

Award of available spectrum: 1781.7-1785 MHz paired with 1876.7-1880 MHz

Ofcom

Date: 8 September 2005

Seminar outline

- Section 1 – Introduction Peter Bury
- Section 2 – Spectrum packaging Tim Cross
- Section 3 – Technical conditions Martin Fenton
- Section 4 – Auction format and rules Graham Louth
- Questions and answers

Introduction – Purpose of the seminar

- The purpose of this seminar is to present the proposals Ofcom made for the award of the Spectrum Bands in the consultation published on 28 July.
- This is also an opportunity to answer stakeholders' questions on the proposals and receive feedback.
- Ofcom is not in a position to give more detail or information than in the proposals that are subject to consultation.
- The consultation document should be taken as the description of Ofcom's proposals and their status.

Introduction – The awards programme

- Radio spectrum is a vital input to electronic communications services and networks and a major asset to the UK. One of Ofcom's primary duties is to ensure optimal use of spectrum in the interests of citizens and consumers.
- In January 2005 Ofcom published the Spectrum Framework Review: Implementation Plan (SFR:IP) which contained proposals for the award of spectrum in over 15 bands in the next 2-3 years.
- Ofcom received 68 responses to the SFR:IP of which over 30 specifically commented on our plans to award spectrum at 1781.7 – 1785 MHz paired with 1876.7 – 1880 MHz, the so called GSM/DECT guard bands.
- Ofcom believes it should proceed with this as the first award in the programme of awards outlined in the SFR:IP; as such, it should be the **first spectrum auction conducted by Ofcom**.

Introduction – The Ofcom spectrum vision

- Ofcom published its statement on the Spectrum Framework Review (SFR) in June 2005. This sets out our vision of how market forces can play an increasing role in spectrum management, encouraging efficiency in spectrum use by increasing the likelihood that spectrum will be held by those who can make best use of it and by creating more freedom for spectrum to be used for more valuable applications.

- **The Ofcom Spectrum Vision**

1. Spectrum should be free of technology and usage constraints as far as possible. Policy constraints should only be used where they can be justified;
2. It should be simple and transparent for licence holders to change the ownership and use of spectrum; and
3. Rights of spectrum users should be clearly defined and users should feel comfortable that they will not be changed without good cause.

Next Steps

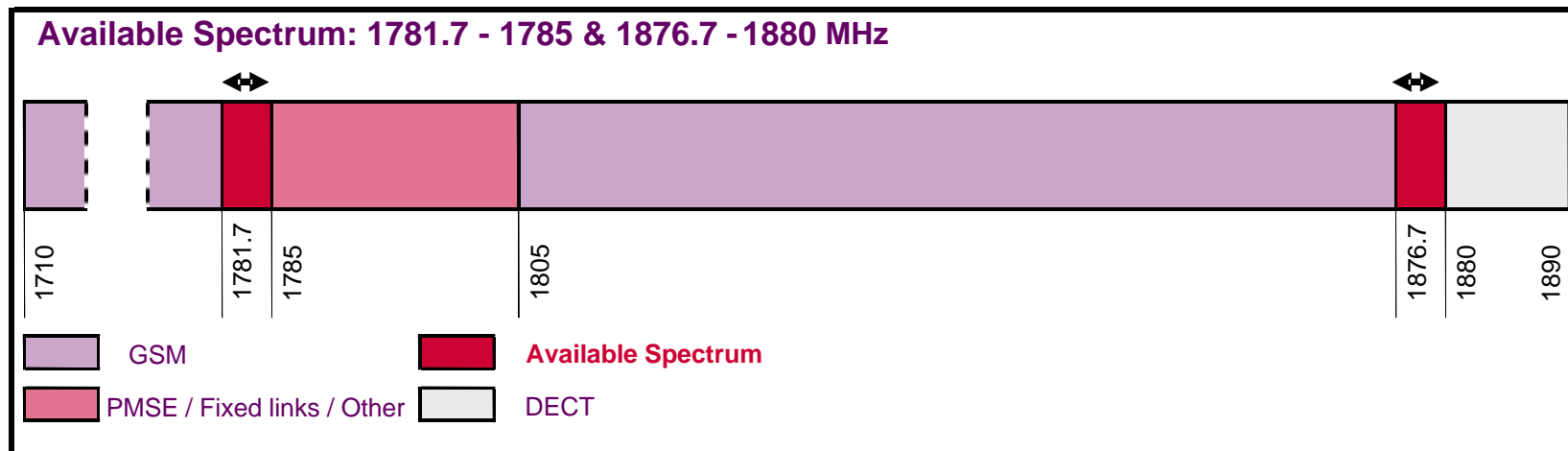


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Spectrum Packaging

The available spectrum



- The band 1876.7 – 1880 MHz was originally set aside to protect GSM and DECT services from interfering with each other – this is no longer considered necessary following further technical study in CEPT hence the band is now available.
- The paired band 1781.7 – 1785 MHz has consequentially also remained un-used (apart from some limited MoD use) and is therefore also available.

Spectrum Packaging

Key proposals

- Licences will have **concurrent rights**
 - All licensees will have equal rights and obligations in relation to the Spectrum Bands, i.e. to use the same frequencies on a shared basis in the whole of the UK: no one licensee will have priority over any other.
- There will be between **5 and 10 licences** awarded – determined by the auction.
- Licences will be **low power**.
- Licences will be **technology neutral**.
- Licences will be tradable
 - Trades will be limited to **outright total transfers**.
- Licences will be of indefinite term with a **minimum term of 10 years** (during which time Ofcom's powers to revoke will be limited).

Spectrum Packaging

Licence term

- Licences will be of indefinite term with a **minimum term of 10 years**.
- During the 10 year minimum term Ofcom's power to revoke the licences will be limited (they cannot be revoked on spectrum management grounds).
- After the minimum term licences can be revoked on spectrum management grounds provided at least 5 years notice has been given (the notice can be given during the minimum term but cannot take effect until after it has come to an end).

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Technical conditions

Power level

- Power will be limited to **200 mW (23 dBm) EIRP per channel**
 - Based on the typical pico-cell power level contained in cellular standards such as GSM.
- This should be sufficient to provide coverage of up to 50 metres radius in a typical office environment.
- It should also be sufficient to provide building penetration of approximately 30 metres up to 140 metres from an outdoor system in a typical campus environment.
- A power level of 1 mW (0 dBm) per channel should be sufficient to cover most residential properties.

Technical conditions

Antenna height

- The height of outdoor antenna systems will be limited to **10 metres**.
- This is necessary to avoid widespread interference from outdoor systems which our analysis indicates can cause unacceptable levels of co-channel interference to indoor systems up to 10 km away.
- Our analysis indicates that building and other clutter can be very effective at limiting co-channel interference if the interfering transmitter is below the level of the surrounding clutter.
- A height restriction is not necessary for indoor systems due to the additional building losses.

Technical conditions

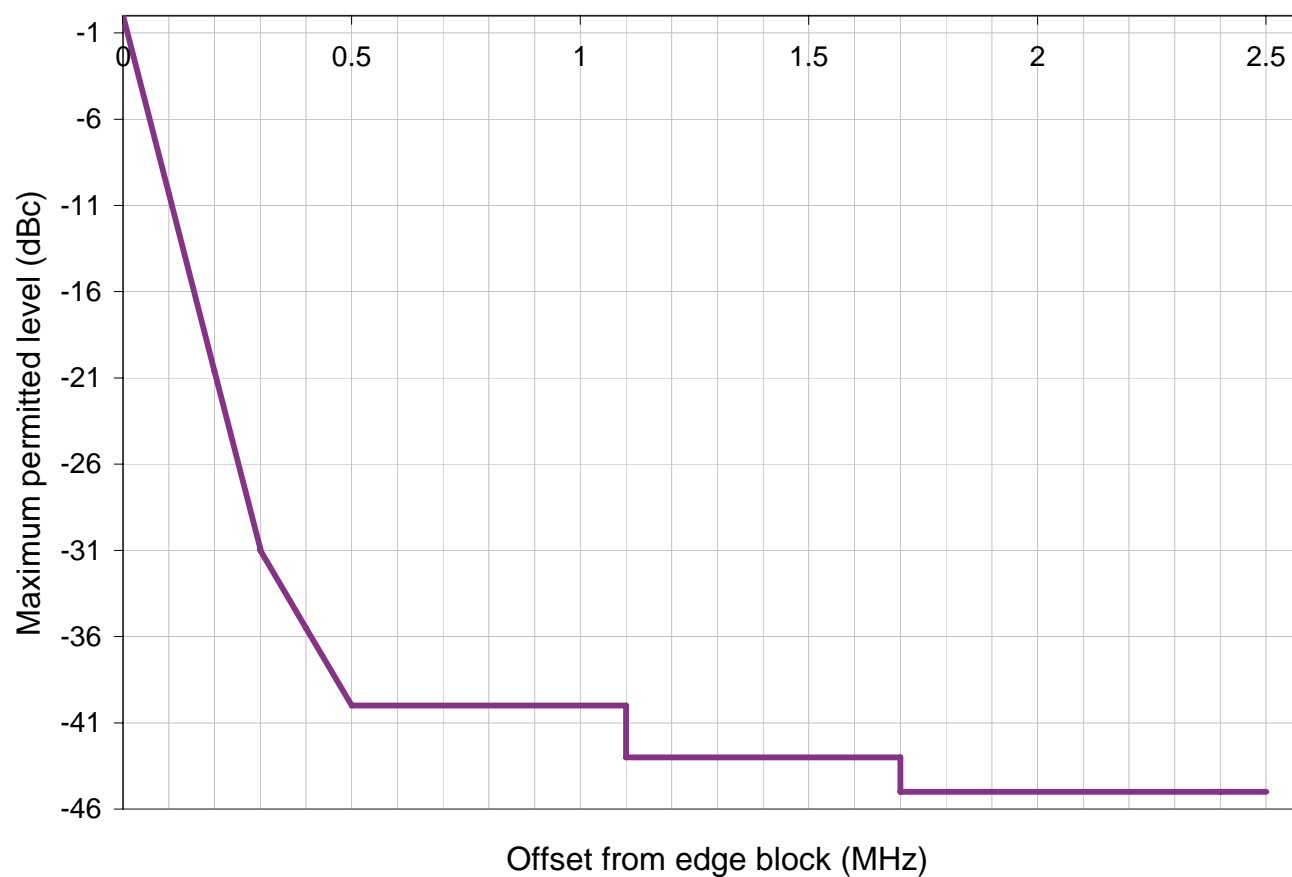
Out-of-block emission mask

- In order to avoid interference into the adjacent licensed GSM band
 - Below 1876.9 MHz an out-of-block emission mask based on the GSM standard will apply
- In order to avoid interference into the adjacent DECT band
 - Above 1879.9 MHz the same out-of-block emission mask will also apply

Offset from block edge	Maximum level	Measurement bandwidth
0.0 to 0.3 MHz	$-103 \times \Delta f$ dBc	30 kHz
0.3 to 0.5 MHz	$-17.5 - (45 \times \Delta f)$ dBc	30 kHz
0.5 to 1.1 MHz	-40 dBc	30 kHz
1.1 to 1.7 MHz	-43 dBc	30 kHz
1.7 to 6.0 MHz	-45 dBc	100 kHz

Technical conditions

Out-of-block emission mask



Technical conditions

Engineering coordination code of practice

- As licensees will have concurrent rights to use the spectrum there is a strong likelihood that they will cause each other harmful interference if they do not cooperate at a technical level to avoid such interference.
- Licensees will be under an obligation to coordinate on a best endeavours basis and negotiate in good faith where interference occurs.
- Licensees will be required to produce a **Code of Practice** on engineering coordination within 6 months of licences being awarded taking in to account the following principles:
 - Using no more channels/bandwidth than needed to provide an effective service
 - Maintaining power levels to the minimum necessary to provide an effective service
 - Siting of equipment to minimise the probability of interference
 - Procedures for information exchange between licensees

Technical conditions

Ofcom's role in engineering coordination

- Ofcom will have the power to impose our own engineering coordination procedure if it becomes clear that the industry generated Code of Practice is not working.
- This is seen as a last resort – as a light touch regulator, Ofcom will prefer it if engineering coordination issues can be resolved between licensees without the direct involvement of Ofcom.
- Ofcom will not become involved in individual engineering coordination disputes. Our involvement will be limited to imposing our own engineering coordination procedure as described above.
- Where a licensee fails to abide by an engineering coordination procedure imposed by Ofcom, this will be treated like any other breach of licence conditions and it is therefore possible that it could lead to revoking the licence.

Technical conditions

Other issues

- Prospective licensees should be aware of the existing MoD use outlined in the consultation.
- Sitefinder
 - It is the Government's wish that any licence holders who use any of the currently covered technologies (GSM, UMTS and TETRA) should be invited to volunteer information for Sitefinder on the same basis as the current mobile operators.
 - Ofcom will therefore invite concurrent low power licensees to participate where appropriate.

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Auction format and rules

Key proposals

- Single round, sealed bid, 'menu' auction
- 'Pay what you bid'
 - Winning bidders have to pay the amount that they bid
- Identity of all registered bidders published before the auction starts
- Prohibitions on collusion and bidder association
- Reserve price of £50,000 per licence
- Deposit required (bank guarantee) = 50% of highest amount bid for a licence
 - Forfeit in case of breach of auction rules or default on final payment
- Full payment upfront
 - 100% of winning bids to be paid by winning bidders before licences issued
- Value of all bids and identity of bidders disclosed at the end of the auction

Auction format and rules

Single round, sealed bid, 'menu' auction

- Only one round of bidding; bids kept secret until result of auction is announced; no opportunity to raise bids in subsequent rounds (there won't be any subsequent rounds)
- Each bidder submits a single bid form; six options listed on the one bid form:
 - one option for each of the different numbers of licences that could be awarded, between 5 and 10 inclusive
- Each bidder can make up to six (parallel) bids on the same bid form, one bid for each of the options listed; in each case the bidder is bidding to win one (and only one) of the concurrent licences available under that option
- Winning option (number of licences to be awarded) is the one that receives the highest aggregate amount bid for the number of licences to be awarded under that option
 - Ties resolved in favour of the award of more licences
- Winning bidders are those that submitted the highest bids for the winning option
 - Ties resolved by the drawing of lots

Auction format and rules

The bid form – an illustration (with a reserve price of £5)

**Auction of licences for the use of spectrum bands
1781.9 - 1784.9 MHz paired with 1876.9 - 1879.9 MHz**

Bidder:

Acme Network PLC

Option:	Amount bid to win one licence in each case:
5 licences to be awarded	£25
6 licences to be awarded	£20
7 licences to be awarded	£15
8 licences to be awarded	£10
9 licences to be awarded	£5
10 licences to be awarded	£5

Auction format and rules

Determining the winning option and bidders – an illustration
(with a reserve price of £5)

		Abi	Ben	Col	Dee	Hal	Jim	Kay	Roy	Seb	Tim	Val	Total
Number of Licences	5	16	12	16	12	14	10	18	13	11	20	13	84
	6	15	12	16	11	14	9	18	10	11	18	13	94
	7	13	12	14	10	13	9	17	10	10	17	11	97
	8	11	12	14	-	12	9	16	9	10	16	10	101
	9	9	12	12	-	10	8	15	9	10	13	9	99
	10	7	12	11	-	9	7	13	8	9	11	9	96

Winning option = 8 licences to be awarded

Winning bidders = Abi, Ben, Col, Hal, Kay, Seb, Tim and Val

(Each winning bidder pays what they bid e.g. Abi pays 11, Ben pays 12, Col pays 14)

Auction format and rules

Determining the winning option and bidders – another illustration
(Ben bids differently)

	Abi	Ben	Col	Dee	Hal	Jim	Kay	Roy	Seb	Tim	Val	Total
5	16	25	16	12	14	10	18	13	11	20	13	95
6	15	20	16	11	14	9	18	10	11	18	13	101
7	13	15	14	10	13	9	17	10	10	17	11	100
8	11	10	14	-	12	9	16	9	10	16	10	99
9	9	5	12	-	10	8	15	9	10	13	9	95
10	7	5	11	-	9	7	13	8	9	11	9	89

Winning option = 6 licences to be awarded

Winning bidders = Abi, Ben, Col, Hal, Kay and Tim

(Each winning bidder pays what they bid e.g. Abi pays 15, Ben pays 20, Col pays 16)

Questions