• Over 13 months in 2016-17 the FCC held an “incentive auction” to repurpose radio spectrum from broadcast television to wireless internet

Before:

After:

• Stations that continued broadcasting were assigned potentially new channels to fit as densely as possible into the channels that remained

• 14 channels were resold as 70 MHz of wireless internet licenses for $19.8 billion

• Over $10 billion was paid to 175 stations for voluntarily relinquishing their licenses
1. A general philosophy of market analysis via **computationally intensive simulations**

2. Some specific insights about the **Incentive Auction design**
   - Given that the auction was **novel**, extremely **complex**, and produced under **time pressure**, we wanted to understand:
     - which elements of the design were most important?
     - are there **variations of the design** that might have led to even **better outcomes**?
   - We asked four questions concerning the auction’s design:
     - Was repacking the VHF band worth its added complexity?
     - Did scoring stations by population decrease the reverse auction cost?
     - Did it help to build custom software to repack stations?
     - How was performance affected by the procedure for deciding the number of channels to clear?
   - We answered these questions quantitatively using simulations
     - We assumed bidders **myopically maximize their profit** in each round
     - We used **two distinct value models** for robustness (one from the literature [Doraszelski et al. 2017], another we fit to bid data)
Simulation Methodology

1. Build an **auction simulator**
   - Choose an appropriate level of abstraction
     - auction rules are often incredibly complex!

2. Construct a **parameterized bidder model**
   - some parameters feed into bidder valuations
   - others help to specify how bidders will behave in the auction

3. Establish a **probability distribution** over the bidder model’s parameters

4. Draw **many samples** from this distribution

5. Run **paired simulations** holding sampled parameters fixed while varying some facet of auction design

6. **Compare** outcomes
**Value Loss:**
Sum of values of stations removed from the air

**Cost of Acquiring Spectrum:**
Sum paid to winning stations

Lower is better for both metrics