

Update on European auctions since Ofcom's consultation on Annual licence fees for 900 MHz and 1800 MHz spectrum

About this document

This document provides an update on further European spectrum auctions that have concluded since publishing the consultation on mobile annual licence fees for 900 MHz and 1800 MHz spectrum in October 2013. These auction results may provide relevant evidence for the purposes of estimating the market value of licences for those bands in the UK. In particular, this document includes further information on auction prices by band from the Austrian multiband combinatorial auction because it is not otherwise in the public domain.

European auctions since consultation document

1. On 10 October 2013, Ofcom published a consultation document entitled "Annual licence fees for 900 MHz and 1800 MHz spectrum" (the "Consultation Document"), setting out its proposals for revising the annual licence fees ("ALF") payable for licences to use radio spectrum in the 900 MHz and 1800 MHz bands so that they reflect full market value. We have published responses to the consultation on our website. We are considering carefully all stakeholders' comments received in response to that consultation and we have not taken any decisions yet on any of the proposals set out in the Consultation Document.
2. As explained in the Consultation Document, we proposed to take into account a range of evidence to inform our estimate of the market value of licences in the two relevant bands, including the prices paid in spectrum auctions abroad¹. In particular, we commissioned a study from DotEcon into prices from relevant auctions in other countries, which we published alongside our Consultation Document. Informed by DotEcon's analysis, we explained in the Consultation Document that we proposed to focus on the results of European spectrum auctions that have taken place since the beginning of 2010 in order to inform our estimates of the values of 900 MHz and 1800 MHz spectrum in the UK (adjusted for differences such as population and licence duration).
3. Since publication of the Consultation Document, further European spectrum auctions have concluded which may provide relevant additional evidence for the purposes of estimating the market value of the 900 MHz and 1800 MHz licences in the UK because they included one or more of the following bands: 800 MHz, 900 MHz, 1800 MHz or 2.6 GHz. We are aware of such auctions in Austria (multiband)², Belgium (800 MHz)³,

¹ See, in particular, sections 1.3, 4.8-4.9, 4.27-4.40 and Annex 7 of the Consultation Document.

² See information available from the website of the Austrian National Regulatory Authority [here](#). In particular, see results [here](#) and the tender documentation [here](#)

Czech Republic (multiband)⁴, Estonia⁵, Finland (800 MHz)⁶, Latvia (800 MHz)⁷, Lithuania (800 MHz)⁸, Norway (multiband)⁹, Slovak republic (multiband)¹⁰ and Slovenia (multiband)¹¹.

4. Information on auction prices is publicly available for these auctions. But for some of these auctions the publicly available auction prices are for multiband packages of spectrum, not separate prices by band. In the case of Austria, which used a combinatorial clock format (similar to the UK auction), we have obtained some further information on auction prices by band that was not in the public domain, as explained below.
5. **We are considering whether this new information on further European spectrum auctions provides relevant evidence for the purposes of estimating the market value of the 900 MHz and 1800 MHz licences in the UK. If stakeholders wish to submit comments on any of this new information, including where relevant revising or adding to comments they have already submitted to us during the consultation process, we request they do so by 7 June 2014.**

Austrian multiband auction

6. The Austrian combinatorial auction for the award of licences for the 800 MHz, 900 MHz and 1800 MHz bands concluded on 21 October 2013. The Austrian Regulatory Authority for Broadcasting and Telecommunications, Rundfunk und Telekom Regulierungs-GmbH ("RTR") published the results of the auction¹² but not the bids data, for reasons of confidentiality.
7. We asked RTR for assistance in calculating prices by band using the Linear Reference Prices (LRP) methodology.¹³

³ See information available from the website of the Belgian National Regulatory Authority [here](#). In particular, see press releases by the Regulator [here](#) and [here](#), as well as the information memorandum [here](#)

⁴ See information available from the website of the Czech National Regulatory Authority [here](#). In particular, see results [here](#) and invitation to tender [here](#)

⁵ See information available from the website of the Estonian Technical Surveillance Authority [here](#). In particular, see discussion of the recent awards at page 30 of the Annual Report [here](#).

⁶ See information available from the website of the Finnish National Regulatory Authority [here](#). In particular, see results [here](#) and auction rules [here](#)

⁷ See information available from the website of the Latvian National Regulatory Authority [here](#). In particular, see results [here](#) and auction rules / tender documentation [here](#) (English translation unavailable)

⁸ See information available from the website of the Lithuanian National Regulatory Authority [here](#). In particular, see results [here](#) and auction rules / tender documentation [here](#) (English translation unavailable)

⁹ See information available from the website of the Norwegian National Regulatory Authority [here](#). In particular, see results [here](#) and auction rules [here](#)

¹⁰ See information available from the website of the Slovakian National Regulatory Authority [here](#). In particular, see results [here](#), licences (which include prices) [here](#) (English translation unavailable) and call for tenders [here](#)

¹¹ See information available from the website of the Slovenian National Regulatory Authority [here](#). In particular, see results [here](#) and tender documentation [here](#)

¹² See https://www.rtr.at/en/tk/multibandauktion_ergebnis

¹³ See DotEcon (September 2013), *800MHz and 2.6GHz linear reference prices and additional spectrum methodology*, section 3.1.2, available here:

8. In conjunction with RTR we adopted the following approach to allow LRPs to be derived for the Austrian multiband auction without RTR releasing any of the bid data it considers confidential. First, we commissioned DotEcon to develop a software module to allow LRPs for the Austrian multiband auction to be calculated by a user with access to the confidential bid data. Then we shared this software module with RTR, who performed the calculations and reported the results to us.
9. Alongside this update note, we are publishing the software module that DotEcon developed and the log of calculations provided by RTR.

Outcome of the Austrian multiband auction

10. Table 1 below provides a summary of the principal stage results in the Austrian auction as published by RTR (with no unsold spectrum). The size of each lot is 2x5 MHz, albeit for some categories the lots are only partially available for a certain initial period.

Table 1 - Principal stage results

	800 MHz			900 MHz			1800 MHz			
Bidder	A1	A2	A3	B1	B2	B3	C1	C2	C3	Base price (rounded)
Telekom Austria (A1)	1	2	1	0	2	1	2	3	2	€1,030m
T-Mobile	0	2	0	1	2	0	0	4	0	€654m
Hutchison 3G Austria	0	0	0	0	1	0	0	1	3	€329m
Total	1	4	1	1	5	1	2	8	5	€2,012m

Source: RTR

11. The lot structure involved three sub-categories for each of the bands. Based on the tender documentation published by the Austrian Telekom-Control Commission (TKK)¹⁴ and correspondence with RTR, the differences between these sub-categories are:

<http://stakeholders.ofcom.org.uk/binaries/consultations/900-1800-mhz-fees/annexes/linear-reference-prices.pdf>

¹⁴ TKK, *Tender documentation for frequency assignments in the frequency ranges of 800 MHz, 900 MHz and 1800 MHz*, 19 March 2013, available at: https://www.rtr.at/en/tk/multibandauktion_AU/2013-03-26_F1_11_Tender_Document_Multiband_Auction_2013.pdf.

- a) In the 800 MHz band, the A1 lot is subject to higher risk of interference or requirements to protect the adjacent DTT than A2 and A3 lots. The A3 lot is subject to enhanced rural coverage requirements (whereas the A1 lot and the four A2 lots are subject to "basic" coverage requirements).¹⁵
- b) In the 900 MHz band, different lot categories reflect the different timing of the spectrum becoming available: the B1 and B3 lots are only partially available (respectively 2x1.7 MHz and 2x4.1 MHz) from 2016 and fully available from 2018, while the five B2 lots are fully available from 2016. In addition, the B1 lot is also subject to possible usage restrictions or co-ordination requirements along railway lines to protect adjacent GSM-R.
- c) In the 1800 MHz band, different lot categories reflect the different timing of the spectrum becoming available: the two C1 lots are fully available from 2016, the eight C2 blocks are partially available from 2016 and fully available from 2020, and the five C3 lots are fully available from 2018.

LRPs in the Austrian multiband auction: base case

12. Table 2 below provides the results of the LRP calculations for the principal stage of the Austrian auction.¹⁶ This setting is equivalent to the base case scenario for the set of LRPs for 800 MHz and 2.6 GHz spectrum in the UK 4G auction, which we used in our consultation document.

Table 2 - LRP, base case scenario (million Euros per lot)

	800 MHz			900 MHz			1800 MHz		
Lot cat.	A1	A2	A3	B1	B2	B3	C1	C2	C3
LRP	84.8	95.7	71.9	68.0	104.5	99.0	57.3	49.7	54.1

Source: RTR

Sensitivities

13. In line with the approach taken in DotEcon's report¹⁷ published alongside the consultation document, we also requested RTR to calculate LRPs for other scenarios:
 - a) Unsold spectrum in the determination of second prices valued at zero (instead of being valued at reserve price);

¹⁵ The tender documentation highlights a structure of basic minimum coverage requirements across all lot categories (including the 900 MHz and 1800 MHz bands) and enhanced coverage requirements for some specified categories. A1 and A2 lots are subject to the same basic obligation, whereas enhanced levels of coverage requirements apply to the A3 lot. For the sake of clarity, please note that the terms "basic" and "enhanced" are not intended to reflect Ofcom's assessment of the onerousness of the coverage obligations, but are only used for ease of reference to describe the relative level of coverage targets associated with each lot category.

¹⁶ Please note that LRPs expressed in million Euros throughout this note are always rounded down, compared to the solution reported in the log of calculations.

¹⁷ DotEcon, 800MHz and 2.6GHz linear reference prices and additional spectrum methodology, September 2013, available at: <http://stakeholders.ofcom.org.uk/binaries/consultations/900-1800-mhz-fees/annexes/linear-reference-prices.pdf>

- b) Without revenue constraint when calculating LRPs; and
- c) Condensed lot structure, with and without revenue constraint.

Unsold spectrum in the determination of second prices valued at zero

- 14. To verify whether reserve prices had any influence on LRPs, we asked RTR to re-run the winner and price determination problem valuing unsold lots at zero (rather than at reserve price) when determining the base price for each bidder, and then re-calculate LRPs using this modified set of auction results as input.
- 15. RTR confirmed to us that the base prices (and hence the revenue constraint for LRPs) were the same as in the base case scenario. The resulting set of LRPs for this sensitivity is hence the same as in the base case scenario (see Table 2 above).

LRPs without revenue constraint

- 16. Table 3 below provides the results of the LRP calculations for the Austrian auction without revenue constraint, i.e. without constraining the sum of the LRPs to be equal to the auction revenue (at base prices).

Table 3 - LRP, without revenue constraint (million Euros per lot)

	800 MHz			900 MHz			1800 MHz		
Lot cat.	A1	A2	A3	B1	B2	B3	C1	C2	C3
LRP	88.8	97.6	71.7	83.6	108.4	108.9	64.2	54.0	61.0

Source: RTR

LRPs with condensed lot structure

- 17. This scenario calculates LRPs with a condensed structure of lot categories:
 - a) A1, A2 and A3 are condensed to a single 800 MHz category;
 - b) B1, B2 and B3 are condensed to a single 900 MHz category; and
 - c) C1, C2 and C3 are condensed to a single 1800 MHz category.
- 18. The results are shown in Table 4 below.

Table 4 - LRP, condensed lot structure (million Euros per lot)

Lot cat.	800 MHz	900 MHz	1800 MHz
With revenue constraint	82.4	106.3	51.5
Without revenue constraint	82.9	110.0	56.1

Source: RTR

Summary of maximum excursions

19. Table 5 provides a summary of maximum excursions for each bidder at the LRP in each scenario. A positive maximum excursion indicates by how much a bidder would have to be compensated to choose their winning packages at the LRPs, as its bids suggest it would have preferred to win another package(s) at these linear prices.

Table 5 - Maximum excursions by scenario (million Euros)

Bidder	Base case	Without revenue constraint	Condensed lot structure, with rev. constr.	Condensed lot structure, without rev. constr.
Telekom Austria (A1)	3.6	8.7	46.6	51.2
T-Mobile	52.5	52.1	76.2	79.9
Hutchison 3G Austria	33.1	4.8	22.3	3.8
Total	89.3	65.7	145.2	135.0

Source: RTR

Relevant comparators for UK spectrum

20. The structure of lot categories in the Austrian auction was relatively complex, with three categories in each band. One issue that arises is how to identify the most relevant comparators to UK spectrum, which might be for the purpose of using absolute or relative value benchmarks. There is a range of possibilities, including:
- Use A2 for UK 800 MHz spectrum without coverage obligation, B2 for UK 900 MHz spectrum and C1 for UK 1800 MHz spectrum, or these categories to derive relative values.
 - Use Austrian condensed categories for the equivalent spectrum band in the UK or to derive relative values.