Smoothing Methodology Fact Sheet

In the FCC's simultaneous multiple round auctions, the FCC Automated Auction System calculates the minimum acceptable bids and bid increments for each license in each round of the auction. For most auctions, the Commission uses a standard smoothing methodology, which takes into account all bidding activity for each license, for these calculations. (For auctions in which the Commission does not employ the smoothing formula, it instead uses a fixed percentage increment.)

Until a bid is placed on a license, the minimum acceptable bid for that license equals its minimum opening bid. In the rounds after a bid has been placed on a license, the minimum acceptable bid for that license equals the standing high bid plus a bid increment. In addition to the minimum acceptable bid amount for each license, bidders may place bids of amounts calculated using multiple bid increments — i.e., the second bid amount equals the standing high bid plus two times the bid increment, the third bid amount equals the standing high bid plus three times the bid increment, etc.

The smoothing formula calculates minimum acceptable bids by first calculating a *percentage increment*, not to be confused with the *bid increment*, for each license based on a weighted average of the activity received on each license in all previous rounds; therefore, a license that has received many bids throughout the auction will have a higher percentage increment than a license that has received few bids.

At the end of each round, the FCC Automate Auction System calculates the percentage increment used to determine the minimum acceptable bid for each license for the next round. The computation is based on an activity index, which is calculated as the weighted average of the activity in that round and the activity index from the prior round. The current activity index is equal to a weighting factor times the number of new bids received on the license in the most recent bidding round plus one minus the weighting factor times the activity index from the prior round. The activity index is then used to calculate a percentage increment by multiplying a minimum percentage increment by one plus the activity index with that result being subject to a maximum percentage increment. In many auctions the Commission initially sets the weighting factor at 0.5, the minimum percentage increment at 0.1 (10%), and the maximum percentage increment at 0.2 (20%).

Equations

$A_i = (C * B_i) + ((1-C) * A_{i-1})$
I_{i+1} = smaller of $((1 + A_i) * N)$ and M
$X_{i+1} = I_{i+1} * Y_i$
where,
A_i = activity index for the current round (round i)
C = activity weight factor
B_i = number of bids in the current round (round i)
A_{i-1} = activity index from previous round (round i-1); (for Round 1, A_{i-1} is set at 0)
I_{i+1} = percentage increment for the next round (round i+1)
N = minimum percentage increment or percentage increment floor
M = maximum percentage increment or percentage increment ceiling

X_{i+1} = dollar amount associated with the percentage increment
Y_i = high bid from the current round

Under the smoothing methodology, once a bid has been received on a license, the minimum acceptable bid for that license in the following round will be the high bid from the current round times one plus the percentage increment, with the result rounded to the nearest thousand if it is over ten thousand, to the nearest hundred if it is under ten thousand but over one thousand, or to the nearest ten if it is below one thousand. Subtracting the high bid from the current round from the minimum acceptable bid for that license for the following round results in dollar amount of the bid increment.

Examples

License 1
C = 0.5, N = 0.1, M = 0.2

Round 1 (2 new bids, high bid = $1,000,000)

1. Calculation of percentage increment for round 2 using the smoothing formula:
   $A_1 = (0.5 * 2) + (0.5 * 0) = 1$
   I_2 = The smaller of ((1 + 1) * 0.1) = 0.2 or 0.2 (the maximum percentage increment)

2. Calculation of dollar amount associated with the percentage increment for round 2 (using I_2 from above):
   $X_2 = 0.2 * \$1,000,000 = \$200,000$

3. Minimum acceptable bid for round 2 = $1,200,000

Round 2 (3 new bids, high bid = $2,000,000)

1. Calculation of percentage increment for round 3 using the smoothing formula:
   $A_2 = (0.5 * 3) + (0.5 * 1) = 2$
   I_3 = The smaller of ((1 + 2) * 0.1) = 0.3 or 0.2 (the maximum percentage increment)

2. Calculation of dollar amount associated with the percentage increment for round 3 (using I_3 from above):
   $X_3 = 0.2 * \$2,000,000 = \$400,000$

3. Minimum acceptable bid for round 3 = $2,400,000

Round 3 (1 new bid, high bid = $2,400,000)

1. Calculation of percentage increment for round 4 using the smoothing formula:
   $A_3 = (0.5 * 1) + (0.5 * 2) = 1.5$
   I_4 = The smaller of ((1 + 1.5) * 0.1) = 0.25 or 0.2 (the maximum percentage increment)

2. Calculation of dollar amount associated with the percentage increment for round 4 (using I_4 from above):
   $X_4 = 0.2 * \$2,400,000 = \$480,000$

3. Minimum acceptable bid for round 4 = $2,880,000

As stated above, until a bid has been placed on a license, the minimum acceptable bid for that license will be equal to its minimum opening bid. The additional bid amounts are calculated using the difference between the minimum opening bid times one plus the minimum percentage increment, rounded as described above, and the minimum opening bid. That is, I = (minimum opening bid)(1 + N){rounded} – (minimum opening bid). Therefore, when N equals 0.1, the first additional bid amount will be approximately ten percent higher than the minimum opening bid; the second, twenty percent higher; the third, thirty percent higher; etc.

In the case of a license for which the standing high bid has been withdrawn, the minimum acceptable bid equals the second highest bid received for the license. The additional bid amounts are calculated using the difference between the second highest bid times one plus the minimum percentage increment, rounded, and the second highest bid.

This fact sheet provides general information about the smoothing formula. For details on minimum acceptable bid and bid increment calculations for a particular auction, please refer to the auction-specific public notice announcing the filing requirements, minimum opening bids, upfront payments and other auction procedures.