

Auction Design:

## Indirect Contention



Background / Terminology

Key Considerations

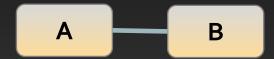
Proposed Solution

Path Forward



### Contention

More than one application for the same or confusingly similar string



### **Indirect Contention**

When two applications are both in direct contention with a third, but not with one another



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



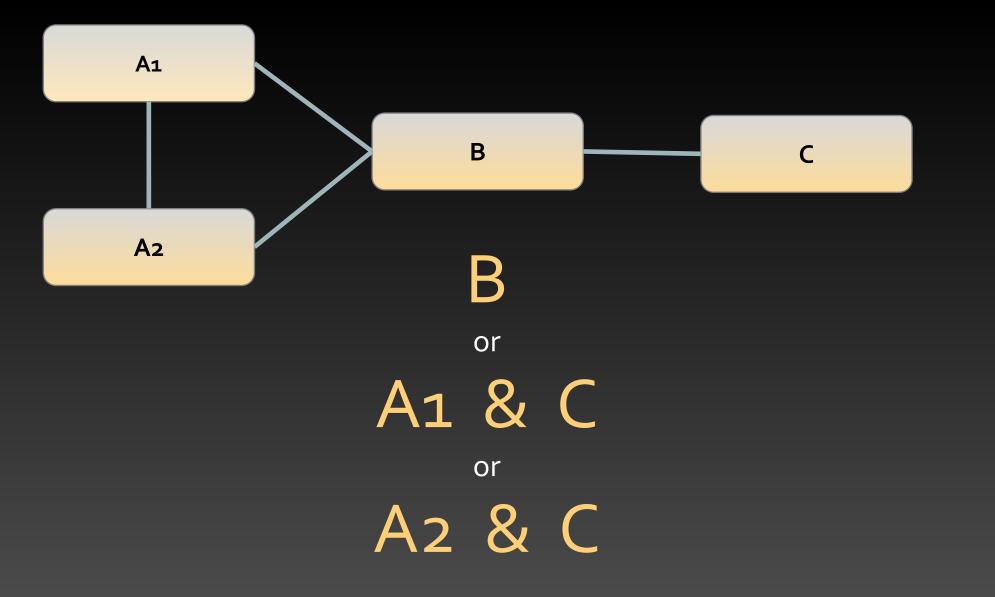
B B or

A & C

### **Discussion Points**

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

## Feasible Set





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

### Feasible Set

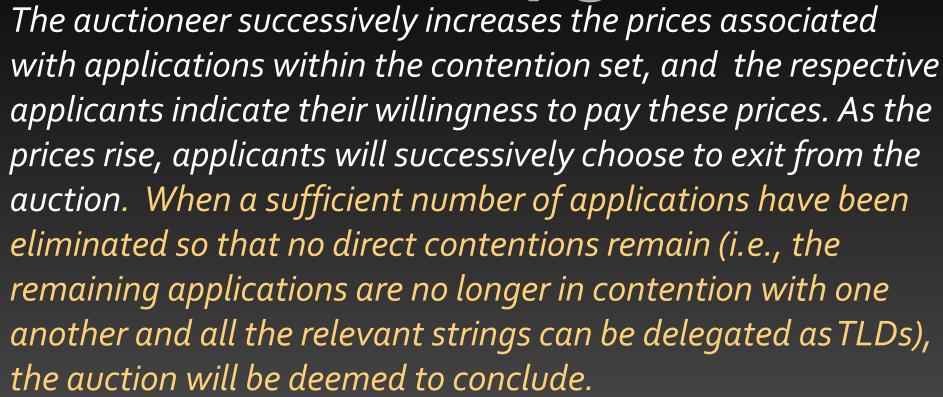


Contention Sets

# Applications Output Descriptions

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







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



## Auction Challenges

- Respecting Contention Relationships
- AGB Principles
- Timing & Fairness
- Clarity to Bidders
- Cost Allocation

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



## Proposed Solution

- Ascending clock auction
- Second Price Auction
- Feasible Set: A<sub>x</sub> + C<sub>x</sub> vs. B

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

### After bidding for a round ends:



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

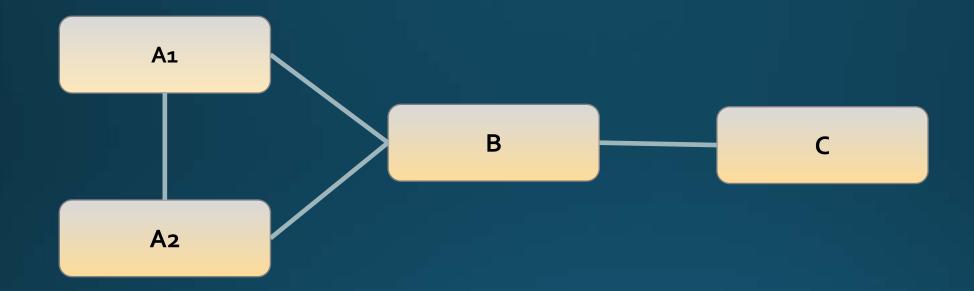
#### **Discussion Points**

- 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

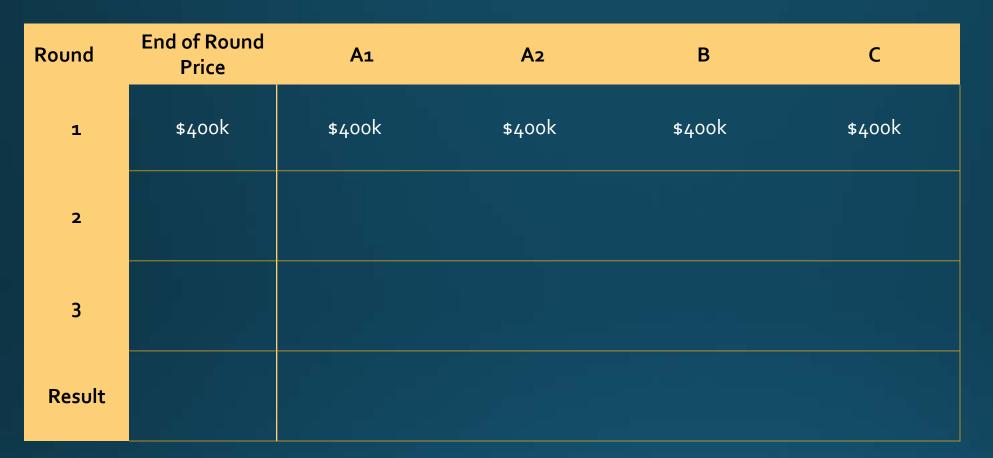
## Basic Set



## Example 1

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

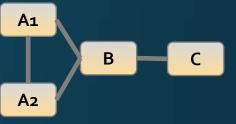
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward





(1) A1, A2, B, and C met the End of Round Price





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

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$400k
2	\$900k	\$6ook	\$700k	\$900k	\$500k
3					
Result					

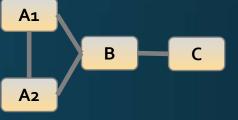


- (1) B met the End of Round Price
- (3) Feasible set {A2, C} sum to meet or exceed the end of round price

### Eliminated:

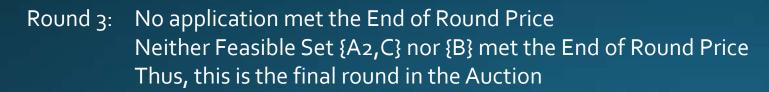
(2) A1 it did not meet the End of Round Price while A2, Positioned the Same, bid more





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

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$400k
2	\$900k	\$6ook	\$700k	\$900k	\$500k
3	\$1.5M	Eliminated	\$750k	\$1.4M	\$550k
Result					



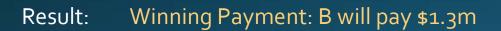
Winning Application: B





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

Round	End of Round Price	A1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$400k
2	\$900k	\$6ook	\$700k	\$900k	\$500k
3	\$1.5M	Eliminated	\$750k	\$1.4M	\$550k
Result		Eliminated	Eliminated	Prevailed	Eliminated





В

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



## Example 2

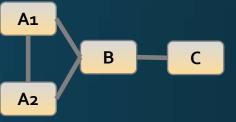
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$50k
2					
3					
Result					



A1, A2, and B met the End of Round Price C did not meet the End of Round Price; however, is part of Feasible Set {A1,C} and {A2,C}





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

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$50k
2	\$900k	\$6ook	\$900k	\$900k	\$100k
3					
Result					

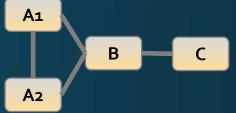


A2 and B met the End of Round Price C did not meet the End of Round Price; however, is part of Feasible Set {A2,C}

### Eliminated:

A1 did not meet the End of Round Price and bid less than A2, who is Positioned the Same





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

Round	End of Round Price	<b>A</b> 1	A2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$50k
2	\$900k	\$6ook	\$900k	\$900k	\$100k
3	\$1.5M	Eliminated	\$1.2M	\$1.3M	\$200k
Result					

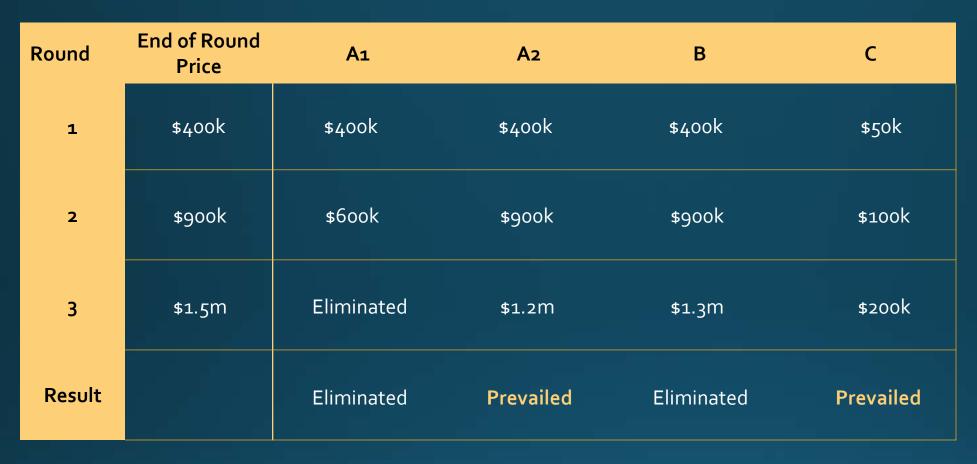


Winning Applications: A2 and C





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





A<sub>2</sub>

Discussion Points

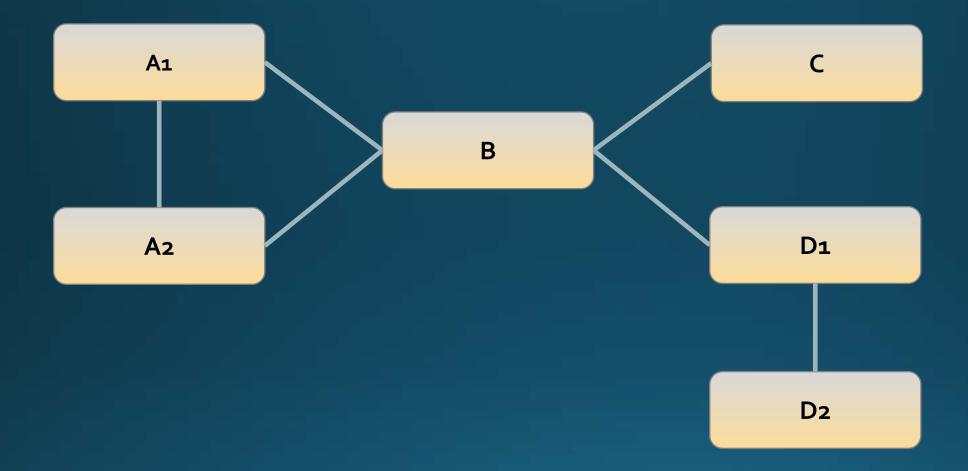
C

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

Result: Winning Payments:

A2 will pay \$1,114,286 (the greater of \$600k (A1) and the proportion of \$1.3m (B)) C will pay \$185,714 (the proportion of \$1.3m (B))



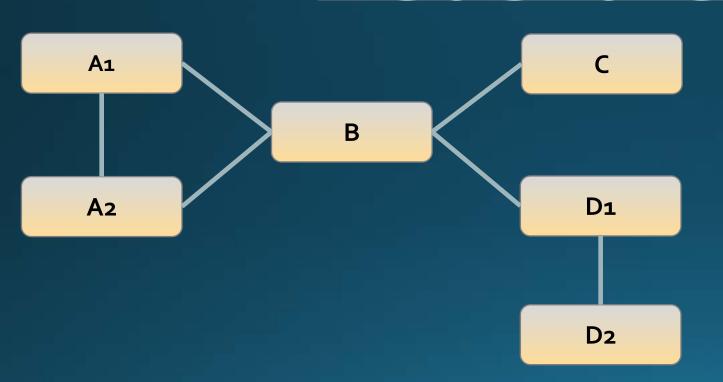


- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

## Complex Set



### Feasible Sets



or

$$A1 + C + D1$$

or

$$A1 + C + D2$$

or

$$A2 + C + D1$$

0

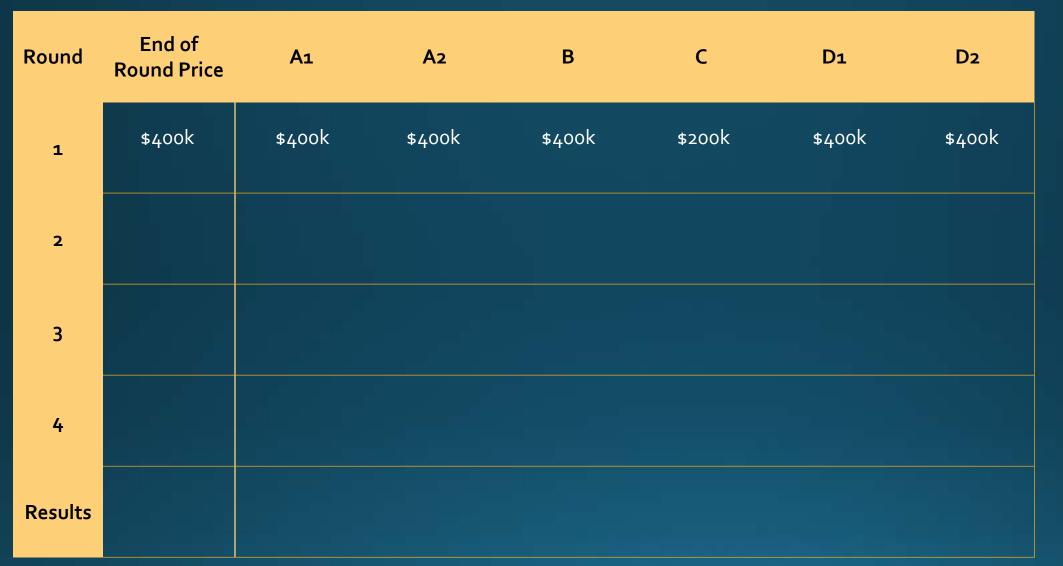
$$A2 + C + D2$$

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



## Example 3

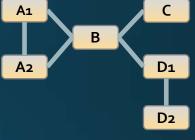
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward





A1, A2, B, D1, and D2 bid the End of Round Price C is part of Feasible Set {A1,C,D1}, {A1,C,D2}, {A2,C,D1}, and {A2,C,D2}



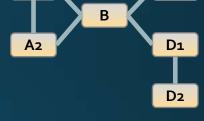


Background / Terminology

- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	A1	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$900k	\$750k	\$200k	\$900k	\$900k
3							
4							
Results							



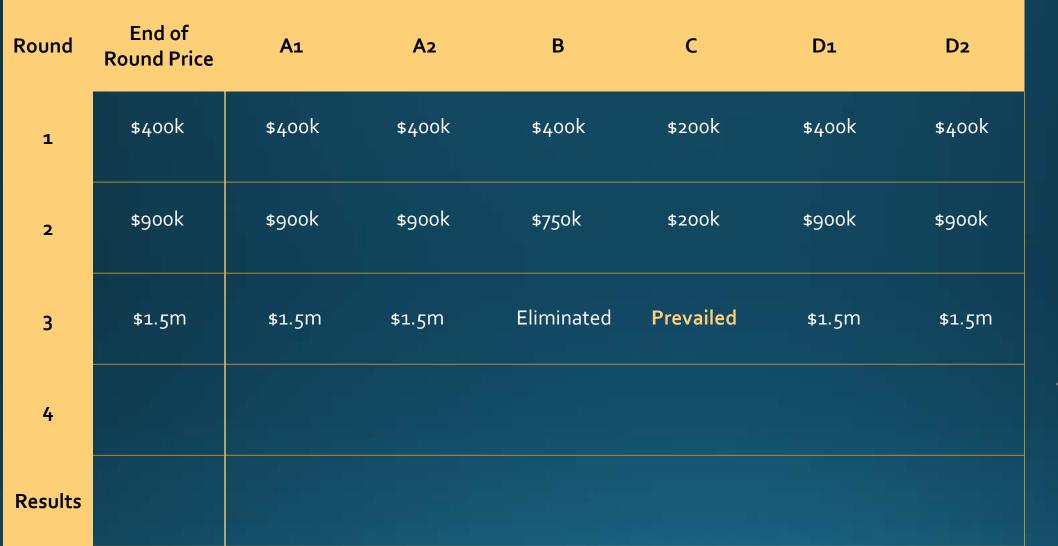


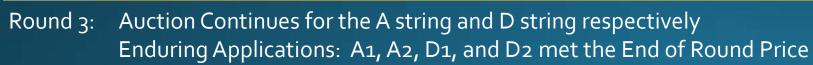
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

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





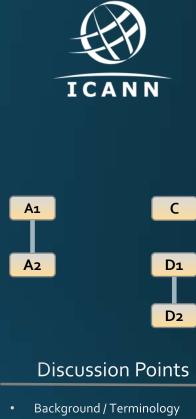






- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	A1	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$900k	\$750k	\$200k	\$900k	\$900k
3	\$1.5M	\$1.5M	\$1.5M	Eliminated	Prevailed	\$1.5M	\$1.5m
4	\$2.2M	\$1.9m	\$2.2M	Eliminated	Prevailed	\$2.2M	\$2.0M
Results							



- Key Considerations
- Proposed Solution
- Path Forward

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

Round	End of Round Price	<b>A</b> 1	A2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$900k	\$750k	\$200k	\$900k	\$900k
3	\$1.5M	\$1.5M	\$1.5M	Eliminated	Prevailed	\$1.5m	\$1.5m
4	\$2.2M	\$1.9M	\$2.2M	Eliminated	Prevailed	\$2.2M	\$2.0M
Results		Eliminated	Prevailed	Eliminated	Prevailed	Prevailed	Eliminated



C

A<sub>2</sub>

**Discussion Points** 

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

Results: Winning Payment:

A2 will pay \$1.9m (the greater of A1's final Exit Bid and B's final Exit Bid (\$750k))

D1 will pay \$2.0m

C will pay \$1 (as a result of Round 2)



## Next Steps

- Public Comment
- Finalize Auction Rules
- Schedule Auctions

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



## ThankYou



## Reference

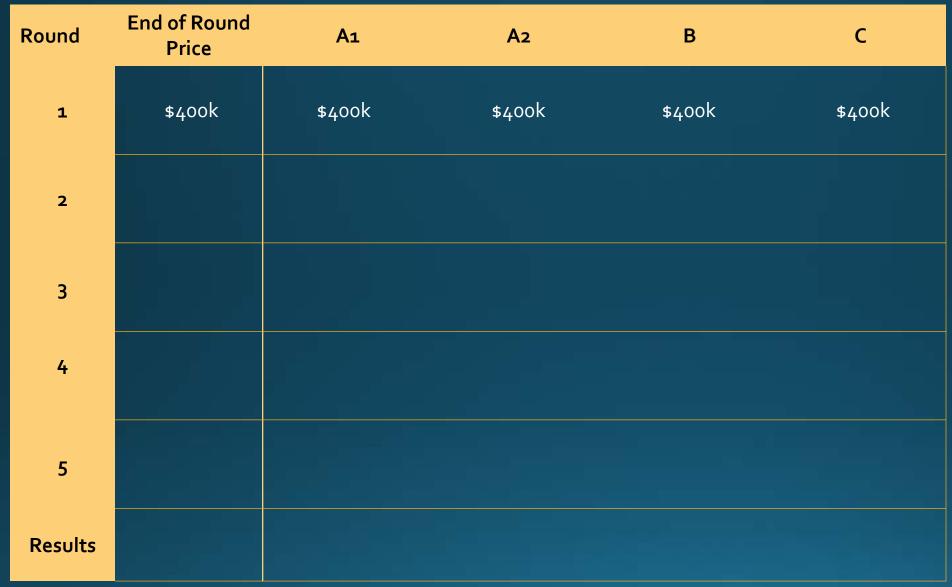
additional examples from the presentation included in the public comment



## Example 2

from the presentation included in the public comment

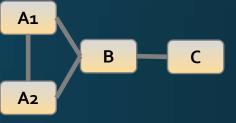
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward





(1) A1, A2, B, and C met the End of Round Price





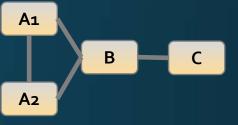
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$400k
2	\$900k	\$900k	\$900k	\$900k	\$500k
3					
4					
5					
Results					



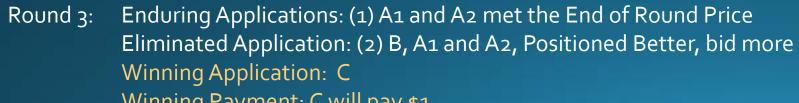
- (1) A1, A2, and B met the End of Round Price
- (3) C is part of an eligible Feasible Set {A1,C} or {A2,C}





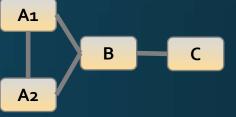
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$400k
2	\$900k	\$900k	\$900k	\$900k	\$500k
3	\$1.5M	\$1.5m	\$1.5M	\$ 1.4M	\$6ook
4					
5					
Results					



Winning Payment: C will pay \$1





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

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$400k
2	\$900k	\$900k	\$900k	\$900k	\$500k
3	\$1.5m	\$1.5M	\$1.5m	\$ 1.4M	\$6ook
4	\$2.2M	\$2.2M	\$2.2M	Eliminated	Prevailed
5					
Results					

Round 4: Enduring Applications:

(1) A1 and A2 met the End of Round Price

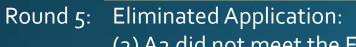




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- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С	
1	\$400k	\$400k	\$400k	\$400k	\$400k	
2	\$900k	\$900k	\$900k	\$900k	\$500k	
3	\$1.5m	\$1.5m	\$1.5m	\$ 1.4M	\$6ook	
4	\$2.2M	\$2.2M	\$2.2M	Eliminated	Prevailed	
5	\$3.om	\$3.om	\$2.6m	Eliminated	Prevailed	
Results						



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







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

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С
1	\$400k	\$400k	\$400k	\$400k	\$400k
2	\$900k	\$900k	\$900k	\$900k \$900k	
3	\$1.5M	\$1.5m	\$1.5m	\$ 1.4M	\$6ook
4	\$2.2M	\$2.2M	\$2.2M	Eliminated	Prevailed
5	\$3.om	\$3.om	\$2.6m	Eliminated	Prevailed
Results		Prevailed	Eliminated	Eliminated	Prevailed



A1

C

#### **Discussion Points**

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

Result: Winning Payment:

A1 will pay \$2.6m (the greater of \$2.6m (A2's final bid) and \$1.4m (B's final Bid) C will pay \$1 (as a result of Round 3)



## Example 4

from the presentation included in the public comment

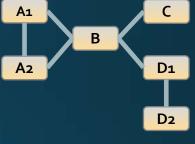
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward





A1, A2, B, D1, and D2 bid the End of Round Price C is part of Feasible Set {A1,C, D1} and {A1,C,D2}, {A2,C,D1}, and {A2,C,D2}

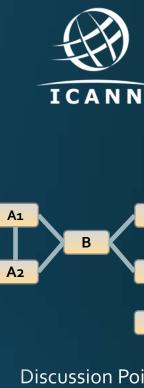




Background / Terminology

- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	A1	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$200k	\$900k	\$900k
3							
4							
5							
Results							



### **Discussion Points**

D1

D<sub>2</sub>

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

Enduring Applications: Round 2:

> A1, B, D1, and D2 met the End of Round Price C is part of an eligible Feasible Set {A1,C, D1} or {A1,C, D2} Eliminated Applications: A2, an Application Positioned the Same (A1), bid more

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С	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	\$8ook	\$1.5M	\$1.5m
4							
5							
Results							



B, D1, and D2 met the End of Round Price
A1 and C are parts of eligible Feasible Set {A1,C,D1} or {A2,C,D2}



### **Discussion Points**

D1

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

Round	End of Round Price	<b>A</b> 1	A2	В	С	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	\$8ook	\$1.5M	\$1.5m
4	\$2.2M	\$1.5M	Eliminated	\$2.2M	\$1.1M	\$1.7M	\$1.9m
5							
Results							

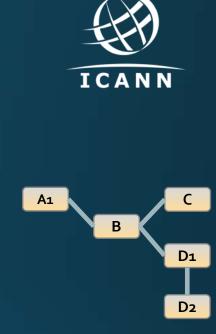


A1 and C are parts of an eligible Feasible Set {A1,C}

Eliminated Applications: D1 an application Positioned Better (D2), bid more

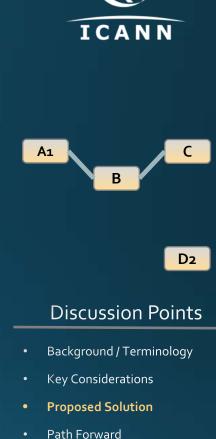
Winning Application: D2

Winning Payment: D2 will pay \$1.7m



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

Round	End of Round Price	<b>A</b> 1	A2	В	С	D1	D <sub>2</sub>
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$200k	\$900k	\$900k
3	\$1.5m	\$1.2M	Eliminated	\$1.5m	\$8ook	\$1.5M	\$1.5M
4	\$2.2M	\$1.5m	Eliminated	\$2.2M	\$1.1M	\$1.7m	\$1.9m
5	\$3.om	\$1.5M	Eliminated	\$2.6m	\$1.5m	Eliminated	Prevailed
Results							



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	<b>A</b> 1	<b>A</b> 2	В	C	D1	D <sub>2</sub>
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$200k	\$900k	\$900k
3	\$1.5m	\$1.2M	Eliminated	\$1.5M	\$8ook	\$1.5M	\$1.5M
4	\$2.2M	\$1.5m	Eliminated	\$2.2M	\$1.1M	\$1.7M	\$1.9m
5	\$3.om	\$1.5m	Eliminated	\$2.6m	\$1.5M	Eliminated	Prevailed
Results		Prevailed	Eliminated	Eliminated	Prevailed	Eliminated	Prevailed



Winning Payment: A1 and C will pay \$1.3m each ((\$1.5m / (\$1.5m + \$1.5m))\*\$2.6m)

D2 will pay \$1.7m (as a Result of Round 4)



A<sub>1</sub>

D<sub>2</sub>

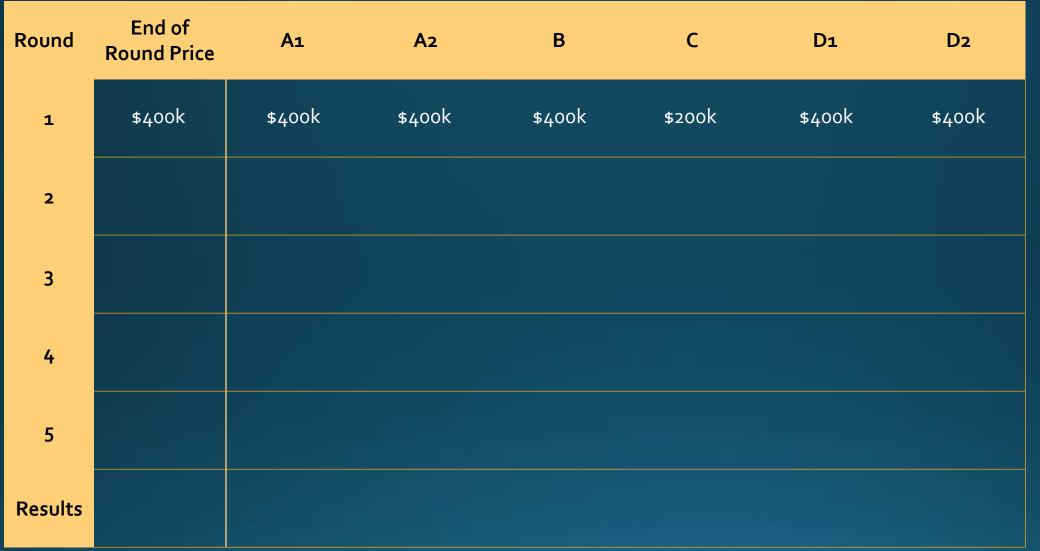
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward



## Example 5

from the presentation included in the public comment

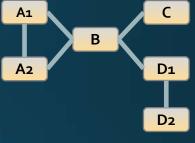
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward





A1, A2, B, D1, and D2 met the End of Round Price C is part of Feasible Set {A1,C,D1}, {A1,C,D2}, {A2,C,D1}, and {A2,C,D2}





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

Round	End of Round Price	Aı	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$200k	\$900k	\$450k
3							
4							
5							
Results							

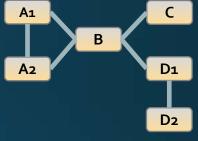


Round 2: Enduring Applications:

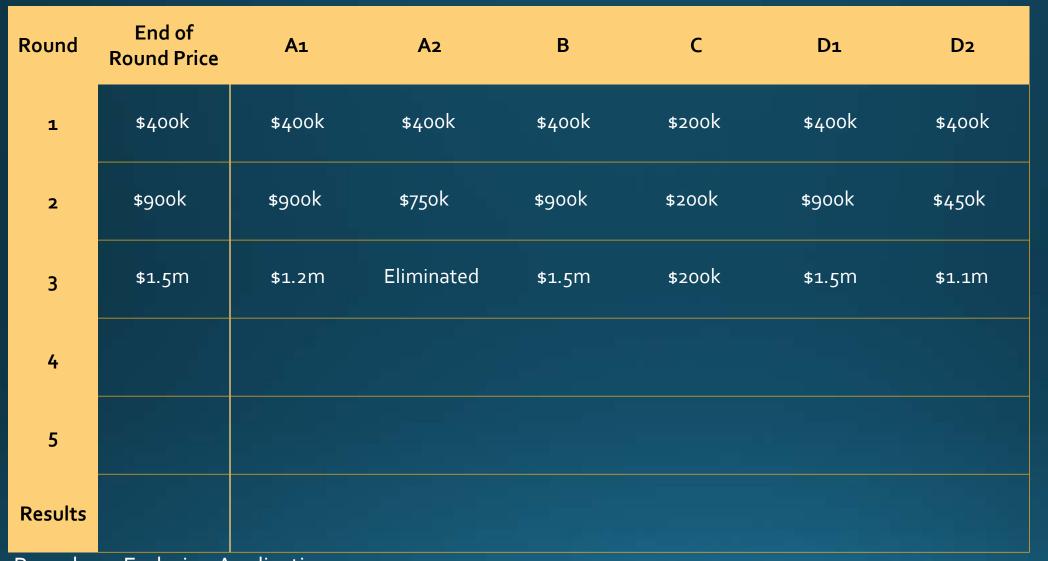
A1, B, and D1 met the End of Round Price C and D2 are part of eligible Feasible Sets

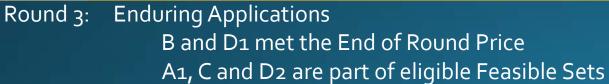
Eliminated Applications: A2 did not meet the End of Round Price while A1, Positioned the Same, bid more



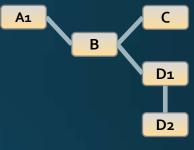


- Background / Terminology
- Key Considerations
- **Proposed Solution**
- Path Forward



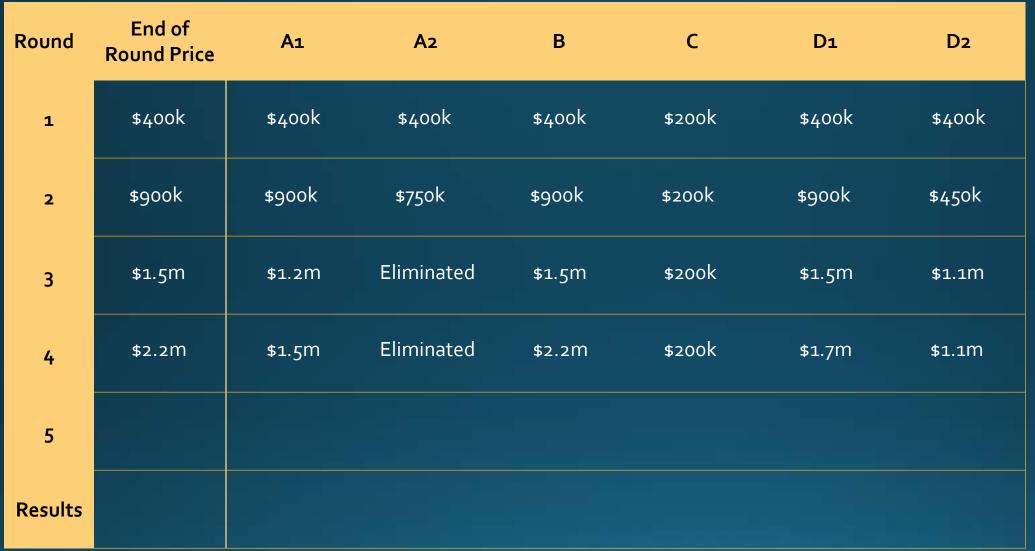






Background / Terminology

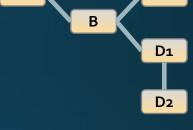
- Key Considerations
- Proposed Solution
- Path Forward





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



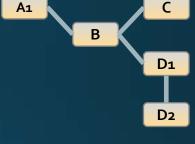


Background / Terminology

- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	<b>A</b> 1	A2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$200k	\$900k	\$450k
3	\$1.5m	\$1.2M	Eliminated	\$1.5M	\$200k	\$1.5M	\$1.1M
4	\$2.2M	\$1.5M	Eliminated	\$2.2M	\$200k	\$1.7m	\$1.1M
5	\$4.om	\$1.5M	Eliminated	\$4.om	\$200k	\$1.7m	\$1.1M
Results							





Background / Terminology

**Discussion Points** 

- Key Considerations
- Proposed Solution
- Path Forward

Round 5: Enduring Applications:

B met the End of Round Price

D2 is part of a Feasible Set {B,D2} which met the end of round price Feasible Set {A1,C,D1} did not met the End of Round Price, thus Round 5 is the final round

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$200k	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$200k	\$900k	\$450k
3	\$1.5m	\$1.2M	Eliminated	\$1.5M	\$200k	\$1.5m	\$1.1M
4	\$2.2M	\$1.5M	Eliminated	\$2.2M	\$200k	\$1.7M	\$1.1M
5	\$4.om	\$1.5M	Eliminated	\$4.om	\$200k	\$1.7M	\$1.1M
Results		Eliminated	Eliminated	Prevailed	Eliminated	Eliminated	Prevailed



В

D<sub>2</sub>

#### **Discussion Points**

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

Results: Winning Applications: B and D2

B and D2 will each pay its proportion of the sum of Feasible Set {A1,C,D1} (\$3.4m)

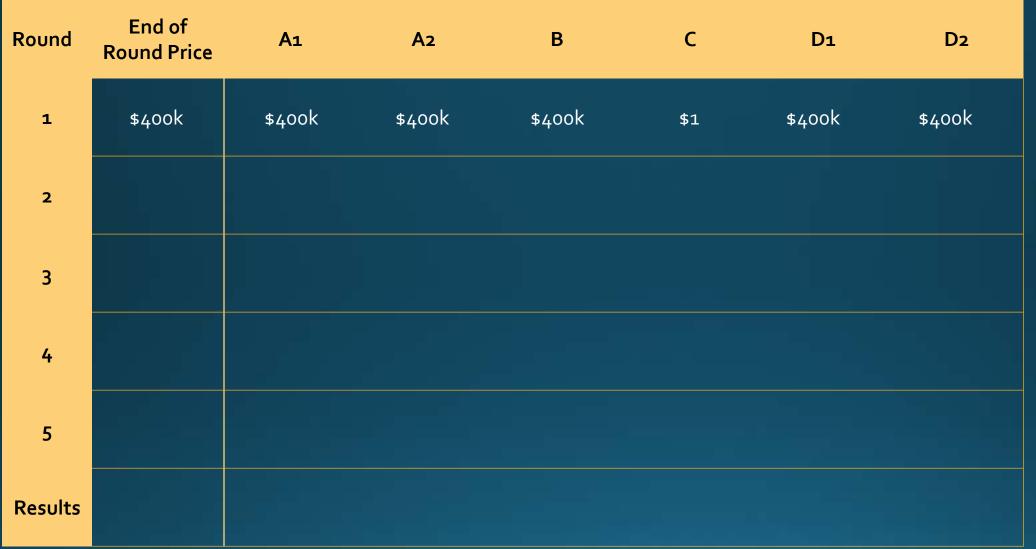
Winning Payment: B will pay \$2,666,667 ((\$4.0m / (\$4.0m + \$1.1m))\* \$3.4m)

D2 will pay \$733,333 ((\$1.1m / (\$4.0m + \$1.1m))\* \$3.4m)



# Example 6

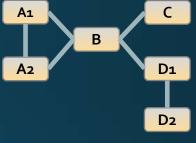
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward





A1, A2, B, D1, and D2 met the End of Round Price C is part of eligible Feasible Sets {A1,C, D1}, {A1,C,D2}, {A2,C,D1}, and {A2,C,D2}



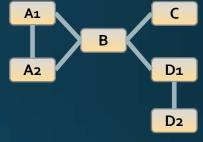


Background / Terminology

- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	Aı	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$1	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$1	\$900k	\$750k
3							
4							
5							
Results							





### Discussion Points

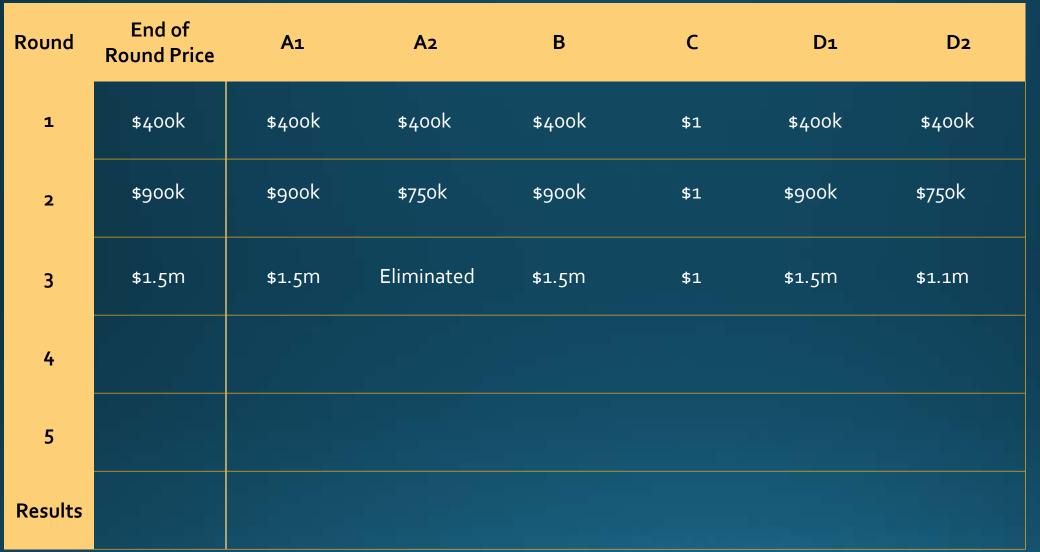
- Background / Terminology
- Key Considerations
- Proposed Solution
- Path Forward

Round 2: Enduring Applications:

A1, B, and D1 met the End of Round Price

C is part of eligible Feasible Sets

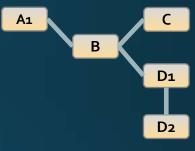
Eliminated Applications: A2 did not meet the End of Round Price while A1, Positioned the Same, bid more





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

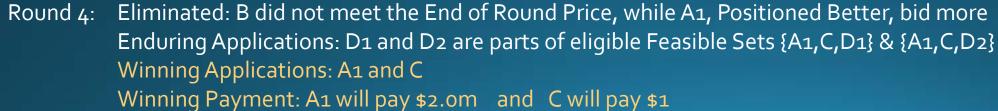




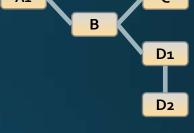
Background / Terminology

- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	<b>A</b> 1	A2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$1	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$1	\$900k	\$750k
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
5							
Results							



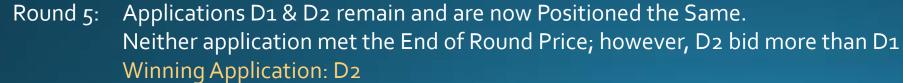




Background / Terminology

- Key Considerations
- Proposed Solution
- Path Forward

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$1	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$1	\$900k	\$750k
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
5	\$3.om	Prevailed	Eliminated	Eliminated	Prevailed	\$1.7M	\$2.0m
Results							





A1





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

Round	End of Round Price	<b>A</b> 1	<b>A</b> 2	В	С	D1	D2
1	\$400k	\$400k	\$400k	\$400k	\$1	\$400k	\$400k
2	\$900k	\$900k	\$750k	\$900k	\$1	\$900k	\$750k
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
5	\$3.om	Prevailed	Eliminated	Eliminated	Prevailed	\$1.7M	\$2.0m
Results		Prevailed	Eliminated	Eliminated	Prevailed	Eliminated	Prevailed



A1

C

D<sub>2</sub>

#### **Discussion Points**

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

Result: Winning Payment:

D2 will pay \$1.7m

A1 will pay \$2.0m (as a result of Round 4)

C will pay \$1 (as a result of Round 4)