



National Audit Office

Report

by the Comptroller
and Auditor General

Ofcom

4G radio spectrum auction: lessons learned

Key facts

83m

mobile connections
in 2012

£20bn

Ofcom's estimate
of consumer
benefits expected
from the auction

£2.4bn

proceeds raised
from the auction

800 MHz spectrum being auctioned
and 2.6 GHz

250 MHz of bandwidth available at the auction

70 per cent increase in spectrum in use following the auction

7 bidders in the auction

5 winners of spectrum in the auction

Summary

Introduction

1 In 2013, the Office of Communications (Ofcom) auctioned licences to use radio spectrum to wholesale telecommunications service providers. The licences did not specify that they had to be used to provide a particular service, but the spectrum is suited for high-speed mobile data services. The spectrum sold in 2013 provided a significant increase over the spectrum already in use and raised proceeds of £2.4 billion. The winning bidders, type of spectrum awarded and prices paid are set out in **Figure 1**.

2 This was the first major sale of radio spectrum in the UK in over ten years and allows much faster mobile communications technology (often referred to as 4G). Ofcom expects this will provide benefits for consumers estimated at £20 billion. Ofcom's main objectives in the auction were to:

- **maintain a competitive market** by having at least four national wholesale providers, each with an adequate holding of radio spectrum; and
- subject to the above objective, **achieve an economically efficient allocation of spectrum** to bidders who valued the spectrum the most and, by implication, could be expected to make best use of it.

Figure 1
Auction outcome

Winner	800 MHz (%)	2.6 GHz (%)	Price paid (£m)
EE	17	38	589
Niche (BT) (new entrant)	0	27	201
O2	33	0	550
Three	17	0	225
Vodafone	33	35	803
Total	100	100	2,368

Note

¹ O2 800 MHz licence includes a coverage obligation.

Source: Ofcom

3 This report sets out the results of our review of the outcome of the auction. As other public assets may be sold using similar auction techniques, we have also set out a number of high-level lessons for future sales of public assets. Although maximising proceeds for the taxpayer was not an objective, we compared the proceeds raised in this auction with proceeds raised in recent spectrum auctions elsewhere in Europe.

Maintain a competitive market

4 Ofcom achieved this objective. The four existing national wholesalers were all allocated at least the amount of spectrum that Ofcom had judged to be the minimum required to ensure their medium-term viability. A new entrant, Niche (BT), was also allocated a substantial holding of spectrum. However, only EE and Vodafone have enough adjacent spectrum to offer advanced 4G services with higher download speeds in future, with EE having the largest amount of spectrum in total. Ofcom also included a national coverage obligation by 2017 on one package of spectrum, which O2 won. Both O2 and Vodafone, who share their infrastructure networks such as transmission masts, announced that they expect to be able to meet the national coverage obligation by 2015, two years earlier than required.

Efficient allocation

5 We cannot yet conclude that the outcome of the auction was economically efficient. The main reasons for this are as follows:

- During the first stage of bidding, the auction rules allowed bidders to make bids knowing these were unlikely to be winning bids, helping to disguise their real intentions. Our analysis indicates both EE and Three did this during the first round of bidding, although not in the final round. This may reduce the value of the first stage of bidding, which was intended to tell each bidder about the values that other bidders were likely to place on the spectrum being offered.
- Our evaluation of Three's bidding strategy suggests that it was designed to ensure that Three never paid more than the reserve price for spectrum packages that had been reserved for it or new entrants to the market. Three knew early on in the auction that it was the only bidder for the reserved spectrum. In our opinion it is very unlikely that the reserve price was equal to its true value to Three's business.
- The auction design will only guarantee an economically efficient outcome if all participants in the auction bid the full value to their businesses of the spectrum they wanted. Based on our analysis, at least two bidders appeared to be subject to budget constraints which may have prevented them from achieving all of their objectives in the auction. This meant that they sought to limit the amount they would be required to pay for spectrum in the auction and that they were not necessarily always bidding the full value of the spectrum to their businesses.

6 Whether or not the auction succeeded in allocating spectrum to those who can make best use of it will only start to become apparent as the spectrum is brought into use by the winning bidders. As one of the conditions of the licences awarded in the auction, Ofcom can monitor operators' use of the spectrum and operators themselves can now buy and sell spectrum to match their business requirements.

Proceeds compared with other auctions

7 Ofcom has statutory obligations to citizens and consumers and had no objective to achieve any particular level of proceeds. However, we compared the proceeds achieved with those obtained in other European 4G auctions. After adjusting for population sizes, proceeds were within the range achieved in other European auctions. Ofcom's consultants, The Smith Institute, calculated that the proceeds were £159 million lower than they would have been had the radio spectrum won by Three not been reserved for a particular type of bidder.¹

Recommendations for Ofcom and wider lessons

8 We have identified a number of recommendations for Ofcom when conducting future radio spectrum auctions. Ofcom's management of the auction contained elements of good practice which other public sector organisations may wish to consider when undertaking asset sales. These wider lessons are summarised in **Figure 2** overleaf.

9 The structure of wholesale and final consumer markets for mobile telecommunications services is changing. Mobile services are increasingly being offered in packages with other services, such as broadband, fixed-line telephones and pay TV. Mobile services offered by a combination of Wi-Fi and fixed line broadband offer an alternative means of delivery, typically with a different price structure, from current mobile services.

Ofcom should therefore conduct a review of the competitive operation of mobile telecommunications markets before offering further spectrum for auction.

10 Ofcom plans to monitor whether each mobile operator is making full use of the spectrum allocated to it and **should also monitor whether the £20 billion of expected consumer benefits from 4G services are being realised.**

11 **Ofcom should select designs for future auctions that take account of the circumstances of likely bidders**, such as the likelihood that they will be subject to budget constraints. In designing future auctions, Ofcom should also try to make the design no more complex than is necessary to meet its objectives. Ofcom should also give bidders reasonable certainty on how the likely outcomes of the auction would relate to their individual bidding strategies.

¹ Assuming that bidders would have bid in exactly the same way had spectrum not been reserved for a new entrant.

Figure 2

Wider lessons

Planning

- Ahead of any sale, conduct a thorough analysis of the market and how it may develop. Ofcom analysed the market before the auction and identified the need to maintain competition among at least four national wholesalers.
- Set clear objectives in the knowledge that they may conflict and need to be prioritised. Ofcom prioritised its objective to maintain a competitive market.
- Conduct a thorough options analysis of available sale methods and select the method that will best achieve the prioritised sale objectives. The sale of radio spectrum by auction has a long history but Ofcom considered a number of changes designed to ensure it met its objectives.

Design of the auction or other method of sale

- Consult widely with potential bidders and allow time for trial runs before the sale. Ofcom took external professional advice and consulted with potential bidders ahead of the auction.
- Understand the financial positions of the bidders involved and, if possible, consider this when designing the auction. In the 4G auction, some bidders appear to have been budget constrained, potentially limiting the efficiency of the auction.
- Consider the balance between the timing of a sale (for example, the availability of finance to potential bidders) and the wider economic benefits from holding a sale sooner rather than later. Ofcom was aware that any delay in holding this auction would also delay the significant benefits for consumers it expected from the launch of 4G services.
- Ensure that the auction design is proportionate to what is trying to be achieved and avoid complexities that may confuse or deter bidders. In this auction, some bidders felt that the rules were overly complicated.

Post-sale

- Encourage transparency wherever possible by publishing full details of the auction bidding and outcomes. Ofcom has published full data on the outcome of the auction.
- Monitor and evaluate whether the expected long-term and wider benefits flowing from the sale are achieved. Ofcom intends to monitor usage of the spectrum released in this auction and should also assess whether the expected consumer benefits are being achieved.

Source: National Audit Office analysis
