

> Publication date: 9 August 2005 Closing Date for Responses: 12 September 2005

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# Section 1

# Summary

- 1.1 Ofcom proposes to make additional spectrum available for use by radio frequency identification ("RFID") equipment in the range 865-868 MHz in line with the European Conference of Communications and Postal Administrations ("CEPT") recommendation on Short Range Devices (CEPT/ERC/Rec 70-03 entitled Relating to the use of Short Range Devices SRD)( "the Recommendation"). RFID is a generic term for technologies that use radio waves to automatically identify objects.
- 1.2 Globalisation of the market and increased interest from businesses in the potential of RFID technology has led to a growing need for more international RFID solutions which utilise spectrum in a harmonised manner. Such solutions now have advanced technical characteristics necessary, for example, to allow for the co-location of multiple sensors which is a requirement of the retail and logistics industries. Implementation of the Recommendation will go some way towards addressing these requirements and enable the benefits of this new technology to be realised.
- 1.3 In the United Kingdom, Ofcom is responsible for the authorisation of civil use of the radio spectrum and achieves this by granting Wireless Telegraphy ("WT") licences under the Wireless Telegraphy Act 1949 (the "1949 Act") and by making regulations exempting users of particular equipment from the requirement to hold such a licence. Under section 1 of the 1949 Act, it is an offence to install or use equipment to transmit without holding a licence granted by Ofcom, unless the use of such equipment is exempted.
- 1.4 Ofcom proposes to make the frequency band 865 to 868 MHz available for RFID by making regulations (a type of statutory instrument) which will permit the use of RFID equipment without the need to hold a licence under the 1949 Act. That exemption is, however, subject to the terms, provisions and limitations set out in the regulations. One of these is that the RFID equipment must not cause or contribute to any undue interference to any wireless telegraphy. Other terms, provisions and limitations are further explained in Section 3 of this document.
- 1.5 In order to exempt the use of the equipment Ofcom proposes to make regulations: the Wireless Telegraphy (Radio Frequency Identification Equipment) (Exemption) Regulations 2005. A draft of these regulations (the "Proposed Regulations") is set out at Annex 4. Further hard copies of these regulations are available from Ofcom at 2a Southwark Bridge Road, London SE1 9HA from the contact specified in Annex 1 for responding to this Notice.
- 1.6 The Proposed Regulations are available for comment and are included at Annex 4 of this document. A number of statutory steps have to be taken to bring the regulations into force and this consultation forms part of that process.
- 1.7 Section 2 of this document discusses the background to Ofcom's proposals and contains the notice of Ofcom's intention to make the Proposed Regulations.
- 1.8 Section 3 of this document sets out the extent of application, scope and intended effect of the Proposed Regulations.

- 1.9 An Impact Assessment (IA) for the Proposed Regulations is available at Annex 5 to this document. The IA sets out the risks, costs and benefits of the proposals and the effects that these will have on the costs to business.
- 1.10 Comments are requested by 12 September 2005. Ofcom then intends to make the final Regulations shortly afterwards. Guidance on how to respond to this consultation is contained in Annex 1.

### **Privacy concerns**

- 1.11 Ofcom recognises that although RFID is not new, the increasing proliferation and potential of the technology has raised questions concerning personal privacy. These concerns involve a wider range of issues which fall outside Ofcom's statutory remit which extends in this instance, only so far as the authorisation of the use of radio equipment under the 1949 Act.
- 1.12 Prior to the publication of this Notice, Ofcom consulted with both the Department of Trade of Industry (DTI) and the Office of the Information Commissioner as to how concerns relating to RFID and privacy might best be addressed. It was agreed that, in the first instance, any concerns relating to privacy should be addressed to the DTI and not Ofcom (who are not the appropriate body to deal with such concerns). DTI contact details are contained in Annex 1of this document. In addition, the Office of the Information Commissioner has published a statement on its website which can be found at <u>http://www.informationcommissioner.gov.uk/cms/DocumentUploads/RFID-Ofcom%20statement.pdf</u>

# Section 2

# **Notice of Proposal**

# **Radio frequency identification**

- 2.1 Radio frequency identification ("RFID") is a generic term for technologies that use radio waves to automatically identify objects. There are several methods of identification, but the most common is to store a serial number that identifies the object and perhaps other information, on a microchip that is attached to an antenna (the chip and the antenna together are commonly called an RFID tag). The antenna enables the RFID tag to transmit the identification information to a reader. The reader converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can make use of it. This process can be thought of as analogous to traditional optical bar-coding familiar in a retail setting, however, rather than using light to collect or read a number from a bar code, radio waves read the number from the RFID tag.
- 2.2 Using radio means that the tag, and hence the object to be identified does not have to be in direct line of sight of the reader. This property means that the technology is ideal for a range of applications in the retail environment, in theft prevention, in access control and in support of manufacturing automation, logistics and distribution. The benefits of this technology, and in particular the new frequency bands Ofcom propose to make available, are discussed further in the Impact Assessment in Annex 5. At present, the majority of tags are "passive" which means that they rely on a minute electrical current induced in their antenna by the incoming radio frequency scan of the reader to provide enough power for the tag to send a response and provide data. Tags may also be "active" which means they do not rely upon power from the reader but have their own means of sending a signal.

# **Current use of RFID**

- 2.3 In the United Kingdom the use of RFID equipment is already authorised<sup>1</sup> in a number of frequency bands. Many applications of this technology are a familiar feature of everyday life such as shop security systems, where a tag is used to deter shoplifting by alerting staff to an individual trying to leave retail premises with un-paid goods, or in the access control systems used in many buildings. RFID tags are also commonly used commercially in pallet and container tracking, and truck and trailer tracking in shipping yards.
- 2.4 RFID operating in the Ultra High Frequency (UHF) range is particularly useful for certain applications because of the propagation characteristics of this frequency band and its support for high rates of data transfer. Currently a limited amount of spectrum is available in this range (869.4 to 869.65 MHz) and the resultant limit on capacity in conjunction with other technical considerations restricts its utility.

# **European developments for RFID**

2.5 Globalisation of the market and increased interest in the potential of RFID technology has inevitably led to a growing need for more international RFID solutions with more spectrum and higher power limits necessary, for example, for the co-location of multiple sensors which is a requirement of the retail and logistics industries.

<sup>&</sup>lt;sup>1</sup> Statutory Instrument 2003 No.74 The Wireless Telegraphy (Exemption) Regulations 2003

- 2.6 Responding to this growing need for new RFID applications, the European Conference of Communications and Postal Administrations ("CEPT") through its' sub committee the Electronic Communications Committee ("ECC"), identified additional spectrum in the 865-868 MHz range for RFID applications. As a result, the existing CEPT recommendation on Short Range Devices (CEPT/ERC/Rec 70-03 entitled *Relating to the use of Short Range Devices SRD* (the "Recommendation") has been amended to include this allocation and the European Telecommunications Standards Institute (ETSI) have developed a technical standard for equipment (EN 302 208)<sup>2</sup>. This amendment was accepted by all CEPT members.
- 2.7 Ofcom highlighted its intention to implement the Recommendation as it relates to RFID and the band 865-868 MHz in its Statement on Spectrum Trading (6 August 2004). This confirmed previous statements issued by the Radiocommunications Agency (the responsible regulatory body prior to the establishment of Ofcom in December 2003) in relation to implementing the Recommendation.

### Ofcom's powers to regulate spectrum use

2.8 Ofcom is responsible for the granting of wireless telegraphy licences under the Wireless Telegraphy Act 1949 (the 1949 Act) and for the making of regulations exempting users of particular equipment from the requirement to hold such a licence. It is an offence to install or use equipment to transmit without holding a licence granted by Ofcom, except where the use of such equipment is exempt from licensing.

### **Proposal**

- 2.9 In order to authorise the use of RFID equipment operating in accordance with the CEPT recommendation, Ofcom proposes to make the Proposed Regulations. This would exempt the establishment, installation and use of RFID equipment in the 865-868 MHz band, from the requirement under section 1(1) of the 1949 Act to hold a licence. The Proposed Regulations are available in Annex 4 of this document.
- 2.10 Licence exemption is proposed as the appropriate method of authorisation on the basis that RFID equipment used in the 865-868 MHz band is unlikely to cause interference to other users of the radio spectrum when operating in accordance with the requirements of the CEPT recommendation as implemented in the Proposed Regulations.
- 2.11 The CEPT recommendation identifies a number of technical parameters necessary to ensure the efficient use of the available spectrum and avoid interference. These were arrived at after a detailed sharing analysis<sup>3</sup> of the ability of different services and users to co-exist in this band. Ofcom proposes to implement these parameters in the following way:
  - For RFID the CEPT recommendation identifies appropriate power levels, frequency bands, channelisation arrangements and antenna characteristics to ensure efficient use of the spectrum. The Proposed Regulations reflect these recommended parameters.

 $^2$  ETSI 300 328 Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2W.

<sup>3</sup> ECC Report 37 "Compatibility of Planned SRD applications with currently existing Radiocommunications applications in the frequency band 863-870 MHz.

- The CEPT recommendation also proposed the adoption of "listen before talk" techniques, which is a spectrally "polite" protocol that avoids transmission in spectrum already in use by other users. The sharing analysis identified four parameters that are essential to ensure that RFID readers using "listen before talk" behave in a spectrally efficient manner:
  - o The maximum period of continuous transmission should be restricted;
  - o A minimum "listen" period before transmission should be stipulated;
  - A minimum period before re-transmission on the same sub-band should be defined;
  - A minimum sensitivity and bandwidth in the "listen" mode should be defined.
- 2.12 ETSI have developed a harmonised standard for RFID in this band (EN 302 208) which contains an implementation of "listen before talk" including the above parameters and which was formulated in accordance with the sharing analysis. This standard is also referenced by the CEPT Recommendation. Therefore, in this initial implementation of the CEPT recommendation, Ofcom's Proposed Regulations in relation to "listen before talk" reflect the ETSI Standard.
- 2.13 Ofcom do not intend to mandate all of the requirements stated in EN 302 208 only those stated in the draft regulations. The technical limits stated in the Proposed Regulations would constitute the minimum equipment requirements for the operation of RFID in the frequency range 865-868 MHz within the UK.
- 2.14 Ofcom believes that the Proposed Regulations represent the best way to ensure that an appropriate authorisation regime is put in place for RFID use in accordance with the CEPT recommendation within a timescale that meets the needs of stakeholders. However, Ofcom welcomes views going forward on the spectrum management framework needed to support future developments in RFID technology and use.

### Other users of the band

2.15 The 865-868 MHz band is currently used by the CT2 digital cordless telephony system, which is in the process of being superseded by more effective digital cordless telephone technology. This equipment is no longer on general sale in the UK and following a public consultation on this subject in 1998, it was proposed that the exemption for new installations of CT2 equipment would be withdrawn with effect from 1 April 2005. Existing installations will continue to be licence exempt, but it is expected that the number of users will diminish with time. In determining the necessary technical restriction on RFID, careful consideration was given in the sharing analysis to minimising the risk of interference to the CT2 systems which will continue to operate in this band.

### **Privacy concerns**

2.16 Ofcom recognises that although RFID is not new, the increasing proliferation and potential of the technology has raised questions concerning personal privacy. These concerns involve a wider range of issues which fall outside Ofcom's statutory remit which extends in this instance, only so far as the authorisation of the use of radio equipment under the 1949 Act.

- 2.17 The UK Government, through the Department of Trade and Industry (DTI), has publicly stated that it is fully committed to ensuring that the use of RFID technology is sensibly managed within a statutory and regulatory framework that allows the benefits to be enjoyed while also addressing public concerns through necessary safeguards for citizens and consumers.
- 2.18 Prior to publication of this Notice, Ofcom consulted with both the DTI and the Office of the Information Commissioner as to how public concerns on these issues, which fall outside Ofcom's responsibilities, might best be addressed. The Information Commissioner's Office is a UK independent supervisory authority reporting directly to Parliament. It oversees and ensures compliance with both the Data Protection Act 1998 and Freedom of Information Act 2000. It was agreed that the most appropriate first point of contact for citizens with concerns in this area is the DTI. Consequently if you have concerns relating to RFID and privacy these should be addressed to the DTI using the contact details contained in Section 5 of this document. In addition, the Office of the Information Commissioner has published a statement on its website which can be found at

http://www.informationcommissioner.gov.uk/cms/DocumentUploads/RFID-Ofcom%20statement.pdf

2.19 We also understand that the Government will continue discussions with the Information Commissioner's Office and the National Consumer Council, who are both independent of Government, to examine privacy issues in more detail and advise on appropriate additional measures should they be required.

# **Consultation period**

2.20 The Proposed Regulations implement previous policy already announced by Ofcom and its predecessor regulator. In order to meet the requirements of stakeholders and to accrue the benefits offered by this technology as quickly as possible Ofcom is keen to bring the Proposed Regulations into force as soon as is practicable. In line with its guidelines Ofcom is required to give statutory notice of at least one month prior to making new exemption regulations and this is the purpose of this notice.

# Section 3

# General effect of the draft Wireless Telegraphy (Radio Frequency Identification Equipment)(Exemption) Regulations 2005

# The legislative framework

- 3.1 Ofcom can exempt the establishment, installation and use of wireless telegraphy equipment by making regulations under section 1(1) of the 1949 Act.
- 3.2 A draft of the Proposed Regulations is set out in Annex 4 of this document.

# **Extent of Application**

3.3 The Proposed Regulations will apply in the United Kingdom, the Channel Islands and Isle of Man, subject to formal agreement of the Island Authorities.

# **The Proposed Regulations**

- 3.4 Regulation 3 of the Proposed Regulations exempts the establishment or installation of equipment and the use of equipment so established or installed from the provisions of section 1(1) of the Wireless Telegraphy Act 1949.
- 3.5 The term "equipment" has been defined as broadly as possible to cover a station or apparatus for wireless telegraphy. Under the 1949 Act users need to hold a licence to use either stations or apparatus for wireless telegraphy. The Proposed Regulations therefore exempts both.
- 3.6 The exemption is subject to two different sets of requirements.
- 3.7 The first set is set out in regulation 4(2) which applies to all equipment. Regulation 4(2) sets out the frequency bands and channels of operations. The channels of operation must be no greater than 200 kHz in bandwidth and must have a centre frequency which is one of those listed in the Schedule.
- 3.8 Regulation 4(2)(c) makes the exemption conditional on the equipment not causing undue (harmful) interference.
- 3.9 Regulation 4(2)(d) requires that transmissions are within certain effective radiated power limits.
- 3.10 The second set of requirements is contained in regulation 4(3). These are for equipment which is capable of initiating communications with other equipment (known as an "interrogator").
- 3.11 In addition to complying with all of the requirements in regulation 4(2) applicable to other equipment, interrogators must:
  - a. only transmit with a certain beamwidth;
  - b. only begin transmitting at the effective radiated power levels stated where the signal level at the receiver of the interrogator is at the levels stipulated;
  - c. operate so that the duration of each transmission from an interrogator is no longer than four seconds; and

- d. operate with an interval between each transmission from the interrogator using the same channel of not less than 100 milliseconds.
- 3.12 Ofcom believes that the Proposed Regulations represent the best way to ensure that an appropriate authorisation regime is put in place for RFID use in accordance with the Recommendation within a timescale that meets the needs of stakeholders. However, Ofcom welcomes views going forward on the spectrum management framework and associated regulations that are needed to support future developments in RFID technology and use.

# Annex 1

# Responding to this Notice

# How to respond

Ofcom invites written views and comments on the spectrum management issues raised in this document, to be made by **5pm on 12 September 2005** 

Ofcom strongly prefers to receive responses as e-mail attachments, in Microsoft Word format, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 2), among other things to indicate whether or not there are confidentiality issues. The cover sheet can be downloaded from the 'Consultations' section of our website.

Please can you send your response to paul.chapman@ofcom.org.uk.

Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.

Paul Chapman

Ofcom Floor 2 Operations/Licensing Riverside House 2A Southwark Bridge Road London SE1 9HA

Fax:020 7981 3921

Note that we do not need a hard copy in addition to an electronic version. Also note that Ofcom will not routinely acknowledge receipt of responses.

It would help if you can explain why you hold your views, and how Ofcom's proposals would impact on you.

### **Further information**

If you want to discuss the issues raised in this consultation, or need advice on the appropriate form of response, please contact:

Russell Kent-Smith: by email - russell.kent-smith@ofcom.org.uk or tel: 020 79813104; or

Andrew Gowans: by email - andrew.gowans@ofcom.org.uk or tel: 020 7981 3191

# Confidentiality

Ofcom thinks it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, <u>www.ofcom.org.uk</u>, ideally on receipt (when respondents confirm on their response cover sheet that this is acceptable).

All comments will be treated as non-confidential unless respondents specify that part or all of the response is confidential and should not be disclosed. Please place any confidential parts of a response in a separate annex, so that non-confidential parts may be published along with the respondent's identity.

Ofcom reserves its power to disclose any information it receives where this is required to carry out its legal requirements. Ofcom will exercise due regard to the confidentiality of information supplied.

Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use, to meet its legal requirements. Ofcom's approach on intellectual property rights is explained further on its website, at <a href="http://www.ofcom.org.uk/about\_ofcom/gov\_accountability/disclaimer">www.ofcom.org.uk/about\_ofcom/gov\_accountability/disclaimer</a>.

### **Next steps**

Following the end of the consultation period, Ofcom intends to publish a statement around the end of September 2005.

Please note that you can register to get automatic notifications of when Ofcom documents are published, at <u>http://www.ofcom.org.uk/static/subscribe/select\_list.htm</u>.

### **Ofcom's consultation processes**

Ofcom is keen to make responding to consultations easy, and has published some consultation principles (see Annex 2) which it seeks to follow, including on the length of consultations.

If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at <u>consult@ofcom.org.uk</u>. We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, whose views are less likely to be obtained in a formal consultation.

If you would like to discuss these issues, or Ofcom's consultation processes more generally, you can alternatively contact Tony Stoller, Director, External Relations, who is Ofcom's consultation champion:

Tony Stoller Ofcom Riverside House 2A Southwark Bridge Road London SE1 9HA Tel: 020 7981 3550 Fax: 020 7981 3333 E-mail: tony.stoller@ofcom.org.uk

### **Privacy concerns**

The UK Government, through the Department of Trade and Industry (DTI), has publicly stated that it is fully committed to ensuring that the use of RFID technology is sensibly managed within a statutory and regulatory framework that allows the benefits to be enjoyed while also addressing public concerns through necessary safeguards for citizens and consumers. If you wish to raise any such concerns, please do so by contacting the DTI using the contact details below:

DTI Response Centre:

Tel: 020 7215 5000

or by writing to:

DTI Response Centre 1 Victoria Street London SW1H 0ET

# Annex 2

# Ofcom's consultation principles

Ofcom has published the following seven principles that it will follow for each public written consultation:

### Before the consultation

A2.1 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

### **During the consultation**

- A2.2 We will be clear about who we are consulting, why, on what questions and for how long.
- A2.3 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened version for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.
- A2.4 We will normally allow ten weeks for responses to consultations on issues of general interest.
- A2.5 There will be a person within Ofcom who will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. This individual (who we call the consultation champion) will also be the main person to contact with views on the way we run our consultations.
- A2.6 If we are not able to follow one of these principles, we will explain why. This may be because a particular issue is urgent. If we need to reduce the amount of time we have set aside for a consultation, we will let those concerned know beforehand that this is a 'red flag consultation' which needs their urgent attention.

### After the consultation

A2.7 We will look at each response carefully and with an open mind. We will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

# Annex 3

# Consultation response cover sheet

- A3.1 In the interests of transparency, we will publish all consultation responses in full on our website, www.ofcom.org.uk, unless a respondent specifies that all or part of their response is confidential. We will also refer to the contents of a response when explaining our decision, without disclosing the specific information that you wish to remain confidential.
- A3.2 We have produced a cover sheet for responses (see below) and would be very grateful if you could send one with your response. This will speed up our processing of responses, and help to maintain confidentiality by allowing you to state very clearly what you don't want to be published. We will keep your completed cover sheets confidential.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their cover sheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses in the form of a Microsoft Word attachment to an email. Our website therefore includes an electronic copy of this cover sheet, which you can download from the 'Consultations' section of our website.
- A3.5 Please put any confidential parts of your response in a separate annex to your response, so that they are clearly identified. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only so that we don't have to edit your response.

# Cover sheet for response to an Ofcom consultation

Consultation title: Notice of Ofcom's proposal to exempt the use of radio frequency identification equipment in the 865-868 MHz band from Wireless Telegraphy licensing			
To (Ofcom contact): Paul Chapman			
Name of respondent:			
Representing (self or organisation/s):			
Address (if not received by email):			
CONFIDENTIALITY			
What do you want Ofcom to keep confidential?			
Nothing	Name/contact details/job title		
Whole response	Organisation		
Part of the response	If there is no separate annex, which parts?		
If you want part of your response, your name or your organisation to be confidential, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?			
DECLARATION			
I confirm that the correspondence supplied with this cover sheet is a formal consultation response. It can be published in full on Ofcom's website, unless otherwise specified on this cover sheet, and I authorise Ofcom to make use of the information in this response to meet its legal requirements. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.			
Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.			
Name	Signed (if hard copy)		

# Proposed Regulations

DRAFT

STATUTORY INSTRUMENTS

# 2005 No. XX

# ELECTRONIC COMMUNICATIONS

# The Wireless Telegraphy (Radio Frequency Identification Equipment) (Exemption) Regulations 2005

Made xxx Coming into force - xxx

Whereas the Office of Communications ("OFCOM") have under section 403(4)(a) of the Communications Act 2003<sup>(a)</sup> ("the 2003 Act"), as applied by section 16(1A) of the Wireless Telegraphy Act 1949<sup>(b)</sup>("the 1949 Act"), given notice of their proposal to make these Regulations and, under section 403(4)(b) of the 2003 Act, as applied by section 16(1A) of the 1949 Act, published notice of their proposal and have considered the representations made to them before the time specified in the notice(<sup>c</sup>);

Now, therefore, OFCOM, in exercise of the powers conferred upon them by section 1(1) of the 1949 Act(<sup>d</sup>), hereby make the following Regulations—

#### **Citation and commencement**

1. These Regulations may be cited as the Wireless Telegraphy (Radio Frequency Identification Equipment) (Exemption) Regulations 2005 and shall come into force on [xxx] 2005.

#### Interpretation

2. In these Regulations—

- (a) "200 kHz channel" has the meaning given by regulation 4(1);
- (b) "beamwidth" means the lowest angle between points in the radiation pattern emitting from the equipment's antenna where at such points emissions from the antenna are half the power of the peak radiation;
- (c) "dBm" means decibel milliWatt;
- (d) "equipment" means a station for wireless telegraphy or apparatus for wireless telegraphy;
- (e) "erp" means effective radiated power;

(<sup>a</sup>) (<sup>b</sup>) 2003 c. 21

1949 c. 54.

Section 16(1A) of the 1949 Act does not extend to the Channel Islands so the procedures set out in section 403 of the 2003 Act, (°) which it applies, are not requirements in so far as these Regulations extend to the Channel Islands.

Section 1(1) was extended to the Channel Islands by S.I. 1952/1900, as amended by S.I. 1967/1279, S.I. 1974/691 and S.I. 1997/284 and to the Isle of Man by S.I. 1952/1899, as amended by S.I. 1967/1280 and S.I. 1997/285. Section 1(1) was amended by the Communications Act 2003 (c. 21), by section 406 and Schedule 17, paragraphs 6(1) and (2). These amendments were extended to Jersey by S.I. 2003/3197 article 6, to the Bailiwick of Guernsey by S.I. 2003/3195 article 6 and to the Isle of Man by S.I. 2003/3198 article 6. There are other amendments to section 1(1) not relevant to these Regulations.

- (f) "interrogator" means equipment which is capable of initiating communications with other equipment;
- (g) "kHz" means kilohertz;
- (h) "MHz" means megahertz; and
- (i) "mW" means milliWatt.

#### Exemption

**3.** Subject to the terms, provisions and limitations set out in regulation 4, the establishment or installation of equipment and the use of equipment so established or installed is hereby exempt from the provisions of section 1(1) of the Wireless Telegraphy Act 1949.

#### Terms, provisions and limitations

**4.**—(1) The exemption provided for in regulation 3 shall be limited to equipment which meets the requirements of regulations 4(2) and 4(3).

(2) Equipment must —

- (a) operate in the frequency band between 865 MHz and 868 MHz;
- (b) operate using one or more of the numbered frequency channels which have a centre frequency specified in the Schedule and which must have a bandwidth no greater than 200 kHz;
- (c) not cause or contribute to any undue interference to any wireless telegraphy; and
- (d) emits transmissions which
  - (i) at frequencies between 865 MHz and 865.6 MHz have an erp no greater than 100 mW;
  - (ii) at frequencies between 865.6 MHz and 867.6 MHz have an erp no greater than 2 Watts; and
  - (iii) at frequencies between 867.6 MHz and 868 MHz have an erp no greater than 500 mW.
- (3) Equipment which is an interrogator must —
- (a) meet the requirements of regulation 4(2);
- (b) transmit with a beamwidth which
  - (i) at an erp less than 500 mW is less than or equal to 90 degrees; and
  - (ii) at an erp greater than or equal to 500 mW is less than or equal to 70 degrees.
- (c) only begin transmitting in any channel—
  - (i) at an erp greater than 500mW, if the signal level at the receiver of the interrogator from other equipment operating within that channel is less than or equal to than -96 dBm for a period of not less than 5 milliseconds immediately prior to transmission;
  - (ii) at an erp greater than 100mW but less than or equal to 500mW, if the signal level at the receiver of the interrogator from other equipment operating within that channel is less than or equal to -90 dBm for a period of not less than 5 milliseconds immediately prior to transmission; and
  - (iii) at an erp less than or equal to 100mW, if the signal level at the receiver of the interrogator from other equipment operating within that channel is less than or equal to -83 dBm for a period of not less than 5 milliseconds immediately prior to transmission.
- (d) operate so that the duration of each transmission on the same frequency channel is no longer than four seconds; and
- (e) operate with an interval between each transmission on the same frequency channel of not less than 100 milliseconds.

Chief Executive of the Office of Communications

[xxx] 2005

For and by authority of the Office of Communications

# SCHEDULE

# CHANNEL NUMBERS AND CENTRE FREQUENCIES

Channel	Centre Frequency (MHz)
1	865.1
2	865.3
3	865.5
4	865.7
5	865.9
6	866.1
7	866.3
8	866.5
9	866.7
10	866.9
11	867.1
12	867.3
13	867.5
14	867.7
15	867.9

# Annex 5

# Impact assessment

### Introduction

- A5.1 An Impact Assessment is an essential part of considering different options for regulation, including alternatives to formal regulation, and then, using objective criteria, selecting the best option. Subject to the principle of proportionality, an Impact Assessment will generally:
  - identify the impacts of each option on the interests of particular groups of stakeholders;
  - assess the impact of the proposed regulations on costs to business;
  - identify any impacts which each option would have on competition;
  - identify and, where possible, quantify the costs and benefits flowing from the impacts which each option would have;
  - assess the key risks associated with each option.
- A5.2 Ofcom's principal duty is to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition. In addition Ofcom has specific duties relating to its management of the radio spectrum. By encouraging policy makers to identify and analyse a wide range of policy options, Impact Assessments form an important part of the decision-making process.
- A5.3 Impact Assessments should enable Ofcom and our stakeholders to see more clearly the costs and benefits associated with different policy and policy implementation options. They will therefore be able to comment on our proposals more easily and as a result, consultations should be more effective.

# **Proposal, purpose and effect**

- A5.4 Of com is proposing to make regulations (a type of statutory instrument) in order to:
  - exempt the use of RFID equipment in the 865 to 868 MHz frequency band from the need to hold a wireless telegraphy licence in accordance with the conditions of use set out in CEPT/ERC recommendation 70-03<sup>1</sup>; and
  - enable the development and further roll-out of RFID equipment in the UK in line with a harmonised European standard. The technology has the potential to significantly lower supply chain costs, benefiting both suppliers and customers.

# **Economic costs and benefits**

A5.5 RFID is a technology that uses radio signals to communicate between reading devices and small electronic transponders (i.e. tag). When the tag is within a <sup>1</sup> European Conference of Postal and Telecommunication Administrations (CEPT)/European Radio Committee (ERC) Recommendation 70-03 (Tromso 1997 and subsequent amendments) "Relating to the use of short range devices."

certain range of a reader, (typically 10 cm to a few metres) communication is established through a signal emitted by the reader. The information transmitted from the tag to the reader enables it to be identified. Importantly, a line of sight does not need to be established between the reader and tag, thus raising the level of performance that can be achieved in capturing and collecting unique numbers and data on product items (compared to, say, traditional bar codes).

- A5.6 RFID is expected to be used in a number of commercial applications in the future. Some possible areas of application include:
  - tagging and tracking goods along the supply chain in supermarkets;
  - tagging of pharmaceutical products to prevent counterfeiting;
  - tracking baggage in the airline industry;
  - intelligent transport systems;
  - ticketless travel in public transport; and
  - building security.
- A5.7 Although there are a wide range of possible applications, it is expected that the retail sector will experience the biggest growth in RFID, initially in the supply chain between the producer and the retail store. For instance, one UK retailer has announced a rollout of RFID within its supplier base while another has conducted trials both at pallet and item level within a number of stores.<sup>2</sup>
- A5.8 For illustrative purposes, this section identifies the costs and benefits of the technology as applied in the retail sector between producers and retail stores. In doing so, it will identify the possible magnitude of costs and benefits that could arise by facilitating the introduction of the technology to the retail sector.
- A5.9 Ofcom is assessing the costs and benefits arising from the proposed regulations and comparing them to the different regulatory options available. However, in order to do that it is first worth assessing the costs and benefits arising to business from RFID equipment.

# Economic benefits of RFID

- A5.10 The key economic benefits of RFID arise from the information generated through tracking and tracing products and improved security along the supply chain. The resulting benefits include the provision of real time inventory information leading to greater supply chain efficiency and a reduction of theft and write-offs.
- A5.11 The provision of real time inventory information will enable suppliers to better manage their inventories, keeping inventory levels to a minimum, while also minimising situations where a customer requests a good that is not in stock. Retailers that are overstocked and under stocked with inventories typically incur additional supply costs. The costs of being overstocked include higher working capital costs and storage costs, whereas the costs of being under stocked relate to lost sales and profits arising from an inability to meet consumer demand. Studies indicate that when a good is out of stock fewer than 50 per cent of consumers

<sup>2</sup> RFID Futures in Western Europe, Juniper Research, January 2005. These tests were, however, conducted under a different frequency band to that discussed in this IA.

purchase a replacement item, with a third going to other retailers. The cost to retailers of being 'out of stock' is estimated to be approximately 4-8 per cent of sales.<sup>3,4</sup> Estimates of cost savings arising from the prevention of overstocking in the retail sector include lower inventory costs<sup>5</sup> in distribution centres could be as high as 7.5 percent on an on-going basis.<sup>6</sup>

- A5.12 Another key benefit relates to improved security in the supply chain, through prevention of theft, shrinkage and inventory write-offs. When counts are taken of stock, sometimes these counts are inaccurate because of customer or employee theft, misplaced orders and stock re-ordered because items are displayed elsewhere. Inventory write-offs occur when goods are damaged or no longer fit for consumption. RFID can assist retailers track use-by dates to reduce write-offs through better inventory management.
- A5.13 A survey conducted in the US in 2000 suggested that overall shrinkage represents approximately 1.7 per cent of sales for retailers.<sup>7</sup>
- A5.14 In relation to the additional turnover that could result from better inventory management and improved security, the turnover for the UK supermarket sector was estimated at £60 billion at 2003.<sup>8</sup> If, going forward, stock outs were reduced by half<sup>9</sup> through roll out of RFID across the sector, then we might expect an eventual 2 4 per cent<sup>10</sup> increase in sales revenues worth £2-£4 billion (in NPV terms).<sup>11</sup>
- A5.15 Similarly, if we assume that shrinkage could be reduced by 50 per cent from 1.7 per cent of sales to 0.85 per cent then accordingly, additional sales revenues reclaimed could amount to £1 billion (in NPV terms). Assuming a steady rollout of RFID, across the sector until completed by 2014/15<sup>12</sup>, and on a NPV basis, an indicative estimate of additional sales revenues is between £3- £5 billion.<sup>13</sup>

<sup>3</sup> Chappell, Gavin, Durdan, David, Gilbert Greg, Ginsburg, Lyle, Smith, Jeff and Tobolski, Joseph, 2003. "Auto-ID in the Box: The Value of Auto-ID Technology in Retail Stores," Accenture and Auto-ID Centre MIT, February 1, 2003 and Corsten, Daniel and Gruen, Thomas, 2004. "Stock-Outs mean Walkouts," *Harvard Business Review*. May 2004, volume 82, issue 5.

<sup>4</sup> Corsten, Daniel and Gruen, Thomas, 2004. "Stock-Outs mean Walkouts," *Harvard Business Review*. May 2004, volume 82, issue 5.

<sup>5</sup> This includes a reduction in labour costs associated with reduced counting of stock.

<sup>6</sup> Supermarkets and Agricultural Development in China: Opportunities and Challenges

May 24-25, 2004Shanghai, China: "Supply Chain Innovations in the U.S. Retail Sector"

Jean Kinsey, Professor, Department of Applied Economics Co-Director, The Food Industry Center, University of Minnesota

<sup>7</sup> "2000 Retail Survey Report", University of Florida, 2000.

<sup>8</sup>Euromonitor International at euromonitor.com. Includes sales turnover for Tesco, Sainsbury, ASDA, Sommerfield/Morrisons.

<sup>9</sup> A US study estimates reductions in shrinkage of over 50 per cent. See Chappell, Gavin, Durdan, David, Gilbert Greg, Ginsburg, Lyle, Smith, Jeff and Tobolski, Joseph, 2003. "Auto-ID in the Box: The Value of Auto-ID Technology in Retail Stores," *Accenture and Auto-ID Centre MIT*, February 1, 2003.

<sup>10</sup> Based on reducing stock outs from 4-8 per cent of sales to 2-4 per cent. Ofcom has applied a discount rate of 12.6 per cent to future benefits. This estimate is based on an average pre-tax nominal cost of capital estimated by the Competition Commission for supermarket industry for the years 1996-1999 (see Competition Commission, Supermarkets: A report on the supply of groceries from multiple stores in the United Kingdom, 1999, paragraph 8.87, p164).

<sup>11</sup> Assuming initial stock outs levels similar to the US.

<sup>12</sup> Assume rolled out by supermarkets collectively representing 50 per cent of sales in the retail supermarket sector.

sector. <sup>13</sup> There are two key assumptions to deriving the NPV of the future stream of benefits from introducing RFID. First, Ofcom has applied a discount rate of 12.6 per cent to future benefits. This estimate is based on an average pre-tax nominal cost of capital estimated by the Competition Commission for supermarket industry for the years 1996-1999 (see Competition Commission, Supermarkets: A report on the supply of groceries from multiple stores

- A5.16 In addition to these estimates based on US studies, data provided to Ofcom by industry stakeholders suggests additional sales revenue is of the same order of magnitude to that estimated in US studies. Importantly, further benefits for UK companies could result from the harmonisation of spectrum frequency used for RFID with other jurisdictions (eg leading to European supply chains to be managed more efficiently).
- A5.17 Importantly, only part of the increased revenue (estimated between £3 billion and £5 billion) represents a welfare gain to suppliers or consumers. The additional welfare gain arises in two complementary ways. First, suppliers are able to supply additional goods at a price that enables them to earn a profit margin on each unit sold. The difference between a supplier's costs to supply and the retail price (i.e. profit margin) represents a welfare gain to suppliers (i.e. a 'producer surplus'). Second, consumers benefit through lower prices if efficiency savings are passed on. The difference between customer's valuations of the goods and the product price represents the welfare gains to consumers (i.e. consumer surplus).
- A5.18 An indicative measure of the producer surplus is the profit margin expressed as a proportion of the increase in turnover from the additional sales. Ofcom uses an estimated operating profit margin of 6 per cent<sup>14</sup> and assuming this margin is maintained in the future, this suggests a producer surplus of around £150 £300 million (in NPV terms).<sup>15</sup> In addition, if we assume that the responsiveness of demand and supply are similar, we could infer that consumer's benefit to a similar degree as suppliers. The total indicative benefits are therefore between £300 million and £600 million (in NPV terms).
- A5.19 Consumers benefit through lower prices, since RFID allows more efficiency and lower costs in their operations such that they can lower prices to customers. Suppliers also benefit through higher profits (to the extent that cost savings are not passed on to customers).

# **Economic costs of RFID**

- A5.20 The costs of introducing RFID to the supermarket supply chain are expected to be sizeable, such that at least for the short term, existing technologies such as barcodes could remain more cost effective. However, changes in RFID chip fabrication could accelerate RFID rollout as costs of introducing the technology fall.<sup>16</sup>
- A5.21 The main cost of implementing RFID includes the hardware costs, return on investment (ROI) and costs of integrating any new system with existing systems. In addition, there are ongoing costs related to maintenance of reading devices and procurement of tag devices.
- A5.22 Ofcom has considered US study data<sup>17</sup> and has cross checked that data with information for the UK market provided to Ofcom by stakeholders. This leads Ofcom to estimate that costs might represent a magnitude of approximately two

in the United Kingdom, 1999, paragraph 8.87, p164). Second it is assumed that RFID is rolled out across the industry by 2014/2015. Accordingly between 2005/06 and 20014/2015 benefits increase linearly and remain constant thereafter. A terminal value is also estimated using a stable future growth assumption (i.e. annual benefit in that year divided by the cost of capital).

<sup>&</sup>lt;sup>14</sup> Based on figures from the Tesco Annual Report 2005

<sup>&</sup>lt;sup>15</sup> This is based on the range of additional sales revenue of the midpoint between US based estimates of additional sales (£3.4 billion) and analysis undertaken by Ofcom using UK industry data (approximately £6 billion).

<sup>&</sup>lt;sup>16</sup> RFID Adoption in the Retail Industry, USA Strategies Inc, May 2005.

<sup>&</sup>lt;sup>17</sup> RFID Adoption in the Retail Industry, USA Strategies Inc, May 2005.

thirds of the value of improved efficiency generated through introducing RFID. On this basis, costs would be of the order of  $\pounds 200 - \pounds 400$  million.

### Non-economic costs and benefits of RFID

- A5.23 In addition to economic costs and benefits, Ofcom recognises that, although RFID is not new, the increasing proliferation and potential of the technology has raised the issues of opportunities presented to consumers in the form of customer empowerment but also risks of possible infringements of personal privacy.
- A5.24 At present, many of the concerns raised regarding privacy relate to the misuse of information which would place the use in breach of privacy and/or data protection legislation. Accordingly, Ofcom does not intend to incorporate non-economic costs that are based on the assumption that users of the devices will do so illegally.
- A5.25 The UK Government, through the DTI, has publicly stated that it is fully committed to ensuring that the use of RFID technology is sensibly managed within a statutory and regulatory framework that allows the benefits to be enjoyed while also addressing public concerns through necessary safeguards for citizens and consumers.

# Summary of costs and benefits of RFID

- A5.26 In summary, consumers and suppliers benefit in net terms from RFID.
- A5.27 This IA provides indicative NPV estimates of the net benefits in the region of £100 £200 million over 10 years. However, this analysis is necessarily partial and incomplete due to the lack of data and uncertainty regarding future costs.
- A5.28 Non-economic costs and benefits have also been considered, and suggest both opportunities and risks. However, it is not clear that the risks relate to the technology per se but rather that they relate to possible breaches of existing privacy or data protection legislation through misuse of information.

# **Regulatory options**

A5.29 In the light of the net benefits of RFID outlined above, Ofcom has considered the costs and benefits of the proposed regulations and the alternative regulatory options.

# Option 1: not licence RFID equipment and not make RFID equipment licence exempt

A5.30 Under the 'do nothing' option, there would be no costs of implementation, compliance with or enforcement of regulations. However, by neither licensing nor making RFID exempt, there would be costs borne both by consumers and businesses in terms of the loss of net benefits from future rollout of RFID, as outlined in the previous section. This loss of net benefits may fall between £100 - £200 million.

# Option 2: require wireless telegraphy licensing of RFID equipment

- A5.31 The 'technological and information' related benefits arising from the use of RFID to better manage inventories and to improve security along the supply chain is common to both regulatory options, that is to say this Option 1 and Option 2 discussed below. These benefits have been discussed above. There are no separate material benefits that arise solely from undertaking this regulatory option.
- A5.32 The cost of adopting a licensing approach includes applying for a licence (including any fees payable by businesses for the licence), and compliance with and enforcement of the regulations. The licensing approach would therefore place costs on consumers, businesses and the regulator
- A5.33 The Licensing option would require each RFID device installed by supermarket retailers and other users in other sectors to be individually licensed under the Wireless Telegraphy Act 1949. Individuals and companies seeking to introduce this technology would bear administrative costs related to applying for the licence and payment of fees, if applicable.
- A5.34 In addition to the direct compliance costs faced by supermarket retailers, there could also be indirect costs where users are discouraged from adopting RFID if they are required to apply for, and potentially pay licence fees for, each licensable device.
- A5.35 Of com would also bear costs of administrating the licence scheme. This would extend to assessing applications and issuing licences, as well as undertaking enforcement action where necessary (e.g. where unlicensed devices are in use).

# Option 3: exempt the use of RFID equipment in the 865 to 868 MHz band from the requirement to hold a WT Act licence

- A5.36 The 'technological and information' related benefits arising from the use of RFID to better manage inventories and to improve security along the supply chain is common to both regulatory options. These benefits have been discussed above.
- A5.37 The cost of compliance for users of RFID under licence exempt status is not material, since users of legitimate RFID devices would not be required to apply for a WT Act licence. Consequently the direct cost to business of these regulations is zero.
- A5.38 The cost to the regulator of making RFID devices which meet the requirements of the regulations, exempt from requiring a licence will include the one-off cost to Ofcom of making these regulations. The regulator will be required to undertake enforcement to ensure that devices not meeting the necessary technical specifications, and therefore risking the possibly of harmful interference, can be located, and their use restricted or prevented. These costs, however, will be absorbed within the existing budget for enforcement activities.

### **Risk assessment**

A5.39 There is a risk that designating this spectrum band for licence exempt use by RFID equipment could affect future use of this band. The uncertainty surrounding other potential future technologies makes the magnitude of this risk difficult to quantify.

However, some of the characteristics of this technology could be thought to mitigate the risk of precluding (at least some) other future uses: namely the limited distance between tags and reading equipment may allow other possible future uses of this band to co-exist with RFID equipment without harmful interference deterring entry by users of the incoming technology.

# Conclusion

- A5.40 This IA has identified the costs and benefits of the use of spectrum designated in the 865 to 868 MHz band for RFID applications. The benefits arise from sizeable reductions in supply chain costs due to better management of inventory and stocks and improved security.
- A5.41 This IA provides indicative estimates of the net benefit in the region of £100 million and £200 million. However, this analysis is necessarily partial and incomplete due to the lack of data and uncertainty regarding future costs and benefits.
- A5.42 Option 1 proposes taking no regulatory action to facilitate the rollout of RFID in the UK. This would present significant costs for consumers and businesses in terms of lost net benefits from the rollout of RFID.
- A5.43 Option 2 proposes taking action to licence RFID device users, which would facilitate rollout of RFID. However, there are material compliance and enforcement costs associated with this regulatory approach.
- A5.44 In conclusion, Ofcom recommends that Option 3, licence exemption of RFID equipment be adopted, since this option is the least costly way of facilitating the introduction of RFID devices, and will maximise the benefits from adoption of the technology that will flow from this decision.