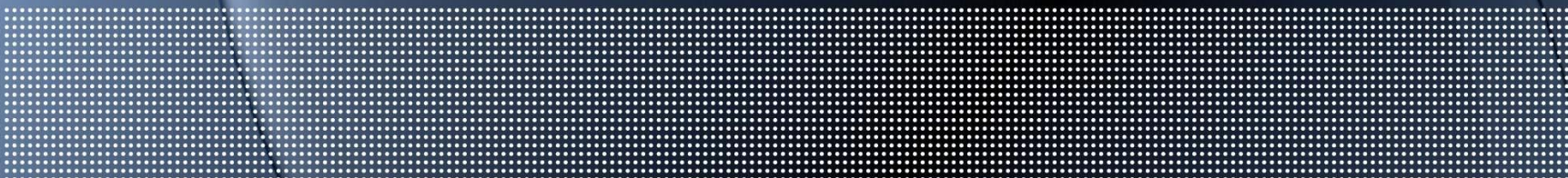


BWA auction



**Clarification session for interested bidders,
Lisbon 10 Nov. 2009**

Inge Hansen and Christian Koboldt, DotEcon Ltd.

- The auction is a sealed bid combinatorial auction in two stages:
 - 1. Distribution stage: determines *how many* lots each bidder wins.
 - Bidders bid for *generic* 2x28MHz lots.
 - 2. Assignment stage: decides *which lots* the winning bidders get.
 - Winners can express preference for certain bands with a top-up bid.

Distribution stage – how it works

- Bidders can submit up to 100 different bids for *packages* of lots, where a package nominates:
 - for all regions
 - the number of lots a bidder wishes to obtain in each region.
- Bids stand or fall in their entirety – there is no risk of winning a subset of the lots needed for a given business plan
- Each bidder can make *more than one bid* to reflect alternative valuations of spectrum according to possible variations of business plan

Distribution stage – Example bid

Enter information in *white* cells:

- Number of lots in package
- Amount for package bid

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Formulário de Licitações da Fase de Distribuição

Nome entidade:	BWA Example Ltd
Caução (milhares de euro)	1450
Pessoas designadas nos termos da alínea g) do n.º1 do artigo 13.º	Ms First Person
	Mr Second Person
Unique form ID:	1785AB98CDFH38998BEF22359BB62FD8

Zona geográfica	Número de Lotes por zona geográfica									Licitação mínima (milhares de euro)	Montante de Licitação (milhares de euro)
	Zona 1	Zona 2	Zona 3	Zona 4	Zona 5	Zona 6	Zona 7	Zona 8	Zona 9		
Preço de reserva por lote (milhares de euro)	300	300	150	100	100	100	150	100	150		
Licitação n.º											
1	2	2	2	2	2	2	2	2	2	2900	3400
2	1	1	1	1						850	
3										0	
4										0	
5										0	
6										0	
7										0	
8										0	
9										0	
10										0	

Distribution stage – winner determination

- The winning bids in the distribution stage are the combination of individual bids that:
 - taken together, are feasible (i.e. do not add up to more than four lots in any of the regions);
 - have the greatest total value of all feasible combinations of bids; and
 - where at most one bid from each bidder is considered in combination.
- This is calculated in bespoke software using an algorithm.
- If more than one combination of bids meets this condition, the following tie break rules apply, in this order:
 - The greatest number of regions to be allocated;
 - The greatest number of winning bidders;
 - The largest number of lots to be allocated.

Simplified example

- Three areas, four lots available in each area.
- Three bidders, who bid as follows:

Bidder	Green area (no. of lots)	Yellow area (no. of lots)	Red area (no. of lots)	Bid (€'000)
Ernesto	3	3	3	5000
Helena	2	2	0	4560
Ana	0	1	1	2581
Ana	0	2	2	4510

Simplified example

- Highest feasible combinations and corresponding value (each bid to win on its own are also feasible but clearly inferior in value):

Bidder	Green area (no. of lots)	Yellow area (no. of lots)	Red area (no. of lots)	Bid (€'000)
Ernesto	3	3	3	5000
Ana	0	1	1	2581
Sum lots\value	3	4	4	7581

Bidder	Green area (no. of lots)	Yellow area (no. of lots)	Red area (no. of lots)	Bid (€'000)
Helena	2	2	0	4560
Ana	0	2	2	4510
Sum lots\value	2	4	2	9070

Bidder	Green area (no. of lots)	Yellow area (no. of lots)	Red area (no. of lots)	Bid (€'000)
Helena	2	2	0	4560
Ana	0	1	1	2581
Sum lots\value	3	3	1	7141

The second price rule

- The winning combination of bids is the combination of compatible bids that maximises total value.
- However, winning bidders typically do not pay the amount of their winning bid.
- *Winners only pay the lowest amount they could have bid in order still to win.*
- For each subset of winning bidders (including each individual bidder), the minimum amount they need to pay in order to remain winners is calculated.

Example – one lot

- Imagine an auction with just one lot for sale and three bidders:
 - Paolo's bid is 21
 - Marina's bid is 26
 - Fernando's bid is 19
- Marina wins (as she bid the highest value) but pays only 21 (the opportunity cost of denying Paolo the lot).
- The second price rule in this auction is more complicated because of package bids, but the basic idea that bidders only pay what they need to win, not what they bid, is still true.

Simplified example (cont.)

- The winning bids were:

Winner	Green area (no. of lots)	Yellow area (no. of lots)	Red area (no. of lots)	Bid (€'000)
Helena	2	2	0	4560
Ana	0	2	2	4510
Sum lots\value	2	4	2	9070

- But the base prices are:

Winner	Green area (no. of lots)	Yellow area (no. of lots)	Red area (no. of lots)	Base price (€'000)
Helena	2	2	0	2525
Ana	0	2	2	2475
Sum lots\value	2	4	2	5000

- If necessary, the assignment stage starts with another round of bidding where winners from the distribution stage may:
 - State preference in relation to the 3400-3600 MHz or 3600-3800 MHz frequency sub-bands; and
 - The amount willing to pay for preferred lots (“Top-Up Bid”).
- The options will be presented as:
 - Winner of a single lot: preference for A or B relative to C or D
 - Winner of two lots: preference for A+B relative to C+D.
 - Winner of three lots: preference for A+B+C relative to B+C+D.
- As in the distribution stage, bids are package bids and each winner may submit more than one bid (up to the number of possible combinations of preferences across the regions in which she has a choice).

Assignment stage

- It is not compulsory to bid in the assignment stage – everybody is a winner at this point.
- If a winner is indifferent as to which specific lots she gets, the best strategy is not to submit an assignment bid.

Assignment stage – Example bid 1

Enter information in white cells:

- '1' if preference for displayed option
- Top up bid amount



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Formulário de Licitações da Fase de Consignação

Nome entidade:	BWA Example Ltd.
Pessoas designadas nos termos da alínea g) do n.º1 do artigo 13.º	Ms First Person Mr Second Person
Unique form ID:	6748A4DCB3D9F0H6ACEGG27618H5D5A2

Zona geográfica	Número de Lotes ganho por zona geográfica									Montante da Licitação Adicional (milhares de euro)
	Zona 1	Zona 2	Zona 3	Zona 4	Zona 5	Zona 6	Zona 7	Zona 8	Zona 9	
Número de lotes ganhos	2	2	2	2	2	2	2	2	2	
Lotes ganhos por outras entidades	2	2	1		1		2			
Licitação n.º	Preferência por A+B	Preferência por A+B	Preferência por A+B		Preferência por A+B		Preferência por A+B			
1	1	1	1		1		1			75
2										
3										
4										
5										
6										
7										
8										

Assignment stage – Example bid 2

Leilão BWA

Formulário de Licitações da Fase de Consignação

Nome entidade:	Start Up Ltd.
Pessoas designadas nos termos da alínea g) do n.º1 do artigo 13.º	Ms Contact One
	Mr Contact Two
Unique form ID:	5748A4DCA3D980H6ACEBG27677H5D5A2

Zona geográfica	Número de Lotes ganho por zona geográfica									Montante da Licitação Adicional (milhares de euro)
	Zona 1	Zona 2	Zona 3	Zona 4	Zona 5	Zona 6	Zona 7	Zona 8	Zona 9	
Número de lotes ganhos	3	2	2							
Lotes ganhos por outras entidades	1	1	0	2	2	2	2	1	1	
Licitação n.º	Preferência por A+B+C	Preferência por A+B								
1	0	1								26
2										
3										
4										
5										
6										
7										
8										

Simplified example (cont.)

- The winning bidders and base prices were:

Winner	Green area (no. of lots)	Yellow area (no. of lots)	Red area (no. of lots)	Base price (€'000)
Helena	2	2	0	2525
Ana	0	2	2	2475
Sum lots\value	2	4	2	5000

- Assignment stage is needed for Yellow area:

Bidder	Green area	Yellow area (pref. for A+B)	Red area	Top up bid (€'000)
Helena		✓		12
Ana		✓		57

- Ana wins A+B. She will pay additionally €12,000 (second price).
- Total prices are Helena: €2,525,000 and Ana: €2,475,000+12,000=€2,487,000

- There may be cases where bidders can simply choose the lots they want because they are single winners in a region, or because two bidders won single lots.
- Lot selection: bidder who has won in the largest number of adjacent regions have first choice; then bidder who has won in the next largest number of adjacent regions and so on.
- Finally, there will be a 5 day “swap” period at the end of the assignment stage, before licences are issued, where winners can swap lots within regions if desired.

- ANACOM will provide the bidders with a full set of instructions for bid submission prior to the auction
- Key aspects:
 - Bids will be submitted by electronic means only
 - Bid submission will involve use of digital certificates (X.509v3, Class3)
 - Bidders and ANACOM will exchange public keys
- There will be a time period to allow for setting up safe connections between bidders and ANACOM

The background is a solid blue color. On the left side, there are several white, thin, curved lines that sweep across the frame, creating a sense of motion and design. The text is positioned on the right side of the image.

LEILÃO DE FREQUÊNCIAS (BWA)

ACESSO DE BANDA LARGA VIA RÁDIO