



SPECTRUM FOR TETRA MOBILE SERVICES IN THE 872 – 876 MHz AND 917 – 921 MHz BANDS

A CONSULTATIVE DOCUMENT

August 2001



**SPECTRUM FOR TETRA MOBILE SERVICES IN THE
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SPECTRUM FOR TETRA MOBILE SERVICES IN THE 872 – 876 MHz AND 917 – 921 MHz BANDS

1. Introduction

- 1.1 The Radiocommunications Agency (RA) published a statement in August 2000¹ setting out the conclusions and recommendations from a review of spectrum for TETRA networks. The review addressed how much spectrum was available for TETRA systems, the prospects for the release of further spectrum, and the likely time frames within which more spectrum would become available.
- 1.2 The statement noted that the availability of spectrum would be kept under constant review and whenever sufficient spectrum became available the RA would consult further. This consultation document seeks views and comments on the RA's proposals for reassigning for public TETRA systems spectrum that has been released by the recent closure of analogue mobile cellular networks.

2. Responses to the consultation

- 2.1 Written comments on the proposals contained in this consultation document should be sent by Friday, 9 November 2001, to the following address:

Girish Patel
Radiocommunications Agency
Public Telecommunication Networks Unit
Wyndham House
189 Marsh Wall
LONDON
E14 9SX

- 2.2 This consultation document is also being published on the RA website. (www.radio.gov.uk).
- 2.3 Comments on this consultation document can also be e-mailed to the RA at the following address:

girish.patel@ra.gsi.gov.uk
- 2.4 All comments will be made publicly available except where respondents indicate that their response, or parts of it, is confidential. Respondents are requested to separate any confidential material into a clearly marked annex if possible. Unconditional permission will be assumed unless the author expressly states otherwise. Any copyright attached to responses, will be assumed to have been relinquished unless it is expressly reserved.

¹ A Statement from the Radiocommunications Agency following the Review of Spectrum for TETRA Networks - August 2000 (<http://www.radio.gov.uk/topics/pmc/document/tetra-aug2000.htm>)

3. TETRA technology and spectrum

- 3.1 TETRA is a digital professional two-way radio standard developed by the European Telecommunications Standards Institute (ETSI). Compared to analogue technology, it provides significant improvements in spectrum efficiency for larger Public Access Mobile Radio (PAMR) networks, as well as enhancing the variety and quality of services to the user which include advanced speech and data facilities, wide area coverage, and greater immunity from interference and eavesdropping.
- 3.2 Four specific frequency bands have been identified for TETRA at a European level² as follows:

385 – 390 MHz paired with 395 – 399.9 MHz;
410 – 420 MHz paired with 420 – 430 MHz;
450 – 460 MHz paired with 460 – 470 MHz;
870 – 876 MHz paired with 915 – 921 MHz.

4. Public TETRA and the mobile communications market

- 4.1 The TETRA market is segmented into three distinct categories: Emergency Services, Private Systems, and Public Network Services. The two public TETRA operators, Tetralink Telecommunications Limited and National Band Three Limited, licensed by the Government in 1996, merged in 1997 to form what is now Dolphin Telecommunications plc (Dolphin).
- 4.2 The Office of Fair Trading conducted an examination of the relevant market in 1997. It concluded that TETRA and GSM³ public networks were in the same relevant market and were therefore competitors. The Office of Telecommunications (OfTel) consultation document 'Effective Competition Review: Mobile, February 2001' defined the mobile market to cover both public TETRA and GSM operators. It noted that at the moment Dolphin remains a small player compared to the GSM operators. The period for responses to this consultation is now over. OfTel is considering the responses given with a view to reaching a final conclusion on the competitiveness of the mobile market.
- 4.3 Dolphin is a relatively new entrant which did not start offering services until autumn 1999. It has nevertheless made a substantial investment in the UK building a national mobile TETRA network that provides radio coverage to over 90% of the UK population from over 1000 base station sites. While the scale of Dolphin's current and future influence on competition in the mobile market is uncertain, it appears likely that a national public TETRA network operator promotes competition and choice in the mobile market.

² CEPT Decision ERC/DEC/(96)04 - CEPT (European Conference of Postal and Telecommunications Administrations) is an association of government departments which administers telecommunications regulation in Europe.

³ GSM (Global System for Mobile Communications) – A standard for digital mobile communications transmissions at a frequency of 900, 1800 or 1900 MHz.

5. Spectrum requirements for future development of public TETRA

- 5.1 There is insufficient spectrum available for public TETRA services to allow for the licensing of another public TETRA operator. In its initial award of 2 x 2.5 MHz of spectrum to Dolphin in 1997, the Government acknowledged that this award would be insufficient to support a mature network. Thus the RA has subsequently endeavoured to ensure that Dolphin has sufficient spectrum for their current and future requirements commensurate with a validated business plan, and on the basis of demonstrable need. Further spectrum has been awarded following consultation and review.
- 5.2 The GSM cellular operators will all be providing GPRS⁴ services on their networks in 2001 which will provide significantly higher data rates than are possible on standard GSM networks. Development of the TETRA family of standards is undertaken by ETSI. Recognising the data speed limitations of the original TETRA standard, ETSI has been developing an enhanced family of TETRA standards generally referred to as TETRA Release 2. This is expected to provide data rates of up to 130 kilobits per second (kbit/s), compared to current TETRA data rates of 4.8 kbit/s.
- 5.3 Future mobile communication market developments will be characterised by the provision of higher data rate services providing ‘always on’ internet connectivity. The improved data speeds provided by GPRS and TETRA Release 2 will be a precursor to the data-rich applications envisaged for third generation (3G) networks. The RA believes that if Dolphin is to continue to compete in the market for mobile communications in the longer term, it will need to be able to offer services and functionality that are comparable to those offered by other mobile communications technologies. To do so they will require additional spectrum to deploy a TETRA Release 2 network. An overview of the spectrum bands identified for TETRA services is at Annex A of this consultation document. The only currently available spectrum is 2 x 4 MHz of spectrum in the 900 MHz band (872 – 876 MHz paired with 917 – 921 MHz) released by the recent closure of analogue telephony networks. The RA seeks views on **its proposal to make the band 872 – 876 MHz paired with 917 – 921 MHz available to Dolphin for the deployment of a TETRA Release 2 network.**
- 5.4 Two partners of Deloitte and Touche were appointed as Administrators of the Dolphin operating companies on 1 August. The appointment of administrators was necessary to protect the businesses during strategic and financial restructuring negotiations. In the meantime Dolphin continues to provide normal network and support services to its customers.

6. Possible other uses for the available spectrum

- 6.1 There is considerable unmet demand for spectrum for private TETRA systems (i.e. systems provided for closed user groups not available to the public). The interest from private TETRA operators has been primarily in the 410 – 430 MHz band. There

⁴ GPRS (General Packet Radio Service) A development of the GSM standards that will offer packet switched services on GSM at speeds of up to 115 kbit/s.

is the possibility of spectrum in the 900 MHz band being bought and managed by, or for, a consortium of private mobile radio (PMR) users. However, some 2 x 1 MHz of spectrum in the 900 MHz band was allocated to private TETRA systems last September. Some interest has been expressed but manufacturers have not developed equipment and there have been no applications for licences.

- 6.2 It is likely that currently the private TETRA market is too small and fragmented to drive down the equipment costs sufficiently to make deployment of private TETRA systems in the 900 MHz band economically viable. However, a public TETRA operator, or a large consortium of private users, is seen as a key enabler in fuelling the volume market that drives costs down for the benefit of the wider TETRA market. It is possible that equipment development will be stimulated by public operator interest and the market for private TETRA systems in the 900 MHz band will follow once equipment is available. Therefore the RA seeks views on **whether the current allocation to private TETRA systems, 871 – 872 MHz paired with 916 –917 MHz should be maintained?**
- 6.3 Another possible option is that the spectrum is made available, through a competitive allocation process, for use by other mobile radio systems such as GSM. However, for GSM this would be a UK specific use and current GSM terminals would not be able to operate in this band. As this band is identified in Europe as a TETRA band and given the limited spectrum available for TETRA in the UK, the option of opening it up to GSM use is not favoured. To date there has been little enthusiasm within Europe for TETRA at 900 MHz. However, the enhanced standards being developed by ETSI and the work currently being carried out within CEPT on the compatibility of TETRA Release 2 within this spectrum, could change the position of TETRA at 900 MHz in favour of the high speed data offering within the TETRA Release 2 technology. This would then lead to recommendations to amend the existing ERC⁵ Decision on TETRA to include TETRA Release 2.
- 6.4 In the long-term (beyond 10 years) the frequency could be considered in the re-farming of 2G networks in any migration from GSM to 3G networks.

7. Potential for sharing and guard band issues

- 7.1 Studies indicate that to deploy a national TETRA Release 2 network that is economically viable would require 2 x 3.6 MHz which, when taken with guard bands (to protect adjacent services), means that all 2 x 4 MHz would be needed. Consequently, only one public national operator could be accommodated in this spectrum. However, there could be scope for re-use of some of the spectrum for private TETRA systems, in areas outside major conurbations. Therefore the RA seeks views on **the likely scope for private TETRA systems to re-use some spectrum outside major conurbations, and what issues should be addressed in any further consultation on this?** In part of the 900 MHz band, civil mobile systems in the UK operate under a pre-emptible sharing arrangement with the Ministry of Defence

⁵ ERC (European Radiocommunications Committee – established by CEPT to develop radiocommunications policy and to co-ordinate frequency, regulatory and technical matters concerning radiocommunications.

(MoD). The MoD spectrum spans from 870-888 MHz and 915-933 MHz and civil systems operating in these bands can only do so under terms agreed with the MoD.

- 7.2 The 900 MHz band plan is shown in Annex B of this document. The spectrum identified for TETRA is adjacent to the GSM-R band. Compatibility studies are now underway within the CEPT Spectrum Engineering Project Team in order to assess whether any guard band between the two systems will be required. Depending on the results of these studies, it is possible that a small amount of spectrum may have to be assigned as a guard band to protect both systems from interference. In this case, the full 2 x 4 MHz may not be available for TETRA since some spectrum may be lost at the band edge. CEPT studies are being conducted into the required guard band between TETRA and GSM at the 915 MHz boundary. The RA is participating in these studies and will undertake a further consultation in due course. However, the RA seeks views now on **CEPT's interim measure that a guard band of 1 MHz below 916 MHz and 350 kHz below 921 MHz should be assumed, in order to protect adjacent services.**

8. Summary of proposals and questions for consultation

- 8.1 The RA welcomes comments and views on all aspects of this consultation. In particular the RA seeks views on:
- a) **its proposal to make the band 872 – 876 MHz paired with 917 – 921 MHz available to Dolphin for the deployment of a TETRA Release 2 network (Paragraph 5.3);**
 - b) **whether the current allocation to private TETRA systems, 871 – 872 MHz paired with 916 –917 MHz should be maintained? (Paragraph 6.2);**
 - c) **the likely scope for private TETRA systems to re-use some spectrum outside major conurbations, and what issues should be addressed in any further consultation on this? (Paragraph 7.1);**
 - d) **CEPT's interim measure that a guard band of 1 MHz below 916 MHz and 350 kHz below 921 MHz should be assumed, in order to protect adjacent services.**

Annex A

Overview of the bands identified for TETRA

A1. TETRA Bands

A1.1 The CEPT Decision (ERC/DEC/(96)04) identifies four bands to be used for the introduction of TETRA. The four frequency bands for TETRA are:

385 – 390 MHz paired with 395 – 399.9 MHz;
410 – 420 MHz paired with 420 – 430 MHz;
450 – 460 MHz paired with 460 – 470 MHz;
870 – 876 MHz paired with 915 – 921 MHz.

Below is a brief overview of the current and planned UK usage in each of the four designated bands.

380 – 400MHz Band

A1.2 The Home Office has selected TETRA as the chosen technology for the Public Safety Radio Communications system to operate in the band identified in a CEPT Decision⁶. This band is specifically assigned for ‘blue light’ emergency related services and specifically excludes commercial TETRA use. Deployment of a nation-wide TETRA-based public safety system for use by the military and emergency services called AIRWAVE is imminent.

A1.3 The band is subdivided into spectrum cleared for the operational roll-out of the AIRWAVE system (380-383/390-393 MHz), expansion spectrum set aside for Airwave (383-385/393-395 MHz) and NATO Military use (385-390/395-399.9 MHz).

410 – 430 MHz Band

A1.4 This band had been primarily used by the MoD and analogue private business radio systems. For the past few years, the RA has been working closely with the MoD to release spectrum for TETRA use.

A1.5 The TETRA Review published by the RA last summer concluded that there was demand for further spectrum from Dolphin and the private TETRA community but both requirements could not be met given the shortage of available spectrum. All of the spectrum released for TETRA in this band has been awarded to Dolphin.

A1.6 Progress has been made in releasing further spectrum from this band but it is clear that Dolphin’s future spectrum requirements are in excess of the spectrum that can be released in this band in the medium term.

⁶ CEPT(ERC/DEC(96)01)

450 – 470 MHz Band

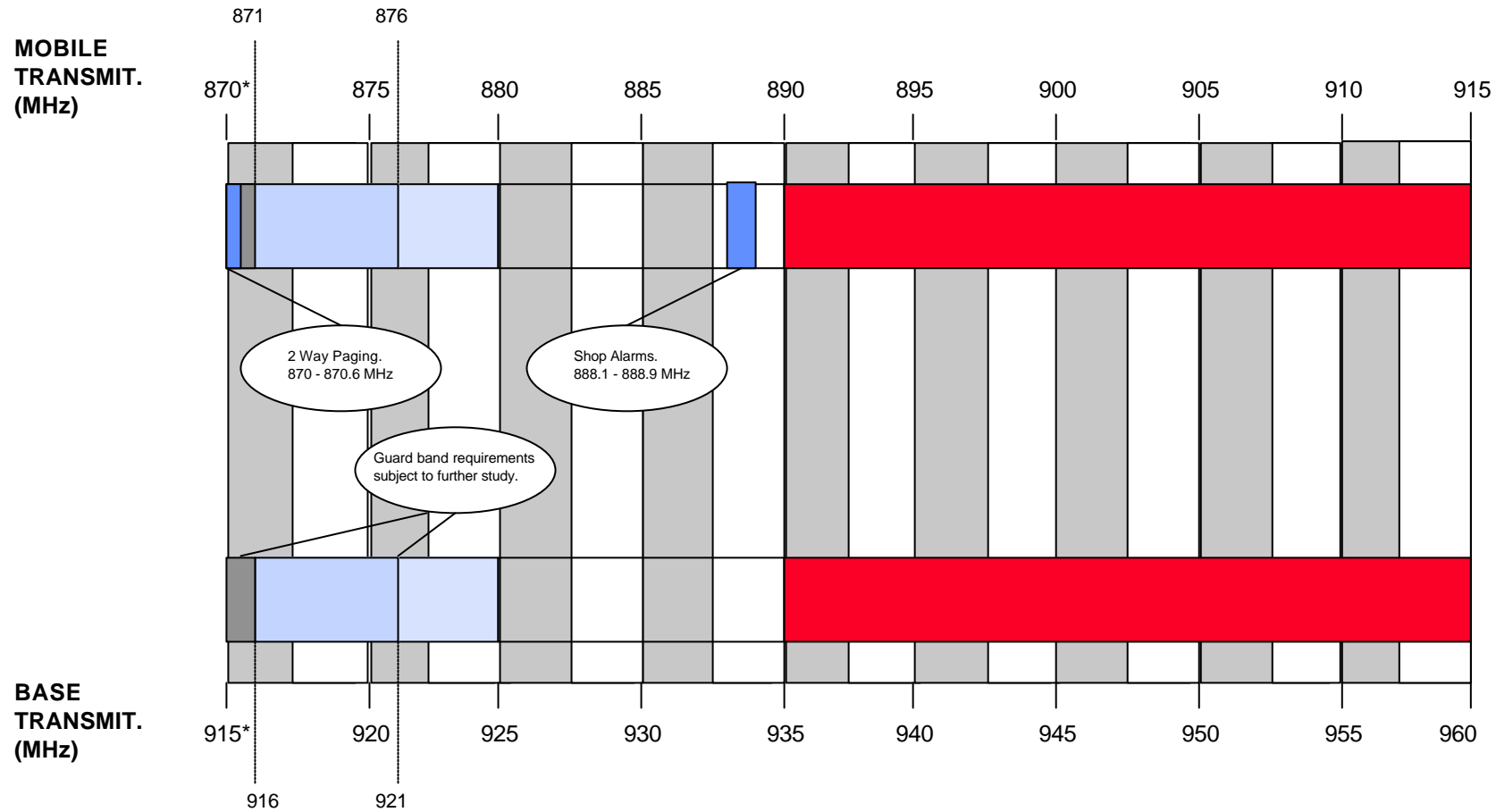
- A1.7 In the UK, this band is used predominantly for analogue Private Business Radio systems with some public network and government use. However, this band is subject to a major re-planning exercise to align UK usage of this band with our European neighbours. The CEPT Recommendation for this band places the mobile transmit in the lower portion of the band, whereas the current UK use has the mobile transmit in the upper portion of the band. This gives rise to serious interference in border areas and hence the RA has been working on re-alignment of this band. A detailed plan for re-alignment of the 17,000 UK licensed systems is being developed in consultation with the major users of the band and trade organisations.
- A1.8 Once sufficient spectrum is aligned, it is envisaged that private TETRA systems will be implemented in this band. However, the current re-planning exercise is not scheduled to start until 2004 and will not be completed until 2010.

872 – 876 MHz paired with 917 – 921 MHz (900 MHz Band)

- A1.9 This band is available following the closure of the analogue cellular telephony networks. In part of the 900 MHz band, civil mobile systems in the UK operate under a pre-emptible sharing arrangement with the Ministry of Defence (MoD). The MoD spectrum spans from 870-888 MHz and 915-933 MHz and civil systems operating in these bands can only do so under terms agreed with the MoD.
- A1.10 In recognition of the demand for private TETRA spectrum, the RA allocated 2 x 1MHz of spectrum in September 2000 in adjacent spectrum at 871-872 MHz paired with 916-917 MHz.

Annex B

Band plan for 900 MHz



KEY



GSM - Global System for Mobile Communication



Identified for Tetra



Guard band



E-GSM - Extended Global System for Mobile Communication



GSM-R/UIC - Global System for Mobile Communication - Railway

*The frequency bands 870 - 888 MHz and 915 - 933 MHz are assigned for Ministry of Defence (MoD) use and civil systems operating in these bands do so under the terms agreed with the MOD.