



Commission for
Communications Regulation

Response to Information Notice 10/84

Licensing Regime for GSM for Railway Operations

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1 Introduction

In Information Notice 10/84¹, the Commission for Communications Regulation (“ComReg”) set out details of its proposals to designate the frequency bands 876-880 MHz and 921 – 925 MHz for railway purposes and to set up a licensing regime for spectrum rights of use for the provision of railway operational systems, in particular Global System for Mobile Communications – Railway (“GSM-R”) services in Ireland. It was proposed that the licensing regime would enable the grant of a limited number of licences under the Wireless Telegraphy Acts 1926 to 2009 authorising the possession of GSM-R apparatus. Information Notice 10/84 set out ComReg’s proposals on such matters as licence duration, co-existence with radiocommunications services in adjacent spectrum bands, spectrum fees, channel plan and award process.

ComReg invited comments from interested parties on its proposals and three responses were received, being from (in alphabetical order)²:

- ESB Networks Ltd. (“ESBN”);
- Iarnród Éireann (“IE”); and
- Silver Spring Networks (“SSN”).

ComReg wishes to express its gratitude to these interested parties for their respective submissions.

ComReg has carefully considered these responses and other relevant material before it and this document sets ComReg’s final position on the matters set out in Information Notice 10/84.

¹ “Proposed licensing regime for GSM for railway operations spectrum”, published 13 October 2010, hereafter “Information Notice 10/84”

² These responses received by ComReg, excluding any confidential material, have been made available on the ComReg website (www.comreg.ie) and are contained in ComReg document number 11/90s.

2 Consideration of submissions received in response to Section 2 of Information Notice 10/84

ComReg set out the background to the GSM-R spectrum band in section 2 of Information Notice 10/84, providing an overview of:

- the GSM-R spectrum band;
- current Irish rail network communications;
- the benefits of upgrading to GSM-R technology;
- the CEPT and European Framework with regard to GSM-R spectrum;
- interoperability with GSM-R services in the UK; and,
- co-existence between GSM-R and adjacent band services .

For further information on each of the above listed items, readers are requested to refer back to Information Notice 10/84.

Before setting out its final position on its licensing proposals, ComReg firstly considers submissions received relating to Section 2 (Background) of Information Notice 10/84 (using the relevant headings from Information Notice 10/84 where possible).

Consideration of submissions was in the context of the CEPT³ and European framework relating to GSM-R spectrum, as set out at section 2.4 of Information Notice 10/84. In summary, a CEPT Electronic Communications Committee (“ECC”) decision ECC/DEC/(02)05⁴ designates the bands 876-880 MHz, paired with 921-925 MHz, for railway purposes. Also of relevance, although they do not deal directly with designation of spectrum, are the rules relating to railway interoperability i.e., the European Communities (Interoperability of the Rail System) Regulations 2011⁵ (“the 2011 Regulations”), which transpose Directive 2008/57/EC⁶ (“the Railway Interoperability Directive”). The Railway Interoperability Directive sets out the essential requirements to be met in order to achieve interoperability of rail systems within the European Community, and in particular requires the production of mandatory Technical Specifications for Interoperability (TSIs) which define the technical standards required to satisfy those conditions. The 2011 Regulations require compliance with TSIs. Several TSIs require the use of GSM-R⁷.

The Union Internationale des Chemins de Fer (“UIC”) has worked specifically towards meeting such conditions through the development of GSM-R systems to operate within these

³ The European Conference of Postal and Telecommunications Administrations

⁴ ECC/DEC/(02)05 on the designation and availability of frequency bands for railway purposes in the 876-880 MHz and 921-925 MHz bands, approved 5 July 2002 and amended 26 June 2009.

⁵ SI 419 of 2011.

⁶ Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community as amended by Directive 2009/131/EC of 16 October 2009 and Directive 2011/18/EU of 1 March 2011

⁷ For example: Commission Decision of 28 March 2006 concerning the technical specification for interoperability relating to the control-command and signalling subsystem of the trans-European conventional rail system (2006/679/EC), as amended; Commission Decision of 29 April 2004 modifying Annex A of the Commission Decision 2002/731/EC of 30 May 2002 and establishing the main characteristics of Class A system (ERTMS) of the control command and signalling subsystem of the trans-European conventional rail system referred to in Directive 2001/16/EC (2004/447/EC); Commission Decision of 20 December 2007 concerning the technical specification of interoperability relating to ‘safety in railway tunnels’ in the trans-European conventional and high-speed rail system (2008/163/EC),

bands, which both fulfils the needs of railways and ensures interoperability across borders. It should be noted that such GSM-R systems are to be used for the provision of Electronic Communications Networks⁸ (ECNs) to provide infrastructure support for the functioning of rail networks (e.g. rail operators) and are not intended for use by third-parties or members of the public. Bearing all of these factors in mind, ComReg has analysed all responses received in relation to its Information Notice 10/84.

2.1 Potential Alternative uses for the GSM-R Band

Views of respondents

ESBN and SSN submit that an opportunity exists for sub-1 GHz spectrum to be used to support communications in the electricity sector through the employment of “Smart Utility Networking applications”.

ESBN indicated that the development of a strong electricity system needs to be supported by a robust telecommunications infrastructure which would provide sufficient bandwidth to meet its key sustainability targets. It was also stated by ESBN that wireless technologies will be a key enabler of the economically viable delivery of smart metering and smart grid services to at least one third of the population.

ESBN noted that a number of initiatives have been undertaken at an international level in efforts to standardise communications technology for utilities, many of which focus on the utilisation of spectrum in the sub-1 GHz bands for such purposes. Despite this, however, ESBN noted that very little sub-1 GHz spectrum is available for such purposes within Europe.

ESBN consider that spectrum in the sub-1 GHz band would best meet any emerging requirements for smart metering and networks infrastructure, providing for increased coverage, effective in-building penetration, and lower infrastructure costs. ESBN expressed particular interest in the bands 870 – 872 MHz, 876 – 880 MHz, 915 – 917 MHz, and 921 – 925 MHz to enable Smart Utility Network Solutions.

SSN also highlighted current work being conducted on an international and European level which focuses on smart utility applications, noting also the scarcity of spectrum below 1 GHz which is currently available for these applications within Europe.

ComReg’s position

ComReg recognises that considerable interest continues to be expressed by industry within Europe in the utilisation of sub-1 GHz spectrum for “smart grid” and “smart metering” applications. These applications can deliver enhanced utility network management through the delivery of two-way digital communication between utility suppliers and consumers.

⁸ An ECN (Electronic Communications Network) is defined in the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. 333of 2011) as “transmission systems and, where applicable switching or routing equipment and other resources, including network elements which are not active, which permit the conveyance of signals by wire, by radio, by optical or by other electromagnetic means, including satellite networks, fixed (circuit- and packet- switched, including Internet) and mobile terrestrial networks, electricity cable systems, to the extent that they are used for the purpose of transmitting signals, networks used for radio and television broadcasting, and cable television networks, irrespective of the type of information conveyed.”

ComReg appreciates that such new energy management systems have the potential to significantly contribute to the functionality and efficient operation of utility networks.

ComReg also notes that the issue of appropriate spectrum allocations for such applications is actively under study at a European level in the CEPT, with the aim of finding a harmonised European solution. ComReg is of the view that, due to the level of international interest in smart networks, a harmonised European solution will benefit Ireland as, for example, it should facilitate the availability of cheaper equipment as a result of economies of scale. ComReg considers that it would be premature to allocate spectrum for such applications prior to European harmonisation and the mass market advantages that such harmonisation can deliver. Therefore, at present ComReg is not minded to set aside spectrum below 1 GHz for smart utility networks. However, ComReg acknowledges the interest in and benefits of Smart Utility Networking applications and will therefore continue to monitor European developments in this regard.

2.2 Current Irish rail network communications

Views of respondents

In summary, IE noted the following in relation to Section 2.2 of Information Notice 10/84:

- that GSM-R has been developed through the UIC as the replacement technology for analogue radio communications systems which have been used by railway operators throughout Europe in the past;
- that all main intercity rail lines within Ireland are classified as “conventional” lines and therefore fall under the remit of the Technical Specifications for Interoperability (TSI) which, IE noted, mandates the adoption of GSM-R by railway operators; and
- that TSIs relate only to “heavy” rail and are not applicable to light rail or metro networks.

ComReg’s position

ComReg agrees with the position as set out by IE in relation to this section, save that it does not propose to distinguish between “heavy” and “light” rail in the context of GSM-R licensing. While “light rail” networks are not required to comply with the 2011 Regulations (and therefore TSIs), such networks could choose to use GSM-R. ComReg, while acknowledging that GSM-R is an appropriate technology to achieve interoperability for conventional and high-speed rail, is of the view that this technology could also potentially be used for other light rail systems within Ireland. Therefore in the proposed GSM-R licensing regime all rail operators (whether operators of “heavy” or “light” rail) will be eligible to obtain a licence to keep GSM-R apparatus.

2.3 Promoting inter-operability with GSM-R services in United Kingdom

In Information Notice 10/84, ComReg noted that it is seeking to establish a Memorandum of Understanding (“MoU”) with the United Kingdom (“UK”) that would facilitate Irish and UK rail operators’ use of spectrum in accordance with the Railway Interoperability Directive, thereby facilitating full interoperability between the two rail networks.

Views of respondents

In its response, IE stated that it:

- fully supports the intention of ComReg to establish a MoU with OfCom⁹ with regard to use of the GSM-R spectrum;
- sees this as an essential requirement to derive the full benefits from GSM-R and ensure seamless interoperability between both rail networks; and
- requests that IE be consulted in this process.

ComReg's position

ComReg is currently seeking to establish a MoU for GSM-R services with Ofcom to ensure efficient usage of the spectrum in border areas.

Prior to formal agreement, it is ComReg's intention to consult with interested parties on the content of any MoU proposal. It is anticipated that the MoU will be made available online, through the ComReg website, for a specified consultation period. Only after responses from interested parties have been given due consideration will an MoU be formally agreed with the UK.

Finally, users of frequencies in the 876-880 MHz and 921-925 MHz bands will be required to adhere to applicable conditions as set out in any agreed MoU. For example, as part of any such MoU, it may be necessary to agree threshold power levels and/or preferential channels for use by respective national rail services when operating in close proximity to the border. Therefore, as set out in Section 3 below, it is ComReg's position that all rights of use issued in the GSM-R band will contain an obligation to adhere to the applicable terms of any agreed MoU.

2.4 Co-existence with adjacent band services

2.4.1 *Co-existence with Wideband Digital Mobile Data Services (WDMDS)*

In Information Notice 10/84, ComReg noted that the WDMDS licensee is obliged to:

- ensure non-interference to GSM in the 907 – 915 MHz part of the band and to make provisions to facilitate coexistence with any future GSM-R systems in the 921 – 925 MHz part of the band;
- meet the cost of any mitigation techniques required to prevent harmful interference to users in adjacent bands; and
- make provision for any guard bands required to prevent harmful interference to spectrum users in adjacent bands using spectrum specified in the WDMDS licence.

Views of respondents

In response to Information 10/84, IE expressed concern as to whether such requirements could be enforced considering the safety critical application of GSM-R in rail operations. IE

⁹ Ofcom is the independent regulator and competition authority for the UK communications industries

drew attention to the issue of meeting costs associated with mitigation of interference between WDMDS and GSM-R systems. IE suggested possible investigation to quantify this issue and establish where interference might occur, and that alterations or expansion of the WDMDS network should be assessed in advance for any potential interference with GSM-R to ensure that the safety and integrity of the GSM-R network is not compromised. IE also suggested that an obligation should be placed on the WDMDS licensee to implement mitigations within their own network at their own cost, should interference occur.

ComReg's position

ComReg acknowledges the importance of the GSM-R network to the safe operation of trains and is conscious of the requirement to avoid interference with the GSM-R band. In addition to the obligations upon WDMDS licensees identified in Information Notice 10/84, ComReg would draw attention to ComReg Document 05/80¹⁰ which states that the WDMDS licensee is responsible for minimising interference potential to all GSM-R licensees and must bear the cost of any mitigation techniques required in order to prevent harmful interference to GSM-R licensees. It should be noted that, in the event of any non-compliance with this or any other licence conditions, ComReg has the power to take the necessary enforcement actions.

ComReg considers that these measures will help safeguard the GSM-R network from interference and address the concerns voiced by IE.

2.4.2 Co-existence with public mobile networks in the adjacent 900 MHz band

In Information Notice 10/84, ComReg in summary stated that:

- a 100 kHz guard band is currently implemented on the 900MHz band side of the GSM-R/GSM-900 band edge;
- interference between GSM-R and 900MHz systems can arise where these systems are deployed within the same geographical location. Such interference could include blocking effects and inter-modulation distortion on the GSM-R system; and
- ECC Report 146¹¹ states that the predominant interference effects are the blocking and adjacent channel performance of the GSM-R terminal, which, however, can be improved by additional filtering. For instance, new GSM-R receivers with narrower and switchable filters are being planned. The report also states that a carrier separation of 400 kHz (200 kHz between the edges of the channels) between 900 MHz multi carrier base transmit stations (MCBTS) and GSM-R is sufficient to avoid harmful interference to GSM-R downlink due to unwanted emissions from a MCBTS.

In light of the recommendations of ECC Report 146, and also the importance of ensuring that no harmful interference occurs between GSM-R and 900 MHz systems, it was therefore proposed to implement the carrier separation of 400 kHz as recommended in the Report..

¹⁰ ComReg document 05/80: Information Memorandum - Process for the award of National Licences for the Provision of Wideband Digital Mobile Data Services.

¹¹“Compatibility between GSM MCBTS and other services (TRR, RSNB/PRMG, HC-SDMA, GSM-R, DME, MIDS, DECT) operating in the 900 and 1800 MHz frequency bands” Baden, June 2010

Also, as studies could conclude that greater guard band requirements were needed, ComReg proposed to issue GSM-R licences based on spectrum allocations from the lower end of the GSM-R band, from 876 MHz paired with 921 MHz, and progressively move towards 880MHz paired with 925 MHz.

Views of respondents

In response to this issue, IE submits that:

- interference issues between GSM-R and 900MHz systems may still be experienced with the implementation of the recommended guard band and that further investigation is being conducted by a European Telecommunications Standards Institute (“ETSI”) Special Task Force working group¹²;
- the implementation of switchable filters on the GSM-R terminals is not a cost effective solution to mitigate an interference issue in one particular area. In that regard, it notes that considering that the train fleet is not captive, it would necessitate fitting the whole fleet of approximately 500 vehicles at an additional cost of approximately €4 million(€8k per unit);
- the proposal to assign frequencies from the lower end of the band and progressively move towards 880 MHz may mitigate this issue in the short term, however as the GSM-R network would expand to cover all four rail lines converging on Dublin, issues may emerge in the future. Consideration must be given to licensing the whole band to the rail infrastructure operator in this context; and
- consideration should also be given to the future use of the E-GSMR band.

ComReg’s position

Having considered the submission, and for the reasons set out below, ComReg has decided to implement a 300 kHz guard band between 900 MHz services and GSM-R, and assign frequencies starting from the lower end of the GSM-R band.

Noting IE’s concerns, ComReg has carefully considered the potential for interference to occur between services operating in the GSM-R and Public Mobile Networks¹³ bands, taking into account the recommendations of ECC Reports¹⁴ 096, 146, and 162. Further, since publication of Information Notice 10/84, ComReg has progressed with plans to utilise spectrum within the Public Mobile Networks band, and is of the view that, from 2013 onwards, Universal Mobile Telecommunications Systems (“UMTS”) (or similar) services could potentially operate in spectrum directly adjacent to the GSM-R band. ComReg therefore considers it particularly prudent to take the recommendations of ECC Report 096¹⁵ into account.

Of specific note, ECC Report 096 recommends that a carrier separation of 2.8 MHz is required to ensure adequate interference protection between GSM-R and potential UMTS

¹² Reference documentation: ETSI TS 102 933-1 V0.1.6 and ETSI TS 102 933-2 V0.1.4.

¹³ 880 – 915 MHz, paired with 925 – 960 MHz.

¹⁴ Within CEPT, the co-existence between GSM-R systems and other services has been addressed in ECC Report 096, ECC Report 146 and ECC Report 162. In addition, the Radio Spectrum Committee of the European Commission has published a paper on GSM-R interference (RSCOM11-05 Working Document; Commission paper on GSM-R interference issues).

¹⁵ “*Compatibility between UMTS 900/1800 and systems operating in adjacent bands*” Krakow, March 2007

Services. In order to ensure that this full recommended carrier separation is implemented, it will therefore be necessary to designate channel 19 in the GSM-R band as a further guard channel, effectively creating a guard band of 300 kHz between the GSM-R and Public Mobile Networks spectrum bands. It should also be noted that the 2.8 MHz carrier separation exceeds that recommended in ECC Report 146 (i.e., 400 kHz) to sufficiently mitigate harmful interference between GSM Multi Carrier Base Transceiver Stations (“MBTS”) and GSM-R downlinks. Implementation of a 2.8 MHz carrier separation will therefore reduce the potential for interference to occur between GSM-R and any prospective UMTS/GSM services in the Public Mobile Networks band. The arrangement is illustrated in Figure 1, below.

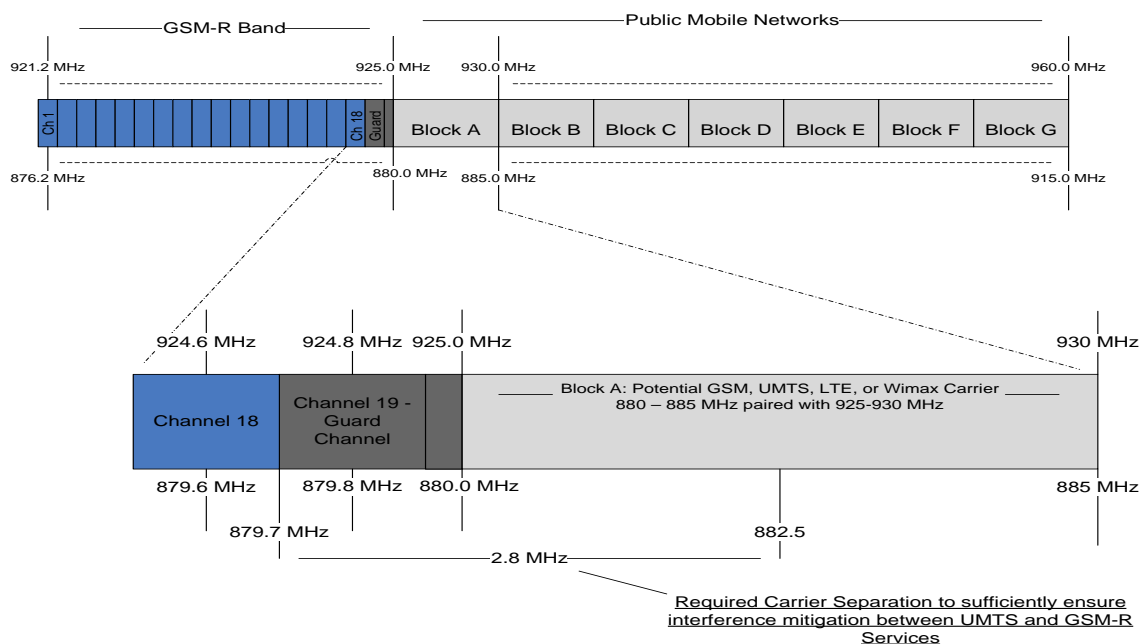


Figure 1 – Proposed Carrier Separation Between GSM-R and Public Mobile Networks Band

ComReg recognises concerns that interference may still be experienced by GSM-R operators notwithstanding such a carrier separation.

In the event that harmful interference occurs between services despite the implementation of recommended carrier spacings, further efforts to resolve the interference between affected parties should then be undertaken by the relevant operators, in accordance with the coordination methods as detailed in ECC Reports 96, 146, and 162, as appropriate. This may entail, amongst other mitigation techniques, the need to employ additional filtering on GSM-R equipment. Although the potential costs of some measures are not insignificant, ComReg’s view is that all such costs should be borne by the GSM-R licensees themselves.

ComReg intends to issue GSM-R licences based on spectrum assignments from Channel 1 moving incrementally towards Channel 18 as demand and need requires. ComReg’s decision to assign frequencies from the lower end of the GSM-R band should avoid or at least reduce the need for mitigation measures and associated costs.

ComReg notes the request put forward by IE that ComReg consider licensing the entire band 876-880 MHz and 921-925 MHz for use by the rail infrastructure operator. Attention is drawn to the fact that although this entire band is used in a number of other European Member States for GSM-R, in those countries the scale of operation for rail services is orders

of magnitude greater than that in Ireland. It should also be noted that there is a limited amount of spectrum being made available for GSM-R and that one of ComReg's statutory objectives is to ensure the efficient management and use of the radio frequency spectrum. In light of the foregoing, ComReg will issue licences in the GSM-R band incrementally (as indicated above) on the basis of need. In order to facilitate its assessment of need, ComReg requires that any prospective users of GSM-R spectrum outline their requirements on a clearly demonstrable basis. It is anticipated that this will entail, for example, details of prospective network plans, specific base station frequency re-use, channel loading, and roll-out timeframes. In conclusion and to respond to IE's point, ComReg may license the full GSM-R spectrum for GSM-R but only on the basis of a clear and demonstrable need of the applicant.

Following IE's proposal, ComReg has considered the future use of the E-GSM-R band (i.e. 873 – 876 MHz, paired with 918 – 921 MHz, known as the GSM-R extension band) for rail purposes. ComReg notes that this band is currently licensed for Wideband Digital Mobile Data Services within Ireland until 2015¹⁶. Further, ComReg considers that sufficient spectrum is currently being made available, through the GSM-R band, to adequately facilitate rail operations throughout the State. Consequently, ComReg is not minded, at present, to further consider the future use of the E-GSM-R band in this response to information notice.

ComReg also notes the work conducted by ETSI to date, and will continue to monitor all developments within Europe with the aim of adopting international best practice.

¹⁶ Digiweb holds a licence to provide WDMDS until 2015.

3 ComReg’s final positions on the licensing regime for spectrum rights of use in the GSM-R band

This section sets out ComReg’s final positions on its licensing proposals, following consideration of responses received to Information Notice 10/84, as follows:

- the amount of spectrum being made available for GSM-R use;
- the limited number of individual spectrum rights of use (licences) being made available and the need for applicants to demonstrate their spectrum requirements;
- the services which could be provided using GSM-R spectrum rights of use;
- key aspects;
- licence conditions
- licence fees; and
- the licensing process.

The legal basis for these positions is set out at Annex 1.

3.1 Amount of spectrum being made available for GSM-R use

In Information Notice 10/84, it was noted that 2 x 3.8 MHz of spectrum would be made available for use by GSM-R apparatus (after taking into account the relevant guard band requirements to provide adequate protection to adjacent band users).

As discussed in section 2.4.2 above, however, in order to ensure successful coexistence between GSM-R Systems and other systems in the adjacent 900 MHz band (designated for Public Mobile Networks), it is proposed that an additional guard channel be used to create a carrier separation of 2.8 MHz between carriers in both bands. For this reason, ComReg’s position is that 2 x 3.6 MHz of spectrum in total will be made available for GSM-R use in 18 x 200 kHz channels (i.e. the “GSM-R band”), as shown in Table 1, below.

Channel Number	Centre frequency Mobile Transmit (MHz)	Centre Frequency Base Transmit (MHz)
1	876.2000	921.2000
2	876.4000	921.4000
3	876.6000	921.6000
4	876.8000	921.8000
5	877.0000	922.0000
6	877.2000	922.2000
7	877.4000	922.4000
8	877.6000	922.6000
9	877.8000	922.8000
10	878.0000	923.0000
11	878.2000	923.2000
12	878.4000	923.4000
13	878.6000	923.6000
14	878.8000	923.8000
15	879.0000	924.0000
16	879.2000	924.2000
17	879.4000	924.4000
18	879.6000	924.6000
Guard Band: 879.7 – 880. 0 MHz		

Table 1: GSM–R Frequency Arrangements¹⁷ (200 kHz channel spacing)

¹⁷ In the bands 876-880 MHz (mobile station transmit) paired with 921-925 MHz (base station transmit) with a duplex separation of 45 MHz for duplex operation

Information Notice 10/84 also listed a number of 12.5 kHz channels for direct mode operation (DMO), as shown in Table 2 below. ComReg notes that GSM-R DMO has not been implemented in any EU countries to date due to technical co-existence issues with GSM TDMA based networks. In that regard, it is notable that ECC Decisions (02)09¹⁸ and (02)10¹⁹ were amended in March 2011, deleting all references to DMO, reflecting the non-utilisation of the DMO channels within the GSM-R band.

DMO Centre Frequency Mobile TX/RX (MHz) ²⁰
876.0125
876.0250
876.0375
876.0500
876.0625

Table 2: 12.5 kHz DMO channels

Given the absence of utilisation of the DMO channels, ComReg therefore considers that the channels are not required for GSM-R purposes. In light of this, the DMO channels will instead be utilised as a guard band between GSM-R and the adjacent band user²¹. This will, ComReg anticipates, provide further interference protection between both services.

3.2 Limited number of individual spectrum rights of use (licences) and demonstrated spectrum requirements

In Information Notice 10/84, ComReg set out reasons underlying its proposal to grant individual spectrum rights of use for GSM-R apparatus in the GSM-R band by way of a limited number of licences issued under the Wireless Telegraphy Acts 1926 to 2009.

In light of the limited amount of spectrum available for licensing for GSM-R, ComReg also proposed that:

- having due regard to the need to maximise benefits for users, to facilitate the development of competition and ensure efficient use of GSM-R spectrum, no licensee would be granted rights of use to all 2 x 3.8 MHz of GSM-R spectrum²²; and
- in light of the need to ensure efficient use of this limited spectrum, there would be a requirement for applicants for a GSM-R licence to satisfactorily demonstrate to ComReg the need for the spectrum requested.²³

¹⁸ ECC Decision (02)09 on the free circulation and use of GSM-R mobile terminals operating within the frequency bands 876 - 880 MHz and 921 - 925 MHz for railway purposes in CEPT countries, enlarging the field of application of ERC/DEC/(95)01 (amended 11 March 2011).

¹⁹ ECC Decision (02)10 on exemption from individual licensing of GSM-R mobile terminals operating within the frequency bands 876 - 880 MHz and 921 - 925 MHz for railway purposes (amended 11 March 2011).

²⁰ 876.000 – 876.100 MHz for direct mode operation (DMO) using single frequency mode. The frequency spacing for DMO is 12.5 kHz

²¹ Adjacent band user is currently Digiweb who holds a licence to provide Wideband Digital Mobile Data Services.

²² Noting that ComReg will now be making available 2 x 3.6 MHz of spectrum.

²³ ComReg noted, in this regard, that it:

- envisaged the provision by applicants of a detailed network plan outlining, amongst other things, specific base station frequency re-use and loading; and
- reserved the right to obtain independent advice relating to such material and to consult as appropriate to determine the veracity of said material.

Views of respondents

In response to this issue, in summary IE submits that:

- it appreciates ComReg’s role in ensuring the efficient use of limited spectrum resources and in this regard understands that licensees must demonstrate the need for the spectrum requested;
- criteria applicable to public commercial cellular infrastructure (for example, ratio of users to RF channels) are not appropriate to assess GSM-R spectrum efficiency. In that regard, IE noted that GSM-R networks typically have a relatively small number of users with more emphasis on QoS, availability, redundancy, safety criticality etc., than would be required of a public network; and
- initial studies have indicated that practically the full GSM-R spectrum may be required in the longer term, particularly in the Greater Dublin Area where four rail lines converge. In addition, IE submits that the initial requirement of a GSM-R voice network will need to be enhanced and duplicated to support the additional demands of European Train Control System (“ETCS”) in the future. IE concludes that because it is the national rail infrastructure provider, sufficient spectrum must be allocated to meet these long term requirements.

ComReg’s position

ComReg has considered the submissions received.

ComReg notes and accepts the submission that criteria applicable to public commercial cellular infrastructure (for example, ratio of users to RF channels) are not always appropriate to assess GSM-R spectrum efficiency. ComReg remains of the view that there should be a requirement for applicants for a GSM-R licence to satisfactorily demonstrate to ComReg the need for a licence to keep GSM-R apparatus. ComReg will assess this need following review of a detailed network plan outlining, amongst other things, specific base station frequency re-use and loading in line with GSM-R network requirements. ComReg considers that this criterion is objective, transparent, non-discriminatory and proportionate in accordance with Regulation 17 of the Framework Regulations²⁴. It is only in circumstances where ComReg is satisfied that there is a need for such licences that it will grant same.

ComReg notes the views of IE that in the long term all of the available spectrum within the band 876-880 MHz and 921-925 MHz will be required for use by the rail infrastructure operator. For the reasons outlined at 2.4.2 above ComReg does not consider that it is necessarily appropriate to make available the full GSM-R spectrum for GSM-R at this stage.

ComReg considers that as the spectrum being allocated for GSM-R is limited, the number of rights of use that it can grant will be limited. In making this decision ComReg has taken into account the matters referred to at paragraph 1(a) and (b) of the Authorisation Regulations²⁵ and it shall grant such rights of use on the basis of need.

²⁴ European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011 (S.I. No. 333 of 2011), hereafter “the Framework Regulations”

²⁵ European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011 (S.I. 335 of 2011), hereafter “the Authorisation Regulations”

Therefore in light of the reasons set out in Information Notice 10/84 for ComReg's proposals and having regard to submissions received, ComReg's position on this issue is as follows:

- it will grant individual spectrum rights of use by way of a limited number of licences issued under the Wireless Telegraphy Acts 1926 to 2009; and
- applications for licences will only be considered where an applicant for a GSM-R licence has satisfactorily demonstrated to ComReg the need for the spectrum requested. ComReg will assess this need following review of a detailed network plan outlining, amongst other things, specific base station frequency re-use and loading in line with GSM-R network requirements.

3.3 Key aspects of Licensing Regime

In Information Notice 10/84, ComReg proposed that GSM-R licences would have the following key aspects:

- they would be issued on a national basis;
- GSM-R spectrum would be made available in channels of minimum bandwidth of 2 x 200 kHz - which correlates with the GSM-R standard channel allocations defined by the ECC Decision ECC/DEC/(02)05;
- GSM-R licences would have a maximum duration of ten years and be subject to annual renewal during this time period. In addition, ComReg noted:
 - that this proposed duration is consistent with licensing regimes for non-commercial service provision (for example, the TETRA licensing regime provides for a maximum ten year licence duration) and would appear appropriate for the services identified above and in light of likely investment timeframe; and
 - for the avoidance of doubt, at the end of the proposed ten year maximum duration, a GSM-R licence will fully expire and licensees will have no rights to renewal, extension or other form of prolongation of this term; and
- the licensee would be subject to an annual spectrum usage fee for 2 x 1 MHz (pro-rated) of €79,900 per annum. This fee was based on a benchmarking process establishing what it considered to be the appropriate spectrum usage fee for GSM-R spectrum, having regard to the objective of ensuring the efficient use of this spectrum. This benchmarking analysis is set out in Annex 3 of Information Notice 10/84.

3.3.1 Geographic scope of licences and minimum channel size

ComReg did not receive any comments on these aspects of its proposed licensing regime.

In light of this, ComReg's final position is that:

- GSM-R licences issued will be on a national basis; and
- GSM-R spectrum rights will be made available in channels of minimum bandwidth of 2 x 200 kHz.

3.3.2 GSM-R Licence Duration

Views of respondents

One interested party, IE, responded to this aspect of ComReg's licensing proposal.

IE stated that automatic termination of a GSM-R licence after the proposed 10 year licence period had lapsed could not be justified and cited the following factors in support of this view:

- GSM-R/ETCS will become a mandated and fundamental requirement for railway safety and railway operation in the future;
- the significant capital investment to implement GSM-R/ETCS that would have been incurred over the initial ten year period; and
- the restricted use of this spectrum for railway purposes in any event.

In light of this argument, IE stated that provision must be included for a right of renewal beyond the ten year horizon.

ComReg's position

ComReg welcomes IE's views on this issue.

In the present case, ComReg's proposal of a 10 year licence period was informed by the durations used for other non-commercial service provision (for example, the TETRA licensing regime). ComReg considers that this time-frame is the appropriate period having regard to the network and service concerned and is also considered by ComReg to allow for an appropriate period for investment amortisation.²⁶

ComReg would also clarify that, to avoid the difficulties presented by licences with different expiry dates, all GSM-R licences issued will co-terminate. That is, the 10 year duration will apply only to the first GSM-R licence issued and all subsequent GSM-R licences issued will have durations that would ensure co-termination with the first GSM-R licence issued.

In that regard, ComReg notes that IE would appear to be not so much concerned about the proposed 10 year duration but rather that no right of renewal is being proposed following the expiry of said duration.

ComReg appreciates the attractiveness to prospective licensees of having spectrum rights for as long as possible (including, by way of example, indefinite licences or provisions relating to rights of renewal etc), However, ComReg is required to consider such requests in the context of the regulatory framework in which it operates, and the statutory objectives it is required to pursue, noting in particular "*the effective management of radio frequencies for electronic communications services*"²⁷

²⁶ Regulation 9(6) of the Authorisation Regulations 2011

²⁷ Regulation 17(1)(a) of the Framework Regulations

Furthermore, attention is drawn to ComReg's Strategy Statement, Document No. 11/89²⁸, where it considers that the periodic re-release of spectrum:

- is wholly compatible with the Common Regulatory Framework;
- allows licence holders sufficient time to obtain a return on its investment in line with the expected life-cycle of the technology deployed;
- provides a sufficiently flexible approach to address future co-ordinated approaches that may be taken with regard to particular spectrum bands at an EU-wide level;
- ensures that there are no long-term barriers to a co-ordinated approach to the bands. This is particularly important where a co-ordinated approach is necessary to introduce new and innovative services to a band; and
- ensures that there can be a co-ordinated approach to bringing about the desired change without perverse incentives emerging for incumbent firms to hold out strategically with a view to gaining more rents.

Therefore, ComReg has decided that GSM-R licences will have a maximum duration of 10 years (with no right of renewal thereafter) and will be subject to annual review during this time period. That said, ComReg undertakes to provide as much certainty as possible to licensees and other interested parties over the future use of the band significantly in advance of expiry of GSM-R licence(s) issued.

3.3.3 GSM-R Licence Fees

Views of respondents

One respondent, IE, provided various comments and suggestions as to why GSM-R licence fees should be different to that proposed by ComReg in Information Notice 10/84. Amongst other points, this respondent noted that:

- the adoption of GSM-R is mandated by EU Directives and not optional for IE;
- the use of the spectrum is not revenue generating, rather is required to enhance the safety of rail operations and provide for safety-critical communications between train drivers and signalling control centres;
- GSM-R will replace the existing analogue systems, but will not provide any additional revenue streams;
- the use of GSM-R is limited to railway applications and cannot be used for public commercial communications services; and
- the spectrum requirements are primarily dictated by the geography of the rail network coupled with the high availability and safety requirements rather than population density or extent of railway.

In addition, this respondent submitted the following two alternative GSM-R licence fee proposals:

- base the fee on that currently paid for the VHF/UHF spectrum allocation (i.e. the business radio licensing regime); or

²⁸ "ComReg Strategy for Managing the Radio Spectrum: 2011 – 2013", published 22 November 2011, Document No. 11/89.

- base the fee on a spectrum usage fee of €27,120 for 2 x 1 MHz per annum, which was calculated by the respondent with reference to a population of 4.5 million and a track length of 1800 km.

ComReg's position

ComReg welcomes IE's views and alternative proposals on this issue.

ComReg agrees with a number of IE's observations regarding the nature of GSM-R services, for instance, that: GSM-R is mandated by an EU Directive, GSM-R is not revenue generating (or will not provide additional revenue streams), GSM-R is limited to railway applications and cannot be used for public commercial communications services

However ComReg considers that:

- appropriate licence fees are nevertheless required to ensure efficient use of spectrum assignments (such as by incentivising return of unused spectrum). ComReg would also note that licence fees are routinely imposed upon spectrum assignments utilised for non-commercial purposes for this reason (e.g TETRA);
- whilst GSM-R services are not dissimilar to services provided via business radio licences (e.g communication between different persons/units within an organisation), basing licence fees of the former upon the latter would not, in ComReg's opinion, ensure the efficient use of GSM-R spectrum because of objective differences²⁹ between GSM-R and business radio, and
- basing GSM-R spectrum fees upon track-length would not, in ComReg's opinion, be appropriate in the context of proposed national licences which for good reason do not purport to impose a constraint upon operational decisions such as rail-line construction. In addition, ComReg notes that such a fee structure could involve various administrative concerns and/or inefficiencies, including:
 - incentives for licensees to understate track lengths;
 - compliance costs for licensees in terms of reporting same; and/or
 - information asymmetry on the part of spectrum manager (and thus increased monitoring burden and costs) in respect of same.

In conclusion, and having taken into account the views of IE and its alternative proposals ComReg has decided to revise the fee structure it proposed in Information Notice 10/84. In particular it has decided to now include the UK fee structure in the benchmarking process as when fees are calculated on a per capita basis it does not significantly deviate from fees charged by other countries included. ComReg has not included Spain's fee in the revised calculations for the reasons as outlined in Information Notice 10/84.

In light of the above factors and having further reviewed the fee calculations, ComReg has determined that the GSM-R licence fees will be €50,400 per 2 x 1 MHz of spectrum per annum on a pro-rata basis. ComReg notes that this fee is significantly lower than that proposed in Information Notice 10/84 and should therefore address some of the issues raised by IE. A table outlining the revised fee calculations is provided in Annex 2.

²⁹ Such as the cellular structure of GSM-R, range of additional services, security of data, etc.

ComReg is satisfied that the fee as specified above is an appropriate fee structure by which to meet its statutory objectives and, in particular, that of ensuring the optimal use of spectrum³⁰.

Furthermore, as detailed in ComReg's Strategy Statement³¹, in order to ensure that annual spectrum fees continue to incentivise efficient spectrum use during the licence term, it is increasingly important for such fees to be updated on an annual basis to account for the general rate of inflation. ComReg will, in the regulations made pursuant to section 6 of the Wireless Telegraphy Acts 1926 to 2009 enabling GSM-R licensing, allow for the fee to be reduced or increased in line with the Consumer Price Index ("CPI"). Such indexation will keep the value of these usage fees constant in real terms and, as such, maintain proper incentives for licensees to continually assess whether they should continue to hold particular spectrum rights.

3.4 Services which may be provided and licence conditions

ComReg did not receive any comments on its proposals regarding (a) the services which could be provided using GSM-R spectrum rights of use or (b) proposed licence conditions.

In light of this, and having regard to the reasons set out in Information Notice 10/84, ComReg's final position on these matters is as follows:

- GSM-R spectrum may only be used for railway operational applications³². This infrastructure includes traffic management, tracking and navigation systems: technical installations for data processing and telecommunications intended for passenger services on these lines in order to guarantee the date and harmonious operation of the network and efficient traffic management.
- public mobile radio services may not be provided using the GSM-R band;
- Conditions to be observed by the holders of the licences to keep GSMR apparatus and subject to which such licences are deemed to be granted will include the following obligations³³:
 - that the licensee will comply with technical conditions as outlined in ETSI standards EN 301 50210³⁴ and EN 301 51511³⁵ to meet the obligations under relevant EU Directives and in order to protect services in adjacent spectrum bands;

³⁰ Pursuant to Regulation 19 of the Authorisation Regulations

³¹ "ComReg Strategy for Managing the Radio Spectrum: 2011 – 2013", published 22 November 2011, Document No. 11/89.

³² ECC Decision ECC/DEC/(02)05.

³³ Note that the phraseology may differ in the regulations and/or licence for GSM-R.

³⁴ EN 301 502: Harmonized EN for Global System for Mobile communications (GSM); Base Station and Repeater equipment covering essential requirements under article 3.2 of the R&TTE directive (GSM 13.21 version 8.1.2 Release 1999)

³⁵ EN 301 515 Global System for Mobile communication (GSM); Requirements for GSM operation on railways

- that the licensee will ensure that non-ionising radiation emissions from each radio installation operated under the licence for the purposes of the services identified above are within the limits specified by the guidelines published by the International Commission for Non-Ionising Radiation Protection (“ICNIRP”) and that it complies with any radiation emission standards adopted and published from time to time by ICNIRP, any standards of the European Committee for Electrotechnical Standards and any standards which may from time to time be specified by the European Union and that the wireless telegraphy apparatus operated under the licence is not installed or operated at a location in a manner such as to be the cause of the aggregate non-ionising radiation emissions exceeding the limits specified by the guidelines published by the ICNIRP and that it complies with any radiation emission standards adapted and published by ICNIRP or its successors from time to time, any radiation emission standards of the European Committee for the Electrotechnical Standards and any radiation emission standards specified by national and European Union law;
- the licensee may not, without the consent of the Commission (which shall not be unreasonably withheld) assign the licence or any of the powers, duties or functions conferred by it or otherwise transfer any of the rights or obligations conferred by it;
- the licensee must comply with obligations under relevant international agreements relating to the use of apparatus or the frequencies to which they are assigned (including the envisaged memorandum of understanding with the UK as discussed in Section 2.3 above); and
- if the address of the licensee or the person to whom the licence has been assigned changes, the licensee shall, as soon as possible, notify the Commission in writing of the change.

3.5 Licensing Process

In Information Notice 10/84, ComReg proposed that licences for GSM-R apparatus in the GSM band would be offered on a first-come, first-served basis.

Views of respondents

In response to this proposal, IE noted that:

- GSM-R is mandated for mainline rail under an EU Directive, and as such, the proposal to award licences on a first-come, first-served basis is not appropriate; and,
- it is the national heavy rail infrastructure provider in the state and as such must be accommodated in relation to allocation of appropriate spectrum to comply with the Directive.

ComReg’s position

ComReg welcomes IE’s views on this issue but does not agree, however, that a first-come, first served basis for the grant of GSM-R licences would be inappropriate in the circumstances. It does not agree that this system could potentially result in a rail

infrastructure provider not being in a position to meet its obligations under relevant European Law relating to GSM-R. In that regard, ComReg notes that:

- it will be requiring applicants for a GSM-R licence to satisfactorily demonstrate to ComReg the need for the spectrum requested;
- GSM-R licence fees are being set at a level to encourage efficient use (and reduce the incentives for spectrum hoarding);
- these factors, singularly and combined, should ensure that rail infrastructure providers are able to obtain and hold spectrum rights sufficient to their particular needs; and

Therefore ComReg's position is that licences for GSM-R apparatus in the GSM-R band will be offered on a first-come, first-served basis, assessed on the basis of need for the spectrum.

4 Next Steps

Having carefully considered the views of interested parties on its proposals as set out in Information Notice 10/84, and for the reasons set out in Information Notice 10/84 and in this document, ComReg intends to proceed and develop the GSM-R licensing regime in accordance with the specific details outlined in this document.

Table 3, below, identifies the next steps in the development of the GSM-R licensing scheme.

Next Steps	
1	Make regulations pursuant to section 6 of the Wireless Telegraphy Acts 1926 to 2009 to enable GSM-R licensing
2	Establish a Memorandum of Understanding on GSM-R with the UK
3	Publish GSM-R guidelines, application procedures and forms

Table 3: Next Steps for GSM-R Licensing Scheme

Appendix 1 – Legal Basis

- 1.1. The decisions contained in this document are made by the Commission for Communications Regulation:
 - 1.1.1. Pursuant to the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011³⁶, and in particular Regulations 17, 19 and 28 thereof;
 - 1.1.2. Pursuant to the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 2011³⁷ and in particular Regulations 9, 10, 11 and 19 thereof;
 - 1.1.3. Pursuant to section 35 of the Communications Regulation Acts 2002 to 2011;
 - 1.1.4. Having regard to ECC/DEC/(02)05 on the designation and availability of frequency bands for railway purposes in the 876-880 MHz and 921-925 MHz bands³⁸ and Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community³⁹ transposed in Ireland by the European Communities (Interoperability of the Rail System) Regulations 2011⁴⁰;
 - 1.1.5. Having regard to its powers under the Wireless Telegraphy Acts 1926 to 2009;
 - 1.1.6. Having, where appropriate, complied with policy decisions made by the Minister for Communications, Energy and Natural Resources⁴¹;
 - 1.1.7. Pursuant to the functions and objectives of the Commission for Communications Regulation as set out in Sections 10 and 12 respectively of the Communications Regulation Acts 2002 to 2011 and Regulation 16 of the Framework Regulations;
 - 1.1.8. Having had regard to the analysis and reasoning set out in ComReg Information Notice 10/84⁴² and this document; and
 - 1.1.9. Having considered the views of interested parties.

³⁶ S.I. No. 333 of 2011, hereafter the “Framework Regulations”

³⁷ S.I. No. 335 of 2011

³⁸ Approved 5 July 2002 and amended 26 June 2009

³⁹ As amended by Directive 2009/131/EC of 16 October 2009 and Directive 2011/18/EU of 1 March 2011

⁴⁰ SI 419 of 2011

⁴¹ Dated 21 February 2003 and 26 March 2004. Section 13(1) of the Communications Regulation Acts 2002 to 2011 requires ComReg to comply with any policy direction given to ComReg by the Minister for Communications, Energy and Natural Resources

⁴² “Proposed licensing regime for GSM for railway operations spectrum”, published 13 October 2010

Appendix 2 - Revised Benchmarking Process

The revised benchmarking process to establish the appropriate level of GSM-R annual licensing fees is set out in table 4, below.

Country	Population (Million)	Spectrum	Total Fees (€)	Fee/MHz/Per Capita (€)	Average Fee/MHz/Per Capita (€)	Fee for Ireland (for 2 x 1 MHz) ⁴³ (€)
Denmark	5	2 x 4 MHz	121,200	0.003	0.0056	€0,400
UK	60	2 x 4 MHz	3,532,968	0.007		
Finland	5	2 x 4 MHz	242,726	0.006		
Switzerland	7.5	2 x 4 MHz	20,992	0.0003		
Norway	4.6	2 x 4 MHz	444,300	0.012		

Table 4: Benchmarking Process

⁴³ Based upon a population of 4.5 Million, as per preliminary results of Census 2011, published in June 2011 by the Central Statistics Office.