Section 24.4: Implementation as a Descending Clock Auction

Auctions and Algorithms

Note: a station's response to an offer of compensation t reveals whether station's value (i.e., min-acceptable compensation) is above or below t. [like a primitive "is $w_v \leq t$" (w_v = v's value for its license)]

FCCGreedy: Sorts stations by w_v/β_v.

=> seems to need known-in-advance w_v's. Dealbreaker?

Hope: reimplement algorithm to use only auction-friendly operations of above form.

Example

Current offer

~~t=5~~

~~t=4~~

~~t=3~~

~~t=2~~

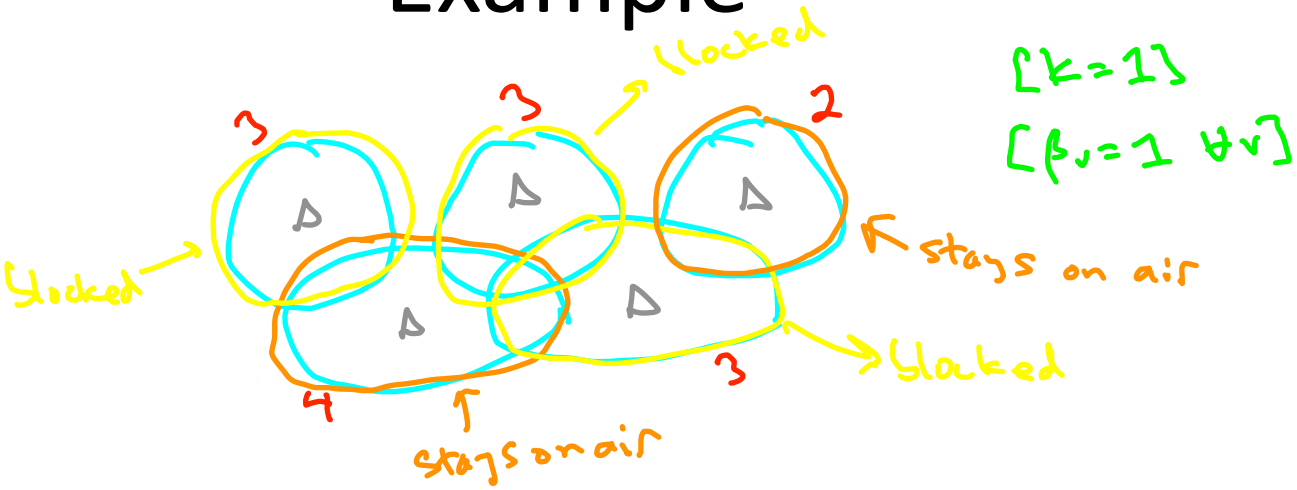
t=1

Stations on air

~~S = ∅~~

S = {value-4 station}

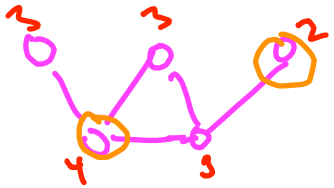
S = {value-4 station, value-2 station}



[k=1]

[β_v=1 ∀v]

Compare to:



In general: recreates trajectory of Basic Greedy algorithm for WIS.

Reimplementing FCCGreedy

To accommodate β_v's: for a "base price" t, offer compensation $t \cdot \beta_v$ to each station v.

Consequence: stations drop out in decreasing order of v/β_v (subject to feasibility).

FCC DescendingClock:

[S = stations remaining on air, initially $\emptyset$]

[T = stations going off air, initially $\emptyset$]

[t = base price, initially very large]

while $S \cup T \neq X$ [X = all stations]

  for each station $v \notin S \cup T$: (uses feasibility checker)

    if $S \cup \{v\}$ is packable:

      offer compensation $\beta_v \cdot t$ to v

      if offer refused:

        $S := S \cup \{v\}$

    else

      $T := T \cup \{v\}$

  $t := (1-\varepsilon) \cdot t$

Time to Get Paid

Question: how to set initial base price? **Answer:** super-high! (e.g., $900M for WCBS)

Contract: accepted offers binding for stations. (can't back out later)

Compensation: Each broadcaster going off the air was paid the most recent (thence lowest) offer they accepted in the auction.

Note: very simple for auction participants (accept offer $\Leftrightarrow \geq$ value).

Note: every timeout by the feasibility checker on a packable set of stations $\Rightarrow$ huge pile of money left on the table!