Commission for
Communications Regulation

Submissions to Consultation 11/80

Submissions on Consultation seeking views on extending the termination date of three MMDS licences in force in the 2.6 GHz band in Dublin, Galway and Waterford to April 2014 and band-sharing update

Submissions to Consultation

Reference: ComReg 11/80s

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

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

Submissions Received from Respondents

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Content

Section

1: Consumer: Kathleen Millar

(11)

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

5th December 2011

Re: Submission re ComReg 11/80

Dear Sinead,

I am and have been a UPC subscriber for many years and am very happy with the services and packages offered by UPC over this time. I understand that COMREG are seeking support for the decision to extend the three MMDS licence from 2012 to April 2014, I would strongly approve and support this decision.

I live in an area where terrestrial TV signal is poor and I don't have access to the cable network, the only other provider in the locality would be SKY, if UPC were to discontinue their MMDS transmissions.

I am an old age pensioner living in the countryside and could not afford to pay the premiums that SKY charge.

I believe that it is important to retain a competitive market and as such would like to see UPC retain their broadcast spectrum, to give people a choice of provider and keep pricing competitive as well as a high quality service. If UPC were to lose the current licence to broadcast on MMDS to the 70,000 homes in rural Ireland would lose their service and give SKY TV the monopoly in the Irish market.
Additionally UPC employ within Ireland and the VAT take is returned to the Irish Exchequer, the loss of the MMDS broadcast licence would result in loss of Irish jobs and loss of monies back into Ireland.

I would hope that your company would favourably consider renewing all ten of the MMDS licence for transmissions up to the year 2019 and continue to support competition in the Irish TV sector.

Yours sincerely

Kathleen Millar

2: Consumer: Louis Fisher

To Sinéad Devey,

Following on from my previous submission to you with regard to future licensing options of the 2.6 GHz spectrum band, I would like to support ComReg's proposal to extend the three MMDS licence to April 2014. I would also support the proposal to renew the full ten MMDS licences from April 2014 to April 2019 and would ask ComReg to favourably consider the MMDS spectrum renewal for the following reasons,

- I continue to be a UPC customer and have been for many years and I am very happy with the quality of the service I receive and the price I pay for that service;
- I do not consider that it is in the interests of customers that SKY should have a monopoly position anywhere in the Irish market;
- UPC contributes to the Irish economy by providing jobs in Ireland and paying taxes to the Irish exchequer;
- UPC contributes to Irish media plurality, the ability for MMDS subscribers to receive all 'must-carry' channels (due to ComReg's regulation of UPC, which is not applicable to Sky);
- Commercial DTT will not have the same capacity as either MMDS or satellite and if ever launched, would not be a comparable service offering for Irish consumers.

I would request that ComReg takes my views on board in consideration of the 2.6 GHz licences and retain them for MMDS use by UPC.

Sincerely,

Louis Fisher
28 Seabury Downs,
Malahide, Co. Dublin

3: Consumer: Shane Daly

Hi Sinead

Following on from your previous request for submission regarding the "licensing options" document posted on your web site

http://www.comreg.ie/publications/information_notice_-_call_for_input_on_potential_uses_and_licensing_options_of_the_2_6_ghz_spectrum_band.583.103624.p.html

I note that you are now seeking feedback on your proposal to extend the current 3 MMDS licenses due to expire in 2012, to April 2014 to coincide with the other 7 MMDS license expiry date, per your website link.

http://www.comreg.ie/_fileupload/publications/ComReg1180.pdf

I continue to live in south Dublin, and my TV service is provided by UPC's MMDS service - I cannot receive cable TV.
My only other option for multi channel TV would be to subscribe to a satellite service provider such as Sky TV.

I would support your proposal to extend the MMDS licenses to 2014, providing continuity of service.

I believe that the MMDS service provided by UPC is excellent and more competitively priced than any comparable Sky packages.

If in the future if Sky were to be the sole provider of such TV services they would have a monopoly, thus putting them in a position where they could control both viewing content and pricing

This I believe would be a backward step in providing customer choice and ensuring Ireland maintains a competitive market

UPC's ability to provide an MMDS service also impact on the local economy providing jobs and revenue for the government, coupled with the fact that as ComReg regulates UPC's it ensures that Irish TV station are provided as standard.

In the future DTT will not be a comparable service, in that it would not be able to provide the same number of channels that UPC currently can on the MMDS system and so I don't think this will be a viable alternative solution in Ireland for customers using UPC

So to conclude and for the above reasons I would like to encourage COMREG to extend the three licences spectrum for MMDS transmissions in 2014, and further approve the renewal of the ten MMDS licenses to 2019 so that I can continue to revive an excellent service at the most completive price.

Regards
Shane Daly

4: eircom Ltd and Meteor Communications Ltd.

eircom Group

Response to ComReg Consultation Paper: Future of the 2.6GHz radio spectrum band

ComReg Document 11/80

16 December 2011

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The comments submitted to this consultation are those of Meteor Mobile Communications Ltd. (MMC) and eircom Ltd (eircom) collectively referred to as eircom Group.

Executive Summary

- eircom Group welcomes the opportunity to comment on the future of the 2.6GHz radio spectrum band. In our response to the call for input (ComReg 10/38) we highlighted our views that:
  - There is no justification for renewal of the existing licences in the 2.6GHz band[1].
  - The 2.6GHz band is strategically significant to the development of advanced mobile broadband services in Ireland.
  - ComReg should undertake and complete the review of the future use of the 2.6GHz band as quickly as possible so that an open award process, in conjunction with other unassigned IMT harmonised spectrum, may be progressed.

- We therefore welcome and support the conclusions of the Aegis / Plum report confirming that there is no objective justification for renewal of the existing licences in the 2.6GHz band beyond 2014.
- eircom Group also notes that the assessment of the benefits of 2.6GHz availability for Next Generation Mobile Broadband (NGMB) between 2014 and 2019 could be significantly understated. The publication of ComReg 11/80 dispels any uncertainty regarding the timing of availability of the 2.6GHz band.
- As we highlight in this response there are clear and compelling reasons to combine the release of the 2.6GHz band with ComReg's proposed multi-band spectrum award process in respect of the 800MHz, 900MHz and 1800MHz bands.
- While it is disappointing that ComReg has not advanced the debate in respect of the 2.6GHz earlier, particularly given the strong conclusions of the Aegis / Plum report of February 2011, we urge ComReg to avoid any further administrative delay and to move rapidly to bring the 2.6GHz band into the proposed multi-band spectrum award process. We believe that the inclusion of the 2.6GHz band in the proposed multi-band award process need not unduly delay completion of that process.
- We have considered ComReg's proposal to amend the termination date of the three MMDS licences and find it to be extremely questionable on the basis of the facts presented. As such we do not agree with ComReg's proposal.

[1] The non-renewal of the current 2.6GHz licences can be justified under any proportionate spectrum licensing regime including a regime of indefinite licences taking into account EU harmonisation measures and efficiency of spectrum use. In contrast we strongly believe there is objective justification for the establishment of renewal rights in respect of the current GSM licences, as set out in our various responses on the issue, in contrast to the disproportionate manner to address licence expiry proposed by ComReg in its recent draft Decision (ComReg 11/60)

Introduction

eircom Group welcomes the opportunity to comment on the future of the 2.6GHz radio spectrum band. In our response to the call for input (ComReg 10/38) we highlighted our views that:

- There is no justification for renewal of the existing licences in the 2.6GHz band[2].
- The 2.6GHz band is strategically significant to the development of advanced mobile broadband services in Ireland.
- ComReg should undertake and complete the review of the future use of the 2.6GHz band as quickly as possible so that an open award process, in conjunction with other unassigned IMT harmonised spectrum, may be progressed.

As such while we welcome the current consultation which advances the debate somewhat we are disappointed that seventeen months after the call for input consultation and nine months since ComReg received the final report[3] from its consultants ComReg has not yet concluded the review.

In the first part of this response we provide contextual information on the two possible uses of 2.6GHz (NGMB and MMDS) and we provide our observations on Aegis and Plum's assessment.

In the second part of this response we address the specific questions raised by ComReg in the consultation document

[2] The non-renewal of the current 2.6GHz licences can be justified under any proportionate spectrum licensing regime including a regime of indefinite licences taking into account EU harmonisation measures and efficiency of spectrum use. In contrast we strongly believe there is objective justification for the establishment of renewal rights in respect of the current GSM licences, as set out in our various responses on the issue, in contrast to the disproportionate manner to address licence expiry proposed by ComReg in its recent draft Decision (ComReg 11/60)

[3] Technical and Economic Study on Multipoint Microwave Distribution Systems and Next Generation Mobile Broadband services in the Band 2500-2690MHz dated 2nd February 2011

PART 1 Consideration of the merits

1 The role of 2.6 GHz in the MBB market

With the upcoming auction of 800MHz, 900MHz and 1800MHz and the existing mobile operator holdings of 2.1GHz spectrum, the mobile industry as a whole will soon have access to a total of 400MHz of harmonised (GSM/3G/LTE) spectrum. Of this 400MHz, 60MHz of 800MHz spectrum and 60MHz of 1800MHz spectrum, totalling 120MHz, is new spectrum for the mobile operators and clear for LTE deployment.

The 2.6GHz band represents a further 190MHz of mobile broadband spectrum, and its availability would more than double the amount of spectrum available for LTE in the early years of deployment. The 2.6GHz band is important harmonised spectrum that will be available for mobile broadband in the majority of EU member states, and is key to the LTE plans of the majority of European mobile operators.

In its submission to ComReg 10/38, UPC makes the point that one third of the 1800MHz band has been previously unassigned and that "*The benefit of using the 2.6GHz band could mostly be realised using alternative frequency bands, in particular the 1800MHz band that is already dedicated to the provision of mobile services and the 2300MHz band when it becomes available…*".

However, as we detail below, it will not be possible to replicate the benefits of 2.6GHz using other bands in the early years of LTE deployment.

The mobile technology transition

Mobile operators, both in Ireland and across Europe, are currently embarking on a complex transition of technologies. The industry has numerous customers with GSM only handsets, in addition to many customers with 3G smartphones and a wide variety of devices using 3G mobile broadband services. Once spectrum becomes available for LTE the industry will enter an unprecedented situation of being required to maintain three generations of mobile network technology (GSM, 3G and LTE) for an extended period.

While the spectrum used for legacy technologies (GSM and 3G) can be re-farmed in due course, it will be essential for high quality networks to be maintained for the foreseeable future. It may be 2020 or beyond before the spectrum used for GSM can be made available for other technologies such as LTE. During this transition phase it is essential that the operators have access to a sufficient spectrum to launch high quality, high speed LTE services without compromising the 2G and 3G networks that are still in use.

The standard configuration for European markets is to use 800MHz spectrum for wide area LTE coverage and to use 2.6GHz for high capacity where required. This amounts to a total of 250MHz of spectrum (taking into account the full 2.6GHz band, although part of that spectrum may be purchased for TDD rather than FDD operation) for the industry as a whole. Where possible part of the 1800MHz spectrum is often made available for LTE in addition.

That quantity of spectrum is required because the full benefits of LTE can only be realised by deploying a 2x20MHz carrier in the high frequency band (either 1800MHz or 2.6 GHz). In a four

player market, 160MHz of spectrum is therefore required, simply to ensure that all operators can offer the full bandwidth capabilities of LTE.

The use of 2.3 GHz as an alternative to 2.6 GHz

The 2.3GHz band is not currently part of the European harmonised bands for LTE, and although there is interest elsewhere in the world it is not yet clear if it could be successfully used in combination with other spectrum bands in Europe because it will not be a priority for handset manufacturers to include 2.3GHz in their European handsets, which will incorporate 800MHz, 1800MHz and 2.6GHz. The 2.3GHz band may become useful for LTE in Europe as the result of future harmonisation measures, but at the current time it is not possible to rely on 2.3GHz as a substitute for 2.6GHz.

The use of 1800MHz spectrum as an alternative to 2.6 GHz

In its submission to ComReg 10/38 UPC plots the availability of spectrum in each of the main mobile bands, and discusses the potential of using the 1800MHz band for LTE rather than the 2.6 GHz band. UPC quote a report by Analysys Mason that the mobile operators could be expected to free up 2x60MHz of 1800MHz spectrum by 2014.

Whilst there is a clear move in the industry to use 1800MHz spectrum for LTE once it can be refarmed from GSM use, eircom Group does not believe that making 2x60MHz available by 2014, as suggested by UPC, is feasible. The implication of this is that only 2x15MHz would be in use by the mobile operators for GSM, which is approximately one third of the current usage. Given the persistence of GSM terminals in the market we believe that estimate of the rate of release of 1800MHz spectrum from refarming GSM is optimistic.

Even if it was possible for 2x60MHz of 1800MHz spectrum to be re-farmed from GSM to LTE by 2014, some operators may be left without sufficient 1800MHz spectrum after the proposed award process to launch a competitive LTE network. The proposed spectrum cap for the proposed award process is such that it is quite feasible for a single operator to acquire 2x30MHz of 1800MHz spectrum, without reducing the amount of sub 1GHz spectrum they can acquire. If the 2.6GHz spectrum is not made available in 2014, the industry could be left with a situation where only two mobile operators can deploy 20MHz carriers in the period up to 2019, leading to a reduction in the competitive intensity of the mobile broadband market for the period from 2014 to 2019 compared to the case where 2.6GHz is made available in 2014.

Even if the proposed award results in a more even distribution of spectrum it will not be possible, under any circumstances, for four operators to create 2x20MHz carriers in the 1800MHz band, which consists of just 2x75MHz of spectrum.

The 2.6GHz band represents a total of 190MHz of spectrum for mobile broadband. If we take UPC's optimistic projection of 2x60MHz of 1800MHz being available for LTE in 2014, then the amount of high frequency spectrum available for NGMB would increase by a factor of 2.58 as a result of the availability of 2.6 GHz spectrum.

The 2.6GHz spectrum is available, or will soon become available, in the vast majority of EU member states. Without 2.6GHz some or all of the operators in Ireland will be running an inferior service to the expected service levels across Europe.

2 The role of MMDS in the TV market

In UPC's submission to ComReg 10/38, UPC portrays the MMDS service as being of key importance in providing competition to BSkyB in the provision of pay-TV services outside of UPC's cable footprint. UPC state that if ComReg decides not to renew the MMDS licences then "*all pay-TV customers who reside in those parts of the country outside UPC's cable footprint will have no competitive choice for pay-TV services*." They state that BskyB will be handed a "*de facto monopoly over significant parts of the country and across all of rural Ireland*".

UPCs statement of "no competitive choice" would appear to be true in areas where there is no cable, currently no digital terrestrial pay-TV, and which are outside of eircom's own planned fibre deployment.

However, eircom Group would like to strongly resist any implication that this would allow BskyB to behave like a monopolist in any part of the Irish TV market. It is important to consider the nature of the pay-TV market. In Ireland pay-TV is a market that operates on a national scale, BskyB cannot and does not alter its prices depending on whether UPC's cable or MMDS systems are present in a given area. The fact that UPC competes with BskyB within its cable TV areas is sufficient to ensure that all consumers who are able to receive BskyB's satellite services benefit from a competitively priced service, even if some of those subscribers are not able to choose which pay-TV provider they use.

eircom Group is itself planning to enter the pay-TV market. eircom Group's services will offer extensive video-on-demand content in addition to broadcast programming, which is made possible by the bandwidth and flexibility of the fibre network that eircom Group is deploying. Far from a reduction in competition, the pay-TV market is about to see an increased level of competition, further ensuring that rural consumers benefit from competitive prices, even if they do not have multiple providers available.

Although UPC's response portrays MMDS as an essential safeguard of competition in the TV market, a more correct picture is revealed by the data and analysis in the Aegis/Plum report. The Aegis/Plum report indicates that as of the time of their report the MMDS customer base was just 7% of the market, or 66,900 customer in Q3 2010, and was experiencing significant year on year decline of 15.48% per annum, having declined from over 100,000 customers in Q1 2008. Aegis and Plum estimate that there will be just 35,000 MMDS customers by 2014, amounting to just 4% of the market. At this level of take-up it is unlikely that MMDS would have any substantial effect on the level of competition in the market.

Furthermore, the rate at which customers appear to be abandoning the platform indicates that there is little if any loss of benefit to the consumer in leaving the platform for an alternative TV service. Although, as UPC points out, the customers of MMDS have currently only one alternative provider of pay-TV, they do also have access to two free to air digital services; DTT and Freesat.

The cost benefit analysis undertaken by Aegis and Plum takes full account of switching cost for subscribers in moving from MMDS to an alternative TV platform, but does not explicitly consider changes to consumer surplus that might result from changes to the price and service that might result from switching from one TV provider to another.

The Aegis/Plum report states that overall producer surplus is likely to remain unchanged as a result of the switch, and we presume that Aegis and Plum are implicitly making the same assumption regarding consumer surplus, that it is essentially unchanged by switching from one supplier to another, provide the offers of those suppliers are competing in the same national market. eircom Group regards this as reasonable given the competitive nature of the national pay TV market. As noted above, the rate of migration away from MMDS would appear to confirm this.

3 The Aegis and Plum calculation of net benefits

eircom Group broadly supports the methodology used by Aegis and Plum in their cost benefit analysis. However, on both the benefit and cost side of the calculation, we believe there are additional factors that should be considered in a fully comprehensive analysis which are worth raising for completeness, but do not invalidate Aegis and Plum's findings.

eircom Group agrees with Aegis and Plum's definition of the two principal benefits and also agrees that the switching costs are the primary cost to be considered.

Capturing the full benefits

Aegis and Plum acknowledge in their report, when commenting on their estimate of the value of 2.6GHz in its NGMB application, that "*none of the above three methodologies is likely to capture the full value associated with mobile broadband*". This does not, of course, invalidate Aegis and Plum's findings because they conclude, based on a consideration of only part of the value of using 2.6 GHz that there is a clear net benefit of between EUR16.8 million and EUR 41.5 million in releasing the 2.6 GHz spectrum in 2014 compared to extending the MMDS licences to 2019.

However, in reaching this conclusion Aegis and Plum appear not to consider in their calculation the consumer benefit created by the use of 2.6 GHz spectrum for NGMB, instead relying on the auction fees paid in recent auctions as a measure of the benefit generated by 2.6GHz. eircom Group believes that if the consumer benefit of faster and cheaper mobile broadband is considered, the case to make 2.6GHz available for NGMB beyond 2014 is even more compelling.

eircom Group believes that changes to consumer surplus that result from both cessation of the MMDS service and making 2.6GHz available for NGMB should be taken into account in the analysis. We believe the benefits to consumers of improved mobile broadband will be substantial, and that these benefits are only partially reflected in the cost of the spectrum. On the other hand we expect, consistent with Aegis and Plum's analysis, that the loss of benefit to the consumer of switching pay TV provider, beyond the switching costs themselves, are likely to be small.

Changes to consumer surplus from cessation of MMDS

In switching from MMDS to another pay TV platform that competes in the national market, with national prices, it is likely that there is little or no change in consumer surplus, even if the consumer is required to purchase a slightly different package due to different pricing structures. The high levels of migration from MMDS to other platforms appear to support this.

eircom Group believe that Aegis and Plum's assessment of the switching costs captures the vast majority of the consumer impact, and that any further effects would be small.

eircom Group notes in passing that the UPC submission to ComReg 10/38 suggests a difference in consumer surplus of EUR27.7 million between renewal and non-renewal of the license. We understand that figure was based on a different time period, but it does not seem credible that such a high increment could be associated with a five year licence extension for a service that is projected to have just 35,000 users, and falling, at the start of that period. The figure for consumer surplus appears to have been based on the fact that BskyB has a higher ARPU than UPC. However as BSkyB are supplying a different mix of packages for that ARPU, eircom Group does not believe it is possible to draw any conclusion regarding consumer surplus from the ARPU figures. In fact, we would note that when switching away from MMDS some consumers will move to BskyB, though they may still choose a basic package with a low monthly expenditure – they are not forced to move to the average spend of a BskyB customer.

Changes to consumer surplus from making 2.6GHz spectrum available to NGMB

In contrast, for the NGMB service eircom Group believes there will be substantial gains in consumer surplus as a result of reduced prices of data service between 2014 and 2019 (on a "per Gbyte" basis) as a result of the 2.6GHz spectrum being available, as well as further gains for the consumer that will result from improved network capabilities and improved levels of competition compared to the situation where 2.6GHz is not made available until 2019.

Reduced prices and improved capability

Although spectrum prices at auction are in part a reflection of the underlying value, auction processes do not, and are not intended to, extract the full valuation of the bidder. Therefore auction prices do not necessarily reflect the full benefit created, even if the producer expects to be able to capture the value created.

In general because the price of spectrum in an auction is set by the valuation of the marginal block of spectrum purchased in each band, there is a surplus retained by the bidders, and this surplus increases with the supply of spectrum. In other words, when 2.6GHz is made available for NGMB the mobile operators can expect to buy additional spectrum at a price that is below the full value that can be provided to the end user with that spectrum.

The surplus will not be retained by the mobile operators but passed on to the consumer because the mobile market is competitive. Consumers will benefit from:

- **Reduced prices (e.g. reduced price per GByte):** The mobile operators cost of production will be reduced compared to a situation where 2.6GHz is not made available, even taking the expenditure on 2.6GHz spectrum into account. This reduced cost will result in reduced prices for the consumer. The consumer may or may not spend less on the service, but they will be able to enjoy a far greater quantity of data for the same price. This represents a clear gain in consumer surplus.

- **Increased network capability (e.g. higher bandwidth services):** With 2.6GHz available it is likely that all mobile operators will be able to deploy the highest speed LTE network, using 20MHz carriers, between 2014 and 2019. Consumers will therefore be

able to access higher bandwidth services than would be possible if 2.6GHz was not made available.

This results in a considerable increase in consumer surplus compared to the situation where 2.6GHz is not made available in 2014. The 190MHz of 2.6GHz spectrum more than doubles the amount of spectrum that can be dedicated to LTE in the early years and these effects are very strong. eircom Group therefore believes that Aegis and Plum's approach of using auction prices to estimate the benefit of NGNB substantially under-states the benefits.

Competition impacts

An additional benefit that eircom Group believes should be considered is the effect that releasing the 2.6GHz will have on maintaining the number of competitors in mobile broadband.

Currently four mobile operators compete in the mobile broadband market. The availability of 2.6GHz will make it possible for each of the 4 mobile operators to use a 20MHz LTE carrier in the high-frequency spectrum (either 1800MHz or 2.6GHz). If the industry only has 1800MHz available, then given the relatively high proposed spectrum caps in the proposed award process it is possible that only two of the four operators will be able to deploy 20MHz carriers. It is clear that it would be impossible for four operators to deploy 20MHz carriers in the absence of 2.6GHz spectrum. There is only 2 x 75MHz of spectrum in the 1800MHz band and some of that spectrum will be tied up with the continuation of GSM services. Depending on the distribution of the 1800MHz spectrum some mobile operators may find it difficult to compete in the mobile broadband market in the absence of 2.6GHz spectrum, effectively removing competitors and reducing the level of competition in the market.

The availability of 2.6GHz spectrum therefore safeguards the competitive nature of the mobile broadband market. In fact, it even presents opportunities for further competitive entry into mobile broadband provision.

The combination of high competitive intensity, high service bandwidth and significantly increased network capacity that will result from the availability of the 2.6GHz spectrum will lead to substantially increased consumer benefits compared to the situation with only 1800MHz available.

4 Conclusions

Contrary to the view put forward by UPC in its submission to ComReg 10/38 the benefits of the 2.6GHz spectrum cannot be fully replicated by using other bands by 2014. eircom Group acknowledges that other bands will be used in addition, and increasingly so over time, but the availability of 2.6GHz is the only way to ensure that all four mobile players can launch an LTE service that takes full advantage of LTE's capabilities by 2014. Without the 2.6GHz spectrum the bandwidths offered by at least some of the network operators will be lower than those available in other European markets where 2.6GHz has been made available.

The subscriber data for MMDS would appear to imply that far from being an important component of the competitive landscape for pay TV, the service is in decline and has little role in determining the overall competitiveness of the pay TV market.

eircom Group supports the methodology and the broad conclusion of the Aegis and Plum report. eircom Group believes that Aegis and Plum's treatment of switching costs for pay-TV is appropriate and captures the most significant costs to consumers of MMDS service being terminated. However, eircom Group feels the conservative approach of taking auction outcomes as being representative of the entire benefit of using the 2.6GHz spectrum for NGMB leads to a significant under-statement of the net benefit of making the 2.6GHz spectrum available for NGMB in 2014.

PART 2 Response to specific consultation questions

Q. 1. Please provide your views on the possible approach of allocating 2.6 GHz spectrum using a technology and service neutral competitive process as outlined by Aegis and Plum?

"*Aegis and Plum suggest that ComReg should consider allocating the 2.6 GHz spectrum using a technology and service neutral competitive process, allowing bids for both NGMB and MMDS uses (or other suitable uses). In the view of Aegis and Plum, such an approach would enable the market rather than ComReg determine the most economically attractive use of the 2.6GHz spectrum band.*"[4]

eircom Group believes that the analysis undertaken by Aegis and Plum provides a clear indication that there are no potential causes of market failure in allowing MMDS and NGMB operators to compete for the spectrum. Aegis and Plum's analysis did not identify any externalities, nor any reason why the benefits derived from license extension beyond 2014 would not be reflected in the licensees willingness to pay in a competitive award process.

eircom Group believes that a technology and service neutral approach to the award of 2.6GHz would be a valid approach provided that it does not lead to undue delay or other loss of efficiency of use of the spectrum. We note that designing an auction that allows for the varying packaging requirements of NGMB and MMDS may be complex. In our view ComReg need do no more than follow the technical parameters set out in the annex to Commission Decision (2008/477/EC). Indeed, Ireland did not seek a derogation in the implementation of Commission Decision (2008/477/EC), on the basis that MMDS is a form of ECS and that the MMDS solution could be made compliant with the technical parameters in the annex to the Commission Decision. In the Radio Spectrum Committee document, RSCOM08-39, it was stated that "*Irish studies concluded that the in-block power levels contained in the annex to Decision 2008/477/EC can be applied to MMDS. As far as out-of-band BEMs are concerned there were no specific conclusions from Ireland. However, there are general means (e.g. filtering, internal guard bands) to ensure compliance of MMDS systems with the technical parameters of the Decision.*" An important consideration in ComReg's review of the current MMDS licences is whether current MMDS transmission is actually compliant with the required technical parameters of the Commission Decision

eircom Group believes that the benefits of making the spectrum available for NGMB are sufficiently clear cut that combining the award of 2.6GHz with that of the other mobile bands should be prioritised above designing an award process specifically to accommodate MMDS use if such use is not compatible with the aforementioned technical parameters.

eircom Group believes there is substantial benefit to be gained from combining the 2.6GHz award process with the award process for 800MHz/900MHz and 1800MHz, for the same reasons that it was beneficial to auction 800MHz/900MHz and 1800MHz in a single process.

At Annex 3 of the Draft Decision regarding the proposed release of the 800MHz, 900MHz and 1800MHz radio spectrum bands ComReg sets out its reasoning as to the spectrum bands that

[4] ComReg 11/80, Page 11

should be included in the proposed process. ComReg sets out its principled reasoning in favour of simultaneous multiple band award processes[5]:

"*a simultaneous multi band award process is likely to lead to more efficient allocation of spectrum than sequential awards where an operator's valuation of spectrum in one band depends on what spectrum it holds, or expects to win, in another band…where spectrum, in different bands are either substitutable or complementary…a combined award of such spectrum bands makes sense.*"

"*Multiple band awards may involve more complexity than single band awards (but much of this can be addressed through appropriate auction design). Furthermore, the multiple band award offers some attractive qualities:*

- *a much richer set of opportunities for bidders regarding their desired holding of spectrum to suit their individual needs and investment plans, through the combination of substitutable and complementary spectrum in the same award;*
- *facilitating new entry; and*
- *much greater transparency in pricing as bidders are able to adapt their valuations and associated demand for spectrum in different bands in response to relative prices.*"

"*ComReg sees merit in a simultaneous award of multiple related spectrum bands where the availability of such bands permits.*"

As we set out above there is a clear and strong link between the 2.6GHz band and the bands ComReg is proposing to release in the Draft Decision. To date ComReg has concluded that the 2.6GHz band should not be included in the proposed multi-band award process "*given the uncertainty that exists regarding when the 2.6 GHz band will be available for liberalised use in Ireland, versus the ability for operators to deploy LTE equipment in 1800 MHz band now*"[6].

The publication of ComReg 11/80 dispels any uncertainty regarding the timing of availability of the 2.6GHz band. We agree with the conclusion of Aegis and Plum "*that if MMDS licences end in 2014, this would offer significant net benefits relative to scenarios where MMDS licences were extended to 2017 or 2019*."[7] Indeed as we highlight above and Aegis / Plum themselves acknowledge[8] their conclusion may be regarded as conservative as it understates the benefits of NGMB use.

The current 2.6GHz licences should expire no later than April 2014 and as such the spectrum will be available in advance of the majority of the 1800MHz band. The 2.6GHz band is both complementary and substitutable relative to the other proposed bands. ComReg's reasoning for the inclusion of the 1800MHz band in the proposed multi-band award process applies equally in respect of the 2.6GHz band. "*Whilst 1800 MHz and 2.6 GHz spectrum may be closer substitutes than 1800 MHz and sub-1 GHz spectrum, substitutability is not the sole motivation for a multi-band award process including sub-1GHz and higher frequency bands. ComReg has previously outlined its view that, while 1800 MHz spectrum is a substitute for sub-1 GHz*

[5] ComReg 11/60a, Paragraphs A3.46 – A3.51
[6] ComReg 11/60a, Paragraph A3.73
[7] ComReg 11/80, page 10
[8] ComReg 11/80a, Page ES-4

spectrum only at the margin, its complementarity to sub-1 GHz spectrum is the main benefit associated with its inclusion in the planned sub-1 GHz award."[9]

We would also note that "*the prospect of entry into the market in Ireland would be less risky where such an entrant could secure all of its spectrum requirements in a single process. Given that 1800MHz"* and 2.6GHz "*spectrum is a complement to sub-1GHz spectrum and a substitute at the margin, the inclusion of this spectrum in the planned sub-1GHz auction would represent a rare opportunity to secure a combination of spectrum across sub-1GHz and higher frequencies that would be sufficient to be an effective competitor within the market.*"[10]

Given the legacy technology issues in respect of the 1800MHz band and the likely continued use of a significant proportion of the band for 2G technologies the inclusion of the 2.6GHz band in the proposed multi-band award process would significantly increase the potential for the rapid deployment of competitive high speed mobile broadband services. Elsewhere in Europe the 2.6Ghz band is clearly recognised as a core LTE band and is being deployed accordingly. The inclusion of the 2.6GHz band is consistent with ComReg's position[11] "*that, where possible, related spectrum bands should be awarded together. ComReg's proposals accord with the holistic approach suggested by a number of respondents from early in this consultation process.*"

We believe that the inclusion of the 2.6GHz band in the proposed multi-band award process need not unduly delay completion of that process. There are a significant number of precedents of European awards already completed in respect of 2.6GHz spectrum that can inform appropriate characteristics for the inclusion of the band. Such factors include technical characteristics and reserve prices. While it is disappointing that ComReg has not advanced the debate in respect of the 2.6GHz earlier, particularly given the strong conclusions of the Aegis / Plum report of February 2011, we urge ComReg to avoid any further administrative delay and to move rapidly to bring the 2.6GHz band into the proposed multi-band spectrum award process.

Q. 2. Do you agree with ComReg's proposal to amend the licence conditions of the three MMDS licences in Dublin, Galway and Waterford so that the licences terminate in April 2014? Please provide reasons for your view.

It is stated[12] that "*On balance and given the unique background circumstances to the expiry of the three licences, ComReg is of the preliminary view that its proposal is appropriate, proportionate and objectively justified.*" eircom Group does not agree.

In May we raised our concern[13] that "*A number of existing licences in the band have expiry dates in 2012. These expiry dates were set as a result of past non-compliance. In the absence of a final Decision* [in respect of the review of the future use of the 2.6GHz band] *it is possible that the current licensee could seek to have the licences rolled over on an interim basis, as has happened in respect of two 900MHz licences. This would call into question the effectiveness of ComReg's enforcement measures.*" We are disappointed to note that our concern has been

[9] ComReg 11/60a, Paragraph A3.64
[10] ComReg 11/60a, Paragraph A3.62
[11] ComReg 11/60a, Paragraph A3.70
[12] ComReg 11/80, Page 13
[13] In our response to ComReg 11/28

realised although it is not clear to us whether ComReg's proposal is an own initiative measure or at the request of the licensee. We would be grateful if ComReg could clarify the facts.

Taking ComReg 11/80 at face value we can only assume that Comreg's proposal is an own initiative measure. It is questionable that ComReg should undertake an own initiative extension of the licence duration if a request for an interim licence has not been made by the licensee. The expiry dates for the three licences fall in April 2012 and have been known to the licensee for almost a decade. As such it would be expected that the licensee would be at an advanced stage to complete the necessary activities to vacate the band unless it has been relying on undisclosed assurances.

ComReg considers that "*The main issue arising from the issue of different expiry dates, in ComReg's view, relates to the extent to which the different expiry dates would affect its ability to achieve its objectives and exercise its functions in relation to the efficient use and management of spectrum*." We would observe that the situation of different expiry dates is a direct consequence of the regulator exercising its functions in relation to the efficient use and management of the spectrum. The termination dates of the three MMDS licences were set, in accordance with the provisions of SI 73 of 1999[14], following a material and sustained period of non-compliance by the licensee. ComReg now appears to be saying that a policy objective of co-terminus licences in the 2.6GHz should take precedence over promoting an effective compliance culture.

It is not clear to us why ComReg has chosen to act in this way and the argumentation put forward by ComReg in Section 4 of ComReg 11/80 is tenuous. Indeed ComReg appears to acknowledge it is acting in an unpredictable manner when it states – "*The alternative to ComReg's proposal would be to let the licences expire in April 2012. The main benefit of this particular option seems to ComReg to be that it would uphold the principal of regulatory predictability.*" The principle of regulatory predictability is an important principle which should not be summarily dismissed without objective justification.

ComReg's proposal is to our knowledge unprecedented. For example in order to address the imminent expiry of the 900MHz licences of Vodafone and O2 in May 2011 the licensees were required to apply for new Interim Licences with re-based licence fees indexed for inflation. In the case of the expiry of eircom Ltd's FWPMA Licence in June 2010 eircom had not completed the migration of the provision of services to certain customers from the licensed spectrum. ComReg decided that the original expiry date should be enforced and temporary transitional licensing arrangements with a new fee structure were established to facilitate clearance of the spectrum. In none of these recent examples did ComReg volunteer to extend the licences. The licensees had to actively seek alternative arrangements and in all cases had to accept alternative licence fees.

ComReg sets out a number of reasons why it feels its proposal is appropriate. We do not believe that the reasons set forth by ComReg offer adequate justification for its proposal. In particular ComReg offers no quantifiable evidence to substantiate its view.

- "*ComReg does not believe it would be an efficient use of spectrum to allow this band lie fallow in those licence areas for 2 years when it could be used to continue the existing MMDS services*."

[14] SI 73 of 1999 was subsequently revoked and replaced by SI 529 of 2003

It is a natural outcome of the regulator's compliance action that the spectrum may lie fallow for two years following licence expiry. We assume the regulator took this into account when determining the proportionality of its compliance action. It is illogical to seek to justify the reversal of a decision because of the consequences of the decision.

- "*No further licence compliance issues have been notified in the period since 2001.*"

It is incorrect to state that no compliance issues have been notified since 2001. According to PR081102, issued in November 2002 the persistent breach first identified in 2000 was still prevailing and was expected to be resolved in June 2003. Furthermore we request ComReg to confirm that no further licence compliance issues have been identified since 2001. In any event if it is correct that there have been no more compliance issues this can only be regarded as a positive result arising from the compliance action taken.

- MMDS consumers "*in the three areas where the licences expire in 2012 would have less than five months to replace the source of their TV programme services*"

ComReg does not provide details of the number of customers potentially impacted by the expiry of the three licences. It would be instructive to consider the number of consumers potentially impacted in order to form a view on materiality. We note that the Aegis / Plum report estimates the time taken by consumers to switch at two hours[15] per consumer.

- "*because of the overlap of coverage from transmitters in different MMDS franchise areas there could be uncertainty in some areas as to which customers would in fact suffer a loss of service*."

We are somewhat surprised by this statement as we find it hard to believe that the licensee is not aware of the coverage area of its transmitters. It is possible that it may be difficult to predict service availability close to the edge of a transmitter coverage area in a precise manner. This would only be relevant to a very small percentage of customers and is something the licensee could address through manual inspection. As such we do not accept this as a valid reason for ComReg's proposed action.

- "*ComReg is required to have regard to the needs of specific social groups... and the difficulties identified above have the potential to confuse viewers from these social groups in particular.*"

We do not dispute that ComReg must have regard to the needs of specific social groups. However in the absence of any quantifiable evidence the above statement is insufficient justification for ComReg's proposal. Members of specific social groups rely on services provided in other spectrum bands where ComReg has implemented or proposes to implement more draconian remedies to address licence expiry such as the examples noted above.

[15] Page 36 of the Report

We have considered ComReg's proposal to amend the termination date of the three MMDS licences and find it to be extremely questionable on the basis of the facts presented. As such we do not agree with ComReg's proposal.

5: Hutchinson 3G Ireland Ltd.

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
Irish Life Centre
Lower Abbey Street
Dublin 1
BY COURIER AND EMAIL: sinead.devey@comreg.ie

14 December 2011

Dear Sinead

RE: SUBMISSION RE: COMREG 11/80

I refer to ComReg Doc. No. 11/80, *"Consultation Paper – Future of the 2.6 GHz radio spectrum band"* ("ComReg's Consultation Paper"). Hutchison 3G Ireland Limited ("H3GI") welcomes the opportunity to respond to ComReg's consultation. It re-iterates its request that ComReg issues its detailed proposals in relation to the release of spectrum in the 2.6 GHz band asap.

ComReg's Intention to Amend the 2.6 GHz Licences in Dublin, Galway and Waterford so that they Terminate in April 2014

As H3GI does not believe that ComReg has the power to foreshorten licences, it does not object to UPC being authorised to provide MMDS services in Dublin, Galway and Waterford until April 2014.

Report on the Technical Feasibility of the 2.6 GHz Band being Shared by MMDS and Next Generation Mobile Broadband ("NGMB") Systems

H3GI agrees with the approach of allocating 2.6 GHz spectrum using a technology and service neutral competitive process as outlined by Aegis and Plum. It shares ComReg's preliminary view that the potential case for sharing ultimately remains limited and that the benefits need to be balanced against the cost of conducting any necessary studies or implementing any practical interference mitigation techniques. H3GI agrees with ComReg's decision to refrain from conducting any further studies on sharing.

Yours sincerely

MARK HUGHES
Head of Regulatory

6: L.A. Services

L A Services

54 Ballybane Industrial Estate

Ms Sinead
Devey

Galway

Commission for Communications Regulations
Irish Life centre
Abbey Street
Freepost
Dublin 1
Reference: Submission re Comreg 11/80

Dear Ms Devey

I would like to make a further submission to you regarding the (upcoming) review of the licence in the 2.6Ghz band. We made a submission to you in 2010 but following on the Aegis and Plum report we would like to make the following points.

The Aegis and Plum is mainly a report on the best technical use of the 2.6Ghz band and takes very little cognisance of what the Irish consumer needs or wants. It does not take account of any qualitative issues.

It does not deal with the fact that if MMDS goes there is only one pay TV provider namely BSKYB, indeed the Aegis and Plum report on page 35 states that customers who want to change to "an" alternative supplier but there is only one alternative supplier when it comes to pay TV. Surely this is the only service or product that will have no alternative in rural Ireland a country where we are always complaining about the cost of services and the lack of competition re Banking, Mobile phones etc.

The argument could be made of course that with BSKYB being such a huge player mainly in the UK the addition of such a relatively small number of new subscribers especially in Ireland would make very little difference to them but this of course is one of the main issues, BSKYB are essentially a UK company and are not subject to regulation (by Comreg) in this country. They would have a monopoly on pay TV in rural Ireland and as DTT is not an alternative option we have absolutely no other choice when it comes to pay TV. Also when it comes to regional and local content BSKYB have absolutely no interest in the needs of rural Ireland.

While the Aegis and Plum report dealt with the cost of the changeover it did not deal with the ongoing higher costs to customers associated with having Sky TV e.g. a service call from a Sky engineer costing €100 at present while callouts (and replacement parts) to MMDS customers are free. These are important issues when so many households are struggling from a financial perspective.

We believe that if MMDS was retained to 2019 and beyond with certain conditions attached e.g. the upgrade to MPEG4 and the potential for the rollout of DVRs to all areas then not only would MMDS be a more viable product but customer numbers would be increased substantially. We also believe that due to the success of their cable TV/broadband service in urban areas UPC have somewhat neglected MMDS which has helped to lead to this

situation. There are many ways in which MMDS could be made more attractive to viewers such as a tie up with DTT or the delivery of wireless broadband and MMDS via the same supplier
As a contractor to UPC I can state categorically that over twenty years we have always given a superb service (testimonials available) to MMDS customers and that is one of the reasons why UPC have maintained a high number of customers in the Galway area where MMDS customers have access to the full range of services including DVRs.

There are other frequencies not being fully utilised (e.g. 1800mhz) which could be used for NGMB and I would suggest that the giant Multinational companies who are looking to carve up the 2.6Ghz band between them care not a jot about what's best for the people of rural Ireland and are only interested in what profits can be made from these frequencies and only in the greater Dublin area at that.

Yours sincerely

Tomas Lynch MD

7: Setanta Sports

SETANTA SPORTS

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

Dec 16, 2011

Submission by Setanta Sports in Respect of MMDS licenses in Ireland

Please find a submission from Setanta Sports in respect of the November 2011 ComReg consultation in which it:

- Indicated its intention, subject to responses received from interested parties, to harmonise the Dublin, Galway and Waterford licences to 2014.
- Published a technical report setting out alternative uses for the 2.6Ghz spectrum band post 2014

On the latter, a decision by ComReg allowing this spectrum to be used for other services would cause the early closure of UPC's MMDS TV.

Setanta Sports believes any such decision would leave the inhabitants of vast areas of rural Ireland without any choice for Multichannel TV. It is important to note that Saorview is not an alternative for these affected homes. The only real alternative to the UPC product is the Multichannel service by UK company, BSkyB. It is our understanding that over 100,000 households in rural Ireland will be disrupted and lose their multi-channel TV service and only have one alternative and therefore no competition will exist. BSkyB would have a pay-TV monopoly across over 700,000 homes and the potential to control prices and access to content. The presence of UPC's MMDS service gives customers a variety of options for pay-TV packages and a choice of service provider.

The Setanta Ireland TV channel is included in the basic service of these 100,000 homes and if the UPC MMDS service ceases our channel will no longer be available on a free basis to these homes. This will dramatically affect Setanta's audience and will have several knock-on effects including:

- A significant reduction in our audience share

- A potential decrease of between 20 to 30% in our advertising revenues

Setanta Sports
Broadcasting House
3A Princes St. South
Dublin 2
Ireland

T: +353 (0) 1 474 8000
F: +353 (0) 1 474 8001

www.setanta.com

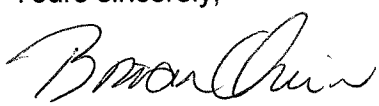
SETANTA SPORTS

- With the potential removal of such a large amount of our rural audience Setanta will not be in a position to produce the same amounts of local content

While Setanta is not a broadband provider, we do provide content across broadband and we do not believe that the freeing up of the 2500-2690MHz band for broadband services will significantly advance the availability of broadband options in rural areas. We also believe that homes in these areas truly value their TV services and will not appreciate the interruption to their service and the lack of alternatives. We hope that Comreg will support consumers' right to have a choice and in the process protect the benefits that UPC's MMDS service brings to the local community, the local economy and local content creators.

If you have any questions, please do not hesitate to contact me.

Yours sincerely,



Brian Quinn, Customer Acquisition Director

Setanta Sports Ireland

Setanta Sports
Broadcasting House
3A Princes St. South
Dublin 2
Ireland

T: +353 (0) 1 474 8000
F: +353 (0) 1 474 8001

www.setanta.com

8: Telefonica O2 Ireland Ltd.

16th December 2011

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

Dear Sinead

The 2.6GHz Radio Spectrum Band – Document 11/80

I refer to previous correspondence regarding the above mentioned consultation, and Telefonica Ireland's (O2's) response. Accordingly, this letter is O2's preliminary response to the consultation, and a further more detailed response will be submitted on 13th January next. For now, we would make the following comments.

Consultant's Report
We note that ComReg has had Ageis and Plum examine some aspects of licensing and use of the 2.6GHz band. This is a useful report and and our preliminary view is that we would agree with its findings.

Licence Expiry in 2012
We note that it is now only a little over four months to when the MMDS licences in Dublin, Galway, and Waterford will expire, and as yet no decision has been made as to what will happen on expiry. This is simply too short of a time period to allow for an orderly switch-off and ComReg has no choice at this point but to grant an extension of some kind. We note that ComReg has always known of the expiry date, and that it has been within ComReg's gift to provide the decision required sufficiently in advance of the expiry date. It is not good enough that such decisions are effectively being made by default as a result of delay on the part of ComReg.

The decision to foreshorten the MMDS licences in the three areas was originally imposed by the regulator as a penalty for failure to meet licence committments. While we understand ComReg must now grant an extension and that it is desirable to have all licences expire at the same time, ComReg's proposal to simply extend the three licences to 2014 effectively negates the penalty. O2 suggests that there is an an alternative means for ComReg to maintain its penalty, while at the same time avoiding licence expiry in 2012 and also having a common expiry date – the three licences in question should be extended, and at the same time the seven other licences should be reduced in duration by a weighted proportionate amount of time. This would give a common expiry date in August or September 2013 for all ten licences (overall reduction = 3 sites x 24 months = 72 months; reduction per site = 72 / 10 = ~ 7 months per site).

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

Future Licences

In the first place, we would note that there is no automatic entitlement to a MMDS licence extension. Regulation 8 of the MMDS Regulations[1] state:

> "*8. (1) The Commission will, after 18 April 2010, and subject to such conditions and restrictions as are prescribed in regard thereto by these Regulations, and after such public consultation (if any) as the Commission considers appropriate, review the operation of all such licences so granted and continuing in force and* ***may****, subject to such terms and conditions as may be specified by the Commission, renew any such licences which are in force on that date for a further period of* ***up to*** *5 years from 19 April 2014*" [emphasis added].

Clearly there is a requirement on ComReg to carry out a review, following which ComReg may extend licences by up to five years. There is a decision to be made by ComReg as to whether to extend MMDS licences and if so, by how much time. This decision would necessarily be taken in accordance with ComReg's general functions and objectives for spectrum management.

The report provided by Aegis and Plum shows that the greatest economic benefit can be gained by the earliest possible award of spectrum in the 2.6GHz band by technology neutral open assignment. O2 support this finding, and ComReg should assign the rights of use for the 2.6GHz band for the period after expiry of the current MMDS licences through an auction to be held as soon as possible.

Substitutable Spectrum

The 1800MHz and 2.6GHz bands contain substitutable spectrum, and current 1800MHz licences expire at end 2014 or mid 2015. In these circumstances, the logical course of action would be to auction both the 2.6GHz and 1800MHz bands together. The logic for this course of action has already been given by ComReg's own auction advisors (DotEcon), who have recommended that spectrum that is substitutable should be auctioned together.

O2 recommends that ComReg should either: (i) include the 2.6GHz spectrum in the multi-band auction planned for 2012 (with a licence commencement date of September 2013 for 2.6GHz); or (ii) remove the 1800MHz spectrum from the first auction and include it in a separate auction together with 2.6GHz to be held as soon as possible after the sub-1GHz auction.

Yours Sincerely

Tom Hickey

[1] WIRELESS TELEGRAPHY (Multipoint Microwave Distribution System) REGULATIONS 2003, SI 529 of 2003

9: Ulster Television Plc.

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

16th December 2011

Dear Sinead,

Re: Submission to ComReg 11/80

UTV is grateful for the opportunity to input to this consultation process. MMDS is a very important platform for the UTV Channel and we have a significant interest in ensuring our service is available as widely as possible across Ireland.

UTV submitted a document to ComReg's previous consultation relating to MMDS distribution and all material points we supplied there remain valid. We welcome ComReg's continued reference to UTV's previous points. Our views have not changed.

UTV supports fully the proposal to run all licences to 2014. Cable and MMDS are the only way viewers in Ireland can receive UTV's services. (There is some overspill in the border area, but this will be significantly reduced at the point of Digital Switch Over in October of next year). UTV is the oldest indigenous television service on the island of Ireland and is valued by a large audience. Due to Content Rights Issues UTV is not available in Ireland on Sky or Saorview.

In regard to the current consultation we wish two re-enforce our key points.

1) The service MMDS provides is important for media plurality as it ensures consumer choice for pay TV in rural areas. As previously stated the UPC platforms are the only platforms on which any viewers in Ireland can receive UTV's services. Without MMDS much of Ireland would lose access to a valued channel which provides high quality, news, current affairs and public service content.

2) The 2.6 GHz band should continue to be used for broadcasts purposes for MMDS until 2019. If MMDS is removed from this part of the spectrum, it is likely it will lie fallow and will not be used for broadband anytime soon. Indeed it is questionable if the band will ever be used for broadband in those areas that currently have MMDS. It is likely only to be rolled-out in urban areas if at all in the 2.6 band as there will be better and more attractive bands that will be available soon (900/1800)

This is a significant issue in terms of audience choice and we hope this is acknowledged by ComReg in their deliberations on the future use of this spectrum.

Yours sincerely,

Michael Wilson
Managing Director, UTV Television

10: UPC Communications (Ireland) Ltd

Future of the 2.6 GHz spectrum band

UPC Ireland's response to
ComReg's Consultation
Document No. 11/80

December 2011

Table of contents

Tables and Figures

Executive Summary

UPC welcomes the opportunity to respond to this consultation, the second that ComReg has initiated on the 2.6 GHz spectrum band issue since May 2010. As the incumbent operator in the 2.6 GHz band, UPC has a particular interest in future usage plans for the spectrum, not least because UPC continues to use it to provide its nationwide MMDS pay-TV service, a service that is used by approximately 50,000 households across the country.

This consultation relates to two separate and distinct issues, i.e. ComReg's proposal to reinstate the April 2014 termination date for the Dublin, Galway and Waterford MMDS licences and the publication of a report by Aegis and Plum, commissioned by ComReg, on technical and economic issues relating to future usage of the 2.6 GHz band. Given the current termination date for the Dublin, Galway and Waterford MMDS licences of April 2012, there is an urgent need for ComReg to issue a swift decision confirming that the original April 2014 termination date applies in those areas. UPC formally calls on ComReg to decouple this issue from its wider review of the 2.6 GHz band and to confirm this as a decision as soon as possible, ideally before year-end.

UPC notes ComReg's reasoning for the extension of the termination date of the Dublin, Galway and Waterford licences until April 2014: if the licences expire in 2012 then the spectrum will lie fallow for at least 2 years given that it will continue to be used to provide UPC's MMDS service elsewhere. Without prejudice to UPC's position that there are other legal grounds for reinstating the original 2014 date we also agree with ComReg's reasoning in this regard. In addition, as ComReg has pointed out, the rationale for originally shortening the licence term no longer applies. It is also the case that ComReg has a clear duty of care in respect of MMDS customers in the affected areas. The sudden termination of their TV service – which would necessarily have to occur following a very short notice period – would be enormously disruptive for the customers involved and ComReg has a duty to ensure that these MMDS customers are not placed in such a situation.

On the wider issue of reviewing the future use of the 2.6 GHz spectrum band, UPC is greatly concerned that ComReg has not yet formally initiated its statutory review of the operation of the MMDS licences. By ComReg's own admission, it is legally obliged to hold such a review but, despite having now issued two consultation papers on future usage of the 2.6 GHz spectrum band in general, UPC is still awaiting the formal commencement of the specific statutory licence review pursuant to Regulation 8 of the 2003 Regulations. UPC therefore calls on ComReg to begin this statutory review of the operation of the MMDS licences without any further delay.

UPC also has strong reservations at the way in which ComReg has published for comment the report by Aegis and Plum on technical and economic issues relating to future usage of the 2.6 GHz band without first publishing any consultation response following the submissions received in response to its Call for Input in 2010. The Call for Input resulted in a significant number of responses – including a detailed and lengthy submission from UPC – and these submissions deserved proper consideration by ComReg prior to its publishing any further consultation documents on the issue.

It is also the case that by placing in the public domain the Aegis and Plum report (which ComReg was in receipt of for eight months before it published it) which deals with a number of issues that are pertinent to the review of the future use of the 2.6 GHz spectrum, ComReg risks having these issues dealt with in a piecemeal way. As a result, ComReg is potentially prejudicing its own consideration of those issues in the review of the MMDS licences that it is still statutorily obliged to undertake.

UPC is of the strong view that ComReg cannot rely in any way on the technical analysis of spectrum sharing options contained in the Aegis and Plum report. UPC has examined each of the eight

possible interference scenarios under spectrum sharing that Aegis and Plum have analysed and in each instance it has found that the risks of possible interference between MMDS and NGMB services have been erroneously over-emphasised. UPC has already submitted to ComReg a detailed study on the viability of geographic spectrum sharing in the 2.6 GHz band and it is UPC's view that the flawed and incomplete analysis undertaken by Aegis and Plum does nothing to undermine the validity of this study.

Likewise, UPC has serious reservations about the economic analysis undertaken by Aegis and Plum which found that the economic benefits arising from the release of the 2.6 GHz band for re-allocation in 2014 outweighed the projected costs. In UPC's opinion, such a conclusion cannot possibly be supported as it is based on a gross overstatement of the economic benefits of using the 2.6 GHz spectrum band for NGMB services in the period 2014 – 2019 and a significant underestimation of the cost to the Irish economy of the early closure of UPC's MMDS service. In its response to the Call for Input, UPC submitted economic evidence to ComReg showing that the benefits of retaining the 2.6 GHz band for MMDS up to 2019 far outweighed those that would accrue if it were re-assigned for use to support the provision of NGMB services. UPC continues to stand over this evidence and dismisses utterly the unsupportable case to the contrary put forward by Aegis and Plum.

A key reason why little or no economic benefits will accrue in the period 2014 to 2019 if the 2.6 GHz band is re-assigned for use to support the provision of NGMB services is because other bands which will be more readily available for use by the mobile operators – i.e. the 800 MHz, 900 MHz, 1800 MHz and 2100 MHz bands – are also more suitable for the provision of NGMB services in a country with Ireland's population density. It is only when operators with access to all this spectrum become capacity constrained (which almost certainly will not to occur prior to 2019) that there is likely to be any demand at all for allocations of 2.6 GHz spectrum for NGMB and only then will demand arise in relation to high capacity zones, such as in dense urban areas. Modelling which UPC has undertaken and the results of which are included in this response clearly support the proposition that such demand is extremely unlikely to arise before the end of 2019.

This in turn means that most, if not all, of the 2.6 GHz spectrum band will lie fallow for at least five years (and possibly much longer) if it is re-assigned for use to support the provision of NGMB services in 2014. It is also the case that releasing the spectrum for competitive assignment on a technology and service neutral basis at this point would have the same practical effect as assigning it for NGMB and would mean the termination of UPC's MMDS service at that point in time. As such, Aegis and Plum's proposed approach is one that will lead to the inefficient use of spectrum since it will result in the wasting of spectrum and at a substantial economic cost. As a result, UPC believes that this proposed approach should be rejected by ComReg.

While UPC accepts that ComReg will eventually have to offer competitive access to the 2.6 GHz band on a technology and service neutral basis, it believes that there is no pressing need for ComReg to do so now. Instead, UPC believes that ComReg should declare its intention to offer competitive access to the band on a technology and service neutral basis in 2019 but in the interim that it intends to renew UPC's MMDS licences for a further five-year term from April 2014.

UPC also believes that ComReg could readily provide for spectrum sharing on a geographic basis prior to 2019 and in doing so could satisfy whatever concerns the mobile operators may have about securing access to the band to meet capacity requirements for their NGMB services in the period up to 2019. If such credible demand materialised, UPC would be willing to work with ComReg to minimise interference in the dense urban areas. In this way, UPC's valued MMDS service could be retained, the efficient use of the spectrum would be ensured and the economic benefits to Ireland would be maximised. This would be a 'win-win' outcome for all stakeholders and it is an approach that UPC urges ComReg to adopt.

Responses to ComReg's consultations

For ease of reference and given the number of publications issued by ComReg in relation to the uses and licensing options for the 2.6GHz spectrum band, throughout this response UPC will refer to ComReg Document 10/38 as the "Call for Input"; ComReg Document 11/80 as the "current consultation paper" or the "Consultation Document" and ComReg Document 11/80a as the "Aegis and Plum Report".[1]

With respect to the current consultation, ComReg has posed two questions to which UPC would provide its detailed feedback as follows:

Q1. Please provide your views on the possible approach of allocating 2.6 GHz spectrum using a technology and service neutral competitive process as outlined by Aegis and Plum.

UPC has a range of concerns on a number of issues in the analysis presented by Aegis and Plum as prepared for ComReg for the current consultation. In particular, it is UPC's view that several of the base assumptions are unproven which means that Aegis and Plum's principal conclusion - that the economic benefits of releasing the band for use by NGMB in 2014 outweigh the benefits of retaining the band for MMDS - cannot be relied upon.

It remains UPC's strong view that any benefits that may arise from releasing the band for NGMB in 2014 would be massively outweighed by the negative short-term impacts of such a move, in terms of the loss of pay-TV competition in large parts of the country as well as associated consumer disruption and job losses during what is already set to be an extremely difficult economic period for Irish citizens. There is also a very real danger that making the band available for NGMB in 2014 would cause significant revenue losses to the Irish exchequer both in the form of reduced VAT receipts and the loss in revenue that would inevitably result from auctioning access rights to the 2.6 GHz band at a point in time where the demand and use for NGMB remains largely unproven and will therefore impact on the operators' willingness to pay anything above the reserve price for access to it.

UPC recognises that ComReg will eventually need to offer access to the 2.6 GHz band on a technology and neutral basis but we strongly believe that the benefits to Ireland can be maximised if this move is not made until 2019. This would facilitate the continued provision of UPC's nationwide MMDS pay-TV service thus ensuring the consequent maintenance of platform competition and consumer choice for pay-TV services over this period.

In the unlikely event that there is any demand for capacity in the 2.6 GHz band to support the provision of NGMB services between 2014 and 2019, UPC believes that ComReg could easily, when renewing the MMDS licences in 2014, make provision for geographic sharing arrangements to take

[1] *Call for input on potential uses and licensing options of the 2.6GHz spectrum band*, (ComReg Document 10/38), May 14, 2010. *Future use of the 2.6GHz radio spectrum band*, (ComReg Document 11/80), November 2, 2011. *Technical and Economic Study on Multipoint Microwave Distribution Systems and Next Generation Mobile Broadband Services in the Band 2500 – 2690 MHz*, Report for ComReg, (ComReg Document 11/80a) February 2, 2011.

place. As we explain in our response below, we do not believe that the analysis of spectrum sharing undertaken by Aegis and Plum was sufficiently detailed and did nothing to disprove the analysis which UPC presented to ComReg in its response to the Call for Input which demonstrated that geographic sharing within the band could take place. UPC therefore strongly believes that ComReg has pre-maturely arrived at this decision which has resulted in the Regulator attempting to pre-empt proper and considered deliberation of this as a viable option. As ComReg is aware, UPC would in any event assert that ComReg is incorrect to dismiss this option. For its part, UPC would be open to considering possible geographic sharing of the 2.6 GHz band being reflected within the MMDS licensing provisions provided that there was demonstrable demand for this spectrum in the region in the period 2017 to 2019.

The other possible alternative use for the 2.6 GHz spectrum could be to support WiMAX-based fixed wireless services.[2] As UPC pointed out in its response to the Call for Input[3], however, ComReg is planning to release up to 100 MHz of spectrum in the 2.3 GHz band, which would be suitable for Time Division Duplex (TDD) systems such as WiMAX. This amount of spectrum would, in addition to existing assignments, appear to be sufficient to meet whatever medium-term demand for capacity that might exist for the further deployment of WiMAX networks across the country.

In responding to ComReg's specific consultation question set out above, UPC wishes to provide comments on (1) procedural issues relating to ComReg's past and current consultations and its review of the 2.6 GHz band, (2) issues relating to the technical analysis contained in the Aegis and Plum report and (3) issues relating to the economic analysis in the Aegis and Plum report. UPC addresses each of these issues in turn before setting out our conclusions on the approach proposed by Aegis and Plum. In conclusion UPC sets out its alternative vision for how the 2.6 GHz band might best be used between 2014 and 2019 in the following sections.

Procedural issues relating to ComReg's review

Before providing detailed feedback on the two questions raised in the current consultation, UPC first wishes to express its strong concern with regards to ComReg's approach in dealing with its required review of the operation of the MMDS licences and its consideration of the future use of the 2.6 GHz band.

As ComReg is aware, UPC's MMDS licences contain a provision which is unique to those licences whereby the Regulator is required to undertake a review and to consider whether those licences should be extended by up to five years i.e. to April 2019. Under the 2003 Regulations[4], which provide the legal basis for the licensing of MMDS services, ComReg is obliged (Regulation 8) *"to review the operation of all such licences granted"*.

In this regard, the first observation UPC would make that despite the current consultation being the second consultation with respect to the future use of the 2.6 GHz band, it is UPC's position that neither ComReg's initial Call for Input in 2010[5] nor the current consultation actually constitute or satisfy ComReg's obligations in relation to conducting this review. Indeed in both documents ComReg acknowledged that its options for future licensing in the band were subject to the outcome of a review it is obliged to undertake.[6] UPC is therefore greatly concerned to note that once again despite the

[2] In their responses to the Call for Input, Digiweb, Imagine and the WiMAX Forum all argued for the freeing up of the 2.6 GHz band for re-allocation to support the provision of WiMAX services. See ComReg document 10/58s.
[3] UPC's response to the Call for Input is attached to this response as Confidential Annex 1.
[4] Wireless Telegraphy (Multipoint Microwave Distribution System) Regulations 2003 (SI No. 529 of 2003).
[5] See *Call for input on potential uses and future licensing options of the 2.6 GHz spectrum band*, ComReg Information Notice (Document No. 10/38), 14th May 2010 ("Call for Input").
[6] Ibid., Page 4 (paragraph headed "Timing of availability").

publication of the current consultation ComReg has failed to commence the appropriate review of the operation of the existing MMDS licences in accordance with its legal duty.

The current consultation deals with the unrelated and separate matters of the 2012/2014 termination date and seeks stakeholders' views on the Aegis and Plum reports, which in some ways suggests ComReg has prejudged the outcome of the statutory review which has yet to commence. In our view neither of these form part or constitute a review as provided for under the 2003 Regulations, despite ComReg's claim that that its commissioning of the Aegis and Plum report forms *"part of its 2.6 GHz band review"*.[7] ComReg concedes in its Consultation Document (Section 2.1) that *it "is obliged under the terms of the 2003 Regulations to review the operation of the licences and to consider whether they should be renewed for a period of up to 5 years following April 2014"* and that "as part of its review" it "must have regard to potential alternative uses of the band". Later in the Consultation Document (at Section 3.1), ComReg makes reference to what it terms *"its wider review of the 2.6 GHz band".* ComReg fails, however, to clarify the purpose of this "wider review" while going on to state that the review will be informed by a range of inputs, including the responses received to its initial Call for Input and to the current consultation.[8]

From UPC's standpoint, ComReg's failure since 18th April 2010 to state clearly and unambiguously its intention to conduct a review of the operation of the current MMDS licences and to provide details of the terms of reference for this review means that ComReg is not complying with its statutory obligations to hold such a review as provided under the 2003 Regulations. In this regard, it appears clear to UPC that ComReg should have commenced its consideration of future usage of the 2.6 GHz spectrum with a review focused solely on the operation of the current MMDS licences and the case for their renewal post-2014. While it would be a matter for ComReg to set the terms of reference for such a review, UPC believes that it could, for example, include an assessment of the effectiveness of the MMDS pay-TV platform to date (in terms of how it has promoted platform competition for pay-TV services and the level of customer satisfaction in this regard) and an examination of the future prospects for the service up to 2019. It could (and, in UPC's view, should) also include a careful assessment of the likely positive and negative factors relating to MMDS licence renewal from 2014 to 2019.

As the incumbent operator in this spectrum band, UPC would have expected ComReg to communicate directly with the company to notify it about the formal commencement of the review and, in doing so, to provide UPC with the any related terms of reference. As ComReg itself is well aware, it has not undertaken either of these steps.

Instead, ComReg has initiated two separate consultations and has commissioned an economic and technical report on aspects that are perhaps incidental to a review of the operation of the MMDS licences. It appears to be ComReg's position that these steps somehow form part of its review and it has stated its intention to undertake *"a wider review of the 2.6 GHz band"* without explaining the purpose of this "wider review" or how such a review relates to their Regulation 8 obligation.[9] Such an approach by ComReg is entirely unsatisfactory in the context of an express statutory basis for the review of the MMDS licences.

The situation is further compounded by the fact that ComReg has still failed to publish any formal response to the 36 submissions made to it pursuant to its Call for Input (a level of response which, it should be noted, is almost without precedent in the area of ComReg consultations thus reflecting the level of interest on this particular issue). When ComReg published these submissions on its website

[7] Consultation Document, Section 1, page 3.
[8] Ibid., Section 3.1.
[9] Ibid.

on 27th July 2010[10], it stated that its "next steps" would be *"to carefully consider the wide range of views received on this matter in preparation for its public consultation which will follow in due course"*.[11] More than sixteen months on from this ComReg's public consultation on this matter is still awaited.

It seems instead, ComReg opted to commission a report from Aegis and Plum to scrutinize and critique points made by parties that responded to the Call for Input (with particular focus on points raised by UPC raised in its response) in a selective manner. ComReg has now presented this report for public consultation. UPC is not aware of any other instance in which ComReg has adopted such a selective approach which we think is highly unusual in terms of consulting on issues of public concern to stakeholders. ComReg's failure to provide a timely response to its own Call for Input contrasts greatly with, for example, the scrupulous way that it has responded to issues raised by stakeholders in relation to spectrum liberalisation and future licensing of the 800 MHz, 900 MHz and 1800 MHz bands. As will have been evident to ComReg from the substantial submission the company made in response to the Call for Input, the continuation of the MMDS service is no less important to UPC than the continuation of GSM services are to the mobile community. UPC therefore does not understand why ComReg has failed to address the review of the 2.6GHz band with the same attention to detail and level of scrutiny as it appears to have undertaken for other spectrum bands. UPC points to the remarkable contrast in the way in which ComReg moved to extend the term of the GSM licences that expired in May 2011 despite there being no express legislative provision for licence renewal with its failure to date to address the issue of MMDS licence renewal post-2014 despite the fact that the 2003 Regulations provide a specific legislative basis for such renewal.

In addition, as referred to above, ComReg has potentially prejudiced its own consideration of the issues in relation to the review by attempting to pre-determine and/or limit the range of issues to be considered within the wider and more specific review of the operation of the current MMDS licences that ComReg has yet to commence.

We are perplexed by ComReg's failure to act with any urgency in relation to this issue, underlined by the fact that it appears ComReg was in receipt of the Aegis and Plum report for a full eight months before it decided to release it for public consultation.[12] We submit also that the Aegis and Plum report is already somewhat dated, with further developments on the licensing of bands to support LTE services having taken place since its inception (including in the area of spectrum auctions in the 2.6 GHz band and other bands that could be used to provide LTE services). Other notable developments that have occurred in the interim include the national launch of RTÉ's *Saorview* service in May of this year[13] and the announcement by the Minister for Communications, Energy and Natural Resources ("DCENR") on 14th October 2011 that Analogue Switch-off ("ASO") would take place on 24th October 2012.[14]

In summary, UPC has grave concerns about compliance by ComReg at a procedural level. ComReg appears to be aware of its statutory obligation to review the operation of the MMDS licences but has neglected to commence it. ComReg appears determined to conflate this obligation with the separate exercise of considering future licensing options within the 2.6 GHz band. UPC therefore once more

[10] See *Publication of submissions to ComReg Information Notice 10/38*, ComReg Document No. 10/548, 27th July 2010.
[11] Ibid., Para. 1.1.
[12] The Aegis and Plum report for ComReg (published on 2nd November 2011 as ComReg Document 11/80a) is dated 2nd February 2011.
[13] See: http://www.rte.ie/news/2011/0526/saorview.html.
[14] See press release at: http://www.dcenr.gov.ie/Press+Releases/MINISTER+RABBITTE+ANNOUNCES+DATE+FOR+DIGITAL+TV+SWITCHOVER.htm

calls on ComReg to comply with the terms of the 2003 Regulations and to furnish without further delay its terms of reference for its review of the current MMDS licences.

Issues relating to the technical analysis contained in the Aegis and Plum report

In this section of its response, UPC examines at a technical level whether or not the 2.6 GHz spectrum band will be required to provide NGMB (i.e. LTE) services prior to 2019 when the MMDS license extension period is due to expire. UPC goes on to examine the technical analysis contained in the Aegis and Plum report, in particular Aegis and Plum's consideration of the possibility of sharing to take place in the band between MMDS and NGMB services.

ComReg (Section 3.2 of the Consultation Document) states that the Aegis and Plum report encompasses "a high-level technical assessment of the potential for sharing the band between MMDS and NGMB". ComReg then discusses (Section 3.2.1) the technical evaluation undertaken by Aegis and Plum as to the feasibility of various sharing options under a range of different scenarios and, on this basis, ComReg concludes that that it *"is of the preliminary view that the potential case for sharing ultimately remains limited"*. Arising from this conclusion, ComReg states that it *"does not propose to conduct further studies on sharing"*.

UPC is greatly concerned that ComReg intends to adopt such a position in relation to potential spectrum sharing within the 2.6 GHz band, as it remains UPC's position (which UPC first articulated in its response to the Call for Input) that geographic sharing could readily satisfy all possible requirements for the use of the band to support the provision of NGMB services between now and 2019, should a demonstrable need for such sharing within the band be required.[15] While geographic sharing in the 2.6 GHz band would certainly not be UPC's favoured option, it is an approach that the company would be willing to consider if its MMDS licences were to be extended until 2019. In addition, it is UPC's position that it would be unsafe for ComReg to close the door on possible geographic sharing within the band on the basis of Aegis and Plum's analysis, given the significant number of inconsistencies contained within the Report.

In summary, it is UPC's firm belief that mobile operator capacity demand for spectrum to support the provision of LTE services will be adequately met up to 2019 by:

- The potential introduction of LTE 800 services from 2013;
- The liberalisation of the 900 MHz and 1800 MHz spectrum bands;
- Allocating the unused spectrum in the 900 and 1800 MHz bands for LTE;
- Using more spectrally efficient technologies at 2100 MHz;
- The mobile broadband operators' ability to pool spectrum to maximize the efficiency of LTE;
- Deploying more in-building solutions and femto cells;
- Operators progressively freeing up the existing GSM spectrum for use by more spectrally efficient technologies;
- The acquisition of more base station sites by the mobile operators.

UPC's examination of the analysis undertaken by Aegis and Plum raises a number of concerns,

[15] As UPC goes on to explain in the next section of this response, modelling the company has undertaken demonstrates clearly that no such demand for 2.6 GHz spectrum to support NGMB should arise until well after 2019 and hence that, in practice, there will be no need for service sharing of the band in the period 2014 to 2019.

specifically in relation to the following:

- The MMDS EIRP values used in the predictions;
- The use of the maximum permitted mobile station EIRP instead of the "more practical" EIRP values ("more practical" is a quote from the Aegis and Plum report);
- The minimal analysis performed regarding micro and pico cells;
- Not stating the assumed antenna heights in their micro and pico cell analysis;
- The fact that Aegis and Plum's analysis assumed that the MMDS and NGMB antennas are facing each other boresite to boresite;
- The use of a net filter discrimination (NFD) value of 30 dB without adequate explanation of its origin.

Based on the above, UPC's conclusions are that:

- Mobile operators should have sufficient capacity until 2019 using existing 900 MHz, 1800 MHz and 2100 MHz spectrum along with the additional 900 MHz, 1800 MHz and digital dividend (800 MHz) spectrum which will soon be available for mobile broadband;
- Due to its propagation characteristics, should the 2.6 GHz spectrum be used for mobile broadband it will only be rolled out in urban areas while the lower frequencies, 800 MHz and 900 MHz, will be used in rural areas. In the event that mobile operators require more spectrum for NGMB before 2019, UPC believes that co-channel operation of MMDS and NGMB is feasible providing that the use of the 2.6 GHz spectrum to support the provision of NGMB is confined to urban hot-spots covered by micro cells, pico cells or in-building solutions.

Mobile broadband coverage and capacity

Radio wave propagation is directly related to frequency. For any given distance a high frequency will suffer more attenuation than a low frequency. Therefore, as low frequencies allow the radio signal to propagate further this means that fewer base stations, and hence less capital expenditure, are required to provide coverage compared to higher frequencies.

The National Broadband Scheme (NBS) has been implemented in Ireland using 3G (i.e. UMTS 2100) spectrum. However, this has necessitated the installation of a large number of repeaters in subscriber's premises to boost the coverage. Providing NBS coverage without using repeaters would involve building an uneconomical number of base station sites. Providing rural coverage using the 2.6 GHz band will face even greater difficulties due to the higher frequency.

Without availing of the 2.6 GHz band mobile phone operators have a number of means to meet increasing capacity demands, such as:

- Employ new technology such as HSPA+ in their existing broadband spectrum at 2100 MHz;
- Acquire more base station sites;
- Deploy more in-building solutions such as femto cells etc. where high capacity is required;
- After the digital dividend and the existing and unused GSM spectrum is auctioned, deploying spectrally efficient technologies in those frequency bands.

We discuss each of these in turn.

Employing new technologies at 2100 MHz

Mobile broadband operators can improve overall capacity utilization to meet increased demand by delivering higher data rates from existing radio spectrum, enabling them to make the most of their existing spectrum allocation. To compete with fixed line broadband services and also to support services that require higher data rates, 3G high-speed packet access (HSPA) was developed. Originally HSPA allowed peak data speeds of 7.2 Mbps to 14.4 Mbps. However HSPA has a defined evolution path and recently mobile operators in Ireland have started trialing and rolling out dual carrier HSPA+ technology allowing a potential peak downlink data rate of 42 Mbps[16]. The next step in the HSPA evolution is the implementation of multiple in multiple out (MIMO) antenna technology allowing a potential peak downlink data rate of 84 Mbps[17] while LTE technology using 2x2 MIMO is expected to peak at 113 Mbps.[18,19]

As the 800 MHz, 900 MHz and 1800 MHz spectrum becomes available operators can roll out LTE (i.e. NGMB) services progressively in these spectrum bands to keep ahead of the expected additional capacity demands. In this respect, it is worth noting that the mobile operators are currently satisfying the demand for 3G mobile data services with spectrum allocations of 2 x 15 MHz each in the 2100MHz band as well as some data traffic that is transported using EDGE technology within the GSM spectrum bands.

Acquiring more base station sites

It is a common strategy for mobile operators to use sub 1 GHz spectrum bands to provide a coverage layer and spectrum above 1 GHz as a capacity layer in dense urban and suburban areas. This is the strategy that has been adopted in Ireland by the three operators who have 900 MHz, 1800 MHz and 2100 MHz spectrum available to them. The other mobile operator, 3, which does not have GSM spectrum, has a national roaming agreement with another operator to enable it to provide rural coverage.

After the Digital Dividend spectrum is released and the 900 and 1800 MHz spectrum usage is liberalised, the 800 and 900 MHz bands can be used to provide a nationwide broadband coverage layer using LTE technology. While the mobile operators still have the 2100 MHz HSPA technology for urban capacity, the 1800 MHz spectrum band will allow LTE broadband to be rolled out as an additional capacity layer for urban, suburban and larger towns.

Currently, if the operators have capacity issues they build new sites to reduce the coverage footprint and thereby increase the capacity of existing sites. After the Digital Dividend and liberalised GSM spectrum auctions, it is expected that the mobile phone operators will soon be able to use their existing sites to provide mobile broadband coverage using the 800 MHz, 900 MHz, 1800 MHz and 2100 MHz spectrum. Cell spacing at 800 MHz will be very similar to that at 900 MHz, which will allow operators to protect their investment in their existing GSM sites. As is the case at the moment, if operators have capacity issues in the future they can acquire new sites to reduce cell sizes. Rolling out LTE in the 2.6 GHz band will require additional sites due to the poorer propagation at higher frequencies.

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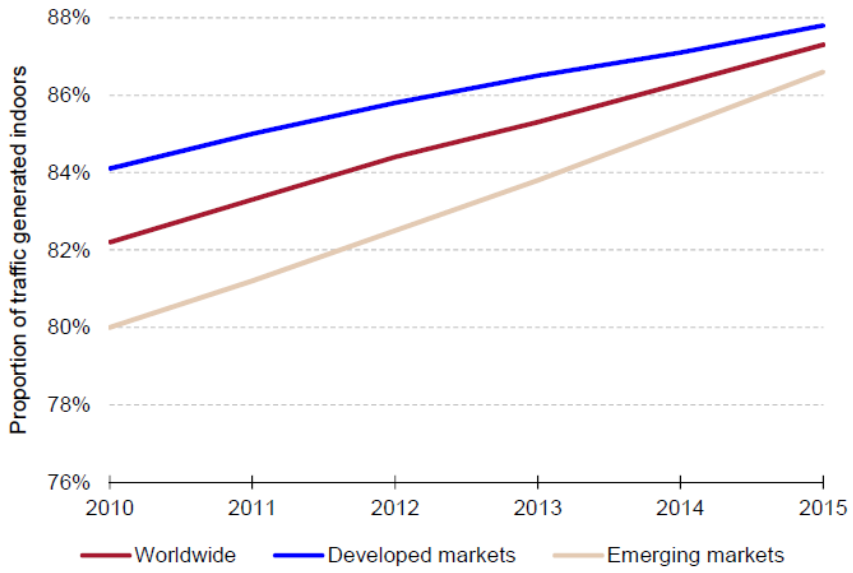
[16] See: http://www.vodafone.ie/aboutus/media/press/show/BAU014941.shtml?date=September+21%2c+2011
[17] Ericsson white paper 284 23-3139, Uen Rev A | July 2010
[18] http://business.motorola.com/experiencelte/lte-depth.html
[19] It is important to note that the discussion above is based on theoretical peak data rates rather than actual average data rates. Actual data rates achieved depend on factors such as distance from a base station, receive signal strength, signal to noise ratio, etc. These theoretical peak rates can only be achieved if there is only one user in the cell, operating in exceptional radio conditions. In a more realistic scenario, with several users in different radio conditions, the actual average throughput achieved by a typical 5MHz WCDMA carrier is 4.5 Mbps (according to vendor simulation and real network data).

Deploying more in-building solutions

Currently, mobile operators are experiencing difficulties providing coverage in office and industrial buildings. This is mainly due to the signal being attenuated when passing through modern building materials such as steel and metal coated “solar” glass. Serving some buildings from the macro network can also present capacity issues for the macro sites. Another problem is related to tall buildings - if the building has a view of a number of macro sites the interference levels in the buildings can reduce signal quality to a point where calls are dropped.

Operators are solving these problems by installing “in-building” distributed antenna systems or femto cells to provide guaranteed coverage and ensuring sufficient capacity in these buildings. If necessary, capacity can be increased in these buildings by providing a multi-sector solution, some large buildings having two or more sectors.

Figure 1: Proportion of wireless traffic generated indoors



Proportion of wireless network traffic generated indoors, [Source: Analysys Mason 2010]

The building penetration attenuation problem will be more acute at 2.6 GHz due to higher losses at that frequency. As the in-building system antennas operate with EIRPs in the mW range they will not pose a problem to existing MMDS services should the operators be permitted to deploy LTE at 2.6 GHz for in-building use, particularly if their use is limited to urban and dense urban environments in Dublin. The penetration attenuation will also limit the interference to the mobile phone subscriber’s user equipment from the MMDS transmitters.

In the Aegis and Plum report, the user equipment EIRP contained in their calculations was 5 dBW / 5 MHz. However, Aegis and Plum acknowledge that ITU-R Report M.2113 suggests a maximum EIRP level of –6 dBW / 5 MHz. Furthermore, typical average EIRP levels of –21.7 dBW/ 5 MHz (rural), –22.5 dBW /5 MHz (macro), –23.4 dBW / 5 MHz (micro) and –32.5 dBW / 5 MHz are specified. Based on these EIRPs the user equipment would not cause an issue with an MMDS receiver due to the penetration attenuation of the RF leaving the building. However, as stated above, increasing the number of sectors in a building will also provide additional capacity.

The Digital Dividend and the existing and unused GSM spectrum

ComReg intends to hold a multi-band spectrum auction in 2012, with license use commencing in February 2013. It will cover the 800 MHz, 900 MHz and 1800 MHz spectrum bands, resulting in 2 × 140 MHz of spectrum being released simultaneously, with the 900 MHz and 1800 MHz bands being liberalised for possible use to support the provision of LTE-based NGMB services.

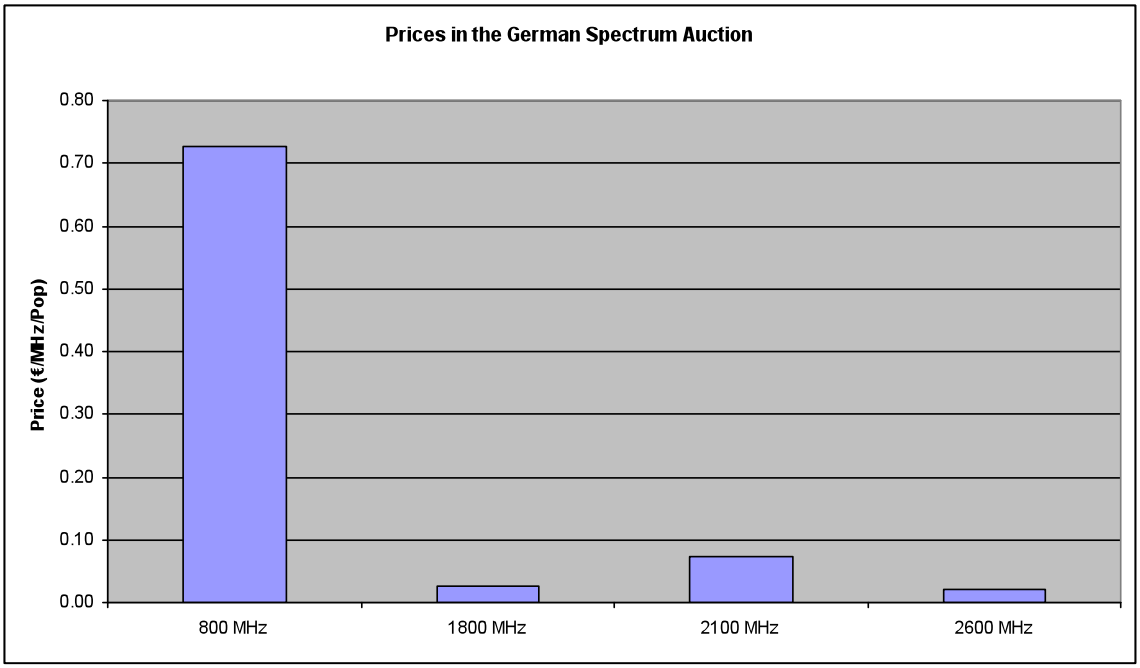
LTE requires larger and contiguous blocks of spectrum to be able to operate efficiently. Operators may agree to allow spectrum blocks to be pooled together enabling the optimum use of new technologies such as LTE. This will be beneficial where operators choose to operate both an LTE and GSM network in the sub-1 GHz bands.

Currently there is unassigned spectrum in the 900 MHz and 1800 MHz bands, which will be offered in upcoming auctions. This unassigned spectrum, along with the newly available 800 MHz spectrum band and the liberalisation of the 900 MHz and 1800 MHz spectrum bands will allow mobile network operators greater scope to manage the capacity demands on their networks and to roll out emerging technologies such as LTE. LTE's OFDMA technology excels in leveraging wider bandwidths to provide very high data rates and supports bandwidths up to 20 MHz. Operators may also be able to pool spectrum to maximize spectral efficiency.

In all recent spectrum auctions, European operators have placed a much higher value on the 800MHz spectrum band than on the higher frequency bands. For example, Germany held their mobile spectrum auction on the 20th of May 2010 offering a total of 358.8 MHz of paired and unpaired spectrum in the 800 MHz, 1.8 GHz, 2.1 GHz, 2.6 GHz bands.

As can be seen in Figure 2 below, prices paid for the higher bands were only a fraction of those paid in the 800 MHz band. Even at this low level, the prices paid in Germany for the 2.6 GHz band were in line with, or even above, other recent 2.6 GHz auctions in Europe, some of which only achieved the reserve price. It should also be noted that Germany has a significant number of cities with high population concentrations potentially making the 2.6 GHz band more valuable in Germany than in many other countries.

Figure 2: Prices achieved in the German spectrum auction



Sources: BNetzA and Pyramid Research

Currently there are 12 x 5 MHz paired spectrum blocks available to the mobile operators at 2100MHz to provide mobile broadband with each of the four operators having 3 x 5 MHz paired. After the Digital Dividend and the existing and unused GSM spectrum auctions there will be an additional 28 x 5 MHz paired spectrum blocks available, as Table 1 below illustrates. While some of this spectrum will initially be required for legacy GSM users, the operators can roll out LTE 800 and, as subscribers migrate to 3G and 4G, they can reassign recovered blocks at both 900 MHz and 1800 MHz for LTE.

Table 1: Summary of spectrum bands to be included in ComReg's forthcoming auction

Frequency Band	Frequency Pairing (FDD)		Number of 2 x 5 MHz Spectrum Blocks
	Uplink band (MHz)	Downlink band (MHz)	
800 MHz	832 - 862	791 – 821	6
900 MHz	880 – 915	925 – 960	7
1800 MHz	1710 - 1785	1805 – 1880	15

Source: ComReg

Population densities also have a direct impact on the capacity requirements of an operator's network. The Netherlands, Denmark and Germany have population densities of 399 pop/ km^2, 127 pop/ km^2 and 229 pop/ km^2 respectively while Ireland has a population density of just 65 pop/ km^2. Ireland's population density is significantly lower than its European neighbours and hence can expect to have lower capacity requirements.

Conclusions

In summary, it appears to UPC that mobile operators' capacity requirements for the provision of mobile broadband services will be adequately met over the short-to-medium term by the deployment of more spectrally efficient technologies at 2100 MHz, the acquisition of more base stations and the deployment of in-building solutions and femto cells and the rolling out of LTE-based NGMB services in the 800 MHz, 900 MHz and 1800 MHz bands. In this respect, the mobile operators will have a clear incentive to progressively free up the existing GSM spectrum for use by more spectrally efficient technologies and in future they may also be in a position to pool spectrum to maximize the efficiency and speeds of LTE-based NGMB services. All of these developments can be achieved without the mobile operators being given access to the 2.6 GHz band prior to 2019.

Evaluation of the technical analysis undertaken by Aegis and Plum

We now turn to the technical analysis on spectrum sharing options in the 2.6 GHz band undertaken by Aegis and Plum on behalf of ComReg. In this respect, UPC has discovered a number of inconsistencies in the Aegis and Plum analysis, which we now discuss in detail in this section of our response.

In the technical analysis section of the executive summary (page ES-2) Aegis and Plum state that five MMDS transmitters need to be turned off while in the next sentence they state that only three sites need to be turned off. While they state that those three MMDS transmitters "prohibit" the operation of

NGMB in Dublin, their analysis does not prove that micro-cells or in-building solutions of the type we discussed in the previous section above could not be deployed.

Aegis and Plum then go on to say that *"a number of mitigation techniques could be considered to improve the feasibility of MMDS and NGMB sharing"* and that *"it was beyond the scope of this study to assess the impact of each mitigation technique though this could in principle be undertaken in further work using practical deployment scenarios"*. Here Aegis and Plum acknowledge (at least implicitly) that sharing in some form would be feasible. In doing so, in fact, Aegis and Plum acknowledge that their conclusions are incomplete and that further study could result in these conclusions being altered.

Aegis and Plum acknowledge that ETSI have defined a transmitter mask in ETSI EN 300 744 giving a transmitter NFD of 50 dB. Despite this, Aegis and Plum also use an NFD of 30 dB in their analysis resulting in increased required separation distances, which has obvious negative implications for sharing.

In the "mitigation measures" section Aegis and Plum acknowledge that micro and pico cell operation is feasible by stating that *"if the receiver operates below the local clutter height an additional path loss can be applied, resulting in a reduced separation requirement. However, this would not be applied to scenarios involving antenna heights above the local clutter"*. Micro and pico cells usually operate below the clutter.

In section 2.3.1 Aegis and Plum state that "there is of course the option of allowing the NGMB operators to utilise the 2.6 GHz spectrum in Dublin on the basis of detailed co-ordination with the MMDS operator". Here Aegis and Plum provide explicit confirmation that there would be no barriers to geographic spectrum sharing in the 2.6 GHz band providing detailed co-ordination plans could be put in place.

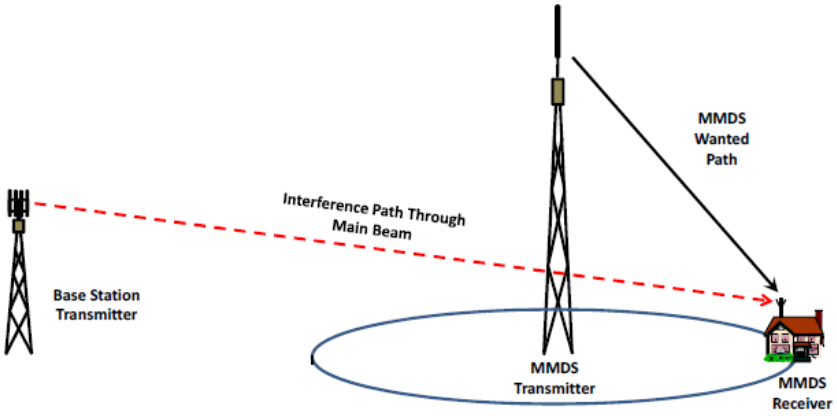
Depending on whether NGMB and MMDS operate in co-channel or adjacent scenarios there are a number of potential interference methods. Aegis and Plum performed predictions on the potential interference on the eight possible methods of interference.[20] The findings made by Aegis and Plum in relation to each of these possible interference scenarios are examined in detail below.

Co-channel: NGMB base station transmitter into MMDS receiver

Aegis analysed situations where the interfering signals enter the receiver from the front or the rear. For clarity, slightly modified versions of their explanatory diagrams are included below.

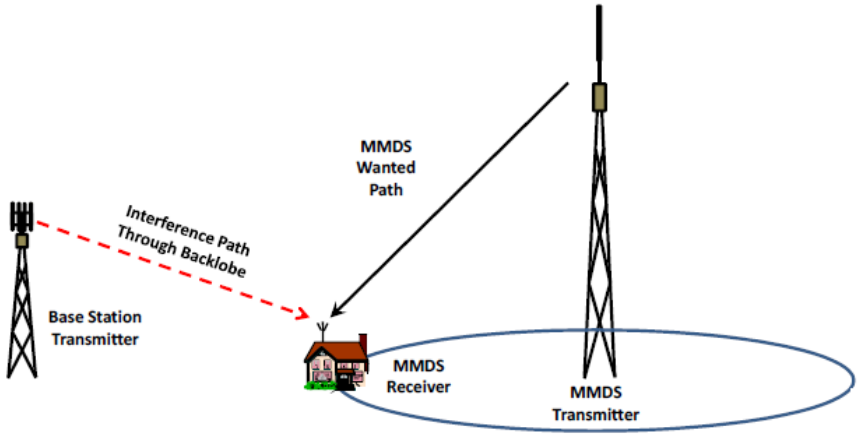
[20] The co-channel scenarios identified by Aegis and Plum are (1) NGMB base station transmitter into MMDS receiver, (2) NGMB mobile station into MMDS receiver, (3) MMDS transmitter into NGMB base station and (4) MMDS transmitter into NGMB mobile station. The adjacent channel scenarios identified are (1) NGMB base station transmitter into MMDS receiver, (2) NGMB mobile station into MMDS receiver, (3) MMDS transmitter into NGMB base station and (4) MMDS transmitter into NGMB mobile station.

Figure 3: Entry through the front of the MMDS antenna



Source: Aegis and Plum report (as modified by UPC)

Figure 4: Entry through the rear of the MMDS antenna



Source: Aegis and Plum report (as modified by UPC)

In section 2.2.1.1 Aegis and Plum conclude that with a NGMB EIRP of 31 dBW / 5 MHz the separation requirement is 51 km from the edge of the MMDS coverage area to ensure the interference level is less than –132.5 dBW / 8 MHz. They then go on to state that the situation may be improved by reducing the EIRP but the results from doing so are only presented in full in section 5.2.1.2.

Table 2 below summarises their conclusions in relation to micro and pico cells.

Table 2: Aegis and Plum conclusions on micro and pico cells

	Entry through the front of the MMDS antenna	Entry through the rear of the MMDS antenna
Micro	7.1 km	13.5 km
Pico	0 km	6.6 km

Source: Aegis and Plum report

In their analysis Aegis and Plum appear to have assumed that the micro and pico antennas are pointing directly at the MMDS receiver antenna. In section 5.2.1, for example, they state that "at each azimuth, it is assumed that the NGMB BS is pointing at the MMDS receiver." In reality this would not be the case as micro-cell antennas usually have a large downtilt to prevent interference with the rest of the network.

Aegis and Plum also fail to specify in their report what antenna height they used when performing predictions relating to the micro and pico cell antennas. Micro cell antennas are usually at or below surrounding building heights which will have a dramatic impact on the propagation of the NGMB signal. Aegis and Plum's own analysis shows this and it is included in the next section.

Based on their findings and the architecture of a micro cell it should be feasible to use NGMB co-channel with MMDS providing the NGMB was only rolled out in urban areas with some co-ordination between the MMDS and NGMB operators.

Co-channel: NGMB mobile station into MMDS receiver

In section 2.2.1.2 of their report Aegis and Plum present their results in which they assume that the mobile station (MS) is operating at the maximum EC Decision limit (i.e. 5 dBW/5 MHz). At this EIRP they state that the required separation from the edge of MMDS service area is below 1.2 km in the urban case and 10.3 km in the rural case.

However in this section they also state that the situation may be improved if (1) the MMDS receiver antenna height is reduced (from 10 metres to 5 metres) and/or (2) more practical EIRP levels specified for macro, micro and pico cells. Taking each of these in turn:

MMDS receiver antenna height is reduced (from 10 m to 5 m): As an example of the effect that antenna height can have on propagation they conclude that reducing the MMDS receiver antenna height from 10 m to 5 m reduces the required separation distance from 1.2 km to 70 m in the urban case and from 10.3 km to 6.7 km in the rural case.

More practical EIRP levels specified for macro, micro and pico cells: The ITU have suggested various EIRP levels for mobile sets. Based on the maximum EIRP of –6 dBW / 5 MHz specified by the ITU Aegis conclude that, with the MMDS receive antenna at 10 m, the required separation distance reduces from 1.2 km to 590 m in the urban case and from 10.3 km to 5 km in the rural case.

In section 5.2.3 of their report, Aegis and Plum acknowledge that ITU-R Report M.2113 suggests EIRP as set out in the Table below.

Table 3: ITU suggested EIRP levels for mobile sets

Level	Reading
Maximum	–6 dBW / 5 MHz
Rural	–21.7 dBW/ 5 MHz
Macro	–22.5 dBW / 5 MHz
Micro	–23.4 dBW / 5 MHz
Minimum	–32.5 dBW / 5 MHz

Source: ITU

Based on the minimum EIRP level of –32.5 dBW / 5 MHz Aegis and Plum calculate the separation distance to be only 100 m for the urban case and 800 m for the rural case. Based on the co-channel NGMB base station and mobile station into an MMDS receiver results, micro and pico cells solutions should be possible in a geographical sharing situation where the NGMB network is only rolled out in dense urban environments.

Co-channel: MMDS transmitter into NGMB base station

In section 2.2.2.1 of their report, Aegis and Plum state that the minimum separation distance is less than 98.7 km from the edge of the MMDS service area. However in this analysis they have used an MMDS EIRP of 32 dBW / 8 MHz which is the maximum level specified in ComReg technical conditions for an analogue MMDS transmitter.

UPC stated in its response to the Call for Input June 2010 that the analogue switchover to digital provision was completed on both MMDS networks (Chorus and NTL) in 2002 so there is no reason for Aegis and Plum to perform analysis with an EIRP greater than the maximum permitted digital MMDS level of 22 dBW / 8 MHz. That is the maximum level stated in ComReg technical conditions for a digital MMDS transmitter.

While it is not implicitly stated by Aegis and Plum, it has to be assumed that all analysis of MMDS interference into NGMB base stations is done on the basis that the base station is a macro site with a 17dBi gain antenna at a height of 30 m and that both antennas are directly facing each other. This is a worst case scenario and is guaranteed to require the greatest separation distance. In this respect, no analysis has been presented by Aegis and Plum regarding potential interference into a NGMB micro or pico cell where the NGMB base station antenna has a substantially lower gain and the antenna is in the clutter.

Co-channel: MMDS transmitter into NGMB mobile station

In section 5.3.3 of the Aegis and Plum report, the statement “if the MMDS coverage area radius of 16–48 km is taken into consideration the required separation from the edge of the MMDS coverage area is less than 33.1 km” appears to be based on the assumption that the MMDS EIRP is 32 dBW / 8 MHz. Aegis and Plum then go on to say that “further calculations have shown that the distance between the MMDS transmitter and the MS receiver is 35.5 km for the MMDS EIRP of 22 dBW / 8 MHz”. While the distances are similar in these two statements, the first distance, i.e. 33.1 km, refers to

the distance from the coverage area while the second, 35.5 km, refers to the distance between the transmitter and receiver. This may cause confusion as the two comparisons are not similar; the distance from the coverage area with the correct EIRP (22 dBW / 8 MHz) is actually 19.9 km.

Aegis and Plum's analysis in section 5.3.3 shows that a separation of 35.9 km is required between the MMDS transmitter and the NGMB mobile station. The only MMDS transmitter this close to Dublin city centre is the one located in the Naul, County Dublin. To ensure co-channel operation with micro cells in Dublin the Naul MMDS antennas may require additional downtilt to ensure that the interference is within the required limits. Analysys Mason have already conducted a study for UPC to show that this solution is technically feasible and full details of this study have already been shared with ComReg.

Adjacent channel: NGMB base station transmitter into MMDS receiver

Aegis and Plum state that "if it can be assumed that an NGMB BS transmitter mask complying with the EC Decision limits is more dominant than MMDS receiver selectivity, an NFD level of 57 dB can be used in the analysis of the adjacent channel sharing feasibility". However they also include an analysis with "an assumed NFD level of 30 dB" without explaining how they arrived at the level of 30dB. The only explanation in section 5.2.2 is "if it is assumed that the adjacent channel NFD is dominated by receiver selectivity at an assumed level of 30 dB".

The NFD levels used in the analysis has a sizable influence on the required separation distances, as the Table below illustrates.

Table 4: NFD levels and required separation distances

NFD	Required separation from the edge of MMDS service area
57 dB	1.6 km
30 dB	8 km

As can be seen from Table 4 above the "assumed" NFD of 30 dB utilised by Aegis and Plum increases by a considerable amount the separation distance required.

Adjacent channel: NGMB mobile station into MMDS receiver

In section 2.2.1.4 it is only the results with an NFD of 30 dB that are presented and these show that the required separation from the edge of MMDS service area is 170 m for the urban case and 1.45 km for the rural case.

Again in this conclusion Aegis and Plum appear to have used the maximum ECC permitted mobile station EIRP rather than the "more practical" ITU EIRPs. In section 2.2.3 of their report, Aegis and Plum conclude that an "NGMB MS with EIRP of 5 dBW/5 MHz interferes with MMDS receiver at 10 m when an NFD of 30 dB is available", (The "10m" refers to the MMDS receiver antenna height).

When dealing with the mobile station the NFD masks are not as well defined and analysis with two values, 30 and 50 dB, is presented in section 5.2.4. The conclusions made by Aegis and Plum in this respect are set out in the Table below.

Table 5: Aegis and Plum calculations on required separation distances

NFD	Required separation from the edge of MMDS service area	
	Urban	Rural
50 dB	70 m	390 m
30 dB	170 m	1.45 km

Source: Aegis and Plum report

The conclusions in section 2.2.3 do not include the results when the 50 dB NFD is analysed, which, as can be seen in Table 5 above, produces more favourable results.

Adjacent channel: MMDS transmitter into NGMB base station

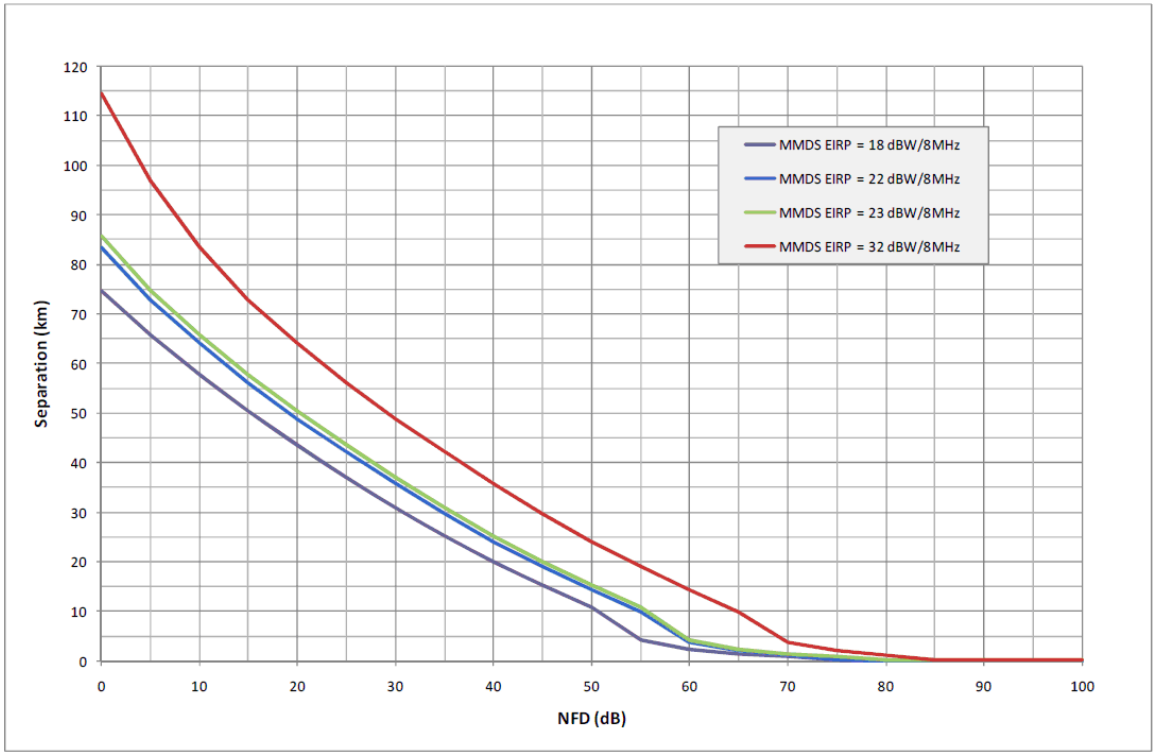
In section 2.2.2.3 of their report Aegis and Plum state "if it can be assumed that the NFD mask is dominated by the MMDS transmitter mask (complying with ETSI DVB-T standard EN 300 744)" then an NFD of 50 dB can be assumed. With this NFD there is no separation required when the MMDS EIRP levels less than or equal to 23 dBW/8 MHz with an MMDS transmitter effective height assumed to be 200 m.

However they then go on to perform a prediction with an assumed NFD of 30 dB and an MMDS EIRP of 32 dBW / 8 MHz where the required separation is 33 km. There is no explanation as to why the NFD should be 30 dB and again have used the analogue maximum EIRP. This simply has the effect of increasing the required separation.

In section 5.3.2 of their report Aegis and Plum state that "ETSI EN 300 744 (V1.6.1) provides emission masks for DVB transmitters. These masks indicate that the signal is suppressed by 50–80 dB in the adjacent channel relative to the in-band signal level".

With an NFD of 50dB the required separation is 24.1 km while with an NFD of 30 dB the required separation is 49 km. However, as already discussed above, Aegis and Plum appear to have based these conclusions on the maximum analog EIRP of 32 dBW / 8 MHz not the maximum digital EIRP of 22 dBW / 8 MHz.

Figure 5: Adjacent channel MMDS transmitter interference into NGMB base station



Source: Aegis and Plum report (reproduction of Figure 32)

It is worth noting also that in section 2.2.2.3 Aegis and Plum report the result as the required separation from the edge of the MMDS coverage area while in section 5.3.2 they report the result as the required separation between transmitter and receiver.

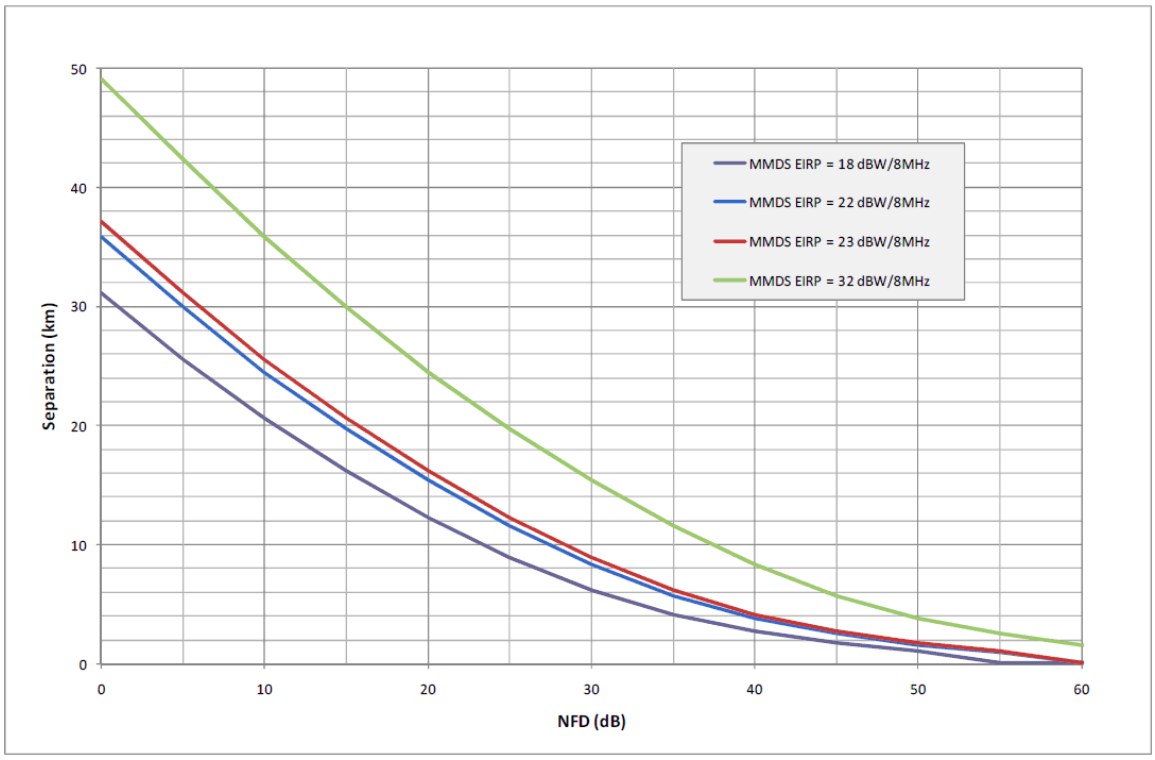
Again the prediction assumes the NGMB is a macro site base station, no analysis has been presented regarding potential interference into a NGMB micro or pico cell where the NGMB base station antenna has a substantially lower gain and the antenna is closer to the clutter.

Adjacent channel: MMDS transmitter into NGMB mobile station

In section 2.2.2.4 Aegis and Plum state that there is no separation required from the edge of the MMDS coverage area for an NFD of 30 dB. In section 5.3.4, however, they state that the there is a separation requirement of 15.4 km between the transmitter and the receiver.

Once again, Aegis and Plum have used the analogue EIRP of 32 dBW / 8 MHz in section 5.3.4. The effect of this may be seen in Figure 6 below.

Figure 6: Adjacent channel MMDS transmitter interference into NGMB mobile station



Source: Aegis and Plum report (reproduction of Figure 33)

Conclusions on Aegis and Plum's technical analysis of spectrum sharing

In summary, it is UPC's position that the technical analysis carried out by Aegis and Plum on the possibility of spectrum sharing in the 2.6 GHz band greatly overstates the possibility of interference between MMDS and NGMB services under each of the scenarios examined. As we have shown, Aegis and Plum's analysis utilises a number of erroneous base assumptions (in particular in the way different EIRP levels are used) which means that predicted output figures (in particular in relation to separation distances) are greatly overstated.

In addition, Aegis and Plum appear to have taken no account of the possible co-existence of MMDS and NGMB where the latter is deployed to provide additional in-building capacity using micro and pico cells. Indeed, Aegis and Plum do not appear to have taken sufficient (or, indeed, any) account of demand drivers for mobile broadband spectrum more generally and what mobile operators' strategies in this regard is likely to mean for the demand for 2.6 GHz spectrum to support NGMB services between now and 2019. This is an issue we now discuss in more detail as we consider issues relating to the economic analysis that is contained in the Aegis and Plum report.

Issues relating to the economic analysis contained in the Aegis and Plum report

UPC has reviewed the economic assessment undertaken by Aegis and Plum and is concerned that a simplistic approach has been undertaken in several areas of the assessment, in particular the specific situation in Ireland has not been fully factored into the assessment, with the consequence that the

conclusions reached are false and, in fact, would result in a considerable loss of benefits to the Irish economy in the period 2014 to 2019.

The main points of concern that UPC has in relation to the analysis that was undertaken by Aegis and Plum relate to the following areas:

- **The assessment of the economic benefits of the 2.6 GHz spectrum if used for the provision of mobile broadband services** between 2014 and 2019 **considerably overstates the economic value** that would arise in practice. This is because the assessment simply utilises a benchmark of auction prices achieved in 2.6 GHz auctions in other European countries. We believe this approach considerably over-estimates the economic value that would arise in Ireland in view of:
    - The calculation of the auction value that could expected to be raised in Ireland simply utilises spectrum prices from auctions in other European markets but adjusts the price to take account of the 3 or 5 year period rather than the full licence period. However such an approach would not be appropriate in a situation where the value of the licence was in the later years (as we expect would be the case for use of 2.6 GHz spectrum in Ireland for mobile broadband, once the 1800 MHz band has been considered)
    - No account appears to have been directly taken of the potential use of re-farmed 1800 MHz spectrum as an alternative means to providing LTE services to the 2.6 GHz band. The amount of spectrum required in a given area is highly affected by population/business density (as this determines the density of traffic in that areas) and Ireland's low population density (e.g. in Dublin compared to other European capital cities) means that 1800 MHz should provide sufficient spectrum for mobile broadband services to be offered without any degradation to the quality of service. Furthermore, the 1800 MHz band has considerable benefits over the 2.6 GHz band for the deployment of mobile broadband services in urban areas, including potential deployment cost savings of up to 60%, faster timescale for network deployment. Ten commercial LTE 1800 networks had been deployed at the end of November 2011 and the equipment ecosystem for LTE technology in this band has seen considerable developments in the last 18 months with 41 devices (including smartphones, tablets and dongles) available at the end of October 2011, with this number increasingly rapidly on a month-to-month basis.
    - In the most recent spectrum auctions (e.g. Belgium and Portugal), paired 2.6 GHz spectrum remained unsold – suggesting that the demand for this spectrum is considerably below the 'hype' (e.g. talk of a "spectrum crisis") that is implied by the traffic forecasts that are presented by equipment vendors. Additionally significant proportions of the 900 MHz and 1800 MHz band have remained unallocated in Ireland for many years, in contrast to many other European countries, as a result of the relatively low population (and hence network traffic) densities. Demand for 2.6 GHz spectrum can also be expected to be lower in Ireland than in many other European markets.
    - There is considerable uncertainty over the future demand for spectrum for the provision of mobile services. By encouraging ComReg to auction the 2.6 GHz spectrum now (considerably in advance of when it is actually likely to be needed, even if the highest traffic forecasts are taken into account), the mobile operators could be seeking to acquire the spectrum at considerably lower prices than would be

paid during an auction in (for example) 2018 when the traffic demand profile is clearer, resulting in a potential loss of revenue for the Irish Exchequer.

- The **costs to the Irish economy of ComReg closing down UPC's MMDS services prior to 2019 are considerably underestimated**. For example:
    - The study does not take account of the considerable investments that UPC could make if provided with certainty over the future of the licences, which would facilitate an enhanced service offering and thereby lead to a reversal of the subscriber decline trend. In fact, by investing to provide a COFDM DVR set –top box UPC would expect to hold this base stable at current levels and with a more substantial investment to facilitate HDTV, UPC would expect to grow its subscriber base.
    - The study fails to acknowledge the wider benefits to Irish television subscribers arising from the competition provided by the MMDS platform, acting as a constraint on overall TV service prices. Instead the study dismisses the value of the MMDS platform as a constraint, arguing that its subscriber base is declining. UPC believes that the economic assessment should take account of the considerable competitive constraint that its MMDS service would provide once it has been upgraded to be able to offer a wider range of high definition programming.
    - No account is taken of the numbers of jobs that would be lost as a result of not renewing UPC's licence. This includes an estimated 50 jobs in UPC itself and a minimum of 50 further jobs in UPC's direct suppliers (as demonstrated in the submissions from several of UPC's partners to ComReg's Call for Input).
    - The study does not take account of the value of expenditure occurred by UPC in operating its MMDS service, much of which remains within the Irish economy. Instead the study actually considers that the loss of this expenditure would be a 'benefit'.
    - No account is taken of the wider societal benefits of UPC's MMDS service, including media plurality and support for indigenous channels. Whilst these benefits may be difficult (perhaps impossible) to quantify accurately, they should nonetheless be considered in any evaluation of the economic benefits of alternative uses of the 2.6 GHz band, particularly in view of the importance of several of these benefits to Ireland's significant rural community.

Correcting for the above issues, many of which are specific to the Irish situation, would lead to a completely different benefit/cost profile – namely that the actual benefits of making the 2.6 GHz band available for mobile broadband services prior to 2019 would fall considerably below the costs to Ireland of doing so (as a result of terminating UPC's MMDS service offering). Such an outcome from the economic assessment would clearly lead ComReg to a different conclusion in relation to its decision regarding the renewal of UPC's licences until 2019.

UPC's submission[21] to ComReg's call for input in May 2010 included such a comprehensive economic analysis, prepared by independent consultants, Analysys Mason[22], which took account of the specific situation in Ireland. This indicated that if ComReg were to decide not to renew UPC's MMDS licences until 2019, it is likely that the mobile operators would acquire the spectrum in any service/technology neutral auction and **the resulting economic benefits of the use of the 2.6 GHz band for mobile broadband services would amount to just EUR0.5 million in the period to 2019** (as the EUR179 million of economic benefits that would arise in Ireland from the deployment of mobile

[21] UPC (Ireland) Ltd, '*Potential uses and future licensing options for the 2.6 GHz spectrum band*', June 2010.
[22] Analysys Mason, '*Maximising the benefits to Ireland of the 2500-2690MHz spectrum band: Report for UPC Ireland*', 6 May 2010. This report is attached to this response as Confidential Annex 2.

broadband services would be obtained in any case through use of the 1800 MHz band). By contrast, there would be **a loss of EUR129 million of economic benefits from not renewing UPC's MMDS licences**, in additional to the loss of numerous social and welfare benefits for Ireland which are impractical to quantify but are of immense importance. Based on current MMDS subscriber numbers and using a time horizon of 2012 to 2019 instead of the original period of 2010 to 2019, the loss in economic benefits from not renewing the MMDS licences would, UPC estimates, still be of the order of **EUR88.4 million**.

UPC there believes it is critical that ComReg follows due process and undertakes a detailed economic assessment which reflects the specific situation in Ireland, considering the factors raised in UPC's response to the Call for Input, including the Analysys Mason study, prior to reaching any conclusions in relation to the renewal of UPC's licences beyond 2014.

In the remainder of this section, we provide detailed information in support of each of the above points.

Economic benefits from non-renewal of UPC's licences

In this section we provide further details in support of our concern that the economic benefits arising from use of the 2.6 GHz band for mobile broadband services are massively overstated in the Aegis/Plum study. Specifically we discuss how the adjustment of spectrum prices from auctions in other European countries is not an appropriate methodology for the calculation of the benefits, how consideration should be given to use of the 1800 MHz band in Ireland to deliver the benefits of mobile broadband instead of 2.6 GHz, the limited demand for 2.6 GHz spectrum in the most recent European spectrum auctions and the potential loss of revenue to the Irish Exchequer from auctioning the spectrum well ahead of the proven demand for additional spectrum for mobile broadband services.

Inappropriate adjustment of European auction prices to calculate benefits in Ireland

In the assessment of the economic benefits of the use of the 2.6GHz band for next generation mobile broadband services, the Aegis/Plum study considers the value of spectrum generated in 2.6GHz auctions undertaken prior to September 2010 in various European and Asian countries. This has resulted in a benchmark range of value for 2.6GHz spectrum from EUR0.0466 per MHz per pop to EUR0.1883 per MHz per pop over the time period 2014 to 2019 which equates to a value of spectrum ranging from EUR6.3 million to EUR25.5 million when taking account of the population of Ireland and the amount of spectrum available (assumed to be 140MHz of the 2.6GHz band).

UPC is concerned that such an approach is highly simplistic and does not take account of the specific situation in Ireland, for example:

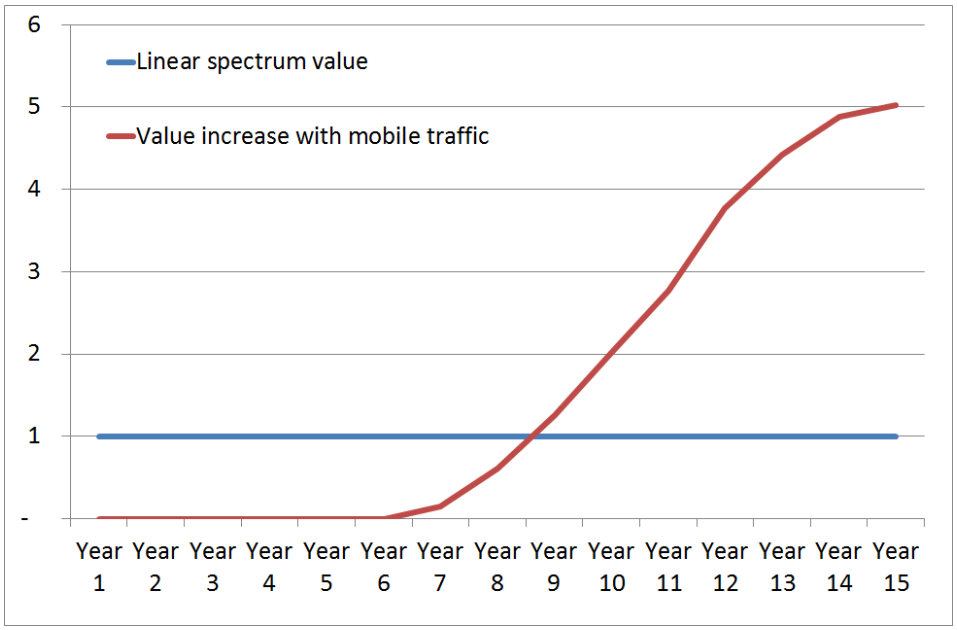
- The assessment of benefits should consider all economic benefits generated by each service – both qualitative and quantitative factors. Specifically the assessment should take account of both direct benefits to consumers and producers of each service (private value) as well as to other parties e.g. wider societal benefits (external value). The assessment undertaken by Aegis and Plum appears to focus on only one element of the total economic benefit – the producer surplus.
- The producer surplus from any given service will be highly dependent on the degree of competition for the provision of that service in a given market. In markets where there is a high degree of competition, surplus is likely to flow from producers to consumers of the service. When comparing the value generated by different uses of the spectrum, consumer surplus and producer surplus should be considered together for each service.

- The value of high-frequency spectrum for mobile broadband use is highly related to the population density (and hence traffic density) that exists (since the greater the traffic density, the more additional base stations that are required to serve the traffic in the absence of additional spectrum being made available). The population density in the main cities is Ireland is considerably below the population density of the European and Asian countries used for the benchmarking exercise, and therefore the value of 2.6 GHz spectrum using such a benchmarking approach is likely to be overstated.
- The spectrum prices yielded in the benchmark countries will also reflect the number of mobile operators competing for the spectrum and the availability of substitute spectrum bands. Whilst the econometric analysis undertaken by DotEcon[23] may have taken some account of the number of competing mobile operators in Ireland, we do not believe it takes full account of the availability of alternative spectrum bands – this is a key point that we discuss further in the section below.

Furthermore, the auction benchmarks which Aegis and Plum have used apply to the entire licence period (typically 15 to 20 years duration). Aegis and Plum state that they have undertaken a correction to calculate the value of 2.6 GHz spectrum in Ireland for the period 2014-2019, however precise details of the approach used for this correction are not presented in the study report. UPC is concerned that the true value generated by the use of 2.6 GHz spectrum for mobile broadband use in the short-term could be very low (perhaps even zero) since traffic levels on mobile networks are expected to grow exponentially over the medium- to long-term. Consequently it is possible that the prices of spectrum that have been realised in other auctions may arise from use of the spectrum in the longer-term – and therefore application of these benchmarks in a relatively simplistic way (e.g. shortening to reflect licence duration and taking account of the time value of money) may overly estimate the value of spectrum in the short-term.

To illustrate this point further, Figure 7 below shows two alternative 'value profiles' that could yield the same equivalent spectrum value in net present value terms.

Figure 7: Alternative value profiles for mobile spectrum which yield the same net present value



[23] Aegis and Plum reference the econometric analysis presented in DotEcon, 'Award of 800MHz and 900MHz spectrum, Update report on benchmarking', published by ComReg 10/71b.

The above chart illustrates a profile where the spectrum generates the same value each year (e.g. EUR 1 million per year) and a second profile where the spectrum generates zero value for the first few years of the licence, then increasing value (for example, in line with an explosion in mobile traffic levels) from Years 7 to 15. Assuming a discount rate of 10%, both profiles result in a net present value over the entire 15-year licence period of EUR7.6 million. Please note that all these numbers are purely for illustrative purposes only.

Consequently when ComReg is considering the value of 2.6 GHz spectrum from the period 2014-2019, its use of a simplistic approach to adjust spectrum auction prices for 15 to 20 year licences could result in a considerable over-valuation of the spectrum. In line with the other points raised in this section, it is vital that ComReg undertakes a detailed assessment which truly reflects the unique situation in Ireland when seeking to quantify the benefits of use of the 2.6 GHz band for the deployment of next generation mobile broadband services.

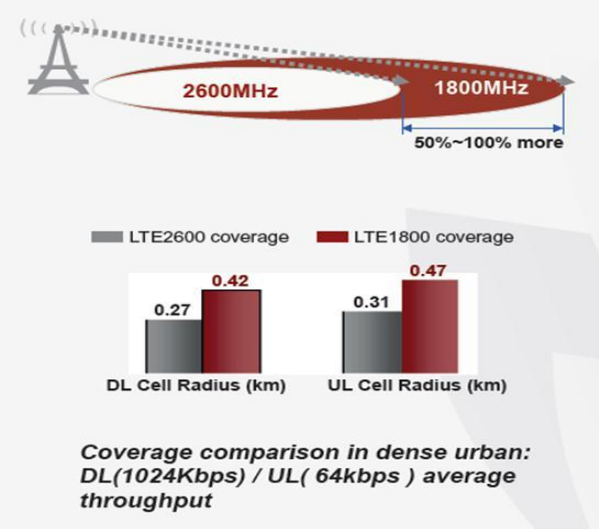
Use of the 1800 MHz band to deliver the economic benefits of mobile broadband services

One key reason why UPC believes that the 2.6 GHz has very little (zero) value for mobile broadband use in Ireland between 2014-2019 is because of the availability of 1800 MHz spectrum which can be utilised for the deployment of advanced LTE networks in the short-term, with the 2.6 GHz being used as an overflow band post-2019 in line with forecast traffic growth levels.

The 1800 MHz band is increasingly being regarded at the main band for deployment of LTE technology in urban areas for a variety of reasons:

- The propagation characteristics of the frequencies mean that an LTE base station operating in the 1800 MHz band can cover a radius with is 1.5 to 2 times larger than the radius covered by an LTE base station operating in the 2.6 GHz band (see Figure 8 for an illustration of this). Put another way, covering an urban area with LTE using 1800 MHz spectrum utilises 30% to 50% fewer cell sites than when 2.6 GHz spectrum is used.

Figure 8: Coverage comparison of LTE using 1800 MHz and 2.6 GHz bands



Source: Huawei[24]

[24] Huawei, 'Spectrum Refarming for Mobile Broadband: Huawei Whitepaper on LTE Refarming in the 1800MHZ Band', November 2011.

- Three of the mobile operators in Ireland already have existing cell site grids for deploying 1800 MHz networks. These sites are not in the ideal locations for deploying LTE using the 2.6 GHz band – and, if 2.6 GHz spectrum were to be used, in addition to making use of the existing 1800 MHz and 2.1 GHz sites, it is likely that a large number of additional new sites would need to be deployed to match the coverage offered using 1800 MHz spectrum. Such sites would create an unnecessary environmental impact. In addition, securing availability of such sites (including obtaining the required planning permissions) may take time, resulting in delays to LTE network deployment in urban areas.
- Additionally, the existing antenna systems of mobile operators can typically be used for the deployment of LTE using 1800 MHz. Use of 2.6 GHz frequencies requires new antenna systems to be deployed.
- A recent study published by Innovation Observatory[25] identified that providing initial widespread coverage of LTE using the 1800 MHz band would be as much as 60% cheaper than covering the same area using higher frequency bands. The report also identified that "1800 MHz is a prime band for LTE deployment in virtually all regions of the world, and is likely to be an important enabler for international roaming". The report also indicates that "LTE in the 2600 MHz band (or other high bands) can then be used to add capacity in selected geographic areas."
- Large amounts of 1800 MHz spectrum are available (the band amounts to 2x75MHz of spectrum in total). In Ireland over 2x20MHz of the band is current unallocated. The recent rapid increases in take-up of 3G smartphones means that the existing 1800 MHz spectrum that is being used for GSM technology is/will become highly under-utilised and therefore available for re-farming for LTE technologies.

The ecosystem for LTE equipment including network equipment and user devices (e.g. dongles and smartphones) has developed considerably over the last 18 months. In particular:

- The GSM Association (GSMA) and the Global mobile Suppliers Association (GSA) launched a joint initiative to develop the 1800 MHz mobile broadband ecosystem in early 2011. This included a workshop at the Mobile World Congress in Barcelona in February 2011, a follow-up event at the GSMA's headquarters in London in March 2011 and the launch of an LTE 1800 group on *Linked In*.
- In May 2011, at the LTE World Summit in Amsterdam, Deutsche Telekom, France Telecom, and TeliaSonera identified the 1800 MHz band as their preferred choice for rolling-out LTE networks in urban regions
- Deutsche Telekom's deployment of LTE technology to-date has utilised the 800 MHz band in rural regions (in line with the coverage commitments of the 800 MHz licences) and the 1800 MHz band for the launch of commercial LTE service in Cologne.
- By November 2011, commercial LTE networks utilising 1800 MHz spectrum had been launched in Australia, Denmark, Finland, Germany, Hong Kong, Latvia, Lithuania, Poland, Saudi Arabia and Singapore[26].

[25] Innovation Observatory, '*Embracing the 1800MHz opportunity: Driving mobile forward with LYE in the 1800MHz band*', Prepared for the GSA, November 2011.
[26] Source: GSA, *'LTE Developments Worldwide, including interest in 1800MHz (LTE 1800)'*, Alan Hadden, President GSA, 24 November 2011.

- 41 LTE 1800 user devices had been launched by October 2011[27] including smartphones, tablets, dongles, routers and embedded modules, with this number rapidly increasing each month.

In summary, the 1800 MHz band is now clearly emerging as the main band for the deployment of LTE technology in urban areas in order to maximise coverage (outdoors and indoors) and minimise the cost of deployment – thereby providing a better and cheaper service for Ireland's citizens. The 2.6 GHz band will have a role to play in providing overflow capacity as traffic on mobile networks grow, however this additional capacity will not be required prior to 2019, when UPC's MMDS licence would expire, in view of the low population and business density in Ireland's main cities such as Dublin compared to other European cities. UPC would point out to ComReg that the emergence of the 1800 MHz band as the key high capacity band for the delivery of LTE services was precisely the trend the company predicted in its response to the Call for Input last year. This reinforces UPC's view that it is correct in asserting (as it also did in its response to the Call for Input) that the 2.6 GHz band will be of far less significance for the purposes of LTE service delivery.

Limited demand for 2.6GHz spectrum in other European countries

In view of mobile operators' increasing plans for the use of 1800MHz spectrum for initial LTE deployment in urban areas, demand for 2.6GHz spectrum has been relatively modest:

- 2x15MHz of paired 2.6 GHz spectrum remained unsold in the Belgian auction held on 28 November 2011;
- 2x10MHz of paired 2.6 GHz spectrum remained unsold in the Portuguese auction which ended on 1 December 2011;
- In the Italian 800 MHz, 1800 MHz and 2.6 GHz auction, Hutchison 3G, Telecom Italia and Vodafone each secured 1800 MHz spectrum at a price which was 4.4 times the price of 2.6 GHz spectrum (after accounting for the amount of spectrum obtained). Additionally, Telecom Italia and Vodafone chose to obtain 2x5MHz of 1800 MHz spectrum in the auction (enabling them to eventually deploy a full 2x20MHz LTE carrier in the 1800 MHz band) rather than continuing to bid for 2x20MHz of 2.6 GHz spectrum (each secured only 2x15MHz of 2.6 GHz spectrum – not sufficient for deployment of a full 20MHz LTE carrier – again indicating the priority placed by the operators on securing 1800MHz spectrum).

Such auction outcomes are in contrast with statements by equipment vendors and mobile operators of an impending "spectrum crisis". Furthermore, in Ireland, the overall demand for mobile spectrum has historically been below the levels experienced in other European countries: in addition to the 2x30MHz of 1800 MHz spectrum that remains unallocated, approximately 2x12.5 MHz (circa 35%) of spectrum in the 900 MHz band also remains unallocated. This is a function of the low population density in this country which places less demand for spectrum for providing additional network traffic capacity. Overall it is likely that demand for 2.6 GHz spectrum in Ireland will be below that experienced in many other European markets, in which there are signs that the 2.6 GHz band is reducing in value for which one key driving factor is likely to be the increased scope for and interest in use of the 1800 MHz band as the main band for deployment of LTE in urban areas.

Estimated demand for 2.6 GHz spectrum in Ireland up to 2019

In order to test its proposition that there will be no demand for capacity within the 2.6 GHz spectrum band to support the provision of NGMB services in Ireland prior to 2019, UPC has undertaken a detailed quantitative analysis of supply and demand factors in relation to NGMB spectrum over the

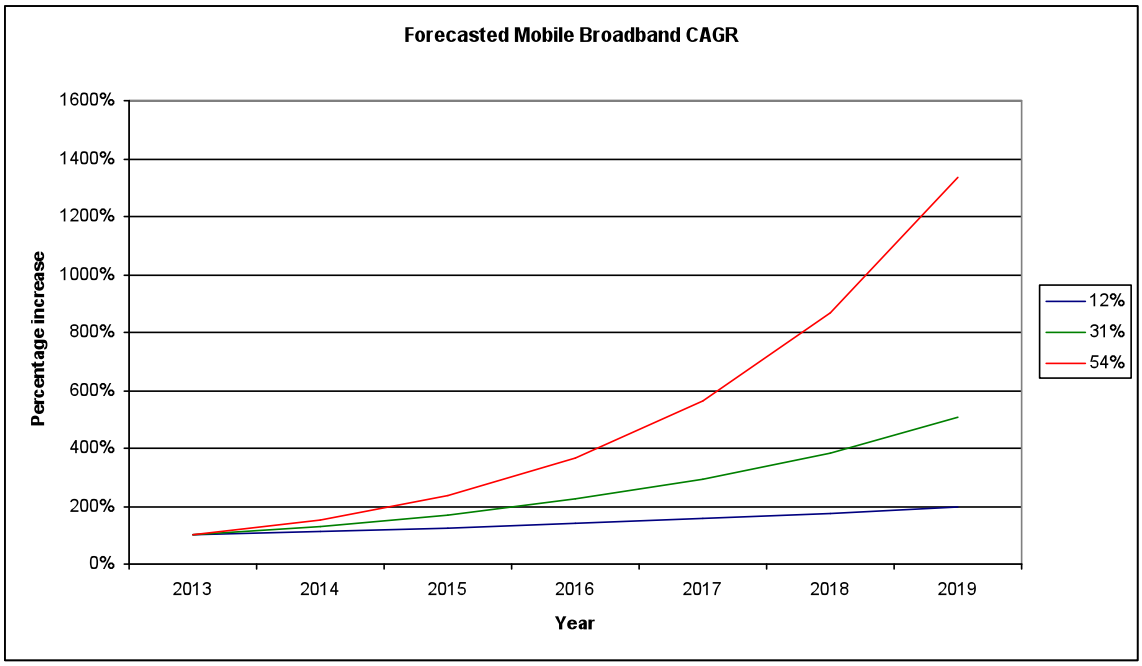
[27] Source: GSA, '*REPORT: Status of the LTE Ecosystem*', 28 October 2011.

coming years. In order to do this, UPC has taken into account the timescale for the availability of NGMB spectrum in the 800 MHz, 900 MHz, 1800 MHz and 2100 MHz bands and has assessed how adequate the supply of NGMB spectrum up to (and beyond) 2019 is likely to be under low, medium and high demand scenarios.

Future NGMB spectrum demand will, in the main, be driven by the speed at which the demand for mobile broadband services grow. It is very difficult, however, to forecast mobile broadband data growth with figures varying from 12% through 31% to 54% CAGR depending on the data source used[28], while very few projections go out to 2019. A problem with forecasting data growth over a period is that new technologies are constantly evolving with improvements in data optimisation and compression, optimized applications for mobiles, etc. Also growth is rarely linear as early adopters embrace new technologies causing initial very steep growth in demand that vendors regularly use to inflate expectations. However this steep growth usually plateaus within a certain period. For mobile telecommunications, defining this period is very difficult due to the constant technology changes.

Figure 9 below shows the potential CAGR capacity requirements of mobile broadband for the period 2013 to 2019 based on the potential growth rates mentioned above, using the assumption that LTE 800 services should first become available during 2013.

Figure 9: Forecasted mobile broadband CAGR from 2013 to 2019

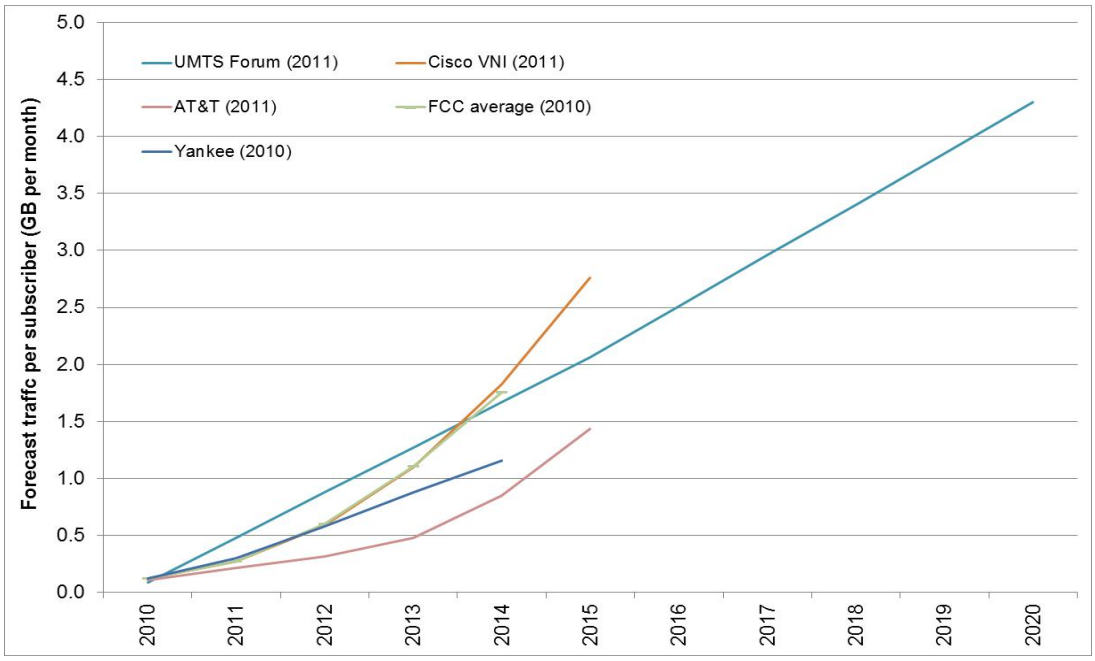


Source: UPC analysis, based on Analysys Mason and Ovum forecasts

Another way of looking at this would be to examine how quickly mobile network traffic levels are likely to increase in future years. Trends in this area are also highly uncertain, as Figure 10 below, which sets out forecasts of mobile data traffic (expressed in GB per subscriber per month) from a number of industry analysts, demonstrates.

[28] These CAGR figures have been taken from Analysys Mason (Analysys Mason: Presentation to the ITU Telecom World 2011, Mobile network traffic worldwide – a summary of recent trends, 26 October 2011) and Ovum (www.f5.com/pdf/analyst-reports/upgrade-mobile-packet-cores.pdf).

Figure 10: Forecast Mobile Data Usage Levels per Subscriber – Peak at 4.5 GB



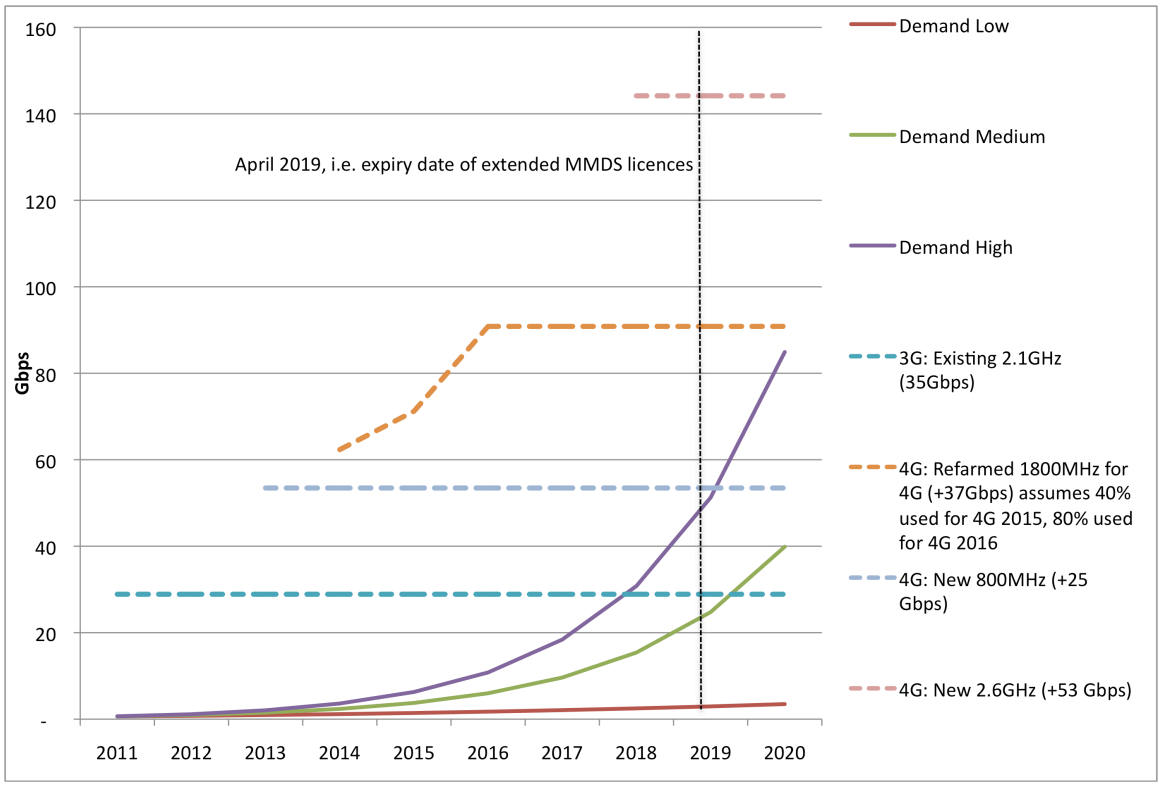
Source: analyst forecasts

Based on the above projections, UPC has examined mobile network traffic levels in the most densely populated region of Ireland (namely the area of Dublin within the M50, which is the only part of the country in which there might conceivably be any demand for access to the 2.6 GHz band to support the provision of NGMB services before 2019) and the capacity of different spectrum bands to meet this need between now and 2019. In view of the uncertainty over future traffic demand, we have developed three alternative scenarios - Low, Medium and High for which we have used different assumptions about subscribers' demand for mobile data services (expressed in GB per month per subscriber). These scenarios are set out in Table 6 below and, as may be seen from Figure 10 above, they are in line with the range of the forecasts developed by industry analysts. In order to rigorously test the hypothesis, however, that high traffic demand might require the re-assignment of the 2.6 GHz band for NGMB prior to 2019, the 'High' demand scenario assumes 9GB of smartphone monthly mobile data usage and 48GB for tablets. This is a CAGR of 54% 2011 to 2020, which is in line with the highest analyst forecasts for mobile broadband growth set out in Figure 9 above. The results of this analysis are illustrated in Figure 11 below.

Table 6: Mobile data demand scenarios per subscriber (GB per month)

Demand scenarios	2011	2015	2020
Low			
- Smartphone	0.2	0.315	0.555
- Laptop/tablet	1.0	1.574	2.773
Medium			
- Smartphone	0.2	0.720	5.149
- Laptop/tablet	1.0	3.599	25.745
High			
- Smartphone	0.2	1.125	9.744
- Laptop/tablet	1.0	5.624	48.718

Figure 11: Estimated demand for NGMB spectrum in Dublin 2011 to 2020



Source: UPC

The analysis illustrated in Figure 11 above shows the capacity provided by 3G networks operating in the 2.1 GHz band and then the incremental capacity provided by LTE networks operating in (i) the 800 MHz band and (ii) 1800 MHz band (assuming 2 x 60 MHz of the 1800 MHz band is used for LTE with the remainder continuing to be used for GSM provision) - these are shown as horizontal dotted lines in the chart. The analysis demonstrates that the combination of the 800 MHz, 1800 MHz and 2.1 GHz frequency bands will more than provide sufficient network capacity to meet forecast demand under all three traffic scenarios until well beyond 2019, even under the extremely aggressive 'High' demand scenario. Put another way, the additional capacity provided by the 2.6 GHz band would not be needed until a number of years after 2019 - and even then, this would only occur if the 'High' traffic scenario were to be realised.

This assessment has also assumed that an existing 2G/3G operator will deploy LTE technology in the 800 MHz and 1800 MHz bands primarily using their existing base station sites i.e. they will not need to deploy any additional macro cell sites. This is a conservative approach - if such additional sites were to be deployed, the combination of the 800 MHz and 1800 MHz spectrum would be sufficient to meet forecast network traffic beyond 2020.

Overall, this quantitative assessment underscores powerfully UPC's argument that the use of the 2.6 GHz band for deploying LTE technology would not provide capacity (and hence economic benefits) that could not otherwise be met by the mobile operators using the 800 MHz and 1800 MHz bands in the period up to (and indeed, well beyond) 2019 and while desired by MNOs it would not be deployed nor highly valued in the period to 2019.

Loss of revenue to the Irish Exchequer

In view of the uncertain demand for 2.6 GHz spectrum, now may not be the appropriate time for auctioning of the band in order to optimise the overall value for Ireland. As we have already illustrated

in Figure 10 above, there is considerable uncertainty over mobile traffic levels in the medium-to-long-term. Furthermore, it is uncertain how much of this growth in traffic could be met through use of more spectrally efficient technologies (initially LTE, which is 2.5 times as efficient as 3G/HSPA+) and alternative network architectures (e.g. increased off-loading to fixed networks using both WiFi and femto cells) rather than large amounts of additional spectrum being required to support these enhanced levels of network traffic.

In view of these uncertainties, it is likely that the mobile operators may place a lower value on the spectrum than would be the case closer to 2019 when UPC's licences would expire, in the event that they were renewed. It would therefore be better for ComReg to hold an auction once the demand for the spectrum is clearer – at which stage the Irish Exchequer (and ultimately all Irish citizens) will benefit from the true underlying value of the spectrum. By making a decision to not renew UPC's licences, ComReg would risk a situation where it auctioned off the spectrum at a low price and the spectrum remained unused for several years in contrast with continuing use for MMDS which would facilitate significant investments by UPC and all the economic benefits arising from this (both to the subscribers to the MMDS service and subscribers to pay-TV services on other platforms), as discussed in the following section.

Economic costs arising from non-renewal of UPC's licences

In this section we provide further details in support of our concern that the economic assessment undertaken by Aegis and Plum significantly underestimates the costs to the Irish economy arising from the closure of UPC's MMDS services as a result of a decision by ComReg to not renew UPC's licences. Specifically we discuss how the study underestimates the numbers of subscribers that would be disrupted, does not appropriately consider the competitive benefits of the MMDS service to all pay TV subscribers in Ireland, fails to consider the vast numbers of jobs that would be lost and the economic impact of this, considers the loss of UPC's on-going expenditure in Ireland as a benefit rather than a cost and the study gives a lack of consideration of the wider social and welfare benefits of the MMDS service, many of which are not quantifiable.

Underestimation of MMDS subscriber numbers

UPC's MMDS subscriber numbers have been falling, primarily as a consequence of its service offering not being viewed by the market as being competitive, particularly in relation to the provision of DVR set top devices and to a lesser extent high definition television channels. As a consequence UPC has been losing market share to Sky in rural areas, with falling numbers of subscribers. UPC does offer a DVR in the greater Dublin region where NTL deployed QAM modulation and the MMDS system benefits from the cable roadmap. Here the subscriber base has remained stable over the last number of years. The contrast to the former Chorus regions can be seen where COFDM modulation was deployed and a DVR is not available and it is here that the subscriber base has declined.[29]

As discussed in UPC's submission to ComReg's previous Call for Input and once ComReg has confirmed its intention in a timely manner to renew UPC's licences unimpeded until 2019, UPC could invest to enhance its service offering. This could occur either through an upgrade of its entire network to support MPEG-4 technology allowing it to offer its customers a highly-competitive package comprising of 200 SD and HDTV channels, thereby enabling it to recapture market share from Sky or alternatively invest to develop a COFDM DVR allow it to maintain its current base and provide at least 90-100 SD channels. UPC's MMDS service is targeted at the market segment that will be seeking more than the 7-10 channels to be offered by *Saorview* and falls outside the coverage of UPC's cable

[29] See Figure 5 of UPC's response to ComReg's Call for Input, June 2010.

service. At present the only provider that can offer large numbers of HDTV and SDTV channels to these households is Sky.

By contrast, the Aegis and Plum study does not take account of the impact of the potential upgrade of UPC's network upgrade and assumes that subscribers will continue to fall over the period from 2011 to 2019. As a consequence the study vastly underestimates the benefits of the MMDS service and costs that would occur in the event that the MMDS platform was to be shut down.

In broad terms, UPC believes that Aegis and Plum's estimation of the MMDS subscriber numbers in 2014 represents only 71% of what they are likely to be at that stage and only 43% of what the 2017 figure is likely to be. These underestimations in subscriber numbers will have a corresponding impact on the costs of migration to new platforms.

Whilst the shortfall in subscriber numbers is the main areas where UPC believes Aegis and Plum have underestimated the costs of migrating subscribers alternative platforms, other assumptions which UPC believes under-estimates the true cost include:

- The additional monthly cost of subscribing to an alternative service such as Sky over and above UPC's monthly MMDS subscription fees. As discussed above, UPC's MMDS subscribers are unlikely to be attracted to the free *Saorview* offering in view of the highly limited numbers of TV channels available on this platform. Consequently the MMDS subscribers would be expected to migrate to the Sky platform where the higher subscription fees that are paid by the subscribers would result in a loss of consumer surplus. This loss (and cost to Ireland) has not been taken into account in the Aegis and Plum analysis.
- The number of hours required by MMDS subscribers to migrate to a new platform. The Aegis and Plum study assumes this is just 2 hours. UPC believes this is unrealistic considering the need to select and order a new service, the time taken to install/oversee the installation of the new service, the time associated with changing payment methods (e.g. direct debit) and the time value of learning how to use a new service. UPC suggests a figure of at least 5 hours per subscriber should be considered instead.
- No account has been taken of the cost to MMDS subscribers who are migrating to satellite services any costs incurred in the day to day provisioning of those customers or separately of costs incurred in repairing their set-top boxes. Sky makes a charge of EUR100 per technician visit after the one-year warranty period has expired. UPC does not make an equivalent charge. Such additional costs should be taken into account – UPC suggests a repair rate of 5% of boxes per annum is utilised for such an assessment.

Benefits of the MMDS platform to all pay TV subscribers

For many households requiring multi-channel and high definition television, MMDS will be the only form of digital TV competition to satellite since the population distribution across the country means that cable TV passes approximately 50% of households. The MMDS platform will therefore continue to play an important role in constraining overall market prices for pay TV services, for which there are around 1.1 million subscribers (out of a total of 1.586 million homes)[30]. If UPC was unable to provide TV services over MMDS, Irish households based in rural areas would only have one option for a managed pay-TV service (namely satellite). This could lead to a rise in prices by Sky, and in turn could deprive some less wealthy rural households of a key source of information and entertainment, as well as resulting in economic welfare losses for consumers.

[30] ComReg Quarterly Report Q3 2011 (Document No. 11/98). ComReg reports (Section 5.1) that there are 1.586 million TV homes in the country and (in Figure 5.1.5) that 70% of all TV homes subscribe to a pay-TV service.

Aegis and Plum dismiss these competitive benefits ("would likely be small, as MMDS comprises less than 7% of the current pay TV market and is declining"). UPC believes this analysis is incorrect as:

- It does not take account of the impact of an upgrade to the MMDS platform to become a more competitive service to Sky, thus acting as a constraint on prices for all pay-TV customers.
- Whilst MMDS's overall share of the pay TV market is small, this does not take account of the fact that MMDS is the only alternative platform to satellite for approximately 50% of households – primarily in rural Ireland.
- The Aegis and Plum study was undertaken prior to the announcement of the programming content on *Saorview* – in particular there may have been an implicit expectation that DTT would provide a competitive service offering to satellite.

The General Policy Direction No. 1 on Competition from 2004 issued by the Department of Communications, Energy and Natural Resources requires that:

ComReg shall focus on the promotion of competition as a key objective. …… ComReg shall have a particular focus on: ……...the potential of alternative technology delivery platforms to support competition.

Consequently in renewing UPC's licences, ComReg would be acting in accordance with its responsibility to promote competition in the pay-TV market. By contrast, in not renewing UPC's licences to 2019, ComReg would be failing to act in accordance with General Policy Direction No. 1.

Aegis and Plum note that (in making the 2.6 GHz band available for mobile broadband services):

"There would likely be positive competition benefits for the mobile broadband market from making additional spectrum available, as additional spectrum could make consolidation in the mobile broadband market less likely and could enhance the ability of mobile broadband to compete more effectively with fixed broadband at the margin."

As indicated previously, UPC believes that the competitive benefits of mobile broadband services could be delivered (up to 2019) using alternative frequency bands such as 1800 MHz, 800 MHz and 2.3 GHz. The availability of the 2.6 GHz band is only likely to drive consolidation in the market at the point at which all these other spectrum bands fail to provide sufficient capacity. By contrast, the closure of UPC's MMDS service would reduce the number of pay-TV suppliers to just one for 50% of Irish households.

Loss of jobs dependent on the MMDS service

The Aegis and Plum study does not take account of the number of Irish jobs that are dependent on the continuation of UPC's MMDS service. This includes:

- 50 staff employed directly by UPC Ireland
- At least a further 40 positions within UPC's suppliers, as detailed in the responses to ComReg's Call for Input[31]:
    - **Anixter Distribution Ireland Ltd**: several of 20 people in Ireland are engaged in maintaining sales and logistical support to UPC
    - **Connacht Rigging Services**: 6 people employed by the company and 95% of the company's work is with UPC – "If this licence renewal is unsuccessful, I shudder to

[31] See ComReg, '*Inputs received on potential uses and future licensing options of the 2.6 GHz spectrum band: Submissions received from respondents*', Document No. 10/58s, 27 July 2010.

think about the future of this company and its employees. Another company goes to the wall."

- **EMR Integrated Solutions**: "Non-renewal of the 2500-2690MHz spectrum band by ComReg to UPC could have a significant impact on EMR's project growth plans over the next 5 years as we have an existing 5 year contract with UPC"
- **KN Network Services (Ireland) Ltd**: Employ 10 full time staff throughout the country on the provision and maintenance of the transmission sites that support the MMDS network – "The work is of huge benefit to our business and forms critical employment for those who are engaged on it."

- Further positions in the organisations that serve all the above companies.

In view of the current economic environment, is it unlikely that the above positions will be replaced within the next few years as the growth of the Irish economy is unlikely to be capacity constrained over this period. Such job losses could therefore represent a cost of several millions of Euros to the Irish economy every single year.

Loss of UPC's on-going expenditure on MMDS in Ireland

A large proportion of UPC's on-going expenditure on its MMDS network (such as network operations, customer operations and marketing) is spent in Ireland, which would be lost in the event that UPC's MMDS service were to be terminated in 2014 and UPC's MMDS customers migrated over to Sky.

The Aegis and Plum study considers savings in this expenditure that would occur as a result of the shutdown of UPC's MMDS service as an economic benefit for Ireland. By contrast UPC believes this expenditure would be a loss to Ireland as the revenues associated with these costs (subscribers paid by UPC's former subscribers to Sky) would flow out of Ireland.

UPC therefore believes that this on-going expenditure should be classified as a cost to Ireland in the event that UPC licences were not renewed, rather than a benefit.

Loss of (non-quantifiable) wider social benefits of the MMDS service

The loss of UPC's MMDS service would lead to the many other (non-quantifiable) benefits to both the Irish economy and society being lost, including:

- Media plurality: A range of distribution channels for different types of TV service (public, commercial and community) are key to maintaining plurality. UPC (unlike Sky) is subject to any rules introduced by the Irish government to preserve plurality and reflect the political and cultural views of Irish society.
- 'Must carry' services: UPC is obliged to carry a range of services on its pay TV platform including RTÉ 1, RTÉ 2, TV3 and TG4 and is not allowed to charge these TV channels the normal transmission costs associated with carrying the signal on its network.
- Electronic Programme Guide fees: UPC does not charge the above channels any fees for their (preferential) positions in UPC's EPG.
- Support for indigenous channels: UPC supports a number of Irish-owned commercial channels) and, where It is technically feasible and capacity exists, UPC provides carriage, free of charge, to local community TV channels on its cable network and will be able to do so on its MMDS network following the technology upgrade.

Several of these benefits are of particular importance to the rural community, who would be particularly disadvantaged by the shutdown of the MMDS service. Whilst many of these benefits are

difficult (impossible in some cases) to quantify, any cost/benefit assessment of the future use of the 2.6GHz spectrum in Ireland should take account of these before reaching any overall conclusions. The Aegis and Plum study does not appear to have considered these factors at all in its assessment.

Conclusions on Aegis and Plum's economic analysis

In this section of its response, UPC has highlighted many significant limitations in the economic analysis undertaken by Aegis and Plum, and, in view of this, it would not be appropriate for such an assessment to form the basis for ComReg's decision over whether to renew UPC's 2.6 GHz licences.

UPC believes that ComReg must undertake a more rigorous and detailed assessment which truly takes accounts of the situation in Ireland – in particular how the low population density in urban areas limits the benefits that would arise from 2.6 GHz spectrum being made available prior to 2019 for mobile broadband services in addition to the 1800 MHz band and also considers how the vast rural population of Ireland would suffer from the withdrawal of the only competing pay TV service to Sky. Such a full evaluation of the issues needs to be part of ComReg's due process for making any decisions on the future use of the 2.6 GHz band.

Many of the issues set out in this section of our response that ComReg should consider have already been raised by UPC in its submission to ComReg's Call for Input – in particular as part of an economic study undertaken by independent consultants Analysys Mason[32] on alternative uses of the 2.6GHz band, which factored in the specific Irish market issues. The study indicated that if ComReg were to decide not to renew UPC's licences until 2019, it is likely that the mobile operators would acquire the spectrum in any service/technology neutral auction and **the resulting economic benefits of the use of the 2.6 GHz band for mobile broadband services would amount to just EUR0.5 million in the period to 2019.**[33]. By contrast, there would be **a loss of at least EUR88 million of economic benefits from not renewing UPC's MMDS licences**[34], in additional to the loss of numerous social and welfare benefits for Ireland which are impractical to quantify but are of immense importance. Clearly, by considering the specific situation in Ireland, the study reached a different result to that of Aegis and Plum in relation to the economic assessment of alternative uses of the 2.6 GHz band from 2014 to 2019 – with a corresponding recommendation that ComReg should renew UPC's licences.

UPC urges ComReg to consider the methodology used, assumptions made and results arising from this study in more detail, in order that ComReg can also reach the right conclusion on the renewal of the 2.6 GHz band that truly maximises the economic benefits for Ireland.

Conclusions on approach proposed by Aegis and Plum

In the above two sections of our response, we have examined at some length the technical and economic analysis undertaken for ComReg by Aegis and Plum and we have set out in detail the shortcomings we have discovered in this analysis. It is clear to UPC that ComReg cannot rely on the technical analysis presented by Aegis and Plum as a number of erroneous base assumptions have

[32] Analysys Mason, '*Maximising the benefits to Ireland of the 2500-2690MHz spectrum band: Report for UPC Ireland*', 6 May 2010.
[33] The extremely low value in this respect calculated by Analysys Mason is explained by the fact that the EUR179 million of economic benefits that would arise in Ireland from the deployment of mobile broadband services would be obtained in any case through use of the 1800 MHz band. As a result, the additional benefit attained through the use of the 2.6 GHz band was shown to be extremely low.
[34] As already mentioned, the Analysys Mason study referred to a value of EUR129 million but this figure was an NPV from 2010 to 2019. The EUR88 million figure quoted here covers the period 2012-2019 and reflects UPC's latest MMDS subscriber numbers and future projections in relation to same.

led them to greatly overstate the possible interference between MMDS and NGMB services in a situation where geographical sharing takes place in the 2.6 GHz band. It is also transparently the case that Aegis and Plum's economic analysis cannot be relied on either, as it greatly overstates the likely economic benefits from freeing up the 2.6 GHz spectrum band for other uses in 2014 and it significantly underestimates the likely economic costs that would arise from the termination of UPC's MMDS services from that date.

It follows that the approach proposed by Aegis and Plum – i.e. that the 2.6 GHz band be freed up for allocation on a technology and service neutral basis in 2014 – is invalid as it is based on unsupportable technical and economic analysis. UPC is of the strong opinion that such an approach would have significant negative consequences as it would mean the loss in 2014 of a valued pay-TV service (with knock-on effects for pay-TV competition generally) while the spectrum used to support this service would in all likelihood lie unused for NGMB up to 2019. Faced with the alternative of renewing the MMDS licences until 2019 and making provision for possible geographic sharing with NGMB, it is obvious that the approach proposed by Aegis and Plum makes little or no sense and it is an approach that should be rejected by ComReg.

UPC's proposed approach on using the 2.6 GHz band up to 2019

UPC recognises that ComReg will eventually have to offer access on a competitive basis to the 2.6 GHz band on a technology and service neutral basis but, for the reasons set out in this response, UPC believes that it makes no sense to do so in 2014. The benefits that Aegis and Plum claim will flow from the re-allocation of the spectrum in 2014 are illusory and a decision to do so would mean the early closure of the MMDS service with a consequent loss of pay-TV competition in much of the country with attendant loss of VAT receipts and job losses.

If the 2.6 GHz band is freed up for re-allocation on a technology and service neutral basis it will almost certainly not be used for NGMB before 2019 and so the band will, in effect, lie fallow for this period when it could be used for the continued provision of what is a valued nationwide pay-TV service. In the unlikely event that some spectrum is needed for capacity purposes in high density population areas, then geographic sharing could be accommodated within the band. UPC would be happy to see such an obligation reflected in its MMDS licences from 2014 onwards.

UPC's proposed alternative approach to the future use of the 2.6 GHz band is therefore as follows:

- ComReg should confirm its intention to offer access on a competitive basis to the 2.6 GHz band on a technology and service neutral basis but to declare that it will not do so until 2019;
- ComReg should renew UPC's MMDS licences for the full five-year period from April 2014 to April 2019 but in doing so it should make provision within the new licences for the possible sharing of the 2.6 GHz band with NGMB where a demonstrable case is made for capacity within the band to support the provision of NGMB services, bearing in mind the capacity that will be available in other spectrum bands that are allocated for this purpose.

By adopting such an approach, ComReg can ensure that the economic loss arising from the early closure of the MMDS service (which UPC currently estimates at some EUR88.4 million) is avoided while the economic benefit arising from the introduction of NGMB (regardless of what this figure is, it will materialise regardless of whether or not the 2.6 GHz band is re-assigned for NGMB in 2014) are also allowed to accrue. Seen in this light, it is obvious that UPC's proposed approach to the future use of the 2.6 GHz band is one that maximises the economic benefits to the country. UPC strongly believes that ComReg can secure a 'win-win' outcome for the country if it adopts this approach, one that maximises the benefits to Ireland in the short- and medium-term while at the same time laying down a clear longer-term framework for the use of the 2.6 GHz spectrum band.

Q2. Do you agree with ComReg's proposal to amend the licence conditions of the three MMDS licences in Dublin, Galway and Waterford so that the licences terminate in April 2014? Please provide reasons for your view.

UPC agrees with and welcomes ComReg's proposal to amend the termination date of the three licences held by UPC that enable it to provide its MMDS service in Dublin, Galway and Waterford so that these licences terminate at the same time as the other MMDS licences that are currently in force, i.e. in April 2014. Given the fact that the termination date of the Dublin, Galway and Waterford licences is fast approaching, UPC urges ComReg to decouple the issue of the 2014 termination date from the wider issue of its review of the MMDS licences and the future of the 2.6 GHz band. UPC calls on ComReg to issue an immediate decision (before year-end) confirming that these licences will terminate in April 2014.

Without prejudice to UPC's position that there are other legal grounds for reinstating the original 2014 date UPC agrees with ComReg's reasoning for extending the termination date of these licences to 2014. As ComReg states in the Consultation Document[35], viewers in the affected areas would be negatively impacted if the three licences were to terminate in April 2012 and there could be significant confusion (due to overlapping coverage from transmitters in different franchise areas) amongst UPC's MMDS customers about which customers would lose their TV service in 2012. In addition, as ComReg also notes[36], the 2.6 GHz spectrum band will not become available nationally for other uses until at least 2014 (at which point the remaining MMDS licences expire) and so the termination of the of the Dublin, Galway and Waterford licences in April 2012 would mean that the 2.6 GHz band in these areas would lie fallow for a two-year period. UPC agrees with ComReg that it would not be an efficient use of the spectrum to allow this to happen when instead the existing MMDS service could be maintained for the benefit of pay-TV consumers in Dublin, Galway and Waterford. Finally, as ComReg correctly states, the regulatory basis for which the 2012 termination date was previously set is no longer valid thus it is right and proper for ComReg to reinstate the original 2014 termination date.

As has been shown in relation to terrestrial services, customers require significant advance notice about the forthcoming closure of their chosen TV service. In the case of terrestrial TV, customers have been given a full year's notice of the impending closure of the analogue terrestrial service and this has been backed up by a significant public information campaign. In fact, RTÉ's *Saorview* service was launched in May this year and therefore terrestrial TV users will have had a full 18 months to make the switch to digital. In addition, many users of terrestrial TV services will have known for some time (in particular because of parallel developments in the UK) that a switch from analogue to digital was inevitably also going to occur in this country. It is worth noting also that customers still using analogue terrestrial TV have been provided with a superior digital variant of the service which they can readily switch to at any time before the analogue network closes in October 2012 and so there is no real danger of any customer losing access to their preferred TV service when ASO occurs.

Unless ComReg moves rapidly to extend the termination date for the MMDS licences in Dublin, Galway and Waterford, MMDS customers in these areas face the situation of being given no more than a few months' notice of the closure of their pay-TV service and, unlike those switching from analogue to digital terrestrial, these customers will not have the choice of a readily-available, equivalent alternative service. As a result, ComReg has a clear duty of care to ensure that these MMDS customers are not faced with the enormous disruption that would result from the switch-off of

[35] Consultation Document, Para. 4.1.
[36] Ibid.

the service in the Dublin, Galway and Waterford areas in early 2012. It is therefore vital that the termination dates of the licences in question are extended to April 2014 as soon as possible, preferably before the end of this year.

Annex 1: UPC Ireland's response to ComReg's Call for Input (Confidential version, containing business secrets)

Annex 2: Analysys Mason report for UPC Ireland (Confidential – contains business secrets)

Potential uses and future licensing options for the 2.6 GHz spectrum band

UPC Ireland's response to
ComReg's Call for Input

June 2010

Table of contents

Tables and Figures

Executive Summary

UPC welcomes the opportunity to respond to ComReg's Call for Input on the uses of and potential licensing options for the 2.6 GHz spectrum band. As the long-standing occupant of this band, UPC has a particular interest in ComReg's future plans for how this spectrum will be used .

UPC also welcomes ComReg's recognition that, unlike many other EU Member States, the 2.6 GHz band is not a 'green field' spectrum band in this country. On the contrary, the 2.6 GHz band is used in Ireland for the provision of UPC's nationwide MMDS TV service, which is a service of important social value and one that is relied upon by approximately 250,000 people in Ireland.

The fact that an existing service of such importance is being provided over the 2.6 GHz band to a large number of customers makes ComReg's decision on future usage of the band a very important one. Should ComReg decide that MMDS can no longer be provided using the 2.6 GHz band, the service will have to be terminated, thus depriving these customers of their muli-channel TV service. The loss of such a service in this way would be a development without precedent in this country.

UPC views this review as an important opportunity for Ireland to secure an enhanced competitive environment for pay-TV services on a nationwide basis. This is because UPC intends to embark upon a significant upgrade of its MMDS network immediately following ComReg's decision to extend the current MMDS licence term to 2019 as provided for under the current licences.

[redacted]

The existing MMDS network, which is currently available on a nationwide basis almost exclusively outside of cable areas, is an important complement to UPC's cable TV offering, and is in effect an alternative digital terrestrial television platform, albeit one operating at 2.6 GHz rather than in the prime UHF band and providing a channel line-up far in excess of what would have been possible via the now stalled commercial DTT initiative. With the enhancements described above, the MMDS network can fulfill a key role in helping to achieve national policy aims in relation to the delivery of digital broadcasting services on a countrywide basis while ensuring consumers outside of cable areas have a choice of pay-TV provider.

In contrast, a decision by ComReg not to renew UPC's MMDS licences would have major negative consequences, both for the customers that would be directly impacted by the resultant closure of the service and for the wider pay-TV market, given such a decision would prevent the expansion of competition for pay-TV services and would instead hand a *de facto* monopoly to BSkyB within this market across much of the country.

UPC is fully cognisant of moves being made at EU level to harmonise use of the 2.6 GHz band for electronic communications services and the company is aware that the 2.6 GHz band is being viewed as one of a number of bands which could be used to provide next

generation mobile broadband services. In UPC's view, however, this development does not, nor should not, mean that the provision of MMDS services is no longer permitted within the band from 2014 onwards.

If the 2.6 GHz band were to be reassigned in order to support the rollout of mobile broadband services, it would only be used for this purpose (certainly up to 2019) within the greater Dublin area and so the band would lie entirely idle across most of the country. Such an outcome, which could only happen as a result of the closure of UPC's nationwide MMDS service, could not be justified on the grounds of promoting spectrum efficiency, the development of competition or the advancement of social policy.

While the continuation of UPC's MMDS service relies entirely on its ability to retain access to its existing spectrum allocation in the 2.6 GHz band, the rollout of mobile broadband services is in no way contingent on the availability of spectrum within this band. In fact, the underutilised 1800 MHz band – which is already allocated for mobile services – has superior properties in the area of radio propagation compared to the 2.6 GHz band and it is already available for use as the main high-capacity band for mobile broadband services in Ireland.

A policy approach that promotes the use of the 1800 MHz band (along with 800 MHz, 900 MHz and 2.1 GHz) for mobile broadband services while the 2.6 GHz band is maintained for MMDS would mean that existing and planned services could both be catered for in an efficient and effective way. Such an approach would make the best possible use of this scarce resource and it would also represent a 'win-win' outcome for operators, customers and the economy as a whole.

Options aimed at sharing the 2.6 GHz band would not result in the same kind of positive outcome. Approaches involving sharing in time (i.e. renewing the MMDS licences for less than five years) would render uneconomic UPC's planned network investment whereas frequency sharing would render the current service uncompetitive and would require incremental investment to enable a sub-optimal pay-TV service and so would, in effect, result in the same outcome as a decision not to renew the licences from 2014. An approach involving geographic sharing, while theoretically possible, would require further study and, in any event, should only be countenanced at a point in time where the mobile operators are in a position to demonstrate a clear need for spectrum within the band in specific geographic areas.

1 Introduction

UPC Communications Ireland Limited ("UPC") welcomes ComReg's publication of its call for input on potential uses and future licensing options of the 2.6 GHz spectrum band (the "Call for Input").[1] UPC is pleased to provide its response to ComReg on this issue.

As ComReg points out in the Call for Input, the majority of the 2.6 GHz band (i.e. 144 MHz, out of a total of 190 MHz) is currently licensed to provide multi-channel TV services using Multipoint Microwave Distribution System ("MMDS") technology. UPC is the long-standing service provider in this band and the current MMDS licences that UPC holds were issued to NTL and Chorus in 1999. The applicable legislation provides for their expiry in April 2014 (with an express possibility of renewal).

UPC is committed to making its high quality multi-channel TV service available to the maximum number of customers on a nationwide basis and so it continues to view its MMDS platform as an important complement to its cable footprint. UPC has firm plans to invest significantly to upgrade the MMDS network to enable it to become a strong nationwide pay-TV option for customers. As a result, for the reasons we detail in this response, UPC requests ComReg to avail of the option open to it within the MMDS licensing framework and extend its licence to provide its MMDS service in the 2.6 GHz band until 2019.

In making this request, UPC is fully aware of spectrum licensing developments internationally in the 2.6 GHz (and related) bands and, in particular, the moves being made in other countries to makes this spectrum available for the provision of other services, notably mobile broadband. As we demonstrate in this response, however, ComReg should be in a position to make sufficient spectrum available to support both the deployment of next generation mobile broadband services while maintaining the provision of the MMDS service in the 2.6 GHz band. Such an approach would, as we explain in our response, reap the greatest economic benefit for Ireland, make the most efficient use of the spectrum and be compatible with the regulatory and licensing frameworks at EU and national level.

The remainder of our response to ComReg is structured as follows:

- In Section 2, we set the context for ComReg's review of the 2.6 GHz band, providing some background detail on UPC and its MMDS service and discussing briefly the main issues that ComReg needs to take account of in deciding on future usage of the band;
- In Section 3, we put forward UPC's vision for the future provision of the MMDS service in the 2.6 GHz band;
- In Section 4, we summarise the economic case for maintaining MMDS within the 2.6 GHz band, where we draw on independent analysis undertaken for UPC by Analysys Mason;
- In Section 5, we discuss issues relating to efficient spectrum usage in the band and examine the various options for sharing spectrum;

[1] ComReg Document No. 10/38, dated 14th May 2010.

- In Section 6, we consider regulatory and licensing issues relating to the future provision of the MMDS service within the band;
- In Section 7, we set out our proposals on how we believe ComReg should move forward in relation to the licensing of the 2.6 GHz band.

2 Context for review of 2.6 GHz band

In this part of our response, we set the context – from UPC's perspective – for ComReg's review of the licensing options for the 2.6 GHz band. In doing so, we provide some background on UPC and its MMDS service before considering briefly the main issues that ComReg will need to take account of in deciding on future usage of the band.

2.1 Background on UPC

UPC is a wholly-owned subsidiary of UPC Broadband, which, in turn, is the European division of Liberty Global, Inc., the world's leading international cable operator. UPC Broadband provides television, broadband internet and telephone services to approximately 13 million customers throughout 10 European countries.

UPC's approach to service delivery across its various markets is one that is characterised by product leadership and by innovation. This is evidenced both by UPC's delivery of a triple-play product offering to customers, comprising a bundled broadband, pay-TV and voice telephony service, but also by the way the company continually seeks to develop and enrich its product offering. In pay-TV, this has led to the rollout of more sophisticated end-user equipment and the provision of High Definition TV (HDTV) services, while in broadband, it has led to ever-higher bandwidth speeds and other service enhancements for end-users.

UPC's Irish arm consists of an amalgamation of the former Chorus and NTL operations. UPC acquired Chorus in 2004 and NTL in 2005. The company was rebranded as UPC in May 2010.

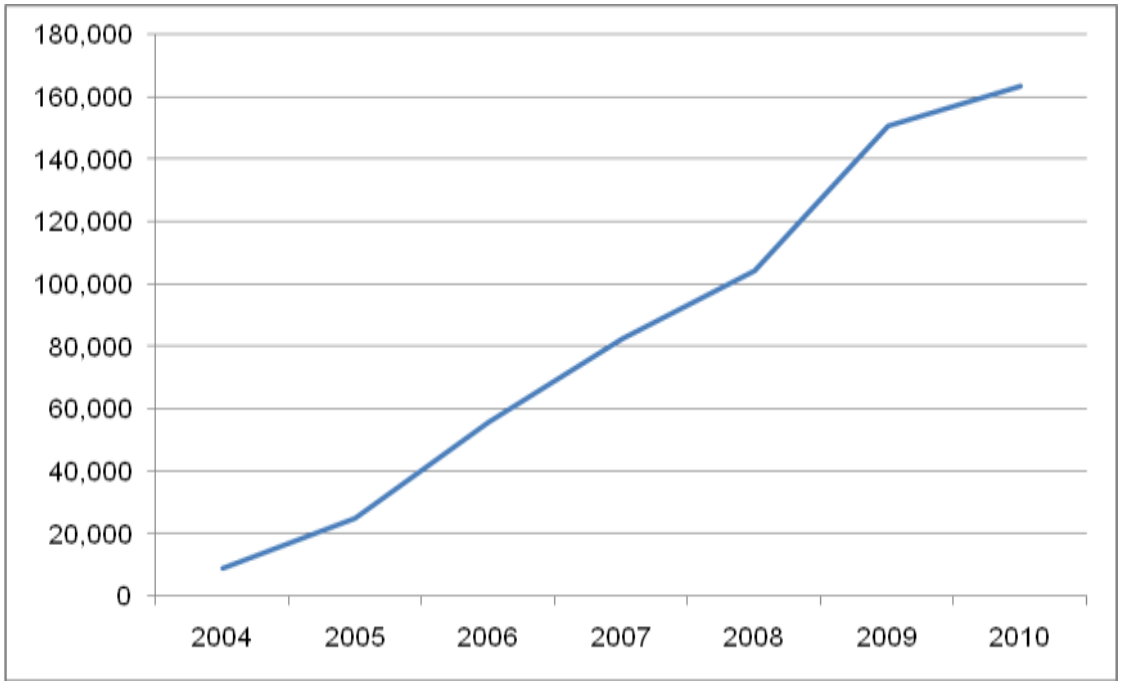
UPC's cable platform is primarily located in five cities – Dublin, Cork, Waterford, Galway and Limerick - and it extends into additional larger towns such as Carlow, Athlone, Portlaoise, Sligo, Mullingar and Newbridge. Over 75% of the network is upgraded to two-way capability, with 63% of its cabled homes served by a network with a bandwidth of at least 550MHz. The percentage breakdown for Digital Video, Broadband Internet and fixed line voice capability is 95%, 75% and 65% respectively across its homes passed. In rural Ireland, UPC offers a digital multi-channel TV service across its MMDS platform.

In addition, UPC Ireland offers to business customers a complete range of telecommunications solutions including voice, data and internet services to the Corporate, Public Sector, Wholesale and SME markets. UPC Ireland is also a trusted partner to Government, health and education authorities and has a strong track record in delivering reliable, fully managed solutions to public safety and public sector organisations.

Building and laying fibre-rich networks enables UPC to develop its broadband service further and it is now preparing to introduce a upgraded services offering download speeds in excess of 100Mbps to around half of all Irish homes. This plan involves a financial commitment with a total spend of over [redacted] by the end of [redacted].

In the five years since its entered the Irish market, UPC has established itself as a significant platform competitor in the Irish broadband market. As Figure 1 shows, cable broadband connections have grown very significantly since UPC entered the Irish market.

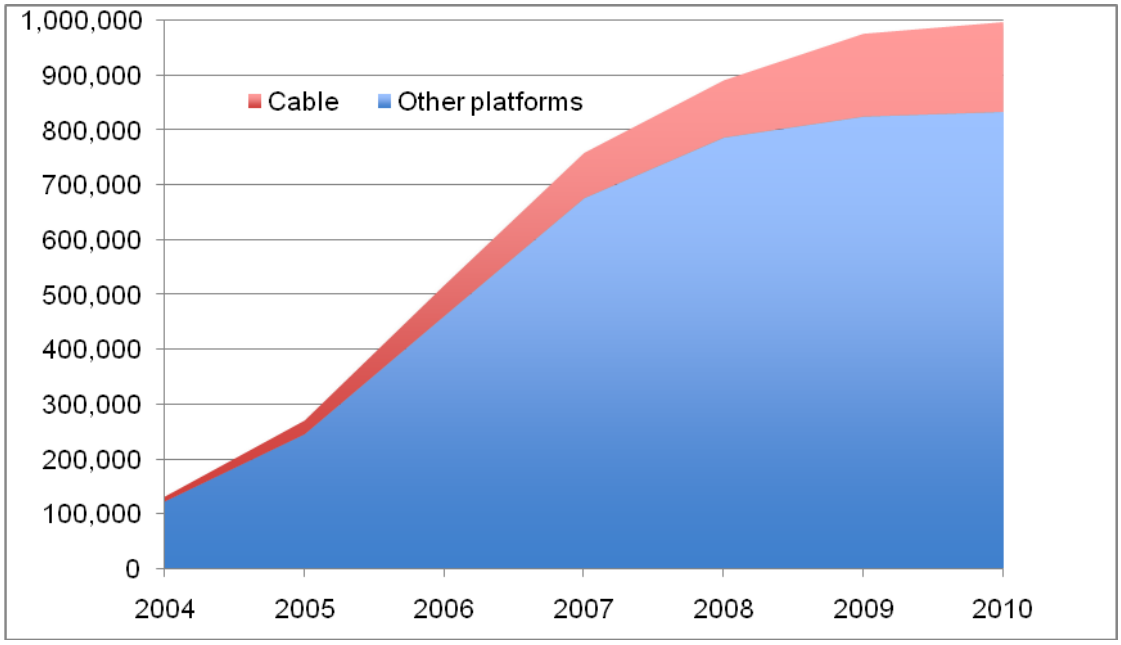
Figure 1: Cable broadband connections, 2004-2010



Source: ComReg Quarterly Reports. All data, apart from 2010, relate to year-end position. 2010 data refer to Q1.

Prior to UPC's market entry, Ireland was one of the weakest broadband markets within the EU and cable was not a significant delivery platform for broadband services. In the years since then, cable has, under UPC's ownership, emerged strongly to become the principal alternative platform to the incumbent's DSL network for fixed broadband connections, and this alternative platform approach has helped to drive upwards the level of national broadband penetration. This development is illustrated in Figure 2 below.

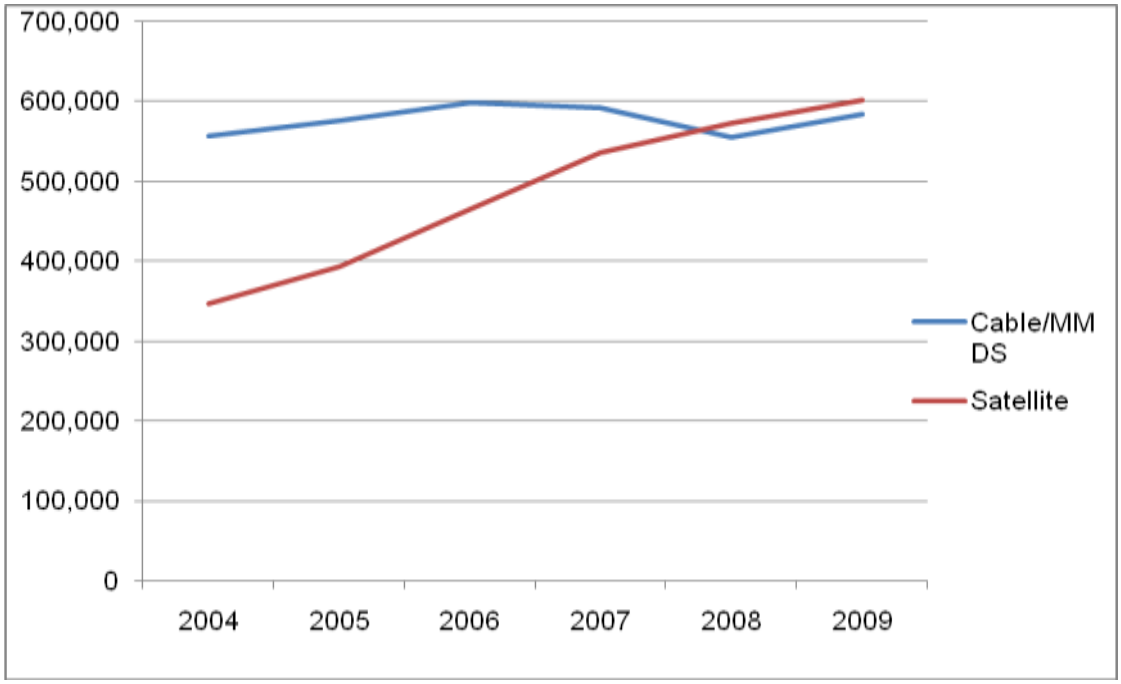
Figure 2: Fixed broadband connections, 2004-2010



Source: ComReg Quarterly Reports. Mobile broadband connections are not included. "Other platforms" comprises DSL, FWA, satellite and optical fibre connections. All data, apart from 2010, relate to year-end position. 2010 data refer to Q1.

Since entering the Irish market, UPC has also competed strongly with BSkyB in the pay-TV sector. BSkyB is the largest pay-TV provider in the UK and its Irish operations benefit from this overall scale, making it very difficult to compete with such a strong entity in this market segment. As Figure 3 below shows, BSkyB has been an aggressive competitor to UPC over the past five years within the Irish pay-TV market, during which time BSkyB has grown substantially the number of pay-TV customers using its platform. Over the same period, the total number of cable and MMDS connections has stagnated, mainly due to the high levels of rural customers churning from MMDS to satellite. As a result, as Figure 3 illustrates, satellite has now become the leading delivery platform for pay-TV services within country.

Figure 3: Pay-TV customers in Ireland, 2004-9



Source: Screen Digest.

2.2 UPC's MMDS service

UPC's current MMDS network, which the company uses to provide a multi-channel TV service to 100,000 households in different parts of the country originated from the various licences for MMDS services which were granted to a number of different companies pursuant to regulations made by the Minister for Communications in 1989.[2] Over time, these different licences became consolidated under common ownership, a process that culminated with UPC's acquisition of NTL and Chorus. As a result, UPC is now licensed to provide its MMDS on a nationwide basis utilising spectrum in the 2.6 GHz band.

At the outset, the MMDS service provided by NTL and Chorus (and the other predecessor providers) was an analogue one but the switchover to digital provision was completed on both networks in 2002. At the outset, the MMDS service provided by NTL and Chorus (and the other predecessor providers) was an analogue one but the switchover to digital provision was completed on both networks in 2002. In converting its network to digital, [redacted][3],[4].

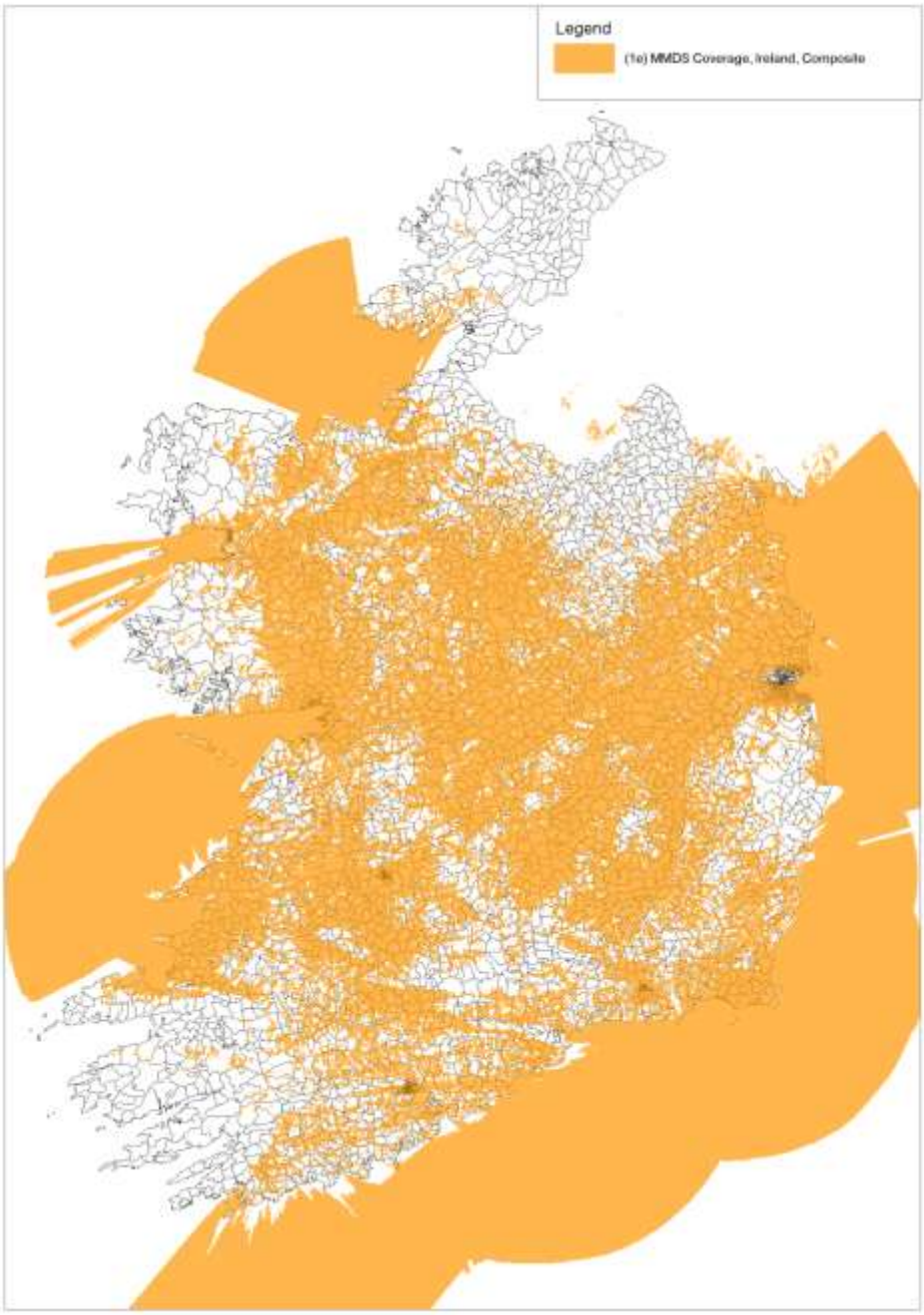
2 Wireless Telegraphy (Television Programme Retransmission) Regulations, 1989 (SI No. 39 of 1989), available at: http://www.irishstatutebook.ie/1989/en/si/0039.html.

3 [redacted]

4 [redacted]

UPC's MMDS network is a nationwide one, comprising 578 different site locations – which include primary hub sites, sites supporting MMDS feeds to end-user local cable networks and local "beambender" sites – scattered around 23 different counties.[5] The network footprint of UPC's MMDS network is illustrated in Figure 4 below.

Figure 4: MMDS network coverage map



Source: UPC

5 [redacted].

It is worth noting that the MMDS coverage illustrated in Figure 4 is, in fact, a conservative representation, as it does not take into account the additional coverage that is provided via the large number of 'beambenders' that are deployed around the country.

UPC estimates that the total number of people within the country who depend on MMDS for their TV service currently stands at approximately 250,000. This figure is derived from the total number of households served by MMDS (both directly and where the MMDS network is used to provide an end-user cable feed) and the average number of persons in private households within the State.[6] Table 1 below provides details, on a county-by-county basis, of where UPC's MMDS customers reside.

Table 1: Households with MMDS, by county

redacted

[redacted][7]

Source: UPC

The current number of MMDS households is, however, just over 30,000 less than the number recorded at the end of 2007.

[6] Latest CSO estimates (for 2006) put the national average number of persons per private household at 2.8. See: http://www.cso.ie/statistics/numprivhseholds.htm.

[7] **[redacted]**

below illustrates the development of the MMDS customer base in recent years.

Figure 5: MMDS households, 2007 - 2010

[redacted]

Source: UPC. Numbers do not include MMDS households where the end-user connection is provided by cable but where the connection to the end-user is fed via MMDS.

Figure 5 clearly shows that [**redacted]**

[redacted].[8]

[redacted]

[redacted]

2.3 Review of 2.6 GHz band – the main issues at stake

There are a number of important issues at stake in ComReg's review of the potential uses of the 2.6 GHz spectrum band. As ComReg correctly notes, this band is not a "green field" one and the fact that MMDS services are currently licensed within it means that there is no possibility of using the band for other services before 2014 at the earliest.

In deciding the way forward in relation to the 2.6 GHz band, ComReg must take account of the fact that several thousand customers – most of whom reside in rural areas – rely on the existing MMDS network to receive their multi-channel pay-TV service. As a result, any decision by ComReg not to extend the current MMDS licences beyond the current expiry date of 2014 will have stark ramifications for these customers. It would deprive them of a valued service and would mean that their only option for obtaining a pay-TV service would be to do so from BSkyB, which would have become the *de facto* monopoly provider of pay-TV services across much of the country.

As ComReg points out in the Call for Input, the conditions for making the 2.6 GHz band available to support the provision of electronic communications services (ECS) have already been harmonised throughout the Community by way of an EC Decision.[9] Arising from this, a number of EU Member States have already assigned spectrum in the 2.6 GHz band to operators who are using it to support the provision

8 [redacted]

9 Call for Input, para. 1.1.

of next generation mobile broadband services.[10] A key question for ComReg to decide is whether or not the time is right to make spectrum in this band – either in whole or in part – available for use in this manner within this country.

This question is a stark one for ComReg because, depending on what it decides, it could lead to the early cessation of an existing service of social value, one that is relied upon by 250,000 people. Although the current MMDS licences do not expire until 2014, any decision in the coming months not to renew the licences would be likely to result in increased churn from MMDS to satellite, with the result that continued maintenance of the MMDS platform would quickly become unviable. The loss of such an important service in this way would be without precedent in this country and would result in significant dislocation for many customers. The fact that such service loss could occur at around the same time as analogue switch-off (ASO) of free-to-air TV is set to happen would therefore add greatly to the potential confusion and disruption felt by customers in relation to the provision of TV services generally.

UPC firmly believes that the extension of the existing MMDS licences as provided for and originally conceived up until 2019, is fully justified. Such a move would trigger immediate and significant investment in the platform, which will result in an enhanced nationwide multi-channel terrestrial digital TV service being made available to customers on a nationwide basis as an important complement to UPC's cable TV offering.

Renewal of the MMDS licences is justified on economic grounds and, as we discuss later in this response, using the spectrum in this way would generate the greatest benefits for the Irish economy. We also show that new mobile broadband services can easily and efficiently be accommodated using other spectrum bands, in particular the under-utilised 1800 MHz band. [redacted].

[redacted].

[10] So-called "4G" mobile services have already been launched by Telia-Telenor in Stockholm and Oslo using the 2.6 GHz spectrum band.

3 UPC's vision for the future of its MMDS service

In this section of our response, we set out UPC's vision for the future provision of an enhanced MMDS service, one that is capable of providing customers living in those areas outside UPC's cable footprint with a significantly enhanced multi-channel pay-TV service. In doing so, we start with a discussion on current developments within the pay-TV market, we describe how the MMDS service can be improved in order to take account of these developments and we discuss the level of investment that would be required to make this reality.

3.1 Pay-TV market developments

The Irish pay-TV market is a well-developed one in terms of customer numbers. Recent ComReg data shows that, at end-2009, there were multi-channel TV connections in 1,228,000 homes accessed via cable, MMDS or satellite.[11] This comprises 78% of all TV connections within the country. The vast majority of these connections are pay-TV ones: latest estimates show that 116,000 homes accessed in this way (i.e. 9% of all homes with such a connection) are of the 'Freesat'[12] variety.[13]

The latest ComReg figures also show that digital services accessed via cable, MMDS or satellite account for 62% of all TV connections[14] and, quoting separate research, ComReg show that the take-up of digital TV services in Ireland was close to the EU average in December 2008.[15]

Television remains a key service for consumers, with viewers in Ireland typically spending 22 hours[16] per week watching TV. Whilst the current standard for broadcast is Standard Definition (SD) technology, HDTV is becoming increasingly prevalent, driven by:

- the growing number of households with HD-ready displays
- the apparent decline in quality of SD services on flat-panel displays
- the emergence of new HD-capable technologies
- the desire to watch high-profile sporting events in HD quality.

The shift to HD-enabled TV sets is set to accelerate in the coming years, according to recent projections made by Screen Digest. This analysis estimates that the number of HD-enabled households in Ireland will rise to 558,000 (i.e. 38% of all TV households) by 2013, as illustrated in Figure below.

11 ComReg Quarterly Report Q4 2009 (ComReg Document 10/19), Figure 5.1.1. ComReg state (footnote 42) that MMDS connections were included under "cable and satellite" for the purposes of this analysis.

12 'Freesat' is a UK satellite service that is available in Ireland due solely to the accidental overspill of the satellite signal onto the island of Ireland. It is an unmanaged service in the sense that, once it is installed, the customer has no contract with any TV provider and so cannot avail of any customer support service if difficulties arise in relation any aspect of the service.

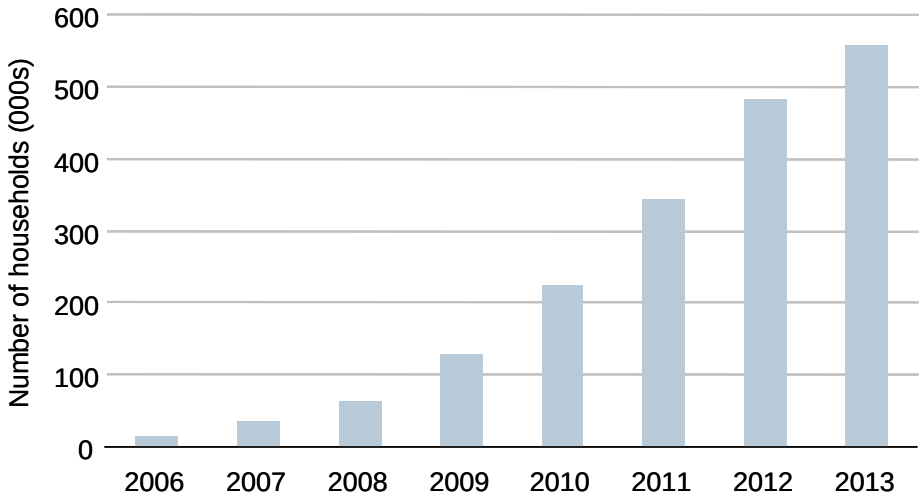
13 AC Nielson research, January 2010.

14 ComReg Quarterly Report Q4 2009.

15 Ibid., Figure 5.2.1.

16 Source: Eurodata TV Worldwide.

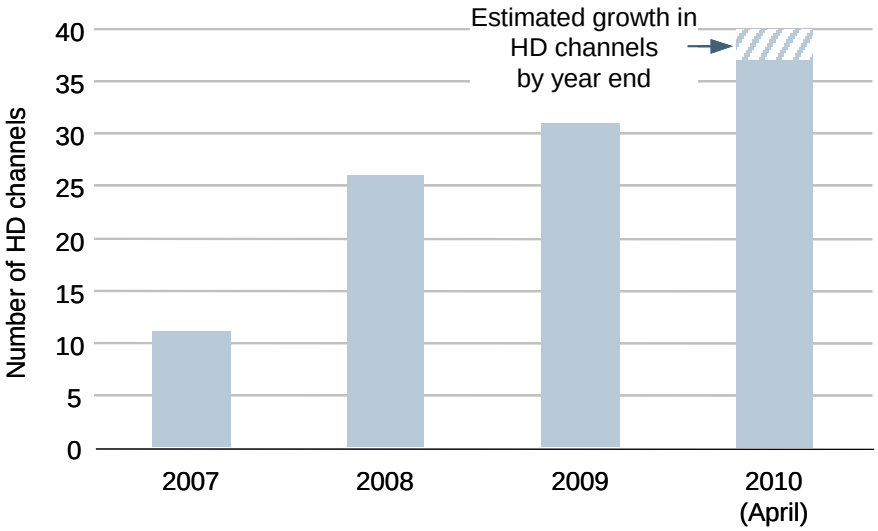
Figure 6: HD-enabled households in Ireland



Source: Screen Digest

The rise in HD-sets TV sets is matched by a sharp rise in the numbers of HD channels that have been made available to Irish TV viewers. This is illustrated in Figure 7 below.

Figure 7: Availability of HD channels in Ireland



Source: Screen Digest, Analysys Mason. HD channels available to Irish viewers comprise both pay-TV and free-to-view, including international and overspill.

The ongoing rise in the number of HD channels that are being made available to customers (mainly, not not exclusively, on a pay-TV basis), as well as through the increasing deployment of DVRs amongst the pay-TV customer base shows that TV services in Ireland are becoming increasingly sophisticated and innovative. BSkyB, by virtue of its strong market position in the UK, has been able to establish a

significant presence in the Irish pay-TV market where, as we have already discussed, it has succeeded in making its satellite service the leading delivery platform for pay-TV services.

UPC is self-evidently the only credible competitor to BSkyB for pay-TV services in Ireland. Within our cable footprint (where we are also in a position to offer triple-play services), UPC is confident of its ability to meet head-on the competitive threat posed by BSkyB and we are determined to maintain our position as the leading provider of pay-TV services within these areas of the country. However, UPC also has ambitious plans to challenge BSkyB's increasing dominance in the provision of pay-TV services in those parts of the country that lie outside the cable footprint and the renewal of our MMDS licences are central to these plans. It should be noted, however, that the non-renewal of the MMDS licences will indirectly impact the cable network as we will have a lower number subscribers and revenues which will have negative consequences both for cable TV services and for broadband.

3.2 The role of an enhanced MMDS service

As we have shown above, there is significant demand from Irish customers for digital pay-TV services, which are evolving and developing rapidly. It is in this context that UPC sees that its MMDS platform can play an important role in enabling customers who live in areas outside its cable footprint to avail of its digital TV service, as an alternative to the TV services that are available on satellite, i.e. BSkyB's pay-TV offering and the unmanaged 'Freesat' service. As such, UPC views its MMDS platform as a crucial complement to its cable network, as it provides the company with the ability to offer a broadly similar pay-TV service on a nationwide basis.

Once UPC has received confirmation that ComReg is willing to extend its MMDS licences until 2019, the company will be in a position to enhance its MMDS service significantly in order to make it a serious competitor to BSkyB, in the way that its TV service provided over cable already is.

[redacted]

This planned investment programme by UPC will position MMDS as a serious alternative pay-TV platform in those areas outside the company's cable footprint. It will also mean that all customers, especially those living in rural areas, will continue to have a choice of pay-TV provider and will ensure that no customers are left in the position where their only option for pay-TV is to avail of the service provided by BSkyB. In contrast, a decision by ComReg not to extend the MMDS licence term beyond 2014 will, as we have already discussed, lead to the loss of a valuable service that is currently used by 250,000 people and would hand a *de facto* monopoly to BSkyB in relation to the provision of pay-TV services across much of the country.

An MMDS service enhanced in the manner planned by UPC will result in the deployment of a credible alternative to BSkyB's satellite offering and as discussed earlier will be a superior alternative nationwide digital terrestrial TV platform in terms of available channels, including increasingly important HD content. Although UPC's upgraded MMDS network will not operate in the frequency bands that are assigned for Digital Terrestrial Television (DTT), it will become a *de facto* DTT service, with the added benefit that the efficient use of spectrum in the 2.6 GHz band to provide the MMDS service will mean (in particular once MPEG-4 compression is deployed) that

far more channels will be available to viewers than would be the case with DTT. In addition, unlike DTT, UPC's MMDS network is already in place and so it is capable of being upgraded rapidly, once confirmation is received from ComReg that the licence term will be extended to 2019.

3.3 Redacted

As noted above, UPC will **[redacted]**

4 Economic case for maintenance of UPC's MMDS service

There is a strong economic case for extending UPC's MMDS licence term until 2019. In order to quantify the economic benefits of such a move, UPC commissioned an independent report from Analysys Mason which examines the relative benefits to Ireland of extending the current licence term to 2019 or freeing up the spectrum band for other uses. Analysys Mason's report on this issue is appended to this response at Annex 2 but its principal findings are summarised below.

Analysys Mason's assessment considered the economic benefits to Ireland under two scenarios – one where UPC's licences are renewed by ComReg and one where they are not. Analysys Mason have concluded that Ireland will benefit economically by EUR129 million if the provision for extension of these licences is applied.

In contrast, Analysys Mason estimate that of the total EUR179 million of benefits (up to 2019) resulting from the introduction of next-generation mobile broadband technologies in Ireland, only EUR0.5 million would be foregone if the 2.6GHz band continued to be used for MMDS until 2019, with the better-suited 1800MHz band used instead to support the provision of mobile broadband services. During the period 2014–2019, it is clear that Ireland would generate significantly greater incremental economic benefit from the continuation of UPC's national MMDS service in the 2.6GHz band than it would gain from the most likely alternative use of this spectrum (the provision of additional capacity for mobile broadband subscribers using next-generation mobile broadband technologies in Dublin and possibly other main cities).

4.1 Continued use of 2.6 GHz band for MMDS

Analysys Mason have concluded that the renewal of UPC's licences will yield many benefits for Ireland, including the following:

- UPC's subscribers will continue to generate VAT receipts for the Irish government amounting to approximately EUR15 million over the period 2010–2014[17];
- Irish consumers, particularly those in rural Ireland, will continue to have a choice of pay-TV providers;
- UPC's MMDS-related direct expenditure in Ireland of approximately EUR8–11 million per annum will continue – this includes the continued employment of 50 staff in UPC Ireland whose jobs are associated with the provision of MMDS, as well as direct expenditure on network operations, customer operations and marketing which also has further multiplier effects;
- The profits generated to date by UPC from the provision of MMDS have been re-invested to support the expansion of UPC's next-generation cable infrastructure and this would continue to be the case in the future;
- The availability of the MMDS service will ensure that media plurality continues to exist, and MMDS will continue to provide support for the distribution of Irish public service and community TV channels. Although difficult to quantify, the

[17] Cumulative value, undiscounted.

value that Irish consumers attribute to these wider societal benefits should not be underestimated. Such social value was recognised when UPC was short-listed for the corporate and social responsibility category of the ICT Excellence Awards. In addition distribution on BSkyB's platform is often not a viable option for start-up channels due to the high transponder cost and the lack of an early page EPG position. To date, UPC has supported many Irish broadcasters for their distribution needs. However were the MMDS platform to be lost cable alone may no longer offer sufficient scale for any broadcaster whose economic model is dependent on advertising and it will also no longer offer a national presence for these channels with the result that future channel innovation may cease entirely in the Irish market;

- **[redacted]**
- UPC's MMDS offering to its target customer base (mostly located outside the main cities) will remain competitive. This will help to prevent alternative providers (e.g. BSkyB) from unduly raising their prices (as they could in the absence of direct competition), and so ensure that less wealthy households can continue to afford a key source of information and entertainment
- UPC will continue to generate significant welfare benefits in Ireland through the provision of services to its nationwide customer base, over and above what would be achieved if its subscribers were forced to migrate to an alternative TV platform at a higher price point

Analysys Mason have sought to quantify the *incremental* value (over and above that generated in a scenario where UPC's licences are not renewed) of many of the above benefits. We estimate that the incremental value is equivalent to an NPV of EUR129 million over the period 2010 to 2019 as indicated in Table 2 below.

Table 2: Economic benefit of MMDS licence renewal

Incremental economic benefit of licence renewal	Amount (EUR million)
Producer surplus	32.8
Consumer surplus	27.7
UPC expenditure	51.2
VAT receipts	13.3
Consumer disruption	4.4
Social value	Not quantified
Total incremental benefit from renewing UPC's licences	**129.4**

Source: Analysys Mason

4.2 Use of 2.6GHz band for mobile broadband services

In contrast, if UPC's licences are not renewed, we have calculated that the economic benefits for Ireland resulting from the best alternative use of the spectrum would be significantly reduced. In such a scenario a highly likely outcome is that the spectrum would be acquired by mobile broadband service providers, primarily the four existing mobile operators (e.g. through an open auction process). We estimate that such an outcome would provide relatively limited incremental economic benefits for Ireland, since:

- The benefits of deploying next-generation mobile broadband technologies (e.g. LTE and WiMAX) in urban areas – especially Dublin – using the 2.6GHz band could mostly be realised using alternative frequency bands, in particular the 1800MHz band that is already dedicated to the provision of mobile services and the 2300MHz when it becomes available later this year:
  - in view of the pace of 2G-to-3G migration, mobile operators should be able to make sufficient spectrum in the 1800MHz band available by 2014 for the highest-speed technologies such as LTE;
  - Analysys Mason's discussions with major network equipment and user terminal manufacturers indicate that equipment operating in the 1800MHz band will be widely available no more than 12 months after equivalent equipment operating in the 2.6GHz band, and in any case before 2014 (which is the earliest date that the 2.6GHz spectrum could become available in Ireland);
  - Analysys Mason's calculations indicate that the 1800MHz spectrum would be sufficient to allow three operators to deploy networks offering the highest-speed LTE services, which in turn would reduce the cost of mobile broadband service provision for mobile operators. In addition, 1800MHz

spectrum has better propagation characteristics than the 2.6GHz band and so is more beneficial to the mobile operators. As discussed earlier, although use of the 2.6GHz band in addition to the 1800MHz band could support further operators, it is unlikely that more than three next-generation mobile networks will be deployed in Ireland. Even in this unlikely scenario, the additional benefits for Ireland's consumers of more mobile networks are minimal, particularly when compared to the benefits for Irish households of having a second nationwide pay-TV operator;

- ComReg will shortly award 100MHz of unpaired spectrum in the 2.3GHz band, which is well suited for the deployment of WiMAX networks. This frequency band is also being made available for WiMAX in Singapore, Hong Kong, India, New Zealand and China, and so equipment will be commercially available before the 2.6GHz spectrum is released in Ireland.

- Outside Dublin, and possibly the other main cities, the 2.6GHz spectrum would mostly remain unused if acquired by mobile broadband providers, since deployment of the next-generation mobile broadband technologies outside highly populated areas would only be economic over lower-frequency bands such as the 900MHz band. In contrast, UPC's MMDS platform is available across almost all of Ireland, reaching more than 92% of the population

- The proceeds accruing to the Irish government from any auction of 2.6GHz spectrum are likely to be limited, based on auctions that have taken place to date in Europe and Asia. Indeed the most recent auction which was just concluded in the Netherlands generated just EUR2.6m for paired spectrum (likely to be used for LTE), and the unpaired spectrum (likely to be used for WiMAX) was not sold

- If mobile operators had access to the majority of the 1800MHz, 2.1GHz and 2.6GHz bands, significant amounts of this spectrum could be unused/underutilised during the period 2014–2019. High-frequency spectrum is generally in plentiful supply – for example, one-third of the 1800MHz band is unassigned. Indeed many European mobile operators are actively developing plans for LTE deployment in the 1800MHz band and LTE services are likely to be offered in this band by 2012 (i.e. two years before the current UPC licences expire). Recent public statements made by Elisa in Finland and Bouyges in relation to their plans to deploy LTE in the 1800 MHz band are annexed to this response. There is a possibility that if all the high-frequency spectrum bands were made available to mobile operators prior to 2019, instead of making the spectrum available for other parties, the mobile operators could 'hoard' spectrum due to concerns over potential loss of profits if other operators were to enter the market

- Use of the 2.6GHz band to provide mobile broadband services would not yield any significant wider societal benefits – this band is suited for use in urban areas where households already typically have two or more next-generation broadband connectivity options, and its use to provide high-speed broadband services to less populated areas (e.g. to reduce the digital divide) would be uneconomic. The generation of such societal benefits requires low-frequency bands.

Analysys Mason estimate that the introduction of next-generation mobile broadband technologies in Ireland would generate a total economic benefit of EUR179 million (NPV over the period 2010–2019), but almost all of this benefit would be realised

without making the 2.6GHz band available for mobile broadband services. Analysys Mason's modelling indicates that if the 2.6GHz band were made available for mobile broadband, the incremental economic benefit to Ireland would be only EUR0.5 million (over the period 2010–2019) as illustrated in Table 3 below. Even this is based on the optimistic assumption that four LTE networks and one mobile WiMAX network would be deployed.

Table 3: Economic benefit of using 2.6 GHz for mobile broadband

Incremental economic benefit from use of 2.6GHz instead of 1800MHz for mobile broadband	Amount (EUR million)
Producer surplus (loss)	(16.1)
Consumer surplus (gain)	16.2
VAT (gain)	0.4
Social value	Minimal
Total incremental benefit from mobile broadband using the 2.6GHz band	**0.5**

Source: Analysys Mason

Comparing the EUR0.5 million incremental benefit of using the 2.6GHz band for mobile broadband services with the EUR129 million of benefits generated by UPC's continuing use of the spectrum between 2010 and 2019, from a purely quantitative perspective it is clearly in Ireland's best interests to renew UPC's licences. Furthermore, as discussed above, renewal of UPC's licences would also provide many non-quantifiable wider societal benefits, such as media plurality.

5 Spectrum issues

5.1 Efficient spectrum usage

Under Article 8(2) of the Framework Directive, national regulatory authorities are required to promote competition in the provision of electronic communications networks, services and associated facilities and services by, inter alia, encouraging efficient use and ensuring the efficient management of radio frequencies and numbering resources. This is reflected in ComReg's statutory objectives as set out in Section 12 of the Communications Regulation Act, 2002.

The meaning of "efficient use" and "efficient management" of radio frequencies is not necessarily well defined. ComReg itself implicitly recognises[18] that technical and economic efficiency may not be the same thing, and indeed that "efficiencies may have to be compromised in order to safeguard the provision of certain public services such as safety, defence and public broadcasting". Technical efficiency may be achieved by, for instance, using the modulation scheme which gives the greatest throughput per MegaHertz of frequency for a given application; however, if that appication is not the one which is most highly valued by users, then economic or social efficiency may be compromised. On the other hand, applications such as analogue broadcasting, which perform an important social function in ensuring widespread free-to-air television distribition but which use far more spectrum than modern digital systems, are recognised as being technically inefficient and are being phased out.

In purely technical terms, efficient use of spectrum may be thought of as ensuring the maximum utilisation of spectrum. Spectrum use has a number of dimensions: frequency, space and time. Clearly, a spectrum management system which leaves large blocks of frequencies unused, thus creating an artificial scarcity, is inefficient. Equally, if spectrum is heavily used in some areas but unused over substantial parts of the national territory, this is also inefficient. Finally, if spectrum is used intensively during certain times of the day, week or year, but unused at other times, and if other users are not allowed to access it during off-peak periods, this cannot be described as efficient.

ComReg's Spectrum Strategy Statement notes, *inter alia*, the following action aimed at promoting the efficient use of scarce spectrum resources:

ComReg seeks to optimise use of the spectrum resource by encouraging the use of spectrum efficient radio systems and the use of the most appropriate frequency band for each application ***in order to maximise spectrum usage in critical frequency bands****; [emphasis added]*

5.2 Plans for spectrum release and liberalisation

In its Call for Input, ComReg has noted that the 2.6GHz spectrum is subject to EC Decision 2008/477/EC ("the EC Decision"), which harmonises the availability of the band for terrestrial systems capable of providing electronic communications services. While the technical conditions set out in the Annex to the EC Decision provide for

[18] See: http://www.comreg.ie/radio_spectrum/spectrum_management.540.html.

service-neutral and (within limits) technology-neutral licensing, in practice ***stated*** demand for this band across Europe is likely to come from mobile operators.

The 2.6GHz band is one of several which are, or are about to become, available to mobile and other operators in Europe. The usefulness of these bands to mobile operators, in particular, depends on the frequency. Lower frequencies have better propagation characteristics – they travel farther for a given emitted power level – while there tends to be greater bandwidth available at higher levels. For this reason, mobile operators tend to seek a mix of lower level frequencies (800 or 900 MHz) to provide geographical and indoor coverage, and higher level frequencies (1800 MHz, 2.1 GHz, 2.3 GHz, 2.6 GHz) to provide high data throughput capacity where it is needed – generally, and certainly initially, in urban centres with a high population density.

One consequence of this is that the use of the higher frequencies purely for mobile (or Electronic Communications Services in general) tends to be highly inefficient in spatial or geographic terms. If bands are allocated on a national basis, they will tend to be used early in cities, and this usage is likely to grow over time. In rural areas, on the other hand, where demand for capacity is lower, these frequencies may be used lightly or not at all.

The following is a quick summary of national and European plans for the award of spectrum in the relevant bands:

- The “Digital Dividend” spectrum in the 790-862MHz band will be made available through the switchover of television broadcasting from analogue to digital. The aim is for this transition to be completed by end 2012, although releasing the feed-up spectrum may take longer. The European Commission supports the idea of a harmonised approach to the digital dividend. However, only Germany has so far awarded this spectrum (see below).
- The 900MHz (suitable for meeting coverage requirements) and 1800MHz (suitable for meeting capacity requirements) licences awarded in the 1990s are now close to their expiry dates. The European Commission has amended the GSM Directive[19] to allow 3G technologies to be used in the 900MHz band, and has also harmonised both bands for the provision of terrestrial electronic communications services. While some regulators have simply extended the term of existing licences while amending the technical conditions to reflect the EC Directives, ComReg plans to auction all the spectrum in both bands.
- ComReg is currently considering options for the release of spectrum in the 2.3GHz band, only a small amount of which is currently in use in a small number of geographic areas (for Rurtel and Dáil TV). ETSI group Broadband Radio Access Networks is currently working on producing a System Reference Document for broadband wireless systems in the frequency range 2300 MHz to 2400 MHz. This technical document will set out standards and specifications for technologies within the band. ComReg is proposing to release 70MHz of the spectrum for national licences and 30MHz for Local Area and Closed User Group licences. Because of its relatively narrow range, this spectrum cannot provide the requisite channel separation for Frequency Division Duplex (FDD) operation and is thererfore available for Time Division Duplex (TDD) systems such as WiMAX.

[19] Via Directive 2009/114/EC

Table 4 below summarises ComReg's current plans for the release of spectrum in the Digital Dividend, 2.3GHz and 2.6GHz bands:

Table 4: Planned release dates of various frequency bands

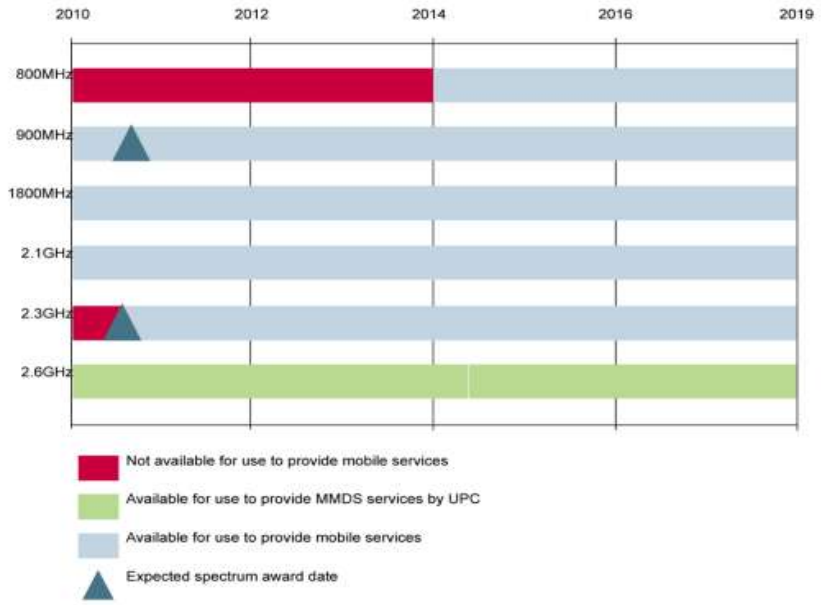
Frequency Band	*Release Planned*
790-862 MHz (Digital Dividend)	Circa 2015[20]
2300 – 2400 MHz	2010
2500 – 2690 MHz (2.6 GHz)	Circa 2013 or 2018[21]

Source: ComReg Q&A page on release of 900/1800 MHz spectrum[22]

5.3 Demand for spectrum in the various frequency bands

As the report carried out for UPC by Analysys Mason indicates, by 2014 the 1800MHz spectrum will be a valid alternative to the 2.6GHz band in Ireland and will provide sufficient capacity for three operators to deploy high-speed mobile broadband services. The position regarding the expected date for the availibility of spectrum in the various frequency bands to support mobile services is illustrated in Figure below.

Figure 8: Availability of main frequency bands for mobile services



Source: Analysys Mason

20 Contingent on analogue TV switch off and digital switchover. This date may also change.

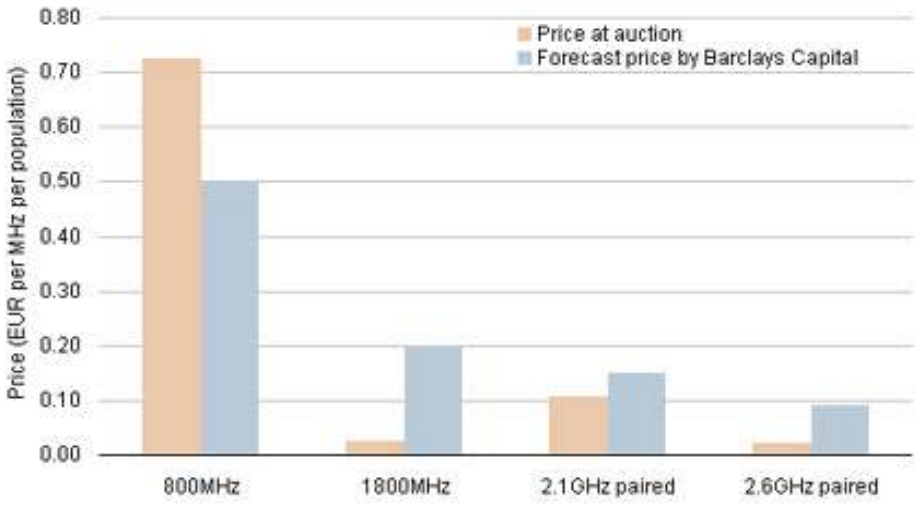
21 For consideration in 2010.

22 See: http://www.comreg.ie/radio_spectrum/recent_questions_and_answers.713.1007.html

Although the mobile operators may claim that 2.6GHz spectrum is essential to the future deployment of LTE, recent auction results indicate that these claims should not be entertained too seriously. Norway, Sweden, Finland, Germany, the Netherlands and Denmark have held 2.6 GHz auctions in recent months. Proceeds from these auctions in terms of €/MHz/pop have been relatively low when compared to past auctions of other spectrum bands, and appear to be declining. Other auctions have tended towards €1.1/MHz/pop, and rose to over €3.0/GHz/pop during the 2.1GHz auctions in 2000. Prices for 2.6GHz spectrum in Europe have ranged from a high of €0.20/MHz/pop in Denmark, through €0.02/MHz/pop in Germany, to a low of €0.002/MHz/pop in the Netherlands. In Finland and Norway, fewer operators bid for the spectrum than the number of available licences.

It is interesting to note that in Germany, where a "big bang" auction was held, out of a total of 360MHz of spectrum across four different bands (800MHz, 1800MHz, 2.1GHz and 2.6GHz) the price achieved for 800MHz was far higher than that for 2.6GHz and was well in excess of forecasts. Details of the outcome of the German auction are summarised in Figure below.

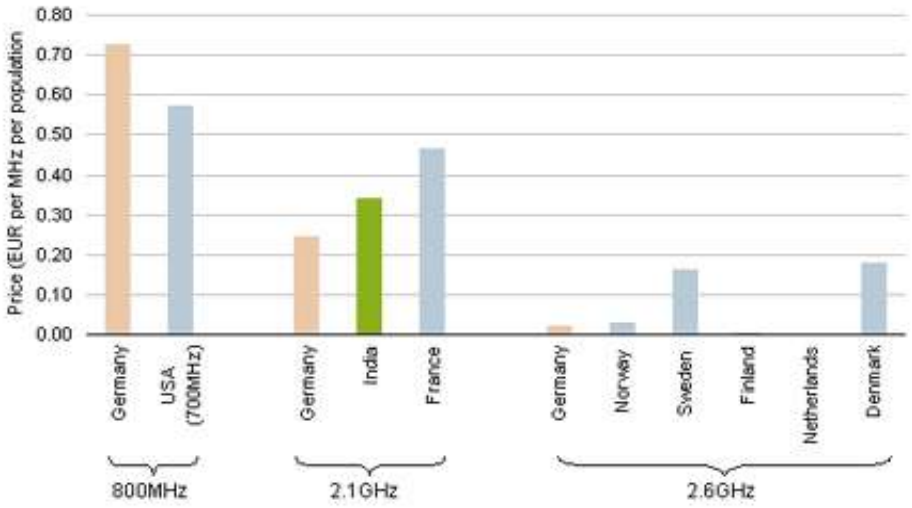
Figure 9: Forecast and actual prices in the German spectrum auction



Sources: BNetzA, Barclays Capital, Analysys Mason

This trend is borne out by other auction results, which confirm that operators are willing to pay far higher prices for lower than higher frequencies, suggesting that the stated demand for the 2.6GHz band may well be exaggerated. Details of these auction results are summarised in Figure below.

Figure 10: Prices of 800MHz, 2.1GHz and 2.6GHz auctons



Source: Analysys Mason

Mobile operators have a number of other viable options for frequencies to meet capacity requirements in densely populated areas. Some operators around the world are considering the 1800MHz and 2.1GHz bands for deploying LTE. These are viable alternatives to the 2.6GHz band, particularly if existing GSM or UMTS networks using 1800MHz of 2.1GHz can be decommissioned, thus freeing up spectrum. The 1800MHz band is superior to 2.6GHz, as operators will be moving away from GSM in the near future, while the use of UMTS on the 2.1GHz band is expected to continue for some time (the current Irish licences for 2.1GHz expire in 2022 (Vodafone, O2 and H3G) and 2027 (Meteor)). The 1800MHz band also has better propagation characteristics than 2.6GHz.

Research by Analysys Mason has shown that all major network equipment and handset vendors anticipate supporting LTE in the 1800MHz band, and therefore a good range of devices is likely to be available well before the UPC expiry date of 2014. By 2012 it is expected that equipment to deploy LTE at 800MHz or 2.6GHz will be fully available. Equipment to deploy LTE at 1800MHz is expected to be available at the same time or shortly thereafter (less than 12 months later).

As Ireland has a relatively low population density, and therefore less need for the additional GSM capacity overlay provided by 1800MHz spectrum, operators may be able to release a large proportion of their 1800MHz spectrum allocations for a new technology. Based on forecasts of subscriber migration from 2G to 3G, Analysys Mason expect that mobile operators will be able to free up over 2X60MHz of spectrum in the 1800MHz band by 2014 for new uses.

This analysis is borne out by comments from industry players. At the recent conference on LTE, a presentation by Dr. Eetu Prieur from Elisa, the market-leading Finnish mobile operator, identified LTE at 1800MHz as the most promising option for many markets, noting that it would be available for the mass market in time to meet

demand.[23] Terminal availability would be only 6-12 months after LTE at 2.6GHz, which he described as "not an issue": "LTE at 1800MHz can be estimated to be ready for mass market in 2012 with first network deployments and terminals in volume".[24] Similarly, Bouygues Telecom has commenced LTE trials in Orleans and has identified 1800MHz as the optimal band for early introduction of LTE as GSM is phased out of the band. At the same conference, Vincent Lemoine of Bouyges stated that the 2.6GHz band would be used for LTE at a later date than would the 1800MHz band and even then would be used solely for "back-up and capacity extension".[25]

In short, therefore, UPC considers that there are many spectrum opportunities which will present themselves well before 2014 for the enhancement of mobile networks. The 2.6GHz band is therefore by no means essential for the deployment of LTE, and there are multiple other suitable spectrum bands available to allow mobile operators to develop 4G services. Indeed, the mobile operators themselves have begun to express a clear preference for 1800MHz spectrum over 2.6GHz. On the other hand, there is no alternative spectrum available which could be used for MMDS, as no equipment is manufactured for any other band. Allocating spectrum ***which is currently fully utilised*** for a valued customer service to a service which would only use it in part, and that not for some time to come, would not represent efficient use. UPC's preferred position is for its existing licences to be renewed in full, and on similar conditions, until the final end date of 2019 set out in the Regulations. Recognising, however, the competing demands for this band, and ComReg's obligations to comply with Decision 2008/477/EC, UPC has considered the options for **[redacted].**

5.4 Broadcasting spectrum and Digital Switchover

Digital transmission allows for much greater efficiency in the use of spectrum than analogue. For most commercial applications, this creates an automatic incentive for the spectrum user to switch to digital transmission, thus increasing the capacity of the band. Mobile telephony, for instance, moved from analogue to digital transmission in the the late 1990s and has introduced successive generations of technology which allow data, music and video transmission over the same bandwidth which once carried voice only. Public service broadcasters, which may be limited in the number of channels available and whose funding may be wholly or partially dependent on a licence fee, do not face the same financial incentives, and Digital Switchover (DSO) in free-to-air broadcasting is happening much later than it did for mobile communications or for commercial broadcasting.

Among the various modes of terrestrial television broadcasting which use spectrum, it is notable that MMDS is among the most efficient. Digital Terrestrial Television (DTT), which has been allotted 320 MHz of prime spectrum in the UHF band (from 470 to 790 MHz), has been allocated at least six national multiplexes (from a total of

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23 *Coverage Optimized Mobile Broadband Solutions: UMTS900 with HSPA Evolution and LTE1800*, Dr. Eetu Prieur, Elisa, LTE World Summit, Amsterdam, 18th May 2010. A copy of this presentation is provided at Annex 2 to this response.

24 Ibid., Slide 18.

25 *Boosting the Capacity of a Network with LTE100*, Vincent Lemoine, Radio Expert, Bouyges Telecom, LTE World Summit, Amsterdam, 18th May 2010. See Slide 9. A copy of this presentation is provided at Annex 3 to this response.

eight), each of which can transmit up to 8 Standard Definition channels, 2 High Defintion channels or a combination of both. MMDS, on the other hand, using only 190MHz with MPEG-4 compression technology, can transmit up to 352 SD channels, 88 HD channels or a combination of the two. MMDS therefore already embodies a far greater degree of technical, and therefore economic, efficiency in its use of spectrum than DTT. Indeed, since it appears that the commercial model of DTT is experiencing difficulties and a pay-DTT service may never be rolled out, MMDS may be the only source of terrestrial digital pay-TV for many people for the foreseeable future. It is a service which is currently physically present, which has a network infrastructure installed and which has an existing customer base. If Irish citizens living outside major cities are to have any choice of pay-TV provider, it looks increasingly likely that MMDS is 'the only game in town'.

It may also be appropriate for ComReg to consider how the unused spectrum below 790MHz (which, as has already been noted, is highly valued by mobile operators) could be made available for alternative uses if it is not to be used for DTT.

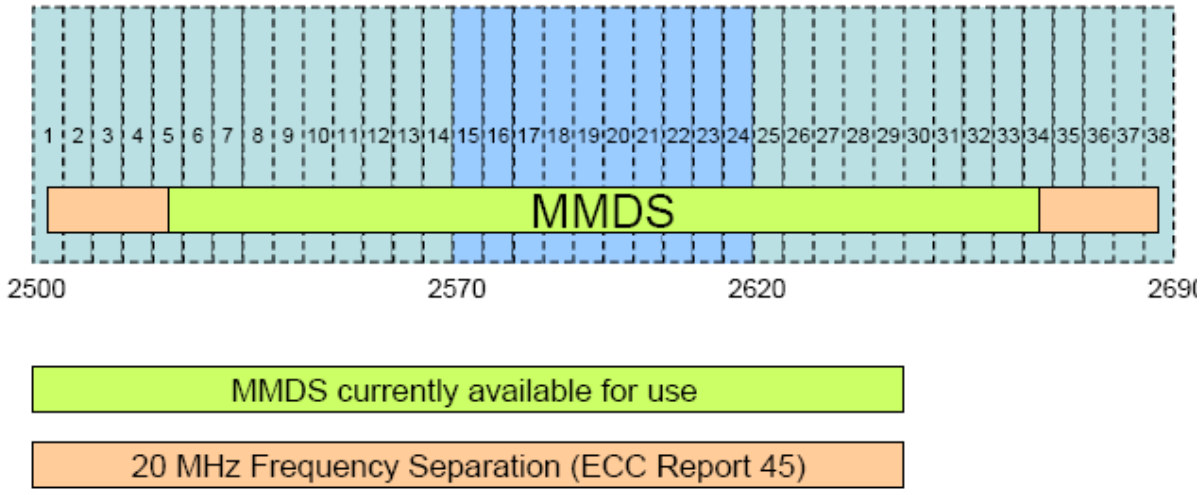
It is worth noting that the spectrum capacity allocated to RTÉ in its capacity as national broadcaster for digital transmission is far greater than that needed to transmit its current bouquet of channels. This is an implicit recognition of the fact that, if each broadcast medium is to be able to compete successfully in the digital era, it must be able to increase and enhance its service offering. UPC wants not just to keep its MMDS service at the current level, but to improve and expand it so that it can offer a service comparable to BSkyB's in terms of the number and quality of channels offered. If free-to-air broadcasting retains only the capacity it had within the analogue era, it will become very much a legacy service which is inferior to cable and satellite, and the same is true of MMDS.

In summary, UPC's view is that, given the right circumstances, MMDS can offer a service to rural dwellers which is already technically efficient, and can become more so if UPC makes its planned investment; which represents an economically valuable use of the spectrum; and which is likely to represent the only form of choice of pay-TV platform in these areas. However, this is predicated on MMDS being given sufficient spectrum (in both geographic and bandwidth terms) to allow it to compete on equal terms with BSkyB.

5.5 Options for [redacted]

[redacted]

Figure 5: MMDS channel plan in 2.6 GHz band



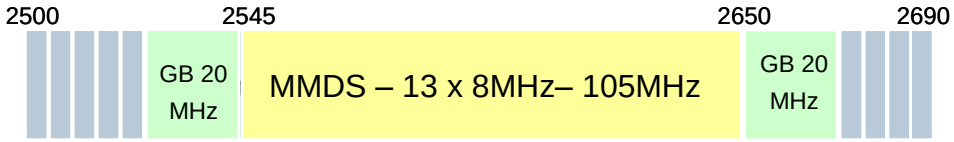
Source: ComReg

[redacted

Figure 6: CEPT band plan for 2.6 GHz band

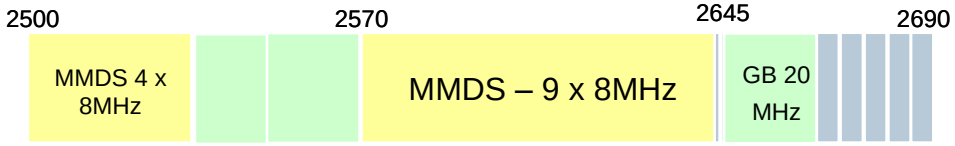
CEPT band plan

Fixed segments: 2x70MHz FDD + 50MHz TDD



MMDS Spanning centre of band

45MHz made available – but gap between bands < 120MHz



Splitting MMDS

Guard bands prevent the use of paired spectrum

Source: CEPT

[redacted]

Figure 7 below illustrates.

Figure 7: MMDS Transmit to Base Station Receive

Source: **[redacted]** *study for UPC*

[redacted]

Figure 8 **redacted]**

Figure 8:]

Source: **[redacted]** *study for UPC*

[redacted.]

6 Regulatory and licensing issues

6.1 Background

In order to provide MMDS services in Ireland, UPC is required to hold licences to use wireless telegraphy apparatus pursuant to the Wireless Telegraphy Act, 1926 (as amended) (the "WTA").

These licences are granted by ComReg in exercise of its powers under the Communications Regulation Act, 2002 (the "2002 Act"). In the exercise of its powers to grant WTA licences, ComReg is required to comply with applicable EU law which is set out in an EU regulatory framework for electronic communications. These EU measure have, to a large extent, been transposed into Irish law by a series of statutory instruments.

Since 6 November 2003, NTL and Chorus have held WTA licences in respect of their MMDS services pursuant to the Wireless Telegraphy (Multipoint Microwave Distribution System) Regulations, 2003 (the "2003 Regulations").

The 2003 Regulations include express provisions on licence renewal, set out in Regulation 8. This provides that ComReg should review the operation of the licences and on conclusion of that review, it may renew the licences for a further period of up to 5 years from 19 April 2014.

In its inclusion of an express reference to the renewal of the licences , the Irish legislation governing the 2003 licences is unusual and is in contrast, for example, with the statutory and licence framework under which mobile operators operate. Given this express reference, renewal is therefore compliant with Irish law and UPC intends to seek renewal of their MMDS licences up to 2019.

UPC considers that ComReg should, in its review, focus on the operation of the licences, as set out in the 2003 Regulations. UPC is confident that it has been compliant with the terms of the 2003 licences, and that any objective review would conclude that it has provided a valuable service, in particular to rural areas which would otherwise have no alternative provider of pay TV. We feel that there should be a strong presumption in favour of renewal until 2019, and that the licences should not be restricted without strong objective justification.

UPC also notes the new requirement on ComReg arising from the revision of the regulatory framework for electronic communications, to give due weight to the need to maximise benefits for users and to facilitate the development of competition, in deciding whether to renew licences (see section "Compatibility with general EU framework for spectrum management", below). Failure to renew the licences would deprive existing users of a valued service, prevent them from reaping the benefits of UPC's planned investment in MMDS, and eliminate competition in the market for pay TV in rural areas.

UPC is aware that ComReg must comply with all relevant national and European legislation. We are confident that renewal of the licences will achieve this and will be compatible with ComReg's objectives and strategy, for the reasons set out in the following section.

6.2 Compatibility with ComReg's statutory objectives and functions

ComReg's primary objectives in carrying out its statutory functions[26] in relation to spectrum management are to:

- promote competition;
- contribute to the development of the internal market;
- promote the interests of users within the Community, and
- ensure the efficient management and use of the radio frequency spectrum.

Continued use of the 2.6 GHz spectrum to provide MMDS services would promote competition in the broadcasting transmission market, since the removal of MMDS would effectively create a monopoly for pay TV in large parts of the country. It would also promote the interests of users, since otherwise they would be deprived of a service which they clearly value. The issue of the efficient management and use of the spectrum has been dealt with in Section 5.

6.3 Compatibility with ComReg's Spectrum Strategy

ComReg's Spectrum Management Strategy Statement 2008 – 2010[27] notes the important role played by the wireless telecommunications sector in the Irish economy. ComReg estimates that over 30,000 people are directly employed in the sector and at a conservative estimate, the economic contribution of the radio sector in 2006 (the most recent data available) amounted to approximately €3 billion, or 1.67% of total GDP for that year. In furtherance of its responsibility for the efficient management and use of the radio spectrum, ComReg's spectrum strategy includes a number of strategic goals, namely:

- Facilitating access to radio spectrum, particularly for innovative technologies and services;
- Maximising the economic and social benefits arising from the use of radio spectrum;
- Promoting the efficient use of scarce radio spectrum resources; and
- Ensuring compliance with international requirements and the avoidance of harmful interference.

UPC believes that the continued use of the 2.6GHz spectrum for MMDS services contributes to, and is consistent with, all of these goals. **[redacted]** This submission clearly demonstrates that use of the spectrum for MMDS, as opposed to other applications, maximizes the economic as well as the social benefits arising from its use. Retaining MMDS in the band would be efficient in terms of spectrum use, as the entire spectrum would be used throughout the nation; other uses would be likely to be concentrated in Dublin only, with the spectrum lying fallow throughout the rest of the country. Finally, UPC is satisfied that this use of the spectrum would be in

[26] The Communications Regulation Act 2002 ("the 2002 Act") and the Wireless Telegraphy Acts set out, amongst other things, functions and objectives of ComReg in relation to spectrum management. Apart from licensing and making regulations in relation to licences, these functions include the management of Ireland's radio frequency spectrum in accordance with ministerial Policy Directions under Section 13 of the 2002 Act.

[27] ComReg Document 08/50.

compliance with Ireland's international obligations and would not create harmful interference.

6.4 Compatibility with EU framework for spectrum management

The current EU regulatory framework[28] requires that Member States:

- Only limit the number of licences where this is necessary to protect against harmful interference;
- Where they do issue individual licences, do so on the basis of objective, transparent, non-discriminatory and proportionate criteria;
- Promote the harmonisation of use of radio frequencies across the Community.

The 2002 Package[29] gave the Commission, for the first time, the right to adopt binding decisions on technical implementing measures and deadlines for harmonisation of use of radio spectrum throughout the EU. The 2.6 GHz band is the subject of such a decision, the implications of which are discussed in the section below.

A new amending package of Directives has been passed by the Parliament and the Council, and is due to be implemented by Member States by 25 May 2011. Several aspects are potentially relevant to the renewal of the UPC licences:

- The Framework Directive has been amended to favour technology- and service-neutral licensing.
- The revised Framework Directive also contains provisions aimed at bringing existing licences into line with the principles of technology and service neutrality.
- New conditions which Member States must consider before deciding whether to ***renew*** licences have been set out[30]. These include the need to give due weight to ***the need to maximise benefits for users and to facilitate the development of competition***. [Emphasis added]
- The Framework also contains references to the important social, cultural and economic value of spectrum.

The new requirement on Member States to give consideration to user benefits when deciding upon licence renewal adds weight to the proposition that an orderly transition of MMDS from the 2.6 GHz band should be allowed to occur over a reasonable time period – up until 2019 - given the significant consumer disruption involved, and the lack of any other viable competitor to BSkyB in rural areas. As outlined in Section 4, MMDS has important economic and societal benefits for Ireland, including the maintenance of consumer choice, media plurality, employment and exchequer revenues. The recent failure of attempts to secure a commercial DTT operator means that UPC's MMDS service is the only foreseeable alternative in the

28 Based on the 2002 Directives, transposed into Irish law in 2003

29 Decision No. 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community ("Radio Spectrum Decision").

30 In Article 7 of the Authorisation Directive, as amended by Article 3(5) of the Better Regulation Directive. These criteria previously applied to the issuing of licences, but have now been extended to cover their renewal also.

digital terrestrial pay-TV market. (Indeed, even if the commercial DTT service originally envisaged were up and running, its capacity limitations mean that it would not be a viable competitor in the pay TV market, given the demand for increased numbers of channels and for High Definition and 3D services).

Non-renewal of the licences would, in UPC's submission, run contrary to the regulatory objectives set out in the EU legislation. Up to 300,000 users will lose a valued service for which there is evident demand, while the rollout of LTE or other services in the 2.6GHz is highly uncertain – so that users in rural areas could lose MMDS without getting access to any other service. At the same time, as there is only one other pay TV provider (BSkB) in the Irish market (which is not subject to Irish regulation), the elimination of MMDS would have a devastating effect on the development of competition in the pay TV market.

6.5 Compatibility with Decision 2008/477/EC

This EC Decision[31] requires Member States, within six months of the date of the Decision (i.e. by 13 December 2008) to "designate and subsequently make available, on a non-exclusive basis, the 2 500 – 2 690 MHz band for terrestrial systems capable of providing electronic communications services, in compliance with the parameters set out in the Annex to this Decision". By way of derogation from this requirement, Member States may request transitional periods that may include sharing arrangements.

While Ireland will need to demonstrate compliance with this Decision, the measure does not, of its own right, create any impediment to the renewal of the MMDS licences for the period to 2019. Several Member States (Ireland, Lithuania, Latvia, Slovakia and Portugal) have MMDS in the band. Bulgaria and France have national security services. The latter two have sought and received official derogations from the decision, while Ireland, and the other countries with MMDS in the band, have not sought derogations. However, as noted in the Call for Input, because of the presence of MMDS in all or part of the band in several Member States, an Explanatory Memorandum[32] was drawn up by the Radio Spectrum Committee to explain how MMDS may be handled within the scope of the EC Decision.

Ireland falls into the third category of MMDS deployment as noted in the Explanatory Memorandum – "substantial to total frequency use, long expiration deadline". The Explanatory Memorandum notes that MMDS can be handled within the scope of the EC Decision, but calls on Member States with this level of deployment of MMDS to investigate the extent to which the MMDS operator is using the frequencies efficiently and whether the occupation of the entire 2.6GHz band is justified. ComReg states that it will first reflect on responses received to the Call for Input before investigating this matter.

[redacted].

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31 Commission Decision of 13 June 2008 on the harmonisation of the 2 500 – 2 690 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community

32 Document RSCOM08-39: Radio Spectrum Committee Working Document – Explanatory Memorandum on MMDS in the 2 500 – 2 690 MHz Band.

[redacted].

In other frequency bands which are covered by EC Decisions, ComReg has adopted a phased approach which respects the rights of existing users while moving towards compliance with the EC Decision. For instance, ComReg recently issued an Information Notice (Document 10/29 of 8 April 2010) on the end date of the FWALA licensing scheme in the 3.6GHz band. This band is now subject to Decision 2008/411/EC (Commission Decision of 21 May 2008 on the harmonisation of the 3400 – 3800MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community), which requires all Member States to designate and make available the band for fixed, nomadic and mobile wireless access systems. In the Information Notice, ComReg sets an end date of 31 July 2017 for the FWALA scheme, implying that the band will continue to be covered by the local area licensing scheme until then (UPC notes that ComReg intends to consult shortly on the narrow issue of the introduction of mobility into the 3.6GHz band in line with the requirements of the EC Decision; however, mobility within a restricted local area, without roaming, is unlikely to be what was intended by the drafters of the EC Decision).

UPC also notes that ComReg, in previous spectrum decisions, has recognised that geographic sharing of frequencies can be both useful and spectrally efficient. The FWALA scheme itself allows allows the same frequencies to be re-used in different geographical areas, subject to technical criteria to avoid interference. Channel E in the 3.6GHz band (3 410 – 3 424MHz paired with 3 510 – 3 524MHz) is shared between FWALA services in the greater Dublin area, Cork County Borough, Limerick County Borough and Waterford County Borough, on the one hand, and eircom's FWPMA network in the rest of the country.

[redacted].

7 UPC's proposals for moving forward

As we have discussed in this response, the review process relating to future use of the 2.6 GHz spectrum band that ComReg has initiated gives rise to a number of key issues that, depending on what decision ComReg reaches, will have far-reaching consequences in relation to the availability of competitive pay-TV services across much of the country.

UPC understands the developments that are being made internationally in relation to spectrum harmonisation and that ComReg is obliged to consider the future use of the 2.6 GHz band in this light. ComReg does, however, have significant room for manoeuvre in relation to how far and how fast in moves in relation to harmonising this spectrum for possible alternative uses and, unlike many other national regulators within the EU, it has to take account of the fact that the band is already being used for an important service of social value.

Thousands of customers rely on MMDS for their pay-TV service today and UPC has ambitious plans to invest significantly to enhance this delivery platform to enable it to rapidly become a more competitive alternative to BSkyB's satellite alternative. UPC will only, however, be able to proceed with this investment if ComReg agrees to extend the MMDS licences until 2019.

If ComReg decides instead not to renew the MMDS licences, then the existing MMDS customer base will face the loss of a TV service that they clearly value. In addition, all pay-TV customers who reside in those parts of the country outside UPC's cable footprint will have no competitive choice for pay-TV services, as BSkyB will be handed a *de facto* monopoly over significant parts of the country and across all of rural Ireland.

UPC is aware that the 2.6 GHz band is likely to be of interest to other players, notably the mobile operators who are likely to put forward the claim that they need access to the band for the deployment of mobile broadband services. UPC notes, however, that mobile broadband is likely to be rolled out using a number of different spectrum bands and that the 2.6 GHz band is only likely to be used in dense urban areas. As a result, if the band is reallocated for mobile broadband it will remain largely unused by the mobile operators across much of the country.

Such an inefficient use of spectrum is not an approach that ComReg should encourage, not least given the fact that the mobile operators have spectrum in other bands, notably at 1800 MHz and 2.1 GHz, which they do not use on a nationwide basis at the present time. Instead, ComReg should be looking for a more imaginative solution, one that facilitates the maximum rollout of mobile broadband, while at the same time ensuring that MMDS services are allowed to continue to be provided on a nationwide basis.

In this regard, UPC believes that the most sensible solution would be for high-capacity mobile broadband rollout to be concentrated in the largely underused 1800 MHz band, with UPC being allowed to retain its current spectrum allocation in the 2.6 GHz band for continued provision of its MMDS service. If, however, ComReg is of the view that some form of sharing is required in relation to the 2.6 GHz band, then it is UPC's position that the only feasible option in this regard (albeit one that would

require further careful study) would be one based on a geographic split. Under such a solution, the band might, at some future point in time, be used for mobile broadband services within the Dublin area (which is the only place it is ever likely to be used for such services), while it is retained as a band for MMDS services elsewhere. This is far from an ideal outcome from UPC's perspective but it is a solution which might enable the continuing provision of MMDS across much of the country and so should be examined as a possible option by ComReg, if ans when the mobile operators are in a position to demonstrate a clear need for spectrum in the band in specific areas of the country.

Annex 2: Analysys Mason report for UPC Ireland (Confidential – contains business secrets)

Report for UPC Ireland

Maximising the benefits to Ireland of the 2500–2690MHz spectrum band

6 May 2010

Ref: 16742-184

analysys mason

Contents

analysys mason

Analysys Mason Limited
Suite 242
The Capel Building
Mary's Abbey
Dublin 7
Ireland
Tel: +353 1 602 4755
Fax: +353 1 602 4777
dublin@analysysmason.com
www.analysysmason.com

Registered in Ireland IR304061

1 Executive summary

1.1 Summary Findings

UPC currently provides over 70 000 households with pay-TV services over an MMDS platform. Its 15-year licences (originally issued to ntl and Chorus in 1999) have a renewal provision for five years. The existing platform, although already 'all digital', uses older technologies and will require investment if subscriber numbers are to grow. UPC recognises the potential for MMDS to offer a 21st-century TV service to Ireland's rural population, and [redacted].

This report has been prepared by Analysys Mason Limited (Analysys Mason) to assess the economic and societal impact to Ireland that would arise if the provision in UPC Ireland's (UPC's) MMDS licences allowing for a five year extension was not applied by ComReg leading to a cessation of the MMDS service. We also compare this impact to any benefits that might arise if the 2500–2690MHz (2.6GHz) band currently used to provide MMDS was used for alternative purposes (such as for next-generation mobile broadband networks). The conclusions of this work are that:

- If UPC's licences are not extended, 700 000 rural households will no longer have a choice of pay-TV provider, and BSkyB will have a pay-TV monopoly in these areas. Commercial DTT will not have the capacity to either meet consumer requirements for pay-TV or offer competition to Sky in these areas.
- Ireland will be EUR129 million worse off economically if MMDS services cease in 2014 including the loss of EUR11million of annual local economy spend and the loss of VAT out of the Irish economy (Sky is a foreign VAT payer).
- There is only negligible benefit if this band is used for mobile broadband, as alternative vacant spectrum bands (1.8GHz, 800MHz, 2.3GHz) offer similar (or superior) features.
- Release of the 2.6GHz band will not lead to an increase in rural broadband deployments, and the spectrum which is currently used for MMDS is likely to lie idle in these areas as it is unsuited to rural deployment.
- Loss of the MMDS service could also lead to a decline in programming choice for Irish consumers and a reduction in media plurality.

The alternative **use of the 2.6GHz spectrum for next-generation mobile broadband would actually widen the digital divide as it would be deployed only in dense urban areas and this would mean that rural populations which were affected by the cessation of MMDS would not see any tangible benefit.**

1.2 Detailed findings and Analysis

Consumer need and competition

Renewal of the licences will ensure that approximately 700 000 homes outside the main cities continue to benefit from a competitive pay-TV service offering to BSkyB. TV is a key service for Irish consumers, with users typically spending 22 hours per week[1] watching TV. Pay-TV services provide a significant source of information and entertainment to 78% of Irish households. The Irish pay-TV market is one of Europe's most sophisticated, with one of the highest levels of digital penetration and the Irish have been among the early adopters of digital video recorders (DVRs) and high-definition (HD) technology. We expect this to trend to continue and strengthen, given the growth in HD and sales of HD-ready TV sets.

Commercial DTT is not a suitable replacement for MMDS as it lacks the necessary standard-definition (SD) and HD capacity desired by consumers and required for UPC to provide a competitive TV service to that of BSkyB.

As new forms of entertainment such as social networking and video delivered to PCs become more prevalent, this consumption appears to be incremental to TV rather than substitutional. Hence, the maintenance of effective competition in this core service and ensuring prices are kept to a minimum while new TV services such as high-definition TV (HDTV) and 3DTV are developed are important issues for the vast majority of Irish households.

Once certainty on the extension of the licences is provided, UPC has indicated that it is committed to providing all Irish households with a competitive TV service, by investing in further development of its MMDS service. Following confirmation of licence renewal, [redacted].

As a result, it will provide greater value to existing subscribers, be able to capture new subscribers, and ensure that Irish consumers retain a choice of pay-TV providers. A combination of growing demand for HD content, growth in the number of HD channels on other platforms (currently close to 50 HD channels are available on satellite), and the increasing number of HD-ready households in Ireland (and other markets) suggests that HDTV is the future viewing standard, and it is likely that the majority of TV viewing will migrate from SD in the coming years.

[1] Source: Eurodata TV Worldwide.

Alternative uses of 2.6GHz

If UPC's licences are not extended, the most likely alternative use of the 2.6GHz spectrum would be for the deployment of next-generation mobile broadband technologies such as LTE or WiMAX in the main population centres. During the period 2014–2019, we expect there to be sufficient spectrum in other frequency bands to support three competing high-speed LTE networks (1800MHz band) and a number of WiMAX networks (2.3GHz band). The principal advantage of 2.6GHz spectrum is that it could theoretically support additional competing mobile broadband network deployments. However, increasing network consolidation/sharing by mobile operators and the limited success of WiMAX in developed markets means it is questionable whether such additional competition would arise in practice. Furthermore, consumers and businesses in urban centres (where 2.6GHz spectrum would be used for next-generation mobile broadband) already have access to next-generation fixed broadband networks. **Use of the 2.6GHz spectrum for next-generation mobile broadband would mean that rural populations which were affected by the cessation of MMDS would not see any tangible benefit, and this in turn would further widen the digital divide.**

Whilst use of the 2.6GHz band for next-generation mobile network deployments would be in line with plans for use of the band elsewhere in Europe, our analysis indicates that the optimal use of the spectrum in Ireland prior to 2019 is different from that in other EU Member States due to the particular circumstances in Ireland, namely:

- In Ireland, **the 2.6GHz band is currently used to provide a valuable and financially viable service (MMDS) across the whole of the country** (both urban and rural areas). As indicated above, the MMDS platform provides TV directly to over 70 000 subscribers and supports a further 26 000 indirect cable TV subscribers. As we discuss below, considerable economic value (including wider societal benefits) is generated from this service, much of which would be lost if UPC's MMDS platform ceased to operate.

- **The MMDS platform is the only form of digital TV competition to satellite for many households**, since the population distribution across the country means that cable TV passes only 50% of households and the DTT service has yet to launch and faces an uncertain future. In any case, the DTT platform will be limited to between 4 and 6 multiplexes in the medium term, providing approximately 40 SD channels (or a small number of HD channels both of which may vary on channel quality), and as a result is not a viable competitive offering to MMDS and satellite. Consequently the MMDS platform plays an enormously important role in constraining overall market prices for pay-TV services, for which there are around 1.2 million subscribers (out of a total of 1.6 million homes). If UPC was unable to provide TV services over MMDS, Irish consumers – particularly those in rural Ireland – wishing to use an equivalent service would only have one option for a managed pay-TV service (satellite). This could lead to a rise in prices by BSkyB, and in turn could deprive some less wealthy rural households of a key source of information and entertainment, as well as resulting in economic welfare losses for consumers.

- All of the economic benefits arising from the provision of mobile services in urban areas can be realised by mobile operators using the **415MHz of spectrum available in other frequency bands dedicated to mobile services** (800MHz, 900MHz, 1800MHz and 2.1GHz). Similarly, the economic benefits arising from the provision of WiMAX service can be delivered using the existing 3.5GHz band and the 100MHz of spectrum that is planned to be made available in the 2.3GHz band. As we discuss below, an additional 190MHz of spectrum in the 2.6GHz band would provide very limited incremental benefit in Ireland.

- By European standards, **Ireland has a low population density**, with 40% of the population living in areas which are classified as rural. One third of the population lives in the greater Dublin area and around 53% of the population lives in Dublin, Cork, Waterford, Limerick and Galway (i.e. the five largest cities). In addition, Irish cities themselves have a low population density. As a result, there is a lower requirement for additional spectrum to increase mobile network capacity in the main cities.

In any event renewal of the licences is compatible with the national and EU regulatory frameworks. UPC has undertaken extensive legal and regulatory analysis and is satisfied that the continued offer of MMDS services in this spectrum band would be consistent with these regulatory regimes. The current EU regulatory framework promotes harmonisation of spectrum usage and provides that licences are awarded on the basis of objective, transparent, non-discriminatory and proportionate criteria. In addition, a new EU regulatory framework due to come into force in May 2011 favours technology- and service-neutral licensing. In particular, the new framework underlines the need to give due consideration to the benefits for users, and facilitate the development of competition, and it refers to the important social, cultural and economic value of spectrum. Renewal is also compliant in terms of national regulation, as UPC's MMDS licences are exceptional in that they do include express provisions for renewal.

In summary, Ireland is in a special situation, because the economic and wider societal benefits that arise from provision of MMDS over the 2.6GHz band outweigh the very limited benefits that would arise from using the band to provide additional capacity for another service in very limited geographical areas of the country, where, in any event, alternative spectrum bands for such services are already available. Overall, we estimate that non-renewal of UPC's licences would deprive the Irish economy of approximately EUR129 million of benefits and would lead to the loss of 50 direct and many more indirect jobs associated with the provision of this service in Ireland.

Consequently a different approach is required in Ireland, and our analysis indicates that renewal of UPC's licences until April 2019 is the best way for ComReg to fulfil its obligations to promote the efficient use of scarce spectrum, promote infrastructure competition, and protect the interests of Irish users and Ireland's own national interests. We provide an overview of the analysis supporting this conclusion in Section 1.3 below.

1.3 Assessment of economic and societal benefits

For our assessment, we have considered the economic benefits to Ireland under two scenarios – one where UPC's licences are renewed by ComReg and one where they are not. We have concluded that Ireland will benefit economically by EUR129 million if the provision for extension of these licences is applied.

In contrast, we estimate that of the total EUR179 million of benefits (up to 2019) resulting from the introduction of next-generation mobile broadband technologies in Ireland, only EUR0.5 million would be foregone if the 2.6GHz band continued to be used for MMDS until 2019 – and this itself is based on the arguably optimistic assumption that four LTE networks and one mobile WiMAX network would be deployed in Ireland prior to 2019 if the 2.6GHz band were available for mobile broadband technologies. During the period 2014–2019, it is clear that Ireland would generate significantly greater incremental economic benefit from the continuation of UPC's national MMDS service in the 2.6GHz band than it would gain from the most likely alternative use of this spectrum (the provision of additional capacity for mobile broadband subscribers using next-generation mobile broadband technologies in Dublin and possibly other main cities).

1.3.1 Benefits arising from continued use of the 2.6GHz band for MMDS through renewal of UPC's licences

Renewal of UPC's licences will yield many benefits for Ireland, including the following:

- **UPC's subscribers will continue to generate VAT receipts** for the Irish government amounting to approximately EUR15 million over the period 2010–2014[2]
- **Irish consumers, particularly those in rural Ireland, will continue to have a choice of pay-TV providers**
- **UPC's MMDS-related direct expenditure in Ireland of approximately EUR8–11 million per annum will continue** – this includes the continued employment of 50 staff in UPC Ireland whose jobs are associated with the provision of MMDS, as well as direct expenditure on network operations, customer operations and marketing which also has further multiplier effects
- **[redacted]**
- **The availability of the MMDS service will ensure that media plurality continues to exist, and MMDS will continue to provide support for the distribution of Irish public service and community TV channels**. Although difficult to quantify, the value that Irish consumers attribute to these wider societal benefits should not be underestimated. Such social value was

[2] Cumulative value, undiscounted.

recognised when UPC was short-listed for the corporate and social responsibility category of the ICT Excellence Awards

- **UPC will [redacted]**

- **UPC's MMDS offering to its target customer base (mostly located outside the main cities) will remain competitive**. This will help to prevent alternative providers (e.g. BSkyB) from unduly raising their prices (as they could in the absence of direct competition), and so ensure that less wealthy households can continue to afford a key source of information and entertainment

- **UPC will continue to generate significant welfare benefits** in Ireland through the provision of services to its nationwide customer base, over and above what would be achieved if its subscribers were forced to migrate to an alternative TV platform at a higher price point

We have sought to quantify the *incremental* value (over and above that generated in a scenario where UPC's licences are not renewed) of many of the above benefits. We estimate that the incremental value is equivalent to an NPV of EUR129 million over the period 2010 to 2019.

1.3.2 Benefits arising from use of the 2.6GHz band for next-generation mobile broadband services in the event of non-renewal of UPC's licences

In contrast, if UPC's licences are not renewed, we have calculated that the economic benefits for Ireland resulting from the best alternative use of the spectrum would be significantly reduced. In such a scenario a highly likely outcome is that the spectrum would be acquired by mobile broadband service providers, primarily the four existing mobile operators (e.g. through an open auction process). We estimate that such an outcome would provide relatively limited incremental economic benefits for Ireland, since:

- **The benefits of deploying next-generation mobile broadband technologies (e.g. LTE and WiMAX) in urban areas – especially Dublin – using the 2.6GHz band could mostly be realised using alternative frequency bands**, in particular the 1800MHz band that is already dedicated to the provision of mobile services:

  – in view of the pace of 2G-to-3G migration, mobile operators should be able to make sufficient spectrum in the 1800MHz band available by 2014 for the highest-speed technologies such as LTE

- our discussions with major network equipment and user terminal manufacturers indicate that equipment operating in the 1800MHz band will be widely available no more than 12 months after equivalent equipment operating in the 2.6GHz band, and in any case before 2014 (which is the earliest date that the 2.6GHz spectrum could become available in Ireland)

- our calculations indicate that the 1800MHz spectrum would be sufficient to allow three operators to deploy networks offering the highest-speed LTE services, which in turn would reduce the cost of mobile broadband service provision for mobile operators. In addition, 1800MHz spectrum has better propagation characteristics than the 2.6GHz band and so is more beneficial to the mobile operators. As discussed earlier, although use of the 2.6GHz band in addition to the 1800MHz band could support further operators, it is unlikely that more than three next-generation mobile networks will be deployed in Ireland. Even in this unlikely scenario, the additional benefits for Ireland's consumers of more mobile networks are minimal, particularly when compared to the benefits for Irish households of having a second nationwide pay-TV operator

- ComReg will shortly award 100MHz of unpaired spectrum in the 2.3GHz band, which is well suited for the deployment of WiMAX networks. This frequency band is also being made available for WiMAX in Singapore, Hong Kong, India, New Zealand and China, and so equipment will be commercially available before the 2.6GHz spectrum is released in Ireland

- **Outside Dublin, and possibly the other main cities, the 2.6GHz spectrum would mostly remain unused if acquired by mobile broadband providers**, since deployment of the next-generation mobile broadband technologies outside highly populated areas would only be economic over lower-frequency bands. In contrast, UPC's MMDS platform is available across almost all of Ireland, reaching more than 92% of the population

- **The proceeds accruing to the Irish government from any auction of 2.6GHz spectrum are likely to be limited**, based on auctions that have taken place to date in Europe and Asia. Indeed the most recent auction which was just concluded in the Netherlands generated just EUR2.6m for paired spectrum (likely to be used for LTE), and the unpaired spectrum (likely to be used for WiMAX) was not sold

- **If mobile operators had access to the majority of the 1800MHz, 2.1GHz and 2.6GHz bands, significant amounts of this spectrum could be unused/underutilised during the period 2014–2019**. High-frequency spectrum is generally in plentiful supply – for example, one-third of the 1800MHz band is unassigned. There is a possibility that if all the high-frequency spectrum bands were made available to mobile operators prior to 2019, instead of making the spectrum available for other parties, the mobile operators could 'hoard' spectrum due to concerns over potential loss of profits if other operators were to enter the market

- **Use of the 2.6GHz band to provide mobile broadband services would not yield any significant wider societal benefits** – this band is suited for use in urban areas where

households already typically have two or more next-generation broadband connectivity options, and its use to provide high-speed broadband services to less populated areas (e.g. to reduce the digital divide) would be uneconomic. The generation of such societal benefits requires low-frequency bands.

We estimate that the introduction of next-generation mobile broadband technologies in Ireland would generate a total economic benefit of EUR179 million (NPV over the period 2010–2019), but almost all of this benefit would be realised without making the 2.6GHz band available for mobile broadband services. Our modelling indicates that if the 2.6GHz band were made available for mobile broadband, the incremental economic benefit to Ireland would be only EUR0.5 million (over the period 2010–2019), and even this is based on the optimistic assumption that four LTE networks and one mobile WiMAX network would be deployed.

Comparing the EUR0.5 million incremental benefit of using the 2.6GHz band for mobile broadband services with the EUR129 million of benefits generated by UPC's continuing use of the spectrum between 2010 and 2019, from a purely quantitative perspective it is clearly in Ireland's best interests to renew UPC's licences. Furthermore, as discussed above, renewal of UPC's licences would also provide many non-quantifiable wider societal benefits, such as media plurality.

1.4 The way forward

In summary, we conclude that the particular circumstances in Ireland mean that extension of UPC's licences until April 2019, as provided for in the terms of the licence, is the best means for ComReg to maximise the benefits of the 2.6GHz band for Ireland. ComReg should therefore aim to apply the provision for a five-year extension as soon as possible, as this will enable UPC to begin its investment in upgrading its network and subscriber base to the most spectrally efficient technologies.

Renewal of UPC's licences is consistent with ComReg's obligations and overall spectrum management policies, which include:

- **promoting infrastructure competition** – renewal of UPC's licences will ensure that 700 000 Irish homes retain a choice between two comparable pay-TV service providers – rather than being served by a monopoly operator

- **promoting the efficient use of scarce radio spectrum resources –** renewal of its licences will enable UPC to [redacted]. In addition, UPC will use the spectrum throughout Ireland (and particularly in rural areas), whereas its use for mobile broadband would be limited to the most dense population centres, particularly Dublin, with the spectrum remaining unused in the rest of the country.

- **promoting the interests of users** – renewal will ensure that UPC's 70 000 existing MMDS customers are not deprived of a service which they clearly value

- **facilitating access to radio spectrum, particularly for innovative technologies and services** – as indicated previously, renewal will enable UPC to invest in new technologies and offer innovative services such as HDTV to 700 000 homes

- **maximising the economic and social benefits arising from the use of radio spectrum** – as detailed in this report, renewal of UPC's licences is estimated to yield approximately EUR129 million of economic benefits for Ireland in the period up to 2019, together with numerous unquantifiable wider societal benefits.

- **ensuring compliance with international requirements and the avoidance of harmful interference** – UPC's proposed use of the 2.6GHz band will reduce UK overspill to a level which will enable the band to be used in Northern Ireland and the west of Britain.

We understand that UPC has examined the legal and regulatory situation in detail and is satisfied that renewal of the MMDS licences is compatible with EU and Irish law. The conclusions from UPC's analysis is that the offer of MMDS services in the 2.6GHz band is compliant with the EU regulatory framework and indeed there is no impediment in this framework to the renewal of the MMDS licences until 2019, as summarised below:

- The current EU regulatory framework promotes harmonisation of spectrum usage and provides that licences are awarded on the basis of objective, transparent, non-discriminatory and proportionate criteria. In addition, the updated EU regulatory framework (due to come into force in May 2011) favours technology- and service-neutral licensing. In particular, it underlines the need to give due consideration to the benefits for users, facilitating the development of competition, and also refers to the important social, cultural and economic value of spectrum.

- From a national regulatory standpoint, UPC provides MMDS services pursuant to the Wireless Telegraphy Act, 1926 (as amended). UPC's 2.6GHz licences are issued by ComReg in compliance with the Wireless Telegraphy (Multipoint Microwave Distribution System) Regulations 2003 ("the 2003 Regulations"), in exercise of its powers under the Communications Regulation Act, 2002. The 2003 Regulations stipulate that these licences expire in April 2014 and exceptionally include express provisions on licence renewal, set out in Regulation 8. In this respect, the 2003 licences are unusual; for example, they are in contrast to the statutory and licence framework under which mobile spectrum has been licensed.

- UPC recognises ComReg's obligations to ensure compliance with harmonisation decisions of the EC in relation to spectrum, but considers that the renewal of its licences is not inconsistent with these decisions. In the first place, what is being proposed is a transitional arrangement for a limited time period. Secondly, the operation of MMDS in the 2.6GHz band is compliant with

the relevant EC Decision[3] as well as with ComReg's statutory objectives and its spectrum strategy.

Overall, from Ireland's perspective there are very limited benefits to be gained from ComReg making the 2.6GHz band available for mobile broadband services in 2014, especially as there are numerous other spectrum bands (e.g. 1800MHz, 2.3GHz, 800MHz) which are equally (or more) suitable for the deployment of next-generation mobile broadband technologies in urban and rural areas. In contrast, if ComReg failed to renew UPC's licence, Ireland would forego significant benefits between 2010 and 2019. Furthermore, licence renewal would be for a period of five years during which time ComReg would be able to evaluate the changing market situation, to determine what use(s) of the 2.6GHz spectrum would be likely to maximise the benefits to Ireland from 2019 onwards.

3 'Commission Decision of 13 June 2008 on the harmonisation of the 2500–2690MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community' reference 2008/477/EC, published in the Official Journal of the European Union, 24 June 2008.

2 Introduction

This report has been prepared by Analysys Mason Limited (Analysys Mason) under contract to UPC Ireland (UPC) to assess the benefits for Ireland that would arise from the renewal of UPC's licences to use the 2500–2690MHz (2.6GHz) band to provide MMDS.

2.1 Background to the provision of UPC's MMDS service

UPC currently uses the 2.6GHz band to provide TV services to over 70 000 homes using MMDS technology, and also provides backhaul feeds to cable head-ends which in turn serve another 26 000 homes.

In order to provide MMDS services in Ireland, ntl and Chorus (both now UPC Ireland (UPC)) are required to hold licences to use wireless telegraphy apparatus pursuant to the Wireless Telegraphy Act, 1926 (as amended) (the "WTA").

These licences are granted by ComReg in exercise of its powers under the Communications Regulation Act, 2002 (the "2002 Act"). In exercising its powers to grant WTA licences, ComReg is required to comply with applicable EU law, which is set out in an EU regulatory framework for electronic communications. These EU measure have, to a large extent, been transposed into Irish law by a series of statutory instruments.

Since 6 November 2003, ntl and Chorus have held WTA licences in respect of their MMDS services pursuant to the Wireless Telegraphy (Multipoint Microwave Distribution System) Regulations, 2003 (the "2003 Regulations").

The 2003 Regulations include express provisions on licence renewal, set out in Regulation 8. This provides that ComReg should review the operation of the licences, and on conclusion of that review it may renew the licences for a further period of up to 5 years from 19 April 2014. In this respect, the 2003 licences are unusual (for example, they are in contrast with the statutory and licence framework under which mobile operators operate).

This report describes our analysis of the situation in Ireland, the results of which indicate that licence renewal would be in the best interests of Ireland, since this would enable significant benefits to be derived from the spectrum that would otherwise largely be foregone.

2.2 The role of UPC's MMDS service in the Irish audiovisual sector

The role that the audiovisual media sector plays in any society is quite unique. It encompasses the offer of public and commercial services that fulfil important cultural, social and public policy objectives. While new media distribution channels are on the increase, TV remains the primary source of information and entertainment – not just in Ireland, but right across the EU. TV

programme services, and the transmission platforms over which these are offered, therefore remain an integral part of society.

In the following subsections we provide an overview of the Irish TV market and MMDS's role in that market.

2.2.1 TV transmission in Ireland

Viewers in Ireland predominantly access TV programme services through four separate transmission systems: terrestrial, cable, MMDS and satellite. IPTV is available on a very limited basis, and although there are currently no mobile TV services, ComReg intends to issue one mobile TV licence by the end of 2010 which enable the eventual winner of the licence to offer services in the five urban centres only.

Across the existing four platforms, there are essentially two markets for the provision of TV services to consumers: free (to air) TV and pay TV. RTÉ offers three public service (PSB) channels (RTÉ 1, Network 2, TG4) and commercial channels on a free-to-air (FTA) basis over its terrestrial platform. Pay-TV services are offered by UPC and BSkyB over their cable, MMDS and satellite platforms.

2.2.2 The pay-TV market in Ireland

Pay-TV services in Ireland originated from a demand in the market for a reliable multi-channel service. Initially this demand was satisfied, at least in urban centres, by development of the cable transmission platform, and later on a national basis (in non-cabled areas) by the MMDS platform. The entry of BSkyB to the Irish market introduced an alternative nationwide provider of pay-TV services.

The value that Irish TV viewers attribute to multi-channel services should not be underestimated. Pay-TV penetration rates in Ireland are among the highest in Europe, and it is estimated that of the 1.46 million Irish TV homes, 78% subscribe to either UPC or BSkyB. This creates a very competitive market between the two companies – a fact that has been repeatedly acknowledged by the Irish Competition Authority[4].

2.2.3 The importance of MMDS to rural Ireland

In rural Ireland, the availability of *managed* pay-TV services is currently limited to BSkyB and UPC's MMDS service.[5] Despite competition from BSkyB, UPC retains a significant base of MMDS subscribers. If UPC's MMDS service ceased to exist, there would be significant disruption

[4] M/05/024 UGC (Chorus) /ntl, Determination of the Competition Authority, November 4, 2005. p29; *Pay TV exclusivity in apartment developments*, The Competition Authority, August 2009; and http://www.tca.ie/images/uploaded/documents/2009-08-14%20Pay-TV%20Exclusivity%20Guidance%20Note.pdf

[5] "Managed" services denotes pay-TV services that are only available on a subscription basis.

to these subscribers, as they would lose service and be forced to migrate to BSkyB in order to continue receiving a managed multi-channel TV service.

It is unlikely that these customers (or Irish consumers, more generally) will be able to obtain a comparable alternative service from either a commercial DTT service provider or Freesat.[6] Firstly, DTT will not have the same network capacity as UPC's MMDS platform. This means that a DTT commercial provider will be unable to offer like-for-like service or even the same quantity of services that are currently offered on UPC's MMDS platform. In addition, the viability of a commercial DTT service is uncertain given the difficulties experienced to date by those involved in contract negotiations for the launch of a service alongside RTÉ's own FTA service.[7]

With regard to the Freesat service, this is operated out of the UK and as such falls under UK jurisdiction. Because it is only available in Ireland due to overspill it is not a 'managed' service, which means that in the event of any problems with the service there is no point of contact or support services for Irish consumers. In addition, the accidental nature of this overspill means there is no guarantee that the service will continue to be available in the future.

Given these considerations, if UPC's 2.6GHz licences are not renewed, there will only be one provider of pay-TV services in rural Ireland (i.e. BSkyB). Such a situation is not in the interests of Irish society at large and more particularly UPC's established MMDS customer base.

2.3 The wider European context and alternative use of the 2.6GHz band

The European Commission's 2.6GHz Decision[8] requires Member States to make the 2.6GHz band available under technical conditions which make the band suitable for providing mobile broadband technologies such as LTE and WiMAX. Across Europe, there is interest in this band from mobile operators and other potential broadband wireless service providers; three countries have held auctions and many others are planning to award this band in 2010 or 2011. If UPC's licences are not renewed, a likely outcome is that the majority of the spectrum will be awarded to the mobile operators (e.g. through an open auction process), and UPC will be obliged to terminate its MMDS platform.

Due to the 2.6GHz band's propagation characteristics and the amount of spectrum that is available, we would expect mobile operators to use the band as an additional capacity overlay in urban areas for next-generation mobile broadband networks which will potentially enable the highest-speed services to be provided to customers and lead to a reduction in the unit cost of providing mobile broadband services. In less densely populated areas, it would be more appropriate to use a low-

6 Freesat is a UK satellite service which is available in Ireland due to an accidental overspill of the satellite signal onto the island of Ireland. It is not a managed pay-TV service in Ireland.

7 DTT, which will be available on a national basis, is expected to launch RTE's FTA service by the end of the year, but to date, no details have been announced regarding the launch of a pay-TV service on this platform.

8 'Commission Decision of 13 June 2008 on the harmonisation of the 2500-2690MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community' reference 2008/477/EC, published in the Official Journal of the European Union, 24 June 2008.

frequency band to provide mobile broadband and it is unlikely that the 2.6GHz spectrum will be utilised in these areas prior to 2019 (if at all).

2.4 Structure of this report

In the remainder of this report we provide details of the economic analysis we have undertaken of the best use of the 2.6GHz band in Ireland:

- Section 3 describes the benefits that would arise from continued use of the 2.6GHz band, following renewal of UPC's licences
- Section 4 describes the benefits that would arise in the event that UPC's licences were not renewed, and the 2.6GHz band was used to provide mobile broadband services
- Section 5 presents our overall conclusions from the study and discusses the best way forward.

The report includes two annexes containing supplementary material:

- Annex A provides further details of our approach to quantification of the incremental economic benefits arising from UPC's continued provision of MMDS using the 2.6GHz band
- Annex B provides further details of our approach to the quantification of the incremental benefits arising from use of the 2.6GHz band for the provision of mobile broadband services.

3 Benefits arising from renewal of UPC's licences

In this section we present the benefits to Ireland from renewal of UPC's 2.6GHz licences. We have quantified the *incremental* benefits from renewal of UPC's licences by considering which benefits would remain and which would be lost if UPC's licences were not renewed and subscribers were forced to migrate to alternative platforms.

In the following sections, we consider benefits arising in a number of areas:

- UPC's plans to invest in spectrally efficient technologies (Section **Error! Reference source not found.**)
- UPC's use of these spectral efficiency gains to enhance its service offering and remain competitive (Section 3.2)
- the Irish welfare benefits (producer and consumer surplus) generated from UPC's use of the 2.6GHz band (Section 3.3)
- the economic benefits that UPC's MMDS business generates through employment of personnel and UPC's other indirect costs (Section 3.4)
- the benefits to Ireland from UPC's payment of VAT (Section 3.5)
- avoidance of customer disruption if UPC's licences are renewed (Section 3.6)
- the wider social and societal benefits generated by UPC's provision of services in sparsely populated areas (Section 3.7).

Finally, in Section 3.8 we summarise the overall benefits to Ireland from renewal of UPC's licences.

3.1 [redacted]

[redacted]

3.2 Providing an enhanced and highly competitive pay-TV service offering to customers

TV is a key service for consumers, with viewers in Ireland typically spending 22 hours[9] per week watching TV. As new forms of entertainment such as social networking and video delivered to PCs become more prevalent, this consumption appears to be incremental to TV rather than substitutional.

Whilst the current standard for broadcast is SD technology, HDTV is becoming increasingly prevalent. HDTV is a widescreen, high-resolution, significantly enhanced TV service. DigiTag (an industry body for broadcasters, manufacturers, network operators and regulators involved in DTT) attributes the demand for HDTV services to a number of factors, including:

- the growing number of households with HD-ready displays
- the apparent decline in quality of SD services on flat-panel displays
- the emergence of new HD-capable technologies
- the desire to watch high-profile sporting events in HD quality.

In the UK, Ofcom's *Digital Progress Report*[10] recorded sales of HD-ready TV sets in the UK exceeding 3030 million by the end of 2009. The report also explained that of the 3.3 million TV sets bought by UK consumers in the final quarter of 2009, 70% were HD-ready models.

In March 2009, Screen Digest forecast that the number of HD-enabled households in Ireland would grow to 558 000 (38% of all TV households) by 2013, as shown in Figure 3.1.

9 Source: Eurodata TV Worldwide.

10 *The Communications Market: Digital Progress Report, Digital TV, Q4 2009*: see http://www.ofcom.org.uk/research/tv/reports/dtv/dtv_2009_q4/dtv_2009_q4.pdf

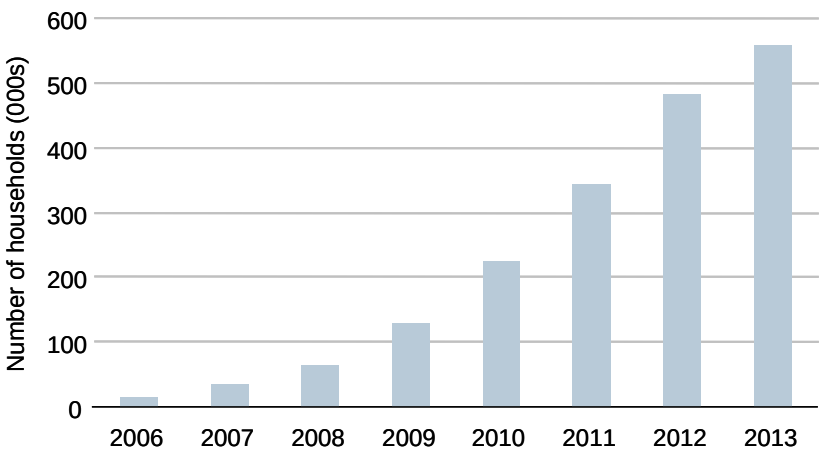


Figure 3.1: HD-enabled households in Ireland [Source: Screen Digest, March 2009]

The number of HD channels available in Ireland has grown steadily over the last four years:

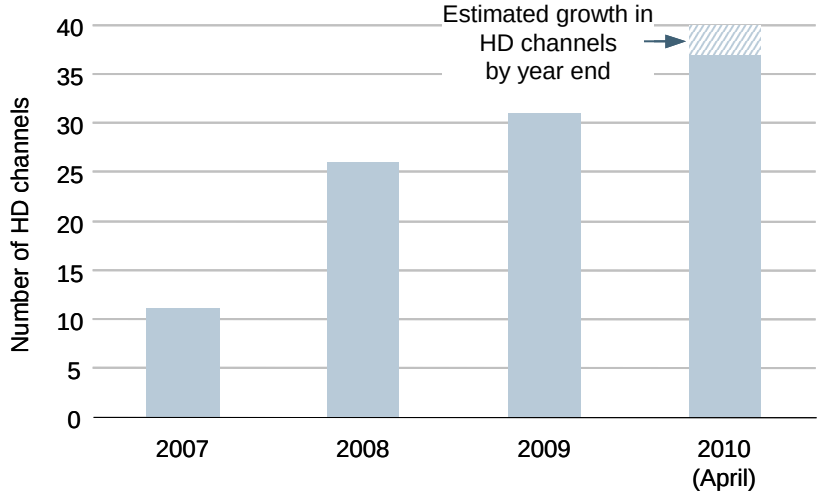


Figure 3.2: Number of HD channels 'available' in Ireland at year end (pay/free-to-view, including international and overspill channels) [Source: Screen Digest, Analysys Mason]

This is consistent with the situation in other countries, as illustrated in Figure 3.3 below. It can be seen that the number of HD channels in all markets is growing.

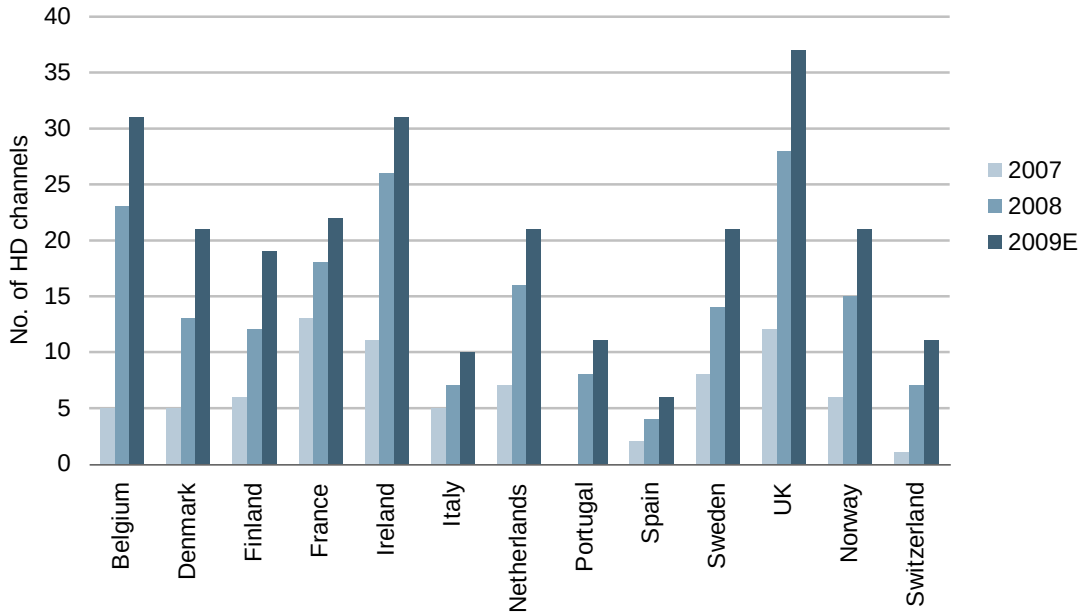


Figure 3.3: Number of HD channels in selected European markets [Source: Screen Digest]

In a recent Ofcom report[11], BSkyB commented that "Such has been the consumer demand for HD that Sky+ HD is the fastest selling additional TV product ever offered by Sky". It is clear that the provision of HD services will be an important part of TV viewing in the future, and the requirement to deliver HD is essential for a pay-TV platform.

The capacity provided by its satellite platform allows BSkyB to offer a wide selection of channels (currently 587) in SD and HD in Ireland, as well as additional services (e.g. interactive and data services). In order to compete successfully with BSkyB, UPC currently uses the entire capacity of the 2.6GHz band to deliver a comprehensive selection of SD channels. [redacted].

UPC currently uses the entire 2.6GHz spectrum band to provide a wide selection of TV channels to its MMDS customers. In order to continue providing an attractive, competitive offering to customers, UPC needs to increase the capacity of its MMDS network to carry more services, including both additional SD video channels and the introduction of HD video channels. In this section we discuss the reasons why UPC considers it so important to make such improvements to the MMDS service offering (including the introduction of HDTV and personal video recorders (PVRs), such as UPC's Digital+ product) in order to ensure that 92% of Irish households are able to benefit from a competitive service offering to BSkyB.

11 See http://www.ofcom.org.uk/consult/condocs/third_paytv/statement/paytv_statement.pdf

Figure 3.4 illustrates the number of video channels that could be offered using the 22 channels in the 2.6GHz [redacted]

Redacted

Figure 3.4: [redacted]

We understand from UPC that the majority of BSkyB's subscribers are located in areas where cable TV services are not available. By renewing UPC's licences to 2019, ComReg will avoid granting BSkyB a pay-TV monopoly across a large area of the country, covering 50% of households. Such a monopoly could provide BSkyB with an opportunity to increase prices throughout the country (in both cable and non-cable areas). Although such price increases might lose BSkyB some subscribers in areas where cable TV services are available, this would be more than offset by the additional revenues from the remaining subscribers (particularly in areas without cable TV, where no alternative comparable pay-TV service is available).

3.3 Continuing generation of welfare benefits in Ireland

UPC's MMDS platform currently generates welfare benefits in the form of the private value it generates for Ireland. Private value captures the direct benefits to individuals from their own consumption of a service (i.e. the value that consumers place on that service), less the costs of producing the service. In economic terms, this is equal to the sum of consumer and producer surplus.

If UPC's licences are renewed, these benefits will continue until the eventual licence expiration in 2019. Indeed, licence renewal is likely to increase the level of benefits generated: UPC will [redacted], which would attract more consumer interest, higher revenues and a larger producer surplus.

In contrast, if UPC's licences are not renewed and it has to close its MMDS platform in 2014, the private value generated for Ireland by UPC's service will end abruptly in 2014. Furthermore, the total private value generated will begin declining from the time it becomes clear that UPC's licences are not to be renewed; there will be no commercial incentive for UPC to continue investing in MMDS and fewer subscribers will join a service that is going to close.. Although most MMDS subscribers are likely to migrate to BSkyB, which will be likely to lead to an increase in producer surplus for BSkyB, this increased producer surplus will mainly benefit the UK economy, where BSkyB is registered.

We have developed a commercial model to forecast the revenues and costs of UPC's MMDS operations in both scenarios: one where UPC's licences are renewed and the other where the licences are not renewed. The **producer surplus** generated for Ireland is calculated by taking a ten-year (2010–2019) NPV of the free cashflows, which can be derived from the model. The difference in the NPV values between the two scenarios is equivalent to the incremental producer surplus derived from renewal of UPC's licences, which we have calculated as EUR32.8 million. Details of the assumptions behind these calculations can be found in Annex A.

Furthermore, if UPC's licences are not renewed, there will be a likely reduction in **consumer surplus**. We expect that the vast majority of UPC's MMDS subscribers would migrate to BSkyB's service in this scenario (with other subscribers migrating to a less attractive service e.g. pay TV or FTA TV on other platforms such as DTT). If the subscribers migrating to BSkyB pay EUR39.2 per month (BSkyB's estimated average revenue per user (ARPU)), this will lead to a loss in consumer surplus (as UPC's ARPU for MMDS is EUR32.5 per month).

Over the same ten-year period, we have calculated this loss in consumer surplus to be EUR27.7 million. Details of the assumptions behind this calculation can be found in Annex A.

Therefore, we estimate the total incremental private value to Ireland (consumer surplus and producer surplus) from renewal of UPC's licences to be EUR60.5 million over the period 2010–2019.

3.4 Continuation of UPC's direct expenditure in Ireland

Ireland will continue to benefit from the **employment** generated by UPC's MMDS business if its licences are renewed. UPC currently has 50 staff, equating to 37 full-time equivalent (FTE) staff working on its MMDS business. In the scenario where UPC closes its MMDS platform, 37 FTE positions could be lost, with a negative impact on employment in Ireland:

- 30 staff focus entirely on the MMDS business; all of these positions would be at risk
- 27 staff work on both UPC's MMDS and cable businesses; there would inevitably be some redundancies among these positions.

Furthermore, we believe that only limited additional employment will be created among alternative service providers. In the scenario where UPC closes its MMDS platform, it can be assumed that most of its MMDS subscribers will migrate to BSkyB since this will be the only comparable managed pay-TV service. It is unlikely that BSkyB will create an equivalent of 37 FTE positions, to compensate for the positions lost at UPC. In fact, BSkyB will probably only require a few more staff, to accommodate the increase in subscriber numbers (e.g. for customer care) and these positions would almost certainly be located outside Ireland.

Ireland also benefits directly from the **indirect costs** of UPC's MMDS business. These include network operations costs, customer operations and customer care costs, billing and collection costs, general and administrative costs, and marketing costs. Each of these costs is an investment

in the Irish economy and has multiplier effects leading to economic benefits that are far higher than the NPV of UPC's projected total indirect costs. For example, UPC's marketing activities result in increased spend in the Irish marketing, advertising and PR industries, hence sustaining more employment and also indirectly increasing the revenues in other industries for marketing channels (TV, radio, etc.).

We have modelled two scenarios to quantify the value to Ireland of the loss of indirect costs:

- In the first scenario, we assume that UPC's licences are renewed, leading to a continuation and improvement in UPC's MMDS service through increased investment
- In the second scenario, we assume that UPC's licences are not renewed, leading to lower investment from 2010 and a gradual loss of subscribers until the closure of UPC's MMDS platform in 2014.

In both scenarios, we have calculated the value to Ireland of indirect costs by taking a ten-year NPV of projected indirect costs, for the period 2010–19. The difference in value between the two scenarios is equivalent to the economic value to Ireland of renewing UPC's licences. We have calculated this value to be EUR51.2 million. Details of the assumptions behind this calculation can be found in Annex A.

3.5 Continuing payment of VAT in Ireland

UPC and BSkyB are the only major pay-TV providers in Ireland. UPC pays VAT in Ireland but BSkyB does not. Therefore, any migration of UPC subscribers to BSkyB due to closure of the MMDS platform will lead to a decline in VAT receipts in Ireland, and will have a negative economic impact on Ireland.

We note that BSkyB is expected to begin paying VAT to the Irish Exchequer, once a new EU Directive is implemented in 2015. Nevertheless, over the period 2010–2014 inclusive, the migration of UPC's MMDS subscribers to BSkyB in anticipation of the closure of UPC's service will have a negative impact on Ireland's VAT revenues.

To quantify the value of VAT to Ireland from UPC's MMDS platform, we have modelled two scenarios:

- In the first scenario, we assume that UPC's licences are renewed
- In the second scenario, we assume that UPC's licences are not renewed and its MMDS platform is closed in 2014.

In both scenarios, we have calculated a ten-year NPV for UPC's VAT payments, for the period 2010–19. The difference in NPVs between the two scenarios is equivalent to the value that is generated from VAT payments through renewal of UPC's licences. We have calculated this value to be EUR13.3 million. Details of the assumptions behind this calculation can be found in Annex A.

3.6 Avoidance of consumer disruption

In the scenario where UPC's licences are not renewed, there will be significant disruption to UPC's MMDS subscriber base of more than 70 000. These subscribers, who live outside UPC's cable coverage, will be forced to terminate their subscriptions with UPC, which will involve cancelling any direct debit payments and un-installing (and/or removing) any equipment such as set-top boxes and MMDS antennas. These subscribers will then be forced to assess alternative TV service options and spend time ordering, installing and learning how to use the chosen new service. The only alternative pay-TV service available is from BSkyB, and subscribers migrating to BSkyB may have to buy new equipment to receive this service and would need to have a satellite dish installed on their premises.

The total cost of consumer disruption is difficult to quantify, as it is challenging to capture the total costs of the various potential disruptive effects arising from the closure of a TV service. However, we have quantified a selection of the costs:

- cost of new equipment for MMDS subscribers migrating to BSkyB
- cost of repair in case of equipment faults, for MMDS subscribers who migrate to BSkyB (UPC does not charge for the equivalent repair service)
- other avoidable costs (the time value of disruption from selecting, ordering, installing and using a new pay-TV service).

We have calculated these costs to be EUR4.4 million, which is equivalent to a lower-bound economic impact on Ireland from consumer disruption.

Details of the assumptions behind this calculation can be found in Annex A.

3.7 Wider social and societal benefits

There are also wider social and societal benefits from UPC's MMDS service that cannot be quantified, but are nevertheless highly significant to Ireland. In the scenario where UPC's licences are not renewed, these benefits will be lost to Irish citizens outside UPC's cable footprint. This section presents examples of these benefits.

3.7.1 UPC's contribution to media plurality in Ireland

Media plurality is a concept that encompasses media ownership and all measures that ensure access to a variety of information sources and opinions for all types of media service. With respect to the TV landscape, all types of TV service – public, commercial and community – play an important role in creating pluralism. These, in addition to the availability of a range of distribution channels for such content, are seen as paramount to maintaining plurality.

The importance attributed to the role and influence that TV programme services can have on a society is reflected by the ability of national governments to introduce rules that preserve plurality and reflect the political and cultural values of their society. These rules apply to any FTA and pay-

TV service providers that fall within the legal jurisdiction of that country. It is for this reason that UPC, not BSkyB, is the only pay-TV service provider that has to respect any existing or future rules on media plurality in Ireland.

3.7.2 'Must carry' services

'Must carry' is a term that refers to specifically designated TV channels which a pay-TV provider must include in its TV packages. In most cases the platform provider is not allowed to charge the TV channels the normal transmission costs associated with carrying the signal on its transmission network. In Ireland, RTÉ 1, Network 2, TV3 and TG4 are 'must carry' channels on all of UPC's transmission networks.

Any other public service channels that emerge in the future (such as the Oireachtas and Film channels, as referenced in the recent 2009 Broadcasting Act) are also likely to be classified as 'must carry' channels.

3.7.3 Carriage and EPG fees

By virtue of their 'must carry' status, UPC does not charge the Irish PSB channel providers for the costs associated with including these channels in its TV packages. Such costs would normally include a fee for carriage on the platform as well as a charge associated with the position that is allocated to the channel on UPC's Electronic Programme Guide (EPG)[12]. While there are no specific rules about where these channels should be listed in UPC's EPG, the company has always voluntarily allocated preferential EPG positions to the Irish PSB channels (e.g. RTÉ 1 is 101 and Network 2 is 102 on UPC's EPG).

BSkyB is not bound by these 'must carry' provisions and is therefore not obliged to make these TV channels available to the Irish public. BSkyB charges fees for carrying these channels on its platform and including them in its EPG. [13]

3.7.4 Support for indigenous channels

UPC plays a key role in supporting Irish channel providers:

- **UPC works very closely with the state broadcaster in supporting its new and emerging services** (such as the *RTÉ Player*), despite having no regulatory obligation to do so. The two organisations are already working together, and we understand that this collaboration extends to new ancillary services currently under development by the broadcaster

[12] An Electronic Programme Guides (EPB) is the name given to the application that lists and numbers channels by a TV service provider.

[13] See http://corporate.sky.com/documents/pdf/20c24d2e1c62406594e1a79de5f917db/bskyb_sssl_price_list_oct09.

- Where it is technically feasible and capacity exists, **UPC provides carriage, free of charge, to local community TV channels**. For example, it currently carries pilots of two community channels (Dublin and Cork) on its cable footprint. Without this support, we understand that community channels would be unable to secure a broadcasting licence from the Broadcasting Authority of Ireland (BAI), since issue of a licence to these channels is dependent on them securing a carriage agreement with a platform provider. UPC is the platform of choice and indeed is the only managed pay-TV service provider that currently offers carriage to these channels. Due to a lack of capacity on its MMDS network, UPC is currently unable to include these channels in its MMDS service but has indicated that it would be very happy to do so if capacity became available. UPC also carries Dublin, Galway and Cork versions of the 'City Channel' on its cable and ntl MMDS footprints.

- **UPC supports a number of Irish-owned commercial channels**. These include Dublin, Galway, Cork and Limerick versions of the 'City Channel' and 'Channel South', which are available on its cable and MMDS footprints. In addition, the company offers the Setanta Ireland sports channel as part of its basic channel package for both analogue and digital services (whereas BSkyB offers this as a premium channel only) and was the first party to offer carriage and a preferential EPG position to 3e (formerly Channel 6). Support for these channels ensures greater access to Gaelic sports and Irish language programming, as these channels, particularly Setanta Ireland, provide extensive coverage of Gaelic games (National League hurling and football) and rugby (Magners League).

UPC believes that, without its support, it is doubtful whether any of these channels (with the exception of RTÉ) would have a viable business case, since they are likely to lack the funds necessary to pay BSkyB's carriage and EPG fees. The loss of UPC's MMDS subscriber base would make it more difficult for UPC to maintain the same levels of support which in turn might jeopardise the continued existence of most of these channels.

In summary, the closure of UPC's MMDS service would have a negative effect on social value to Ireland. Although difficult to quantify, such social value was widely recognised when UPC was short-listed for the corporate and social responsibility category of the ICT Excellence Awards.

3.8 Summary

If UPC's licences are not renewed, we estimate that this would result in **a loss of around EUR129 million in economic value to Ireland between 2010 and 2019 (NPV)**, as shown in Figure 3.5. This would arise from a combination of loss of producer surplus, reductions in consumer surplus, reductions in VAT receipts, reduced UPC expenditure, and losses from consumer disruption.

Incremental economic benefit	*Amount (EUR million)*
Producer surplus	32.8
Consumer surplus	27.7
UPC expenditure	51.2
VAT receipts	13.3
Consumer disruption	4.4
Social value	*Not quantified*
Total incremental benefit from renewing UPC's licences	***129.4***

Figure 3.5: Incremental value to Ireland of UPC's MMDS service [Source: Analysys Mason]

Finally, several wider societal benefits delivered by UPC's MMDS service will also be lost if UPC's licences are not renewed. Although difficult to quantify, there are clear benefits from media plurality and direct regulation associated with UPC's MMDS service.

4 Benefits arising from non-renewal of UPC's licences

In this section we seek to quantify the incremental benefits arising from other potential uses of 2.6GHz spectrum, if UPC's licences are not renewed. As discussed in Section 2, we view the most likely alternative use of the spectrum as being for the deployment of next-generation mobile technologies (such as LTE and WiMAX) to provide mobile broadband services. We have therefore compared the benefits arising to Ireland if the 2.6GHz band is made available for this service from 2014 with the benefits that arise if 2.6GHz spectrum is not available and an alternative spectrum band (1800MHz) is used instead.

We have structured this section as follows:

- Section 4.1 discusses the feasibility of using the 1800MHz band to deploy next-generation mobile broadband technologies as an alternative to use of the 2.6GHz band
- Section 4.2 quantifies the incremental economic benefits to Ireland if the 2.6GHz spectrum band is used for the provision of mobile broadband services
- Section 4.3 describes the wider social and societal benefits to Ireland if the 2.6GHz spectrum band is used to provide mobile broadband services.

4.1 Feasibility of using 1800MHz spectrum for next-generation mobile broadband

There are several spectrum bands which may be used to provide next-generation mobile broadband services, including the 800MHz, 900MHz, 1800MHz, 2100MHz and 2.6GHz bands. For the deployment of WiMAX networks, the 2300MHz band is an alternative option: ComReg plans to award this band later in 2010, and as it is already being used in several Asian markets user terminals will be widely available.

The lower-frequency bands (i.e. 800MHz and 900MHz) are expected to be used by mobile operators, primarily to provide nationwide mobile broadband coverage, while the higher-frequency bands (i.e. 1800MHz, 2.6GHz and possibly 2100MHz) are expected to be used to provide additional network capacity in densely populated areas (i.e. the main cities in Ireland, and particularly the Dublin area). Mobile operators will wish to deploy next-generation mobile broadband networks using a combination of one low-frequency spectrum band (to provide widespread coverage) and one high-frequency spectrum band (to provide additional capacity in the most populated areas). If UPC's licences are not renewed, the spectrum band will become available to other uses in 2014. Numerous mobile network operators worldwide are considering use of the 2.6GHz spectrum band for provision of mobile broadband services, while several others intend to use the 1800MHz band. Our analysis indicates that by 2014 the 1800MHz spectrum band will be a valid alternative to the 2.6GHz band in Ireland and will provide sufficient capacity for three operators to deploy high-speed mobile broadband services.

Overall our analysis suggests that almost all of the economic benefits arising from the provision of mobile services in urban areas can be realised by mobile operators using the 415MHz of spectrum which is already available to them in other dedicated frequency bands for mobile services (800MHz, 900MHz, 1800MHz and 2.1GHz) – the additional 190MHz of spectrum in the 2.6GHz band would provide very limited incremental benefit in Ireland. Figure 4.1 highlights the expected date of availability of spectrum in Ireland in each of these bands for mobile services (and the 2.3GHz band for mobile broadband services).

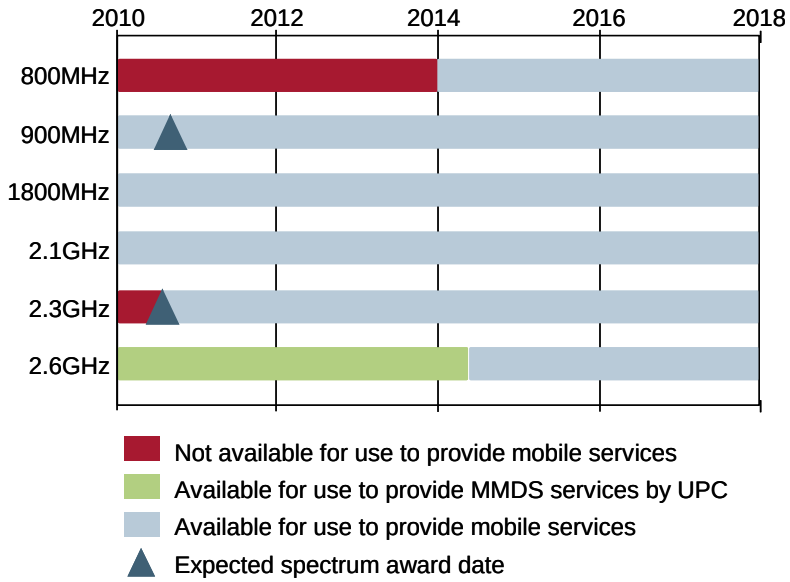


Figure 4.1: Availability of main frequency bands for mobile services including 2.3GHz for mobile broadband services [Source: Analysys Mason]

4.1.1 Propagation characteristics and spectrum quantity

Both the 1800MHz and 2.6GHz bands are generally considered as 'high-frequency' bands by mobile network operators and can be used to provide additional network capacity in areas of high population density. Ireland does not have many densely populated areas when compared with other European countries, and so high-frequency spectrum is likely to be used to provide additional network capacity only in the main cities. Moreover, population density in the most populated areas of Ireland (e.g. central Dublin) is typically lower than the population density in the most populated areas of other countries (e.g. central Paris).

The 1800MHz and 2.6GHz spectrum bands have similar propagation characteristics; in fact, base stations transmitting at 1800MHz can cover slightly larger areas than those transmitting at 2.6GHz (assuming similar topography and mast height). In addition, each band has relatively large amounts of paired spectrum available: the 2.6GHz band has up to 70MHz and the 1800MHz has 75MHz. It is widely acknowledged that provision of the highest-speed mobile broadband services using LTE technology will require 2×20MHz of spectrum per operator.

As such, a mobile broadband network operator could use either band to provide highest-speed mobile broadband services, assuming there is enough free spectrum available and vendors are able to supply network equipment and handsets for the specific band.

4.1.2 Migration of subscribers from 2G to 3G networks

At present, mobile operators in Ireland use the 900MHz and 1800MHz bands to provide 2G services using GSM technology. However, the number of GSM connections in Ireland has been declining steadily since 2007 as subscribers migrate to 3G, and this trend is expected to continue in the short to medium term. By 2012, 55% of all mobile connections in Ireland are expected to be 3G connections, while 43% will be on GSM. By 2014, fewer than 25% of mobile connections in Ireland are expected to be on GSM[14]. The expected migration from 2G to 3G is shown in Figure 4.2.

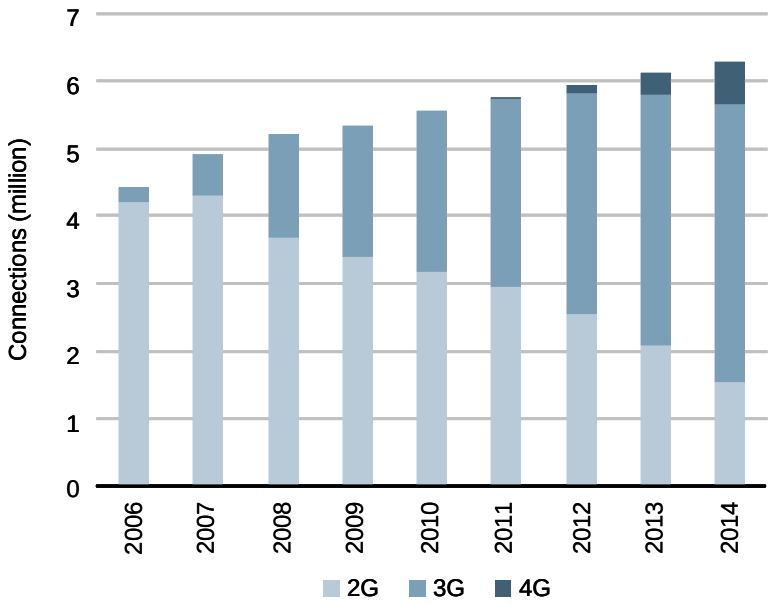


Figure 4.2: Forecast of migration from 2G to 3G and 4G technologies in Ireland [Source: Analysys Mason]

Liberalisation of the 900MHz spectrum from 2011 could accelerate this migration as availability of 3G services extends further across the population/land in Ireland: this is due to the enhanced coverage and significant improvement in economics that would arise from use of the 900MHz band to provide coverage in rural areas, compared with the 2.1GHz band.

Currently, the 1800MHz spectrum band is used to provide capacity overlay for operators' 900MHz GSM networks. As subscribers migrate from GSM to UMTS, this additional capacity is less likely to be required. With this reduction in the demand for GSM capacity over time, mobile operators in Ireland may be able to release a large portion of their 1800MHz spectrum allocations for a new mobile broadband technology, such as LTE.

4.1.3 Availability of 1800MHz spectrum in 2014

Based on forecasts of subscriber migration from 2G to 3G, we expect that mobile operators will be able to free up over 2×60MHz of spectrum in the 1800MHz band by 2014 for new uses. This analysis is detailed below, and summarised in Figure 4.3.

14 Analysys Mason estimates.

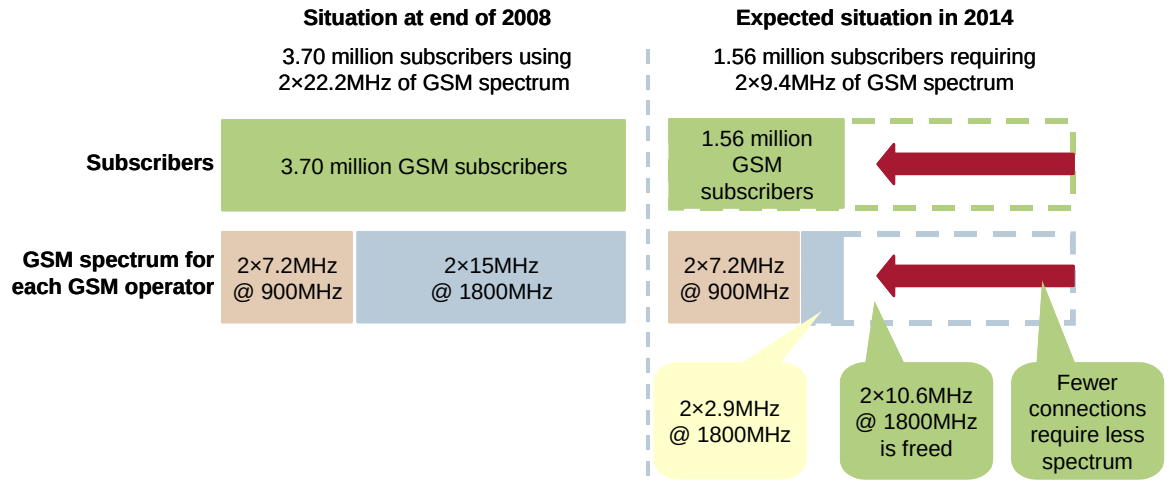


Figure 4.3: Expected reduction in 1800MHz spectrum required for provision of GSM capacity [Source: Analysys Mason]

At present, Meteor, O_2 and Vodafone have 900MHz and 1800MHz spectrum in Ireland, which they use to carry GSM services. Each operator holds 2×7.2MHz of 900MHz spectrum and 2×15MHz of 1800MHz.

There were approximately 3.70 million 2G connections in Ireland at the end of 2009[15]. We expect the number of 2G connections to decline to 1.56 million by 2014. Based on an assumption that at the end of 2008 the amount of 900MHz and 1800MHz spectrum used to provide capacity on 2G networks was at least sufficient to ensure acceptable quality-of-service levels, on a pro-rata basis this indicates that the amount of spectrum required to provide acceptable 2G network service levels in 2014 amounts to approximately 2×9.4MHz per operator. This is illustrated in Figure 4.3. In practice this is likely to be an over-estimate, since the total amount of spectrum is only needed in the most populated areas (e.g. central Dublin), and subscribers in these areas are likely to migrate from 2G networks to 3G networks earlier than subscribers across Ireland as a whole.

In the upcoming 900MHz auction in Ireland, an individual operator will be able to bid for a maximum of 2×10MHz of spectrum. We expect that the existing 2G network operators will seek to acquire 2×10MHz each, and use this to continue to operate their 2G networks as well as deploying 3G networks. The remaining 5MHz is expected to be secured by a new entrant to the 900MHz band.

If a mobile operator uses 2×5MHz of 900MHz spectrum for GSM (and the other 2×5MHz for 3G) then, based on the above estimate, the operator will require 2×4.4MHz of 1800MHz spectrum to service its 2G subscriber base in 2014. Altogether, the three operators will require 2×13.2MHz in the 1800MHz band. There is currently 2×75MHz of capacity in the 1800MHz band, and the

15 ComReg Key Data Report – Q4 2009 (ComReg Document 10/19), Section 4. ComReg reports that, at the end of 2009, there were 5 302 345 mobile subscriptions (2G and 3G) and (in Figure 4.2.5) that 70% of these (i.e. 3.7 million) were 2G.

remaining 2×61.8MHz of 1800MHz spectrum could be used for provision of mobile broadband using new technologies.

4.1.4 Availability of mobile broadband equipment for the 1800MHz band

A key consideration for mobile network operators is how soon mobile broadband network equipment and handsets will be available for the 1800MHz band. It is important that network equipment is available in time to allow thorough testing prior to network roll-out, and that a range of handsets is available for consumers.

As part of Analysys Mason's ongoing research programmes, to ascertain the expected timeline for availability of network equipment and handsets for the 1800MHz band, we conducted a series of interviews with mobile operators and equipment vendors, focusing particularly on their plans for LTE over the 1800MHz band. The interviews were carried out between July 2009 and March 2010. We found that mobile operators and vendors are engaged in discussions on the provision of LTE equipment for the 1800MHz band. We received the following comments regarding demand for LTE over 1800MHz:

- *"There are several operators looking at LTE 1800. There is definitely more interest in this band than in 2100[MHz]."* – Major equipment vendor

- *"LTE 1800 is more interesting than LTE 2600 and LTE 2100, and we see a potential launch in 2011/12. However, there needs to be more than just us in the market to ensure handset volumes will be there."* – Major European mobile network operator

- *"We are in active discussions with two operators on LTE 1800, one of which is in Europe."* – Huawei.

In addition, SmarTone–Vodafone, an operator in Hong Kong, has publicly commented on its plans to deploy LTE over the 1800MHz band:

- *"The investment in new spectrum further demonstrates our long term commitment to 4G LTE on 1800 MHz. Our implementation of 4G LTE on 1800 MHz instead of 2500/2600 MHz offers the benefit of better radio in-building coverage, an important advantage in the Hong Kong cityscape. It also provides the best values for our shareholders and customers."* – SmarTone-Vodafone.

The vendors we interviewed were either currently testing or had already tested LTE network equipment and handsets for the 1800MHz band, and expected this equipment to be widely available within 12 months of LTE equipment for the 800MHz and 2.6GHz bands. As all major network equipment and handset vendors anticipate supporting LTE in the 1800MHz band, a good range of devices is likely to be available. Most vendors interviewed agreed that initial LTE devices will be modems, and handsets supporting VoIP are expected to be launched approximately one year after data devices.

We received some positive comments regarding LTE network equipment and handsets in the 1800MHz band from vendors:

- *"There is interest in LTE 2600 and LTE 900 but LTE 1800 is coming. There is not only interest in MEA but also APAC where operators have 1800MHz and not 900MHz."* – NSN
- *"There are many chipset manufacturers supporting LTE 1800 and 2600. LTE 1800 could be driven by the likes of Orange and T-Mobile, who have lots of 1800MHz. We anticipate deployments in 2011."* – Alcatel-Lucent
- *"We expect the first commercial deployment will be in 2011 and will initially be small scale but will catch up to LTE 2600 rapidly. We need to have the capability to support several bands in chipsets before commercial networks are deployed. We believe handsets will not be an issue for operators considering deploying LTE 1800."* – Major global device manufacturer.

All vendors interviewed agreed that demand from mobile operators would be the primary driver of the mass-market production of LTE equipment for the 1800MHz band.

Based on these interviews, we have compiled a timeline indicating the expected availability of LTE equipment in the 2.6GHz, 800MHz and 1800MHz bands, as shown in Figure 4.4. By 2014, we expect that there will be widespread availability of both network equipment and handsets to support LTE over the 1800MHz band.

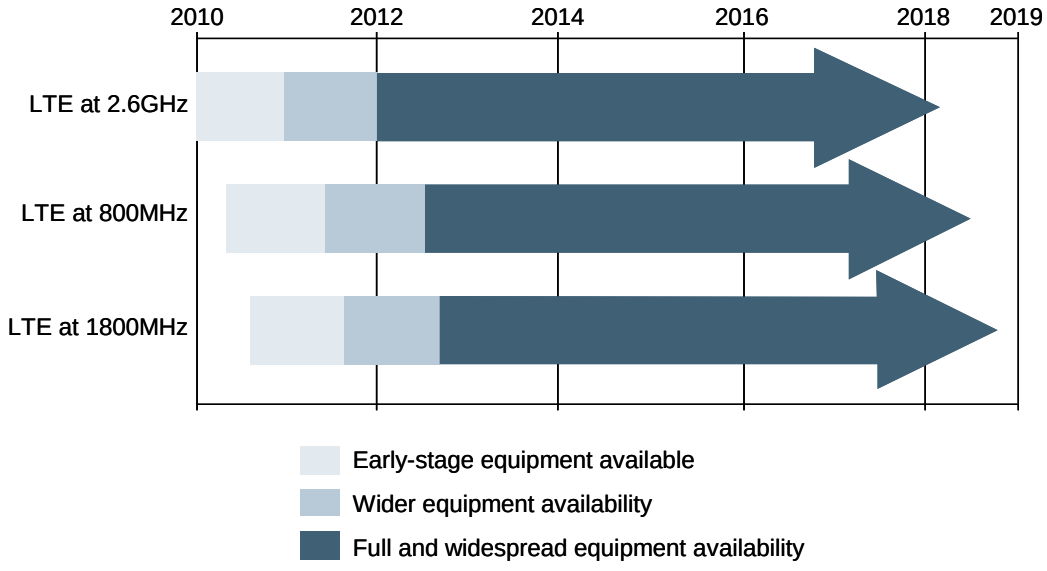


Figure 4.4: Expected timeline for availability of LTE equipment for the 2.6GHz, 800MHz and 1800MHz spectrum bands [Source: Analysys Mason]

4.2 Incremental economic benefits of 2.6GHz spectrum for provision of mobile broadband

The provision of mobile broadband services will generate welfare benefits for Ireland. The 2.6GHz spectrum band could be used for the provision of mobile broadband in the most densely populated urban areas such as Dublin (for example, using LTE or WiMAX technologies), in combination with use of the 800MHz band in less populated areas. However, as indicated above, the 1800MHz band is a viable alternative to the 2.6GHz band. As UPC's licences do not expire until 2014, the 2.6GHz band will not be available for mobile broadband before this date. By 2014, it is very likely that there will have been sufficient migration of mobile subscribers from 2G to 3G to allow operators to use 1800MHz spectrum for LTE (as discussed in Section 4.1.2 above). Therefore, whether or not 2.6GHz spectrum is made available to mobile and WiMAX operators, it is realistic to assume that mobile broadband services will be launched anyway and private value will be generated from these services in Ireland.

The private value generated by mobile broadband services is equivalent to the producer surplus to Ireland plus the consumer surplus to Ireland. To quantify the incremental private value gained from the provision of mobile broadband services using 2.6GHz spectrum, we have modelled two scenarios (as shown in Figure 4.5) – one to examine what might occur if UPC's licences were renewed (namely that three mobile operators would launch services using the 1800MHz band) and one to examine what might occur if UPC's licences were not renewed (in which case four mobile operators and a WiMAX operator may all launch services in urban areas). This latter scenario is likely to be optimistic – in practice, it is unlikely that five competing networks will be deployed in Ireland, given:

- the increasing global trend for mobile operators to share network infrastructure
- the collapse in WiMAX network launch plans in developed markets, as a result of doubts about the commercial feasibility of the business and uncertainty over availability of user equipment (e.g. subscriber handsets) that will support WiMAX and older mobile technologies such as GSM.

Scenario	*Mobile broadband service providers and spectrum bands used*
A: UPC's 2.6GHz licences are renewed	• 2.6GHz spectrum not used for mobile broadband • Three mobile operators launch LTE with 1800MHz (and 800MHz in rural areas) • One mobile operator launches LTE with 800MHz only • No mobile WiMAX operator using 2.6GHz band
B: UPC's 2.6GHz licences are not renewed	• Four MNOs launch LTE with 2.6GHz/1800MHz in urban areas (and 800MHz in rural areas) • One WiMAX operator launches with 2.6GHz

Figure 4.5: Mobile broadband scenarios modelled [Source: Analysys Mason]

Furthermore, the 2.3GHz band is a suitable alternative for the deployment of WiMAX networks – therefore our economic analysis may also overstate the competitive benefits of use of the 2.6GHz band for the deployment of a WiMAX network.

For both scenarios, we have developed a model to calculate the incremental private value generated from mobile broadband services. The detailed assumptions of the model are provided in Annex B.

In both scenarios, we assume that mobile broadband services will be launched in 2014. This assumption reflects the timing of 800MHz, 1800MHz and 2.6GHz spectrum availability in Ireland, as well as the likely international availability of LTE equipment. In the event that 2.6GHz spectrum is not made available for mobile broadband services, it is most likely that other spectrum bands will be used. However, in this scenario, it is also assumed that there will be less market competition, as there will be less high-frequency spectrum available for mobile broadband services.

Producer surplus is generated from profits derived from the provision of mobile broadband services. To quantify this, we have modelled the incremental revenues from mobile broadband services (which we consider as an uplift to subscriber ARPUs) and related costs over the period 2010–2019. We then calculated the free cashflow on an annual basis. The producer surplus is equivalent to the NPV of the free cashflow. The difference in NPV between the two scenarios is the incremental economic benefit gained from using 2.6GHz for mobile broadband services.

Consumer surplus is generated from revenues of mobile broadband services; it is equivalent to the shaded area in Figure 4.6.

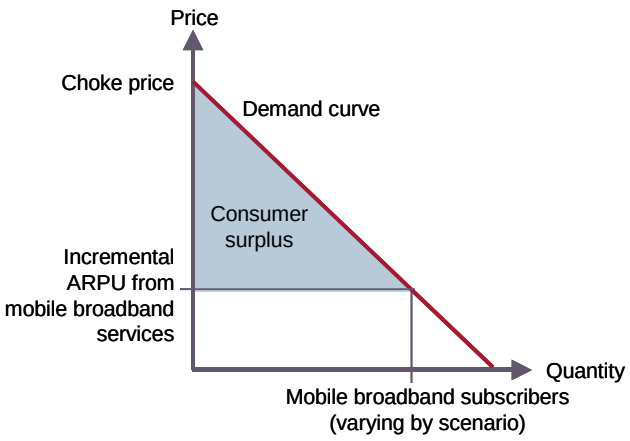


Figure 4.6: Approach to estimation of consumer surplus from mobile broadband services [Source: Analysys Mason]

The results shown in Figure 4.7 below suggest that the total incremental private value of using 2.6GHz spectrum for mobile broadband services is just EUR0.1 million. This value is relatively insignificant, since we assume that 1800MHz spectrum could be used for the provision of mobile broadband services in urban areas even in the absence of 2.6GHz spectrum. If 2.6GHz is made available for mobile broadband (Scenario B), we assume that there would be more competition in the market, leading to lower producer surplus but higher consumer surplus. Our modelling

suggests that these effects may be evenly balanced and so there is little difference in the incremental private value to Ireland between the two scenarios. Details of the assumptions behind our calculations can be found in Annex B.

	Producer surplus (EUR million)	*Consumer surplus (EUR million)*	*Total private value (EUR million)*
Scenario A (2.6GHz not available for mobile broadband)	52.3	126.3	178.6
Scenario B (2.6GHz available for mobile broadband)	36.2	142.5	178.7
Incremental value from mobile broadband services	**–16.1**	**16.2**	**0.1**

Figure 4.7: Producer surplus and consumer surplus results table [Source: Analysys Mason]

The use of 2.6GHz spectrum for mobile broadband services may also generate additional value to Ireland from increased VAT receipts. If the availability of 2.6GHz spectrum for mobile broadband services leads to higher market revenues, arising from a small incremental increase in subscriber take-up, a higher amount of VAT will be generated. To quantify this, we have modelled the VAT that would be paid on the revenues in both scenarios, and have calculated a ten-year NPV for the period 2010–19. The difference between NPV values for the two scenarios is equivalent to the incremental value from VAT of using 2.6GHz spectrum for mobile broadband services in Ireland. We have calculated this incremental value to be EUR0.4 million. Details of the assumptions behind this calculation can be found in Annex B.

4.3 Wider social and societal benefits

The provision of next-generation mobile broadband services will generate wider social and societal benefits for Ireland. These benefits are difficult to quantify, but include the provision of high-speed broadband services on a nationwide basis and the consequent reduction of the 'digital divide'. However, these benefits are to be gained primarily in rural areas as urban areas are already well served by next-generation fixed broadband networks based on cable, fixed wireless and DSL broadband. Mobile broadband service providers are most likely to use 800MHz to reach rural customers because of the wider wave propagation characteristics of this band compared to 2.6GHz spectrum. Therefore most of the social and societal benefits from mobile broadband are likely to be gained from the use of 800MHz spectrum and not from the use of 2.6GHz spectrum.

It can be argued that the availability of 2.6GHz spectrum could lead to a more competitive mobile broadband market if more than three competing next-generation mobile broadband networks are deployed, which in turn would reduce prices and hence have benefits for society in Ireland. However, the increase in competition would mainly be in urban areas, where there will be strong competition from both fixed and mobile broadband providers whether or not 2.6GHz spectrum is available for mobile broadband services.

Furthermore, in the absence of the availability of 2.6GHz spectrum, mobile broadband service providers are likely to use 1800MHz and/or 800MHz spectrum instead. Therefore, 2.6GHz spectrum is not a constraining factor in the provision of mobile broadband services.

For these reasons, we conclude that making 2.6GHz spectrum available for mobile broadband services has little incremental social and societal benefit for Ireland.

4.4 Summary

Overall, we have estimated that the introduction of next-generation mobile broadband technologies in Ireland would generate a total economic benefit of EUR179 million (NPV over the period 2010–2019). However, almost all of this value would be realised without the need to make the 2.6GHz band available for mobile broadband services. Our modelling indicates that if the 2.6GHz band was made available for mobile broadband, the incremental economic benefit that this would bring to Ireland would be EUR0.5 million (over the period 2010–2019), and this is based on the optimistic assumption that four LTE networks and one mobile WiMAX network would be deployed. This incremental benefit is relatively low, especially when compared to the EUR129 million incremental value to Ireland from UPC continuing to use the 2.6GHz band for MMDS.

Economic benefit from use of 2.6GHz spectrum for mobile broadband	*Scenario B (EUR million)*
Producer surplus (loss)	(16.1)
Consumer surplus (gain)	16.2
VAT (gain)	0.4
Social value	Minimal
Total incremental value from mobile broadband	***0.5***

Figure 4.8: Summary of quantifiable economic benefits to Ireland of mobile broadband services [Source: Analysys Mason]

Furthermore, there is a risk that the EUR0.5 million in economic benefits from mobile broadband services will not actually materialise in 2014. Mobile operators will be able to pay a higher price than UPC for 2.6GHz spectrum, given the substantial cashflows generated across their businesses. The operators are likely to perceive that there is a risk associated with not acquiring 2.6GHz spectrum; i.e. the risk that competitors will acquire this spectrum and offer more competitive services. Although this is unlikely to be the case, given the potential to use other spectrum bands to launch equivalent services, the perceived threat may still exist. In such circumstances, having acquired 2.6GHz spectrum, the mobile operators could delay launching mobile broadband services until there is sufficient demand to make this commercially viable, and so service launch may actually occur some time after 2014.

The economic benefits generated by mobile broadband services will therefore depend on there being sufficiently high demand for mobile broadband in urban areas in 2014 to make it economically viable for mobile broadband providers to invest in a network. Without sufficient demand for mobile broadband, there is a high risk that 2.6GHz spectrum remains unused or underutilised; in such circumstances, mobile network operators would be 'hoarding' 2.6GHz

spectrum (potentially in addition to underutilised 1800MHz spectrum), and no benefits would be gained from this spectrum band.

5 Proposed way forward for Ireland

Our assessment suggests that it is in the best interests of Ireland for the 2.6GHz band to continue to be used for MMDS in the period 2014–2019:

- **Continuation of the MMDS service would ensure that approximately 700 000 homes outside the main cities continue to benefit from a competitive pay-TV service offering** to BSkyB. Pay-TV services provide a key source of information and entertainment to 78% of Irish households, and other wireless platforms available in Ireland (such as DTT) do not have the capacity to provide a service offering that can compete with satellite. Cessation of the MMDS service would therefore be to the detriment of Irish society as a whole, and rural Ireland in particular, as it would give BSkyB a monopoly outside the urban centres

- **The quantifiable economic benefits of MMDS significantly outweigh those associated with the next-best alternative use – for the deployment of next-generation mobile broadband networks in urban centres – in the period to 2019**. We estimate that the incremental economic benefits of continued use of the 2.6GHz band for MMDS up to 2019 amount to EUR129 million (NPV over 2010–2019), compared with the incremental economic benefit of using 2.6GHz for mobile broadband services of only EUR0.5 million (NPV over 2010–2019). This is because the benefits arising from the deployment of next-generation mobile broadband technologies such as LTE and WiMAX could be realised through the use of alternative frequency bands such as 1800MHz and 2.3GHz. Continuation of the MMDS service would enable UPC to continue employing the 37 FTE personnel involved in provision of the service and ensure the continued indirect expenditure and its associated multiplier effects,

- **The MMDS platform provides wider societal benefits** that are difficult to quantify. In particular, availability of the MMDS service will ensure that media plurality continues to exist and provide continued support for the distribution of Irish public service and community TV channels to 700 000 homes outside the main cities.

To ensure that the benefits of the 2.6GHz band are maximised in Ireland, **we recommend that ComReg makes a decision to renew UPC's licences until April 2019 and confirms this to UPC as soon as possible**. [redacted].

Renewal of UPC's licences is consistent with ComReg's obligations and overall spectrum management policies, which include:

- **promoting infrastructure competition** – renewal of UPC's licences will ensure that 700 000 Irish homes retain a choice between two comparable pay-TV service providers – rather than being served by a monopoly operator

- **promoting the efficient use of scarce radio spectrum resources –** renewal of its licences will enable UPC to [redacted]. In addition, UPC will use the spectrum throughout Ireland, whereas its use for mobile broadband would be limited to the most densely populated areas (most likely only Dublin) with the spectrum remaining unused in the rest of the country

- **promoting the interests of users** – renewal will ensure that UPC's 70 000 existing MMDS customers are not deprived of a service which they clearly value and in which they have made an investment (e.g. deployment of an MMDS antenna)

- **facilitating access to radio spectrum, particularly for innovative technologies and services** – as indicated previously, renewal will enable UPC to invest in new technologies and bring innovative services such as HDTV and/or 3DTV to 700 000 homes

- **maximising the economic and social benefits arising from the use of radio spectrum** – as detailed in this report, renewal of UPC's licences is estimated to yield approximately EUR129 million of economic benefits for Ireland in the period up to 2019, together with numerous unquantifiable wider societal benefits

- **ensuring compliance with international requirements and the avoidance of harmful interference** – UPC's proposed use of the 2.6GHz band will reduce overspill into the UK to a level which will enable the band to be used without interference both in Northern Ireland and the western parts of England and Wales.

We understand that UPC has examined the legal and regulatory situation in detail and is satisfied that renewal of the MMDS licences is compatible with EU and Irish law. The conclusions from UPC's analysis can be summarised as follows:

- The current EU regulatory framework promotes harmonisation of spectrum usage and provides that licences are awarded on the basis of objective, transparent, non-discriminatory and proportionate criteria. In addition, the updated EU regulatory framework (due to come into force in May 2011) favours technology- and service-neutral licensing. In particular, it underlines the need to give due consideration to the benefits for users, facilitating the development of competition, and also refers to the important social, cultural and economic value of spectrum. The offer of MMDS services in the 2.6GHz band is compliant with the EU regulatory framework and indeed there is no impediment in this framework to the renewal of the MMDS licences until 2019.

- From a national regulatory standpoint, UPC provides MMDS services pursuant to the Wireless Telegraphy Act, 1926 (as amended). UPC's 2.6GHz licences are issued by ComReg in compliance with the Wireless Telegraphy (Multipoint Microwave Distribution System) Regulations 2003 ("the 2003 Regulations"), in exercise of its powers under the

Communications Regulation Act, 2002. The 2003 Regulations stipulate that these licences expire in April 2014 and include express provisions on licence renewal, set out in Regulation 8. In this respect, the 2003 licences are unusual; for example, they are in contrast to the statutory and licence framework under which mobile spectrum has been licensed.

- UPC recognises ComReg's obligations to ensure compliance with harmonisation decisions of the EC in relation to spectrum, but considers that the renewal of its licences is not inconsistent with these decisions. In the first place, what is being proposed is a transitional arrangement for a limited time period. Secondly, the operation of MMDS in the 2.6GHz band is compliant with the relevant EC Decision[16] as well as with ComReg's statutory objectives and its spectrum strategy. In addition, a new EU Framework Directive, due to be transposed into national legislation by May 2011, provides that Member States have the ability to specify services in a particular band if these satisfy "general interest objectives" that promote "cultural and linguistic diversity and media pluralism".

Overall from Ireland's perspective, there are very limited benefits to be gained from ComReg making the 2.6GHz band available for mobile broadband services in 2014, especially as there are numerous other spectrum bands (e.g. 1800MHz, 2.3GHz, 800MHz) which are equally (or more) suitable for the deployment of next-generation mobile broadband technologies in urban and rural areas. In contrast, if ComReg failed to renew UPC's licence, Ireland would forego significant benefits between 2010 and 2019. Furthermore licence renewal would be for a period of five years during which time ComReg would be able to evaluate the changing market situation, to determine what use(s) of the 2.6GHz spectrum would be likely to maximise the benefits to Ireland from 2019 onwards.

16 'Commission Decision of 13 June 2008 on the harmonisation of the 2500–2690MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community' reference 2008/477/EC, published in the Official Journal of the European Union, 24 June 2008.

Annex A: Quantification of economic benefits from UPC's provision of MMDS services

This annex details our methodology and the assumptions we made in quantifying the economic benefits from UPC's continued provision of MMDS services. For each benefit, we have modelled two scenarios:

Scenario	*Description*
Scenario A	• UPC's 2.6GHz licences are renewed • UPC's MMDS service continues and is upgraded to provide more channels, including HD channels
Scenario B	• UPC's 2.6GHz licences are **not** renewed • UPC's MMDS service is terminated in 2014 and there is no further investment in MMDS

Figure A.1: Scenarios modelled [Source: Analysys Mason]

The identified categories of economic benefit and their respective values are summarised in the following table:

Economic benefit	*Scenario A (EUR million)*	*Scenario B (EUR million)*	*Incremental benefit*
Producer surplus	55.8	3030.0	32.8
Consumer surplus	0.0	–27.7	27.7
VAT	0.0	–13.3	13.3
UPC expenditure	0.0	–51.2	51.2
Consumer disruption	0.0	–4.4	4.4
Social value	*Not quantified*	*Not quantified*	*Not quantified*
Total economic benefit	*55.8*	*–73.6*	*129.4*

Figure A.2: Economic benefits from UPC [Source: Analysys Mason]

Throughout the economic analysis we have used 3.5% discount rate, which represents a typical treasury social rate.

Below, we provide more detail of our methodology and assumptions for calculating each category of economic benefit.

Producer surplus

The producer surplus generated in each scenario is equal to the NPV of the free cashflow generated between 2010 and 2019. To quantify this, we developed a commercial model to forecast the expected cashflows from UPC's MMDS operations in each scenario.

Our forecast of producer surplus involved the following steps:

- Subscriber figures were forecast for both scenarios, based on historical trends and future product offering. Historical subscriber churn figures were used to estimate the number of gross additional subscribers in each year.
- Revenues were forecast using existing UPC MMDS service prices. (The commercial model factors in an uplift to account for expected price increases.)
- The cost of goods sold (COGS) was calculated using existing costs. (Expected future changes in costs were taken into account.)
- The indirect costs associated with each scenario were forecast based on the expected term of operations. These included operations, administrative and marketing costs.
- The capital expenditure associated with upgrading UPC's MMDS system to MPEG-4 was taken into account. Additional capital expenditure was assumed to include hardware and installation costs associated with providing all new and existing customers with MPEG-4 compatible set-top boxes.
- Subtracting costs and capital expenditure from revenues yielded the free cashflow for each scenario. The NPV of the free cashflows from 2010–2019 provided the producer surplus for each scenario.

We made the following assumptions in the commercial model, to calculate the producer surplus for each scenario:

- In Scenario A, UPC's licences expire in 2019, while in Scenario B they expire in 2014.
- In Scenario A, subscribers are expected to grow by 0.71% in 2011, and then by 1.5% per annum from 2012 to 2016. There is no subscriber growth in 2017, and 75% of subscribers are lost in 2018, with the remaining 25% lost as MMDS operations cease in 2019.
- In Scenario B, UPC's MMDS subscribers decline steadily between 2010 and 2014. In absolute terms, the subscriber base declines by approximately 13 000 per annum in 2010 and 2011, 15 000 in 2012, and 19 000 in 2013. The remaining 10 000 subscribers are lost in 2014.
- The commercial model assumes that the percentages of UPC subscribers [redacted] remain constant at [redacted].

- The direct costs of providing MMDS services are expected to remain constant between 2011 and 2019.
- It is assumed that network operations costs will increase by 2% per annum in 2010, 2011 and 2012, and remain stable from 2013 to 2019.
- The commercial model assumes that, if UPC's licences are extended, spectrum licence fees will remain unchanged.
- All other indirect costs, both fixed and variable (i.e. based on subscribers) are expected to remain unchanged.
- The capital expenditure required to [redacted].
- In Scenario A, it is assumed that 10 000 existing UPC MMDS subscribers will have their set-top boxes upgraded to MPEG-4 in each of 2010, 2011 and 2012. All new subscribers will be provided with (new) MPEG-4 compatible set-top boxes.
- The capital expenditure associated with connecting a new subscriber is the cost of the set-top box, labour costs and an additional cost for MMDS (as additional time and effort is required to set up antennae, etc.), which totals EUR269 per subscriber.

Figure A.3 shows the steps taken and assumptions made in diagrammatic form.

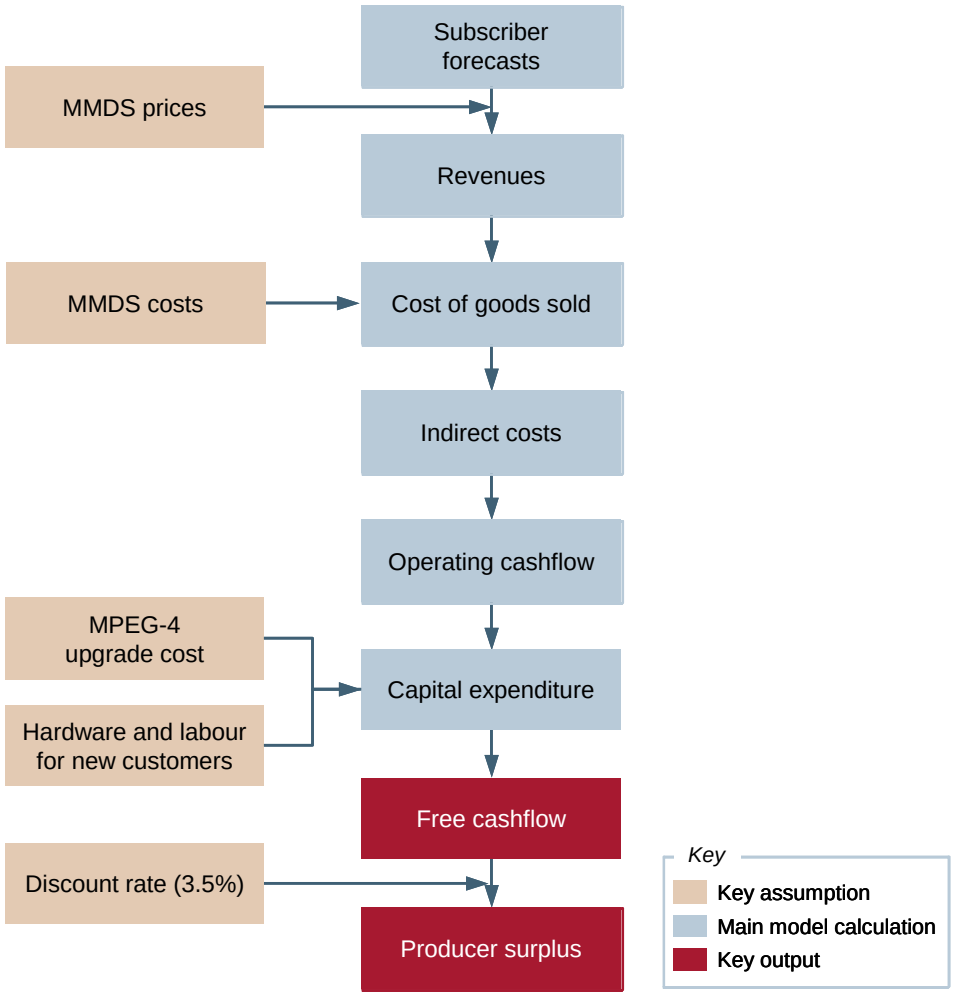


Figure A.3: Key assumptions, calculations and outputs of commercial model to calculate producer surplus [Source: Analysys Mason]

Consumer surplus

If UPC's licences are not renewed (Scenario B), it is assumed that most MMDS subscribers will migrate to BSkyB. The difference in price between UPC's service and BSkyB's service results in a change in consumer surplus. Ideally, this analysis would compare the price of a BSkyB package that is equivalent (in terms of channels available) to the average UPC MMDS package. However, because UPC's and BSkyB's packages have different structures, it is difficult to make a direct comparison between packages offered by the two providers. Therefore, our analysis involves comparing the ARPUs for UPC and BSkyB.

As BSkyB's ARPU is estimated to be higher than UPC's MMDS ARPU, migration of UPC's subscribers to BSkyB would lead to a loss in consumer surplus, as shown in Figure A.4.

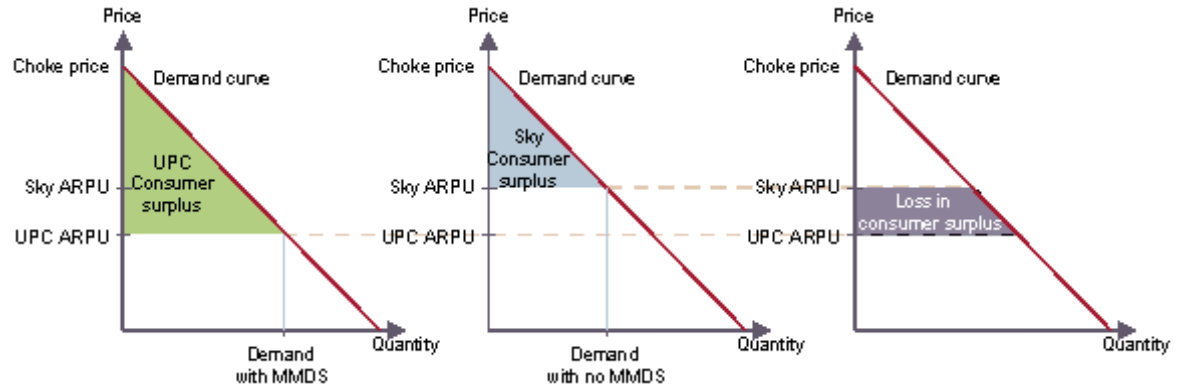


Figure A.4: Loss in consumer surplus resulting from migration of UPC's MMDS subscribers to BSkyB [Source: Analysys Mason]

A ten-year NPV of consumer surplus in Scenario B would be lower than in Scenario A, due to the loss of MMDS subscribers. However, as most of the MMDS subscribers leaving UPC would migrate to BSkyB, these new BSkyB subscribers would generate consumer surplus; albeit lower consumer surplus than they were generating as UPC subscribers (because BSkyB is assumed to have a higher ARPU).

Our calculation of the loss in consumer surplus involved the following steps:

- For Scenario A, the consumer surplus generated from UPC's MMDS subscribers was calculated for the period 2010–2019
- For Scenario B, the consumer surplus generated from UPC's MMDS subscribers is calculated for the period 2010–2019. Added to this is the consumer surplus generated from UPC's MMDS subscribers who migrate to BSkyB. We assumed that 90% of subscribers who leave UPC's MMDS service will migrate to BSkyB. As in the commercial model, we assumed that these subscribers will migrate to BSkyB gradually between 2010 to 2014.
- The difference in total consumer surplus between Scenario A and Scenario B was calculated, and an NPV (2010–19) of this was calculated.
- This NPV is equivalent to the loss in consumer surplus if UPC's licences are not renewed.

In calculating the loss of consumer surplus we made the following assumptions:

- UPC's ARPU was assumed to be EUR32.5 in 2009, increasing gradually to EUR35.4 in 2019
- BSkyB ARPU was assumed to be EUR39.2 in 2009, increasing at the same rate as UPC's ARPU to EUR42.8 in 2019. In 2009, BSkyB's reported blended ARPU for the UK and Ireland was EUR41, including broadband and telephony services. Assuming that the 18% of BSkyB's customers who subscribe to broadband and telephony services spend EUR10 per month on these services; video ARPU would be EUR39.2

- The assumed choke price[17] is EUR65.8 in 2010, increasing at the same rate as UPC's ARPU to reach EUR70.9 in 2019. The choke price for 2010 was calculated using UPC's 2010 ARPU, UPC 2010 revenue-generating unit (RGUs) and an assumed elasticity of –1

- Subscriber forecasts for UPC were taken from the commercial model, described above in the *Producer Surplus* section of this annex.

VAT

BSkyB does not pay VAT in Ireland but UPC does, and so if UPC closes down its MMDS service its subscribers are likely to migrate to BSkyB or possibly a cheaper DTT service, which would result in lower VAT income for the Irish government.

In Scenario B, where UPC's licences are not renewed, most (though probably not all) of the MMDS subscribers will migrate to BSkyB. We have calculated the revenues that these migrating subscribers would have generated with UPC; these revenues will not be subject to VAT as BSkyB is not expected to pay VAT in Ireland until 2015. From this, we calculated the value of VAT lost to Ireland from the closure of UPC's MMDS service. In quantifying this, we made the following assumptions:

- 90% of subscribers who leave UPC's MMDS subscribe will migrate to BSkyB

- In calculating the revenues that subscribers who migrate to BSkyB would have generated if they stayed at UPC, we applied 21% VAT to derive the annual value of VAT lost to Ireland. (Note that this will only apply until 2014, as it is likely that BSkyB will have to pay VAT in Ireland from 2015)

- We calculated a ten-year NPV (2010–19) of the potential VAT lost.

UPC expenditure

In the scenario where UPC's licences are not renewed and its MMDS business closes, the benefits to Ireland from the indirect costs from the MMDS business will be lost. The annual value of these indirect costs over the period 2010–2019 is taken from the commercial model.

Most of UPC's indirect costs for MMDS have a benefit to Ireland. Each indirect cost category is shown in the following table, as well as the percentage of that cost which is assumed to have an economic benefit to Ireland.

17 A choke price is the price at or above which demand falls to zero.

Indirect cost	*% of cost that is of benefit to Ireland*
Network operations	80%
Customer operations and customer care	100%
Billing and collection	100%
General and administrative	100%
Marketing	100%

Figure A.5: UPC's MMDS indirect costs that have an economic benefit to Ireland [Source: Analysys Mason, UPC]

Considering each of Scenario A and Scenario B separately, we took the forecast indirect costs from the commercial model and then applied the percentage of cost that is of benefit to Ireland (in Figure A.5) to these costs. From this, we calculated the total indirect costs from UPC's MMDS operations that benefit Ireland over the period 2010–2019.

For each year, we subtracted the value in Scenario B from the value in Scenario A to calculate the total indirect costs lost to Ireland from the closure of UPC's MMDS service.

We calculated a ten-year NPV (2010–2019) of the total indirect costs lost to Ireland.

Consumer disruption

In Scenario B, where UPC's licences are not renewed, the resulting closure of its MMDS service will be disruptive to existing subscribers. We have identified three areas of cost from consumer disruption:

- **Cost of new equipment for subscribers**: in Scenario B, it is assumed that most subscribers will migrate to BSkyB. For new BSkyB subscribers who do not take up the HD service, there is a EUR49 charge for new equipment (a set-top box). It is assumed that of the subscribers migrating to BSkyB (assumed to be 90% of MMDS subscribers, as detailed above), 50% will choose not to take up the HD service. We have calculated the total annual cost of this new equipment, and have calculated a ten-year NPV of the equipment costs.

- **Cost of equipment repair**: after a one-year warranty period, BSkyB charges EUR100 per technician visit if a subscriber's set-top box needs repair. UPC does not make an equivalent charge. In Scenario B, for UPC's MMDS subscribers who migrate to BSkyB it is assumed that 5% of boxes fail each year, after the first-year warranty period. We calculated the total annual cost for equipment repair for the period 2010–2019, and a ten-year NPV of the equipment repair costs.

- **Other avoidable costs**: this includes the time value of selecting and ordering a new service, the time value and potential costs of installing a new service, the time value of changing payment methods (e.g. direct debit) and the time value of learning how to use a new service. It is assumed that the disruption per MMDS subscriber leaving is equivalent to five hours. Assuming that the average salary of a subscriber is EUR25 000, the total cost per person is estimated to be EUR14.3. Using the subscriber forecasts in the commercial model, we were able to calculate the annual cost of disruption, and a ten-year NPV of the disruption costs.

Annex B: Quantification of economic benefits from use of 2.6GHz band for mobile broadband

This annex details our methodology and the assumptions we made in quantifying the economic benefits from using the 2.6GHz band to provide mobile broadband services. For each benefit, we have modelled two scenarios:

Scenario	*Description*
A: UPC's 2.6GHz licences are renewed	• 2.6GHz spectrum not used for mobile broadband • Three mobile operators launch LTE with 1800MHz (and 800MHz in rural areas) • One mobile operator launches LTE with 800MHz only • No mobile WiMAX operator using 2.6GHz band
B: UPC's 2.6GHz licences are **not** renewed	• Four MNOs launch LTE with 2.6GHz/1800MHz in urban areas (and 800MHz in rural areas) • One WiMAX operator launches with 2.6GHz

Figure B.1: Mobile broadband scenarios modelled [Source: Analysys Mason]

The identified categories of economic benefit and their respective values are summarised in the following table:

	Scenario A (EUR million)	*Scenario B (EUR million)*
Producer surplus	52.3	36.2
Consumer surplus	126.3	142.5
VAT	0.0	0.4

Figure B.2: Economic benefit from mobile broadband services [Source: Analysys Mason]

Throughout the economic analysis we have used a 3.5% discount rate, which represents a typical treasury social rate.

Below, we provide more detail of our methodology and assumptions for calculating each category of economic benefit.

Producer surplus

To calculate the producer surplus from mobile broadband services, we developed a model to calculate the incremental free cashflow from mobile broadband. Figure B.3 provides an overview of the model structure.

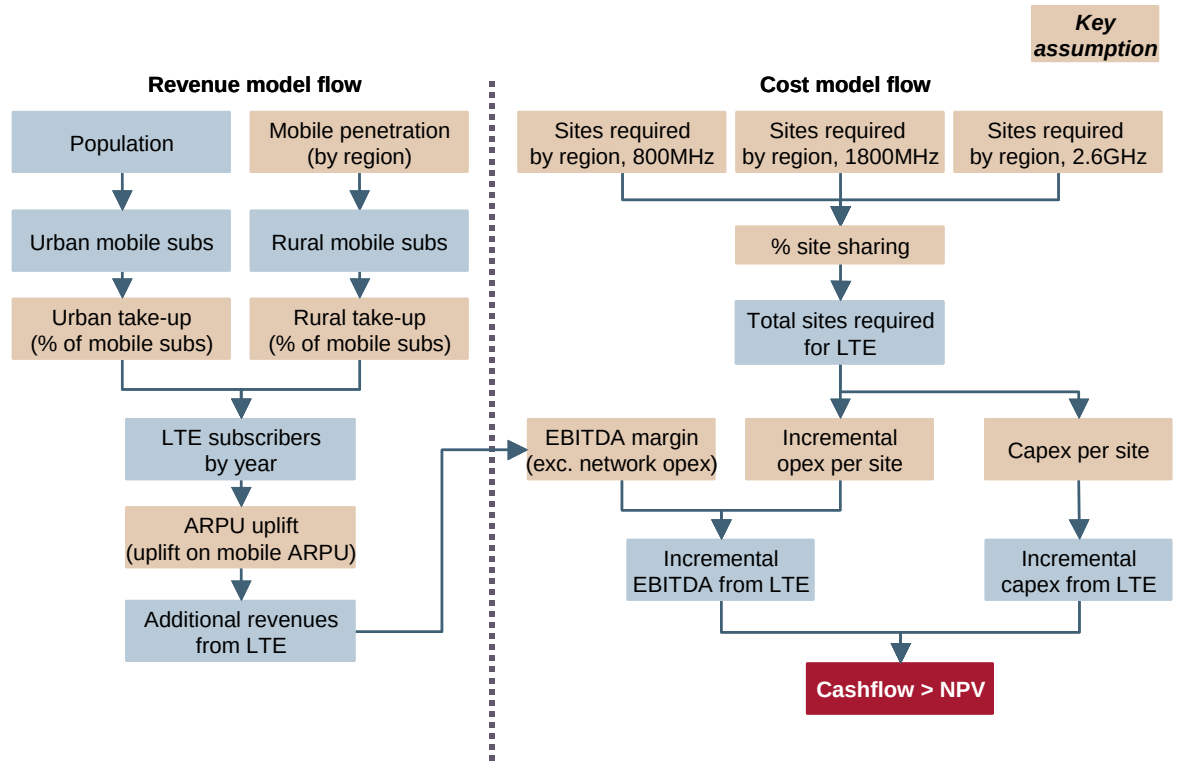


Figure B.3: Model of free cashflow from mobile broadband services [Source: Analysys Mason]

Mobile broadband revenues are driven by an assumed percentage take-up of mobile broadband by mobile subscribers and a percentage uplift on ARPU. We made a number of key assumptions:

- Mobile subscriber forecasts assume that mobile penetration increases from 117% in 2009 to 130% in the long run; it is assumed that mobile penetration is highest in Dublin, followed by Cork, then Galway, Limerick and Waterford, with rural Ireland having the lowest penetration
- In both scenarios, next-generation mobile broadband is assumed to be launched in Ireland from 2014
- In Scenario A, where 2.6GHz is not available, it is assumed that mobile operators use 1800MHz or 800MHz for LTE
- In Scenario A, an ARPU uplift of 10.0% is assumed for mobile broadband services in 2014, declining slowly to 8.7% in the long run; this is equivalent to an incremental ARPU of EUR3.1 in 2014, declining to EUR2.7 in the long run
- In Scenario B, an ARPU uplift of 9.4% is assumed for mobile broadband service in 2014, declining slowly to 8.2% in the long run; this is equivalent to an incremental ARPU of EUR2.9 in 2014, declining to EUR2.6 in the long run

  - The ARPU uplift is expected to be lower in Scenario B than Scenario A, due to the higher level of competition in the mobile broadband market in Scenario B

- In Scenario A, the take-up of mobile broadband in the first year of launch is assumed to be 4.6% in urban areas and 3.7% in rural areas, increasing to around 100% in the long run
- In Scenario B, the take-up of mobile broadband in the first year of launch is assumed to be 4.9% in urban areas and 3.9% in rural areas, increasing to around 100% in the long run
  - The early take-up of mobile broadband services is expected to be higher in Scenario B than Scenario A due to the higher level of competition in the mobile broadband market in Scenario B

Mobile broadband costs are driven by the number of new network sites. Our key assumptions are:

- In Scenario A, it is assumed that an equivalent of 3.5 full networks are built, with the fourth service provider having a less extensive network than its competitors
- In Scenario B, it is assumed that an equivalent of 4.5 full networks are built, with the WiMAX operator building a less extensive network than the four competing LTE mobile operators
- Each full competitor is assumed to require 800 urban LTE sites and 700 rural sites
- It is assumed that 50% of sites are built in the first year of LTE launch, increasing to 80%, 90% and 100% in the second, third and fourth years of operations, respectively
- 25% of sites in urban areas and 50% of sites in rural areas are assumed to be shared
- Capex per site is assumed to be EUR20 000
- Incremental opex per site is assumed to be EUR200.

Using the modelled revenues and costs, the free cashflow from mobile broadband services can be calculated in both scenarios. A ten-year NPV (2010–2019) is calculated for the free cashflow, which is equivalent to the producer surplus.

Consumer surplus

For both scenarios, the consumer surplus generated from mobile broadband services is calculated using the total incremental revenues from mobile broadband services and a choke price.

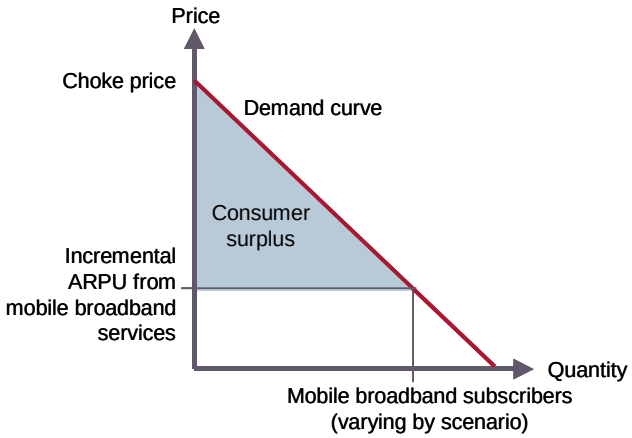


Figure B.4: Approach to estimation of consumer surplus [Source: Analysys Mason]

In calculating the consumer surplus we made the following assumptions:

- Annual mobile broadband ARPU and subscribers are taken from the model (assumptions detailed above in the *Producer surplus* section)
- A choke price is calculated assuming an elasticity of –1; the choke price in 2014 is assumed to be EUR5.9 per month.

VAT

The use of 2.6GHz spectrum for mobile broadband services may generate additional value to Ireland from increased VAT receipts. If the availability of 2.6GHz spectrum for mobile broadband services leads to higher market revenues, from a small incremental rise in subscriber take-up, a larger amount of VAT would be generated. To quantify this, we have modelled the VAT that would be paid on the revenues in both scenarios, and calculated a ten-year NPV (for the period 2010–19). The difference between the two NPV values is equivalent to the incremental value from VAT of using 2.6GHz spectrum for mobile broadband services in Ireland.

Annex 3: Presentation by Dr. Eetu Prieur, Elisa, at the LTE World Summit, Amsterdam, 18th May 2010

Coverage Optimized Mobile Broadband Solutions: UMTS900 with HSPA Evolution and LTE1800

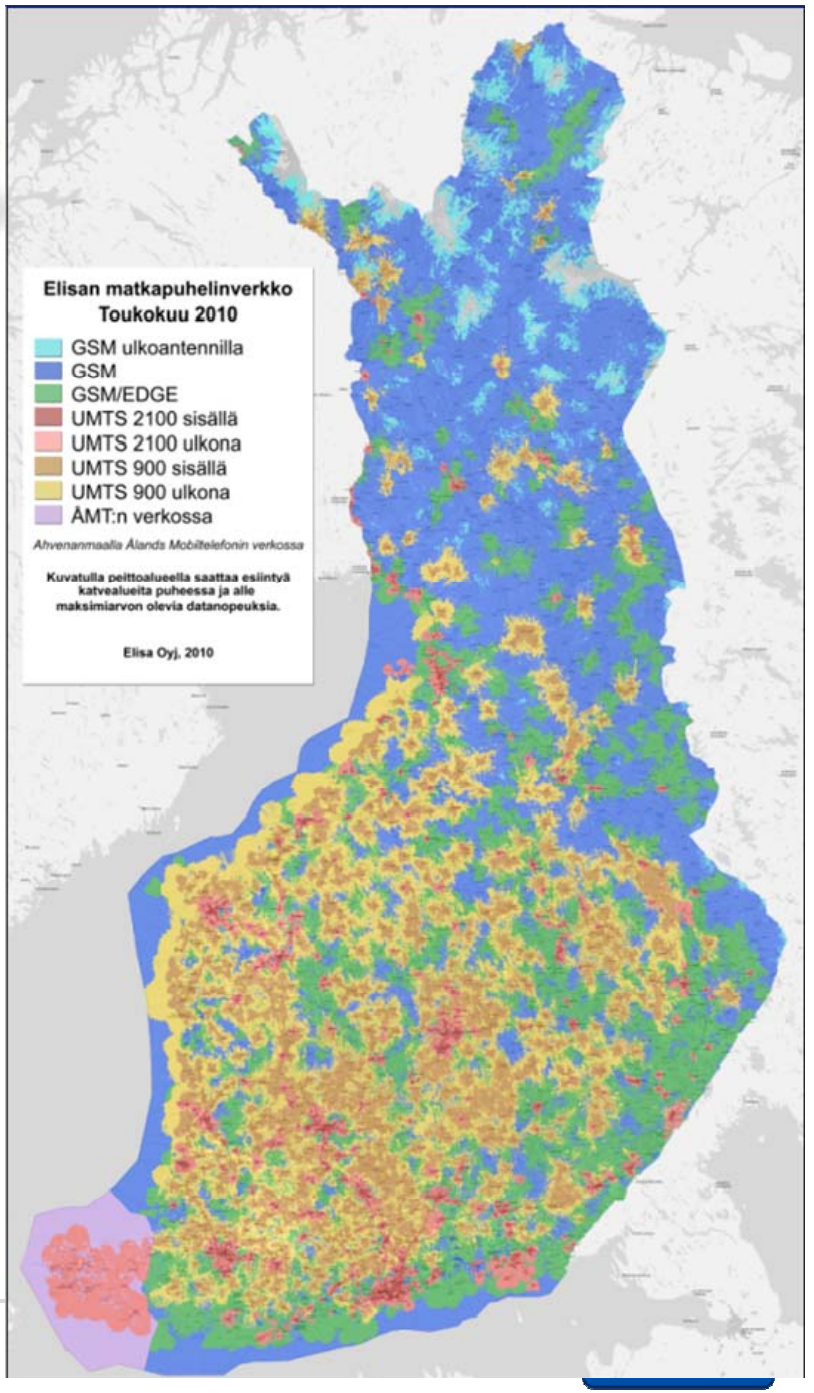
LTE World Summit, Amsterdam

18.5.2010

Dr. Eetu Prieur, Elisa

Elisa-Finland in brief

- Founded 1882
- World's first GSM network launched in 1991
- Revenue in 2009 was EUR 1.5 billion
- The number of personnel is 3 000
- 3 million mobile subscriptions, 38% market share, market leader (Finland: 5.4M inhabit., 17 per km^2)
- 1.2 million fixed subs (market leader) including 0.5 million ADSL subs (market leader)
- HSDPA 21 Mbps and HSUPA 5.7 Mbps
- World's first UMTS900 network launched in 2007
- LTE license for both 1800 and 2600 MHz in 2010
- Subsidiary in Estonia, both for mobile and fixed



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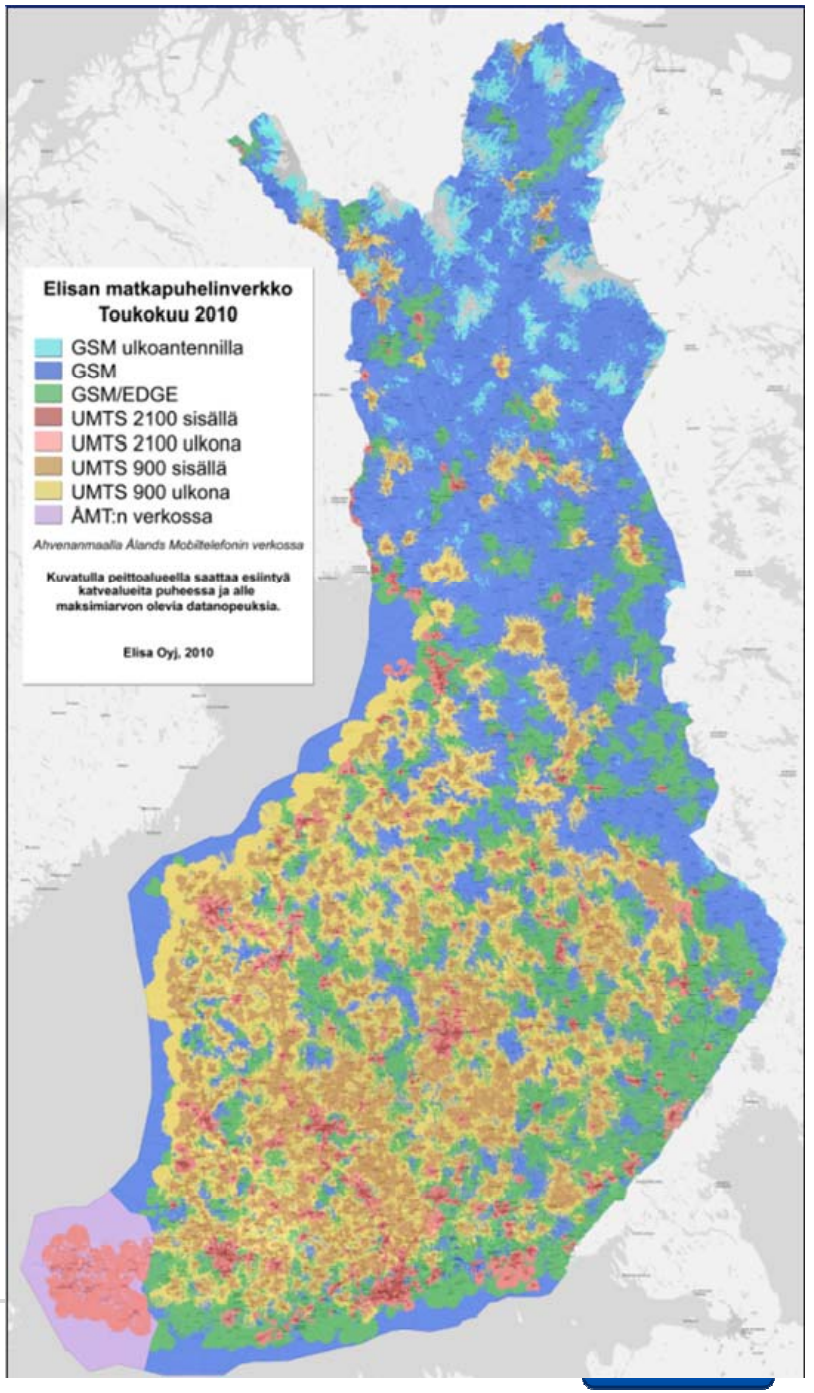
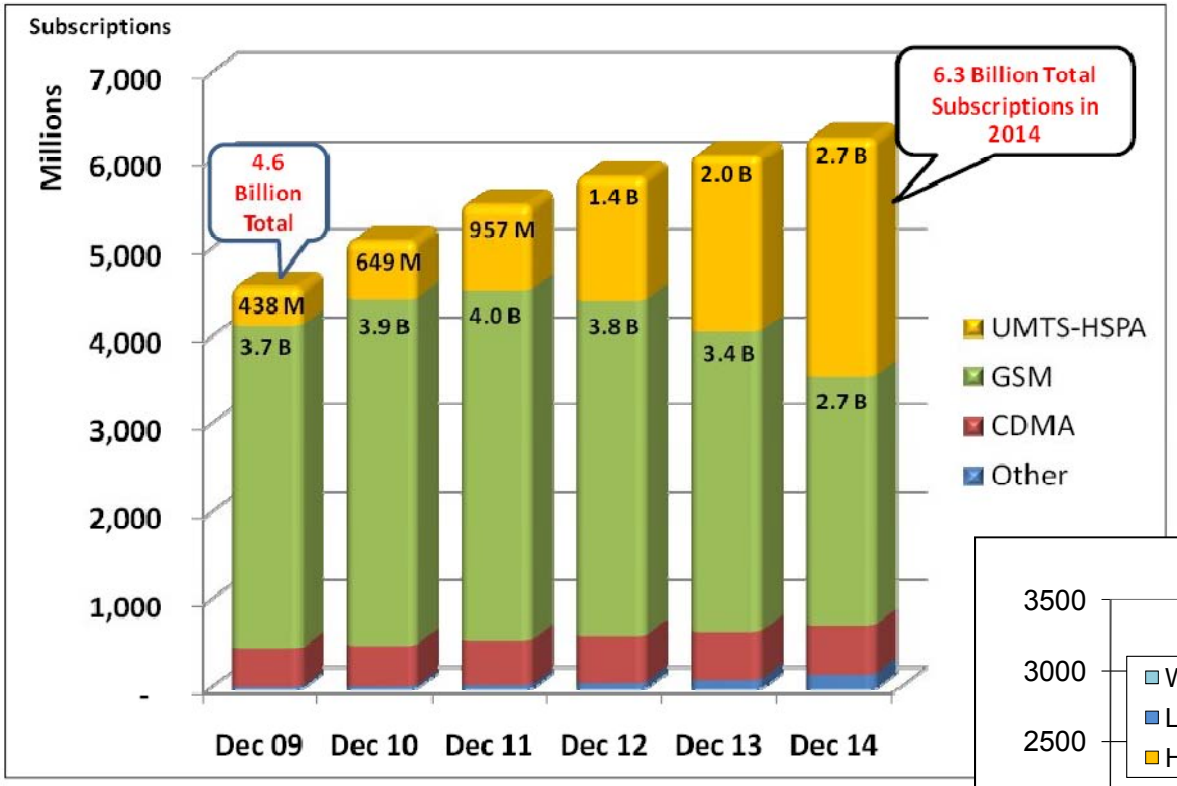


Wireless broadband forecasts: HSPA domination

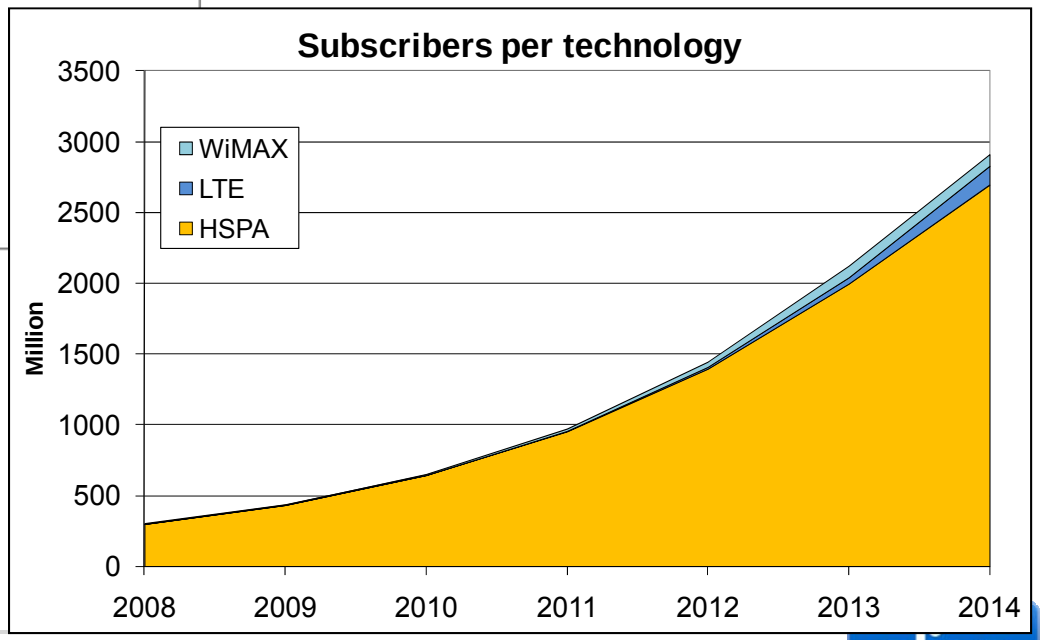


	2008	2009	2010	2011	2012	2013	2014
WiMAX	0.5	2.8	7.5	16.7	37.1	82.1	
LTE	0.0	0.0	0.5	3.5	13.1	44.5	131.5
HSPA	304	438	649	957	1400	2000	2700

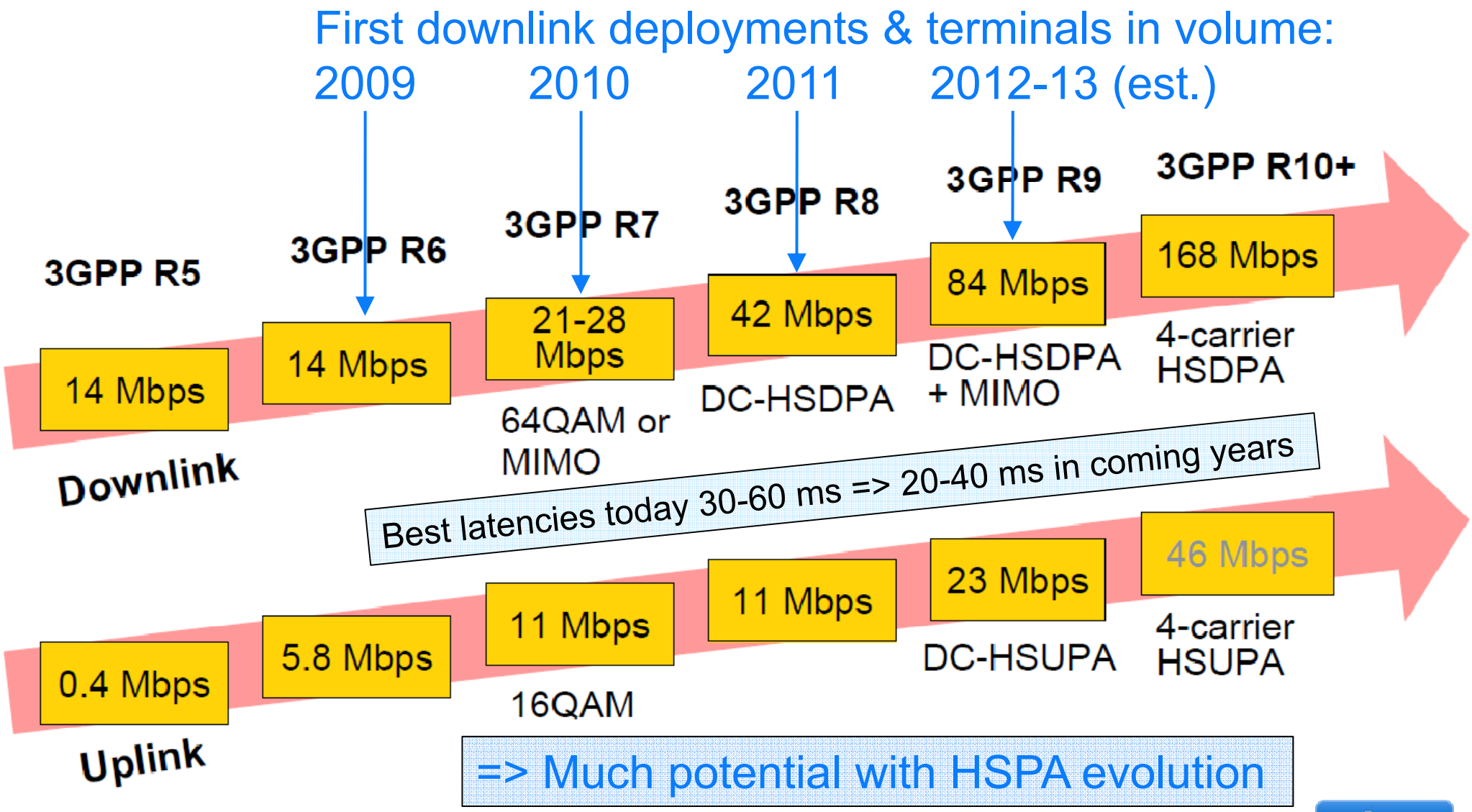
Source: Informa Telecoms & Media, WCIS+, June 2009

HSPA mass market:

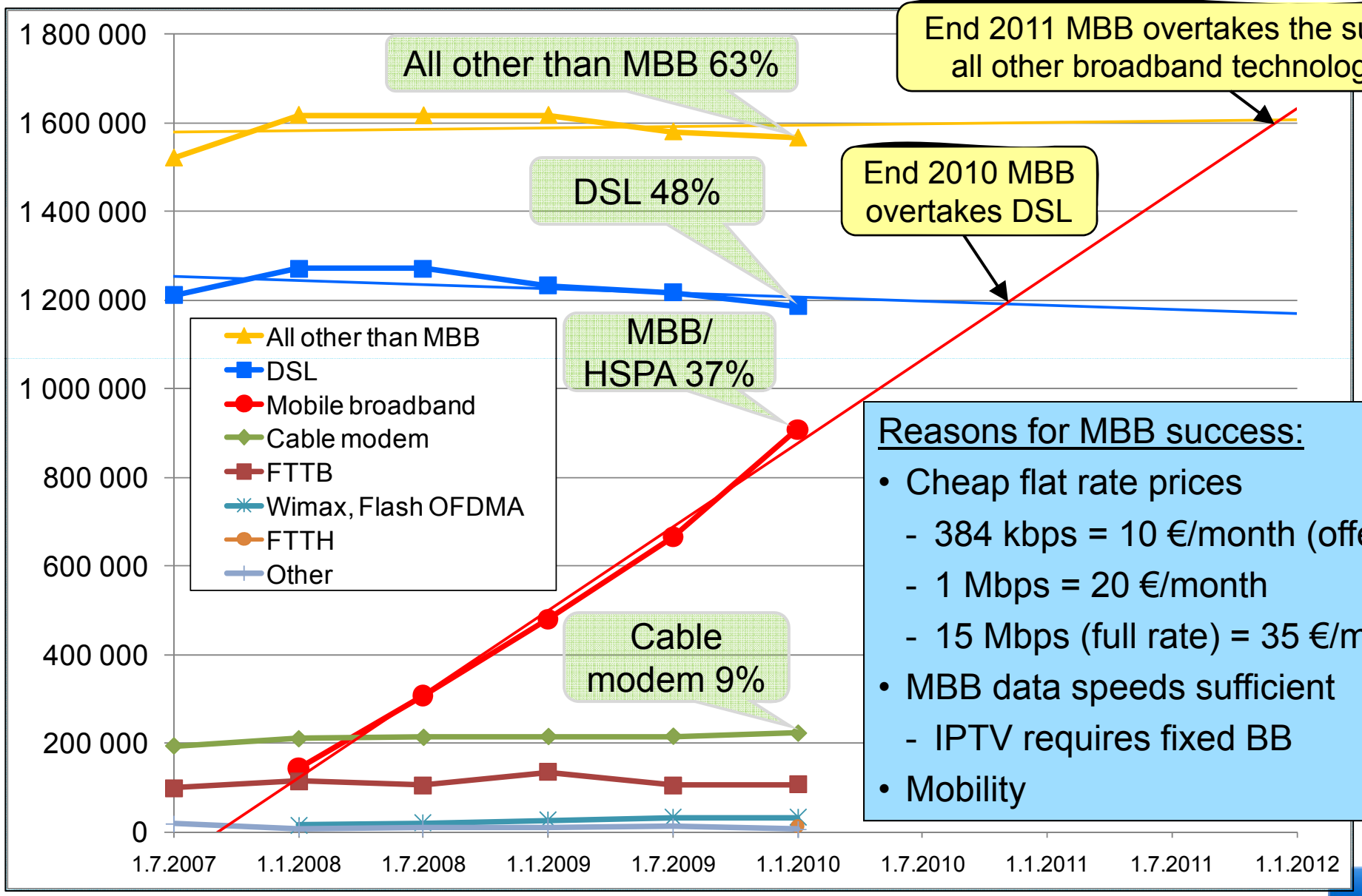
- Big variety of terminals + low cost
- Existing networks + evolution
- Available spectrum + UMTS900
- Sufficient user experience so far



HSPA evolution, theor. max. user speed and carrier capacity



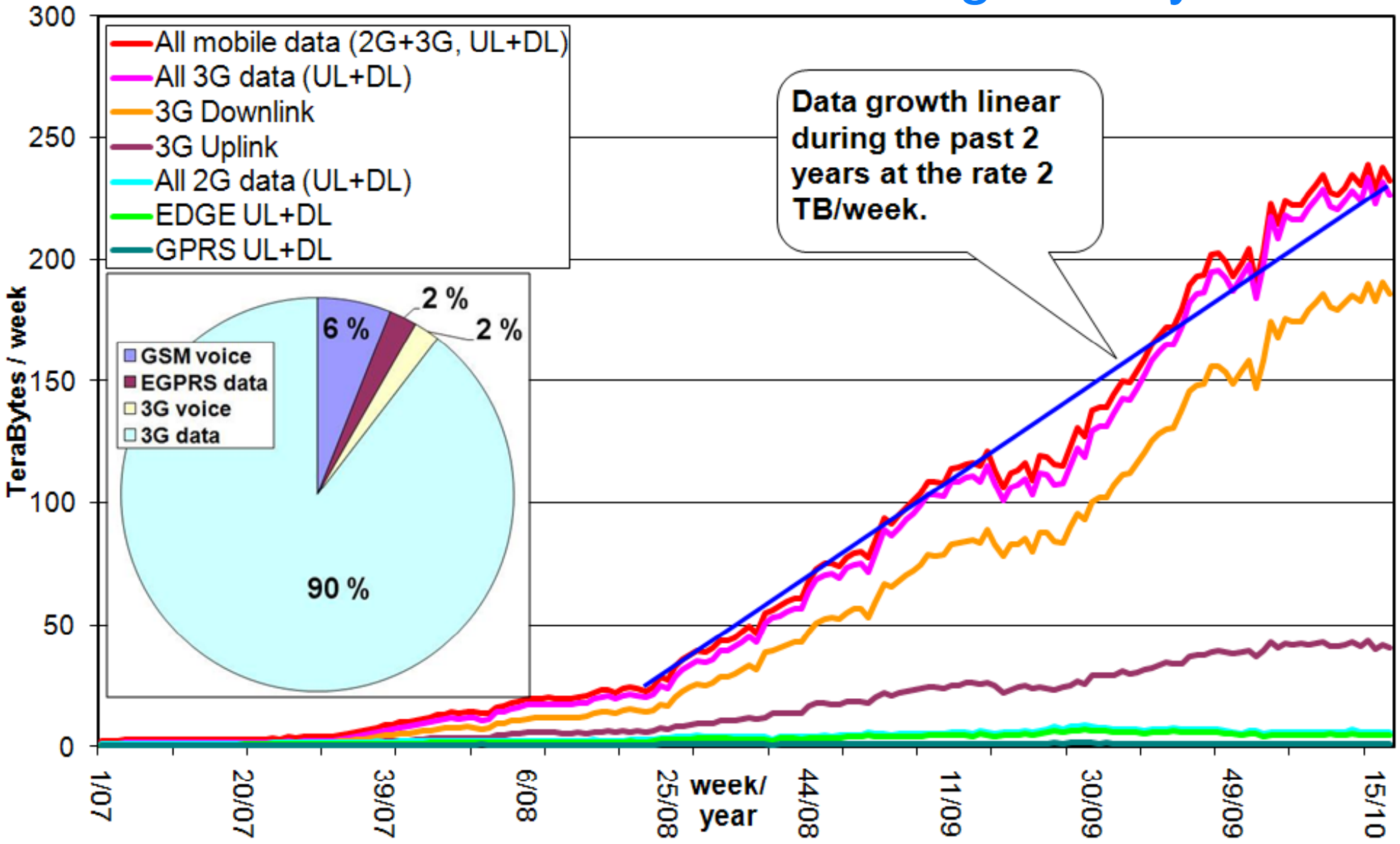
Broadband subscriptions in Finland



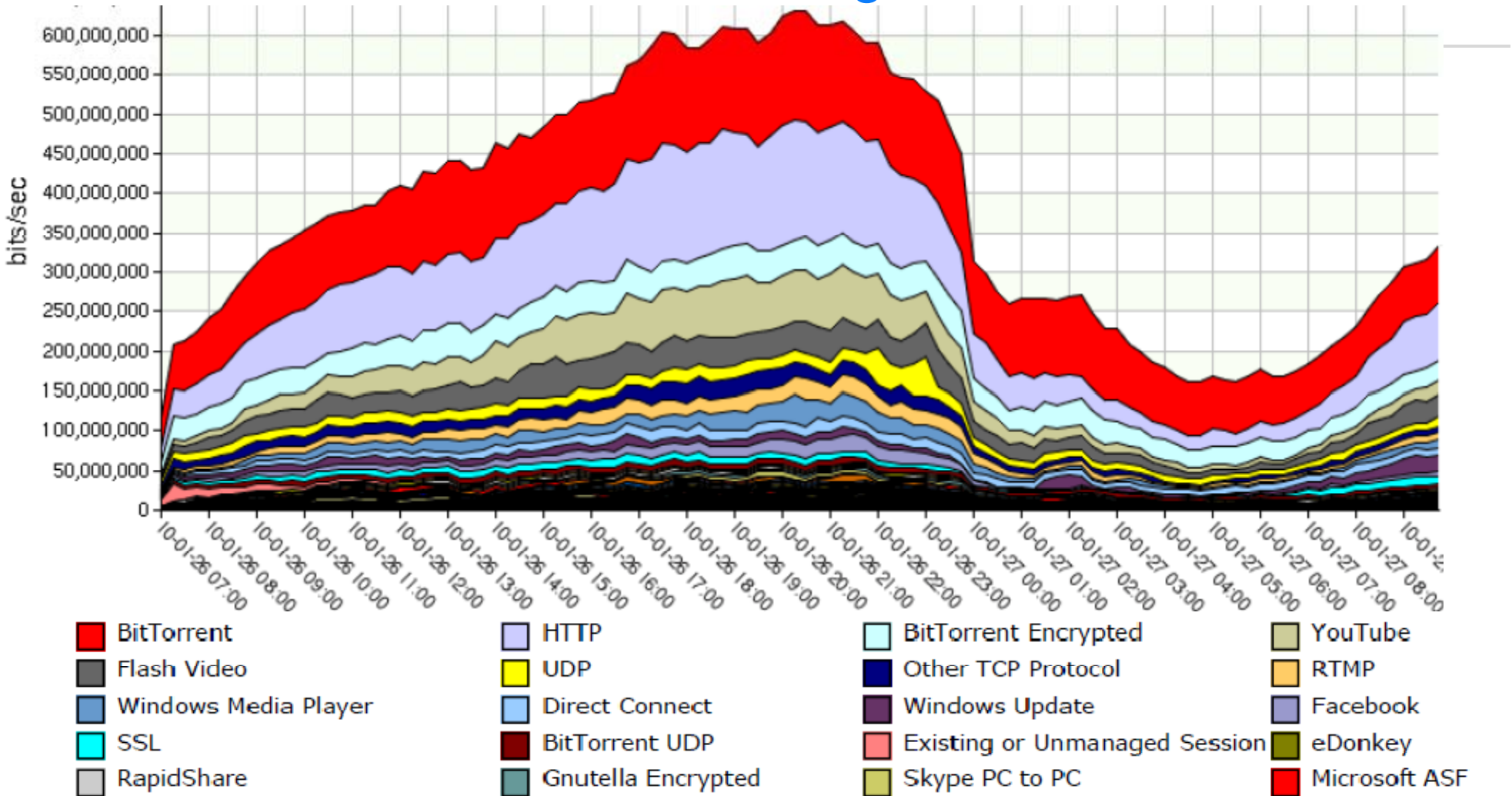
Reasons for MBB success:

- Cheap flat rate prices
  - 384 kbps = 10 €/month (offer 5€!)
  - 1 Mbps = 20 €/month
  - 15 Mbps (full rate) = 35 €/month
- MBB data speeds sufficient
  - IPTV requires fixed BB
- Mobility

3G mobile data traffic still increasing heavily



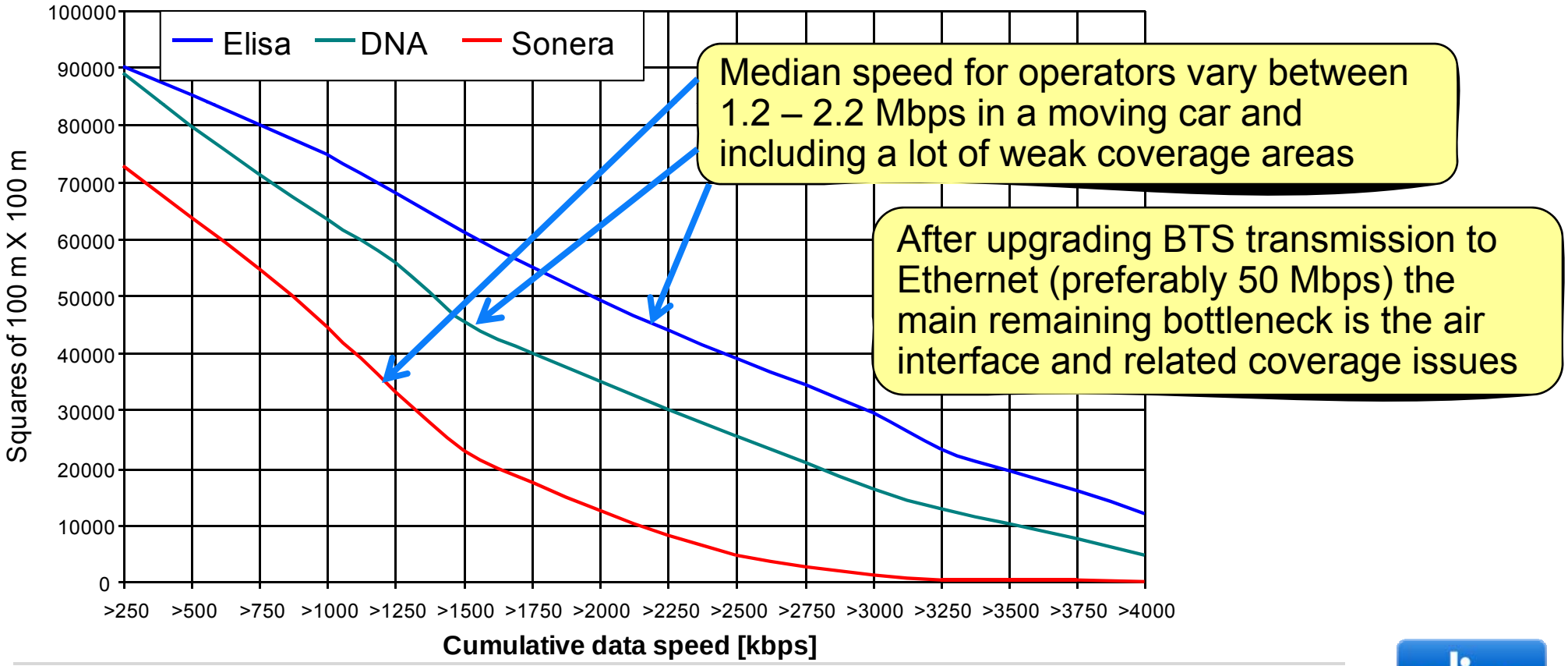
Downlink traffic distribution during 27 hours in one GGSN



- Downlink: streaming, peer-to-peer and web browsing each about 30%
- Uplink: peer-to-peer at least 60%, web browsing about 10%, streaming 5%
- **QoS mechanisms** in RAN applied to protect premium users

Comparison of data speeds in Finnish 3G networks

- Measurements made by European Communications Engineering (http://www.eceltd.com)
- Drive tests with over 12 000 kilometers in Finland, measurements mainly in the moving car
- Download of 50 MB file repeatedly, using 3 USB modems connected to 3 laptops
- Car was driven in the main roads inside and outside of 100 cities until 3G coverage was ended
- One measurement point is the average of the data speeds in one 100 m X 100 m square



HSPA+ offers enormous network capacity

ADSL analogy:

- ADSL 2010: 500 000 homes, BH-traffic 35 Gbps → 70 kbps/home
- Assume similar mobile data usage: 70 kbps/user (20 GB/month/user)
- Assume 1000 subs/BTS → BH-traffic 70 Mbps/BTS
- HSPA+ capacity in loaded network about 8 Mbps/sector

  → 3+3+3 configuration HSPA+ base stations would be sufficient

Heavy assumption!

Remarks:

- 1000 subs/BTS is a relatively high value, especially outside urban areas
- Fixed broadband takes much of the traffic load + possible offload to LTE
- Quality of service (QoS) can help manage the traffic load
- BTS transmission capacity: possible bottleneck, Ethernet is the only choice!

=> HSPA+ network capacity satisfies most traffic predictions for the coming years. In many cases the most critical issue is **the coverage**.

Demand for HSPA coverage everywhere

- Customers getting more and more dependent on the internet access
- Mobility getting increasingly important
- Increasing demand to have HSPA coverage everywhere, also rural areas
- (Mobile) internet used mostly indoors
- Comparison to GSM voice service: it's needed everywhere

=> HSPA (or mobile internet) should work everywhere!

- UMTS2100 and other high spectrum technologies have tough business case
- UMTS900 suits here very well!

Why UMTS900 (or HSPA at 900 MHz)?

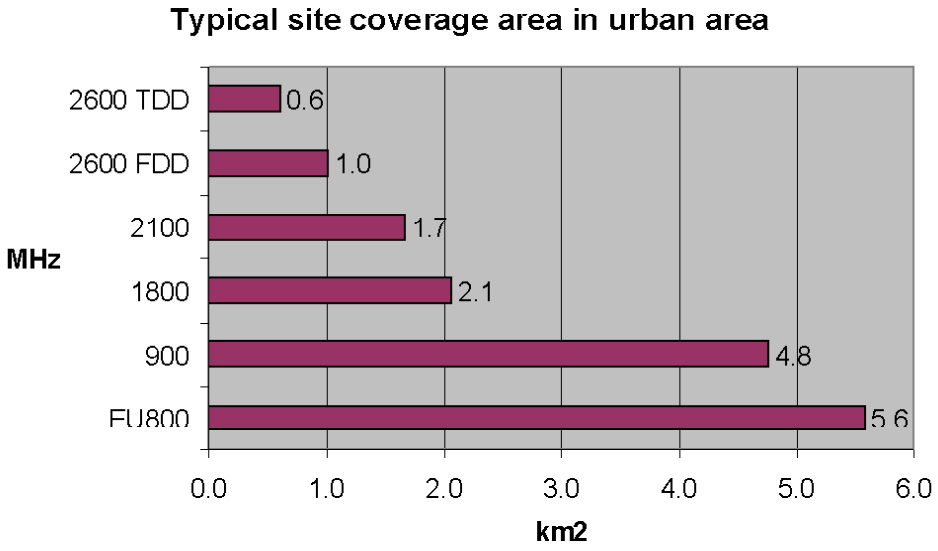
In principle, only for one reason:

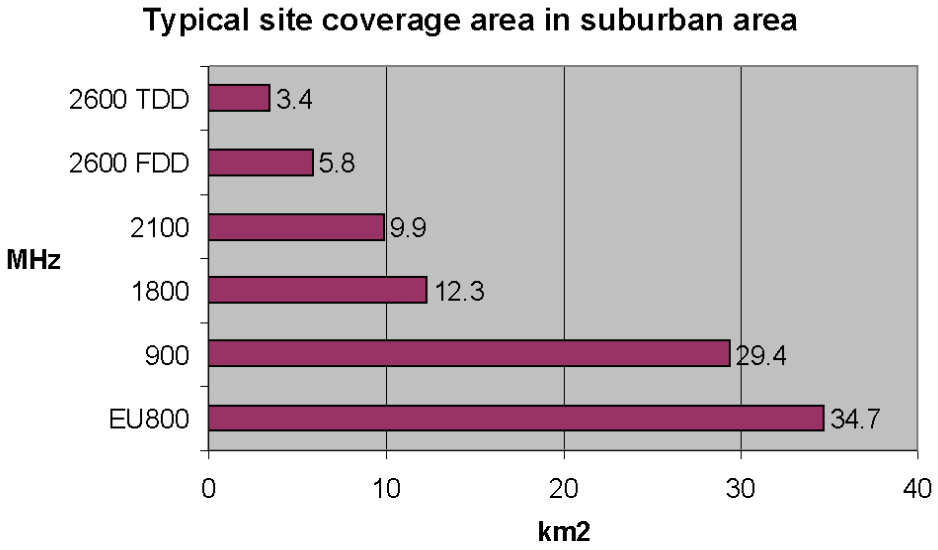
- Network costs for HSPA coverage at 900 MHz can be only about one third compared to the costs for HSPA coverage at 2100 MHz
- Especially attractive for rural area HSPA coverage

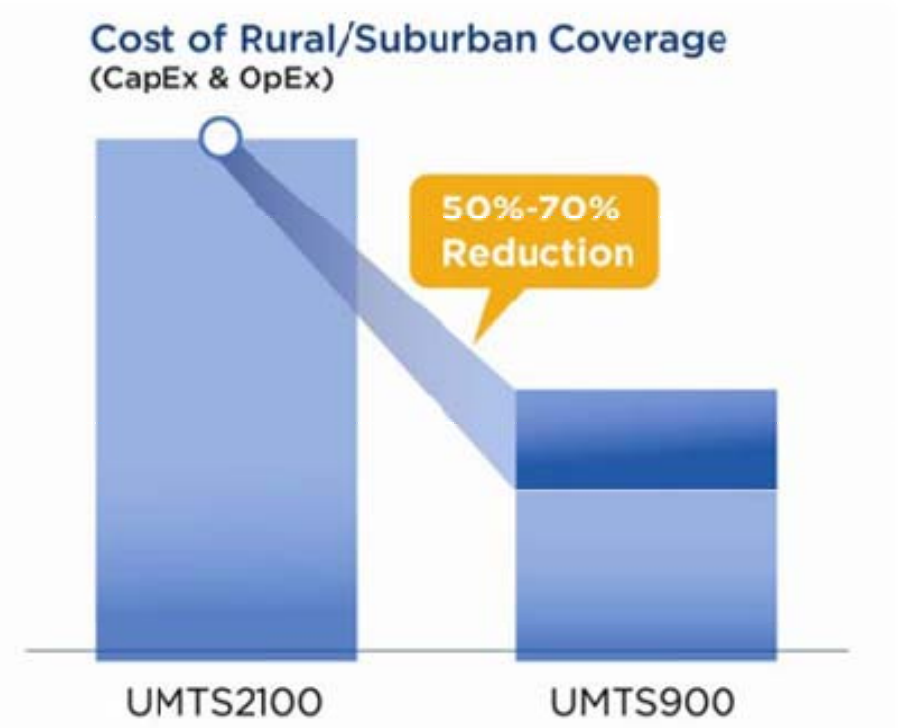
Other reasons:

- Better indoor coverage in urban areas (10 .. 20 dB)
- Possible to reuse existing GSM900 sites and infrastructure => relatively easy rollout for an existing GSM900 operator (typically GSM voice coverage area corresponds to 1 Mbps data coverage area for UMTS900)

Coverage Impact of the Spectrum

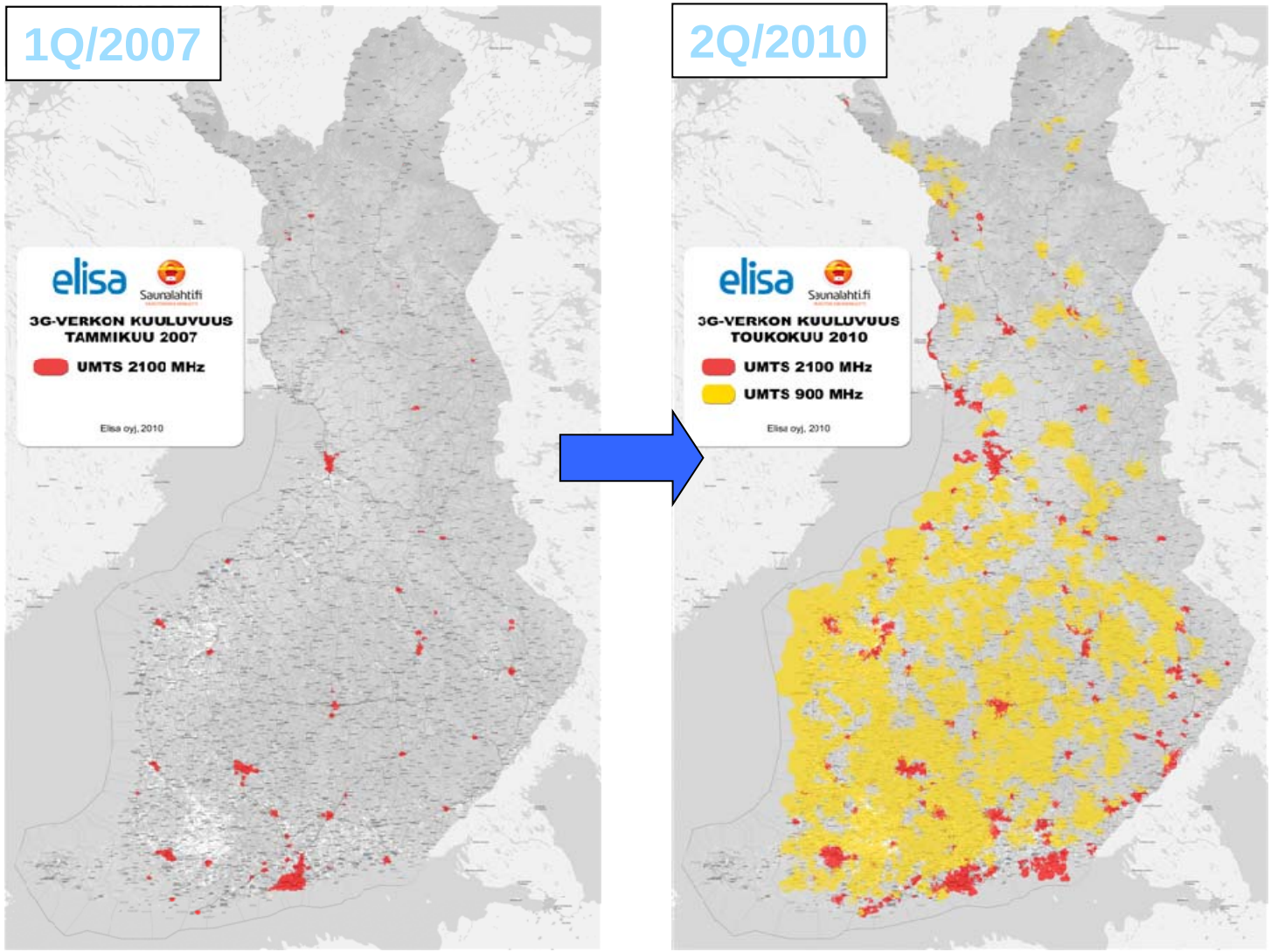






Mobile network <u>costs are proportional to the number of sites</u> => larger coverage area means less costs

Elisa 3G coverage 2007-2010



= UMTS900
= UMTS2100

3 times more UMTS2100 sites compared to UMTS900 sites.

Still UMTS900 has much larger coverage area.

Field Experience of UMTS900

Item under analysis	Expected performance	Verified
Coverage area compared to UMTS 2100 MHz	3 times larger	3...5 times larger
Indoor coverage compared to UMTS 2100 MHz	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 UMTS2100 MHz cell edge	Doubled	More than doubled
1 Mbps coverage area for UMTS900	Similar to voice coverage area for GSM900	Verified

≥ 14 networks, refarming ≥ 24 countries, devices ≥ 300

UMTS900 deployment status
www.gsacom.com

Country	Operator	Status
Australia	Optus	Launched
Australia	Vodafone	Launched
Belgium	Mobistar	Launched
Belgium	Proximus	Launched
Bulgaria	Globul	Testing
Estonia	Elisa	Launched
Finland	Elisa	Launched
Finland	DNA	Launched
Finland	TeliaSonera	Launched
France	SFR	Pilot network
Ghana	MTN Ghana	In deployment
Greece	Cosmote	Testing
Greenland	Tele Greenland	In deployment
Hong Kong	CSL Limited	In deployment
Iceland	Siminn	Launched
Latvia	LMT	Launched
New Zealand	Vodafone	Launched
Norway	TeleNor	Planned
Norway	Netcom	Planned
Poland	Aero2	Launched
Russia	All operators	Trials
South Africa	Cell C	In deployment
Spain	Telefonica	Testing
Sweden	3	In deployment
Thailand	AIS	Launched
Thailand	DTAC	In deployment
Venezuela	Digitel	Launched

Refarming status
www.gsacom.com

Country	Re-farming status
Australia	UMTS900 is allowed
Belgium	UMTS900 is allowed
Estonia	UMTS900 is allowed
Finland	UMTS900 is allowed
France	UMTS900 is allowed
Germany	Under consideration
Ghana	UMTS900 is allowed
Greece	Under consideration
Greenland	UMTS900 is allowed
Hong Kong	UMTS900 is allowed
Iceland	UMTS900 is allowed
Indonesia	UMTS900 is allowed
Ireland	Under consideration
Italy	UMTS900 is allowed
Latvia	UMTS900 is allowed
New Zealand	UMTS900 is allowed
Norway	UMTS900 is allowed
Poland	UMTS900 is allowed
Portugal	Under consideration
Romania	UMTS900 is allowed
Russia	Under consideration
Saudi Arabia	UMTS900 is allowed
Singapore	UMTS900 is allowed
Spain	Under consideration
South Africa	UMTS900 is allowed
Sweden	UMTS900 is allowed
Switzerland	UMTS900 is allowed
Thailand	UMTS900 is allowed
UAE	UMTS900 is allowed
UK	Under consideration
Venezuela	UMTS900 is allowed

EU frees new spectrum for new and faster mobile services

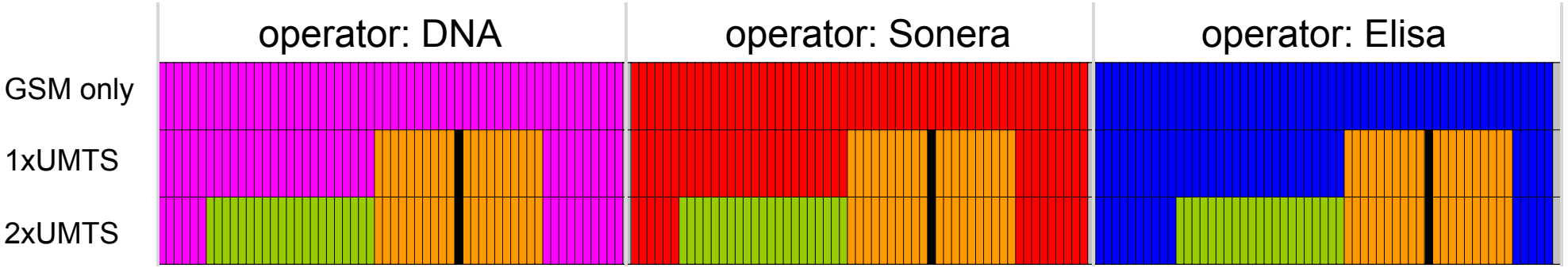
http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1192&type=HTML&aged=0&language=EN&guiLanguage=en

Brussels, 27 July 2009
Europe took an important step towards a new generation of mobile services today. The Council of Ministers followed the European Parliament in approving a proposal from the European Commission to modernise European legislation – the so-called GSM Directive – on the use of the radio spectrum needed for mobile services. The updated Directive now allows the 900 MHz frequency band to be used to provide faster, pan-European services such as mobile internet while ensuring the continuation of GSM services. Industry **savings of up to € 1.6 billion** are expected from the reform of the GSM Directive. The renewed Directive will enter **into force this October**.

321 UMTS900 devices announced (GSA 7.4.2010). Number more than doubled in 9 months.

900 MHz Allocation and Refarming in Finland

- 11.4 MHz or 57 GSM carriers per operator (DNA 58)
- Each operator has allocated UMTS900 carrier in such a way that 2nd UMTS carrier can be activated later without moving 1st carrier.
  - 2nd carrier assumes that GSM900 traffic must be very low. We can have max 16 GSM carriers together with 2xUMTS, which implies max GSM 1+1+1
  - the use of AMR HR and 1800 MHz makes refarming easier (later possibly Orth. Sub Channel)

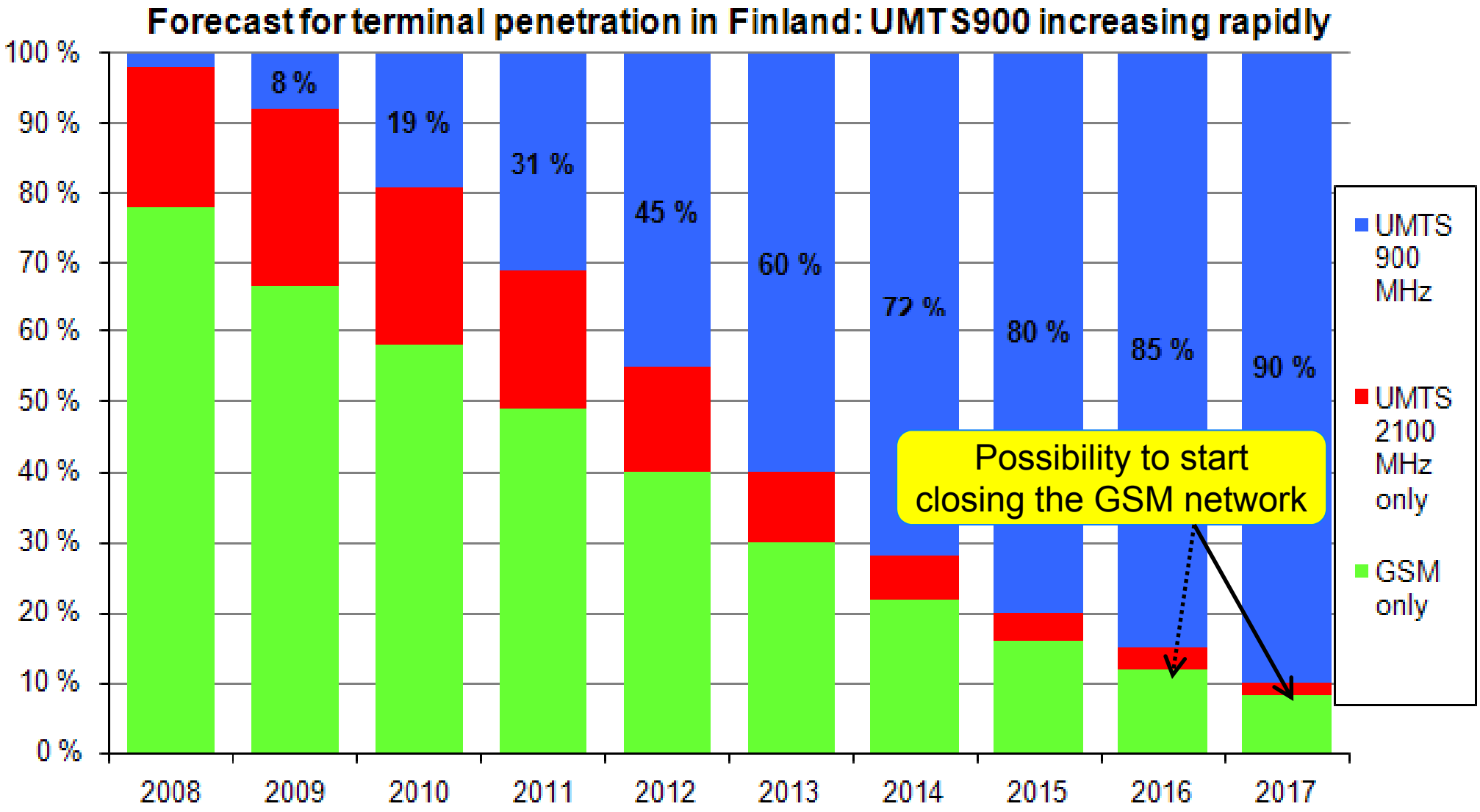


= DNA
= Sonera
= Elisa
= Current UMTS900 center frequency
= Current UMTS900 channel occupancy (4.2 MHz)
= Potential future 2nd UMTS900 carrier (4.2 MHz)
= Guard carrier

⇒ Possibility for dual cell UMTS900
⇒ Theor. max. peak bit rate of 84 Mbps, similar speed to LTE using 10 MHz bandwidth which is the assumed case at LTE coverage band (800 MHz or digital dividend)

A possible scenario for terminal penetration in Finland

- UMTS900 in practically every 3G terminal => penetration gets very high



LTE1800 – promising option for many markets

+ Main motivation: coverage area about 2X larger than LTE2600.
+ Possibility to reuse antenna lines of UMTS2100 or GSM1800.
+ Possibility to deploy multi-RAN BTS with simultaneous LTE&GSM.
+ 1800 MHz (ITU band 3) widely available in Europe and APAC.
+ Not big regulatory issues: 1800 band often technology neutral.

+ Spectrum need for full LTE data speed 18.4 MHz when GSM and LTE base stations at same sites (coordinated case).
+ Often easier to refarm than 900 MHz.

Coordinated GSM-LTE case	Required spectrum
20 MHz LTE	18.4 MHz
15 MHz LTE	13.8 MHz
10 MHz LTE	9.4 MHz

- Terminal availability 6-12 months after LTE2600: not a real issue.
- LTE1800 can be estimated to be ready for mass market in 2012 with first network deployments and terminals in volume.

=> LTE1800: promising and available for mass market in time

Summary

- HSPA can offer sufficient speed and capacity for the coming years.
- HSPA service needed everywhere, coverage often an issue.
- UMTS900 saves max. 50-70% of costs in rural/suburban areas.
- UMTS900 a proven solution already with 10+ commercial networks.
- UMTS900 improves coverage also in urban areas.
- Former issues with regulation and terminals practically solved.
- Refarming is time consuming but worth the effort.
- LTE1800 provides 2 times larger coverage area than LTE2600.

=> UMTS900 is a 100% clear go, the focus is now on the details for the most efficient deployment.

=> When LTE needed, LTE1800 is a promising option for LTE

Thank You!

Dr. Eetu Prieur

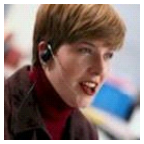
eetu.prieur@elisa.fi

Annex 4: Presentation by Vincent Lemoine, Bouyges Telecom, at the LTE World Summit, Amsterdam, 18th May 2010

Bouygues Telecom key figures

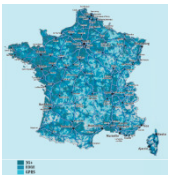
> 10 **Millions** customers in France
> **400K ADSL subscribers**

9000 employees
Including **2000** Customer Relation Staff



4000 points of sale
600 Bouygues Telecom Clubs
6 Customer Services Centers

>**98**% of GSM coverage, >**94**% EDGE
13300 sites + shared network in rural areas



>**81**% of HSPA coverage
rollout started in 2007

More than **170 countries covered** in the world including 100% of the European market

Turnover 2009: **5368 M€**
Net Profit 2009 : **471 M€**

BOOSTING THE CAPACITY OF A NETWORK WITH LTE 1800

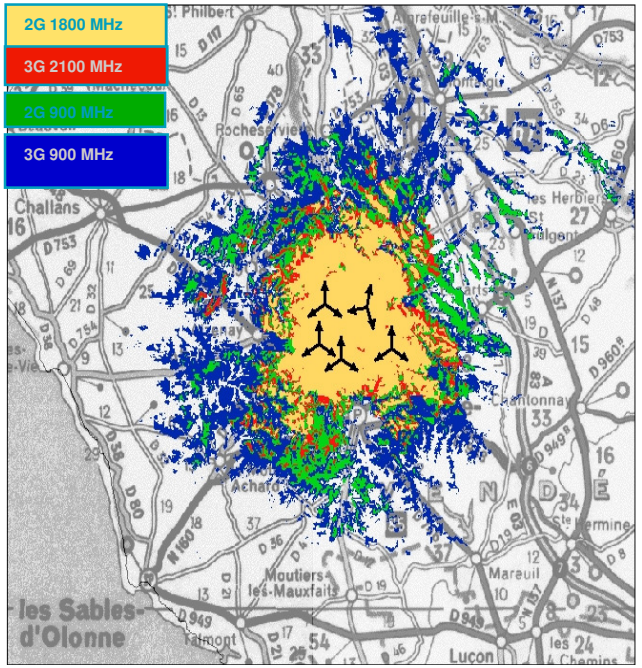
VINCENT LEMOINE
RADIO EXPERT

LTE WORLD SUMMIT
18 MAY 2010

BOUYGUES TELECOM'S STRATEGY FOR RADIO ACCESS

UMTS coverage must be extended to GSM coverage
900 and 2100 MHz bands dedicated to UMTS
Bouygues Telecom will further invest in HSPA

- Keep GSM coverage
- Completion of the UMTS deployment in 2100
- Deployment of UMTS 900 to reach GSM coverage (rural and indoor coverage in urban)
- Improve the user experience with HSPA post Release 6 features



3

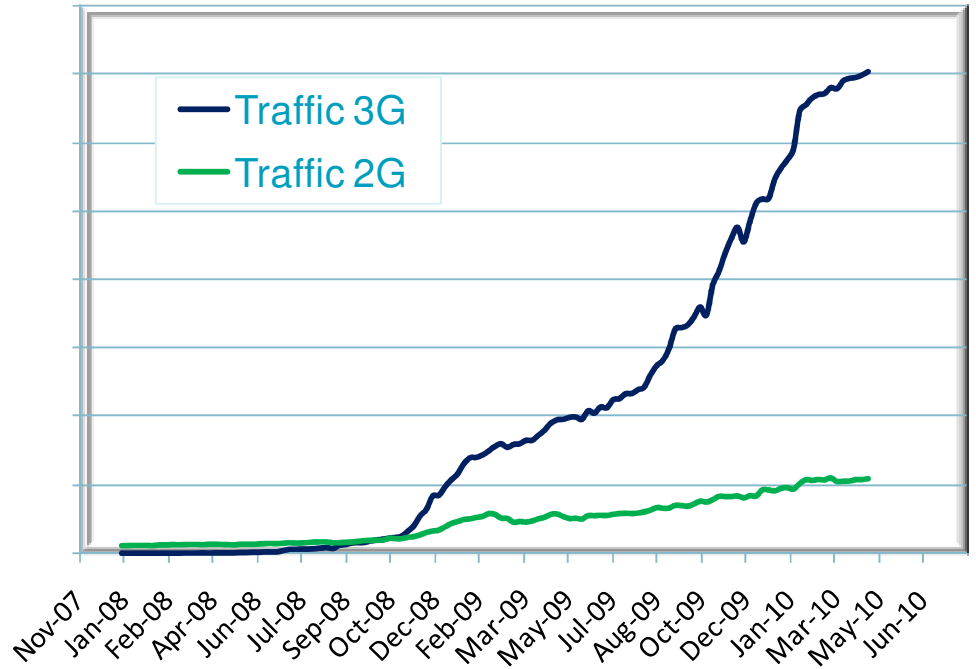
TRAFFIC EVOLUTION

Capacity issues with 900 and 2100 MHz frequency bands
New usage : Always on – HSPA not optimized
Cost per bit

Reasons for 3G traffic rapid rise :

- New handsets = new usage
  data cards, smartphones
- Penetration rate for 3G handsets

➔ traffic:
- x 10 during 2008,
- x 3.5 during 2009



NETWORK CAPACITY

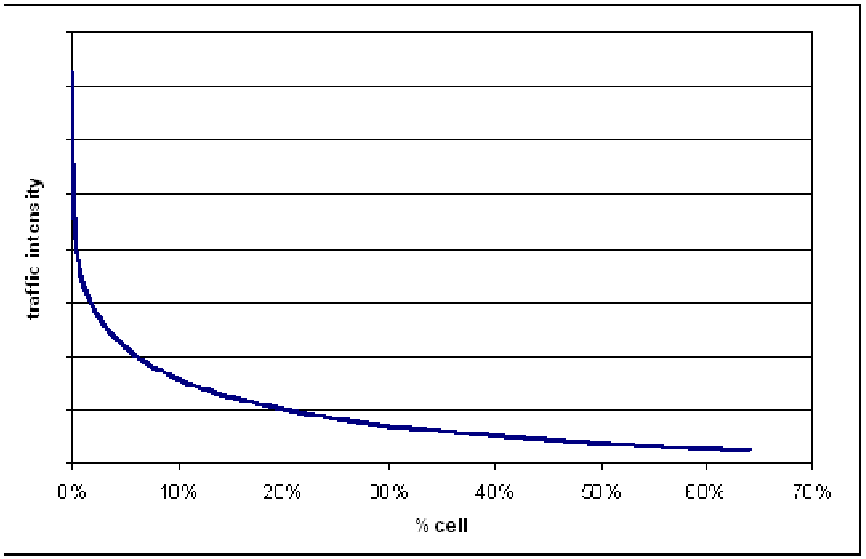
Going to LTE is a strategic decision
LTE must be deployed in clusters in order to justify the investment in handsets, frequency and technology knowledge

The capacity of the network is the used capacity, not the installed

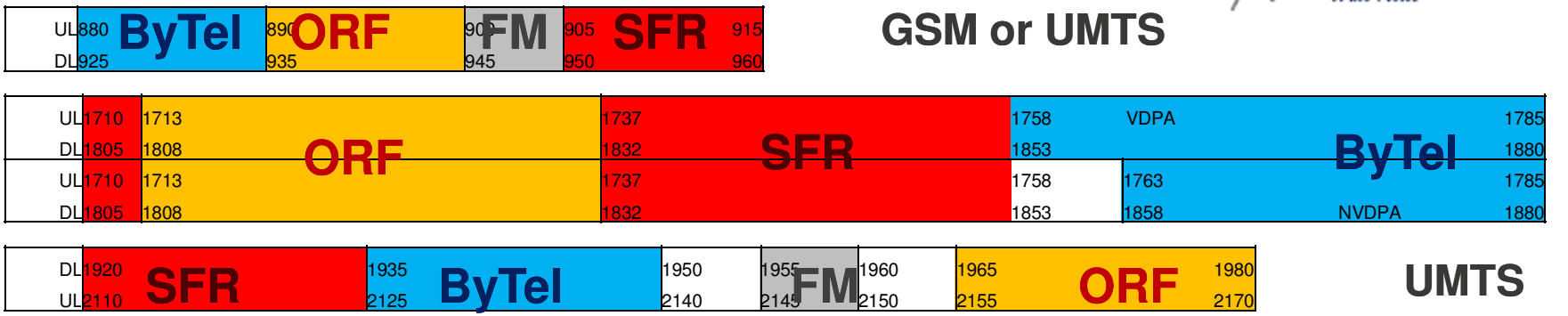
Cost effective solution : adding carriers to the congested cells.

Densification, hotspots, femtocells, Wifi, …

- ➔ New spectrum for high data rate applications
- ➔ New technology more efficient (spectral and cost)



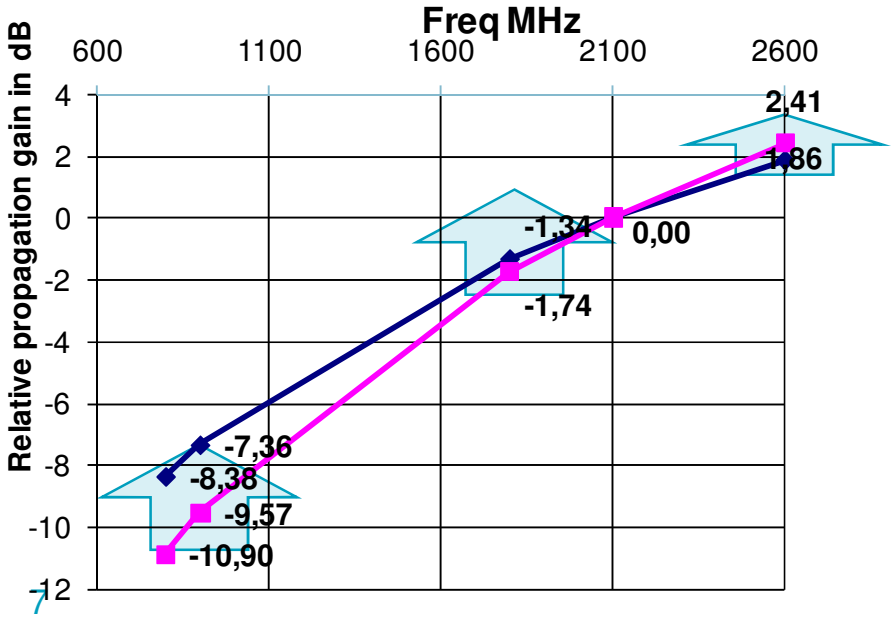
FRENCH SPECTRUM FOR RADIO ACCESS NETWORKS

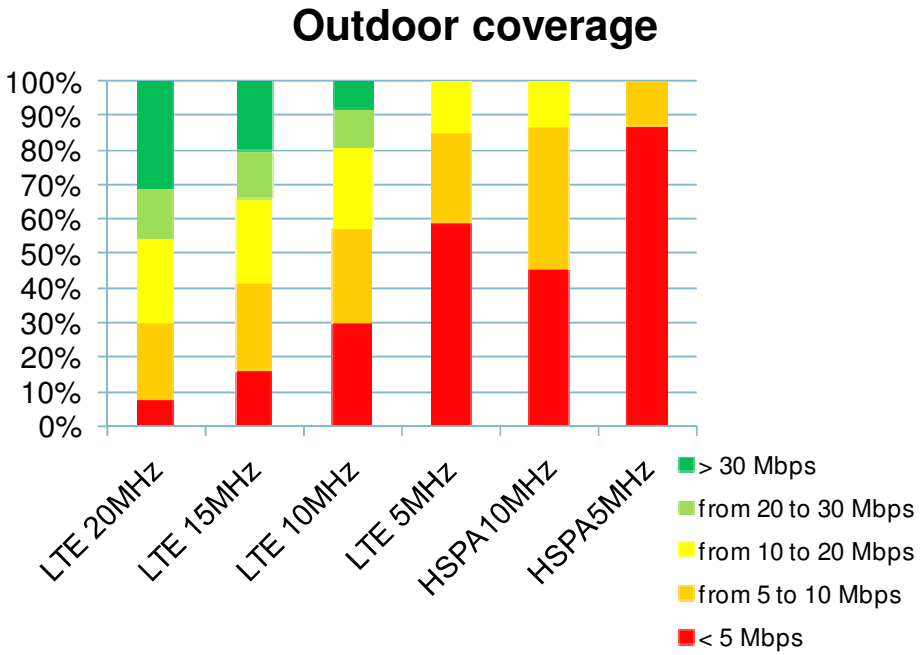


- 2 remaining 2.1 GHz blocks : auction 11 May 2010
- 2.6 GHz :
  - Auction planned before the end of 2010
- 1.8 GHz:
  - Already allocated, refarming to be started
- Digital dividend :
  - Allocated to the development of high data rate wireless technologies : coverage obligations
  - Limited bandwidth per operator, expensive band, remaining technical issues

THE DIFFERENT PATHS TO LTE

	Coverage	Performances
2600 MHz	-	
2100 MHz	-	Optimal
1800 MHz	-	Risks due to the limited duplex gap
900 MHz	++	Limited channelization
Digital Dividend	++	Cohabitation issues with DVB-T





THE DIFFERENT PATHS TO LTE

	Deployment	Ecosystem	FDD Bandwidth
2600 MHz	New antennas	Best choice for early introduction of LTE	70MHz
2100 MHz		UMTS	60MHz
1800 MHz	Reuse of existing antennas	GSM/LTE	75MHz
900 MHz	New antennas if three technologies in the same band	GSM/UMTS	35 MHz
Digital Dividend	New antennas	Band for LTE Not harmonized Remaining technical issues	30 MHz

THE DIFFERENT PATHS TO LTE

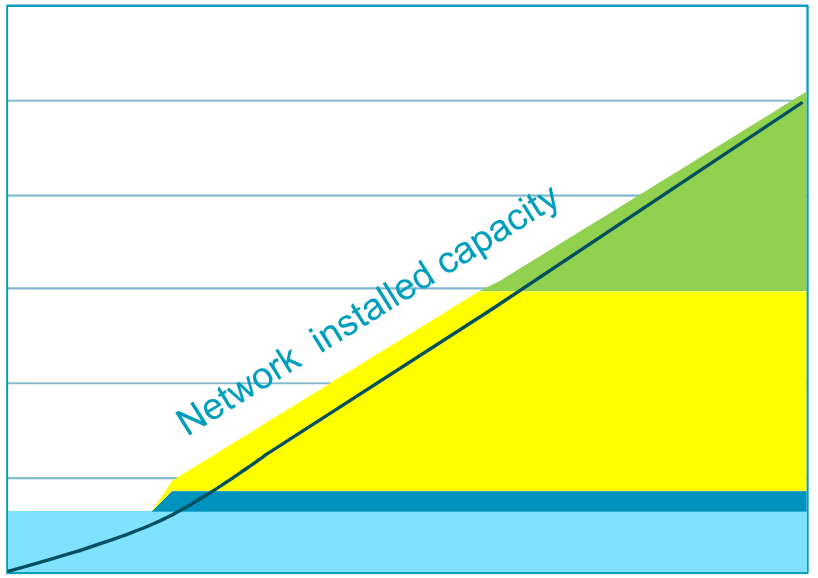
2,6 GHz — *Back-up and capacity extension* — LTE

2,1 GHz — 3G

1,8 GHz — GSM / LTE

900 MHz — GSM

800 MHz — *Ideal for indoor and rural coverage*
No technology migration! — LTE



3G	5 MHz @ 900 MHz	LTE	20 MHz @ 1800 MHz
3G	15 MHz @ 2.1 GHz	LTE	20 MHz @ 2600 MHz

TECHNICAL AND REGULATORY ISSUES
INDUSTRY CHALLENGES FOR LTE 1800

- DCS1800 defined as 3GPP Band 3 for UMTS and LTE

- Ongoing technical work on coexistence issues at CEPT, probably no supplementary constraint
  ➔ Update of the COMMISSION DECISION 2009/766/EC

- First LTE 1800 handsets expected in 2011
  Mass production could be considered in S2 2012
  new WI at GCF for the interoperability testing in 1800
  - 1800 is the fourth band after 2.6GHz, 2.1GHz and 700MHz before Digital Dividend

- Infrastructures will be available this year.

LTE 1800 TRIAL IN ORLEANS

- Bouygues Telecom is performing a trial at 1800
- First results to be presented at next LSTI meeting in Shanghai mid June.

4 sites/12 cells in Orléans
MIMO : 2*2
Bandwidth : 10MHz
Manufacturer : Alcatel Lucent

LTE 1800 TRIAL IN ORLEANS

Ambition :

- Bouygues Telecom has a strong interest for LTE 1800
- Build the LTE 1800 ecosystem
- Understand the technology

Test plan :

- LSTI Tests
- Cohabitation between GSM and LTE in band 3 : co-siting, carrier spacing, separation distance between technologies using the same frequencies
- Performance comparison with HSPA

11: Vodafone Ireland Ltd

Vodafone Response to the ComReg Consultation on Future of the 2.6 GHz radio spectrum band

Ref. ComReg Document 11/80

Response Date:16 Dec 2011

Introduction

In the period since the publication of ComReg's call for input on potential uses and future licensing options for the 2.6 GHz spectrum band in May 2010 (ComReg document 10/38), the assignment and use of the band for the provision of advanced wireless/mobile broadband services has become widespread across Europe. As a result the substantial economic and social value of use of 2.6 GHz spectrum on this basis is now beginning to be realised internationally.

Vodafone provided a detailed response to ComReg's original call for input and we also take the opportunity to provide our views on the matters raised by the present consultation. We welcome the completion of the necessary detailed technical and economic assessment of the main options for future use of the 2.6 GHz band, including the analysis of the feasibility of spectrum sharing scenarios. The approach and scope of the consultant's report commissioned by ComReg is consistent with Vodafone's recommendations as set out in our response to ComReg document 10/38 and we strongly agree with the conclusions of the economic cost-benefit analysis indicating the large net benefits that would arise from early release of the 2.6 GHz band for uses other than MMDS in 2014.

The extensive technical analysis also carried out as part of the Aegis and Plum report indicates the limitations on shared use of the 2.6 GHz spectrum band generally, and in the 3 licence areas where MMDS licences are due to expire in April 2012. However Vodafone considers that some of the assumptions and calculations adopted in the assessment may be overly conservative and consequently that there may be some scope for limited shared use of the band in practice. Nonetheless Vodafone does not believe that facilitating shared use of the 2.6 GHz band between MMDS and mobile broadband, to the extent feasible, is a priority in current circumstances. Moreover we do not object to the proposed extension of the 3 MMDS licences presently due to expire in 2012, to terminate in April 2014, given factors such as the relatively short term nature of the extension, the need to provide sufficient notice of service termination, and to avoid causing uncertainty to existing customers of the MMDS service.

In our response to ComReg's call for inputs document we emphasised the need for ComReg to provide transparency and regulatory certainty in relation to the future licensing arrangements for the 2.6 GHz band as expeditiously as possible. In particular we explained the importance of timely and full visibility of ComReg's plans for future use of this spectrum in maximising the prospects for efficient investment and the optimal allocation of spectrum in the 2.6 GHz and other bands. This issue is now of central importance given ComReg's separate proposals for the imminent holding of an award process for the allocation of spectrum in the sub-1 GHz and 1800 MHz bands and the considerable scope for 2.6 GHz spectrum to act as a substitute and/or complement to spectrum in the former bands.

Information on the future arrangements for the 2.6 GHz spectrum is an important factor in the valuation placed by prospective bidders on spectrum in the sub-1 GHz and 1800 MHz bands. In this context Vodafone is seriously concerned by:

- The substantial amount of time that has elapsed between the issuing of the call for inputs document and the initiation of this current stage of the 2.6 GHz licensing consultation process.

- The present consultation makes proposals relevant to the use of the 2.6 GHz band in the short term (the proposal for all MMDS licences to continue in force until at least April 2014) but it does not provide comprehensive ComReg proposals on the allocation and use of the band in the longer term, with such proposals being deferred until a subsequent consultation document in this process is published.

- The uncertainty around when full visibility for interested parties of plans for the future use of the 2.6 GHz band will be possible, and the apparent low probability that this visibility will now be provided sufficiently in advance of the proposed multi-band spectrum award process to enable the necessary information to be effectively incorporated into prospective bidder's spectrum valuation decisions and business plans. This will considerably reduce the potential for optimal spectrum allocation and use.

This delay and the resulting continuing significant uncertainty is inconsistent with the achievement of ComReg's statutory objectives, and Vodafone therefore urges ComReg to reach a final decision in relation to the longer term licensing arrangements for the 2.6 GHz band in conformity with Decision 2008/477/EC at the earliest practicable opportunity, and in any event in advance of the holding of a spectrum award process for the sub-1 GHz and 1800 MHz bands.

Technical Evaluation of 2.6 GHz Spectrum Sharing Options

The extensive technical analysis also carried out as part of the Aegis and Plum report indicates the constraints on shared use of the 2.6 GHz spectrum band generally, and in the 3 licence areas where MMDS licences are due to expire in April 2012. However Vodafone considers that some of the assumptions and calculations adopted in the assessment may be overly conservative and consequently that there may be some scope for limited shared use of the band in practice (albeit with mobile broadband providers having to be willing to tolerate the risk of some interference from existing MMDS transmission sites). In particular:

- Vodafone notes that the Aegis and Plum study itself recognises (section 2.1.1 of the report) that required separation distances for next generation mobile broadband with pico cell application will be much lower than those for base stations operating with an EIRP equal to the EC Decision limit.

- The maximum allowed interference levels for base stations and user terminals used in the assessment, as detailed in Table 17 of section 5.1.2 of the report, are very conservative, and while it may not be an ideal scenario, a mobile operator using these frequencies in urban areas would expect to tolerate interference levels considerably higher than the parameters used in the Aegis analysis.

- It is unclear how the effects of urban clutter have been evaluated in implementing the effect of propagation from MMDS transmitters outside Dublin into the city's urban area.

However in current circumstances we do not believe that facilitating shared use of the 2.6 GHz band between MMDS and mobile broadband, to the extent feasible, should be implemented or considered as an option in an economic assessment. This is due to factors including those identified by ComReg such as the short duration of any sharing arrangements until all existing

MMDS licences in the band are due to expire by April 2014, the need to provide sufficient notice of service termination to MMDS customers in the areas covered by the 3 licences currently due to expire next year, and the key consideration of minimising uncertainty around continuity of service for these customers in the short term.

Economic Analysis of 2.6 GHz Policy Options

Vodafone considers that the scope and overall methodological approach of the cost-benefit analysis (CBA) carried out by Aegis and Plum is correct and that the assessment is sufficiently comprehensive in its assessment of all the relevant impacts of the options considered. We agree that the base case and the two alternative options of ending MMDS licences in 2014 and 2017 respectively are appropriate to use in the context where ComReg must have regard to the requirement to implement EC Decision, which is incompatible with exclusive use of the 2500-2690 MHz band for MMDS in the longer term.

We agree that the categories of costs and benefits of the two alternative options identified and analysed by Aegis and Plum are the correct costs and benefits, and are consistent with those referred to by Vodafone in our response to ComReg document 10/38. In most cases the estimates of the size of these categories of costs and benefits in the report also appear to be reasonably accurate.

Vodafone notes however that the estimate of the value of the 2.6 GHz spectrum is based on an econometric benchmark analysis carried out by DotEcon of outcomes of 2.6 GHz spectrum auctions in other countries. As set out in our various responses to successive consultation documents issued by ComReg in respect of the proposed future licensing arrangements for spectrum in the sub-1 GHz and 1800 MHz bands, we do not agree that this type of analytical approach and its resulting outputs is necessarily the most appropriate to use in estimating the value of spectrum in either the 2.6 GHz or other spectrum bands. Among other issues, we would be concerned that spectrum values estimated from the use of this benchmarking analysis are not appropriately adjusted to reflect the Ireland specific factors relevant to accurate valuation of this spectrum. However Vodafone notes that the sensitivity analysis carried out in the Aegis and Plum report indicates that the findings of the CBA are not sensitive to lower values of spectrum for mobile broadband. Therefore the finding of the study that ending all MMDS licences in 2014 yields (Option 1) the greatest net benefits to society relative to Option 2 and the base case remains valid in the scenario of 2.6 GHz spectrum values as derived from the DotEcon analysis being in error, with actual values being materially lower than those estimated in the CBA.

Vodafone generally agrees that the assumptions underlying the CBA are appropriate but also necessarily conservative. We note in particular the assumption set out by ComReg in section 4.8.1 that the incremental external social value from additional spectrum for mobile broadband, relative to MMDS, is zero. For practical purposes, Vodafone believes that it is the case that the incremental external social value from additional spectrum for mobile broadband is in fact substantial given the very large number of customers likely to benefit from use of the 2.6 GHz spectrum for mobile broadband service provision will far outweigh the relatively small and declining number of customers that would avail of broadcasting services via the MMDS platform over the 2014-2019 time period covered by the CBA. In addition Vodafone notes that mobile broadband services inherently offer a far greater range of services (e-mail, online shopping and banking, voice over broadband, music and app downloads, video on demand etc) from which users obtain utility relative to the sole service provided over the MMDS platform, the provision of programme content. External social value from mobile broadband services in the form of consumer surplus and the

productivity and environmental benefits resulting from factors such as the greater facilitation of remote working can reasonably be expected to be very much greater than that provided by the MMDS service. The exclusion of this social value from the CBA makes its findings robust even to large changes to the size of costs and benefits within the scope of the analysis.

Response to Consultation Questions

Q1. Please provide your views on the possible approach of allocating 2.6 GHz spectrum using a technology and service neutral competitive process as outlined by Aegis and Plum?

Vodafone agrees that the allocation of 2.6 GHz spectrum using a technology and service neutral competitive process is an appropriate option to consider as it would have the advantage of maximising the prospects of the 2.6 GHz band being assigned to its highest valued use rather than ComReg itself being required to make judgements on the highest valued use on the basis of incomplete information.

Q2. Do you agree with ComReg's proposal to amend the licence conditions of the three MMDS licences in Dublin, Galway and Waterford so that the licences terminate in April 2014? Please provide reasons for your view.

Vodafone has no objection to ComReg's proposal to amend the conditions of the MMDS licences in Dublin, Galway, and Waterford so as to extend their duration from April 2012 to April 2014. As outlined previously in this response, we consider that some of the assumptions underlying the Aegis and Plum technical analysis are overly strict, and that there could be somewhat more scope in practice to allow limited shared use of the 2.6 GHz band by MMDS and mobile broadband than concluded by the report. However given the relatively short period between the currently specified expiry of the 3 MMDS licences in the above areas and the subsequent expiry of the other 7 MMDS licences in 2014 it is unclear if the benefits of any early facilitation of mobile broadband use of the spectrum in restricted geographic areas would warrant the associated costs incurred.

Moreover Vodafone considers that the major benefits of future mobile broadband use of the 2.6 GHz band would be realised in the context of the allocation of spectrum in the band in its entirety on a national basis and in conformity with the provisions of EC Decision 2008/477/EC. This can be effectively achieved upon the expiry of all the existing MMDS licences in the band by April 2014 and the holding of a technology and service neutral competitive award process significantly in advance of that date so that the full band can be assigned for uses including advanced mobile broadband service provision immediately following that date. Accordingly Vodafone does not consider the allocation of 2.6 GHz spectrum for uses other than MMDS from 2012 to be a regulatory priority.

We note ComReg's view that the relatively short notice of termination of service that would be provided to existing MMDS customers in the 3 affected licence areas in the event that the licences were to expire in 2012, uncertainty in relation to the exact areas affected, and the needs of specific social groups, further support its decision to co-terminate existing MMDS licences. Vodafone

agrees that these factors are significant and are supportive of ComReg's decision, however Vodafone observes that these factors are strongly supportive in present circumstances in the main due to the very short time (4 months) remaining from now until the current expiry date of the 3 shorter duration MMDS licences. This tight time constraint is largely the result of what we consider to be the unduly long period of time that has passed between the receipt of respondent's submissions to ComReg document 10/38 and the publication of the present consultation document (which itself is only an intermediate step in the overall 2.6 GHz consultation process) and the length of this time period was primarily within ComReg's influence.

Vodafone also considers that ComReg's current proposal, effectively the reversal of a previous regulatory compliance action that shortened the duration of 3 licences as a penalty for the failure of a licensee to meet network rollout obligations, calls into question the appropriateness and credibility of reducing licence duration as a sanction against failure to comply with licence conditions in spectrum licences in general. This is because the potential shortening of the duration of existing licences as a regulatory compliance action would be likely to be inconsistent with ensuring efficient spectrum use (by letting spectrum lie fallow for 'tail' periods that would be too short to make it attractive to be re-assigned) across a whole range of spectrum bands and would therefore not be capable of being applied, or would later have to be rescinded, on spectrum efficiency grounds. Vodafone believes that this factor should be taken fully into account in considering the menu of possible penalties for non-compliance with licence conditions in all future assignments of spectrum licences.