CSS Spectrum Management Services Ltd.

Canvin Court
Somerton Business Park
Somerton
Somerset
TA11 6SB
Tel: 01458 273 789
Fax: 01458 273 883
17th August 2001
Email: david.tripp@css.gb.com

Mr Daniel Storey
c/o Radiocommunications Agency
Wyndham House
189 Marsh Wall
LONDON
E14 9SX

Dear Daniel

Following our telephone conversation this afternoon please find enclosed the Water Industry's responses to the Independent Review of Radio Spectrum Management.

RESPONSE BY THE TELECOMMUNICATIONS ADVISORY COMMITTEE TO THE DRAFT CONSULTATION DOCUMENT ON THE INDEPENDENT REVIEW OF RADIO SPECTRUM MANAGEMENT
JUNE 2001

INTRODUCTION

This response is provided by CSS Spectrum Management Services Ltd. who act on behalf of the Telecommunications Advisory Committee (TAC).
The Telecommunication Advisory Committee is chaired by Mr Keith Edwards, International Technology Director for the Anglian Water Group.
TAC has been established for over 10 years and represents the United Kingdom Water Industry on a range of matters related to Mobile and Fixed Communications and Radio Scanning Telemetry.

The membership is drawn from representative of the following Industry Groups:

10 main Water Service Companies
15 Water Supply Companies
3 Water Authorities in Scotland
The Environment Agency
Dept of Regional Development Water Service Northern Ireland

The Water Industry (WI) is a major user of Private Business Radio systems. The majority operate analogue trunked radio systems. In addition, increasing use is being made of Public Cellular, provided by the UK operators on the GSM 900 and GSM 1800 systems.

The Water Industry is also a major user of licensed Radio Scanning Telemetry systems which are designed and assigned to the MPT 141 I/RA 375 specifications.

The Committee has provided input into the various stages of the Spectrum Review and the resulting Consultative Documents leading to the 1998 WT Act and the various Consultations which have followed.

Management and support for matters related to Water Industry mobile communications and Scanning Telemetry are provided by CSS Spectrum Management Services. This relationship provides the RF engineering and planning necessary to ensure that the most effective use is made of the radio spectrum. The majority of the radio spectrum allocated to the Water Industry is licensed on a national channel basis, with CSS dealing with the Radiocommunications Agency on behalf of the Water Industry in a financial as well as management and consultative role.
In liaison with the TAC membership, CSS is currently developing a Water Industry Mobile Communications Strategy for the medium and long ten-n.

The Industry is keen to support the DTI and Radiocommunications Agency in their process of reviewing the Management of Radio Spectrum.

Yours sincerely

David Tripp C. Eng. MIEE.
Managing Director
Chairman of Water Industry Spectrum Management Group
17th August 2001

by

CSS Spectrum Management Services Ltd
on behalf of the
Telecommunications Advisory Committee (TAC)
of the UK Water Industry

Summary of issues for discussion

Economic gains from efficient use of spectrum

i. How best can Government assess the economic gains from enabling more efficient use to be made of spectrum?

The question could be answered by asking the question: what will happen if the available spectrum is not managed effectively and allocated in a way which acts as an enabler for existing and emerging companies and organisations? It may be necessary to update the previous work undertaken* for *the RA on the users view* of *the long term impact* as *a result* of *the considerable change that has taken place in the marketplace. The added features, capacity and coverage of the established Public Access Systems may have already made the earlier predication questionable.

ii How could information from market transactions and economic impact studies best help inform the design of spectrum management policies?

The focus must also be on how the top end frequency spectrum which has been and will become available will also provide potential economic impact on the economy. This information will ensure that the focus of spectrum management is in the correct area of commerce and that it can directly have a economic impact. It will be necessary to obtain the views across a wide range of industries.

Economic principles of spectrum management

iii How far can the over-arching principle, that spectrum users should bear the opportunity cost of their usage, be applied in practice?

The use of radio spectrum in many instances is an enabler for many industries and organisations. Care must be taken to ensure that all sectors of the economy can afford to make use of the technology that requires transmission or reception by radio. By pursuing the principle of obtaining as high a price as possible can distort the market and value of spectrum.

iv How can the trade-offs between competing economic and social uses of spectrum be more clearly articulated in the principles governing spectrum management?

There is a need for the Government to produce a mission statement which recognises the social and business value of radio spectrum. It must identify the opportunities that wider access to spectrum can provide across all sectors of the economy. Although licensing can be a form of

revenue generation, the drive to produce higher revenues will not necessarily help business to develop and be an enabler for systems and equipment which will be of benefit to the country in general. This approach to generating income is more beneficial to the larger organisations who will by virtue of their large revenue requirement focus on the larger or mass markets. A research study should be able to identify the percentage split between revenue earning and service or opportunities for the country as a whole.

Legislative basis for spectrum management

v. To what extent would a separate spectrum management duty for Ofcom be helpful, and how could this best be articulated in a new statutory framework for communications regulation?

It is important that Ofcom has a clearly defined overall spectrum management role. As identified later in this report there are many facets to the management of the radio spectrum, especially as the need for European and global harmonisation increase. In addition the need for research and development for the common good must not be overlooked. The R&D work undertaken by the Radiocommunications Agency aids and supports evolving technologies and provides the necessary input to the senior management to enable them to recognise and focus the use of spectrum in the most effective way. Key to the effective use of and access to the radio spectrum is freedom from interference caused by poor quality, faulty or incorrectly installed equipment. The radio spectrum must continue to be monitored and policed by an organisation with a role similar to that of the Radio Investigation Service (RIS). This duty would sit well underneath a spectrum management role within Ofcom as access to licence holder data, test and development information are essential for ongoing unhindered access to the radio spectrum for all users or licence holders.

vi. What additional statutory alternatives to apparatus licensing could assist Ofcom in meeting its spectrum management objectives?

The use of predefined licences would aid the spectrum management role. The draw back to this approach is that the quality of the path cannot be guaranteed in the long term. There would still be a need to record and monitor the general location and packing density in certain areas. This might be a halfway house between equipment licensing and spectrum licensing.

vii. How far can new modes of licensing, based upon access to defined spectrum rather than defined wireless apparatus, assist in enabling more efficient use to be made of spectrum?

Regulation by access to specific blocks of the radio spectrum has potential in areas where the geographic area of coverage is clearly defined.
In order to make the most effective use of the spectrum it is necessary to reuse the spectrum as many times as possible within a geographic area. To do this accurate predictions of coverage and potential interference are required. Users must operate within these constraints to enable other organisations to operate within a defined area.

Technologies such as spread spectrum or frequency hopping can increase the number of users per square kilometre but equipment does have to operate to exacting technical standards or constraints. The overall approach requires monitoring and managing. Modern coding and modulation techniques cannot change the laws of radio propagation. The overcrowding now occurring in the deregulated band could occur elsewhere if blocks of spectrum are licensed on a spectrum only basis. It has taken a number of years for the overcrowding issue to come to the fore as it is now doing in some of the deregulated bands. A mixture of the two approaches, the first: equipment to a detailed specification and power levels defined by the spectrum manager. The second, equipment for use in a specified band of spectrum to predefined standards, power levels, and receiver sensitivity settings. The details of such a dual approach would require further investigation.

Regulatory framework for spectrum management

International dimension

vii. How can the UK's stance towards international spectrum management policy best reflect the opportunity costs of different spectrum uses?

The potential to improve the economic impact from the manufactures and suppliers position is to ensure that UK customers have access to harmonised bands and that UK manufacturers and suppliers can sell in this market as well as in the European and Global markets. The revenue opportunity for the Government from licence fees would be small compared to the market opportunities both for mobile handsets and equipment infrastructure. The emphasis should be to encompass international spectrum management as a policy where this approach does not limit or inhibit the home market.

viii. What scope is there for greater autonomy in domestic spectrum policy within the constraints imposed by the UK's international commitments?

There are clearly international allocations of spectrum that are already heavily used in other countries as well as the UK and it would be unrealistic to expect to be able to harmonise these bands. In these instances the most effective use of the spectrum should be made for the common good of the UK. If at some time in the future true harmonisation becomes viable the use of the spectrum would have to be reviewed.
As the radio based communications market is developing so quickly it is appropriate that a review of spectrum usage be made by Ofcom, perhaps every 7 years.

ix. How should the UK Government judge the trade-off between a more liberal approach to spectrum management and one in which technology standards and spectrum access are mandated as part of a strategic industrial and trade policy?

Care must be taken to ensure that when authority is given to a person or organisation to use radio spectrum, it is clear of interference and will meet the expectations of the licence holder. A degree

of control will always be required as, without containing or limiting the range of the radio signals interference will get worse and worse until all the systems in an area become unusable. This has proved to be the case with the deregulated telemetry band in which organisations have invested in equipment and aerials only to find that has become very unreliable due to other organisations operating in the same area on the same frequency, which of course they are quite entitled to do. To improve the situation a clear guiding framework is required to ensure that users and installers operate the equipment in the way in which the manufactures intended. There needs to be a robust enforcement process to deal with users or installers who install equipment in such a way that it causes interference to other users either by accident or design.

x. If there were greater latitude in international allocations and/or the UK's implementation of such decisions, to what extent would market mechanisms result in harmonisation of equipment and transmission standards?

Due to the global nature of the equipment manufacturers marketplaces, harmonisation will serve to open up the market, increase volume production and so reduce prices. Standards are the key to the success of such a process, GSM is living proof of this. The work done by ETSI and other standards bodies are essential It is also imperative that a regulatory authority such as the RA or Ofcom provide support to the standards bodies and ensure that the standards are driven by the common requirements and not for the advantage of any particular manufacturer or supplier.

National dimension

xi. Within the current and proposed statutory framework, what improvements (if any) could be made to the institutional arrangements for spectrum management in the UK?

The last 3 years has seen a considerable change in the style of implementing the regulations associated with radio Spectrum Management by the Radiocommunications Agency. There is now a more open and flexible approach to dealing with matters related to radio based communications. This change has made working with and developing solutions much more of a partnership as opposed to a dictatorial relationship.
It is clear that the basic structure currently developed by the Radiocommunications Agency is working well. However there might appear to be some difficulties in relation to the interface with other Government Departments. Any new structure should centralise the different spectrum management approaches into a common area.

xii. To what extent would greater transparency of specific data on current and prospective spectrum uses support efficient spectrum use? What are the key issues and trade-offs pertinent to the provision, by RA, of an on-line database containing spectrum utilisation details? How far is transparency compatible with commercial confidentiality and public safety and security considerations?

There is value in being able to identify what the loading on the various sectors of the spectrum is and the type of use that the spectrum is being put to. An indication of the User group might be of value but for commercial and security reasons the disclosure of individual frequencies, channels, location and users details should be avoided. The question might be asked, what is the value to an external organisation of having access to this information? It is a relatively simple process to de-

stabilise radio based communications by jamming or other methods once the exact location, frequency and aerial type and direction are known.

xiii. To what extent could intermediaries play a valuable role in buying rights to manage a particular frequency band and then selling access to parts of this spectrum to users on a commercial basis?

In principle the process could be of value, especially for closed user groups. In many ways this is similar to the way in which CSS Spectrum Management Services acts on behalf of the UK Water Industry and the RA. A single licence payment for the whole Water Industry is paid to the RA for National PBR channels. The problem is more to do with ensuring that the process is fair to all users regardless of the size their requirement. If there is a financial incentive it is important that the process does not discriminate against the small organisation or individual For the process to work the licence fees would need to be set by the Government, the allocation criteria would also need to be clearly laid down to ensure transparency for the process.

Spectrum use: marketed and non-marketed outputs

xiv. To what extent is the review's distinction between radio spectrum used for marketed and non-marketed goods a helpful one?

Neither approach provides the scope to evaluate the type of use that an organisation makes of the spectrum within its service. If there is a need to split the process into two areas, it might be more appropriate to consider public or private services.
It is difficult to support the marketed and non marketed approach as a fundamental part of ***the process in encouraging spectrum efficiency. We feel that more work is required in this area.***

xv. How far can public policy objectives for the delivery of non-marketed goods be separated from the regulation of access to the spectrum necessary to deliver such services?

It has been recognised that the spectrum is a limited resource and as such has to be valued. In many instances the availability of spectrum is necessary to meet the business objectives or statutory undertakings of the organisations, such as the Broadcasting and Utility Industries.
The regulatory regime should be, in principle the same for all sectors of the economy, both public and private although the government drivers may be different, for reasons of National requirements. These different needs are already recognised.

Issues in non-marketed uses of spectrum

Defence

xvi. Is this a valid description of the factors affecting defence use of radio spectrum?

From an external viewpoint and following discussions with MOD, this would appear to be a valid description.

xvii. What opportunities exist for commercial and other civil users to share spectrum with the defence establishment in the UK?

There would certainly appear to be opportunities to share spectrum, however the right of tenure would have to be weak in order to ensure that the defence of the country is not put at risk. Many organisations would be reluctant to make significant investments in equipment and systems which may need to be turned off at very short notice. Such a system would be ideal for providing additional capacity when available but with the core traffic being routed over a dedicated core network. This option has considerable potential and should be explored.

xviii. What further incentives could be introduced to encourage more intensive and efficient use of spectrum allocated to defence?

More centralised control of all available spectrum would identify the actual amount of spectrum available to all sectors of the economy including the Defence sector. Evolving new technology will enable more information to be transmitted over less bandwidth. This will be as a direct result of the investment into new technology and equipment. The need to justify, or make a case for allocations of spectrum and the increased cost of licence fees should lead to a further reduction in the demand for spectrum.

Broadcasting

We are not in a position to comment authoritatively on this section

xix. Is this a valid description of the factors affecting use of radio spectrum by the broadcasting sector?

xx. How can the Government's commitment to value the spectrum used by broadcasters be implemented in a way which encourages spectrum efficiency?

xxi. What further incentives might be introduced, consistent with wider broadcasting policy and with previous Government about television and radio franchise fees, to encourage greater spectrum efficiency by commercial broadcasters? Are there differences in the approach to incentives before and after the proposed switchover from analogue to digital terrestrial TV broadcasting?

xxii. What incentives might be introduced, consistent with wider broadcasting policy and the Govemment's approach to the funding of the BBC and its public service remit, to encourage greater spectrum efficiency by the BBC?

Aeronautical and maritime services

We are not in a position to comment authoritatively on this section

xxiii. Is this a valid description of the factors affecting use of radio spectrum by aeronautical and maritime services?
Given the international harmonisation constraints, where could new economic incentives most encourage more efficient use of spectrum in the UK?

xxiv. How far could changes in spectrum use charges be reflected in air traffic control fees which are passed on to users of UK airspace and landing services?

Emergency services

xxvi. Is this a valid description of the factors affecting use of radio spectrum by the emergency services?

From an external viewpoint and following discussions with some members of the emergency services this would appear to be a valid description.

xxvii. How far can spectrum pricing influence emergency services to make efficient use of spectrum over time?

The commitment to the PSRC-S and the longer term closure of the majority of existing systems, indicates that the need for up to date and frequency efficient systems have been recognised and is being acted upon. We are aware that costs are a sensitive issue, especially as the new service is more expensive than existing systems although it does have considerably more functionality.

xxviii. What scope might there be for sharing of spectrum access with other users to enable more efficient spectrum use?

In view of the concerns over the higher than originally expected revenue costs of the system and, it is understood, the lower than expected take up by certain emergency service users, it would seem logical for additional non emergency users to be offered access to the system under agreed limitations.
The Water Industry would be very interested in having access to the system. This approach is even more relevant in view of the financial difficulties being faced by Dolphin Telecommunications Ltd and the resulting lack of a public Tetra based system.
The Water Industry would be keen to discuss this option further with the DTI and Home Office.

Spectrum pricing and auctions

xxix. How far have economic incentives from spectrum prices helped to encourage efficient spectrum use?

It is clear that the introduction of spectrum pricing has made all organisations much more aware of the value of the spectrum to which they have access. The introduction of spectrum pricing has resulted in increased licence fees for the majority of organizations. For many users such as the Utilities there is no profit from the self provision of mobile radio systems and so they are far more aware of increasing costs, at a time when the pressure from the business is to drive costs down. Although the Cellular Service Providers also experienced an increase in license fees, in relative term this could be offset against the increased growth and usage of the services.

xxx. Where should the balance lie between administratively-set incentive prices and competitive auction of spectrum licences? To what extent could the two approaches be combined to encourage spectrum efficiency?

Auctions have a value which does much more that set a value on the spectrum. When a supplier is awarded a licence they are given a guaranteed term of tenure, as was the case with the 3G Auctions. For most licences based on administrative pricing, in most cases there is very little security of tenure for radio licences. The Secretary of State has the right to revoke a licence as he or the Government see fit.

This is not an ideal situation in which to invest considerable sums in infrastructure and mobile equipment. A better business case can be made for a fixed term asset, which in practice is what an auctioned licence is. Auctions can be considered as providing stability for organisations investing in radio based communications.

xxxi. What factors should determine the choice of frequencies subject to auction of licences?

Auctions should continue to be used for new allocations of spectrum.
Users should to be moved out of existing spectrum in order to clear spectrum for auctions.

Spectrum trading

xxxii. Which areas of spectrum use are most amenable to and which areas offer the greatest potential efficiency gains from the introduction of spectrum trading?

Those blocks of spectrum that are auctioned tend to offer long term stability. The organisations that follow this approach are likely to be interested in secondary trading. Legislation would be required to avoid organisations obtaining large allocations of spectrum with the objective of trading them for profit.
The process of secondary trading does of course remove a considerable burden from the regulator. Without careful monitoring secondary trading could push the price of spectrum up without necessarily improving efficiency.
From the financial viewpoint the most congested areas of spectrum would be the most obvious starting point. It must be clear how secondary trading will benefit the overall economy, especially as there are many organisations with relatively small numbers of employees individually. As a group they provide considerable value to the overall economy.

xxxiii. To what extent would a move to licensing of spectrum access, as opposed to wireless apparatus licensing as now, facilitate spectrum trading?

This approach subject to the correct management and compatible equipment, could in effect allow more user groups access to blocks of spectrum.
Secondary trading in blocks of spectrum in which equipment from different organisations can co-exist, subject to controls would seem the ideal type of allocation to consider for secondary trading.

xxxiv. What changes to the terms and conditions of licences for the operation of wireless equipment and/or for access to spectrum would facilitate spectrum trading?

It is essential that any organisation can be confident that it can have access to spectrum for the period over which the whole life costs the capital investment in equipment has been calculated.

Systems that can co-exist seem the most appropriate for spectrum trading, however the underlying principles for secondary trading must be to ensure that organisations have minimum right of access. This of course is different to many of the current licences awarded to the non public operators, who have no minimum right of tenure.
Public Access Licences would need a licence which ensures that it is traded as a licence and not as a package which could be used to sell a complete infrastructure and licence.

xxxv. If new modes of licensing spectrum access (rather than equipment operation) were introduced, how could rights to spectrum usage, such as interference standards and length of licences, best be defined to facilitate spectrum trading?

The detailed management could be undertaken by the secondary trading organisation. It would have to operate within a framework which specifies items such as: rights to spectrum usage, equipment conformity, interference standards and duration of licences. This would depend upon the size and scope of the organisation, but if it was one of a number, it would be essential that the licensing of spectrum access is monitored or managed by a central body that has an overall view of the situation and has access to the detailed assignment information. Very much as the Radiocommunications Agency already does.
Once again this approach would also have to support some form of monitoring and verification of installation standards and authorised power levels. To do this it would need access to one or all of the databases and be involved in the allocation of spectrum or equipment licences. Very much as the Radio Investigation Service already does.

xxxvi. What market infrastructure, such as spectrum registers and dispute resolution procedures, could facilitate spectrum trading?

It will be necessity for one organisation to have access to all the information relating to the use of spectrum, even if a number of spectrum management organisations were dealing with different blocks of the spectrum. These organisations will also need to be monitored for their performance and standards. It would seem logical that Ofcom would be the organisation to do this, as well as some of the other tasks already discussed.

xxxvii. What lessons can be learnt from the experiences of other countries (such as Australia, New Zealand and the United States) in introducing different modes of spectrum trading?

The experience gained in other countries in secondary trading should be reviewed in detail It is also important to be aware of the levels of congestion in those countries and the density of use in all areas, especially over longer distances. Some of these processes are in their infancy and so a judgement may be required of the longer term opportunities.

It is clear that no one solution will '!fit all" the requirements of the UK.

The boundaries of spectrum regulation

xxxviii. What factors should guide regulators in setting the boundaries of licence-exempt spectrum use?

It is clear from the tremendous growth in deregulated spectrum that many users prefer to avoid the licensing process. Unfortunately this success has brought with it the problems of overcrowding and thus interference in some areas, to such a degree that many users are having to move into licensed bands due to the high level of interference from other users in their area. This is a classic example of what can happen when there are too many users operating in the some area with little or no control.

xxxix. What remit should regulators hold over licence-exempt spectrum use, other than ensuring that it does not interfere unduly with licensed spectrum use?

The Water Industry has made use of deregulated spectrum for many of its telemetry links, however due to congestion many of these links are now becoming unworkable and the users are reviewing their options.
In practice there is little that can be done other than to offer more spectrum, with perhaps limited regulation for those who are prepared to install equipment to agreed standards. It should be noted that many organisations already do this. The problem occurs when new users set up systems in the same geographic area. This topic would need further investigation.

xl. How far can developments in radio technology provide an alternative to regulation in licence-exempt spectrum bands, particularly where the potential for interference with other users is very low given the propagation and power characteristics of the signals concerned?

The current congestion in many areas shows that although power levels are low, so are the received signal levels, even with high quality aerials. If there are too many transmitters in one area on the same frequency, the end result will be interference and a degraded service to many users.
Modern techniques may allow more users to time-share the spectrum but this may require a degree of sharing information.

The Water Industry would be happy to discuss this and any of the other topics with Professor Cave and the Independent Review Group.

David Tripp C. Eng. MIEE.
Managing Director
Chairman of Water Industry Spectrum Management Group

17th August 2001.