



# **SPECTRUM PRICING: THIRD STAGE UPDATE AND CONSULTATION**

## **Appendix 2 Public Telecommunication Network Services**

Your views on the proposals set out in this document are sought by 9 February 2001. Comments should be sent to the address below. It would be helpful if lengthy written documents could be sent via email or on disk in Word 7:

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## **APPENDIX 2: Public Telecommunications Services**

### Mobile Operators

#### *Introduction*

1 This document and the third stage update document is aimed at informing customers on the Radiocommunication Agency's continued implementation of administrative pricing through regulation under the powers of the Wireless Telegraphy Act 1998. It outlines proposed changes to become effective from July 2001 and beyond.

2 The objective of spectrum pricing for mobile communications is to promote spectrum efficiency; encourage users to consider alternative services and frequency bands; and promote the use of more spectrally efficient technologies (i.e. the ability to handle the same/more traffic within narrower bandwidths).

3 The primary aim of this document is to illustrate further the migration levels for the pricing of the wide range of public telecommunications services towards equivalent relative levels for the amount of spectrum utilised, adjusted by appropriate modifier scaling factors to address particular spectrum or sector issues as already addressed in the previous three phases. Additionally, proposals are offered for the pricing of categories of cellular telephone services in the Channel Islands and the Isle of Man and Remote Meter Reading services. Fixed Wireless Access is covered in Appendix 1 as a separate topic.

4 As previously, PTN will hold discussions both individually and collectively, with the Public Mobile Communications operators to agree the application and value of appropriate modifiers. The Mobile Services Committee will discuss whether there is a need to reconvene the group to review the existing modifiers as well as whether any new modifiers need to be introduced.

#### *Licence Classes*

5 The classes to which it is proposed to continue to apply spectrum pricing principles for the year 2000/01 include:

i) Public Mobile Operator class, which covers:

- Cellular and PCN Radiotelephones;
- Public Mobile Data;
- Public Paging;
- Public Access Mobile Radio (PAMR) including Public TETRA.

ii) Common Base Stations (CBS) licence class:

- Existing CBS services including congestion factors;
- New CBS services in new spectrum such as Band 1 and Band III.

iii) Licence classes being considered for incentive pricing proposals:

- Fixed Wireless Access (formerly Radio Fixed Access); (see appendix 1)
- iv) Other Public Telecommunications Services
- Remote Meter Reading

### *Spectrum Allocation for Public Services*

6 Spectrum for Public Networks is allocated on an exclusive basis for a local area, regional, national or UK-wide coverage. With the exception of local area common base station services, the allocation procedure is normally through public open consultation/competition which is managed jointly by RA and DTI. Spectrum for entirely new services, or for later generation technologies of existing services may be (and has been) considered in future for possible auctioning of spectrum which is made possible by the provisions of the 1998 Act.

7 Once the initial allocation is made, further spectrum may be allocated (if available) only on demonstrable need and, if not specifically provisioned for call-off under the terms of the original consultation, may also be subject to open consultation/competition. The channels allocated are considered to be uniformly ‘congested’ since, once allocated to meet the operators’ traffic demand, there is no further spectrum available for these services. The use of ‘congestion’ as a factor is therefore not appropriate in calculating fees for these services.

8 Common Base Station (CBS) assignments are made from a pool of spectrum allocated to the sector, with defined levels of traffic and customer loading required to retain existing channels or to justify additional allocations. The Agency uses monitoring data (both routine and targeted) as well as customer-supplied information in order to assess the merits of applications and employs coverage-prediction software tools to make effective re-use of the spectrum. Longer term, the Agency intends eventually to replace the current fees based on the base station location (ie. within a non-, ordinary- or heavy- congested area) with a regime that calculates the fee based on the coverage area of the CBS, reflecting the percentage of congested/heavily congested coverage.

### *STU rate and phasing-in arrangements*

9 Chapter 4 of the document “Spectrum Pricing: Third Stage Update and Consultation” recaps the back ground to spectrum pricing and the development of the Standard Tariff Unit (STU) as a means of equitable pricing.

10 The STU rate for mobile communications of £1.65 per MHz/km<sup>2</sup> (yielding a value of £9,900 per 2 x 12.5kHz channel nationally) which was calculated and applied in the earlier stages, was based on the relative allocations of spectrum to the range of service sectors. As allocations have changed in recent years and since further spectrum will continue to be allocated, for instance to 3<sup>rd</sup> Generation Cellular, to Public (and in due course private) TETRA, the basic STU unit will in time need to be re-calculated. However it must be remembered that this represents only half the recommended tariff rate suggested by the initial consultancy work<sup>1</sup>. The Government decided that a cautious

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<sup>1</sup> Smith Nera Report

approach to implement the £1.65 rate as appropriate with a review to assess the effect of spectrum pricing on the radiocommunication market. It is therefore proposed that, in these initial implementation years, a stable basis of £1.65 should continue to apply and that there should be no increase until a further review at the end of the implementation phase.

11 This being so, table T1 shows the steps thus far and the remaining years envisaged to phase in the £1.65 STU rate to current services. However, it is possible that amended or additional modifier rates may be applicable for particular licence categories or in particular bands.

#### *Modifiers and Congestion Factors*

12 The Modifiers Working Group of the original Spectrum Pricing Sub-Committee formulated the framework of the policy for applying a scaling factor or 'modifier' in cases where there was demonstrable need and five modifier types were agreed. (Appendix A) giving further information is reproduced from the second stage consultation document.

#### ***Cellular/PCN Radiotelephony***

13 Under the old regime of cost-recovery pricing, cellular operators and PCN mobile telephony services paid proportionally much less for spectrum than other public and private users of mobile radio. Through discussions with the four mobile operators (Cellnet, Vodafone, Orange and One-2-One) it was agreed to extend the implementation period from 3 to 4 years in order to ease in the proposed fees over a longer period.

14 Modifiers have been introduced in preparation for future years when the fee will mirror more closely the anticipated market value. The modifiers take account of differences in cellular and PCN propagation abilities and the varying levels of spectrum fragmentation. The modifiers seek to balance reasonable competing factors between cellular operators. The modifiers already in place for fragmentation, for geographically restricted channels and for propagation differences should continue as they provide a balance between the respective operators in this sector. The fragmentation modifier shall be reviewed as the migration from analogue to digital has begun and a more cohesive allocation is emerging. Having started a year before the other PMO operators, 2000/01 will be the third and penultimate year towards applying the full £1.65 STU rate.

#### ***Public Data Networks***

15 The demand for Public Mobile Data (PMD) has increased greatly due to the expansion of computer-based services and the popularity of mobile personalised communication. This sector uses prime mobile spectrum and, as such, the national standard value of £9,900 per 25kHz of spectrum (2 x 12.5kHz) applies. It is proposed to continue the progression toward implementing the full charge by 2002/2003 to reflect the market value. A response to the second stage consultation asked for consideration to be given that some national channels have geographic constraints to their usage. This been accepted and where applicable a modifier of 0.8 has been agreed for spectrum constraints and co-ordination.

## ***Public Paging***

16 This sector has experienced considerable change over the past year. Innovative new services have now been introduced such as two way paging and growth in the paging market has continued to increase. The full rate for national mobile spectrum is therefore appropriate and the incremental fees are shown in table T1, towards the national standard rate of £9,900 per 25kHz of spectrum.

## ***PAMR/TETRA***

17 It is proposed that the modifier of value 0.7 for choice and diversity should continue to be applied for analogue PAMR services, such that the national standard rate of £9,900 is modified to £6,930 (regional £1,386 based on a reuse factor of 5) and the phased increments as given in the previous consultation shall remain unchanged. Following comments from the Agency's customers it has also been agreed to apply a 0.8 modifier to national and regional channels in Band III (174 - 208 MHz) as spectrum usage is constrained by co-ordination requirements.

18 It is also proposed that for digital public TETRA services a modifier of 0.7 is now included for fragmented spectrum and co-ordination. New services will still be entitled to a start-up escalator over 5 years, rising to the new proposed equivalent national standard value of £13,860 per channel of 50kHz (2 x 25kHz). Some channels may also have additional geographic restrictions and this factor will be reflected in the charge. Currently 1 MHz (Duplex) has been rewarded for Civil TETRA, which will be charged on the same basis as 400 MHz TETRA.

## ***Common Base Stations (CBS)***

19 The aim of administrative pricing for CBS is to encourage operators to use channels more effectively, including the use of trunking. Spectrum pricing will mean that CBS are assigned customised licences on a similar basis to that in the proposal for PBR wide-area. Hence, congestion is a criterion for formulating the licence fee.

20 It is proposed that the modifier of value 0.7 for choice and diversity should continue to be applied for CBS services and that in bands where there is congestion, the PBR fee ratio of 1:2:4 for non-congested: congested: heavily congested should still hold, assuming a theoretical reuse factor of 10. In bands where there is no congestion, specifically those where new spectrum is now being made available for CBS services such as Band I and Band III, a non congested rate should be adopted, again with an assumed reuse of 10. To encourage new services into the uncongested bands it has been agreed that services utilising these bands be entitled to start-up escalators, rising to the proposed equivalent national standard value of £824 per channel. The incremental steps will be different for each escalator as they are dependent on the band used. Table T2 illustrates the relevant fees structures.

21. At present the revised fees for CBS vary according to congestion , defined by grid-references. This arrangement is currently being considered to be reviewed. For

example, the pollution of CBS channels by historical PMR assignments may affect the congested state in some areas. It is therefore proposed that the pricing of CBS will be reviewed in the near future so that it is based on the actual coverage area, rather than the initial band reuse factor of 10 regions (although this is expected to cause problems of administrative practicality). CBS assignments are made on the understanding that new licensees will establish a defined level of traffic loading within a given period. If the specified channel loading is not reached, the assignment may be revoked.

### ***Fees in the Channel Islands and Isle of Man.***

#### *Channel Islands and Isle of Man Cellular Telephony*

22 In previous years, only an administrative fee for the ongoing maintenance of licences has been levied. This was because at sector level under a cost/recovery system of charging, the Cellular Telephone licence class was already fully funded by the mainland national operators and the islands' contribution was negligible by comparison. However, on an individual basis the work of co-ordinating the islands' local channels and services both nationally and internationally as well as the overhead of work done towards development of technical standards, planning and policy would, in real terms, have far exceeded the amounts actually levied.

23 It has been the intention therefore that, at such time as the development of fees policy and legislation would permit, a spectrally priced fee structure would be applied in a similar way as for other services. The Agency therefore continues to propose that, based on the relative proportion of the UK population resident in the islands, a value on the order of 0.2% of the national channel fee rate (based on the £1.65 STU) should be applied per channel and that the introduction of this fee rate should be phased in over three years. This should encourage efficient use of spectrum resulting in fewer channels requiring co-ordination. It is also proposed that the same fee value shall be applied also to third generation (UMTS) spectrum in these islands.

#### ***Remote Meter Reading***

24 This class of licence, introduced in 1999/00 is already priced closely equivalent to the £1.65 STU rate and it is therefore proposed not to make changes therefore until the value of the STU rate is reviewed. This is not likely to be earlier than 2002/03.

#### ***Actual Values***

25 Tables T1 and T2 below summarises the headline fee rates proposed, and the corresponding values after the application of proposed modifiers.

**Table T1**

<i>Headline Tariffs</i>		1997/8	1998/9	1999/00	2000/01	2001/2	2002/3	2003/4		
No Modifiers Applied	KHz	£	£	£ (ex. mods)	£ (ex. mods)	£ (ex. mods)	£ (ex. mods)	£ (ex. mods)		
		SP: Pre.	SP: Pre.	SP: Yr 1	SP: Yr 2	SP: Yr 3	SP: Yr 4	SP: Post		
Regional Paging	1 x 25	3,600	3,600	1,980	1,980	1,980	1,980	1,980		
National Paging	1 x 25	5,400	5,400	6,500	7,600	8,750	9,900	9,900		
Regional PAMR	2 x 12½	790	790	1,285	1,645	1,785	1,980	1,980		
National PAMR	2 x 12½	1,800	1,800	3,571	4,714	6,857	9,900	9,900		
National TETRA PAMR	2 x 25	-	-	4,950	7,425	9,900	14,850	19,800		
Data	2 x 12½	1,800	1,800	4,500	6,000	7,500	9,900	9,900		
		SP: Pre.	SP: Yr 1	SP: Yr 2	SP: Yr 3	SP: Yr 4	SP: Post	SP: Post		
Cellular	2 x 25	1,800	3,960	6,875	12,500	19,800	19,800	19,800		
Cellular/PCN	2 x 200	14,400	31,680	55,000	100,000	158,400	158,400	158,400		

<i>Actual Tariffs</i>		1997/8	1998/9	1999/00	2000/01	2001/2	2002/3	2003/4		
With Modifiers Included	KHz	£	£	£ (inc. mods)	£ (inc. mods)	£ (inc. mods)	£ (inc. mods)	£ (inc. mods)	Modifier	Rate
		SP: Pre.	SP: Pre.	SP: Yr 1	SP: Yr 2	SP: Yr 3	SP: Yr 4	SP: Post		
Regional Paging	1 x 25	3,600	3,600	1,980	1,980	1,980	1,980	1,980		Unity
National Paging	1 x 25	5,400	5,400	6,500	7,600	8,750	9,900	9,900		Unity
Regional PAMR (* See below)	2 x 12½	790	790	900	920	1000	1,109	1,109	Choice & Diversity	0.7 x 0.8*
National PAMR (* See below)	2 x 12½	1,800	1,800	2,000	2,640	3,840	5,544	5,544	Choice & Diversity	0.7 x 0.8*
National TETRA PAMR (* & ** See below)	2 x 25	-	-	4,950	5,200	6,930 *(5,545)	10,395 *(8,315)	13,860 *(11,090)		0.7 *(0.7 x 0.8)
National Data (* See Below)	2 x 12½	1,800	1,800	3,600	6,000 *(4,800)	7,500 *(6,000)	9,900 *(7,920)	9,900 *(7,920)		Unity *(0.8)
		SP: Pre.	SP: Yr 1	SP: Yr 2	SP: Yr 3	SP: Yr 4	SP: Post	SP: Post		
Cellular (900) (** See below)	2 x 25	1,800	3,960	5,500	10,000	17,820	17,820	17,820	Fragmentation	0.9
Cellular(GSM900)	2 x 200	14,400	31,680	44,000	80,000	142,560	142,560	142,560	Fragmentation	0.9
Cellular(GSM1800)	2 x 200	14,400	31,680	41,250	75,000	158,400	158,400	158,400		Unity
PCN (1800)	2 x 200	14,400	31,680	38,500	70,000	110,880	110,880	110,880	Propagation	0.7
Channel Isles / IoM	2 x 25	-	-	-	25	32.5	40	40		-
Cellular(900/1800/UMTS)	2 x 200	-	-	-	200	260	320	320		-

\* A modifier of 0.8 applies to national or regional channels in Band III (174 - 208 MHz) and designated channels in UHF1 (420 - 450 MHz), and for TETRA in the band (410 - 430 MHz) as spectrum usage is constrained by co-ordination requirements.

\*\* 900 MHz TETRA (1 MHz available now unfragmented) other spectrum released with closure of TACS and subject to local restrictions for RAFSEE.



**Table T2**

<i>Headline Tariffs</i>		1997/8	1998/9	1999/00	2000/01	2001/2	2002/3	2003/4		
No Modifiers Applied	KHz	£	£	£ (ex. mods)	£ (ex. mods)	£ (ex. mods)	£ (ex. mods)	£ (ex. mods)		
		SP: Pre.	SP: Pre.	SP: Yr 1	SP: Yr 2	SP: Yr 3	SP: Yr 4	SP: Post		
CBS – Channels with congestion areas	2 x 12½	675	675	1,285 (H/C) 800 (C) 582 (N/C)	1,714 (H/C) 964 (C) 582 (N/C)	2,000 (H/C) 1,071 (C) 582 (N/C)	2,328 (H/C) 1,164 (C) 582 (N/C)	2,328 (H/C) 1,164 (C) 582 (N/C)		
CBS – Uncongested Band				-	825	825	825	825		

<i>Actual Tariffs</i>		1997/8	1998/9	1999/00	2000/01	2001/2	2002/3	2003/4		
With Modifiers Included	KHz	£	£	£ (inc. mods)	£ (inc. mods)	£ (inc. mods)	£ (inc. mods)	£ (inc. mods)	Modifier	Rate
		SP: Pre.	SP: Pre.	SP: Yr 1	SP: Yr 2	SP: Yr 3	SP: Yr 4	SP: Post		
CBS – Channels with congestion areas (# See below)	2 x 12½	675	675	900 (H/C) 675 (C) 407 (N/C)	1,200 (H/C) 675 (C) 407 (N/C)	1,400 (H/C) 750 (C) 407 (N/C)	1,630 (H/C) 815 (C) 407 (N/C)	1,630 (H/C) 815 (C) 407 (N/C)	Choice & Diversity	0.7 0.7 0.7
CBS – Uncongested Bands	2 x 12½	-	-	-	-	-	-	-		Unity
Band I and Sub-Band I of Band III										
On issue					103	103	103	103		
1 <sup>st</sup> Anniversary					206	206	206	206		
2 <sup>nd</sup> Anniversary					309	309	309	309		
3 <sup>rd</sup> Anniversary					412	412	412	412		
4 <sup>th</sup> Anniversary					618	618	618	618		
5 <sup>th</sup> Anniversary					824	824	824	824		
Sub-Band III of Band III										
On issue					412	412	412	412		
1 <sup>st</sup> Anniversary					516	516	516	516		
2 <sup>nd</sup> Anniversary					618	618	618	618		
3 <sup>rd</sup> Anniversary					722	722	722	722		
4 <sup>th</sup> Anniversary					824	824	824	824		

### Summary of the modifier group's recommendations

*[A full version of "Report on modifiers to be used in determining administrative fee charges for mobile services" is available from the RA's library or web site]*

A considerable number of responses to the May 1997 consultation paper on Spectrum Pricing made proposals that fees should be determined by a formula such as:

Licence Fee = [ Spectrum Tariff Unit (STU) ] x [ bandwidth ] x [ area sterilised ] x [ modifier ]

where the modifier is a multiplying factor which mitigates certain technical and/or economic factors relating specifically to the service considered.

It is an underlying assumption of the Government's proposals that a uniform price is justifiable only where mobile services are perfect substitutes or where mobile allocations are interchangeable and whilst neither assumption is strictly true, it was felt appropriate to have one base price for all mobile spectrum. Differential modifiers would then be applied to address the impact of factors such as spectrum usage constraints, propagation characteristics, choice, competition, spectral efficiency, quality of service, etc., applied on a case by case examination of each service sector to be priced.

In order to take forward the issues identified in the responses to the consultation document, the Agency established a Spectrum Pricing Plenary Group which had widespread representation from the mobile radiocommunications industry. A sub-group was specifically tasked to review the candidate modifiers that had been proposed in responses to the consultation. In addition, the sub-group ascribed values to a number of the modifiers that were deemed appropriate and susceptible to quantitative analysis. A number of modifiers were also identified as being appropriate but were better addressed on a broader qualitative basis.

The modifiers group reviewed fourteen candidate modifiers in detail. After careful consideration within the sub-group and subsequent endorsement from the main Spectrum Pricing Group, this initial list was reduced to five modifiers as follows:

<b><u>Modifier</u></b>		<b><u>Application</u></b>
Competition, choice & diversity	-	Case by case basis
Quality of Service	-	Limited application, cases by case
Technology choice	-	Dependant on the degree of constraint imposed by a mandated technology
Congestion	-	Proportional to values considered in a separate sub-group
Spectrum Usage Constraints	-	Variable - see table below

Spectrum Usage Constraints:	Proposed Value
Propagation at frequencies < 100MHz	0.7
Propagation at frequencies = 100MHz - 1GHz	Unity
Propagation at frequencies > 1GHz, < 2.5GHz	0.7
Fragmentation of allocated spectrum	0.8
Interference / International Co-ordination	0.7 - 1.0

The full text of the findings of the sub-group as presented to the plenary group in April 1998 is available from the RA library or from the RA Website [www.open.gov.uk/radiocom/](http://www.open.gov.uk/radiocom/), titled: "Report on modifiers to be used in determining administrative pricing fee charges for mobile services"