (and the FCC experience) would suggest a dynamic auction**
- **Greenhouse gas emission reductions**
  - ◆ **Tendency of political process is to grandfather them**
  - ◆ **Most academic economists would favor 100% auction**
  - ◆ **The current proposed approach for Australia is a simultaneous clock auction (closely related in structure to the FCC auctions)**