



cutting through complexity

What can we learn from the UK 4G auction?

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The UK LTE (4G) auction concluded in early 2013 after numerous delays caused by threats of legal action by mobile operators and associated changes in auction rules.

Late last year we began talking to a number of players in the UK market, who had been successful in the auction, and Ofcom to get their views on how the UK LTE auction was run. Our aim from these interviews was to identify the key public policy principles needed for effective auctions. Obtaining broad consensus on these public policy principles is critically important for the future success of the industry. It is likely that auctions will continue to be the key method for allocating spectrum globally. More auctions to allocate additional spectrum are planned to cater for predicted ever growing demand (e.g. the next round of spectrum auctions in Europe are planned in the 700MHz band). Drawing on the lessons from previous auctions will help ensure that this incredibly valuable resource is allocated in the most efficient and effective way.

The auction of 4G spectrum in the UK was finally concluded in early 2013. Six different lots of spectrum frequency were auctioned. Overall the auction raised just over £2.3 billion, much lower than the £3.5 billion anticipated by the government:

Lot	Ai	Aii	C	Di	Dii	E
	800MHz 2x5 MHz 800MHz 2x5 MHz	800 MHz 2x10 MHz (with coverage obligation)	2.6GHz 2x5MHz (std power)	2.6GHz 2x10MHz (shared low power)	2.6GHz 2x20MHz (shared low power)	2.6 GHz 5 MHz (unpaired)
Ofcom Reserve proposal	£225m	£250m	£15m	£3m per bidder & £30m per threshold	£6m per bidder & £60m per threshold	£0.1m

¹ Table 1 Ofcom, Statement on the making of regulations in connection with the award of 800 MHz and 2.6 GHz, 12th November 2012, <http://stakeholders.ofcom.org.uk/binaries/consultations/regs-800mhz/statement/statement.pdf>

Winning bidder	Spectrum won	Base Price (Total price after assignment phase)
Everything Everywhere Ltd	2 x 5 MHz of 800 MHz and 2 x 35 MHz of 2.6 GHz	£588,876,000
Hutchison 3G UK Ltd	2 x 5 MHz of 800 MHz	£225,000,000
Niche Spectrum Ventures Ltd (a subsidiary of BT Group plc)	2 x 15 MHz of 2.6 GHz and 1 x 20 MHz of 2.6 GHz (unpaired)	£186,476,000 (£201,537,179)
Telefónica UK Ltd	2 x 10 MHz of 800 MHz (coverage obligation lot)	£550,000,000
Vodafone Ltd	2 x 10 MHz of 800 MHz, 2 x 20 MHz of 2.6 GHz and 25 MHz of 2.6 GHz (unpaired)	£790,761,000 (£802,860,143)
HKT (UK) Company Limited (a subsidiary of PCCW Ltd)	Unsuccessful	
MLL Telecom	Unsuccessful	
Total		£2,341,113,000 (£2,368,273,322)

Was the auction a success? The stated objectives of Ofcom, the UK regulator who organised the auction, were to:

- ensure efficient use of spectrum;
- maintain competition in the industry; and
- promote widespread availability of services.

Ofcom sought to achieve these aims through the auction design. It used the combinatorial clock auction (CCA) model with modifications such as: caps on the amount of spectrum held by any one operator; coverage obligations attached to certain frequency lots; and the adoption of the “second-price” rule where effectively the winner of the lot pays the amount bid by the second placed runner-up.

COMBINATORIAL CLOCK AUCTIONS (CCA):

CCA is a combination of a clock auction and a single sealed bid auction. During the initial clock stage bids are placed on desired products, after each round if excess demand exists the price is raised. This round ends when there are no new bids. This stage is followed by a sealed bid auction that allows one last bid to be made on packages they qualify for, dealing with the issue of buyer's remorse.

² 20th February 2013, Ofcom, Award of the 800 MHz and 2.6 GHz spectrum bands – Publication of results of principal stage under regulation 71(1) of the Wireless Telegraphy (Licence Award) Regulations 2012, <http://stakeholders.ofcom.org.uk/binaries/spectrum/spectrum-awards/awards-in-progress/notices/results.pdf>

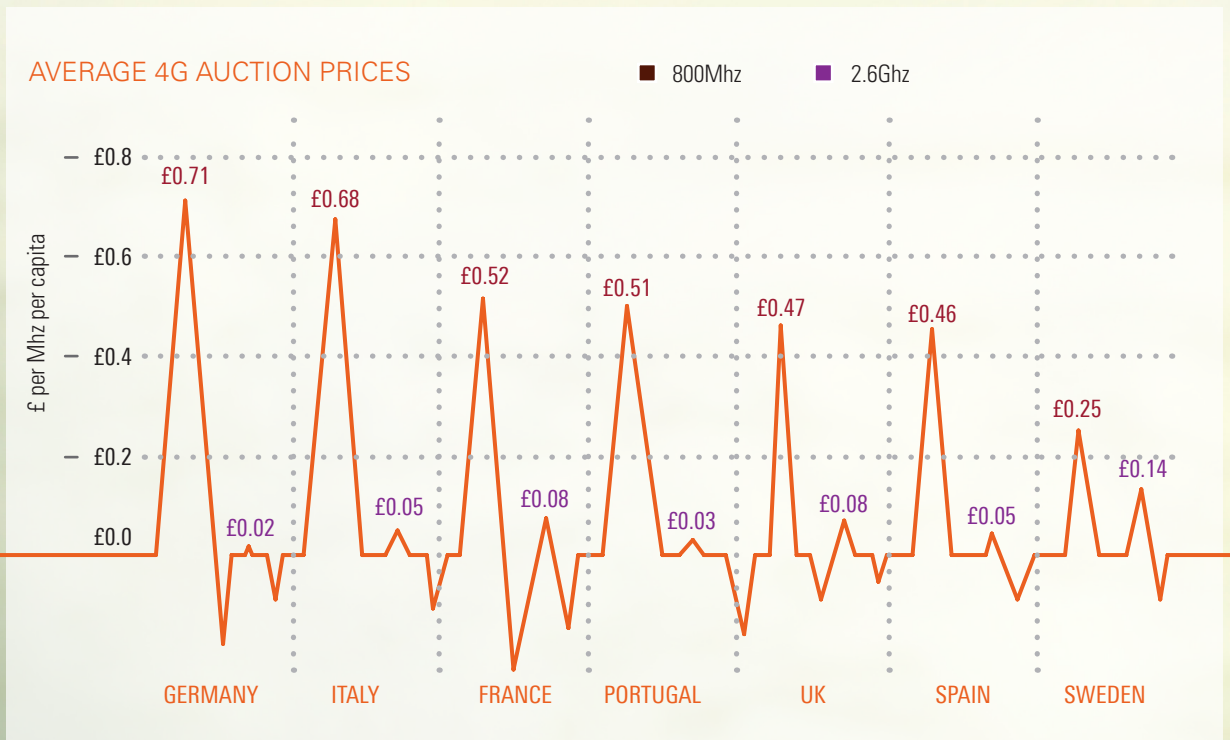
Award of the 800 MHz and 2.6 GHz spectrum bands – Publication of final results of auction under regulation 111 of the Wireless Telegraphy (Licence Award) Regulations 2012 <http://stakeholders.ofcom.org.uk/binaries/spectrum/spectrum-awards/awards-in-progress/notices/4g-final-results.pdf>

Out of the seven original applicants, five were successful and awarded spectrum.

Ofcom reported that all of its key objectives had been achieved by the auction:

- spectrum was licensed to credible bidders at prices that were at or above the reserve prices;
- a re-entrant won a licence and a fourth wholesaler was secured potentially introducing more competition to the market; and
- a licence was issued with a 98% coverage obligation and was won by Telefonica.

The figure below shows a comparison of the prices paid in the 4G auctions across Europe on a per Mhz per population basis. Any comparison of price needs to be viewed in the context that only the prices for the bundles of spectrum awarded are known.



Source: KPMG Spectrum Monitor

Our discussions with industry participants clearly indicated that there were highs and lows of the UK experience - with some clear successes but also with some improvements that are needed for future auctions. ***The overwhelming message was that if there are clear public policy principles, by which auctions are run, then more economically efficient allocations that are beneficial to the UK economy can result.***

Setting clear objectives, and applying them consistently, benefits stakeholders. It allows businesses to build more informed business plans and valuation scenarios. The success or otherwise of the auction can be easily measured, and the auction rules and process can be designed with these objectives clearly in mind.

The challenge arises when there are conflicts between objectives. There are often tradeoffs when more than one objective is in scope, affecting the ability to achieve success.

For example, revenue raising objectives can conflict with the objective to promote efficiency or competition. ***Spectrum will be more valuable to a bidder the less competition there is in the market after the auction. The prospect of making monopoly profits, and so allowing the bidder with the highest valuation to win the most spectrum, would result in the most revenue being raised.*** Such a bidder is likely to be already dominant in the market and this drives up the value it attaches to the spectrum; ***it can exclude or weaken other operators by hoarding the spectrum potentially impacting competition in the market.*** Whilst understanding the tradeoffs and being clear on what constitutes a “successful” auction is essential, it is also relevant that regulators keep in mind other tools, such as spectrum trading and ex post competition law, they can use to achieve their objectives.

Objectives should consider what is right for UK plc. This would mean looking forward at consumer demand and how best to deliver this whilst maintaining competition and profitability in the industry. //

Regulators need to continue to monitor developments in spectrum demand and predicted trends to ensure that spectrum assignments meet industry and consumer needs whilst also promoting innovation and optimal use of a finite resource.

Ensuring spectrum plans are forward looking, with clear medium term guidance to operators on the timing of future auctions, may mitigate some of the costs and uncertainty faced by operators, particularly for Mobile Network Operators that operate in a number of countries. ***Better coordination at the European level would provide operators with the certainty they need to make the sizeable investments required to meet the predicted consumer data demands.*** Operators can make longer term plans regarding their spectrum requirements, and potentially develop more coherent bid strategies, if they know that lack of success in one auction does not put them irrecoverably behind in the market (as future auctions and spectrum trading or leasing can provide additional opportunities).

Effective spectrum trading and leasing provide other means by which operators can plan how they will meet future demand growth in the market and how best to meet consumers needs. However, whilst in the UK there has been active spectrum trading for certain less scarce frequency bands, for example business radio³, there has been little activity for the more valuable spectrum frequencies.

A clear message from the operators interviewed was that there is strategic holding of this valuable spectrum, particularly given the anticipated increased demand for mobile data (and hence spectrum requirements) in the future. This is the case even if the spectrum is surplus to current customer demand.

³The range of frequencies defined by Ofcom as “business radio” can be found here: <http://licensing.ofcom.org.uk/binaries/spectrum/business-radio/technical-information/tfac/ofw164.pdf>

Spectrum allocation is one tool used to promote competition, and spectrum auctions can be designed to enable new market entry and/or to support smaller existing players in the market. This can be through straight forward 'set asides' of spectrum or more complex spectrum caps and restrictions on what the existing operators can bid for. However, ensuring the smallest market players or new entrants obtain spectrum in the auction is not necessarily an efficient outcome. Competition is not just about the number of players in the market but how effectively they compete with each other. Auctions designed to favour small players may lead to spectrum being used sub-optimally or not at all, because they cannot afford the investment needed to exploit it.

What should also be avoided is the perception that regulatory authorities are effectively deciding the outcome of the auction – which operator gets what – before it has even started. There was a sense from at least one participant that Ofcom had designed the 4G auction with a certain outcome in mind, and that this had focussed on maintaining current competition rather than promoting innovation and new competition. ***It should not be a regulator's role to pick winners in the market.***

Setting the auction rules to achieve a pre-determined competitive outcome may be particularly undesirable given that there is no clear consensus on the right number of market participants.

Trends towards market consolidation are in part driven by the need for substantial network investment. The move towards a single EU market is also likely to drive changes in the industry landscape.

Ensuring competition can be achieved through the use of spectrum caps, but consolidation suggests that looser caps may be possible while at the same time preventing any one operator from obtaining a dominant position due to its spectrum holding.

Regulators/governments should seek to achieve allocative efficiency both in the assignment of spectrum to different uses and in the allocation of specific spectrum bands in auctions. Spectrum reassignment requires a value assessment to ensure that any reallocation of spectrum to new users is economically beneficial and the value in alternative uses is maximised.

Developments in auction design over the years have been driven by the guiding principle of achieving allocative efficiency – ensuring that the value the operator places on the spectrum is revealed and reflected in the price they are willing to bid. Attempts have been made to design the auctions to enable the true preferences of bidders to be revealed and to limit the ability to "game" the auction.

Where spectrum auctions are designed and implemented appropriately they can be an effective means of ensuring that spectrum is allocated to bidders who value it most highly. However, the pursuit of other objectives, such as promoting competition, can complicate the design of the auction making it harder to achieve allocative efficiency in practice.

Ofcom designed the auction to maintain competition. There was no promotion of innovation or of new competition. //

When the design of the auction is complex it is difficult to achieve allocative efficiency. The theory works well but all the edits and changes means that in reality it doesn't. //

It was evident from our interviews with key players in the UK market, that the view was overwhelmingly consistent: ***spectrum auctions should be designed to achieve the objectives set as simply as possible.***

Complexity can blur the objectives the auction is trying to achieve, increase costs to the industry and regulatory authorities, limit the ability of new entrants to be successful in auctions and complicate the bidding strategies.

The design adopted by Ofcom in the UK, with a range of different spectrum packages, reserve prices and caps, was highly complex. Indeed, the view of one stakeholder interviewed was that the design was so complex that at least one bidder did not understand the auction and so did not obtain the spectrum it wanted. (We note, however, that all participants have publicly stated that they were happy with their outcome.)

Complexity makes it a difficult process to explain to stakeholders and then to monitor how it is progressing. //

Participants are only able to bid rationally if they understand the rules and potential outcomes; there has to be some trade-off between an auction which theoretically would ensure objectives are met, and its practical application. The message from those we interviewed was clear – complex auctions add to the difficulties and risks operators face when developing their bidding strategies.

Whilst acknowledging that complexity can result in problems; there is again a trade off – between the complexity of auctions and achieving allocative efficiency. CCA type auctions, while more complex, are designed to reduce aggregation risks (that a bidder does not get the 'package' of spectrum it needs).

Auctions should be transparent, with reasonable objectives and simple. //

Ofcom indicated that the inclusion of low power 2.6G spectrum slots in the auction considerably increased the complexity of the auction. In the end, this spectrum was not successfully auctioned and it should not have been included as part of the auction. //

When asked their views on the recent UK 4G auction industry stakeholders were in general agreement. Clear and consistent policy objectives should be set, based on a forward looking view of the industry, with as simple as possible an auction designed to enable those objectives to be met. Whilst this would appear to be obvious, this is sometimes difficult given the rapidly changing nature of the telecoms market along with the need to address the sometimes competing political demands for more competition, along with the desire for a significant financial contribution to government coffers from the auction.

Overall, whilst Ofcom was praised for its engagement with industry and the smooth running of the process, some felt that the resulting auction may have been over-engineered, with the results of the auction determined before it had started. This highlights the difficulties of designing successful auctions that have to navigate potentially conflicting objectives.

Auctions will continue to be a key tool for allocating spectrum in the telecoms market. More and more spectrum will be up for auction over the next few years, driven by the requirements of new technologies and ever increasing demand for data by users. Successfully allocating spectrum to those that value it the most, in a timely manner, should be the main objective. Obtaining broad consensus on the underlying public policy principles required to achieve this should be a key focus area for stakeholders. This is relevant for everyone – not just stakeholders in the UK.

In terms of the 4G auctions there was a policy vacuum, it wasn't clear who was setting the objectives which also meant it wasn't clear who was ultimately accountable for achieving those objectives. //





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