Commission for
Communications Regulation

Response to Consultation

Response to the Consultation on a Strategy for Management of the Radio Spectrum.

An Analysis of Responses Received and Comment on those Responses by the Commission.

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Contents

1 Foreword

This document is ComReg's analysis of the responses received to the consultation document, ComReg 05/01, "Preparing the Radio Spectrum Management Strategy for 2005 - 2007", published on 9 January 2005. In the consultation, we examined the key drivers affecting spectrum demand, the economic impact of spectrum usage and put forward a series of proposals to build upon Ireland's strengths in this area.

A total of thirty five responses were received by the closing date and ComReg was delighted by the positive and constructive nature of the majority of responses. Reflecting the broad scope of the consultation document, the respondents focused on many different areas, providing valuable insight to the various sectors. Respondents put forward a number of helpful suggestions on how we might develop our Spectrum Strategy and achieve the specific goals we have declared.

I intend to publish the final Spectrum Strategy Statement in the coming months having taken into account all the input received and analysed in this document. In the meantime I would like to express my gratitude to all those who responded to the consultation.

Isolde Goggin
Chairperson
Commission for Communications Regulation

2 List of Respondents

The thirty five respondents to the consultation were, in alphabetical order:

- Abundant Life Church
- Anne Newell
- Brian Duffield
- Carol MacGuinness
- Centre for Justice & Liberty
- Chorus
- Chris Bower
- Competition Authority
- eircom
- Esat
- ESB Telecom
- Evangelical Alliance Ireland
- Focus on the Family Ireland
- Forfás
- Futurepace Solutions
- Gary Hill
- Gerard Shanahan
- Intel Corporation
- Irish Christian Broadcasters
- JP Walsh
- Kevin Fitzgibbon
- Met Éireann
- Mona Evans
- ntl
- Oak Global
- O2
- Paddy Monaghan
- Peter Finch
- Roisín Ní Cheallaigh
- Scagaire
- Sean Dooley

- Three
- Tom MacGuinness
- TV3
- Vodafone

With the exception of material marked confidential, the written responses are available for inspection at the Commission for Communications Regulation office in Dublin.

3 Responses to issues raised in the Consultation

3.1 ComReg strategic options to ensure correct engagement with regional and specifically European Union issues.

3.1.1 Summary of Consultation Topic (Q1 and Q2)

As the telecommunications regulator for Ireland, ComReg plays an active role at both the global and regional (European) level through the International Telecommunications Union (ITU), the European Union (EU) and the European Conference of Post and Telecommunications Administrations (CEPT). A number of key objectives were proposed for ComReg's strategy at the global and regional framework levels and views were requested on any further strategic options that should be considered.

3.1.2 Summary of Responses

Eight of the eleven responses to these questions broadly supported the proposed key elements of ComReg's strategy. One of these suggested that it would be beneficial to prioritise these elements. Another commented that ComReg should realise the difference between services without specific social or cultural functions (citing telephony as an example) and those (e.g. broadcasting) that may have obligations in these areas to fulfil. A further respondent felt that in addition to the elements identified, ComReg should be supportive of international activities relating to the use of new technologies in specific frequency bands, such as 2.6 GHz.

One respondent suggested that ComReg should also monitor developments in ITU Regions 1 and 3 (the Americas and Far East / Australasia) as Ireland might be able to gain competitive advantage by being first to introduce North American or Asian standards in Europe. It was also suggested that ComReg should consider if further mechanisms could be developed to relay additional information to national and industry fora. A second respondent raised a similar point, noting that the spectrum strategy should provide transparency at a national level along with regular updates on key topics being considered in the ITU. Another raised concerns about areas where specific issues or proposals may give rise to conflict. This respondent also noted the significant benefits that can be accrued from international standards and the facilitation of common international services (citing GSM and 3G mobile as examples). This respondent proposed that ComReg's objectives should flow from the European Framework. Another respondent suggested that ComReg and other NRAs should feed information relating to demand for spectrum into the process for allocating bands.

One respondent noted that urgent reform of the Wireless Telegraphy Act was required to ensure compatibility with the current European Framework.
Another respondent was concerned that scientific uses of radio spectrum such as the monitoring of passive emissions and monitoring of weather conditions should be protected from interference. This respondent also noted the contribution of scientific radio services to the public good and pointed out that alternative bands cannot be used for these services. Specific concerns in this

regard were raised about the potential impact of the use of the 24 GHz band for Automotive Short Range Radar and Ultra Wide Band (UWB) devices.

3.1.3 Comment by the Commission

ComReg is grateful for the points made in response to these questions and will endeavour to reflect the concerns raised on specific issues in the final version of the strategy document.

In line with Ministerial Policy Direction[1], ComReg must take into account the interests of all radio spectrum users and differentiating between services based on social or cultural functions would not be appropriate.

ComReg will continue to actively participate in international spectrum management activities in order to promote the best interests of Irish consumers and the radiocommunications industry.

With regard to international activities and developments, ComReg currently publishes information relating to major developments such as World or Regional Radio Conferences and will explore ways to improve further the flow of information in this area. The national position on topics under consideration in the ITU is formulated by a National Preparatory Group (NPG) under the auspices of the Department of Communications, Marine and Natural Resources. For this reason it is not appropriate for ComReg to present the national position. However, it is fitting that future strategy documents highlight relevant issues and the options under consideration.

3.2 General assessment of the economic and social impact of radio spectrum (Q3)

3.2.1 Summary of Consultation Topic

Views were requested on whether there was any further detail that should be taken into account in the general assessment of the economic and social impact of the radio spectrum.

3.2.2 Summary of Responses

There were ten responses to this question. All of those who commented welcomed the research undertaken and were broadly in agreement with ComReg that radio spectrum makes an important contribution to the Irish economy. One respondent felt that there were significant social and economic benefits to be had from ubiquitous broadband penetration from a consumer, e-government and broad national perspective, and that barriers to broadband deployments, particularly wireless, need to be identified and resolved.

[1] Directions by the Minister for Communications Marine and Natural Resources to the Commission for Communications Regulation under s. 13 of the Communications Regulation Act 2002

However three respondents queried the accuracy of the figures for the broadcasting (one reply) and mobile phone sectors (two replies), arguing that the figures should be higher. Two of these respondents provided additional information which has been used to update ComReg information.

One respondent noted that revenue leaves the Irish economy each year via BSkyB's share of the Irish TV market. ComReg should therefore keep this factor in mind and encourage an Irish alternative to BSkyB. This respondent also urged ComReg to seek ways to encourage indigenous Irish broadcasters, given the popularity of UK based broadcast signals in Ireland and noting that the latter are outside the scope of Irish regulation. The respondent also commented on the impact of state subvention of RTÉ in this context.

One respondent raised the concern that producer and consumer surpluses should not be used as precise tools to make decisions on specific spectrum allocations and that policies should reflect a series of factors including public demand for entertainment services. The importance of broadcasting from a political, social and cultural perspective was raised in another reply. This respondent was concerned that community radio was not mentioned in the consultation and felt that the approach taken did not capture the social impact of broadcasting, resulting in an incomplete impact assessment.

Another respondent felt that due recognition should be given to the economic aspects of meteorological and environmental uses of radio spectrum. For example warnings of hazardous weather conditions lead to a mitigation of the loss of life and damage to property that might otherwise result and such warnings are dependent on real-time measurements of weather conditions, many of which use radio spectrum.

One respondent noted the contribution of radiocommunications to the safe and secure operation of national infrastructure such as power and transport. Another commented that Ireland is developing a significant internationally traded sector based around wireless software and applications with significant potential to develop further.

A further respondent referenced work on welfare analysis[2] for spectrum usage and suggested that this approach may have been more thorough than that of most economists in the area of spectrum policy.

With regard to outsourced management of spectrum one respondent replied that considerable benefit can be derived from the implementation of a management system which can operate from and feed data into a single national online database of licences.

3.2.3 Comment by the Commission

The additional information provided has been used to revise the GDP and employment estimates given in Section B.4.3 of the Consultation. The updated

[2] Hazlett; http://www.manhattan-institute.org/html/hazlett.htm

table of GDP and employment impacts associated with broadcasting are given in the table below.

Table 1: GDP and employment impacts associated with broadcasting

	GDP		Employment	
	2002	2003	2002	2003
TV and radio	148	188	3408	3403
Advertising industry	50	53	510	534
Sub-total	189	241	3918	3937
Multiplier effects	19	24	392	394
Total	208	265	4310	4331

Source: Indepen and Aegis analysis, Company annual reports

ComReg agrees that the consumer surplus figures used in the consultation may underestimate the benefits, given the popularity of UK terrestrial services here, which are financed by the UK television licence. In relation to the satellite TV services, ComReg accepts that the GDP figure may be negatively impacted (in 2003 BSkyB Irish revenue was approximately £93 million) but also considers that in the context of this analysis an argument could be made that some revenues may be retained as a result of marketing operations, satellite dish retailers/installers etc. It could also be argued that consumers derive benefit from these services, although as mentioned in the consultation, pay-TV operators are normally adept at extracting the entire consumer surplus in price setting.

In relation to one of the comments on the contribution made by the mobile sector and whether the benefits may have been under-estimated, the research commissioned by ComReg has taken a more conservative approach and excluded some of the indirect inputs to the sector which may explain some of the differences in their estimates of the contribution to GDP. For example, the respondent provided national data on the UK telecommunications sector which was similar to the estimate for the Irish mobile sector in their research, indicating that more of the indirect input to the sector has been counted in their estimate. In addition, there are some activities which take place in the UK, such as the manufacture of handsets and other equipment which do not take place in Ireland and would also result in a smaller estimate of the GDP contribution in Ireland compared to the UK.

In relation to another comment on whether all benefits had been considered in the analysis, ComReg confirms that the employment and GDP contributions of independent mobile retailers such as Carphone Warehouse have been included. ComReg also confirms that Meteor is included in the calculation of profit/producer surplus but that Three is not, as it was not operating in the years in question. In relation to both of the respondents' comments on the calculation of the return on capital employed (ROCE) ComReg refers readers to the response to consultation document 04/118[3], which has addressed the issues raised.

[3] ComReg doc. 04/118: Market Analysis – Wholesale Mobile Access and Call Origination, 9 December 2004.

ComReg agrees that GDP does not capture many of the social aspects of the contribution of broadcasting spectrum and that it is a partial, albeit commonly used measure of welfare. The data included in the GDP calculation for broadcasting includes estimates for commercial radio but does not include estimates for community radio due to a lack of available data. ComReg considers that the consumer surplus measure, included in the analysis, goes a step closer in capturing the social benefits from broadcasting to the extent that these are perceived by individuals. The consumer surplus is the amount that consumers benefit by being able to purchase a product for a price that is less than they would be willing to pay. The measure used in the analysis started with the surplus associated with RTÉ services (TV and radio) and then rated this upwards by using TV audience share data to give a total for all services. ComReg also acknowledges that certain activities which use radio spectrum such as to meteorological or power services also make a contribution to the economy but data limitations mean that this cannot be accurately measured in this research.

ComReg considers that the measures of GDP, employment, consumer and producer surplus are very useful tools to focus and inform the spectrum strategy but agrees that there are other considerations to be taken into account when managing the radio spectrum.

3.3 Key Strategic Goals for Spectrum Management (Q4 and Q5)

3.3.1 Summary of Consultation Topic

Views were requested on the proposed policies for ComReg with regard to:

- Facilitating access to radio spectrum
- Maximising economic and social benefits
- Promoting the efficient use of scarce spectrum resources and
- Ensuring compliance with national and international requirements and the avoidance of harmful interference. (Q4)

In addition, views were sought on whether there were any further broad strategic issues that would be appropriate for consideration (Q5).

3.3.2 Summary of Responses

There were eight responses to Q4 and ten responses to Q5. Five of the respondents agreed in general with the proposed strategic goals. One of these suggested that the strategic goals should be prioritised as this would be beneficial for the future management of spectrum and provide an indication to industry of what ComReg views as the most important aspects for the future. Another respondent considered that the strategic aim of ensuring compliance with national and international requirements and the avoidance of harmful interference were the most important areas. This respondent also felt that it was important that ComReg's strategy with regard to interference continues to be proactive especially when considering spectrum trading and liberalisation.

One respondent considered that benefits could be gained by harmonising spectrum licensing policies through support of global standards and industries working towards worldwide mass market consumer systems. However another respondent cautioned that international agreements are not always of direct benefit to Ireland and a pragmatic approach should sometimes be taken where ComReg should support updates or renegotiation of these agreements.

Additional broad strategic issues proposed were:

- ComReg could pursue the strategic aim of "being a leader in Europe" by adopting and implementing new initiatives under consideration across Europe and introducing technologies from other parts of the world. It was proposed that ComReg should include an additional action (under section 7.3.2 of the draft Spectrum Strategy document) to develop a programme to promote, communicate and publicise Ireland's strengths.
- The role that spectrum can play in promoting regional development.
- The objective of achieving a healthy, vibrant and competitive industry which competes on both services and infrastructure.
- Reform of the Wireless Telegraphy Acts.
- A strategic goal that addresses the "sunset" of economic regulation, as the ultimate goal of regulation is to develop competitive conditions such that economic regulation is not required and only need to address technical regulation.

In addition to the remarks and suggestions above, a number of the respondents raised specific issues that were relevant to the strategic goals. These included:

- Use of web-based online transmitter certification and authorisation services.
- Including power utilities in the grouping which refers to Safety of Life / Emergency Systems.
- The need to preserve spectrum for mass market applications and where possible to adopt an internationally harmonised approach in all frequency bands.
- The principle of non-discrimination in defining licence conditions for any new licences.
- The current and future benefits of the mobile networks in extending broadband access.

3.3.3 Comment by the Commission

ComReg welcomes the suggestions made regarding additional strategic issues that should be addressed. A number of the additional broad strategic issues raised will be included in the spectrum strategy. ComReg is committed to promoting innovation and maximising awareness of opportunities, such as the

recently enhanced licensing scheme for radio tests and trials. Ensuring a healthy and competitive electronic communications industry is already part of ComReg's wider brief as the national regulatory authority.

Regarding the more detailed issues mentioned, ComReg has already started the implementation of some on-line customer services, for example, the registration scheme for 5.8 GHz fixed wireless access networks/metropolitan area networks. ComReg is committed to extending this facility across the range of licensed services.

ComReg recognises the critical importance of spectrum for utility supplies. Whilst these services do not fit into the same category as the Gardaí, fire and ambulance services, the integrity of the spectrum assigned for use by utility services is catered for by the licensing regime.

ComReg is keen to apply harmonisation measures where clear benefits for Irish users are identified or where required to do so by international obligations. ComReg also understands the importance of introducing national solutions where this is attractive and in the best interest of Irish users, for example, the release of spectrum in the 3.5 GHz and 5.8 GHz bands for fixed wireless access.

In relation to comments on prioritising the strategic goals, ComReg considers that the high level strategic goals raised in the consultation carry equal weight and are largely interdependent on each other.

3.4 Liberalisation of Spectrum Management (Q6)

3.4.1 Summary of Consultation Topic

ComReg suggested in the consultation that convergence may favour a more flexible approach to spectrum allocation and licensing and views were requested on whether this was the case and, if so, in what areas of spectrum management and licensing ComReg should adopt a more liberalised approach.

3.4.2 Summary of Responses

There were twelve responses to this question, eleven of which indicated support either explicitly or implicitly for a more flexible approach to spectrum management and licensing.

Specific suggestions included:

- Allowing a change in focus or application of a licence (e.g. from narrowband to broadband fixed wireless access or mobile applications in what was originally FWA spectrum and vice-versa).
- Adopting a more liberal approach to bands where individual assignments are made.
- Liberalisation of spectrum allocation and licensing conditions through introduction of spectrum trading.

- Providing greater flexibility for point to point and point to multi point spectrum with the latter being made available for 2G and 3G mobile backhaul use.
- Ireland could be an ideal location to demonstrate management of national boundaries and show that a new method of interference management supporting "change of use" can be used, although spectrum liberalisation was not necessarily applicable to all areas of spectrum.
- Supporting "technology neutrality" where an operator has a technology choice.
- Supporting secondary trading and liberalisation, with a clear timetable and prioritisation of frequency bands, to avoid Ireland becoming a "follower" market and to encourage further investment
- Applying fewer constraints to the use of spectrum in areas of low population where demand for spectrum is less.
- Access to mobile spectrum for future innovative technologies, e.g. those based on IEEE 802.16, will require careful attention.

One respondent considered the recently announced improvements to the ComReg test licensing regime (ComReg Doc. 04/115)[4] to be a positive step that would have an important part to play in increasing investor confidence and enabling innovative technology deployments. In this respect, this respondent was keen to work with ComReg in relation to technology developments such as UWB and identifying spectrum for mobile-capable WiMAX-type services.

Another respondent was concerned that a more flexible approach should not lead to a situation where basic public services are subject to significant interference (with specific reference to the use of the 24 GHz band by automotive short range radar and UWB applications).

3.4.3 Comment by the Commission

ComReg welcomes the broadly positive and constructive comments in response to this question and will take these into account in developing its policy on liberalisation. ComReg expects to consult on specific proposals for spectrum liberalisation later in 2005.

3.5 Method of Award of Spectrum Rights (Q 7)

3.5.1 Summary of Consultation Topic

Spectrum auctions, which are a market based mechanism, have been used as an alternative to comparative selection procedures to award rights to use radio spectrum where the number of rights available are limited. Views were requested on which method was favoured and reasons were requested to support the stated preference.

[4] ComReg Document 04/115 – Opportunities for trailing wireless services and technologies in Ireland.

3.5.2 Summary of Responses

There were nine responses to this question. Six of these had no particular preference for auctions or comparative selection and the majority supported ComReg's proposal to decide the methodology used on a case by case basis. It was proposed in one reply that there should be a framework for assessing the merits of each case in order to decide the appropriate method. One respondent felt that the method of allocation was not important for long duration licences (15 years or more). Two respondents indicated a preference for auctions and another a preference for comparative selection.

Reasons cited for using comparative selection included:

- Comparison between candidates on the basis of geographical coverage, technical or commercial criteria may encourage them to improve their provision of service.
- Concerns that where auctions are used, payment of substantial fees can divert financial resources from service provision and might lead to reduced service quality or coverage.
- It is easier to modify the conditions and adapt the process in the case of possible failure of the process.

Reasons cited for using auctions included:

- May provide efficient results provided that they are well thought through and designed.
- Largely avoids the possibility of discriminating against any party (greater fairness and transparency) and in theory the spectrum is awarded to those that value it most, leading to the most economically efficient use.
- Speed of spectrum release as auctions are generally faster and less resource-intensive.
- Auctions are objective whereas comparative selections tend to be subjective and can be subject to legal challenge.
- Bidders in an auction have considerable incentives to make bids that are realistic as they pay the amount bid whereas applicants in a comparative selection may exaggerate their business case to increase the chance of winning.
- Public financial interest as auctions enable the public to benefit from the full value of licences through transfers from private organisations and their shareholders.

However, it was noted that there may be a need for pre-qualifying conditions to be set prior to an auction. Also in the design of auctions it should be ensured that rollout to less developed areas is not neglected and the development of new and innovative solutions should not be penalised, deterred or otherwise impeded.

It was also noted that auctions are not appropriate for some occasions such as:

- Where there are specific public policy goals, e.g. where the value of the spectrum is not just monetary but also provides other value to the end users (e.g. broadcasting).
- Where there is heavily fragmented demand such as in the case of individual fixed links and local PMR systems and it is impractical to divide the spectrum into appropriate packages.
- In the presence of large externalities such as those created through innovative technologies and the development of new markets.

One respondent proposed that there might be a case for harmonising guidelines for selection procedures across Europe, i.e. a common set of principles that could be used to determine the most appropriate assignment procedure.

3.5.3 Comment by the Commission

The responses indicate that there is no strong preference for one particular approach to assigning spectrum rights-of-use and ComReg will therefore continue to adopt appropriate procedures on a case by case basis. ComReg notes the specific concerns raised in relation to auctions and comparative selection procedures and will take these into consideration when implementing future competitions.

3.6 Position on Spectrum Trading

3.6.1 Summary of Consultation Topic (Q 8 and Q9)

ComReg is currently considering the potential benefits of allowing secondary trading in spectrum rights for specific licence categories and may also extend this to other services in the longer term. Views were requested on whether provision should be made for trading of spectrum rights in the future (Q8) and if so what form they should take and whether provision should be made for change of use (Q9).

3.6.2 Summary of Responses

There were eleven responses to each of these questions. All of the respondents were in favour of the introduction of spectrum trading. However there were differing views on the degree to which trading should take place.

For example, one respondent felt that ComReg should avoid restricting the types of trades that can be undertaken and that spectrum leasing could be of significant benefit to potential new entrants. Another replied that spectrum assets need to be tradable and for this it must be possible to aggregate or divide spectrum without reference to the Regulator. This respondent also felt that spectrum sharing agreements would be important in a trading environment. One respondent commented that the timescales involved in the use of spectrum and the "intrinsically low liquidity" of spectrum assets argue against excessive use of rights trading. Another welcomed the cautious and pragmatic approach

proposed by ComReg and suggested that there should be an assessment of the merits of trading on a case by case basis. In some cases different balances of market and regulatory solutions would be efficient in different frequency bands. The issues of guaranteeing efficient use of spectrum and avoiding speculative spectrum hoarding were raised in another reply.

Similarly there was general support for the provision for change of use of spectrum. One respondent made the point that limiting bands through imposed co-ordination procedures based on their "likely use" leads to the regulator pre-determining the future directions for industry and effectively "picks the winners in the technology race". Another was strongly in favour of change of use and noted that studies have highlighted the economic benefit of introducing simultaneously both spectrum trading and a flexible approach to change of use.

A respondent commented that it is currently difficult, resource-intensive and time consuming to achieve change of use of spectrum which in turn stifles innovation and slows rollout of new services to consumers. However any regime for change of use of spectrum would need to:

- Set parameters on selected technical, product / service and consumer related issues.
- Take into account the possibility of dividing frequency bands and the potential to complicate international coordination because of the different technologies deployed in the sub-bands.
- The need to link transfer of rights with associated obligations (coverage, frequency coordination etc) to avoid market distortions.

Another respondent felt that spectrum trading is a tool that regulators must give serious consideration to implementing as it enables greater flexibility, improves innovation and reduces bureaucracy. However it was also noted that involvement by the regulator in dispute resolution may be needed and that this could require significant resources. This respondent also expressed concern that enabling a market to trade spectrum may increase the possibility of speculators and possibly sterilise large areas of spectrum. It was therefore recommended that the licensing mechanism be designed to maximise the use of the spectrum, offered at reasonably low costs, with minimised stipulations on roll out conditions. A review process may be considered as an option to address spectrum speculators. This respondent fully supported change of use where this enables access to spectrum for innovative services.

3.6.3 Comment by the Commission

ComReg is encouraged by the generally favourable views expressed towards spectrum trading and change of use. ComReg will be developing proposals in relation to trading and change of use as part of its broader work on spectrum liberalisation. Although some aspects of this will depend upon revision of the primary legislation (Wireless Telegraphy Acts), in the meantime ComReg will be seeking opportunities to liberalise specific frequency bands or services where this would provide benefits and could be done within the scope of existing legislation. ComReg expects to consult on specific proposals later in 2005.

3.7 Future Expansion Spectrum for 3G Mobile Services

3.7.1 Summary of Consultation Topic (Q10 and Q11)

ComReg is considering the future of the band 2010- 2025 MHz for other services and views were requested on whether this band should be made available for other services on a technologically neutral basis (Q10) and what the services should be and why (Q11).

3.7.2 Summary of Responses

There were eleven responses to Q10 and seven to Q11. Six respondents were in favour of opening up the 2010 – 2025 MHz band and supported the principle of a technology neutral approach. One respondent said that ComReg should follow European harmonisation and another felt that use of the spectrum would depend on the level of demand for other services in relation to the demand for the service allocated in this band. Three respondents were in favour of maintaining the use of these bands for IMT-2000/UMTS services and felt that it was not appropriate to consider alternative services for the 2010 – 2025 MHz band and one proposed that the current restriction to self-provided applications should be removed.

Another respondent supported a TDD channelling arrangement in the band that would enable flexibility and "technology neutrality" which could be realised by technologies applying the given channelling arrangement within the band (i.e. same level of interference protection to adjacent spectrum and no constraints on the deployment of IMT-2000) through national licensing schemes. A further respondent suggested that pre-allocation technical rules for the band should be developed so that industry can properly dimension and value the amount of spectrum it requires.

The potential services proposed by respondents were:

- Broadband interactive services and interactive educational services using the spectrum in conjunction with neighbouring bands
- Broadband data-centric services including carrier class Voice over IP. The services could be fixed, nomadic or mobile. Technology was claimed to be available in this band which can be deployed by mobile or fixed operators to provide such services and so aid convergence.

Three respondents commented on ComReg's proposal to consult on the 2.6 GHz band in relation to the development of 3G services. Two of these respondents raised specific concerns that the existing use of this band should be taken into consideration, given the market demand for MMDS and level of investment. They also felt that the ECC Decisions on IMT-2000/UMTS in this band gave no consideration to existing licensees and one expressed the view that there is no legal basis for designation of the spectrum 2524 – 2668 MHz for 3G services in Ireland. The third reply did not support exclusive rights to spectrum in this band and recommended that it be made available by 2007 for

mobile wireless under a technology neutral framework. Where all or parts of the band are already in use then access could be provided to the band through spectrum trading or refarming.

3.7.3 Comment by the Commission

ComReg notes the concerns about the existing use of the 2.6 GHz band and intends to host a workshop in mid-2005 for interested parties to formulate a coherent strategy to facilitate the development of IMT-2000 whilst accommodating existing MMDS operators. It is intended to review the utilisation of this band in the near future.

The 2010 – 2025 MHz band remains unassigned in most of Europe and there is presently no market demand for self provided UMTS TDD applications. CEPT is conducting a review of the future use of this band with the possible intention of removing the reference to self provided applications and to identify potential future harmonised use of this band across Europe. On the basis of responses received, and subject to developments in CEPT, ComReg supports the removal of the reference to self provided applications and efforts to achieve a flexible solution for the future use of this band on a harmonised basis subject to market demand.

3.8 Future Use of Existing Unassigned GSM and 3G Mobile Spectrum

3.8.1 Summary of Consultation Topic (Q 12 – Q 14)

There is currently available 2 x 40.2 MHz of unassigned spectrum in the GSM bands and 2 x 15 MHz (paired) plus 10 MHz (unpaired) in the 3G bands for which ComReg has identified a number of options. Views were requested on which of the proposed options were preferred and why (Q12), the appropriate timeframe for making the spectrum available (Q13) and whether any other options should be considered (Q14).

3.8.2 Summary of Responses

There were nine responses to these questions. One respondent commented that the difficulty for interested parties was uncertainty over the approaches likely to be taken by other European administrations. Respondents' views on how the currently unassigned spectrum should be used are summarised below:

(i) Do not use the spectrum until it is required by the current or future licensed operators, at which point it should be licensed on a national basis.

(ii) Spectrum should be reserved for facilitating the growth in GSM and 3G services and it is premature to consider alternative options. This would also allow ComReg to cater for international developments in these bands. This respondent did not consider it appropriate for these bands to be considered for alternative uses or technologies particularly where those alternatives may already have spectrum designated but not yet fully utilised. The timing of a decision on using this spectrum should

depend on demands from customers of mobile networks and developments in international standards.

(iii) Retain the spectrum for mobile use for reasons of international harmonisation.

(iv) Retain spectrum to allow a further 3G entrant. Remaining spectrum beyond that should be assigned in blocks to interested parties on a time constrained basis, with no restrictions on the type of service to be provided beyond those required to meet international obligations.

(v) Make the spectrum available for innovative wireless services by 2007, assigning spectrum rights via auction or beauty contest with no restrictions, beyond those required to meet international obligations, on the type of services to be introduced.

Two respondents raised concerns that any spectrum awards should take into account the rights of use of the existing users of these bands. One of these respondents also noted that current and potential services should not be damaged by UWB technology, which would raise the noise floor and impact on the existing planning of the networks. Another respondent felt that the spectrum should be used for innovative wireless services and agreed that rights of use should be assigned by auctions or beauty contests without any restrictions on the types of service to be offered.

3.8.3 Comment by the Commission

ComReg is grateful for the suggestions made in relation to the future of these bands and will consider these alongside wider policy considerations in relation to spectrum liberalisation.

3.9 Possible Demand for Content Delivery using Digital Broadcasting Technology

3.9.1 Summary of Consultation Topic (Q 15)

ComReg proposed to review the spectrum options for DVB and / or DAB based delivery of content to mobile platforms. Views were requested on whether there will be a significant demand for DVB or DAB technologies and what form this demand might take.

3.9.2 Summary of Responses

There were six responses to this question and none specifically indicated that they expected there to be a significant demand. One respondent considered it was too early to be definitive about future demand and another proposed that ComReg strategy should provide opportunities to take advantage of such technologies but it was difficult to assess the level of demand that may arise. A further respondent thought that demand may be less than proponents of these technologies are predicting, whilst another commented that the use of Digital Audio Broadcasting (DAB) has grown in countries where it has been introduced. The final respondent proposed that Ireland should consider

following the lead of countries such as Germany in looking towards adopting a more advanced technology than DAB to accommodate audio service needs. It also mentioned the need to guarantee the availability of audio services for local and community services and the spectrum to maintain and develop them.

3.9.3 Comment by the Commission

Recent approaches to ComReg in relation to trials of mobile content delivery over broadcast platforms indicate that there is growing market interest in this application. However, ComReg acknowledges the difficulty in predicting future demand for new services and will therefore continue to monitor government policy, market and technology developments in this area before making specific decisions.

3.10 Approach to New Fixed Terrestrial Services Frequency Bands

3.10.1 Summary of Consultation Topic (Q 16 and Q 17)

ComReg, as part of its approach to dealing with congestion and encouraging efficient use of fixed service spectrum, is considering a liberalised approach to new frequency bands to allow the market to decide on the optimum use, e.g. for fixed links or fixed wireless access. In this regard, views were requested on the future use of the 4 GHz (3800 – 4200 GHz) band (Q16). In addition it was proposed that ComReg would study the potential demand for new fixed links bands such as 58 GHz and views were sought on whether there was any demand to open up this spectrum (Q17).

3.10.2 Summary of Responses

There were six responses to the question on the 4 GHz band. Of these, one supported the development of a liberalised approach to the new frequency bands, allowing the market to decide the optimum use. Another respondent highlighted the need for mobile back-haul links, the importance of point to multipoint as an access technology for 3G networks and the need to take into account current and likely future requirements of international standards. Two respondents proposed either FWA or high capacity backbone links in this band. One of these felt that there were future opportunities in the 4 GHz band for wireless access systems with in-band back-haul possibilities. This was echoed by another respondent who also noted that, as the band was being discussed under the auspices of 4G for future mobile services, such use should also be considered in the longer term. This respondent agreed with the proposals from ComReg and expressed doubts about the suitability of the 26 GHz band for Wireless Broadband Services on technological and economic grounds. The respondent also felt that FWA technologies currently available and emerging still do not make good business cases at any of the frequency bands available for such services.

There were four responses relating to the second proposal concerning bands such as 58 GHz. Two of these held no current views and another felt that such bands were currently of no interest. One respondent felt that lack of

standardised equipment is a key issue and another suggested that the 58 GHz band should be used on a licence-exempt non-coordinated basis for point to point links, but the links should be notified to ComReg.

3.10.3 Comment by the Commission

ComReg welcomes the views expressed in relation to these frequency bands, which will be reviewed as part of our broader work on spectrum liberalisation. ComReg will consider the feasibility of developing a light licensing regime for the 58 GHz band or other millimetric-wave bands if sufficient demand becomes apparent. It is apparent from the responses received that there is no consensus on the future use of the 4 GHz band. ComReg has decided to wait for the nature of demand to become clearer and will therefore consider the options available in the spectrum liberalisation consultation.

3.11 Wireless Broadband Services

3.11.1 Summary of Consultation Topic (Q 18 and Q 19)

ComReg supports the national objective of bringing Irish broadband penetration into line with other EU countries and a number of policies were proposed. Views were requested on:

- the balance between licensed and licence-exempt spectrum that will best facilitate wireless broadband (Q18).
- how wireless broadband applications and technologies could best facilitate the rollout of broadband access in Ireland (Q19).

3.11.2 Summary of responses

There were ten responses to Q18. Three of the respondents felt that the need to minimise interference and meet quality of service levels meant that licensed spectrum was required. The need to monitor the use and effectiveness of unlicensed spectrum was mentioned in one reply, whilst another felt that any increase in licence exempt spectrum needs to be fully justified. Another respondent also favoured licensed spectrum due to the restrictions on radiated powers in unlicensed bands. This respondent referred to studies in the UK which suggest that around 800 MHz of unlicensed spectrum would allow users to have access to 100 Mbit/s transmissions. There was no evidence currently that the recently released spectrum, including 5.8 GHz, is insufficient.

Another respondent proposed that sufficient unlicensed spectrum should be made available to allow the deployment of broadband access systems in the range 1 to 5 km. In another reply, support was given to any policy that would encourage availability of non-commercial, community based wireless services. One respondent felt that it was important that the wireless industry does not exaggerate the usefulness and economic benefits of FWA. One respondent felt there were benefits from both licensed and license-exempt access to spectrum. This respondent believed that the 5.8 GHz should remain license-exempt, while licenses within the 3.4 – 3.6 GHz, and any future 2.5 – 2.69 GHz systems should be licensed.

There were nine responses to Q19. One respondent took the view that no one technology best satisfies the rollout of broadband services whereas another felt that wireless broadband can provide a realistic alternative to DSL and cable in many situations. It was noted in one reply that ComReg should take into account the cost of equipment (citing. the 26 GHz band failure) and should encourage the introduction of WiMAX and other appropriate technologies on a realistic and sustainable basis. Another respondent proposed that the licence terms and conditions should be sufficiently fluid to allow new equipment and services to be easily introduced. This was reflected in a further reply which said that licensing of broadband applications in the 26 GHz band should not prevent its use for point to multipoint for mobile backhaul. Another respondent made a proposal to conduct a review of the 26 GHz band.

In another reply, it was considered that the main role of wireless broadband would be to reach rural areas. To encourage and facilitate deployment in rural areas ComReg was encouraged to:

- Continue to make licence exempt spectrum available in internationally harmonised bands such as 2.4 and 5 GHz.
- Maintain a technology-neutral policy, and allow as many commercial spectrum uses as possible to be changed so more spectrum can be used for fixed wireless if required.

This respondent also commented that the ComReg strategy for WiMAX and 26 GHz was sensible.

A licence exempt regime was supported by one respondent on the basis that it would enhance roll-out by overcoming local loop deficiencies that are undermining the widespread availability of broadband. Another reply noted that community and non-profit wireless networks are a source of extensive innovations internationally.

3.11.3 Comment by the Commission

ComReg notes the importance attached by users to both licensed and licence-exempt spectrum and will endeavour to meet market requirements for both, particularly where this has the potential to stimulate the rollout of broadband access services in Ireland.

A public consultation on the future structure of the 26 GHz band will be conducted shortly. This consultation will review the current structure and use of the band and propose a number of options to facilitate a more flexible use of the band for a range of services. This includes options for point-to-point and point-to-multipoint services for both public and network access.

3.12 Radars, Radionavigation and Science Services

3.12.1 Summary of Consultation Topic (Q 20, Q 21, Q 24 and Q 25)

To ensure efficient and effective use of spectrum it is proposed to introduce a licensing regime for aeronautical, maritime and meteorological radars as well as for radionavigation systems, including the charging of a one-off licence fee of around €500 for new stations or modifications to existing stations was proposed to cover co-ordination and notification costs. Views were requested on:

- The proposal to introduce a licensing regime (Q20 and Q24).
- The proposed fees (Q21 and Q 25).

3.12.2 Summary of Responses

There were six responses to these four questions, each of which was in broad agreement with the proposals. One respondent indicated that the proposed fee was acceptable and appreciated the logic of licensing equipment operating in a band where protection against radio interference is a vital issue. Two respondents indicated that they had no current views but one of these raised the point that licence fees should be based on administrative costs and therefore the once–off fee should be clearly justified. Another respondent considered that all users of spectrum should be given equivalent treatment and therefore supported the use of a licence fee for the use of radar and other navigation systems, derived on the same objective basis as all other licence fees. Another reply accepted that achievement of efficient and effective use of the spectrum may require the use of a simple licensing system. Another indicated that in its opinion the proposals appeared sensible.

3.12.3 Comment by the Commission

In view of the positive responses to this proposal, ComReg is minded to proceed with the proposed new radar and radionavigation licensing scheme. Fees for the scheme also appeared to be generally acceptable.

3.13 Business Radio

3.13.1 Summary of Consultation Topic (Q 22 and Q 23)

ComReg proposed to introduce a licensing regime for paging systems to replace the current system of permits and to charge a one-off licence fee of around €50 per base station. Views were requested on:

- The proposal to introduce a licensing regime (Q22).
- The proposed fee (Q23).

3.13.2 Summary of Responses

There were six responses to these two questions. Two replies specifically supported the proposals and another expressed the opinion that they appeared sensible. One of the respondents who supported the introduction of a licensing regime for paging permits believed that a review should also be carried out on the requirements of public paging systems, in particular to determine whether

the current permitted levels of radiated power for transmitters are sufficient for a public wide-area paging service.

One respondent had no objections to the proposal provided that the charges are transparent, proportionate and justified. This respondent suggested that the same principles should be used to determine fees for PMR and paging. Another respondent supported the aims to ensure efficient and effective use of the spectrum.

3.13.3 Comment by the Commission

In view of the positive responses to this proposal, ComReg is minded to proceed with the proposed new paging licensing scheme. Fees for the scheme will be addressed as part of a wider consultation on radio spectrum fees later this year.

The issue raised by one respondent on the appropriate permitted levels of radiated power for public wide-area paging services will be dealt with in the new scheme.

3.14 Miscellaneous Services – Wireless Public Address Systems

3.14.1 Summary of Consultation Topic (Q 26 – Q 28)

ComReg is proposing to permit Wireless Public Address Systems in the band 27.6 – 27.99 MHz to meet the needs of religious and other community organisations. The systems would allow, for example, the house-bound and the infirm to listen to their local church service whilst at home.

Views were requested on:

- Whether there is a demand for the provision of religious and community based Wireless Public Address services (Q26).
- Whether they should be permitted in the 27.6 – 27.99 MHz band (Q27).
- The proposal to charge €25 per application (Q28).

3.14.2 Summary of Responses

There was considerable interest and comment by more than half the respondents to the consultation on the topic of wireless public address systems. All respondents broadly were supportive of the proposal (Question 26). The respondents also commented that the demand in particular for religious broadcasting services necessitated a national solution. This included calls for a fully fledged national radio service comprising a national network of local radio stations and the provision of additional spectrum for non-commercial use.

The spectrum to be used for Wireless Public Address Systems was generally acceptable as long as the equipment used ensured that the service would be non-exclusive and work on a non-interference basis. The proposed fee for this

service was found to be acceptable by all respondents who commented on this question, as long as the fee was only used to cover administration costs.

3.14.3 Comment by the Commission

In inviting comment on this issue, ComReg is seeking a solution for a public address system to facilitate the social inclusion of, and meet the needs of the housebound be they sick, disabled and/or elderly, using wireless technology.

Following consultation with the Broadcasting Commission of Ireland (BCI), ComReg has established that the proposed service is not a broadcasting service and does not therefore come under the BCI regulatory regime. This is reflected in four key characteristics which define wireless public address systems and place it outside the broadcasting space. These characteristics are:

- Spectrum will be allocated on a non-exclusive and non-interference basis in a frequency band not used by BCI Sound Broadcasting Contractors.
- The system is to be used for unabridged wireless retransmission of audio from a public address system that is associated with a public event.
- The service will only be available on a non commercial basis (for local community users).
- The service will not be available for reception on standard domestic broadcast receivers.

Only equipment in the band 27.6 – 27.99 MHz that meets the requirements of the R&TTE Directive will be permitted for use on the available 35 channels within that band.

A once-off licence processing fee will be applied to cover basic administrative costs.

3.15 Miscellaneous Services – Automotive Short Range Radar

3.15.1 Summary of Consultation Topic (Q 29)

A recent CEPT ECC Decision opened the 24 GHz band for short range radar (SRR) in vehicles for anti-collision related applications on a non-interference, non-protected and temporary basis (until 30 June 2013 or sooner if the penetration of equipped vehicles in any European market reaches 7%). Views and opinions were requested on the implementation of this Decision in Ireland.

3.15.2 Summary of Responses

There were three responses that expressed a view in response to this question. These raised a number of concerns with the proposal as briefly summarised below:

- Emissions from the automotive radars above a low level would cause serious interference with passive monitoring from meteorological satellites as the data processing cannot distinguish

between the atmospheric and automotive short range signals received by the satellite. The absence of valid information in the 24 GHz band would seriously degrade much of the information from the satellite from the region subject to interference. The State should introduce legislation or regulations to ensure the temporary arrangement is not exceeded. The penetration of the Irish market by automotive short range radars should be monitored.

- Allowing UWB transmissions in a deregulated manner has the potential for raising the noise floor above the level at which cellular networks have been dimensioned and could threaten licensed operations. Therefore issues associated with interference must be addressed before usage on a licence exempt basis can be validly considered. It is suggested that ComReg should begin preparation of the interference monitoring procedures that will be a necessary part of the implementation of the package of measures covering Automotive Short Range Radar and should commit to the implementation of the ECC Decision on this subject.
- The proposal to allow short-range radar in the 24 GHz band raises concerns about the risk of interference to radio links that operate in this band. Assurances were requested on a number of issues including the technical parameters of the radar devices, how the level of penetration will be monitored, forecasting for the level of usage and migration of these services in the 24 GHz band, how ComReg will carry out intra-system interference analysis and guarantee minimum availability figures.

3.15.3 Comment by the Commission

ComReg has participated actively in the discussions at the European level on the regulatory and technical measures to be implemented to facilitate the use of the 24 GHz band by Automotive Short Range Radar on an interim basis and which will at the same time afford adequate protection to other terrestrial and space-borne users of the band. These measures have been developed with the involvement of all parties involved including the meteorological community, the automotive industry, mobile and fixed services, CEPT and the European Commission. There will also be a parallel EC Decision including an associated Explanatory Memorandum to underpin the legislative framework for controlling the number of devices on the market in any EU country and in Europe as a whole. Ireland is likely to implement both Decisions.

In Ireland, the Department of Communications, Marine and Natural Resources will be making arrangements with the Department of Transport for the collection and reporting of the penetration in the Irish market of vehicles fitted with 24 GHz SRR. This will be done via the vehicle registration process. The procedures which have been put in place at the European level will allow for regulators to stop the placing of 24 GHz SRR on the market if either the 7% penetration level is exceeded or undue interference is caused to other services, and in any case by 30 June 2013.

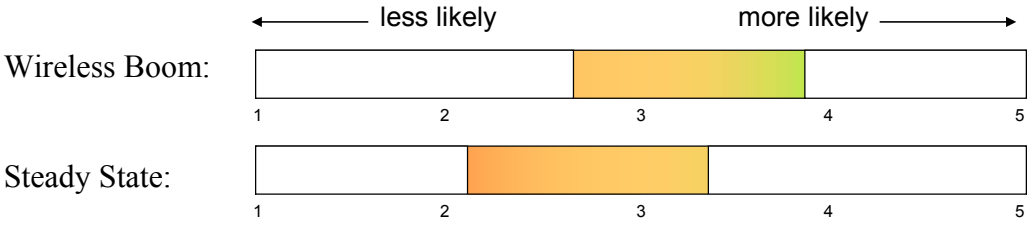
3.16 Scenario Analysis

3.16.1 Summary of Consultation Topic (Q30 - Q 34 inclusive)

Two potential scenarios, namely "wireless boom" (Q30 and 31) and "steady growth" (Q32 and 33) were put forward by ComReg and views requested on the likelihood of the assumptions behind each scenario arising over the next 3 to 5 years. Comments were also sought on the individual assumptions and also what others, if any, would be appropriate to these scenarios. Finally, views were sought on which scenario was felt to be the most likely and why (Q34).

3.16.2 Summary of Responses

Seven respondents provided comments on the individual assumptions underlying each scenario. A detailed analysis of the views is presented in ***Annex 1***. Overall, analysis of the responses to the individual assumptions indicated that the "wireless boom" scenario was considered more likely to arise than the "steady growth" scenario, although with slightly more statistical uncertainty. The following diagram compares the average mark given to all of the assumptions for each scenario. The centre of the bar corresponds to the average mark, the width corresponds to the standard deviation across all the responses received, indicating the degree of variability of the respondents' views.



In addition to the assumptions presented in the consultation document, two further assumptions for the Wireless Boom scenario were suggested, namely:

- A freeing up of and investment in existing local loop (including Cable television infrastructure), enabling competition will have a dramatic impact on the availability of Broadband, especially in urban areas.
- Wireless technology becomes the standard access technology for voice and data in the very rural network.

There were seven responses to question 34. Of these, two felt that the "wireless boom" scenario was more likely, three felt that the "steady state" scenario was more likely and two felt that there would be a mix of the two. However, as noted above the views expressed on the individual assumptions favoured the "wireless boom".

Of the individual assumptions presented in the two scenarios, the following were considered most likely to happen:

(i) There is very high demand for broadband access throughout the country, which can be met only by radio in some areas due to remaining deficiencies in legacy wireline networks (mean score 4.0).

(ii) Continuing popularity of 2nd generation mobile technologies and analogue broadcasting constrains scope for new services in these bands and increased pressure on other available spectrum such as the 410-430 MHz band (3.7).

(iii) There is continuing growth in demand for access and infrastructure links in higher frequency bands above 12 GHz (3.6).

(iv) There is extensive availability of free "community" WLAN services, placing pressure on available spectrum and driving demand for more spectrum including licence-exempt spectrum (3.5).

The following assumptions were considered the least likely to happen:

(i) Take up of broadband in the market is limited and data speeds are no higher than today, so demand for spectrum has not gone beyond the currently available bands (2.0).

(ii) There is only limited use of WLANs in homes and businesses and the existing 2.4 GHz and 5 GHz are sufficient to meet this demand. There is also only limited demand for public WLAN connections (2.3).

(iii) Widespread availability of broadband in non-rural areas, backed in part by government initiatives, involving extensive use of FWA technology (2.3).

3.16.3 Comment by the Commission

There was a fairly limited response to questions on the scenario analysis and as a result the outcome may not be statistically robust. However, there is certainly some value to be taken out of the analysis done in Annex 1. ComReg will develop the scenario analysis further in the light of the comments received, with a view to developing a "most likely" scenario that will be used to refine the working assumptions on which future spectrum strategy is based.

4 Other Issues Raised

4.1 Sound Broadcasting in the Medium Wave Band

4.1.1 Summary of Input Received and Current status

Twelve respondents to the consultation brought up the issue of reassigning two medium wave frequencies, originally allocated to the Russian Federation, to Ireland for the establishment of Christian broadcast services.

4.1.2 Comment by the Commission

ComReg is aware of this issue and had been working thorough the ITU with a view to coordinating these two frequencies (549 kHz and 846 kHz) for use in Ireland. This work is being carried out in accordance with the treaty covering the use of this spectrum[5].

The current status after more than two years of effort is as follows:

- Co-ordination for use of the frequency of 846 kHz in Ireland is complete. Due to the nature of radiowave propagation at these frequencies, this frequency is not usable above 300 watts in Ireland in order to avoid harmful interference to the service area of a co-channel transmitter located in Rome. It is doubtful if use of this frequency, at such a low power, is of any practical use in Ireland.

- Co-ordination for use of the frequency of 549 kHz in Ireland is reaching a conclusion. Current indications are that the frequency may be usable below 40 000 watts in order to avoid harmful interference to the service area of a co-channel transmitter located in Spain.

Once co-ordination and reassignment is completed these two frequencies will be made available for licensing by the Broadcasting Commission of Ireland (BCI). The BCI has the legislative responsibility for licensing Irish independent broadcasting services which includes national television, national radio, local, community, community of interest and institutional radio services; as well as services on digital cable, MMDS and satellite systems.

[5] Final Acts of the Regional Administrative LF/MF Broadcasting Conference (Regions 1 and 3), Geneva 1975.

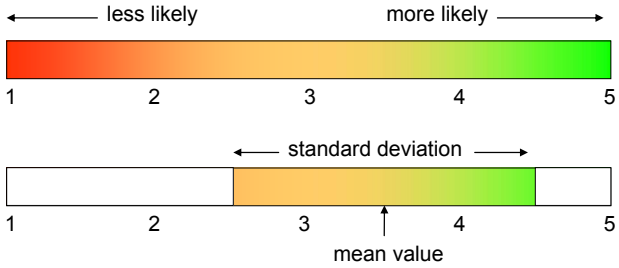
5 Next Steps

This review of responses on the consultation paper will be followed by the publication of the Radio Spectrum Management Strategy for 2005 – 2007. The publication will take into account all the feedback received.

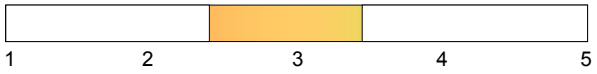
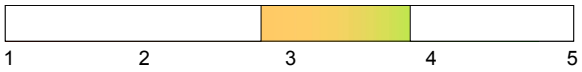
Annex 1 - Summary of views on Scenarios

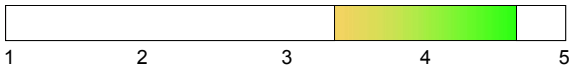
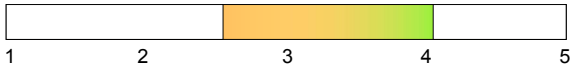
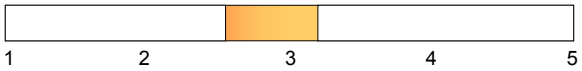
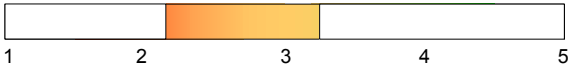
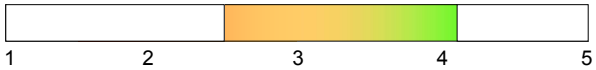
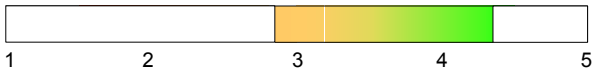
The likelihood of the assumed situation arising over the next 3 – 5 years is provided using the following scale:

1 = very unlikely to happen
2 = unlikely to happen
3 = no particular view
4 = likely to happen
5 = very likely to happen



Scenario 1: "Wireless Boom" (Q32/33)

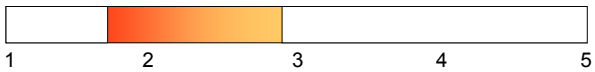
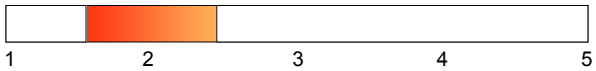
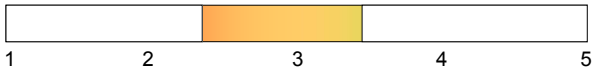
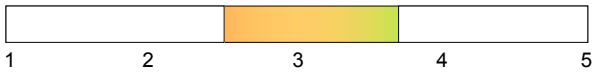
	Assumption	
i	3G mobile becomes firmly established, with market penetration approaching the current levels of 2G services and widespread downloading of rich mobile content such as high-quality audio and video.	
ii	Continuing growth in the transport and logistics sectors maintains demand for PMR and PAMR services, dedicated to particular user groups, including new digital and data-oriented services using wideband technologies.	
iii	Ubiquitous availability of digital multi-channel TV by cable/MMDS and satellite enables analogue transmissions to cease. Digital terrestrial transmission primarily focuses on mobile TV and other content, and on supporting broadband access in rural areas.	
iv	Mobile digital TV and delivery of audio visual content to mobile phones is commonplace, using the DVB-H standard.	

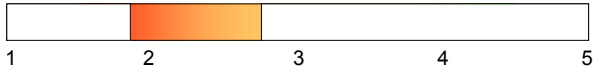
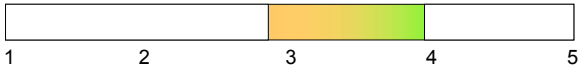
	Assumption	
v (a)	There is very high demand for broadband access throughout the country, which can be met only by radio in some areas due to remaining deficiencies in legacy wireline networks.	
v (b)	Much of the demand growth is on demand video content which drives bandwidth and quality of service requirements further, leading to pressure for more FWA spectrum in the 26 GHz and 40 GHz band.	
vi	There is extensive availability of free "community" WLAN services, placing pressure on available spectrum and driving demand for more spectrum including licence-exempt spectrum.	
vii	DAB has been launched and has achieved a substantial market penetration. L-band (1452 – 1492 MHz) DAB spectrum has been licensed for a mix of audio and multimedia services.	
viii	Regional wideband PAMR services have been established to cater for specialist users.	
ix (a)	Backbone radio links have largely been superseded by extensive fibre infrastructure	
ix (b)	There is continuing growth in demand for access and infrastructure links in higher frequency bands (above 12 GHz).	

Scenario 2: "Steady Growth" (Q32/33)

There were six responses to these questions and the table below summarises the views on the likelihood of the assumed situations arising. It is interesting to note the divergence of views and that for some assumptions respondents involved in the same market sector had virtually opposing opinions (e.g. assumption (ii)).

The likelihood of the assumed situation arising over the next 3 – 5 years is provided using the following scale:
1 = very unlikely to happen
2 = unlikely to happen
3 = no particular view
4 = likely to happen
5 = very likely to happen

Ref	Assumption	Likelihood	Mean	Std Dev
i (a)	Widespread availability of broadband in non-rural areas, backed in part by government initiatives, involving extensive use of FWA technology.			
i (b)	But take up of broadband in the market is limited and data speeds are no higher than today, so demand for spectrum has not gone beyond the currently available bands.			
ii	Mobile data remains a niche market, 3G coverage restricted to main urban areas, no immediate demand for more spectrum.			
iii	Mobiles are still predominantly used for voice and messaging services, with limited demand for data, so there is no immediate requirement for any spectrum beyond the current 2G and 3G allocations.			

Ref	Assumption	Likelihood	Mean	Std Dev
iv	There is only limited use of WLANs in homes and businesses and the existing 2.4 GHz and 5 GHz are sufficient to meet this demand. There is also only limited demand for public WLAN connections.			
v	Continuing popularity of 2nd generation mobile technologies and analogue broadcasting constrains scope for new services in these bands and increased pressure on other available spectrum such as the 410-430 MHz band.			
vi	Continuing reliance on radio for backbone networks has led to congestion in some frequency bands.			
vii	Limited availability of terrestrial broadband access networks in rural areas has created demand growth for satellite based broadband access, both for individual users and to provide hubs for local communities who connect using WLAN connections