Auction Design:
Indirect Contention

## Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward


## Contention

More than one application for the same or confusingly similar string


When two applications are both in direct contention with a third,

- Background / Terminology
- Key Considerations
- Proposed Solution
but not with one another


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A1 \& C
or
A2 \& C

Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

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## Contention Sets



- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

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## AGB Section 4,3.1

The auctioneer successively increases the prices associated with applications within the contention set, and the respective applicants indicate their willingness to pay these prices. As the prices rise, applicants will successively choose to exit from the auction. When a sufficient number of applications have been eliminated so that no direct contentions remain (i.e., the remaining applications are no longer in contention with one another and all the relevant strings can be delegated as TLDs), the auction will be deemed to conclude.

## Auction Challenges

- Respecting Contention Relationships
- AGB Principles
- Timing \& Fairness
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward
- Clarity to Bidders
- Cost Allocation


## Proposed Solution

- Ascending clock auction
- Second Price Auction
- Feasible Set: $\mathrm{A}_{\mathrm{x}}+\mathrm{C}_{\mathrm{x}}$ vs. B
- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward


## After bidding for a round ends:

1. Any application that met the End of Round Price, remains in the auction for the next round.

2 If an application, $X$, did not meet the End of Round Price, and an application, $Y$, Positioned the Same or Better than application X, outbid application X, then application X is eliminated.

3 When..

- Neither condition (1) or (2), above, are satisfied for application X
- And application X is part of a Feasible Set that remains eligible to bid in the auction,
- Then we compare the sum of the bids of the applications in the Feasible Set to the End of Round Price or other remaining Feasible Sets
- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Applications eligible for the next round are termed: Enduring Applications


- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward


## Basic Set

## Example 1

The first example will include (1), (2), and (3) references next to the action that correlates to those referenced in slide 10

Discussion Points

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

| Round | End of Round <br> Price | A1 | A2 | B | C |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| Result |  |  |  |  |  |

Round 1: Enduring Applications:
(1) $A_{1}, A_{2}, B$, and C met the End of Round Price

| Round | End of Round <br> Price | A1 | A2 | B | C |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 k$ | $\$ 600 k$ | $\$ 700 k$ | $\$ 900 k$ | $\$ 500 k$ |
| $\mathbf{3}$ |  |  |  |  |  |
| Result |  |  |  |  |  |


(1) B met the End of Round Price

## Eliminated:

(2) A1 it did not meet the End of Round Price while A2, Positioned the Same, bid more

| Round | End of Round <br> Price | A1 | A2 | B | C |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ \$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 600 \mathrm{k}$ | $\$ 700 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | \$500k |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 750 \mathrm{k}$ | $\$ 1.4 \mathrm{~m}$ | $\$ 550 \mathrm{k}$ |
| Result |  |  |  |  |  |



Round 3: No application met the End of Round Price
Neither Feasible Set $\{A 2, C\}$ nor $\{B\}$ met the End of Round Price
Thus, this is the final round in the Auction
Winning Application: B

| Round | End of Ro Price | A1 | A2 | B | C |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | \$400k | \$400k | \$400k | \$400k | \$400k |
| 2 | \$900k | \$60ok | \$700k | \$900k | \$500k |
| 3 | \$1.5m | Eliminated | \$750k | \$1.4m | \$550k |
| Result |  | Eliminated | Eliminated | Prevailed | Eliminated |

Result: Winning Payment: B will pay $\$ 1.3 \mathrm{~m}$

- Key Considerations
- Proposed Solution
- Path Forward
(\$1.4m > \$750k + \$550k (\$1.3m) )

Example 2

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

| Round | End of Round <br> Price | A1 | A2 | B | C |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | \$50k |
| $\mathbf{2}$ |  |  |  |  |  |
| $\mathbf{3}$ |  |  |  |  |  |
| Result |  |  |  |  |  |

Round 1: Enduring Applications:
$A_{1}, A 2$, and $B$ met the End of Round Price
C did not meet the End of Round Price; however, is part of Feasible Set $\{A 1, C\}$ and \{A2,C\}

Discussion Points

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

| Round | End of Round <br> Price | A1 | A2 | B |
| :---: | :---: | :---: | :---: | :---: |
| 1 | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ |
| $\mathbf{2}$ | $\$ 900 k$ | $\$ 600 k$ | $\$ 900 k$ | $\$ 900 k$ |
| $\mathbf{3}$ |  |  |  | $\$ 50 k$ |
| Result |  |  |  |  |

Round 2: Enduring Applications:
$A 2$ and B met the End of Round Price
C did not meet the End of Round Price; however, is part of Feasible Set $\{A 2, C\}$
Eliminated:
A1 did not meet the End of Round Price and bid less than A2, who is Positioned the Same

| Round | End of Round <br> Price | A1 | A2 | B | C |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | \$50k |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 600 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 100 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 1.2 \mathrm{~m}$ | $\$ 1.3 \mathrm{~m}$ | $\$ 200 \mathrm{k}$ |
| Result |  |  |  |  |  |



Round 3: No Bidder met the End of Round Price Neither Feasible Set $\{B\}$ nor $\{A 2, C\}$ met the End of Round Price, thus Round 3 is the final round

Winning Applications: A2 and C
$\left.\begin{array}{|c|cccc|}\hline \text { Round } & \begin{array}{c}\text { End of Round } \\ \text { Price }\end{array} & \text { A1 } & \text { A2 } & \text { B }\end{array}\right]$ C


Result: Winning Payments:
A2 will pay $\$ 1,114,286$ (the greater of $\$ 600 \mathrm{k}(\mathrm{A} 1)$ and the proportion of $\$ 1.3 \mathrm{~m}(\mathrm{~B})$ )
C will pay $\$ 185,714$ (the proportion of $\$ 1.3 \mathrm{~m}(\mathrm{~B})$ )


## Discussion Points

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward


## Complex Set

## Feasible Sets



$$
\begin{aligned}
& B+D 2 \\
& \text { or } \\
& \text { A1 + C + D1 } \\
& \text { or } \\
& \mathrm{A} 1+\mathrm{C}+\mathrm{D} 2 \\
& \text { or } \\
& \mathrm{A} 2+\underset{\text { or }}{\mathrm{C}}+\mathrm{D} 1 \\
& A_{2}+C+D 2 \\
& \text { - Background/Terminology } \\
& \text { - Key Considerations } \\
& \text { - Proposed Solution } \\
& \text { - Path Forward } \\
& 23 \text { of } 31
\end{aligned}
$$

## Example 3

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

| Round | End of Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | \$400k | \$400k | \$400k | \$400k | \$200k | \$400k | \$400k |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |



Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 1: Enduring Applications:
$A_{1}, A_{2}, B_{1} D_{1}$, and $D_{2}$ bid the End of Round Price
$C$ is part of Feasible Set $\{A 1, C, D 1\},\{A 1, C, D 2\},\{A 2, C, D 1\}$, and $\{A 2, C, D 2\}$

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 200 k$ | $\$ 400 k$ | $\$ 400 k$ |  |
| $\mathbf{2}$ | $\$ 900 k$ | $\$ 900 k$ | $\$ 900 k$ | $\$ 750 k$ | $\$ 200 k$ | $\$ 900 k$ | $\$ 900 k$ |  |
| $\mathbf{3}$ |  |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |  |

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward
Round 2: Enduring Applications: A1, A2, D1, and D2 met the End of Round Price Eliminated: B did not meet the End of Round Price while A1 or A2, bid more
Winning Application: C
Winning Payment: C will pay $\$ 1 \quad 26$ of 31

| RoundEnd of <br> Round Price | A1 | A2 | B | C | D1 | D2 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |  |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ |  |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | Prevailed | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ |  |
| $\mathbf{4}$ |  |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |  |



- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 3: Auction Continues for the $A$ string and $D$ string respectively
Enduring Applications: $A 1, A 2, D_{1}$, and $D_{2}$ met the End of Round Price

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | Prevailed | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ |
| $\mathbf{4}$ | $\$ 2.2 \mathrm{~m}$ | $\$ 1.9 \mathrm{~m}$ | $\$ 2.2 \mathrm{~m}$ | Eliminated | Prevailed | $\$ 2.2 \mathrm{~m}$ | $\$ 2.0 \mathrm{~m}$ |
| Results |  |  |  |  |  |  |  |

Round 4: Enduring Applications: A2 and D1 met the End of Round Price
Eliminated Applications: A1 and D2, did not meet the End of Round Price while, A2 and D1 respectively, bid more
Winning Applications: A2 \& D1


Next Steps

- Public Comment
- Finalize Auction Rules
- Schedule Auctions
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward


## Thank You

# Reference additional examples from the presentation included in the public comment 

## Example 2 <br> from the presentation <br> included in the public comment

Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward








# Example 4 <br> from the presentation <br> included in the public comment 

## Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward


| Round | End of Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | \$400k | \$400k | \$400k | \$400k | \$200k | \$400k | \$400k |
| 2 | \$900k | \$900k | \$750k | \$900k | \$200k | \$900k | \$900k |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 2: Enduring Applications:
A1, B, D1, and D2 met the End of Round Price
$C$ is part of an eligible Feasible Set $\left\{A_{1}, C_{1} D_{1}\right\}$ or $\left\{A_{1}, C_{1} D_{2}\right\}$
Eliminated Applications: A2, an Application Positioned the Same (A1), bid more


| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.2 \mathrm{~m}$ | Eliminated | $\$ 1.5 \mathrm{~m}$ | $\$ 800 \mathrm{k}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ |
| $\mathbf{4}$ | $\$ 2.2 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 2.2 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ | $\$ 1.7 \mathrm{~m}$ | $\$ 1.9 \mathrm{~m}$ |
| $\mathbf{5}$ |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |



Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 4: Enduring Applications: B met the End of Round Price.
A1 and $C$ are parts of an eligible Feasible Set $\left\{A_{1}, C\right\}$
Eliminated Applications: D1 an application Positioned Better (D2), bid more Winning Application: D2
Winning Payment: D2 will pay \$1.7m

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.2 \mathrm{~m}$ | Eliminated | $\$ 1.5 \mathrm{~m}$ | $\$ 800 \mathrm{k}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ |
| $\mathbf{4}$ | $\$ 2.2 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 2.2 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ | $\$ 1.7 \mathrm{~m}$ | $\$ 1.9 \mathrm{~m}$ |
| $\mathbf{5}$ | $\$ 3.0 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 2.6 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | Prevailed |
| Results |  |  |  |  |  |  |  |

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B

Discussion Point

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 5: No application met the End of Round Price
Enduring Applications: A1 and C are parts of eligible Feasible Set \{A1,C\}
This is the final round in the Auction
Winning Applications: A1 and C

| Round | End of Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | \$400k | \$400k | \$400k | \$400k | \$200k | \$400k | \$400k |
| 2 | \$900k | \$900k | \$750k | \$900k | \$200k | \$900k | \$900k |
| 3 | \$1.5m | \$1.2m | Eliminated | \$1.5m | \$80ok | \$1.5m | \$1.5m |
| 4 | \$2.2m | \$1.5m | Eliminated | \$2.2m | \$1.1m | \$1.7m | \$1.9m |
| 5 | \$3.0m | \$1.5m | Eliminated | \$2.6m | \$1.5m | Eliminated | Prevailed |
| Results |  | Prevailed | Eliminated | Eliminated | Prevailed | Eliminated | Prevailed |
| Result: | A1 and C will pay its proportion of B's final bid Winning Payment: A1 and C will pay $\$ 1.3 \mathrm{~m}$ each $((\$ 1.5 \mathrm{~m} /(\$ 1.5 \mathrm{~m}+\$ 1.5 \mathrm{~m})) * \$ 2.6 \mathrm{~m})$ D2 will pay \$1.7m (as a Result of Round 4) |  |  |  |  |  |  |

```
A1
```

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward


## Example 5 <br> from the presentation <br> included in the public comment

Discussion Points

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 200 k$ | $\$ 400 k$ | $\$ 400 \mathrm{k}$ |
| 2 |  |  |  |  |  |  |  |
| $\mathbf{3}$ |  |  |  |  |  |  |  |
| $\mathbf{5}$ |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |



Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 1: Enduring Applications:
A1, A2, B, D1, and D2 met the End of Round Price
$C$ is part of Feasible Set $\{A 1, C, D 1\},\{A 1, C, D 2\},\{A 2, C, D 1\}$, and $\{A 2, C, D 2\}$

| Round | End of Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | \$400k | \$400k | \$400k | \$400k | \$200k | \$400k | \$400k |
| 2 | \$900k | \$900k | \$750k | \$900k | \$200k | \$900k | \$450k |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |

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Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 2: Enduring Applications:
A1, B, and D1 met the End of Round Price C and D2 are part of eligible Feasible Sets
Eliminated Applications: A2 did not meet the End of Round Price while A1, Positioned the


| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 450 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.2 \mathrm{~m}$ | Eliminated | $\$ 1.5 \mathrm{~m}$ | $\$ 200 \mathrm{k}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| $\mathbf{4}$ | $\$ 2.2 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 2.2 \mathrm{~m}$ | $\$ 200 \mathrm{k}$ | $\$ 1.7 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| $\mathbf{5}$ |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |

Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 4: Enduring Applications:
B met the End of Round Price
A1, C, D1 and D2 are part of eligible Feasible Sets

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 200 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 450 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.2 \mathrm{~m}$ | Eliminated | $\$ 1.5 \mathrm{~m}$ | $\$ 200 \mathrm{k}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| $\mathbf{4}$ | $\$ 2.2 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 2.2 \mathrm{~m}$ | $\$ 200 \mathrm{k}$ | $\$ 1.7 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| $\mathbf{5}$ | $\$ 4.0 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 4.0 \mathrm{~m}$ | $\$ 200 \mathrm{k}$ | $\$ 1.7 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| Results |  |  |  |  |  |  |  |

Discussion Points

- Background/Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 5: Enduring Applications:
B met the End of Round Price
D2 is part of a Feasible Set $\{\mathrm{B}, \mathrm{D} 2\}$ which met the end of round price
Feasible Set $\left\{A_{1}, C, D 1\right\}$ did not met the End of Round Price, thus Round 5 is the final round


## Example 6

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 400 k$ | $\$ 1$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| $\mathbf{4}$ |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |



Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 1: Enduring Applications:
A1, A2, B, D1, and D2 met the End of Round Price
C is part of eligible Feasible Sets $\{A 1, C, D 1\},\{A 1, C, D 2\},\{A 2, C, D 1\}$, and $\{A 2, C, D 2\}$

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 1$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 1$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ |
| $\mathbf{3}$ |  |  |  |  |  |  |  |
| $\mathbf{5}$ |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |



Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 2: Enduring Applications:
A1, B, and D1 met the End of Round Price
C is part of eligible Feasible Sets
Eliminated Applications: A2 did not meet the End of Round Price while A1, Positioned the

| RoundEnd of <br> Round Price | A1 | A2 | B | C | D1 | D2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 1$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 1$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 1.5 \mathrm{~m}$ | $\$ 1$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| $\mathbf{4}$ |  |  |  |  |  |  |  |
| $\mathbf{5}$ |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |

Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 3: Enduring Applications:
A1, B, and D1 met the End of Round Price $C$ and D2 are part of eligible Feasible Sets

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 1$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 1$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 1.5 \mathrm{~m}$ | $\$ 1$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| $\mathbf{4}$ | $\$ 2.2 \mathrm{~m}$ | $\$ 2.2 \mathrm{~m}$ | Eliminated | $\$ 2.0 \mathrm{~m}$ | $\$ 1$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.3 \mathrm{~m}$ |
| $\mathbf{5}$ |  |  |  |  |  |  |  |
| Results |  |  |  |  |  |  |  |

Discussion Points

- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 4: Eliminated: B did not meet the End of Round Price, while A1, Positioned Better, bid more Enduring Applications: D1 and D2 are parts of eligible Feasible Sets \{A1, C, D1 $\}$ \& $\left\{A_{1}, C, D 2\right\}$ Winning Applications: A1 and C
Winning Payment: A1 will pay $\$ 2.0 m$ and C will pay $\$ 1$

| Round | End of <br> Round Price | A1 | A2 | B | C | D1 | D2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{1}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ | $\$ 1$ | $\$ 400 \mathrm{k}$ | $\$ 400 \mathrm{k}$ |
| $\mathbf{2}$ | $\$ 900 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ | $\$ 900 \mathrm{k}$ | $\$ 1$ | $\$ 900 \mathrm{k}$ | $\$ 750 \mathrm{k}$ |
| $\mathbf{3}$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.5 \mathrm{~m}$ | Eliminated | $\$ 1.5 \mathrm{~m}$ | $\$ 1$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.1 \mathrm{~m}$ |
| $\mathbf{4}$ | $\$ 2.2 \mathrm{~m}$ | $\$ 2.2 \mathrm{~m}$ | Eliminated | $\$ 2.0 \mathrm{~m}$ | $\$ 1$ | $\$ 1.5 \mathrm{~m}$ | $\$ 1.3 \mathrm{~m}$ |
| $\mathbf{5}$ | $\$ 3.0 \mathrm{~m}$ | Prevailed | Eliminated | Eliminated | Prevailed | $\$ 1.7 \mathrm{~m}$ | $\$ 2.0 \mathrm{~m}$ |
| Results |  |  |  |  |  |  |  |

A1

Round 5: Applications D1 \& D2 remain and are now Positioned the Same.
Neither application met the End of Round Price; however, D2 bid more than D1
Winning Application: D2

| Round | End of Round Price | A1 | A2 | B | C | D1 | D2 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | \$400k | \$400k | \$400k | \$400k | \$1 | \$400k | \$400k |  |
| 2 | \$900k | \$900k | \$750k | \$900k | \$1 | \$900k | \$750k | A1 |
| 3 | \$1.5m | \$1.5m | Eliminated | \$1.5m | \$1 | \$1.5m | \$1.1m |  |
| 4 | \$2.2m | \$2.2m | Eliminated | \$2.0m | \$1 | \$1.5m | \$1.3m | Discussion Points |
| 5 | \$3.0m | Prevailed | Eliminated | Eliminated | Prevailed | \$1.7m | \$2.0m | Background / Terminology <br> Key Considerations |
| Results |  | Prevailed | Eliminated | Eliminated | Prevailed | Eliminated | Prevailed | Path Forward |
| Result: |  |  |  |  |  |  |  |  |
|  | D2 will pay $\$ 1.7 \mathrm{~m}$ |  |  |  |  |  |  |  |
|  | A1 will pay \$2.om (as a result of Round 4) |  |  |  |  |  |  |  |
|  | C will pay \$1 (as a result of Round 4) |  |  |  |  |  |  | Ex6. 6 |

