Commission for
Communications Regulation

Information Notice

GSM Liberalisation Project: Publication of non-confidential correspondence provided by respondents (and ComReg written responses to same)

Document No:	**11/69**
Date:	**4 October 2011**

An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland
Telephone +353 1 804 9600 *Fax* +353 1 804 9680 *Email* info@comreg.ie *Web* www.comreg.ie

ANNEX A

A1. Publication of non-confidential correspondence provided by respondents (and ComReg written responses to same) since July 2011.

1. Telecommunications and Internet Federation (TIF): Letter to ComReg "Clarification of Process and Timetable Proposed 800MHz, 900MHz and 1800MHz Auction" (letter dated 11 July May 2011)

2. ComReg: Reply to TIF letter of 11 July 2011 (letter dated 25 July 2011)

3. Meteor: Email to ComReg "RE: Spectrum: next steps" (email dated 11 July 2011)

4. ComReg: Reply to Meteor email of 11 July 2011 (email dated 11 July 2011)

5. Meteor: Letter to ComReg – Meteor extension request to ComReg document 11/60 (letter dated 29 August 2011)

6. Meteor: Email to ComReg "ComReg 11/60: request for information" (email dated 6 September 2011)

7. ComReg: Reply to Meteor email of 6 September 2011 (email dated 16 September 2011)

8. Meteor: Reply to ComReg email of 16 September 2011 (email dated 19 September 2011)

9. ComReg: Reply to Meteor email of 19 September 2011 (email dated 30 September 2011)

10. H3GI: Letter to ComReg "COMREG - 800, 900 AND 1800 MHZ CONSULTATION PROCESS " (letter dated 22 July 2011), with Value Partners/Radio Regulatory Associates Consultants report attached "REPORT PREPARED FOR HUTCHISON 3G IRELAND LIMITED "H3GI""

11. ComReg: Reply to H3GI letter of 22 July 2011 (letter dated 27 July 2011)

12. H3GI: Reply to ComReg letter of 27 July 2011 (letter dated 3 August 2011)

13. H3GI: Letter to ComReg – H3GI extension request to ComReg document 11/60 ""COMREG - 800, 900 AND 1800 MHZ CONSULTATION PROCESS "" (letter dated 30 August 2011)

14. H3GI: Letter to ComReg" COMREG DOC. NO.S 11/60, 11/60A AND 11/58" (letter dated 23 September 2011)

15. Telefonica Ireland: Letter to ComReg "Proposed Assignment of Spectrum in the 800MHz, 900MHz,and 1800MHz Bands - Minimum Price" (letter dated 5 August 2011)

16. ComReg: Reply to Telefonica Ireland letter of 5 August 2011 (letter dated 9 August 2011)

17. Telefonica Ireland: Letter to ComReg – Telefonica extension request to ComReg document 11/60 "ComReg Document 11/60 Proposed Release of Spectrum in the 800MHz, 900MHz, and 1800MHz Bands" (letter dated 30 August 2011)

A2. Publication of Draft Decision from ComReg Document 11/60 (Chapter 8) in editable format.

ANNEX A

1. Telecommunications and Internet Federation (TIF): Letter to ComReg "Clarification of Process and Timetable Proposed 800MHz, 900MHz and 1800MHz Auction" (letter dated 11 July May 2011)

the voice of the telecommunications and internet federation

telecommunications and internet federation

Mr. Alex Chisholm
Chairman
Commission for Communications Regulation
Abbey Court
Irish Life Centre
Lower Abbey Street
Dublin 1

11th July 2011

Dear Alex

Clarification of Process and Timetable
Proposed 800MHz, 900MHz and 1800MHz Auction

I write on behalf of the TIF Mobile and Wireless Group to highlight a concern of the members regarding the process and timetable in the lead-up to the proposed spectrum auction.

Members understand that ComReg proposes to shortly publish a substantial response to consultation and further consultation in relation to the principles of the proposed spectrum auction (the "First Consultation"), together with a further consultation in respect of the detailed rules of the proposed spectrum auction later in the year (the "Second Consultation"). The First Consultation is a response to several consultations, addresses complex issues and is of enormous significance to the mobile sector, a point specifically acknowledged by ComReg in its previous consultations. The Second Consultation will require close scrutiny in order to ensure that the detailed rules properly implement the proposed principles of the proposed auction. Additionally, you will appreciate that as potential investing operators members have significant governance and approval processes to conduct with overseas shareholders and need to advise them of the upcoming timetable for the proposed auction.

As a result, members of the TIF Mobile and Wireless Group believe that ComReg should: (i) immediately publish a detailed timetable showing all of the steps up until the proposed spectrum auction including dates for proposed consultations, deadlines for responses to consultations, dates for decisions, dates for mock auctions, etc; and (ii) provide for sufficient time to respond to ComReg's consultations. In relation to the First Consultation, given the complexity and significance of the issues involved, the members believe a consultation period of eight weeks is necessary and appropriate.

We look forward to hearing from you.

Yours Sincerely

pp Emer Condon
Tommy McCabe

TELECOMMUNICATIONS AND INTERNET FEDERATION
A Business Sector of IBEC Ltd

SECTOR DIRECTOR TOMMY MCCABE

IRISH BUSINESS AND EMPLOYERS CONFEDERATION
IBEC LIMITED REGISTERED IN IRELAND REGISTRATION NO. 8706
REGISTERED DIRECTORS DONAL BYRNE ANTHONY O'BRIEN BREEGE O'DONOGHUE
REGISTERED ADDRESS Confederation House 84/86 Lower Baggot Street Dublin 2
PHONE + 353 (0)1 605 1500 FAX + 353 (0)1 638 1500 EMAIL info@ibec.ie WEB www.ibec.ie
PHONE + 353 (0)1 605 1528 FAX + 353 (0)1 638 1528 EMAIL tommy.mccabe@ibec.ie WEB www.tif.ie

EXECUTIVE MANAGEMENT TEAM
DANNY McCOY (DIRECTOR GENERAL)
BRENDAN BUTLER PAT DELANEY
BRENDAN McGINTY DON O'HIGGINS

2. ComReg: Reply to TIF letter of 11 July 2011 (letter dated 25 July 2011)

Commission for
Communications Regulation

from the chairperson

25 July 2011

Mr Tommy McCabe
Sector Director
Telecommunications and Internet Federation
IBEC
Confederation House
84/86 Lower Baggot Street
Dublin 2

Dear Mr McCabe

Re: Clarification of Process and Timetable / Proposed 800MHz, 900MHz and 1800 MHz Award

I refer to your letter of 11 July 2011 regarding ComReg's consultation on the future award of liberalised spectrum-use rights in various frequency bands, which may include some or all of the 800 MHz, 900 MHz and 1800 MHz bands.

On behalf of the members of the TIF Mobile and Wireless Group, you submit in your letter that ComReg should immediately publish a detailed timetable of future steps leading up to the holding of the auction that has been envisaged in ComReg's process documents in this matter. You further state that your members consider a consultation period of eight weeks to be necessary and appropriate.

I shall address both points in this letter, in turn.

First, much of the detail you seek relates to proposals which have not yet been finalised or decided upon. In that regard, ComReg has received an extensive amount of material from interested parties, and must give full and proper consideration to that material and to all the issues raised therein, as well as to all other relevant information before it, prior to ComReg reaching its final proposals-in-principle and, thereafter, its final approach to this matter. Having said that, your members might wish to note that the work regarding the former is nearing conclusion, and ComReg expects to publish its Response to Consultation and Draft Decision on its broader spectrum proposals (what you term the "First Consultation") in the coming weeks. As your members will be aware, ComReg must then allow interested parties sufficient time to comment on these documents, following which ComReg will require sufficient time to consider all responses received before arriving at any final decision.

An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland
Telephone +353 1 804 9642 *Fax* +353 1 804 9645 *Email* chairperson@comreg.ie *Web* www.comreg.ie

There would also be considerable preparatory work prior to holding any auction of the type currently envisaged. This would include publishing a draft Information Memorandum (what you term as the "Second Consultation") for comment. It might also include such tasks as conducting auction workshops or holding mock auctions. While ComReg would seek to conclude such work as quickly as possible, any changes to ComReg's proposals-in-principle as set out in its forthcoming paper and reflected in the Draft Decision to be included therewith (on foot of submissions and material received, for example) could impact on the draft Information Memorandum.

There are thus many variables which still affect both the nature and the timing of future events in this process, and it therefore is not possible or desirable to attempt to present a more detailed timetable at this time. However, on an ongoing basis, ComReg will endeavour to provide additional and appropriate details regarding events and timeframes as soon as this appears to it to be possible and desirable.

Secondly, ComReg notes that your members believe that it will be necessary and appropriate to allow a period of eight weeks for responses to be submitted to ComReg's forthcoming paper. We understand this to mean that your members are requesting an extension to the normal four-week period for submitting responses to a consultation, as provided for in ComReg's *Consultation Procedures* (Document 11/34). ComReg will consider your request in coming to a decision on the duration of the response period, having taken into account the criteria as detailed in our Consultation Procedures.

Finally, as is ComReg's usual practice, your letter of 11 July, 2011 is considered to be a submission in response to consultation and will be published as such in due course, subject to ComReg's *Guidelines on the Treatment of Confidential Information* (Document 05/24) and any comments you wish to make in that regard.

I hope and trust that this adequately deals with the matters raised.

Yours sincerely

Alex Chisholm
Chairperson

3. Meteor: Email to ComReg “RE: Spectrum: next steps” (email dated 11 July 2011)

From: McCoubrey, William
Sent: 11 July 2011 10:51
To: Samuel Ritchie
Subject: RE: Spectrum: next steps

Dear Samuel,

Further to recent mails. Are you in a position to provide any further clarity on likely publication date for the next consultation?

Regards,
William

4. ComReg: Reply to Meteor email of 11 July 2011 (email dated 11 July 2011)

From: Samuel Ritchie
Sent: 11 July 2011 16:04
To: 'McCoubrey, William'
Subject: RE: Spectrum: next steps

Dear Mr. McCoubrey

At this moment I cannot provide any information other than that set out in my email of 23 June.

As soon as this situation changes, I shall inform you and the other respondents of the intended time-plan for progressing and completing the consultation and the spectrum award process. I hope to be able provide this information in the coming weeks.

Yours sincerely

Dr. Samuel Ritchie
Manager Spectrum Operations

Commission for Communications Regulation

5. Meteor: Letter to ComReg – Meteor extension request to ComReg document 11/60 (letter dated 29 August 2011)

Meteor Mobile Communications Limited

1 Heuston South Quarter,
St. Johns Road, Dublin 8.

Tel: +353 1 430 7000 Fax: +353 1 430 7010
Email: info@meteor.ie

29th August 2011

Ms. Sinead Devey
Commission for Communications Regulation
Irish Life Centre
Abbey Street
Dublin 1

Dear Sinead,

Further to the publication of Response to Consultation and Draft Decision, ComReg 11/60, Release of the 800MHz, 900MHz and 1800MHz radio spectrum bands, I write to request an extension to the deadline of 30th September 2011 set for receipt of responses.

The Draft Decision concerns complex issues that are fundamental to the future operation of our business. ComReg has published almost 1,000 pages of material which we must review, analyse and carefully consider. We do not consider a five week consultation period to be sufficient or reasonable.

Meteor therefore requests at least an additional month consultation, extending the full response period to Friday 28th October 2011 at the earliest.

I trust that ComReg will look favourably on this request.

Yours sincerely

W. McCoubrey

William McCoubrey
Head of Regulatory Affairs

6. Meteor: Email to ComReg “ComReg 11/60: request for information” (email dated 6 September 2011)

From: McCoubrey, William
Sent: 06 September 2011 14:10
To: Samuel Ritchie
Subject: ComReg 11/60: request for information

Dear Samuel,

In order to inform our ongoing review of ComReg's Draft Decision (ComReg 11/60) I am writing to request that the following be published and made available to interested parties :

1. We request a clear statement as to whether the draft Information Memorandum will be published for consultation during or after the consultation period for ComReg 11/60.

2. Please provide details, including relevant formulae, setting out how the reserve prices (for both temporal periods) and the annual spectrum usage fees have been calculated from the minimum fees (currently proposed at €20m for sub 1GHz and €10m for 1800MHz).

3. Please provide a copy of the current Irish DTT channel plan including details of which MUXs, if any, will occupy channels 57, 58, and 59 (we note ComReg's confirmation in Annex 10, of ComReg 11/60, that channel 60 will not be used for DTT purposes in Ireland) and the geographic extent of such usage. We would also welcome visibility of the Northern Irish DTT channel plan if that is within the gift of ComReg.

4. Please confirm the dates when ComReg will publish its Spectrum Strategy 2011-13 and correspondence it has received from H3G pertaining to spectrum floors and caps referred to in the consultation document.

5. Please provide a soft copy, in an editable format, of the Draft Decision (chapter 8 of the consultation).

I look forward to hearing from you.

Regards,
William

William McCoubrey
Head of Regulatory Affairs
Meteor Mobile Communications Ltd

7. ComReg: Reply to Meteor email of 6 September 2011 (email dated 16 September 2011)

From: Samuel Ritchie
Sent: 16 September 2011 15:16
To: McCoubrey, William
Subject: RE: ComReg 11/60: request for information

Dear William

Thank you for your e-mail of 6 September.

In relation to item 1, you will be aware from paragraph 9.11 of ComReg Document 11/60 that ComReg is currently preparing a draft information memorandum and intends to publish same at the earliest opportunity. ComReg is, however, not in a position to specify a date of publication.

In relation to item 2, the reserve price and spectrum usage fees (SUF) figures presented in ComReg Document 11/60 refer to a 2.5 year licence commencing 1 February 2013 and a 15 year licence starting 2.5 years from February 2013. No adjustment has been made for inflation or other time value of money effects between the time of the proposed auction and 1 February 2013, and both the SUF and reserve prices are therefore expressed in February 2013 terms (where the appropriate discount rate is Eircom's WACC of 10.2%). The methodology used in these calculations accords with ComReg Document 10/03 which provided clarifications in relation to the reserve prices and fees proposed in ComReg Document 09/99.

In relation to item 3:

- ComReg has published the current Irish DTT channel plan including details of MUXs channel usage and it is available at: http://www.comreg.ie/radio_spectrum/technical_parameters.542.1071.html . The last update of this channel plan was 8 August 2011;
- it is not within ComReg's gift to supply an unqualified version of Northern Ireland's DTT channel plan. I would, however, draw your attention to Ofcom's web-site where such information may be available. For instance, http://stakeholders.ofcom.org.uk/broadcasting/guidance/tech-guidance/ . ComReg, of course, makes no warranty as to the accuracy of this information and accepts no liability for any loss or damage suffered as a result of reliance on this information.

In relation to the first part of item 4, you will be aware from section 2.2 of ComReg Document 11/28 that ComReg is currently finalising its strategy statement and will publish same at the earliest opportunity. ComReg is, however, not in a position to specify a date of publication.

In relation to the second part of item 4, ComReg intends to publish this shortly.

In relation to item 5, ComReg intends to publish this shortly.

As is ComReg's usual practice, correspondence, such as your email, are treated as submissions in response to consultation, and, subject to ComReg's guidelines on the treatment of confidential information and to any comments you wish to make in that regard, your e-mail will be published as a response. Accordingly, I would be grateful if you could let this office know by return if there is anything in your e-mail that Meteor considers to be properly confidential, and ought not to be published, in order that these materials (or, as the case may be, appropriate versions of them) might in due course be published as consultation responses. Please note that ComReg will publish this e-mail in due course.

Regards

Samuel

Dr. Samuel Ritchie
Manager Spectrum Operations

Commission for Communications Regulation

8. Meteor: Reply to ComReg email of 16 September 2011 (email dated 19 September 2011)

From: McCoubrey, William
Sent: 19 September 2011 14:30
To: Samuel Ritchie
Subject: RE: ComReg 11/60: request for information

Dear Samuel,

Thank you for your response to my email of 6th September and the clarifications offered. We would like to follow up on the following:

Item 1: We note that ComReg is not in a position to specify a date of publication. It would however be extremely helpful to our resource planning if ComReg could indicate whether it is likely that the draft information memorandum will be published before 14th October, the current response deadline for ComReg11/60. In our view there should not be any overlap between the consultation periods for ComReg 11/60 and the draft information memorandum.

Item 2: Thank you for the clarifications and confirmation that the calculations accord with the methodology set out in ComReg 10/03. We have attempted to re-create the calculations using that methodology. Our calculations are attached. We are unable to reconcile the calculations to the figures proposed for the reserve prices in ComReg 11/60. We therefore reiterate our request for details of the calculation to be published or alternatively please advise if we have erred in our attached calculations.

Item 3: Thank you for details of the current DTT channel plan as requested. We would also be grateful if you could inform us of the DTT channel plan that will be in place post analogue switch off, when the proposed 800MHz spectrum would be available for use.

Item 4a: We note that ComReg is not in a position to specify a date of publication for its strategy statement. ComReg's draft strategy statement, ComReg 11/28, consulted on a number of matters directly relevant to the proposed future licences in the 800MHz, 900MHz and 1800MHz bands, such as policy in respect of licence duration as ComReg notes in Annex 10 of the current consultation. We strongly believe that interested parties must have sight of ComReg's detailed reasoning in response to the evidence submitted to ComReg 11/28. Is ComReg at least able to indicate if publication can be expected prior to 14th October, the current response deadline for ComReg 11/60?

Item 4b & item 5: We look forward to the imminent publications.

I can confirm that nothing in this email or my email of 6th September is considered confidential.

Regards,
William

9. ComReg: Reply to Meteor email of 19 September 2011 (email dated 30 September 2011)

From: Samuel Ritchie
Sent: 30 September 2011 11:49
To: McCoubrey, William
Subject: RE: ComReg 11/60: request for information

Dear William

Thank you for your e-mail dated 19 September. I address the matters raised as follows.

Item 1: I would update my previous response (provided on 16 September) to advise that the draft information memorandum is not expected to be published before the consultation deadline for ComReg Document 11/60.

Item 2: From our examination of the spreadsheet attached to your email, we believe the differences can be explained as follows:

1. ComReg has used a discount rate of 10.2%;

2. To account for the two temporal lots (i.e. 2.5 years commencing from 1 Feb 2013 until 31 July 2015, and 15 years from 1 August 2015 until 31 July 2030), ComReg has defined the following time periods:
   - Yr 1, Yr 2, Yr 2.5 (i.e. a half year from 1 Feb 2015 to 31 July 2015), Yr 3 (i.e. a ½ year from 1 Aug 2015 to 31 Jan 2016), Yr 4, ….. ,Yr 16, Yr 17 (i.e. a full year from 1 Feb 2029 to 31 Jan 2030), Yr 17.5 (i.e. a half year from 1 Feb 2030 to 31 July 2030);

3. The following formulae have been used to calculate the cumulative discount factor for Yr 2.5, Yr 3 and Yr 17.5 of the licence respectively:
   - Yr 2.5 = Yr 2 / ((1+discount rate)^0.5);
   - Yr 3 = Yr 2.5 / ((1+discount rate)^0.5);
   - Yr 17.5 = Yr 17 / ((1+discount rate)^0.5),

   where the discount rate is 10.2%, as noted above;

4. In calculating the NPVs, ComReg has used the following formulae:
   - For the first 15 years: (Sum of Yr 1 and Yr 2) + (Sum of Yr 3 to Yr 15 inclusive);
   - Feb 2013 – July 2015: Sum of Yr 1 + Yr 2 + Yr 2.5; and
   - July 2015 – July 2030: Sum of Yr 3 to Yr 17.5 inclusive.

Item 3: Based on present information, we would expect the post-ASO DTT channel plan to be substantially the same as the current DTT channel plan.

Item 4a: I note your view that interested parties (to ComReg's spectrum liberalisation consultation) "must have sight of ComReg's detailed reasoning in response to the evidence submitted to ComReg 11/28".

Whilst some of the spectrum management issues raised in ComReg Documents 11/60 and 11/28 are clearly the same (for example, spectrum trading, spectrum sharing/pooling, licence duration and

indefinite licences), we would disagree with your stated view in the context of the spectrum liberalisation matter because:

- ComReg's position on such overlapping spectrum management issues in the context of the spectrum liberalisation matter, on which it is seeking views from interested parties, has already been set out in ComReg Documents 11/60 and 11/60a (and other relevant consultation papers and documents issued in this matter to-date);
- ComReg has not, in Document 11/60 and/or 11/60a deferred stating its current substantive position on these issues in the context of the spectrum liberalisation matter to its forthcoming response to consultation on ComReg Document 11/28 or otherwise withheld stating its substantive position in a way that would deny an interested party to the spectrum liberalisation matter an opportunity to comment on same; and
- As ComReg Document 11/28 addressed these overlapping issues in the form of a broader, spectrum management policy context, ComReg's forthcoming response to Document 11/28 is expected to consider material received from interested parties on same basis.

In addition, and in the context of your stated resource planning concerns, we would not expect the forthcoming response to ComReg Document 11/28 to be published before the consultation deadline for ComReg Document 11/60, but shortly thereafter.

As is ComReg's usual practice, correspondence, such as your email, are treated as submissions in response to consultation, and, subject to ComReg's guidelines on the treatment of confidential information and to any comments you wish to make in that regard, your e-mail will be published as a response. Accordingly, I would be grateful if you could let me know if there is anything in your e-mail that Meteor considers to be properly confidential and ought not to be published in order that these materials (or, as the case may be, appropriate versions of them) might in due course be published as consultation responses. Please note that ComReg will publish this e-mail in due course.

Regards

Samuel

10. H3GI: Letter to ComReg “COMREG - 800, 900 AND 1800 MHZ CONSULTATION PROCESS ” (letter dated 22 July 2011), with Non-Confidential version of Value Partners/Radio Regulatory Associates Consultants report attached “REPORT PREPARED FOR HUTCHISON 3G IRELAND LIMITED "H3GI"”

Hutchison 3G Ireland Limited
Registered office

3rd Floor
One Clarendon Row,
Dublin 2, Ireland

Registered Number: 316982
Place of Registration: Republic of Ireland

Three.ie

Mr Samuel Ritchie, Manager Spectrum Operations
Commission for Communications Regulation
Abbey Court
Irish Life Centre
Lower Abbey Street
Dublin 1
BY COURIER AND EMAIL: samuel.ritchie@comreg.ie

22 July 2011

Dear Samuel

COMREG – 800, 900 AND 1800 MHZ CONSULTATION PROCESS

I refer to your letter dated 8 July 2011.

In your letter, ComReg states: *"We further note your submission that, in respect of the future award of any or all of the 800 MHz, 900 MHz and 1800 MHz spectrum bands in the State, ComReg should apply a similar approach as that proposed by H3GUK".*

In fact, Hutchison 3G Ireland Limited ("H3GI") submitted that ComReg should apply a similar approach in respect of the award of 800, 900 and 1800 MHz to that of Ofcom (and not Hutchison 3G UK Limited ("H3GUK")) ie:

1. Given the importance of this spectrum to the economy, society and competition, including reducing or eliminating the Digital Divide, conducting an assessment of the likely future competition in markets for the provision of mobile electronic services after conclusion of the award of the 800 and 2600 MHz bands;

2. The promotion of competition at the national wholesale level to ensure that after the auction, subject to demand, there are at least four holders of a minimum spectrum portfolio that mean they are credibly capable of providing high quality data services in the future by means of spectrum floors and by setting safeguard spectrum caps;

3. Proportionate coverage obligations;

4. Spectrum trading; and

5. Licences of indefinite duration.

As stated in our letter of 5 July 2011:

"This spectrum is critical to economic recovery, society and future competition, including reducing or eliminating the Digital Divide. This is acknowledged by ComReg. At page 18 of ComReg Doc. No. 10/105, "Inclusion of the 1800 MHz Band into the Proposed joint award of 800 MHz and 900 MHz Spectrum", ComReg states: "… It is … likely to be the case that the outcome of the award process … will be the most significant determinant of the future structure of the mobile market in Ireland". As a result, ComReg should conduct an

Hutchison 3G Ireland Limited
Registered office

3rd Floor
One Clarendon Row,
Dublin 2, Ireland

Registered Number: 316982
Place of Registration: Republic of Ireland

Three.ie

assessment of the likely future competition in markets for the provision of mobile electronic services after conclusion of the award of the 800, 900 and 1800 MHz bands. The promotion of competition at the national wholesale level in Ireland needs to ensure that after the auction, subject to demand, there are at least four holders of a minimum spectrum portfolio that mean they are credibly capable of providing high quality data services in the future ("Credible Future MNO Competition"). As a result, ComReg should impose appropriate spectrum floors and caps. H3GI does not believe that the spectrum cap currently proposed by ComReg is sufficient to ensure Credible Future MNO Competition. This is supported by the response of H3GUK to Ofcom's consultation. In particular, H3GI believes that it is inappropriate for ComReg to proceed on the unproven assumption that the spectrum cap currently proposed by ComReg is sufficient to ensure Credible Future MNO Competition."

We now have pleasure in enclosing an independent and objective report prepared by Value Partners Management Consulting ("Value Partners") and Radio Regulatory Associates Limited ("RRA") in respect of ComReg's proposed spectrum cap structure. In this report and adding to the work done by H3GUK, Value Partners and RRA examine the applicability of Ofcom's analysis to Ireland and recommend alternative spectrum rules to: (i) ensure a sustainable and competitive four player market going forward; and (ii) avoid the risk of significant damage to the Irish economy, namely, the combination of a total spectrum cap of 2 x 40 MHz across all bands and a spectrum floor of 2 x 10 MHz of contiguous sub 1 GHz spectrum, alongside the 2 x 20 MHz sub 1 GHz spectrum cap already proposed by ComReg in its consultations (the "Alternative Spectrum Rules"). We agree with this analysis and believe that ComReg should implement the Alternative Spectrum Rules in the upcoming auction.

We look forward to an open-minded and thorough discussion of these issues in your forthcoming consultation.

Yours sincerely

MARK HUGHES
Head of Regulatory

Encl.

Copy: Mr Alex Chisholm, Chairperson, ComReg (alex.chisholm@comreg.ie)

VALUE PARTNERS
MANAGEMENT CONSULTING

Radio Regulatory Associates ltd

FINAL

REPORT PREPARED FOR HUTCHISON 3G IRELAND LIMITED "H3GI"

London, July 2011

Contents

1 Executive Summary

1.1 Overview

In order to maintain a credible and competitive four-player mobile telecoms market in Ireland and guarantee the significant welfare benefits pursuant to this level of competitive intensity, spectrum rules which ensure that all operators obtain a credible minimum spectrum portfolio (MSP)[1] should be implemented. Alternative spectrum rules to those proposed by ComReg, outlined in Section 6.3 of this document, include:

- **A total spectrum cap of 2 x 40MHz across all bands**; **and**
- **A floor of 2 x 10MHz of contiguous sub-1GHz spectrum.**

The combination of these two rules, implemented alongside the 2 x 20MHz sub-1GHz spectrum cap already proposed by ComReg in its consultations, would ensure that no operator would obtain a spectrum allocation which would inhibit it from competing fairly with the other operators in the market, thereby ensuring a sustainable four-player mobile telecoms market going forward.

1.2 The derivation of a credible Minimum Spectrum Portfolio (MSP) for MNOs in Ireland

In the planning of an auction of spectrum, regulators have the unique opportunity to ensure that a certain number of mobile operators obtain a credible MSP, allowing them to compete fairly on quality of service. Determining the composition of a credible MSP, on the basis of a technical analysis of the spectrum bands and an understanding of their respective technical and temporal advantages, is critical to ensure a competitive market.

Recent analysis performed by Ofcom in 2011[2] in defining an MSP for operators in the UK, was used here as a basis for determining a suitable MSP for operators in Ireland. In its consultations, Ofcom recognised that if a player was to emerge from the auction with a spectrum portfolio below the MSP, there was a risk that competitive intensity in the UK market would be reduced to the extent that a complete market exit of a player would be possible. Considering the technical characteristics of each of the bands and the predicted rise in the importance of high quality data services, Ofcom concluded that an operator with access to sub-1GHz spectrum would have an unmatchable advantage - regarding network performance - over a competitor without sub-1GHz spectrum. Moreover, it was also stated that an assignment of 2 x 5MHz of sub-1GHz spectrum would not be sufficient to match the network performance of an operator with 2 x 20MHz of sub-1GHz spectrum. As a result of its analysis, Ofcom proposed a set of auction rules, which were

[1] Minimum Spectrum Portfolio (MSP) is a term used by Ofcom in association with the concept of Spectrum Floors – more information is provided in this report under 'Importance of a four player market'.

[2] Consultation on assessment of future mobile competition and proposals for the award of 800MHz and 2.6GHz spectrum and related issues published 22 March 2011

designed to ensure a minimum allocation of both sub and above 1GHz spectrum to the UK operators.

Ofcom's MSP analysis was taken as a starting point for the determination of a credible MSP for operators in the Irish market. For a number of technical reasons, Value Partners (VP)/Radio Regulatory Associates (RRA) argue that Ofcom's preference for the MSPs specified in Option 1 in its 2011 consultation is inappropriate and the MSPs defined in Option 2 in this consultation are correct and this conclusion is also relevant to Ireland. There are a number of reasons for reaching this conclusion e.g. the use of an unrealistic network loading assumption; that capacity for users inside buildings will often be determined by the sub-1GHz carrier rather than the higher band carrier; a lack of forward-looking analysis of how connection speeds will evolve in the next five years; the exclusion of 'voice traffic' from its analysis and an over estimate of the available mitigation options, all contributed to the view that the higher of Ofcom's two UK-based MSP options should be taken as the basis for an MSP for Ireland.

It is the view of VP and RRA that a credible MSP for Ireland would comprise 2 x 10MHz of sub-1GHz and 2 x 10MHz of 1800MHz spectrum. The sub-1GHz allocation could be split between the 800MHz band and the 900MHz band, however a fragmented allocation of spectrum would incur higher overheads in terms of network management which would reduce the throughput performance of the network. Therefore, it is suggested that the 2 x10MHz of sub-1GHz spectrum should be contiguous.

Therefore, the MSP used in the analysis in the rest of this document herein was:

- ***2 x 10MHz of contiguous sub-1GHz; and***
- ***2 x 10GHz of 1800MHz spectrum.***

1.3 Understanding the most probable outcome of ComReg's current spectrum rules

Having established a credible MSP for a sustainable Irish operator, the most probable spectrum allocation outcome under ComReg's current spectrum rules was analysed.

ComReg has proposed a set of spectrum rules for the planned auction of 800MHz, 900MHz and 1800MHz spectrum in 2011. There are two key spectrum rules which will influence the allocation of spectrum between interested parties:

- ***A 2x20MHz sub-1GHz spectrum cap; and***
- ***A total spectrum cap across all bands of 2x50MHz.***

The result of these rules proposed by ComReg is that they do not ensure the MSP outlined above for all operators. A range of auction outcome scenarios are possible, many of which deliver a spectrum allocation for the fourth strongest bidding player below that of the MSP.

Moreover, if the most probable outcome from the auction is determined, it is likely that the player in the weakest bidding position will obtain a spectrum allocation far below the MSP. For example, in the scenario that three operators buy as much spectrum as possible under the current caps (a situation which is highly likely given the value of the spectrum to a large player), then the player with the weakest bidding capacity will be left with a total of only 2 x 5MHz of spectrum, located in the sub-1GHz bands.

[redacted] The most probable auction outcome was determined by careful analysis of the technical characteristics of the spectrum bands, the operators' commercial priorities and the likely bidding capacities of the operators and their holding groups. In essence, the 800MHz and 900MHz bands were deemed to be the most valuable for the purposes of rolling out 3G/LTE services - greater propagation characteristics and better indoor penetration qualities of sub-1GHz spectrum bands reduce network expenditure and provide superior capacity and downlink data speeds for users located inside buildings. However, capacity expansion is most likely to be achieved through the 1800MHz spectrum band. In terms of the commercial objectives of the operators, it was established that all operators would prioritise spectrum allocations which would maximise overall outdoor and indoor signal quality. Finally, in terms of the bidding capacities of the operators and their holding groups, it was deemed that Vodafone and Telefonica (owners of O2) would be the most likely to obtain the spectrum for which they see strategic value. [redacted] With regards to a new entrant it is impossible to determine its exact positioning but it is possible to assume that it would face the most challenging business case due to the absence of a pre-existing customer base and network and would have to raise extensive funding to support the launch of a new mobile operator.

As a result, it was established that the most probable outcome of the auction under ComReg's current proposed auction rules would be one player emerging from the auction with an allocation falling significantly short of the MSP.

1.4 Assessing the potential impact on Ireland of ComReg's current spectrum rules

An operator obtaining a spectrum allocation significantly below the defined MSP would place the sustainability of a competitive four-player market in jeopardy. Any operator with an allocation below the MSP would be at a significant competitive disadvantage at competing on a network quality basis with other operators who have allocations of spectrum well above the MSP. As such, that operator would be at risk of a total or a partial market exit.

In order to quantify the impact of either of these scenarios on the welfare of Ireland, estimation was made of the changes they would cause to the combined producer and consumer surplus of the mobile telecoms industry. An identical analysis performed by Ofcom in 2007[3], which modelled the

[3] Consultation titled "*Application of spectrum liberalisation and trading to the mobile sector*".

effect on welfare of the reduction in competitive intensity following the loss of a player from the mobile telecoms market, was replicated here for the Irish market. A Cournot economic approach was borrowed from the Ofcom analysis and used to predict the change in total producer and consumer surplus in Ireland from the change in prices pursuant to a loss of a player from the market (either fully or in part). The effect was measured from 2013 until 2030 (the effective lifespan of the spectrum licences in question). All model inputs were based either on sound Ofcom methodology, or on reputable, third-party sources. Sensitivity testing was performed on all inputs for which assumptions were made.

As a result of the analysis performed, it was estimated that the loss of welfare to the Irish economy from the total exit from the market of a mobile network operator, due to changes in the amount of producer and consumer surplus, would equal over €740m over the life of the licences. In the case of a partial market exit, the loss of welfare over the life of the spectrum licences would be at least €185m.

This impact to the welfare of the Irish economy is deemed to be both significant and, most importantly, avoidable. Spectrum rules which would ensure that all four operators obtain the MSP would ensure the competitive sustainability of all operators, thereby reducing the risk of damage to the Irish economy from the loss of a player from the market.

1.5 Alternative spectrum rules to ensure the sustainability of a competitive four-player market

Currently, ComReg has proposed the following spectrum rules for the forthcoming auction of the 800MHz, 900MHz and 1800MHz bands:

- ***A 2x20MHz sub-1GHz spectrum cap; and***
- ***A total spectrum cap across all bands of 2x50MHz.***

These rules do not ensure the credible MSP (defined herein) to all operators, and the most probable outcome will leave one operator with an allocation which falls significantly below the MSP. Consequently, the current spectrum rules are at risk of causing either the partial or complete exit of one of the players of the mobile telecoms market, risking up to €740m in Irish welfare over the life of the licences.

Alternative spectrum rules have been presented which would ensure that all operators receive at least the MSP defined herein. This would ensure the sustainability of each operator and reduce the likelihood of one player exiting the market.

There are two suggestions that are presented here, namely:

- ***Lower the total spectrum cap to 2 x 40MHz; and***
- ***Introduce a floor of 2 x 10MHz of contiguous sub-1GHz spectrum.***

These alternative spectrum rules, implemented alongside the 2 x 20MHz sub-1GHz spectrum cap already proposed by ComReg, would ensure that all operators in the market would obtain at least 2 x 10MHz of sub-1GHz spectrum and at least 2 x 10MHz of 1800MHz spectrum. As such, no operator would be left with an allocation lower than the MSP and all operators would be able to compete fairly with the other operators in the market, thereby reducing any risk of a loss of welfare to the Irish economy while ensuring that the auction process remains competitive. VP and RRA recommend that ComReg adopt the above alternative spectrum rules in order to ensure a sustainable and competitive four player market going forward and avoid the risk of damage to the Irish economy.

2 Introduction

2.1 Overview

The purpose of this document is to set out the analysis and recommendations of VP and RRA in relation to ComReg's proposed spectrum cap structure in the forthcoming auction of spectrum in the 800 MHz, 900MHz and 1800MHz bands.

2.2 Context of this document

ComReg is currently developing its plans for the liberalisation of 900MHz and 1800MHz spectrum and the release of 800MHz in Ireland. In the process of developing its plans, ComReg has produced six consultations, with the latest document, 11/29, "Response to Consultation and Decision: Interim Licences for the 900 MHz Band", being released in February 2011. Within these consultations, ComReg has outlined its proposals for a set of spectrum auction rules which will impact the likely allocation outcome of spectrum between the four Irish mobile operators: Vodafone, O2, Meteor and H3GI. The outcome achieved will have an impact on the competitive landscape of the Irish telecoms market and as such, is of significant importance to all operators involved in the auction.

H3GI has engaged VP and RRA to evaluate the rules proposed by ComReg and to suggest, if necessary, alternative spectrum rules that would contribute to a more effective and universally beneficial auction result. To this end, VP and RRA analysed the following areas:

i. ***Minimum spectrum portfolio (MSP):*** identification of the MSP required by an operator to sustain a competitive mobile service in Ireland;

ii. ***Risk of the current ComReg proposals not delivering the MSP:*** evaluation of the outcome of ComReg's current proposed spectrum rules and the risk of not ensuring that all operators reach the MSP;

iii. ***Welfare benefits of a competitive market:*** evaluation of the welfare impact of an operator having to exit completely or in part from the Irish market; and

iv. ***Suggestion of alternative spectrum rules:*** on the basis of the analysis performed in (i), (ii) and (iii), suggestion of alternative spectrum rules which would ensure all operators have access to the MSP.

The objective of this document is to present the analysis performed and its results. The analysis presented and the opinions expressed in the course of this document represent the independent and objective views of VP and RRA.

2.3 Document structure

This document is structured as follows:

- **Chapter 3** sets out a detailed analysis of the technical characteristics of the 800MHz, 900MHz and 1800MHz bands, and the minimum spectrum allocation (MSP) required by an operator to sustain a credible level of service in the Irish market;
- **Chapter 4** contains an assessment of the spectrum allocation which is most likely to result from ComReg's current auction rules, as outlined in its recent consultations;
- **Chapter 5** introduces the concept of the welfare benefit of a competitive market and estimates the benefit to Irish welfare of sustaining a competitive, four-player mobile telecoms market; and
- **Chapter 6** provides a suggested alternative to the spectrum rules currently proposed by ComReg to ensure all operators have access to the MSP. This suggestion is intended to increase the likelihood that Ireland will benefit from the welfare effects of having a sustainable and competitive four-player mobile telecoms market.

3 Minimum spectrum portfolios required to deliver high quality data services

3.1 Introduction

ComReg is currently planning a clear auction of the 800MHz, 900MHz and 1800MHz spectrum bands subject only to a sub-1GHz spectrum cap of 2 x 20MHz and an overall spectrum cap of 2 x 50MHz. It is VP/RRA's view that these rules will not be sufficient to ensure a credible competitive four player market for Ireland.

Aware of the risks that consolidation poses to competition in national mobile markets, many regulators (e.g. Belgium and the Netherlands) have implemented or propose to implement measures which promote or secure a competitive four player market. The most recent example of a regulatory intervention is that provided by Ofcom, the UK regulator. The Ofcom proposals are discussed in this Chapter, as there is a considerable amount of relevant analysis and some innovative proposals contained in its proposals that promote or secure a four player market. These proposals are also relevant to the Irish market as there is a similar concern that unless the current auction rules are amended to support a four player market there is a material risk that competition in the future Irish mobile market will be weakened.

This Chapter discusses the importance of a MSP, the relevance of the Ofcom MSP analysis in the UK and the determination of a suitable MSP in the context of the Irish market.

3.2 Spectrum requirements and characteristics

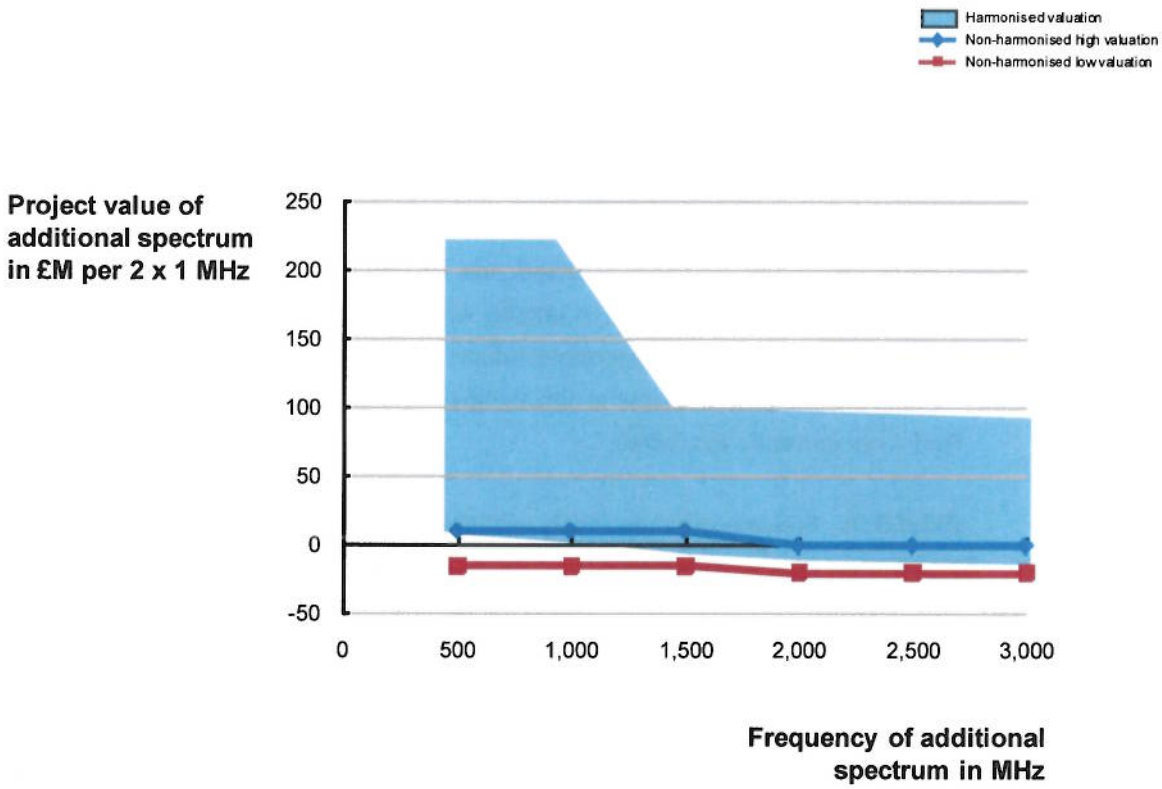
3.2.1 Introduction

Access to radio spectrum that is suitable for mobile data services is absolutely vital for mobile operators. Unfortunately suitable spectrum is in short supply. Frequency bands for mobile services need to be internationally harmonised to ensure that users can roam onto other networks when abroad and to create a large market for mobile products, national markets are too small.

Internationally harmonised spectrum bands provide the regulatory certainty necessary for vendors to invest significant resources into developing and marketing mobile devices for use in the harmonised mobile frequency bands. This arrangement has enabled the mobile market to benefit from the economies of scale that a global or near global market delivers. This is seen by the success of GSM and HSPA where mobile device prices have fallen considerably and the ecosystem for mobile products is huge with competition driving innovation and consumer choice.

The importance of harmonised spectrum is illustrated in the exhibit below. The implied valuations are not of interest as they are based on the underlying assumptions made by the authors of the report but the relative importance of harmonised spectrum compared to spectrum that has not been harmonised for mobile services is instructive and underlines the importance of harmonised spectrum to mobile operators.

Exhibit 1: Estimated values for incremental 2 x 5MHz for a cellular mobile operator.



Source: Plum analysis

There are only a handful of frequency bands that are internationally harmonised for mobile data services and no additional allocations to mobile services are expected for at least the next 5 – 10 years, consequently the supply of spectrum can be considered to be fixed for the purposes of the current competition assessment. A total of 2 x 65MHz is available below 1GHz and another 2 x 275MHz is potentially available in the frequency bands above 1GHz. Therefore, spectrum suitable for mobile data is scarce but spectrum below 1GHz is particularly scarce. The imbalance is further exacerbated by the fact that the sub-1GHz spectrum has advantages when compared to the frequency bands above 1GHz. In broad terms the advantages of sub-1GHz spectrum are widely accepted by the mobile industry and regulators.

This section discusses these advantages noting that some aspects were also addressed in the previous Value Partner/Radio Regulatory Associates Report.

In brief, the advantages of sub-1GHz spectrum over the higher frequency mobile bands stem from the superior radio propagation characteristics of 800/900MHz spectrum, i.e. a radio path can be maintained over longer distances in the 800/900MHz band than in the higher frequency bands (therefore requiring fewer cell sites for a given coverage area) and that the lower frequency bands provide improved building penetration characteristics compared to the higher frequency mobile bands. These advantages translate into better network coverage; faster download data speeds within buildings and network capacity advantages. Given the paucity of sub-1GHz spectrum,

regulators need to design auction rules that will promote or secure a distribution of spectrum that supports more effective competition in the future mobile market.

3.2.2 *Review of key frequency band characteristics*

In effect there are only five bands that are harmonised for mobile data in Europe – these are the 800MHz, 900MHz, 1800MHz, 2100MHz and 2600MHz bands. The first and last of these bands are only now becoming available as national regulators start to award spectrum in the 800MHz and 2600MHz bands. Noting that Ireland has no immediate plans to release the 2600MHz band, it means that LTE deployments in Ireland will necessarily have to be in the 800MHz band and the 1800MHz band for the foreseeable future. The frequency bands and the bandwidth available in each band are shown below in the exhibit below. (Green = Bands in ComReg's planned award; Red = not currently available).

Exhibit 2: Frequency bands widely available in Europe for Mobile data services

Frequency Band (MHz)	Bandwidth allocated (MHz)*	Current Status
800	30	Starting to become available in Europe but very early days and a number of EU states have requested derogations from the EU deadline until 2015 and possibly thereafter on one year rolling derogations. Co-existence with DTT is an issue and lack of voice traffic capability will be an issue for operators with little or no sub-1GHz spectrum (until VOLTE is available and customer base grows).
900	35	Previously used for GSM, now becoming available for HSPA services as the band is liberalised in line with EC amending Directive 2009/114/EC.LTE900 is seen as a longer term prospect.
1800	75	Previously used for GSM, the band has been liberalised by Commission Decision 2009/766/EC. Was seen as another HSPA band but increasing interest in use for LTE.
2100	60	The core 3G band licensed for UMTS around a decade ago. Expected to remain 3G for the foreseeable future.
2600	140	The LTE/WiMax band. Becoming available as administrations award licences for this band but still relatively early days. Expected to be used for LTE in most European markets. Ireland has MMDS use of this band.

*Paired spectrum, i.e. uplink and downlink are in separate sub-bands with a fixed duplex spacing. Only paired spectrum shown.

Source: RRA

a) The 900MHz and 1800MHz bands

The 900MHz and 1800MHz bands are widely used for GSM but are now being refarmed for HSPA/HSPA+ or LTE services. There is a consensus that the 900MHz band will be primarily used for 3G services such as HSPA/HSPA+ for the short-medium term. Refarming the 900MHz band to LTE is not expected to happen much before 2020. The 1800MHz band could also be used for HSPA/HSPA+ networks but there is growing support for the band to become an LTE band. At the recent LTE World Summit[4], Deutsche Telecom, France Telecom and Teliasonera jointly called for vendors to rapidly develop an 1800MHz LTE ecosystem as they plan to deploy LTE using their 1800MHz spectrum holdings. A number of LTE 1800 deployments have already been implemented, e.g. Poland's Mobyland and CenterNet launched a commercial LTE 1800 network in September 2010 and Deutsche Telecom planned to launch a commercial network in the Cologne area from the 1st July 2011. There are also a growing number of mobile operators that are conducting trials of LTE 1800, e.g. Bouygues Telecom, Telstra etc.

b) The 800MHz band

The 800MHz band is just starting to become available in a number of European countries but there are regulatory and compatibility issues that may slow the wider adoption of this band for mobile data. These concerns may restrain the growth of what is at present a small ecosystem of devices for LTE 800. In contrast, the 900MHz band has a significantly larger ecosystem of devices for HSPA/HSPA+. This means that the 800MHz band, in the short-medium term, may be less attractive to operators than 900MHz. These issues are discussed in section 3 of the previous VP/RRA report and the recent update from the GSMA[5] highlights one aspect of the reported concerns –

"*Following the European Parliament's vote on the European Commission's proposal establishing the first Radio Spectrum Policy Programme (RSPP) in May, the EU Telecoms Council adopted its progress report on the first RSPP as well as its Conclusions on the WRC-12 seeking the inclusion on the agenda for the next WRC (2015) of an item considering spectrum requirements and possible regulatory actions, to facilitate the growth of wireless broadband services (WRC-12 Agenda Item 8.2).*

With regard to the RSPP, several disagreements remain between the European Commission, European Parliament and the Council. ***One of the key concerns remains the availability of the 800 MHz band and the cross-border frequency coordination problems with third countries. This is particularly true for Lithuania, Latvia, Estonia, Malta, Cyprus, Bulgaria, and Poland who have been calling for a specific derogations until 2015, asking also the Commission to authorise exceptional derogations beyond 2015 on an annual basis until such obstacles are removed***. "(VP/RRA emphasis added)

[4] LTE World Summit, London, May 2011.
[5] GSMA Digital Dividend Newsletter, May 2011.

c) The 2100MHz band

It is widely accepted that the 2100MHz band will likely remain a 3G UMTS band for the foreseeable future, refarming to LTE or LTE Advanced is not likely to take place before 2020 at the earliest. This effectively means that the 800MHz band, 1800MHz band and the 2600MHz band are seen as the prime LTE bands in the short-to-medium term and, as noted earlier, Ireland has no firm plans for the release of the 2600MHz band so the focus is on the 800MHz and 1800MHz bands for LTE deployment in Ireland.

d) Conclusions

The industry consensus is that the 800MHz, 1800MHz and 2600MHz bands will largely be used for LTE in Europe. It is likely to be 2013 or 2014 before the LTE ecosystem for these bands has grown to a reasonable size.

The 2100MHz band will remain a HSPA band for the medium term and 900MHz band is largely expected to be developed as an HSPA band in the short-medium term and then probably migrating to LTE in the medium-long term. HSPA/HSPA+ devices currently available with a large and expanding ecosystem.

3.2.3 *Data-centric Mobile Networks and Growth in Data Traffic*

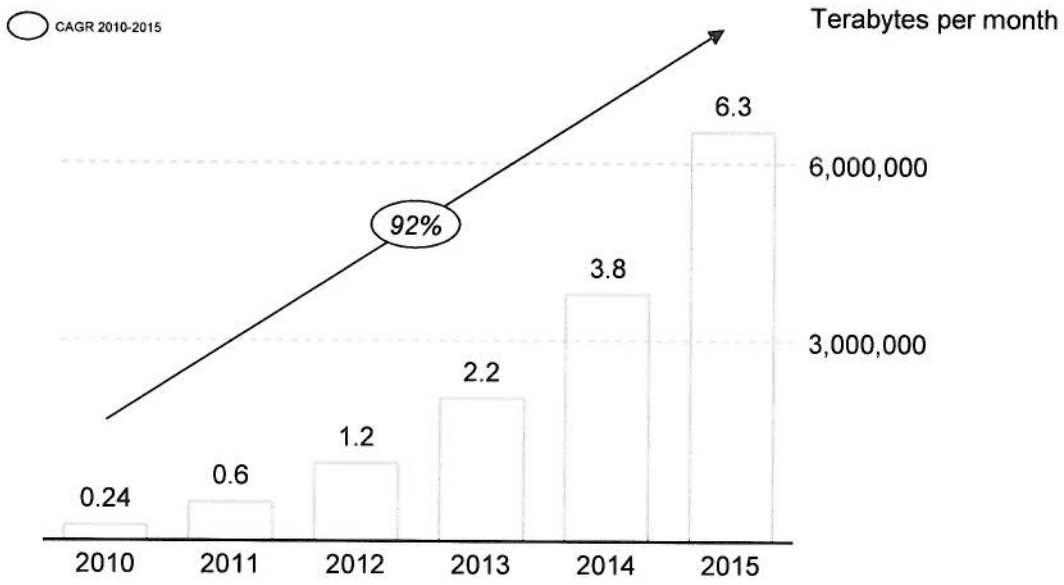
After a relatively slow start, the original concepts for 3G and systems beyond are coming to fruition. That is to say that data centric networks supporting Smartphones and similar devices are becoming common-place and driving data hungry applications such as downloading video clips, online gaming, etc. For example: in the UK, which is a similar market to Ireland, smartphones sales accounted for 35% of the market in 2010 but this market share is forecast to grow to 60% in 2011 and 80% in 2012[6] .At the global level, it is estimated that by 2015[7] approximately 50% of the mobile market will be attributed to smartphone use.

A forecast produced by Cisco into the growth in global network data is shown in the exhibit below. It can be seen that the overall mobile data traffic is expected to grow to 6.3 exabytes per month by 2015, a 26-fold increase over 2010. Mobile data traffic will grow at a CAGR of 92% from 2010 to 2015. Annual growth rates will taper over the forecast period from 131% in 2011 to 64% in 2015.

There are other forecasts available, they all reach the same conclusion – data traffic is set to grow at a phenomenal rate over the next five years or so. That growth is, and increasingly will, put pressure on mobile operators in how they will manage these increases in data volumes whilst maintaining network quality metrics and protecting a viable business model. Part of the answer is access to additional harmonised spectrum and sub-1GHz spectrum is a vital component of the spectrum mix given the need to serve customers inside buildings.

[6] Enders Analysis, Smartphone and mobile advertising, January 2011.
[7] Pyramid Research, Quarterly Smartphone Forecast, May 2011.

Exhibit 3: Cisco Forecasts 6.3 Exabytes per Month of Mobile Data Traffic by 2015



Source: Cisco VNI Mobile, 2011

To help in understanding this phenomenal growth in data volumes the following graphic illustrates the increases in typical data use by current day mobile devices compared to a standard handset used for 2G type services.

Exhibit 4: Comparision of the data usage for the latest devices compared to a standard mobile handset – high end devices can multiply traffic (Monthly basic mobile phone traffic)

Source: Cisco VNI Mobile, 2011

The next graphic has more detail on how the data usage will grow by device type. This is again from Cisco but other forecasts give similar results to the first approximation.

Exhibit 5: Summary of Per Device Usage Growth

Device type	2009	2010	2015
Non-smartphone	1.5x	3.3x	54x
E-reader	5x	11x	245x
Smartphone	35x	79x	1,272x
Portable gaming console	Not available	250x	879x
Tablet	28x	405x	2,311x
Laptop and netbook	1,145x	1,708x	6,522x
M2M module	3x	35x	166x

Source: Cisco VNI Mobile, 2011

These are examples of forecast growth in data traffic and the contribution made by different types of device. A network must have sufficient capacity to handle these data volumes and provide end-users with adequate data rate speeds. Consumers are sensitive to network quality metrics and data rate throughput is a key driver. The Exhibit below illustrates typical download times for different data rates and illustrates how operators that can deliver higher data rates to users will have a competitive advantage.

Exhibit 6: Theoretical time to download files

Application Activity	1Mbit/s	2Mbit/s	8Mbit/s	14Mbit/s
Download 250kB web page	2 seconds	1 second	0.3 sec	0.17 sec
Download 5MB Music Track	42 seconds	21 seconds	5 sec	3 sec
Download 25MB Video Clip	3 min 30 sec	1 min 45 sec	26 sec	15 sec
Download 750MB Low Quality Film	104 minutes	52 minutes	13 min 6 sec	7 min 8 sec
Download 4GB DVD Quality Film	9 h 36 min	4 h 48 min	1 h 11 min	38 min 57 sec

Source: Ofcom

3.2.4 *Benefits of sub-1GHz spectrum*

a) Radiowave Propagation - Coverage

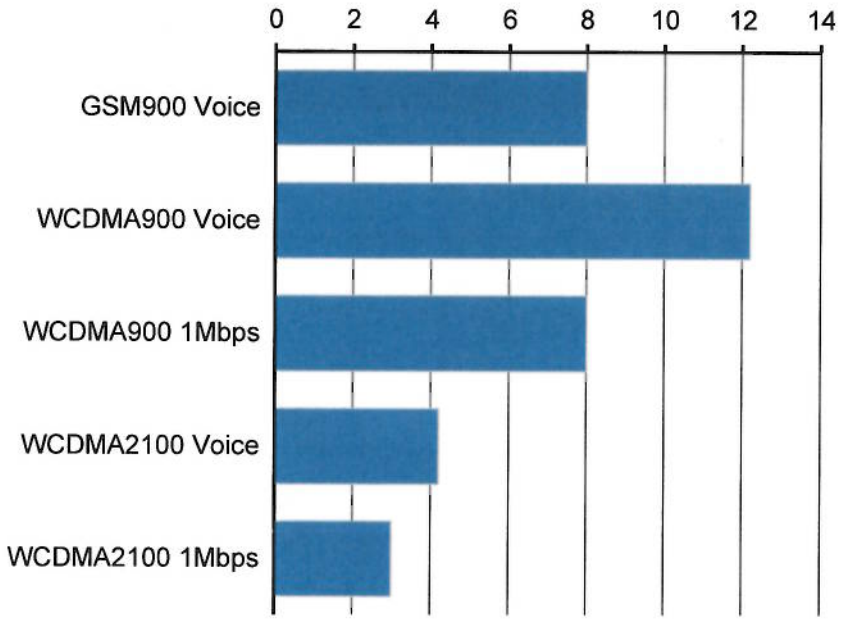
In terms of the technical characteristics of the five harmonised frequency bands, the 800MHz and 900MHz bands are very similar and, being considerably lower in frequency than the other three bands, provide excellent coverage (typically 8 – 9dB less attenuation of the signal path compared to 1800MHz) and better in-building penetration as these lower frequencies are widely accepted as having lower building attenuation characteristics than the higher frequency bands. This means that the 800/900MHz network is able to provide better connectivity and download data speeds within buildings than the alternative higher frequency bands.

The 1800MHz band and the 2100MHz band are broadly similar in terms of technical characteristics and can be considered, to a first approximation, as being equivalent (there is a slight advantage for 1800MHz regarding propagation characteristic but it is only a dB or so).

Radio wave propagation in the 2600MHz band is typically 11 – 12dB worse than 900MHz and about 3dB or so worse than 1800MHz.

In the exhibit below the cell coverage for 900MHz and 2100MHz is shown for data and voice traffic and illustrates the significant advantage that 900MHz has over the higher frequency bands.

Exhibit 7: Cell Coverage Comparison (km^2)



Source: RRA based on GSA data

b) Building Penetration Characteristics

It is also instructive to consider the assessment made by Ofcom in Annex 13 to the 2009 Consultation – Access to lower frequencies in more densely populated areas – site counts[8]. Building penetration losses are considered under Issue 4 – Propagation differences between frequency bands. Ofcom lists 30 references regarding studies into Building Penetration Losses at the end of Annex 13. Ofcom reviews the literature and briefly comments on some of these studies. Ofcom has compiled values based on the research material for all buildings types and produced a best-fit line for three categories: All Data; Urban and Suburban data. Ofcom concludes that for its 'Central Assumption' a mean difference of 3dB is appropriate for the building penetration loss between 900MHz and 2100MHz that is to say that 900MHz has a 3dB advantage compared to 2100MHz.

However, there is evidence from operators deploying 3G networks in the 900MHz band that the difference between 900MHz and 2100MHz for building penetration may be significantly greater than 3dB and information released from operators that have deployed 3G networks in the 900MHz band indicate that much more favourable results have been achieved e.g. the Elisa case study that is featured in the previous VP/RRA Report. The main findings are shown below in the exhibit below.

Exhibit 8: Elisa Case Study: Performance metrics: coverage, in-building penetration, data throughput, co-existence with GSM and required bandwidth

Item under analysis	Expected performance	Verified
Coverage area compared to UMTS2100MHz	3 times larger	3 - 5 times larger
Indoor coverage compared to UMTS2100MHz	10 – 20 dB better	Verified
Required spectrum	4.2 MHz enough for UMTS900	Verified
Co-existence with GSM900	No significant interference	Verified
HSPA throughput at UMTS2100MHz cell edge	Doubled	More than doubled

[8] Annex 13: Access to lower frequencies in more densely populated areas – Site counts; from the Ofcom Consultation: Application of spectrum liberalisation and trading to the Mobile sector – A further consultation, February 2009.

1 Mbps coverage area for UMTS900	Similar to voice coverage area for GSM900	Verified

Source: Elisa

The coverage and in-building performance of the sub-1GHz bands makes these bands particularly attractive to mobile operators and the recent German Auction of 800MHz and the auctions of 700MHz in the USA in 2008 illustrate the importance mobile operators attach to sub-1GHz spectrum.

3.2.5 Scoping the costs associated with different frequency bands

An operator without access to sub-1GHz spectrum is therefore at a competitive disadvantage. The network performance issues can be partially addressed by building additional cell sites as this may be able to broadly match the coverage advantage enjoyed by a sub-1GHz network operator (if financially viable) and can reduce the data rate speed advantage but not fully close the performance gap.

A useful analysis of some of these issues is provided in the Ofcom consultation document published in 2009.[9] The analysis considers how many more base stations a 2100MHz operator would require to match the network coverage and quality of a 900MHz operator. Noting that a 2100MHz network will have less range and inferior building penetration characteristics compared to a sub-1GHz network, the question becomes how many more cell sites would be required for the 2100MHz network and what is the magnitude of the additional costs, e.g. the extra capital and operational expenditure.

A wide range of forecasts have been produced by Ofcom in the previously mentioned consultation but a 'ball park' figure for a 2100MHz network is 2 – 3.5 times the number of cell sites needed for a 900MHz network. Ofcom concludes that this would result in potential additional costs to an operator without access to sub-1GHz of over £1bn based on a 20 year NPV at 3.5%. This estimate is obviously dependent on the assumptions made in the analysis and is UK specific but the results are indicative of the magnitude of the additional costs associated with building out a network using 2100MHz spectrum rather than 900MHz. Similar results would be expected in Ireland once the specifics of the Irish market had been taken into account and ComReg has conducted a similar exercise that also indicate the cost benefits of 900MHz spectrum.

It is also worth noting again that whilst the 2100MHz network performance can approach the quality of the 900MHz network through building more cell sites, it will fail to match the network performance of the sub-1GHz network and there are additional capex, opex and time to market penalties of pursuing the 2100MHz option.

[9] Ofcom Consultation: Application of spectrum liberalisation and trading to the Mobile sector – A further consultation, February 2009.

Therefore, the scale of the advantages that an operator with sub-1GHz spectrum has over its competitors if they have no sub-1GHz spectrum has been well documented and ComReg acknowledges some of the cost advantages of sub-1GHz spectrum in its Consultation Document No 08/57[10], e.g. see text in §5.2.

In addition to these substantial benefits there is, as noted, the equally important benefit of improved in-building network performance. Noting that about two-thirds[11] of users are in buildings when accessing mobile data (as opposed to being on the move) this is a significant factor. The Ofcom consultation addressed the relevant building penetration losses associated with these two frequency bands. The following sub-section discusses Ofcom's analysis and results and the relevance to Ireland.

a) Differences in data rates and in-building coverage

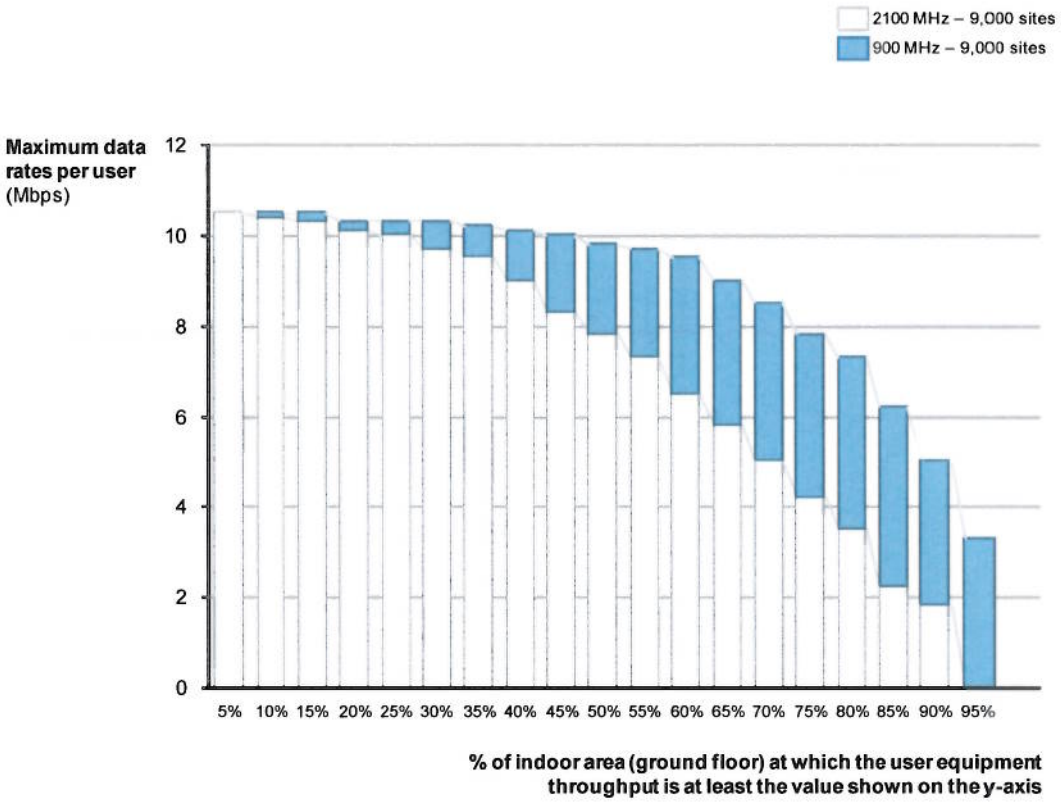
In Section 4 of Ofcom's 2009 consultation, consideration was given to differences in data rates and indoor coverage.

Ofcom considered estimates of the differences arising from the use of 900MHz spectrum as opposed to using 2100MHz spectrum for the provision of mobile data services using UMTS technology (i.e. the differences between a UMTS900 and UMTS 2100 network). The analysis assumed that the service area equated to 80% of the population and there was an equal number of base station sites (9,000 sites) for each network.

The comparison obtained showed the data rates that users may experience across a range of indoor locations. A graphical representation of the results was produced in Figure 4 of Ofcom's document and is reproduced below.

[10] ComReg's Consultation document entitled: Liberalising the use of the 900MHz and 1800MHz Spectrum bands; published 17th July 2008.
[11] CISCO ISBG Connected Life Market Watch: 2009.

Exhibit 9: Data rates achieved by networks with the same number of sites and different spectrum bands, as seen from a range of indoor locations



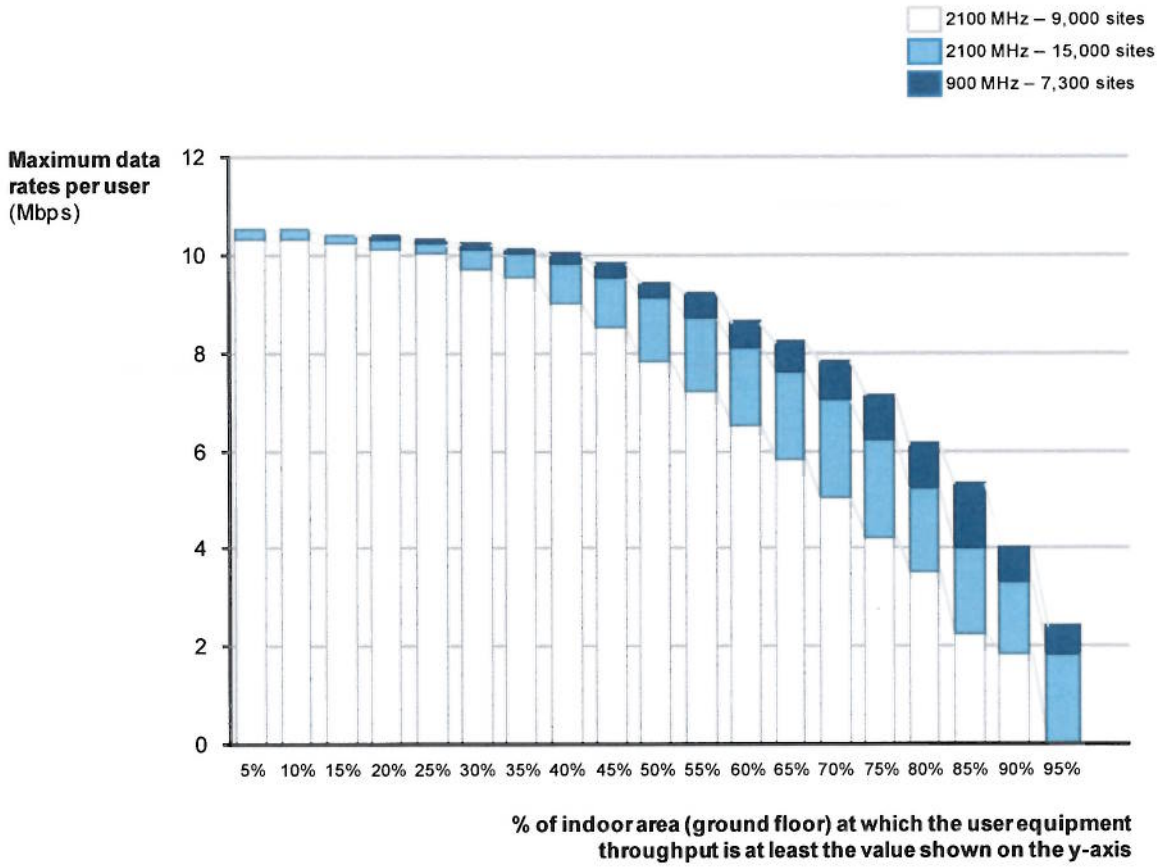
Source: Ofcom

It can be seen that in the best 5% of locations data rates in excess of 10 Mbit/s can be obtained from either network but the data rate throughput for the 2100MHz network really deteriorates at the higher percentages of indoor area until there is a marked difference in performance in the last 20% of locations where a UMTS2100 user would get, at best, less than half the speed available to UMTS900 customers and no service in the last 5% of locations.

The ability of an operator to deliver high data rate speeds to users located inside buildings is a competitive differentiator, operators that can provide these data services will be perceived as having better network quality and will impact on consumer preferences when chosing a network. This is an issue that is likely to become more relevant in the future as it is expected that high speed data applications will become ubiquitous as the mobile market develops. Therefore, access to sub-1GHz spectrum is an important issue now but will only grow in importance as the mobile market develops over the next few years.

Ofcom then considered the impact of a 2100MHz operator deploying an extra 6,000 sites making a total of 15,000 to reduce the difference in data rates provided to users. Figure 5 from the Ofcom document contains the relevant results and is reproduced below.

Exhibit 10: Data rates achieved by different networks, as seen from a range of indoor locations



Source: Ofcom

It can be seen that the differences in data rates are reduced compared to the previous case and in the last 20% of locations the difference between the data rates provided by the 900MHz network and the 2100MHz network (with 15000 sites) has now narrowed to being approximately 30 % or less than the data rate provided by the 900MHz network, e.g. for the 85% of indoor locations reference point, the 900MHz network will deliver 5.5Mbps compared to 4.0Mbps for the larger 2100MHz network. This is a difference of approximately 27%. However, this is still a significant difference. The 2100MHz operator will also incur significantly higher costs, Ofcom estimated £700 million in this scenario due to the higher number of sites deployed. The UMTS900 operator would also be able to reach the required number of sites more quickly as the network roll-out is considerably smaller and an existing 900MHz operator would be able to re-use existing sites.

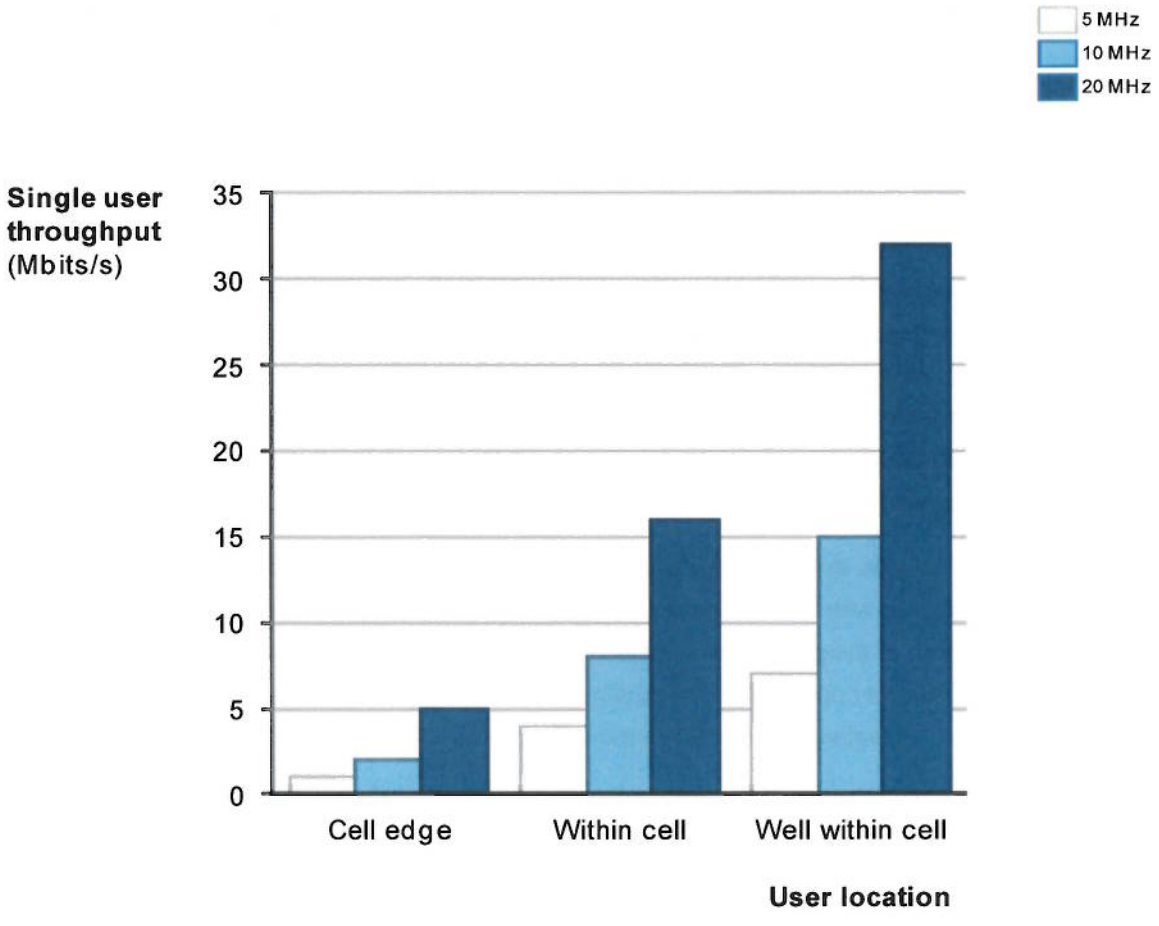
Ofcom's findings provide a spread of results dependent upon future demand but in general an operator without 900MHz spectrum, using 2100MHz is likely to need at least twice as many sites as a 900MHz operator to provide an inferior service.

These results are confirmed in Ofcom's recent consultation published in 2011 where a similar analysis was undertaken for networks in the 800MHz, 1800MHz and 2600MHz bands. The base case is considering sub-1GHz network performance compared to networks using 1800MHz and

2600MHz. However, Ofcom then considers whether the network advantages for sub-1GHz networks can be matched by a network with a portfolio of spectrum.

In the exhibit below, the relationship between single-user throughput and bandwidth for three sample locations within a cell are shown. As expected, the higher throughputs of data occur at locations 'well within cell' and the lower throughputs occur at the 'cell edge' and the throughput performance is broadly linear with bandwidth, i.e. a doubling of bandwidth provides a doubling of throughput.

Exhibit 11: Single User Performance vs Bandwidth



Source: H Holma & A Toskala, 'LTE for UMTS Evolution to LTE-Advanced'

3.3 A unique opportunity to ensure a competitive future for the Irish mobile market

The liberalisation of the 2G spectrum bands and the award of the 800MHz and 2600MHz bands across Europe is a 'once in a generation' opportunity for regulators to influence the competitive landscape through appropriate and proportionate measures. In this context, the current decisions being made by ComReg and other national regulators will shape their mobile markets for the next decade or more.

The mobile market is characterised by high barriers to entry. This is primarily due to the difficulty that a new entrant has in gaining access to suitable spectrum that has been harmonised internationally for mobile services. The limited availability of suitable spectrum imposes constraints on the number of licences that national regulators can award. Typically, four or five licences are possible given the amount of spectrum available and the minimum requirements for an operator to deploy a national network.

The other important constraint on new entry is the significant sunk costs involved in building a mobile network with national coverage. The scale of the fixed costs tends to limit the number of national operators that can profitably survive in a competitive market. The Federal Communications Commission's fourteenth annual report on the state of competition in mobile wireless in the USA[12] included a comparison of mobile market structures and performances in the United States, Western Europe and Asia-Pacific countries of comparable income levels. One of its findings was that the structure is converging to three or four national competitors per market in many countries.

There is increasing attention from regulators on how best to promote or secure a 'four player market' in their national mobile markets. This is due to the recognition that the mobile market in the developed world has matured and the very high subscriber growth rate figures seen over the past few decades have been replaced by relatively modest year-on-year growth. In these more challenging market conditions there have recently been a number of mergers and acquisitions in a number of national markets prompting concern by regulators that in an era of market consolidation, there is a risk that competitive intensity could be weakened if the number of players in a national market falls.

There is evidence in Europe that a four player market can deliver a competitive market but a market with three or fewer players is less competitive. This is also supported by economic theory. Both of these matters are discussed in detail in section 3 of H3GUK's non-confidential response to Ofcom's consultation in respect of 800 and 2600 MHz dated 7 June 2011. Consequently, a number of regulators have intervened to promote an outcome that promotes or secures a four player market.

3.4 The importance of a credible Minimum Spectrum Portfolio (MSP)

The concept of ensuring that all players have a reasonable amount of spectrum to promote competition is a common objective shared by many regulators but the concept has been refined in Ofcom's 2011 Consultation. In this document, Ofcom consults on an assessment of future mobile competition and proposals for the award of the 800MHz and 2600MHz spectrum and explicitly acknowledges that an operator with sub-1GHz spectrum would have an unmatchable advantage regarding network performance over a competitor without sub-1GHz spectrum. Additionally, Ofcom concludes that an assignment of 2 x 5MHz of sub-1GHz spectrum would not be sufficient to match the network performance of an operator with 2 x 20MHz of sub-1GHz spectrum. Ofcom then

[12] See paragraphs 364 to 367 of the FCC's Fourteenth Report, 20 May 2010.

assesses whether a portfolio of spectrum can broadly match the reference network and concludes that an operator with one of its MSPs can broadly match the reference network.

Ofcom's competition assessment recognised that if a player was to emerge from the planned spectrum award without the MSP there was a risk that competitive intensity in the UK market would be weakened and could lead to market exit. To prevent or minimise such an outcome, Ofcom proposes the use of spectrum floors as a way of guaranteeing that four players will emerge with credible MSPs. Two sets of spectrum floors are defined by Ofcom and it seeks comments from stakeholders on the more appropriate set. In essence, the award process ensures that four players will emerge from the process with a guaranteed allocation of spectrum that is one of the MSPs defined by Ofcom as providing broadly comparable network quality to a reference network that has access to 2 x 20MHz of sub-1GHz spectrum. The exhibit below has the two options that Ofcom has proposed.

Exhibit 12: Ofcom's proposed MSPs for the UK market

Option 1: *5 possible portfolios*

	Sub-1GHz	1800MHz	2.6GHz	Total
a)	2 x 5MHz	2 x 15MHz		2 x 20MHz
b)	2 x 5MHz		2 x 20MHz	2 x 25MHz
c)	2 x 10MHz	2 x 10MHz		2 x 20MHz
d)	2 x 10MHz		2 x 15MHz	2 x 25MHz
e)	2 x 15MHz			2 x 15MHz

Option 2: *5 possible portfolios*

	Sub-1GHz	1800MHz	2.6GHz	Total
a)	2 x 10MHz	2 x 15MHz		2 x 25MHz
b)	2 x 10MHz		2 x 20MHz	2 x 30MHz
c)	2 x 15MHz	2 x 10MHz		2 x 25MHz
d)	2 x 15MHz		2 x 15MHz	2 x 30MHz
e)	2 x 20MHz			2 x 20MHz

Source: Ofcom

The options highlighted in grey refer to possible MSPs that can be applied to Ireland, noting that the 2600MHz band is not currently available.

Ofcom has a preference for Option 1 but recognises that its technical assessment is rather inconclusive regarding whether the sub-1GHz component of the MSP should be 2 x 5MHz or 2 x 10MHz. VP/RRA believe that there are good reasons to conclude that the Option 2 proposal for MSPs is more appropriate and these points are discussed in Section 3.5.2. Whilst this discussion is focussed on the Ofcom consultation, the broad points made in Ofcom's analyses have wider application and are relevant to the Irish market particularly in relation to promoting a credible competitive four player market in Ireland.

Given the concept of an MSP, the following section demonstrates the need for specific spectrum components.

3.4.1 Importance of sub-1GHz spectrum to the future mobile market within the context of a credible MSP

a) The growing importance of high quality data services

The benefits of sub-1GHz spectrum (or a portfolio of spectrum that includes sub-1GHz spectrum) are even more important for providing high quality data services in the future. This is because of the rapid growth in the use of smartphones and 3G-enabled dongles that has fuelled the shift from a voice centric to a high speed data centric mobile market. Being able to provide good quality high speed data services to users located in buildings is critical because, as stated above, that is where the majority of users are accessing mobile data services.

The importance of sub-1GHz spectrum is acknowledged by ComReg and has been highlighted in H3GI's response and is further discussed in the previous VP/RRA report. Based on a future mobile market where data services are vital to an operator's ability to compete effectively, an operator without adequate sub-1GHz spectrum holdings will be at a competitive disadvantage. The importance of sub-1GHz spectrum is even more significant in the context of Ireland as, compared to the UK, there is a more significant rural component in network coverage considerations. In these rural areas, mobile data services are a major player as alternatives are limited or not commercially viable. These issues highlight the particular importance of sub-1GHz spectrum to the Irish market.

b) Overview of Ofcom's recent analysis of network performance for 800MHz, 1800MHz and 2600MHz networks

Ofcom has conducted a very useful technical analysis of the advantages of sub-1GHz spectrum in Annex 7 of its recent consultation document on the planned 800MHz and 2600MHz competition assessment and award proposals. Ofcom concludes that the superior signal quality and higher download speeds within buildings affords operators with sub-1GHz spectrum an unmatchable competitive advantage compared to those operators without sub-1GHz spectrum. Ofcom then analyses whether an operator with a portfolio of spectrum (including sub-1GHz spectrum) is able to match the performance of the 'benchmark' sub-1GHz network.

The analysis has focussed on considering the advantages of sub-1GHz spectrum in terms of indoor coverage. This reflects the view that indoor coverage rather than rural services are likely to

be more important. Ofcom, in Annex 6 of the consultation document undertakes a competition assessment and assesses what combinations of spectrum could broadly match the network performance that may be provided by an operator with 2 x 20MHz of sub-1GHz spectrum.

In Ofcom's assessment, three metrics of performance are considered:

- **Coverage** – the proportion of the population within an area to which it is technically possible to deliver a service indoors with a particular downlink speed (single user) as a function of the number of network sites (and in some cases the loading on the network);
- **Speed** – for a given number of sites and network loading, the proportion of the population within an area to which it is possible to deliver a particular downlink data-rate (single user); and
- **Capacity** – for a given downlink speed and network loading, the number of sites needed to provide enough capacity to simultaneously serve a certain proportion of the population within an area with the given downlink speed.

Ofcom assumes a loading of around 85% on the 2 x 20MHz sub-1GHz network and assumes that a competitor need not match the network quality of the 'benchmark' operator but needs to have enough capacity to be a competitive constraint. Speed and coverage need to be comparable but not necessarily equal.

c) Modelled comparison between an 800MHz, 1800MHz and 2600MHz network

The comparison of the modelled performance of a sub-1GHz network with an 1800MHz network and a 2600MHz network (all with 2 x 20MHz of spectrum) illustrates both the significant differences between the networks and the fact that a sub-1GHz network has unmatchable advantages over a network using one of the higher frequency bands such as 1800MHz. It is possible to reduce the advantage by building more cell sites or operating the network on a lower loading factor, but these mitigation techniques fail to eliminate the benefits of using sub-1GHz spectrum.

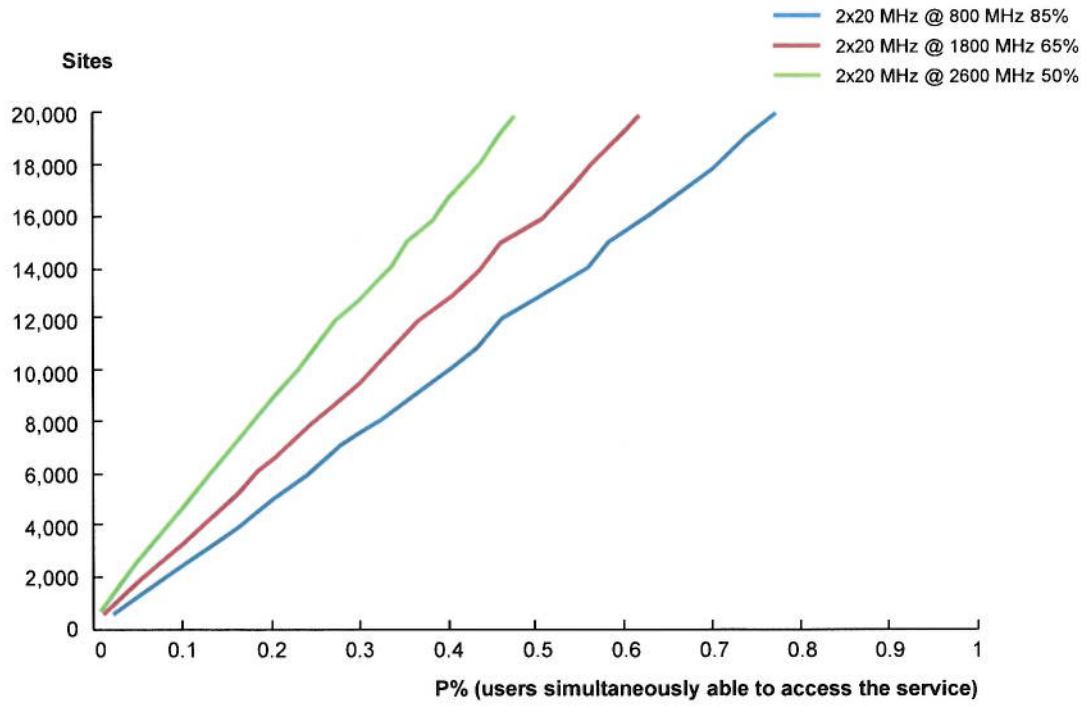
The current Ofcom assessment of 800MHz, 1800MHz and 2600MHz networks, whilst having a wider scope than the 2009 consultation, essentially confirms the results of the 2009 analyses. This is useful and serves to reinforce the conclusions of the earlier analyses.

However, having established that an operator with sub-1GHz spectrum would have a material competitive advantage over a competitor without sub-1GHz spectrum, Ofcom then analysed whether it was possible to broadly match the network performance of the sub-1GHz network (the reference or benchmark network that is assumed to have 2 x 20 MHz of sub-1GHz spectrum) with a network that has a portfolio of spectrum. Critically, the portfolios of spectrum all include sub-1GHz spectrum as this is seen as essential from the previous analyses of network performance.

Before moving on to the consideration of portfolios of spectrum it is helpful to briefly note some of the results obtained by Ofcom in relation to comparing the network performance of 800MHz, 1800MHz and 2600MHz networks.

In Exhibit 13: the difference between three networks, each with 2 x 20MHz of spectrum: a network using 800MHz spectrum; a network using 1800MHz spectrum and a network using 2600MHz.

Exhibit 13: Comparison of 800, 1800 and 2600MHz networks for a guaranteed data rate of 4Mbit/s

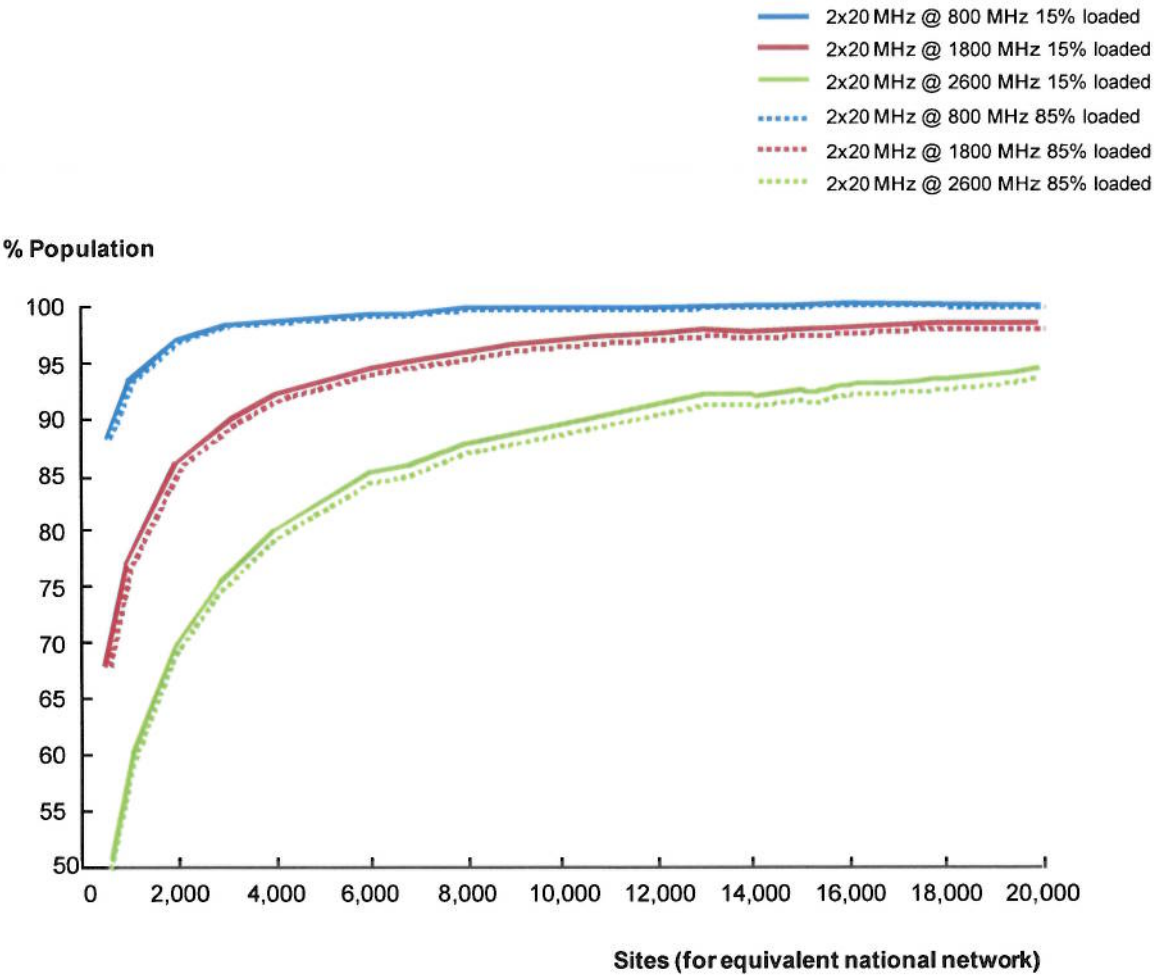


Source: Ofcom

The information in the exhibit above shows that the 800MHz network is able to deliver a higher guaranteed data rate (in this case 4Mbit/s) than the higher frequency networks and for a higher network loading figure. The higher frequency band networks are inferior even allowing for the loss of capacity due to operating at a lower network loading factor. The higher band operator can reduce the performance gap by building more cell sites but that has a cost impact and, importantly, there still remains a potentially material difference in performance between the networks.

The coverage and downlink speed performance versus the number of sites required was modelled by Ofcom for an 800MHz, 1800MHz and 2600MHz network. Examples of the results obtained are shown in the figures below.

Exhibit 14: Comparison of the coverage provided by 800, 1800 and 2600MHz networks for a downlink speed of at least 4.0 Mbit/s



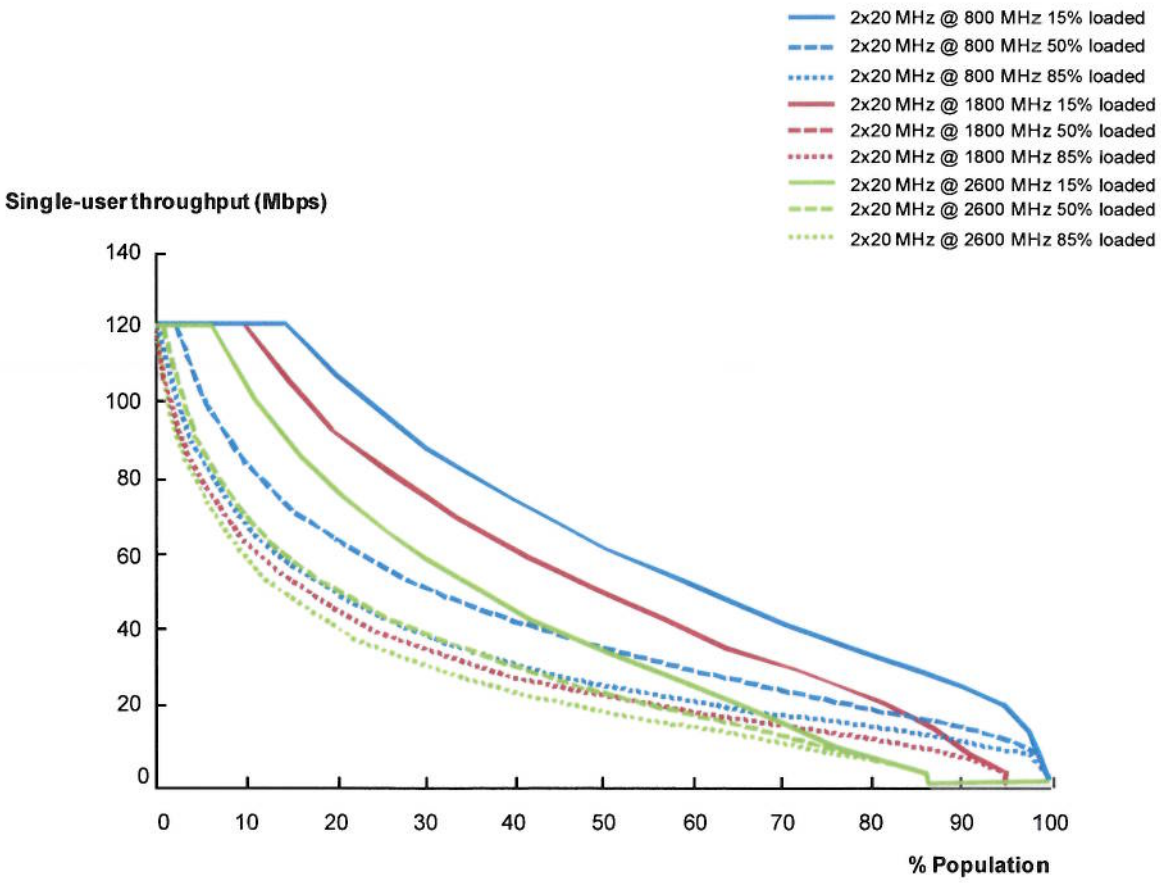
Source: Ofcom

The exhibit above shows that for a given level of coverage and a given downlink data speed, the predicted number of sites needed for an 1800MHz network is significantly higher than that required for an 800/900MHz network. For example, a network of 8000 sites delivers approximately 96% population coverage at 1800MHz but 100% coverage at 800/900MHz.

Ofcom's modelling also illustrates that a sub-1GHz network can deliver markedly higher data rates to a given proportion of the population than networks operating at 1800MHz or 2600MHz. This advantage is particularly prevalent when the networks are lightly loaded but is still evident as the networks become more heavily loaded.

Exhibit 15: taken from Ofcom's consultation document, illustrates the advantage that a network using 2 x 20MHz of 800MHz spectrum (900MHz would produce the same result) has in terms of single user throughput over an 1800MHz and a 2600MHz network.

Exhibit 15: Single-user throughput vs. population – 5000 sites



Source: Ofcom

Ofcom's analysis shows that an operator without sub-1GHz spectrum might be able to partially close the performance gap with the sub-1GHz network but would be forced to operate at considerably lower loading figures which translate into additional costs or poor network performance. However, even with a reduction in loading there remains a material difference between the performance of a sub-1GHz network and a network using 1800MHz spectrum.

The modelling produces similar results for the capacities of sub-1GHz networks and networks operating in the 1800MHz and 2.6GHz bands. The 800MHz network has a capacity advantage over the higher band networks.

d) Summary

Ofcom's analyses indicate that a comparison of networks using the 800MHz band (and the same conclusion would apply to 900MHz) and the higher frequency bands of 1800MHz and 2600MHz, each with 2 x 20MHz of spectrum, shows that the sub-1GHz network will have an advantage in terms of providing coverage, data speeds and capacity. The differences in network quality can be reduced to some extent if more cell sites are used for the higher frequency network and if the higher frequency network is operated at a lighter loading but the model predicts that the

performance of the higher frequency band networks will still fall short at the edge of coverage when compared to the sub-1GHz network. Therefore, Ofcom concludes that the benefits of sub-1GHz spectrum cannot be matched by using higher frequency bands.

Ofcom's analysis of the benefits of sub-1GHz spectrum confirms the widely held view that sub-1GHz spectrum can confer a material advantage to those operators that hold sub-1GHz spectrum. As such, the results are not particularly controversial, merely adding further weight to the established view.

3.4.2 Credible Negotiating Position

In addition to the network quality and competition aspects of an operator having a credible MSP, it is postulated that in the future mobile market where LTE is dominant, there will be incentives for operators to negotiate network sharing agreements (subject to the requirements of competition law) as a means of reducing costs and to facilitate more efficient use of the scarce radio spectrum resource as LTE is optimally utilised in a 20MHz channel. An operator that has a credible spectrum portfolio is more likely to be able to negotiate on equal terms as this operator could 'go it alone' if necessary. An operator without a credible portfolio of spectrum will enter negotiations in a weak position and will likely emerge with a less favourable deal that may lessen competitive intensity to the detriment of consumers. ComReg's current proposals risk one operator failing to secure a credible portfolio of spectrum and therefore may be in a weak position to negotiate a spectrum sharing agreement.

3.5 Defining a suitable MSP for Ireland

3.5.1 Ofcom analysis

Having demonstrated that a benchmark network of sub-1GHz spectrum has an unmatchable advantage over corresponding networks using 1800MHz or 2600MHz spectrum, Ofcom then assesses the performance of sub-1GHz networks; i.e. comparing a network with 2 x 5MHz of spectrum against a network with 2 x 10MHz and a network with 2 x 20MHz.

Ofcom concludes that an operator with only 2 x 5MHz of sub-1GHz spectrum would not be able to compete with operators that had access to 2 x 20MHz of sub-1GHz spectrum. The performance of the network with only 2 x 5MHz of spectrum is materially inferior to networks that have access to 2 x 20MHz of sub-1GHz spectrum and, significantly, the network quality difference is related to the downlink data speed – a factor that is seen as vitally important in the future mobile market. [redacted] This finding has particular resonance with ComReg's current proposals as this is a likely outcome of the auction and demonstrates that the fourth player would be disadvantaged.

Having concluded that an assignment of 2 x 5MHz of sub-1GHz spectrum is insufficient, Ofcom considers whether networks with both sub-1GHz spectrum and higher band spectrum can broadly match the performance of the benchmark network. In this assessment, Ofcom takes the view that as long as the networks are broadly comparable then the operator can act as a competitive

constraint. Ofcom has considered various options by modelling the impact of different portfolios of spectrum to determine whether it was possible to broadly replicate the network performance of a sub-1GHz network. In particular, Ofcom has modelled:

- ***Option 1:*** 2 x 5MHz @ sub-1GHz + 2 x 15MHz @ above 1GHz; and
- ***Option 2:*** 2 x 10MHz @ sub-1GHz + 2 x 15MHz @ above 1GHz.

Ofcom claims that its analysis illustrates that a network with 2 x 5MHz of 800MHz spectrum and 2 x 15MHz of 1800MHz spectrum is able to largely replicate the performance of the benchmark network but there is some deterioration in speed capabilities at the edge of coverage. Ofcom concludes that a network with 2 x 10MHz of 800MHz spectrum (or 2 x 10MHz of 900MHz spectrum) and 2 x 15MHz of 1800MHz spectrum pretty well replicates the performance of the benchmark network but for lower network loading figures. Ofcom's analysis is rather inconclusive on whether Option 1 or Option 2 provides the more appropriate set of MSPs and invites comments from stakeholders on this important issue.

The Ofcom modelling also illustrates the diffference in coverage between networks using different frequencies. In some circumstances it may be possible to match the coverage of an 800/900MHz network when using higher frequency bands through the deployment of more sites, but in other circumstances this may be impractical. Noting that a 800/900MHz network provides a speed (single-user throughput) advantage over higher frequency networks, this may be matched in the coverage area closer to the cell site by operating a higher frequency network at ligher loading (at the expense of potential capacity), but the model predicts that such matching will not be possible at the edge of coverage given equal numbers of sites.

However, there are multiple reasons as to why Option 1 (detailed above) is insufficient in the UK context and by extension the conclusion applies to the Irish market. These will be detailed in the following section.

3.5.2 *The need for a higher amount of sub-1GHz spectrum in Ireland*

a) Network loading

The Ofcom modelling is a theoretical construct that is far removed from practical networks. The most glaring departure from reality is the use of completely unrealistic network loading figures. Ofcom has made some extreme assumptions about network loading – with loading of 15% in some examples. This is unrealistic for a practical network as the capacity would be restricted to 15% and the range of the cell is also reduced. This would have a negative impact on network coverage and capacity to the extent that these network planning assumptions are unacceptable given that a typical practical network loading is in excess of 60%. This scenario does not represent how networks are operated and loaded in practice. The simulation should reflect the reality of actual networks. That would mean that it is necessary in the analysis to assume that the load on the reference cell and the wider network are the same, as this is the way a network would be planned and operated in practice.

If practical load figures are used in place of Ofcom's assumptions then the conclusions shift decisively. The Option 1 set of MSPs are no longer acceptable – they were marginal based on Ofcom's assumptions but given that those assumptions are flawed the minimum sub-1GHz spectrum portfolio is now 2 x 10MHz, i.e. the Option 2 set of MSPs are appropriate. The Option 1 set of MSPs will not provide a credible portfolio of spectrum as 2 x5MHz of sub-1GHz spectrum plus higher band spectrum fails to provide a broadly similar level of performance to the benchmark network. The inclusion of 2 x 10MHz of sub-1GHz spectrum in the MSPs provided in Option 2 can broadly match the performance of the benchmark network.

b) Sub-1GHz spectrum is the limiting constraint regarding capacity for in-building locations

In relation to providing services to users located inside buildings, it is important to note that if capacity is constrained on the sub-1GHz carrier, the high frequency carrier will not be able to deliver a comparable service to users in these locations and therefore high frequency spectrum as capacity relief is not an alternative in these areas. This means that the capacity of the low frequency carrier is often the determining factor. If the capacity on the sub-1GHz carrier is insufficient, the service quality offered by the multi-frequency network will be limited and fail to match the performance (particularly in-building) of Ofcom's benchmark network.

For users who are only served by the low frequency band (e.g. users inside a building) if there is insufficient capacity, they will experience congestion that will not be replicated in the benchmark sub-1GHz network. The network performance of a network with only 2 x 5MHz of sub-1GHz spectrum plus higher band spectrum is therefore materially poorer and will be viewed by users as such.

c) Ofcom's analysis needs to be future proofed

Whilst Ofcom acknowledges the importance of network quality delivered to users located within buildings, the consensus is that between 60 and 80% of data traffic could be originated within buildings and this figure may grow to approximately 90% within the next five years. Ofcom's own analysis shows that network performance deteriorates as the data rate speed is increased, current forecasts indicate that data speeds will grow from about 2Mbit/s today to over 6Mbit/s by 2015. As a consequence, Ofcom's analysis is not sufficiently future proof and should have considered developments in the market over the medium term.

A forecast of average download speeds in Western Europe and some individual European countries is shown in Exhibit 16: and is an extract from a table in a Cisco White Paper[13].

[13] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2010 – 2015, February 2011.

Exhibit 16: Projected Average Mobile Network Connection Speeds (in kbps) in Western Europe (as a whole) and some selected European countries

Territory	Projected Average Connection Speeds (in kbps)							CAGR
	2009	2010	2011	2012	2013	2014	2015	2010 - 2015
Western Europe	151	444	932	1,696	2,708	3,919	5,336	64%
France	111	530	1,307	2,516	3,992	5,662	7,510	70%
Germany	61	306	730	1,462	2,486	3,668	4,929	74%
Italy	158	465	1,073	2,092	3,475	5,142	7,037	72%
UK	306	820	1,466	2,338	3,398	4,668	6,155	50%

Source: RRA based on Cisco material, 2011.

The Cisco forecast is predicting a substantial increase in the average download speed delivered on mobile networks. If we take Italy, Germany, France and the UK as a reasonable proxy for Ireland, the average download speed in 2015 is approximately 6Mbit/s.

d) Voice traffic has not been factored

Ofcom has neglected to consider voice traffic for an operator that currently has no sub-1GHz spectrum. Voice traffic is still an important component of revenues and will likely still account for approximately 50% of revenues by 2015. If an operator acquires 800MHz spectrum in the planned award but has no other sub-1GHz spectrum then that operator will not be able to provide voice services on LTE800 in the early stages of deployment as voice on LTE (VOLTE) is still a feature not currently available on handsets and probably will not be available until 2014. It will also take many years before the market share of LTE800 devices with VOLTE is significant.

This gives other operators with access to 900MHz an advantage in terms of access to the market for voice calls inside buildings This is a very credible scenario for Ireland where the incumbents will likely retain their access to 900MHz spectrum and will therefore be able to provide voice traffic on either GSM or HSPA. A proportion of the 800MHz capacity will necessarily be assigned to voice traffic, reducing the capacity available for data services. For operators with access to 900MHz, as noted, they have options of using GSM900 and UMTS900 to serve these users. If these operators also had access to 800MHz spectrum they would be able to optimise their LTE800 network for data services rather than pay a capacity penalty by providing voice traffic in addition to data.

The added loading that voice traffic would place on the sub-1GHz network is another reason that Ofcom's technical analysis has overestimated the performance that can be achieved by 2 x5MHz of sub-1GHz spectrum plus 2 x 15MHz of 1800MHz spectrum. 2 x 5MHz of sub-1GHz spectrum is not sufficient spectrum for an operator to be able to carry both a competitive voice and data service

to users located inside buildings where sub-1GHz spectrum has material benefits over the higher frequency bands.

This creates a strong case for increasing the minimum amount of sub-1GHz spectrum in the MSPs as proposed in Ofcom's set of MSPs detailed under Option 2.

e) Mitigation options are flawed

Ofcom suggests that operators could relieve congestion in their sub-1GHz spectrum by using WiFi access or femtocells. WiFi has a role to play in off-loading network capacity but it has a number of disadvantages from an operator's perspective. The principal concern is that the WiFi spectrum is a spectrum commons model and that creates a conflict for mobile operators because mobile spectrum is licensed and therefore operators plan their networks to deliver a certain level of network coverage and capacity. The mobile network quality is monitored and any problems identified and remedied. In contrast, WiFi spectrum is unmanaged and shared amongst all users. The 2.4GHz band (used for WiFi, amongst other uses) is already experiencing congestion in some public places in a number of European countries and can offer a relative poor user experience. Network quality is a key competitive differentiator – an operator that has sufficient sub-1GHz spectrum to provide capacity and downlink data speeds within its managed spectrum is likely to provide a better user experience than an operator that is capacity/data rate speed constrained and reliant on WiFi with less control over network quality issues.

There is interest in using femtocells, it is widely accepted that they can be an effective solution for providing the private user with their own coverage and capacity. However, femtocells are unlikely to be an effective tool for capacity relief. To achieve significant capacity relief at the network level, a very high proportion of homes would need to have femtocells installed and without that critical mass of femtocells in the installed base, operators are unable to plan their networks on the basis that femtocells will make a significant contribution to capacity relief.

f) A uniform distribution of users between the low and the high frequency carrier is inappropriate

Ofcom has assumed a 'doughnut' model for the multi-frequency network – that is to say that an assumption has been made that users near the cell centre tend to be served by the higher frequency band carrier and those users nearer the cell edge are served by the sub-1GHz carrier. The distribution of users in this scenario will tend to be split between sub-1GHz users that will be disproportionately closer to the cell edge and the higher band users that will tend to be close to the cell centre, i.e. a non-uniform distribution of users across the cell. The limited uplink power from the mobiles will limit the range over which a high speed data service can be maintained. This has the effect of reducing the capacity of the sub-1GHz cell to an appreciable extent as these users will be disproportionately near the edge of the cell and the only option is to reduce the loading to maintain

the throughput speed – hence capacity is adversely affected. Ofcom acknowledges that its analysis, by using a uniform distribution of users, is overly simplistic in this respect.[14]

g) LTE -Advanced and carrier aggregation

[redacted] Under ComReg's current proposals it is likely that [redacted] That in itself would be a significant and damaging assignment of critical spectrum assets that will determine the capacity and downlink data rate speeds that an operator can viably provide. [redacted] one of the most important features of LTE-Advanced is carrier aggregation. This feature, standardised by 3GPP,[15] enables spectrum assets to be combined in the network and mobile device to create an effective 'virtual carrier' whose bandwidth equals the combined bandwidths of the different assets. [redacted] In this credible scenario [redacted] a new market entrant, with only 2 x 5MHz of sub-1GHz spectrum, would not be able to match the excellent in-building performance of the incumbent operators' networks and would be placed at a competitive disadvantage.

As noted earlier in this section, Ofcom's analysis is overly theoretical and a number of key assumptions are questionable leading to the conclusion that even to deliver 2Mbit/s at a national level, 2 x 10MHz of sub-1GHz spectrum and at least 2 x 10MHz of 1800MHz spectrum are required to broadly match a network that had 2 x 20MHz of sub-1GHz spectrum. The performance gap grows as the data rate speed increases so the initial finding regarding 2Mbit/s becomes more evident at higher data speeds.

As noted, ComReg's current proposals will not ensure that four players will emerge from the award process with credible spectrum portfolios as one operator will likely only secure 2 x 5MHz of sub-1GHz spectrum and no 1800MHz spectrum. This allocation would not constitute a credible MSP and there is a material risk that the operator with this inferior allocation would face a very uncertain future and possible market exit.

[14] Footnote 9 of Annex 7, Ofcom Consultation document 2011.
[15] This is a Release 10 feature, with key enablers standardised in 2010 and specifications for initial band combinations to be completed during 2011. Further band combinations can be added according to demand within 3GPP without waiting for next full release of specifications.

3.5.3 *The Irish MSP should therefore include 2 x 10MHz of contiguous sub-1GHz spectrum*

In Ofcom's own analysis, a network that has only 2 x 5MHz of sub-1GHz spectrum and 2 x 15MHz of 1800MHz spectrum is not able to match the network performance of a competitor with 2 x 20MHz of sub-1GHz spectrum. There are coverage and downlink data rate issues at the edge of coverage particularly regarding in-building locations e.g. as the downlink data rate speed increases the performance of the 2 x 5MHz sub-1GHz network deteriorates relative to the benchmark network; e.g. there is a material difference between the benchmark sub-1GHz network and the 2 x 5MHz @ sub-1GHz + 2 x 15 MHz @ 1800MHz network for downlink data speeds above 4 Mbit/s. Ofcom's analysis needs to reflect the anticipated growth in data rates that will be ushered in by the use of SmartPhones and dongles.

However, as noted earlier in Section 3.5.2, Ofcom's modelling assumptions are questionable. Once these modelling assumptions are corrected and taking account of the technical analysis undertaken by Hutchison 3G UK Limited ("H3GUK") in its response to Ofcom's consultation, the case for 2 x 10MHz of sub-1GHz spectrum as part of the MSP becomes compelling.

Ofcom's proposal should be based on Option 2 i.e. 2 x 10MHz sub-1GHz plus higher band spectrum. Ofcom's analysis of the network that has 2 x 10MHz of sub-1GHz + 2 x 15MHz of 1800MHz is that such a network is broadly able to match the network quality of the benchmark network. As noted, when the modelling assumptions are modified to reflect future market developments and practical network planning assumptions the results of the analysis are tilted even further towards the Option 2 MSPs rather than the Option 1 MSPs.

Therefore it is the view of VP and RRA that a credible MSP would be 2 x 10MHz of sub-1GHz plus 2 x 10MHz of 1800MHz as a minimum and a case can be made for 2 x 15MHz of 1800MHz. In theory the sub-1GHz allocation could be split between the 800MHz band and the 900MHz band. However, a fragmented allocation of spectrum would incur higher overheads in terms of network management which reduces the throughput performance of the network.

It is acknowledged that carrier aggregation will be available in the future but currently there are clear benefits from having contiguous spectrum in one frequency band.

3.6 Compatibility issues may need to be reflected in the auction rules

ComReg has acknowledged the coverage benefits from sub-1GHz spectrum but has not addressed the in-building performance aspects in any depth and has been silent on the compatibity issues in the 800MHz band. The interference into DTT from mobile data services is expected to be material and therefore require amendment to the sub-1GHz auction rules. Currently, the weakest operator could be left with the first block of the 800MHz band – the block that has the highest risk of interference into DTT that will trigger additional costs and delay roll-out plans as remedies are sought to deal with specific cases of interference. It is noted that the planned French award has

been challenged by an operator on the grounds that the costs and liabilities of interference into DTT have not been defined in the French auction.

3.7 Conclusions

The Ofcom analysis indicates that the player without a credible portfolio of spectrum will be unable to match the network quality of its competitors in terms of coverage, data speed and capacity. It is likely that these factors will result in a lessening in competitive intensity as the fourth player is unable to compete on an equal basis and therefore likely to lose market share and may exit the market in due course.

The analyses conducted by Ofcom provide a body of research material that is comprehensive and has the assumptions and results clearly described. As such, the material is a solid basis for comparing mobile networks with differing frequency assignments and the related competition issues. In the absence of a comparable study, the Ofcom research results are the best available material currently in the public domain. As noted in Section 3.5.2 above, there are some assumptions that we feel are inappropriate and taken together it is our view that the MSPs should be those outlined in Option 2 of Ofcom's consultation document. In conclusion, we believe that the Ofcom material has much to offer and can, to a first approximation, be applied to other markets such as Ireland.

It is deemed prudent that the material in the Ofcom assessment of future competition and the need for intervention to promote a four player market should be taken into account in ComReg's consultation. There are differences between the UK and Irish markets but Ofcom's analysis is a very useful assessment of the comparative performance of mobile networks – particularly addressing performance of sub-1GHz networks with higher frequency band networks and networks with a portfolio of spectrum that includes sub-1GHz spectrum.

It is VP/RRA's view that on the basis of the material presented by Ofcom, once modified to reflect more appropriate assumptions, that the MSPs need to include 2 x 10MHz of contiguous sub-1GHz spectrum and 2 x 10MHz of 1800MHz spectrum.

As noted, there are potential compatibility issues between mobile use of the 800MHz band and adjacent band use of DTT. These issues are believed to particularly affect the frequency blocks adjacent to the DTT band. Currently, the weakest operator could be left with the first block of the 800MHz band – the block that has the highest risk of interference into DTT that will trigger additional costs and delay roll-out plans as remedies are sought to deal with specific cases of interference. ComReg should address these issues when defining the auction rules.

4 Risk of the current ComReg proposals not delivering the MSP

[redacted]

This Chapter outlines the approach taken to determining the likely spectrum allocation outcome of the proposed spectrum rules. It then estimates the impact of these rules on the auction outcome and the risk of them not ensuring that all operators have access to the MSP.

In order to determine the spectrum requirements and likely operator value of each spectrum band, a framework was developed to assess the value of the spectrum bands at a high level.

In this Chapter, the most likely outcome of ComReg's proposed spectrum rules and their likely impact on the Irish mobile market is described. The methodology undertaken and the results obtained in determining this description is outlined. On the basis of the relative attractiveness of the individual spectrum bands and the bidding capacities of the auction's participants, a detailed outline has been made of the likely order of spectrum allocation. From this, the total spectrum likely to be secured by each operator was determined.

4.1 The current spectrum rules proposed by ComReg include two caps

ComReg has proposed a set of spectrum rules for the planned auction of 800, 900 and 1800MHz spectrum in 2011. There are two key spectrum rules which will influence the allocation of spectrum between interested parties:

- ***2x20MHz sub-1GHz spectrum cap:*** ComReg set out in its consultation document 10/71, *'800MHz, 900MHz & 1800MHz spectrum release'*, that *"on balance it would appear that a spectrum cap of 2x20MHz for sub-1GHz spectrum is the most appropriate cap"*[16].
- **Total spectrum cap across all bands of 2x50MHz:** ComReg set out in its consultation document 10/105, *'Inclusion of the 1800 MHz Band into the Proposed joint award of 800 MHz and 900 MHz'*, that *"a limit of 2 x 50 MHz on the total amount of spectrum any one bidder could be awarded in the joint auction appears to strike a balance between providing sufficient 1800 MHz spectrum to allow an operator to provide a differentiated high bandwidth service, while also ensuring that 2 x 25 MHz of 1800 MHz spectrum is available to other bidders if one bidder was to be awarded the maximum permitted under this cap"*.

4.2 ComReg's current spectrum rules do not ensure the MSP for all players

The current spectrum rules proposed by ComReg (i.e. a 2 x 20MHz sub-1GHz spectrum cap and a total spectrum cap of 2 x 50MHz) do not ensure the MSP for all players in the auction. For example, in the scenario where three operators acquire sub-1GHz spectrum up to the sub-1GHz cap (2 x 20MHz), this leaves 2 x 5MHz of sub-1GHz spectrum for the least powerful bidder. If the

[16] '800MHz, 900MHz and 1800MHz spectrum release' – ComReg consultation 10/71, 17th September 2010, page 4.

remaining above 1GHz spectrum is allocated in the same way to the most powerful bidders (as much as is permitted within the confines of the total spectrum cap of 2 x 50MHz) then no spectrum will be left for the least powerful bidder (see Exhibit 17 below). In this scenario, the least powerful bidder has an allocation of spectrum of only 2 x 5MHz of sub-1GHz spectrum, which is significantly below the MSP described in Chapter 3. In this way, the current spectrum rules proposed by ComReg do not ensure that the MSP will be obtained by each player in the auction.

Exhibit 17: Possible spectrum allocation outcome from current ComReg spectrum rules

Paired MHz	Player 1	Player 2	Player 3	Player 4
800	10	10	10	0
900	10	10	10	5
1800	30	30	15	0
Total	**50**	**50**	**35**	**5**

Source: Value Partners analysis

As described above, the current spectrum rules do not ensure that all operators are able to obtain the MSP. However, when the most probable spectrum outcome is determined in the following section, it is apparent that the most probable outcome will also deliver a spectrum allocation to the weakest bidder which falls far below that of the MSP described in Chapter 3.

The analysis performed to determine the likely spectrum allocation resulting from ComReg's spectrum rules considers both the 2x20MHz sub-1GHz spectrum cap and 2x50MHz total spectrum cap, and is detailed in the following sections.

4.3 Framework for determining likely spectrum allocation outcomes

A framework was developed to determine the likely spectrum allocation outcome resulting from ComReg's proposed spectrum rules. This framework was used to establish the value of each spectrum band (available in the forthcoming auction) to each Irish operator and combine this with an assessment of their individual ability to pay for spectrum in the auction.

A series of steps were undertaken involving analysis of the technical characteristics of the spectrum bands, the commercial preferences and current spectrum holdings of the individual mobile network operators and the respective financial positions of the operators and their holding groups. In this way, an impression was built of the value of each band to each operator and the likelihood of them winning certain bits of spectrum.

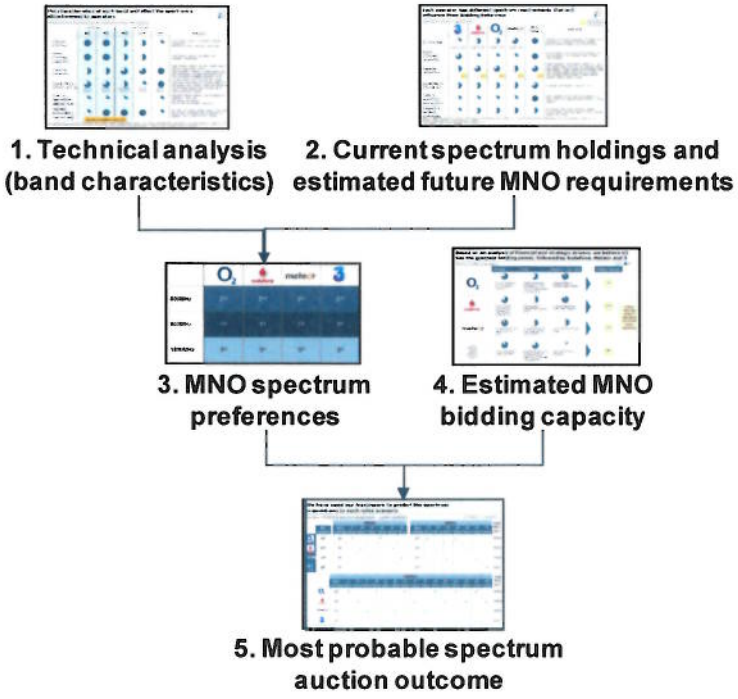
The process to determine the spectrum allocation criteria was composed of five key steps:

- ***Step 1:*** the technical characteristics of each spectrum band were evaluated;

- ***Step 2:*** the commercial needs and current spectrum holdings of each of the four Irish operators were evaluated;
- ***Step 3:*** the results of steps 1 and 2 were combined so the relative attractiveness of each spectrum band to each operator could be assessed;
- ***Step 4:*** an evaluation was made of the overall bidding capacity of each of the operators and their holding groups;
- ***Step 5:*** the results of steps 3 and 4 were combined, so that the order of assignment of each spectrum lot could be identified.

An outline of the process is demonstrated in the exhibit below.

Exhibit 18: Framework for identifying the most probable spectrum allocation from the proposed spectrum rules



Source: Value Partners

4.3.1 *Caveats of the analysis approach*

The approach taken to determine the most probable spectrum allocation between the four Irish operators involved a probability-based methodology using high-level analysis. The approach does not involve a comprehensive, bottom-up quantitative model of the individual net present value (NPV) of each of the spectrum bands to each operator. Each step in the analysis is based on publically available information or on expert knowledge of technical characteristics of spectrum.

The results obtained in the analysis described here serve as a reasonable proxy for how the individual operators would value each band of spectrum and what their willingness to pay is expected to be.

The assumptions used to perform each step of the analysis and their inherent limitations are discussed in turn in this section. In the absence of complete information, this is the best approach one can take.

4.3.2 *Methodology used within each step*

This section outlines the methodology used for the analysis within each step of the framework.

a) Step 1: the technical characteristics of each spectrum band

The evaluation of the spectrum bands was based on analysis of the commercial implications of the technical characteristics of each spectrum band, across six key dimensions:

- ***Outdoor Coverage:*** the difference in outdoor coverage achievable (measured by the difference in the size of cell site radii of each band);
- ***Indoor coverage capabilities:*** the strength of indoor signal of each band;
- ***Capacity expansion:*** the expected capacity and bandwidth achievable with each band;
- ***Suitability for 3G/LTE:*** the timing of availability of 3G and LTE services and the availability of sufficient spectrum per band for use with 3G/LTE;
- ***Costs:*** the rollout and maintenance costs of each band;
- ***Handset availability:*** the compatible handset penetration and timing of availability of handsets respective to each band.

Note on approach: This analysis was based on industry analysis of the technical characteristics of the separate spectrum bands.

b) Step 2: the commercial needs and current spectrum holdings of each of the four Irish operators and a new market entrant

The likely spectrum requirements of each operator were evaluated using the same six dimensions used to evaluate the technical characteristics of the spectrum bands, alongside an evaluation of the operators' current spectrum holdings. Each operator's position was assessed with respect to each of these characteristics in order to understand the value they would place on each of their technical characteristics. This approach was taken in order to derive a set of operator-specific priorities which could be directly compared to the characteristics offered by each band.

- ***3G Coverage:*** the percentage 3G coverage of each operator in Ireland;
- ***Indoor coverage capabilities:*** the strength and quality of indoor signal offered by each operator;

- ***Capacity expansion:*** the need of the operator to achieve expansion in bandwidth capacity;
- ***Suitability for 3G/LTE:*** the attractiveness of launching 3G and LTE services to each operator;
- ***Costs:*** the impact of cost of upgrading infrastructure to each operator; and
- ***Handset availability:*** assessment of the range of compatible handsets offered by each operator.

For example, if an operator has a high level of 3G coverage in Ireland then its requirement for spectrum which is suitable for covering large areas with 3G networks is lower than that of an operator with a low level of 3G coverage.

Note on approach: This analysis is based on publically available information specific to the commercial needs and priorities of the individual Irish operators. Short of an in-depth quantitative analysis of the predicted NPV of the spectrum bands to each operator, this approach generates a reliable proxy for the relative value of each band to the operators.

c) Step 3: the relative attractiveness of each band to each operator

Based on the technical characteristics of each band and the commercial requirements of each operator, the relative attractiveness of each spectrum band to each operator was determined. This analysis provided the basis of the operator-specific demand side of the spectrum auction and represented the ideal spectrum allocation for each operator.

d) Step 4: overall bidding capacity of each of the operators and their holding groups

Step 4 of the framework involves assessing the "bidding capacity" of the operators with respect to publically available information regarding their financial position and that of their holding groups. For the operators' holding groups, their financial situation was assessed based on five elements:

- ***Profitability:*** EBITDA margin;
- ***Rate of investment:*** CAPEX/Sales ratio;
- ***Liquidity:*** Current ratio;
- ***Solvency:*** Net debt and Debt/Equity ratio.

In order to assess the financial position and profitability structure of the individual operators, they were assessed on the following five elements:

- ***Size:*** Service revenues and market share;
- ***Profitability:*** Blended ARPU and EBITDA margin;
- ***Rate of investment:*** CAPEX/Sales ratio.

Note on approach: This analysis is based on publically available information published in financial statements regarding the financial positions of all the operators and their holding groups.

e) Step 5: the order of assignment of each spectrum lot was identified

By combining the relative attractiveness of each band to each operator and their overall "bidding capacity", the order of assignment of each spectrum block and final allocation was estimated.

The following section outlines the results obtained for each step used to determine the likely spectrum allocation for Ireland based on the current spectrum rules proposed by ComReg.

4.4 Assessing the likely spectrum allocation outcome for Ireland

4.4.1 Analysis of the technical characteristics of the spectrum bands

In the forthcoming spectrum auction to be held by ComReg in 2011, spectrum licences concerning the 800, 900 and 1800MHz bands will be allocated. In the process of analysing the technical characteristics of the relevant spectrum bands, a number of key differentiating attributes arose.

Overall, the 800 and 900MHz spectrum bands are the most valuable for the purposes of rolling out mobile services based on 3G or LTE. Greater propagation characteristics and better indoor penetration qualities of sub-1GHz spectrum lends itself well to building 3G/LTE coverage. However, capacity expansion is most likely to be achieved through 1800MHz spectrum bands[17].

Outdoor and indoor coverage: 800 and 900MHz spectrum bands are the most valuable bands with respect to outdoor and indoor 3G/LTE coverage. Due to the superior penetration characteristics and larger cell site radii of sub-1GHz spectrum in relation to over 1GHz spectrum, building out a 3G/LTE network over 800 or 900MHz spectrum is more cost effective. [redacted] This means that a 3G/LTE network covering the same area requires fewer base site stations over sub-1GHz bands than over 1GHz bands.

Capacity expansion: 1800MHz spectrum is appealing to operators seeking to expand the capacity of their LTE data service offering. The additional MHz available for the provision of mobile services in the 1800MHz spectrum band[19] increases the likelihood that an operator will be able to obtain a large amount of contiguous spectrum, which lends itself to higher transmission speeds, since transmission speed is a function of the total spectrum block size and the number of users at any particular moment.

Suitability for 3G/LTE roll-out: Sub-1GHz spectrum is marginally more suitable for 3G/LTE than 1800MHz spectrum. Within the bands being auctioned by ComReg in the planned award the 800MHz spectrum will be the first to support LTE roll-out (in 2013), followed by LTE roll-out in the

---

[17] ComReg, in its consultation 10/71 '*800MHz, 900MHz & 1800MHz Spectrum release*' confirms this observation: 'Without access to sub-1GHz spectrum, an operator wishing to provide wide-area coverage would need to deploy a larger number of radio sites than otherwise required. Additionally, such an operator's in-building coverage could be reduced as the lower spectrum bands propagate further into buildings. This could be an important quality differentiator and could make it difficult to compete for particular types of customers (e.g. high-value mobile workers using data cards)'.

[18] RRA 2010.

[19] There are 2x75MHz of spectrum available for the provision of mobile services in the 1800MHz band compared to only 2 x 30 and 2 x 35MHz available in the 800 and 900MHz bands respectively.

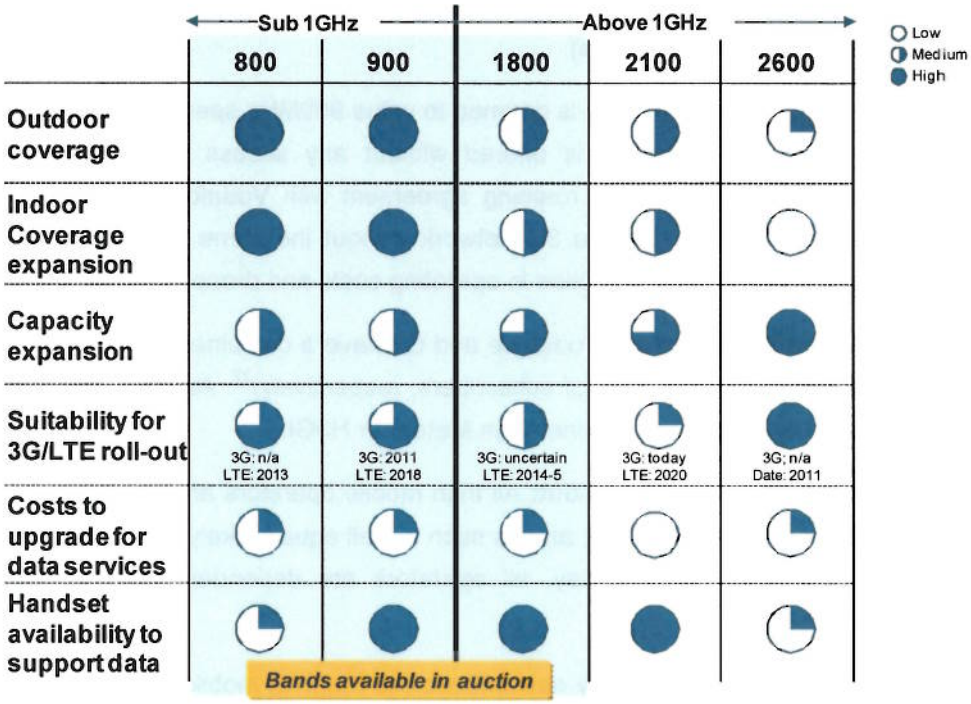
1800MHz band. The 900MHz band is expected to be the last to migrate to LTE. However, the 900MHz band will be used for HSPA/HSPA+ and can deliver similar data rates. As such, the attractiveness of the bands is ranked by the immediacy of an operator being able to deliver high speed data services in rural areas and in urban areas where good in-building coverage is essential. This favours the sub-1GHz bands over the 1800MHz band.

Costs to upgrade for data services: Most of the spectrum bands are comparatively equal in terms of the costs of upgrading infrastructure[20] and there is a range of similar handsets supporting 900MHz and 1800MHz.[21]

The result of this analysis is a detailed set of commercial implications of the technical characteristics of the spectrum bands available in the forthcoming auction. These results comprised the starting point of determining the relative attractiveness of each of the bands to the individual operators in the Irish mobile market.

The summary of the analysis is shown in the exhibit below.

Exhibit 19: Results of analysing the technical characteristics of each spectrum band



Note: Voice/3G coverage: difference in cell site radii; Indoor coverage: strength of signal indoors; Capacity: any numbers or qualitative capacity characteristics; LTE: timing of availability, suitability for LTE. Handsets: handset penetration, timing of

[20] No significant cost differences would arise between the operators in the roll-out of additional 3G services and all costs are deemed to be minor to the operators in comparison to upgrading the existing network or the cost of losing customers.
[21] Source: Operator Websites.

availability of handsets; Cost: actual cost differences per site (opex/capex) or impact on costs (i.e. requires mitigation of interference)

Source: Value Partners analysis

4.4.2 *Analysis of the commercial requirements and current spectrum holdings of each MNO or a new entrant*

An assessment of commercial requirements and current spectrum holdings was used in this analysis to generate a view of the operators' respective spectrum priorities, and therefore, their likely bidding objectives in the forthcoming auction.

In general, all operators are deemed to want spectrum allocations which maximise overall coverage and indoor signal quality.

3G Coverage: In relative terms, overall 3G coverage was determined to be most important to Vodafone, O2 and Meteor as their coverage levels are currently below that offered by H3GI without any 900MHz spectrum allocation (over 97%). Conversely, due to H3GI's current lack of 900MHz spectrum compared to its competitors, improving indoor signal strength is seen as a commercial priority of H3GI's (see chapter 3 and section 3.2 for details of the technical characteristics of the relevant spectrum bands).

Indoor coverage: H3GI is deemed to value 900MHz spectrum very highly because its current 97% 3G network coverage is offered without any access to 900MHz spectrum and requires the utilisation of a national roaming agreement with Vodafone. Access to 900MHz spectrum would allow H3GI to operate a 3G network without the same need for a national roaming agreement, resulting in a large reduction in operating costs and dropped call frequency.

Capacity expansion: Vodafone and O2 have a combined market share of the Irish mobile market of 75% (42% and 32% of subscribers, respectively)[22]. As such, Vodafone and O2 are likely to be capacity constrained sooner than Meteor or H3GI.

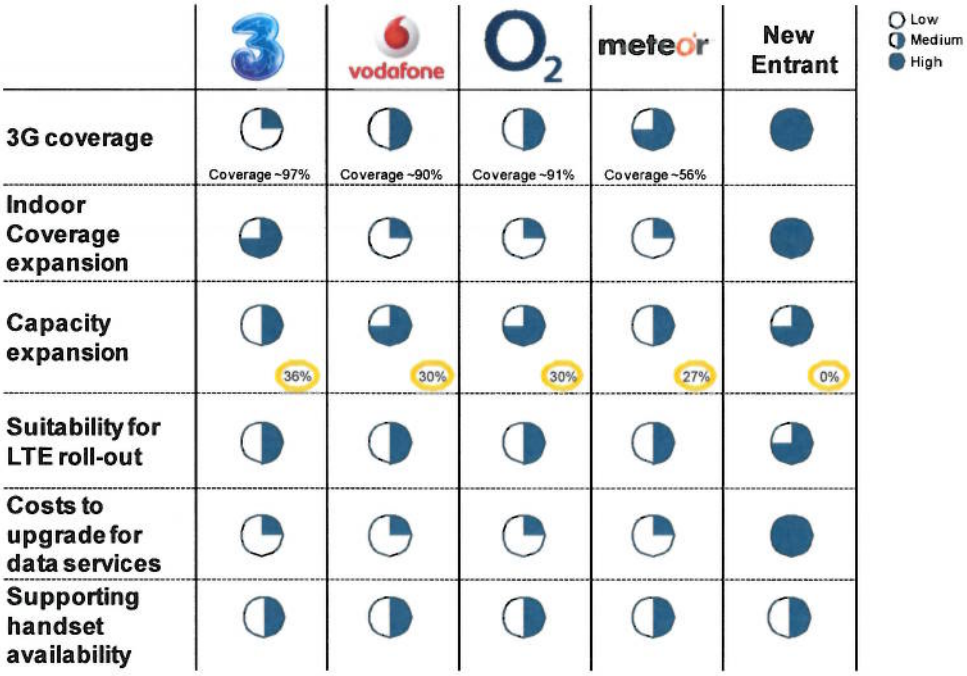
Suitability for LTE roll-out: All Irish mobile operators are interested in rolling out LTE services at some point in the future, and as such are all equally likely to bid for spectrum allocations which are LTE-suitable. In this way, all operators are dependent on the availability of LTE-supporting handsets.

It was assumed that any new entrant into the Irish mobile market would be interested in obtaining spectrum for all the commercial reasons outlined in the analysis, with a focus on sub-1GHz for the most viable business case. See Chapter 3 for an outline of the MSP required to sustain a mobile network operator.

[22] Source: Annual reports, Informa, WCIS, Value Partners analysis.

A detailed breakdown of the analysis of MNO commercial requirements is shown in the exhibit below.

Exhibit 20: Results of analysing the commercial requirements of each MNO and a new entrant



Source: Informa, Operator websites, ComReg, Value Partners analysis

4.4.3 *Determining the operator's spectrum band priority*

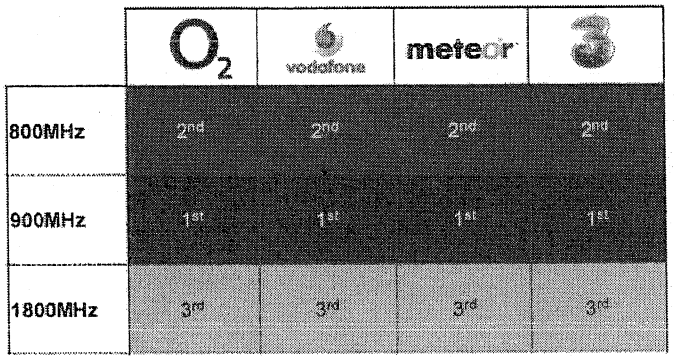
Following the analysis of the technical characteristics of the spectrum bands, the current operator spectrum holdings and the commercial priorities of the individual operators, a likely spectrum order ranking was determined.

It was determined that in a 'no rules scenario', where every operator can have access to any spectrum band, the bid priorities would be the same across all operators.

900MHz spectrum would be the first priority for all four MNOs given its importance for current business operations in 2G/3G, followed by spectrum in the 800MHz band for its imminent LTE roll-out timeline, and finally by spectrum in the 1800MHz band, where high data transmission speeds are more achievable.

This ranking guides the spectrum allocation analysis used to determine the most probable allocation in any given scenario of spectrum rules.

Exhibit 21: Conclusion of the spectrum assignment order analysis



Source: Value Partners analysis

4.4.4 *Determining bidding capacity: an overview of the financial position of each mobile network operator and its holding group*

In order to determine the bidding capacity of each Irish MNO, two factors were considered: group performance (i.e. the cash position and the relative ability to pay for spectrum licences of the operators' holding groups) and the relative performance of each MNO in the market (i.e. a proxy for the likely value of spectrum). These factors were combined to represent the ultimate ability of the operators and their holding groups to pay.

a) Group financial position

Overall, Telefonica and Vodafone have similar group bidding positions. They are the most likely to be able to command spectrum for which they see strategic value. [redacted]

Telefonica (O2's holding group) is in a highly leveraged financial position (debt/equity ratio of 3.1) but is operating at a level of high profitability (EBIDTA margin 43%). While its net debt is extremely high at €56bn, it is thought to be likely that Telefonica will have significant ability to pay to maintain its strong positioning in each market.

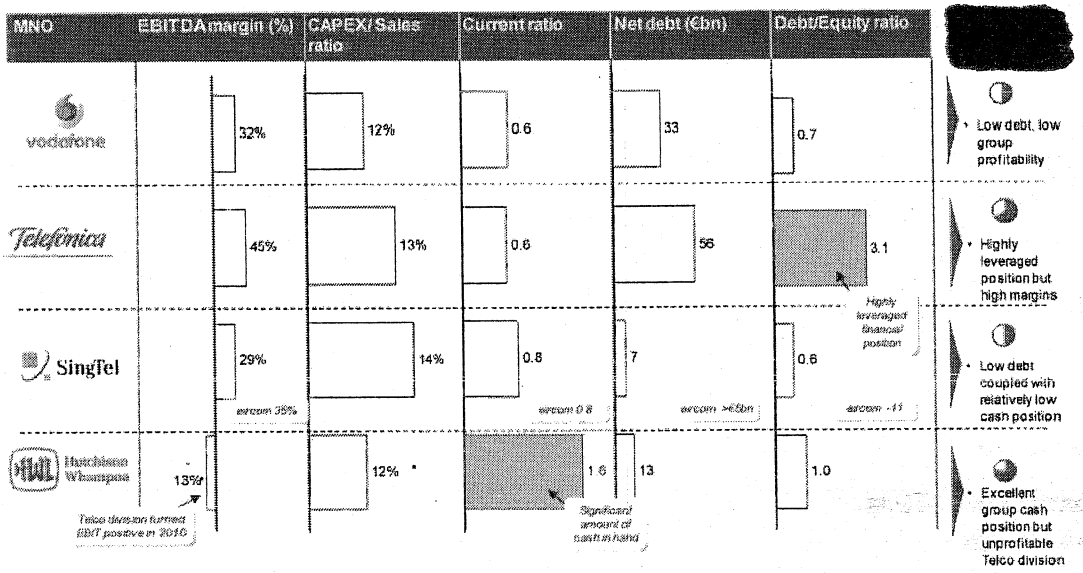
The Vodafone group has less debt (€33bn) than Telefonica and lower group profitability. Due to Vodafone's relatively strong operating profit margins (32%), it is deemed likely that Vodafone will also be able to pay for valuable spectrum.

Meteor, eircom and Singtel (which owns 35% of Meteor) have a combined low debt position (€7bn) and also a low cash position. [redacted]

Hutchison Whampoa (H3GI's holding group) has a strong group cash position (1.6 current ratio) but has historically not generated returns from the telecoms division of its business (-13% EBITDA with an EBIT which just turned positive at the end of 2010). It is seen as likely that H3GI will have bidding capacity available [redacted]

[redacted]

Exhibit 22: Results of analysing the bidding capacity of the holding groups of the Irish MNOs



Source: Annual reports, Value Partners analysis

b) Mobile network operator performance

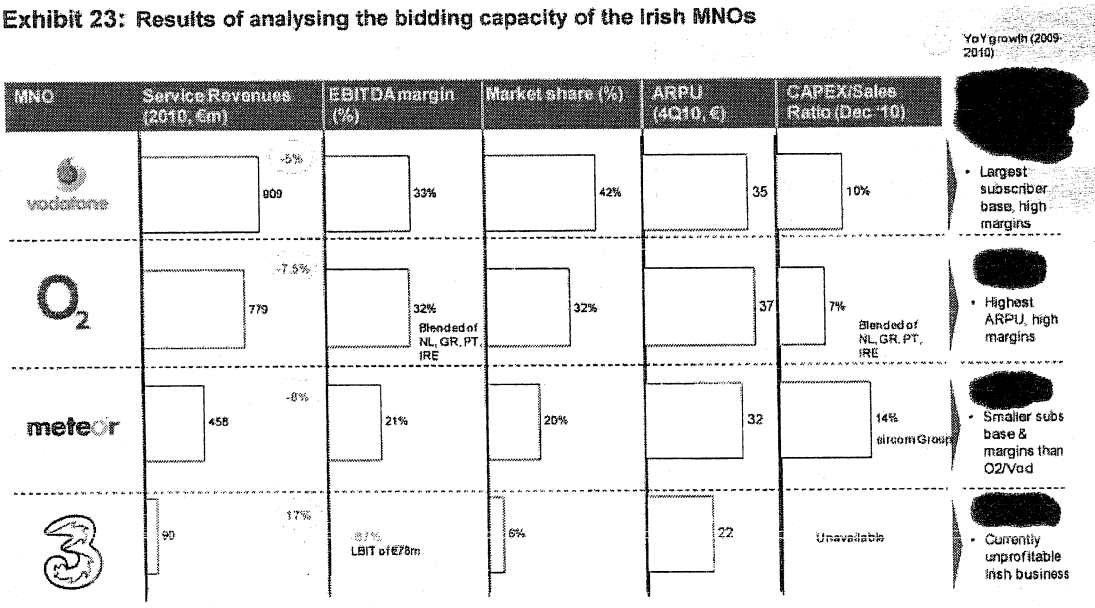
[redacted]

O2 and Vodafone are the largest players in the market by total revenues (€779m and €909m, respectively) and both players have achieved similar EBITDA margins in recent years (32-33%). [redacted] both players achieving the largest average revenue per user (ARPU) in the market.

Meteor has a smaller but comparable subscriber base (20%) and ARPU figure (€32) to those of the dominant market players, O2 and Vodafone. Meteor is therefore deemed to be behind O2 and Vodafone in likely size of bidding capacity.

[redacted] H3GI is not a profitable business in Ireland. Its subscriber base (6%) and ARPUs (€22) have generated negative EBITDAs [redacted]

Exhibit 23: Results of analysing the bidding capacity of the Irish MNOs



Notes: (1) Blended of NL, GR, PT and IRE, (2) eircom group

Source: Annual reports, Informa, WCIS, Value Partners analysis

A new entrant would face the hardest business case due to the absence of a pre-existing customer base and network and would have to raise extensive funding to support the launch of a new mobile operator.

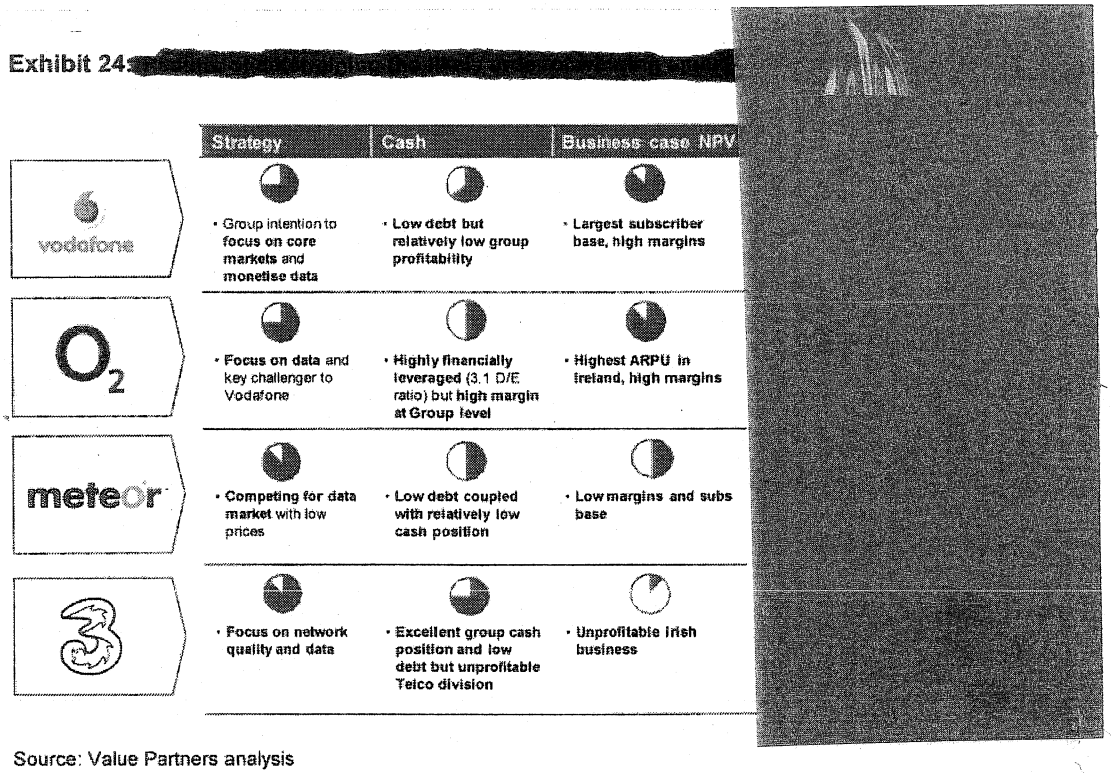
4.4.5 [redacted]

The analysis performed to establish the strategic objectives, cash positions and business case likely values individually for each operator was combined [redacted]

Vodafone was deemed to be ranked first in terms of likely bid winning order, followed by O2 in second place, Meteor in third and H3GI in fourth place.

In general, it was considered that Vodafone had a strong strategic requirement for spectrum, a strong cash position and the strongest financial performance in the market. O2 was also seen to have a good strategic rationale for the spectrum and a similar financial performance to Vodafone in the context of the market. Meteor was judged to have a very strong rationale for spectrum allocation, a good cash position but a weaker financial performance in the market than both O2 and Vodafone. Despite H3GI's very strong commercial requirement for spectrum and comparatively strong group cash position, its market performance is the weakest of the four operators [redacted]

Exhibit 24: [redacted]



Source: Value Partners analysis

With regards to a new entrant it is impossible to determine its exact positioning but it is possible to assume that it would face the hardest business case due to the absence of a pre-existing customer base and network and would have to raise extensive funding to support the launch of a new mobile operator.

4.4.6 *Likely spectrum allocation outcome from current ComReg rules*

In the final step of determining the likely spectrum allocation, the relative attractiveness of each spectrum band was combined with the assessment of the overall bidding capacity of each operator to generate the overall order of assignment of each spectrum lot.

The result of this analysis was a detailed outline of the likely order of allocation of each MNO and a new market entrant for each 2x5MHz spectrum block within the 800MHz, 900MHz and 1800MHz band available in the auction.

The likely order of allocation is demonstrated in Exhibit 25: below. The Exhibit does not represent physical blocks of spectrum, rather the theoretical winning order (ie. from highest to lowest bidder). The physical blocks of spectrum would be assigned to the appropriate operators in contiguous blocks in order to maximise spectrum use efficiency and to maintain current holdings as far as possible. It was assumed that it is more likely that operators would bid for 2x10MHz in each of the 800MHz and 900MHz bands, rather than 2x5MHz in one band and 2x15MHz in the other. The rationale behind this assumption is that to any operator, the value of the speed of data transmission achievable with contiguous bandwidth is higher than the incremental benefit of an extra 5MHz of

spectrum on the 900MHz band (i.e. increasing the 900MHz band allocation from 2x10MHz to 2x15MHz).

Exhibit 25: The likely order of spectrum bidding under proposed spectrum rules

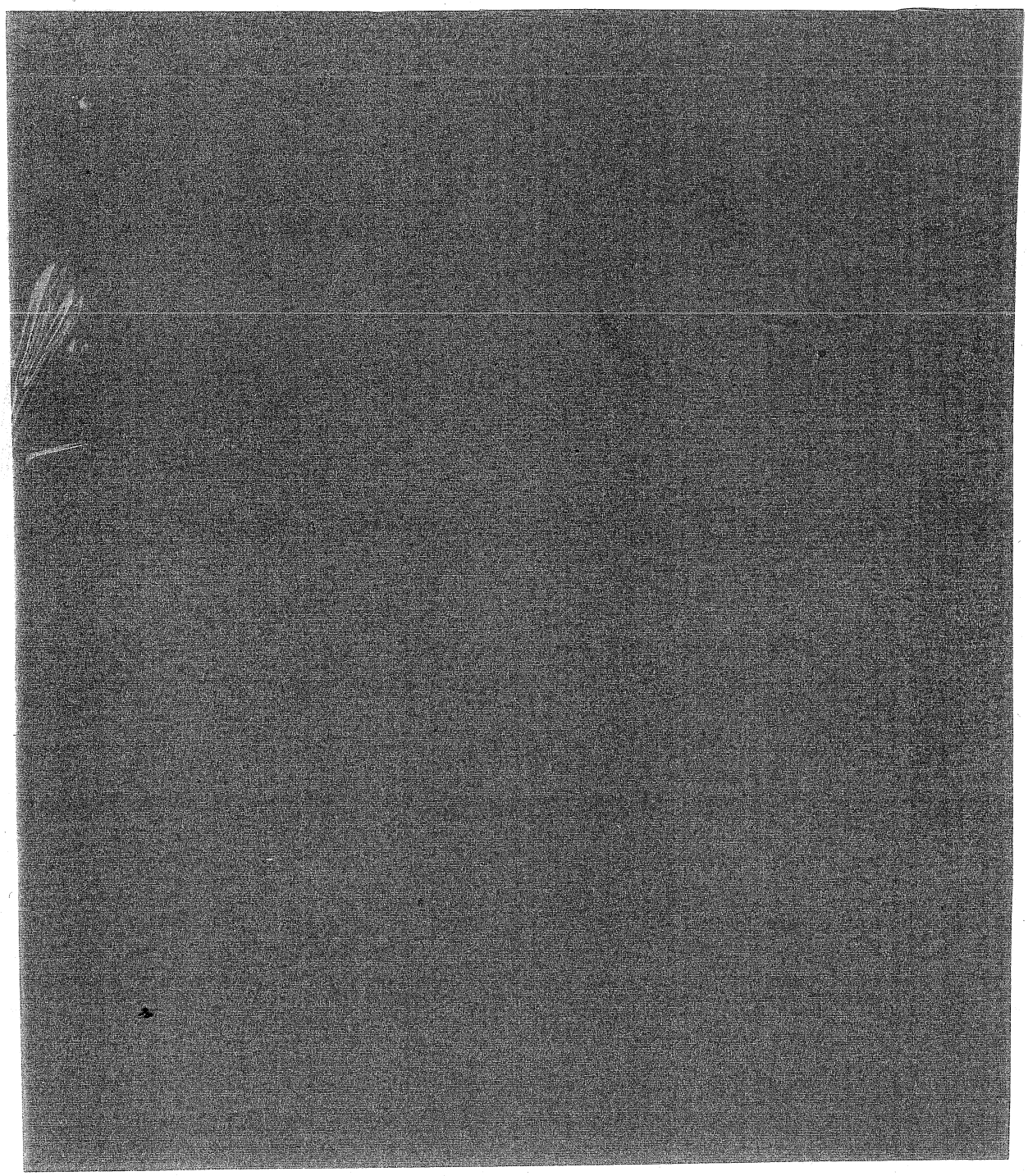
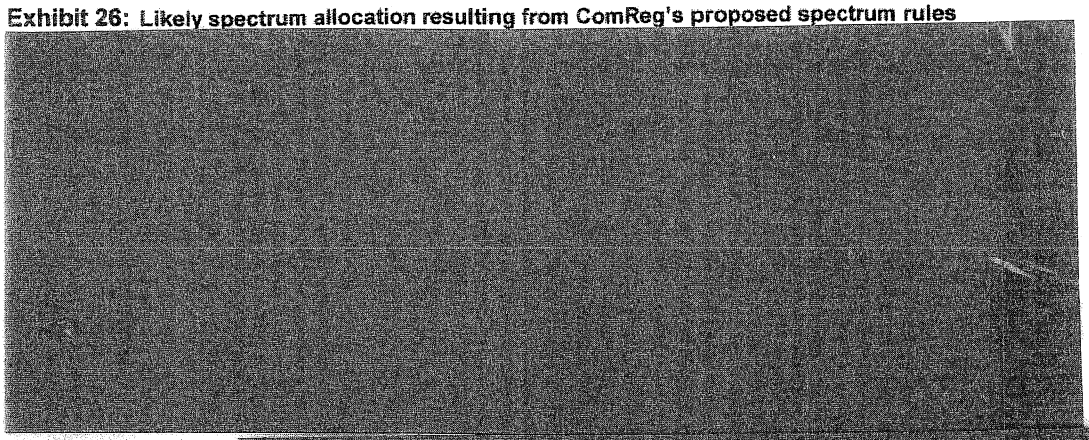
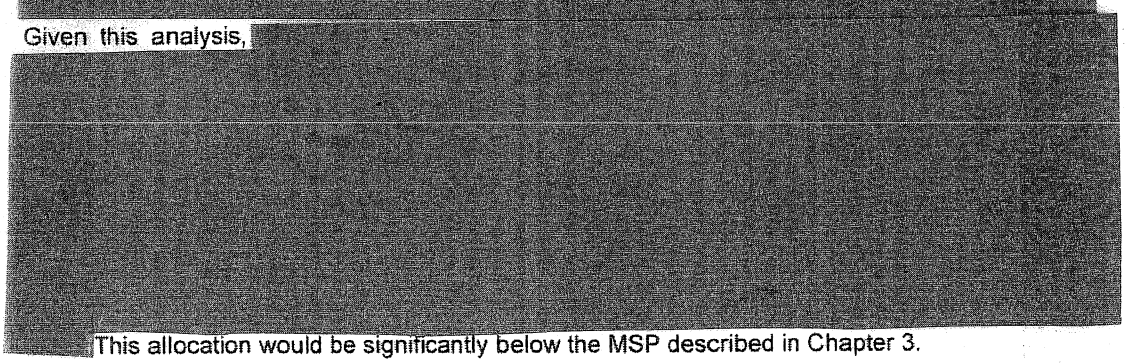


Exhibit 26: Likely spectrum allocation resulting from ComReg's proposed spectrum rules



Given this analysis,



This allocation would be significantly below the MSP described in Chapter 3.

The likely spectrum allocation profile is shown by operator in Exhibit 26: above.

In effect, the most probable outcome of the spectrum auction under the proposed spectrum rules would produce three operators with over 2x30MHz of licensed spectrum, and one operator with 2x5MHz of spectrum. As ComReg has stated in their consultation document 10/71, '800MHz, 900MHz and 1800MHz spectrum release', a 2x20MHz cap on sub-1GHz spectrum 'risks that the outcome could be that three operators gain the maximum amount of spectrum permitted by the cap, with a fourth operator gaining just one block of spectrum. This could create a market structure where three large operators dominate the market, with a fourth very weak competitor'.

The most probable outcome of the current spectrum rules is therefore likely to leave one operator with an allocation which is considerably lower than the MSP described in Chapter 3. The effects of this are described in further detail in the following Chapter.

4.5 Conclusions

In the forthcoming spectrum auction relating to licences in the 800, 900 and 1800MHz band, ComReg has proposed the following set of spectrum rules:

- A sub-1GHz cap per operator of 2x20MHz; and
- A total spectrum cap across all bands of 2x50MHz.

This set of rules does not ensure all operators have access to the MSP and the high-level, probability-based, analysis performed shows the most likely auction outcome will not deliver the MSP for one of the operators involved.

It was found that in the most likely outcome of the proposed spectrum rules, [redacted] This would mean that a new entrant would obtain spectrum clearly below the MSP, which would significantly impede their ability to compete in the market. The effects of this impact on the competitive landscape are described in Chapter 5.

5 Welfare benefits of a sustainable four player market

5.1 Discussion

Chapter 3 concluded that in order to create four sustainable players in the Irish mobile market, all operators must have an allocation of spectrum which is equal to or superior to the MSP. Chapter 4 concluded that the current rules proposed by ComReg do not ensure this MSP is met and the most probable outcome of the auction will have one operator not reaching the MSP. Based on these conclusions, this chapter examines the potential impact on producer and consumer welfare in Ireland of a reduction in competitive intensity in the Irish mobile market driven by the scenario where one operator has an allocation of spectrum which is below that of the MSP.

Ofcom stated in its 2007 consultation document, "*Application of spectrum liberalisation and trading to the mobile sector*", that "asymmetric access to 900 MHz spectrum is likely to lead to significant differences in the quality of 3G services that operators choose to provide" and "asymmetric access to 900 MHz spectrum could lead to lower competitive intensity"[23]. The implication of this is that a proportion of consumers in the market who are sensitive to changes in quality will suffer from a reduction in welfare brought about by higher prices. If an operator's position of lower quality is unsustainable, it could lead the operator to exit the market, resulting in a wider market impact.

The approach to modelling this impact and the results generated for Ireland are detailed in this section, along with an overview of key assumptions made and their respective sensitivities.

5.2 Overview of modelling approach

The modelling approach is closely based on the methodology used by Ofcom in 2007 for a very similar analysis in its consultation document, *"Application of spectrum liberalisation and trading to the mobile sector"*, in which Ofcom assessed the welfare effect of one operator exiting from a five player mobile market due to it not obtaining access to 900MHz spectrum[24].

Similarly to the Ofcom analysis, the modelling approach undertaken is based on four guiding principles:

1) ***A spectrum allocation below the MSP causes the potential exit of an operator from a portion or all of the market;***

2) ***Producer and consumer surplus are the basis for calculating economic welfare;***

3) ***The use of the Cournot approach is the most appropriate model to measure the impact of competitive intensity on producer and consumer surplus;***

[23] Ofcom consultation, November 2007, titled "Application of spectrum liberalisation and trading to the mobile sector" page number 64 and 65 respectively.
[24] The Ofcom 2007 consultation, the model and findings is publically accessible at:http://stakeholders.ofcom.org.uk/consultations/liberalisation/.

4) ***Estimating welfare benefit requires the comparison of a factual and a counterfactual scenario.***

5.2.1 *A spectrum allocation below the MSP causes the potential exit of an operator from a portion or all of the market;*

As described in detail in the previous chapters, the inability of one of the operators to obtain the MSP is likely to result in a disparity in the ability of the four Irish operators to offer an equal and equivalent quality of service to consumers. This leaves the operator with an inferior service offering and three possible options to consider:

- ***Option 1:*** It can continue to provide a service to its customers at a reduced level of quality;
- ***Option 2:*** It can try to improve the level of quality to that which is broadly equivalent to its competitors but at significant levels of financial investment and operating expense[25]; or
- ***Option 3:*** It can exit the market altogether.

Options 1 and 2 would result in a higher price and/or a lower quantity provided to the proportion of the market which values a high quality of service - as only the operators with a spectrum allocation above the MSP would be able to provide this quality of service at a profitable price. In Option 3, where the operator with an inferior allocation of spectrum exits the market altogether, the whole market would see a price/quantity impact.

In the context of measuring the impact on Irish welfare, these effects are quantified assuming that, in Option 1 & 2, four sustainable players are maintained if all operators obtain the MSP, and that one operator exits a portion of the market if it does not have the MSP. While in Option 3, a four player market is maintained if all operators obtain the MSP, while only three sustainable players remain in the market in the event that an operator fails to obtain the MSP.

5.2.2 *Producer and consumer surplus are the basis for calculating economic welfare*

Economic welfare can be calculated by measuring both producer and consumer surplus within a market situation.

Producer surplus is best measured as the difference between revenue gained from selling products and services to consumers and the costs associated with producing them i.e. the profit.

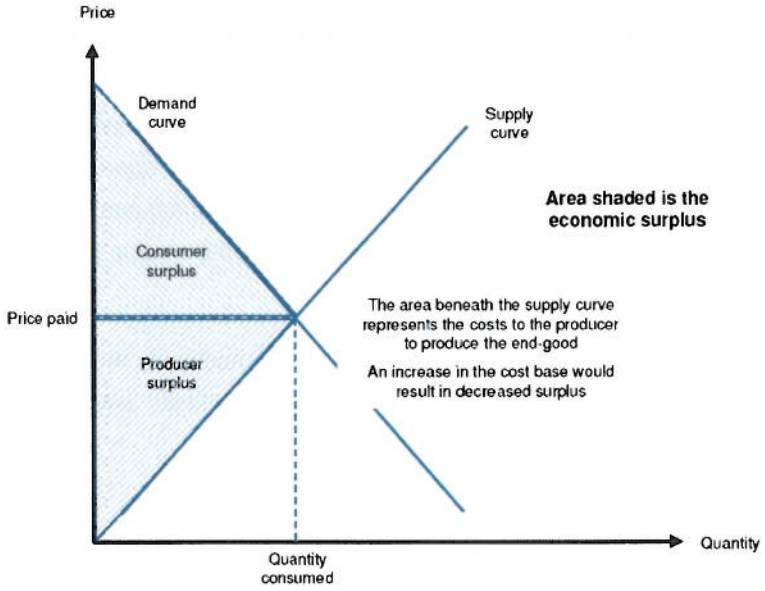
Consumer surplus is the difference between how much consumers value the consumption of a product or service and the costs incurred in consuming it. The value that consumers put on the consumption is reflected by their Willingness to Pay (WTP) for the product or service. The consumer surplus is, in other words, the difference between what consumers are willing to pay and what they actually pay.

[25] The cost differential of rolling out an analogous quality of service over different spectrum bands is explained in further detail in Chapter 3

Producer and consumer surplus are dictated by the price and quantity of a good sold. A decrease in the price of a good increases the quantity of that good sold, which in turn changes the value of both the producer and consumer surplus achieved in the market, generating an overall change in welfare. Reductions in prices are brought about in situations of high competitive intensity, which is why the welfare effects of changes in competition can be assessed in this way.

The economic basis for calculating producer and consumer surplus is depicted in the chart below.

Exhibit 27: Calculating the overall economic surplus



The methodology used takes a conservative approach to estimating economic surplus as it discounts the benefits to players who are further upstream in the supply chain than the mobile operator (i.e. externalities). While benefits to these players are, to some extent, reflected in shifts in the supply curve of the end-producer, this analysis takes a simpler and more conservative approach.

5.2.3 *The use of the Cournot approach is the most appropriate model to measure the impact of competitive intensity on producer and consumer surplus*

The Cournot model is an economic model used to describe an industry structure in which companies or operators compete on the amount of output they produce, which they decide upon simultaneously and independently. The Cournot model is used to describe a market with a number of players, all producing the same homogenous product, which have equal market influence, who do not cooperate and who act strategically to maximise their own profits. The key assumption in the Cournot model is that firms first commit to capacity and then compete on price.

It was determined that for the purposes of this analysis, the Cournot approach describes the provision of mobile services in the most appropriate way. Another advantage of using the Cournot model is that it produces very similar results to other models of imperfect competition which describe mobile services provision well (e.g. the Bertrand model, as discussed below). Finally, there is a precedent for using the Cournot approach in that of similar analysis performed by Ofcom in their 2007 document "*Application of spectrum liberalisation and trading to the mobile sector*", where it was used to measure the potential welfare impact of a reduction in the number of mobile operators in the UK market from five players to four as a result of one operator obtaining a lower spectrum allocation than the MSP.

The alternative model to Cournot – the Bertrand model – was not considered appropriate for this analysis because it assumes that players in a market compete first on price and not output quantity, and therefore predicts that a market duopoly is enough to push prices down to marginal cost level. This approach ultimately means that a duopoly will result in perfect competition. Furthermore it has been proven that the Bertrand model produces outcomes similar to the standard Cournot model and therefore the significance of the choice between the two models in this case is minimal.[26]

As a result, due to its robustness, wide acceptance and use in key analogous consultation procedures published by Ofcom, the Cournot model was deemed the most appropriate and objective approach for use in this analysis.

5.2.4 *Estimating welfare benefit requires the comparison of a factual and a counterfactual scenario*

In order to estimate the total impact on the producer and consumer surplus of a change in the intensity of competition in the Irish market, a comparison is made between a counterfactual and a factual scenario.

The counterfactual scenario forecasts a 'status quo' view of the Irish market in which one of the operators does not reach the MSP - causing either harm to or total exit of that operator from 2013 (after the new spectrum licences become effective) until 2030.

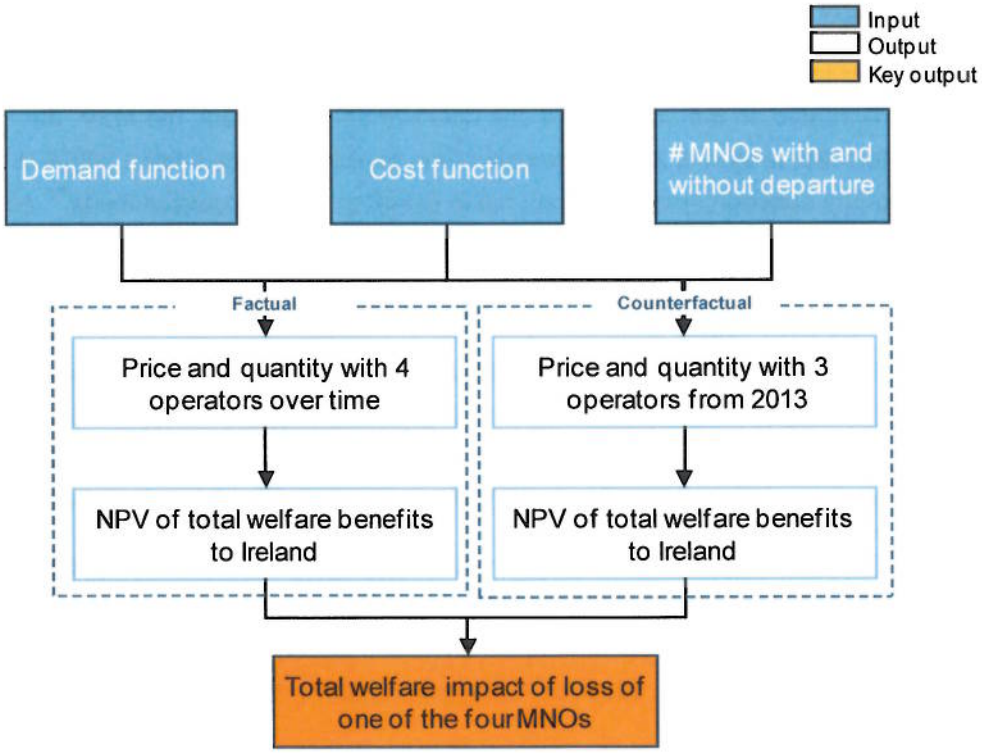
The factual case describes a situation where all operators reach the MSP, resulting in parity in quality of service and sustainability of all four operators in a competitive market until 2030.

The difference in the combined producer and consumer surplus generated from 2011 to 2030 between the two scenarios, discounted back to present day value using an assumed social discount rate[27], produces an estimate for the total welfare impact of a change in competitive intensity of the Irish mobile market.

[26] D. Kreps, J.Scheinkman: Quantity Pre-Commitment and Bertrand Competition Yield Cournot Outcomes, Bell Journal of Economics 1983.
[27] The Social Discount Rate is a measure of the value of a future public benefit in present day value. It is used to help guide choices about the value of diverting funds to social projects.

An overview of the model structure is given in Exhibit 28: below.

Exhibit 28: Model structure – welfare benefit calculation



5.3 Key assumptions for Ireland

To determine the overall impact of a change in the competitive landscape on Irish producer and consumer surplus, a number of assumptions were made with respect to specifics of the Irish mobile market and wider macroeconomic landscape.

The primary objective in determining these assumptions for Ireland was to use publically available sources and, where possible, to follow robust precedents available in other publically accessible modelling exercises, including Ofcom's 2007 consultation, mentioned previously.

In this section, the rationale and sources for the assumptions for the following model inputs are detailed:

- *The time period of analysis (the date from the spectrum release to 2030);*
- *Total Irish mobile subscribers forecast;*
- *Average monthly revenue per user (ARPU) forecast.*
- *The proportion of market revenues sensitive to a reduction in the quality of service;*
- *Shape of demand curve*
- *Price elasticity of the Irish telecoms market;*

- *Price change of substitutes;*
- *The Social Discount rate (SDR);*

a) Time period for estimating impact

The total welfare impact on Ireland of the change in competitive intensity from 2011 to 2030 was estimated. In the case where one operator does not reach the MSP, the effect of this change was forecast to start in 2013 – the date of the expiration of the interim 900MHz licences and reallocation of the spectrum licences as set out in ComReg's recent consultations[28]. All forecasts are calculated until 2030 – which is when the licences in question are due to expire.

b) Total Irish mobile market subscribers forecast

As a starting point, ComReg's published data of 5.3m total mobile subscribers in Ireland at the end of Q4 2010[29] was taken. Forecasts of total subscriptions between 2010 and 2014/5 were obtained from a range of public sources (including Analysys, Informa, Ovum and Cowen) and the average compound annual growth rate (CAGR) was calculated across all of these forecasts to be c. 2%.

The 2010 number of 5.3m subscribers was grown forward using this average CAGR and total subscriber numbers of industry analysts as a basis for the short-term period. Growth beyond this period to 2030 was forecast to continue at a steady rate, growing alongside ComReg's population growth forecast to 2026 of 1.5% per annum[7], to generate a conservative estimate of total subscribers.

This approach generated a subscriber forecast which capitalised on all available ComReg data, and produced a forecast that was deemed to be appropriate in the context of total market mobile subscriber penetration.

c) Average monthly revenue per user (ARPU) forecast

The forecast for the average monthly revenue per user was determined by taking ComReg's published data on the overall revenue size of the Irish mobile market in 2010 (€1.7bn[30]) and dividing it by the total subscriber forecast. On the assumption that the Irish mobile market will remain at the same proportion of the GDP of Ireland as in 2010, this total revenue figure was grown forward at the same rate as the International Monetary Fund's (IMF) prediction of overall Irish GDP growth of 2.4% until 2030[31]. This is the same methodology that was used by Ofcom in its consultation, "*Application of spectrum liberalisation and trading to the mobile sector*", and is relevant to Ireland given a similar stage of market maturity and number of operators in the market (125% mobile penetration in the UK today with four/five players versus 117% in Ireland with four players).

[28] The most recent consultation was published by ComReg in February 2011 11/11 'Interim licences for the 900MHz band'.
[29] From ComReg's Summary statistical data on the Irish mobile market (http://www.comstat.ie/data/data.472.data.html).
[30] ComReg 2010 - http://www.comstat.ie/data/data.472.data.html.
[31] http://www.imf.org.

d) Proportion of the market sensitive to a reduction in the quality of service

The important hypothesis in this analysis is that only operators with access to the MSP would be able to competitively provide quality mobile services. Two reasonable scenarios resulting from an operator achieving an allocation of spectrum below the MSP have been identified: one which affects only a certain segment of the market, and one which brings about a complete market exit for the operator with an inferior allocation of spectrum.

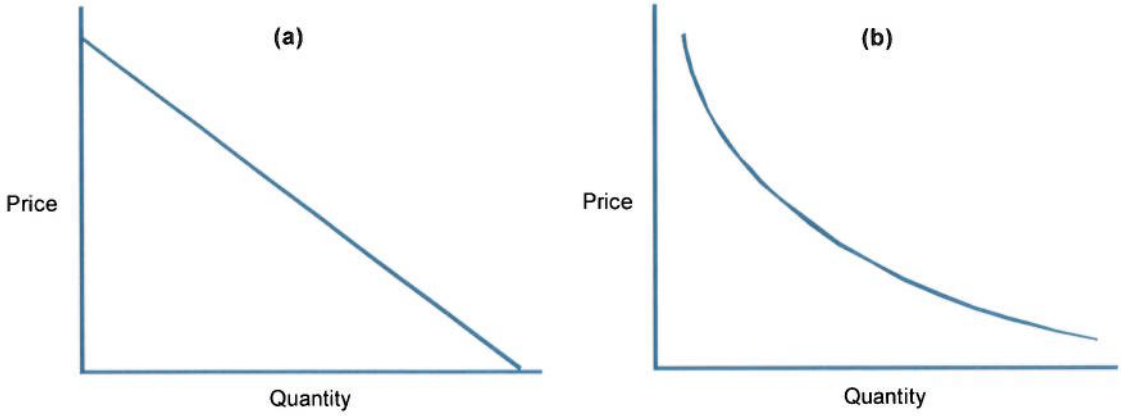
In the course of this analysis, the applicable market segment that would be sensitive to a reduction in the quality of service was dimensioned. It was assumed that the revenues that would be sensitive to changes in quality – and thus forming the size of the affected market segment – is 25% of the total Irish mobile market revenues, and the associated number of subscribers would be consistent with this. This is in line with the assumptions made in Ofcom's 2007 consultation document "*Application of spectrum liberalisation and trading to the mobile sector*". Given the inherent uncertainty in this assumption, a series of sensitivities have been tested in the following section. It is to be noted that this assumption is conservative as the importance of data services has increased over the past 3 years and will continue to increase in the future driving the sensitivity of all users to quality of service.

In the scenario where a player exits the market altogether, it is assumed that 100% of the revenues would be affected by this change in the intensity of competition in the market.

e) Shape of demand curve

The model was performed using a linear demand curve (Option a below), deemed as the more conservative and therefore prudent option, and following precedent from Ofcom's 2007 Cournot analysis. A negative exponential demand curve was also modelled but tested only as sensitivity in the following section.

Exhibit 29: (a) Linear demand curve and a (b) negative exponential demand curve



f) Price elasticity of the Irish telecoms market

Price elasticity is a powerful input in this model as it dictates the slope of the demand curve and therefore the size of the impact of a fall in prices on the quantity of goods sold. In this way, price

elasticity dictates how great the change in consumer or producer surplus will be when price and quantity change in a Cournot equilibrium.

A price elasticity of -0.5 has been chosen in our analysis as it represents a conservative view of all benchmarks available for price sensitivity in the mobile market.

There are a limited number of benchmarks available for the price elasticity of the mobile market. A study by Teligen Consultants on the UK mobile market used a price elasticity of -0.47 and a further study by the Competition Commission in 2003 used a value of -0.3. Ofcom has used several price elasticity assumptions from these reports and in its 2007 consultation "*Application of spectrum liberalisation and trading to the mobile sector*", a range of values were used, from -0.5 to -1, with -1 as a base case.

Given the lack of available data on Ireland and the similarity in mobile market characteristics between the UK and Ireland[32], UK benchmarks were deemed appropriate to represent the price elasticity of the Irish mobile market.

g) Price change of substitutes

The model used in this analysis assumes a year-on-year price change of substitutes of -1%. This reflects a broad assumption which characterises the expected trend in the price change of comparable substitutes to mobile services, and has a direct impact on the demand curve calculated in the model. The same assumption used in the analysis was also used in Ofcom's 2007 consultation, "*Application of spectrum liberalisation and trading to the mobile sector*", and is also deemed to be appropriate in the case of Ireland.

h) The Social Discount Rate (SDR)

The Social Discount rate (SDR) is used to determine the net present value (NPV) for the future value of a public benefit. In this case, a social discount rate of 6.8% for Ireland was used. This SDR has been chosen for this analysis because the costs and benefits to the Irish society are being considered for different public options, rather than on the commercial decisions of the operators for which a commercial discount rate (typically higher than discount rates for social benefits, ranging between 8% and 12%) would be more appropriate.

SDRs in developed nations typically range from 3-7%, while SDRs of between 8-15% are more appropriate for developing nations[33]. Research performed by Dr David Evans of Oxford Brookes Business School concluded in 2003, Ireland had an SDR of 6.8%[34].

[32] Similarities between the Irish and UK market at a high level indicate they may be sufficiently related with respect to sensitivity in the price of mobile products; e.g. in penetration (125% for UK vs. 117% for Ireland) and pricing (average blended ARPU of €25 for UK vs. €34 for Ireland). All data based on Informa WCIS+ database.
[33] Reviewing social discount rates – Report from the Asian Development Bank - Emma-Kate Kunth Symons.
[34] Social discount rates for the European Union – Dr David J Evans.

5.4 Results and sensitivities

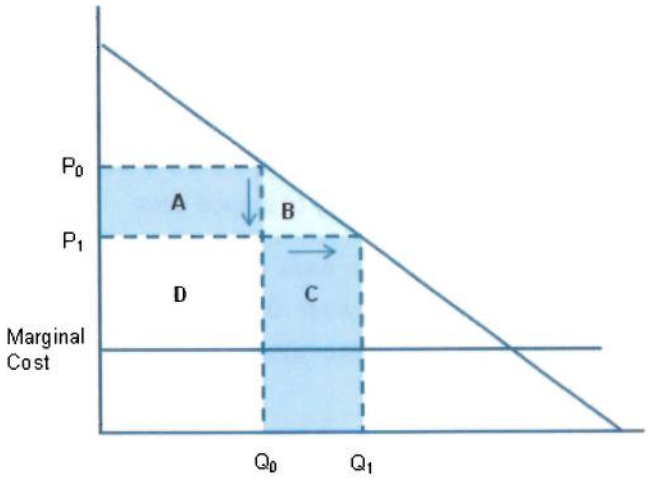
5.4.1 Model results

As a result of the analysis performed, an estimate for the difference between the welfare produced by a sustainable four player Irish mobile market from 2011 to 2030, with the welfare produced by a four-player market where one exits the market in 2013 until 2030 was obtained.

The results found that a welfare benefit of between €185m-€740m could be achieved if all operators acquired the MSP required to deliver quality mobile services. The range depends on the whether the impact represents avoiding a partial or full exit from the mobile services market of one operator, respectively.

Exhibit 30 below demonstrates how the creation of a sustainable four player market, versus one where one player exits the market entirely, creates welfare benefit. In the analysis performed, it was estimated that maintaining a four player market would keep prices from rising by 13%, resulting in an increase in consumer welfare (area A + B in the exhibit below) of €2.6bn in 2011 values. The creation of the four player market changes total producer surplus from area A + D, to D + C in the exhibit below, due to increased subscriber volumes but reduced prices. It was estimated that the total producer surplus is decreased by €1.8bn in 2011 values. This scenario generated an overall welfare benefit of €740m.

Exhibit 30: Changes in producer and consumer surplus resulting from changes in price and quantity in the mobile market



In the event that the player with an inferior allocation of spectrum survives in the market when the new spectrum licences are issued in 2013, but continues to provide a service at a reduced level of quality, the benefit to the Irish economy of maintaining a four player market can be conservatively estimated at €185m of otherwise lost welfare from 2011 to 2030, in 2011 values. As this is a conservative estimate, we would expect the benefit to the Irish economy of maintaining a four player market to exceed this figure.

Exhibit 31: Model results – Total welfare benefits (€m)

	Total exit	Partial exit
Consumer Surplus	2,550	638
Producer Surplus	-1,810	-452
Total Welfare Benefit	**740**	**185**

Source: Value Partners

5.4.2 *Model sensitivities*

There are a number of input variables within the model that cannot be determined concretely. Some of these variables have an impact on the consumer and producer welfare measured. The central base case assumptions are based on what are believed to be reasonable assumptions. However, given the inherent uncertainty in these variables, ranges around these assumptions and their impact on the results are considered in an overview of the sensitivities below.

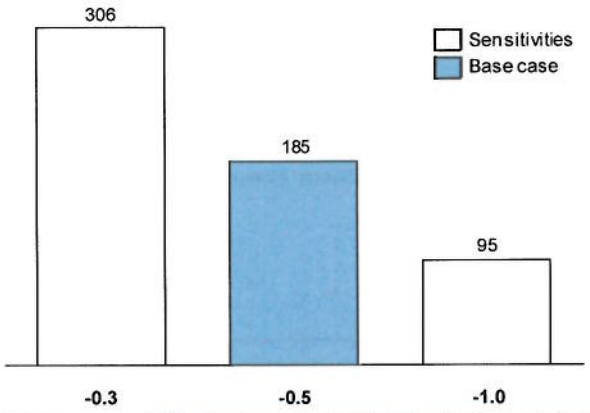
A significant number of viable sensitivities were tested on the 'Partial market exit' scenario only to demonstrate the impact on the result. The 'partial market exit' scenario was chosen as a base for our sensitivity tests because this case is central to the estimation produced. The overall range, taking all tested sensitivities into account, brings our base number of €185m to between €95m and €306m with the major sensitivity being the elasticity, proportion of the market affected and the shape of the demand curve.

a) Price elasticity

The model is sensitive to changes in price elasticity. Price elasticity determines the slope of the demand curve used in the Cournot model and therefore dictates the scale of the effect of a change of price on the change in quantity of a good sold.

As discussed above, the base case was determined as -0.5. The boundaries were determined by low and high benchmarks: lowest -0.3 and Ofcom base of -1. Using these boundaries creates a welfare benefit range from €95m-306m.

Exhibit 32: Sensitivity to the Price Elasticity (Total welfare benefit, €m)



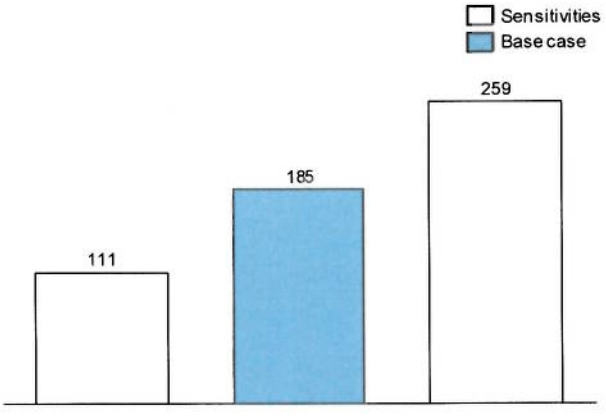
Consumer Surplus	1053	638	326
Producer Surplus	-747	-452	-231

Source: Value Partners

b) Proportion of revenue sensitive to changes in the quality of service

The overall welfare impact of the change in competitive intensity is inherently sensitive to the proportion of the market revenues which are affected by a reduction in the quality of service. In this instance, it was assumed that the same base case used by Ofcom in their 2007 consultation, "*Application of spectrum liberalisation and trading to the mobile sector*", of 25%, is appropriate. A range from 15% as a lower band to 35% as an upper band was tested and generated a welfare benefit range of €111m-259m.

Exhibit 33: Sensitivity to the proportion of revenues sensitive to reduction in the quality of service (Total welfare benefit, €m)



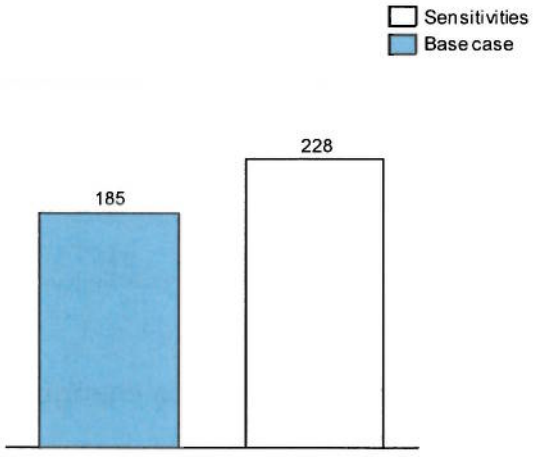
Consumer Surplus	383	638	893
Producer Surplus	-271	-452	-633

Source: Value Partners

c) Linear vs. negative exponential demand curve

The model was performed using a linear demand curve. Using a negative exponential demand curve increases the welfare benefit by up to 25%, or from €185m to €228m.

Exhibit 34: Sensitivity to a linear versus a negative exponential demand curve (Total welfare benefit, €m)



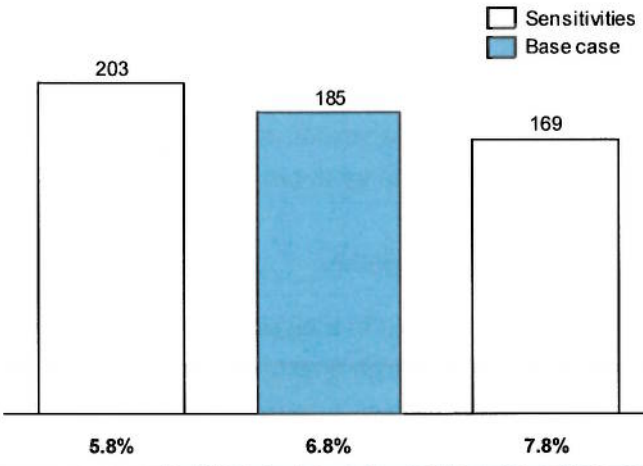
Consumer Surplus	638	785
Producer Surplus	-452	-556

Source: Value Partners

d) Social Discount Rate (SDR)

The Social Discount rate has a small impact on the total welfare impact of our modelled scenarios. The base case was taken to be 6.8% for Ireland as this is within the range of a number of sources. A range of 1% either side of our base case of 6.8% was tested and generated a range of welfare benefit from €169-203m.

Exhibit 35: Sensitivity to the Social Discount Rate (Total welfare benefit, €m)



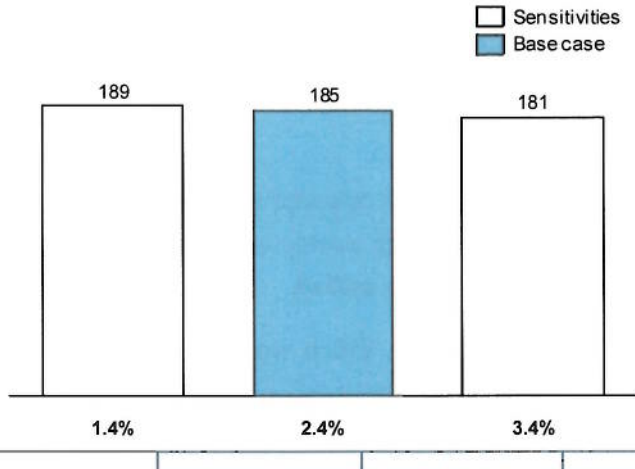
Consumer Surplus	700	638	581
Producer Surplus	-497	-452	-413

Source: Value Partners

e) Revenue growth rate

A change in revenue growth rate has a negligible impact on the overall welfare effect of the change in competitive intensity. A change in revenue growth was only applied post 2015, as this is the end of the IMF forecast for total GDP of Ireland, which is one reason why the impact is limited. The IMF forecast, of 2.4%, was taken as the base case and lower and upper boundaries of 1.4% and 3.4% respectively, were tested. This generated a range of welfare benefit impact from €181m-189m.

Exhibit 36: Sensitivity to the mobile market total revenue growth (Total welfare benefit, €m)



Consumer Surplus	651	638	623
Producer Surplus	-462	-452	-442

Source: Value Partners

5.5 Conclusion

If an operator obtains a spectrum allocation which falls below the MSP described in Chapter 3, it is left with three options, to:

- Continue providing a service at a reduced level of quality;
- Invest significantly to try to broadly match the quality of service offered by its competitors[35]; or
- Exit the market altogether.

Options 1 and 2 would result in a higher price and/or a lower quantity provided to the proportion of the market which values a high quality of service - as only the operators with a spectrum allocation above the MSP would be able to provide this quality of service at a profitable price. In Option 3, where the operator with an inferior allocation of spectrum exits the market altogether, the whole market would see a price/quantity impact.

VP undertook a modelling exercise to estimate the total value of welfare lost to the Irish economy between 2011 and 2030 in the scenario that the operator with an inferior allocation of spectrum either continued at a reduced level of quality of service, or exited the market altogether.

On the basis of a number of assumptions detailed in this Chapter, it was estimated that in the event that the operator with an inferior allocation of spectrum was to exit the mobile market altogether because it was unsustainable to remain a viable competitor, the Irish economy would be denied a sum of €740m in total welfare benefit between 2011 and 2030. If, the same operator was to continue to supply a mobile service to the market, but at a reduced level of quality, it is estimated that Ireland would forgo at least €185m in welfare benefit. A key factor in this analysis is the proportion of the market sensitive to a reduction in the quality of service. For the purposes of this analysis, it was assumed that 25% of the total Irish mobile market revenues would be sensitive to changes in quality. However, the importance of data services has increased over the past 3 years and will continue to increase in the future driving the sensitivity of all users to quality of service. As a result, we expect the benefit to the Irish economy of maintaining a four player market to exceed €185m.

As a result, the failure of an operator to obtain the MSP and the resultant disparity in the market's operators' ability to compete evenly on quality of service has the potential to cause a significant and avoidable deficit to Irish welfare.

Alternative spectrum rules, which would ensure that all operators obtain the credible MSP as detailed in Chapter 3, are discussed in Chapter 6.

[35] The cost differential of trying to roll out an analogous quality of service over different spectrum bands is explained in further detail in Chapter 3

6 Potential options for revised spectrum rules

6.1 Overview

This Chapter sets out the conclusions that have been reached in Chapters 3, 4 and 5 and outlines the suggested alternative spectrum auction rules that would ensure that all operators obtain a spectrum allocation equivalent to or better than the MSP described in Chapter 3. These alternative spectrum auction rules would thereby reduce the likelihood of a loss of a player from the market and the resultant loss of welfare benefit to Ireland.

6.2 The need for alternative spectrum rules

As discussed in Section 3.5.3, the MSP required to sustain a credible operator is deemed to be 2 x 10MHz of sub-1GHz plus 2 x 10MHz of above 1GHz spectrum. This allocation would allow an operator to roll-out 3G and LTE services competitively and represents an allocation of spectrum which would sustain a credible player.

As stated in Section 4.4.6, it was established that the current spectrum rules proposed by ComReg did not ensure that every operator would obtain a spectrum allocation equivalent to or better than the MSP. [redacted] Moreover, it was determined that the most probable outcome of spectrum allocation resulting from ComReg's proposed spectrum rules was an allocation for the weakest bidding player which fell far below the MSP outlined in Chapter 3 by 2 x 5MHz of Sub 1 GHz and 2 x 10MHz of over 1 GHz spectrum. As a result, it was deemed to be likely that the most probable outcome of ComReg's proposed rules would cause the full or partial exit of a player from the market, and as stated in Section 5.4.1, the welfare benefits of sustaining a competitive four-player mobile market would be up to €740m.

As such, it can be seen that the current spectrum rules as proposed by ComReg do not ensure that all operators have access to the MSP and, under the most probable outcome analysis, are likely to result in one operator achieving a spectrum allocation below the MSP, causing the potential exit of that player from the market and a loss of welfare to the Irish economy of up to €740m.

Alternative spectrum rules which would ensure that all operators obtained the MSP are presented in the following section.

6.3 Alternative spectrum rules

There are two suggestions that VP and RRA present here, that would combine to ensure the spectrum outcome would provide the MSPs for all players in the market:

1. ***Lower the total spectrum cap to 2 x 40MHz:*** Tightening the total spectrum cap(s) to promote a wider distribution of spectrum would ensure that all operators would have access to above 1GHz spectrum. If the total spectrum cap is reduced to 2 x 40MHz, then given the total amount of 2 x 140MHz spectrum available at the forthcoming auction, all operators are guaranteed a minimum of 2 x 20MHz of spectrum across all bands.

2. ***Introduce a floor of 2 x 10MHz of contiguous sub-1GHz spectrum:*** a spectrum floor of this type would ensure that all operators would obtain a contiguous amount of sub-1GHz spectrum, which would allow them to compete on a quality basis with any other operator. A spectrum floor of sub-1GHz would not reduce the efficiency of the auction and would not prejudice any operator over another. The only effect this floor would have is to ensure that no operator is left with an unsustainable allocation of sub-1GHz spectrum.

The combination of these two rules, applied in conjunction with ComReg's currently proposed 2 x 20MHz sub-1GHz spectrum cap, would ensure that no operator obtains an allocation lower than the MSP while ensuring that the auction process remains competitive. [redacted] The exhibit below outlines the most probable scenarios that would result if these alternative spectrum rules were applied.

Exhibit 37: Spectrum allocation scenarios given the implementation of the alternative spectrum rules

Scenario 1

Paired MHz	Player 1	Player 2	Player 3	Player 4
800	10	10	0	10
900	10	10	10	5
1800	20	20	20	15
Total	**40**	**40**	**30**	**30**

Scenario 2

Paired MHz	Player 1	Player 2	Player 3	Player 4
800	10	10	0	10
900	10	10	15	0
1800	20	20	20	15
Total	**40**	**40**	**35**	**25**

Scenario 3

Paired MHz	Player 1	Player 2	Player 3	Player 4
800	10	10	10	0
900	10	10	5	10
1800	20	20	20	15
Total	**40**	**40**	**35**	**25**

Source: Value Partners analysis]

It is certain that the current proposed spectrum rules present a very high risk, as they will not ensure a credible MSP for all operators, and will probably produce an outcome where one operator obtains considerably less than the credible MSP.

VP and RRA recommend that ComReg adopt the above alternative spectrum rules in order to ensure a sustainable and competitive four player market going forward and avoid the risk of damage to the Irish economy.

7 Appendix

7.1 Detailed welfare modelling methodology

This appendix gives further detail of the specific modelling methodology used in calculating the welfare impact of one operator obtaining a spectrum allocation of below the MSP in Ireland.

Specifically, this appendix outlines the methodology for the:

- Calibration exercise
- Base line development
- Cournot equilibrium

a) Calibration exercise

The first stage of the modelling was a calibration exercise which calculates the parameters of the assumed linear demand curve P = a – bQ and the symmetric marginal cost.

Given the forecast price and the output for the first year, and the assumed elasticity the model calculates the slope of the demand curve (a) and the choke price (b) by considering a small (0.1%) change in price.

The model calibration uses the parameters a, b and the number of players in the market, N, to calculate the average marginal cost required to produce the Cournot equilibrium price and output values equal to the forecast price and output[36].

b) Base line development

The second stage of the modelling is to calculate a base line development of the demand curve parameters a and b, and the average marginal cost.

c) Cournot equilibrium

The third stage of the modelling process is to establish a Cournot equilibrium in every year of the relevant period for both the factual (i.e. the survival of a four-player Irish mobile market) and the counterfactual (the harm or exit of one of the four Irish mobile operators). The inputs for this computation are the number of operators in the market, the demand curve and the average marginal cost (the parameters for which are calculated in the earlier stages). The outputs of this stage of the model are the price and the quantity of output. Using price, quantity, the demand curve, and the marginal cost, values for consumer and producer surplus can be obtained.

[36] This approach derives the marginal cost assumption that is consistent with the forecast price and output in the base line market development with 4 players as the equilibrium outcome under Cournot competition. An alternative approach would be to specify the marginal cost and derive the equilibrium price and quantity with Cournot competition. The former approach was adopted using the ComReg and Informa forecasts of ARPU and subscribers.

When comparing the inputs into the factual and counterfactual scenarios, it is only the number of operators in the market which changes between the two[37]. While it might be argued that a further difference between the factual and counterfactual would be due to cost differences (either fixed or marginal costs), the analysis abstracts from such differences in order to simplify the analysis[38].

With all the inputs specified, the consumer and producer welfare produced in each year of the 19 year NPV period are calculated for each scenario, and discounted back using the real social discount rate of 6.8% to 2011 values. The difference between the discounted welfare values of the factual and counterfactual is therefore the welfare implication of the difference in the number of players resultant from the two scenarios.

[37] This makes the assumption that the demand conditions in the market and costs are independent of the number of players. While it is possible to envisage scenarios in which that is not the case (for example where the take up of a certain service is materially affected by the number of players promoting it), such effects are uncertain and would add to the complexity of the modelling.

[38] For example, with more operators (i.e. the factual) industry fixed costs will be higher. By contrast, it might be argued that the marginal costs per operator would be lower in the factual if more than the incumbent 900MHz operators have access to this spectrum. In this way, the welfare consequences of these two effects would offset each other to some extent.

Contact information

Value Partners Management Consulting Ltd
Greencoat House
Francis Street
London SW1P 1DH
United Kingdom
Telephone: +44 (0)20 7630 1400
Facsimile: +44 (0)20 7630 7011

chris.cowan@valuepartners.com
daniele.schneeberg@valuepartners.com
michael.rothkopf@valuepartners.com

Value Partners Group
http://www.valuepartners.com

Radio Regulatory Associates Ltd
19 Festival Avenue
Longfield
Kent
DA3 7HR
Tel: + 44(0) 7802 656390
Fax: + 44(0) 1474 704423

brian.last@rraltd.com

http://www.rraltd.com

11. ComReg: Reply to H3GI letter of 22 July 2011 (letter dated 27 July 2011)

Commission for
Communications Regulation

27 July 2011

Mr Mark Hughes
Head of Regulatory
Hutchison 3G Ireland
1 Clarendon Row
Dublin 2

Dear Mr Hughes

Re: COMREG – 800, 900 AND 1800 MHz Consultation Process

I refer to your letter of 22 July, 2011, in response to mine of 8 July, 2011. That letter, in turn, responded to your letter of 5 July, 2011 concerning Ofcom's consultation on the future award of spectrum in the 800 MHz and 2600 MHz bands in the UK.

On behalf of ComReg, I respond as set out below.

We thank you for, and note, your clarification with regard to the particular nature of the submission H3GI intended to make by means of your letter of 5 July.

More specifically, we now note that that submission was to the effect that, in respect of the award of rights of use of spectrum in the 800 MHz, 900 MHz and/or 1800 MHz bands, ComReg should apply a similar approach to that proposed by *Ofcom,* and not that proposed in response to Ofcom's consultation by *Hutchinson 3G UK Limited* ("H3GUK"). In that regard, on page 1 of your letter of 22 July, you specify the five elements of the approach of Ofcom that you urge ComReg to apply in this jurisdiction, and, indeed, the numbered list you provide there mirrors the one you provided on page 3 of your letter of 5 July.

On re-reading the correspondence of 5 July in tandem with that of 22 July, it appears that ComReg's confusion as to the precise nature of H3GI's submission may have arisen from your having first set out Ofcom's proposals, and then having gone on to detail the modifications and clarifications to those proposals considered to be necessary by H3GUK, as well as enclosing a copy of H3GUK's response to Ofcom's consultation in that regard.

An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland
Telephone +353 1 804 9600 *Fax* +353 1 804 9665 *Email* info@comreg.ie *Web* www.comreg.ie

Commission for
Communications Regulation

In any event, whilst ComReg has had regard to H3GUK's response to Ofcom's consultation, you have now clarified the precise material related to the Ofcom consultation to which H3GI would like ComReg to have particular regard, in addition to the Value Partners Management Consulting/Radio Regulatory Associates Limited ("VPMC/RRAL") report enclosed with your letter of 22 July.

By way of final clarification in this connection, however, I would be grateful if you could also confirm that the reference in the penultimate paragraph of your letter of 22 July to the VPMC/RRAL report examining the applicability of Ofcom's analysis to Ireland in a manner *"...adding to the work done by H3GUK..."* is not inconsistent with the above clarification, and, in particular, is not a reference pointing ComReg back in the direction of the H3GUK response to the Ofcom consultation which was enclosed with your letter of 5 July.

Finally, I advise that ComReg will publish this letter and your letter of 22 July together with its enclosure, in due course, and in accordance with its standard process in any consultation. Publication shall as usual be subject to its *Guidelines on the Treatment of Confidential Information* and to any comments you might wish to make in that regard.

Yours sincerely,

Dr. Samuel Ritchie
Spectrum Operations Manager

12. H3GI: Reply to ComReg letter of 27 July 2011 (letter dated 3 August 2011)

[redacted]

Hutchison 3G Ireland Limited
Registered office

3rd Floor
One Clarendon Row,
Dublin 2, Ireland

Registered Number: 316982
Place of Registration: Republic of Ireland

Three.ie

Mr Samuel Ritchie, Manager Spectrum Operations
Commission for Communications Regulation
Abbey Court
Irish Life Centre
Lower Abbey Street
Dublin 1
BY COURIER AND EMAIL: samuel.ritchie@comreg.ie

03 August 2011

Dear Samuel

COMREG – 800, 900 AND 1800 MHZ CONSULTATION PROCESS

I refer to your letter dated 27 July 2011.

In respect of the award of 800, 900 and 1800 MHz bands Hutchison 3G Ireland Limited believes that ComReg should apply a similar approach to that of Ofcom, and have regard to (i) Hutchison 3G UK Limited's non-confidential response to Ofcom's Consultation and (ii) Value Partners Management Consulting and Radio Regulatory Associates Limited independent and objective report.

We look forward to an open-minded and thorough discussion of these issues in your forthcoming consultation.

Yours sincerely

P.P.

MARK HUGHES
Head of Regulatory

Copy: Mr Alex Chisholm, Chairperson, ComReg (alex.chisholm@comreg.ie)

13. H3GI: Letter to ComReg – H3GI extension request to ComReg document 11/60 ““COMREG - 800, 900 AND 1800 MHZ CONSULTATION PROCESS ”” (letter dated 30 August 2011)

Hutchison 3G Ireland Limited
Registered office

3rd Floor
One Clarendon Row,
Dublin 2, Ireland

Registered Number: 316982
Place of Registration: Republic of Ireland

Three.ie

Ms Sinead Devey
Commission for Communications Regulation
Abbey Court
Irish Life Centre
Lower Abbey Street
Dublin 1
BY REGISTERED POST AND EMAIL: sinead.devey@comreg.ie

30 August 2011

Dear Sinead

COMREG – 800, 900 AND 1800 MHZ CONSULTATION PROCESS

I refer to: (i) ComReg Doc. No. 11/60, "Multi-Band Spectrum Release – Release of the 800 MHz, 900 MHz and 1800 MHz radio spectrum bands" and related documents (ComReg Doc. No.s 11/57- 59 and 60(a))("ComReg's 800, 900 and 1800 MHz Consultation"); and (ii) the letter from Mr Tommy McCabe, of IBEC's telecommunications and internet federation ("tif") to Mr Alex Chisholm, Chair of ComReg dated 11 July 2011. For the following reasons, Hutchison 3G Ireland Limited ("H3GI") hereby applies to ComReg for an extension of three weeks to the current deadline of 30 September 2011 for responding to ComReg Doc. No. 11/60:

1. ComReg's 800, 900 and 1800 Consultation raises complex and significant issues. This is acknowledged by ComReg at paragraph 1.3 of ComReg Doc. No. 11/60:

   "All three bands are universally regarded as highly suitable for mobile services by virtue of their propagation properties, enabling wide area coverage, reasonable bandwidth capacity and effective in-building penetration, and hence the ability to provide a high quality national mobile network coverage at reasonable cost. How these bands are assigned will therefore be critical to the development of mobile services in Ireland, affecting in general terms the attainable levels of efficiency, innovation and quality in these services, but also the competitive position of operators as well as the interests of all mobile users. In addition to this factor, there is a considerable element of technical complexity associated with planning for an award across different bands with licences held by the different operators for varying periods of time. One measure of this is the volume of material this process has generated - to date, over 1700 pages of external submissions and expert reports. ComReg has therefore approached this process with considerable care and attention, based on a very full and thorough examination of all relevant options, in the light of all the economic, legal and technical material available to it."

2. It raises issues and provides detail that were never raised or provided before.

3. It extends to several hundred pages and involves both an economic and technical report.

Hutchison 3G Ireland Limited
Registered office

3rd Floor
One Clarendon Row,
Dublin 2, Ireland

Registered Number: 316982
Place of Registration: Republic of Ireland

Three.ie

4. Whilst *"ComReg notes the significant amount of detail already in the public domain …"*, ComReg's updated view in respect of this detail is only known now.

5. It is disproportionate for ComReg to take just short of seven months since the deadline for responding to ComReg Doc. No. 10/105, *"Inclusion of the 1800 MHz Band into the Proposed joint award of 800 MHz and 900 MHz Spectrum"*, to prepare ComReg's 800, 900 and 1800 Consultation and only provide marginally in excess of five working weeks to respondents to respond to ComReg's consultation.

6. ComReg will be publishing over the coming weeks a further consultation document, namely a draft Information Memorandum setting out detailed rules for the proposed auction.

7. This request is in line with that submitted by IBEC's tif to ComReg on 11 July 2011 (referred to above).

Yours sincerely

MARK HUGHES
Head of Regulatory

Copy: Mr Samuel Ritchie, ComReg (samuel.ritchie@comreg.ie)

14. H3GI: Letter to ComReg" COMREG DOC. NO.S 11/60, 11/60A AND 11/58” (letter dated 23 September 2011)

Hutchison 3G Ireland Limited
Registered office

3rd Floor
One Clarendon Row,
Dublin 2, Ireland

Registered Number: 316982
Place of Registration: Republic of Ireland

Three.ie

Dr Samuel Ritchie, Manager Spectrum Operations
Commission for Communications Regulation
Abbey Court
Irish Life Centre
Lower Abbey Street
Dublin 1
BY COURIER AND EMAIL: samuel.ritchie@comreg.ie

23 September 2011

Dear Samuel

COMREG DOC. NO.S 11/60, 11/60A AND 11/58

I refer to ComReg Doc. No. 11/60, *"Multi-Band Spectrum Release – Release of the 800 MHz, 900 MHz and 1800 MHz radio spectrum bands"* ("ComReg's Response to Consultation"), ComReg Doc. No. 11/60a, *"Multi-Band Spectrum Release – This document contains annexes relevant to publication 11/60"* and ComReg Doc. No. 11/58, *"Economic Consultant's Report – Issues relating to the award of spectrum in multiple bands in Ireland"* ("DotEcon's Issues Report").

For the purposes of properly considering and responding to ComReg's Response to Consultation, Hutchison 3G Ireland Limited ("H3GI") would appreciate if you could provide the following confirmation and clarification as a matter of urgency.

At paragraph 4.44 of ComReg's Response to Consultation, ComReg states:

"ComReg also agrees with DotEcon's conclusions in Section 4.4 of its Report (11/58), regarding H3GI's submission that ComReg should impose spectrum floors in order to ensure effective market competition. While this maybe a reasonable action for Ofcom to take in its particular circumstances, there is not a compelling basis for ComReg to do likewise, given the patently different market conditions between Ireland and the UK and the fact that other features of the proposed multi-band award are different. …."

Please confirm whether ComReg is referring exclusively to the different market conditions between Ireland and the UK and features of the proposed multi-band award in Ireland and the UK referred to by DotEcon in DotEcon's Issues Report.

At paragraph 156 of DotEcon's Issues Report, DotEcon states:

"... In addition, the proposed safeguards of competition will be implemented in a market with characteristics that are uncommon in other countries ….."

Please clarify what these characteristics are.

Hutchison 3G Ireland Limited
Registered office

3rd Floor
One Clarendon Row,
Dublin 2, Ireland

Registered Number: 316982
Place of Registration: Republic of Ireland

Three.ie

At paragraph 164 of DotEcon's Issues Report, DotEcon states:

" … Ofcom's assessment clearly does not rule out the possibility that three competitors might be sufficient to protect competition in Ireland, or four competitors in which only three are reasonably symmetric national network operators with additional network operators having a more limited geographical focus."

Please confirm whether ComReg shares DotEcon's belief that it is possible that three competitors or four competitors in which only three are reasonably symmetric national network operators with additional network operators having a more limited geographical focus might be sufficient to protect competition in Ireland.

Yours sincerely

MARK HUGHES
Head of Regulatory

15. Telefonica Ireland: Letter to ComReg ”Proposed Assignment of Spectrum in the 800MHz, 900MHz,and 1800MHz Bands - Minimum Price” (letter dated 5 August 2011)

5th August 2011

Mr. George Merrigan
Commission for Communication Regulation
Irish Life Centre
Lower Abbey Street
Dublin 1

Dear Mr. Merrigan

Proposed Assignment of Spectrum in the 800MHz, 900MHz, and 1800MHz Bands – Minimum Price

I refer to ComReg's proposal to assign spectrum in the above bands. As you will be aware, Telefonica Ireland disagreed with several aspects of the approach proposed by ComReg in determining an appropriate minimum price for the spectrum.

It is our understanding that ComReg will presently issue a further document for consultation, which will outline updated proposals for the assignment. We would expect that this will include a revised and updated determination of the appropriate minimum price. We would note that there have been a number of assignments of spectrum in Europe since ComReg last issued a proposal on this subject, including most recently the multi-band assignment which concluded in Spain last week. We would expect that this information will be taken into account appropriately in ComReg's next proposal.

We look forward to seeing the document soon.

Yours sincerely,

Tom Hickey

CC: Samuel Ritchie

16. ComReg: Reply to Telefonica Ireland letter of 5 August 2011 (letter dated 9 August 2011)

Commission for
Communications Regulation

9 August 2011

Mr Tom Hickey
Telefónica O2 Ireland Limited
Sir John Rogerson's Quay
Docklands
Dublin 2

Ref: Proposed Assignment of Spectrum in the 800MHz, 900MHz and 1800MHz bands – Minimum Price

Dear Tom,

I am responding to your letter to George Merrigan of 5 August.

I can confirm that ComReg will shortly be issuing its response to consultation and draft decision on its broader spectrum release proposals and that this document will be accompanied by, amongst other things, an updated benchmarking report on minimum prices. While this update takes into account a number of recent auction outcomes (and updates of previous data) it does not, at this stage, include the recent Spanish spectrum auction results referred to in your letter.

I can, however, assure you that it is ComReg's intention to take into account any recent relevant data that comes to light, including the recent Spanish spectrum auction results, before setting out its final decision on this matter.

Yours sincerely

Dr. Samuel Ritchie
Manger Spectrum Operations

An Coimisiún um Rialáil Cumarsáide
Commission for Communications Regulation
Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland
Telephone +353 1 804 9600 *Fax* +353 1 804 9665 *Email* info@comreg.ie *Web* www.comreg.ie

17. Telefonica Ireland: Letter to ComReg – Telefonica extension request to ComReg document 11/60 “ComReg Document 11/60 Proposed Release of Spectrum in the 800MHz, 900MHz, and 1800MHz Bands” (letter dated 30 August 2011)

30th August 2011

Mr. George Merrigan
Commission for Communication Regulation
Irish Life Centre
Lower Abbey Street
Dublin 1

Dear Mr. Merrigan

ComReg Document 11/60 Proposed Release of Spectrum in the 800MHz, 900MHz, and 1800MHz Bands

Telefonica Ireland is pleased that that ComReg has issued the above document, it has been long anticipated, and it is a necessary step prior to ComReg's planned assignment of spectrum.

Based on our experience of the consultation process to date, Telefonica is concerned that the timetable outlined by ComReg leading to the availability of spectrum in 2013 is already tight and it is not our desire to see any unnecessary delay in the process. Any delay would impact on network modifications that might be required following the assignment; however we also note that ComReg has just issued the most substantial collection of documents in this process to date. It addresses a broad range of detailed and intricate considerations from regulation, to spectrum engineering, to consumer services. As we have stated previously, this is a complex subject but one that is of critical importance for both operators and consumers. It is also noted that part of the documentation – non-confidential correspondence received by ComReg has yet to be published.

ComReg has requested that responses to this document are received no later than 30th September 2011, allowing just five full weeks for responses to be submitted. Given the above, Telefonica does not believe ComReg has given adequate time for the consultation document to be analysed and answered. Telefonica Ireland will not be able to provide a fully considered response within that time.

Telefonica Ireland now requests that ComReg extend the consultation period to 28th October 2011. In order to be able to schedule work correctly, and to benefit from the extended consultation period,

Telefónica Ireland Limited
28-29 Sir John Rogerson's Quay
Docklands
Dublin 2
Ireland
T +353 (0)1 609 5000
www.telefonica.com

this must be known as soon as possible. Telefonica requests that ComReg respond to this request by return.

Yours sincerely,

Tom Hickey

A2. Publication of Draft Decision from ComReg Document 11/60 (Chapter 8) in editable format.

One respondent (see Meteor email of 6 September 2011, Document 6 in Section A.1 of this document) requested that ComReg make Chapter 8 from ComReg document 11/60 available in editable format. ComReg has provided an editable version of this chapter in the following pages. Please note that in the event of any discrepancy between the version of Chapter 8 presented below in this document and the version contained within ComReg Document 11/60, the latter will take precedence.

Chapter 8 – Draft Decision

This chapter sets out, in draft form, a decision document based on the preliminary conclusions arrived at by ComReg in the preceding chapters.

1. DEFINITIONS AND INTERPRETATION

In this Decision, save where the context otherwise admits or requires:

"Advanced Commencement Date" means a date earlier than the proposed commencement date of Temporal Lot 1, from which a particular Liberalised-Use Licence commences;

"Authorisation Regulations" means the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations, 2011 (S.I. No. 335 of 2011);

"Communications Regulation Act 2002" means the Communications Regulation Act, 2002, (No. 20 of 2002), as amended;

"ComReg" means the Commission for Communications Regulation, established under section 6 of the Communications Regulation Act, 2002;

"Existing GSM Licensee" means a person with GSM 900 MHz and/or 1800 MHz rights of use existing on the day before the commencement of the auction described in section 3.3 of this Decision;

"Framework Regulations" means the European Communities (Electronic Communications Networks and Services) (Framework) Regulations 2011, (S.I. No. 333 of 2011);

"GSM Amendment Regulations" means the European Communities (Public Pan-European Cellular Digital Land-Based Mobile Communications) Regulations 2010 (S.I. No. 195 of 2010), made under section 3 of the European Communities Act 1972 (No. 27 of 1972) for the purpose of giving effect to Directive 87/372/EEC, as amended by Directive 2009/114/EC;

"Liberalised-Use Licences" means licences of the type set out in draft form in Annex 8 to ComReg Document 11/60 and described in [Regulation XX] of the Liberalised-Use Licence Regulations;

“Liberalised-Use Licence Regulations” means the Wireless Telegraphy [(…….)] Regulations as set out in draft form in [Annex XX] to ComReg Document 11/YY [FORTHCOMING DRAFT INFORMATION MEMORANDUM];

“Minister” means the Minister for Communications, Energy and Natural Resources;

“New Entrant” means a person who is not an Existing GSM Licensee;

“Preparatory Licence” means licences granted under the Wireless Telegraphy Act 1926 as set out in draft form in [Annex XX] to ComReg Document 11/YY [FORTHCOMING DRAFT INFORMATION MEMORANDUM] and described in [Regulation XX] of the Preparatory Licence Regulations;

“Preparatory Licence Regulations” means the Wireless Telegraphy [(…….)] Regulations as set out in draft form in [Annex XX] to ComReg Document 11/YY [FORTHCOMING DRAFT INFORMATION MEMORANDUM]

“RIA” means Regulatory Impact Assessment;

“Wireless Telegraphy Act 1926” means the Wireless Telegraphy Act, 1926, as amended.

2. DECISION-MAKING CONSIDERATIONS

2.1 ComReg has made this Decision having regard to:

(i) the contents of, and the materials and reasoning referred to in, as well as the materials provided by respondents in connection with, the below-listed ComReg documents:

a. 08/57;

b. 09/14;

c. 09/99;

d. 10/59;

e. 10/71;

f. 10/105;

g. 11/11;

h. 11/29;

i. 11/60;

j. 11/YY [FORTHCOMING DRAFT INFORMATION MEMORANDUM]; and

k. 11/ZZ [FINAL RESPONSE TO CONSULTATION AND DECISION DOCUMENTS];

(ii) the consultants' reports commissioned, and the advice obtained, by ComReg in relation to the subject-matter of the documents and materials listed above;

(iii) the powers, functions, objectives and duties of ComReg, including, without limitation those under and by virtue of:

a. the Communications Regulation Act 2002, and, in particular, sections 10, 12 and 13 thereof;

b. the applicable Policy Directions made by the Minister under Section 13 of the Communications Regulation Act 2002;

c. the Framework Regulations, and, in particular, Regulations 13, 16 and 17 thereof;

d. the Authorisation Regulations, and, in particular, Regulations 9, 10, 11, 12 and 18(1)(c) thereof;

e. Regulation 6(1) of the Access Regulations;

f. the GSM Amendment Regulations;

g. Decision 2009/766/EC of 16 October, 2009, on the harmonisation of the 900 MHz and 1,800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community;

h. Decision 2010/267/EU of 6 May, 2010, on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union; and

i. Sections 5 and 6 of the Wireless Telegraphy Act, 1926,

and noting that it has

a. given all interested parties the opportunity to express their views and make their submissions in accordance with Regulation 11 of the Authorisation Regulations and Regulation 12 of the Framework Regulations; and

b. evaluated the matters to be decided, in accordance with its obligations pursuant to, *inter alia,* ComReg's RIA Guidelines (ComReg Document 07/56a) and the RIA Guidelines issued by the Department of An Taoiseach in June, 2009.

3. DECISION

ComReg hereby decides:

3.1. subject to obtaining the consent of the Minister to the making by it of the Preparatory Licence Regulations and the Liberalised-Use Licence Regulations, to make those regulations under section 6 of the Wireless Telegraphy Act 1926, prescribing relevant matters in relation to Preparatory Licences and Liberalised-Use Licences, including prescribing the form of the licences concerned, their duration and the conditions and restrictions subject to which they are granted.

3.2. under section 5 of the Wireless Telegraphy Act 1926, and pursuant to the Preparatory Licence Regulations and the Liberalised-Use Licence Regulations as made following the obtaining of ministerial consent, to grant a limited number of Preparatory Licences, and Liberalised-Use Licences and individual rights of use in respect of spectrum in the 800, 900 and 1800 MHz frequency bands, respectively.

3.3. to select those to whom the Liberalised-Use Licences and rights of use will be granted (hereafter referred to as "Eligible Parties") by means of a competitive selection procedure comprising of a combinatorial clock auction which will more particularly be described in [FORTHCOMING DRAFT INFORMATION MEMORANDUM], in which (without prejudice to the terms of the Information Memorandum), parties wishing to become Eligible Parties will bid for assignments and rights of use of spectrum in the 800, 900 and/or 1800 MHz frequency bands, in an auction process incorporating, *inter alia,* the following elements:

3.3.1. two temporal lots in which rights of use of spectrum in the 800, 900 and 1800 MHz frequency bands will be granted, *viz*:

3.3.1.1 Temporal Lot 1: which is currently intended to commence on 1 February 2013 (or, where applicable, the Advanced Commencement Date) and which shall run until 12 July 2015; and

3.3.1.2 Temporal Lot 2: From 13 July 2015 to 12 July 2030.

3.3.2 multiple combinatorial clock rounds, in each round of which the auctioneer will set the price for each type of lot, and bidders will bid, subject to detailed activity rules to be set out in the Information Memorandum, for packages of lots of spectrum at that price, until supply exceeds demand at the round price.

3.3.3 a single, sealed bid, supplemental round following the combinatorial clock rounds, in which bidders will be entitled, again subject to detailed rules to be set out in [FORTHCOMING DRAFT INFORMATION MEMORANDUM], to submit a bid price of their choosing, in respect of packages of spectrum. An algorithm will be provided in the Information Memorandum, which will allow a bidder who had won lots in the combinatorial clock rounds, to calculate the minimum price that it would need to bid to be guaranteed to win those lots in the supplemental round. A second price rule will then be applied to calculate the price actually payable by winners in the auction.

3.3.4 an assignment round in which bidders will bid for the location of their lots in the relevant frequency bands and part of which round is described further in section 3.3.11 below.

3.3.5 a constraint whereby only assignment options that ensured contiguous spectrum assignments across Temporal Lot 1 and 2 for Eligible Bidders winning the same amount of spectrum rights in Temporal Lot 1 and 2 would be presented to Eligible Bidders.

3.3.6 the possibility of a Liberalised-Use Licence for the 900 MHz frequency band being granted in which the rights of use of certain spectrum would commence earlier than the proposed commencement date for Temporal Lot 1 identified above where an Existing GSM Licensee won rights to blocks A and B or where a New Entrant won rights to block A in the 900 MHz assignment round.

3.3.7 the possibility of a Liberalised-Use Licence, or Liberalised-Use Licences for the 1800 MHz frequency band being granted in which the rights of

use of spectrum would commence earlier than the proposed commencement date for Temporal Lot 1 identified above which would be determined following the outcome of the proposed 1800 MHz assignment round.

3.3.8 the ability for an Existing GSM Licensee with GSM rights of use which are intended to continue after the proposed commencement date for Temporal Lot 1 to relinquish its existing GSM 900 MHz and/or 1800 MHz spectrum rights contingent on it winning at least the same quantum of liberalised 900 MHz and/or 1800 MHz spectrum rights in the same Time Slice ("Early Liberalisation Option"). Where such an Existing GSM Licensee availed of the Early Liberalisation Option for its existing GSM 900 MHz and/or 1800 MHz spectrum rights, a rebate would be provided to the Existing GSM Licensee.

3.3.9 auction spectrum caps of:

- 2 × 50 MHz in the 800 MHz, 900 MHz and 1800 MHz frequency bands;
- 2 × 20 MHz in the 800 MHz and 900 MHz frequency bands; and
- 2 x 10 MHz in the 900 MHz band, for Temporal Lot 1.

3.3.10 an ability on the part of bidders to switch their bidding demand between the 800 MHz, 900 MHz and 1800 MHz frequency bands through an auction activity rule based on a system of eligibility points whereby twice as many eligibility points would be assigned to the 800 MHz and 900 MHz lots as against the 1800 MHz lot category and where such eligibility points would not be transferrable between Temporal Lot 1 and 2. Further detail on the activity rules will be set out in [FORTHCOMING DRAFT INFORMATION MEMORANDUM]

3.3.11 an assignment round in which, amongst other things, all GSM 900 MHz and 1800 MHz frequency rights existing in Time Slice 1 will be included and where, amongst other things, all such rights holders will be required to participate to determine the location of these existing GSM frequency rights in Temporal Lot 1. Where an Existing GSM Licensee does not avail of the Early Liberalisation Option in Temporal Lot 1 and does not win spectrum rights in Temporal Lot 2 compensation will be provided for the relocation costs it incurs further to the assignment round. Where an Existing GSM Licensee does not avail of the Early Liberalisation Option in Temporal Lot 1 and wins spectrum rights in Temporal Lot 2 compensation will be provided only for the additional "time value of

money" costs (but not for relocation costs themselves) to Existing GSM Licensee having regard to the following factors:

- an appropriate Weighted Average Cost of Capital (WACC);
- changes in the relocation costs for the time period between when these costs are actually incurred and when they would have incurred in the future if there had been no assignment round; and
- pro-rata to the quantum of time involved.

3.3.12 minimum price for licences with liberalised rights of use to 800, 900 and 1800 MHz spectrum bands as follows:

- for a Liberalised-Use Licence in Temporal Lot 1:
  - the reserve price would be €3.34 million with Spectrum Usage Fees (SUFs) of €1.21 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 800 MHz or 900 MHz spectrum;
  - the reserve price would be €1.67 million with SUFs of €0.60 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 1800 MHz spectrum;
  - SUFs would be subject to a simple form of indexation reflecting the annual rate of inflation using the CPI published by the Central Statistics Office; and
- for a Liberalised-Use Licence in Temporal Lot 2:
  - the reserve price would be €8.48 million with SUFs of €1.21 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 800 or 900 MHz spectrum;
  - the reserve price would be €4.24 million with SUFs of €0.60 million per annum for each 2 × 5 MHz lot of liberalised rights of use in respect of 1800 MHz spectrum; and
  - SUFs would be subject to a simple form of indexation reflecting the annual rate of inflation using the CPI published by the Central Statistics Office

3.3.13 additional SUFs for each day a Liberalised-Use Licence commences earlier than the proposed commencement date for Temporal Lot 1, based on the applicable SUFs identified above.

3.3.14 an agreement on the part of all Eligible Parties - if successful in winning any liberalised rights of use in the 900 MHz and 1800 MHz frequency bands - to participate in the establishment and implementation of a Project Plan that would identify project milestones and related deliverables concerning transitional activities required to be completed by Eligible Parties prior to the commencement of Liberalised-Use Licences in Temporal Lot 1, including agreement to the payment of

liquidated damages where an Eligible Party fails to discharge their obligations in accordance with the milestones set out in the Project Plan.

3.4 upon application properly being made to it by Eligible Parties within the terms of the Liberalised-Use Licence Regulations as made following the obtaining of ministerial consent, and on payment of the Fees prescribed thereby, to grant Liberalised-Use Licences to Eligible Parties, under section 5 of the Wireless Telegraphy Act 1926 for the period, and subject to the conditions and restrictions (including conditions as to revocation), prescribed in the such Liberalised-Use Licence Regulations, including, as appropriate, the schedules to the Liberalised-Use Licences as set out in [Annex XX] to ComReg Document [11/xx] [FORTHCOMING DRAFT INFORMATION MEMORANDUM].

3.5 upon application properly being made to it by Eligible Parties within the terms of the Preparatory Licence Regulations as made following the obtaining of ministerial consent, to grant Preparatory Licences to Eligible Parties, under section 5 of the Wireless Telegraphy Act 1926 for the period, and subject to the conditions and restrictions (including conditions as to revocation), prescribed in the such Preparatory Licence Regulations, including, as appropriate, the schedules to the Preparatory Licences as set out in [Annex XX] to ComReg Document [11/xx] [FORTHCOMING DRAFT INFORMATION MEMORANDUM].

4. STATUTORY POWERS NOT AFFECTED

4.1. Nothing in this Decision shall operate to limit ComReg in the exercise of discretions or powers, or the performance of functions or duties, or the attainment of objectives under any primary or secondary legislation applicable to ComReg from time to time.

ALEX CHISHOLM

CHAIRPERSON

THE COMMISSION FOR COMMUNICATIONS REGULATION

THE DAY OF 2011

Annex aa – Draft Liberalised-Use Licence Regulations and Draft Preparatory Licence Regulations [FORTHCOMING DRAFT INFORMATION MEMORANDUM]

Annex bb – Draft Liberalised-Use Licence [FORTHCOMING DRAFT INFORMATION MEMORANDUM] and Draft Schedules [Annex 8 of COMREG DOCUMENT 11/60]

Annex cc – Draft Preparatory Licence and Draft Schedules [FORTHCOMING DRAFT INFORMATION MEMORANDUM]